

**Developing an Infrastructure Prioritization Tool for Charlottesville Elementary Schools
with a Focus on Walkability**
(Technical Paper)

Rippling Changes on Privacy and User Operations from Facebook's Data Awakening
(STS Paper)

A Thesis Prospectus
In STS 4500
Presented to
The Faculty of the
School of Engineering and Applied Science
University of Virginia
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in System and Information Engineering

By
Rahul Dhansinghani

November 23, 2021

Technical Team Members:

Ayman Ibrahim
Aditya Kannoth
Claire Miller
Lena Nguyen
Steven Pham

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.

ADVISORS

Bryn Seabrook, Department of Engineering and Society

Reid Bailey, Department of Systems and Information Engineering

Introduction

On the inflection point of technological revolution in society, the light being bright on Facebook and their relationships with Cambridge Analytica has sparked the Great Privacy Awakening. With the data being bought and misused, Cambridge Analytica was able to create psychographic analysis and was able to then predict the ‘needs’ of the subjects – infringing on democratic elections throughout the world. The ease of obtaining the data illicitly has questioned the validity of social media outputs that of Facebook in which data of their users is knowingly been given to third party firms. The focus has of privacy has now reduced the difficulty in companies answering questions and altered the focus of consumers who want the internet to stay convenient and free (Lapowksy 2019). As a result, there is an understanding that there is only so much connecting social-media platforms can do prior to consumers being concerned about privacy changing the mannerisms in users online (Beck 2021). The exploitation of data by Cambridge Analytica through Facebook user’s right under their nose is a sign of awakening but needs to result in change. Three years removed, the change is evident and observable but the question remains to what extent. Privacy has remained a top selling point for all social media platforms from their origination; however, a look behind the curtain has revealed a faulty foundation bound to create a shift in the way consumers continue using their product as well as how companies continue to exploit the data they obtain.

While data is at times exploited, it is quite often used in the development of projects and advancements throughout communities. The constant reliance on data has made its way to Charlottesville City Schools and have aided them in making prioritizing projects that they have had slated on their list. Given the constant hurdle that was a byproduct of COVID-19 pandemic, the city has been facing a drastic shortage of bus drivers, resulting in only 9 of the 30 bus drivers

being hired to handle the typical school year capacity (Knott 2021). The school district and board turned toward shuffling different mediums to get the students to and from school. For the City of Charlottesville and Charlottesville Schools, that means combatting the shortage of busses and leveraging the influx of COVID relief bills to prioritize projects that target equity, need, and infrastructure improvements in order to create an aura of safety and ability for sustainable actions that will permit students to walk/bike to schools. Through working with city officials, stakeholders, and schools, the technical aspect of the report focuses on developing a prioritization tool for the city of Charlottesville and Charlottesville Schools to further refine the decision process that will aid in developing projects to enhance walkability for students. The tool is focused to analyze project data and seek to prioritize the most optimal projects that will improve the infrastructure of Charlottesville and in turn solve concerns that plague Charlottesville City Schools effort to improve walkability for students moving forward.

Technical – Prioritizing Charlottesville’s Infrastructure Projects

The City of Charlottesville and Charlottesville School currently prioritize projects through the current restrictions of Capital Improvement Program (CIP) budget provided every five years – there is no specific tool that helps prioritize infrastructure projects with focus on walkability and bikeability. Their decision process is limited through the budget provisions with no accountability of equity, demand, and cost. At its current situation, the prioritization of projects is not efficiently selected due to the fact that the city’s budgets tends to underestimate costs and creates a process that goes wary. Projects end up running into roadblocks and the lack of completion within slated projects creates the need for a tool to seamlessly prioritize projects.

In terms of utilizing a tool in the current situation, there is no current one that the city leverages to rank projects but there is an alternative known as the ActiveTrans Priority Tool (APT) developed by a team within the US Department of Transportation. Programmed as an Excel spreadsheet, the tool helps rank projects based on the data inputted by the user and considers such as “Equity” and “Demand” through weights selected by the user itself. Combining all of these factors, the tool provides a priority score and ranking of each of the projects that are inputted. While the APT has been a helpful tool to evaluate and prioritize projects, it still lacks a central focus on equity within schools and certain walkability measures in which the team is centralized on improving.

Leveraging decision theory principles and stakeholder information, the team is focused on prioritizing existing and future projects with the focus of improving on the drawbacks of pointed research and the framework of the APT. Using the information of the allocated funding, the proposed tool will focus on presenting a solution that connects the walkability aspect, certain demand characteristics, but a focus on the equity of schools as well. The team’s research is developed to understand the walkability of certain neighborhoods and households to schools through field study to get a better perspective of how improvements can be factored into the tool. Focus of equity on schools permits to put forth projects that will affect and impact schools who haven’t received projects in the past.

The proposed tool is there to venture beyond the alternatives discovered – it not only factors in a budget but intangible areas of analysis that will help optimize prioritization of projects to get the best overall impact in various neighborhoods. The tool is not secluded to a cost restriction but ideally factors in equity (in schools and neighborhoods), walkability, and connections that weren’t present in other prioritization tools. While the team initiates this

approach solely in the city of Charlottesville, the future relies on expanding research and horizon of where the tool can be applied to various cities and counties in order to best prioritize projects that focus outside of a cost restraint itself.

STS Topic – The Definition of Privacy and Future Use of social media

Connection is the ‘buzzword’ for the reason behind the existence of Facebook – a platform the connections a community of friends. Facebook is about connections and focusing on developing a social connection through a virtual platform, until it became a platform about data misuse.

Early 2018 is when Facebook admitted to mishandling data from over 90 million Facebook users through an improper mining of data obtained by political consultant firm Cambridge Analytica (Cambridge). Cambridge harvested personal information on where users lives and what pages and posts they liked and developed psychological profiled that analyzed characteristics and personality traits – ones that were then used in political campaigns (Ma Gilbert 2019). Through a series of quizzes that were provided to users for monetary payments, the data was exploited for the incorrect reasons; microtargeting users to influence their behaviors, the way they processed information, and to sway them to be manipulated in certain directions.

Through a series of whistleblowers, the information about Facebook’s links continue to pile and so does the name that is tarnished through the scandal itself. Cambridge continues to be pinned as the poster child who created a ‘psychological warfare tool’ in which Americans and citizens of other countries were manipulated in certain elections – essentially removing their place in democracy. While the resulting manners of such actions were important in developing a

staunch political standing by governments protecting citizens and halting monopolies, the livelihood of people changed; for the first time, the use of social media platforms were questioned – were they truly being connected to their friends or pawns in a larger chess board. Important questions emerged on how Facebook may have given special data deals to companies and whether the change has been immediate within the internal team (Lapowsky 2019).

As regulations are tightened and changes are made within social media platforms, users are now faced with whether their trust is solid and whether more regulations create even more dark spaces and criminal activity without a trace to follow. Social media has become less novel and more like a utility as people are more aware of their private information (Beck 2021) and the change of how people use social media is altered by its core value – there is less of a connection when information is purposely refrained by the users due to the lack of trust. The tug of war between providing personal information and becoming a ‘datapoint’ versus the fear of being manipulated by companies exploiting data is persistent among users, but do users truly have a choice when these platforms have been a utility in every manner of life.

To analyze the implications of this Facebook-Cambridge data scandal on how users plan on using social media as well as the definition of privacy, the Social Construction of Technology (SCOT) framework will be utilized. From the originations of Trevor Pinch and Wiebe Bijker, SCOT is a theory that dictates how social groups and humans within a society are the driving factors between the progress and development of technology. SCOT furthers into a demonstration that even post-development of certain technologies exist the refining and repurposing from humans as the stakeholders of that technology. Leveraging the components of Interpretive Flexibility (technology is an open process producing different outcomes and Wider Context (artifact development in larger sociocultural and political environments), helped round

the SCOT framework as the manner to point out the importance in the development of technology design and the role of human decision making (Klein and Kleinman).

SCOT, as the main framework, assists in establishing the use technologies (such as Facebook and Cambridge's data modelling techniques) that are in question. With a true sense of how the development of Facebook has occurred dependent on the social circumstances (interpretive flexibility) will product a better understanding on the larger sociocultural use of these technologies and how the political environments are altered to provide a place for technologies like Facebook to thrive (Wider Context). Through the lens of the SCOT framework, there will be a great perspective to analyze the development of Facebook and the matter of privacy existent in social media platforms, but connect it to how the shift of users operating on these platforms is occurring and what the future could be through certain changes.

Research Question and Methods

With all provided, the research attempts to answer the question: How has the Facebook-Cambridge Analytica data breach and misuse of privacy alter how users operate and corporations treat data and privacy? Through Wicked Problem Framing, the understanding of how to develop privacy measures while not infringing on the essence of social media can be concluded. Conclusions can be drawn to find connections between the change of privacy within Facebook and how their users operate moving forward.

To truly answer the question at hand, Wicked Problem Framing will help gather evidence to reveal otherwise hidden relationships between actions and consequences (Seager, Selinger, & Wiek, 2012). Through this will there be a connection of the Facebook-Cambridge scandal and the change within privacy measures but mainly the affect subconsciously on user's operation of

the platform itself. With a combination of studies and analysis of privacy changes, an establishment of the connection between the change of user's outlook on the platform will be evident and to see if the definition of privacy is affecting social media's essence. Wicked Problem Framing will set up an analysis of the relationships between privacy, corporations, and the implications it has on its users – if one exists.

Conclusion

This paper covers an investigation of City of Charlottesville and Charlottesville Schools use of projects and implications on improving the walkability for students to and from school. Through this, the team aims to create a prioritization tool for Charlottesville Schools that helps prioritize projects not solely on the budget restraints but with a focus on equity, walkability, and demand that will optimally place projects at the forefront with the most calculated impact. Using this tool provides an efficient manner for officials to input and rank projects that truly provide an observable impact with not foregoing equity at the school and neighborhood level.

This paper, in addition, covers an analysis of the relationship between Facebook and Cambridge Analytica and the misuse of data that occurred between two parties. Aside from analyzing the relationship, it specifically explores the changes of privacy that technological companies face and the challenge it provides to keeping the integrity of the essence of social media and technology companies. From this can there be a dive in the implications and understanding of the change of user's use of these platforms and whether the change is moving users away from the main reason they joined these platforms in the first place. The research will identify the many aspects of the question at hand but simply connect the relation between

changes in privacy within these technological companies and the implications that arise with the users that were drawn to it initially.

References

- BBC. (2019, July 13). *Facebook 'to be fined \$5bn over Cambridge Analytica scandal'*. BBC News. Retrieved October 25, 2021, from <https://www.bbc.com/news/world-us-canada-48972327>.
- Beck, J. (2018, June 8). *People are changing the way they use social media*. The Atlantic. Retrieved October 25, 2021, from <https://www.theatlantic.com/technology/archive/2018/06/did-cambridge-analytica-actually-change-facebook-users-behavior/562154/>.
- Cambridge Analytica, GDPR - 1 year on - a lot of words and some action*. Privacy International. (n.d.). Retrieved October 25, 2021, from <https://privacyinternational.org/news-analysis/2857/cambridge-analytica-gdpr-1-year-lot-words-and-some-action>.
- Cambridge Analytica: Hijacking democracy*. Big Cloud. (2021, April 13). Retrieved October 25, 2021, from <https://bigcloud.global/cambridge-analytica-hijacking-democracy/>.
- Confessore, N. (2018, April 4). *Cambridge Analytica and Facebook: The scandal and the fallout so far*. The New York Times. Retrieved October 25, 2021, from <https://www.nytimes.com/2018/04/04/us/politics/cambridge-analytica-scandal-fallout.html>.
- Guardian News and Media. (2019, March 18). *The Cambridge Analytica scandal changed the world – but it didn't change Facebook*. The Guardian. Retrieved October 25, 2021, from <https://www.theguardian.com/technology/2019/mar/17/the-cambridge-analytica-scandal-changed-the-world-but-it-didnt-change-facebook>.
- Hu, M. (n.d.). *Cambridge Analytica's black box - Margaret Hu, 2020*. SAGE Journals. Retrieved October 25, 2021, from <https://journals.sagepub.com/doi/full/10.1177/2053951720938091>.
- Lapowsky, I. (2019, March 17). *How Cambridge Analytica sparked the Great Privacy Awakening*. Wired. Retrieved October 25, 2021, from <https://www.wired.com/story/cambridge-analytica-facebook-privacy-awakening/>.
- Lomas, N. (2020, January 6). *Facebook data misuse and voter manipulation back in the frame with latest Cambridge Analytica leaks*. TechCrunch. Retrieved October 25, 2021, from <https://techcrunch.com/2020/01/06/facebook-data-misuse-and-voter-manipulation-back-in-the-frame-with-latest-cambridge-analytica-leaks/>.
- Ma, A. (2019, August 23). *Facebook understood how dangerous the trump-linked data firm Cambridge Analytica could be much earlier than it previously said. here's everything that's happened up until now*. Business Insider. Retrieved October 25, 2021, from <https://www.businessinsider.com/cambridge-analytica-a-guide-to-the-trump-linked-data-firm-that-harvested-50-million-facebook-profiles-2018-3>.

Otlowski, A., Acadia Otlowski / About Author More posts by Acadia Otlowski, & Otlowski, M. posts by A. (2021, September 3). *Two years later: Cambridge Analytica and its impact on data privacy*. HIPB2B. Retrieved October 25, 2021, from <https://www.hipb2b.com/blog/two-years-later-cambridge-analytica-and-its-impact-on-data-privacy>.

The ethical implications of the 2018 ... - repository home. (n.d.). Retrieved October 25, 2021, from <https://repositories.lib.utexas.edu/handle/2152/80574>.

The NonProfit Times News June 6, & The NonProfit Times. (2019, June 6). *Impact of the cambridge analytica & facebook scandal on nonprofits, donors, and advocates*. The NonProfit Times. Retrieved October 25, 2021, from <https://www.thenonproffitimes.com/webinar/impact-of-the-cambridge-analytica-facebook-scandal-on-nonprofits-donors-and-advocates/>.