An Analysis of the Failure of COVID-19 Contact Tracing Apps and How Society Determines the Technology's Demise

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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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INTRODUCTION

The coronavirus SARS-CoV-2 disease (COVID-19) is “the most current threat that challenges health and economic sectors in the world” (Abuhammad, Khabour, Alzoubi, 2020). In response to this health crisis, governments around the world have deployed COVID contact tracing apps. The Social Construction of Technology framework is utilized to better understand why some populations have not adopted this technology. Due to factors such as concerns with data privacy, surveillance, and effects of the crisis, many people have been slow to adopt this technology. As a result, this thesis examines if the technology was successful in its purpose or if it failed at adoption.

STS FRAMEWORK INTRODUCTION

To facilitate an analysis of the adoption of contact tracing applications, the STS Framework, the Social Construction of Technology (SCOT), will be used. The SCOT framework, developed by Pinch and Bijker, asserts that human actions shape technology, rather than vice versa. In the development of the SCOT framework, Pinch and Bijker introduce ideas and principles so as to analyze technology in its social context through relevant social groups, design flexibility, rhetorical closure, and the Principle of Symmetry. The relevant social groups of contact tracing apps that will be analyzed are the individual governments or public health agencies that deploy the apps and make the policies regarding them, the citizens expected to use the apps, and the tech giants and engineers that have pooled together to help develop the apps. It is important to analyze from the perspective of these social groups and determine what criteria they use when judging and defining the technology so as to understand its perceived success or failure (Bijker, Pinch, 1987). Another aspect of SCOT, design flexibility, will allow for analysis between different constructions of COVID contact tracing technologies. Due to different

interpretations of social groups (such as the privacy levels of these apps), varying designs have emerged and may differ by the manner of tracking location by either Bluetooth, which is considered more private but less accurate, or GPS, which is considered less private, but more accurate (Kleinman, Merkel, 2020). Rhetorical closure, another aspect of the SCOT framework, examines how the need for alternative solutions diminishes when the social groups define the problem as being solved (Bijker, Pinch, 1987). Lastly, the Principle of Symmetry will facilitate analysis on the impartial success or failure of COVID contact tracing apps (Bijker, Pinch, 1987). A special and situational technology such as contact tracing apps have such a unique setting for which to analyze the adoption of the technology. SCOT attempts to facilitate understanding of the acceptance or rejection of technologies and will aid in the analysis of social constructs and outlooks about this unique technology.

BACKGROUND INFORMATION

In response to the outbreak of the coronavirus pandemic, the rapid spread of the virus exceeds the capacity for health agencies to undertake traditional contact tracing (Kleinman, Merkel, 2020). Contact tracing is one of the most effective ways to decrease the spread of the virus by tracing the primary and secondary contacts of confirmed coronavirus cases (Abuhammad, Khabour, Alzoubi, 2020). With such a vast number of cases, governments and technology companies have automated the contact tracing process utilizing technologies such as GPS, Bluetooth, and mobile applications for tracing. Some apps keep relevant information such as the locations a user has been and with whom, whereas other apps provide an alert that one has been in close proximity with an individual that has tested positive for the virus and thus may need to be tested or self-isolate (Hsu, 2020).

Due to the nature of contact tracing, mass participation is needed for its success. A study conducted at University of Oxford modeled the coronavirus' spread through a simulated city of one million people and found that 60 percent adoption of contact tracing is needed to stop the pandemic (Hsu, 2020). Time is of the essence in regard to the adoption of contact tracing, since millions of deaths could be prevented. Even though lives are at stake, it is obvious that globally, people are concerned with privacy issues, maybe even more than potential imminent death. Contact tracing adoption issues are extremely relevant to research and analyze in order to create an effective, trusted solution in the midst of a global health crisis.

ANALYSIS

As of November 2020, 47 countries had introduced or were planning to introduce a contact tracing application (Zhang, 2020). China has been very successful at controlling the spread of COVID-19 using tracing technology (Abuhammad, Khabour, Alzoubi, 2020); China's success is largely due to major societal participation because of the country's governmental influence and control over its citizens. Other countries such as Australia, the UK, and Germany have not had the same success as China regarding the adoption of the app. Researchers found that resistance to downloading and using the app was quite high in countries such as Australia, the UK, and Germany, where participation was voluntary, and citizens have a low trust-index of their governments (Hampson, 2021). The Australian app was introduced in May 2020, and as of December 2020, less than 30 percent of the population had downloaded the app (Chan, 2021). Even in Canada, where their COVID Alert app is open source, meaning that it requires no identifiable information from users, and all data is deleted after two weeks, it was found through a survey that two thirds of Canadians would not download the app since it was still "too invasive" (Hampson, 2021). On the contrary, India's contact tracing app had few privacy

safeguards, and also had low adoption with only 127.6 million downloads as of July 2020. Singapore had such low uptake levels, the Prime Minister Lee Hsien Loong legally enforced its download in October 2020 (Chan, 2021).

Globally, download rates of contact tracing apps are low so long as participation is voluntary, regardless of how high or low the data protection. America has had similar trends but took a different approach compared to other governments. The American national government left it up to states to decide if they would develop and deploy a COVID app. Decentralizing this power hurt wide-spread adoption of contact tracing apps; as of December 2020, only 18 states even had contact tracing apps available for download (Press, 2020). Apple and Google teamed up and developed an open API contact tracing technology and deployed it on all of their smart phones (Sainz, 2020) (O'Flaherty, 2020). This technology covers more than the 18 states with tracing apps as anyone across the 50 states with an Apple or Android phone received the technology with an operating system (OS) update. Yet the embedded contact tracing technology may be turned off by the user, meaning not all smartphone users in America are actively using the technology.

Researchers conducted a survey of about 2,000 American adults to measure their support for COVID-19 surveillance methods including contact tracing apps. They found that 42 percent of respondents supported the "government encouraging everyone to download and use contact tracing apps." Though Republicans were more likely to oppose the contact surveillance methods, survey results of comfortability of the technology were fairly similar across party lines. They deduced that one's political beliefs or levels of liberalism or conservativism are not a main determining factor of one's subscription to tracing apps. The research conducted determined there was only one statistically significant factor that affected the self-reported likelihood of

downloading a contact tracing app: the app's data architecture. Referring back to SCOT and design flexibility, there are multiple ways to design the data architecture within these apps. American contact tracing apps use Bluetooth-based tracing but vary on method of data storage. Some use centralized data storage where the user's anonymized ID is sent to a central database to perform contact matching with other users. The other approach, used by the Google/Apple Exposure Notification System, uses a decentralized system in which a user's anonymized ID is added to only a central list of infected individuals and checked on a user's own phone, not the central server (Zhang, 2020). This study supports that after education of the varying technological designs, the likelihood of support for tracing apps is improved with a decentralized data storage approach, signifying that users' have the most concern about data privacy when considering adopting COVID contact tracing apps.

Another study was done in Australia to explore if COVID-19 concerns, which should increase concerns about public health, might actually reduce uptake of contact tracing apps. When there is a crisis, many people revert to social conservatism, which explains why some refrained from downloading the apps as contact tracing apps were developed and introduced during the pandemic when worries were already high and caution about privacy increased. The results of the study indeed showed a link between the crisis and social conservatism, leading to elevated wariness of adopting the apps (Chan, 2021).

Though it is obvious people have not adopted to the levels that health officials have suggested for maximum prevention of the spread of the coronavirus for reasons of security and general self-preservation in uncertain times, SCOT rhetorical closure introduces yet another reason. In my research, many articles and journals were published before the year 2021, and very few journals could be found on contact tracing apps after January 2021. One article published in

March 2021, was titled “Contact tracing apps now cover nearly half of America. It’s not too late to use one.” (Sato, 2021). Why might society consider it “too late to use” contact tracing apps? It is imperative, SCOT asserts, to understand the social interpretation of the technology and setting it is deployed in so as to discover why the phenomenon such as the title of the article implies others may see this technology as obsolete.

Rhetorical closure of the SCOT framework analyzes when society considers a problem as solved. The purpose of contact tracing apps was to slow down or prevent the spread of the disease by tracking where the disease is presently located to isolate those individuals or communities. With the “second spike” in covid cases in 2021, the push for the surveilling contact tracing apps was needed to prevent more contacts with the virus between persons and to “flatten the curve” (Chan, 2021). In November 2020, the first announcement was made about the promise of a US-approved vaccine (Gallagher, 2020). In December 2020, the first dose of a COVID vaccine was administered (BBC, 2020). It seems as if society, even researchers analyzing and publishing studies about contact tracing apps have given up on the technology since the release of the COVID vaccine. Before, when COVID numbers spiked, contact tracing app numbers peaked. Yet even with a third wave of COVID-19 sweeping across the European Union, very little effort has been put into promoting contact tracing apps, where efforts have now simply regressed to emphasize only tighter social restrictions (McKie, 2021). The vaccine seems to be the new hope people were waiting for, and as SCOT’s rhetorical closure asserts, that the vaccine is what caused society to see the initial problem of stopping the spread of the virus as solved. Christian Sandvig, director of the Center for Ethics, Society, and Computing at the University of Michigan stated, “There’s an ultimate question here…which is, Is this a great

opportunity for software? It may be that it is not" (De La Garza, 2020); maybe contact tracing apps were not a successful technology after all.

According to SCOT we must identify who is to determine if a contact tracing app is successful. If it were up to the relevant social group of the citizens of tracing app countries, the apps failed as the governments and big tech firms are not worthy of trust enough for citizens to download the apps they produce. "Trust in the government is perhaps the single most important public health tool," says McGrail (McGrail, 2021). According to the view of public health safety experts and officials that originally claimed that there must be 60% of adoption of the apps to properly protect the entirety of a population, the failure to adopt at high percentages among most countries would again deem this technology a failure (Hsu, 2020).

Though it seems that COVID contact tracing apps are a secondary technology to the vaccine in solving the original problem, they may not be totally obsolete yet. Referring to the study done in Australia indicating the rise in social conservatism during a crisis, the results suggest a surveillance technology like contact tracing apps would be better adopted outside of a public health crisis. "After the novel coronavirus pandemic, governments can potentially continue to promote contact tracing apps to ensure public health in the future. During such a time, disease concerns are low, and so concerns about personal privacy would be less of a concern, per our hypothesis" (Chan, 2021). It is not guaranteed there will be another pandemic in the future, but in the instance that a technology like contact tracing apps needed to be reintroduced, it may be best to do so following the coronavirus pandemic once its hysterics and affects have died down.

CONCLUSION

Each country has responded differently to the pandemic, yet of those that introduced contact tracing apps, many saw similar results of distrust. People were slow to or never adopted the technology due to privacy concerns, self-preservation during a crisis, and the introduction of the perceived solution of the COVID vaccine. To facilitate the analysis of the adoption of contact tracing applications, design flexibility, relevant social groups, and rhetorical closure of the STS Framework, SCOT, are used. It is unknown whether this is the last pandemic of humankind, so it is important to understand how this technology succeeded and how it failed if we are to do better in the next global health crisis.

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