

THE FUTURE OF LIVESTREAMING

AN ANALYSIS OF THE SOCIETAL IMPACTS OF DATA AND DATA PRIVACY

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By
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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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Everybody knows what Facebook is. It is used by many to connect with friends and family, join groups with people who share similar interests, and explore engaging content. However, many may not have had the opportunity to explore one of Facebook's newest features, Facebook Live. Facebook Live was launched in August of 2015, and it quickly began to grow in popularity (Lazauskas, 2016). It is a feature of Facebook in which content publishers can live-stream content to a group of viewers. These content publishers can be individual users, celebrities, or even large-scale news networks. While many enjoy this and Facebook's other engaging features, they may be unaware of what is happening behind-the-scenes. Every time an individual watches a video, views a friend's page, or even clicks a button, Facebook collects data on that user. Over time, and with enough users, this data collection aggregates to unfathomable amounts of personal data that Facebook controls. This data is both Facebook's greatest asset and its greatest curse. It is an asset in that Facebook can use the data to predict user behavior, provide relevant content, and show personalized advertisements. It is a curse, however, in that many do not trust Facebook to use their personal data honestly. This problem is not unique to Facebook. As many massive technology companies have been gathering and storing personal data, arguments over the importance of data privacy have been ongoing for decades. Governments and corporations around the world are struggling to find balance in the tradeoff between civilian privacy and commerce.

The technical project will focus on delivering a three to five-year strategic plan for Facebook Live. In doing so, it is evident that the project and analysis will require a fair amount of user data. As the technical project progresses, the importance and data privacy and protection will remain a point of emphasis. More specifically, the STS research aims to answer two key

questions: What are the societal impacts of data and data privacy, and what can we as a society do to protect our data?

These two topics are loosely coupled in that both involve the technology giant Facebook, as concerns have been raised in the past regarding Facebook’s data privacy behavior.

Additionally, seeing as my technical project will involve the analysis of user data, it is important to gain an understanding of the impact that this analysis can have when applied to society at large. Figure 1 shows a rough timeline for our course of work for the technical project, with the STS Thesis also being delivered in April or May of 2021.

October 2020 – November 2020	Perform data analysis on data provided by client and form initial hypotheses, identify trends in data
November 2020 – December 2020	Deliver preliminary analysis of the Live product and present interesting findings
January 2021 – March 2021	Test out preliminary recommendations on Facebook platform and solicit feedback from clients and it’s users
April 2021	Refine initial hypotheses with use of data from tests
May 2021	Deliver final recommendations and 3-5 year strategy guidance

Figure 1. Timeline of Technical Project Deliverables. This table shows the approximate dates by which the different aspects of my technical project will take place. (Brenman, 2020).

THE FUTURE OF LIVE STREAMING

As mentioned above, Facebook Live was launched in 2016 and has continued to grow since then.

However, Facebook’s entry into the live streaming market has not necessarily gone smoothly.

They have struggled to find their foothold, and at times have even seen Facebook Live used to spread sensitive content. For example, soon after its launch in 2016, Facebook Live was used to broadcast the killing of Philando Castile by Minnesota Police (Stelter, 2016). This sparked

concern internally at Facebook, as they wanted the ability to properly curate which content was available to the public – a challenge that is especially difficult when the content is happening live. They also have faced relatively fierce competition since entering the streaming market. YouTube has long dominated the online video-watching space, specifically focusing on videos that are on average thirteen to fourteen minutes in length (Alexander, 2019). More recently, however, additional competitors have emerged. Twitch is a powerful player in the live streaming world, specifically when it comes to online gaming. Additionally, the newly popular platform TikTok is filling the internet with 30-second to 1-minute clips, and is making the battle for viewership much more challenging.

Despite these difficulties, Facebook still believes the Live is a great opportunity for them to grow. To them, the more watch time that users spend on Facebook Live, the more likely that these users are to explore and engage with other aspects of Facebook’s platform. This, in turn, not only drives users to more heavily monetized aspects of the website, but also helps fulfill Facebook’s mission statement to connect people all over the world through engaging and pertinent content. Facebook also believes that they have a distinct advantage in the live streaming space. Facebook data scientist James Valeiras noted that live streaming provides one-to-many broadcasting, and Facebook’s massive user base can provide the ‘many’ better than anyone else (J. Valeiras, personal communication, October 2020).

Facebook is not alone in thinking that the live streaming market is a strong opportunity. Analysts at the company BusinessWire project that the video streaming market will nearly triple in size within the next five years (“\$15 Billion”, 2020). In addition to the growth of the overall market, Facebook aims to grow their presence within the market. They hope to do this by allowing Facebook Live to contribute to their mission statement. Their mission is to give people

the power to build community and bring the world closer together. Facebook Live helps the company achieve this mission by allowing users to both share and express what matters to them as well as to discover what is going on in the world around them.

OBJECTIVES & APPROACH

As we see it, the objectives for Facebook Live are split into two main categories. One category focuses on the financial impact of Facebook Live on the bottom line of Facebook as a whole, while the other focuses on how Facebook Live can help Facebook live up to its mission statement. On the financial side, we see the objective of Facebook Live as to drive overall profitability for Facebook. While Facebook's profitability is dependent on both its revenues and costs, in the near future we will solely focus on the revenue side. Future work may involve potential cost changes as well. Facebook Live can generate revenue for Facebook in two main ways: by generating revenue from ads within Facebook Live, and by driving Live users to pursue other features of Facebook and generating ad revenue there. The other set of objectives for Facebook Live focus on living up to Facebook's mission statement: to give people the power to build community and bring the world closer together. These objectives focus on how Facebook Live can connect friends and family, help people discover what's going on in the world, and share what matters. For a more detailed look at the objectives and sub-objectives of Facebook Live, please see our preliminary objectives tree in Figure 2. The objectives tree is subject to change as the project progresses.

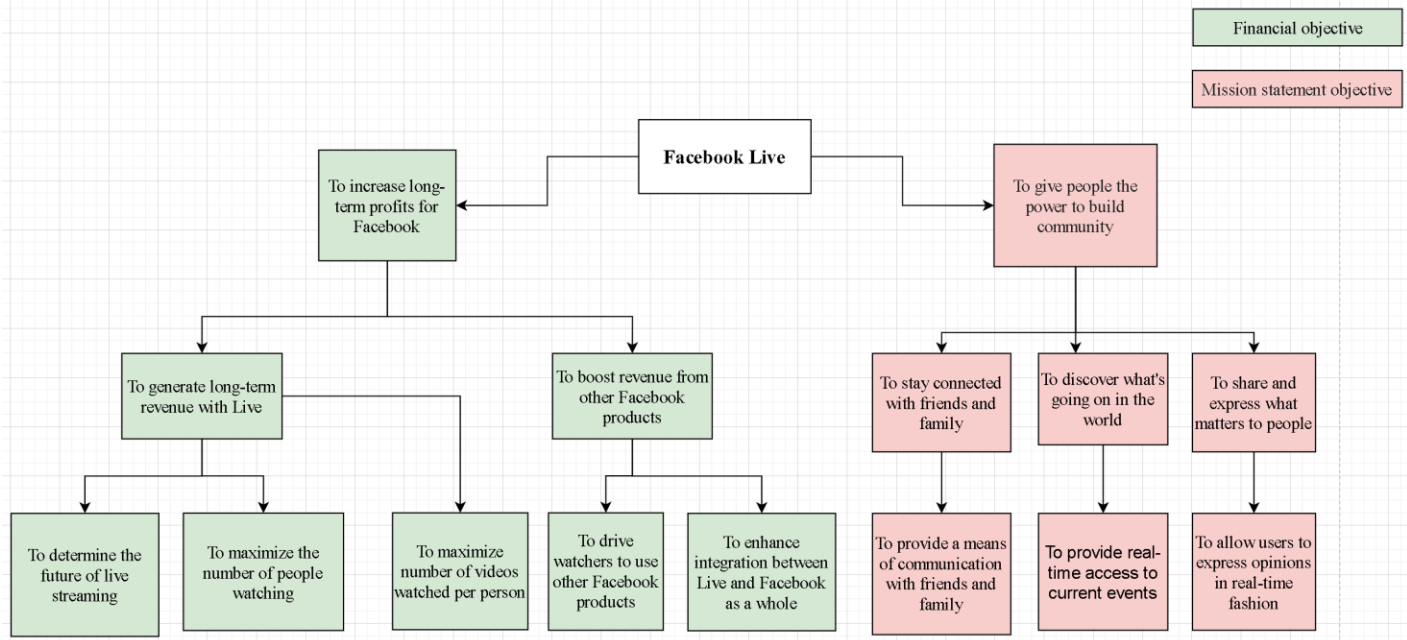


Figure 2. Facebook Live Objectives Tree. This figure visualizations the objectives and subobjectives of the Facebook Live platform. (Alexander, Brenman, Eshirov, Rosenblatt, Wolter, 2020).

We will use our primary objectives and sub-objectives to highlight where Facebook Live’s most pressing challenges lie. These challenges will help to further guide our future research and additional analysis.

There are three main aspects in our approach to this problem. First, we are researching the history of video and live streaming in order to predict the future of the market. This approach is relatively qualitative and involves reading and listening to the perspectives of industry experts as well as futurists. Second, we plan to analyze user data that is sent to us by Facebook. While some data has already been sent, we hope to access more in the future. Our data analysis will primarily focus on predictive models to determine what characteristics lead to users spending more time on Facebook Live. This analysis will allow Facebook to more carefully curate video content in order to provide viewers with the most pleasurable and engaging Live experience. Finally, we will continue to research emerging markets in the live streaming space. We believe this to be one of the most important aspects of our project. We hope to predict certain types of

video content that are likely to become very popular in the future so that Facebook Live can gain an early foothold and be a strong player in these areas. We have already identified education technology as having strong potential, and we hope to further analyze this market as well as other emerging markets. While the three aspects of our approach outlined above provide a general framework, each may involve multiple smaller tasks to accomplish, such as competitive analysis. We know that our approach is likely to change as more information surfaces, our grasp of the problem increases, and changes occur around so world, so we are ready to pivot our approach whenever necessary.

My project team consists of five undergraduate students in the Systems Engineering major: John Eshirov, Nolan Alexander, Justin Wolter, Joshua Rosenblatt, and myself. Our technical advisor is Bill Scherer, a long-standing professor at UVA's Systems Engineering department. Finally, our client contact is James Valeiras. James was a Systems Engineering major at UVA as well as a member of the UVA Football team, and now works as a data scientist for Facebook Live. James will provide us with our most valuable resource: data. He has access to large swaths of user data and has been given the ability to send that data to us at his discretion. We hope to utilize this amazing resource to guide our findings.

During the duration of this engagement, the group plans to better understand the Live product and how it adds to the overall strategy of Facebook. The team will look into understanding the origins of the product, it's current standing in the market, as well as where the product can be in both the short and the long term. We want to provide the client with many alternatives, as the world will be changing constantly over time, but our relationship with the client will likely end in May. Our final deliverable will consist of a strategic plan. This will most

likely be in the form of a report that includes, but is not limited to: a summary of the problem, objectives, an overview of our analysis, our conclusions, recommendations, potential risks, and next steps.

Throughout this process, we will be collecting and analyzing private user data from Facebook. It will also be important to keep in mind that Facebook has been under scrutiny in the past for large-scale breaches of confidential user data. Because of this, it is worthwhile to examine the importance of data and data privacy, and how these entities impact our society.

AN ANALYSIS OF THE SOCIETAL IMPACTS OF DATA AND DATA

As our society grows increasingly intertwined with technology, technology companies continue to accumulate massive amounts of personal information from their users. User data is the one of the single most valuable assets that any technological entity can possess. It can be used to predict user behavior, buying patterns, and content consumption. Companies like Facebook can employ user data to offer timely, specialized content to users, and target specific ads given the user's previous buying and watching behavior. Facebook, however, has been known for a litany of data privacy breaches in the past. Figure 3 summarizes some of Facebook's largest data breaches in the past decade.

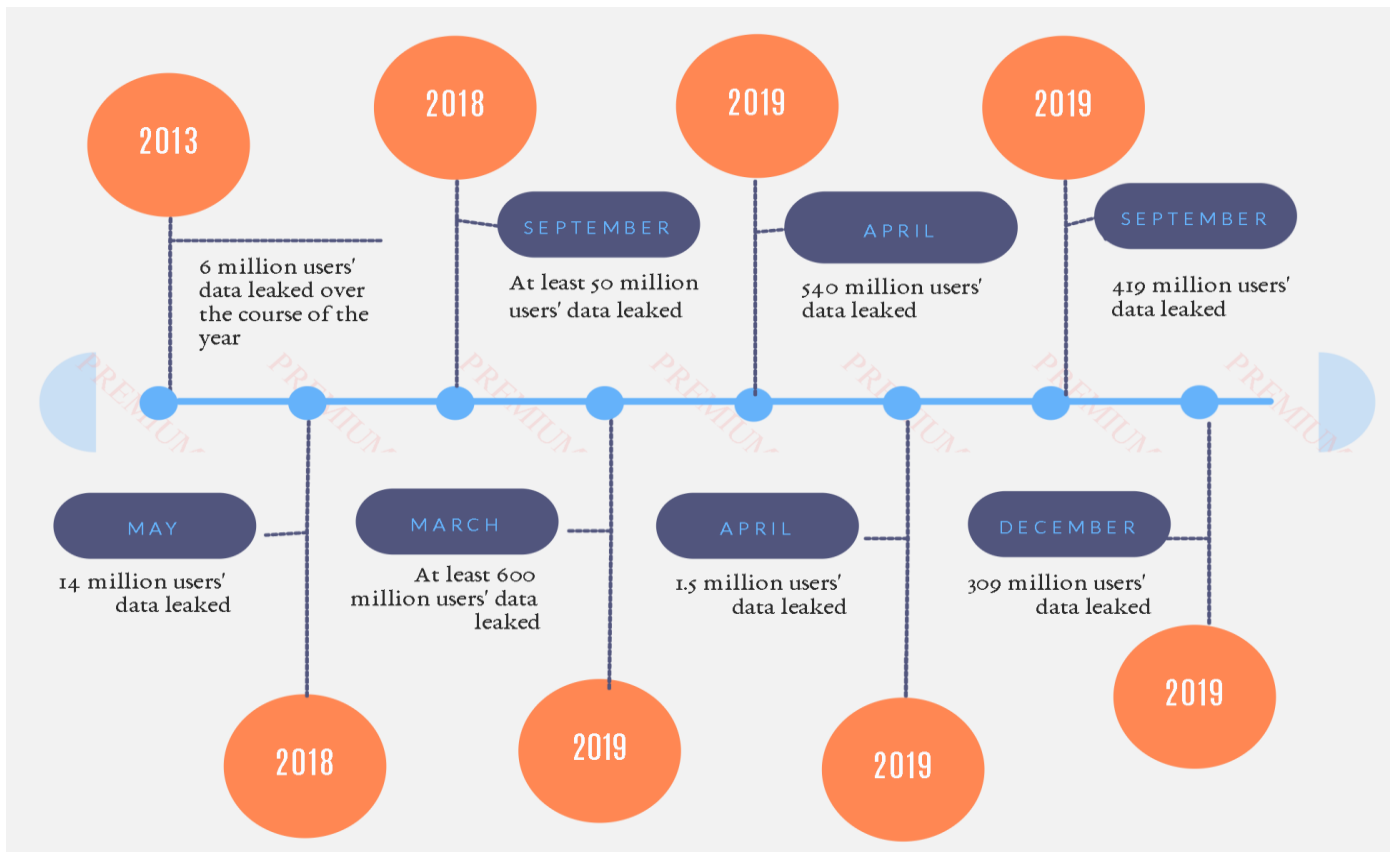


Figure 3. Timeline of Facebook's Largest Data Breaches. This illustration shows a timeline of some of the most significant data privacy breaches that Facebook has encountered, beginning in 2013. Each node shows the year, month, and number of victims of each breach. (Brenman, 2020).

In the past, data privacy has not been a concern for a large portion of our society. Many have thought to themselves that they should not be concerned about data privacy because they have nothing to hide. However, many do not realize that the manipulation of user data can have profound societal impacts. I plan for my research to analyze the societal impacts of data and data privacy to fully understand the scope of this problem. I will be conducting this research and analysis by myself, under the advisement of Catherine Baritaud of UVA's department of Science, Technology, and Society.

There exists a fair amount of research surrounding the importance of data privacy, and much about certain measures or legislation that have been made in an attempt to protect it. What is missing, in my opinion, is that these analyses fail to analyze how data privacy and data protection measures shape our society and our technology together. For example, Schechner and Glazer (2020) examine the recent European legislation ordering Facebook to stop sending data to the US. The European Union had differing societal views regarding data privacy than the United States, and their respective legislation reflected that sentiment. This distinction is what led to Europe restricting Facebook from sending personal data from Europe to the United States. It is a prime example of interpretive flexibility, as the two social groups view the technology of Facebook and data collection in very different ways. Because of this, either Facebook must adjust its technology to be able to keep European data in Europe, or the U.S. must shift its societal views surrounding data privacy to more closely match Europe’s standards. Figure 4 uses this example to illustrate the unique ways that our societal standards can shape technology, and vice versa.

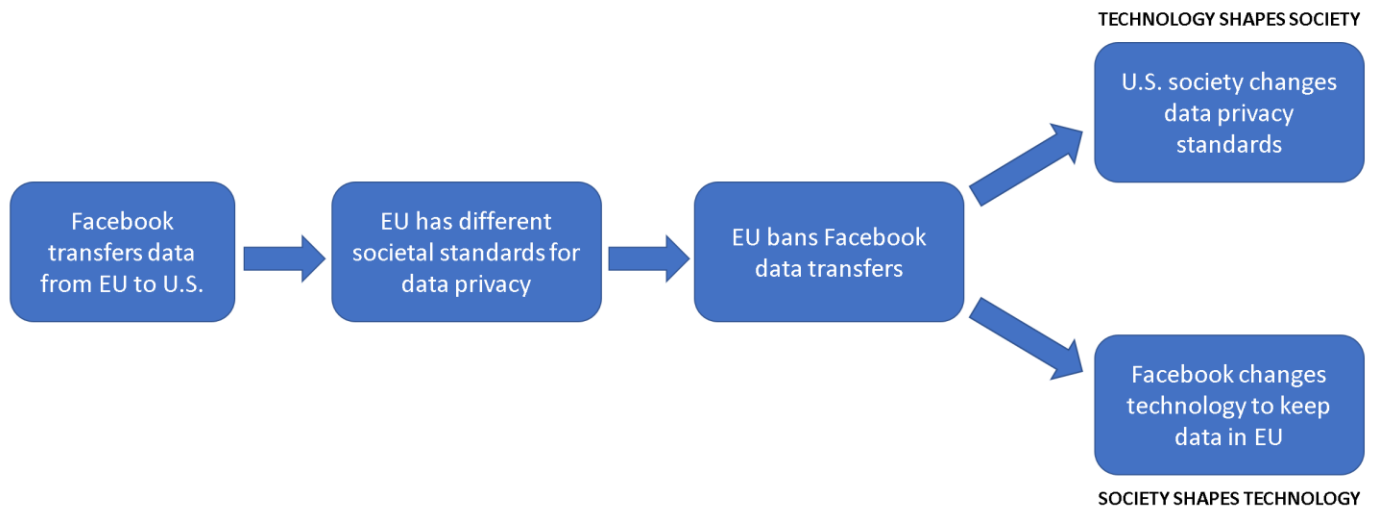


Figure 4. Society Shaping Facebook’s Technology. This chart uses the example of the European Union banning Facebook’s data transfers to the U.S. to illustrate how societal standards can impact technological innovation, and vice versa. (Brenman, 2020)

Another societal impact of data and data privacy is outlined by Blanchette and Johnson (2002). They take a unique perspective on data privacy, shifting their focus from the typical criticism of data collection, but rather emphasize the importance of data disposal. They argue that social forgetfulness is a critical aspect of society and allows individuals to have a second chance in life. As limited policy currently exists regarding data disposal, companies can keep our data indefinitely as we lose opportunity for social forgetfulness. The principle of social forgetfulness has already been recognized in other industries, such as bankruptcy law, juvenile criminal records, and financial credit. As technology companies continue to gain power and collect massive amounts of data, policy should set limits on the amount of time that they can hold onto our data.

The objective of my research is to answer two key questions: What are the societal impacts of data and data privacy, and what can we as a society do to protect our data? To go about answering these questions, I will examine prior research regarding the sociotechnical impacts of data privacy, as well as legal analysis of measures that have been taken to protect data privacy and how effective they have been. To structure my research, I will approach these topics using a Social Construction of Technology (SCOT) approach as outlined by Pinch and Bijker (1984). It is clear, as outlined by the example above, that in the world of data privacy, the interactions between companies, lawmakers, governments, and users are both complex and important. I plan to dig deeper into these interactions to fully understand the ways in which these groups interact with data privacy and interpret its meaning in different ways. Furthermore, in viewing Facebook as an artifact, it falls into Winner's (1986) second interpretation of how artifacts contain political properties: Facebook is inherently political. Whether the viewpoint is looking at policy surrounding Facebook, political sentiment posted by its users, or political

advertisements posted on its platform, there is no doubt that Facebook is political. I plan to examine the many different groups that interact with not only Facebook, but data privacy in general, and how it is used and interpreted differently. I also plan to research both legislative and social measures that have been taken in attempts to stabilize these differing interpretations, and examine how successful they have been. I also hope to potentially propose certain alternative legal or social solutions.

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