TRUST IN REMOTE WORK: ACCESSIBILITY THROUGH DATA AT SLACK

SEX AND THE SWE: AN ANALYSIS OF MATCHMAKING SOFTWARE

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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 expansion of remote work has reshaped the way that people can exist in the workforce, allowing work to be more accessible and more diverse. Specifically, remote work has enabled people with both physical and mental disabilities to work more comfortably and even work at jobs that were otherwise not possible (Federici, 2022). Disabilities that may have previously prevented people from commuting, sitting for long periods of time, or anything else preventing them from working in a typical office space can now be more easily controlled as people can work on their own terms (Das et al., 2021).

However, technological advancement only has an impact if social groups properly utilize it. For example, Ontario's school system noted that remote learning had negative effects for disabled students at first due to a poorly executed shift to remote learning, but had positive effects such as reduced sensory barriers later on (Pichette et al., 2020). Perhaps the biggest social factor in the rise of accessibility through remote work is user adoption. User adoption has been seen to play large roles in the success of software systems (Maalej & Pagano, 2011). In fact, user adoption by disabled people was a large factor in the replacement of Skype by Zoom (Burgan, 2021).

Despite the importance of social factors, the software industry still suffers from technological determinism, or the view that technology is a driver for social development. Software companies often justify their work using the idea that software and the world interact unidirectionally. To put a label on it, this is a type of justificatory technological determinism as outlined by Wyatt (2008) where technological determinism is deployed by actors as a view of their own actions. Following this model, it becomes clear that the software engineers that develop remote work applications view themselves as driving social development, causing them

to ignore user adoption even though it is a key factor in the effects of their software (Oliver, 2011).

Therefore, a crucial element to the emergence of accessibility in the corporate world is the trust of organizations in remote work. Possibly the biggest factor for corporate trust in remote software applications is data consistency and availability (Passi, 2018). One such software company that is essential to the expansion of remote work, and clearly impacted by trust in their data, is the corporate messaging application Slack. The importance of user trust in Slack can be seen in the example of education systems. In a case study of Slack use at the University of Jyväskylä, users cited organization endorsement as a barrier to the use of Slack (Tuhkala, 2018). Millions of users rely on Slack for communication with their managers, teams, and clients. Even momentary lapses in Slack data can cause large social media reactions (Greig, 2022). Ensuring that messaging data on Slack is accurate and updated is essential to user adoption and therefore the viability of remote work. As an industry leading messaging app like Slack improves its software, remote work becomes more feasible and more companies will implement remote work policies, leading to increased accessibility in the workforce. The adoption of Slack reduces social barriers (among others) by showing coworkers' online status instead of forcing navigation of subtle in-person social cues to see if someone is available to meet (Stray, 2020). Thus, the design of data provision at Slack is essential to the social acceptance of remote work and therefore accessibility in the corporate world.

Technical Topic

In Slack, the "mentions" tab is a crucial tool employed by users to track any messages that mention them, as well as any message they have sent that others have reacted to. For

high-usage remote workers in large companies with many channels, this tool is extremely important to productivity. However, in the iOS implementation of Slack, mentions data is manually refreshed, often leading to it being slow to update and even inconsistent with other parts of the app that are constantly streaming updates. For example, a new message mentioning a user could be sent and show up in the home tab before a user manually refreshes the mentions tab creating inconsistent data.

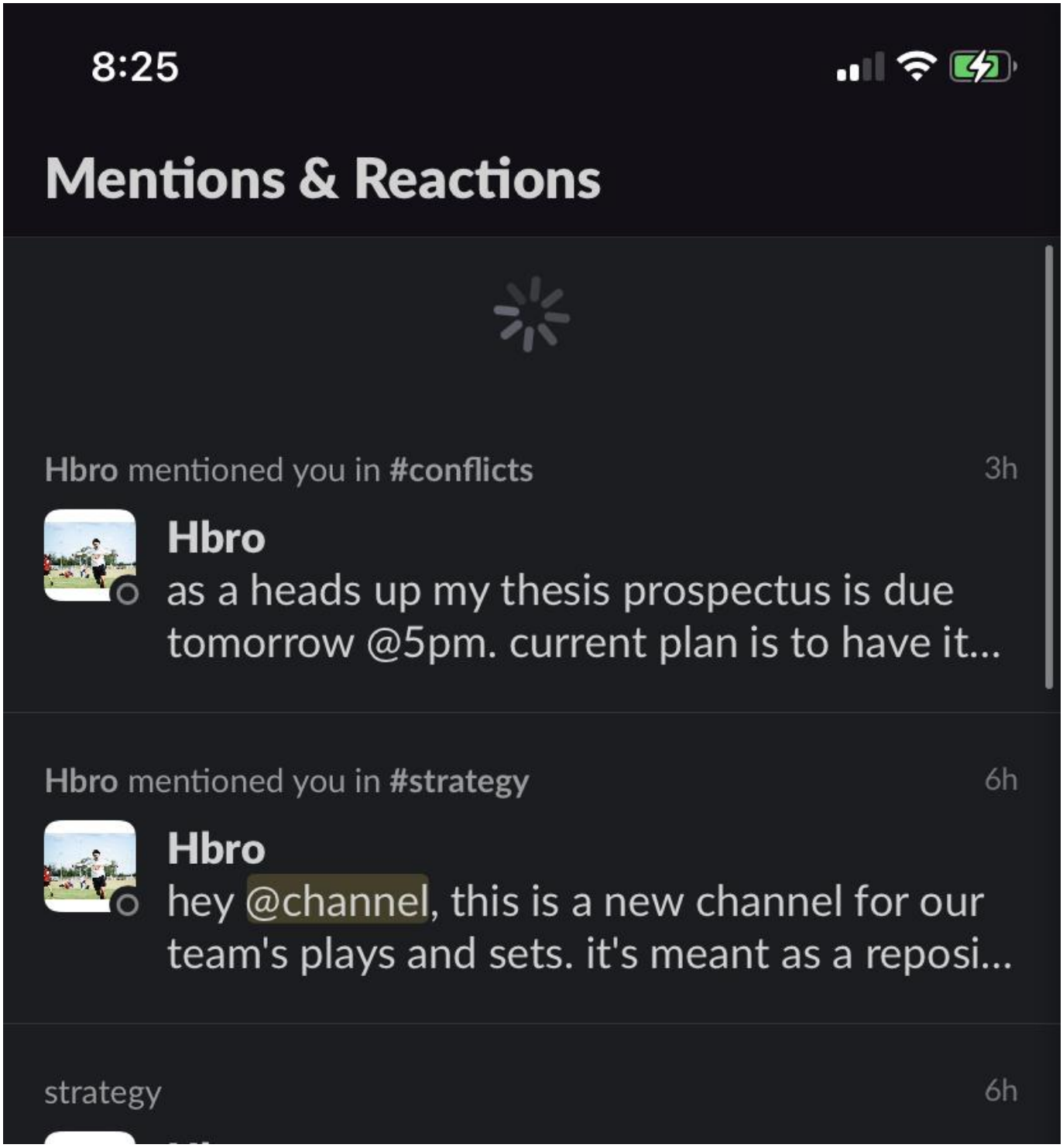

Figure 1. Mentions tab in Slack after being manually pulled to refresh

Therefore, my team at Slack decided to develop a more updated and intuitive version of the “mentions” tab in the iOS app by showing any updates to the screen without a manual

refresh. I achieved this by changing from a “1-way” application programming interface (API) call that does not refresh data until the next network request to a “2-way” connection that streams any new mention changes.

The solution involved two parts. First, I realized that every mention data object, or *Activity*, has an associated message object, or *Message*, in the local database. This is because each *Activity* is related to either a *Message* that mentions the user, or a *Message* sent by the user that was reacted to. *Message* data was already being streamed with a 2-way connection using the framework for server and device communication “WebSocket”. Thus, I modified the *Activity* data provider to stream all associated *Message* objects so that any updates to a related *Message* would change the corresponding *Activity*. This enabled 2-way streaming of existing mentions, but I also needed to implement streaming of any new or deleted mentions not present in the last API call. To do this, I used the same existing *Message* 2-way connection to create a stream of any *Activity* data changes that were not modifications to existing *Activities*. This stream was then combined with the existing *Activity* data from the last API call and synchronized.

I successfully implemented this feature, modernizing data provision for the mentions tab in Slack’s iOS app. The new mentions tab is currently being rolled out internally and will soon be available on the App Store version of Slack. These changes have a noticeable impact on how up-to-date and consistent mention tab data is, directly contributing to user trust in Slack. Even small improvements to user trust in Slack can have large ramifications on corporations’ willingness to allow remote work, which in turn has a big effect on accessibility in the workplace. In the future, to fully convert the mentions tab to a 2-way connection, we could include all necessary *Activity* data in *Message* WebSocket events so that an API call is never needed. This implementation of using a related WebSocket stream to fill in holes in an associated

data stream without creating a new connection could also be applied to other software companies looking to sync data from multiple streams.

The Software Design of Tinder and Actor Network Theory

While my technical project focused on improving the accessibility of remote work through expanding user trust in Slack, my research will focus on analyzing matchmaking software through the lens of Latour's actor-network theory. Matchmaking software like Tinder that allows users to meet sexual partners in their geographical vicinity has significantly changed the way young adults approach dating. Some find this software to be greatly beneficial for their dating lives because it expands their pool of potential partners and makes dating more accessible (Ranzini et al., 2016). However, with the wide availability of partners whom users have not met in person first, there also comes clear risks associated with matchmaking software. Tinder use is associated with being a victim of sexual assault (Shapiro et al., 2017), having contracting sexually transmitted infections (Ciocca, 2020), and even misogyny (Thompson, 2018). However, people are also more likely to use Tinder if they rate higher on extravert scales (Timmermans et al., 2017) and have prior sexual experience (Shapiro et al., 2017), things that are also associated with sexual violence (Walker et al., 2011). Therefore, we must also consider the user base as a factor in the effects of Tinder. Given the huge amount of components influencing matchmaking software combined with its increasing popularity with up to 40% of people having met a sexual partner online (Daneback, 2007), how can matchmaking software be properly designed and used to benefit adults seeking sexual partners?

To properly review the design and use of matchmaking software we must look at both the users and non users that have shaped the software, as well as the impact that the technology itself

has had. Combining these two approaches is essentially resolving the conflicting ideologies of technological determinism (the view that technology is a driver for social development) and social constructivism (the view that social development shapes technology). Bruno Latour provides such a solution to the dichotomy in "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts" (1992), introducing his own type of actor-network theory where pieces of technology are "artifacts" that play a role in the social construction of technology. Latour discusses the *delegation of responsibilities* to humans which, according to Latour, can help control the "erratic behavior" of a larger group of humans but can cause simple tasks to have "incredible cost". Delegation to technology, on the other hand, often creates imperfect solutions at a lesser cost and shapes the behavior of humans (Latour, 1992). He also defines discrimination, the idea that technology can be unintentionally designed to be used by certain groups, and prescription which he defines as "the moral and ethical dimension of mechanisms" (Latour, 1992). Lastly, Latour defines inscription which he says is the placement of ideas of builders and users into technology, much like authors place ideas of themselves and their readers in a story.

Latour's actor-network theory can be directly applied to matchmaking software to examine how the technology itself and society surrounding it can best be constructed. How do we mitigate the role matchmaking software clearly plays in sexual violence? Should the change come from the technological side, the user base, or a third party like the police? Currently, we seem to delegate the parsing of partners for potential sexual violence to the userbase, even though Tinder has more data about their personality and history. Yet, there are certainly clear downsides to delegating sexual violence risk assessment to companies like Tinder such as discrimination against those with a criminal record: which can have racial implications as well

(Henkels, 2020). If Tinder were to use artificial intelligence to analyze risk, they would run the risk of the same AI discrimination (Ferrer et al., 2010) that we see in many other systems. Inscription, too, plays a role as using AI would leave Tinder having to make assumptions about how their users view AI. Are users competent enough to know to what extent AI can be trusted and not blindly follow Tinder's model? Latour's framework provides interesting questions that must be answered when trying to improve the safety and quality of matchmaking software.

Research Questions And Methods

My research question is what should be delegated to matchmaking software to best form dating life in young adults? I'm interested in comparing matchmaking software with traditional dating methods to see if the downsides of matchmaking software can be mitigated by changing the delegation of various parts of dating to technology and humans. Some potential avenues I want to explore are the mitigation of sexual violence, self esteem, and privacy issues. For example, in terms of scanning dates for potential sexual violence: what should be delegated to humans and what should be delegated to the software?

I plan on conducting literature reviews and interviews with experts on dating, sexual violence, and software. I hope to combine these different disciplines to determine what combination of social and technological change can be used to mitigate the harms of matchmaking software. Specifically, I want to interview machine learning professors at UVA and get their opinion on whether AI could be applied to assess sexual violence risk from profiles. I also want to do a literature review of relevant articles like *AI Ethics in Predictive Policing: From Models of Threat to an Ethics of Care* (Asaro 2019). I plan to do interviews with software engineers at matchmaking software companies and compare design philosophies between Tinder

and Hinge to see if corporate differences lead to differences in outcome. Finally, I want to interview professors on the social side of the issue who are experts on dating or sexual violence and ask them what they think the risks of matchmaking software are and how they can be mitigated. These sources combined will help me draw conclusions about what we can (and should) do to mitigate the issues that are most important in matchmaking software.

Conclusion

The adoption of remote work has had and can potentially have a huge effect on the accessibility of the corporate world by lowering social and physical barriers for people with disabilities. However, user adoption is a key social factor in realizing the effect of remote software. Therefore, at Slack I redesigned data provision in the mentions tab by converting from manual refresh to a 2-way WebSocket connection, increasing user trust in Slack and by extension remote work. Separately, matchmaking software has significantly changed dating, making it more accessible but also increasing the risk of sexual violence. Through surveys and interviews with users and engineers of matchmaking software, I plan to investigate the delegation of dating to matchmaking software's effects on sexual violence, self-esteem, and privacy concerns. The expected results of this research is that users of matchmaking software are more concerned about sexual violence and that such software should delegate some of violence prevention to the technology itself.

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