The High Cost of Free Services: Problems with Surveillance Capitalism for IT Infrastructure and Possible Alternatives

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ABSTRACT

A large portion of the software side of our information technology infrastructure, including web search, email, social media, transportation information, and much more, is provided "free" to the end users, although the corporations that provide this are often enormously profitable. The business model involves customized advertising and behavior manipulation, powered by intensive gathering and cross-correlation of personal information. Significant other parts of our IT infrastructure use fees-for-service but still involve intensive gathering and cross-correlation of information. There are significant indirect costs of these business models, including loss of privacy, supporting surveillance by both the state and corporations, undermining the democratic process, other kinds of automated manipulations of behavior, and excessive consumerism with its attendant environmental costs. In a recent book, Shoshana Zuboff terms this "surveillance capitalism." Our primary focus in this essay is how we could develop new models for providing these services. We describe some intermediate steps toward those models: eduation, regulation, and resistance. Following that, we discuss a partial solution, involving for-profit corporations that provide these services without tracking personal information. Finally, we describe desired characteristics for more comprehensive solutions, and outline a range of such solutions for different portions of the IT infrastructure that more truly return control to the end users. A common feature of several is the use of highly decentralized storage of information (either on the end user's own personal devices or on small servers), a modular architecture and interface to allow for customization of what information is to be shared, and a distributed ledger mechanism for authentication.

CCS CONCEPTS

• **Social and professional topics** → **Computing / technology policy**; *Surveillance*; *Sustainability*; *Governmental regulations*.

KEYWORDS

surveillance capitalism, political manipulation, manipulation of behavior, economics, digital infrastructure, business models, advertising

1 SURVEILLANCE CAPITALISM

In the aftermath of the dot-com-bubble surviving IT companies had to find business models to provide a return to the venture capitalists they were funded by. In order to keep increasing the user base, it was essential for the services to continue to be free of charge for the users. Therefore it comes as no surprise that they chose to embed advertisements to generate revenue. However, the way in which they implemented this turns out to make them highly profitable at the expense of a devasting societal spillover. Instead of merely placing ads, user actions were tracked and recorded in large data bases. When computer scientists at these companies invented algorithms to effectively analyze the giant volumes of data and employed statistical methods to derive predictions from user profiles, they invented a new business model that turned out to be so profitable that even companies that are financed by fees also adopted this practice.

Based on this data, they generate revenue by selling customized advertising or predicting and influencing their users' behavior. User data becomes much more valuable where a) in contexts of past and planned purchases, b) when data that corresponds to the same user can be connected out of different contexts to generate a significantly more sophisticated user profile and c) profile data can be compared and correlated to similar profiles from the database d) it can serve as basis for behavioral manipulation. Since it is their predictive and manipulative capital [20], usually the data is not sold directly, as that would undermine the basis of their business model. Although smaller companies exist that employ trackers and presumably serve as additional data suppliers, these transfers are typically not visible to the end user. For the big IT companies instead revenue is generated by predicting and influencing user behavior [6].

Shoshana Zuboff has named this business model "surveillance capitalism" [36, 37], and we use this same term here as well. Her recent book makes clear that this is not simply an issue of surveillance and loss of privacy, but also a radical and ominous automated manipulation of behavior.

However, despite this very dark side of surveillance capitalism, at the same time these services have enormous utility for business, social engagement, political work, and much more. So in any potential measures to address these problems, we want to retain as much as possible the benefits.

To relate this analysis to work presented at LIMITS 2018 [4] and elsewhere [3], the SEED[1] project is based on the observation that quality of life for growing numbers of people on the planet is threatened by a set of integrated, systemic problems in the environment and our economic and political systems. The goal of the SEED project is to form an international network of scholar/activists, advocates, and practitioners who seek to address these problems in a similarly integrated fashion. The work presented here is a further step in a working out of how the SEED ideas play out in a particular economic sector, namely the IT sector. (We can imagine similar efforts in the future in other sectors.)

In describing SEED, we put forth an ideal of the relationship among the environment, society, government, and the economy, firmly grounded in the natural world. Within and bounded by the natural world is human society, with a goal of prosperity for all and supporting human flourishing. Government in turn is subservient to society, and finally the economy is subservient to all three other systems. This vision is in sharp contrast to our current system, in which the economy takes priority. The added problem of surveillance capitalism is thus: in addition to making the natural world subservient to and serving the needs of the economy, now human nature is being similarly dominated.

In the following section we discuss the processes by which surveillance capitalism impacts consumerism, threatens democracy, fuels social fragmentation, undermines our ability to tackle the major environmental problems and thereby ultimately constitutes a hurdle to any sustainable development within the planetary ecological limits. While workers in leading position in those companies were well aware of their influence on human behavior and the negative effects on society [1, 23], it was underrecognized by major parts of the society.

2 PROBLEMS

This business model produces a range of problems. In order to maximize the value for advertisers the companies need to capture the user for as long as possible on the website or using the application. This is achieved by applying knowledge of human psychology [21] and experimenting with different interfaces using A/B and other testing. (Another example of this sort of manipulation is an experiment in which Facebook tried to make users sad [12].)

One strategy to maximize the time spent on social media is to push toward more provocative content, both on the side of the viewer (who becomes more engaged or outraged when confronted with extreme positions, so that feeds tend to select for such content [31]), and also on the side of the contributor (since these posts then tend to receive more positive feedback, encouraging users to post more in that direction). This self enforcing feedback loop is just one example based in a kind of psychological trap. Other strategies are to trigger anxieties (fear of missing out (FOMO) or how one compares with others), or exploit tendencies toward certain kinds of addiction. Overall these methods aim to result in a strong pull toward the website, platform or application.

In addition to maximizing the number of people who see an advertisement and the length of time they attend to it, the ad also

becomes much more effective if seen by groups most likely to respond to it. IT companies that gather personal user information can not only identify the users as participants of a certain group, they can also use their elaborate algorithmic tools of statistical analysis to identify for the advertiser which target group to aim for [6, 21]. However, in order to provide these services to the advertiser, the company needs to gather and correlate more and more personal information. There are three things happening. The first is the gathering of any available possibly relevant raw information by tracking the user, including actions taken in the browser, contact addresses or the mobile location. In addition, if the records that belong to a given person can be connected during a series of visits and between different websites or applications, a far more sophisticated user profile is generated. This is the reason these websites use trackers that are able track the entire activity during the browser session. It is also a reason that Facebook and Google are highly motivated for users to login with their account for identification to other service providers. Third, the correlation of many of these sophisticated user profiles makes it possible to statistically make predictions about user behavior, and thereby understanding the users possibly better than they understand themselves.

A fourth possible practice is becoming increasingly relevant, which is the manipulation of user behavior on that basis. A detailed knowledge of which environments a certain user needs to be confronted with, for which behavior to show in reaction enables a whole new category of customers in addition to classical product advertisement. If the desired reaction is no longer limited to buying a certain product, but adopting a certain opinion or voting in a certain way, the IT company has invented a tool to wield power and control over society.

Above we suggest the effect that the business model has on the orientation of these IT companies. In the following we further explore the outcomes for individuals and society. This helps illuminate how the intensive gathering, tracking and correlation and of personal information poses a threat to sustainable economies and democracies in multiple dimensions.

2.1 Consumerism and Excessive Consumption

The increasing profoundness of customized advertising fuels the imperative for consumerism and unending growth. The generation of artificial needs is valuable to the advertising companies, which can serve these, while having a destructive influence on the individual as well as the society. On the individual level the users pay twice for these artificially generated needs, while true needs remain unsatisfied. Once with the money of their purchases and the second time with the time they spend due to the provocative content and in psychological traps. On the level of society, (1) personal information bubbles amplify social fragmentation and thereby hinder the contemplation of global problems/challenges, while (2) the consumerism can not be integrated within ecological limits. Let us now have a closer examination of these two mentioned outcomes.

2.2 Threats to Government and Democratic Processes

Social media platforms such as Twitter, Facebook, and Instagram offer new types of (semi-)public spaces. They play an increasingly

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[1]Solutions for Environment, Economy and Democracy

important role in the exchange of ideas, visions and convictions that drives the necessary continuous adjustment of the overall political picture. However, the algorithms by which content is selected is often opaque to the reader [2]. Further, on the one hand, these public spaces can have an emancipatory effect specifically under the conditions of surveilled telephone lines and censored mass media, as occurred in the early stages of the Arab Spring when discussions critical of the regime, planning for demonstrations, and the distribution of news was facilitated by these platforms [28, 35]. On the other hand, the content of these discourses will be recorded by the platforms and can contribute to the personal profiling of the discussants. Thus, the semi-public spaces have a Janus nature. They offer emancipatory potential, but at the same time contribute to the refinement of personal profiles and opportunities for manipulation. The role of Facebook in the 2016 U.S. election and the appropriation of the Whatsapp messenger in the recent elections in Brazil shows the manipulative power that comes with the ability to create personal profiles and to distribute targeted political propaganda via social media platforms [17, 30].

A lack of privacy with regard to political communication on social media platforms can lead to less participation and to self-censorship, depriving the debate of opinions that could support political progress. Particularly due to the potentially unlimited lifetime of the data, and lack of transparency with regard to what personal data was gathered and how it was used in profiling, people in public offices or running for them will have to permanently fear that unpleasant private matters from their past could be dug up. In addition, the pressures toward more and more provocative content drives extremism and social fragmentation.

Looking, for instance, at the experiences of the Arab Spring [28] it becomes obvious that authoritarian regimes can use the personal data stored in social media platfom for surveillance and propaganda. This facts applies unfortunately also to Western governments (Snowdon papers). The platforms themselves do not need to be in hands of the government; it is sufficient for the government to gain access to the gathered data. As the case of NSA indicates, platform providers could grant the access if they are blackmailed by legal action or threats of losing government support or even market access. A state does not need to initially be an authoritarian regime to develop in that direction as a result of building up these types of surveillance techniques.

In China, the government is accessing different social media platforms to profile the behavior of its population by means of a point-based social credit system [8]. In the West this is regarded as a development toward an Orwellian surveillance state [9], while at the same time similar software architectures and personal profiling capabilities are built up. Although the state is legally not (yet) able to directly access these profiling data and match between the different platforms, security services seem to have these abilities.

Even in western democracies, governments will not want to see any drift toward political opinions that do not support their own political mandate. If they, instead, can use these services as a tool to propagate their own world view, it could in the eyes of the government even be a good thing to do so. Therefore it comes at no surprise that many countries deploy significant resources to manipulate domestic as well as foreign public spaces [5].

Particularly in democratic countries, the targeting of voters based on their psychological profiles becomes politically charged, as the case of Cambridge Analytica shows. This company played an important role in the Brexit referendum as well as in the Trump election [7, 20]. Once the sovereignty of humans over their personal data is lost, the borders with a propaganda and surveillance state blur. Or as the Cambridge Analytica whistleblower Christopher Wylie puts it [7]:

> If you do not respect the agency of people, anything that you're doing after that point is not conducive to democracy.

2.3 Privacy Concerns

The practices of personal data amassing conflict with principles of privacy. Although people deliberately choose to use the services and thereby provide their personal data to the company, they are pushed to do so, due to a lack of transparency, which data is tracked and whom it is handed to, little understanding by most users as well as the non existence of real alternatives or options for end user control.

While general business conditions or national law may regulate the handling of this data, a) this regulation is only on a legal level, whereas misdemeanor can be hard to prove on a factual level, where the IT companies still control the data and b) these regulations do not apply to predictions generated out of this raw data.

2.4 Concentrations of Wealth and Power

The power, that roots in the control over the service and the personal data, is apparently more profitably turned into revenue, not by selling the service, but instead by predicting and manipulating user behavior. The concentration of power is therefore followed by a concentration of wealth, which becomes obvious by the amount of capital these companies were able to accumulate. Furthermore their existence as a tool to wield control provides wealthy customers with more power that can be used to accumulate even more capital. In other words surveillance capitalism enhances the concentration of power within and outside these IT companies.

2.5 Sustainability

Precisely in countries with saturating growth rates it is regarded as increasingly important to fuel consumerism. The desire for unending growth leads to excessive consumption for which more and more needs are generated artificially. This kind of growth does not take place in any productive way, but instead in two undesirable forms. One form is the increased consumption, that is an ever faster conversion of valuable resources into waste, that is dumped into the environment. The second and more subtle form is the growing of behavioral prediction markets. Those can take any forms, where foreseeing and influencing human behavior is of value and thus can be turned into capital [36, 37].

To challenge this worldview and tackle the global challenge of a transition toward more sustainability it would need information and energy channeled in that direction and it requires significant personal perseverance. However the behavioral patterns that are

trained in contact with social media platforms, even if yet under-investigated, tend to drive people toward fast emotional rewards and less focused pursuit of long term goals.

Finally, the small number of employees versus the revenue generated by these companies exacerbates inequality, which undermines sustainability, democracy, and much else.

3 STEPS TOWARD SOLUTIONS

Ultimately we need new business models for these services that do not rely on the logic of surveillance capitalism. In Section 4 we outline a partial solution, and in Section 6 a number of more comprehensive and hopefully effective ones. Getting to any of these solutions (especially the more comprehensive ones) will be very difficult. In this section, we outline some intermediate steps that we believe will help pave the way toward making these new business models feasible. These steps are grouped into three categories: education, regulation, and resistance. However, they are interrelated and build on each other: for example, regulations that make it easier for people to see what information about them is being stored support both education and resistance.

3.1 Education

One key step toward finding solutions is for people to understand how these services are being funded, what kinds of information is being gathered about them, how their behavior is being manipulated, and the consequences of all this. A great deal of the rhetoric around the corporations using a surveillance capitalist business model has focused on individual choice, limitless access to information, empowerment, and personalization, until recently with relatively little focus on the model's dark side of surveillance and manipulation. There were flare-ups of negative reactions, for example, in 2004 to the initial description of how Google's Gmail scans private correspondence to place targeted advertising, but subsequently this became (perhaps grudgingly) accepted as normal. In the last two years there has a been a substantial shift as more of the extent of the surveillance and manipulation becomes visible, especially in light of the reports of extensive online Russian targeting of the 2016 U.S. presidential election. In addition to numerous reports on election hacking, there have been increasing numbers of editorials, articles, and books on this topic, with Zuboff's book [37] being a significant milestone in terms of presenting the depth and broad scope of the problem and an intellectual framing.

It is essential that the education process continues, with ongoing discussion and exposure of the extent of surveillance and political and other behavior manipulation. It is also important that we don't fall into the trap of assuming such a world is now normal and acceptable. However, neither being in a state of numbness or grudging acceptance, nor being in a state of continual outrage for years, seem like particularly attractive alternatives. We also need positive visions of how we can use information technology to support human flourishing without surveillance and manipulation, and the collective political will to move toward those visions.

3.2 Regulation

Another key step is stronger regulation of the corporations practicing surveillance capitalism [32]. An important milestone here is the General Data Protection Regulation (GDPR) from the European Union, which took effect in May 2018. The GDPR is certainly a major step forward; how it plays out in the next years remains to be seen. Two obvious concerns are that it applies only in the EU; and also that the corporations most affected by it will be able to afford to hire numerous highly-skilled lawyers, lobbyists, and others to counter its impacts on their profits. And given that the profits of Google and Facebook in their current forms, for example, are almost completely linked to surveillance capitalism, these efforts will likely be formidable. (In other words, the basic business model of surveillance capitalism leads to the problems described in Sections 1 and 2 — they are not incidental byproducts. Absent different models, regulation can help mitigate but not eliminate these problems.) An in-depth discussion of regulation of this industry, including its international ramifications, is well beyond the scope of this essay. Instead, here are a few additional ideas. (Not all of these will be feasible — but we hope they will be at least provocative and help further the discussion.)

It should be possible for individuals to know just what information various corporations are storing about them, which other corporations they are exchanging it with, to challenge inaccurate information, and demand deletions, all in easy-to-understand presentations. Regulation can help support education, for example, by making it easier for people to see what information about them is being stored. Zuboff [37, p. 482–483] for example describes the unsuccessful struggle of Belgian mathematician and data protection activist Paul-Olivier Dehaye to uncover all of the web pages where Facebook had tracked him, despite several years of persistent efforts. (If a determined activist will not be successful in such a pursuit, what are the chances for an average citizen?) Regulations that require companies to make this information easily available, and tools provided by activists to help us digest it, can make these abstract threats much more personal and tangible, and motivate pushing for change.

In particular, if people knew just how much data was being amassed about them under surveillance capitalism, perhaps enough of them would be sufficiently outraged to push for alternate business models. This is of course likely to get even more intense pushback — on the other hand, it would be difficult for a corporation to argue that the data it holds about its users should not be revealed because they would be angry — the pushback will instead likely be about technical feasibility, inhibiting innovation, undermining their ability to provide highly personalized service, "our existing privacy policies provide full protection," and so forth. (Pushback aside, there are in fact some real dangers that might arise in conjunction with such visibility, such as the danger of misuse if someone else fraudulently obtains your data or coerces you into providing it, and the problem of indirect stakeholders — other people who were tracked at the same time you were and whose information would also be exposed or made public if you did so.)

As noted above, the GDPR includes a high threshold for the definition of "consent," but when possible there should be strong privacy protections that entirely eliminate classes of data collection and sharing and behavior manipulation. For cases where consent is still appropriate, it is likely that additional requirements could help. Regulations could require unbundling what is being consented to, with different options for what can be gathered and how long it

can be retained, and with which other entities it can be shared. Consent should only be opt-in and not opt-out, and clearly and concisely stated — a recent *New York Times* editorial [10] notes that "The average person would have to spend 76 working days reading all of the digital privacy policies they agree to in the span of a year. Reading Amazon's terms and conditions alone out loud takes approximately nine hours."

Corporations engaged in this kind of data gathering and manipulation could be subject to an impartial external audit, conducted by skilled researchers who investigate what the corporations are storing and manipulating, and publicize the results.

An action that is regularly proposed is to declare that corporations such as Google and Facebook are monopolies, and to require that they be broken up. We have concerns about such a move: the result could well be that there would be a multiplicity of surveillance capital firms, with all the same problems but harder to keep track of. Better is probably to break up firms by functional capabilities, in particular, to separate out the common carrier (network infrastructure) functionality from content functionality, and to restrict the data that the common carriers can share.

Regulation is likely to result in lower profit margins for surveillance capitalist corporations [33]; arguably this should not be the goal of such regulation, but should nevertheless be an acceptable outcome. Finally, another important purpose of regulation could be to deliberately nudge the market to make it easier for other models for providing IT infrastructure to flourish — or in the extreme case, to make surveillance capitalism models untenable.

3.3 Resistance

There are several potential goals for resistance to surveillance capitalism, including personal integrity, undermining the profitability of this business model, and raising awareness and calling people to action (i.e., education). Trying to maintain personal integrity is of course important as an end in itself, and also in helping avoid having surveillance become normalized. However, such actions, or other actions whose purpose is to undermine the profitability of the business model, seem unlikely to have sufficient impact. But doing these things (and discussing doing them and the challenges of doing them), can contribute to awareness and calls to action.

Resistance can take a variety of forms. One is to simply not use certain parts of the IT infrastructure, e.g., the #DeleteFacebook movement. This certainly has merit, but can also make it difficult to participate fully in society, given the extent to which Facebook enters into many social interactions, into deliberations among members of a political movement, and so forth. It also recasts a political issue as a willpower issue [13]. And it seems simpler to delete Facebook than for example Google, given Google's pervasiveness. (As a more extreme example, Hill describes her attempt over a period of six weeks to block the five tech giants [15].) Another important form is as art directed at the themes of surveillance and resistance [37, p. 491–492], which (among other things) can push back against such surveillance and manipulation as being considered normal. Finally, there are various kinds of technical resistance that seek to avoid being tracked, or to disrupt surveillance.

Regarding specific tools for such technical resistance, web browsers often provide a switch to block setting third-party cookies.

This is only somewhat useful, since among other things it often just blocks cookie writing, not reading/sending. For example, if a user visits Facebook directly, it would be a first party and so a cookie could be set and then subsequently used by third parties. Also, there are many other techniques for tracking besides cookies, notably browser/machine fingerprinting [25]. Web browsers may also provide a "do not track" setting — unfortunately, though, this option is effectively dead since it only works if trackers honor the request (and many do not). Simply turning off JavaScript can help as well, although doing so will also cause many sites to be unusable.

There are also a variety of ad blocker plugins and other anti-tracking browser extensions, such as uBlock Origin[2], Privacy Badger[3], AdBlock Plus[4], and Ghostery[5]. On the more stringent (and difficult-to-use) side, uMatrix[6] can be set up to block all third-party requests by default, and then let the user choose which domains to enable for a particular webpage. The Firefox browser itself also includes some tracking protection [24], including in "private browsing" mode. (In other browsers, "private browsing" modes may not really protect against tracking — the goal there is more to protect the user's web history from someone with access to the user's device.) Panopticlick[7] from the Electronic Frontier Foundation will analyze how well the user's browser protects against tracking.

A different approach is taken by AdNauseam[8], built atop uBlock Origin, which simulates clicks on every blocked ad to generate a stream of meaningless data that obscures the user's actual interests and behavior (also see [16]). Another is a Firefox add-on called Multi-Account Containers[9], which are like normal tabs on a browser except that each container has its own preferences, advertising tracking data, and other information, which cannot be seen by the other containers, making it harder to do tracking across sites. (However, they can be unintuitive for users, and it can still be difficult for users to reason about tracking since webpages often load from so many different sources.)

Relevant papers in the academic literature include an early study on tracking with measurements in Summer 2011 [27], a longitudinal study of tracking 1996–present [18], and a demonstration that anyone can buy ads to track a targeted individual [34].

Stepping back, one is struck by the considerable effort that is going into these technical approaches to resistance, how complex the solutions are, and the extent to which there is a cat-and-mouse game going on between the trackers and the tracked. The economic impact on surveillance capitalism of this technical resistance is liable to be limited by its complexity. However, the main practitioners of both its development and use, such as computer science students and software engineers, are also likely the potential employees of the big IT corporations, and employees are a scarce resource, so they may have power by other means. Finally, if technically skilled users find the landscape challenging and confusing, nontechnical users must find it even more so. If one were a journalist reporting from on-the-ground in a repressive regime, one can imagine it being

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[2]https://github.com/gorhill/uBlock
[3]https://www.eff.org/privacybadger
[4]https://adblockplus.org
[5]https://www.ghostery.com
[6]https://addons.mozilla.org/en-US/firefox/addon/umatrix/
[7]https://panopticlick.eff.org
[8]https://adnauseam.io
[9]https://support.mozilla.org/en-US/kb/containers

reasonable to require these kinds of precautions. But should ordinary citizens who just don't want corporations tracking everything they do online need to do this also? Ultimately, the most important role for such technical resistance may be as part of education and helping build pressure for more comprehensive change.

4 A PARTIAL SOLUTION

The problems of surveillance capitalism can to some degree be addressed by regulation, pushed by an educated population and selective resistance. A further step in this direction is to encourage the development and growth of for-profit corporations that still provide these services but without tracking personal information, both to provide an alternative for users and thereby also to nudge the existing big IT corporations. In other words, this partial solution is still very much capitalism, just not surveillance capitalism (or at least not surveillance to the same extent).

Two systems to be noted in particular are Brave[10] and DuckDuckGo[11]. Brave is an open-source browser that (the company says) blocks ads and trackers, in both mobile and desktop versions. It includes a facility for giving micropayments to publishers using blockchain-based tokens. The DuckDuckGo search engine does not collect or share personal information. The company's business model is still based on advertising (and also affiliate marketing). The ads shown on DuckDuckGo are based just on the keywords typed in the search box, rather than also on tracked personal information. Affiliate revenues come from Amazon and eBay affiliate programs: when users are referred to one of those sites by DuckDuckGo and then buy something, the company collects a commission. Finally, Apple among the big five tech companies has a significantly better record with respect to privacy. Apple still has other major issues with respect to sustainability (for example, encouraging frequent purchase of expensive new devices), labor practices, and so forth — but to date they have resisted to a considerable extent adopting a surveillance capitalist business model.

In terms of why we label this as only a partial solution, Brave and DuckDuckGo are still advertising-supported — this seems potentially problematic because it leaves the companies vulnerable to the desires of the advertisers. Also, to what extent will this challenge the power of the entrenched surveillance capitalist corporations?

In Section 6 we discuss approaches for a variety of application areas. Systems that implement some of these approaches, for example for public transit information (Section 6.2.5), can be provided now without needing to use a surveillance capitalist model, making them quite compatible with the partial solution approach discussed in this section.

A final idea here is to nudge the market by having institutions such as libraries, universities, and others buy ad-free, no tracking versions of services for their patrons/students, either from new companies, or from existing large IT corporations if they are willing to unbundle their services to support this. (Note that it would be essential to carefully monitor the corporations to ensure they are not tracking these users [11, 26].)

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[10]https://brave.com
[11]https://duckduckgo.com

5 ISSUES OF FUNDING AND POWER

Section 4 described approaches that are still very much capitalism, just not surveillance capitalism as it is currently practiced. We view these as partial solutions only. In this section and the one that follows, we instead consider more far-reaching alternatives that question not just the "surveillance" part of the phrase but also the "capitalism" part. Two major issues are thus funding and power. We first consider some alternate options for funding. However, merely changing the source of the revenue stream is insufficient, because the resulting models still all suffer from a similar problem of power that is rooted in the structure of ownership.

5.1 Public Funding

As the government should have an interest in protecting its citizens against manipulation and falling for extremism, one of the first funding alternatives that comes to mind is public funding for IT services. If these services can be used as a tool to influence the public opinion and behavior, which has been shown that they can [21], it is highly questionable whether a government IT service can present a safe alternative. All the objections from the paragraph about threats to the government and the democratic processes (Section 2.2) hold even more, if governments not only attain some influence on the tools but in fact are their owners and creators.

These considerations raise the debate whether society is better off with the immense power that arises from the control over a medium of communication people rely on, in the hands of governments or of private corporations. We propose neither provides a satisfactory solution, since in both cases there is a strong interest in trying to control the behaviors of individuals.

Despite these considerations, we do believe there is a substantial role for government funding, for example, in analogy with the public radio and television systems that exist in many countries, or even the subsidies to newspapers that existed in the U.S. in the 19th century via subsidized postal rates and tax policy [22]. Or there could be other programs that emphasize individual choice and responsibility, for example, "journalism vouchers" issued to every voter that would allow people to provide grants to investigative journalists.

5.2 Cooperatives

Due to these concerns a third way of other societal institutions controlling the service seem better suitable. Such institutions should not have an interest in propaganda or surveillance as their continued existence should not depend on peoples opinions. One third way that comes to mind are NGOs, but the proclamation of being a non government organization as such protects in no way from interest conflicts that arise in connection with the funding. At least a journey into the organization structure is needed.

Nathan Schneider and Trebor Schulz [29] advocate placing these alternatives in the hands of worker cooperatives. Therefore all relevant stakeholders should be included in the ownership model. Using such a model, they could only be exploited by themselves. Which sounds like a contradiction, but if one takes a closer look, at the ownership structure it becomes apparent, that the distribution of influence between these groups hides enough potential for conflicts of interest. Although such a structure would be a significant

advancement in the power balance, it still leaves open questions. By which mechanism would the formal owners coordinate and exercise their right to make decisions? What if one group of stakeholders, e.g., the programmers, refuse to implement the changes the majority of owners decided upon?

5.3 No Funding

Freely contributed work could be an alternative to the funding problem. Examples like Wikipedia show how an enormous amount of knowledge can be gathered from free contributors. Such a model can work well, if a precise structure is provided, that guides how to arrange and connect the pieces of contribution. While the development of an IT service is not suitable for a group of loosely organized free time contributors, such a group could very well do the maintenance, given that a clear structure to do so is provided. Such a structure can be given by a modular design, which we propose in Section 6.1

To use infrastructure without a funding, would require freeing up idle capacities of existing infrastructure. There are working examples, where the infrastructure is provided freely by the users themselves. Those include File Sharing and streaming services and utilize decentralized architectures as we propose in Section 6.2.

We also need to admit, that we did not arrive at unfunded alternatives because we were not able to find a funder, that might be interested, quite contrarily we could think up many of them. The point was, that we had caveats to place the control over the service in their hands in all of the cases. The considerations of freely contributed labor and infrastructure did not answer the question who is controlling the data. This question will guide us toward and through the next section discussing what an actual solution should look like.

6 POTENTIAL SOLUTIONS

In the previous section we discussed some general issues for alternatives to the business model of surveillance capitalism. None of these alternatives so far are entirely adequate, since for any one of them we arrive at the question of who controls the service. Who is the legal owner of the data? Who has access to the benefits of datamining them? Who has the ability to design the digital environments users are confronted with and that form their behavior? The power that arises from these privileges is simply too big to be placed in the hands of any entity. This gives rise to the question of whether the service itself can be structured in a way that there is no such entity. In the next section we consider some necessary properties such a liberating software would need to possess.

6.1 Desired Characteristics

The first necessary condition to prevent an extensive data gathering is user control over their personal data. Personal data here not only consists of the information the user is giving about him- or herself, but also a record of every action he or she takes, that is at least theoretically trackable, while interacting with the service. For the latter kind of data it will in many cases mean, that they are not tracked at all. Since that depends on the program code, the source code must be visible. For the first kind, the users need to be able to choose who is allowed to see this data. Although current service

providers often offer some choice which other users are allowed to see the data, there is no option, to hide the information from the service provider itself. Realizing this requirement highly suggests not to be satisfied with end-to-end-encryption, but to save user data locally instead of on a central server.

The second point is about the development of features that the user desires. In an economy run according to capitalistic principles the approach to this is a corporation guessing, or surveying the desired features and developing them. If they turn out to be valuable to the user, this grants the corporation a competitive advantage. However, in a world of networks the situation can arise, that the corporation has no interest in implementing a feature users desire, since it would reduce the corporation's ability to generate revenue, as for example a feature for more privacy. But still other competitors have no chance of out-competing that corporation by the implementation of such a feature, because for the user the network effect states a barrier to adoption, that is bigger than the benefit. In such a situation the progress gets stuck. To prevent this from happening it is necessary that the software is not designed monolithically, with only small APIs, that enable some limited connection with other services, but instead the options to add, hide and connect with other features. This is very similar to the approach called End User Development from 2006 [19]. Not every user will have the technical knowledge nor the willingness to experiment with such options, but the lower the hurdle is to do so, the more easily user desired designs and features will be found. As it is not required for all of the users to migrate from one service to the other, but instead new features come as optional add-ons to the existing ones, users don't loose connection to their old peers upon testing a new feature. In such an environment two users that want to interact with each other simply have access to all of the features they share in common. For such a modular set of features to be overseeable, ideally the user has software that arranges these tools in a customized way, that he or she is familiar with. Such a software design also weakens the users unwilling exposure to manipulation and pull toward extremism. It would for example act empowering toward the user, if there was the choice between different news feeds, that are not all designed to consume time. Therefore a modular architecture is the second ingredient to enable users to create an online experience oriented toward their personal needs.

Modular solutions that leave individuals in charge of their data and experience would, still be a tool to concentrate power, as long as there is any entity, with the ability to read and or deny the exchange of information via this service. Therefore the third requirement is the one of truly peer-to-peer services. There are many platforms that label themselves as peer-to-peer, because peers do communicate with each other. However, the communication is using the central server of the platform provider as a channel, this does not suffice the stronger understanding of truly peer-to-peer communication that is meant here. The strong understanding of a peer-to-peer system demands the entire communication, including the channel to be held up by the peers. Such applications, instead of answering the question in whose hands power over the communication system might be relatively save, solve the problem of power by not letting it manifest in the first place.

In combination these three architectural choices seem promising to solve the problems from Section 2:

(1) User control over personal data
(2) Modular design
(3) Truly peer-to-peer communication

We do not see any indications that these properties could contradict each other, quite contrarily user control over personal data strongly hints in direction of peer-to-peer communication. To substantiate this the following subsection illustrates how these properties could be realized for particular classes of IT services.

6.2 Returning Control to the Users

The outlined properties radically place the control over the services into the hands of users. They are well aligned with what Tim Berners-Lee tries to accomplish with the SOLID project[12] at MIT. However in order to achieve this we propose distributed ledger technology (DLT) to play the key role of implementing truly peer-to-peer structures. For this purpose the most prominent DLT, blockchain, is not suitable, since it requires the full data load of all members to be held by every peer (changing precisely this property is called Sharding, which is difficult and not acheived by classical blockchains), therefore it neither scales up, nor does it prevent excessive data mining. In especially Proof-of-Work Blockchains, like the ones Bitcoin and Ethereum are based upon, require an ecologically unsustainable energy consumption. However, there are promising blockchain alternatives, that do not suffer from these weaknesses and that are potentially able to implement the outlined desired characteristics. One of them, that is in particular advocating these properties is Holochain [14]. To give examples how alternative services, which use such distributed ledger technology to implement these principles would manifest, we need to distinguish between different classes of services.

6.2.1 Social Media Services. One class of services, for which currently the surveillance capitalism business model is prevalent are social media services and publishing platforms. Examples of this class are Facebook, Twitter, Instagram, Medium, LinkedIn etc. For these applications users create a personal profile themselves and desire the content they create to be connected to that profile, visibly to other users. They might want to create different categories of visibility and authenticate other users for these categories. In our proposed alternative the user profile and their content are stored locally on the users device. Since that will not be available all the time the DLT stores the data with some redundancy on other devices. When somebody wants to visit the users profile, instead of sending a request to a central server he now needs to connect to one of the devices that holds the user profiles data. That means on the other hand that every user needs to carry in addition to their own data load the backup for other users. Because for example mobile devices are not designed to carry and upload bigger amounts of data, these obligations can be fulfilled by devices with a better hosting capacity and a broadband connection. It would of course be highly inefficient to require every user to own a tiny server, instead we imagine many hosts to fulfill these obligations, for which they can be paid with micro-payments. Technologically this is enabled by deploying the right distributed ledger technology. With the demand for tiny hosting volumes and the technical abilities to settle these automatically

it becomes feasible to rent out idle capacities of existing computers for example, resulting in a much more decentralized network in contrast to the central structure of big companies like Amazon Web Services, that we have today. In addition, the capacity of public institutions like libraries and universities could be integrated in such networks. This structure does introduce some inefficiency, since the data is stored with a higher redundancy, than on a central server, where redundancy only needs to counter the rare case of hardware failure. Therefore it grants complete control over private data to the user who is freed from the service provider. That service provider no longer plays any role in the communication between users and can not datamine the user profiles easily, because there is no single database of user profiles, and because he might not be authorized to access the profiles unless the user chooses so.

The second dimension of user control is over the features the service offers, in especially the algorithms that selectively present content. Where today the features are determined by the service provider, with in the best case very limited APIs, and the algorithms stay a mystery to the users, in our proposal the requirement for a modular software structure gives users the ability to add in their own modules. Those could be modules for simple features such as a dislike-button. By this process the community can find out, whether such a module enriches or frustrates their experience. A more complicated module example is a content filter for the activity of friends, implementing a new algorithm. This enables users to control their online experience and overcomes the problem constituted by the network effect, that every single user would not migrate to a different social network that has a better feature, but very few users. Admittedly only users that are educated and motivated well enough in that direction would embrace that opportunity, but the resulting alternations would be available to all users that are interested into them. The modular structure aims to make this barrier for participation as small as possible.

6.2.2 Employment and Rental Platforms. A second class of services consists of platforms that connect different user groups with complementary needs in especially digital employment platforms. Examples for this class include Airbnb, Uber, Deliveroo, blablacar etc. These platforms are the backbone of the Gig Economy and although they do not heavily rely on advertising for funding, they still involve many of the same characteristics of surveillance and behavioral manipulation, so we view them as also being instances of surveillance capitalism. Alternative applications that would avoid this surveillance and manipulation (and also perhaps some of the high fees) could be analogous to what we just described in the first class of examples, including different user groups. Because once such an application with a license that allows free usage of the software is distributed, no fees can be imposed by e.g. the software provider, who is no longer a part of the communication.

6.2.3 Search Engines and Browsers. Two other classes of examples are search engines and browsing applications. For these, users usually do not want any information to be shared with other users or corporations. There might be some interest in sharing certain customized settings or bookmarks between different devices that belong to the same user, and where a generalized structure for peer-to-peer applications is in place it might be used for this case as well. However, in general, for this class of services versions that

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[12]https://solid.mit.edu/

do not track any personal information (Section 4), perhaps with a funding source other than advertising, seem appropriate.

6.2.4 EMail and Messaging. For the class of email providers and messaging applications a serverless peer-to-peer structure would not be far fetched. Many of these applications are encrypted end-to-end already, but the provider can still try to monetize meta data. The difference would be that the emails or messages are not stored centrally at the providers server, but instead locally on the users device. Again some redundancy is required, so that the role of the server is replaced by the DLT, or more precisely a small part of the peer-to-peer network of users. This backup also enables the users to synchronize between their different devices. In contrast to the first class something like a tool to micro-pay for hosting services might not even be needed, when the application requires users to carry this backup for other users, because messages are small. Only to attach bigger files, like pictures, audio or video recordings a solution similar to what we described in the class of social media needs to be found.

6.2.5 Public Transit Information and Other Specialized Applications. There are also a variety of specialized applications that are clearly appropriate for public funding and do not require the peer-to-peer approach. One example is apps for public transit information, including schedules, trip planning, and real-time arrival information. In Europe, these are often already publicly funded, but in the U.S., many transit agencies make their schedule and real-time information available via an API and perhaps a website only, so that users who want to access this information online via apps on mobile phones must do so via ones that are funded by the surveillance capitalism model (or by startups funded by venture capitalists whose business model is presumably to garner as large a user base as possible for eventual sale to the surveillance capital market). Public funding for the apps as well as the servers, with open source software that guards rider privacy, would be a relatively small additional expense and definitely worthwhile. One example of such a system is OneBusAway[13], which also includes open source versions of the server side software as well. OneBusAway is in production use in a number of regions in the U.S., Canada, and Europe. In informal presentations and discussions with transit riders, they often do not realize the surveillance potential of for-profit transit apps, but once they do, they typically strongly support an open-source surveillance-free alternative — thus providing another example of the importance of education.

6.2.6 Wrapping Up. The example application areas presented above that rely on strongly decentralized peer-to-peer architectures are structured in a fundamentally different way to the current practice; while others would need "only" a different funding mechanism. The peer-to-peer applications would not only require a rebuild of a significant part of modern software infrastructure, but also a fundamental rethinking by the developers of these new services. We have only guessed how the exploration of the design space shaped by the three properties listed in Section 6.1, and new obstacles may well arise. Let us therefore at least consider funding as one obvious source of obstacles.

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[13]https://onebusaway.org

6.3 Revisiting Funding Options

For many of the relevant applications we could describe implementations of the the peer-to-peer approach described in Subsection 6.2, embodying the three desired properties, that by design protect against the undesired outcomes of surveillance capitalism. This reopens all the possibilities, which we dismissed in Section 5, due to the problem of ownership and control, which the peer-to-peer approach addresses technologically. Given the modular and decentralized nature of this approach, different implementations of services, with funding from any of private, state, cooperative, or volunteer sources, should be capable of co-existing and evolving.

6.4 Open Problems

The approach described in Section 6.2 applies only to certain classes of applications; for the important cases of search engines and browsers, and also public transit information, we basically remained at the partial solutions of Section 4. It remains an open question as to whether these applications can be build in a way that prevents the undesired outcomes of Section 2, using distributed ledger technology or some other architecture. For other classes the peer-to-peer approach does not immediately solve all problems. It does not help to prevent the attempt to influence opinions by bots or trolls and for the effects of personal informational bubbles is only mitigated to the degree, that people decide to use filters and feeds, that open their world view. Similarly for employment platforms the competition between workers may still push the wages to a precarious level. Furthermore we did not address the questions of how the industry could evolve and be restructed, as well as how to overcome an imbalance between the largest companies and new contestants in funding and incentivizing good developers and designers.

7 CONCLUSIONS

In this essay, we began by describing the ominous implications of the business model of surveillance capitalism that underlies most of the major IT corporations, which include both intensive gathering and correlation of personal information and also behavioral manipulation. We then described three categories of steps toward solutions: education, regulation, and resistance. Following that we discussed a partial solution that involves encouraging the development and growth of for-profit corporations that still provide the IT software infrastructure services but without tracking personal information, and then outline a range of more comprehensive solutions for different portions of the IT infrastructure that more truly return control to the end users. While many challenging problems remain to be worked out, particularly with the more comprehensive solutions, we hope that this essay can help stimulate discussion of these problems and more importantly potential solutions.

ACKNOWLEDGMENTS

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