They are watching us: Designing for Behavioral Tracking Awareness.

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Abstract Surveillance Capitalism permeates every aspect of our lives. Our behavior is getting recorded, analyzed and used to influence our choices. How can we raise people's awareness in regards to Behavioral Tracking and the implication that it can have in their lives, allowing them to steer towards a more conscious interaction with digital media? And again, how can all of this be achieved on mobile devices, without disrupting the user freedom and offering a meaningful experience?"

Through User Experience and Behavioral design method, this Master thesis tries to give an answer to those two questions. Research has been conducted through different methods such as semi-structured interviews, user testing, observation, literature review, and desktop research. The resulting product is PanOp, a mobile app which, as in a "who will watch the watchers?" situation, tracks the activity of behavioral tracking apps, providing useful data to the user, who can become more aware of what behavioral tracking is, how it affects his life, and decide to take steps to regain his freedom.

Keywords *Surveillance Capitalism, Behavioral Tracking, Privacy, Behavioral Design, User Experience Design, Awareness*

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Introduction

Prolegomenon

This Master's Thesis focuses on the subject of behavioral tracking, or collecting user activity data to provide them with content especially tailored for them. The practice is placed into the so-called “Surveillance Capitalism” economic system, which is based on the idea of transforming personal data into commodities that can be used, traded, and sold for profit (Zuboff, 2019). Given the profound implications and the reach that this practice has on the population, and acknowledging the lack of education and readily accessible resources on the matter, the project aims at enhancing digital product user awareness on the subject while maintaining a high degree of accessibility and engagement.

Behavioral tracking happens in virtually every bit of our lives (Zuboff, 2019), and it was essential to narrow the scope of my research in order to obtain tangible and effective results (Muratovski, 2016). For this reason, I focused on raising the awareness of mobile user data collection, as smartphones have become a de-facto extension of almost everyone’s body due to their affordability and portability. 78.05% of the global population owned a smartphone in 2020 (Statista, 2022), and in Europe that number is even higher, a reported 93% (Schumacher & Kent, 2020). These numbers are expected to grow even more in the near future.

In light of the widespread use of this kind of technology and the economic system that encircles it, the topic of privacy (or the lack of it) becomes even more relevant. A smartphone can track the behavior of its user in a more granular way, as it has access to a GPS module which provides location data, a microphone, and a camera that can be used to analyze both user conversations, their surroundings and even communicate between de-

vices (Arp et al., 2016) and antennas such as WiFi and Bluetooth, which can connect to access points and determine locations, etc. As dreadful as it may sound in any other context (such as a private investigator following you and writing a complete report of your actions in real-time), when the offender is a smartphone the sensation of discomfort is almost nonexistent, and it gets justified by the convenience of accessing its functionalities on a whim. This can be linked to a phenomenon referred to as "The Wisdom Gap", or the difference between the rapidly increasing complexity of the technological issues and our human ability to make sense of them (Technology, 2022). In a time in which sophisticated Artificial Intelligence algorithms can write pieces of text (Brockman et al., 2020), (GPT-3, 2020) that can be mistaken as human takes and could potentially sway the public opinion, how can we counter it if we are not even aware of this?

Due to the COVID-19 pandemic, the usage of social media and entertainment apps has skyrocketed (Koeze & Popper, 2020). The tailoring of content and advertisement can nudge people into behaviors that are designed against their natural interests, like purchasing certain products or being more inclined to vote for certain parties (BBC, 2018), but it can also affect the physical and mental wellbeing (as well as the strain on the National Health Service) by gaslighting its users into self-diagnosing certain conditions, such as ADHD and Tourette's Syndrome (Yeung et al., 2022), (Olvera et al., 2021). Enhancing user awareness of behavioral tracking and its effects can lead to an improvement in their overall wellbeing.

Motivation

Privacy has always been a theme dear to me, as I feel that everyone should be allowed to have a space where they can retire themselves, free from external judgment and interferences, in which they could elaborate on their own opinions and form their own thoughts. In ancient times, the so-called "Right of Sanctuary" offered people a refuge from persecutions; once you stepped foot inside the sacred grounds, nobody could come for you. Even if these institutions lost their purpose a long time ago, up until recently people could count on having the same kind of experience (even if they would still be vulnerable to the government, you could consider yourself in a space virtually devoid of external interferences) as soon as they locked the door of their homes. As we started developing and allowing technology with tracking capabilities in our lives, however, we started giving away this right, little by little, in the name of convenience. The convenience factor in the equation is so important that the argument of "Why should I be worried about people spying on me if I have nothing to hide?" takes more and more space in the public debate - Edward Snowden answers that question by stating that "saying you don't care about privacy because you have nothing to hide is like saying you don't care about free speech because you have nothing to say". We are slowly but steadily cornering ourselves in a situation that provides no exit; the best time to ask ourselves how not to find ourselves in this situation has come and passed, but the second-best time is now.

For this thesis, I decided to focus on designing a digital experience that could allow people to gain knowledge about the topic of behavioral tracking, which is pervasive in our everyday life, in a way that could result engaging and non-intrusive. I blended

behavioral and user experience design to craft a digital experience that could allow even the so-called “non-initiated” to understand the impact that this tracking technique can have on their lives. The focus on smartphones and social media apps was meant to reach the widest audience possible.

The decision to undertake this journey was guided by the understanding that the majority of the people are not keen on losing their privacy, but since in order to regain it you have to lower the perceived quality of life, only a small part of them actually decide to follow through. Through awareness, people will be prompted into thinking about the issue, while being more mindful of their actions and the consequences, and subsequently making a conscious decision on how to progress.

What is Surveillance Capitalism?

Shoshana Zuboff, Harvard Professor and Social Psychologist, defined Surveillance Capitalism as “a coup from above, not an overthrow of the state but rather an overthrow of the people's sovereignty and a prominent force in the perilous drift towards democratic de-consolidation that now threatens Western liberal democracies” (Gray, 2019). These words can sound dreadful, and they indeed paint a grim scenario in front of us. If Industrial Capitalism transformed natural resources into assets that could be exploited for profit (with tangible consequences in our everyday lives, such as unregulated deforestation and mining, depletion of raw materials, and so on), Surveillance Capitalism is based on extracting pieces of information from their users, who is virtually everyone, to commodify them and use them to extract surplus value.

In 2020, Alphabet (Google’s holding company and number one player in the advertising game) generated 147 billion US Dollars just from targeted advertisement, which accounts for 80% of their total revenue (Inc., 2020). The advertisements are monetized in different ways depending on the customer's needs, but they rely on each user's searches. Looking for anything within their search engine (and within their ecosystem) will provide the user-specific ads which, if clicked, will generate profit for the company (Inc., 2022). The same applies to services like Google Maps, for example; If a user looks for a place (a supermarket, for example) he will first receive an advertisement regarding advertised supermarkets (shown in brighter colors and with a more prominent page placement), and only after that, he will be able to access the information about the ones closest to him (these practices are used by many actors within the system, and the Google references have been made for the sake of understandability).

This system inherently controls the flow of information, and it’s just a simple example of how the flow of data can be used to influence behaviors through behavioral design. In the aforementioned cases, the mere-exposure effect (the more you see the product, the more likely you'll be to prefer it over others) (Zajonc, 2001), the Contrast Effect (if the advertised product is presented better, people will tend to prefer it) (Kushner, 2008) and the Distinction Bias (two options will look more dissimilar if presented at the same time) (Hsee & Zhang, 2004) have a high impact on the future behavior of the user, an advantage that the company will use to capitalize.

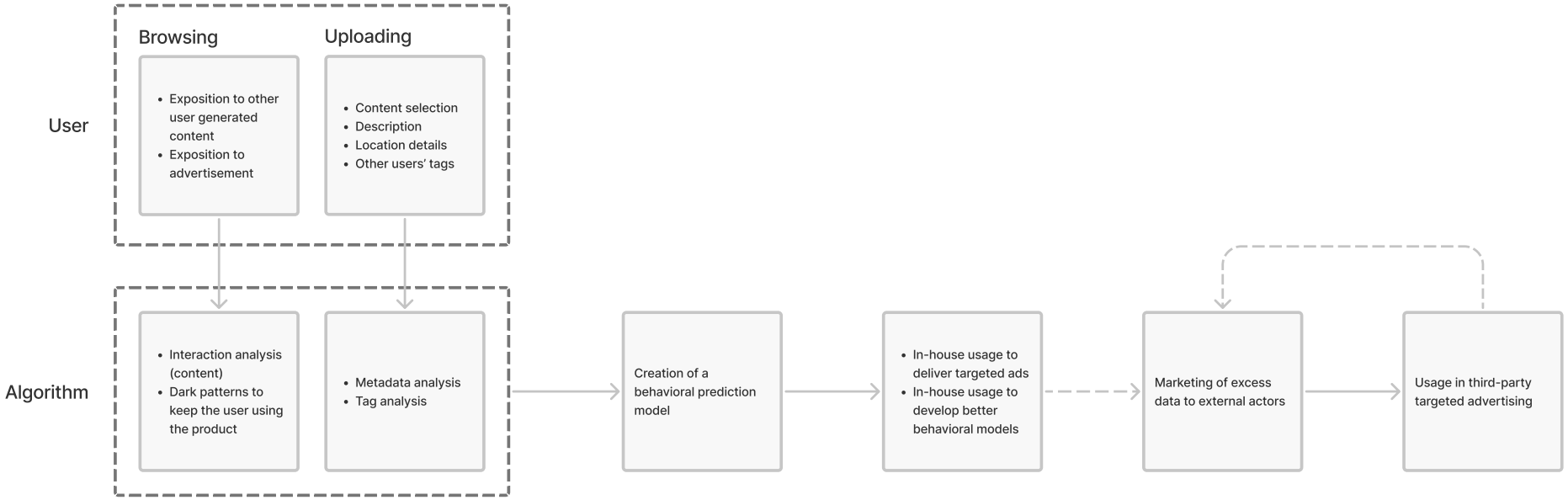


FIG. 1 Scheme contextualizing Surveillance Capitalism (Gherardi, 2022)

If societies are not defined anymore by their resources and industrial progress, but instead by the knowledge they hold, the capitalist paradigm that we got used to knowing doesn't change. Who has access to information? Who decides who knows? Quoting the Roman poet Juvenal, "Quis custodiet ipsos custodes?" (which translates to "Who watches the watchers?"). The main actors, the Surveillance Capitalists, can answer each of those questions - And that position was not given them democratically, they obtained it through controlling the means through which information gets collected and shared (Zuboff, 2019).

In regard to our scenario, Surveillance Capitalism takes form as follows: Each user gets exposed to content that caters to its own interests through a platform, and its behavior gets recorded. Likes, saved posts, duration of each interaction, most common searches and words, location data, and so on are collected (this takes the name of Behavioral Tracking), and an active effort in getting as many pieces of information as possible is made designing those platforms exploiting behavioral dark patterns. The data will then get fed to an algorithm designed to create a behavioral prediction model that will be used to deliver targeted advertisement. The companies will do that for their own clients (getting a first revenue stream), use these pieces of data to develop a better algorithm, then sell the data to third parties (second revenue stream). These third parties will be able to replicate the pattern up until the point in which said information gets too old to be accurate.

Even ignoring the fact that every aspect of our life is being commodified for someone else's profit, having granular control over "who gets served what" pieces of information is dangerous in every context of our lives. Knowing the best content to appeal to a certain audience can push them towards making purchases they would never do otherwise, change behaviors, gaslight users into self-diagnosing certain health conditions and, in some cases, sway the result of the democratic election process (BBC, 2018).

On a final note, claims regarding the alleged anonymization of the collected data have been made by the companies operating in this market. However, multiple journalists proved how it's fairly simple to reconnect those pieces of information to the original owner (Valentino-DeVries et al., 2018), (Gundersen, 2020). This poses an additional risk to the users, especially if they are in a risky situation; A report proved how it is possible and cheap to purchase data regarding people visiting abortion clinics (in the light of the current events happening in the United States of America), possibly putting the lives of those who access these services in danger (Cox, 2022).

Research Question

Throughout the whole project, the research question has been adjusted multiple times, narrowing the focus and allowing it to become more effective in the intervention. The final research question has become "How can we raise people's awareness in regards to Behavioral Tracking and the implication that it can have in their lives, allowing them to steer towards a more conscious interaction with digital media?", with the subquestion "How can all of this be achieved on mobile devices, without disrupting the user freedom and offering a meaningful experience?"

Project Boundaries

For this Master thesis, I focused on delivering a design proposal that successfully answers the research question "How can we raise people's awareness in regards to Behavioral Tracking and the implication that it can have in their lives, allowing them to steer toward a more conscious interaction with digital media?". Due to the peculiarities of the topic, I used a variation of the "Double Diamond" (on four stages: Discover, Define, Develop, Deliver) that will be discussed afterward.

Given the fact that Behavioral Tracking permeates almost every aspect of the current human experience, I decided to construct a secondary question that would allow me to have more control and focus over the whole process: "How can all of this be achieved on mobile devices, without disrupting the user freedom and offering a meaningful experience?". I focused on mobile devices as they are the most widespread way of accessing internet services, widely available to everyone independently of social status, race, location, and wealth. Since the audience is virtually anyone with a device, and since mobile device possession spans across generations (it's common for children in elementary school to have one, as well as for the elderly), the approach to the development of the concept took this factor into account. The topic is constantly evolving, and some of the research made during the Discovery phase of the project proved to be outdated by the Delivery phase. For this exact reason, I kept researching throughout the whole design process, updating the data and the concept accordingly to the latest discoveries in the field.

The complexity of the topic, the limited amount of time available and the size of the team played important factors in evaluating the focus area. The proposal will leave a margin for future developments, both regarding the cross-device availability of the service and the functionalities, depending on future feedback and the development of behavioral tracking technologies. As I am very interested in the topic and have both a passion and a background in Information Technology, I had to acknowledge my biases in every aspect of the project - I approached the research methodically, making use of interviews, user tests, observations, literature reviews, and desktop research, disregarding my personal opinions on the subject.

“Arguing that you don't care about the right to privacy because you have nothing to hide is no different than saying you don't care about free speech because you have nothing to say.” ”

Edward Snowden

Approaches

User Experience Design

Behavioral Design

User Experience Design

This project was for the greater part based on the User Experience Design approach (oftentimes abbreviated in UX Design or XD), a practice that uses research, data analysis, and test to make decisions regarding how humans and machines interact, discarding aesthetic preferences and personal opinions. This practice, pioneered and popularized by Donald Norman, finds its roots in human factors and ergonomics, fields extensively studied in physical product design, and translated to the digital scenario with the diffusion of workplace computers.

This particular branch of design is composed of 7 main elements, described as follows:

- **Research:** This part focuses on understanding users' needs and motivations to perform a certain task or use a certain service, understanding how they interact with the products, and figuring out all the actors involved in the system.

- **Visual Design:** Represents the visual perception of the user interface, the so-called look-and-feel. The purpose of this is to convey messages effectively through the use of visual elements such as shapes, colors, images, and symbols.

- **Information Architecture:** In this part, the focus is on structuring the pieces of information that will be presented to the user in such a way that they can be accessed and used seamlessly. This takes into account both the presented data (such as dishes in a restaurant menu, or transactions in a financial spreadsheet) and the navigability of the system.

- **Interaction Design:** Everything that allows the end-user to have meaningful and pleasant interactions with the product, allowing it to achieve the desired outcome most efficiently.

- **Usability:** This part is fundamental within digital and non-digital products, and it aims to letting the user achieve its goals with effectiveness, efficiency, and satisfaction.

- **Accessibility:** Its purpose is to lower the learning curve associated with the product, allowing every user, independently of their skills, to have easy access to the services that the product provides.

- **Human-Computer Interaction:** Its concern is the design, the implementation, and the evaluation of digital systems, as well as the various phenomena that surround them.

Behavioral Design

Another approach that had a substantial impact on this project is Behavioral Design, which focus is to understand and determine how design can shape and influence human behavior (Lockton et al., 2010). It makes heavy use of the theories of behavioral change, and it finds applications in multiple areas, from health to social media. This approach seeks to promote ethical behaviors, but the public debate is discussing the power it holds in case of exploitation and abuse. Independently of the criticism, however, it proves to be a strong approach in order to achieve the project goal.

"Design needs to be plugged into human behavior. Design dissolves in behavior."

Naoto Fukasawa

Data Gathering Methods

Semi-structured Interviews

Observation

Explorative Literature Review

Desktop Research

User Testing

The data gathering took place mainly via digital means, as it fitted the soul of the topic - However, I had chances to interview subjects in person, which proved useful to gain insights on the non-verbal side of their answers, adding valuable information on their feelings and behaviors on certain matters. The methods used were multiple, all within the field of qualitative research: semi-structured interviews, user testing, observation, literature review, and desktop research - each one of these methods aimed at gaining different kinds of insights, trying to get the most valuable pieces of information within the timeframe of the project.

Semi-structured Interviews

These kinds of interviews were conducted on chosen subjects due to their knowledge (or, in some cases, lack of) in the subject of interest. They were conducted singularly, letting the interviewee know in advance the topic of the conversation in broad terms. Lacking a tight frame of set questions, but instead allowing and encouraging controlled exploration and discussion, this method proved extremely useful not only to understand their thoughts and position in regard to the topic but also to point out new areas of interest that have not been considered in advance. The presence of a relaxed atmosphere built through small talk, the usage of layman terminology and the possibility to freely express and explain themselves were fundamental for the correct execution of the interview. This methodology was used in the Discovery and the Define phases of the design process, and it allowed to narrow down the focus of the research question as well as understanding the possible user's needs (Muratovski, 2016).

Observation

This method has been used to see and understand how users approach and deal with behavioral tracking and targeted advertisement in their daily lives, without being prompted to pay particular attention, to better understand their behaviors. This proved fundamental in drawing a line between what the selected users do, instead of what they state they do. In cases, questions were asked to understand the rationale behind their actions (Rodgers & Milton, 2013). This methodology was also used in the Discovery and the Define phases, as it provided useful leads to each individual's approach to the theme.

Explorative Literature Review

Having the possibility to access research papers and books on the subject was extremely important to the successful execution of the project. The main focus was on extracting useful information and contextualizing it in our scenario through the mediation of my research question. Through meta-analysis, the findings were combined in order to achieve a higher quality research result (Bolderston, 2008). I took advantage of this methodology during the whole design process, as the topic of behavioral design is actively developing, and new findings come out regularly.

Desktop Research

Since not every aspect of the topic has been thoroughly researched and reported in research papers and other materials, I actively took part in digging into the "whys" and the "hows" of the design choices in currently available products. This was meant to see and understand the so-called best practices, get a proper view on if and when they fall short on delivering the service they have been created for, and develop possible solutions to that.

User Testing

This methodology found implementation during the Development phase of the project, where there was a need to understand which design choices conveyed the desired message effectively and unequivocally. After testing the proposed solutions, users were prompted with a series of questions aimed at understanding their thoughts and perceptions regarding multiple aspects of the solution (Nielsen, 1994). Similar to semi-structured interviews, those questions allowed clarification or referencing to unforeseen topics, in a way that allowed to gather even more pieces of information that have then been used to develop the product further or to consider their implementation at a later stage, outside the timeframe of the Master Thesis.

Engagement Methods

Heuristics

- Framing
- Priming

Techniques

- CAR Model
- Optimal Challenge
- Optimal Information Flow

Having to counter an issue that aims specifically at influencing human behavior, I decided to put a huge focus on the same area. The idea was that by implementing positive behavioral changing techniques in the project, they could counteract the nefarious effects of dark patterns integrated into the digital products to gather more data. However, an ethical choice had to be made: should the users be steered towards a better understanding of the situation through patterns that would exploit their intrinsic needs and coerce them into using the product, or should the approach be mindful of each individual's liberty, allowing them to engage with the solution without recurring to forced interactions that would lower their quality of life? The answer was crystal clear, there was no point in working on a solution that should enhance their way of experiencing the digital world while using "dark techniques". Because of that, those patterns have been extensively researched to avoid them, while implementing behavioral design techniques that could still generate engagement and lead to meaningful results. These are divided into Heuristics, or cognitive shortcuts that allow the user to simplify decisions (David & Myers, 2013), and Techniques, reference frameworks that allow designing for activating certain behaviors (Combs & Brown, 2018).

Heuristics Not every form of heuristics has been implemented in the final deliverable. The ones that will be discussed in the following paragraphs were considered most appropriate for the project.

Framing The key idea for this heuristic is that, through design, a user can be influenced into creating his own personal reality, which will differ from objective re-

ality. (Tversky & Kahneman, 1985). For example, two products could be priced differently without having substantial differences - the more expensive one will give the perception of having a higher quality. However, this method does not stop at price; in this project, the Tone of Voice in which pieces of information were presented is the main focus of the heuristic.

Priming This phenomenon is based on external stimuli that could prime a certain idea without being actively aware of it happening (Kahneman, 2011). As an example, in a restaurant focused on vegetarian dishes, the environment, and the setting will likely lead the user into ordering a vegetarian meal, even if the menu also offers animal-based food. Given the fact that this activation heuristic is based on idea association, its efficacy varies depending on who's its subject.

Techniques As for the heuristics, only the techniques deemed appropriate to the project were included in the delivery. A brief overview of those is hereby presented.

CAR Model This model consists of three steps named Cue, Action, and Reward, and it can be useful to design habit-formation and long-term behaviors (Combs & Brown, 2018). The steps are described as follows:

- **Cue**: also known as trigger, is based on each individual's thoughts, feelings, and senses. They are meant to draw user's attention and lead them into a performing a particular action;

- **Action**: The behavior that it's desired to be performed more often;

- **Reward**: A positive reinforcement for performing the aforementioned action. Rewarding increases the chances to repeat said behavior.

Optimal Challenge A technique that aims to find the perfect difficulty balance to push a user into performing a task (Combs & Brown, 2018). If it is considered too easy, there will not be enough interest to pursue it; if too challenging, however, it will induce fatigue, leading to failure.

Optimal Information Flow This technique is based on evaluating the sequence of steps and weight of information to help users understand processes, concepts, and ideas quickly and with little to no friction (Combs & Brown, 2018).

Gathered Data

Semi-structured Interviews

Observation

Explorative Literature Review

Desktop Research

- Hardware Solutions
- Software Solutions
- Knowledge Solutions

User Testing

Semi-structured Interviews

During these interviews, I tried to connect and interact with various actors that could be involved in the process to understand their thoughts, feelings, and approaches that would prove beneficial to the project.

The vast majority of the interviews with future users turned out to be insightful, as most of the interviewed subjects stated their genuine interest in a product that would make them more aware of when they are getting tracked and its consequences. They proved not to see this kind of tracking as ethical and they would prefer not to be subject to it, which corroborates previous research in other markets (Turow et al., 2009) and shows that the market is receptive. When asked what they wanted to be able to see, a huge emphasis was put on the reasons why they are getting targeted with certain kinds of content even if they cannot understand the reasons. They noted that some apps offer you an explanation, but those are shallow and don't really provide enough information to have a clear understanding of the matter. When asking about their online behaviors, the results were split; part of the subjects said they tried their best to minimize their footprint while online, consuming content passively without engaging in interactions (such as leaving comments, reacting to content, sharing, and saving what they liked) as they felt that their mobile phones were meant to be windows into something they are interested in seeing but not in disturbing. Some others engaged way more within the constraints given by the device, as they perceived it as a sort of podium in which they could make their voices heard. When asked if they ever got advertisements or suggestions related to topics they never researched on their phones, the answer was a unison “yes”, but they never fully un-

derstood how that was possible, each one of them theorizing a possibility to justify it and move on with their lives. A common remark in the totality of the interviews was the feeling of powerlessness regarding this situation.

During the semi-structured interview with an IT Specialist, I asked the same questions as the "User" group, as well as more technical ones related to the feasibility of the project. His knowledge of the subject was more advanced than the average person in the other interview group, but he pinpointed the benefits he encounters in his daily life by being tracked, such as getting suggestions on how to spend his hard-earned salary and getting tips to restaurants and bars he could like whenever he travels somewhere new - because of this, he did not mind being tracked even if he doesn't fully trust those who track him. He proceeded to say that "it's the real price you are paying to have a useful product for free", a belief shared by various technologists (even if sometimes phrased differently) involved in the world of Surveillance Capitalism. He rarely engages with online content, and if he does it's mostly related to his job - he, however, interacts with targeted advertisements a lot due to the perceived convenience. Discussing the practical feasibility of the project he was skeptical in the beginning, due to not knowing the limitations of the Operative Systems and of the apps that will be analyzed. Regardless of his first thoughts, he reached out after the interview was over with multiple possible ways of implementing the technical side of the project while underlining the fact that he has not researched the matter in-depth and that to work it out proper research on the engineering side should be conducted.

Observation

Two observation sessions were conducted during the course of the project, one to prove empirically the capabilities of behavioral tracking and targeted ads, and the second one to cross-reference the described behavior of one of the interviewees in the "User" group with the statements made during the interview.

The first observation has been carried out on me directly, consuming and interacting with content related to snowboarding over the course of a week. Before the beginning of the observation, no conscious engagement with this kind of content has been done. During that week, the number of suggested content (such as photos and videos) related to the topic dramatically increased - as well as other content regarding winter sports, spanning from cross-country skiing to dog-sledding. Advertisement related to the topic increased, but not sensibly; this could also be tied to the time of the year and the winter season. However, after a couple of hours of coming back from a trip to one of the snow parks outside the city, I registered an increase in advertisements related to mountain sports, winter resorts, and technical gear, empirically proving the usage of interpolated data (using location, time and interest) in order to provide me with an advertisement that would engage me. It has to be noted, however, that the observation could be involuntarily biased by my perception even if I tried to be as analytical as possible, as it was conducted on myself.

The last observation was conducted over the course of an afternoon using a technique named "shoulder surfing" (observing the interactions of the subject with the digital device without disrupting his experience) to assess the claims of one of

the interviewees. The subject proved himself right in regards to his statement of passive fruition of digital content, as he rarely "liked" it, and never left comments for others to read or posted original content.

Explorative Literature Review

Extensive research regarding the topic of Surveillance Capitalism has been conducted, and the findings have already been reported in the "What is Surveillance Capitalism?" chapter. Methods for engagement have also been thoroughly explored and described in the previous chapter named "Engagement Methods".

Desktop Research

While conducting desktop research, I focused on understanding the current methods of signaling data collection in digital devices. From my findings, I discovered how this kind of signaling happens in three different ways, described as follows.

Hardware Solutions

On laptops, external peripherals, or whenever the form factor allows it, the main method of showing ongoing data collection is through the usage of light sources (such as LEDs). The light will be prompted to turn on whenever a sensor, usually a camera or a microphone, is active.

The downsides to this method, however, are multiple. First of all, it requires physical space to accommodate the light source; then, depending on the device architecture, a malevolent actor could bypass it, successfully acquiring data without the user's knowledge.

Software Solutions

On mobile devices or wherever the form factor has to be as small as possible, as well as a backup system in bigger products, the signaling will happen through digital means, this time conveyed by the main screen. The user will be prompted to allow data collection before being able to use certain features of the app, which can be either accepted or denied. In certain systems, the user will be also shown a visual reminder (usually taking the form of a color-coded symbol appearing on the status bar) which will automatically disappear once the data collection is over.

Even in this case, there are shortcomings: Applications could stop working properly if permissions are denied, and the permissions are not always clear in regard to what kind of data the software will collect, as they offer an umbrella definition that is rarely comprehensive. The color-coded symbols are not universally implemented by every Operative System manufacturer, and at the moment a shared color code is non-existent; Certain versions of Android use a red round shape encircling the clock in the status bar to signal an active microphone, while iOS (and Apple devices in general) use a more discreet yellow dot near the device icons in the status bar. The last downside of this solution is that being completely digital, a malevolent actor could find a way to deactivate the signaling system in order to acquire data without consent.

Knowledge Solutions

The last technique is based on the work of trusted individuals or communities who research, develop and share resources such as reports, articles, and software plugins allowing people to gain insights on how much people can trust tech with their data.

FIG. 2 Hardware solution implemented on a Macbook Air to signal camera usage (Apple, 2022)

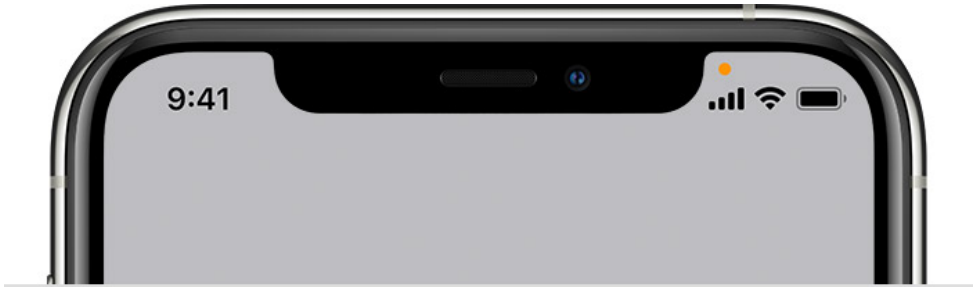


FIG. 3 Software solution implemented on iOS to signal microphone usage (Apple, 2022)

The downside of this method is that even if pieces of information are publicly available, they are oftentimes hard to find due to the fact that they are usually published on specialized websites, and rarely known to the average user. Those resources are usually aimed at professionals, requiring an active effort in order to understand them.

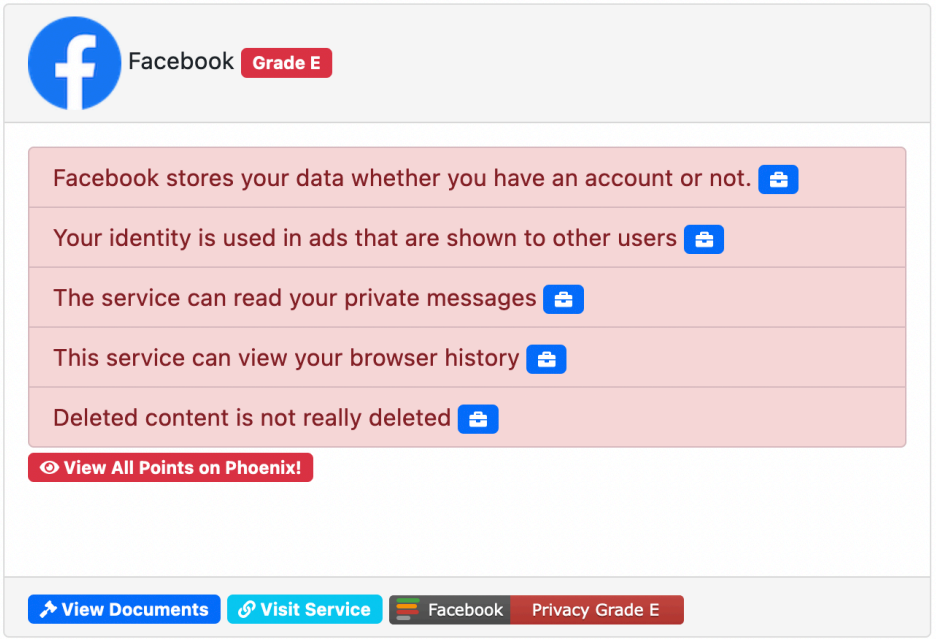


FIG. 4 Knowledge solution implemented to rate an online service (Terms of Service; Didn't Read, 2022)

User Testing

During the development phase of the project, I decided to test different mockups which shared the same goal while implementing different design solutions, in order to understand which ones would prove more effective in achieving the intended result. Since the product is a mobile application, I used a digital prototyping software to enhance the testing process.

The test was conducted on a pool of 10 potential users. They were offered to try three different flows and then answer questions based on their experiences. Given a common structure, each one of the prototypes differed in Interactions, Tone of Voice, and Visual Cues.

After a brief onboarding explaining the purpose of the app, all the prototypes had to be activated through a circular “Power Button” resembling the ones available on electrical appliances such as TV remotes. Once the button was pressed, a visual indicator of the app being active would appear on the status bar and the user was offered to see the overview of his daily tracking through a Call To Action.

The first prototypes showed a grey eye-shaped icon signaling the app’s active status, offered a colloquial and direct copy, and no interactions in the recap. The second prototype used a red dot icon, a neutral and stoic tone of voice, and a request to tell whether you saw a proposed advertisement during your day. The last prototype had a red eye-shaped icon, a dreadful and accusatory tone of voice, and shared the same interaction as the second prototype.

The results of the following test explained how the majority of the users found the prototypes easy to use, validating the navigation design side of the app. Most of the testers preferred the copy in the first prototype, stating how it was easy to understand. The interactive user flows used as an engagement method were warmly welcomed; this could be due to the fact that the testing was one-off and not in a real setting. Almost the totality of the users perceived the signaling icon, and the preferred one was the red eye-shaped one. All this feedback has been used in future iterations of the app.

Design Proposal

Premise

Introducing PanOp

App Overview

Interactive Prototype

Premise After careful consideration, I decided that in order to achieve the goal set by the research question, I would have to find a way to sensitize and raise awareness on the topic of behavioral tracking through the same screen from which users get tracked every day.

PanOp, short for “Panopticon” (a type of prison and system of control designed by the philosopher and social theorist Jeremy Bentham in the 18th century), serves exactly that purpose. In a Panopticon, all the prison cells are built around a circular ground plan and with an open view of the center of the circle. In the middle of the circle, an inspection house can be found, with a guard always present and able to watch the inmates. Even if the guard can’t control what is happening in every cell at the same time, the impossibility for the inmates to know or predict when they are being watched will lead them to behave like they’re being controlled at all times.

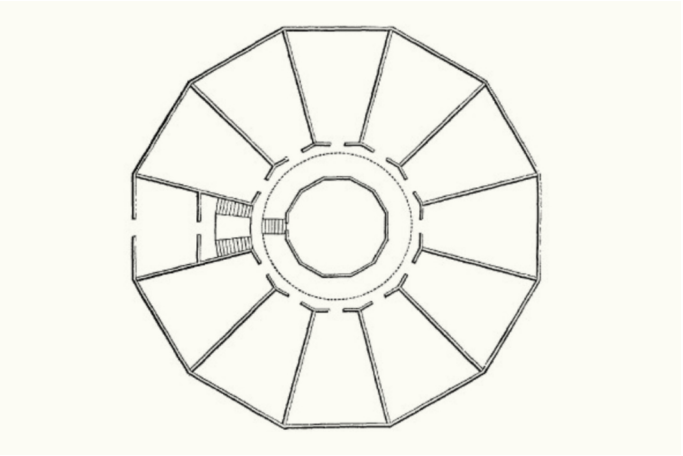


FIG. 5 Floor plan of a Panopticon building (Bentham, 1812)

Introducing PanOp

With PanOp the user installs the app on his mobile device, and after a brief onboarding explaining its function, he can decide to activate it. When he does, a small icon shaped like a red eye will appear on the left side of the status bar, always present to let the user be aware that it's being active observation is happening. PanOp will monitor the applications tracking the user for as long as it's active, and at the end of the day will create a short report describing the app's tracking activities of the day. The report will deliver pieces of information in a concise, colloquial, and clear way, actively achieving the Optimal Information Flow engagement technique (Combs & Brown, 2018) and the Framing engagement Heuristic (David & Myers, 2013). By activating questions tailored to the content the user was exposed to during the day, the app aims at enhancing concept retention by exploiting the CAR Model and the Optimal Challenge engagement techniques (Combs & Brown, 2018).

PanOp also offers direct and granular control over the statistic data through its "Activities" section, in which the user can access a chart tracking the weekly tracking in real-time (from the "Weekly Tracking" section) and see the tracking details for everyone of the tracking actors. The app also offers the possibility of reviewing the Interactions that the user had with the content he got exposed to such as liked posts, recommended posts, and targeted advertisements through the "Interaction Recap" section, which will allow him to have an overview of the reasons why something has been suggested to him, as well as other suggestions he had based on common topics. This serves the purpose of exposing the mechanisms of the system, in order for him to develop a conscience that will help him to avoid the possible mindless behavioral conditioning.

The "News" section of the app will provide easy access to knowledge sources on the topic, such as articles and podcasts, selected especially for their clarity and ease of access. The selection is updated regularly, in order to keep the user in the loop with the latest developments in a subject that evolves continuously.

The "Settings" app provides a quick overview of the scope of the project, allows the user to access the public repository of the app's source code, and allows the deletion of all the app data saved on the device.

Multiple iterations of PanOp were made and tested before this version, which encompasses all the key features in an easy-to-use application.

App Overview

In the following pages, the user flow and the main sections of the app will be shown and explained.

User Flow This chart illustrates the possible user flows within the app, with a brief description of the possibilities in each section.

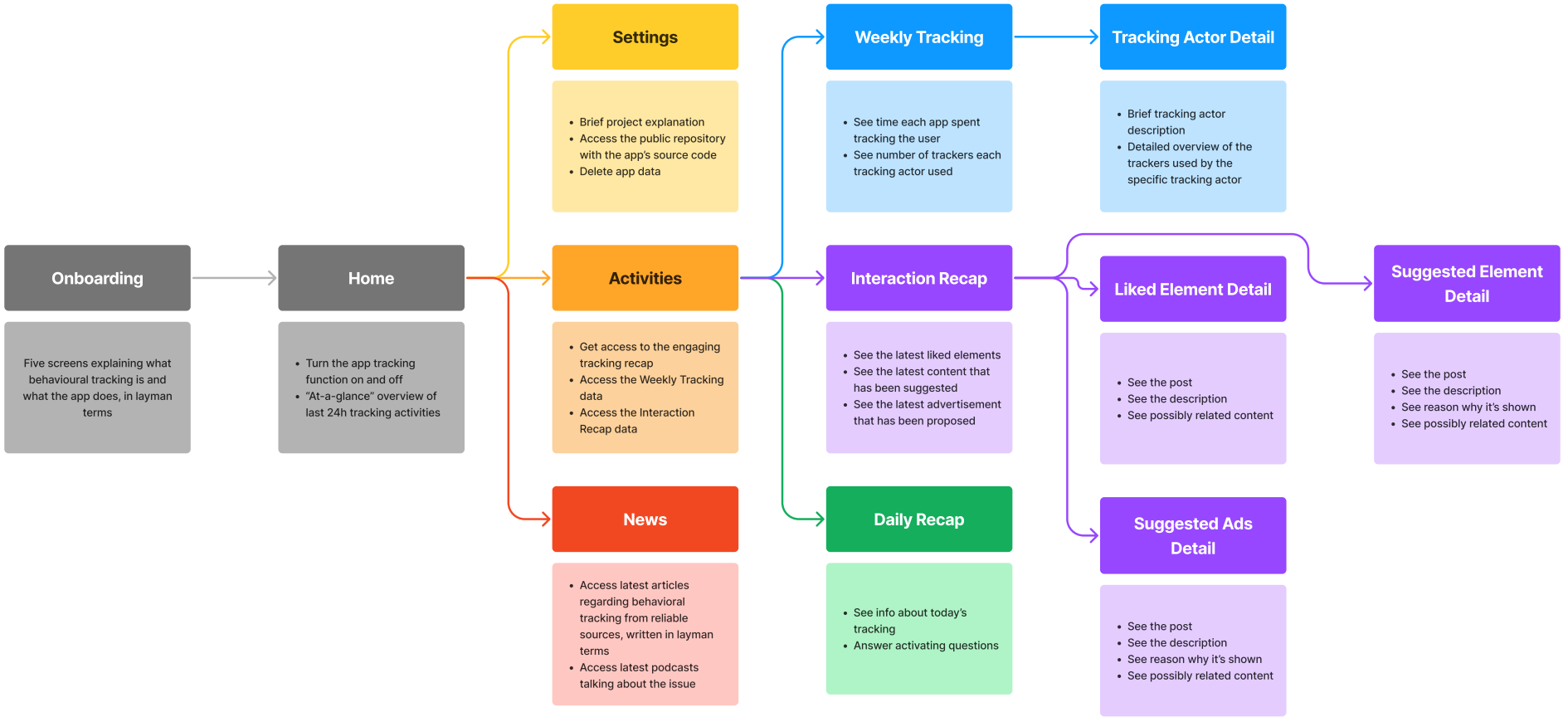


FIG. 6 PanOp's User Flow (Gherardi, 2022)

Onboarding This flow introduces the app and the concept behind it to the users, independently of their knowledge.

The screens are missing illustrations that could further help conveying the message. I decided to omit them as they could've moved the focus away from the core concept.

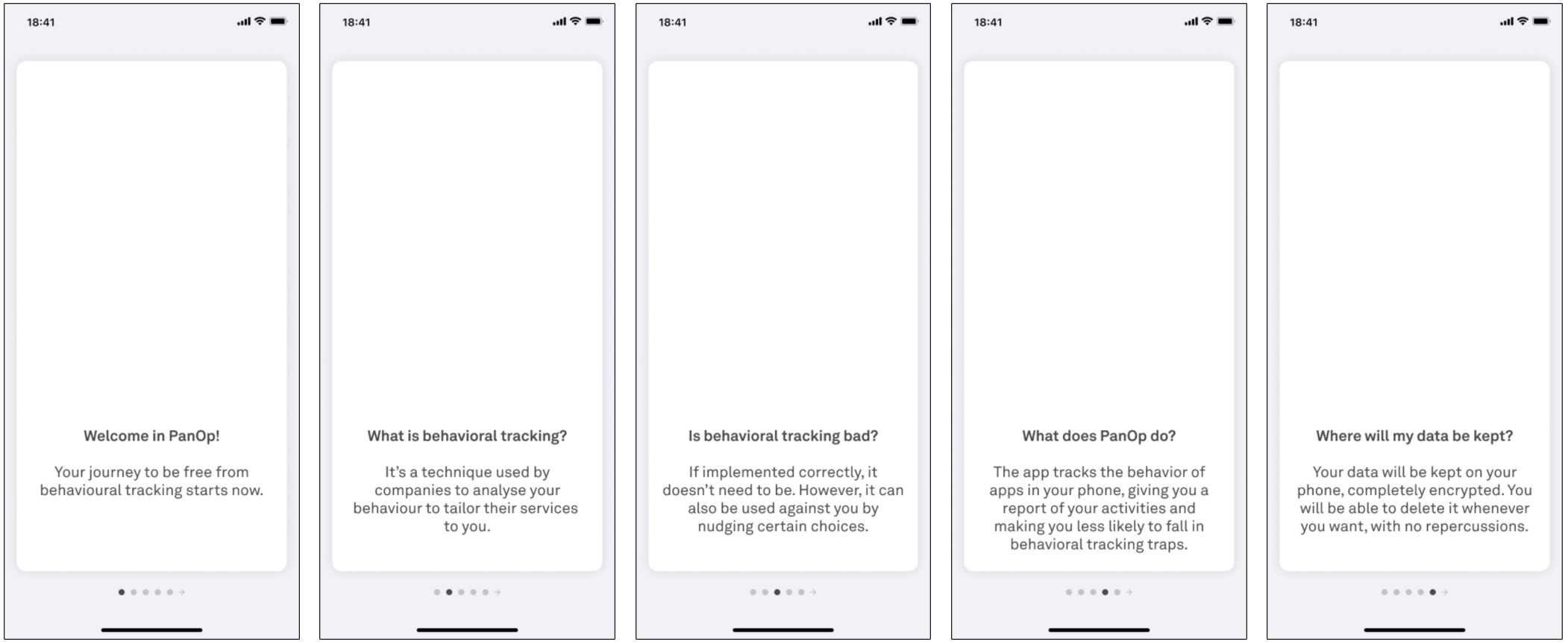


FIG. 7 PanOp's Onboarding screens (Gherardi, 2022)

Home The “Power Button” shadow changes color to signal the app status. When working, the shadow will be blue, a red eye-shaped icon will appear, and the copy underneath the app name will change.

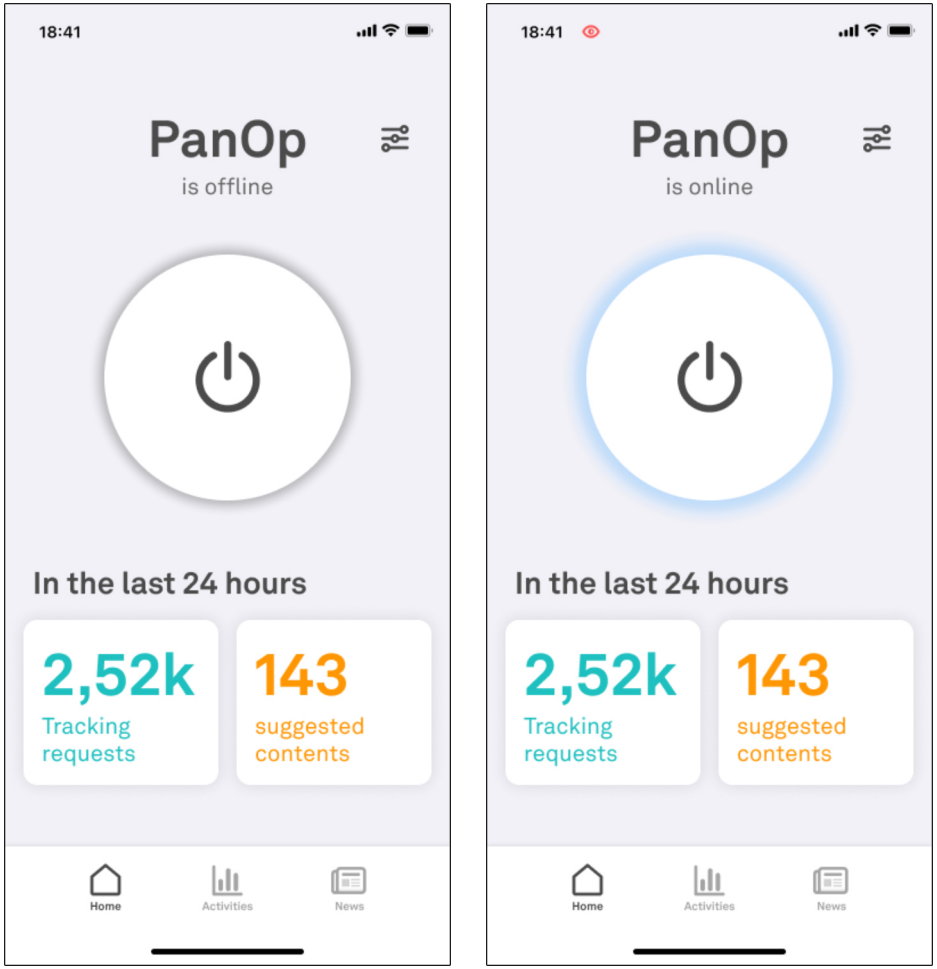


FIG. 8 PanOp’s Home screen (Gherardi, 2022)

Settings There are not many possible options, to keep the experience easy and accessible. The user can read a brief description, access the public repository and delete the app’s data.

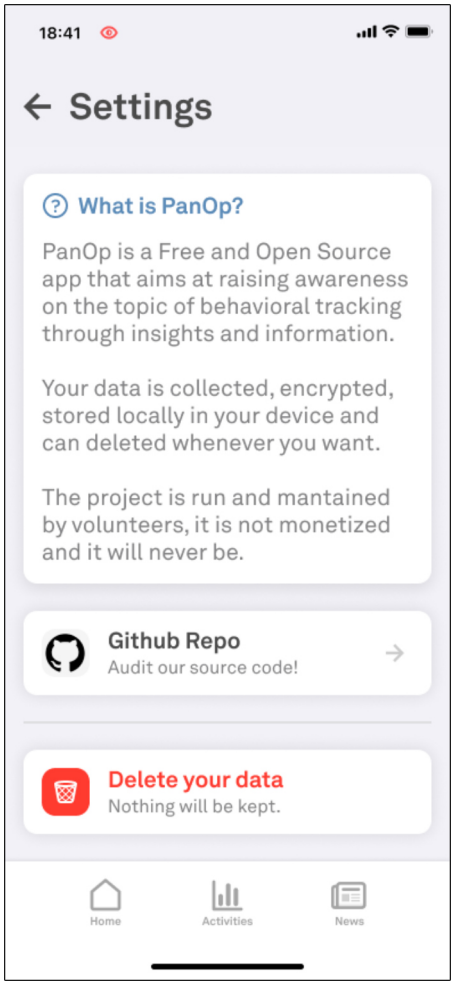


FIG. 9 PanOp’s Settings screen (Gherardi, 2022)

Activities This page offers an overview on the latest tracking activities. Tapping on each element will give the user the most relevant pieces of information.

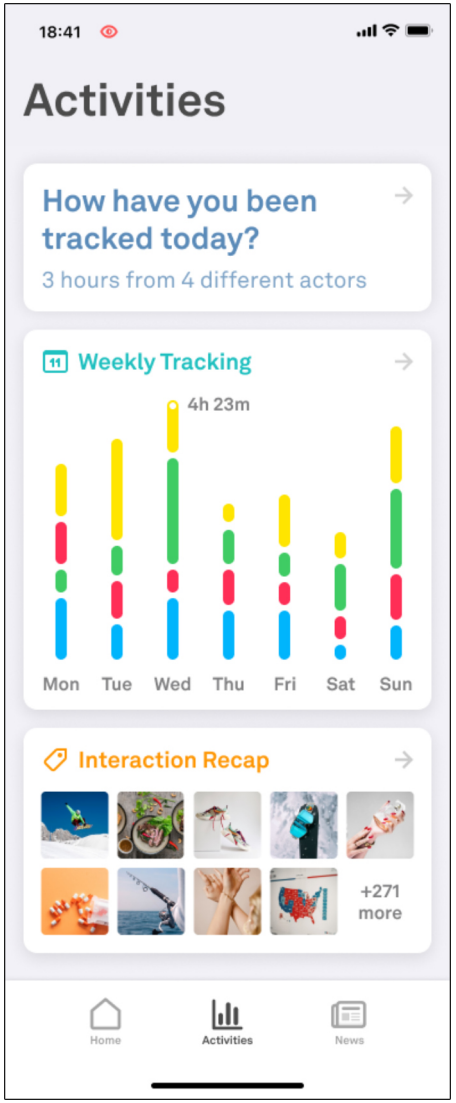
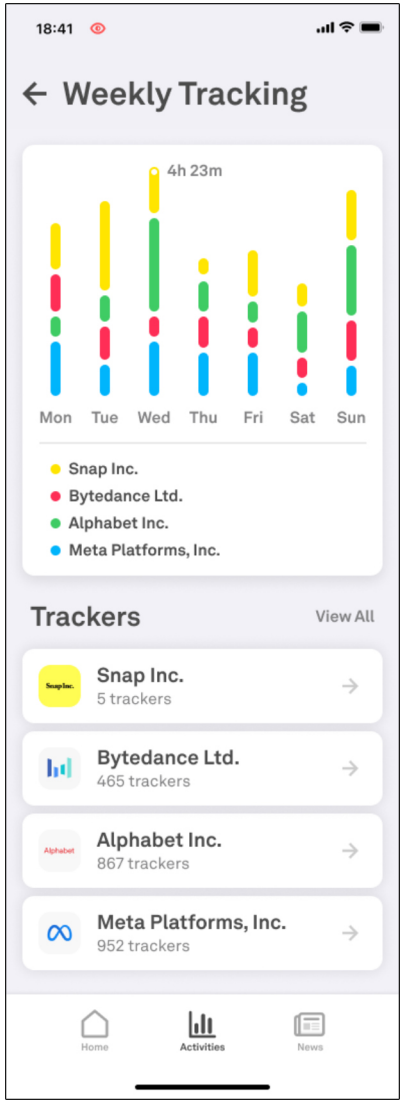


FIG. 10 PanOp's Activities main screen (Gherardi, 2022)

Weekly Tracking These screens offer more detailed data on the weekly tracking activities and tracking actors.



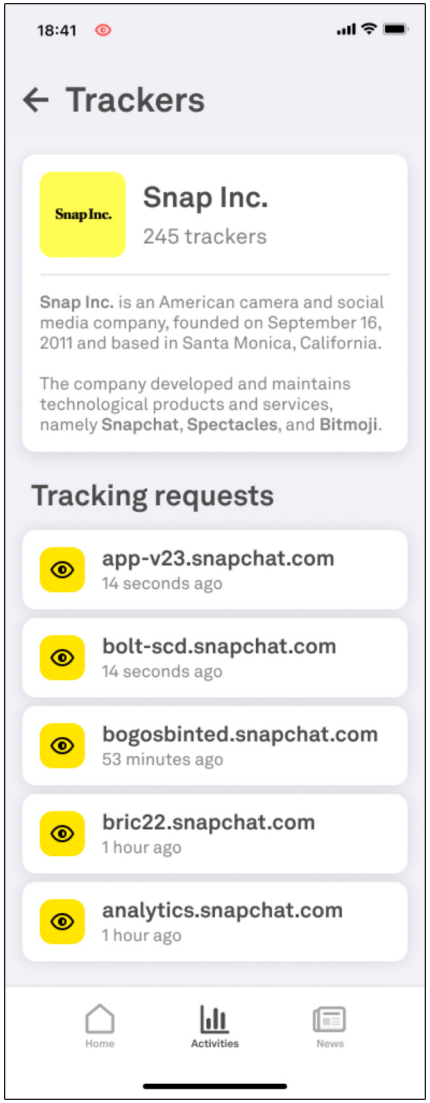


FIG. 11 PanOp's Weekly Tracking screens (Gherardi, 2022)

Interaction Recap

This flow allows the user to examine the interactions he had with content, as well as suggested contents and advertisements.

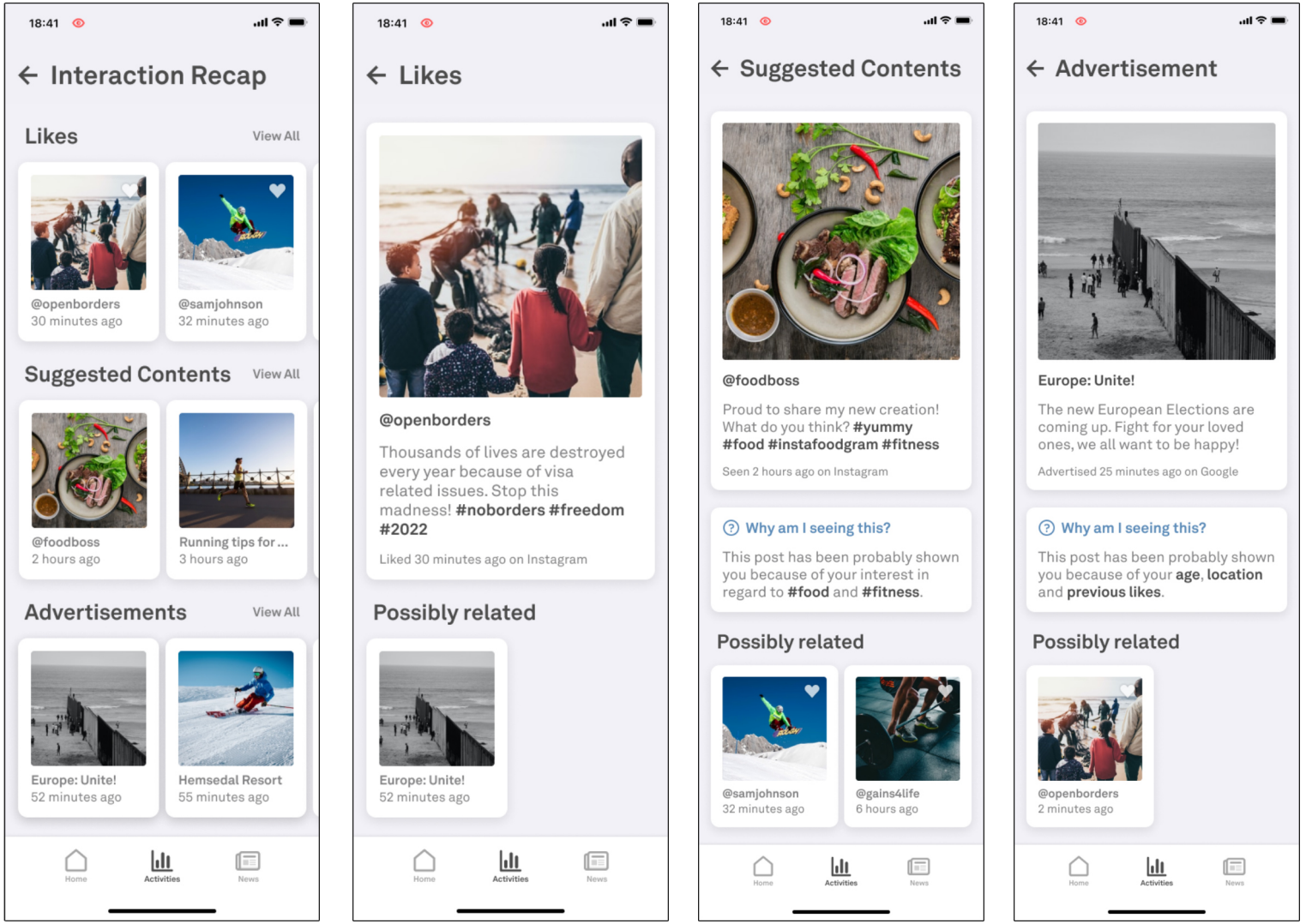


FIG. 12 PanOp's Interaction Recap screens (Gherardi, 2022)

Daily Recap (1 of 2)

This flow allows the user to see, through a colloquial and direct copy, the tracking for the day. Each day, the text will vary (as well as the statistics, depending on the tracking activities) in order to keep the user engaged. The tone of voice is based on the preferences that emerged from the user testing.

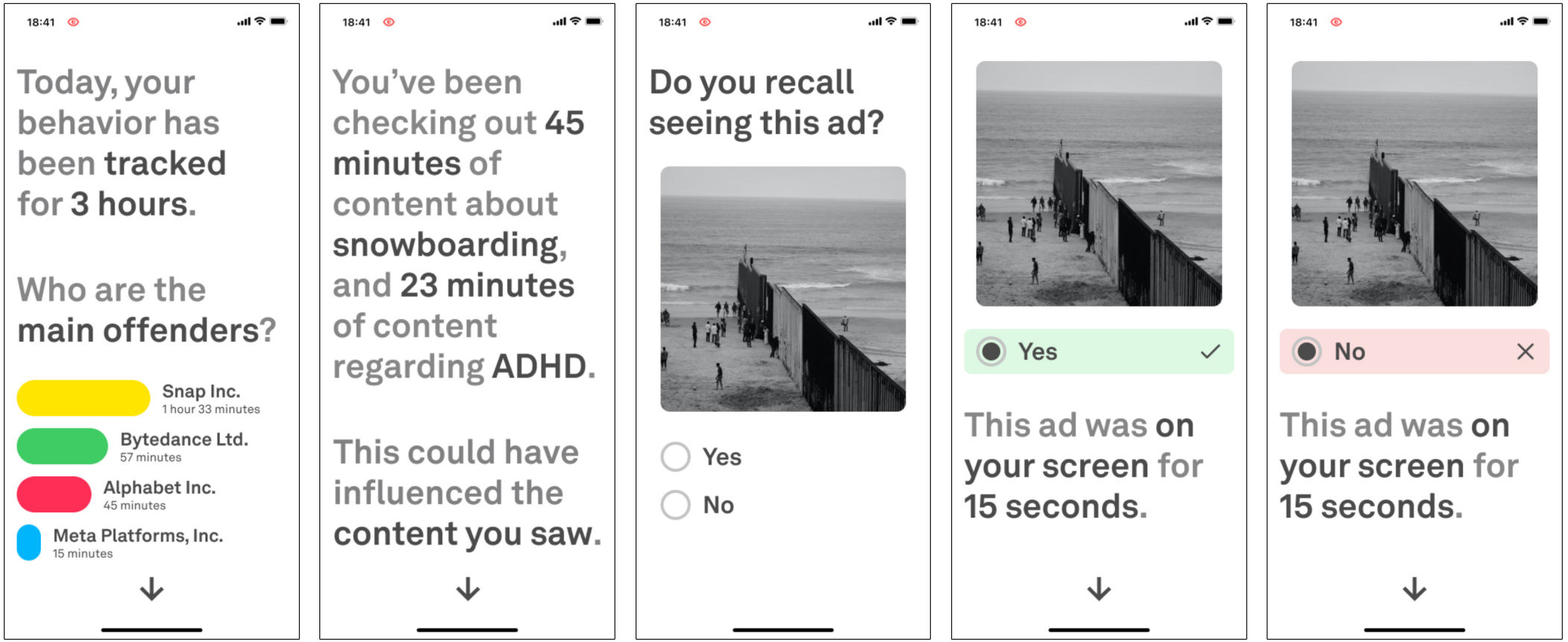


FIG. 13a PanOp's Daily Recap screens (Gherardi, 2022)

Daily Recap (2 of 2)

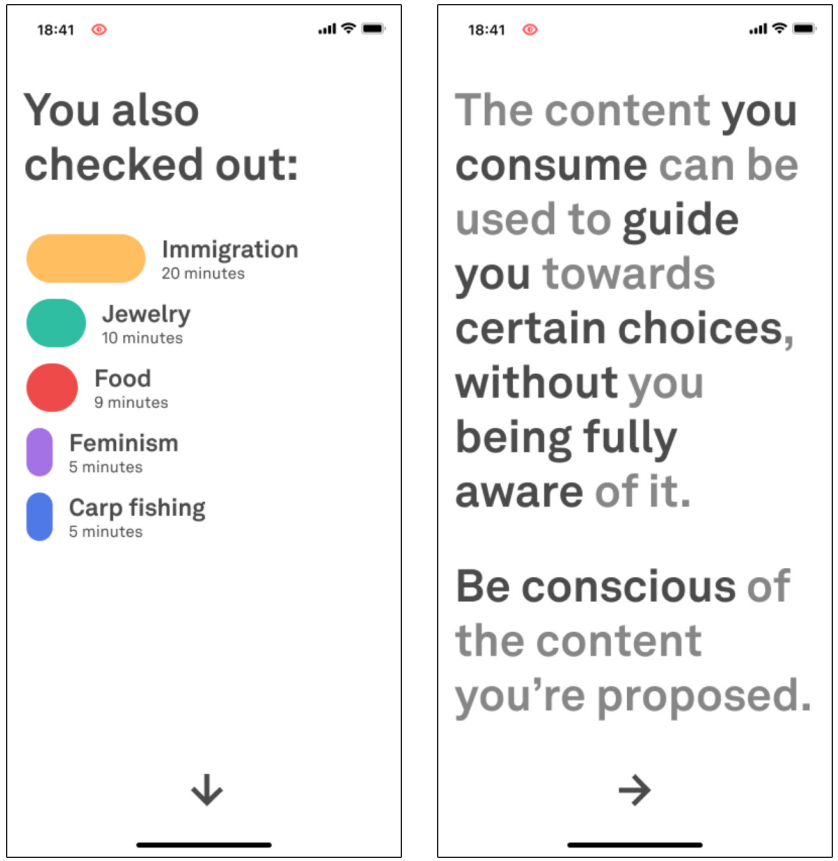


FIG. 13b PanOp's Daily Recap screens (Gherardi, 2022)

News This section offers the user easy-to-access content to keep himself updated on the latest developments. When some content is selected, the app will open it in the default browser.

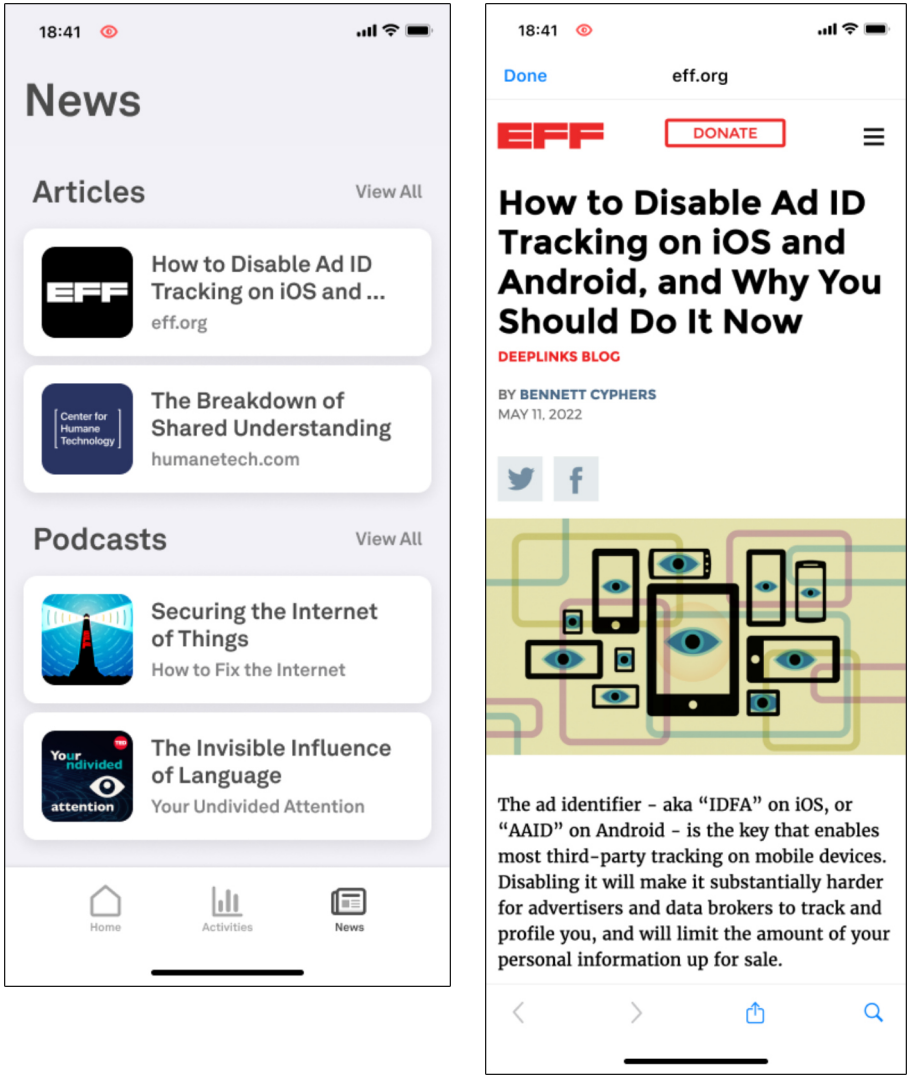


FIG. 14 PanOp's News screens (Gherardi, 2022)

Interactive Prototype

An interactive prototype of PanOp can be found clicking here, or scanning the following QR code.

FIG. 15 PanOp's Interactive Prototype QR Code (Gherardi, 2022)

Device Mockup

FIG. 16 PanOp's Device Mockup (Gherardi, 2022)

Discussion

Freedom of action

A paramount value upon which PanOp is built is respecting the individual freedom of its users. Saying that data collection is exclusively nefarious would be an utter lie, it can be helpful and provide value for those whose data is being collected. The focus of the app is raising awareness on the matter while nudging people into being more mindful of what happens with their data, but there is no desire nor will for steering the users into avoiding every kind of tracking if they do not want to. Everyone has the right to make their decisions depending on what they need, and this is the reason why the app offers no reward for avoiding tracking.

A case against Gamification

Gamification is a very powerful engagement technique to change user behavior, and its implementation has seen a quick rise in popularity in the recent period. It finds its roots in game design, from which borrows characteristics and mechanics and implements them in other fields. If implemented correctly, it yields incredible results in regards to user engagement, leaving the user yearning for more. This, however, is a double-edged sword in my project: even if a user's engagement is positive, I don't want to leave my user base in a state of desire to come back for no reason other than completing quests. The relationships that are built between a user and a gamified experience are based on the desire for rewards after showing the desired behavior, and that would be detrimental to the belief of the project described in the last chapter.

Free and Open Source Software, Data Management

In order to be able to trust an app that has an overview of the user's tracking, the source code has to be freely accessible and auditable by virtually everyone. In order to do this, one of the cornerstones of PanOp is being Free and Open Source Software (oftentimes abbreviated in FOSS), with the source code available on a public repository. In this way, everyone with the proper knowledge can verify the inner workings of the app, assuring the rest of the users that it is not a malicious piece of software.

The software being free from monetization is fundamental in building trust; Data cannot be collected, bartered, or sold. PanOp will be maintained by volunteers, who will take part in the development effort because they believe in the project. This strategy has been implemented in multiple products widely available to the public like Blender, VLC, and LibreOffice, proving its efficacy on a large scale.

Regarding the management of the collected data, the data is thought to be encrypted and stored in the internal storage of the mobile device, with no way of transmitting it to external servers. This design decision is taken in order to reinforce trust in the system and reduce the chances of data leakage in case a remote server gets compromised. A malicious actor obtaining the encrypted data will have no way to access it, as he does not know the decryption key. All the stored pieces of data can be safely deleted by the user at any time with no repercussions on the user experience (other than losing the log of the activities that happened prior to the deletion).

Late Use considerations

Since PanOp is a tool meant to raise awareness on the subject of Behavioral Tracking, the hoped outcome is that a user will be able to part ways from the app once he fully understood the concepts and decided how to approach the issue for himself. However, the app could be considered a helpful tool for keeping up to date with the latest developments regarding this technology, and keeping track of possible biases and echo chambers through cross-referencing the content the user engages with the content he gets proposed.

End-of-pipe solution?

It could be argued about PanOp is an end-of-pipe solution, aiming at educating the users on the matter without actually shifting the paradigm to a more mindful approach to data collection. However, being aware of an issue is the first step toward solving it. Edward Osborne Wilson, the so-called "Father of Biodiversity", stated that "Humans have Paleolithic emotions, medieval institutions, and god-like technology"; technological advancements are moving faster than ever and in a way we couldn't even imagine some years ago, and both individuals and societies struggle to keep up with what happens. The audience does not have a clear picture of the issue yet, and the regulations are not comprehensive. In order to be there and tackle those issues, those issues have to reach the mainstream audience and be understandable while doing so. Only through this, lawmakers can create regulations to control the collection of data, theorists can ideate better ways to move forward, and finally reach the desired paradigm shift.

Future Developments

In case PanOp gets developed further, an effort into researching and integrating more activation techniques is strongly suggested. At the time being, the systems which have been implemented are few but have proved to work for the majority of the test subjects. In order to reach an ever wider audience and yield better results, focusing on engaging could prove useful. While doing this, it is suggested to widen the test subject pool during the testing phase to have more insightful results. Testing should happen by making use of people from different backgrounds and ethnicities, as a person taking part in the user test pointed out how the most suitable tone of voice could vary depending on the environment and the social norms of the user group. This consideration could have an incredible amount of potential and it deserves to be further developed.

Due to time constraints, I decided to prioritize the user experience over the visual appeal of the app; Building a stronger visual identity for PanOp could help to increase the user base.

To have better chances of reaching a critical mass of users and developers, it should be considered to pitch PanOp to non-profit organizations that are involved in technological issues, such as the Electronic Frontier Foundation. This could prove useful to get news coverage, as well as reach and if needed, funding.

"The real problem of humanity is the following: We have Paleolithic emotions, medieval institutions and godlike technology. And it is terrifically dangerous, and it is now approaching a point of crisis overall."

Edward O. Wilson

Conclusion

Answering the Research Question

Final considerations

Answering the Research Question

PanOp answers both the research question “How can we raise people’s awareness in regards to Behavioral Tracking and the implication that it can have in their lives, allowing them to steer towards a more conscious interaction with digital media?” and the sub-question “How can all of this be achieved on mobile devices, without disrupting the user freedom and offering a meaningful experience?” making use of behavioral design and user experience design approaches and methods. Through enhanced knowledge, users can be more mindful when confronted with targeted content and advertisement, reducing the risks connected to it. Allowing the users to choose their own approach to the issue by not challenging them into avoiding all the tracking, but working on sharing information and building culture around the topic, the risk of polarizing individuals is minimized.

The usage of a direct and colloquial tone of voice serves the purpose of conveying the message easily and clearly, enhancing the retention of the content. This could lead to having these subjects discussed in the public debate, possibly accelerating its regulation and paradigm shifts. Others engagement methods allow for a wider reach, independently of personal preferences.

Final considerations

PanOp has to be considered as a product still in its early development stage - it proves a concept, but as stated in the chapters “Discussion” and “Future Developments”, it still has room for improvement that could not be made due to the time constraints of this project. Nonetheless, it can still be useful for sparking curiosity, starting debates, and advancing in this new and almost ubiquitous field.

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Figures

List of figures

Thanks to everyone involved.