SPECIAL

Scalable Policy-awarE Linked Data arChitecture for prIvacy, trAnsparency and compLiance

Deliverable D4.2

Usability testing report V1

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SPECIAL DELIVERABLE

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1 Introduction

In **D4.1 Transparency dashboard and control panel release V1** multiple user interfaces are presented including a design for a privacy dashboard, that aims to provide users with transparency concerning the processing and sharing of their processed personal data, and multiple interfaces to obtain user consent enabling users to make informed privacy decisions, while having more control over what happens with their personal data. The evaluation of these interfaces was not discussed in **D4.1 Transparency dashboard and control panel release V1**. Therefore, this deliverable will report on conducted to date evaluations and user tests of the developed prototypes and user interfaces.

As stated in deliverable **D4.1 Transparency dashboard and control panel release V1**, the presented prototypes are in a rather early stage and require multiple further iterations so as to develop a robust and solid design. In keeping with the agile development methodology, smaller user tests to evaluate the prototypes are reasonable and adequate to collect feedback on a more frequent basis and to make adaptions based on the results of these user tests. This approach conforms to Nielsen's Usability Engineering Lifecycle (Nielsen 1994), which we use as our methodology to address usability from the beginning of the development of our functional components. The goal of these early user tests is to identify usability issues and pitfalls that come along with the concept and design of our user interfaces, which can be corrected rather easy early in development but are more difficult to change in a later stage of the development process.

It is also important to emphasize that testing the usability of our system is only one evaluation criteria. Since we propose alternative approaches for consent interfaces, we also want to measure the impact of our user interfaces on the user's willingness to give consent or not. As also stated in deliverable **D4.1 Transparency dashboard and control panel release V1**, it is an important goal to strengthen users in their confidence to give consent by informing them about the intended personal data processing in a more comfortable manner and by increasing the level of control given to them.

At the time of writing, the current version of the designed and developed privacy dashboard went through one development iteration. An expert evaluation has been conducted with three usability experts. Based on the collected feedback several adoptions have been made that will be presented in this deliverable as well. Besides the evaluation of the dynamic consent interface, the evaluation of the other consent interfaces is not included in this deliverable, since an evaluation of them is scheduled after the deadline of this deliverable, thus the results of those tests will be presented in **D4.4 Usability testing report V2**, which will be in due in M27.

The remainder of this deliverable is structured as follows: Chapter 2 will reiterate the scope of this deliverable. Chapter 3 gives a rather brief overview of the methodology used to evaluate the prototypes. Chapter 4 reports on the evaluation of the privacy dashboard. Chapter 5 presents the evaluation of the consent interface. Finally, Chapter 6 concludes this deliverable.

2 Scope of this deliverable

This chapter aims to specify and narrow the scope of this deliverable. We therefore refer to the description of the deliverable in the proposal. There it says:

"The results of the usability testing (T4.4) will be documented and used to inform future releases of the platform (D4.3 & D4.5)."

- Description of D4.2 in the proposal

Based on this description, it is reasonable to look at the proposal's definition of task **T4.4 Front end usability testing**, which says:

"This task will be dedicated to testing the robustness of the transparency dashboard. The objective of the task is threefold: (i) to stress test the individual components and the dashboard both in terms of performance and scalability; (ii) to validate the usability of the dashboard; and (iii) as per T3.6, to expose the front end to open penetration/hacking challenges in WP5."

- Description of T4.4 in the proposal

Consequently, this deliverable addresses aspect (ii) of the task's description. In contrast to what the description of **D4.2 Usability testing report V1** indicates ("[…] *used to inform future releases of the platform (D4.3 & D4.5)"),* planned or already realized adaptions to the interfaces based on the results of our tests are document and presented in this deliverable as well.

Moreover, to avoid confidentiality issues with regard to the use cases of our industry partners, we did not address the use cases in our user tests but used our exemplary BeFit use case. The results of these user tests are rather generic and apply to the use cases as well. However, a more in-depth elaboration on the issue will be part of **D4.4 Usability testing report V2**.

3 Methodology

As already stated in the introduction of this deliverable, we follow Nielsen's Usability Engineering Lifecycle (Nielsen 1994) for the design and development of our user interfaces and prototypes to address and pursue usability from the beginning of the development process. Nielsen's work is considered fundamental in the field of usability engineering and is well-suited for the design and development of complex systems that are intended to be used by various user groups including rather inexperienced users. The Usability Engineering Lifecycle consists of the following seven phases (Möller 2003), which are briefly discussed in the following separately:

1. Analysis
2. Design
3. Prototyping
4. Expert evaluation
5. Empirical testing
6. Iterative design
7. Feedback from field

ANALYSIS

The cycle starts with the Analysis phase, in which the target users of the system are defined and analyzed with regard to specific aspects and criteria. Here, users could be categorized by their familiarity with technology or their privacy-awareness for example. The Analysis phase further involves the definition and specification of tasks that the to-be-developed system promises to solve and possible conventional means that are used by the target users to solve the same tasks.

DESIGN

In the Design phase, the system is designed in a manner that includes the development of concepts that take into consideration the target users, the specified tasks, alternative means to solve the tasks, and the context of the system's use. The design phase is passed through in iterations with the intend to refine the design after insights have be gained from the collected feedback. Therefore, it can happen that parallel design versions exist in one or multiple iterations, which are tested separately so that the results of the conducted user tests can be compared.

PROTOTYPING

The Prototyping phase aims to implement the system entirely or certain components of it. Prototypes can be categorized into three different categories: horizontal, vertical, or scenario-based prototypes. Horizontal prototypes aim to present the system completely, while not offering any or only reduced functionality. This is achieved by using placeholders, dummy data, or simulations. Vertical prototypes, on the contrary, are limited to a certain feature of the system, while neglecting all other planned features of it. The combination of both approaches is called scenario-based prototype.

EXPERT EVALUATION

Developed prototypes are then evaluated by so-called usability experts, since these prototypes are in a too early stage in order to be shown to real users of the target group. To get constructive feedback it requires experienced users who are able to infer from the presented prototype to a possible product that is run in production. Here, smaller groups of users can be used so that evaluations can be conducted on a more frequent basis. However, it is also possible to already work with real users in this phase (Möller 2003) in combination with developers and usability experts.

EMPIRICAL TESTING

In contrast to the expert evaluation, the Empirical testing phase involves real users of the system that test the system in a specific environment for example on a dedicated and tested device with a certain network connection and so on. Feedback is collected in this phase as well, which is considered in following iterations.

ITERATIVE DESIGN

In the Iterative design phase, the next iteration is prepared by gathering the feedback and deciding which adaptions are necessary in the following design phase in order to address the issues.

FEEDBACK FROM FIELD

Even after the system has been released and the target user group actually uses it, feedback should be collected to identify and resolve usability issues.

We are currently in the expert evaluation phase with our prototypes, i.e. our prototypes are in rather early stages and require further iterations. However, first evaluations show that the designs and concepts for our prototypes are worth pursuing.

4 Privacy dashboard

This chapter reports on the usability testing conducted on the privacy dashboard, which has been tested once up to the deadline of this deliverable. In the first iteration, a horizontal prototype was developed that was tested by three usability experts using a Thinking Aloud test (Jaspers 2004), which is quite similar to the cognitive walkthrough method (Lewis 1990) that is proposed by Möller (Möller 2003) during the Expert evaluation phase. The tested version of the privacy dashboard can be accessed through the link: http://raschke.cc/GDPR-privacy-dashboard/. Figure 1 shows a screenshot of the tested version.

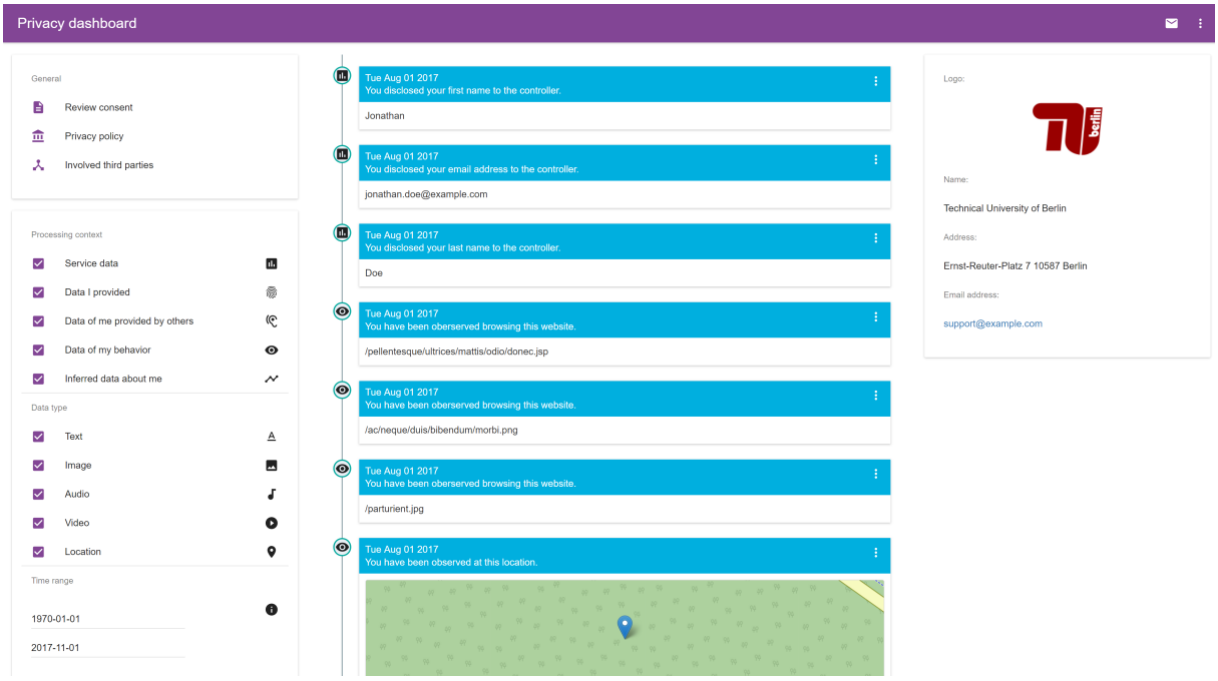

Figure 1: Earliest version of the privacy dashboard.

The main goal of the user test was to assess the applicability of the used data categories, which have been presented in **D4.1 Transparency dashboard and control panel release V1**, and whether those were helpful to the user or not when navigating through the personal data. Therefore, three fellow researchers were given a specific task to answer a set of questions which they were supposed to answer by using the privacy dashboard. A scenario has been made up for which fake data has been produced and used within the user tests to ensure that the test subjects run into certain situations. A description of the task and a list of the posed questions is given below:

``European law gives you the right to request from any entity that processes your personal data access to it. Imagine you requested access to your personal data from a company and you're confronted with the tool in front of you. Please answer the following questions:"

- Which data did you have to provide when creating an account for this service?
- Did you provide any voice recordings to the service?
- Have you disclosed your location voluntarily?
- Has anyone provided the controller with photos of you?

- Does this service provider track your location?
- Has the service provider knowledge about your gender?
- Does the service provider know your income?
- Does the service provider know which websites you visit?

RESULTS

All three participants required some time at the beginning to comprehend the setting of the privacy dashboard and what functionality it provides to them. The scenario plays a major role. Since fake data is used, the test subjects were not required to authenticate, they just saw "their" personal data not knowing whether they installed the privacy dashboard on their computer or had to sign up for a service of a third party. For reasons of simplification, the data subjects were told to assume the privacy dashboard is provided by the controller in order to achieve compliance with the General Data Protection Regulation's[1] (GDPR) transparency principle[2]. However, it is noteworthy that the setup of the privacy dashboard plays an important role to the test subjects and might also be important to regular users.

The first question was meant to be solved by using the corresponding data category, however all participants used the chronological order to answer that question by assuming that the data provided first was required to sign up for the service in question. This could have been prevented by generating data items that were processed before the disclosure of service data. Behavioral information, i.e. the user browses the website to sign up, is most probably processed at first in real-life scenarios. However, this behavior of the test subjects indicate that the data category service data is less helpful, since it is also disclosed data.

The participants also found that the filter options are not visible enough. In Figure 1, it can be seen that in the left column general information (like consent given, the controller's privacy policy, and involved third parties) were placed above the filter options. However, these options rather fit into the right column where general information about the controller are given.

In general, it can be said, that the test subjects were able to answer the posed questions by using the privacy dashboard. Their speed improved during the course of the test, which indicates that the tool is rather easy to learn. As consequence of the test subject's feedback adaptions to the proposed data categories have been made as well as minor improvements to the appearance of the user interface. See Figure 2 for the second version of the privacy dashboard after the feedback of the test subjects has been considered. The general options are now moved to the right column so that the filter options are the only component in the left column. Moreover, the data categories have been redefined in order to better meet the users' expectations. See deliverable **D4.1 Transparency dashboard and control panel release V1** for our redefined and adjusted data categories. The second version is accessible through the link: http://raschke.cc/SPECIAL-privacy-dashboard/.

[1] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 4.5.2016, p. 1-88 [hereinafter GDPR]

[2] GDPR art. 5(1)(a)

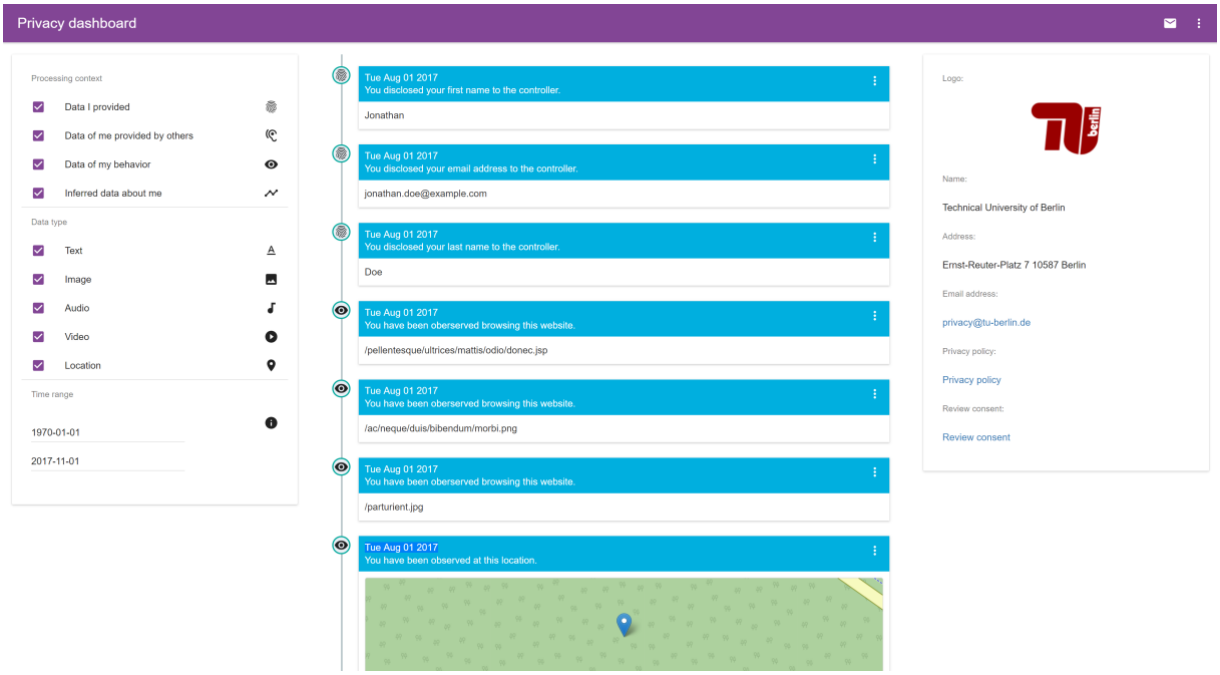

Figure 2: Second version of the privacy dashboard

Before the second version of the privacy dashboard is tested again with usability experts, further adjustments have been made to test how users respond to a more abstract view. See Figure 3, in which the actual data items are concealed per default and an option to display a certain data item is offered to the user (see Figure 4). Moreover, data items are aggregated over a certain time period (for example a day) to reduce entries in the timeline. This way the privacy dashboard is less overloaded, and data can be shown on demand. However, it could be possible that users prefer to instantly see their personal data to navigate through it. By developing another version based on a parallel design, we can ask the usability experts in the next iteration which of the versions they prefer. This version is available through: http://raschke.cc/LNDW18/. Both versions are not tested yet and will be tested at a later point in time. The results of these tests will be part of **D4.4 Usability testing report V2**, which is due in month 27.

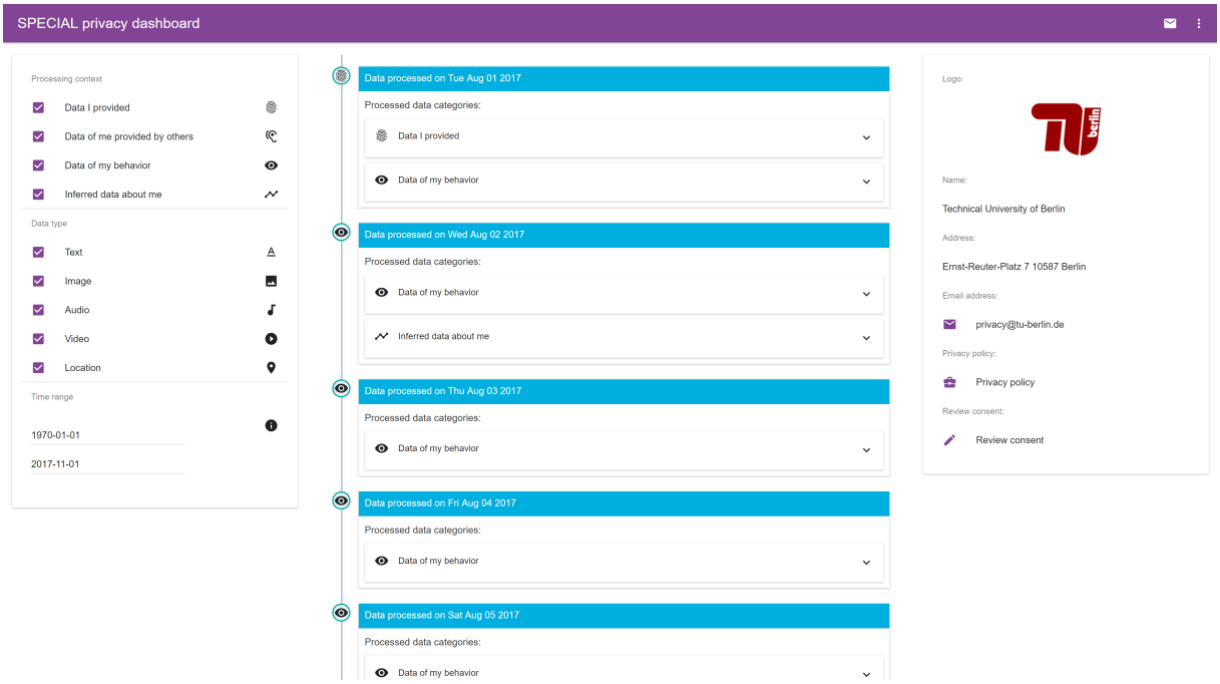

Figure 3: Aggregated data processing items to reduce complexity

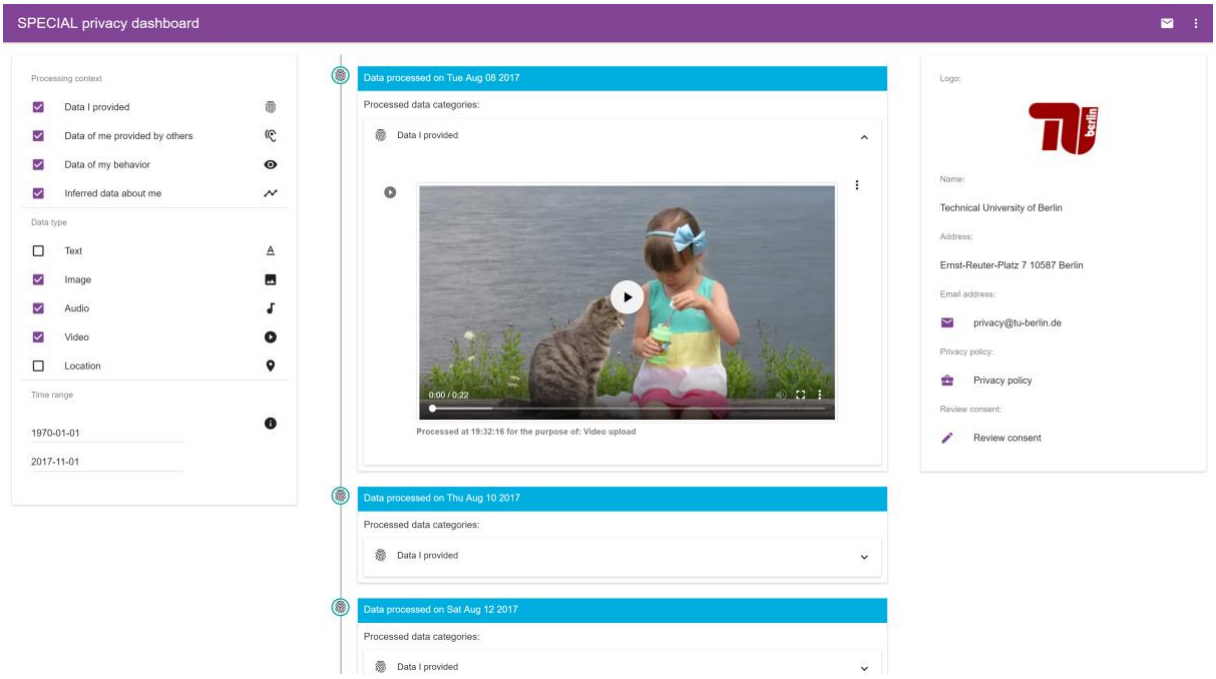

Figure 4: Aggregated data processing items with expanded data item

5 Dynamic consent request

In this chapter, we first describe our exemplifying use case scenario from **D1.3 Policy, transparency and compliance guidelines V1**. Then we provide information about the first interactive wireframe for the dynamic consent request that was introduced in **D4.1 Transparency dashboard and control panel release V1**. This wireframe is created based on the BeFit use case and tested in our user study, the results of which are described in this chapter. At the end of the section, we provide some details on our planned development of the second and improved wireframe for the dynamic consent request.

5.1 Introduction

Before discussing the first user interface (UI) user study, which was needed to evaluate the first version of the informed consent request, let us recall the use case scenario that our first wireframe is based on, what the wireframe looks like and its functionality.

5.1.1 Use case scenario

For the development of the first version of our consent request UI we used the exemplifying use case scenario introduced in **D1.3 Policy, transparency and compliance guidelines V1**:

> *Sue buys a wearable appliance for fitness tracking from BeFit. She is presented with a dynamic informed consent request, comprised of a data usage policy that describes which data shall be collected, why they are collected, how they will be processed, stored and shared in order to give her fitness-related information*.

For the purpose of our research and analysis we made the use case more specific by adding the exemplifying concrete data flow (see Figure 5) where we describe what data are collected by BeFit for what purpose and sub-purpose, where the collected data are stored and for how long, how those data are processed, what data are shared with third parties and what third parties are involved.

We would like to stress that our current use case includes only the initial consent request (i.e., before the data subject starts using the device). In future, we could expand the use case to include situations where the consent requests are contextualized, incremental and distributed over time (see deliverable **D1.6 Legal requirements for a privacy-enhancing Big Data V2**).

5.1.2 First interactive wireframe for the dynamic consent request

In **D4.1 Transparency dashboard and control panel release V1** we provide a detailed description of three different versions of the UI wireframes for the dynamic consent request, namely graph, tabs, and user agent, that we plan to test with users to determine how they perceive those UIs and what improvements could be made. All of them have features of the dynamic consent request as well as fulfill the requirements of the GDPR, in terms of the main information that should be presented to the user.

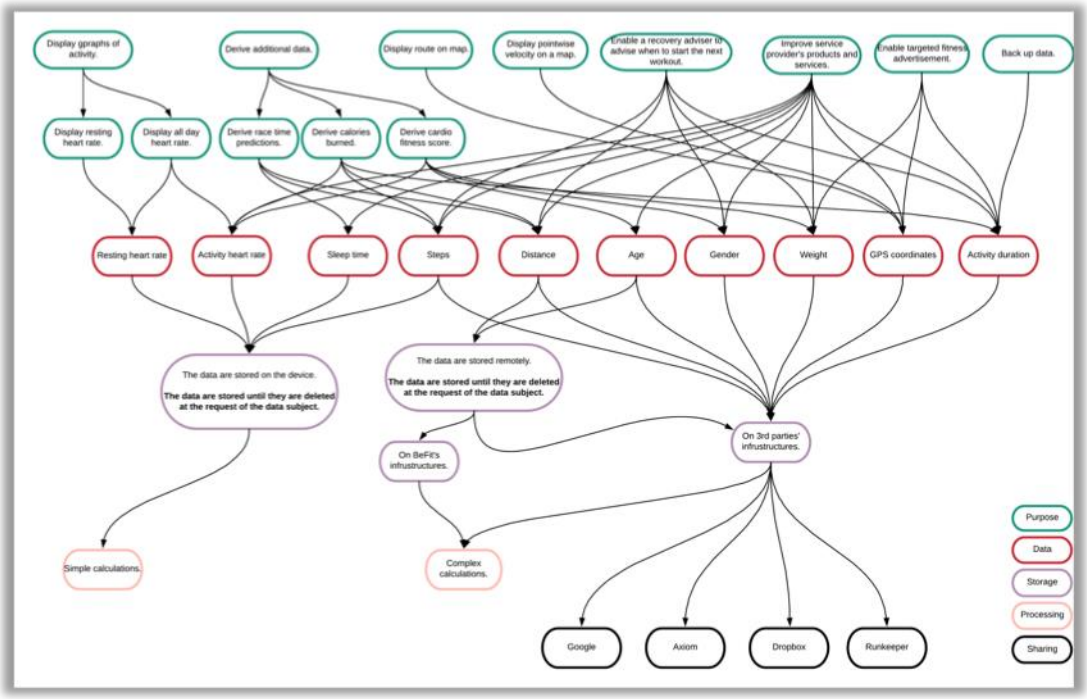

Figure 5: The information that must be presented to the data subject in BeFit's consent request.

Figure 6 depicts our wireframe of the first UI version for BeFit's dynamic consent request. Based on the feedback from the consortium partners and colleagues in the UI field of research, we decided to take the tabs UI as the basis for our first interactive wireframe but enrich it with the graph UI.

Since we wanted to involve real data subjects at the early stage of the UI development, we prepared a user study (see Chapter 5.2) in order to test the UI functionality, content placement and intended page behavior. To make our wireframe more realistic and more suitable for the user study, we developed a fully functional online version[3]. While creating this online version we followed Jackob Nielsen's usability heuristics for user interface design[4]. We used Angular Material[5] and D3.js[6] for the front-end development of the online version and Firebase[7], with its real-time database and hosting, for the server side. The online wireframe enables participants to give their consent from any place comfortable for them, making our user study more realistic.

Our wireframe provides the following features.

Categorization. We grouped information according to five categories, namely purpose, data, storage, sharing and processing. This grouping is realized in the form of tabs (see Figure 6 (1)). In the *purpose tab,* we display the services that are offered by BeFit and that require personal data processing. The *data tab* lists personal data that could be processed by BeFit, if the data subject consents to data processing. In the *storage* tab we provide information on where BeFit stores data subject's personal data. The *sharing* tab gives insights into third parties with whom BeFit may share personal data of the data subject. In the *processing* tab we describe how personal data could be processed. To

[3] BeFit | Consent Request. https://concent-request.firebaseapp.com/wizard, last accessed: 06/12/2018.

[4] 10 Heuristics for User Interface Design: Article by Jakob Nielsen. https://www.nngroup.com/articles/ten-usability-heuristics/, last accessed: 06/12/2018.

[5] Angular Material. https://material.angular.io/, last accessed: 06/12/2018.

[6] D3.js - Data-Driven Documents. https://d3js.org/, last accessed: 06/12/2018.

[7] Firebase. https://firebase.google.com/, last accessed: 06/12/2018.

support the visualization, in addition to the name of the category on the tab, we added icons for each category.

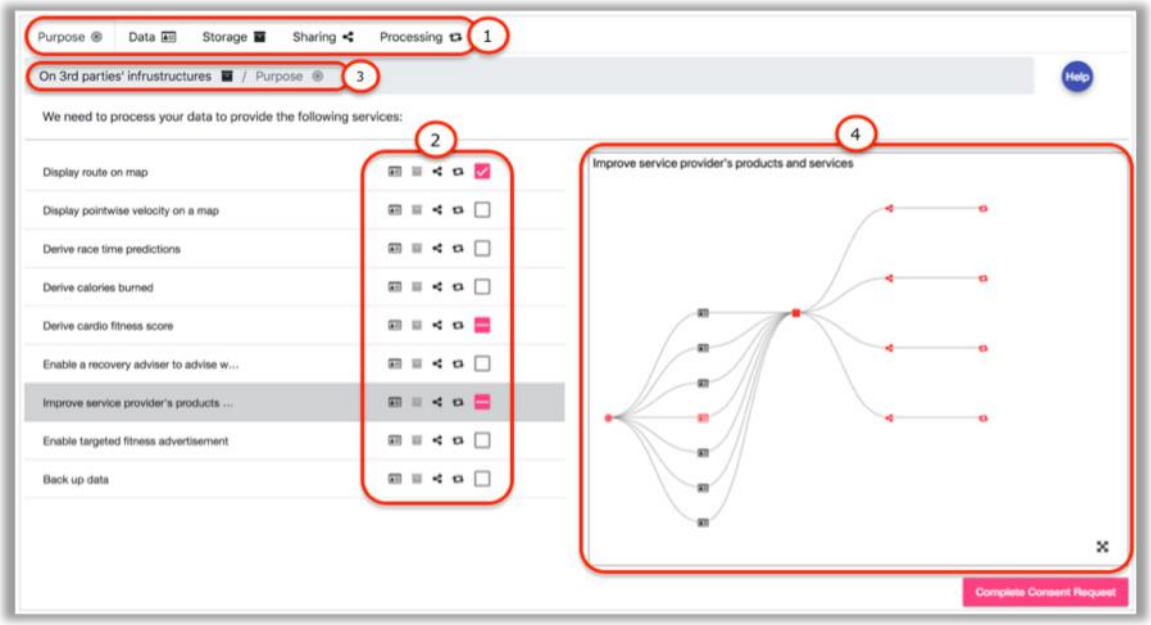

Figure 6: The wireframe of the first version of the dynamic consent request UI. (1) Tabs. (2) Drill down. (3) Breadcrumb. (4) Graph.

Customization. The most important feature of our first version of the consent request UI is the full customization of data subject's consent. We do not offer an all or nothing approach. The user can fully adjust their consent specifically to their wishes. Our consent request gives the possibility to review information or give consent according to five categories mentioned in the categorization feature above. Any tab category can be a starting point of giving consent. The user is also given a possibility to drill down a concrete path and agree only to that path. This means that the data subject can also give permissions to process only specific data categories for chosen purposes, etc. For example, he or she can allow BeFit to process his or her resting heart rate (*data*) to be displayed to him or her in BeFit's app (*purpose*) by performing on-device calculations (*processing*) and saving his or her data on his or her device (*storage*) without *sharing* it with anybody. The drill down feature is implemented by placing clickable icons of possible drill-down options near each item in the category/tab list (see Figure 6 (2)). The user can drill down through each item in the list by clicking on an icon that corresponds to the category he or she wants to select. In this way the user can create a unique path to consent to. The unique path is displayed and can be navigated in the breadcrumb under the tabs (see Figure 6 (3)). The user gives their consent just by selecting checkboxes (see Figure 6 (2)) that correspond to their preferences. The check box is placed near each category item after the icons for drill-down options.

Revocation. The user can withdraw their consent by removing the selection in any checkbox at any time (see Figure 6 (2)). In our use case the consent is given for the first time before using the device and the consent withdrawal in our interactive UI wireframe is tailored to this use case. If the user changes his or her mind, they can use the privacy dashboard with the integrated consent controls to revoke their consent.

Understandability. To increase understandability and ease of use of the consent request we are using plain language and standard icons for the content. Every action of a user is backed up by feedback. To help the data subject understand the implications of their consent, our dynamic

consent request is supported by a graph (see Figure 6 (4)). The graph has a tree form and shows every possible unique path that goes through the selected item. The paths that the user consented to are highlighted in red. Each item in the graph is represented with the help of already mentioned icons. More information, in the form of a tooltip, is shown upon hovering over each icon.

***Summary*.** After the user finishes consenting (by clicking "Complete Consent Request" button), he or she is presented with an overview of all the information that he or she gave his or her consent to be processed by BeFit.

5.2 User study

We checked the usability of our first UI for dynamic consent request by conducting a user study. For the study we selected a think aloud method (van Someren 1994, Seidman 2006, Charters 2003) where we asked our participants to think aloud when testing the UI and record their screen as well as their thoughts. We recruited our participants among students who attended the course "Intelligent Customer Interaction Design" at the Vienna University of Economics and Business. According to Nielsen and Landauer (Nielsen 1993) one needs to test the UI with at least 15 users in a qualitative user study to identify all usability issues. However, they also argue that a smaller number of participants and higher iterations deliver the same results.

Twenty-seven participants, who were between 16 and 35 years old, took part in our user study. We targeted this segment of the population because the imaginary persona (Sue) in our use case was a student and the first UI was developed considering our persona. We are aware that this could be a limitation of the UI and the user study, however, as we work in the iterative manner, the first UI will be improved and different population segments will be taken into consideration. The second and improved UI version will be tested by a broader user segment. Taking into account participants' feedback, not only the UI itself could be enhanced, but we also might improve the user study to receive better feedback from the participants. Our first user study and its results are described below.

5.2.1 Task introduction

Before the actual UI testing, the participants were asked to imagine themselves buying BeFit's wearable appliance for fitness tracking instead of our imaginary persona - Sue (see Figure 7).

Figure 7: Assignment introduction.

As a second step they were presented with BeFit's instructions (see Figure 8).

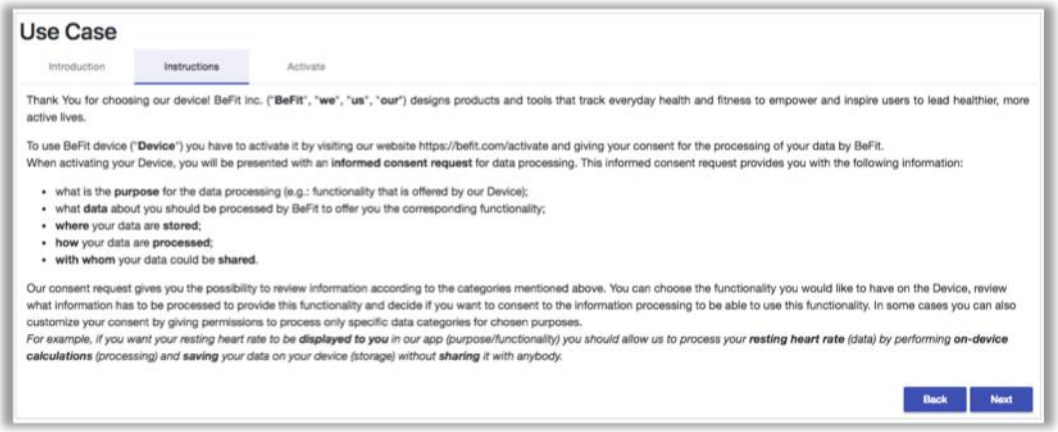

Figure 8: BeFit's instructions.

After the participants read the instructions they were asked to activate the device and give their consent for the processing of their data by BeFit (see Figure 9).

Figure 9: Device activation.

When the participants clicked the “Activate” button, they were redirected to a short user guide (see Figure 10). The user guide explains the functionality and the structure of the application. After reviewing the user guide and clicking “Done” button, the participants were forwarded to the application prototype described in Chapter 5.1.2 for the actual testing.

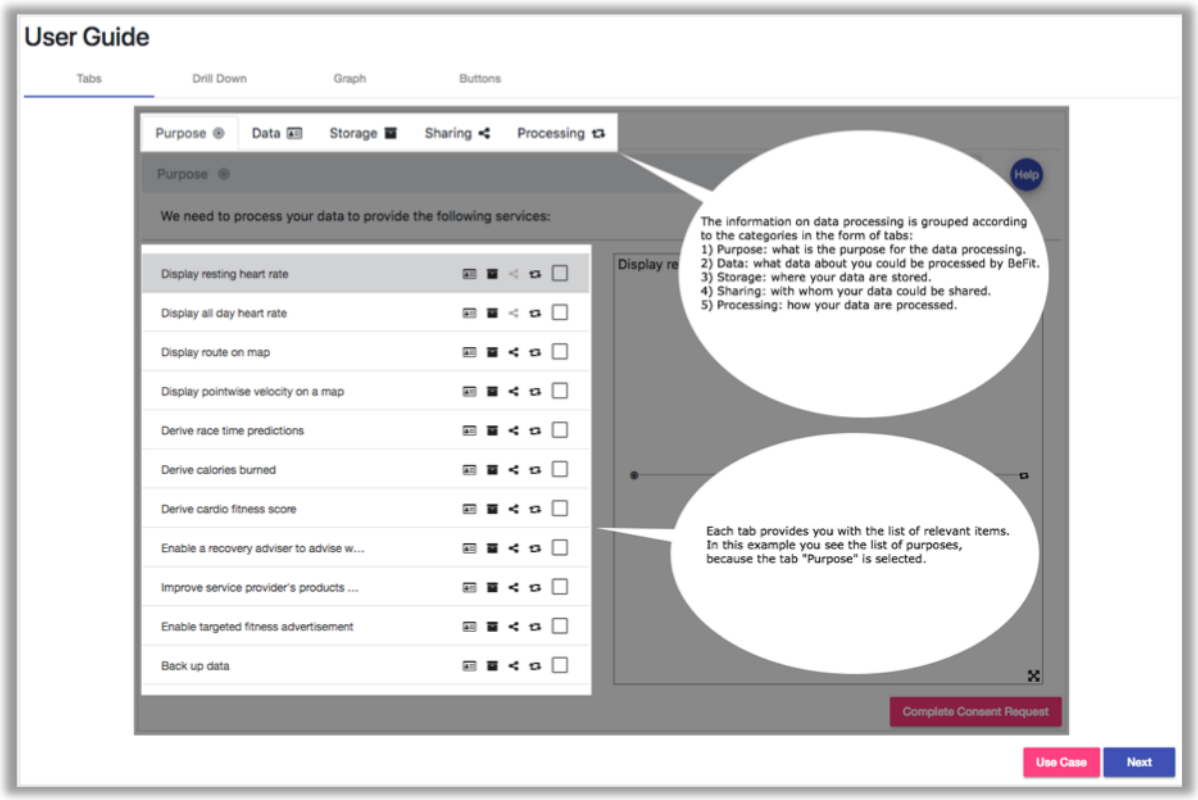

Figure 10: User guide.

5.2.2 Testing tasks

In the beginning the participants completed the following tasks of giving and withdrawing consent.

*Please **give** your consent:*

a. *to process your **resting heart rate** to be **displayed to you** in the app by performing **on-device calculations** and **saving** your data **on your device**.*
b. *to process your **steps** to **derive how many calories you have burned** by performing **Runkeeper's calculations** and **storing** your steps on **3rd parties' infrastructures**.*
c. *to process your **age** to **derive your cardio fitness score** by performing **BeFit's calculations** and **storing** your age on **BeFit's infrastructures**.*
d. *to get your **race time predictions**.*
e. *to **back up** your data only in **Dropbox**.*
f. *to receive **targeted fitness advertisement** only from **Google**.*

*Please **withdraw** your consent:*

a. *to **share** any data with **Google**.*
b. *to perform **BeFit's calculations**.*
c. *to your **steps** to **derive how many calories you have burned** by performing **Runkeeper's calculations** and **storing** your steps on **3rd parties' infrastructures**.*
d. *to **back up** your **activity duration** in **Dropbox**.*
e. *to process your **resting heart rate** to be **displayed to you** in the app by performing **on-device calculations** and **saving** your data **on your device**.*
f.

Then they were asked to assess the tree graph functionality.

Please have a look at a full screen view of a tree graph for Axiom's calculations.

After this exercise, the participants were asked to just give their own consent, as they would have done this, if they bought the BeFit smart watch.

> *Now, that you got acquainted with how the consent request works, please imagine that you decided to use the BeFit device and give **your** consent according to **your own** preferences. When you are done click „Finish" button to be redirected to the questionnaire.*

During the completion of their tasks the participants took a video recording of their screen and audio of their thoughts. At the end of the assignment each participant filled in a questionnaire providing us with their demographic data as well as their impression of our dynamic consent request UI. The questions of both questionnaires can be found in the annexes (see Chapter 8), while the results of the user study are discussed in the following section.

5.2.3 Results

Twenty-seven participants, who were between 16 and 35 years old, took part in our user study. Most of them graduated from high school and had either Information Technology or Education as their background. 63% of the participants were male and 37% were female. More details on the demographic data can be seen in Figure 11.

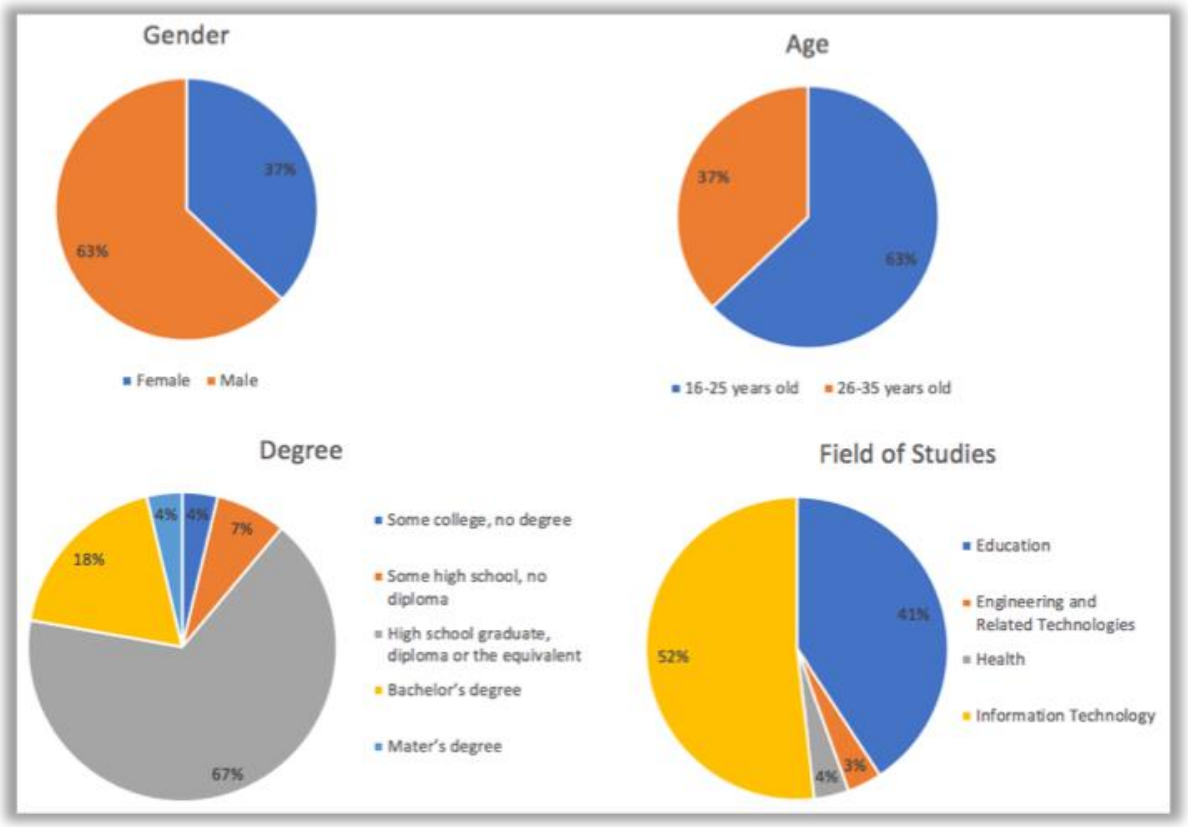

Figure 11: Demographics.

The participants consider themselves competent, proficient or experts in Internet surfing. No beginners, in terms of Internet usage skills, took part in the user study. Figure 12 shows that almost half of the participants (44%) spend 3-6 hours on the Internet and only 4% spend less than one hour. As can, also, be seen in Figure 12, all participants have no difficulty using computers; half of them

prefer laptops for Internet browsing, 32% preferably use desktop computers, only 11% would choose smartphone to surf the Internet and 7% would use tablet.

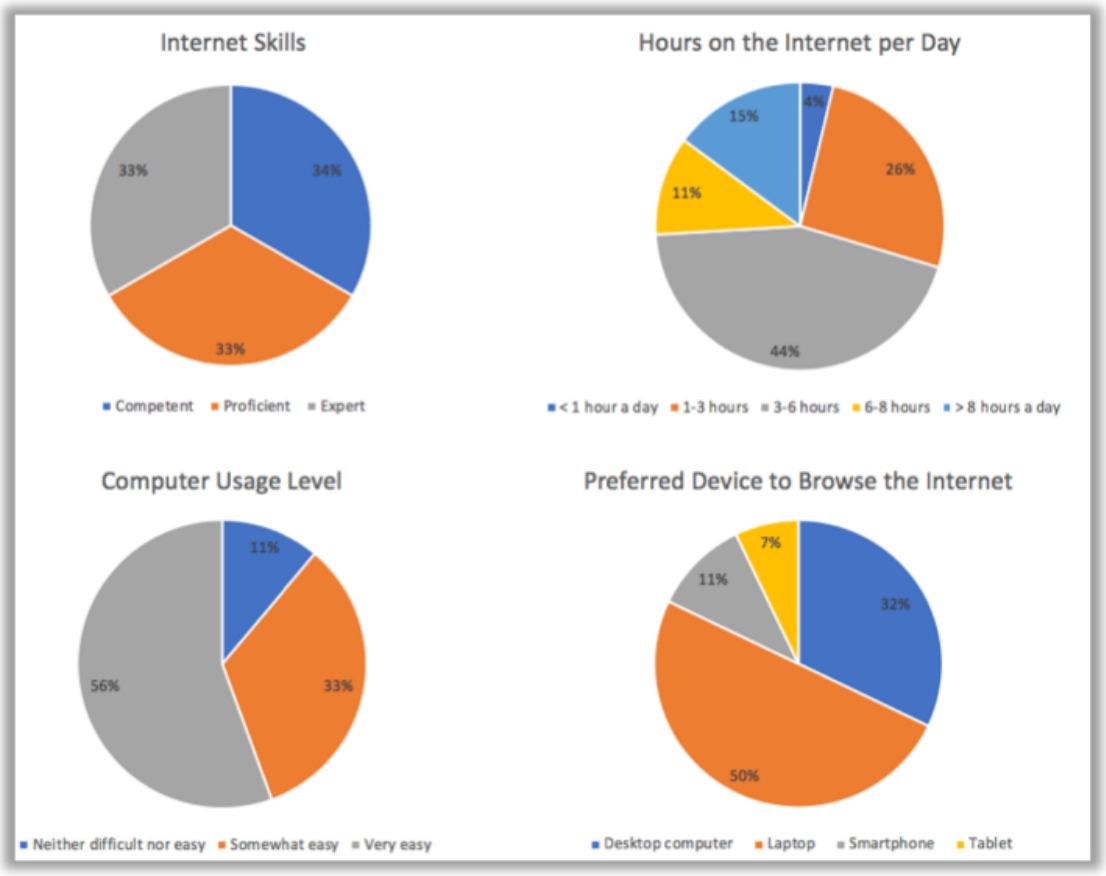

Figure 12: Internet and computer/device usage.

When we asked users if they were overall satisfied with the consent request, 44% of the participants reported dissatisfaction (11% - very dissatisfied, 33% - somewhat dissatisfied) with the consent request (see **Figure 13**). 15% of the users remained neutral towards the consent request, 30% were somewhat satisfied and 11% were very satisfied with our UI.

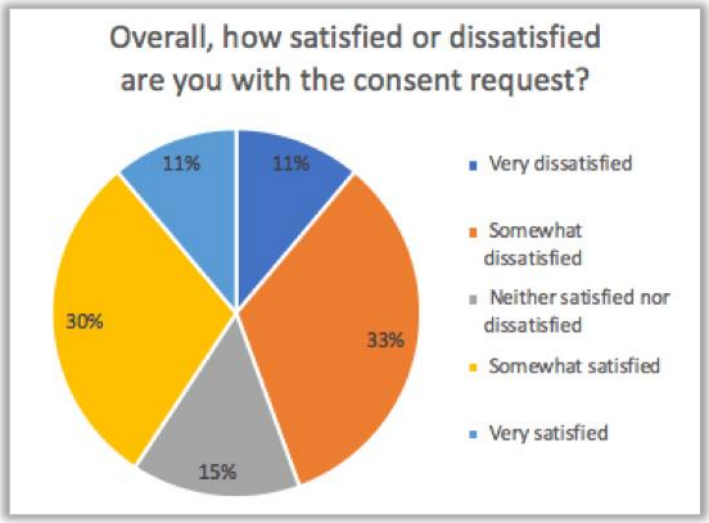

Figure 13: Satisfaction with consent request.

The high overall dissatisfaction also reflects on the answers to the question about the recommendation of our consent request to a friend (see **Figure 14**). 18% of the participants would not recommend it to a friend. 44% said that it was slightly likely that they would do that and 15% replied that it was moderately likely. 21% of the respondents would advise a friend to use our consent request.

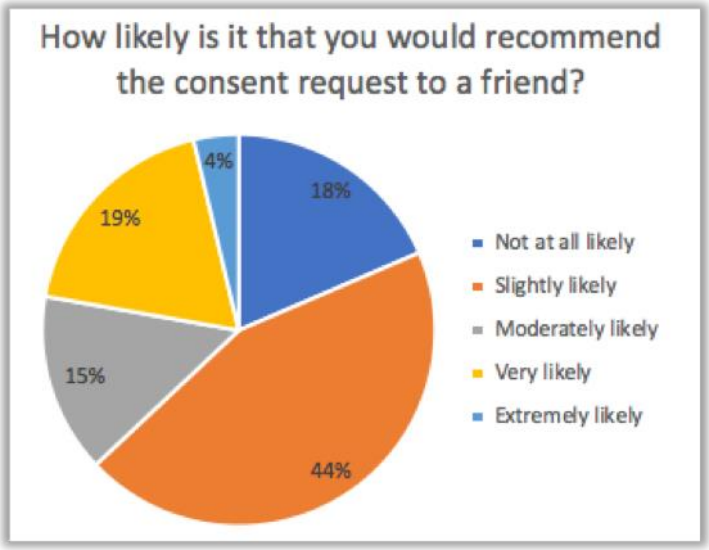

Figure 14: Recommendation of the consent request.

However, the question *"how well the consent request meets your needs for privacy policy representation?"* received only 15% of negative answers (see **Figure 15**). Most of the users selected somewhat well (41%), very well (29%) or extremely well (15%) as their answers.

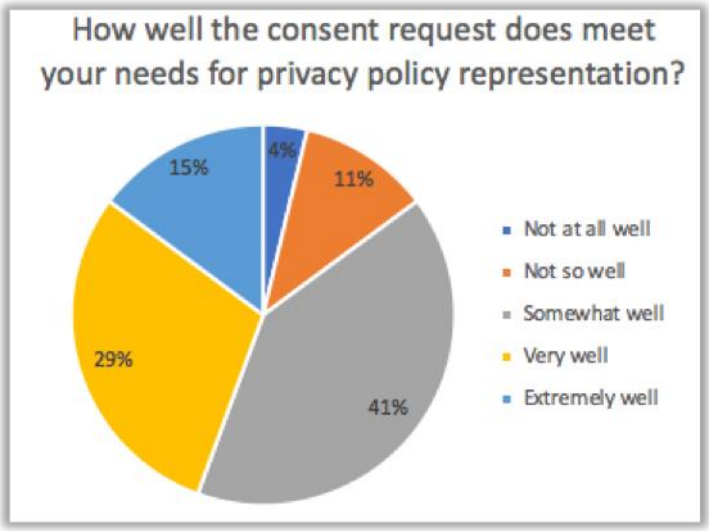

Figure 15: Consent request as privacy policy representation.

When asked to assess the time it took to give or withdraw the consent, almost half of the participants (48%) answered that it took them *too long* to give or withdraw the consent (see **Figure 16**). 22% selected *too long, but it was worthwhile* as their answer. For the rest of the users it took either *less time* (11%) or about the *right amount* of time (19%).

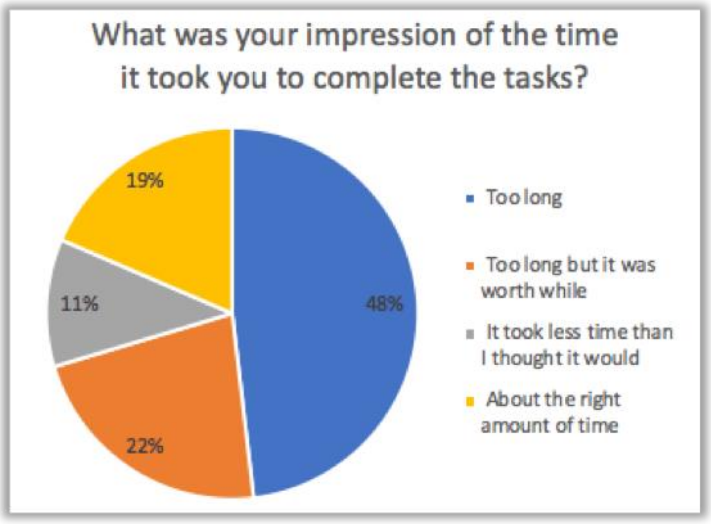

Figure 16: Assessment of the time needed for tasks completion.

The users were prompted to select adjectives that they would use to describe the UI they were testing. We used the list of adjectives from Microsoft Desirability Toolkit, developed by Joey Benedeck and Trish Miner (Benedeck 2002). Since the original list consists of 118 words, it is recommended to shorten and adapt the list[8], which we did in our user study. The adjectives users selected to describe the UI are listed in Figure 17. As we expected a lot of the users (18 out of 27) found the UI *complex* and the whole process *time consuming*. Fifteen participants found the consent representation to be *confusing*. For fourteen of them the UI was *hard to use*. Twelve users thought the UI was *annoying* and eleven were *frustrated* when using the consent request. Apart from the negative adjectives, we also received some positive feedback. Nine participants described the UI as being *organized*, eight as *effective*, seven as *innovative*, six as *flexible* and five as *valuable*.

[8] https://www.nngroup.com/articles/microsoft-desirability-toolkit/, last accessed: 06/12/2018.

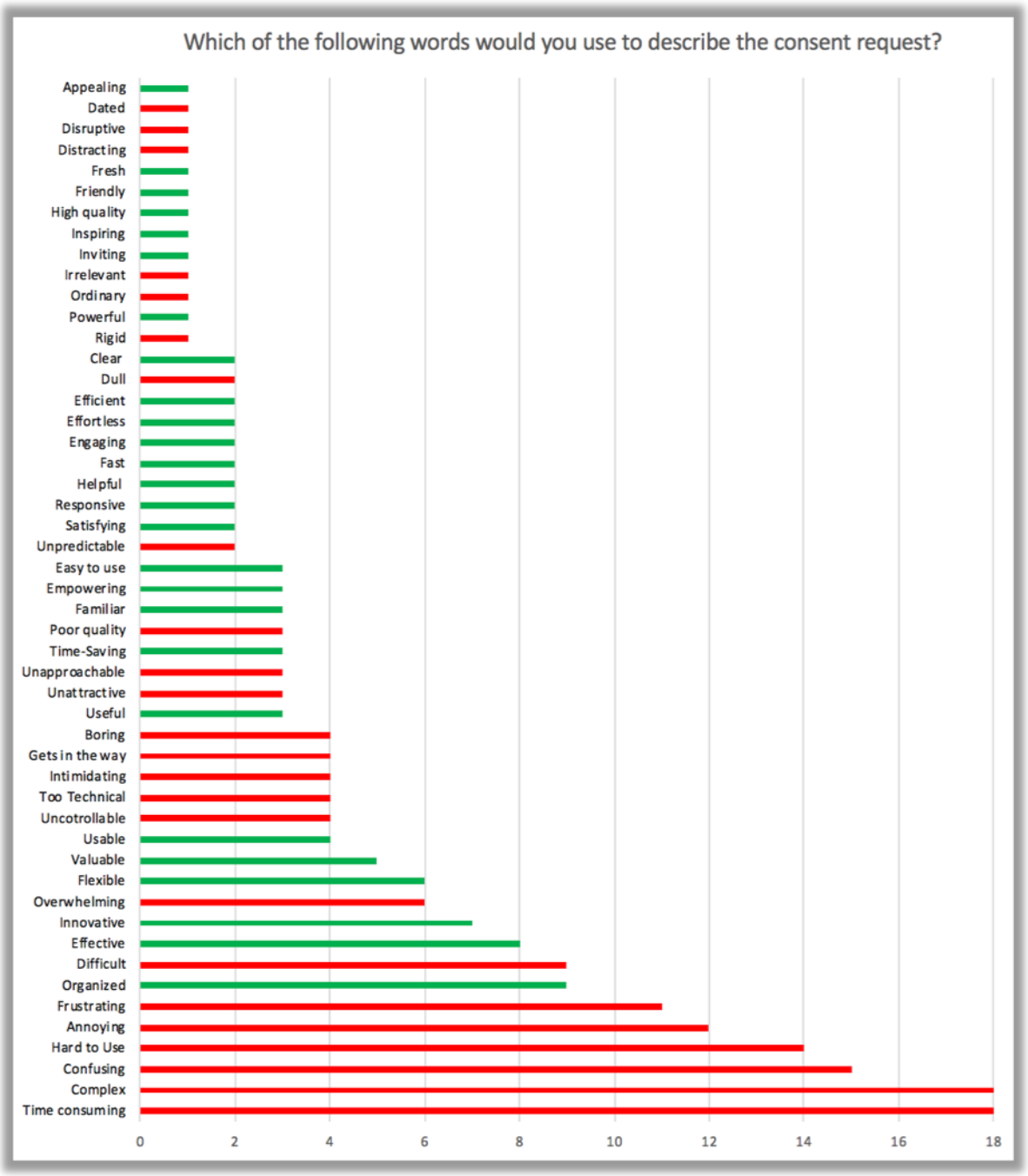

Figure 17: Adjectives that describe the consent request UI.

Since we anticipated that providing all the information to the users and giving them such a detailed control over the data processing would be overwhelming for them, we included questions regarding the usefulness of the information provided by the tabs, in order to identify which tabs could be hidden in the UI and shown only on demand. In Figure 18 one can see how the participants answered these questions. Surprisingly, no one considered information regarding the data that is collected about the user to be useful. However, no one also identified this tab as useless. 35% of the participants think that information on all tabs is important. 38% voted for the tab “Processing” to be removed.

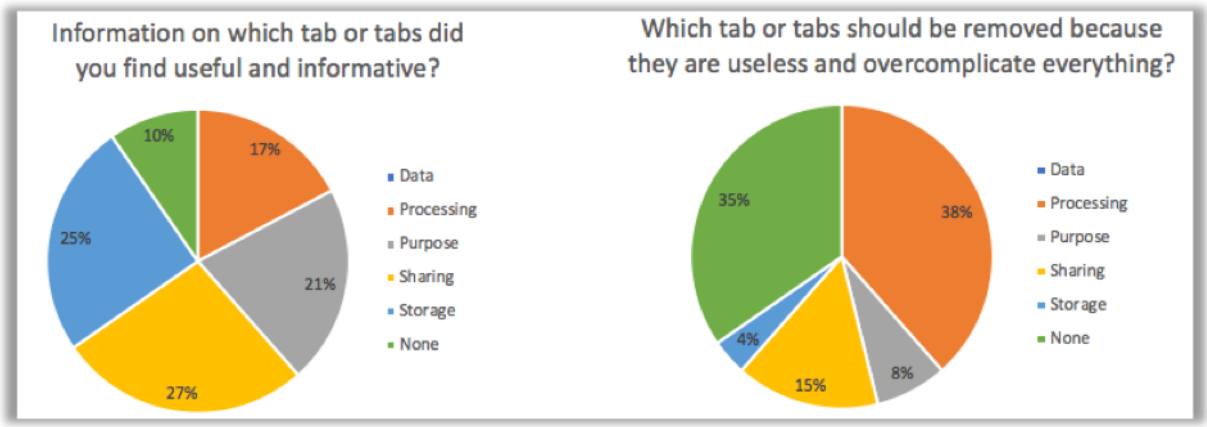

Figure 18: Tab usefulness.

We asked the participants to answer two questions regarding the tree graph to find out if they understood it and if they found it useful. Figure 19 provides detailed analysis of the received answers. We can see that 22% of the users could not understand the graph and 30% found it to be not useful. For others the graph was slightly, moderately, very or extremely understandable and useful.

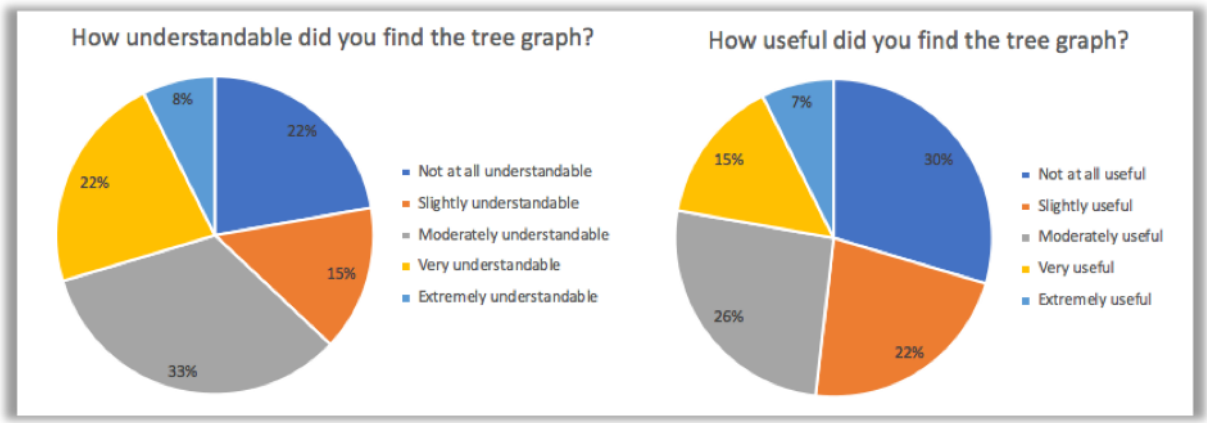

Figure 19: Evaluation of the tree graph.

Apart from the single- and multiple-choice questions, our questionnaire contained open questions. The analysis of the answers to the open questions is presented below.

What did you like most about the consent request in comparison to a traditional privacy policy? The respondents mentioned that they found the graph functionality very useful and they liked the summary in the end of the process of giving their consent. A lot of the users highlighted that they liked flexibility and customization features (e.g.: I liked that: "*I could choose*"," I *could change the settings*", "I could actually decide…", "*I had the possibility to change setting individually*", "*I was able to shape everything to my needs*", "*I could withdraw the consent at any time"*). Some participants replied that they liked the readability of the consent (e.g.: *"It was readable.", "I liked the language – there were no problems understanding the consent request"*). Some users mentioned they found the division of information into tabs very good, because it provided some structure and contributed to understandability (e.g.: *"Each part, like sharing and storing, has a nice look.", "Everything is clear structured.", "It was very clear and compact."*).

What was the easiest and the hardest part about using the consent request? The participants named four features that were the easiest for them to use, namely the *graph*, the *summary*, *tabs* navigation and structure, as well as giving and withdrawing consent by clicking on *checkboxes*. The hardest part was not to be lost in all the information that was provided to the users. A lot of them mentioned that it was the hardest to keep all the information in mind.

What could be done to improve the consent request? Since a lot of the participants said that they were overloaded with the information, they suggested *shortening* or *simplifying the information* that is presented to the user. Some users suggested simplifying the customization by offering *fewer options* to choose from. The respondents also suggested using *color-coding* for UI simplification.

What would you suggest to improve in the tree graph? The participants suggested two main improvements for the graph feature: adding color-coding (e.g.: *"add color coding", "use different colors", "adding more colors could improve the graph"*) and short descriptions (e.g.: *"add some text", "add short descriptions"*). In addition to the improvements suggestion, we also received good feedback from the users to the graph feature: *"The graph is good as it is. No improvements needed.", "The graph was the only thing I really understood.", "A very nice form to give the overview"*.

What might keep people from using the consent request? The main reasons why one might not use our consent request, according to the user study, are *information overload*, *complexity* and *too many options* to choose from.

As we can see from the results, the data subjects were overwhelmed with the consent information because they needed to read and understand all the details. There is a clear need for the simplification of the consent request and the reduction of the consent information details that are mandatory for the data subject to read.

Based on the user study results, we are going to develop an improved version of the UI to be further tested in our next user study.

5.3 Second interactive wireframe for the dynamic consent request

Since the graph functionality was well received by the users in our first user study, we decided to use the graph as the basis for our next version of the consent request UI. In our first wireframe draft (see Figure 20) we added color-coding to the graph, as it was suggested by many participants in the user study.

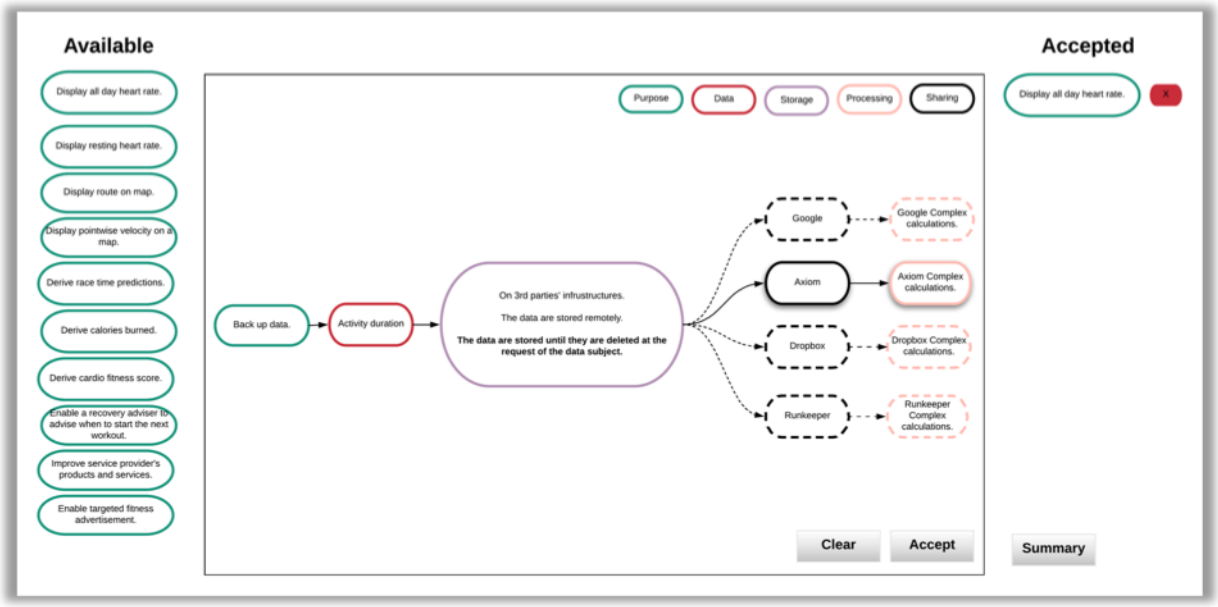

Figure 20: The first draft of the second consent request UI.

The short consent information could be placed inside a "bubble" in the graph. The users liked the categorization of the consent information into purpose, data, storage, processing and sharing in the previous UI, so we kept this categorization in the second version of the UI. The participants highly appreciated the customization and the flexibility of the consent request; however, they expressed their frustration with too many options and asked for the option reduction. In our next UI we still want to keep the customization option, but we could reduce options by presenting users with the list of available functionalities of the device and providing a possibility to browse just the functionalities. All other information is then just shown in connection to the selected functionality and if there are any optional items they could be separately highlighted in the graph path.

The UI should still also provide a possibility to withdraw the consent at any point in time. We further plan to investigate the applicability of the UI on mobile devices, since this could be a requirement in different use cases. The final implementation of the second UI version and the next user study will be described in the next deliverable (**D4.4 Usability testing report V2**).

6 Conclusion and outlook

In this deliverable the results of our first evaluations of our designed and developed interfaces are documented and discussed. We used Nielsen's Usability Engineering Lifecycle to structure our development process and evaluations. Until the deadline of this deliverable, the privacy dashboard has been tested once and multiple adjustments have been made to improve the usability. Before the privacy dashboard is tested again, a parallel design is developed to assess how the usability experts react to the two different versions of the privacy dashboard. The results of this evaluation will be reported in **D4.4 Usability testing report V2**. The dynamic consent request interface has been tested more extensively with 27 participants and a comprehensive questionnaire. The results have been analyzed thoroughly indicating that while further adjustments are necessary to improve the usability, the approach is worthwhile pursuing.

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8 Annexes

8.1 First user study questionnaire

8.1.1 Demographic Data Questionnaire

1. **What is your gender?**
    - Male
    - Female
2. **What is your age**
    - less than 16 years old
    - 16-25 years old
    - 26-35 years old
    - 36-45 years old
    - 46-55 years old
    - 55 years and over
3. **What is the highest level of education you have completed?**
    - Some high school, no diploma
    - High school graduate, diploma or the equivalent
    - Trade/technical/vocational training
    - Some college, no degree
    - Bachelor's degree
    - Master's degree
    - Doctorate degree
4. **What is (or was) your field of studies?**
    - Natural and Physical Sciences
    - Information Technology
    - Engineering and Related Technologies
    - Architecture and Building
    - Agriculture, Environment and Related Studies
    - Health
    - Education
    - Management and Commerce
    - Society and Culture
    - Creative Arts
    - Food, Hospitality and Personal Services
5. **On average, how many hours per day do you spend on the Internet?**
    - Less than 1 hour a day
    - 1-3 hours
    - 3-6 hours

- 6-8 hours
- More than 8 hours a day

6. How would you assess your current skills for using the Internet?

- Novice
- Advanced beginner
- Competent
- Proficient
- Expert

7. How easy is it for you to use computers?

- Very difficult
- Somewhat difficult
- Neither difficult nor easy
- Somewhat easy
- Very easy

8. What is your preferred device to browse the Internet?

- Desktop computer
- Laptop
- Tablet
- Smartphone

8.1.2 Usability testing questionnaire

1. **What do you remember agreeing to?**
    - Data
    - Sharing
    - Storage
    - Purpose
    - Processing
2. **Overall, how satisfied or dissatisfied are you with the consent request?**
    - Very satisfied
    - Somewhat satisfied
    - Neither satisfied nor dissatisfied
    - Somewhat dissatisfied
    - Very dissatisfied
3. **How likely is it that you would recommend the consent request to a friend?**
    - Not at all likely
    - Slightly likely
    - Moderately likely
    - Very likely
    - Extremely likely
4. **What was your impression of the time it took you to complete the tasks?**
    - Too long
    - Too long but it was worth while
    - About the right amount of time
    - It took less time than I thought it would
5. **Which of the following words would you use to describe the consent request?**
    - Annoying
    - Appealing
    - Boring
    - Clear
    - Compelling
    - Complex
    - Confusing
    - Cutting edge
    - Dated
    - Difficult
    - Disruptive

- Distracting
- Dull
- Easy to use
- Effective
- Efficient
- Effortless
- Empowering
- Engaging
- Exceptional
- Familiar
- Fast
- Flexible
- Fresh
- Friendly
- Frustrating
- Gets in the way
- Hard to Use
- Helpful
- High quality
- Impressive
- Ineffective
- Innovative
- Inspiring
- Intimidating
- Intuitive
- Inviting
- Irrelevant
- Old
- Ordinary
- Organized
- Overwhelming
- Patronizing
- Poor quality
- Powerful
- Responsive
- Rigid
- Satisfying
- Slow
- Time-consuming
- Time-Saving
- Too Technical
- Unapproachable
- Unattractive

- Uncontrollable
- Understandable
- Undesirable
- Unpredictable
- Usable
- Useful
- Valuable

6. **How well the consent request does meet your needs for privacy policy representation?**
    - Extremely well
    - Very well
    - Somewhat well
    - Not so well
    - Not at all well
7. **Information on which tab or tabs did you find useful and informative?**
    - Purpose
    - Data
    - Storage
    - Sharing
    - Processing
    - None
8. **Which tab or tabs should be removed because they are useless and overcomplicate everything**
    - Purpose
    - Data
    - Storage
    - Sharing
    - Processing
    - None
9. **How understandable did you find the tree graph?**
    - Not at all understandable
    - Slightly understandable
    - Moderately understandable
    - Very understandable
    - Extremely understandable
10. **How useful did you find the tree graph?**
    - Not at all useful
    - Slightly useful
    - Moderately useful
    - Very useful
    - Extremely useful
11. **What would you suggest to improve in the tree graph?**

Leave a comment

12. What did you like most about the consent request in comparison to a traditional privacy policy?

Leave a comment

13. What's the easiest part about using the consent request?

Leave a comment

14. What's the hardest part about using the consent request?

Leave a comment

15. Was there anything surprising or unexpected about the consent request?

Leave a comment

16. What could be done to improve the consent request?

Leave a comment

17. How easy is the consent request to use?

Leave a comment

18. Which feature (or features) of the consent request are most important to you?

Leave a comment

19. Which feature (or features) of the consent request are least important to you?

Leave a comment

20. What might keep people from using the consent request?

Leave a comment