User control of personal data
A study of personal data management in a GDPR-compliant graphical user interface
Abstract

The following bachelor thesis explores the design of a GDPR (General Data Protection Regulation) compliant graphical user interface, for an administrative school system. The work presents the process of developing and evaluating a web-based prototype, a platform chosen because of its availability. The aim is to investigate if the design increases the caregivers perception of being in control over personal data, both their own and data related to children in their care. The methods for investigating this subject are grounded in real world research, using both quantitative and qualitative methods.

The results indicate that the users perceive the prototype to be useful, easy to use, easy to learn and that they are satisfied with it. The results also point towards the users feeling of control of both their own and their child’s personal data when using the prototype. The users agree that a higher sense of control also increases their sense of security.

Keywords

GDPR, General Data Protection Regulation, Data privacy, Usability, Interface design

Thanks

First, I would like to thank my supervisor Janosch Zbick for all the help with planning, structuring and your general good advice for this thesis. I would also like to thank my colleagues at the department of Computer Science and Media Technology; Rebecka Green, Karl Johan Rosqvist, Henrik Andersen and Romain Herault for all your help and feedback. And finally, I would like to thank my partner for not leaving me during my most stressful weeks. And yes, I did elaborate this section too, just to be on the safe side.
Table of Contents

1 Introduction .................................................. 1
   1.1 Background ........................................... 1
   1.2 Motivation ........................................... 2
   1.3 Problem Definition ................................... 2
   1.4 Purpose .............................................. 3
   1.5 Hypothesis ........................................... 3
   1.6 Research Question ................................... 3
   1.7 Limitations .......................................... 3

2 Foundation .................................................. 4
   2.1 General Data Protection Regulation .................... 4
   2.2 Data Taxonomy ........................................ 5
   2.3 Service Data .......................................... 5
   2.4 Related Work ......................................... 6
      2.4.1 Dexter ........................................... 6
      2.4.2 Google Dashboard ................................ 7
      2.4.3 The Privacy Dashboard ......................... 8
      2.4.4 User-Friendly Legal Documents ................. 10

3 Methodology ............................................... 11
   3.1 Chosen Methodologies ................................ 11
      3.1.1 Real World Research ............................ 11
      3.1.2 Qualitative social research .................... 11
   3.2 Literature Survey .................................... 11
      3.2.1 Google Scholar .................................. 11
      3.2.2 IEEE Xplore ..................................... 12
      3.2.3 Snowball Sampling .............................. 12
   3.3 Rapid Application Development ....................... 13
   3.4 Think-Aloud .......................................... 14
   3.5 Questionnaire ....................................... 15

4 Implementation ............................................ 17
   4.1 Requirements Engineering ................................ 17
      4.1.1 Explanations ..................................... 17
   4.2 Requirement Specification .............................. 18
      4.2.1 Content .......................................... 18
      4.2.2 Functionality .................................... 19
      4.2.3 Technical specifications ........................ 19
   4.3 User Design .......................................... 19
      4.3.1 Use Cases ........................................ 19
      4.3.2 Mock-ups ........................................ 20
   4.4 Construction .......................................... 20
      4.4.1 Prototype Building Blocks ....................... 20
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Results &amp; Analysis</td>
<td>5.1 Requirements</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>5.2 User evaluation</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>5.3 Think-aloud</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>5.3.1 Tasks</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>5.4 Questionnaire</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>5.4.1 Usefulness</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>5.4.2 Ease of Use</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>5.4.3 Ease of Learning</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>5.4.4 Satisfaction</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>5.4.5 Additional questions</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>5.5 Summary</td>
<td>34</td>
</tr>
<tr>
<td>6 Discussion</td>
<td>6.1 Improvements</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6.1.1 Personal records</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6.1.2 Income</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>6.1.3 Schedule</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>6.1.4 Changes</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>6.1.5 Terms and Conditions</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>6.1.6 General comments</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>6.2 Summary</td>
<td>39</td>
</tr>
<tr>
<td>7 Conclusion &amp; Future Work</td>
<td>7.1 Answering the Research Question</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>7.2 Future Work</td>
<td>41</td>
</tr>
<tr>
<td>References</td>
<td>Literature</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Informants</td>
<td>I</td>
</tr>
<tr>
<td>Appendix</td>
<td>Appendix A: Foundation</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Database Tables – UML</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Relation Chart</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>Dexter (Views of relevance to the prototype)</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>Appendix B: Prototype</td>
<td>VI</td>
</tr>
<tr>
<td></td>
<td>Mock-Ups</td>
<td>VI</td>
</tr>
<tr>
<td></td>
<td>Prototype</td>
<td>VII</td>
</tr>
<tr>
<td></td>
<td>Appendix C: Questionnaire</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Usefulness</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Ease of Use</td>
<td>XII</td>
</tr>
<tr>
<td></td>
<td>Ease of Learning</td>
<td>XVI</td>
</tr>
<tr>
<td></td>
<td>Satisfaction</td>
<td>XVII</td>
</tr>
</tbody>
</table>
1 Introduction

In this section, the background, motivation, problem definition, research questions and limitations of this work is presented.

1.1 Background

With the new General Data Protection Regulation (hereafter, GDPR)\(^1\), companies and organizations all through the member states of the EU face new challenges. Challenges that include not only how data is stored but all parts of processing, i.e. how it is displayed, and where. The new demands for data processing increases the need for IT-solutions that complies to the new law, e.g. web solutions. The new law will result in inevitable architectural changes in a variety of system solutions that processes personal data. Both in back-end solutions and in the front-end design that the back-end provides the data to. These changes could for example be connected to functionality, e.g. by giving the data owner options to retract consent given at an earlier stage, or content-related updates like providing the user information about the processing of their data.

The GDPR puts pressure on companies and institutions that process personal data. The penalties are high in case of non-compliance. Infringements can be subject to fines up to 10 000 000 EUR, or 2% of the total worldwide annual turnover (of the preceding financial year), whichever is higher (The European Parliament and The Council of the European Union, 2016). The threat of these fines should work as motivation for implementing well working compliant systems.

An initial interview was conducted in which two employees at the Växjö municipal office were asked about the new law, and especially how it applies to school systems. Their positions in the municipality are municipal lawyer and group leader; they will hereafter be referred to as Informant 1 and Informant 2.

Later, additional information was acquired through e-mail correspondence with a systems manager, also employed by the municipal office. This correspondence supplemented the previous information with more details on which personal records are required to get registered in a school system. The system manager is hereafter referred to as Informant 3.

School systems are no exception from the overall implementation of the GDPR, even if municipal systems are given some dispensation, i.e. all data cannot be removed by the data owner (Informant 1, 2018) and is therefore not given the “right to be forgotten” in this type of systems.

In this thesis a way to present data from a school system will be explored in the form of a web application prototype. In the context of this work one administrative school system

---

\(^1\) [https://gdpr-info.eu/](https://gdpr-info.eu/)
(Dexter) has been examined. This system is used by school administrators and caregivers to register and manage personal data like contact information, schedules, income information etc. The school system reviewed in the context of this work is widely used in Växjö municipality, although the result of this work is aiming to apply to any school system with similar data sets.

1.2 Motivation

During the spring of 2018 came the news on how the company Cambridge Analytica" had gathered personal data from millions of Facebook users, in many cases without their knowledge (Linde, 2018). With these recent events of mishandling of personal data, the trust for personal data processing is plummeting. During this crisis, users need to feel confident that their personal data is used in the ways it is supposed to, and with their consent, now more than ever before.

One of the main purposes of the GDPR is to protect the fundamental rights and freedom of the individual (The Swedish Data Protection Authority, 2017). This could be considered particularly important concerning their personal records. The need for interfaces that complies to this have never been greater due to above mentioned issues. It is not only a matter of complying to the new law, it is deemed important for the sake of increasing the trust for web-users. To increase the trust of the users, interfaces must give them both information and control over the processing of the data. This is the aim of this graphical user interface (GUI) proposal.

The decision to use web technologies in this work is mainly to take advantage the wide use of SaaS (Software as a Service), where the only thing needed by the user is a device connected to the internet, and a web browser to access the product (IDG, n.d.). The definition of SaaS further describes that all the main functionalities are executed on the servers of the service, which in turn increases the services’ maintainability since all updates are executed on the server side, and not the client side, making sure that all clients have access to same version of the service instantly.

1.3 Problem Definition

In the examined system there is a plentitude of information stored about students and their caregivers. Information like, but not limited to; civic number, name records, addresses, phone numbers, relations, schedules, non-attendance and family income level.

The main problem is that the system does not facilitate rectification of most of this data, which in turn takes away the control the data owner should have of the information according to the GDPR (European Union, 2016). Neither does it provide information on how the data is processed (used, stored, and otherwise handled). It facilitates no trust to the user.

---

2 [https://cambridgeanalytica.org/](https://cambridgeanalytica.org/)
1.4 Purpose

The purpose of this bachelor thesis is to produce and explore a suggestion to improve the GUI of an administrative school system. The improvements aim to bring a feeling of increased trust and control to the users. The compliance to the GDPR is used as a necessity and a tool to reach this goal. This will be done mainly by focusing on what kind of personal data that is available and how it is presented.

1.5 Hypothesis

The new GUI will make the data subjects feel more in control of their own data and the data of children in their care. The interface will also increase trust on how the data is processed.

1.6 Research Question

How can the design of a graphical user interface improve the control perceived by users in a GDPR-compliant context?

1.7 Limitations

This work is limited to personal records related to caregivers and their children in Växjö Municipality, Kronoberg County, Sweden. Since older students might have more access to their own data (Informant 1), the focus is mainly on the data of younger children and their caregivers. The age span of interest ranges from pre-school age and up to high school. The data structures used in this project are imitated from structures used in the administrative school system Dexter. This was done to provide a realistic structure and to give a realistic expectation on school system content. When data subjects turn 18 years old they automatically become the information owner of their own personal record, ceteris paribus. How this transition should be implemented in the graphical user interface is not covered in this work.
2 Foundation
In this section the theory and related work is presented.

2.1 General Data Protection Regulation

GDPR is a data protection reform that applies to all members in the European Union from May 25, 2018. The purpose of this law is among other things to protect the personal records of individuals (The Swedish Data Protection Authority, 2017). This new regulation replaces the Swedish law of personal records (Personuppgiftslagen - PUL), which at the time of writing, is the law currently valid in Sweden.

One important aspect of the new law (GDPR) and the old law (PUL) have in common, is the way the data subject must be informed about how their personal records will be processed. In the regulation ‘processing’ is partly explained as “any operation or set of operation that are performed on personal data or on sets of personal data, whether or not by automated means” (The Swedish Data Protection Authority, 2017). They who process this kind of data (called a processor or controller) are obligated to make sure the right measurements for security is used (a.a). This especially concerns records that are sensitive in nature. This can be information about health, ethnicity, religion or political views (a.a).

The data subject is the individual the information in question is related to. The data owner is the person that has the right to rectify or remove this information. The data owner and the data subject are not necessary the same person. In this context the data owners are mainly the caregivers of the children (data subjects) in the school systems database. Individuals under the age of 18 are not considered complete owners of their own data, hence the caregivers are considered the main data owners. In general, the older a child is the more control they get of their own personal record (Informant 1, 2018). Either way, for younger children (up to the adolescent years), parents have the full right to access personal data for their child, with exception of certain exceptions like custody issues (Informant 1, 2018).

One article from The Swedish Data Protection Authority (2017) claims GDPR concerns everyone that treats personal records, both when one self is in control of the treatment as responsible of personal records, or when you act as assistant to someone else.

In the regulation (The European Parliament and The Council of the European Union, 2016) the term personal data is defined in the following way: “‘personal data’ means any information relating to an identified or identifiable natural person (‘data subject’); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person”.
In the regulation it is also mentioned that personal records cannot be stored in a form that makes the registered identifiable during a longer period than is deemed necessary for the purpose of the information (The European Parliament and The Council of the European Union, 2016). In practical terms this means redundant information must be deleted from the system when the student no longer is registered in a school or daycare related to the school data system. Examples of redundant information in this context may be: contact information, and miscellaneous information about caregivers (Informant 2, 2018).

2.2 Data Taxonomy

To understand different types of data better, the use of taxonomy for social networks developed by Schneier (2010) was chosen. Some of these data types where not assessed to be relevant to the context of an administrative school system, since these types of systems are not usually constructed as a social platform.

- **Service data** is the data that is given to a service in order to use it. In this context this could be the civic number of child in the care of the user and the users’ own civic number.
- **Disclosed data** is data that the user posts on their own page. This could in this context be additional phone numbers or addresses.
- **Entrusted data** is data that the user posts on other users’ pages. This type of data is not relevant to this context since these types of systems do not allow this kind of interaction.
- **Incidental data** is what other users post about the user in question. This is data that you do not control yourself. This could be information that system administrators add to the system.
- **Behavioral data** is data the site collects about the users’ habits by recording what the user does and who the users’ do it with. In this context, information stored in a timeline, i.e. events related to data could be defined as this type of data, i.e. when you changed your email and what you changed it to.
- **Derived data** is data about the user in question and is derived from all the other data.

In this work the service data, disclosed data and behavioral data are deemed the most important types. These data types can be used to group the data within the system in different ways in the interface. By giving the user an opportunity to filter out a certain kind of data set, they are given more possibilities in viewing their data in different ways i.e. adding a separate page for income information.

2.3 Service Data

Data required to register a child in a school system differ a bit depending on if the child is nationally registered in Sweden, is a citizen of EU/EEA or from a country outside of the EU/EEA (Informant 3, 2018).
Data required (service data) for children nationally registered in Sweden.

- Civic Number for the child.
- Civic Number for a caregiver for the child in question.

Data required (service data) for children registered outside of Sweden but in an EU/EEA country.

- Co-ordination number for the child.
- Co-ordination number for a caregiver to the child in question.

For both children registered in Sweden and in an EU/EEA country, data including addresses, family relations etc. is collected automatically from the Swedish tax agency. Data including information about special diets, allergies and contact information like phone numbers are registered by the caregiver through e-services like the school system later described in this study.

Data required (service data) for children registered outside of Sweden and the EU/EEA countries, i.e. asylum seekers.

- Temporary civic number for the child.
- Temporary civic number for the child in question.
- This data is registered manually, and that is also true for contact information, information about special diets etc.

Co-ordination number and temporary civic numbers act as identifiers for persons that is not nationally registered in Sweden. The purpose of this number is to identify persons living in Sweden even if they are not nationally registered (The Swedish Tax Agency, n.d.).

2.4 Related Work

In this section related projects and software is presented.

2.4.1 Dexter

*Dexter* is an e-service, used as an administrative tool for school systems. It is developed by the software company IST (International Software Technology)

3. The interface of this system stands as starting point for developing the artefact used as the evaluation tool for this thesis. This system is used or has been used by most of the stakeholders involved in the testing of the developed prototype, which aids in comparing the two.

This system is used by Växjö municipality

4. as a tool for registration of current records that concerns child care (Växjö Municipality, no date). It offers functionalities like schedule changes as well as caregiver income information, upon which the childcare fee is based. The hub of the interface consists of a start page which presents links to these limited functionalities (Fig. 1 below).

---

3 https://www.ist.com/
4 http://vaxjo.se/
2.4.2 Google Dashboard

In the dashboard connected to “My Account” in Google’s services, Google include information on what data they gather and how they use it. If you are logged in using your Google account, the interface also provides functionality to change your data and conveys who has access to your data entries. It allows you to overview your recent activities and it gives the user an option to delete them. These activities include directions in Google Maps, what YouTube-videos you have watched, your search history, browser history, what advertisements you have clicked on, your location, device information and your IP and cookie-data. On their information page they inform about their data processing and uses.

The editing-view (Fig. 2 below) of each data entry provides information on what the editing will achieve, in the example the changes will be shown though the whole Google account. The entry (in this case a name) is paired with a pen, (in this case a metaphor for editing). When the pen is clicked on, a dialog (Fig. 3 below) opens and the user can change the information. This is also a technique used in the prototype.

---

5 https://privacy.google.com/your-data.html
2.4.3 The Privacy Dashboard

A work strongly connected to the beforementioned security section of the Google Dashboard is the Privacy Dashboard developed by Raschke et al. (2017). In their paper they present their developed prototype called the privacy dashboard. The purpose of the dashboard is to work as interface between data subject and controller (a.a). They describe the dashboard as a way for the controller to reach out to the data subject in cases where the controller needs to ask for additional consent. The authors further explain that the “work designs, implements, and evaluates a privacy dashboard for data subjects intending to enable and ease the execution of data privacy rights granted by the GDPR”. In Fig. 4 and 5 below, some examples are presented, i.e. that the user has disclosed their name and email. This interface is similar in many ways to the dashboard on Google’s My Account but differs in some ways as this interface gives even more information about the data and puts emphasis on the interface between data subject and controller (administrative) as explained earlier.

Figure 3 - Dialog for editing of the data owners name.
Figure 4 - View of side menu where the user can filter their data.

Figure 5 - The timeline.
Several aspects are interesting for this thesis for starters, the timeline presented in Fig. 5. By presenting events related to personal data in a timeline, the user can get a quick overview of their data and events connected to it. They also explore an interesting solution to requests that cannot be handled instantly. In Raschke’s paper the authors explain that “Requests for rectification, erasure or withdrawal of consent cannot be expected to be responded to immediately”. They describe that a section for messages, showing the status of the pending requests is reasonable. In the prototype used for this thesis there will be no back-end solution, hence no back-end controller, but this is an interesting aspect for further work.

2.4.4 User-Friendly Legal Documents

The paper “A Visualization Approach for Adaptive Consent in the European Data Protection Framework” by Rossi and Palmirani (2017) presents how graphical elements (e.g. icons) can enhance the readers understanding of legal documents. It especially explores this in the context of GDPR and the data subjects right to give informed consent. Their research relies on legal Semantic Web technologies and HCI principles to propose visualizations in legal documents, like policies and consent forms (Rossi and Palmirani, 2017).

The paper states that graphical elements (e.g. images, schemas, icons etc.) have the power of eliciting legal information clearly, efficiently, and quickly. The authors also comment that it can enhance the readers degree of comprehension.

Even though this thesis does not emphasis on legal documents, Rossi and Palmarini’s research is interesting in the aspect of making the data subject aware of what they are giving consent to in a user-friendly way. Other interesting aspects is the use of icons as metaphors for their respective users for example a pen for editing.
3 Methodology
This section describes the methods used.

3.1 Chosen Methodologies

3.1.1 Real World Research

The methods chosen are grounded in real world research. Real world research puts emphasis on solving real world problems (Robson and McCartan, 2016). This methodology is almost always connected to the ‘field’ e.g. school, industry, hospitals etc. (a.a). Since this study is strongly connected to a real-world problem (GDPR compliance) and a has clear field (school), methods within this type of research was considered the most fitting e.g. empirical studies.

3.1.2 Qualitative Social Research

The study follows a qualitative social research tradition. This is described by Robson and McCartan (2016) as a tradition where results are presented verbally or in non-numerical form. They further explain that there is little or no use of quantitative data or statistical analysis. Another aspect of this tradition is the importance of context. The authors explain this as “a need to understand phenomena in their setting”. In the qualitative tradition situations are described from the perspective of those involved (a.a). This thesis is connected to the user perspective in the sense that it will result in users’ perception of an interface.

3.2 Literature Survey

The goal of the literature review was to build the foundation for the thesis. For the review, the IEEE Xplore and Google Scholar was used to find publications of interest. Articles of interest was related to general interface design methods and specific design issues related to the GDPR and its implementation in user interfaces.

3.2.1 Google Scholar

In Google Scholar the filters used were: ‘patents not included’ and ‘all publications’. Keywords used where different variations of ‘GUI design’ and ‘GDPR interface design’. The number of results generated by the more general keyword ‘GUI design’ were 13 500 and the first and second page of results were sifted through.

The keyword ‘GDPR interface design’ resulted in 988 results. Results with a clear angle on GDPR implementations in user interfaces had the highest priority.

Articles with the highest number of citations were considered the most credible and their abstracts and conclusions were read. The credibility was based on the articles’ connection use of the keywords it claimed to have and especially if it GDPR was a dominating
element of the study or not. In the end four articles of these where reviewed in whole and two of them chosen to be of most relevance to this thesis.

### 3.2.2 IEEE Xplore

In this publication database the first keyword used was ‘GDPR’, all publications. It resulted in 26 articles. As stated above, the results of most relevance (see section 3.2.1) included implementation of the GDPR in user interface context and/or design principles regarding this subject.

Other searches where conducted using different variations of the keyword ‘GUI design’ e.g. Graphical User Interface, User Interface Design, GUI design etc. The results using this keyword (and similar) were filtered by year of publication (2010-2017) to narrow down the results, which ended on 48.

The keywords ‘Rapid Application Development’ was also used, resulting in 183 results, filters used: all publications. Articles that described an implementation of this methodology were prioritized. Four articles were read in full.

### 3.2.3 Snowball Sampling

Parts of this survey was conducted using the snowball sampling methodology. The ‘snowball sampling method is based on referrals from initial subjects to generate additional subjects’ (Dudovskiy, 2017).

In this case articles of interest were found in the initial articles list of references. Which articles were acquired through this method is presented in Table 1 below.

<table>
<thead>
<tr>
<th>Source</th>
<th>Used</th>
<th>Referenced Article</th>
<th>Used</th>
</tr>
</thead>
</table>

Table 1 – Articles gathered by snowball sampling.
The article written by Schneier (2010) was chosen because of the data taxonomy the author presents in it, this taxonomy was also used by the related work by Raschke, et al (2017), which was the original source for this article as presented in Table 1 above.

The source IEEE (1990) was chosen based on the definition of a method of interest (Rapid Application Development). The original source was not used in this case.

3.3 Rapid Application Development

The prototype was developed with inspiration of a method called Rapid Application Development (RAD). The IEEE Standard Glossary of Software Engineering Terminology (Geraci et al., 1991) defines this method as ‘a type of prototyping in which emphasis is placed on developing prototypes early in the process to permit early feedback and analysis in support of the development process’.

![Figure 6 - The Iterative Design Process.](image)

The methodology supports an iterative prototype process (Fig. 6 above) where each version of the prototype is evaluated by both end-users and user experts. Each prototype is tested and then reworked based on the feedback of the evaluation (CASEmaker, 2000).

This method is based on a lifecycle of four different phases; Requirements Planning, User Design, Construction and Implementation (Fig. 7 below). This work followed these phases with exception of the last one, implementation. Since the prototype produced was not fully implemented, the last phase is not deemed relevant for this project.

![Figure 7 - The Rapid Application Design Process.](image)

**Requirements Planning**
The process of requirement engineering and defining the scope of the system. This phase is also known as the Concept Definition Stage (CASEMaker, 2000 s.7). During this phase the requirements was identified and put into a requirement specification. These
requirements were reviewed before the next step of the methodology. The requirements were partly established by analyzing the GUI of the administrative school system *Dexter*. The content of the system underwent analysis to detect eventual flaws (lack of GDPR compliance). This technique was used to investigate how these flaws could be avoided in the prototype.

*User Design*
This stage is also known as the Functional Design Stage (CASEMaker, 2000 s.7). Interlinking somewhat with the earlier stage this stage puts more emphasis on functionality. During this phase the functionality of the artifact was planned, in other words planning how the user intends to use it. The basic functionalities and layout was evaluated by making semi-functional mock-ups of the interface.

*Construction*
This stage is also known as the Development Stage (CASEMaker, 2000 s.7). This was the phase where the web technologies were implemented in the project. In this case, the building of the prototype. When the construction of the prototype reached a satisfactory level, the user evaluation begun.

*Implementation*
This stage is also known as the Deployment Stage (CASEMaker, 2000 s.7). In this phase the product is meant to be deployed. As mentioned in the introduction of this method the prototype was not implemented with full functionality, and therefore this phase was not fully conducted in this project.

3.4 Think-Aloud
The definition of this method is described by (Nielsen, 2012) as follows:

> "In a thinking aloud test, you ask test participants to use the system while continuously thinking out loud – that is, simply verbalizing their thoughts as they move through the user interface."

He further explains that the method allows you to gain insights about misconceptions of users about some parts of the UI and why other parts are considered easy to use. He states, ‘when users misinterpret design elements, you need to change them’. By following this protocol, the hopes are to evaluate the usability in a reliant and time effective way.

The stakeholders that were selected to participate in this part of the evaluation all have previous (or current) experience with the *Dexter* system as caregivers to children registered there. These stakeholders were given tasks to complete by using the GUI, for example “change your address”. When performing these they were asked to say what they do and think about their actions out loud.
Using the think aloud method, the users were prompted to perform five tasks related to the interface.

These tasks were:
1. Add information about allergies for a specific child.
2. Change the home address of a child.
3. Change your income information.
4. Add a temporary schedule.
5. Find the terms and conditions.

3.5 Questionnaire

To gather more distinct information from the user test the participants were given a questionnaire containing statements regarding their experience with the interface. The type of questionnaire used is called the USE questionnaire. The USE-questionnaire is developed Arnold Lund (2001). USE stands for usefulness, satisfaction and ease. Lund (2001) divided statements related to usability into four sections; Usefulness, Ease of Use, Ease of Learning and Satisfaction. These statements make up the format and are answered using a scale of one to ten. One meaning “strongly disagree” and ten meaning “strongly agree”. Statements are shown under their respective headers in Table 2 below.

<table>
<thead>
<tr>
<th>Usefulness</th>
<th>Ease of Use</th>
<th>Ease of Learning</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>It helps me be more effective.</td>
<td>It is easy to use.</td>
<td>I learned to use it quickly.</td>
<td>I am satisfied with it.</td>
</tr>
<tr>
<td>It helps me be more productive.</td>
<td>It is simple to use.</td>
<td>I easily remember how to use it.</td>
<td>I would recommend it to a friend.</td>
</tr>
<tr>
<td>It is useful.</td>
<td>It is user friendly.</td>
<td>It is easy to learn to use it.</td>
<td>It is fun to use.</td>
</tr>
<tr>
<td>It gives me more control over the activities in my life.</td>
<td>It requires the fewest steps possible to accomplish what I want to do with it.</td>
<td>I quickly became skillful with it.</td>
<td>It works the way I want it to work.</td>
</tr>
<tr>
<td>It makes the things I want to accomplish easier to get done.</td>
<td>It is flexible.</td>
<td></td>
<td>It is wonderful.</td>
</tr>
<tr>
<td>It saves me time when I use it.</td>
<td>Using it is effortless.</td>
<td></td>
<td>I feel I need to have it.</td>
</tr>
<tr>
<td>It meets my needs.</td>
<td>I can use it without written instructions.</td>
<td></td>
<td>It is pleasant to use.</td>
</tr>
<tr>
<td>It does everything I would expect it to do.</td>
<td>I don’t notice any inconsistencies as I use it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both occasional and regular users would like it.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can recover from mistakes quickly and easily.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can use it successfully every time.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 2 - USE Statements*
To complete the questionnaire a fifth section was added, containing additional questions specially designed to help get a more direct perspective on the users’ perception of control over personal data. First the user was requested to answer three statements by the scale mentioned previously in this section. These statements are:

- Do you experience increased control over your personal data through the interface?
- Do you experience increased control over your child’s data through the interface?
- Do you experience that an increased sense of control also increases your sense of security?

The questionnaire ends with two voluntary questions aiming to collect more qualitative data, these questions asks the user to describe positive and negative elements of the interface.
4 Implementation

The artifact was built according to the steps of the RAD-methodology. In this section, details about the process of development will be presented.

4.1 Requirements Engineering

The analysis of the current interface of Dexter was the base for the requirement specification that was used to build the prototype. This method identified what the current interface was and where it was not, lacking in terms of GDPR compliance (see Table 2). The result of this evaluation is the digital artefact that was used to answer the research questions.

The requirements were gathered in several steps. First an existing GUI of a school system where examined. During this phase the school system interface were analyzed and compared to the GDPR to see if and where it failed to comply to the new demands (see Table 3). The analyze is based on four factors; Rectification, Removal, Consent, and Processing (defined in section 4.1.1 Explanations below). After this analysis, the requirements were discussed with peers and experts.

<table>
<thead>
<tr>
<th>Data</th>
<th>Rectification</th>
<th>Removal</th>
<th>Consent</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civic Number</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Address</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Phone number</td>
<td>Yes</td>
<td>Unsure</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>E-mail</td>
<td>No</td>
<td>Unsure</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>E-mail*</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Income*</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Absence</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 3 - Compliance Overview (Dexter). * marks specific caregiver data.

4.1.1 Explanations

- **Data** - The data entry in question. Available through the school system interface.
- **Rectification** - Functionality to edit the data entry. Is the user allowed to rectify this specific information?
- **Removal** - Functionality for removal of the data entry. Is the user allowed to remove this specific information?
- **Consent** - The user can give consent for the use of the specific data entry. Additional point of interest: is there any indicators in the interface that gives the user feedback if consent is given previously?
- **Processing** - Information about why and where the data will be used and how will it be stored. This includes an additional number of questions. Does the interface tell the user how their data is handled and how long the system will keep it? Is there any information on who has access to the data?
As presented in Table 3 on the previous page no information about consent nor processing of the data is available in the current interface. The data subject is thus not given the option to actively withdraw or give consent for any of the data entries through this interface nor given any explicit information about how the data is used and how it is stored.

4.2 Requirement Specification

The requirement specification was developed as a result of the analysis of the interface of Dexter. To complement the result of the analyze some questions where produced. The purpose of these questions is to aid the establishment of requirements by putting emphasis on GUI layout and content’s compliance to the GDPR.

- How can the data be visualized in compliance to the GDPR (transparency)?
- How should the information be grouped?
- What information can be rectified, and what can be erased (by the data owner)?
- What information is required by the system (service data)?
- What information does the data subject have to give consent to?

The requirements were divided into functional and content requirements a taxonomy described by Garrett (2011, p.63). He describes functional requirements as specifications about what the system should be able to do. He further describes content requirements as specifications about what information needs to be included in the content of the product.

The described process resulted in the following requirement specification.

4.2.1 Content

- The following data entries should be available:
  - Civic number
  - Address
  - Phone number
  - E-mail*
  - Income*
- Data entries should be categorized in service data and disclosed data.

*Email is optional, and income is only relevant for caregivers.
- Timeline available showing events to data entries. Additions, rectifications, deletions etc.
  - Timeline entries will show date of event and short description of event.
    - Additions will only show the new information.
    - Rectifications will show both earlier data entry and the updated information.
    - Deletions will show information deleted, e.g. an e-mail address.
4.2.2 Functionality

- By each data entry, the following functionality will be provided:
  - Option to rectify or remove (where allowed)
  - Give consent (when needed)
  - Withdraw consent (where allowed)
  - (Rectification requests will be sent to controller on admin side.)

- Caregiver should be able to give consent to child showing up in public class list.

4.2.3 Technical Specifications

- The product will be web-based and available through several browsers.

4.3 User Design

After the requirement engineering the process of designing the functionality of the artifact begun.

4.3.1 User Cases

To understand the user’s interaction with the interface, user cases where made. A user case is a written description of how users will perform a certain task (Use Cases, 2010). A user case illustrated as a flow charts is showed in Fig. 8 below. This method puts the functionalities of the interface in the user’s point of view.

![Flowchart showing a user case: Rectification of data entry.](image)
4.3.2 Mock-ups

Semi-functional mock-ups were made to explore the basic functionalities of the future prototype, e.g. navigation between different views. These mockups and their functionality were evaluated through testing and discussion with experts and peers. The purpose of this evaluation was to find early problems regarding usability aspects of the prototype. The aim of this was to gain time in regard to iterations and improvements of the interface.

To evaluate and test these interactions semi interactive mock-ups were made (the last version of the mock-ups is presented in Fig. 9 below). This was conducted in several steps. At first three different versions of the interface were made and evaluated. One of these was chosen and the following work was based on that layout.

Figure 9 - Semi-interactive mock-up.

4.4 Construction

During this phase the prototype was built. Using front-end web technologies, a GUI following the previous established requirements took form.

4.4.1 Prototype Building Blocks

Describing the different components contributing to the development.

Google Material Design

For the layout of the prototype, the online specification Google material design guidelines\(^6\) were followed. It enables the developer to “create a visual language that synthesizes classic principles of good design with the innovation and possibility of technology and science” (Google, no date d).

\(^6\) [https://material.io/guidelines](https://material.io/guidelines)
These guidelines strive for use of materials that provide visual cues that are grounded in reality (Google, no date d), thereby becoming metaphors that users quickly can understand. The guidelines further explain that the fundamentals of light, surface and movement are key to give the user feedback on how objects move, interact and exist in space and in relation to each other.

**Web Technologies**

The prototype is developed using the framework Angular 5. Angular (Google, no date a) is a framework and is used for building web application using HTML and TypeScript (Google, no date b). TypeScript is a typed superset of JavaScript that compiles to plain JavaScript.

To ease implementation of the Google Material Guidelines the Angular Material library was paired with Angular 5. Angular Material (Google, no date c) is a library using UI components that facilitates implementation of the Google Material Guidelines.

**Architecture**

Future implementations of the interface should be paired with a back-end solution, since the developed prototype only uses mock data retrieved from the client script. This would not work for a fully functional version of the service, in which data should be retrieved from a database containing a great amount of data sets. Data that not every client will nor should have access to. The solution should consist of a RESTful API (Application Programming Interface), connecting the database with the user interface (Fig. 10 below). REST stands for Representational State Transfer and can be used over nearly any protocol (MuleSoft, 2018). The information article previous cited further explain that RESTful APIs are designed to take advantage of existing protocols, especially web protocols like HTTP. Since the prototype is a proposal for a web service.

![Figure 10 - Connection between the user interface and the user data.](image)

The back-end solution should also provide an authentication system to protect the users’ information. The service could for example be connected via BankID. BankID is a e-identification service that makes it possible for companies, banks, organizations and government agencies to enter into agreements with individuals. They also provide a service where the user can keep the ID on their smartphones (BankID mobile) and use this device to connect to web services e.g. provided by banks and other high security transaction of data.

---

7 [https://angular.io](https://angular.io)
8 [https://www.typescriptlang.org](https://www.typescriptlang.org)
5 Results & Analysis

This section covers the result and analysis of the research done. A discussion of the results will follow in the next section.

5.1 Requirements

The analysis of Dexter and comparison with the GDPR resulted in a requirement specification on which the digital artefact is based. A description of this process starts on page 18 in the previous section in this thesis, Implementation.

The product should:
- Present personal data related to both child and caregivers.
- Present the data categorized.
- Include a visual timeline of data events.
- Allow the user to edit certain entries.
- Allow the user to withdraw consent.
- Allow the user to give consent.
- Be web-based.

5.2 User Evaluation

The user evaluations were conducted on five different occasions (Table 4 below) and in the same geographical area, namely Växjö, Sweden. In total, ten people within the target group participated.

As a first step, the participants got a quick explanation of the purpose of the prototype, as being an interface for a school system in the likes of Dexter, which is the system that all of them had previous experience of. Thereafter, a scenario was explained to set the context of this session. Since their own personal data was not used, an introduction to the mock data was regarded necessary and provided to the participants. It was explained that they were already logged in to the service, and that the personal mock data presented belonged to their family, consisting of two cohabitant partners and a child to whom they both were registered caregivers. By providing this background, the goal was to connect the participants to the fictional characters. Each session took around 20 minutes to complete.

<table>
<thead>
<tr>
<th>Date</th>
<th>Place</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 4, 2018</td>
<td>Växjö</td>
<td>4</td>
</tr>
<tr>
<td>May 8, 2018</td>
<td>Växjö</td>
<td>1</td>
</tr>
<tr>
<td>May 9, 2018</td>
<td>Växjö</td>
<td>1</td>
</tr>
<tr>
<td>May 10, 2018</td>
<td>Växjö</td>
<td>2</td>
</tr>
<tr>
<td>May 14, 2018</td>
<td>Växjö</td>
<td>2</td>
</tr>
</tbody>
</table>

Tabell 4 - User evaluation, date and number of participants.
5.3 Think-aloud

Here the findings from the think-aloud evaluations are presented (see section 3.4 Think-aloud), one task at the time. The users were encouraged to discuss usability issues they encountered and were told that suggestions for improvements were welcomed. All participants were asked to complete the same set of tasks. They completed the tasks by using the same version of the prototype (see Fig. 11 below).

The tasks were:
1. Add information about allergies for a specific child.
2. Change the home address of a child.
3. Change your income information.
4. Add a temporary schedule.
5. Find the terms and conditions.

Some of the users were asked to explore the last page in the side menu, called “Changes”. They were asked open ended questions like “What do you think this page is used for?” and “What do you think about it?”. Since the timeline is an addition that does not exist in *Dexter*, the purpose of this was to explore the participants’ attitudes towards this addition.

5.3.1 Tasks

*Add information about allergies for a specific child*

Overall, the first choice for this task was to click on the lower left link on the card, named “add information” (which is the right choice). Some of the participants first instinct was to click on the last link in the menu, named “changes”, and ignored the “add information”-button. Since the “changes” lead to the timeline-page, this could indicate an inaccurate
head-lining for that section of the service. An important note here is that the participants that made this mistake recovered quickly and found the right button, which makes the “add information”-button their second choice. Some representative comments related to this section:

“This is clear.”

“Where can I see the change?”

“Feedback is missing.”

“I would like the info to be placed in a separate section of the card when applied.”

These comments and observations made during the usability testing was later used to make suggestions for improvements to the interface. The comments are translated from Swedish and appear as close to the participant’s original phrasing as possible.

*Change the home address of a child*

No user made an inaccurate choice here. All chose to click on the pen-icon beside the address heading, without any hesitation worthy of mentioning. A couple of participants mentioned that they considered the pen to be a “classic” and “obvious” metaphor for editing, which explains the lack of hesitation. One person clicked the information icon as a first choice before clicking on the pen. After clicking the pen-icon and opening the dialog-box, some read the information text about the processing of the address, and some did not. A couple of participants stated that they almost never read information texts, and therefore clicked “request change” almost immediately. A collection of comments related to this task:

“I would like to change the address myself.”

“What does registration mean? I would like to know more about this process.”

“To much text, simplify!”

“I never read this type of text.”

“I had expected to edit the address myself, not retrieving from the tax registration database.”

“I would like the option to add a temporary address.”

“Add some kind of notice when the update [from the Swedish tax agency] is done.”

“Quite logical.”
These comments and observations made during the usability testing-sessions were later used to make suggestions for improvements to the interface. The comments are translated from Swedish and appear as close to the participant’s original phrasing as possible.

Change your income information

The same pattern as in the first task also showed up here. The users did not hesitate on where they should make the change, and went directly to the pen-icon for this. Some of the participants said that they wanted more information in the dialog box where the editing takes place (Fig. 12 below). One participant stated, “I forgot which persons income I am editing and there is no clue to help me remember, maybe the name of the person could be visible in the box as well?”. One participant was not sure of in what format the income should be written, “It would be good to include information if it should be after taxes or not”. The same participant also suggested the income information should be retrieved the same way as the address, through the Swedish Tax Agency.

Some additional comments made during this task:

“Is it before or after taxes? What currency? Be extra clear on this.”

“Add some sort of notification that the change went through.”

“Does anyone control this entry before it is approved?”

“I think the information text about maximum charge must be made clearer.”

“I would like a connection to the Swedish Social Insurance Agency or the Swedish Tax Agency to collect this data.”

Figure 12 - Dialog box for editing of income information.
“I would like to see pending requests somewhere on the card.”

“Good overview.”

“The pen icon seems to be standard for change here.”

These comments and observations made during the usability testing-sessions were later used to make suggestions for improvements to the interface. The comments are translated from Swedish and appear as close to the participant’s original phrasing as possible.

**Add a temporary schedule**

Most participants (90%) had no troubles finding the “add temporary schedule”-functionality, but one participant (10%) wanted to make the changes in the ordinary schedule since this was presented first in the interface (Fig. 13 below). She explained why as “I didn’t read everything on the page, I just saw the schedule header and went to the pen-icon right way”.

![Figure 13 - Schedule View](image)

Some collected comments about the schedule functionality during the test:

“Which period is this schedule for? Add related semester and show start date and end date of the schedule.”

“I would like to see a more classic calendar view.”

“I don’t like the use of week numbers.”

“I would rather choose dates than whole weeks.”

“Available.”

“I would like to add the same time to all days without having to fill out the day one by one.”

“Is it the schedule for daycare or school?”
“I would like a more visual representation of the schedule.”

“I would like a drop-down-menu to choose time.”

“I want more information about temporary schedules.”

These comments and observations made during the usability testing-sessions were later used to make suggestions for improvements to the interface. The comments are translated from Swedish and appear as close to the participant’s original phrasing as possible.

Find the terms and conditions

When the participants were told to find this page, all of them looked for it in the lower parts of the GUI, which led to no problems of finding the link fast. The link is placed in the lower left corner, at the bottom of the side menu (marked with a green oval shape in Fig. 14 below).

![Figure 14 - Placement of the link to the terms and conditions page.]

General comments about the terms-and-conditions-page:

“I usually don’t read the terms and conditions.”

“I always read the terms and conditions, especially if it’s about my child.”

“I can find the link to this everywhere in the interface where it mentions GDPR.”

“I don’t read this, I trust the municipality.”

These comments and observations made during the usability testing-sessions were later used to make suggestions for improvements to the interface. The comments are translated from Swedish and appear as close to the participant’s original phrasing as possible.
Changes
This view was not included among the user tasks. This was done on purpose to see if any of the users wanted to explore this page on their own. If they did not, they were told to enter that view and evaluate it. One participant said that the color coding was confusing, and further explained that if it was going to be used, it should be used everywhere so that the connection between colors and persons would be easier to perceive. Several of the participants expressed that they liked the idea of the timeline. Some other comments related to this section:

“It’s good, I can see what I’ve done here.”

“As a parent to small children is good to see what you have agreed on or changed, it can be hard to remember sometimes”.

“I don’t think this is needed that often.”

“It’s not that relevant to store event logs over e-mail changes.”

These comments and observations made during the usability testing-sessions were later used to make suggestions for improvements to the interface. The comments are translated from Swedish and appear as close to the participant’s original phrasing as possible.

5.4 Questionnaire

After completing the task described for the think-aloud procedure, the participants were asked to fill out a questionnaire. The questionnaire is divided into five parts; Usefulness, Ease of Use, Ease of Learning, Satisfaction and Additional Questions. This section presents the quantitative results in the form of tables and bar charts. While the participants filled out the form they were encouraged to ask the test manager about any of the statements if they felt uncertain. This openness lead to deeper insights in how the participants interpreted some of the statements. This will also be presented in the following sections.

5.4.1 Usefulness

The first eight statements in the questionnaire (Table 5, Column 1 below) were related to Usefulness. In other words, how useful the participant perceived the service. Table 5 below presents the statements and their respective mean value (hereafter MV), standard deviation (hereafter SD) and number of answers. Figure 15 below presents the results in the form of a vertical bar chart, including mean value and SD for each statement in this section.

Overall usefulness ranks high, as the MV from each question is on the higher end of the ten-point scale. The main question of usefulness ranked very high, as presented in Table 5, the MV of “it is useful” is 9.4. On three of the statements (2, 4 and 8 as seen in Table
4, in section 5.2) the value of the SD is high, over or around 2.5. This could be explained by two participants that deviated drastically on these responses. Especially one participant deviated on a more regular basis from the other responses on these statements, ranking them very low while the others put their grade in the higher end of the scale. An explanation for this could be different interpretations for some of the statements or different expectations of the service. The high ratings of the other participants contribute to the overall high MV (a rank of 7 or over on all statements) which indicates an overall perceived usefulness of the service.

Lund (2001) writes that ‘users are more variable in their ‘Useful’ ratings when they have had only limited exposure to a product’, which also could be an explanation for the high SD values.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Mean Value</th>
<th>Standard Deviation</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It helps me be more effective.</td>
<td>7,9</td>
<td>1,3703</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>It helps me be more productive.</td>
<td>7</td>
<td>2,7487</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>It is useful.</td>
<td>9,5</td>
<td>0,8498</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>It gives me more control over the activities in my life.</td>
<td>7,5</td>
<td>2,3687</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>It makes the things I want to accomplish easier to get done.</td>
<td>8,4</td>
<td>1,0749</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td><strong>It saves me time when I use it.</strong></td>
<td><strong>8,7</strong></td>
<td><strong>0,8232</strong></td>
<td><strong>10</strong></td>
</tr>
<tr>
<td>7</td>
<td>It meets my needs.</td>
<td><strong>8,7</strong></td>
<td>1,4181</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>It does everything I would expect of it.</td>
<td><strong>7,3</strong></td>
<td><strong>2,5407</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

*Table 5 - Usefulness results. Information and ratings. Italic marked statements are according to Lund (2001) loaded less strongly on the factor relative to the statements not presented in italic.*

![Usefulness](image-url)
5.4.2 Ease of Use

The second part of the questionnaire aimed to inquire the participants about their perceived Ease of Use. Table 6 below presents the statements and their respective MV, SD and number of answers. Figure 16 below presents the results in the form of a vertical bar chart, including MV and SD for each statement in this section.

The overall MV is high here as well, all but one ranking above 7, which indicates an ease of use for the service. The lowest value (6,8) relates to the statement “It is flexible”. Some participants stated that a service not being flexible not necessarily have to be a negative attribute, leading to an issue of varied interpretation. This interpretation could explain the lowest value being 3 and the highest value being 10.

The results of this section also include some high SD values. These occur on statement 5 and 9 (see Table 6 below). On statement 5, two participants (20%) measured medium to low on this, while the rest 8 participants rated this high. As for the statement “I can use it without written instructions” most participants ranked this on the higher end, with 60% on 9 and 30% on 10. There is one outlier, the same who previous ranked this as 1 (lowest possible), which explain the high mean value, and a high standard deviation.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Mean Value</th>
<th>Standard Deviation</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It is easy to use.</td>
<td>9.4</td>
<td>0.9660</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>It is user friendly</td>
<td>8.8</td>
<td>1.3984</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>It requires the fewest steps possible to accomplish what I want to do with it</td>
<td>8</td>
<td>1.2472</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>It is flexible.</td>
<td>6.8</td>
<td>1.9321</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Using it is effortless.</td>
<td>7.9</td>
<td>2.3309</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>I can use it without written instructions.</td>
<td>8.1</td>
<td>2.22</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>I don’t notice any inconsistencies as I use it.</td>
<td>7.6</td>
<td>2.2211</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Both occasional regular users would like it.</td>
<td>8.5</td>
<td>1.4337</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>I can recover from mistakes quickly and easily.</td>
<td>7.8</td>
<td>2.5298</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>I can use it successfully every time.</td>
<td>8.4</td>
<td>1.7763</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 6 - Ease of Use results. Information and ratings. Italic marked statements are according to Lund (2001) loaded less strongly on the factor relative to the statements not presented in italic.
3.4.3 Ease of Learning

The shortest section of the USE-questionnaire is the evaluation of the Ease of Learning which includes four statements. The results from this section are presented in Table 7 and Figure 17 below. The figure presents the data in the form of a vertical bar chart, including MV and SD for each statement.

As presented, none of these statements have a standard deviation worthy of mentioning and the mean value is very high. The participants agree that the service was easy to use and easy to learn.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Mean Value</th>
<th>Standard Deviation</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I learned to use it quickly.</td>
<td>9.4</td>
<td>0.5163</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>I easily remember how to use it.</td>
<td>8.8</td>
<td>1.6193</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>It is easy to learn to use it.</td>
<td>9</td>
<td>1.3333</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>I quickly became skillful with it.</td>
<td>8.9</td>
<td>1.1972</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 7 - Ease of Learning results. Information and ratings. Italic marked statements are according to Lund (2001) loaded less strongly on the factor relative to the statements not presented in italic.
Figure 17 - Ease of Learning results. Mean values and standard deviations. Responses scale from 1-10.

5.4.4 Satisfaction

The last section of the USE-questionnaire is aimed towards User Satisfaction regarding the service. Lund (2001) mentions that Satisfaction is strongly related to the actual or predicted use of the product, in this case, predicted.

The results from this section are presented in Table 8 and Figure 18 below. The figure presents the result data in the form of a vertical bar chart, including MV and SD values for each statement.

Overall, the satisfaction could be interpreted as high, with an exception for “It is fun to use”, which rates closer to a neutral value.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Mean Value</th>
<th>Standard Deviation</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I am satisfied with it.</td>
<td>8.2</td>
<td>2.0439</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>I would recommend it to a friend.</td>
<td>8.4</td>
<td>2.0655</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>It is fun to use.</td>
<td>6.4</td>
<td>1.7763</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>It works the way I want it to work.</td>
<td>7.7</td>
<td>1.8885</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>It is wonderful.</td>
<td>6.2</td>
<td>2.0439</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>I feel I need to have it.</td>
<td>8.3</td>
<td>1.7669</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>It is pleasant to use.</td>
<td>8.8</td>
<td>0.9189</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 8 – Satisfaction results. Information and ratings. Italic marked statements are according to Lund (2001) loaded less strongly on the factor relative to the statements not presented in italic.
5.4.5 Additional Questions

The Additional Questions are not included in the standard USE-questionnaire format. These questions were added with the aim to gain insight on how the users perceived the control of personal data throughout the prototype. Another aspect was to find out if indications of increased perceived control also increased the sense of security (regarding the data). The result from the Additional Questions are presented in Table 9 and Figure 19 below. The figure shows the results in the form of a vertical bar chart including MV and SD values.

As presented in Table 9, the MV rates high on all three questions. Interestingly, the participants felt more control over their child’s data than their own. The participants agreed on the statement that an increased sense of control also increases the sense of security.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Mean Value</th>
<th>Standard Deviation</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you experience increased control over your personal data through the interface?</td>
<td>7.7</td>
<td>2.0027</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Do you experience increased control over your child’s data through the interface?</td>
<td>8.3</td>
<td>1.6363</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Do you experience that an increased sense of control also increases your sense of security?</td>
<td>7.6</td>
<td>2.2211</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 9 – Additional questions result. Information and ratings.
5.5 Summary

The overall mean value of the USE-statements rated high, indicating high usability of the prototype. If the outliers were to be ruled out, some of the mean values would have been even higher. According to Lund (2001), some of the statements are designated less strongly to the factor relative to the statements. These statements are presented in italic in the tables presented for each factor. It is assumed that the same conclusion about usability could have been derived from the questionnaire if these statements were left out.

The high mean values of the Additional Questions show that the users feel in control of the personal records through the interface, regarding both the entries representing their own personal data, and the entries representing the data of their child/children.

The users experience that an increased sense of control correlates with an increased sense of security.
6 Discussion
In this section a discussion regarding the result is presented, with emphasis on usability.

6.1 Improvements
The suggested improvements for further iterations are based on suggestions from the participants of the evaluation and also based on the analysis of the result. Here the improvements are categorized by the page on which they should be implemented.

6.1.1 Personal Records
The misunderstanding on where to add new data could probably be avoided by renaming the timeline-page to something more suitable like “Event-log” or something of the like. Another element that would add consistency to the interface would be to add a section on the card where additions (and changes to these) could be made by clicking a pen-icon, since this principle is used for most other changes, e.g. address, phone and email. Some participants also wanted more options other than allergies and special diets, e.g. be able to add information about medicines and conditions like asthma.

One participant suggested a shorter and more direct information of the address processing, preferable in the form of a short list. Perhaps this type of change could encourage more users to read the information to make them aware on how their data is processed, in this case, the address.

Two of the participants wanted the option to edit the address themselves although they said they understood why this could be problematic, and why the address is retrieved from the national registration. Two participants also suggested that they would like to be given the option to add a temporary address. The later suggestion could be a useful feature in situations where the child have an irregular home address, e.g. living in two different households due to caregivers living apart. One of these addresses would be seen as the primary one and the latter the secondary (or temporary).

One participant also wanted to be given more information regarding the registration process, e.g. when and how the information first enters the system. Information on the registration process would be a motivated addition to the terms- and condition-page, since this would reinforce the GDPR-compliance.

6.1.2 Income
Additional information in the dialog box could be the name of the person the changes are related to, and information that “income” should be in the format of the monthly income before taxes. This would probably facilitate this functionality for the user and prevent user mistakes.
Two of the participants thought that perhaps the user should not edit this information themselves. The income should instead be calculated based in information from the Swedish tax agency. This functionality would make the service more consistent since a similar method would be used to retrieve addresses.

A couple of participants also mentioned that the information about maximum charge should be shorter and more concise. They believed that otherwise most people would not read it and understand it.

**6.1.3 Schedule**

Some suggestions were related to the *Schedule*-page itself. Some participants wanted more information as to which time-period the ordinary schedule was related. They also wanted to see the name of the school and/or daycare facility presented somewhere on the card. Some participants also wanted information on the card that conveyed that a temporary schedule had been added and whether it had been confirmed by personnel at the school yet. Minor changes in the interface would be required to achieve this, e.g. by adding complementary headers to the card components and adding extra information about pending and recently processed requests.

In the dialog-box related to this page, most participants wanted to alter the input-options. They rather wanted to choose start date and end date for the temporary schedule, than using week numbers. One comment states that “a calendar and a clock were missing” from the interface. Other suggestions proposed the option to choose the same times for all days without having to fill out the days one by one, e.g. an input allowing to repeat a certain time for all or a selected number of days.

Another suggestion from the participants was to make the schedule to more resemble a calendar software, thus making it easier to get an overview of the timetable and dates, perhaps even allow for import and export of the schedule to appropriate formats.

The schedule was the section of the prototype that promoted most discussion. It was clear that the participants felt strongly about being able to adjust the schedule in a more visual way, and that the usability of this section probably could be improved by implementing the above-mentioned suggestions.

**6.1.4 Changes**

The *Changes*-page was the only page that grouped events data for both persons and by color coding (see Fig. 19 below). One user clearly expressed confusion over the color-coding, stating that she could not see the purpose of the different colors until she had it explained, an outcome which is undermining the purpose. Perhaps this confusion could be avoided by implementing the color coding on all cards, or to remove it completely, thus improving the consistency of the interface.
One participant wanted to see more information in the timeline (such as consent-related information), and also examples of pending requests e.g. schedule changes and or estimated time of approval of the request. Requests that requires approval from a controller (school administrative) could for example be changes related to income or schedule-changes. This is an aspect explored in the related work by Raschke et al (2017) mentioned previously on page 8 in the Foundation-section. Processed request could e.g. include information on who did the processing and the date of the decision.

Since some of the users mistook this page for a page where you add new data, its title should be changed to a more suitting one, e.g. “Event History” or “Event Log”. This could support avoiding this confusion, and thereby prevent mistakes of this type.

Most of the participants said that they could see the use of the timeline, and they thought it was good to be able to see previous changes and events related to their data. After explaining that this view could also include timeline-events related to consent, e.g. for photo opportunities in school, one participant stated “It would be good to have a place where I can see what I have agreed to [regarding the child]. It is easy to forget if and when you have given the school permission to publish photos [of the child] on their web page or on Facebook”. It could be discussed if all events should be logged. One participant commented “I don’t think it’s relevant to show changes to e-mail and phone numbers”. It would be interesting to find out if more caregivers would agree on this. The type of events that should be prioritized for this type of log is a valid cause for further investigation.
6.1.5 Terms and Conditions

There were no suggestions for improvements from the participants regarding this section. About half of the participants stated that they never read the terms and conditions, and the rest just skimmed through the info and were satisfied with the presentation. None of them took the time to read the terms and conditions more carefully. There is no indication that improvements are needed here, neither regarding the placement of the link nor the content of the page. An exception is the addition of information regarding the registration process, which is previously discussed in the section 6.1.1 (Personal Records, page 35). Although this was discussed during the evaluation of the Personal Records-page, this type of information is considered to belong on the terms- and conditions-page.

6.1.6 General Comments

Here, overall comments made on the interface in general are presented.

Layout
Several comments, both from the questionnaire (see Appendix C) and from the think-aloud evaluation, show that the users perceived the interface to be simple, clean and intuitive. One participant commented on the similarity to the design used by Google and thought it was positive with a familiar layout.

Feedback
Most of the participants complained about the lack of feedback during the think-aloud sessions. Comments like: “Where can I see my changes?”, “Did I send the information?” and “What happens now?” were common. Several similar comments from the questionnaire also add to this, indicating that this is an important aspect missing from the interface. This would be prioritized to implement in future versions of the suggested interface.

Languages
The service is presented in Swedish, but a couple of participants thought it should also be available in more languages to promote accessibility. Suggestions for suitable languages other than Swedish were Arabic, BCS (Bosnian, Croatian and Serbian), Kurdish, Polish, Somali and Persian. The choice of languages is based on statistics and predictions presented in an article written by Mikael Parkvall (2016), published in the Swedish magazine Språktidningen, since these are languages (besides Swedish) spoken by the most people in Sweden. Finnish is also in the top of spoken languages but Parkvall states that this target group is aging, and the use of the Finnish language in Sweden therefore is declining. Hence, the language is left out of the list of suggestions.
6.2 Summary

The most relevant changes to be made are:

- Increase feedback.
  - Add a notification after each completed task.
- Improve Schedule functionality.
  - Implement above listed suggestions to support a more intuitive use of the schedule functionality.
- Increase consistency
  - All actions of the same type should use the same elements.
- Timeline
  - Supply more information about user events (e.g. schedule requests).

The above-mentioned changes should be conducted to improve the usability of the interface even further, and perhaps also improve the users’ perceived control. Since both the usability and the perceived control ranked high among the participants of the evaluation, this could indicate a correlation between these factors. If a user perceives an interface easy to use and easy to learn, it could be considered a logical deduction that this is related to the users’ perceived control. Consequently, if a service is difficult to use and to understand, it would be surprising if a person would feel in control while using it. Therefore, high usability ratings could be considered to facilitate the users’ perception of control regarding personal data. This claim is supported by the result of the additional statements of the questionnaire.
7 Conclusion & Future Work

This section covers the conclusion made and the suggestions for future work.

7.1 Answering the Research Question

RQ: How can the design of a graphical user interface improve the control perceived by users in a GDPR-compliant context?

A: The results indicate that the users perceive the prototype to be useful, easy to use, easy to learn and that they are overall satisfied. The results also point towards the users’ feel in control of both their own and their child’s personal data when using the prototype. The users agree that a higher sense of control also increases their sense of security. The participants’ reflections are based on previous experiences with administrative school systems such as Dexter, and the results could indicate improvement of the perceived control of personal data, although further comparisons with Dexter and other similar systems could be made to further support this.

An explanation of the overall sense of improvement could be seen as a result of the added functionalities for rectification, addition and removal of data and new features like the timeline-section, since most of these features are missing from Dexter.

Through analysis of the results one could argue that the proposed design of the interface correlates with the users’ perception of control and security, although perhaps future changes could improve this even further.

This deduction should be seen as a preliminary one, as the prototype should go through further iterations and evaluations to provide a more reliable outcome.

The hypothesis stated is:

The new GUI will make the data subjects feel more in control of their own data and the data of children in their care. The interface will also increase trust on how the data is processed.

The results support the hypothesis, in the way that the results indicate a connection between the design of the user interface and the users’ perceived control. According to this, the hypothesis has not been discarded, though further research could define what elements play a more dominant role of increasing trust and security in the context of processing of the users’ personal data.
7.2 Future Work

A first step would be to implement the suggested improvements, and to further evaluate them. The next step would be to analyze several other administrative school systems to evaluate if and how this proposal could be implemented on these different systems and their data sets. Another interesting aspect would be to implement the suggested authorization (BankID) for the service, and evaluate to the impact of this on the user experience, especially from a security perspective.

Since this artefact only uses mock data it would also be interesting to see how users in reality perceive the control of the data when their own data, is presented in the system.

Another proposal is to investigate other areas with similar demands from the GDPR. It would be interesting to see if a similar interface could be implemented in higher education settings or even in the field of healthcare.
References

This section provides a list of references and list of informants.

Literature


Google (no date a) *Angular.* Available at: https://angular.io/ (Accessed: 13 April 2018).


Google (no date c) *Angular Material.* Available at: https://material.angular.io/ (Accessed: 20 March 2018).


IDG (no date) *software-as-a-service.* Available at: https://it-ord.idg.se/ord/software-as-a-service/ (Accessed: 19 May 2018).


Växjö Municipality (no date) Dexter. Växjö.

Informants


### Appendix

#### Appendix A: Foundation

**Database Tables – UML**

<table>
<thead>
<tr>
<th>Address</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>address_id: varchar(40 byte)</td>
<td>relation_id: varchar(240 byte)</td>
</tr>
<tr>
<td>person_id: varchar(40 byte)</td>
<td>from_person_id: varchar(240 byte)</td>
</tr>
<tr>
<td>primary_address: number(1,0)</td>
<td>to_person_id: varchar(240 byte)</td>
</tr>
<tr>
<td>street_address: varchar(255 byte)</td>
<td>type: varchar(255 byte)</td>
</tr>
<tr>
<td>apartment_number: varchar(255 byte)</td>
<td>start_date: timestamp(0)</td>
</tr>
<tr>
<td>co_address: varchar(255 byte)</td>
<td>end_date: timestamp(0)</td>
</tr>
<tr>
<td>postal_code: varchar(255 byte)</td>
<td>official: number(1,0)</td>
</tr>
<tr>
<td>city: varchar(255 byte)</td>
<td>modified: timestamp(0)</td>
</tr>
<tr>
<td>parish: varchar(255 byte)</td>
<td>modified_by: varchar(255 byte)</td>
</tr>
<tr>
<td>municipality_code: varchar(255 byte)</td>
<td>created: timestamp(0)</td>
</tr>
<tr>
<td>national_key: varchar(255 byte)</td>
<td>orderby_number: number(1,0)</td>
</tr>
<tr>
<td>address_type: varchar(255 byte)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Person</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>person_id: varchar(240 byte)</td>
<td></td>
</tr>
<tr>
<td>first_name: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>last_name: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>contact_name: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>civic_no: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>date_of_birth: date</td>
<td></td>
</tr>
<tr>
<td>date_of_death: date</td>
<td></td>
</tr>
<tr>
<td>temporary_civic_no: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>customer_id: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>sorting_name: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>protected_identity: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>deregistered: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>concealed: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>replaced_by: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>official: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>modified: timestamp(0)</td>
<td></td>
</tr>
<tr>
<td>modified_by: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>deleted: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>metadata: varchar(1024 byte)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>contact_id: varchar(40 byte)</td>
<td></td>
</tr>
<tr>
<td>person_id: varchar(40 byte)</td>
<td></td>
</tr>
<tr>
<td>primary_contact: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>info: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>description: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>type: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>official: number(1,0)</td>
<td></td>
</tr>
<tr>
<td>start_date: timestamp(0)</td>
<td></td>
</tr>
<tr>
<td>end_date: timestamp(0)</td>
<td></td>
</tr>
<tr>
<td>modified: timestamp(0)</td>
<td></td>
</tr>
<tr>
<td>modified_by: varchar(255 byte)</td>
<td></td>
</tr>
<tr>
<td>created: timestamp(0)</td>
<td></td>
</tr>
</tbody>
</table>
Relation Chart

Dexter (Views of relevance to the prototype)

Entry page.
Income page
Appendix B: Prototype

Mock-Ups

First draft.

Second draft.
Prototype

Overview of personal data (entry page).
Han Solo
1995-02-12

27500kr (bruttoinkomst/månad)

Jag har godkänt mestas

Det bruttoinkomsten är de månadsinkomsten innera sikt. På grundare person somma inkost
är en is för inkost och skatte för beromsing ut ur schema

Leia Organa
1992-02-10

29500kr (bruttoinkomst/månad)

Jag har godkänt mestas

Det bruttoinkomsten är de månadsinkomsten innera sikt. På grundare person somma inkost
är en is för inkost och skatte för beromsing ut ur schema

Income view.

Schedule view
Changes (Timeline) view.
Appendix C: Questionnaire
Usefulness

Tjänsten hjälper mig att bli mer effektiv.
10 responses

Tjänsten hjälper mig att bli mer produktiv.
10 responses

Tjänsten fyller ett syfte.
10 responses
Tjänsten ger mig kontroll över aktiviteterna i mitt liv.

10 responses

Tjänsten underlättar att få saker gjorda.

10 responses

Tjänsten är en tidsbesparing för mig.

10 responses
Tjänsten uppfyller mina behov.
10 responses

Tjänsten gör allt som jag förväntar mig av den.
10 responses

Ease of Use

Tjänsten är enkel att använda.
10 responses
Tjänsten är användarvänlig.

Det krävs så få steg som möjligt för att jag ska kunna utföra det jag tänkt.

Tjänsten är flexibel.
Att använda tjänsten är inte ansträngande.
10 responses

Jag kan använda tjänsten utan att behöva läsa instruktioner.
10 responses

Jag upplevde ingen inkonsekvens i tjänsten.
10 responses
Både oregelbundna och regelbundna användare skulle tycka om tjänsten.

10 responses

Jag kan rätta misstag snabbt och lätt.

10 responses

Jag kan framgångsrikt använda tjänsten varje gång.

10 responses
Ease of Learning

Jag lärde mig snabbt hur tjänsten fungerar.

10 responses

Jag kommer enkelt ihåg hur tjänsten ska användas.

10 responses

Det är lätt att lära sig att använda tjänsten.

10 responses
Jag blev snabbt skicklig på att använda tjänsten.
10 responses

Satisfaction

Jag är nöjd med tjänsten.
10 responses

Jag skulle recomendera den till en vän.
10 responses
Tjänsten är rolig att använda.
10 responses

Tjästen fungerar som jag vill att den ska fungera.
10 responses

Tjänsten är underbar.
10 responses
Jag känner att jag behöver tjänsten.
10 responses

Tjänsten är behaglig att använda.
10 responses

Additional questions

Upplever du att gränssnittet ger dig ökad kontroll över dina egna personuppgifter?
10 responses
Upplever du att gränssnittet ger dig ökad kontroll över ditt barns personuppgifter?

10 responses

Upplever du att en känsla av ökad kontroll även ökar din känsla av trygghet?

10 responses
<table>
<thead>
<tr>
<th>Är det något i denna tjäst som du upplevde som särskilt negativt?</th>
<th>6 responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saknar bekräftelse av det som jag ändrar /uppdaterar. Saknar möjlighet att ge godkännande för publicering av ex bilder på socialmedier, hemsidor etc.</td>
<td></td>
</tr>
<tr>
<td>Mycket text och ingen återkoppling när ändring sker. Läsbarhet vid inkomst och adressändring. Saknas kalender och klocka. Sjuknamn saknas med fritttextmöjlighet, be om återkoppling från mentor.</td>
<td></td>
</tr>
<tr>
<td>Brist på feedback vid ändringar.</td>
<td></td>
</tr>
<tr>
<td>Att kopplingen mellan &quot;dexter&quot; och skatteverket/försäkringskassan inte finns.</td>
<td></td>
</tr>
<tr>
<td>Det var någonstans som jag saknade en informationsruta.</td>
<td></td>
</tr>
<tr>
<td>Mer respons ifrån systemet att ändringar sparats. Att man ska kunna fylla i tider för en hel vecka, och slippa fylla i varje dag.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Är det något i denna tjäst som du upplevde som särskilt positivt?</th>
<th>8 responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Att den är tydlig och enkel. Lätt att hitta de funktioner som man är ute efter.</td>
<td></td>
</tr>
<tr>
<td>enkelt</td>
<td></td>
</tr>
<tr>
<td>Ren visuell vid ingång, intuitiv och behövde inte klicka runt för att hitta.</td>
<td></td>
</tr>
<tr>
<td>bra överblick över hela gränssnittet, allt var sammanhängande och konsekvent.</td>
<td></td>
</tr>
<tr>
<td>Enkelt och snyggt utseende. Lättöverskådligt. Åndamålsenlig. Extra skönt att ha en hel veckas schema i samma ruta och att markören automatiskt hoppar till nästa ruta när jag fyller i tiderna för lämning och hämtning.</td>
<td></td>
</tr>
<tr>
<td>Enkelheten.</td>
<td></td>
</tr>
<tr>
<td>Användarvänligt med överskådlig vy.</td>
<td></td>
</tr>
<tr>
<td>Tydliga rubriker. Lätt att hitta det man letar efter. Visas bara nödvändig information på sidorna, men lätt att få fram när man behöver infon.</td>
<td></td>
</tr>
</tbody>
</table>