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Evaluation of alternative UX design principles for To Do lists

Utvärdering av alternativa UX design principer för att göra-listor

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Abstract

As government authorities are getting more digitalized, the variety of case management systems is increasing. Therefore, the competition is getting tougher for companies that develop such systems and the goal to create a system that both fulfills its purpose and is easy to use is getting more important. Human-centered design is used to evaluate how general design principles work on To Do lists in a case management system. A pre-test survey is sent out to current users of a case management system to understand their requirements, what works for them and what does not. Then, three prototypes were developed from the answers to the pre-test survey and the design principles. The prototypes were then evaluated by the system's users during online evaluation sessions. The result was that the functionalities requested by the users and that were developed with the help of design principles were more popular than functionalities inspired by only the principles. Also, functionalities that were less of a change were more desired to be implemented in the system directly. To conclude, the designer is not the user and a pre-test is essential to understand the users' perception of the system. The pre-test should catch what amount of redesign is reasonable and what should not be changed. Further, design principles should be followed along the way, not to inspire changes that were not requested by the users, but rather to develop requested changes.

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1 Introduction

The Swedish Agency for Digital Government (2023) is an authority that oversees the digitalization of government authorities. Its mission includes analyzing the digitalization of society and helping public authorities make decisions that are built on facts. Case management systems are part of the digitalization process as they contribute to digitalizing the process of handling cases. A case management system is built to guide administrative officials and case assignees to execute the right tasks and have a background of the cases' history (Hildebrandt et al., 2011). There exists a variety of case management systems an authority can choose from today. Therefore, companies that develop such systems need to create a system that both fulfills its purpose and is easy to use so that they gain loyal customers. To achieve that, the design of the system should be a priority. Kanungo (2022) stated that 75% of people choose a specific brand thanks to the design and that design can contribute to creating a trustworthy and reliable impression of the company. Beaird et al. (2020) listed two important requirements that need to be fulfilled to consider a website good. The first one is that the website is usable in terms of functionality and the second is the aesthetic point of view. If one of them is lacking, then there is a risk that users abandon the webpage. One way to ensure that a system's design takes its users into account is to build it using human-centered design (HCD). HCD is defined as

> "approach to systems design and development that aims to make interactive systems more usable by focusing on the use of the system and applying human factors/ergonomics and usability knowledge and techniques" (ISO 9241-210, 2019).

Having user experience (UX) and usability in focus is a way to achieve satisfaction among users. UX has the focus of the user's emotional experience when using the system and how aesthetic the system is (Law et al., 2009), while usability focuses more on functionality and how easy it is to complete a specific task in the system (Vermeeren et al., 2010).

1.1 Motivation

Ida Infront works with digitalizing the public and private sectors with their product iipax (Ida Infront, n.d.). iipax is their standard product that is used for efficient case and document management. As a case is processed in iipax, it will pass a lot of activities carried out by

several employees with different roles. Currently, these activities are displayed as "To Do views" in iipax. However, it is not easy today to get a sense of how the cases, which are tasks of several different types, that an employee is involved in are progressing and it is hard to find a specific case. Another problem is that there is no standardized method of how to create a To Do list and therefore it is hard to know how the lists should be designed to be as easy as possible for the users. There are different design principles that can be implemented on a To Do list but it is difficult to know which design principle works best in practice and from an HCD perspective.

1.2 Aim

The desire of Ida Infront from this thesis is to get an understanding of how the To Do list in iipax can be improved in terms of usability and user experience. Therefore, this master thesis aims to evaluate how different UX design principles work in practice when it comes to the design of To Do lists in case management systems. The first step is to evaluate the current To Do list in iipax. To understand the problems that need to be acknowledged in the current design of the To Do list in iipax, a survey will be sent out to current users of the system. Then, the aim of the thesis will be achieved by creating three alternative prototypes that build on different UX design principles. These prototypes will then be tested by users to evaluate their advantages and disadvantages from the users' perspective in terms of usability and subjective user satisfaction.

1.3 Research questions

This section presents the research questions that the report aims to answer. The research questions will be followed up and answered under the conclusion (chapter 11).

1. From a usability and user experience perspective, what should be changed in the current design of the To Do list in iipax?
2. From a usability and user experience perspective, what are the requirements of a To Do list in a case management system?
3. How can a To Do list, in a case management system, be redesigned to achieve improved usability and user experience according to the system's users?

1.4 Delimitations

In this study, the developed prototypes will be adjusted to the desktop version of iipax only as it is the most commonly used version. The prototypes will not be customized for the tablet or mobile versions of iipax. The study will only focus on the To Do list in one case management system, iipax. Other case management systems will not be considered due to the time limit of the study. This will also limit the number of participants during the evaluation sessions as only iipax users will be considered and Ida Infront cannot require their customers to contribute with resources to their research. The time limit will also limit the number of design iterations which means that the three prototypes will only be evaluated once and they will not be modified according to the feedback in order to be evaluated again.

2 Background

The thesis is conducted at the company Ida Infront and the study is about improving the UX design of the To Do list in their product called iipax. Therefore, a background about Ida Infront and iipax is presented in detail under this section.

2.1 Ida Infront

Ida Infront is a Swedish company that was founded in 1984 and has today about 130 employees that belong to one of Ida Infront's three offices (Ida Infront, n.d.). The headquarters are located in Linköping, Sweden. The two other offices are in Stockholm, Sweden and Mumbai, India. Ida Infront describe themselves as one of Sweden's leading companies in the e-Government sector. Ida Infront's customer base includes several Swedish public authorities. Ida Infront has also several customers in the private sector and even some in Finland and Norway.

At Ida Infront, there exist several roles within the organization. For example, Chief Product Officer (CPO), Business Consultant, User Experience Designer, and the Chief Technology Officer (CTO). A CPO at Ida Infront is responsible for which functions iipax should have. Business Consultants are the link between Ida Infront and the customers. They are responsible for the requirements specification and make sure that the developers understand the customer's needs. User Experience Designers work with iipax and its customizations in terms of user-friendliness. They work closely with CPO, Business Consultants, Software Developers, and customers. A CTO is the one that oversees that development at Ida Infront happens effectively and sustainably.

2.2 iipax - a case management system

iipax is used by Ida Infront's customers for case and document management (Ida Infront, n.d.). iipax is a base product that can be configured and customized according to each customer's needs. It is a web-based system that can be used on desktops, tablets, and mobile phones. According to Ida Infront's webpage, iipax is user-friendly in the way it presents information to the user. Information in iipax's To Do list is presented using case cards in the *card view* which can be seen in Figure 2.1. The other way to view the cases in iipax currently

is called *table view*. An example of how the table view looks can be seen in Figure 2.2. Beside the cases shown in Figures 2.1 and 2.2, a variety of different filters can be seen above the To Do list. Those filters can be utilized to ease the search for a single or a group of cases. The current To Do list has a limitation of the number of cases it can show simultaneously. The limit is 100 cases, so Ida Infront's recommendation that iipax's users use the filters to refine the list can be seen in the yellow box below the filters when the number of cases exceeds 100. Beside the filters, to the right, is the sorting options menu. The cases in both views can be sorted according to different variables, for example, the creation date or title.

There are two types of labels that can be set on cases. The first label indicates the secrecy level of the case. The different secrecy levels are *Ingen sekretess* (No secrecy), *Ej klassat* (Unclassified), *Svag sekretess* (Weak secrecy), and *Stark sekretess* (Strong secrecy). If a case is unclassified or has either strong or weak secrecy, a label will indicate that both in the card and the table views. The second type of label indicates that the case has exceeded its set deadlines. Those labels are either *Varning* (Warning) or *Alarm* (Alarm). In the card view (Figure 2.1), two colors can be seen surrounding different cases. All cases that are *Generellt ärende* (General case) have an orange left border. However, if a case has a secrecy label, then the border is red. If a case is no older than 7 days, a blue dot can be seen only in the top left corner of the cards. In Figure 2.1, the case titled *Åre Kommun e-arkiv* can be seen with an expansion. The cases in the card view can be expanded when they are clicked in order to get several more details about the case.

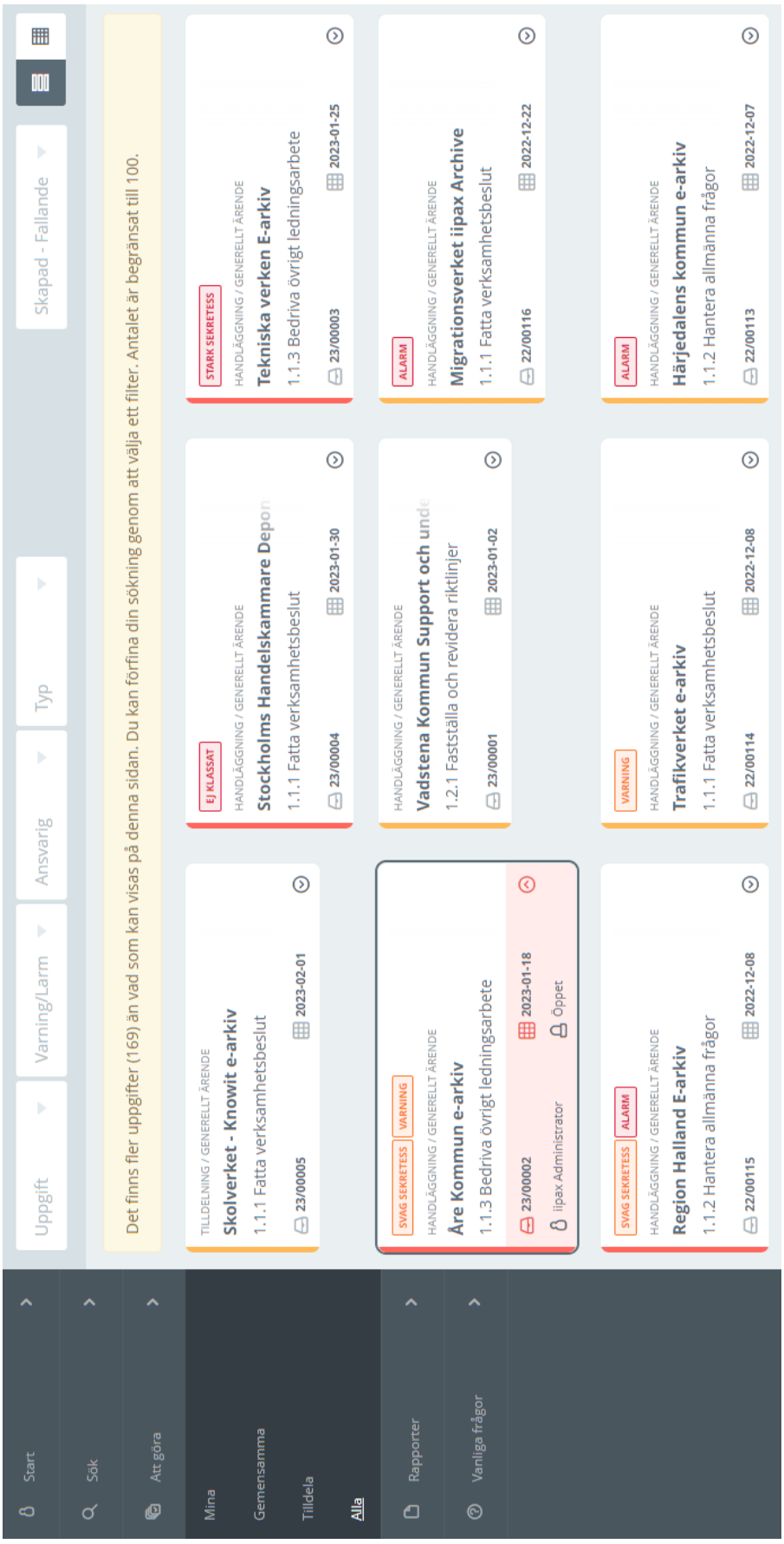

Figure 2.1: The To Do list in iipax using card view

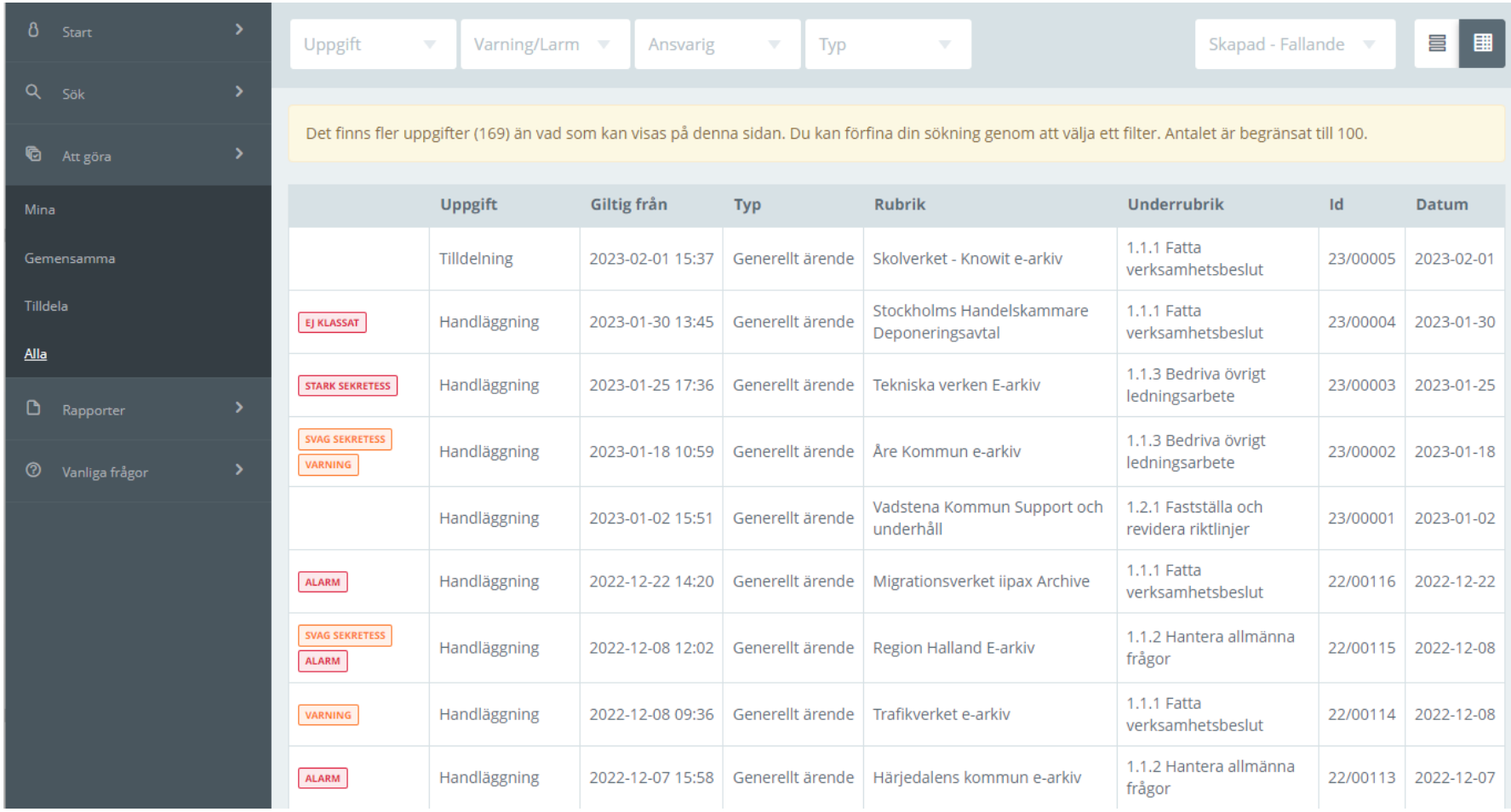

Figure 2.2: The To Do list in iipax using table view

3 Theory

This section starts by explaining the difference between usability and UX. It continues then by summarizing several design principles retrieved from different studies. After that, two studies of the design of a To Do list application are presented.

3.1 Difference between usability and UX

Usability is objective and can be evaluated by, for example, measuring task execution time and the number of clicks (Vermeeren et al., 2010). Additionally, Law et al. (2009) described usability evaluation as evaluating whether an artifact is built correctly to complete a given task. On the other hand, Law et al. stated that evaluating the UX has the aim of assessing the user's feelings about an artifact. Kaye (2007) described UX as being more user-centered than task-centered.

Hassan and Galal-Edeen (2017) made a literature review about how different studies define usability, UX and the relationship between the two. They concluded that most researchers and scholars consider usability at the heart of UX and therefore, can be utilized as a metric to measure UX. Another conclusion of their study was that both usability and UX are necessary to achieve a product that keeps the customers loyal by being both useful and beautiful.

3.2 Design principles

According to Kanungo (2022), the design of a webpage helps towards building trust between the company and the user. This leads to loyal customers with long-term commitments. The different sections below define the different principles that will be used to build the prototypes.

3.2.1 Color theory

Goethe and Steiner (1952) wrote about warm and cold colors. Warm colors give the sense of movement, they are lively and striving and those colors are red, yellow and orange. Cold colors, on the other hand, are blue, green and purple and generate feelings such as anxiety and desire. Beaird et al. (2020) wrote about how to use color when designing a web page

and stated that different colors lead to different feelings. Therefore, it is important to use color theory to give the intended feeling to the user. Beaird et al. also pointed out that cold colors are good to use for backgrounds and big elements since they would not overpower the content and are easy for the eye to look at. Warm colors positioned close to cold colors make the warm colors more visible and are therefore good for smaller items that you want the user to see directly. Goethe and Steiner (1952) also stated that a light color feels happier and that a darker color feels sad. Beaird et al. (2020) pointed out that light colors are associated with daylight while dark colors are associated with night.

Goethe and Steiner (1952) and Beaird et al. (2020) wrote about the feelings different colors generate. Both studies agree that red is a dramatic and energetic color and that dark red is connected to seriousness while light red symbolizes love. They also agreed that orange is an energetic color, that green is a color that the eye likes to look at and that purple symbolizes power since clergy and royalty have used the color. Beaird et al. (2020) connected the colors more to nature compared to Goethe and Steiner (1952). In Table 3.1, the feelings caused by different colors are presented according to both Goethe and Steiner and Beaird et al.

3.2.2 General design principles

Several studies have published general design principles that should be utilized to achieve an interface that takes its users into account. One of those studies was conducted by Blair-Early and Zender (2008) who proposed 10 design principles for user interfaces. Another study was conducted by Grant (2018) who listed 101 general UX principles. Grant's principles that are applicable on To Do lists are listed below:

- Principle number 18 suggests that whenever a list of objects has a defined beginning, middle and end, a seemingly endless scroll should be avoided. Instead, pagination should be utilized as it gives the user more information about the number of objects in the list. This may lead the user to use the available filter or sort algorithms to minimize the number of objects.
- Principle number 25 reads that menus should be split and grouped into subsections so the user is able to remember all the options. According to Miller (1994) the human mind is so limited that it can only remember between five and nine items in a list. Principle number 82, similar to principle number 25, is about categorizing the search results into smaller subsections rather than being a long list of items. Users have then the choice to skip to the subsection that is most relevant to them. Grant also mentioned the importance of showing the user the number of items in those subsections.
- Grant suggested under principle 27 that UX design that has navigation buttons at the top of the page should have the same navigation at the footer. A user should not need to scroll up to the top of the page just to navigate if they are at the end of a page.
- Principle number 64 is about colors. It reads that even though it is recommended to use colors, those should not be the only source of information. Some users may suffer from problems distinguishing some colors which may lead to them missing out on critical information. If red is used to indicate that an error has occurred, then the word "Error" should be shown as well.
- Principles 70 and 71 stress the importance of giving the user clear information about their tasks. It should be obvious to the user when their task began, where it is now and when it will end.
- Principles 84 and 85 are about texts. Principle 84 urges UX designers to use other means of showing information rather than long texts. While principle 85 is about being consistent with the language and terms being used around the system.

Table 3.1: Colors and their feeling

Color	Feelings according to Goethe and Steiner (1952)	Feelings according to Beaird et al. (2020)
Red	Gives a feeling of seriousness as a dark color Gives a feeling of delightfulness and goodness as a light color. The first color a child learns to see.	Dramatic color. Light red is the color of love.
Yellow	The color closest to light. Symbolizes cleanness. A color that is awake and friendly. Dark yellow gives an unpleasant impression like disgust.	Symbolizes warning since it is used on warning signs. Too much yellow can be overpowering.
Orange	Everything that is said about yellow but even more. Energic color. Appears powerful and more beautiful. Gives a warm and happy feeling. Represents the color of the glow and the evening sun.	Active and energic color. More informal than red. Unusual in nature, good for items that need to be highly visible like life vests.
Green	Satisfies the eye. Equalizes good between warm and cold colors.	Easy for the eyes to see. Most common color in nature. Symbolizes growth, freshness and hope.
Blue	Brings darkness and coldness. Gives a wonderful impression to the eye. The color of the sky and mountains. Sea green, blue with a warm color, is a loved color. The last color a child learns to see.	Universally loved color. Symbolizes openness, intelligence, and faith since it is associated with heaven and the ocean. Have a calming effect. When used in logotypes, it gives a sense of stability and clarity of purpose.
Purple	Generates more worrying than encouraging feeling. The higher clergy uses this color.	Royal color since it was hard to produce the dye needed to create the purple garments. Symbolizes power, wealth and extravagance. Creates a good balance of the effects of red and blue. Unusual on web pages.
White	Not included	Symbolizes perfection, light and purity.
Black	Not included	Symbolizes death and evil but also power, elegance and strength.

- Principle 91 advises UX designers to show the most relevant search results at the top of the page. While principle 92 is about having default settings that make sense to the user and seldom require changing. For instance, the most useful sorting variable should be the default.
- Grant wrote in his principle number 96 about different types of interactions. The UX designer should categorize interactions into obvious, easy and possible. The obvious

interactions are the ones used mostly and should be visible to all users. The possible ones are seldom used and should be somewhat hidden from most users. The easy interactions are between the both.

Table 3.2 lists the 10 principles by Blair-Early and Zender (2008) where, for example, the fifth principle is about Feedback being essential to users. Blair-Early and Zender continued by defining four general design principles. According to them, those general principles are not specific to just interfaces but should be included in interface design. The first one is to build the interface so it describes the content from every possible angle. The second is about using form and color to present data to the user as humans are good at recognizing changes in shapes and colors. The third is about building an interface that is able to pique the user's interest in the content. Lastly, the fourth is about using metaphors to assist the user while introducing new concepts.

Table 3.2: 10 design principles (Blair-Early and Zender, 2008)

Design principle	Description
Obvious Start	A defined start of the interaction is critical. Especially if it is a first-time encounter. To learn how to interact with an interface, it should be clear where to begin.
Clear Reverse	Every action should be reversible and the way to do it should be obvious to the user.
Consistent Logic	The effects of the user's actions should be logical to the user.
Observe Conventions	The terminology and images that the user identifies as familiar should be preserved.
Feedback	Feedback is essential to users.
Landmarks	It should be straightforward for the users to identify their location in the interface. This can be done using distinguishable reference points.
Proximity	The authors listed three types of proximity, space, time, and concept. The space proximity builds on having content in its logical location. While time proximity is about presenting the right content at the right time. Concept proximity, on the other hand, is about grouping the items in a logical way.
Adaption	The interface should be designed to be adaptable depending on the user's actions.
Help	It should be possible for the user to get support but it should not be the user's first choice when help is needed.
Interface Is Content	The interface should not be designed as a hinder between the user and the content.

3.3 The design of a To Do list application

Bellotti et al. (2004) did a study about the design of a personal To Do list manager. At first, they conducted a study to find out what is appreciated by the users in a To Do list. The study resulted in a list of functionalities that a To Do list manager must offer:

- Several different ways of presenting the tasks.
- Relevant methods of sorting and filtering.
- A way of distinctly showing tasks with high priority.
- Groups of tasks that have similar variables or that should be accomplished together.

- A way to show the state of the task, for example, when the last change occurred and what should be done next and by whom.
- A way of showing the relevant variables to support planning what task should be next and what tasks should be accomplished together.

The authors went on by developing a To Do application with functionalities that they deemed essential. Some of those functionalities are listed below:

- Tasks that are done or that are of low priority are not required to be erased but they are intentionally kept out of the user's main view.
- The possibility of dragging new items into the list making it easy to create new tasks.
- Every task has a variable that is used to determine its place in the user's own list when it is sorted according to importance. Users can change the importance of a task by dragging it and changing its order in the list.
- If a task has a deadline, it is indicated using a green progress bar that turns into red as the deadline is approaching.
- Tasks can be visualized on a Gantt chart depending on their dependencies and deadlines.
- Each task can have several variables or priorities, for example, task assignee.
- The tasks can also be sorted and filtered according to one or more variables.

Another study involving To Do lists was conducted by Zhu et al. (2022). They created a To Do application for older adults and evaluated the application on the same target group. The main focus of this To Do application was to help elders with their memory and therefore, the article's focus was on the medical aspect and not the technical one. A result of the study was the importance of ordering the tasks in the list in chronological order. Additionally, the elders had difficulty understanding if a task was achieved or not. Their solution was to sort the list where the task closest to the deadline was placed at the top of the list and completed tasks were placed at the bottom.

4 Method theory

This chapter is divided into three sections. The first one is about different design approaches. The second is about different methods of prototyping and how prototypes can be categorized. The last section is about testing and it lists several methods from relevant studies.

4.1 Approaches to design

Two design approaches that originate from different resources are human-centered design (HCD) and task-centered design (TCD). The two sections below describe the processes of both approaches.

4.1.1 Human-centered design

Human-centered design is a design approach that has its focus on the human factors throughout the design process. Jokela et al. (2003) conducted a study that compared the ISO standard for human-centered design against the standard definition of usability. Their study included an overview of ISO 13407 (1999) (this standard is today replaced by ISO 9241-210 (2019)). ISO 13407 includes the process of HCD which consists of four phases. Figure 4.1 shows the development process of the HCD approach. The first stage is to decide whether to use HCD. The second stage of the process is to learn about the intended users, how the product will be used, and its planned environment. The third stage is to set up a requirement specification that is built on the result of the second stage. The fourth stage is to implement all the requirements and the fifth is to evaluate if the requirements were fulfilled according to the users. If requirements were not met, the process iterates from the second stage. Otherwise, the system is considered to be satisfactory according to the users.

4.1.2 Task-centered design

Compared to HCD which focuses on the users and their needs, TCD focuses on tasks that the system is built to accomplish. Lewis and Reiman (1993) presented a guideline for the task-centered design approach. The first stage of the TCD process is about learning about the potential users and what tasks they want to accomplish using the system. The second stage is to pick tasks that represent the system and have been requested by the users. The

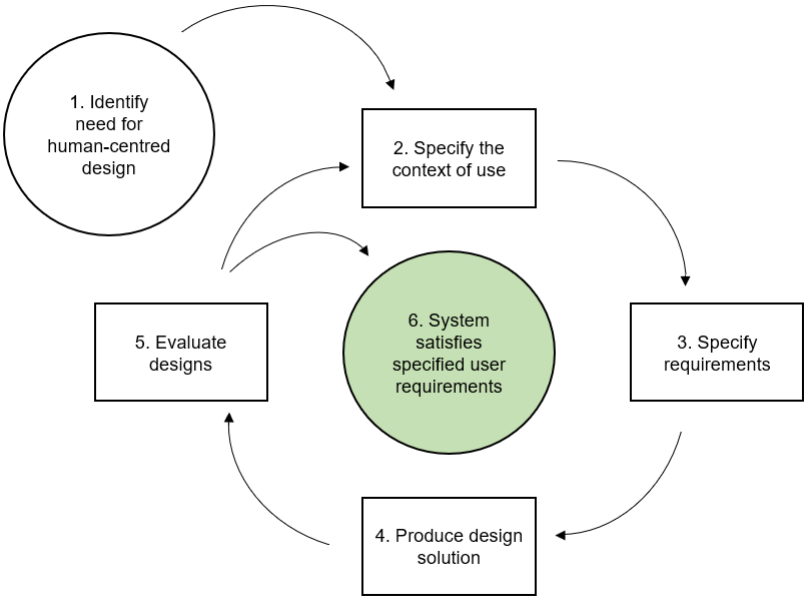

Figure 4.1: Human-centered design process (Jokela et al. (2003))

third step is about taking inspiration from projects with similar tasks as the authors believe that it is unnecessary to reinvent the wheel. Then, in the next stage, the authors believe that the design team should make up a paper prototype that describes the intended system. Each suggestion that is included in the prototype should be related to a specific task. The following stage is about analyzing several aspects of the system, for example, the average task execution time and how many clicks it requires. The stage after that is where a concrete prototype is created. The seventh stage is evaluation. If the need exists according to the evaluation results, the design process can be iterated by either tweaking the concrete prototype built in the former stage or from the first stage if a reconsideration of the users and the tasks is required. The final stages are to build, track and change the design respectively. Figure 4.2 shows an interpretation of Lewis and Reiman's TCD process description.

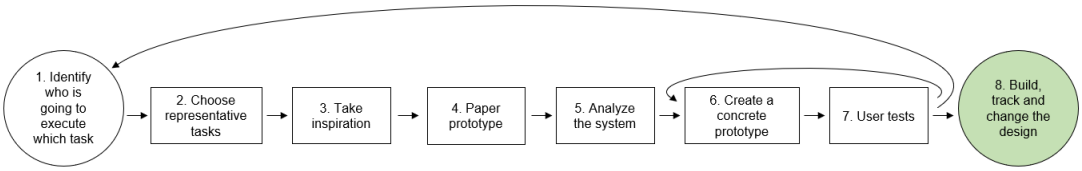

Figure 4.2: Task-centered design process

4.2 Prototyping

A way of evaluating a product during the development's early stages is through prototypes. According to Vrizi (1989), prototypes can be categorized according to their demanded resources and how close they resemble the final artifact. A low-fidelity prototype is static with few to no interactions at all. This kind of prototypes requires a human to fake an interaction whenever feedback is required. A high-fidelity prototype, on the other hand, is a prototype that has required more investment than a low-fidelity one and that mostly works as the in-

tended final artifact. The data in the prototype, if it is not the real data, should try to resemble how data is in a real-life situation.

An example of a study that used Vrizi's categorization of prototypes was conducted by Haesen et al. (2009). Haesen et al. wrote in their paper about their experiment of designing an interactive coal mine museum visit in form of a children's mobile game. The focus of the paper is the different types of prototypes used throughout the several stages of the development process. In the early stages of the development process, a graphic designer built some low-fidelity prototypes. Those prototypes were built using paper and evaluated with the help of a group of children in a lab environment. The results of the first evaluation were then used to build a high-fidelity prototype which consisted of an application used on a personal digital assistant (PDA). The high-fidelity prototype was evaluated with the help of a larger number of children at the location of the mine museum. The prototypes were utilized to list the advantages and disadvantages of the mobile game and how much it contributes to piquing the children's interest in the museum.

Houde and Hill (1997), on the other hand, wrote that categorizing the prototypes into low- and high-fidelity does not necessarily reflect the stage of the design process. They defined their own model as a triangle where each corner is a dimension and the edges can be seen as scales between the dimensions. The dimensions are "Implementation", "Look and feel", and "Role". "Implementation" is the dimension where the focus is on how the product is built to perform what it is supposed to. While "Look and feel" dimension is about how the user experiences the product. Lastly, "Role" is about the way the product will serve the user. The model is intended to be used to classify the design requirements in order to choose a suitable approach to build the prototype. To use the model, designers mark where in the triangle they subjectively believe the focus of their prototype should be. Figure 4.3 shows an example of how Houde and Hill's model is used. This example was a 3D space-planning program where the goal of the prototype was to evaluate the intended UI of the program which means how the prototype was experienced by users. The test also had a role evaluation since users were given tasks to solve in the prototype. Hound and Hill, therefore, placed the prototype between "Role" and "Look and feel" in their model (Figure 4.3).

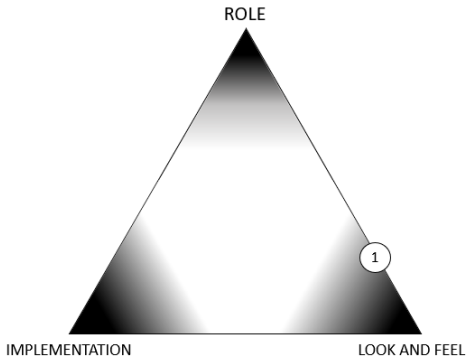

Figure 4.3: The prototype marked on Houde and Hill's model (1997)

4.3 Testing

Since a UX designer is not the user, testing should be used to assure that the product is usable by its real users (Kanungo, 2022). Tests are even essential to estimate the reasonable amount of redesign that is required to improve usability, which means that the existing product should be tested to find out what works in the current design and what does not. The research

should also include what the users regard as a standard way of performing a task in the tested system.

4.3.1 Qualitative and Quantitative research

Qualitative research can be defined as the type of research where only a small sample of users is included (Kanungo, 2022). This type of research requires the researcher to be responsible for collecting, analyzing and understanding the individuals' interpretations of reality at a certain time point and in a certain context according to Merriam (2002). The collecting can happen during user interviews or field studies using open-ended questions to gather as much information as possible. On the other hand, quantitative research requires a bigger sample of participants. Instead of observation, the quantitative research method uses measurement to collect quantifiable data about the users' behaviors. This is, for example, done using surveys with closed questions (Kanungo, 2022). One way of conducting quantitative research is by using System Usability Scale (SUS). SUS is a method to evaluate usability (Brooke, 1996). SUS uses ten different questions that alter between positive and negative statements (Table 4.1) and the respondent rates each statement from one to five where one indicates strongly disagreeing and five indicates strongly agreeing. The SUS-test should be done after the user has experienced the system but before there has been an opportunity to discuss the system. Brooke also explained that the test should be done with the first impression for each statement.

Table 4.1: Questions in SUS (Brooke, 1996). 1 = strongly disagree and 5 = strongly agree

Nr	Question	1	2	3	4	5
1	I think that I would like to use this system frequently					
2	I found the system unnecessarily complex					
3	I thought the system was easy to use					
4	I think that I would need the support of a technical person to be able to use this system					
5	I found the various functions in this system were well integrated					
6	I thought there was too much inconsistency in this system					
7	I would imagine that most people would learn to use this system very quickly					
8	I found the system very cumbersome to use					
9	I felt very confident using the system					
10	I needed to learn a lot of things before I could get going with this system					

To evaluate an application with the help of users, there is a question of the number of evaluation participants needed to find all issues with a design. When it comes to the qualitative research method, Virzi (1992) stated that 80% of all issues can be found with only four or five participants but to find approximately 100% of all the issues in the application, at least 15 are needed. On the other hand, the quantitative research method requires a bigger sample of participants, for instance, 40 is recommended by Sauro and Lewis (2013) to get a small error margin. However, they also stated that a sample of 30 persons gives you results with a confidence level of 90% which may be enough if you have a strictly limited budget and the cost of testing is high. Even a sample of 20 can be sufficient if a larger margin of error is tolerated.

There is also a question on how to interpret the results of the evaluation. Results from qualitative methods can have a huge variety as those originate from the users' subjective feelings about an artifact (Kanungo, 2022). Those results have to be categorized to make sense when deciding what should be changed in the redesign. To sort those results into something that can be analyzed, Kanungo recommended Affinity Diagrams. According to

Hartson and Pyla (2012), Affinity Diagrams are used to map and organize large amounts of results that are neither structured nor similar. Lucero (2015) explained the process of using Affinity Diagrams when evaluating interactive prototypes which consists of four steps. The first three steps are visualized in Figure 4.4. The first step is creating the Affinity notes. This is done by two researchers with different areas of expertise that watch videos of the interviews conducted and write down important aspects on sticky notes. The number of resulting sticky notes varies depending on the number of conducted interviews. It should take twice as long time to create the notes compared to the length of the videos. The next step is to cluster the notes together depending on their category. The team members should read the existing notes and decide what categories arise from those notes. The third step is called walking the wall in which the team members go through the different categories and filter out those that overlap and can eventually be merged. Then, the useful notes are moved to a sheet until no more useful notes are on the wall. The fourth step is documentation. During this step, a digital record of the Affinity sheet is created.

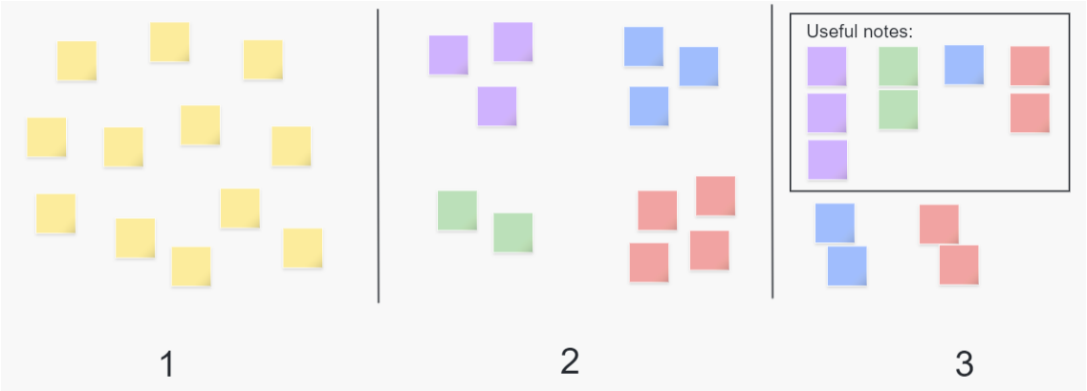

Figure 4.4: The process of using Affinity Diagrams

Results from quantitative evaluation methods, on the other hand, are easier to interpret. To calculate the SUS score, for example, the scores of all statements with an odd number should be reduced by one and for all statements with even numbers one should subtract the score from five. Finally, everything is summed up and multiplied by 2.5 and the final score is a number between 1 and 100. To analyze the SUS score, it can be converted into grades. Bangor et al. (2009) suggested a grading system between A to F called Grade scale, where A is the best and F is not acceptable, (Table 4.2). Bangor et al. also suggested another grading system from "Worst imaginable" to "Best imaginable" called Adjective ratings (Table 4.3). Here, a single answer does not provide any insights and has no value on its own. It is the overall score combining all the responses that has to be considered (Brooke, 1996).

Table 4.2: Grade scale (Bangor et al., 2009)

Grade	Score
F	0-59
D	60-69
C	70-79
B	80-89
A	90-100

Table 4.3: Adjective ratings (Bangor et al., 2009)

Grade	Score
Worst imaginable	12.5
Awful	20.3
Poor	35.7
OK	50.9
Good	71.4
Excellent	85.5
Best imaginable	90.9

4.3.2 User experience evaluation

UX is subjective and personal as each person has her own experience. Those experiences can be affected by the community but the user experience of an artifact is still individual according to Law et al. (2009). It is also essential to assess why the user experience evaluation is needed to determine what kind of evaluation methods should be used. For example, it is important to assess the user experience before, during, and after an interaction with an artifact. However, the industry is often more interested in longer-term user experience rather than a one-interaction experience.

Karapanos et al. (2009) suggested that the UX should be evaluated by each subject based on their personal criteria. That is because of the diversity between the subjects' perceptions. The drawback of this approach, according to Karapanos et al., is that it will be complicated to compare the different individuals' perceptions against each other as those may overlap or counter each other. It is therefore more useful to define metrics that are tied to the product itself instead of the individuals' subjective interaction (Roto et al., 2009). According to Roto's et al. study about UX evaluation methods of early product concepts, the evaluation method in an industry context should require fewer resources. Otherwise, the resources would not suffice to conduct the evaluation often enough. Roto et al. suggested two evaluation methods to evaluate an early concept of a product. The first one is early expert evaluation, where experts in UX design systematically evaluate the early concept in terms of the functionality of the product. The second evaluation method is a remote online evaluation where users get to evaluate the early concept. To have the evaluation remotely saves resources and evaluations can be conducted more often.

4.3.3 Usability testing

Usability tests are a way of observing existing or potential users while performing tasks in a controlled environment according to Dumas and Loring (2008). One type of usability tests is the diagnostic test which is conducted during the early phases of product development. The moderators' role during such tests is to observe the participants' behavior. Two other types of usability tests are measurement tests where the aim is to measure the usability of a product and comparison tests. The aim of a comparison test is the comparison of several products. The authors also mentioned that different types of tests require different amounts of interaction between the moderator and the participants. For example, more interaction is required during the early phases and a diagnostic test.

Dumas and Loring (2008) even mentioned the advantages of conducting usability tests remotely. One advantage is that it increases the accessibility to more participants as logistics and geography are no longer a problem. Another advantage is that it can be easier to get participants to sign up. Furthermore, evidence shows that participants may be more open about their thoughts during a remote session. A disadvantage though is that the conductor has less control of the surrounding environment which may lead to the participants experiencing distractions.

4.3.4 Eye tracking

Another method is to use eye-tracking to evaluate the user interface. In order to gather leads on the users' points-of-interest in an interface, Goldberg and Kotval (1999) used analysis of eye movements. According to the authors, attention points can be found if samples of eye-tracking that are long enough are collected and averaged out. Kar and Corcoran (2017) classified types of eye movements to provide different usage areas to measure different variables. Those types provide different usage areas to measure different variables. The first type is Fixation which measures how long the eye has been static. Fixation can be utilized to gather information about points-of-interest in an interface. The second type is Saccade which measures the reflexes of the eyes and is used to analyze the visual search map the user applies on an interface and what sticks out. The third classification is Scanpath which refers to the path that the user uses while scanning an interface that can be utilized to assess the quality of the layout. The fourth classification is Gaze duration which is used to measure the time spent looking at an area of interest. Lastly, the number of blinks and pupil size change is used to measure the level of stress that the user is experiencing.

5 Method

The design approach used for this thesis is an interpretation of the HCD process (chapter 4.1.1). The reason why HCD is chosen above TCD is that the aim of the study is to explore different ways of designing a To Do list rather than comparing how different designs work against each other. The focus is on soft variables which means that the evaluation will focus on testing how the users think about and experience the prototypes, not how effective the prototypes are. The results that are of interest are qualitative which HCD generate. If the aim of the study instead had been optimizing the To Do list in iipax, TCD would have been the better alternative. In this thesis, only one iteration of the HCD process is going to be executed due to the time limit. Figure 5.1 represents a map of the working methodology throughout the study and is built on the HCD process. The first two stages in Figure 5.1 are presented in chapter 5.1. The third and fourth stages are presented in chapter 5.2 and the fifth in chapter 5.3. Finally, the sixth stage is described in chapter 5.4.

5.1 Pre-test

To get to understand what the users think of iipax´s current To Do list and to assess the reasonable amount of redesign that is required, qualitative survey research with open questions is conducted. The choice between qualitative and quantitative is made based on the number of respondents and the kind of data that is needed. The number of respondents is limited since the survey is meant to be sent out to iipax's users that usually are employees at public authorities with limited available time. As mentioned in section 4.3.2, a remote online evaluation does not require as many resources. The data that is needed is the user's subjective thoughts and feelings regarding the current design, rather than quantifiable data, as the respondents' comments would contribute to the brainstorming and ideation that would generate the bases for the three prototypes.

The survey consists of three parts. The first part is five background questions to get an understanding of, for example, how long the respondent has used iipax and how many cases the respondent has on their To Do list (Appendix A.1). The second part consists of three questions that are about what the respondent thinks is good with the To Do list and what should be changed (Appendix A.2). The third part is about how the respondent uses the To Do list today. Six questions focus on, for example, which filters are used and what cases are prioritized (Appendix A.3). All the questions in the survey can be seen under Appendix A.

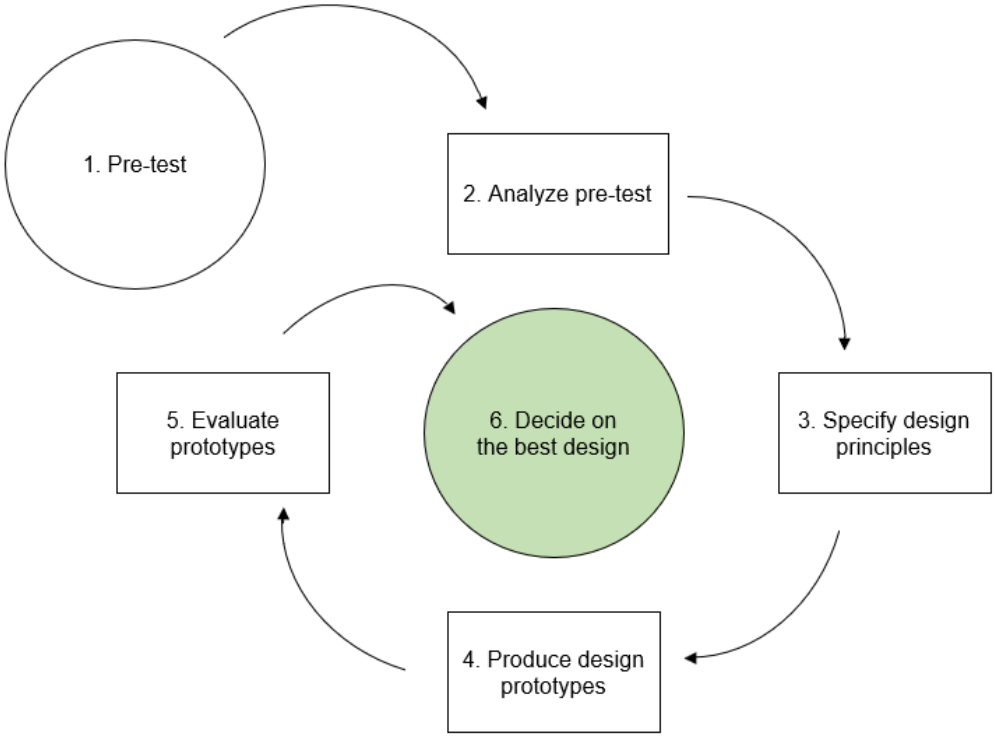

Figure 5.1: The chosen method that builds on the HCD process

The survey was sent out to one of Ida Infront's customers, authority A, by a business consultant. The customer, in their turn, uploaded the survey on their intranet and it got answered by 16 employees that use iipax. As mentioned under section 4.3.2, UX is subjective and it is complicated to evaluate a product out of each individual's own criteria as those may overlap or counter each other. Therefore, long-text answers are categorized into groups according to their main points. The survey answers are then analyzed and, together with the principles under section 3.2, three principles are suggested. These principles are then discussed with the CPO and a UX designer at Ida Infront.

5.2 Implementation

Before implementing the three prototypes, a replica of today's To Do list is developed in React[1]. The replica has the same layout and graphical components as iipax (Figure 2.1 and 2.2) but limited to the functionality that is relevant to the aim of the study. This replica works as a base for all the prototypes.

All three prototypes are high-fidelity prototypes since they mostly work as the intended To Do list is supposed to do. According to the model of prototypes by Houde and Hill (1997), all three prototypes would be between "Role" and "Look and feel" but much closer to "Look and feel" as the example in Figure 4.3. Since the prototypes are not implemented in the code-base of iipax, it cannot be "Implementation". It is "Role" since the prototypes will be evaluated using interview sessions to collect data of what has been an aid for the user and what is more of a hinder. It is more towards "Look and feel" though since the prototypes are intended to test how users that are familiar with iipax feel using them. The prototypes are intended to

[1]React, https://reactjs.org/

look as familiar as possible to the To Do list in iipax. Each prototype will focus on a certain area of requests from the participants of the pre-test and use different principles.

5.3 Evaluation sessions

As mentioned under section 4.3.2, two types of UX evaluation methods were recommended by Roto et al. (2009) during the early stages of development in an industry context. The first one is early expert evaluation and the second one is remote online evaluation. When all the prototypes are done, they are demonstrated to experts at Ida Infront to get their feedback. The prototypes are then evaluated with the help of Ida Infront's customers and business consultants. Before the evaluation phase started, three pilot tests were conducted to see if there was a good amount of tasks and questions and if they were within the time limit of one hour. The pilot test was conducted with three colleagues at Ida Infront that have been supporting during the whole project.

In the pre-test survey, the customers were asked to fill in their mail addresses if they were interested in participating in the evaluation sessions. Four respondents from authority A expressed their interest. Those are sent an e-mail with a Calendly[2] link to book a one hour's timeslot for the evaluation sessions, three of which booked a timeslot. One of those three answered the e-mail recommending two other colleagues that also ended up booking a timeslot. To recruit more participants that would represent other customers, the same e-mail is sent out to business consultants and project managers at Ida Infront. Eight of those were willing to participate. One business consultant sent out an invite to another customer, authority B, to book slots for the evaluation sessions. One user from authority B booked a timeslot.

Each user tests all the prototypes but the order of the prototypes is balanced between the users since the order can affect the evaluation (Grant et al., 2020). The evaluation sessions can be considered both diagnostic and comparison (chapter 4.3.3) as each prototype is evaluated on its own but even compared with the other prototypes. There exists a time limit of a maximum of one hour per session since the evaluation is conducted with the help of Ida Infront´s customers and Ida Infront cannot require more resources from their customers. All the sessions are conducted remotely via Zoom[3]. Before the evaluation with real users, pilot sessions are conducted to evaluate the questions and tasks.

The arrangement of the evaluation sessions is that the evaluation conductors start by introducing themselves and giving some general information about how the upcoming questions and tasks are formed. One of the evaluation conductors will guide the participant through the session while the other conductor will take notes of the participant's opinions and behavior while performing the tasks. The conductors then start with one of the prototypes by reading out the tasks one by one. Those tasks are for the participant to perform by getting remote control via Zoom. During the session, the participant is asked to think aloud and explain their thought process while performing the tasks. During these tasks, the conductors should only observe and the participant is supposed to tell when they think they are done with a task. Even if the task is not completed correctly, the conductor continues with the next task. After the participant has performed all the tasks, they get sent a link to a SUS-test (section 4.3.1) regarding the prototype they have performed tasks in. After that, the conductors ask some questions regarding the prototype. Visual features that could not be evaluated by having tasks related to them, for example, the colors and secrecy labels were only evaluated using the open-ended questions. In the end, when the same process has been repeated for the two other prototypes, the participant gets some general questions regarding all three prototypes. All the tasks and questions from the evaluation can be found in Appendix B. Everything in the evaluation sessions is conducted in Swedish as it is the language iipax uses

[2]Calendly, https://calendly.com/
[3]Zoom, https://zoom.us/

today. Even the SUS-test used is a Swedish version of the example presented in Table 4.1. The only record of the session is the notes taken by one of the conductors. Because of the integrity of the participants, no recording is done. Both conductors review the notes directly after the session.

5.4 Analysis

The notes from the evaluation sessions are analyzed with the help of Affinity Diagrams (section 4.3.1). Affinity Diagrams are chosen as the notes are neither structured nor similar. The notes consist of qualitative data that describes the user's thoughts and behaviors during the sessions and those may overlap or counter each other. Affinity Diagrams are used to categorize and extract conclusions that do not exclude any useful input from the users.

The first step of creating the Affinity Diagrams is by reading the notes from each interview and writing down important aspects of the interview on different sticky notes. If a note is from the task part, the sticky note is marked with a "U" in the upper right corner and if the note is from the questions, it is marked with an "F". The sticky notes are in different colors depending on the participants. If the notes concern an employee at authority A or authority B, the sticky notes are yellow. If they, on the other hand, concern business consultants at Ida Infront, the sticky notes are pink. The sticky notes are divided between the different tables depending on which prototype they are about. Figure C.1 in Appendix C.1 shows all the sticky notes about prototype 1, Figure C.2 shows all for prototype 2 and finally, Figure C.3, shows all for prototype 3. All notes are written in Swedish. The next step is to go through the tables one by one and cluster the sticky notes according to their categories. The categories are often the different functionalities in the prototype. Figures and explanations about the different categories can be found in Appendix C.2 in Figures C.4, C.5 and C.6. The final steps are to go through the categories and filter overlapping categories or those that counter each other. The last step is to remove the notes deemed to be unuseful and only keep the useful ones on the tables. The process is completed for each prototype individually and each prototype gets its own Affinity Diagram.

The questions at the end of the interview, that are about all the prototypes (Appendix B.4), are analyzed by each question. The questions "Considering all the prototypes, what functionality did you like the most?" and "Any functionality you wish existed in iipax already today?" are analyzed using a score system where each participant gets one point. If a participant gives multiple answers to one of the questions, the participant's point is divided among those multiple answers. On the question "Any of the prototypes you liked more than the others?", the answer from each participant is either one of the prototypes or "all". The same set of answers is used on the question "Any of the prototypes you did not like?" but instead of "all", it is "none".

The three SUS-tests that the users perform during the evaluation sessions give quantifiable results. The analysis of those results is built on the average score for each prototype. The way to count the score of a SUS-test is described in section 4.3.1.

6 Results of pre-test

In total, 16 responses were collected. A brief summary of the answers on the first part of the survey (Appendix A.1) is that 85.7% of the respondents were case managers and 14.3% system administrators. The majority of the respondents had worked with iipax for at least a year and 81.3% of the responses stated that they had some kind of training regarding iipax. A vast majority of the respondents (87.5%) usually have less than 50 cases on their To Do list. The table view is the most commonly used among the respondents as 62.5% answered that they use it more often than the card view. See Figure 6.1 for more details about the first part.

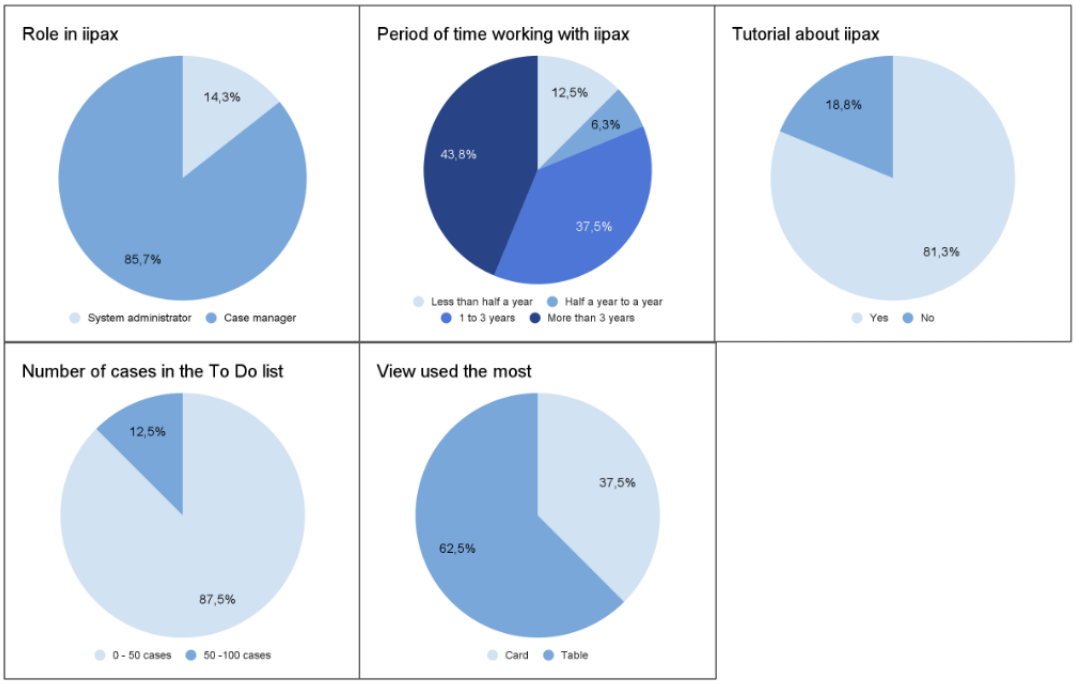

Figure 6.1: Pie charts for the questions in Appendix A.1

In the second part of the survey (Appendix A.2), more than half of the responses (56.3%) were that the best functionality of the To Do list is that it provides a good overview of the cases. Other answers included warning and alarm labels, good design, and notifications. One respondent stated that they do not use the To Do list. When asked about what should be changed in the To Do list, the responses were more diverse. 31.3% of the suggestions consisted of some type of additional information that the respondent wants to see on the To Do list, for example, the case owner or warning and alarm dates. Being able to customize the appearance of the To Do list personally was also among the suggestions. A couple of the suggestions focused on the design of the table view, where the respondents suggested adding the color theme used in the card view to the table view. A respondent stated that they do not use the To Do list and another answered that they have not been using it long enough to be able to give any suggestions. When asked about what they think is missing from the To Do list in iipax, 56.3% of the respondents either left the field empty or stated that nothing is missing. Others suggested additions, for example, a text field where one can comment on a case, a notification that is sent out when the warning and alarm dates are passed, or more sorting methods. See Figure 6.2 for more details about the questions in the second part.

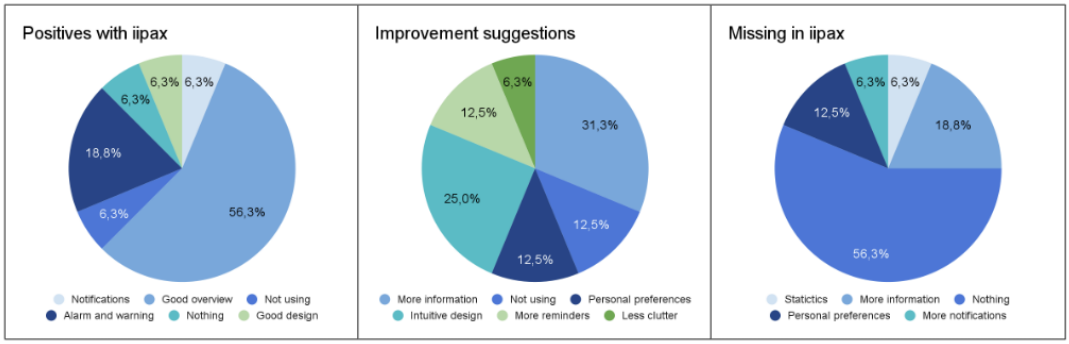

Figure 6.2: Pie charts for the questions in Appendix A.2

The third part of the survey (Apendix A.3) deals with the way iipax is used. When asked about how they choose a case to work with, 37.5% answered that they have their working schedule outside of iipax on, for example, in an Excel sheet. While 25.0% stated that they work on the most recently changed cases first. Other answers were the cases closest to the deadline or cases that require input from the user. Under the question about what cases hold the highest priority, 25.0% answered that do not have a specific answer to the question as it may vary. The next most common answer was that cases closest to their deadline are usually prioritized. Among the other answers were the oldest cases, the most recent ones and the most recently changed. When asked about what cases they want to see at the top of the To Do list, 31.3% of the responses were the cases with the closest deadline. The next most popular answer was the most recent cases (25.0% of the responses). Other answers were oldest cases, most recently changed, and no specific preference. 43.8% of the respondents use filters to ease the search of a case. Among those, 28.6% use mostly the classification filter. Another 21.4% use the case type filter. The other answers were task, warning and alarm, assignee and sender and recipient filters. Among the respondents, 43.8% had used the search function instead of the To Do list on the same day or the day before they sent in their responses. 25.0% had done that during the last week, 18.8% further back than the last month and the rest had never done that. See Figure 6.3 for more details about the third part. Answers to the question about what data is interesting to the users on the case cards varied a lot. Answers included title, recently updated, sender and recipient, organization, deadline date, start date, and case type. Other answers were own notes, warning and alarm date, diary number, and accounting unit.

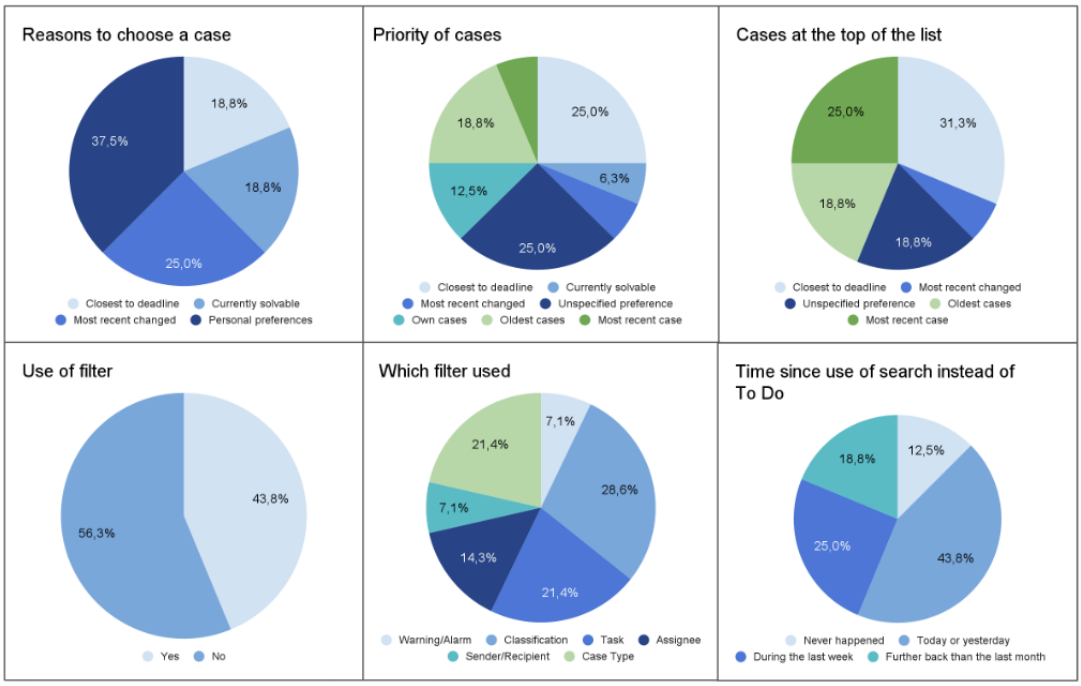

Figure 6.3: Pie charts for the questions in Appendix A.3

7 Prototypes

In this chapter, a description in detail of each of the three prototypes is presented. The first one focuses on color theory, the second is about making the To Do list more individually customizable and the last one is about categorizing. All these prototypes are built on theories of design principles (section 3.2) and the results of the pre-test (chapter 6).

7.1 Prototype 1 - Color

This prototype focuses mostly on the table view (Figure 2.2) but some features are added to the card view as well to get a similarity between the views. This prototype is built on the color theories that are cited in chapter 3.2.1 but, with a big focus on how to make it useable for individuals with color vision deficiency as well. Therefore, both colors and symbols have been combined to communicate different information in the system. Since this prototype has the biggest focus on the table, some minor changes to the table have been done that have nothing to do with colors but were requested by the users.

The biggest change is that the labels for warning and alarm have been replaced with a progress bar where the user can see in percentage how much time it is left to the date of warning and then alarm. In Figure 7.2, the first bar indicates that the case is still within the time limit but it has passed halftime until the date of warning. The second bar has passed the warning date and is on its way to alarm. The third progress bar has passed both dates. If the cursor is hovering over the icon for a warning, the date of the warning is shown in a tooltip and the same goes for the alarm icon but with the alarm date instead.

The labels have been changed and the new layout can be seen in Figure 7.3. The blue dot on the cards, which indicates a new case, has been added to the table as well and has become a label instead with the text *Ny* (New). A blue bell has been added to communicate that a new change has occurred within a case. In the filter header, a new button has been added to filter out all cases with a bell. The secrecy labels have been expanded with an icon to distinguish them more and weak secrecy has changed to red instead of orange as it was in the original iipax. Another feature that was added was the color border on the left side of the table so it matches the colored border in the card view (Figure 2.1). Also, a background color was added when hovering over a row (see the orange row in Figure 7.1). The background color is orange if the border is orange and light red if the border is red.

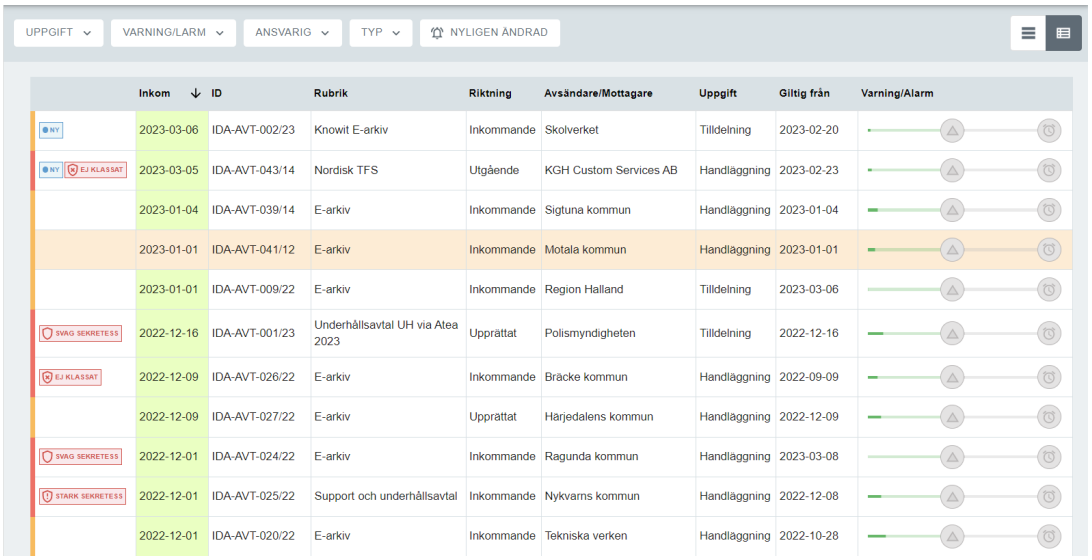

Figure 7.1: Prototype 1 - The table view

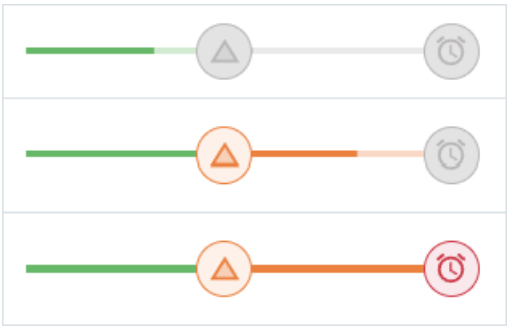

Figure 7.2: Prototype 1 - Three different progress bars

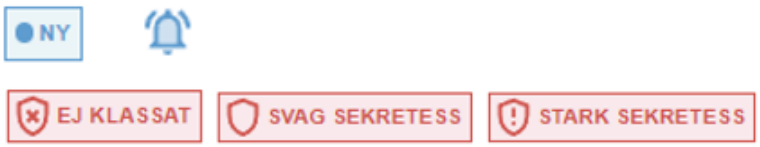

Figure 7.3: Prototype 1 - Labels

Some changes that have more to do with the table and less with colors were that the sorting dropdown button got replaced by clickable table headers. When a user clicks on a header, the table is sorted from top to bottom from that column. The column becomes green and an arrow is shown to the right of the header text. If the user clicks the same header again, the sorting becomes bottom to top and the arrow is pointing up. The default sorting is *Inkom* (Arrived), which can be seen in Figure 7.1. If the user clicks on the same header a third time, the sorting would go back to default. Some columns have also been replaced with other data in this prototype to make the table more comprehensive for the users. *Underrubrik* (Subtitle) and *Typ* (Type) have been removed and *Riktning* (Direction), *Avsändare/Mottagare* (Sender/Receiver) and *Varning/Alarm* (Warning/Alarm) have been added. *Datum* (Date)

have been changed to *Inkom* (Arrived) to specify what the date represents. The sender and the receiver are dependent on direction. If the direction is *Inkommande* (Incoming) the sender and the receiver column specifies the sender and if the direction is *Utgående* (Outgoing) the column specifies the receiver.

The new labels, the progress bar and the data with directions and the sender and the receiver have been added to the cards as well (Figure 7.1). Both the table view and the card view have pagination instead of a scroll with a limited number of cases, as in the original iipax. Both show 21 cases on each page since it is divisible by three and there are three cards per row in the card view.

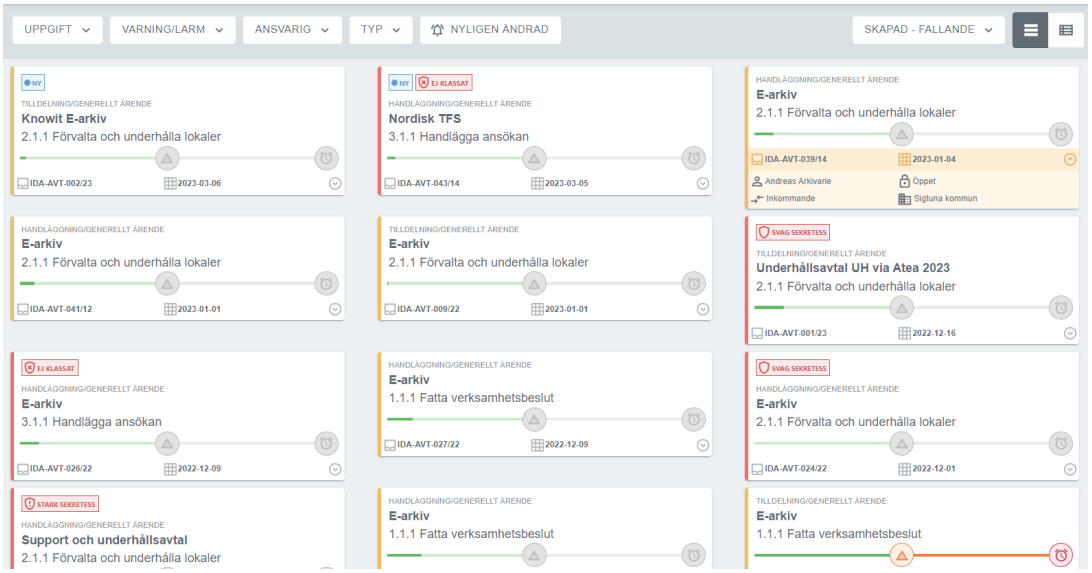

Figure 7.4: Prototype 1 - The card view

7.2 Prototype 2 - Personal preferences

This prototype was built on the idea of giving the user more control of the interface. An example of that is that even though it has pagination like the first prototype, it is unique in giving the user several alternatives of the number of cases presented on each page (Figure 7.5). The numbers a user can choose among are 10, 20, 30, 40 or 50 cases on each page. 20 cases per page are the default. Having numbers divisible by 10 as alternatives to the number of items per page is a standard on most websites.

Figure 7.5: Prototype 2 - Pagination at the bottom with an options menu to the left

Two completely new features in this prototype are pinning and bookmarking. In both the card and the table view, two new icons can be seen on each case, a pin and a bookmark (Figure 7.6). When the pin icon is clicked, the case is pinned to the top of the page and is not affected by sorting but can be filtered out. A maximum of three cases can be pinned at the same time. When three cases are pinned, the pin button is disabled for the rest and a warning will be shown explaining why the button is disabled if the user tries clicking it. The pinned cases can be distinguished by having an orange-filled pin icon, while the rest have an outlined black pin icon. A disabled pin icon is also outlined but gray. A bookmarked case,

on the other hand, will have a golden-filled bookmark icon, otherwise, the icon is black and outlined. The user can choose to only view the bookmarked cases by clicking on the button with the label *Visa bara bokmarkerade* (Show only bookmarked) in the filter header which filters out all the other cases (Figure 7.9).

Figure 7.6: Prototype 2 - A case that is both pinned and bookmarked

Another major change in this prototype is when a case gets bookmarked, it is automatically added to a To Do board that is personal for each user. This board can be accessed by changing the view in the filter header (Figure 7.9). The user now has three alternatives, card, table, and board. In the board view, the bookmarked cases are shown like cards and they can be moved between three different lists, *Att göra* (To Do), *Pågående* (Doing), and *Avklarat* (Done) (Figure 7.7). The cases can be sorted and moved between the lists by dragging and dropping. To remove a case from the board, the user has to "un-bookmark" it by clicking the bookmark icon on its card.

Figure 7.7: Prototype 2 - The new board view

The last feature of this prototype is the ability to choose among three different card layouts depending on the user's personal preferences. A button beside the sorting button has been added (Figure 7.9). When clicked, the user gets a pop-up window with three alternatives (Figure 7.8). The button is only visible while the user is on either the card or the board view as it only concerns those. The first alternative has the same layout as in the original iipax. While the second is focused on presenting all dates related to the case. The third alternative is compact and focuses on the task type in the case. When the third alternative is applied, the card view presents four columns of cases (Figure 7.9), while the other alternatives are limited to three columns of cases. In the filter header in Figure 7.9, one can see the filters that existed in the original design of iipax but also the filter for bookmarked cases and the layout changing button. Both new buttons are located beside the original filters. Furthest to the right is the button that leads to the new board view. Among the cards, three are pinned and four are bookmarked.

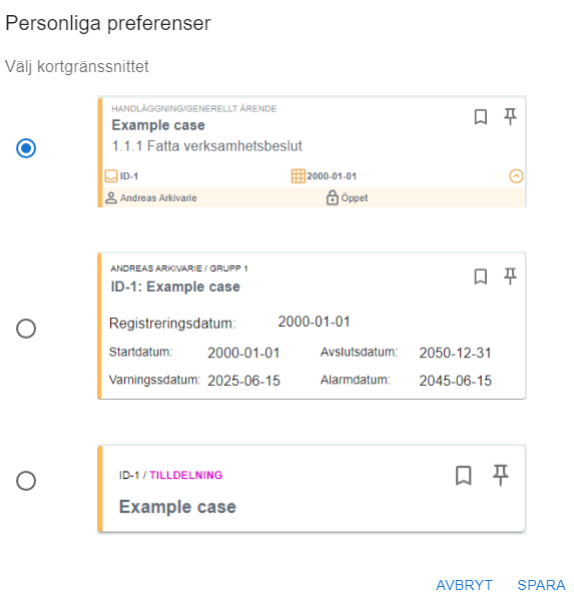

Figure 7.8: Prototype 2 - The layout changing pop-up

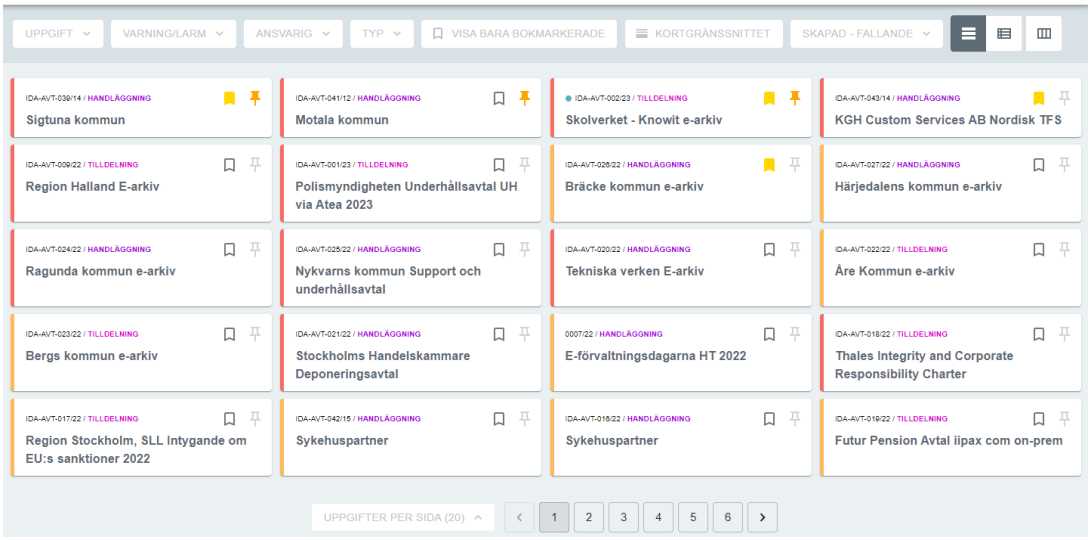

Figure 7.9: Prototype 2 - The card view using the third card layout with three pinned cases and four bookmarked ones

7.3 Prototype 3 - Categorizing

The third prototype focuses on categorizing. The categorization depends on the chosen sorting variable. For example, in Figure 7.10 the cards are sorted by creation date and descending order. Between the filter header and the cards is a row with links to all the category titles. The same set of links exist also at the bottom of the page. When clicked, the page would scroll to where that title exists. In the parentheses, beside the title, is the number of items in each category. On each card and in each row in the table, the corresponding variable to the chosen sorting variable is marked with black and bold text. When sorting by created date and descending order the items are categorized by *Senaste veckan* (Last week), *Senaste månaden*

(Last month) and then *2 månader sedan* (2 months ago) throughout 11 months ago. Then, the categories are divided by the number of years since the creation date.

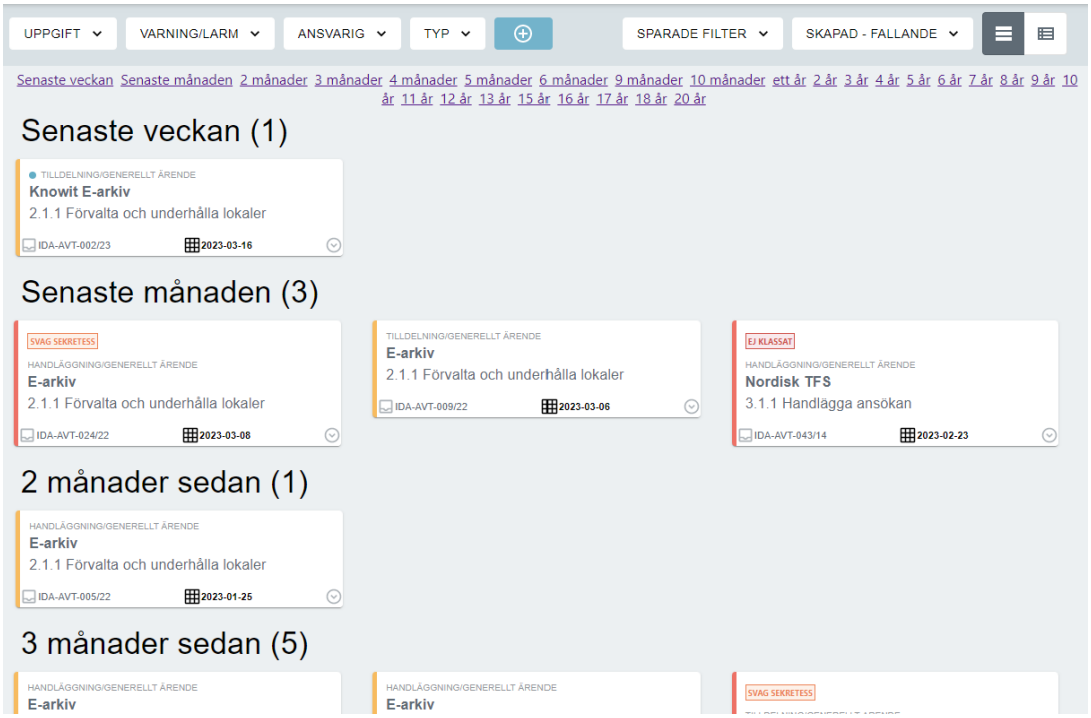

Figure 7.10: Prototype 3 - The card view sorted by created date

In Figure 7.11 the original table has been changed to a collapsible table, which means that each category is hidden until its title is clicked. Otherwise, the functionality with the links is the same as the card view but, in Figure 7.11, the sorting variable is *Rubrik* (Title).

Another big functionality that was implemented in prototype 3 is that filters can be saved. If the user uses one or multiple filters, the user can click on the blue button next to the filter dropdowns and a pop-up window will appear like Figure 7.12. In that pop-up, the user can see both the filter chosen and the sorting variable. The name of the saved filter must be unique and the saved filters can be found under the dropdown *Sparade filter* (Saved filters) that is located to the right in the filter header in Figure 7.11. The user is able to delete a specific saved filter by clicking on a red recycle bin icon that is located beside the name in the dropdown.

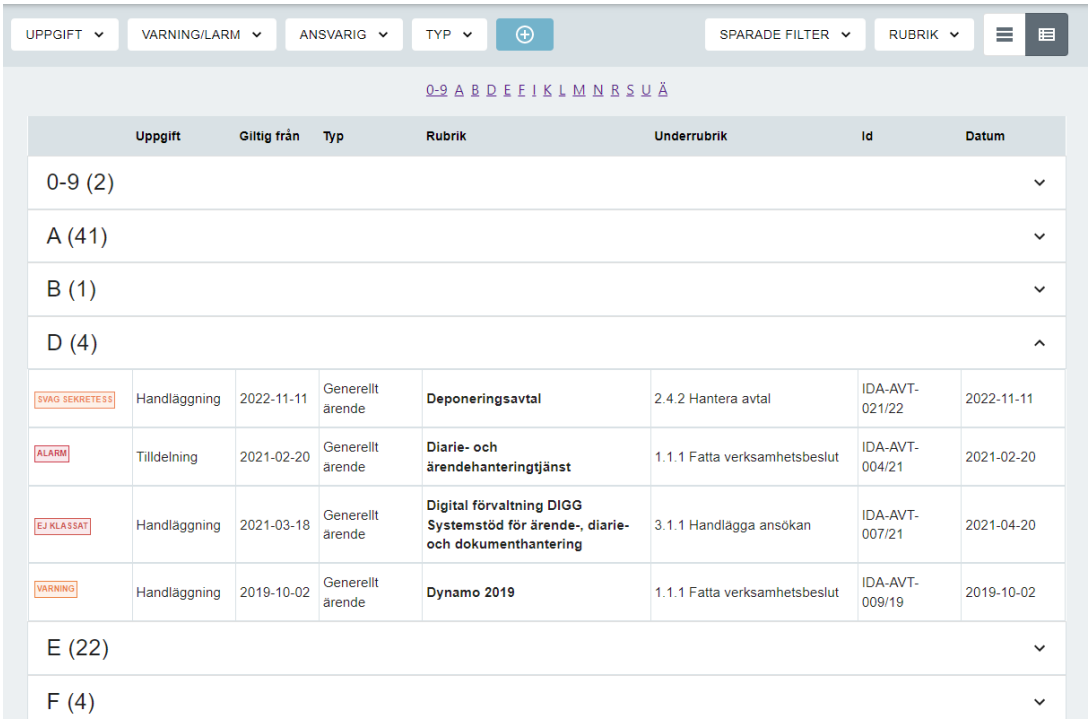

Figure 7.11: Prototype 3 - The table view sorted by title

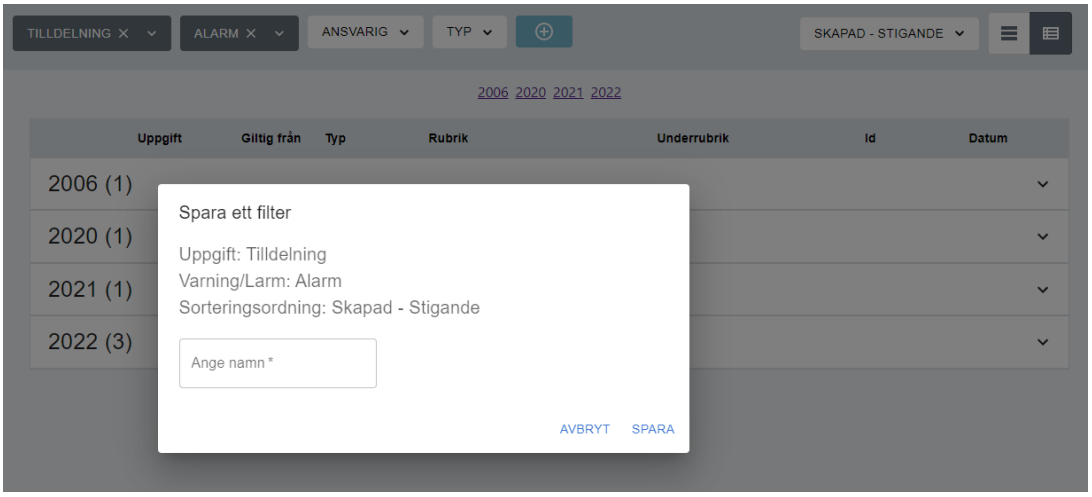

Figure 7.12: Prototype 3 - Save filter

8 Analysis of the prototypes

The four general design principles by Blair-Early and Zender (2008) were followed throughout the implementation phase of the three prototypes. The first principle about building an interface that describes its content was followed by making the cases in the To Do list the scope of the design. For example, the header of the To Do list is utilized for the filters and sorting of the items. The second principle is about using color and form was followed by using them instead of text when applicable. The third principle is about building an interface that piques the user's interest which was followed by, for example, using a progress bar in one of the prototypes. Another example is giving the users their own To Do board in another prototype. Lastly, the fourth principle which emphasized the importance of using metaphors whenever new concepts are introduced was followed by using tooltips where new unfamiliar functionality was implemented.

Another aim that was used as a base during the planning and implementation phases of the prototypes, was to build prototypes that would assist the users. The prototypes were to contribute toward utilizing the full potential of the To Do list instead of feeling the need to use external software, for example, Excel to keep track of their cases. A functionality that was implemented to fulfill this aim is the To Do board.

8.1 Prototype 1

Most of the pre-test survey respondents (62.5%) answered that the table view is the one they use more often, therefore, this prototype had the table view as its main scope. Several responses were that the table view should get the same color theme as the card view. For example, one user said that it was hard to separate the rows if you have a lot of cases. To solve that, a background color was added when the mouse is hovering over a row.

Two users pointed out that the sorting functionality should be done by clicking on the headers in the table. This is shown with an arrow to the right of the header title and the column gets a green background. On the question of what type of cases the user wanted to be seen at the top of the page, 25% answered the most recent cases which is the default sorting. 31.3% requested closest to deadline which was not implemented in the original iipax but is implemented in this prototype. If the user sort by the progress column, they get the cases sorted by closest to the deadline. Only 6.3% wanted the cases that have most recently changed at the top but, on the question of priority, 25% answered that they prioritize the cases

that are most recently changed. Therefore, a blue bell was implemented to indicate if cases have an update. Also, a filter button was added to filter out those cases. Bellotti et al. (2004) pointed out that it is important to have relevant methods for sorting and filtering which the new button contributes to. Bellotti et al. also stated that a To Do list manager should have a way of distinctly showing tasks with high priority which is followed in the table with the first column that has the secrecy labels if a case has them and otherwise the column is empty. One user also thought that the subtitle was unnecessary and instead wanted the sender and receiver and this request was also fulfilled in this prototype.

According to the color theory by Beaird et al. (2020), warm colors on cold backgrounds make the warm colors more visible. Therefore all secrecy labels continued to be red since the background is white and the circles for warning and alarm, orange and red. Beaird et al. stated that yellow is the color that symbolizes warning but since the background is white, the yellow color was hard to distinguish and therefore orange was chosen instead. For the bell and the new case labels, blue was chosen since it is a positive color and those labels symbolize good updates. Blue is not as dramatic as red or orange which is the intention. Grant's (2018) 64th principle, of making the prototype usable for individuals with color vision deficiency, was a base during the implementation phase. Where colors were used to indicate something, a text or a symbol was also added to communicate the same message. The clearest example of that is the blue dot that indicated a new case was replaced by a label that has the text "new" in Swedish on it. The three different secrecy labels got different symbols to separate them more. Another example is that the mark for warning and alarm in the progress bar has a tooltip that shows the date of the warning or alarm.

Grant (2018) pointed out the importance of making it clear for the user where the task began, where it is now and the deadline in principles 70 and 71. Bellotti et al. (2004) stated that if there is a deadline, the bar should be green and then turn red when the deadline is closing in. Both principles were followed by the progress bar since it clearly shows the beginning, warning and alarm and the actual dates of these deadlines. It is green until the date of the warning, between the warning and alarm orange and finally red if the alarm date has passed. Also, pagination makes it clear that the number of cases is limited and has a start, middle and end.

8.2 Prototype 2

Prototype 2 was built on answers from the pre-test that suggested adding the ability to customize the To Do list depending on personal preferences. As the responses to what the users wanted to see on the case cards varied a lot (section 6), prototype 2 gives the user the possibility to choose among several layouts for the case cards (Figure 7.8). The layouts offer different types of information to cover the requests of most users. This functionality was even suggested by Bellotti et al. (2004), who mentioned the importance of offering several ways of presenting the tasks.

Another functionality in prototype 2 is the ability to pin cases. This functionality comes from the users' diverse answers to what cases hold the highest priority and should be presented at the top of the To Do list. Pinning is related to the article by Bellotti et al. (2004), where they mentioned that the user should have the ability to determine the importance of a task. If the user tries to pin more than three cases, a warning is shown explaining why that is not possible. This can be associated with the article by Blair-Early and Zender (2008) where one of their principles was about the importance of feedback.

The ability to bookmark cases and to have those cases appear on a new view in the form of a board is a way to make the users avoid having to use an Excel sheet. The board view gives the users their own To Do board where they can sort the cases and move them between different lists by simply dragging them. This relates to the article by Bellotti et al. (2004) where their application had the functionality of dragging. Both pinning and bookmarking are

obvious interactions according to Grant's (2018) 96th principle. Blair-Early and Zender (2008) emphasized the importance of having landmarks to help the users identify their location in the interface. The toggle buttons in the page header give the users information about what view they currently are using.

Grant's (2018) 64th principle stresses the importance of not using color as the only source of information. Even though the pin and bookmarking buttons change colors when clicked, the change is also visible to people with color vision deficiency as clicking the buttons makes them filled and reversing the action makes them outlined. This also relates to 2 of the 10 principles by Blair-Early and Zender (2008), Consistent Logic as the consequences of the user's clicks are made to be logical to the user, and Clear Reverse as it is obvious to the user how to reverse pinning and bookmarking.

Pagination is also available in this prototype and replaces scroll, but with an addition compared to prototype 1 (section 8.1). Here, the user was given more freedom of customizing the To Do list by being able to choose the number of cases per page. This was done to further emphasize that the scope of this prototype is personal preferences.

8.3 Prototype 3

Prototype 3 was focused mostly on categorizing cases with similar variables together. This was made to ease the search process for a specific case. Bellotti et al. (2004) mentioned that tasks with similar variables should be put together in a To Do list. The categorization depends on the sorting variable chosen by the user, if the user chooses to sort after the cases' creation dates then, cases from the same time period will be in the same group. One of the principles by Blair-Early and Zender (2008) is about making the interface adaptable to the user's actions which can be observed in prototype 3 when the categories change as the sorting method changes. Another principle by Blair-Early and Zender is about Proximity, concept proximity is followed by grouping the To Do list's items in a way that makes sense to the user. The prototype also follows principles 25 and 82 by Grant (2018) which stresses the importance of splitting lists with many items into subsections. Principle 27 was also followed by having navigation buttons at the top of the page as well as at the bottom.

The other new functionality in prototype 3 is about the ability to save personal sets of applied filters and sorting variables. This comes from one of Blair-Early and Zender's principles (2008). The principle in question is Observe Conventions which calls on preserving terminology and images that are familiar to the user. The same design as the button to save filter on the search page in iipax was used as a button to save filters in prototype 3.

9 Results from the evaluation sessions

When the prototypes were done, they were demonstrated to a UX designer, the CTO, the CPO and a line manager at Ida Infront. Since the feedback was mostly positive and no major changes were recommended, and the pilot tests went well, the phase of the evaluation sessions began. In total, 14 persons participated in the evaluation sessions. Five participants were from authority A, one from authority B and eight were business consultants at Ida Infront. Each business consultant represented different customers. Each customer has a customized version of iipax that fits their requirements which means that there are some differences in iipax between the different configurations. Since all the answers in the pre-test were from employees at authority A, the prototypes were focused on their version of iipax.

The prototypes were evaluated in varied order during the different evaluation sessions. Prototype 1 was shown the first five times, the second five times and the last four times. Prototype 2 was presented first four times and five times as second and third. Prototype 3 was shown five times as the first and last and four times as the second.

9.1 SUS-test

The SUS-test was filled in directly after the participants had done all the tasks of each prototype. Therefore, the result of the SUS-test is the participants' usability evaluation before the conductors had described the idea behind different functions. Each prototype had its own survey but with the exact same questions so the participant answered the same questions three times.

In Table 9.1, the total score of each prototype can be seen. Also the lowest and the highest scores together with the grades. Prototype 1 had the biggest variation since it got scores between 27.5 and 100, but still got the highest average score. Prototype 2 had almost the same average score as prototype 1 but not as big variation. Prototype 3 got the lowest average score and the lowest single score of all prototypes with 25. When it comes to grading, both prototypes 1 and 2 got a C and Good while prototype 3 got an unaccepted Grade scale of F but an OK grade according to the Adjective rating.

Table 9.1: The result of the SUS-test

Prototype	Lowest score	Highest score	**Average score**	Grade scale	Adjective rating
1	27.5	100	**73.75**	C	Good
2	50	100	**73.57**	C	Good
3	25	90	**57.68**	F	OK

9.2 Affinity Diagrams

The tasks and the questions about each prototype were analyzed with one Affinity Diagram for each prototype. Each diagram was done with three steps, figures of the first two steps can be found in Appendix C. The last step and the final results are shown in Figures 9.1, 9.2 and 9.3. All notes were written in Swedish since the interviews were conducted in Swedish. The sticky notes were sorted so that all critical sticky notes, if they existed, were placed at the top of each column and the positive ones are placed after a bigger gap in the bottom part of the column.

9.2.1 Affinity Diagram about prototype 1

Figure 9.1 shows the Affinity Diagram for prototype 1. In the figure, the sticky notes were divided into categories where 1 is all notes about the secrecy labels and individuals with color vision deficiency, 2 is about sorting by the headers, 3 about the label for new cases and the recently changed label, 4 the progress bar and finally, 5 is about the different colors in the prototype.

In column 1, the upper part is about the critical opinions regarding the secrecy labels. Some participants did not like that all three levels of the secrecy labels were red and another participant thought the new labels gave a messy impression with different widths and symbols. Two participants mentioned individuals with color vision deficiency. One said that individuals with color vision deficiency could have difficulty reading the red text on the red background while the other said that the icons could be good for individuals with color vision deficiency but, thought it was too many colors and icons in this prototype. On the other hand, in the second part of column 1, four participants thought that the labels were clearer and better compared to the current design of iipax.

The second column is about sorting by the table headers instead of the sorting dropdown that exists in iipax today. Three participants had a hard time figuring out how to sort but the majority of the rest liked that functionality a lot and multiple business consultants said that the customers had requested that functionality. One participant even said that it is standard today to click on headers in a table to sort.

The next column is about recently changed and the label that symbolizes a new case. Three participants thought the symbol for recently changed, that is a ringing bell, was a symbol for warning or alarm. Others thought that it was clear and liked that they could filter out all cases where something new had happened. It was only business consultants that said that recently changed was a good addition.

Most sticky notes about prototype 1 were about the progress bar. Four participants either did not understand how the progress bar worked or thought it was a good idea in theory but that would not work in practice. Six participants (the bottom part of column 4) thought the progress bar took up too much space in the table. Many business consultants said that their customers do not use warning and alarm and thought the space could be utilized better. Two business consultants pointed out that if the progress bar took more space, the customer might change how they work with warning and alarm. Two participants were looking for the old labels instead of looking at the progress bar.

The fifth column is about what the participants thought about the colors. The first four sticky notes list the observations of participants that did not understand the colors in the table. The next four sticky notes are from participants that were bothered by the colors, especially the green column. While five others thought the colors were useful as long as someone explains what they mean.

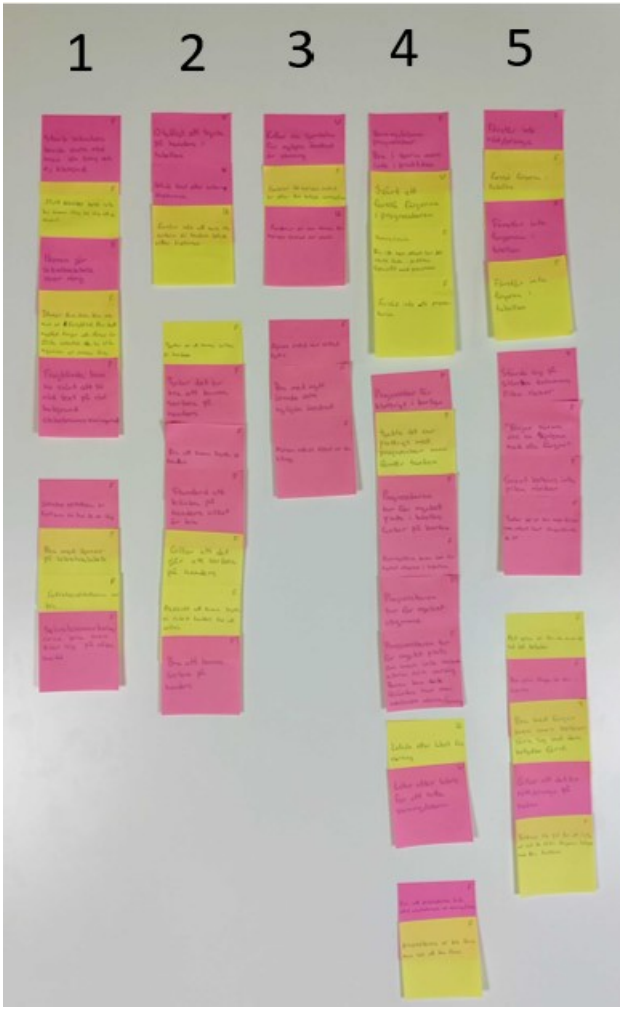

Figure 9.1: Result of Affinity Diagram of prototype 1

9.2.2 Affinity Diagram about prototype 2

In Figure 9.2 the sticky notes were divided into five categories. One is about tooltips and the next is about pagination and changing the number of cases per page. The third column is about the card layout change and the fourth is about the To Do board. Category 5 is about pin and bookmark and is divided into three columns to categorize the notes more.

The first category is for sticky notes only taken from the task part of the evaluation sessions. Some participants were looking for tooltips to find out what the icons for bookmark and pin symbolize. Other participants were also looking for tooltips on the view change buttons even though the current iipax does not have tooltips on them today.

When it comes to the task of changing how many cases that are shown per page multiple participants had problems finding the dropdown. Often the participant had to search for it for a while and multiple times the conductor had to give a hint that the participant should scroll

to the bottom of the page. However, when they had found the dropdown and the pagination, no one had a problem changing the number of cases per page. Three participants then said that they liked the ability to change how many cases are shown per page and pagination instead of an endless scroll.

The third column is about changing the layout of the cards. Two participants had some problems finding the button to change the layout but, otherwise, the response on this functionality was positive. 10 participants mentioned that they liked the functionality but they differed in if they wanted to see more or less on the cards. Two participants also mentioned a request of having a similar functionality in the table view.

The most confusing functionality in prototype 2 was the To Do board which is a completely new view. In iipax, the cases go through a process from the moment they are received until they are sent to the archive. An example of a simple process can be that a case gets submitted to a public authority. The case shows up on the To Do list of a registrar who in their turn reviews the case and makes sure all required documents are attached and then, marks it as done. The case disappears from the registrar's To Do list and appears on a case manager's list. The case manager reviews the case and takes a decision and again, marks it as done. The case is then sent to an archivist's To Do list where the decision of the case manager is reviewed and the case gets archived. Each case type has its unique process and those can vary in complexity and how automised they are. Some processes require very little manual labor while others have very little automation. These processes had not been taken into account when implementing the prototypes which made the participants confused. They wondered how the new To Do board is connected to the process and what it actually means when a case is dragged to the done column in the board. Is the whole case done and moved from the person's list to the next person or must that happen manually as well? The conductor had to explain the idea of this view to all the participants but, when the participants had understood the idea, the response was different. Six participants said then that they liked the new view and believed it could be useful.

The fifth categorization is about pins and bookmarks. Column 5.1 is about the pinning function and that multiple participants were confused at first that the cards hoped to the first row. Not every participant discovered the consequence of pinning and that cases hop to the first row because they pinned a case that was already in the first row. Two persons mentioned the limitation of pinning only three cases. One thought it was reasonable and the other did not like the limitation. Column 5.2 is about the difference between pinning and bookmarking and three participants thought it was unclear. Finally, 5.3 is about whether the participants liked pinning or bookmarking the most. Four participants liked both equally and thought both were useful, two liked them both but preferred bookmarking while three preferred pinning.

9.2.3 Affinity Diagram about prototype 3

The Affinity Diagram for prototype 3 was divided into five categories which can be seen in Figure 9.3. The first column is about the categorization, the second about the links and the third is about saving filters. How to sort in the table is the fourth category and the last one is the table as a whole.

Regarding the categorization, four participants stated that they were skeptical and did not see any good usage of it. On the other hand, two participants were positive about the categorization, especially when there are many cases, and five liked it for some categories but not for others. Some thought the categorization was good when the sorting was by dates or tasks but not by titles for example.

Column 2 has two sticky notes. One says that the links look unmodern and fit more in systems built in the 90s. While the other reads that the links can solve a problem with long To Do lists since the user does not need to scroll between a lot of cases or filter to find a specific case.

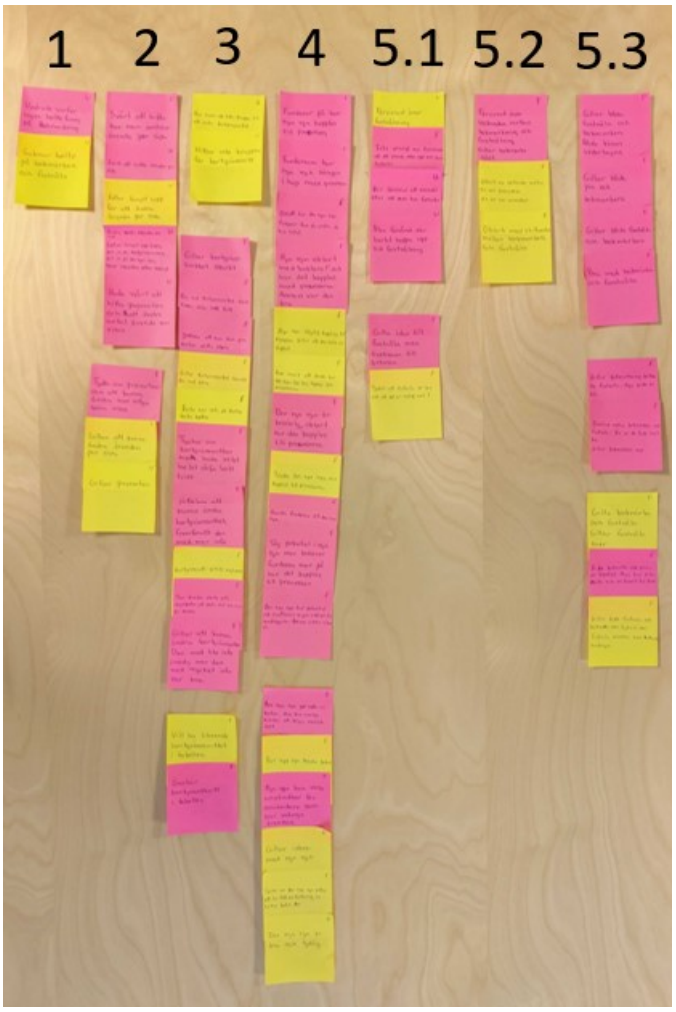

Figure 9.2: Result of Affinity Diagram of prototype 2

The next column is about saving filters. The first part is sticky notes that are from the task part of the evaluation session where five of the participants were looking in the menu to the left to find the saved filter. That is because it is there the saved filter is when a user saves a filter on the search page in iipax today. Three participants were critical to having the functionality in To Do since it already exists on the search page and they thought it was unnecessary to have it in both places. Most of the participants though, eight persons, thought that the functionality of saving filters was really good and useful on both the search page and the To Do.

Almost every one of the participants tried to click on the headers in the table when they were asked to go to the table and sort by title. One participant stated that the sorting dropdown, which is at the same place as in the original iipax, was placed too far away from the table. It was only one participant that sorted with the dropdown without trying to click on the headers first.

The final column is about what the participants thought about the table with collapsible categories. Five participants stated that they were doubtful or did not like the table and thought it would be more annoying than useful. One business consultant said that the customers missed a button in the card view where all cards can be expanded and that they probably would miss a similar button here if the table was collapsible. Five participants had another opinion, they liked the table and thought it could be good to not need to see ev-

erything at once. One participant pointed out that the numbers in parentheses gave a good overview.

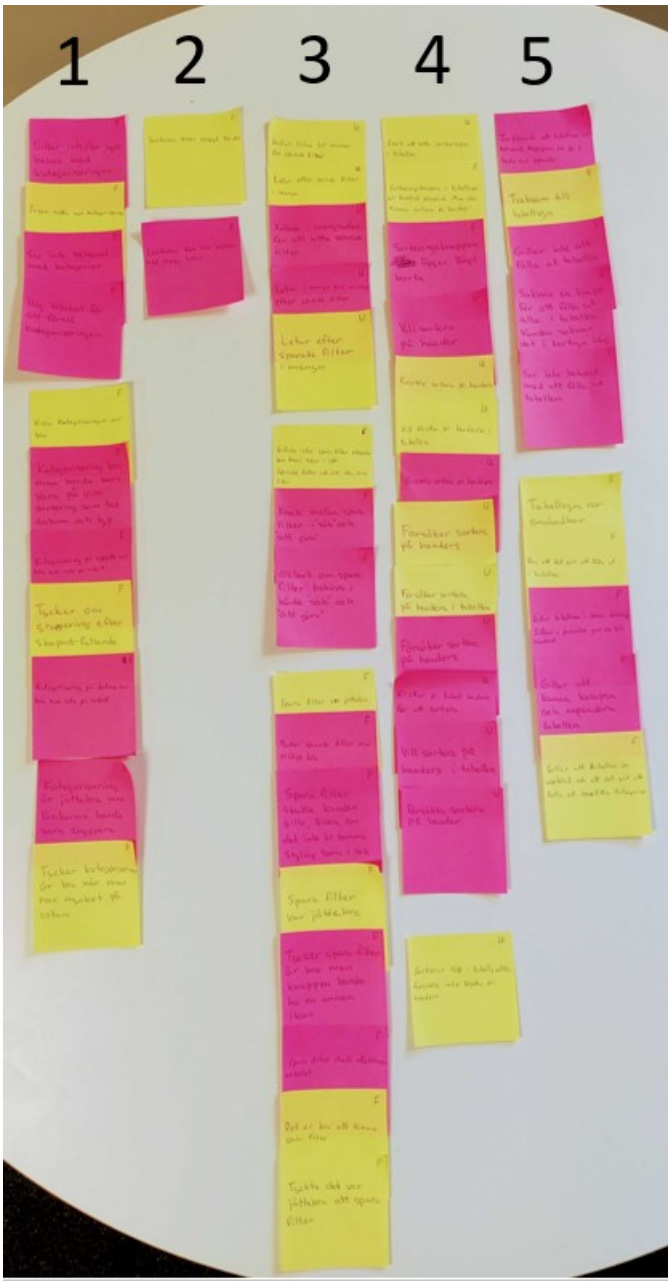

Figure 9.3: Result of Affinity Diagram of prototype 3

9.3 General questions about all prototypes

The general questions were the questions that were about all three prototypes that were asked at the end of each session (see Appendix B.4). The diagram to the left in Figure 9.4 is the result of the question "Any of the prototypes you liked more than the others?" and the one to the right is the result of the question "Any of the prototypes you did not like?". Prototype 2 is clearly the most liked prototype with 57.1% . In second place comes prototype 1 with 21.4%.

14.4% answered that they liked all prototypes equally and therefore, could not say a prototype they liked more than the others. Only one person stated that they liked prototype 3 the most. Prototype 3 is instead the prototype that most participants (42.9%) did not like. 28.6% answered that they did not like prototype 1 and the same number of participants answered that they did not have a prototype they did not like, which means that they thought all prototypes had good functions. No participants answered prototype 2 on which prototype they did not like.

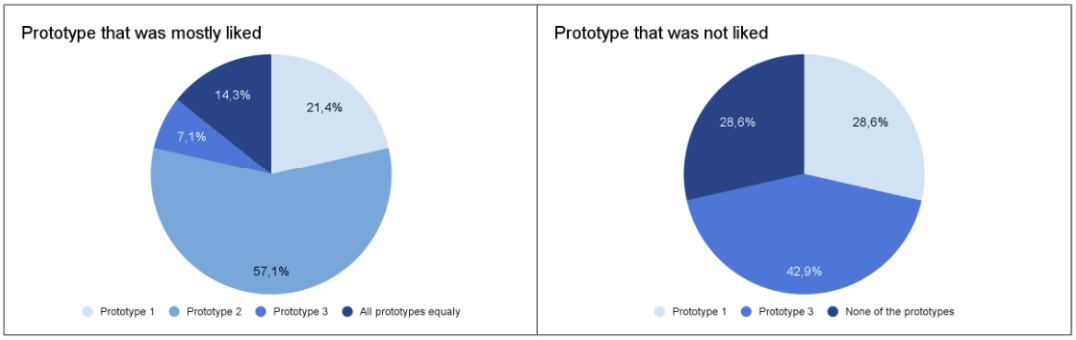

Figure 9.4: Pie charts of which prototypes are liked the most and disliked

The result of the question "Considering all the prototypes, what functionality did you like the most?" is shown to the left in Figure 9.5 and to the right is the result for "Any functionality you wish existed in iipax already today?". The pie charts at the top show the functions the participants answered on the questions and the ones at the bottom show in which prototypes these functions are implemented. Bookmark is the function that was the most popular (23.3%) on the question with functions they liked the most and then sorting by headers is second with 17.8%. Also, card layout change (12.3%), pagination and change the number of cases per page (9.6%) and recently changed (8.2%) were popular functions. Other functions that were most liked were save filters, pin, categorization by date, progress bar, secrecy labels and links. The majority (57.1%) of the functions that were most liked were implemented in prototype 2. On the other question, on what they wished was implemented in iipax today, sort by header in the table was the answer that was brought up the most (29.5%) and then save filter with 19.2% and card layout change (14.1%). A new answer that was not answered on the first question was that the user could see the sender and the receiver in the table. From this question, most of the functions that were brought up came from either prototype 1 (41.0%) or prototype 2 (35.9%).

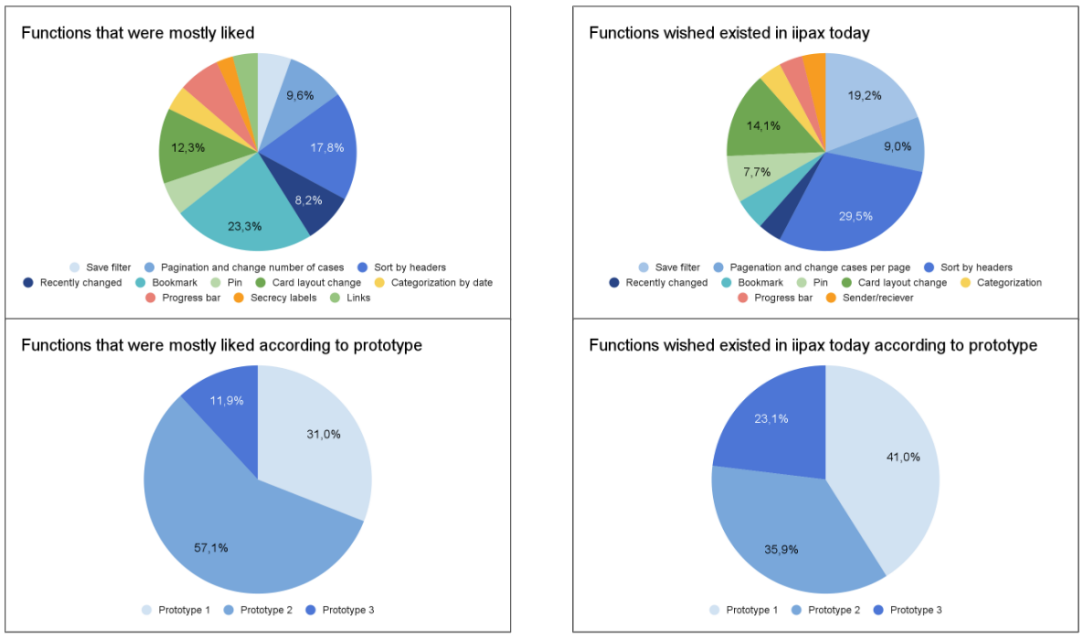

Figure 9.5: Pie charts of which functions are liked the most

10 Discussion

This chapter first discusses the different methods used throughout the study and what could have been done differently. Then, the results of the pre-test and all the prototypes are discussed respectively. After that, a discussion about the results of the evaluation sessions follows and finally, the study is discussed from a wider context.

10.1 Method

In this study, three different prototypes were developed with different approaches and principles to be evaluated with the help of current users of iipax. The aim was not to develop three complete applications but rather prototypes. To find sources online for the study, the search engine Google Scholar and Linköping University library website were used. To find even more peer-reviewed sources, a traceback was done of the reference lists of relevant papers. It was difficult to find peer-reviewed papers with principles specific to To Do lists, therefore, general principles were applied. It was also easier to find the principles in books rather than in papers published online. To find these books, the library of Linköping University was visited. When defining terms and concepts, first-hand sources or ISO standards were cited. The prototypes were built using the authors' interpretations of how different design principles can be applied to the design of a To Do list. The evaluation was performed with the help of Ida Infront's customers which may not be as diverse as one would have wanted in terms of IT-knowledge and UX-expertise and the customers would only be available once and have a limited time frame of a maximum of one hour per participant.

10.1.1 Pre-test survey

The survey of the pre-test included mostly open-ended questions which may have caused some to ignore it as those may be considered time-consuming. Having been answered by 16 employees was sufficient enough as the survey collected qualitative free-text answers. All the respondents were employees at authority A which may have affected the outcome of the thesis by not being diverse and including. This kind of issue was expected though as one cannot expect customers to be willing to spend time and resources on research they are not conducting themselves. This is why interviews were not conducted during the pre-test phase.

An alternative would have been to send out a quantitative survey with multiple-choice questions. Such surveys are not considered as time-consuming as surveys with open-ended questions. However, more responses would have been required for the results to be sufficient. Also, the multiple-choice questions would have limited the variation of answers and therefore, limited the results from the pre-test survey. Since the answers would evaluate whether the designers thought should be changed in the system was right rather than giving inspiration and insights into what the users want to change.

10.1.2 Interviews and participants

The interviews were conducted with a total of 14 participants of which five were from authority A, one from authority B and eight were business consultants at Ida Infront. Since it was only employees at authority A who had responded to the pre-test survey, the prototypes were, partly, built on requests from their answers and their configuration of iipax. Since one from authority B and eight business consultants were interviewed, some questions or changes were not relevant for all the customers that were represented. For example, there were differences in how many secrecy levels the customers have or use. Some just use one level and therefore, it was not relevant to evaluate the different labels while, authority B uses all three levels. The same aspect concerns how often different customers use warning and alarm. Some do not use them at all and therefore, the progress bar would not make sense to them according to the participating business consultants. This could have affected the evaluation of the design principle regarding the progress bar as it was associated with a functionality that some participants do not use in iipax. Therefore, the design principle itself might have not been fairly evaluated. If warning and alarm were used more often by the participants, the participants might either have appreciated it more or still been skeptical against it as it would be considered such a big change compared to the labels that are used today.

The more interviews the more accurate results but, according to the theory, 14 participants would be sufficient for this study. Since interviews are a qualitative research method, Virzi (1992) stresses that if 100% of all issues should be found, at least 15 participants are needed but, 80% could be found with just five. Since 14 persons participated in the study, almost every issue has been found according to Virzi and therefore, the number of participants was enough. One-hour timeslots showed to be sufficient in the pilot tests and the time limitation was never a problem during the evaluation sessions. The participants from authority A had used iipax for different amounts of time. One had barely used the To Do list in iipax while others have had a tutorial about it and worked with it for a long time. The quota of participants that might be missing in this evaluation and that could have been good was participants with color vision deficiency. No questions were asked during the interview whether the participants had color vision deficiency or not and no questions were asked about how people with color vision deficiency would have experienced the prototypes. That was a conscious choice the conductors made even though, prototype 1 was designed to evaluate the color theories (section 3.2.1) and therefore, had to make it easy for users with color vision deficiency as well. Since the prototypes focus on more than colors, this study has a wider aim. A more specific study that would aim to evaluate the prototypes by people with color vision deficiency would have been more suitable for such results. Therefore, no questions were asked about that. During the interviews, some of the participants did mention that, for example, the labels could be an aid for people with color vision deficiency when it is different icons but that it could be hard to read red text on red backgrounds.

When evaluating a product with the help of users, there is always a question of how comfortable the participants feel during those sessions. The evaluation sessions were always initiated with an introductory chapter that was read out to the participant. This chapter included information about the goal of the study and that it is the system that is being evaluated and not the participant and that it is impossible to fail. It even informed the participant that

their answers will not be traceable back to them in the result and that they have the right to end the session whenever they feel the need to do so.

For the interviews, the participants had to book a timeslot via Calendly. An issue that emerged was that the free trial of Calendly ended during the period that the participants were given to book slots. This caused the old link to stop functioning and a new link that only used free features was sent out. The issue was handled within a couple of hours, but, there is still a risk that someone used the old link that had stopped functioning and abandoned the thought of participating since the link was not functional. Therefore, there exists a small risk that this might have decreased the number of participants. All interview sessions were conducted via Zoom. Because of that, some interviews faced some technical difficulties. During one session, the participant could not see the bottom of the page and during another session, the response was slow when the participant took an action. The biggest issue faced was when a participant's remote control stopped working. To resume the test, the participant had to tell their thought process and the conductor of the test clicked for the participant. This could have affected the evaluation by making the tasks easier for the participant since the conductor sometimes was a bit too fast moving the cursor in the right direction before the participant was done explaining. For example, by giving hints that the participant would not have gotten otherwise. Some participants faced the issue of Zoom's floating view of the meeting participants' cameras sometimes covering some buttons that were required for the tasks in the evaluation sessions. Some of the aspects of using online evaluation sessions rather than physical meetings were however positive. For example, the number of participants could have been lower since the public authorities that participated in the sessions are located in other geographical locations than the study conductors. Even some of Ida Infront's business consultants that participated were working remotely. According to Dumas and Loring (2008), evidence shows that participants are willing to be more open when the evaluation session is held remotely which is another advantage. A disadvantage Dumas and Loring mentioned is that the conductors have less control of the environment which was experienced when technical difficulties emerged.

The reason eye tracking is not used as an evaluation method in this study is that the overall layout of the To Do list in the prototypes is not meant to be redesigned to the level that makes it unfamiliar to its current users. For example, the placement of the filters and the sorting dropdown is identical to the one in iipax today. Therefore, eye tracking would not have provided a more useful evaluation of the prototypes than notes of the users' thoughts and behaviors during the sessions.

10.1.3 Affinity Diagrams

According to Lucero (2015), the first step of creating Affinity Diagrams is to watch recordings of the evaluation sessions and take notes. However, none of the evaluation sessions in this study were recorded to ensure the integrity of the participants. Instead, during each session, two conductors were present to ensure that one is conducting the interview and reading out the instructions while the other is taking notes. The guarantee of not missing out on any important aspects is lower with no video recordings. However, the integrity of the participants weighed more. Both the test conductors read the notes together after each session which increased the reliability of the method since both conductors had the session fresh in memory and could fill in missing parts in the notes. Instead of watching video recordings in the first step as Lucero recommended the sticky notes were created out of the written notes from the sessions. As the evaluation sessions spanned over a period of three weeks, the conductors might have missed some patterns that could have been recognized if the conductors got to watch recordings of the sessions sequentially.

10.2 Pre-test results

The majority of the respondents to the pre-test survey had worked with iipax for a period longer than 6 months. This is beneficial as those have had the time to experience iipax and know its weaknesses and what could be done to improve it. However, this should be considered when evaluating the results of the evaluation sessions as being accustomed to a certain design may affect the evaluation of a redesign. The majority of the pre-test respondents have had some sort of tutorial about iipax which should also be considered in the evaluation sessions later as the users will not have any tutorial regarding the new functions added in the prototypes. This can impact their judgment of the new functionalities in the prototypes as they may be considered more difficult than functionalities that already exist in iipax. Most of the respondents use the table view more often than the card view and requested more attention to the table view as they thought that it misses a color theme that exists in the card view. This gave a new direction to the design of one of the prototypes which focused mostly on the table view (see prototype 1 in section 7.1).

The majority of the respondents listed giving a good overview of the cases as the main positive of the To Do list which is why that was considered as the main guideline for all the prototypes. If a To Do list does not offer a clear overview of its contents, the purpose behind it is not fulfilled. When it came to improvement suggestions and missing functionality in the To Do list, the answers varied more. Some wanted to see less clutter while others wanted to see more information presented in the case cards. Being able to individually customize the To Do list was also present among the responses. As people work in their own ways, have their own preferences, and a To Do list is used to give an overview of the available tasks, it should be adjustable to suit most users' preferences. Which the To Do list in iipax does not fulfill today. It is only customizable for different authorities according to their requirements but not for different employees. Personal preferences were mostly considered in prototype 2 (section 7.2) by, for example, introducing pinning and different card layouts. Prototype 3 (section 7.3) was not built on the results of the pre-test, instead, its focus was only on the theory.

10.3 Evaluation sessions

When the prototypes were evaluated by the users, the order in which they were presented varied. This may have affected how different participants viewed the same prototype depending on its order which is required to evaluate all the prototypes fairly. There were some mutual reactions from several participants to certain functionalities and there were some more unique ones.

10.3.1 Affinity Diagram regarding prototype 1

When it comes to prototype 1, the majority of the participants liked the ability to sort the table items by clicking on the header with the variable they want to sort after. This is because it is the standard way that most tables are sorted today in many popular systems. Some participants had a hard time finding out how to sort, but, this can be caused by them being accustomed to the way sorting works in iipax today. Those who had a hard time finding out how to sort neither stated that they liked nor disliked the functionality when they were told how it works. They did not state that they liked the old way better which may suggest that even they would have liked the new functionality if they had gotten more time getting to know the prototype.

When it came to the newly added filter and icon for the recently changed cases, some participants were confused by the icon (the bell icon in Figure 7.3) and thought that it represents a warning or an alarm. It may have been a consequence of placing the icon where warning and alarm labels are in iipax today while replacing warning and alarm with a progress bar in the column furthest away. Even though the bell icon had a tooltip with explanatory text, it

was still confusing for some. Another choice of icon or a text in the label beside the icon may have been clearer. The bell icon is often used to communicate new notifications, but with a number that indicates the number of notifications which might have been less confusing if used in the prototype.

The answers varied more when it came to the progress bar. This depends on how much different customers use the functionality of warning and alarm in iipax today. But even how accustomed they are to the placement of the warning and alarm labels in the current design of iipax. Some answers were that the progress bar would be a good addition if it did not take so much place in the table view. The progress bar was inspired by principles 70 and 71 by Grant (2018) and the To Do manager by Bellotti et al. (2004) and was not requested by the respondents to the survey which may explain the variety of opinions regarding it. Grant suggested giving the user an indication of how far the task has progressed. So a progress bar showing the process the case has to go through, the current and the next steps and how far it has progressed may have been more useful than a progress bar with the focus on warning and alarm. Especially for customers that do not utilize warning and alarm a lot. Another improvement would have been to combine this feature with the ability to hide columns that are not deemed interesting by the user. Then, those who were critical of how much space it takes may accept it more. Some of the business consultants pointed out that using the progress bar for warning and alarm and the fact that it takes too much space may actually make the customers start using warning and alarm more. This hypothesis would be interesting to test. However, it requires implementing the progress bar in the customers' iipax server and evaluating how their behavior changes over a longer period.

Most of the responses to the added colors in the table view were critical even though colors were requested in the pre-test. This can be the consequence of being such a big change compared to how iipax looks today. Some liked the color theme but were critical of using strong colors and would have preferred lighter shades. This can be related to what was mentioned under section 3.2.1 about using warm colors when you want the user to see small things directly on cold-colored backgrounds. The usage of red and orange as colors for whole rows may have been perceived as too much. Using gray, for example, instead of red and orange may have been a better choice as it does not stick out as much on a white background. Most of the critical participants though, did not understand what different colors represented. A short review of what different colors mean may change critical opinions to positive ones. This would also mean including colors in the iipax tutorial that is given to first-time users when they start working with iipax. The same applies to the secrecy labels where some were critical to the color red being used for all the different secrecy levels. Using different colors to communicate the different levels would have made them more distinguishable from each other.

10.3.2 Affinity Diagram regarding prototype 2

In prototype 2, three functionalities were the focus of the discussions and a pattern of what participants thought of them could be recognized in the Affinity Diagrams. Those are the To Do board, pin, and bookmark. The majority of the participants wondered how the board is connected to the cases' processes and what the consequences are of dragging the case between the different columns. This may have been caused by several factors. The first being that the board was such a big addition that it required some type of tutorial before the idea behind it was comprehended. While the second is that the headers of the columns gave a false picture of what the board is. Having done as a header made some participants think that this would mark the case as done and send it further in the process. After the idea behind the board was explained, the participants were more positive about it. The business consultants, for example, thought that the idea is creative but it needs more work before it can be implemented. This can be a consequence of not taking the processes into account while developing the prototypes and therefore, not being able to introduce such a huge addi-

tion to iipax with no further discussions with the experts at Ida Infront and the customers. A deeper understanding of all the processes that exist in iipax would have assisted the study's conductors in introducing big changes. Two things could have been done to make it easier for first-time users to understand the new To Do board. First, have an explanatory text at the header of the page that is shown the first time a user enters the page. Second, change the labels of the columns so they do not use terms used in the processes. Even offering the ability to individually customize those labels is an option that would make the prototype even more personalized which was the main goal behind it.

Pin and bookmark were often clustered together during the discussions in the evaluation sessions which could be caused by having the two tasks that include using them right after each other. Some participants thought that having both pinning and bookmark was confusing and that the difference between their usages was unclear. This could have been caused by introducing two new functionalities that are somewhat similar to each other in terms of their goal and how they are used. Both were implemented to ease the search of cases the user decided were relevant. Having their icon buttons right beside each other may have also contributed to the confusion. What might be done to avoid such confusion is either keeping one of them and skipping the other depending on the customer's needs or introducing one of them first and waiting until the users get well accustomed to it before introducing the second one. This could make the users learn the difference by themselves rather than writing an explanatory text for each one as it could result in even more confusion due to the fact that they are so similar. Another improvement suggestion that was inspired by the evaluation sessions participants was putting tooltips on the icon buttons to distinguish them more. According to Grant (2018), such buttons are obvious interactions that should be visible and clear to all users which stresses the importance of making them distinguishable. Pinning was a favorite among users with a small margin compared to bookmark. This can be the consequence of bookmarking being connected to the To Do board and therefore, it is perceived as more confusing than pinning. Many participants that pinned a case that was not in the first row, got confused when the case they had pinned had disappeared from its original place. The participants that pinned a case that already existed in the first row did not give the same reaction since the cases stayed in their original place. To make every participant notice how the functionality works, the task should have been to pin a specific case instead of pinning a case of their choice. The confusion that arose when the pinned cases hoped to the first row may have been the consequence of two factors. The first one is that the functionality is new and does not exist in iipax today, so the participants did not have any expectations as to what their actions would result in. The second factor is that the prototype does not give feedback that explains the consequence of the user's action. One of Blair-Early and Zender's (2008) principles is to provide the user with feedback and another one is about making sure that the consequence of the user's actions should be logical to the user. An improvement suggestion is, for example, to show an alert with a text that explains what has changed, the alert should avoid the colors orange or red since it could give the user the impression that the user had made a mistake. Only two participants mentioned the limitation of only being able to pin three cases. The two opinions countered each other and a longer evaluation period is required to determine what is suitable. Different customers may have different averages of the number of cases in the To Do list and therefore, the limitations may differ between different configurations of iipax.

A functionality that was discussed less but that is worth mentioning is pagination and the ability to change the number of cases per page. The responses were positive to the pagination and cases per page dropdown. However, multiple participants faced a problem finding the dropdown and the pagination and sometimes needed hints as to where those can be found. This can be caused by the functionality being a new addition to iipax and that the buttons only exist at the bottom of the page. Grant's (2018) 27th principle suggests that navigation buttons should exist at the top of the page as well as at the bottom. Following that principle may have resulted in less confusion for the users as they would not need to scroll down to find the dropdown and pagination.

The ability to change the card's layout in this prototype got positive feedback from the participants. Some even wanted to see similar functionality in the table view. This may be the consequence of this functionality giving the users more freedom in customizing the look of their own To Do lists which was requested during the pre-test. The participants' opinions differed in their favorite layout. However, the main aim of having this functionality in the prototype was to evaluate the concept as a whole and the different layouts were just examples. To decide on layout variants if this functionality were to be implemented, an understanding of each customer's needs and requirements is needed as those may differ and different configurations of iipax would have to offer different variants.

10.3.3 Affinity Diagram regarding prototype 3

During the evaluation of prototype 3, one of the discussion subjects was the categorization which this prototype focuses on. The opinions differed here on whether there exist any areas of use for the functionality. The two participants that were positive regarding categorization thought that the functionality would assist on a To Do list with many cases. Five others were positive about categorization by several variables but critical to others while four participants did not see any areas of use for categorization. Categorization was not a functionality that was recommended by the respondents to the pre-test survey but was rather inspired by Bellotti et al. (2004) and Grant (2018). This made the aim behind the prototype to evaluate design principles rather than evaluate if the prototype fulfills the users' requests from the pre-test. Which, to some extent, explains the variation in response. Another factor that may explain the differences in the responses is the difference between the number of cases that the customers usually have on their To Do lists. If the customer has few cases on their employees' To Do lists, there is not any benefit of dividing those by categories. It would be interesting to investigate what variables different customers use for sorting since it became clear that categorization by some variables got more positive responses than others. Some participants stated that categorization by title would not be beneficial since almost all cases have the same title at the authority where they work.

The collapsible rows in the table view were a watershed in this prototype. Some participants liked the idea of having collapsed categories and being able to skip to the category that is relevant to them. While others were not able to see how it would assist the users in their work. This variation in answers can relate to what was mentioned about categorization. Some have many cases on their To Do lists and therefore need categorization to ease the search for a specific case or group of cases. While others have few cases in which case, categorization would only contribute to more clicks per task.

The ability to save filters was also a functionality that got discussed during the evaluation sessions. The majority of the participants liked the addition and thought that it would be useful in the To Do list in iipax. However, three others were critical of the idea of having the functionality in both the To Do list and the search page since it may get confusing. This can be explained by the fact that some do not use the To Do list and its filters and prefer to use the search page to find a specific case. The button to save a set of filters was implemented to be similar to the one on the search page of iipax today. That was done to follow Blair-Early and Zender's (2008) principle that reads that terminology and images that the user identifies as familiar should be preserved. This made it easy for the participants to find the button to save filters. However, it may have contributed to the confusion between the two functionalities, save filters in the search page and save filters in the To Do list. An observation that was made during the evaluation sessions was that some participants tried to find the set of filters they had saved in the menu to the left since it is there the saved filters can be found on the search page. This simple change in the layout made it confusing to some participants. However, it is possible that placing the saved filters from the To Do list in the menu to the left as well would have made it even more confusing as it would function in the exact same way as saving filters on the search page.

An interesting observation from the evaluation sessions was that almost every participant tried to sort by clicking on the headers in the table view. This could be the consequence of getting to evaluate prototype 1 before this one. However, even in cases where prototype 1 was after this prototype, the participants tried to sort by clicking on the headers. This can be the consequence of the participants either expecting this change in prototypes as it had been requested by them according to the business consultants at Ida Infront or them not recognizing the table view they are used to in iipax today.

10.3.4 General observations

In the SUS-test (Table 9.1), prototype 1 got the highest score and prototype 2 was close behind. Prototype 3 had a much lower score than prototypes 1 and 2. Both prototypes 1 and 2 got grades that are acceptable but could be much better. Prototype 3, on the other hand, got the grade F which is an unacceptable grade according to the Grade scale but still got an OK according to the Adjective rating. In the general questions (Figure 9.4), prototype 2 is clearly the one with the most votes and prototype 1 comes next. Prototype 3 only got 7.1% of the votes and on the other hand, 42.9% stated that they did not like it. The few persons who liked prototype 3 thought this prototype was the easiest to learn and looked the most familiar. The functionality of saving filter, categorization by date and the links were mentioned as functionalities that were mostly liked (Figure 9.5) but, all of them combined got less than 6% of the total. On the question of what function the participants wished existed in iipax today, save filter was the second most mentioned with 19.2% of the votes. This could be an effect of saving filter being a small addition to the To Do list but, also one that is familiar and could help the customers a lot. Prototype 3 is the most disliked as a whole since most of the users did not like the categorizations and the collapsible table. The functionality of saving filters is not that important so that it overcomes skeptical opinions about the prototype. Prototype 3 was also only built on theory from the design principles and does not include functions required by the users. Kanungo (2022) stated that evaluation with the help of real users is essential to assess the reasonable amount of redesign that is required to improve the usability of the system. The evaluation should also include what works well in the current design and what does not. Having based the third prototype on design principles and not on the results of the pre-test may have caused it to solve problems that the users did not have and therefore, created new ones. For example, missing a button that would show all the collapsed rows in the table view. This could be the reason why the users did not see as much potential in prototype 3 as in the other two which were, to some extent, built on feedback from the users.

What the users thought about prototype 1 varied a lot. In the SUS-test in Table 9.1, prototype 1 had the biggest variation between the lowest score, 27.5 and the highest 100. Also, on the questions of which prototype was liked and disliked the most (Figure 9.4) prototype 1 got varied results. Some users (21,4%) thought it was the best prototype while others (28.6%) did not like it. This could be a consequence that some users did not like the colors or the progress bar. While others thought that the colors were a good addition to the table view or liked the functionality of sorting by the headers. Colors in the table view were requested in the pre-test where the respondents wanted the same colors as in the cards but the prototype took it way further to really test the color theory. Some users thought then that the colors overpowered the view and that the prototype became messier instead of easier to use. On the other hand, some participants thought that the colors could be helpful as long as they know what they communicate. The colors were though never mentioned as a function the participants liked the most or wished existed in iipax today (Figure 9.5) which can be because they are not seen as a function in the same way as the progress bar for example. A specific question about whether the participants wanted to see the colors getting implemented in the table view of iipax or not would have given a more accurate picture of opinions regarding colors. When it comes to the progress bar of warning and alarm, it could have the same issue as prototype

3. New ways of showing warning and alarm dates were not requested by the respondents in the pre-test. It came from Grant's (2018) principles 70 and 71, which reads that it is important to show the user the beginning, the present and the end, but also from Bellotti et al. (2004) that said that if a task has a deadline, it is indicated using a green progress bar that turns into red as the deadline is approaching. Since the participants said that they seldom use the warning and alarm dates, the progress bar took up too much space in the table that already got a problem not fitting all the columns that the users want to see. The thing that raised the score of the prototype was the functionality of sorting by the headers. During the interviews with business consultants, it became clear that the users had requested the functionality for a long time. This can also be seen in Figure 9.5 where sorting by headers is the most requested feature the users wish to be implemented in iipax today. This idea was requested by the users in the pre-test and it became clear that the standard way of sorting today is by clicking on the headers when prototype 3 was evaluated. Almost every participant tried to sort by the headers instead of using the dropdown, as it is in iipax today. To mark cases where something new had been updated was also a popular functionality for the users and it was a functionality that was brought up in the pre-test. The chosen icon got some critical feedback but the functionality was popular.

Prototype 2 is clearly the most liked prototype at the end of the sessions. It did not get the highest score in the SUS-test which can be a result that this prototype needs the most explanation to be comprehended. Many users liked both pinning and bookmark but, were confused about the difference. They answered the SUS-test before the differences were explained. The same factor concerns the new view with the To Do board. The participants had questions about what the idea behind the board was but, they did not get any answers before the SUS-test. Therefore, the score of the SUS-test could be lower than it could have been if the respondents had understood the prototype completely before submitting their answers. This also shows that the users need a tutorial about prototype 2 to get the most out of it. Bookmarking was the functionality that the users liked the most but it was not requested as much to be implemented in iipax today. This could be explained that bookmarking is connected to the To Do board and the users saw potential in the new board but thought it needed more development before it could be implemented in the customers' servers. Sorting by headers and save filters which were the most requested to have in iipax today are functionalities they already know about and are not as complex as other parts of the system and therefore are safer to implement. Some wondered if bookmarking and pinning affected only their list or if it was something that affected all the users in the same group. The idea behind pinning and bookmarking is that it is something that only affects the user's own To Do list and the user's bookmarked and pinned cases cannot be seen by other users. On the other hand, other functionalities could be utilized for cooperation among teams. The To Do board could, for example, be a workspace for all members of a team. One participant also said that it could be useful to share saved filters between the team members as the relevant filters are often shared by a team that works on a specific set of cases. One thing that was mentioned a lot in both the pre-test and during the interviews was how much they wished to be able to change what information is presented on the cards and in the table. However, the functionality of changing the card layout was the highest on neither the question of what functionality they liked the most nor what functionality they wished existed in iipax today (Figure 9.5). It still got a high number of votes which suggests that the users' requests from the pre-test were, to some extent, fulfilled.

10.4 The work in a wider context

As iipax is used by employees at several different public authorities for case management, it needs to be effective. By making the To Do list in iipax more effective and easier to use, there is a possibility that the processes of managing cases consume fewer resources. This leads

to the whole society benefiting from it since public authorities are financed with tax money. Although, the effectiveness was not compared between the prototypes and the To Do list in iipax today, multiple participants commented on some implemented functionalities, for example, the ability to save a set of filters being able to streamline the working process. Another aspect to streamline the working process of the users was using more colors and shapes to communicate information instead of using long texts. However, people with color vision deficiency were also considered as those may sometimes miss out on important information that is only communicated through color.

This study shows that it is generally essential that designers listen to future or current users of the system. Then, use design principles and standards to implement the users' requests. However, one should not forget that the users are not the only source of inspiration when it comes to what should be included in the design. For example, if the users are accustomed to a system then a major change can at first glance seem like a bad idea to the users, but, after a while when they have had time to experience the system, they get accustomed to the new additions. Therefore, it is important to conduct evaluation sessions directly but some functionalities might need to be evaluated over a longer period of time. The industry is often more interested in such evaluations compared to ones that evaluate the first impression of the users for the same reason. To conclude, it is important to both listen to the users, but, even to the theory and standards. Theory and standards are built on studies that have succeeded in achieving improved satisfaction among users and take into account human factors and ergonomics. Satisfaction among the users is also important for companies that develop case management systems in order for them to retain their customer base.

11 Conclusion

This chapter includes answers to the research questions of the study. Conclusions to the first research question are drawn from the results of the pre-test. While the other two questions were answered by the results of the evaluation sessions. It ends with a section about future work in the research area of UX and usability in the field of To Do lists.

11.1 From a usability and user experience perspective, what should be changed in the current design of the To Do list in iipax?

Most of the responses regarding the positives with iipax were about the good overview it gives about the cases. Which indicates what must be preserved even in the prototypes. Even though the majority of the respondents in the pre-test survey had used iipax for more than 6 months and has had a tutorial about it, they use the search function often instead of the To Do list. That is because 37.5% of the respondents also said that they had the cases they worked on in an external working schedule, for example, Excel and then search for the cases in iipax. When asked about what should be changed in the To Do list in iipax in order to make it more functional, the responses varied. However, some wanted a more customizable To Do list to have the same freedom they have in Excel. The majority of the respondents used the table view more often than the card view and some requested to see the same color theme in the table view as in the card view. Some even requested the ability to sort by clicking on the different headers in the table.

11.2 From a usability and user experience perspective, what are the requirements of a To Do list in a case management system?

The main goal of the To Do list should be to give a good overview of its tasks and to visualize what should be done. Since people have different preferences and a To Do list is a tool to help the user structure their schedule, there should be several different ways of presenting the tasks and the list should be individually customizable. It should also have relevant filters to ease the search for tasks and sorting methods to structure the list after relevant variables. Each task in the list should have several variables that the user can sort by, for example, creation date. Tasks that have been newly added or updated should indicate that clearly.

The user should be able to determine the priority of tasks by putting a label on them. Tasks with similar variables should be clustered together. However, only relevant variables should be used for categorization. If a task has a deadline, it should be presented clearly and the user should be notified as it is closing in. If colors are used in the layout, they should not be the only way of communicating information with the user so that people with color vision deficiency are included. Colors could be helpful in communicating with the user, but, should be used with caution as using the wrong colors could give the wrong impression to the user and overpower the layout. It is recommended to choose a color with the feeling that the designer wants to achieve with the layout. To conclude, since the designer is not the user and people have different preferences, it is important to listen to the users' requirements and design principles should be used to fulfill those requirements.

11.3 How can a To Do list, in a case management system, be redesigned to achieve improved usability and user experience according to the system's users?

To make sure that the To Do list gives an overview of its content, the tasks should be the focus of the design. For example, tools like filters and sorting methods, which goal is to ease the search for a task, should be easy to use and considered obvious interactions. Filter and sorting should include variables the user finds relevant and, since they are considered obvious interactions, their placement should reflect that. For example, if the To Do list consists of a table, sorting by clicking on the headers showed to be the most reasonable way. A way of achieving improved usability and streamlining is to decrease the required number of clicks, especially if the process is repeated frequently. Being able to save a set of filters and sorting is an example that was popular among the participants. Other popular functions were pinning and bookmarking, which allow the user to determine the priority of tasks and mark them with a label. Also, the ability to filter out bookmarked tasks makes the functionality even more useful. Pinning and bookmarking made the case management system more customizable which can even be achieved by offering different ways of presenting both a list of tasks and individual tasks. For example, offer more than one view, but, even offer different layouts of variables for the individual tasks.

When designing, first-time users should be considered and it is important to implement logical responses and feedback to the user's actions. For example, by adding tooltips that describe what icons mean or adding an alert if a response could be perceived as illogical to users. This is extra important if the system is planned to be used without any introductory tutorial so the users do not miss out on functionalities that could affect their streamline.

To conclude the answers to this research question, it is essential to listen to the users while designing an interface. The design principles should work as an aid toward the goal of fulfilling the users' requirements. The progress bar is an example of a functionality that worked in a study by Bellotti et al. (2004) but that was not popular during the evaluation sessions in this study. Colors were requested by the users but were not popular during the evaluation sessions. A drawn lesson is that a miscommunication between the users and the designer or the designer not using design principles to fulfill the users' requirements can lead to unsatisfied users.

The general conclusion of the thesis is that the designer is not the user and a pre-test is essential to understand the users' perception of the system. The pre-test should catch what amount of redesign is reasonable and what should not be changed. Further, design principles should be followed along the way, not to inspire changes that were not requested by the users, but rather to develop requested changes.

11.4 Future work

The conclusions drawn from this thesis can be utilized for further research in the area of the design of To Do lists. A wider variety of participants from different public authorities would contribute further to the research area. Some of the functionalities developed in the prototypes can be implemented in the customers' iipax servers, while others would require further investigation. For example, the To Do board, the limit of the number of pinned cases, and the different card layouts. Those functionalities require a deeper understanding of iipax as a whole and the different requirements and processes of each customer. This study did only one iteration of the HCD process. More iterations would result in prototypes that are more satisfactory to the users and contribute further to the research area.

From a wider perspective, the design principles that were used in this study should be applied to prototypes of To Do lists in other case management systems in order to evaluate them and compare results. It would be interesting to investigate what users of other case management systems require and to compare that to what the design principles recommend. Another aspect that was considered throughout the study was communicating with the user via colors without excluding people with color vision deficiency. A study with a more specific aim of evaluating the choice of colors with the focus on people with color vision deficiency would answer if the prototypes actually fulfilled that requirement. It would also be interesting to conduct a longer study to evaluate what users thought of the functionalities that were inspired by design principles in this study after they had used them for a while. This study only evaluated the first impression of the functionalities by the users. For example, would the progress bar be more popular if the users had used it for a while? Would there be a difference in what is the most popular among pinning and bookmarking after the users had used them for a longer period of time?

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A Appendix A - Pre-test survey

This is the pre-test survey that was sent out to Ida Infront´s customers. Since the customers are Sweedish public authorities, the survey was sent out in Swedish. This appendix is a translation of the survey. In the survey, ○ means that the respondent had to choose one of the alternative answers. □ means that the respondent had to choose one or multiple answers. If "Other…" is one of the alternatives, the respondent can choose to write an answer if the suggested ones are not suitable. Questions with no alternatives are free-text questions.

A.1 Background questions

1. Which role do you have in iipax?
   - ○ Case manager
   - ○ Registrar
   - ○ System administrator
   - ○ Archivist
   - ○ Other…
2. For how long have you been using iipax?
   - ○ Less than half a year
   - ○ Half a year to a year
   - ○ 1 to 3 years
   - ○ More than 3 years
3. Have you participated in a tutorial about iipax?
   - ○ Yes
   - ○ No

4. Approximately, how many cases do you usually have on your To Do list in iipax?
   - 0-50 cases
   - 50-100 cases
   - 100-200 cases
   - More than 200 cases
5. Which of these two views do you use the most?
   - Card

   - Table

A.2 Good or bad with the To Do list today

6. What do you think is good with the To Do list in iipax today?
7. What do you think should be changed with the To Do list in iipax?
8. Is there anything you think is missing in the To Do list?

A.3 Your usage of iipax today

9. How do you decide which case you will work on?
10. What type of cases are prioritized the highest?
11. What do you want to be shown at the top of the To Do list?
    - □ New cases
    - □ Oldest cases
    - □ The cases with closes deadline
    - □ Other...
12. Do you use a filter to find the right case?
    - Yes
    - No

    If your answer was yes, which filter do you use?

13. When was the last time you had to use "search" because the case you were looking for was not found in the To Do list?
    - Never happened
    - Today or yesterday
    - During the last week
    - During the last month
    - Further back than the last month
14. What information do you want to see directly on the cards or in the list?

B Appendix B - Evaluation

These are the tasks and questions that were used during the evaluation sessions. Since all the test participants were Swedish speakers, the interviews were conducted in Swedish. This appendix is therefore a translation of the interview. All three prototypes were evaluated by all participants but in different orders. There were three different SUS surveys but every survey had the same questions as in Table 4.1

B.1 Prototype 1

Tasks to perform in prototype 1:

1. Go to the table view and sort the table by the title so it is in alphabetic order.
2. Sort "Available from" so the cases are listed from the earliest date to the closest date (increasing order).
3. Find a case that has passed the warning date but not the alarm date.
4. Find a case that has passed the alarm date.
5. Filter all cases where something new has happened.
6. Find a new case.

SUS survey for prototype 1.

General questions about prototype 1:

1. What do you think about the new secrecy labels?
2. What do you think about the new way of displaying warning and alarm?
3. What do you think about the table view as a whole?
4. Do you understand what the different colors in the table communicate? For example, the green column and the red and orange rows?
5. Is there something you particularly like?
6. Is there something that is unclear or less good?

B.2 Prototype 2

Tasks to perform in prototype 2:

1. Pin an optional case.
2. Bookmark four optional cases.
3. Change so that 40 cases are displayed per page.
4. Change what is displayed on the cards to show as little as possible.
5. Show only the cases that are bookmarked.
6. Find a new view where you can place the cards in different statuses.
7. Mark a case as done.

SUS survey for prototype 2.

General questions about prototype 2:

1. What do you think about the new view?
2. What do you think about the opportunity to pin cases?
3. What do you think about the opportunity to bookmark cases?
4. What do you think about being able to change what is displayed on the cards?
5. Is there something you particularly like?
6. Is there something that is unclear or less good?

B.3 Prototype 3

Tasks to perform in prototype 3:

1. Skip to cases that were created 10 months ago.
2. Filter according to "Allocation" and "Alarm" and save that filter with the name "Filter 1".
3. Remove the filters.
4. Use Filter 1.
5. Delete Filter 1.
6. Go to the table view. Sort by title and show all cases that start with "S".

SUS survey for prototype 3.

General questions about prototype 3:

1. What do you think about saving filters?
2. What do you think about the categorization?
3. What do you think about the table view?
4. Is there something you particularly like?
5. Is there something that is unclear or less good?

B.4 Generall questions about all three prototypes

1. Considering all the prototypes, what functionality did you like the most?
2. Any of the prototypes you liked more than the others? Why?
3. Any of the prototypes you did not like? Why?
4. Any functionality you wish existed in iipax already today?
5. Anything else you would like to add?

C Appendix C - Affinity Diagrams

C.1 Step 1

In Figure C.1, are all the sticky notes from the first step of Affinity Diagrams for prototype 1. Figure C.2 are for prototype 2 and Figure C.3 for prototype 3. The yellow sticky notes are notes from interviews with customers and the pink ones are notes from business consultants at Ida Infront. All notes are written in Swedish. The notes are unsorted and put out randomly on the tables.

Figure C.1: All sticky notes about prototype 1

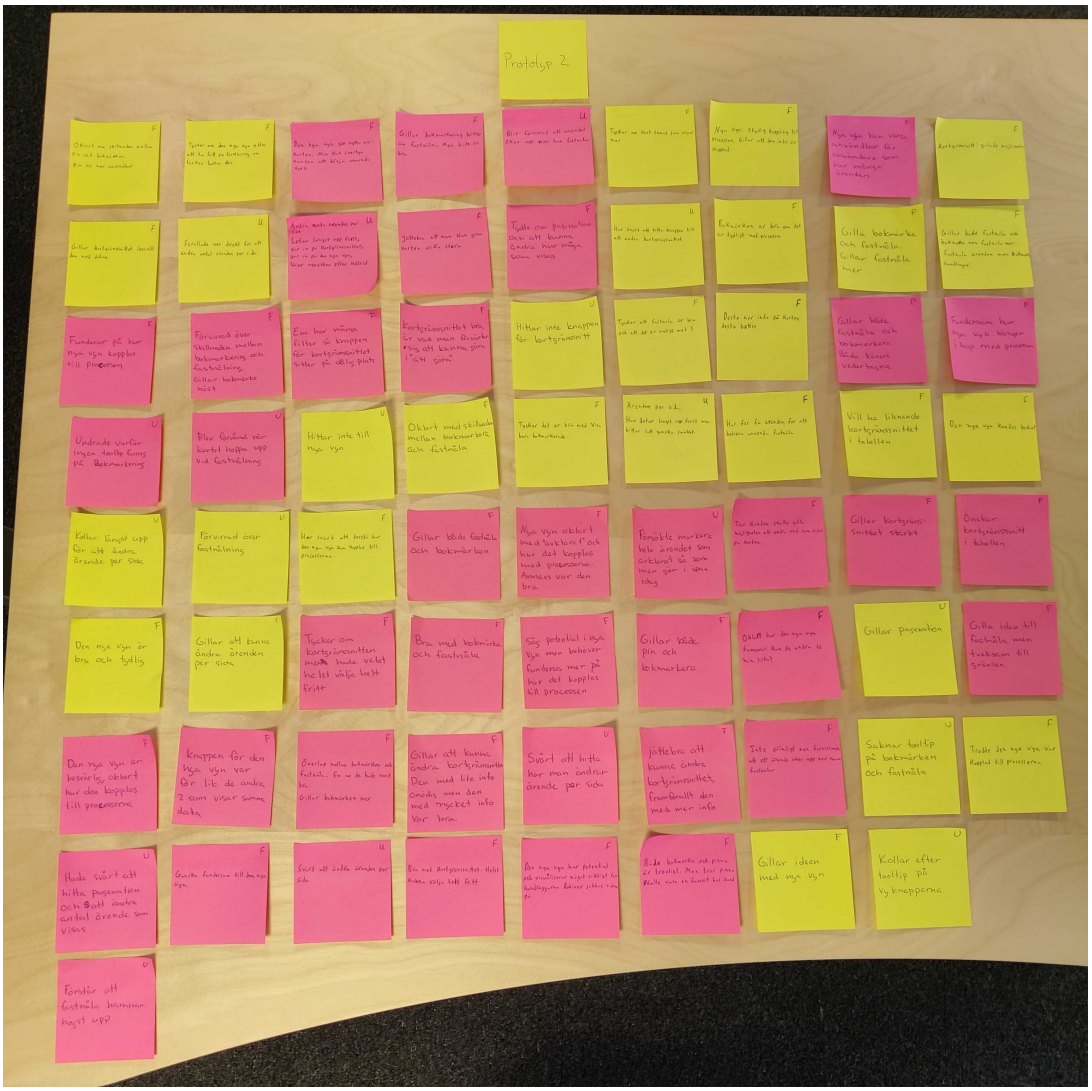

Figure C.2: All sticky notes about prototype 2

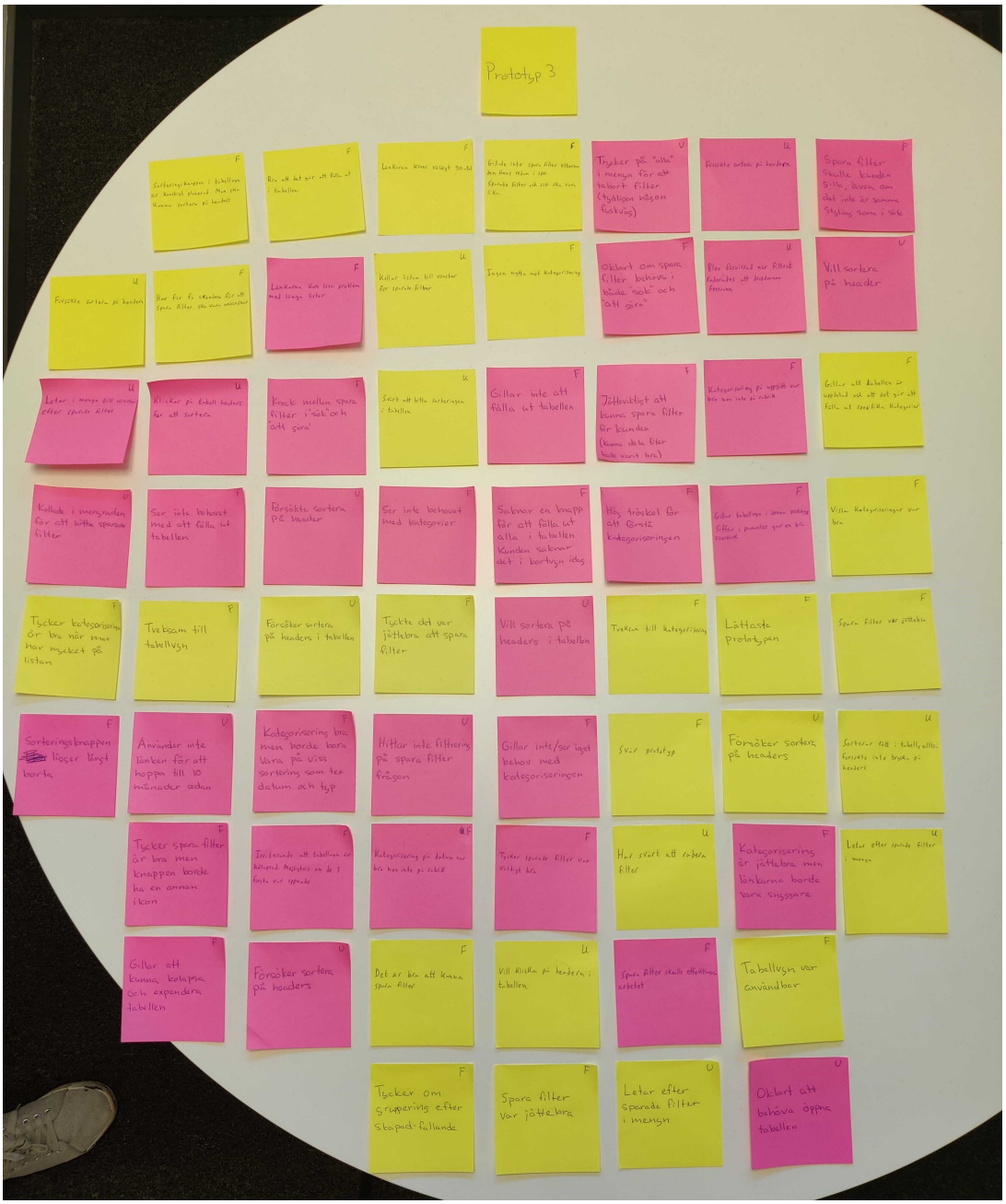

Figure C.3: All sticky notes about prototype 3

C.2 Step 2

Figures C.4, C.5 and C.6 show pictures of the second step in the process. It is a rough categorization before any notes are removed. The notes that are not circumscribed are notes that could not be categorized with other notes. More information on what is written on the sticky notes in each category can be found in the result.

The sticky notes from prototype 1 are divided into five categories (Figure C.4). The first one is about secrecy, second is notes that are about sorting on headers. The third has notes that mention the labels of new and recently changed. Category 4 is about the progress bar and the fifth is notes that are about colors.

Figure C.4: Grouped sticky notes about prototype 1

Figure C.5 is also divided into five groups but this time is the first about tooltips, two about pagination and number of cases per page and three is notes that mention card layout change. The new view with the To Do board is category 4 and 5 is about pinning and bookmarking.

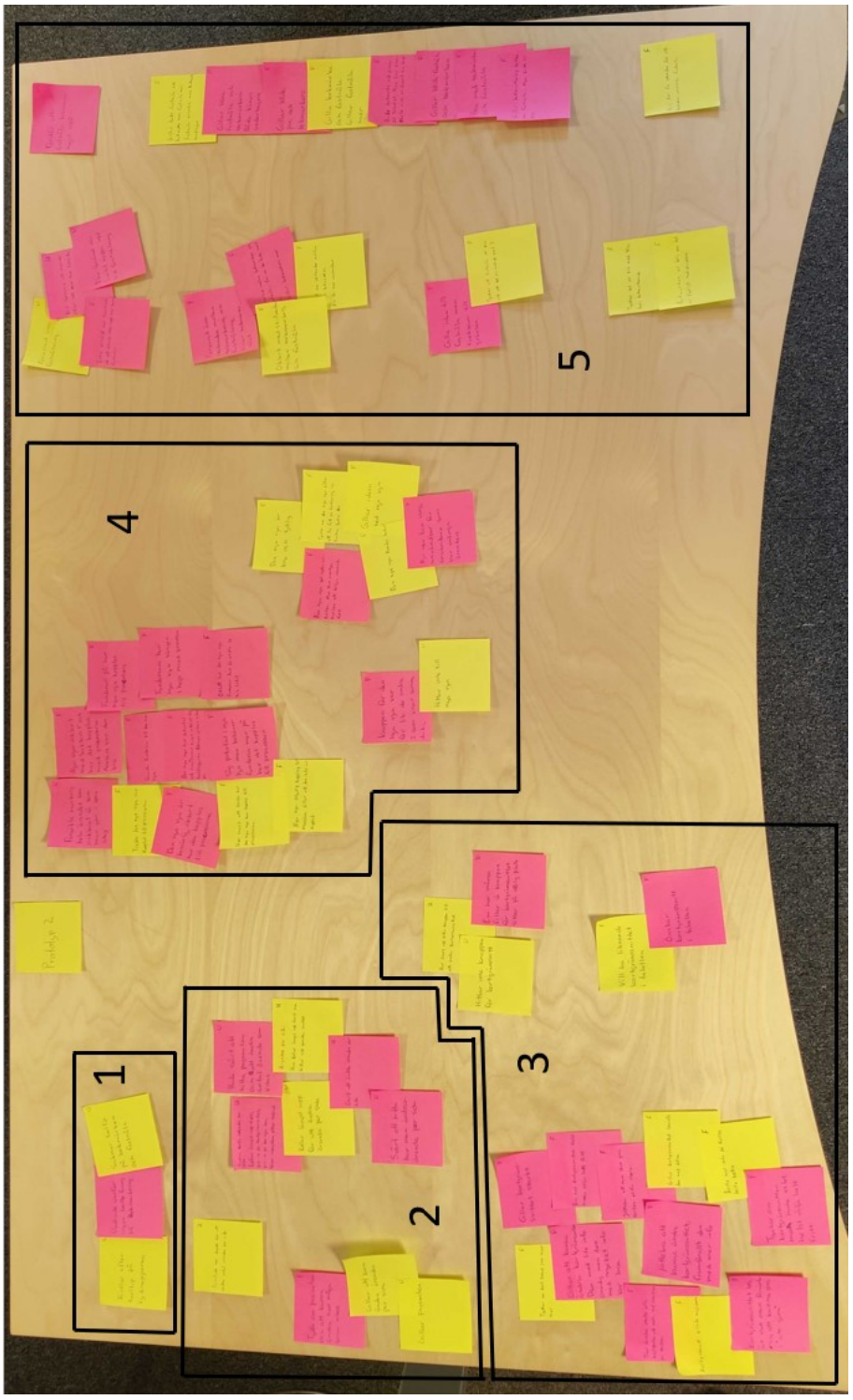

Figure C.5: Grouped sticky notes about prototype 2

Figure C.6 shows the five groups for prototype 3. Here, group 1 consists of notes about categorization, group 2 is about the links, 3 is about saving filters, 4 is about sorting in the table and, finally, 5 is about the table as a whole.

Figure C.6: Grouped sticky notes about prototype 3