**Master's Thesis for Jeppe Hjersing Knudsen & Martin Geertsen**
Engineering Psychology $10^{th}$ semester

# Development Of The TonePrint Community:
# A case study in user involvment

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# Contents

# Chapter 1

# Introduction

The philosophy of human-centered design is to start a design process with a good understanding of the users and their needs. A common issue with developing products without involving the users in some way is that the products will be developed according to how the developers believe it should look and behave, and not how the users would expect it to. This will result in deficiencies for the users' interaction with the products, as they are likely to make mistakes and get confused. This is where good design becomes essential. If something unexpected happens, and the users are capable of easily fixing it, much satisfaction can arise for the users (Norman 2013, pp. 6-9). User experience design (UX) intends to provide the users with this satisfaction by designing products according to their needs, capabilities, and behaviour, which includes multiple aspects of branding, design, usability, and function (Foundation 2019). This, however, haven't been fully integrated in the industry yet, as there still seems to be some misconception to what a human-centered design approach provides in development. This report will therefore start with an interpretation of the benefits of human-centered design in correlation with the terms UX and usability, before investigating different approaches for involving the users in the design process at a specific company.

The danish tech company **TC Electronic (TC)** is the collaborating company for this purpose and has collaborated with students of Engineering Psychology on previous occasions. TC was originally formed in the early 1970's by Kim and John Rishøj in Aarhus, Denmark, and today they are worldwide known manufactorers of effect units for musicians. Besides effect units, they also produce other audio equipment such as amplifiers, sound and picture production systems, and broadcast systems (Electronic 2019a). The collaboration was agreed upon through dialogue with TC themselves in shape of some mail correspondence before meeting with them at their headquarters and agreeing on a scope for the project. TC currently don't have a dedicated strategy for implementing methods for investigating UX and usability in their design process, but it is something they are interested in implementing in the development of future products.

## 1.1 The benefits of human-centered design

The term *user experience* was originally coined by Don Norman in 1993 while working at Apple. He defined it as everything that touches upon the user's experience with the product from first acquiring it to actually interacting with it and later evaluating this experience (Norman 2019). Numerous interpretations have since been formulated with *allaboutux.org* containing a vast amount of these. Despite the differences in phrasing, what seems to be a common trait for these is that UX should be considered a broader term also covering other terms such as usability (UX 2019). By investigating an ISO standard on human-centered design for interactive systems, this is emphazised, as UX is defined as *a person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service.* Three notes further elaborates how this includes all aspects of the person's emotions, beliefs, preferences, etc. (ISO 2010, p. 3). In the same ISO standard, usability is defined as *the extend to which a product can be used for specified goals with effectiveness, efficiency and satisfaction in a specified context.* (ISO 2010). Both these definitions support that UX should be considered the broader term, as usability is related to the functionality of a system, including the users' successes and failures during interaction, while UX also contains a hedonic aspect.

Designing with a human-centered approach holds multiple benefits. Reka (2017) describes these with regards to both the benefits for the users but also for the design process in general and the members of the design team. Firstly, if the developers in the company in question understand their users, they will then be able to understand the problems they may face by observing how they interact with a system. Secondly, sales increase when products satisfies their users. As it was mentioned in the introduction, a common issue is when products are developed solely from the developers' understanding of how it should look and behave. The developers then expect the users to have the same understanding, but since the users typically can't speak with the developers, the burden of communicating this understanding lies solely on the product itself including the documentations and manuals involved (Norman 2013, p. 31). If it isn't clear to the users how they interact with the product, they won't have a satisfying experience with it. However, if the appropriate information is available to make the product understandable and usable, especially in situations when things go wrong, the users are then more likely to have a pleasent experience (Norman 2013, p. 32). Finally, the development team itself can also benefit from a human-centered design approach. The better understanding of the users' needs, the design team have, the better their basis is for estimating the required amount of time and money for both development and subsequent maintenance of the product (Reka 2017).

Despite the outlined benefits of a human-centered approach to the design process, it is not yet fully integrated in the industry, and the reason for this lies in the difference of how the academic world develops methods for UX and usability testing, and how the industry utilizes these. Dennis Wixon stated in 2003 that *"The literature evaluating usability*

*methods is fundamentally flawed by its lack of relevance to applied usability work"* (Wixon 2003), this supports the concept of a gap between academia and industry. Several studies have since been made on this with Øvad and Larsen (2015) being of interest. The purpose of this study was to investigate how 8 different companies changed how they worked within the fields of UX and usability over a period of 2 years. Interviews were held in 2013 and 2015 to uncover a positive development in the companies' understanding of UX and usability during these two years. Almost all of the companies had developed or were developing ways of implementing UX in their design process with examples such as low-fi prototyping, usability testing, workshops, personas, expert evaluations, etc. (Øvad and Larsen 2015, p. 48). In correlation with this, it is important to emphasize that almost all of these companies follows the agile *Scrum* framework in their design process, which means that development is carried out as an iterative process in the form of sprints with the option of going back and making changes to the product in between these.

More papers have recently been released on this topic and the challenges facing it. In a paper by Silva et al. (2018), the focus is on analyzing the evolution and current state of agile UX to provide a brief overview of theses challenges yet to be solved. It also takes its starting point in the increasing attention UX has gotten in the last 16 years, as designers and developers do understand the importance of each others work but don't know how to synchronize their daily operations in a meaningful way. As previously mentioned, the challenge lies in making UX relevant to the specific work in focus, but the challenge also lies in making everyone in the design team understand UX as a team discipline rather than a role in the team. As such, a more thorough understanding of UX and the agile framework is required to help both fields reach a shared understanding of each other (Silva et al. 2018, p. 2). For Persson et al. (2018) the focus is specifically on how UX and agility contribute to each other. The notion is that what helps a software developer to be agile may not help a UX consultant to be agile in the same way and vice versa. This is already well addressed as true, and the findings presented in the study further supports this notion. The study was conducted in an unspecified danish software company with *Conboy's theory of agility* as research approach, which is elaborated on in the paper (Persson et al. 2018, p. 3). The study showed that the two practices contributed substantially different to agility for UX consultants and developers in correlation with different aspects of the design process. Finally, by consulting Nielsen Norman Group it is clear that despite the tendency of UX professionals perceiving Scrum meetings as barriers to productivity, they should still be involved in these meetings to stay engaged and aware of what's going on in the team (Kaley 2019). They propose that UX professionals take part in the scrum framework equivalently to any other member of the design team. This includes daily meetings addressing the questions *what did you do yesterday? what will you do today?* and *what is in your way?*. This is considered important, as the UX professionals usually are working ahead of the development team. The UX professionals should furthermore engage in the work of the other members of the team, as they may be able to help resolve potential issues, they are facing.

## 1.2 The Scrum framework

As previously stated, much of the problem with employing a proper UX strategy in software development companies is due to UX not reconciling well with the agile scrum framework. The development teams of TC Electronic also employs this framework, and as such it seems fit to provide a proper description of it.

The scrum framework has gained popularity in the industry of developing software and hardware, as it has contributed to faster market times, greater flexibility, higher-quality products, and customer satisfaction (Gonçalves 2018, p. 40). The overall concept is that the work is split into development iterations referred to as *sprints*. These periods are typically of one month or less where a clear objective is set up and carried out by the *Scrum team* which consists of the members of the development team. There are three different roles for the members, each expected to be self-organizing and cross-functional without being dependent on others outside the team (Gonçalves 2018, p. 41).

- **The Scrum Master** serves, much as the name indicates, as the leader of the Scrum Team. His primary objective is to make sure that the work to be done is understood and carried out by the Scrum Team.
- **The Product Owner** focuses on maximizing the work of the development team. He manages the list of requirements that the end product must meet, also known as the *The Product Backlog*. This includes defining the backlog items and prioritizing them in order to optimize the value of the work done by the development team
- **The Development Team** consists of the remaining members of the Scrum Team, which typically is three professionals. Their goal is to execute the objectives established by The Product Owner and Scrum Master, and have them done by the end of sprint.

The sprint starts with the initial planning by the members of the scrum team. During this phase they determine realistic goals for the sprint in correlation with what they want to achieve. The steps required to achieve their goals for the sprint are then determined from the backlog items as well through discussions with the product owner. When this is settled, the sprint starts. During the sprint, the team sets aside 15 minutes every day in order to synchronize activities and develop a plan for the next 24 hours. this is simply referred to as *The Daily Scrum* (Gonçalves 2018, p. 41). By the end of the sprint, the period is reviewed by the team in order to evaluate what has been achieved during the sprint, and what still needs to be done in order to complete the current sprint within the assigned time frame. Finally, a retrospective meeting inspects the sprint in order to discuss possible improvements for the next sprint to come. Figure 1.1 provides a graphical elaboration of this process.

## Scrum Process - Overview



**Figure 1.1:** a graphical overview of the Scrum Process. `https://luis-goncalves.com/what-is-scrum-methodology/`

## 1.3 The TonePrint concept

An investigation of how TC can apply human-centered design approaches to their design process also requires specific

also requires specific cases to involve users in, in order to make it more relatable for TC. Keeping it too overall will most likely make it too abstract for them to understand how to implement it in the future.

Describing the TonePrint concept and the software involved is done from three studies conducted by TC themselves (Andersen 2012; Andersen 2014; Andersen 2015) including how they describe it on their own webpage (Electronic 2019b).

Effect pedals in general are well known units for guitarists and bassists alike, spanding multiple music genres. The pedal works by taking the input signal from the guitar and changing it to the tweaking by the users.

Depending on the effect type, and when playing, the user activates these changes by a single button on the pedal. An example of a simple guitar effect pedal is displayed on Figure 1.2, where the adjustable parameters on it consists of *Dwell, Mix,* and *Tone.* Each

of these are accessed and tweaked with individual knobs on the unit, which gives the user a limited range of ways to change the sound. With this limitation as a motivation, TC created the TonePrint concept, enabling users to tweak the sound of effects beyond the parameters on the pedals. Using the TonePrint application, the users have a vast selection of custom presets with further parameters available for tweaking. These presets are what the term *TonePrint* covers and they are either created in collaboration with professional musicians or by the common user. In order to distinguish these from each other, they are referred to as *Artist TonePrints* and *User TonePrints* respectively. After selecting one for the effect pedal in question, the user can make any desired tweaking or transfer it directly to the pedal with the option of altering it even more on the physical knobs (Andersen 2012). TC has collaborated with multiple guitarists and bassists, creating TonePrints for effect pedals used by the artists themselves. After the creators are satisfied with their TonePrints, they are uploaded to the TonePrint library in the application where any users of the same effect pedal can download the TonePrint and as such match the sound of their favourite artist. For User TonePrints the overall concept is the same. They differ in the fact that the creator isn't a famous guitarist, but the TonePrint is still made using the application and can be transferred directly to its effect pedal. However, when it comes to sharing these User TonePrint with friends and other aspiring guitarist, a platform for this purpose doesn't exist yet.



**Figure 1.2:** This figure shows a Drip spring reverb effect pedal by TC Electronic `https://www.tcelectronic.com/Categories/Tcelectronic/Guitar/Stompboxes/` `DRIP-SPRING-REVERB/p/P0CQ2#googtrans(en|en)`.

### 1.3.1 The TonePrint Software

As previously stated, the exploring of TonePrints start with the TonePrint application available for smartphones and tablets. However, the software is also available for PC and MAC, and the reason for this distinction lies in the difference of how a TonePrint is transferred to its respective pedal. For PC and MAC the user is required to use a cable from the computer to the pedal, but through the tablet and smartphone application, the

user also have the option of beaming it directly to the pedal. whatever the platform, however, when opening the software the user is introduced to a list selection of different effect pedals, each holding a vast number of TonePrints created by famous guitarists. After selecting an effect pedal from this list, the user is then presented a new list selection of the many guitarist who have created TonePrints for this pedal. When selecting one of the guitarists, and depending on whether the guitarist have created more TonePrints for the same pedal, the user is then presented a bigger view of this specific TonePrint with a description of it and its creator. An example of this is displayed on Figure 1.3. Depending on the users' motivation when opening the application first time, they can also choose to browse by artist instead of pedal, if their starting point is to find out what it takes to sound like their favourite artist.
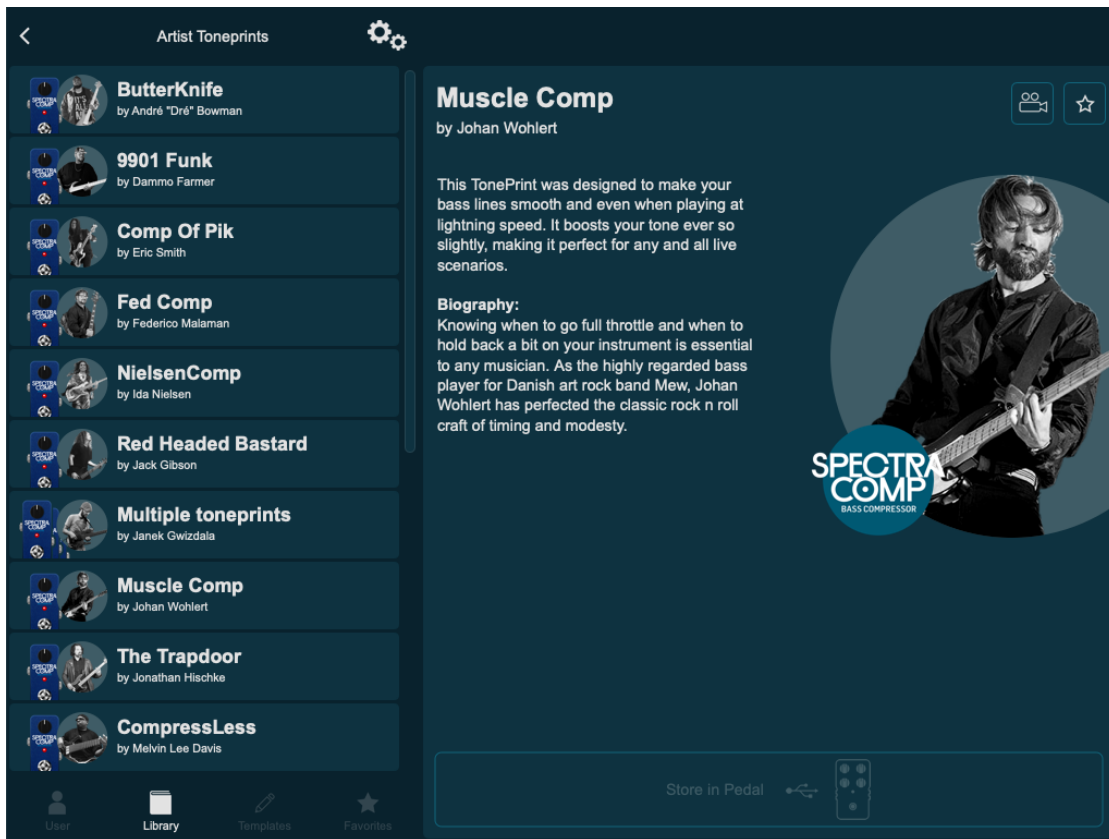


**Figure 1.3:** The view in the TonePrint application after selecting an effect pedal and a TonePrint. This example displays a TonePrint created by Johan Wohlert of the danish rock band *Mew*.

## 1.4   Research question

*Mirror mirror on the wall, who is the gayest of them all?*

# Chapter 2

# Evaluating the Design Process

As made clear through chapter 1 and ($^1$) is the goal of this project to help TC Electronic towards adapting a user centered design process, for the process of designing the upcoming TonePrint Community. In order to help focusing their scope towards being more user centered it's deemed necessary to examine their current design process. This is found necessary because the authors want's the findings of this project to be easy to implement for the company, and therefore wouldn't require a total rearrange of their design process. The designing process at TC Electronic might differ in accordance to the kind of product being developed e.g. hardware might have a different process than software, and phone applications might differ from software for sound cards. Therefor will the analysis of the design process be based on a product with similarities towards the future TonePrint Community. After a short discussion with the company supervisor[2] the product with most similarities is found to be the current TonePrint application which is described in subsection 1.3.1.

## 2.1  Analyzing the design process of the TonePrint App

To analyze the design process of the TonePrint application there it's different approaches which should be taken into account. One consideration is to what extend the analysis should be based on observable or self reported data. This leads to a choice of method between a observational study, or an study based on self reporting.

**Observational study**

An observational study is a classic method used in field studies. This could be used to observe the entire development team, in order to analyze their every day work process, and the overall development process. This allows the observer to create a understanding of development process, which isn't biased by the individuals of the development team, whom might have problems recalling every aspects of the process. However would a

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[1]FiXme Note: Reference til probelmformulering and shit
[2]FiXme Note: Skal vi sige dette?

classic observational study not allow the observers to gain knowledge of the background of the individual team members decisions.[3] There is however a method which have many things in common with classical observational studies, which is contextual inquiry. In contextual inquiry your normally observing the use of a product in the target environment and by it's target user, to analyze usability. Besides the observation part of this method, it also relay on the observer to interview the user, while he or she is interacting with the product. This enables the observer to get a better understanding of what user are thinking. This could be used in observing the development process, where the process wold be observed, and team members would be interviewed when the observers would find it relevant.

One problem regarding the observational methods is however that it might be very time consuming in the context of analyzing the design process. Fore once, the use of the SCRUM framework would imply that at least one sprint should be observed and preferable more, to ensure covering the necessary parts of the process. Another part of the problem is that a design process is a product of several phases with meetings, iterations and rethinking, which would be difficult to cower.

## Self reporting methods

Compared to the observational methods, there is a large branch of methods which rely on getting the involved personals own reflective view on the process. When looking at the aspects which is found problematic for evaluating the design process though observations, these wouldn't necessarily be problems for a self reporting inquiry. The long span of the development process and the iterative process which the TonePrint app already have gone through, would be able to explore, by getting the people who have been a part of the process to elaborate. This of cause heavily relies on the memory of the respondents and their willingness and ability to reflect upon former decisions and processes.

There is many different approaches which may be used to examine the design process using the involved personals reflective knowledge. In one end of the spectrum there is the highly structured survey presenting close-ended questions, whereas in the other end there is the unstructured focus-group inquiries focusing on discussing open-ended questions in smaller groups Adams (2015). A middle ground between these approaches would arguably be the semi structured interview approach. The scope of this approach is to use both open- and close-ended questions to further investigate and describe the purpose of the questions which the interview are suppose to answer. Using the approach of a semi structured interview to analyze the design process of the TonePrint app, it would enable the individual interviews to better focus on areas found interesting based on the

interviewees answers[4]. The interview will more or less become a conversation in which the interviewee describes their view on the design process based on questions prepared before the interview, and questions used to created on the go, to further clarify the answers to the prepared questions. Taking this into account it's decided to conduct this

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[3]FiXme Note: Skal der brugeskilder her?

[4]FiXme Note: Ekstra kilde ind her? muligvis Brinkmans kapitel i(Oxford Handbook of Qualitative Research : Oxford Handbook of Qualitative Research)

analysis using the approach of the semi structured interview.

### 2.1.1  Preparing the interview

Before conducting an interview it's important to plan the process of the interview and prepare the necessary inquiry and research questions, to ensure the purpose of the interview being reached. For the interview exploring the design process of the TonePrint app it's necessary to establish what knowledge that is necessary to obtain, in order to analyze the process to help focus on adapting the way of user centered design.
An aspect which should be highlighted though the interview is TC's own understanding of their target users, and how they have applied that knowledge in the design of the Toneprint app.
Another aspect is to investigate how the decision process is, when deciding on different implementations.
The aspect of how the SCRUM framework affects the design process is also interesting because the suggested user centered approach also should take this into account.
Furthermore it's also interesting to get an understanding of how the design team looks at the future TonePrint community, which may provide a knowledge of which steps of a user centered design process should be taken into account at first.
These themes are all necessary for the interview to accommodate the purpose of the study, and the questions presented in the interview will serve the purpose of highlighting these themes. Before preparing the individual questions it's necessary to establish a understanding of the TonePrint app. When conducting a semi structured interview it's important to be able to ask follow up questions, which helps the interviewee elaborate on thoughts and decisions. With a focal point of this interview being the TonePrint app it's important have a good understanding of how it is designed. This knowledge would also help focusing questions towards decisions regarding specific elements in the design, and overall themes seen in the design[5].

FiXme Note!

## 2.2  Heuristic evaluation

As mentioned in subsection 2.1.1 it's necessary to explore the TonePrint app before conducting the interview. When exploring the TonePrint app it's also decided to create a usability evaluation. The objective of the evaluation is to highlight usability problems that may be addressed in the interview. This enables questions to be directed at specific parts of the app, hopefully results in answers that describes the decisions related to the development of specific parts of the app.
There exist many different methods and approaches for evaluating the usability of a sys-

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[5]FiXme Note: Muligvis kan der hendvises til brinkman kilden for at sige noget om specifikke eksemple kan hjælpe på huskommelsen, vi stiller bare ikke så specifikke spørgsmål (måske)

|    | Heuristics (Nielsen 1994a) |
|----|----------------------------|
| 1  | Visibility of the system status |
| 2  | Match between system and the real world |
| 3  | User control and freedom |
| 4  | Consistency and standards |
| 5  | Error Prevention |
| 6  | Recognition rather than recall |
| 7  | Flexibility and efficiency of use |
| 8  | Aesthetic and minimalist design |
| 9  | Help users recognize, diagnose, and recover from errors |
| 10 | Help and documentation |

**Table 2.1:** The Ten usability heuristic described by Nielsen (1994a)

tem, which differ in thoroughness, time and resources[6]. Given that the scope of this evaluation is to generate questions and explore the application, it's decided to use a methods that is fast to plan, conduct and analyze. A method which is deemed applicable with the given terms, is the Heuristic evaluation, which is described by (Nielsen 1994c). The scope of this method is to have a team of evaluators, preferable with some expertise regarding usability design, evaluating the usability of a systems interface, by comparing elements with a set of usability design Heuristics. The result of the heuristic evaluation is a list of usability problems, defined by how the heuristic they violate, and why. Nielsen (1994c) recommends that the number of evaluators should be among Three to Five. It's stated that less than Three evaluators probably wouldn't be able to identify a sufficient number of usability problems, while more than Five evaluators would have problems identifying new usability problems, that haven't allready been identified by another evaluator. The use of the evaluation in this study is however not to identify all usability problems in order to redesign the interface, but to find examples that some of the interview would be based on. The heuristic evaluation is therefore still considered applicable, even though the only evaluators is the Two authors of this thesis.

A key factor of the heuristic evaluation is obviously the heuristics which is used for identifying the usability problems. Nielsen (1994b) defines nine usability heuristics which identifies different aspects kinds of usability problems. The heuristics was created by analyzing seven sets of existing usability heuristics, with a combined total of 101 heuristics. The paper results in Nine usability heuristics that may be used in a heuristic evaluation, however while referring to hes own heuristics (Nielsen 1994b) Jakob Nielsen describes Ten heuristics (Nielsen 1994a; Nielsen 1994c), adding One more to the list. These Ten heuristics is used for this evaluation and is listed in Table 2.1[7].

FiXme Note!

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[6]Skal vi bruge en kilde til dette?

[7]FiXme Note: Skal vi have en stører diskussion vedrørende huristikkerne?

### 2.2.1 Procedure

By following the steps described by Nielsen (1994c) the evaluation is divided into two phases. The scope of the first phase is for the evaluators to get familiar with the system they are evaluating. Here they are to inspect and navigate through the system and learn the way around it. The purpose of this is to prevent identifying false problems due to a lack of knowledge of the system and to ensurer that the evaluators doesn't miss any areas of the system, while identifying usability problems. The second phase is the Evaluation phase, where the evaluators finds usability problems by comparing different elements of the interface to the usability heuristics Table 2.1. When something in the interface violates a heuristic, it's recorded by the evaluator which in the end leads to a list of violations of the heuristics, hence usability problems.

### 2.2.2 Evaluation Results

Based on the procedure described above, each evaluator recorded they usability problems they identified by shortly describing the problem and noting the heuristic it violates. The problems found by each evaluator is compared and combined. The combined results are presented in Appendix A.

### 2.2.3 Discussion

When looking at the usability problems listed in Appendix A it's important to remember the scope of conducting this evaluation. The scope is not to describe all the systems usability issues in order to redesign of the TonePrint application, but rather to generate the necessary knowledge regarding the app to specify questions and discussions towards the process of developing of the app.
One thing that might have affected the findings of this evaluation is that the two evaluators isn't necessarily target users of the system. This might have resulted in problems identified based on a lac of knowledge regarding domain specific design patterns. This further highlights the interesting point of how they have directed their design towards their target users or how thy otherwise have been considered through the design process, which is mentioned in subsection 2.1.1.
A variety of problems were concerning overall problems whit the evaluatores nor finding the information expected through a series of interaction. This should lead to questions inquiring the decisions regarding the structure and design of information though the app. Some more specific problem that might should be addressed is the problems which seems to be platform specific, either for PC, MAC, Android or Iphone. This is interesting because it might enlighten how design decisions is made or how different users are targeted though the design.

# Chapter 3

# The Design process of TC Electronic

## Interview with the development team

- Aim of questions

  - Describe the focus points of the interview (I think we had four areas of interest)

- Questions

  - Questions as result of the evaluation
  - The rest of the questions and each questions purpose
  - Interview guide.

- Setup

  - The experimental description
  - Describe how it went
  - Short description of the results and how they are handled (Something leading into the thematic analysis)

- Thematic analysis

  - What is the purpose?
  - How is it done
  - How we have done it

- Themes

  - Present a overview of the themes
  - Link to appendix with a description of each theme
  - Describe the overall finding from the interview, with references to the Themes,

which should refer to timestamps in the transcription.
- (It's important we highlight something related to SCRUM, decisions making, Community thoughts and little experience with user involvement.)

- Conclusion

  - The conclusion should highlight the current development process at TC Electronic and answer a research question.

Som beskrevet i chapter 2 har vi valgt at lave et interview for at undersøge udviklings processen ved TC. Ud fra den heuristiske evalueringer har vi fået en forståelse for nogle problemer ved TonePrint appe, hvilket giver grundlag for nogle af spørgsmålende i det følgende interview.

## 3.1 Interview with TC

**Introduction**

Formålet med dette interview er, at vi gerne vil have et indblik i jeres udviklingsproces af TonePrint appen, da fokusset for vores projekt er at kigge på, hvordan et fremtidigt TonePrint community kan udvikles. Interviewet kommer til at foregå under et semistruktureret format. Det vil sige, at vi har forberedt nogle spørgsmål, men hvis du har nogle pludselige indskydelser eller ekstra informationer, du tænker vil være relevante, så skal du endelig ikke holde dig tilbage med disse.

For at vi kan holde styr på de mange informationer, vi må få ud af interviewet, kunne vi godt tænke os at lydoptage det. I den forbindelse, vil vi selvfølgelig gerne høre, om det er ok med dig? Optagelserne har til formål at hjælpe os videre i processen med vores projekt, og dit navn vil på ingen måde fremgå af vores dokumentation.

- Da i udviklede konceptet for TonePrint appen, hvordan besluttede i hvilke funktioner der skulle være med og hvordan de skulle designes?

- Hvordan har jeres viden angående jeres brugere påvirket udviklingen af TonePrint appen, og hvor har i den viden fra?

- Gjorde i noget for at målrette TonePrint appen mod bestemte brugergrupper, og hvordan gjorde i det i såfald?

- Selvom TonePrint appen er et ret unikt produkt har i så draget inspiration fra andre interne eller eksterne produkter, og i så fald hvordan?

- Hvordan besluttede i jer for informationsstrukturen i TonePrint appen, både set i

forhold til menustrukturen og de forskellige måder de kan kategoriseres på?

- I har en meget stor database af både TonePrints, pedaler, kunstnere og videoer. Hvordan besluttede i jer for, hvordan i håndterer og præsenterer de forskellige data?

- Hvilken data vil du mene er nødvendig for at kunne gøre et TonePrint community med User TonePrints effektiv, og hvordan vil du mene denne data skal struktureres og kategoriseres.

- Hvad ligger til grunde for forskellen på appen fra platform til platform? Eksempelvis informationen om ikke tilsluttet pedal, søge funktionen, video visning og TonePrint information samt beaming?

- Hvad er formålet med tekstbeskrivelserne tilhørende de forskellige TonePrints, og hvordan beslutter i jer for, hvad der skal stå?

- Hvilken type feedback får i vedrørende TonePrint editoren, og hvordan bruger i denne feedback?

- Til hvilken grad bruger i informationer, i får gennem TonePrint-junkies-facebook-siden, youtube eller music tribe community?

- Meget har ændret sig op til den nuværende app. Hvorfor ændrede i både den grafiske identitet og flere features?

- Hvilke positive og negative effekter har jeres SCRUM arbejdsmetode haft på udviklingen af TonePrint appen?

- Hvilke teknologiske begrænsninger har i haft under udviklingen af TonePrint editoren, og hvordan har i kompenseret for disse?

- Hvordan opstillede i kravene for TonePrint appen, både konceptuelt og design mæssigt?

- Hvordan opstillede i målsætninger for TonePrint appen? og hvordan sikrede i jer, at disse blev nået?

- Hvis du skulle nævne fem vigtige aspekter som vi bør tage med videre i udviklingen af et TonePrint Community, hvad skulle det så være?

# Chapter 4

# Thematic Analysis

## 4.1 Method

- Til et semistrukturet interview er det svært at følge en prædifeneret analyse, da man ikke ved hvilken vej interviewet tager.
- Vi valgte den tematiske analyse fordi man kunne komme godt ned i ens data og laver et overblik, før man analyserede.
- Beskriv stepne fra kilden.

## 4.2 Themes

As described in (Braun and Clark (lav kilde)) does the thematic analysis create a understanding of the interview data by thoroughly coding the transcribed interview data, whereafter the codes are used to create themes, that can be used to interpret the interview.

The four interviews were given a total of 272 codes, from which several codes did cover more than one interesting aspect and is hence present in more than one theme. As result of an iterative process of dividing the codes into themes, a total of 35 themes were created. Some of the themes are strongly connected by addressing some of the same areas, but are divided to create more specific themes rater than to general. The themes are in danish and is shown in **??**. This is followed by a description of the theme.

## 4.3 Interview conclusions

Som resultat af analysen kan det ses at SCRUM er en meget vigitg del af mentaliteten hos TC og at den måde at opsætte krav for sprints og prioritere features, har ens stor betydning for deres udviklings process. Det virker til at den erfaring de har fra tidligere brugerinddragelse har være meget god, dog ikke den ene gang med Jesper, hvor det virker til at timingen har været forkert. Det virker til at de har en idé om hvem deres brugere

er, dog uden helt at vide det, samtidig med at de ikke rigtig har erfaring med at målrette efter bestemte brugere når de designer, da de mener at TonePrint konseptet aspirere nok til deres brugere. Det ses at de har en masse idéer til TonePrint communitiet, hvor de fleste er enige om at det med Tags, er en vigtig del at få undersøgt og lavet.

# Chapter 5

# Community concept

Based on the description of TC Electronics development process in section 4.3, the current task is to develop conceptual models, which describes the functionalities and use cases of the TonePrint Community. The scope of this phase is to discover which tasks that lay ahead the development of the TonePrint Community, while focusing on user involvement and user experience.

## 5.1 Conceptual model

In (J. Johnson and Henderson 2012, p. 17) a conceptual model is descried as "*A high-level description of an application. It enumerates all concepts in the application that users can encounter, describes how those concepts relate to each other, and explains how those concepts fit into tasks that users perform with the application*".
In order to create the conceptual model of the TonePrint Community, some decisions have to be taken about functions, features and interactions, which hasn't been made on a business level yet. These decisions are therefore not fixed, in term of the final product, but will serve its purpose for this project. The decisions are based on the interviews in chapter 4 and reflects ideas and opinions from the development team.

### 5.1.1 The TonePrint Concept model

When creating the conceptual model we need to look at the task domains in which the user till perform activities to reach their goal. Different users have different purposes for using the community and therefore will there be more than one task domain to consider, while designing the community.
At first we look at the different groups of users for the TonePrint concept, as described in ([1]). On Figure 5.1 it's depicted how users of the TonePrint concept are categorized into three groups, Pedal only users, TonePrint Users and TonePrint creators. The 'Pedal only

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[1]Appendix or analysis of interview

users' are the users whom own a TonePrint pedal, but doesn't use the TonePrint functionalities of the pedal and just are using it as a regular pedal. We define the TonePrint Users as those who use the TonePrint concept to find and beam Artist TonePrints to their pedals. These users are therefore connected to the Artist Library of the TonePrint application. We define the TonePrint Creators as those whom uses the TonePrint concept to create User TonePrints, which they can use with their pedals. These users are therefore connected to the Editor and the User TonePrint Library. The connecting arrow between TonePrint Users and Creators on Figure 5.1 indicates that these users isn't necessary different people, but might be the same user using the system differently.
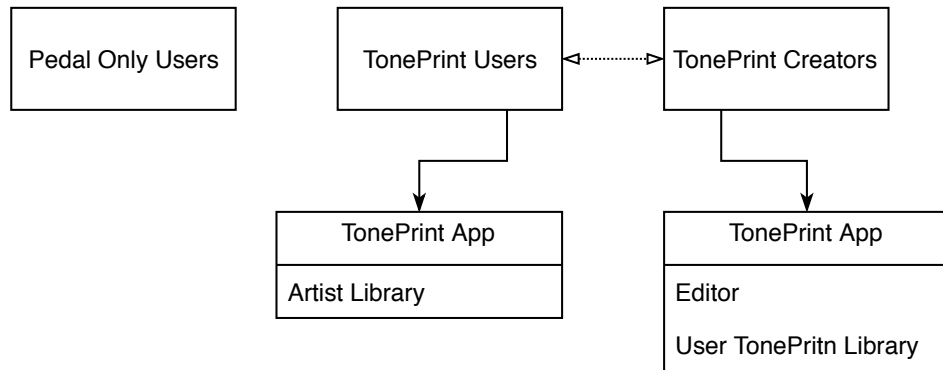


**Figure 5.1:** This illustrates the different groups of users of the TonePrint concept

The definition of the different user groups of the TonePrint concept will also be applied to the concept of the TonePrint Community, however are the 'Pedal Only Users' neglected in future models. This is because they aren't using the TonePrint functions and thereby don't have any use of the TonePrint Community. The features listed in Table 5.1 are suggested to accommodate both the TonePrint users and creators in the community. The features are based on the ideas and suggestions from the interview with development team in chapter 4.

| Ref. nr | Features |
|---|---|
| 1 | Uploading TonePrints |
| 2 | Categorize by tags |
| 3 | TonePrint description |
| 4 | Search |
| 5 | Rate TonePrint |
| 6 | Subscribe to users |
| 7 | Recommendations |
| 8 | User profile |

**Table 5.1:** The left column contains the number which is used to refer to the feature in the right column

The features 1, 2 and 3 in Table 5.1 are all closely related and accommodates especially the task domain of the TonePrint Creators. The feature of uploading features are simply to enable user to upload TonePrints to the community, that they have created with the editor. This feature covers the main function requested by the users which is the ability to share TonePrint with each other.

Feature 2, Categorizing by tags refers to the idea of letting users use tags to categorize the TonePrint they have uploaded. The purpose of these tags are to easily allow other users to identify which categories the TonePrint belongs to, which also enable users to find the discover tonePrints by searching on different tags/categories.

Feature 3, TonePrint description allows the creator of a TonePrint to write about the TonePrint, similar to the descriptions of the Artist TonePrints in the current TonePrint application. The description might contain information about the parameter settings, inspiration, self-promoting text or likewise.

Feature 4 is a search function which users can use to search for TonePrints, either by name, tag, artist, pedal or likewise. As one mentions in the interview it's essential to make this a proper search engine[2]. The current search functionality for the TonePrint application, which only is idle for android, is very limited and wouldn't be sufficient, as mentioned in subsection 2.2.2.

Feature 5, the Rate TonePrint feature, is based on the idea of letting TonePrint users, whom have tried a creators TonePrints, rate the TonePrints. This rating could work as a motivation for creators to create more TonePrints, while it as the same time gives the TonePrint users the opportunity to see how much other users like the TonePrint.

Feature 6, Subscribe to users, are a feature which enables users to follow other users. A user could for instance have tried a TonePrint created by a certain other user and like it to a degree of which he want's to see which other TonePrints that user have created, and wants to be notified when new ones are created.

Feature 7, Recommendation, this feature is suggested to help users find and explore TonePrints. This could be recommendations like, "People who like this TonePrint also like these", "These are the highest rated TonePrints for your pedals" or "These TonePrints will at something new" etc.

Feature 8, Community Profile, is a feature which sums it all up. This profile is going to be a 'Front Page' for the users containing their own TonePrints, their recommendations, the TonePrints of those they subscribe to and the option to make a personal description and link to personal youtube, soundcloud or likewise sites, as a self-promoting feature.

How the eight features above works on a detailed and technical level won't be a concern at the conceptual model. The goal of the conceptual model is to explain the relationship between functions, which can be used to perform the activities necessary for the user to reach a goal (**Henderson2012** )(Kilden skal opdateres så der er et kapitel mere med).

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[2]Tjek

### 5.1.2 Community Model

[3] The Toneprint communitys conceptual model consists of several concepts, which includes the already mentioned features Table 5.1, which works together to accommodate the users needs. The conceptual model of the TonePrint Community is illustrated on Figure 5.2.



**Figure 5.2:** Illustration of the relationships of the concepts that makes up the Communities conceptual model

At first there is the User TonePrint concept which contains: Parameter settings for the TonePrint. The name of the TonePrint. A description of the TonePrint (Feature 3 in Table 5.1). Tags that categorize the TonePrint (Feature 2 in Table 5.1). The beaming functionality ([4]). And lastly User ID, which is inherited from the Community Profile, which identifies the creator. This concepts differs from the original User TonePrint concept by adding the Description, tags and User ID, which all are new additions which aims to accommodate and ease the use of the Community. The User TonePrints are uploaded to the Communitys TonePrint library, for all user to find. It's also uploaded to the users own Community Profile so it's always easy accessible.

Secondly there is the Community Profile (Feature 8 in Table 5.1) which contains: User ID that is used to identify the profile. Self-promotion which could include self description or links to other personal sites etc. Subscription list, which is a list of the user whom the user are subscribing to. Follower list, which is a list of those whom subscribe to the

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[3](Opdater billede, spell check, add follower list, User library -> Profile Library, Community -> Community platform, Connection from editor to User TonePrint)

[4]Skal det med

user. And lastly the User TonePrints which is a list of the users self created TonePrints. The Community Profile is crucial to shape the concept of including the users into a community, instead of just having a simple Upload/Download site. Some of the idea of self-promotion stems from the workshop in (Jespers kilde) and is also mentioned in (ref til interview/tema). The Community profile will work as a starting point for users when interacting with the Community.

Thirdly there's the Community platform which contains: The TonePrint library which give access to use and rate all the uploaded TonePrints (Feature 5 in Table 5.1). The Profile library give access to visit all of the Community Profiles and subscribe to them (Feature 6 in Table 5.1). Search option (Feature 4 in Table 5.1) is simply a function which help user find the TonePrint they are looking fore. Recommendations which is described above(Feature 7 in Table 5.1). The Community Platform sums up all of the features and concepts which shapes the TonePrint Community concept, by using both the User TonePrint concept and the Community Profile concept.

Lastly there is the concept of the TonePrint application which contains: The Community Platform, which represent all of the features and concepts of the TonePrint Community. The TonePrint library represent both the User TonePrint library and the Artist TonePrint library, first described in subsection 1.3.1, and seen in Figure 5.1. The TonePrint Editor, which is used to create the User TonePrints, which is described in subsection 1.3.1 and seen in Figure 5.1 ([5]). The only change in the TonePrint application concept is the addition of the Community concept. As see in (Finde ref fra interview) does all of the interviewees agree upon letting the community be a part of the TonePrint application, however might there still be some disagreement to what extend it's to be included.

### 5.1.3  Community Use Cases

Contrary to the Conceptual model that depicts how the different concepts of the tonePrint Community are connected, is the scope of the use cases to depict how the users will use the Community to accommodate different goals. The goals are based on ideas that were expressed during the interview chapter 4 and the initiating meeting that started this project.

**Use Case 1**

Describe the steps user goes through while interacting with the system, to reach a goal. Use Figure 5.3 as inspiration.

**Use Case 2**

**Use Case 3**

**Use Case 4**

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[5]tjek om vi siger det vi vil bruge i der hvor vi referer til

**Figure 5.3:** a graphical overview of the TonePrint Community use case

# Chapter 6

# Tasks and Methods

Tasks and methods in near future of TC Electronic

- Fitting UX and SCRUM

    - What is the know problems and limitations.
    - How have other worked around this problem
    - Which way does we find applicable at TC Electronic?

- UX tasks for this phase of developing TPC

    - Methods applicable for each task

- Choosing one for this project

Case: Information architecture.

- Aim of task
- Methods
- Card sort theory
- Execution of the online card sort
- Workshop to analyze mental model (interaction related)
- Theory for icebreaker, concept maps and collaborative work.
- Card Sort Results
- Workshop Results
- Discussion
- Conclusion

The scope of this chapter is to use the Concepts from Chapter 5 and the understanding of the current design process to generate the tasks, in which user involvement is considered helpful in the design and development of the TonePrint community. The tasks focus

on how to acquire the necessary information from the users to design different features or how to evaluate already made decisions. The objective of some of the tasks may also be to simply get a better understanding of the users themselves. A general insight into the users' perspective will help optimize the general utilization of usability and UX at TC Electronic, even though the direct objective of the specific study doesn't have a direct relation to usability or UX. After providing a description of the tasks and the need for user involvement for these individual instances, proposals for applicable methods for uncovering usability or UX in their respective contexts will then be presented. One of the tasks will then be selected to be carried out during the last phase of this project.

## 6.1   Task 1: Designing the information architecture

When designing the TonePrint community, it's important to consider the structure of the information, better known as information architecture. The purpose of this is to ensure that the design accommodates the users' mental model in terms of being a closer match to the conceptual model of the system. This would ease the use of the system, as the system would act accordingly to the users' expectations. As explained in Chapter 4, TC Electronic haven't acquired information about their users understanding of the TonePrint application before, which makes this task even more important. two ways of approaching this will be addressed.

One approach could be to involve the users early on while designing the system by letting them take part in shaping the concept and flow of the community. This is also referred to as a *participatory design procedure* [1]. During this, the users are provided a chance of influencing the design of a future product for example by conducting workshops with them as participants. In the case of the TonePrint community, these workshops could for example be set up with multiple steps focusing on different aspects of the informational structure. This could include a brainstorming session for creating conceptual ideas for the community, a card sorting task where these ideas are grouped, and a session for creating prototypes from these groups. Another approach also focusing on the informational structure could be to test the current thoughts and ideas of how the application should be structured through prototype testing. Low fidelity (Lo-fi) prototypes comes to mind in this context. These are used to test the functionality of an application even though a functional prototype isn't available. Instead prototypes are constructed from easy accessible materials without spending much time on the aesthetic appearance. Usually, subjects are asked to complete tasks on prototypes sketched on paper. For the TonePrint community, lo-fi prototyping can as such be employed to indicate how the functionalities and features shall be shaped, through user tests with the information structure in focus. This makes lo-fi prototypes very usefull to employ, however, they require a rough idea of how the system should work and how the information is going to presented before conducting the actual test. When brainstorming possible methods for testing with lo-fi

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[1]Participatory design methods in telemedicine research

prototypes, *the cognitive walkthrough* comes to mind as a suitable suggestion. Through this method, the subjects are given a number of tasks to complete on the prototype, where each task has a well defined action sequence necessary to follow step-by-step in order complete the task correctly. The subjects' results are then analyzed through general principles of cognitive psychology in order to locate potential pitfalls in the design.

For either of the tasks above, some preparation is necessary. firstly in the case of constructing lo-fi prototypes, the necessary materials are needed to create a fitting representation. For a participatory design workshop, there are some materials required depending on the sessions in the workshop, but in general, generic elements such as post-it notes for the brainstorming session are needed. The subjects required for participating, whatever the approach, need to account for the possible end-users of the TonePrint community, which means musician, sound engineers, novice and expert TonePrint users, etc. Hopefully, several different groups can take part in this, as a clear representation of each group's understanding of what the engineers conceive as useful tools is desired. The process of acquiring the subjects can be eased with the help of TC Electronic themselves though their existing community on Facebook among others. For the cognitive walkthrough the subjects don't necessarily require the same level of background knowledge, as it can be conducted with novices and experts alike, depending on the chosen approach. As such, the members of the development teams at TC Electronic could also be used as subjects for the test.

Both the participatory design workshop and the Lo-fi prototype test could fit into a strict time schedule, which could look a bit like the following.

- acquiring test participants.

    - TC employees or development team = 1-2 days
    - Users of TonePrint or extended knowledge regarding it = 5 days
    - Novice participants = 2 days, or find them on the day of testing.

- Planing workshop + preparing material = 2 days
- Planing prototype test + creating prototypes = 2 days
- Conducting workshop.

    - Workshop at TC with employees (depending on length of workshop) = 1-2 days
    - Workshop with users 1-3 days (Depending on length and schedule of participants)

- Conducting prototype test

    - Test on development team and employees = 1-2 days *Test on novices = 1-2*

*days (depending on participants scheduale)*

- Analyzing workshop = 4-5 days (depending on analysis method)
- Analyzing prototype test = 4-5 days (depending on analysis method(IDA might be faster))

## 6.2    Task 2: Tags

A new feature in the TonePrint Community is the 'tag' feature which is described in point 2 in Table 5.1. Furthermore is it conceptualized in the conceptual model Figure 5.2 and the use case Figure 5.3, and is based on the interview with the development team section 4.3. From the interview it's clear that the fist task related to tags is to investigate how tags can be made feasible and distinguishable for users. To accommodate this, some decision should be taken regarding to which extend the users should be limited in their choice of tag. If every user is allowed to assign tags without any constrains, could would be difficult for other users to have clear expectations regarding towards what a TonePrint sounds like, because of subjective opinions could affect the understanding of tags. To accommodate this could the TonePrint community generate tag suggestions based on the parameter settings , from which the TonePrint creator than would choose from. The tags which the user would pick from would in other words be "Effect describing categories" This leads to a task defining which parameters based tags users would be able to use to describe their TonePrint, and to what extend its possible to distinguish between tags.

For accommodating this task a sensory analysis like study could be conducted with at group a representative subjects. The participants would be given a tasks of rating different auditory stimuli consisting of TonePrints on scales representing the effect describing categories. Depending on how the ratings are clustered in groups it would indicate the users ability to distinguish the TonePrints on the basis of the effect describing categories. These ratings would indicate to what extend the effects can be distinguished, which than would indicate naturals level of tags, which than could be given names [2]. Before conducting this experiment it's necessary to create the effect describing categories. This could fore instance be done by having a word elicitation session where attributes which may describe a TonePrint stimuli is determined. These attributes would than either be used directly or as inspiration fore creating, effect describing categories.

The time expected for accommodating this task by using the explained method would probably reach more than one sprint cycle. This is partially doe to the need of at least two separate sessions (Word elicitation and sensory analysis), from which the latter should be conducted for several effect types and with several different effect describing categories. It would be possible to fit one experiment at a time accordingly with a sprint.

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[2]Skal det nævnes at der efter den sensoriske analyse kunne laves en card sort analyse for at se om der er enighed om hvordan de her 'Tags' høre sammen og evntuelt et forsøg hvor de fremstillede tas skal gives til nogle stimuli

## 6.3  Task 3: Self-promoting functionalities

It's necessary to have a functional community before looking at how much users will like to promote them self and how they will like to do it. Here it might be a good idea to look at other systems based on user created content, which is shared with others. Users with experience of creating User TonePrints would be included in a explorative evaluation of these other systems, evaluating the amount and type of self promotion. This evaluation could lead to qualitative data which should indicate the users expected attitude towards how the self promotion factors should be designed.
(At sætte en test op hvor man gennemgår et andet systems måde at gøre det på, vil muligvis ikke være optimalt i fohold til den tid det vil tage, kontra det man får ud af det. Måske bør det sættes op sådan at man laver en prototype baseret på en analyse af hvordan andre gør, som så kan bruges i test scenarier. Det vil dog alt sammen kun afspegle forventet brug, da brugernes actuelle brug vil kunne ændre sig i den rigtige TonePrint Community)

## 6.4  Task 4: Appearance and GUI of the App

From the name of this task, it seems as the scope of it is the same as that of task 1, this is however not the case. Task 1 aims to approach the design of the information structure from scratch, either by conducting user tests on specific design proposals or by approaching it as a *participatory design phase* with excessive user involvement. The scope of this task moves beyond just the information structure, as it can concern any aspects of the functionality and aesthetics of the GUI. As students of engineering psychology, such a task could easily resemble that of a typical semester project. The logical approach would be to conduct user tests on existing products in order to propose eventual re-designs, and in the case of the TonePrint concept, it could for example be the application or a design proposal for a community platform.

At this point, TC Electronic don't conduct user tests to the extend of UX-designers, but it is a field, they are interested in exploring further. Design proposals are currently decided upon by the graphical designers in the firm, and a way of involving users could be to either confirm or reject these proposals through an A/B test scenario. In this, different design proposals are scientifically tested, comparing them to each other by measuring the effects of different assignments on the users' behavior. the two variables A and B usually consists of a currently used version and another version modified in correlation with what the focus of the test is. The differences between the designs should be small and concern specific elements, as the method is particularly valuable when there isn't a vast number of variables. As an example, the method could be applied to the TonePrint app by testing a part of the interface that has been modified in an alternate version where the rest of the interface remains unchanged. If the scope of the test is concerning an evaluation of the entire system, either as a stand-alone evaluation or in comparison with a re-designed version, methods are also applicable for this approach, even though a

comparison of two versions with multiple variables is considered risky. The UX-designer needs to have a clear idea of what is wanted from the test, and if the scope of interest for example is an evaluation of the system's overall usability, the *System Usability Scale (SUS)* comes to mind as an applicable method. This is a quick and dirty, reliable tool that consists of 10 questions, intended to uncover the system's usability through a somewhat complex scoring system. The resulting score can nevertheless be evaluated by itself or in comparison with the SUS score from a modified system.

In the well planned scenario, conducting such a user test should be easy, as it isn't considered time-consuming if all the variables are understood and decided upon. Depending on the state of the design process, it can either be conducted as a low-fidelity or a high-fidelity test. For the A/B test, it would be preferable to conduct the test at an early stage with a lo-fi approach, as the specifications for the design elements still might be up for discussion. In order to best manage the variables in the test, TC should consider focusing on individual elements and test them one at a time. This would furthermore be a good way of applying it to the Scrum framework, as a test shouldn't take more than 3 weeks to plan, execute, and analyze. In a hypothetical scenario, the graphical designers and programmers at TC could spend a sprint on designing and implementing a functionality, which then would be the focus of a user test in the following sprint. A UX-designer could then spend the first week planning, how they best uncover the important aspect from the user, spend the second week executing this, and during the analysis of the final week, they could already begin planning the scope of the user test for the following sprint. The developers would simultaneously be working on implementing the next feature, and this would make the argument for the UX-designers to participate in the daily scrum meetings to the same extend as the developers. The UX-designer would get a look into what they are working on and as such be able to think ahead for the next sprint.

Conducting such a test requires the involvement of the developers, as they implement the functionality that is of interest in the test. a UX-designer should discuss with them, what they want to uncover from the test and then apply his knowledge of how to uncover this. In the case of simply being interested in usability, the UX-designer would then gather a number of unbiased subjects and have them perform a task with the new functionality in focus. The following evaluation could then simply be the subjects filling out a system usability scale. In the case of an A/B test, the materials required would be an alternate version to the current, either constructed as a paper prototype or through wire-framing software. Groups of users would then be assigned to interact with each of the different designs, uncovering their experience for each of these instances through different measurements and questioning.

## 6.5   Task 5: Defining the user groups

The purpose of this task is to ease the process of designing and developing the TonePrint community by getting a better understanding of who the users are. By having a clear

understanding of the users, it's easier to get the design right, faster, and it will require fewer individual user studies. If the developers can make decisions from simply asking themselves "how would the users react and perform to this feature?" much time and resources can be spared on recruiting subjects and conducting user tests.

From this description, the ideal approach seems to be constructing *personas* of the typical TonePrint users. In general, personas serve as archetypes of the users who you can turn to when asking the previously mentioned question of "how would person X react and perform to this feature?" instead of designing these features by the preferences of the design team. While creating personas, there are four different ways of approaching them:

1. **Goal-directed Personas**
2. **Role-based Personas**
3. **Engaging Personas**
4. **Fictional Personas**

The goal-directed personas intends to uncover what the typical user wants to do with a system in question by examining their workflow while trying to complete an objective with the system. By understanding the goals of the users, it's easier to fit the necessary requirements within the system to make these objectives easy to perform for the users. The role-based personas should also be considered goal-directed but focuses more on behaviour by examining the user's role in a wider perspective. For example by understanding where the product will be used and what the purpose of the user's role is, it can help the design team make better design decisions for the product. The engaging persona method is a way of getting more engaged with the users, as the method employs both a goal and role-directed approach. Typically, a 3D rendering of the user is created from this method, which will make the developers more likely to consider them during the design process, their emotions, and their psychological background. Finally, the fictional personas don't emerge from user research but instead from the experience of the UX design team. Based on past interactions with the user base, the team makes assumptions of what users look like. This can be debated as a flawed approach, but it does allow for considerations of the user's needs at an early stage.

Having these personas seems as ideal guidelines for making design decisions for the system in question, however, constructing these personas aren't something done easily over a 3-week sprint period. The process includes multiple steps of first finding the users, collecting data on the their patterns within different user groups and then describing and validating these findings. as such, extensive interviews sessions and observational studies of the users interacting with the system in question is required. For this project, this task is therefore considered too extensive for a 2-week period, but for TC Electronic's future work on the TonePrint community, a design approach with personas is considered ideal.

As previously mentioned, the personas method requires a lot of data collection, preferably from interviews and observational studies, and while clear-cut explanations of how to create personas exist, this paper also proposes an alternative approach. For all the tasks listed in this section, different proposals have been made on how to engage them with different types of user involvement. besides providing a helping hand in the decision making for the design of the TonePrint community, Each of these proposals also provide individual minor descriptions of the users in the context of the individual user studies. Another approach to defining the user groups could therefore be to gather descriptions of the users through these individual user studies and then create the personas on the basis of them. The benefit of such an approach is that the developers could kill two birds with one stone while conducting user studies on different features for the TonePrint community. they would simply gather the needed information from a lot of smaller user studies.

# Chapter 7

# User Study of The TP Community

The tasks presented in chapter 6 serve as proposals for how to include the users as an active part of the design process at TC Electronic in correlation with developing a platform for sharing User TonePrints. The tasks are all considered equally important, but ultimately only one of them is explored in this project due to the restricted timeframe. Through discussions with our company supervisor, task 1 is chosen for this purpose. The following chapter will start with an elaboration on this decision before moving on to the execution and subsequent analysis of the results, including what methods are applied for both parts.

## 7.1 Deciding on a task

As described in section 6.1, the purpose of task 1 is to investigate how to design the information architecture of the TonePrint community, in order to ensure that the design accommodates to the users' mental model of the system. Many considerations were put in to the decision of conducting this task, including TC's wishes, how well it would fit into a typical SCRUM sprint, the remaining timeframe for this project etc. The impact of all these factors also influenced what methods to consider and how to approach them.

Firstly, an investigation of the information architecture seemed the most fitting to conduct due to the current state of the TonePrint community. TC are at a very early stage of development, as no version of a sharing platform currently exist. TC therefore considered it evident to start with an assessment of how content and features should be structured as a baseline for the future design process.

Secondly, previous investigations in this project have showed how TC follows the SCRUM framework in the shape of 3-week sprints (see chapter 4). As such, much of the discussion was on finding a task and suitable method that could easily fit to this timeframe, and task 1 was here considered ideal. the limited time remaining on the project furthermore required to conduct it as a 2-week sprint, and even though this is not same duration as a sprint at TC, conducting a task in this timeframe would still provide TC insight into how UX tests can fit to a short time period. Task 3 and 4 could just as well fit this timeframe, but each of them required an existing app to some

extend. It wouldn't necessarily have to be a fully functional system, but still one that could represent the appearance and functionalities of the system.

Thirdly, task 5 focusing on creating personas of the typical users of TC products was considered very valuable for TC in their understanding of them. However, this task was too extensive and time-consuming to execute in a 2-week sprint and is in general considered a semester project on its own. If it were to be executed anyway, it would only result in demographical info on the users, which doesn't provide anything new for TC.

When choosing task 1, further specifying the approach is required, as it proposes two different ones. One of these is through Lo-fi testing which is a great tool, but as it is elaborated on in section 6.1, it requires a rough idea of how the system should work and how the information should be presented. For the TonePrint community there currently is no rough idea of how it should look, and it would as such make more sense to include the users in shaping the concept and flow of the community from the bottom through a *participatory design procedure*. The approach should then follow the outlined suggestion in section 6.1 by conducting a workshop with potential end-users as subjects in order to explore their mental models of a TonePrint community.

## 7.2   Mental Models

Before proposing the experimental design and setup of a workshop, it seems appropriate to first define what is meant by *mental models*, and how they are constructed. In section 1.1 it is mentioned that if the developers have the same understanding of how a given product should look and behave, then the users are more likely to have a pleasant experience. this is a quick explanation of the term, as it merely touches the surface of it. In general, mental models are types of conceptual models that resides in people minds, as the name implies. In other words, mental models are the users' understanding of how something works. The definition of a conceptual model is already outlined in chapter 5 as an explanation of how something works, including all concepts in it, and how they relate to each other. For mental models, different people may hold different versions for the same system, and some people may even hold multiple models of the same system, FiXme Note! focusing on different aspects of its operation (Norman 2013, p. 26). [1]

## 7.3   Experimental design

For task 1, it's important to remember that the main goal is to investigate possible end-users' mental models of a sharing platform for User TonePrints, in order to asses how the information architecture of it should be shaped. The employment of end-users and not generic users is important, as they represent the mental models of the people who are most likely to use a finished version of the system. The current TonePrint app already

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[1] FiXme Note: Section is not finished

aims at a certain audience, i.e. guitarists, and employing subjects with no experience with this field wouldn't result in an appropriate outcome of the study.

Shaping the information architecture of a system requires multiple steps of generating ideas for content and communicating these, before moving on to testing them with the users (Rosenfeld et al. 2015, pp. 356-364). For this task, the first step would as such be to generate ideas for content and features to be included, and how they should communicate with each other? Instead of engaging in a phase of generating such ideas, this paper instead suggests to make use of studies already conducted by TC focusing on a sharing platform for User TonePrints. A study by our company supervisor Andersen (2015), investigates what is required from such a platform, and the result is given in the shape of a list of content which, if included, would make end-users more interested in using the platform (Andersen 2015, p. 35). It's important to note that this content also is produced by the users in a workshop, and by utilizing this information, it will serve as a good starting point. Furthermore, the interview conducted with members of the TC staff previously in this project may also contain appropriate content for developing an appropriate strategy for the information architecture.

### 7.3.1 The card sorting method

As the previously mentioned sources of inspiration provide meaningful content for a sharing platform for User TonePrints, the next step is then to investigate how the users will organise this content. A suitable approach for this purpose is by utilizing the card sorting method. Donna Spencer describes this in her book as a fairly straightforward tool that helps the developers understand the people they are designing for (Spencer 2009, p. 6). The method involves users sorting a set of cards into piles of what they find similar either according to predetermined group names, or they can be told to describe the categories themselves after the sort. These are referred to as an *open card sort* and a *closed card sort* respectively.

Each card represents an item formulated either from the study by TC Electronic or from the interview previously in this project, and while making these, some considerations must be made to the number of cards formulated.

For the purpose of using the users mental models to shape the IA of the TonePrint Community, it's desired to look at similarities of the mental models. T. E. Johnson and O'Connor (2008) suggest a method for analyzing a teams Shared Mental Model (SMM). SMM represents a mental model shared by a group of people working together i.e at solving a problem or a task. It's important that there is a some what mutual consensus of the SMM, otherwise it would be difficult for the people working together, because they may not know the purpose of what their fellow team members do and it could cause miss communication. The scope of identifying the SMM in this study is however not to evaluate how well users may work together. It's desired to investigate this SMM let the IA accomodate the different mental models section 7.1.

## 7.4    Analysis Constructed Shared Mental Model

To analyze the SMM it's proposed by T. E. Johnson and O'Connor (2008) to create a Analysis Constructed Shared Mental Model (ACSMM). Figure 7.1 illustrates a very simplistic view of the process of constructing a ACSMM. At the beginning there is the users Individual Mental Model (IMM). These IMM is what is addressed in section 7.2. The next part is to acquire the users Individual Constructed Mental Model ICMM, which is their mental model putted in their own words. In this workshop the ICMM's is visualized be the concept maps created by each subject, as described in **??**. The ICMM's is then analyzed and compared, so that a ASCMM may be created for explaining a common mental model shared by the users Figure 7.1.
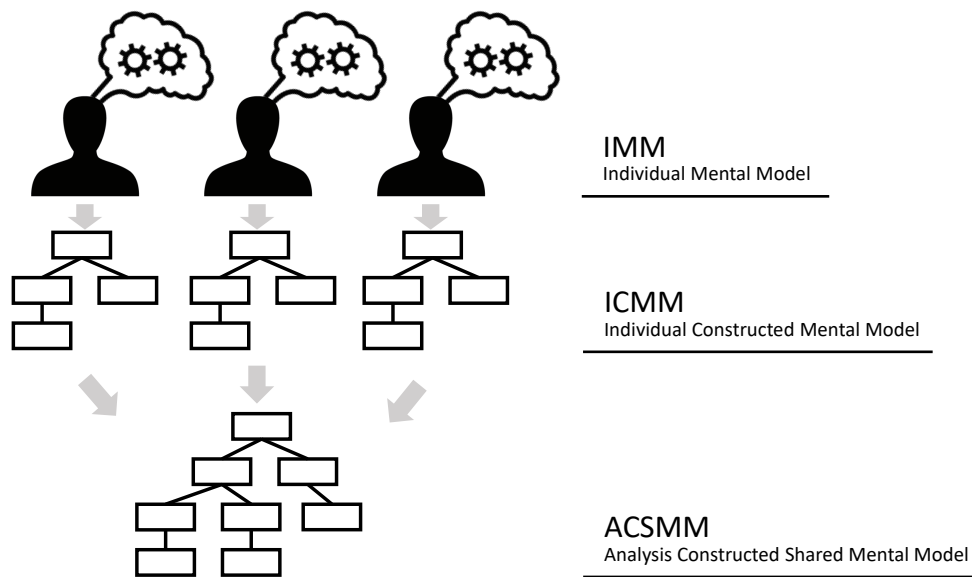


**Figure 7.1:** Illustration of the process of crating a ACSMM

The step of going from multiple ICMM to a ACSMM is described in T. E. Johnson and O'Connor (2008) as a ICMM coding phase, a shared analysis phase and a SCSMM construction phase. In the coding phase the concepts, links and cluster depict in the ICMM's are transformed into codes, that is comparable. The coding process for this workshop will not only be conducted for the subjects concept maps, however will it be based on the subjects presentation of their concept maps, which has been recorded **??**. This is due to the concept maps being constructed quite different and because when putted to word, a more representative description of the IMM may be derived. In the shared analysis phase the codes from each subject is analyzed in order to determine which items of the ICMM's the subjects shares. To determine this a criterion is set for percentages of subjects sharing an item. T. E. Johnson and O'Connor (2008) suggest 50% as criterion. Finally is the ACSMM constructed by taking the shared items from

the previous step and use them to construct a Concept Map. After this the shared items
is used to assembly a model which serves as the ACSMM.

# Chapter 8

# User study results

As it is elaborated on in chapter 7, the purpose of the card sort and workshop is to elicit mental models of the users' interaction with a TonePrint community platform. In the workshop this is investigated for two specific tasks, which on their own don't provide a full explanation for how the entire information architecture should be. The given tasks are the overall new features going from the current TonePrint app to a TonePrint community, and the results are as such also overall explanations. For further elaborating explanations, the various elements in each task should be investigated on their own as a set of subtasks. The subjects' mental models are derived from their hand drawn concept maps and subsequent explanations of them, which was video recorded, and the purpose of the following chapter is to present the results of this workshop before uniting them with the results of the card sort.

## 8.1 Workshop results

The workshop was conducted in a meeting room at TC Electronic's headquarters in Aarhus, and five members of their staff served as subjects for this. It's important to note that none of them have been affiliated with either the development or maintenance of the TonePrint application at any point, so they were considered fitting subjects for the workshop. The obvious bias of including developers of the TonePrint app would have meant that the workshop wouldn't have produced mental models representing those of the end-users. One of the subjects, however, was considered a potential bias as he develops templates for User TonePrints. He has not had any influence on the design of the TonePrint app though, so he was included in the individual task any way but instead served as an observer for the group task, leaving the remaining four subjects for this.

For the individual task, the results produced five different hand drawn concept maps, these are all found in Appendix C. The results for the subjects are presented individually including their concept map, depicted with software to make it more presentable and readable, a table of their highlighted content and actions, and codings of their video presentations. For the depicting of the concept maps it was considered insufficient to create a complete remake of their drawings alone, as they differ greatly in terms of

structure and detail. In order to balance these differences, the new concept maps are made from their presentation of their drawings. The codings of their explanations are presented with the concept map with the important content and actions highlighted with **bold text**. This is done to put the content and actions into context and not only have them displayed in a table.
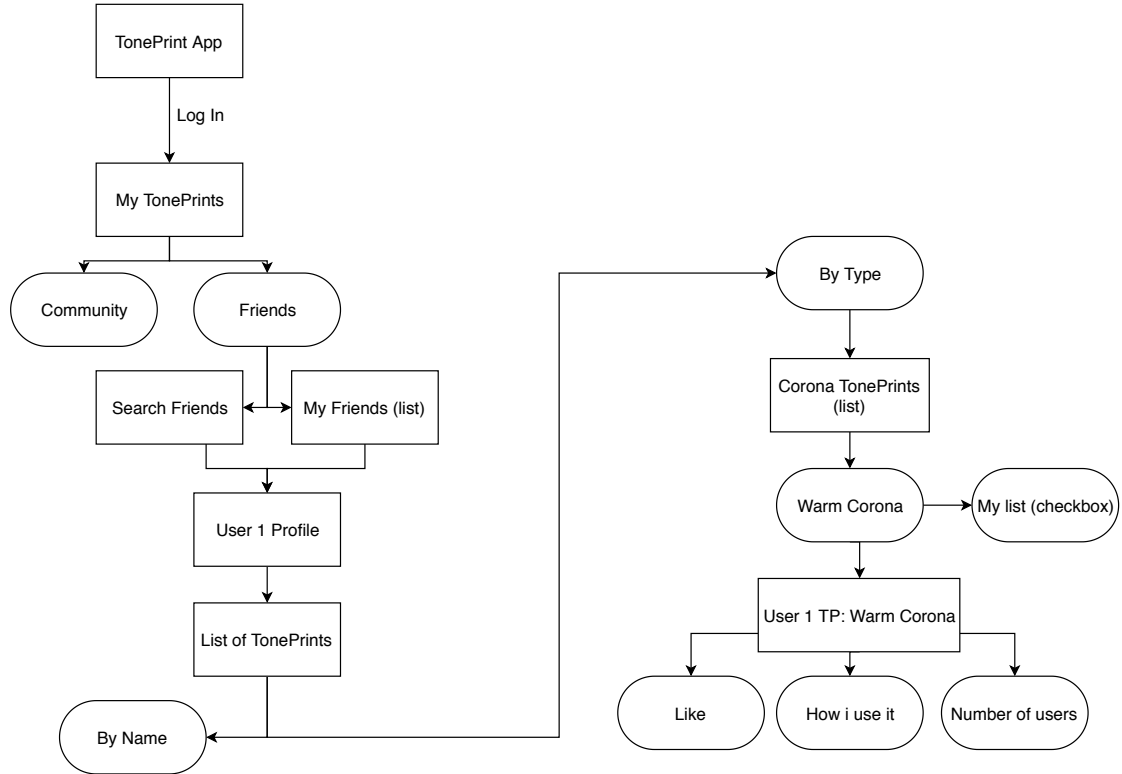
**Subject 1**



**Figure 8.1:** The Concept map created by subject 1.

He begins at the **TP App** from which he wants to **Log in** If he isn't already logged in. Than he enters his site **My TonePrints** which contains the buttons **Friends** and /or **Community**. He uses friends to either enter a **Search Friends** where he can find specific friends, or he enters **Friends List** where he gets an overview of all of his friends. He uses this to find/select user 1, hence entering **User 1 Profile**. On this profile he is presented a **List of TonePrints** created by user 1. The list is divided in **By Name** and **By Type**. From By Type he selects the Corona Type and is presented with a **Corona TP List**. From this list he's able to use a checkbox saying **My List** which adds the TonePrint to his My TonePrints. There's also a Gear/settings buttons, which he doesn't know what does. He choses the **Warm Corona** TonePrint by clicking on the name, which presents him the **User 1 TP: Warm Corona** site. From this site he has the

option to **Like** the TP, to se **Number of users using this** and read a description of **How I use It**.
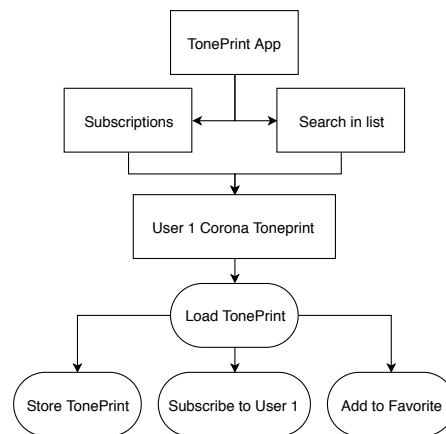
**Subject 2**



**Figure 8.2:** The Concept map created by subject 2.

He begins by opening the **App**. He than have to opportunities, either he would open for his **Subscriptions** which is people he already subscribes, where he can find user 1, or he could go to another **list and search** for user 1. This list can be used for finding users who you don't subscribe to. He then would Connect his pedal and guitar so that he can test the TP he's about to find. He than go and chooses one of **User 1's Corona TonePrints** and **Loads it to his pedal**. He then tries the TP By playing he guitar. If he doesn't like it, he would go find another. If he likes it he would like to have the option to **Subscribe to user 1** if he doesn't already are a subscriber. He would also like the option to **Add the TonePrint as favorite**, so that it would be easier to find later. He than **Store the TonePrint** in his pedal. When he chooses to subscribe to user 1 he would like to have the option to select **Getting notification** either by mail or in app, when user 1 makes something new.
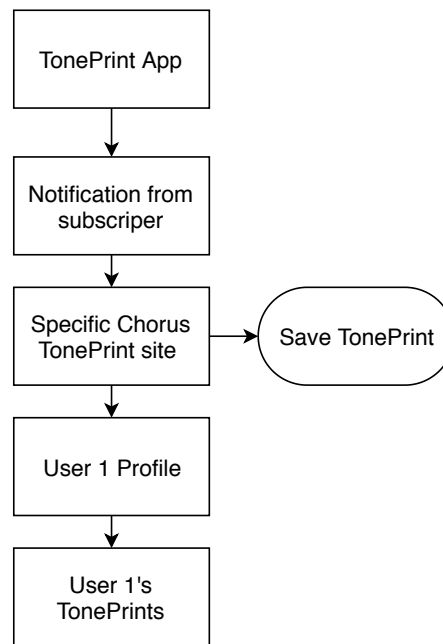
**Subject 3**



**Figure 8.3:** The Concept map created by subject 3.

The first thing he does is to open the **TP App**. When it opens I gets a **Notification** telling that user 1, who he **subscribes** to have uploaded a new Chorus TonePrint. He than taps on the notification, which sends him to the **Specific Chorus TP Site**, in which he selects to **Save TonePrint**. He then gets the opportunity go to **User 1 Profile** where he can check the rest of **User 1's TonePrints**, which he expect is given a **Logical indexation** which could be alphabetical or something else.
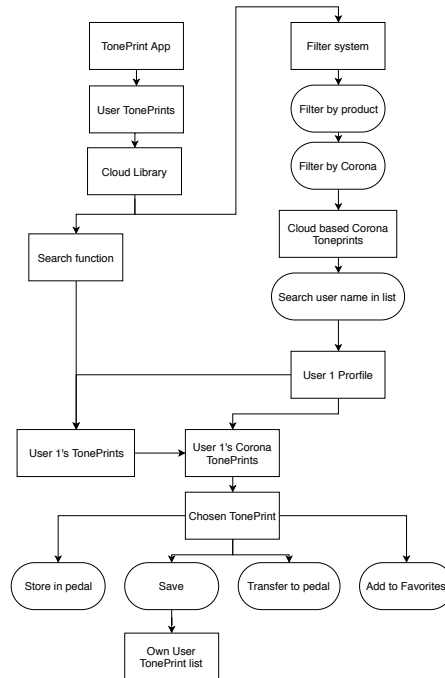
**Subject 4**



**Figure 8.4:** The Concept map created by subject 4.

He begins by opening the **TP App** where expect it to have something like the currently infra structure. He navigates to the **User TonePrints** where he expects to find all of his own User TonePrints and the option to choose **Cloud Library** in which all the User Toneprints is stored. He chooses the Cloud Library because he wants to find a TonePrint from another user. Then goes to a **Filter system** where he wants to **Filter by product** where he chooses to **filter by Corona**. This presents him a list containing all **Cloud based Corona TonePrints**. Then he would be able to **Search for User names** in a **list** until he finds User 1. He also mentions another approach where instead of filtering use a **Search Function** to find all of **User 1's TonePrints**. After his filtering and searching on User 1 he enters **User 1's profile site** Containing all of his TonePrints, however just the ones for Corona, given the filtering. In this **User 1 Corona TonePrint list** he clicks on one so that he can try it, indicating he is **Transferring the TP to his pedal**. After trying it he then have the option to save it to his own **User Toneprint Library** and he's in doubt what happens if he leaves the TonePrint, so he would also like to **Add it to Favorites**. He wants a interface like the current where he can **Save the TonePrint** and **Store it in pedal**.
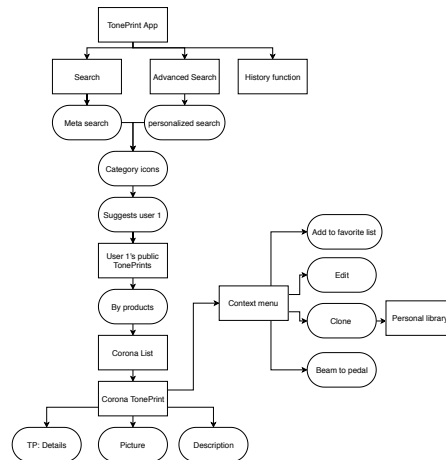
**Subject 5**



**Figure 8.5:** The Concept map created by subject 5.

He wants the app to be simple and similar to some popular apps, so that it's like something you have tried before. In the **TP App** he imagines a magnifying glass in the corner so that he can **Search**. He want to create a option for **Advanced Search**, where you can personalize what you are searching for, but also that the standard Search is a **Meta Search option**. This means that it search on ever thing int the system(TonePrints, User, Product...). He imagines that **Icons could indicate the category** of the search items. So when he searches User 1 it would **suggest User: User 1**. Then he comes to the **Public TonePrints by User 1**, which is **Lists organized by products**. From here he chooses a **Corona TP** from the **Corona list**. When selecting the TonePrint he's presented with the **Toneprints details**, a **Picture** that has been attach and a **description**. If he just Right click or on the phone Hold he's shown a **Context menu** where he can **Beam** the TonePrnt to his pedal, **Clone** it to his **Personal Library** where he can **edit it**, or **Favorite it** so it goes to his list of favorites. He want's a **history function**, so even though he doesn't save or favorites, he still have the option to backtrack to it, like in a web browser.

## 8.1.1 Shared Analysis

The next phase is the shared analysis in which the codes derived from the ICMM's is used, in order to find items (concept and links) which is shared between them. In order to determine which items that identifies as shared a criterion needs to be defined. As described in section 7.4 it's suggested to set the criterion at 50% at the beginning, which afterwards may be adjusted. This means that a given item have to occur in atleast in 50% of the ICMM's to be identified as shared.

To compare the codes they are first typed into tables, for the purpose of gathering the codes for easier overview. The tables containing the codes is Table 8.2 to Table 8.6.

| Shared item | subject 1 | subject 2 | subject 3 | subject 4 |
|---|---|---|---|---|
| TP App | TP App | App | TP App | TP App |
| My User Toneptints | My TonePrint site | | | User TonePrints & Own |
| Search function | Search Friends | Search in List | | Search User Name & Sea |
| User 1 Profile | User 1 Profile | | User 1 Profile | User 1 Profile site |
| User 1 TonePrints | User 1 TonePrint list | | User 1's Toneprints | User 1 TonePrints |

The lists containing the subjects individual codes, Table 8.2 to Table 8.6 are compared to each other to find the concepts which is shared. As recommended by T. E. Johnson and O'Connor (2008) is the criterion for a concept to be identified as shared defined as 50%. The concepts which is defined as shared is listed at Table 8.1(WHich isn't finish).

It's deemed problematic to use the described steps from T. E. Johnson and O'Connor (2008) to create a ACSMM. This is because the task of the workshop was for the subjects to solve a task with a they have to build up as they go. This gives the users full control in regards to which features that exists in the system, how they works and when they wants to use them. This results in the subjects going different ways around the task and solving it in their won way. This is quite similar to some system in the real world which give you the option to reach a certain goal different ways. This however creates one big problem regarding, them only describing the part of the system, which they uses. This makes it very difficult to compare one persons ICMM with another, because they may have chosen different ways of solving the task and theirby having a minimal of similar concepts in common. This doesn't necessarily mean that the two subject disagree on how the system should work and their mental models might be similar towards the system. They just have chosen different approaches for the task, ehich means that they don't uses the same branches of the system.

| Shared concept | Sharedness level (%) |
|---|---|
| TP App | 100% |
| User TonePrint Library | 60% |

**Table 8.1:** Shared concepts and sharedness level

51

| Subject 1 |
| --- |
| TP App |
| Log in |
| My TonePrint site |
| Friends button |
| Community button |
| Search Friends |
| Friends List |
| User 1 Profile |
| User 1 TonePrint List |
| List by Name |
| List by Type |
| Corona TonePrint List |
| My List Check-box |
| Warm Corona TonePrint |
| User 1 TP: Warm corona site |
| Like |
| Number of users using this |
| How i use it |

**Table 8.2:** List of subject 1's coded concepts

| Subject 2 |
| --- |
| App |
| Subscriptions |
| Search in List |
| User 1's Corona TonePrints |
| Load to Pedal |
| Subscribe to user 1 |
| Add TonePrint to favorites |
| Store in Pedal |
| Getting notification |

**Table 8.3:** List of subject 2's coded concepts

| Subject 3 |
| --- |
| TP App |
| Notification |
| Subscribes |
| Specific Chorus TP site |
| Save TonePrint |
| User 1 Profile |
| User 1's TonePrints |
| Logical Indexation |

**Table 8.4:** List of subject 3's coded concepts

| Subject 4 |
| --- |
| TP App |
| User TonePrints |
| Cloud Library |
| Filter system |
| Filter by product |
| Filter by Corona |
| Cloud based Corona TonePrints |
| Search User Name |
| Users List |
| Search function |
| User 1's TonePrints |
| User 1 profile site |
| User 1 Corona TonePrint |
| Transfer to pedal |
| Own User TonePrint Library |
| Add to Favorites |
| Save TonePrint |
| Store in pedal |

**Table 8.5:** List of subject 4's coded concepts

| Subject 5 |
| --- |
| TP App |
| Search |
| Advanced Search |
| Meta Search option |
| Icons indicating category |
| Suggest User: user 1 |
| Public TonePrints by User 1 |
| List organized by Products |
| Corona TonePrint |
| Corona List |
| TonePrints Details |
| Picture |
| Description |
| Context Menu |
| Beam |
| Clone |
| Personal Library |
| Edit |
| Favorite it |
| History function |

**Table 8.6:** List of subject 5's coded concepts

# Bibliography

**Adams, W. C. (2015):** "Conducting Semi-Structured Interviews". In: Newcomer, K. E. et al. *Handbook of Practical Program Evaluation*. Ed. by 4th.

**Andersen, J. L. (2014):** *Forslag til designforløb for oplevelsesdesign af deling af User TonePrint*. Report. TC Electronic.

— **(2015):** *Gennemførelse af bruger-workshop for oplevelsesdesign af deling af User TonePrints*. Report. TC Electronic.

— **(2012):** *Teoretisk Analyse af oplevelsesdesign i TonePrint*. Report. TC Electronic.

**Electronic, T. (2019a):** *About: Our Story*. URL: https://www.tcelectronic.com/brand/tcelectronic/our-story#googtrans(en%7Cen).

— **(2019b):** *What's TonePrint?* TC Electronic. URL: https://www.tcelectronic.com/toneprints#googtrans(en%7Cen).

**Foundation, I. D. (2019):** *User Experience (UX) Design*. Interaction Design Foundation. URL: https://www.interaction-design.org/literature/topics/ux-design.

**Gonçalves, L. (2018):** "Scrum". The Methodology to become more agile. In: *Controlling and Management Review* 62 (4), pp. 40–42.

**ISO (2010):** "ISO 9241-210: Ergonomics of human-system interaction – Part 210". Human-centred design for interactive systems. In: *International Organization for Standardization*, p. 32.

**Johnson, J.; A. Henderson (2012):** "Chapter 3: Definition". In: *Conceptual Models: Core to Good Design*.

**Johnson, T. E.; D. L. O'Connor (2008):** "Measuring team shared understanding using the analysis-constructed shared mental model methodology". In: *Wiley InterScience*, pp. 113–134.

**Kaley, A. (2019):** "UX Responsibilities in Scrum Ceremonies". In: *Nielsen Norman Group.*

**Nielsen, J. (1994a):** *10 Usability Heuristics for User Interface Design.* Ed. by N. N. Group. URL: https://www.nngroup.com/articles/ten-usability-heuristics/.

— **(1994b):** "Enhancing the Explanatory Power of Usability Heuristics". In: *Human factors in computing systems.*

— **(1994c):** *How to Conduct a Heuristic Evaluation.* Ed. by N. N. Group. URL: https://www.nngroup.com/articles/how-to-conduct-a-heuristic-evaluation/.

**Norman, D. (2019):** *Don Norman on the term "UX".* Ed. by N. N. Group. URL: https://www.nngroup.com/videos/don-norman-term-ux/.

— **(2013):** *The Design of Everyday Things.* Basic Books.

**Øvad, T.; L. B. Larsen (2015):** "The prevalence of UX Design in Agile Development Processes in Inudstry". In: *Proceedings of the 2015 Agile Conference*, pp. 40–49.

**Persson, J. S. et al. (2018):** "Agility for UX and Development: A Case Study". In: *NordiCHI.*

**Reka, L. (2017):** *The Benefits of User Experience.* UX Matters. URL: https://www.uxmatters.com/mt/archives/2017/12/the-benefits-of-user-experience.php.

**Rosenfeld, L. et al. (2015):** *Information Architecture. For the Web and Beyond.* 4th ed. O'Reily Media, Incorporated, p. 485.

**Silva, T. S. D. et al. (2018):** "The evolution og agile UXD". In: *Information and Software Technology* 102, pp. 1–5.

**Spencer, D. (2009):** *Card Sorting.* 1st ed. Rosenfeld Media, p. 282.

**UX, A. A. (2019):** *User experience definitions.* Ed. by allaboutux.org. URL: https://www.allaboutux.org/ux-definitions.

**Wixon, D. (2003):** "Evaluating Usability Methods". Why the Current Litterature Fails the Practitioner. In: *Interactions* 10.4. Ed. by S. Dray; D. A. Siegel, pp. 28–34.

# Appendix A

# Usability problems of the TonePrint App

The content of this appendix is the usability problems defined through the heuristic evaluation of the TonePrint application [1]. The problems are listed in accordance with the heuristic it violates. No problems were identified for the "User control and freedom" and "Help users recognise, diagnose, and recover from errors", which is why the two heuristics aren't mentioned below.[2]

FiXme Note!

FiXme Note!

**Visibility of system status**

- When browsing through the available TonePrints for artists, some of them may have created the same TonePrint settings for multiple pedals. Clicking between these doesn't provide any clear feedback to which is selected however, as the description of the TonePrint is the same whichever pedal it is set for.

- There is a lack of indication to which instrument is selected, as this selection happens in settings and not in the list itself. If either *guitar* or *bass* is selected under the instrument filter, and not *all*, the message in the list *"all TonePrints by..."* is misleading, as the user is only going to find TonePrints for one instruments.

- When pressing *user* on the computer application there are no indications of what to do next. The user is just presented a blank column with nothing in it.

- When selecting the **Helix Phaser** with the *guitar* filter active on the computer app, nothing happens. When trying this on the Iphone app, it opens one TonePrint, and when opening it on an android unit, the app crashes.

- When pressing the video icon on the android and computer app, it isn't clear that

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[1]FiXme Note: Her skal der refereres til udførelsen af den heuristiske evaluering
[2]FiXme Note: Skal de engelte problemer have en mere fyldsgørende beskrivelse?

the unit will open youtube in a web browser compared to the Iphone app.

- There is no indication of which TonePrint you already have stored in the pedal connected. [3]

### Match between systems and the real world

- The sliders for the various parameters are all presented as circular sliders, but interaction with them are done by pressing the center of it and swiping up or down. As such there is a risk of grabbing the entire canvas and not the parameter in question.

- It appears to still be possible to select bass TonePrints with the *guitar* filter active.

### Consistency and standards

- Some artists have published the same TonePrint for multiple pedals and when switching between these, the text description is the same. However, in some cases there is a noticeable difference when doing these switch, as some of the descriptions has minor spelling or typeset errors, even though they should be identical.

- When opening a video description of a TonePrint with its creator on the smartphone app, it is presented in a new window. When opening one in the computer app, it passes you on to the given video on youtube.

- When browsing TonePrints, there are different buttons in the top right corner of the description page, depending on on the TonePrint.

- When watching a video description of a TonePrint on the Iphone app and the user at some point wants to return to the list of TonePrints or artists, it demands two different interactions. First, the user must swipe down in order to return to the TonePrint description, before either swiping right or pressing *back* to get back to the list view.

- When choosing the **SpectraComp Bass Compressor** with the *guitar* filter on, the user dosen't get the same menu as when choosing other pedals. This is probably due to it being a bass effect.

- When creating a favourites list, the TonePrints are sorted by pedal name, even if the user selects *sort by artist.*

- When opening the app on an android unit, the user gets informed that he needs a midi connection. This message doesn't appear on the desktop version, even though

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[3]FiXme Note: Spell check: Jeppe

the same goes for that.

- The user has a search functionality available on the android system but not on either the desktop or Iphone version.

- After connecting the pedal and setting the app to 'browse by artist', the artists who have a TonePrint applicable for the pedal aren't highlighted. This contradicts what happens if the app is set to Brows by Pedal.

- After you have created your own TonePrint and saved it, it becomes visible in the user menu and three dots to the right of it indicates interaction possibilities. On a mac and as a mac user it's expected that you can swipe on the computer's trackpad, instead of using the three dots, this is however not true in this case. [4]   FiXme Note!

**Error prevention**

- The typical confirmation dialogue of either ✓ or ✗ is presented to the users with these icons inside the button on the Iphone app. As such it isn't clear whether the user selects an action when it is visible, or if this visibility means that it is already selected.

- When the user is beaming a TonePrint to the pedal, he is given the instruction: *If your pedal flashed like this beaming was a succes.* In order to follow this instruction the user would have to focus on the pedal, and by doing this he wouldn't have seen this instruction in the first place. As such, the user has to focus on two things at once.

- The user can assign different parameters to the same physical button on the pedal, allowing for live editing of the TonePrint. However, the pedal comes with a print above the knob on the pedal itself, which can't change. As such, the user can potentially edit a parameter, even though the knob says something different.

- In the mapping settings of the editor part it's possible to select which parameters the physical buttons of the pedal should affect and map their behavior. When changing the parameters, the mapping of the new parameters is set to a default. If you regret and wants to use the former parameter as it was mapped you would have to remember how it was mapped, because it's also given the default mapping. [5]   FiXme Note!

- Knob range: The indications of what's represented on the x and y axis in the mapping part of the editor is not very clear. The writing is dark blue on a dark blue background.[6]   FiXme Note!

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[4]FiXme Note: Spell check: Jeppe
[5]FiXme Note: Spell check: Jeppe
[6]FiXme Note: Spell check: Jeppe

### Recognition rather than recall

- When switching between *browse by product* and *browse by artist*, this has to be done under settings, and the same goes for switching between type of instrument. Instead of having this filtering action visible with the list, the user must remember to check this in the settings menu.

### Flexibility and efficiency of use

- In general there are limited ways of customising the canvas, for example the favourite list.

- The search functionality on the android app only allows for searching in the open menu, making it almost redundant. The user still needs to to go to the right menu before searching for specifics, making scrolling a faster way of finding the right TonePrint.

- While browsing the TonePrints in the Library menu or the templates menu you are forced to use the "Back arrow", in the upper left corner, to navigate back to the main page of the menu. This contradicts with the expectations of the menu icons also being applicable for this interaction, which stems from interaction with other systems. [7]

### Aesthetic and minimalist design

- It's limited to what extend the size of the canvas can be expanded on the computer app. If it is made full-screen it will no long match the size of the window and take all the space. Instead, the far right of the window will just be a blank column of nothing.

- When opening the computer application, until something is chosen, the screen will primarily be just blank.

### Help and documentation

- When choosing *Editor Help*, the user is sent to the main TonePrint webpage.

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[7]FiXme Note: Spell check: Jeppe

# Appendix B

# Interview Themes

The following appendix contains the resulting themes from the thematic analysis of the interview with the 4 members of the development team at TC Electronic. Each theme is presented with a brief elaboration of what it covers, and they are presented in chronological order as they came up during the analysis with only a few exceptions. Some themes were formulated during a second iteration by reorganising some of the codes and by renaming some of the theme names in order to better fit the content. The approach and method for the analysis is described in chapter 4.

### Beaming app

The focus of this theme is the TonePrint application in its early stage, where the editor wasn't included. Instead, the app only consisted of a library with artists TonePrints that could be filtered by either *guitar* or *bass*. The reason for the label "Beaming App" comes from the four subjects describing the app this way, as beaming already was available through the pickup in the instrument in this early stage. The codes within the theme covers descriptions of different elements of the app, as the first question is interested with the decisions made during the initial design process of the app.

### No external inspiration

This is a small theme containing comments from the subjects when they're asked whether they have sought inspiration from any internal or external products during the development of the TonePrint app. And as the name indicates, they generally don't believe that they were inspired by any external ones. However, one of the subjects commented that a sister company had a product with some similarities, but he didn't consider it a source of inspiration.

### Development tool

The TonePrint editor and general concept stems from a development tool used by TC Electronic for creating parameter settings in new pedals. This theme is concerned with

that tool, referred to as *virtual front*, and originally it wasn't something TC had offered customers, as it was rather complicated and primarily utilized by the sound engineers at TC. It was used to set which parameters that was available for editing in the knobs on the pedals, and it has, as already mentioned, since been developed into a product on its own in the form of the current TonePrint editor.

## Parameter design

Given the functionality of TC Electronic's products, the different parameters of the audio settings are set by models described as *meta models*. The meta model is what is altered to define the sound of the given product. A challenge for TC has been to make these models easier to read and understand by the users e.g. how gain is controlled with labels, intervals etc. These models are what the editor is altering, and the underlying challenge for TC is to avoid showing the users all parts of the concept and risk being copied.

## Internal hierarchy

This theme deals with the internal structure of the development team, more specifically in correlation with how decisions are made. At some point during the design process, decisions has to be made to reach deadlines, and it was explained by the subjects that the *product manager* has the final saying in these scenarios. This has lead to situations where the developer had to integrate features in the app that he wasn't capable of explaining himself due to high complexity. In other situations, however, the developer was more persistent and managed to get the final saying in how the feature should be designed.

## Feature prioritisation

During development of new products, TC have to prioritise which features to include first. All the members of the development team has a saying in this process, but users are also involved in the process, if they have specific feature requests. These requests are gathered from the existing online communities such as *TonePrint Junkies* on Facebook and their own Music Tribe site. When it comes to deciding on which features to implement, two factors play an important role, how easily can it be implemented? and how important is the feature? If a feature is considered important but at the same time time-consuming to implement, other requests may be implemented before it. The TonePrint community is in its own right a request made by many users and is a great example of the just mentioned prioritisation process. It's heavily requested and as such important but also difficult to create. As such, it has since been postponed, while other features have been implemented in the existing TonePrint app.

## Decisions made from testing

TC Electronic doesn't have extensive experience with user involvement but have already conducted a few user studies. Some design decisions have been made on the basis of the results in these studies where competitors' products was investigated in order to get into

other markets. One example involved a type of pedal, they weren't making themselves at the time. They then decided to study competing products and found that the interface and controls of that pedal were too complicated. They then applied this knowledge to their own pedal which then became more succesfull.

The concept of making the editor available for users, instead of just using it as a development tool, also came from a user study. Here, a group a bass players were given access to the virtual front with the task of creating a new sound for a bass amp, which resulted in a new setting for the TC products. The result of this eye-opener for TC became what is now referred to as the TonePrint editor. Finally, a user workshop was conducted by TC focusing on developing ideas for a TonePrint community (Andersen 2015). This workshop lead to multiple ideas for content and features, but the development of this is still at a conceptual stage.

## Experience from earlier products

This theme highlights that TC Electronic utilizes the experience they have gained during the development of some of their earlier products and from their user studies. One example of this is a pedal that turned out to be too complicated and too expensive, and another is the user study on competing products mentioned in the previous theme. This experience has also been present in the development of he TonePrint concept, as they kept it in mind that they had to focus on reducing complexity.

## Focus on the target users

There are different kinds of target users for the TonePrint concept in general. Some of them just wants a regular pedal with physical buttons on them for editing the sound, while others have more extensive requests for content and functionalities. Some of them are users of the TonePrint pedals and application because they want to sound like their idol or want to discover new sounds made by professionals, while others wants to make their own TonePrints from the bottom. The requests from these different groups are met in the form of the pedals themselves, the Artist TonePrints, and the TonePrint editor. These groupings of target users are not something that TC have defined through user studies but more from a gut-feeling. Finally, for the TonePrint community, there also is the group of people who wants to share their TonePrint with each other.

## Decisions made from assumptions

This theme further emphasises how TC don't have much experience with user involvement. The decisions of which features to include and how to design them are mostly based on assumptions of what they believe the users want and what works best. An example of this is the design of the interface for the parameter settings in the TonePrint editor. The developers describe how this was shaped accordingly to their own assumptions, with one of them further stating that he would expect it to simply be the typical way of setting it up.

## Decisions made from convenience

Here, two situations are mentioned of how convenience played a role in decision-making. An example of this is how they want to implement options such as "link to Youtube" and "like your favourite users" in the TonePrint community through technology that they already possess. Another interesting point made in the interview is that they in some instances have had a tendency to just try out the easier design proposals before discussing what they actually want to achieve from it.

## Communication in the development of an app

From the interview it was found that the current level of communication in the development and maintenance of the TonePrint app is insufficient. It was found that the platform-specific differences between the different versions of the app to some extend is caused by a different programmer for each platform. They have a level of "artistic freedom" and they are furthermore seated in different teams. As such they have each implemented features depending on what is commonly used on their given platform and communication between them is complicated due to their different seatings.

## Business model

The TonePrint concept enables TC to always upgrade their product by adding new content in the form of new artists and templates. In this theme it's also highlighted how TC wants to separate themselves from their competitors which is why they have conducted user tests of competing product.

## TonePrint descriptions

For every TonePrint in the library, there is a text description telling something about the artist and the specific TonePrint. The motivation for what is written in these descriptions typically comes from members of marketing who meet up with the artists in question. The aim for the descriptions is to involve the artists and make the users want to try out the given TonePrint. By providing them, the users have some information about the settings in the TonePrint in question, and this is considered further valuable in a TonePrint community. For professional artists, it may seem more obvious for the users what the artists wanted to achieve. Furthermore, in the case where many TonePrints for the same pedal are made, the descriptions will help the users sort out which ones they want to try. there could easily come alot of TonePrints, where these descriptions can help the users sort out which ones they want to try.

## TonePrint Concept

This theme covers comments made on the TonePrint concept in general. The TonePrint concept consists of three layers: Regular pedal adjustment, beaming of Artist TonePrints and templates, and finally the creation of User TonePrints. Each of these layers aims at

different target users and helps TC expand the spectrum of possible end-users. Many of the comments are concerned with how TonePrints allow the users to sound more like their idols and as such is a unique product. Other comments also covers their thoughts of including a community for sharing user TonePrints in a future version of the platform and what should be included in this.

## UI design specifications

Going from the former TonePrint editor to the current, a lot of the UI was changed. In the early version, many interactions were controlled with sliders, and this was challenging for the UI designers, as there were problems with mapping these sliders to the screen, especially for the phone users. The comments in this theme is concerned with how they made changes to the editor in order to make it more user friendly. A current challenge being discussed is the lack of information at each parameter setting. There is a lack of cues to what the parameter changes, so the main way to figure this out is to try editing them and listen. one solution proposal up for debate is to group the more similar parameters together and provide descriptions of them. This should enable the users to better understand how to interact with the sliders in order to reach a desired effect.

## No user involvement

This is a very brief theme containing comments of situations where TC haven't involved users in the design process. It's mainly in correlation with the first question concerning how they decided which features to include in the TonePrint app.

## Decisions made from personal opinions

Many decisions made in the design process comes from personal opinions. This theme emphasises the need for more user involvement instead of relying on a general gut-feeling within the development teams. Designing the information architecture of the TonePrint was for example done on the basis of their own gut feeling of how it should look and behave.

## Inspiration from external products

In this theme it becomes clear that TC Electronic have been looking at other companies for inspiration for the TonePrint Community. Examples of this are *Soundmondo* from Yamaha and *The Fyre Effect* from AudeoBox, who both offer a community, to some extend, to the users. From their research into these, they have found that having a 'like' feature may risk many effects being difficult to to discover until they get likes themselves, which TC wants to avoid happening in the TonePrint community.

## Micsellaneous

As the name of this theme much indicates, it contains codes that are too unique to fit in elsewhere. If the codes don't seem to bring any applicable content to the analysis, they may also be placed in this theme.

## Native UI

Following the initial release of the newest version of the TonePrint app, TC received negative feedback from users who thought the app was simply working too slow. The reason for this was that TC originally used a cross-platform approach for developing the TonePrint app. Things that made sense for developing the app on android would cause issues on the Iphone version and vice versa. TC therefore made changes and fixed these issues by making different design solutions for the different platforms.

## User involvement

As it has already been elaborated on, user involvement isn't a completely new area for TC, but it is something they want to apply further in their design process. This theme covers the codes concerned with situations where TC actually did involve the users to some extend, and an example of this is how the development of the TonePrint editor was based on a user study involving bass players interacting with the virtual front. Another example is the workshop conducted by Andersen (2015), where potential end-users' wishes for a TonePrint community was investigated. It seems reoccurring that they want to know what find out what the users want through these studies instead of figuring out what they need.

## External developers

TC have on previous occasions involved external designers and developers in the development products. A great example of this is the very first version of the TonePrint app. This was designed by an external designer but implemented by TC's own programmers.

## User feedback

There are typically two ways that TC receives feedback from their users. Either they get feedback through their facebook site *TonePrint Junkies* or through their Music Tribe Community Forum. Much of the feedback they get is about feature requests for the TonePrint app, and this is something that TC are good at keeping track of. The feedback is also about issues found in their products. Every member of the development team is a member of the facebook site, so each of them do have some user contact, but typically the feedback has been through the marketing team first.

## Community requests

The idea of being able to share User TonePrints with other users has been a request since the beginning of the TonePrint concept. TC obviously acknowledges this request, but as it has already been mentioned, it is an extensive and time-consuming task. They have however been making steps towards beginning an actual development process of this community, as they see it as a matter of time before the users find other ways of sharing User TonePrints with each other.

## Sharing detained

In correlation with the previous theme, TC have had to make precautions for the users not to find ways of sharing User TonePrints through other means than their own systems. TC describes how they have locked the files that represent the TonePrints in order to stay in control of how this is done. This has lead to some users finding creative workarounds to share their TonePrints anyway, with examples of users who have taken screenshots of the parameter settings in their editor and tell the other users to set their parameters the same way.

## Community tags

One feature that seems to be of great interest for the TonePrint Community is what TC refers to as *tags*. The intention is to assist the users of the TonePrint community in finding certain TonePrints by providing them with tags for categorisation. Some suggest that the users should be completely free to come up with these tags themselves, while others suggest that the users should be provided with a limited number of pre-defined tags. They do however agree that the challenge with such a feature is that it depends on the users' understanding of the tags. What may be obvious for some users may at the same time be misleading to other users, as it can be very subjective what they mean.

## Community Features (besides tags)

Beside the tagging feature, TC has also given thoughts to other elements to include in a future TonePrint community. Some of them emphasise a way of subscribing to another user, where they would be kept updated when this user would upload new TonePrints. This would make the users resemble the professional artist in the existing TonePrint app, as they would have the potential of becoming idols themselves. In order to further support this possible motivation for using the TonePrint community, Text descriptions and other self-promoting elements such as links to examples on Youtube or SoundCloud could also be included. For all of the subjects in the interview, it in general seems as the ideas for the TonePrint community relies on some sort of account system for the users, which currently doesn't exist for the TonePrint concept and as such requires a database for managing it. Other important considerations revolves around how the TonePrints are prioritised when displayed to the users. Some of them suggests by name, rating, or whether they have an extensive text description. One of them even suggests a way of

logging which TonePrints are used more then others and then bring these to the top of the list. Whatever the solution may include, they all agree that an effective search functionality should be included with this.

### Community decisions

This theme is very broad, as it covers decisions already made for the community in general. One of these, which they don't fully agree on yet, is how much they believe the community should be integrated in the current TonePrint app. Some of them wants it fully integrated with the current system maybe as a tab much like with the editor, Others want to keep it separated with just a few sharing and uploading options available in the app. They want the remaining "social media" elements to be a thing of its own. What they do agree on, however, is to include the users in its development, in order to meet their expectations in the end.

### Focus on users and user-friendliness

This theme covers the extend to which they already know their users. They want their users to easily be able to use their products, but they have currently just scratched the surface of including them in the design process. The comments concerning this do state that user-friendliness is a high priority focus for them, but there seems to be a lack of understanding of how and why.

### TonePrint app prioritisation

The maintenance and further development of the TonePrint app has become a priority on the same level as for other TC Electronic products despite that they offer this app for free. This has resulted in more time and resources being allocated to its further development. This is also a factor in why the development of the TonePrint community has been postponed.

### SCRUM

This theme is concerned with their framework in the design process, SCRUM. Each sprint is three weeks long and by the end of this timeframe, each member may present results of their work. Before the start of a sprint, they check the backlog to determine what tasks to focus on and how to prioritise them. If a task is considered too time-consuming for a three week sprint, it is deconstructed into smaller tasks which then are divided between the current and future sprints. The SCRUM method is in general considered beneficial by the development team, as they agree it helps them focus on what is currently at hand and then postpone the less important tasks for later sprints. Planning and executing the sprints seems to be a fine balance between staying realistic in correlation with goals, and having more tasks to engage with if they finish their initial ones before the end of the sprint.

## No outlined goals for the TonePrint app

TC don't seem to have outlined goals for the TonePrint app, and in their own words this may be because it's a product they offer for free. Every now and then, some of them do check how many people are using the system though.

# Appendix C

# Concept maps from workshop

This appendix contains the concept maps which is derived from the workshop **??**. The first section contains the individual concept maps as they were drawn by the participants of the workshop. The second section contains larger versions of the individual concept maps derived from the participants presentation, which is seen in **??**.
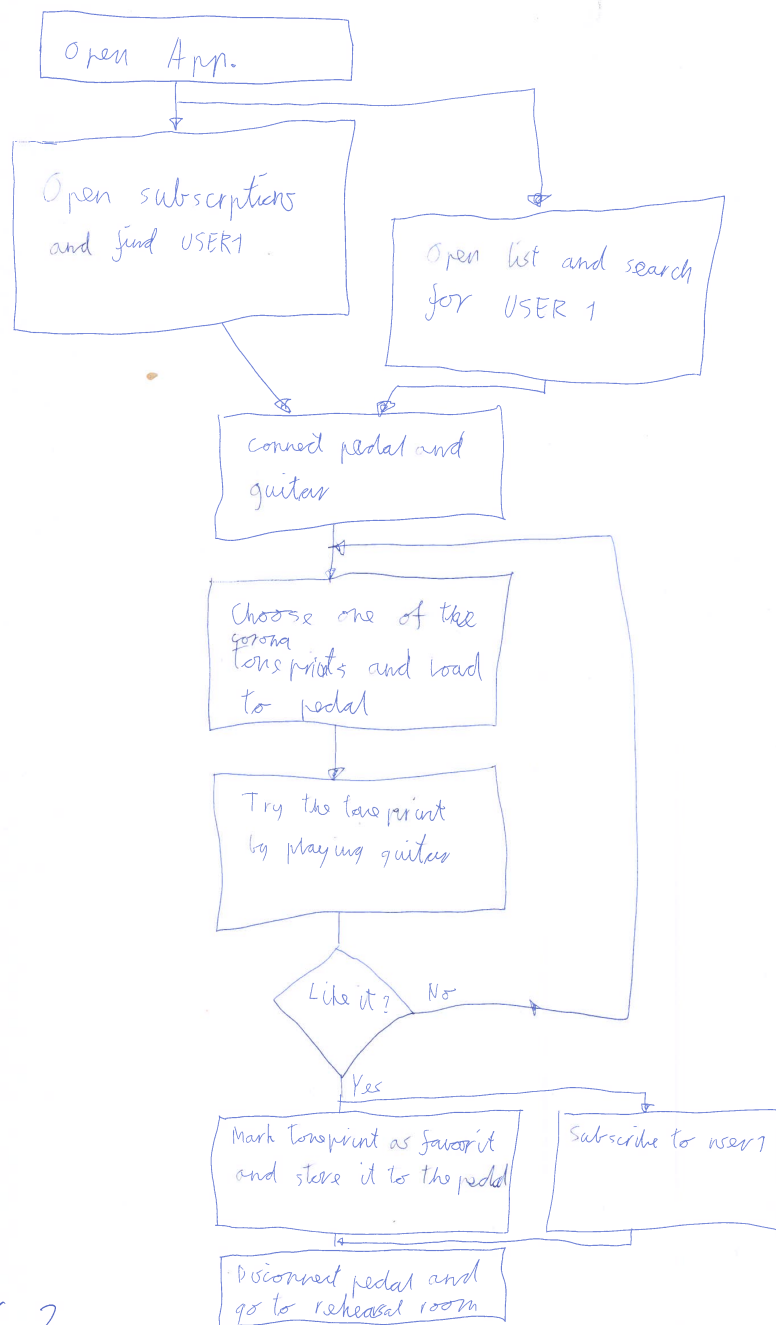
## C.1  Drawn Concept Maps
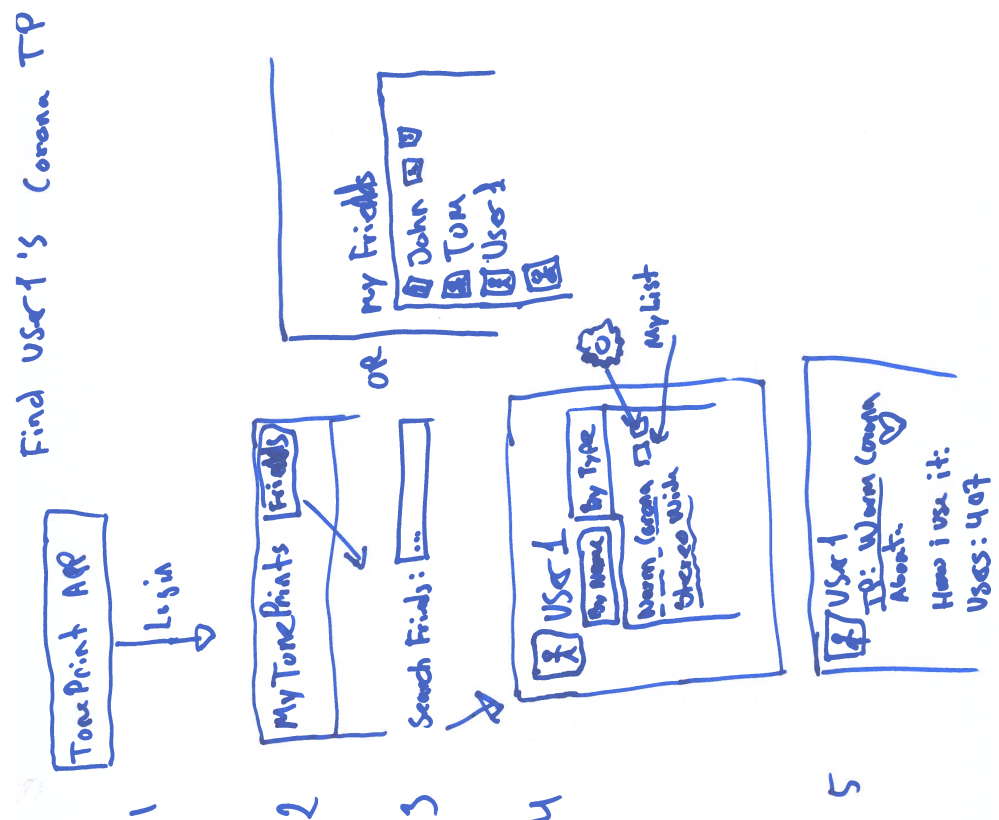


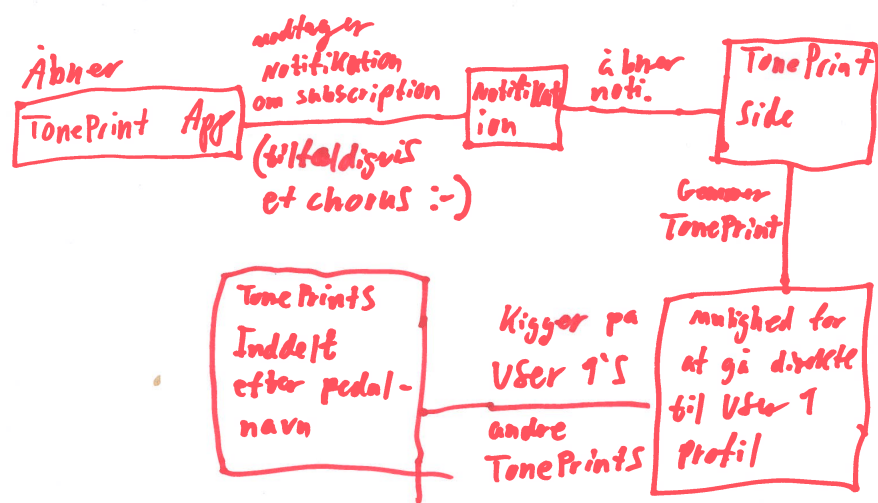**Figure C.1:** The Concept map drawn by subject 1.

Figure C.2: The Concept map drawn by subject 2.
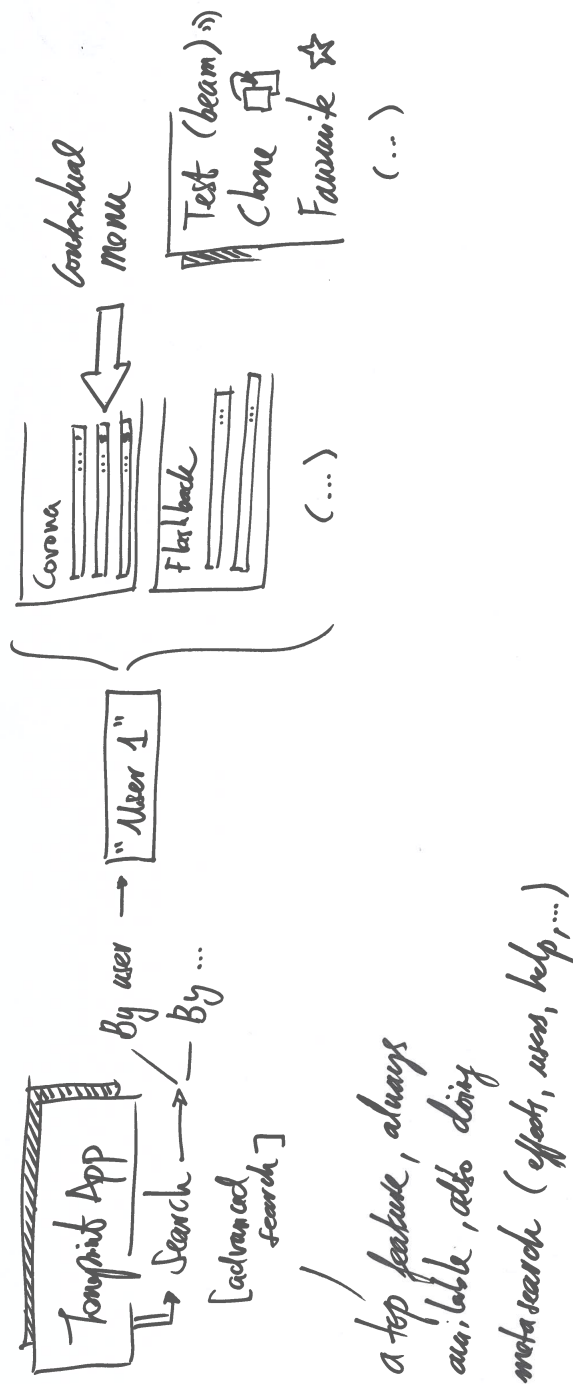
71

Figure C.3: The Concept map drawn by subject 3.

**Figure C.4:** The Concept map drawn by subject 4.

**Figure C.5:** The Concept map drawn by subject 5.
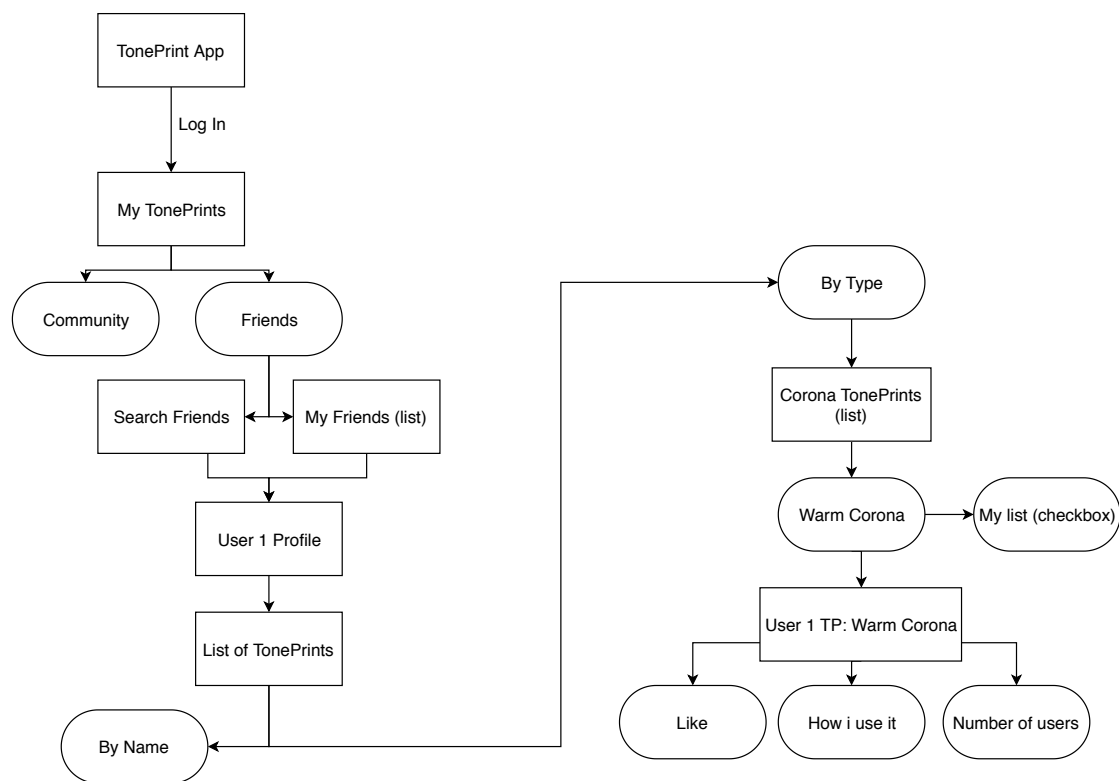
## C.2 ICMM's Derived from presentation



**Figure C.6:** Concept map from subject 1, used for comparing mental models in **??**
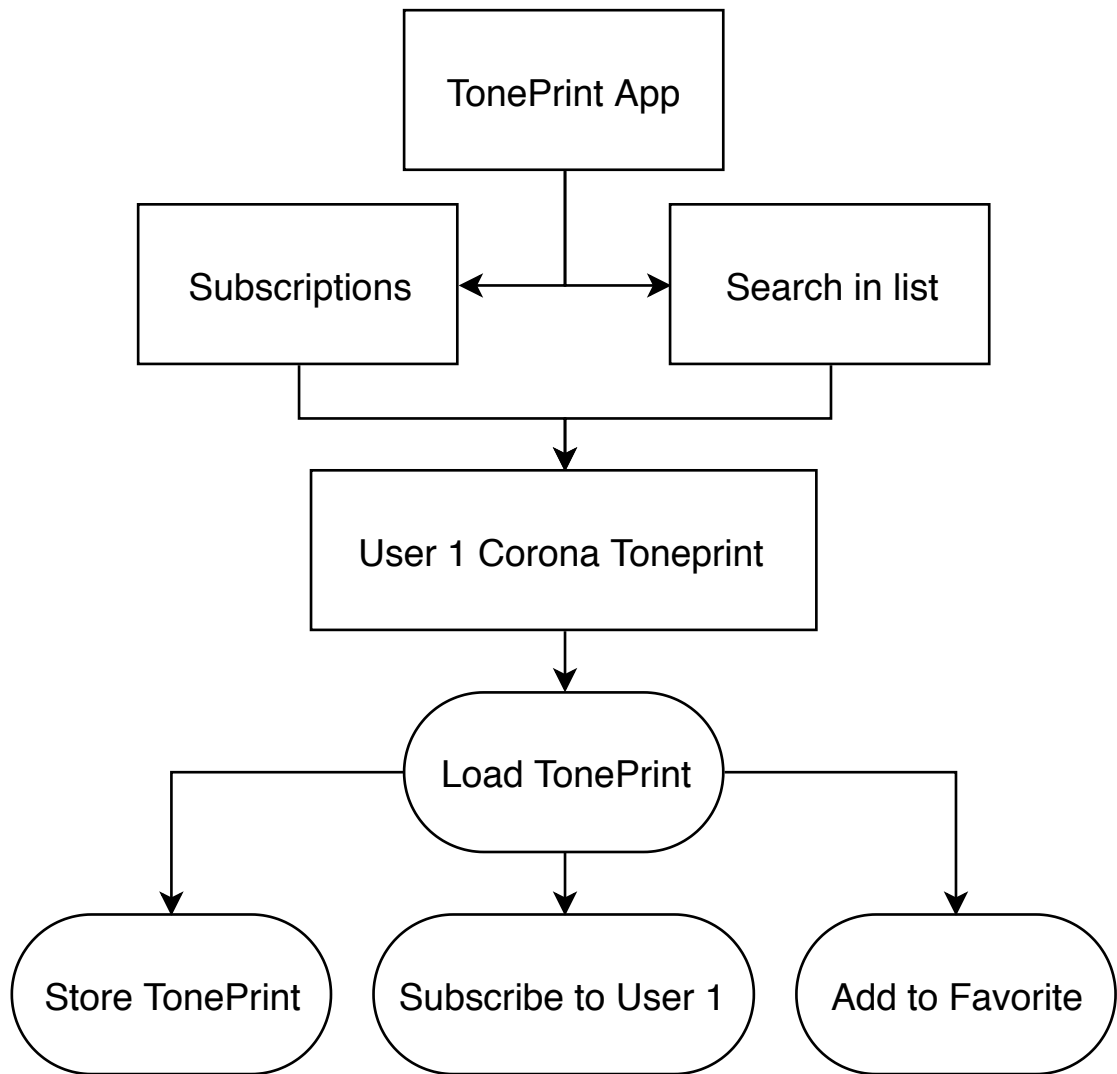
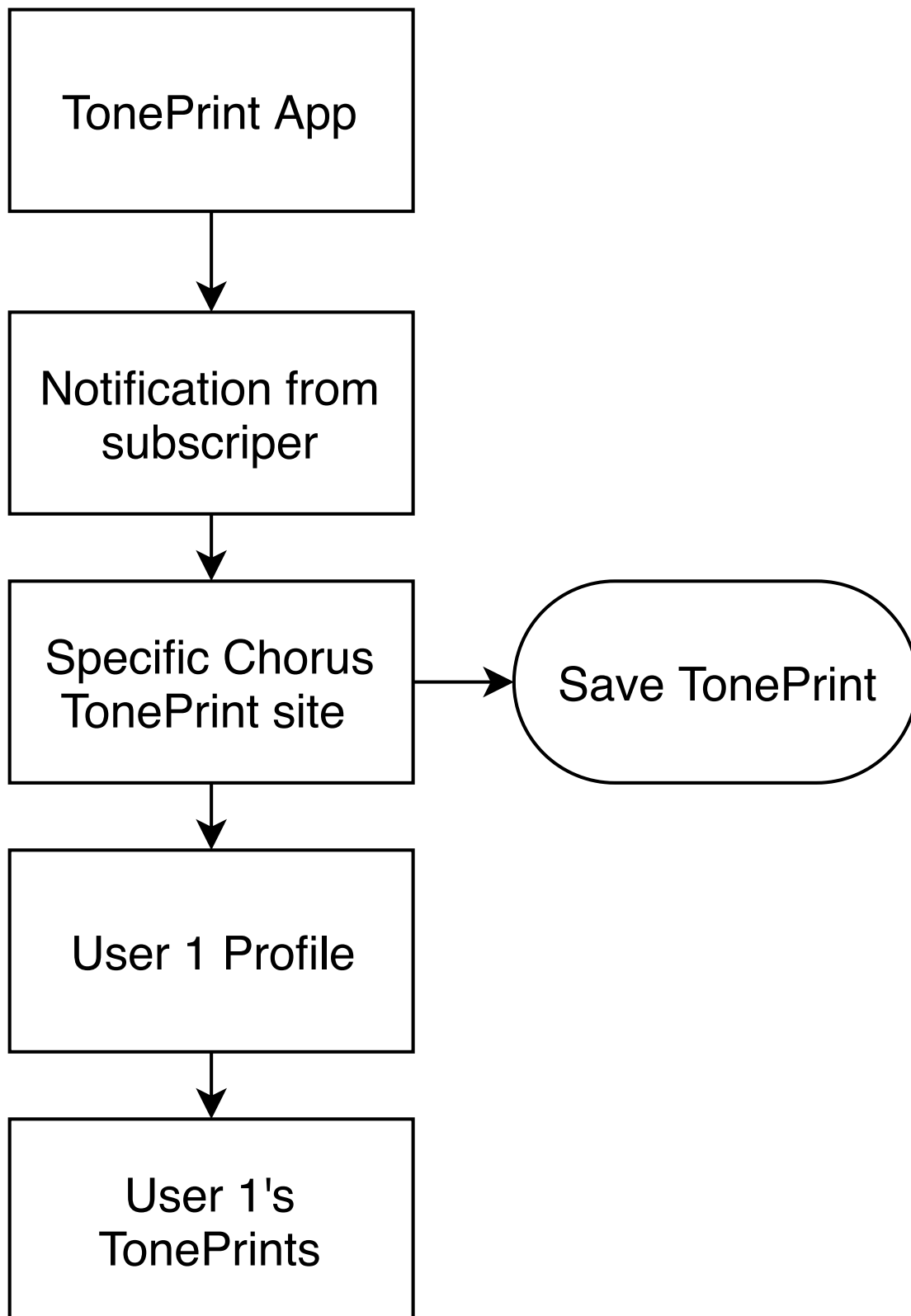**Figure C.7:** Concept map from subject 2, used for comparing mental models in **??**

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│    User 1's     │
│   TonePrints    │
└─────────────────┘
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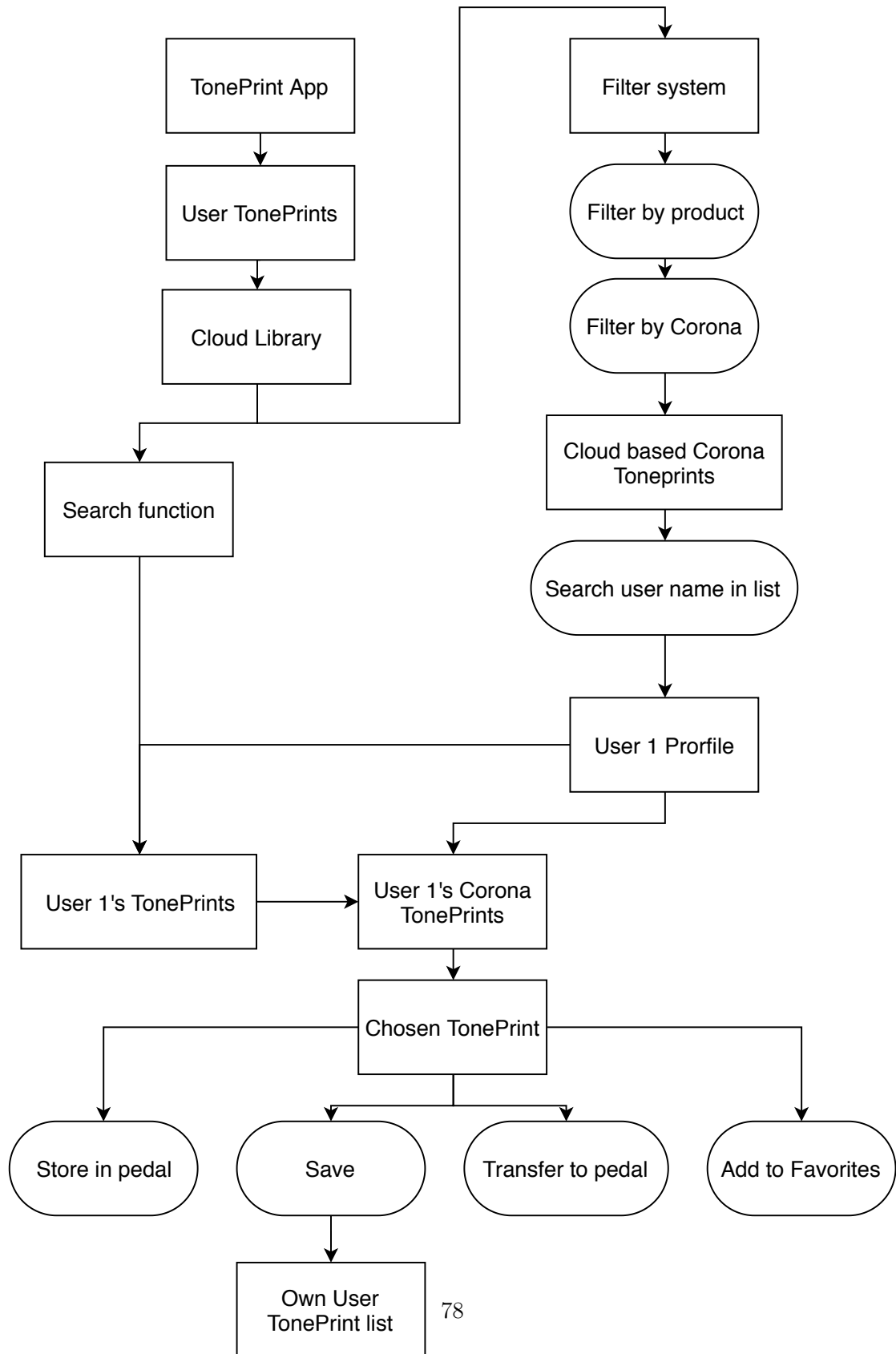**Figure C.8:** Concept map from subject 37, used for comparing mental models in **??**

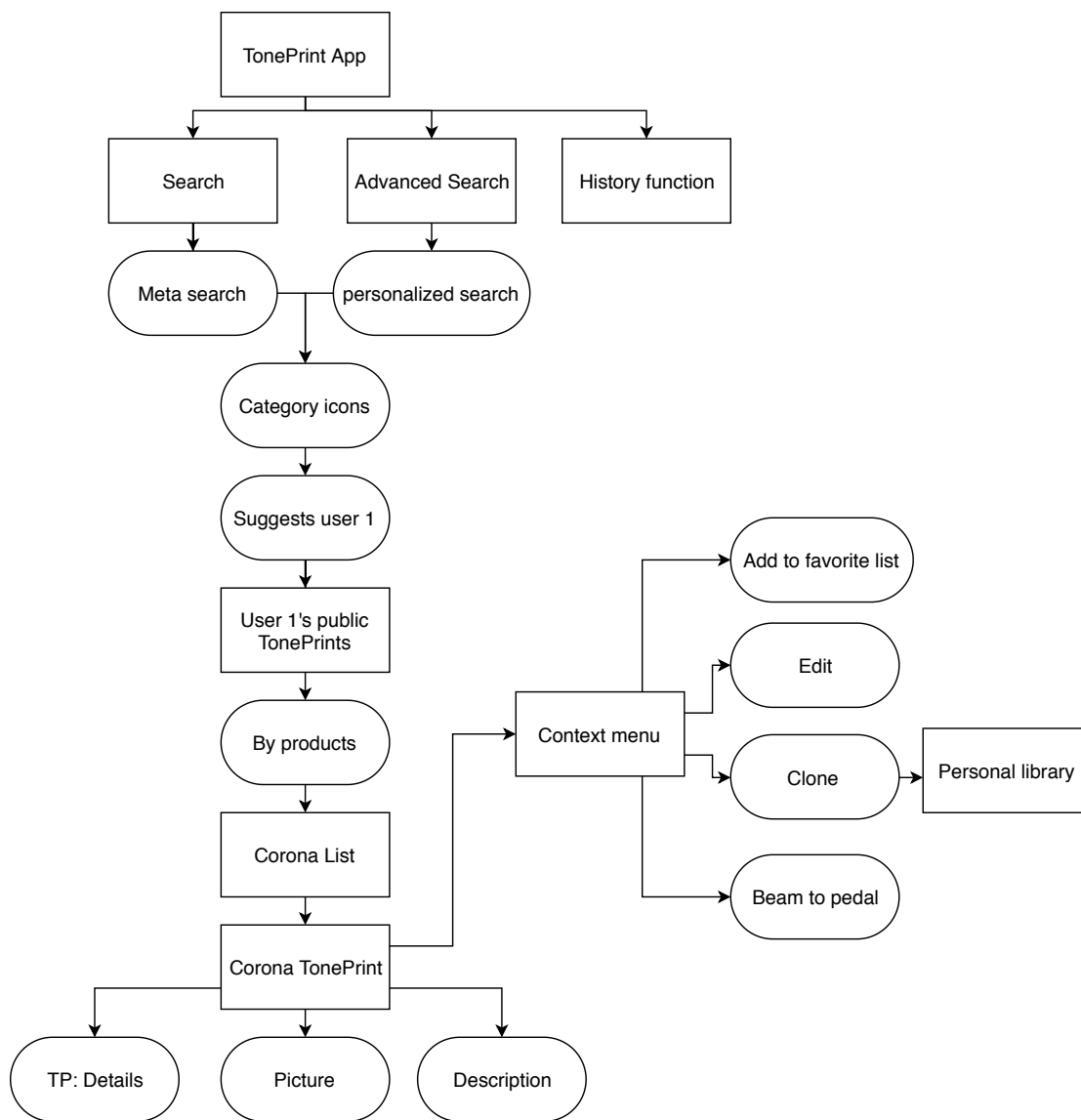**Figure C.9:** Concept map from subject 4, used for comparing mental models in **??**

**Figure C.10:** Concept map from subject 5, used for comparing mental models in ??