Designing a gift giving support application
Abstract

Gift giving has far deeper societal, sociological, and psychological implications than people are generally aware of. It can work in both positive and negative ways – building and strengthening or weakening and breaking social ties, imposing identity images on both the givers and the recipients. Gifts are also important from a consumer and marketing perspective and tend to cause their seekers anxiety in many ways.

To counter the difficulties in the gift giving process it is important to record information about important dates, recipients, given and received gifts, as well as new plans and ideas. Many tools are already being used to help keep track of gift giving, and these range from simple pen-and-paper solutions to productivity applications like note-taking tools and spreadsheets. Unfortunately, there are only a few tools that specialise in gift management, and even these have shortcomings in one way or another.

The purpose of this thesis was to design a new and better solution to meet gift giving management needs. Gift giving behaviour was explored through literature and interviews, and the Technology Acceptance Model and Design Science Research approach were utilised to triangulate a complete list of requirements for a gift giving support application, which was then designed. A prototype was constructed according to the design. The prototype was evaluated with heuristic evaluation and small-scale user testing using a paper prototype. The findings were used to correct flaws in the initial design, resulting in an improved design of the proposed application. While nowhere near ready for production, the prototype could stand up to evaluation against requirements on an acceptable level, thus validating the design approach.

These results can be utilised in future research and/or development to continue the design and production of an actual gift giving support application that will meet the needs of both gift givers and recipients.

Keywords
gift giving, Design Science Research, UI design, UX design, heuristic evaluation, user testing, personas, ICT, literature review, Technology Acceptance Model

Supervisor
Raija Halonen
Foreword

I have always loved gifts. Giving them, getting them, others giving and getting them, talking about them, thinking about them, planning them… The whole deal. Despite this, I know all too well that giving gifts is not always a bed of roses – sometimes you cannot seem to find the right gift, become paranoid of having possibly picked the wrong gift, cannot find the perfect materials for a DIY gift, accidentally ruin a great gift, or just hate the recipient but are bound by social rules to give them something. While not all the troubles can be alleviated by a computer, I have always wanted something that would at least help with the management. Alas, no such solution could ever be found and thus the idea of “The Little Gift Helper” application was born. If nothing else, this thesis brought me closer to realising that idea.

I would like to thank my hazy Pauli Rönkkö for his unwavering support through the hardships of writing this Master’s thesis. A huge thanks also goes to my sister Dr Piaistinta Tikka, whose academic expertise was crucial to finishing the journey. My poor parents and grandmother deserve a shout-out for their endless patience, support, love, and belief.

A big thanks to University Lecturer and Adjunct Professor Raija Halonen for supervising my work on this thesis, and forcing it to completion.

Annariina Tikka

Oulu, May 26, 2017
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1. Introduction

The purpose of this study was to explore the process of gift giving and define the requirements of a gift giving support application, then design a prototype matching those criteria, and evaluate it.

There are numerous occasions for gift giving: Christmas, birthdays, graduations, anniversaries, apologies, romantic occasions, spontaneity – all are occasions that can be associated with giving gifts in Western societies. The plentiful occasions for gift giving vary around the world and carry a significant social value (Parker-Pope, 2007). Gifts are also often ritualised, such as Christmas, and gift giving has then a symbolic acting out of commitment between the giver and the receiver (Furnham, 2016).

One of the most important reasons we give gifts is to feel closer to other people – to form and strengthen social bonds between individuals (and sometimes communities), integrate with others, in both personal and formal contexts – but also to reflect social distance (Schwartz, 1967; Sherry Jr., 1983; Waits, 1994). The act of gift giving, along with the related mental and physical processes, can give a profound sense of joy not only to the recipient but also the person giving the gift, and often other people, too, who are involved in the event somehow (Areni, Kiecker, & Palan, 1998). While usually more of an annoyance or inconvenience rather than an actual problem for most people, at worst, it can be the cause of a psychological phenomenon known as gift giving anxiety (Schwartz, 1967; Sherry, McGrath, & Levy, 1993; Wooten, 2000). One can assume a lot of excitement, thought, uncertainty and even agony go into the determining of the best possible gift for a loved one – or figuring out what is appropriate for a more awkward and formal occasion, when the recipient is perhaps not personally known.

The research problems were directly drawn from not only personal experience giving and receiving gifts, but also the experiences of family, friends, and even acquaintances: what are the difficulties of gift giving, and how could ICT help alleviate those difficulties? While not as serious a topic as e.g. war or poverty, gift giving is a significant historical tradition all around the world (Sherry Jr., 1983), and is especially alive and well in modern Western countries that focus more and more on a culture of buying and consuming. Shops exist whose only purpose is to sell gift items. Still, there is nothing quite as admirable as observing someone who always seems to find great gifts for everyone. Gifts, that do not feel pretentious or shallow, but hold a deeper meaning.

People utilise many kinds of tools to help remember gifting occasions, plan gifts, organise combined efforts for bigger gifts, and to figure out what to get someone, as becomes evident from the tool usage examples of real-life gift givers (see Ch. 4.1). How to use this information to formulate a support application using ICT knowledge, however, is quite another thing. Combining experience with hard research material about gift giving, from the fields of cultural anthropology, consumer research, marketing, sociology, and consumer and social psychology on one hand, and productivity enhancing applications and behaviour change support systems from ICT field on the other, form the starting point of the present thesis, thus contributing directly
to the identification and development of an ICT solution to help boost the process of gift giving.

The present study reviews relevant literature on gift giving and problems therein, producing preliminary requirements in the context of the Technology Acceptance Model (TAM) (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). These requirements are further supplemented by real life examples of existing solutions to gift management, and user analysis using open-ended interviews to formulate personas (Cooper, 2004; Cooper, Reimann, & Cronin, 2007; Pruitt & Grudin, 2003). Design concepts were created based on the accumulated requirements, each concept was evaluated, and the best ones selected for further development. A prototype was designed from the selected concepts, which was then evaluated using heuristic evaluation (Nielsen, 1994a), and a small-scale usability test with one representative user and a paper prototype (e.g. Shneiderman & Plaisant, 2010). The prototype design was then iterated through the evaluation findings to produce an improved version.

This introduction is followed by Chapter 2, which delves into the essence of gift giving by outlining the main approaches to research in the topic, characteristics of good gifts, and ambivalence inherent in the process. The chapter ends in a list of requirements created by viewing the literature findings through a TAM lens. Chapter 3 describes the methods used to conduct the present study, which include Design Science Research as well as usability and user experience (UX) methods. Chapter 4 reports the flow of the actual study, step by step. Chapter 5 holds the discussion of the study, the findings, and relation to prior knowledge, as well as its limitations and shortcomings, and potential objectives of future research. Chapter 6 offers a brief conclusion of the thesis.
2. Background

The purpose of this chapter is to establish the importance of gift giving to human social interaction, as well as discover the factors that hinder people’s ability to take part in the activity. Gift giving research was explored via narrative literature review, which summarises the most important characteristics of the gift giving process, presents some tools currently used by gift-givers, and then combines these aspects with the Technology Acceptance Model. The research resulted in a list of requirements with suggested solutions for a gift giving support application. The requirements and suggested solutions were then used in Chapter 4 to design the aforementioned application. The review of prior knowledge and literature on gift giving, as well as the real-life examples of gift management solutions in Chapter 4 are originally a part of the author's BSc thesis.

2.1 Gift giving

In this chapter, Section 2.1.1 outlines the narrative literature review method and other materials used. Section 2.1.2 goes over the basic aspects of gift giving via cultural anthropology and social psychology, Section 2.1.3 handles the characteristics of a good/successful gift, while Section 2.1.4 considers the drawbacks of gift giving – the less ideal emotions associated with it, as well as why some people are deemed difficult to find gifts for.

2.1.1 Narrative literature review and other materials

A goal for the review is to scope the state of the research topic at present, in order to gain a good overview. By establishing such an overview, it is possible to gauge possible solutions or further directions of research for the stated problem. (Baumeister & Leary, 1997.)

The process of accumulating source material was started with a simple Google Scholar search into gift giving, to gain insight into the topic and which aspects should possibly be investigated in more detail. A simple search string of “gift giving” was used as a starting point. This first round of searches especially provided two interesting finds: the existence of a psychological phenomenon known as gift giving anxiety, and a collection of fields that generally show the most interest in the topic of gift giving:

- Cultural anthropology
- consumer research & behaviour
- marketing
- sociology
- psychology, consumer psychology, social psychology.

The literature searches performed for the present study indicated that gift giving behaviour is widely researched especially in the contexts of marketing, consumers, sociology, and psychology. The former two often have an interest from a monetary
point of view (i.e., how to encourage gift buying, how to predict consumer buying behaviour), while the latter two are more interested in the essence of the behaviour itself (e.g., why do we give gifts, what effect does it have on our psyches and emotional lives).

The databases Academic Search Premier (EBSCO) and ACM Digital Library were mainly used in addition to Google Scholar to find articles of interest, and backward and forward searches from identified articles were used to identify further relevant records. The main themes searched for were the anthropological, social, and psychological perspectives of gift giving behaviour, what is important to consider when choosing a gift, productivity enhancement apps, and behaviour change support systems. For the topic of gifts, only articles with relevant abstract content were chosen, for the ICT portion the most central articles and models were triangulated and used.

The literature review was complemented by additional material from a real life sample of convenience, illustrating methods actually used in managing gift giving and gift receiving. The material is presented in Figures 5-8, in Chapter 4.1.

Considering the aspects of gift giving provided clues as to what to look for in the field of ICT that could possibly help in managing gifts and gift ideas. While no research on actual gift giving software could be found, in the practical area, productivity applications seemed to incorporate relevant features, and were further explored to help determine how gift giving could be supported. As for a theoretical approach to drawing the literature and real-life examples together for a number of high-level guidelines for designing a gift giving support application, the present thesis based the design goals on TAM.

2.1.2 Approaches to gift giving research

The online world presents a belief that it is better to look for recipient-centric gifts (Stanley, 2014; Worthen Gardner, 2014), i.e., gifts that match the recipient’s tastes and preferences. Paolacci, Straeter and de Hooge (2015) themselves note that the usual approach is indeed to look for recipient-centric gifts despite finding through four rounds of studies that gifts that draw from true core characteristics of the givers are liked more by the recipients, due to perceived identity-congruence. Aknin and Human (2015) claim that giving giver-centric gifts increases the gains in relationship closeness between the giver and the recipient – albeit this was only evaluated from the givers’ point of view, therefore it is difficult to conclude if the gain is bidirectional or not.

Social psychology offers various constructs that can in some part explain gift giving. For example, the principle of reciprocity describes the tendency to want to return a deed or a gesture received from others (Cialdini, 2006), and adherence to social norms (Myers, Abell, & Sani, 2014) can be a motivator for giving gifts. In other words, receiving a gift from someone results in us wanting to give something in return, and because it is customary in some cultures to give gifts at certain occasions, not giving one would break the norm and potentially result in social friction.

Sherry Jr. (1983) took an anthropological point of view into gift giving behaviour and presented a model (see Fig. 1) to describe the process of gift-giving as early as 1983 that not only illustrates the many aspects of the gifting process, but also reveals how complex it is. As he aptly puts it, “Gifts are tangible expressions of social relationships ... Giving too much, too little, or too late can strain a relationship to the point of dissolution” (p. 158). The roles of a person change throughout their lives (son, brother,
husband, father, etc.), and so must their gifting strategies. At certain phases, there may be plenty of resources (and a gift can be made out of virtually any form of resource) for giving, and plenty of people to give to, at other phases that may all change drastically. (Sherry Jr., 1983.)


The model divides the process of gift giving into three stages:

**Gestation** – The idea of the gift becomes reality, usually following a motivational trigger such as Christmas approaching. The giver deals with the search/creation of the
gift, investing a symbolic meaning, while the recipient intentionally or unintentionally elicits for a gift. (Sherry Jr., 1983.)

**Prestation** – The actual exchange happens, not only in the form of the material gift. The giver worries about the recipient’s response, the recipient evaluates the gift and responds, and the giver evaluates the verbal and nonverbal responses. (Sherry Jr., 1983.)

**Reformulation** – The gift is consumed or stored, the effects of the exchange on the relationship take place. The roles of the participants are often reversed at this point, forming a continual pattern of gift exchange. (Sherry Jr., 1983.)

Schwartz’s (1967) perspective is that of social psychology, and presents gift exchanges in a darker tone, going as far as citing the way gifts are used in prisons to establish dominance over other inmates through indebtedness. He stresses the role of gifts as impositions of identity. That is, giving a gift not only expresses and confirms the identity of the giver, but also communicates an image of the recipient. Ward and Broniarczyk (2011) confirm this, and add that buying self-concept challenging gifts to please a close friend will cause an identity threat to the giver, which they will most likely attempt to correct with following gifts. Accepting a gift is accepting the image, rejecting a gift rejects the image. Still, a gift does not only affect the identities of the involved parties, but also symbolises the relationship between them (Waits, 1994).

Gifts have many uses in parent-child relationships. They can be used by parents to indoctrinate their children with the features they want them to adhere to (e.g., giving “masculine” gifts to a boy and “feminine” gifts to a girl). Excessive gift giving, on the other hand, tips the scale of balance in the parents’ favour and robs the child of opportunities to self- hood strengthening experiences through gifting. It may also be intended for other reasons: by making it impossible for the child to return gifts of equal value they become inferior, subordinate, obedient – “the only way he can pay his debt may be to accept the orders of the giver” (Schwartz, 1967, p. 4). In a similar way Santa Claus is used to assert control, by using him as an instrument to sanction bad behaviour and encourage good. A gift can also be used as punishment when it is presented to the child as a reward while stressing it is being given despite the child's poor behaviour, not deserving it, which results in shame. Sometimes children are given gifts beyond their age and abilities, to facilitate (or impede) maturation, but this also tends to cause anxiety for them. (Schwartz, 1967.)

Gifts can also be used to boast identity and social status: a husband may give his wife elaborate gifts to display, making the wife an instrument of amplification for his own identity. The same can happen with children. (Schwartz, 1967.)

Professor Ellen J. Langer points out in an interview (Parker-Pope, 2007) that a present trend of forbidding gift exchange, for example at Christmas time, may be counter-productive in social terms: banning someone from giving a gift also puts restrictions on that person’s freedom to think about another person’s likes and what would bring that person joy.

Whether seeing gift giving as part of creating social conformity and enforcing social dynamic, as in Schwartz’s (1967) view, or a ritual that supports social bonding and closeness, as in Langer’s (Parker-Pope, 2007), the common element is interaction. Researchers have also approached gift giving from the point of view of what gift giving as an act means in different relationships (Otnes & Beltramini, 1996): for example, what type of gifts are given to a casual date vs. an established lover (Belk & Coon, 1993).
The ritualistic aspects of gift giving are also not merely customary gift exchange, but have a deeper function of societal preservation (Otnes & Beltramini, 1996), which essentially aims at promoting social conformity.

From an evolutionary standpoint, gift giving behaviour is speculated to have evolved from ancient activities such as food sharing and courtship (Saad & Gill, 2003). Meanwhile, in our modern times, young people were using mobile phones – especially text messaging – in ways very close to gift giving characteristics some 15 years ago (Taylor & Harper, 2002). It could be very interesting to find out if the new generation of instant-messaging systems (e.g. WhatsApp, Facebook Messenger) have changed that.

2.1.3 What makes a good gift

Areni et al. (1998) gathered personal stories about memorable gifts from 174 people from both the U.S. and Europe, and were able to form 10 common themes/characteristics for gifts that really left a mark on either the recipient or the giver. The participants had been asked to tell the story of a memorable occasion of either receiving or giving a gift. The gender distribution of participants was almost precisely 50/50, while most roles (71%) described were that of a receiver. The relationships of the gifting occasions were divided into romantic partners, parents, grandparents, siblings, and friends and kin. The themes serve to indicate what the perceived value of meaningful gifts can be based on, i.e., what makes a good gift, what should be strived for. The themes are described next.

**Personal history** – The gift uniquely symbolises a period of the giver’s life. This could be, for example, a personal item or heirloom that has been with the giver through interesting life experiences, e.g. a war.

**Helping others** – A gift that specifically helps the recipient at a time of need, e.g. a gift of money at a time of temporary poverty.

**Surprise as value** – The gift is so unexpected it causes a strong reaction, be it shock, thrill, etc.

**Secrecy/deception** – The recipient is misled or their attention diverted away from a gift they might otherwise have anticipated. Done on purpose, to increase/create the surprise factor.

**Sacrifice as value** – Time, effort and/or personal sacrifice expended to plan, acquire or create the gift. The most obvious example would be crafted or partly-crafted gifts, such as knitted blankets or personalised items.

**Planning everything to a tee** – The giver meticulously plans something so elaborate and precise the effort put into it cannot go unnoticed by the recipient. This theme is favoured by male gift givers.

**Family tradition** – Families sometimes have traditions regarding gifts, often in certain situations. It could be a family heirloom passed down to the next generation, or something as simple as letting everyone in the family open one Christmas present early every year.

**Symbol of relationship** – Jewellery is a prime example of this theme, e.g., rings given to romantic partners. They do not even have to be promise or engagement rings which
are traditionally thought to be very meaningful, but also any other items symbolising the relationship will suffice.

**Trust/responsibility** – A gift with a trust/responsibility theme can be something valuable (or even dangerous) that the recipient is then trusted to take good care of or know how to handle properly. These are mostly used as gifts for younger people, by their parents or grandparents, as a sort of coming of age or rite of passage symbol.

**Perfect thing** – A gift that is exactly what the recipient needed/wanted, often obsessed about, for a long period of time, or just something that perfectly matches their personality.

### 2.1.4 The drawbacks of gift giving

Despite its depiction, the ritual of gift giving is not always a positive experience but often one of mixed emotions, and one of the last real remaining tests of social ties (Sherry et al., 1993). Generally, anxiety levels rise as the more the giver wants to impress the recipient, the less certainty there is over the success of the gift – often due to uncertainty as to what the recipient wants or would like – but some givers enjoy the challenge it provides (Wooten, 2000). People also give gifts that are not meant to be desirable to the recipient, according to Schwartz (1967) this is to satisfy “man’s need to give gifts that hurt or embarrass” (p. 5) but does not elaborate on where such a “need” stems from or even what evidence the notion is based on. He also points out the way gifts are used in prisons to establish dominance over other inmates through indebtedness.

Sherry et al. (1993) conducted a sentence completion exercise around four themes: the wrong gift, the problem with gifts, last minute shopping, and owing someone a gift. All of them yielded mostly negative responses from the participants.

"The wrong gift" brought out emotions like frustration, disappointment, annoyance, embarrassment, and even despair through the belief of unavoidability. Only one response was positive. For "the problem with gifts" there are mentions of technical difficulties like mailing, wrapping, and shopping. Thinking of the right gift, time, expense, and propriety also worried the participants, some going as far as guilt and obligation. While negative evaluations were clearly more common in "last minute shopping" as well, some participants also found the thrill, excitement, hectic fun, delight, and potential for treasure finding positive aspects. Again, there were references to guilt, but also foolishness, pain, and even experiences of psychological threat.

"Owing someone a gift" was found the most disconcerting to the participants, with a wide range of negative connotation, and many feeling it goes against the whole idea of a gift, while others considered it normal. For some, a time-constraint was identified in the obligation of payback, feeling pressured in many ways, or even as if they were being blackmailed.

Sherry et al. (1993) describe the strain on both parties of the gift giving process: "**Recipients must gauge the motivation of the donor and calibrate a response. Donors must gauge the response and divine a motivation.**" (p. 230), which matches the contents of Sherry's previous model of the gift giving behaviour process (Sherry Jr., 1983) presented in section 2.1.2, albeit appearing here in a gloomier context. Gifts strengthen
and threaten social ties, cause logistical and psychological trauma, and the considerations of propriety and negotiation of identity involved in the act of giving gifts add tension to what is generally expected to be a fun activity. Giving the wrong gift can imply to the recipient the giver does not know them well enough, which especially in a romantic relationship could be detrimental. Themes of negativity are also identified: entrapment in ritual, relationship of substance to sentiment, displeasure at the extremes, discontent in possibility and reality. (Sherry et al., 1993.)

Negativity also stems from perceiving certain people "difficult" as recipients (Otnes, Kim, & Lowrey, 1992). It appears the closer the recipient is to the giver, the more pressure they feel for the gift to be good enough (Paolacci et al., 2015), however, out of the usual recipients of gifts, in-laws, stepparents, and other affinal relatives were the most likely to be deemed difficult by the participants of the study by Otnes et al. (1992). They were able to find nine typical characteristics of a difficult gift giving relationship: perceived lack of necessity/desire, fear of being unappreciated, different tastes/interests, unfamiliarity with the recipient, perceived recipient limitations, imposed giver limitations, imbalance, personality conflicts, thwarting of a gift selection.

2.2 Technology Acceptance Model

The previous chapters have focused on identifying characteristics of gift giving as a cultural phenomenon and as regards behavioural aspects. The present chapter presents an overview of the Technology Acceptance Model (TAM) (Davis, 1989; Davis et al., 1989) as a lens for evaluating feasible and functional system features of a gift giving support tool.

![Technology Acceptance Model](image)

Figure 2. Technology Acceptance Model (c.f. Davis, Bagozzi and Warshaw, 1989).

The purpose of TAM is to predict new system acceptance. The model (see Fig. 2) assumes that if the perceived ease of use and perceived usefulness of a system are high enough, they have a positive impact on attitude toward using, leading on to intention to use and finally to actually using the system. The basis of the model is in Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) where, in short, beliefs, attitudes, norms, and intentions form the basis for actual behaviour. The TRA was developed further by Ajzen in 1985 into Theory of Planned Behaviour (TPB) which added a behavioural control element into the model, namely the intention-behaviour gap, when a person intends to perform some behaviour but then does not do so (Ajzen, 1985). Essentially, Ajzen highlighted in the TPB the role of intention as the predictor of behaviour (Ajzen, 1985).
In other words, according to TAM the actual use of a system is predicted by intention to use, which is predicted by attitude toward using the system. How useful and easy to use a person believes a system to be in turn predict the aforementioned attitude. The model also suggests a direct connection between perceived ease of use and perceived usefulness so that a perceived increase in ease of use means, in practice, improved performance (the system is more useful when you can do more with the same effort). Perceived usefulness and perceived ease of use can also be influenced by external variables such as training, documentation and user support made available to the system users (Davis et al., 1989). Further work has also been conducted in the area of understanding how the aforementioned beliefs are formed, particularly the role of a holistic experience with technology where the user is absorbed in an activity and experiences something akin to joy or pleasure (Agarwal & Karahanna, 2000).

An application that would assist a person in finding, selecting and managing their gift giving should, in line with TAM, provide its user with a sense of perceived usefulness and perceived ease of use in order for the user to develop and maintain a strong intention to use the system. By early user testing for perceived usefulness and perceived ease of use it will be possible to establish users’ willingness to take the system into use before putting great effort into actual development (Davis et al., 1989). On the whole, establishing a system design that supports intention to use means a higher chance of overall positive user experience with the system.

The implications of the constructs from TAM run alongside the design considerations in Chapter 4, where the literature and real-life based predominants of developing a gift giving support application are pulled together into design requirements.

2.3 Derived requirements list

The purpose of this part of the study was to put together a preliminary set of design guidelines and system requirements for a gift giving support application based on literature. What makes a good gift (Ch. 2.1.3) and the negative side of gifts (Ch. 2.1.4) form the basis of what kind of features a gift giving support application would need. TAM helps conquer these goals by providing a framework to work with.

There are two perspectives to gift giving – that of the recipient, and that of the giver. Choosing a gift that reflects the giver will also increase the giver’s perceived closeness to the recipient, while choosing a gift that reflects the giver’s knowledge and understanding of the recipient will increase the recipient’s perceived closeness to the giver. The identity-imposing effect of gift giving plays a big part in this, as people like to give and get gifts that match their self-image, and the images they have of others.

As we know from Chapter 2.1.4, anxiety stems from virtually any kind of uncertainty. It could be regarding what will be “good enough” or appropriate or what message the gift conveys, how to convey a desired message via gift, what to get someone who “already has everything”, or just what a gift could be. Another common situation among an immediate sample of convenience is somebody’s birthday approaching, stress levels increasing as the day gets closer and closer, and no gift solution has been found.

To battle these problems, one needs to know and remember details about the people they give gifts to (both for better chance of ideas and to avoid contradicting anyone’s identities), and try to plan and come up with ideas as early as possible. Some sources of anxiety, like choosing to conform to the idea of “owing someone a gift”, are very difficult to change, but even if one felt obligated to match a received gift with their own,
a support application could still at least help them achieve that. After all, the intention is not to judge or attempt to alter personal gift giving philosophies, but to support the process and user needs, whatever the sentiment behind them.

It is more convenient and much less stressful to gather potential gift ideas along the year, instead of always trying to come up with one right before a birthday or Christmas. There are already great tools for ideas, such as Pinterest and big webstores such as Amazon. These are great for combining user data to suggest items that might never have occurred to a giver otherwise. Once one learns how to search, where to look, and how to think, managing gifts becomes more of a problem of abundance and organisation: recording useful details and cataloguing/organising ideas and projects yields more benefit to the actual routine and act of gift giving. Having such a tool handy can also help adapt into the new way of thinking and observing one’s daily surroundings.

The following list outlines the points that would most likely help:

1. Regularly keep tabs on the calendar regarding birthdays and other significant days that may involve gifts;
2. Know the people you exchange gifts with – not only does it help with gift idea generation, the two-way identity-imposing effect of gifts makes it all the more important;
3. Accumulate ideas over a longer period – picking from a pool is much easier than having to come up with something out of nowhere, at the last minute;
4. Ideas birth new ideas – sometimes just looking into the pool will yield something completely new;
5. Plan ahead with "do it yourself" (DIY) projects – allocate the time needed to gather the materials for and complete them;
6. Keep track of gifts received and given – reduce the fear of accidentally duplicating a gift, or gifting the same item back;
7. Keep track of prices – resources for gifts can be limited, which is another known potential source of distress, knowing what is being spent on each gift helps avoid going over budget.
8. Mobility – implied by points 1, 3, and 4, having the application at hand when an idea or inspiration unexpectedly arises is ideal.

Preparation, considering the recipient, thinking up ideas and then recording them continuously can help support the above-listed approaches to easing gift giving anxiety. A productivity-oriented application solution would bring together the elements of knowing the people close to you (much like profiles and contact lists), collecting ideas (similar to solutions like Pinterest or Amazon's wish list), reminders for up-coming events (much like calendars and organizers), and ideation (seeing your own plans as a means of creating new ideas) into a package that should appeal to a need for usefulness. Taking away effort of multiple records of what presents there could be, what has already been bought or made, and when and to whom they are intended cognitively streamlines gift giving into one continuous process. An amalgamation of such related pieces of information into one application provides also ease of use compared to using multiple systems for the gift management purpose.

Table 1 collects the identified system requirements (listed above) alongside a design contribution possibility that would aim at increasing perceived ease of use and/or perceived usefulness. Naturally, a good level of UX hygiene (e.g. Krug, 2014) for the interfaces needs to be maintained throughout the design, and the listed elements in Table 1 focus on task-related aspects of ease of use and usefulness.
<table>
<thead>
<tr>
<th>#</th>
<th>System requirement</th>
<th>Design contribution possibility to perceived ease of use and/or perceived usefulness</th>
</tr>
</thead>
</table>
| 1  | Regularly keep tabs on the calendar regarding birthdays and other significant days that may involve gifts | • Calendar integration or API: adding a birthday or other applicable event in one is visible also in other (pending user settings).  
• Top level content in an application, always visible when starting the application. |
| 2  | Know the people gifts are exchanged with                                              | • Creation of profiles with details on each person that can be easily accessed and kept up to date.                                                                                                                    |
| 3  | Accumulate ideas over a longer period                                                 | • System enables listing possible gifts with tagging that enable sorting for example by date/holiday period/gift recipient;  
• Interface for tagging and sorting lists with should be in the same view with the lists so as to minimize view changes;  
• Such a feature will, over time, reduce last-minute gift buying stress and leverages gift buying activities to suitable slots of time early on instead of requiring an extra effort at the last minute. |
| 4  | Ideation based on existing gift lists                                                | • System offers "gift pool" views sortable per gifts given in the past (time of year/holiday season), gift type (e.g. Birthday/Christmas/ per person, relationship, etc.);  
• Noticing trends or themes of previous gifts and gift ideas can help in gaining new ideas, thus reducing stress. |
| 5  | DIY planning                                                                         | • Early notifications can be given for example when a homemade gift idea has been listed for a recipient (reminders for supplies, etc.);  
• "Outsourcing" memory in this manner is a known stress reducer (Levitin, 2014). |
| 6  | Tracking received and given gifts                                                    | • Build a database where gift entries can be added with giver/recipient connection, dates, and other details.                                                                                             |
| 7  | Tracking prices of gifts                                                             | • The price of a gift or materials could be a detail that can be filled in for gift entries in 6. This information could then be used for different kinds of budget calculations, e.g., comparing tallied prices against a set budget for a group of people. |
| 8  | Mobility                                                                             | • Store all application data in the cloud. (Note: The impact of mobile data roaming and availability of cloud data when roaming should be considered as well.)  
• Use mobile-first design approach to optimise application use on mobile devices. |

With applications intended for personal interests and entertainment, it is particularly important to provide systems that are usable, easy to learn, error-free, and offer subjective satisfaction - otherwise the user will easily give up the system and look for something else that satisfies these categories (Shneiderman & Plaisant, 2010).
3. Methods

To approach the topic of gift giving and the management issues therein, the present study employs Design Science Research (DSR) as the main research method (in Chapters 3.1 and 3.2), and a selection of user and usability research methods and guidelines in its user study and design evaluation (Chapter 3.3).

Emerging from the understanding of culture of gift giving and the practical issues in managing gift giving, the research problem can be summed up into these two research questions:

- What are the main difficulties in gift giving?
- How could those difficulties be alleviated by ICT?

In order to design a solution to the second problem, the first one had to be answered first. For that purpose, a narrative literature review was conducted into gift giving research, to establish the basic needs that should be met by an ICT solution (the process and results were presented in Chapter 2). The next logical step was to design an actual application that could support all the areas of difficulty. Thus, design science was a natural approach to take.

3.1 Design Science Research Method

In DSR the objective is to design, build and evaluate a system for the purpose of solving an organisational problem (Hevner, March, Park, & Ram, 2004). The framework for IS is illustrated in Figure 3.
In the present study, the 'organisation' as per Hevner et al. (2004) is adapted to mean a defined user group with a distinct task and objective. The design process outcome is an innovative product, and the evaluation of this design artefact then informs the designers and researchers more deeply about the problem and its context. This further knowledge provides feedback for improvements, which can again be evaluated. Such iterations are typically repeated a number of times before the artefact can be considered final (Hevner et al., 2004). For the design of the gift giving system described in the present thesis, the DSR framework by Hevner et al. (2004) is used (Fig. 3).

Hevner et al. (2004) also propose seven guidelines for DSR, which in the present study are addressed in Chapter 4. Figure 4 illustrates the application of the research framework to research. In the present study, the Environment has been evaluated and studied so as to identify relevant business needs that become requirements for the system being developed. IS research involves the building of the artefact and its evaluation based on existing and validated theoretical and methodological knowledge base (thus ensuring research rigor). The knowledge base in this study involves the literature overview covering the cultural aspects of gift giving, based on the author's Bachelor's thesis. The analysis informs the design process of social and cultural factors involved in gift giving in a way that augments the needs identified in user research that was also conducted as a part of the research process (environment).
As a formal and practical guidance for the development and research process, the DSR methodology (DSRM) by Peffers, Tuunanen, Rothenberger and Chatterjee (2007) was used (Fig. 4). The process outlines the research steps. The sequence is nominal and there are four entry points for the design cycle. After problem definition, the remaining steps are part of process iteration.

### 3.2 Applying DSRM in the present study

In the present study the point of entry for research was an objective centred solution. By exploring the cultural context of gift giving and researching user needs for solving the specific needs as regards a system that helps organise and plan finding, making, and giving gifts, a number of concepts were developed and considered. The aim was to find a concept that would best support the identified requirements, but would remain a feasible product to develop.

Problem identification and motivation for the study arose initially from informal observations by the author. Creating various arts and crafts as presents for friends and family, keeping track of what had been given to (or received from) others in the past, when there were anniversaries or other occasions for gifts in the future, planning future gifts all formed a single problem field of both tracking and planning. These observations were confirmed through discussions with other people to indicate that remembering great gift ideas later, keeping track of what gifts had been received or what had been given to others in the past were an issue that involved more people than just the author.

Objective of the solution, thus, was to produce a system concept that provided support for tracking and planning of gift giving. In the interest of feasibility and simplicity, the level of the first version of the system was limited to ideation, planning and giving, leaving the tracking of gifts received by the user to another version. The design and development involved further research into the problem domain in order to identify further and perhaps more universal factors in gift giving, an evaluation of end users (contributing to creation of personas), and rounds of concept sketching based on the identified requirements for the application. Demonstration and evaluation of the application involved a prototype that was used in evaluating the match of the solution features to user needs. These heuristic evaluations focused on verifying that the identified system features and the selected interface design supported the objectives of the application. Communication of the application involved coursework for an interface programming course and the present MSc thesis.
The contribution from this study is predominantly involved in the identification of feasible and realistic system features that support end users in a specific problem domain, paired with an interface design that highlights the central contents such a system has to prioritise. The evaluation verifies the identified features and approach as feasible and effective.

### 3.3 User research and evaluation methods

Cooper (2004) advises designing for pretend users, *personas*. While imaginary, these personas are still based on discovery of user base, and embody the very real characteristics of multiple actual users, combined and generalised into one. Cooper also advises against trying to create a broad audience of personas, instead focusing on a very limited scope at a time. While creating separate car designs for every individual persona type may not be feasible, having a software product meet the needs of multiple types of users is not usually as big a problem (Cooper, 2004). Personas are a psychologically engaging way of producing user experience focused designs (Pruitt & Grudin, 2003).

The user personas and their needs and objectives for this study were seeded by user interviews, open-ended with an outline of questions to ensure that the sessions covered all intended topics (Patton, 1990). By using an open-ended and loosely fixed interview style, it was possible to remain flexible and include topics that emerged from the interviewees even when not probed with a specific question. Using *category questions*, such as "what else?", "how? Or "why?" offered further flexibility and were used to seek further elaboration or clarification (Crabtree & Miller, 1999). A collection of the questions used to direct the interviews can be found in Appendix 1.

Two types of evaluations were used to evaluate the prototype designed in this study: heuristic evaluation, based on Nielsen's (1994a) set of usability heuristics, and a task-based usability test using a paper prototype. The former is a well-established method often used in the earlier cycles of research and development to discover critical problems in usability (Nielsen, 1994a; 1994b). There is a higher likelihood of spotting major problems than minor problems with the heuristic expert evaluation method, while minor problems found are more numerous in absolute terms (Nielsen, 1992).

The set of heuristics (Nielsen, 1994a) that was used for the heuristic evaluation:

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation.

The usability test with a paper prototype was based on user tasks derived from the identified system requirements. The tasks are listed in Appendix 2.

Usability testing is a great way to catch problems with a UI early in the development process, providing an opportunity to fix them before doing so becomes resource-heavy. The user was encouraged to think out loud while attempting to perform the tasks, a
practice which allows further insight into the reasoning behind the user’s actions, especially when no forms of recording are available for later study. The influence of this *think aloud protocol* on the user’s ability to solve problems while doing the tasks is considered negligible. (Lauesen, 2005; Shneiderman & Plaisant, 2010.)
4. The study

This chapter details the entire process of designing the gift giving support application. It starts with gaining an understanding of how people manage their gift giving as it is (Ch. 4.1), and then goes on to identifying the users, their characteristics and needs using personas (Ch. 4.2), followed by summary of the findings as requirements in Chapter 4.3. Data model for the system is illustrated in Chapter 4.4 and concept creation is described in Chapter 4.5. The steps of creating a prototype, evaluating the system and iterating the design are presented in Chapters 4.6, 4.7 and 4.8.

4.1 Gift exchange tools

Two of the interviewees (referred to in this chapter as Participant A and Participant B) used to create personas were kind enough to allow the use of screen captures and photographs of their actual usage of Google Drive and Docs, as well as traditional pen-and-paper solutions, to be used as examples. As can be seen from them, productivity suites and apps are already being used to support gift giving activities. Four categories of tracking can easily be identified (described more closely in the following sections): Christmas cards, birthdays, gifts given and received, and planned gifts and/or gift ideas. Sections 4.1.1 to 4.1.4 will cover each of these categories separately, while 4.1.5 offers a brief overview of gift giving related mobile apps already available in the market.

4.1.1 Christmas cards

Christmas cards are typically exchanged between members of the same social circles every year. Since the balance of giving and receiving is at least somewhat important, it can be wise to keep a list of whom cards have been received from, and whom they have been sent to, each year. In Figure 5 a simple spreadsheet has been used to keep track of card exchange over a course of three years by Participant A.
Figure 5. A screenshot of a Christmas card log in a Google Docs sheet used by Participant A.

The first column lists all the people Christmas cards are being exchanged with, after it there are two columns per year to be marked with Xs: one for having sent a card, and another for having received one. Two of the rows visible are partly coloured grey which is used to indicate the recipients are no longer eligible for card exchange: row 6 depicts a couple that has divorced, while row 13 depicts a grandmother who has passed away.

4.1.2 Upcoming birthdays and other occasions

A rather obvious part of gift giving is knowing people’s birthdays, anniversaries, etc. The usual method of keeping up with this information is writing down those occasions in a calendar. Participant B used a fairly standard day planner, which has had some of its pages refurbished to serve as reminders of whose birthdays are coming up in each month (Fig. 6).
Birthdays could also be added to a calendar app on a phone, or a cloud-based calendar like Google Calendar. Unfortunately, most such productivity apps do not provide a “monthly birthday view” such as depicted in Figure 6, making it slightly less convenient to stay up to date on which birthdays are coming up next.

4.1.3 Gifts given and received

The more people in one’s social circles, the more gifts tend to get exchanged. It would be unfortunate to find a great gift for a friend, only to realise after giving it you had already given that exact same item to the same person a couple of years earlier. Also, some gift ideas can be somewhat universal, in that they would be suitable for more than one person. It is easy to forget and get mixed up, resulting in embarrassment and less enjoyable gifting experiences. Therefore, it makes sense to keep track of what has been given to whom, and perhaps also what has been received from whom. It would be equally embarrassing to give the same gift back.

Figure 7 is an old gift logging system by Participant B, going all the way back to 1979. The log is still in use.
Figure 7. A gift log by Participant B.

The first column houses recipient names, and the columns marked by years contain gifts given to each person that year, including the money spent on them. The log does not have information on received gifts. Participant B reported using two versions of this log: one for their own relatives, and another for their spouse’s relatives.

4.1.4 Gift ideas and planning

One of the greatest enemies of blissful gift giving is time – or, more accurately, the lack of it. Time is needed to generate and look for ideas, as well as making preparations such as acquiring a gift (e.g. waiting for the postal service to deliver an item ordered from abroad), or crafting it. Therefore, it can be useful to plan ahead, and try to have at least some idea of what to get somebody, preferably well in advance. There are countless guides to generating ideas, and common points tend to be allowing time for the subconscious to work, and to do exploring, find inspiration.

The list in Figure 8 acts as a sort of a “gift idea pool” by Participant A. Several gift ideas are listed per person, used ones have been marked by strike-through, the occasion the gift was given on, and the year the idea was used.
The participant reported having a habit of writing down gift ideas whenever they happened to emerge, so that there would hopefully always be something to use when the time came to get or create a gift for someone, thus avoiding panic and anxiety.

### 4.1.5 Existing gift giving applications

This section is a brief subjective overview of the current supply of gift giving support applications on the smartphone market. A search for “gift giving” in both AppStore and Google Play gave plenty of results in both free and paid apps. Most of the apps found this way, however, are intended for earning money or gift cards through completing tasks like completing surveys or testing apps. Gift-wrapping tutorials are also a prominent theme, and there are some apps that allow you to exchange digital gifts like pictures with your friends.

While none of these types of “gift apps” help the actual real-life process of gift giving, there is only a small number of real gift apps on the market that can indeed support the tasks implied in the previous subsections, at the very least by offering gift suggestions or ideas. Some are only focused on Christmas. Table 2 presents three examples picked from Google Play, with their relevant information. It should be noted that finding these apps required sifting through a lot of results, as none were anywhere near the top of the search results.
Table 2. Examples of gift giving application available on Google Play.

<table>
<thead>
<tr>
<th>App name</th>
<th>Company</th>
<th>Rating</th>
<th>Installs</th>
<th>Last update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gift App ELF!</td>
<td>Internet Business Enterprises LLC</td>
<td>-</td>
<td>1-5</td>
<td>2012</td>
</tr>
<tr>
<td>Gifter</td>
<td>Faith Through Technology</td>
<td>3.9/5</td>
<td>100-500</td>
<td>2014</td>
</tr>
<tr>
<td>Gifts.</td>
<td>CoreSolutions Software Inc.</td>
<td>4.4/5</td>
<td>100-500</td>
<td>2016</td>
</tr>
</tbody>
</table>

What becomes immediately clear from Table 2 is that none of the gift giving apps in focus are particularly popular, two of them reaching the 100-500 installs bracket with the third left at just 1-5 installs. It should be noted, that Gift App ELF! was the only non-free app in the selection, costing 0,80 euros, which may have had an effect on its popularity. The latter also has not seen an update in five years, while Gifter was updated in 2014, and Gifts. had the most recent update of 2016. The ratings on the two rated apps are quite good with generally favourable comments.

Individual features most commonly offered are tracking given and/or received gifts, adding gift entries with details like price and where to buy it, importing phone contacts to be used as gift recipients, and adding notes to gift or contact entries. However, the main problem with the available apps is that while they offer varying combinations of the features described in the previous subsections, none appear to include all of them. There is also a lack of localisation features, with some features (e.g. product barcode scanning) clearly designed solely for the US market.

4.2 Identifying the users

A small sample of convenience was used to discover and collect characteristics of types of users for the gift giving support application. Example users were derived from the process to represent all occurring characteristics, and were written into the form of small stories, or personas. A few examples of these personas are described in the following sections.

Persona #1

Liisa, 62 years – pensioner, physiotherapist

Liisa grew up in the countryside and has been doing all sorts of handicrafts from a young age. Handicraft skills and interests are largely handed down from her crafty grandmother, and have made for a nice hobby as an adult. She lives in a detached house in the countryside, at a reasonable distance from the nearest city. Her three children have long since moved out, and with retirement she has lots of free time. Hip pain makes moving around on a daily basis somewhat difficult, and despite the help of a cane, often cause her to opt out of trips to visit far-away relatives. Her husband of the same age is a part-time pensioner and spends most of his free time doing renovations and building things. In the winter, they go skiing a lot together.

Remembering special days in the family is left almost completely on Liisa’s shoulders. She writes down notes about sent and received Christmas cards every year in an old almanac as a table, birthdays and other special days she marks in her pocket calendar as well as several other wall calendars, in order to minimise the chance of forgetting them. Despite the precautions, every now and then a date or two get copied wrong from an old calendar to a new one, and embarrassing incidents ensue.
Liisa knows the basics of Windows, and editing documents in Word and playing Spider Solitaire work out without trouble. She can also handle paying bills via online banking and browsing the internet without much trouble, although she only ends up using the internet a couple of times a week. When problems or uncertainties arise with the computer, one of the children is called for immediate help. The couple is considering buying a tablet, having seen one of their children using one, which they felt seemed very handy. Using a tablet to browse the internet and look at photos especially interest them.

Persona #2

Pirkko, 38 years – PhD, CEO of a mobile game company, worked before as a usability specialist at a big local ICT company

Pirkko has inherited her interest in handicrafts from her mother, and especially enjoys papercraft and needle-felting. She lives in a large detached house in a posh neighbourhood, with her husband. He appreciates handicrafts but does not do them himself. Both are into playing musical instruments as well as listening to music. Weeks go by fast at Pirkko’s fledgling company, and her background in usability has made mobile devices and computers familiar daily tools. She mainly uses a Mac at home, but work requires her to also use a Windows PC, for mobile needs she owns an iPhone and a Nokia mobile phone. On mobile devices, she mostly uses Spotify for listening to music, a navigator app when driving, and an app that recites poems in the voice of William Shatner. Being able to access internet anywhere and anytime is also a huge perk for her. On her desktop and laptop computers she mostly browses the internet and plays games on Steam. The online services she most uses include banking, entrepreneurship support, YouTube, Pinterest, and Dropbox. The couple put a lot of work into remembering the people close to them with gifts and greetings – not only on special days but often for no official reason.

Persona #3

Anniina, 15 years – pupil

Anniina is still in secondary school, but is getting ready to move on to the next level of education. She has been in a special musical class since third grade and plays the transverse flute as well as the piano. Giving gifts has always been a big part of her family culture. As a teenager, she is starting to have her own circle of friends outside the family, and thinking up gifts for them is very exciting for her. She uses her smartphone all the time to keep in touch with her friends, and also utilises a memo app to keep a list of gift ideas for friends. Some of them are crazy and/or unrealistic, some standard things like books and CDs. Anniina likes to crochet and sew clothes, but most gifts she buys in shops – depending on her allowance.

4.3 Summary of user characteristics for design purposes

About a half of the example users either used a tablet or were considering getting one, while all of them used a smartphone. At least two users had access to a desktop computer at home. A tablet can be used much like a desktop, but without the interface peripherals (mouse, keyboard).

Notable physical attributes included possible weakened mobility, memory, and vision, likely due to old age. Physically impaired people are likely to use their devices more in
the comfort of their homes, while busy people who are constantly on the move use theirs on-the-go, outside the home.

Most of the example users had handicraft hobbies, which could point towards at least some level of finger deftness, making touchscreen use especially convenient. The possible weakening memory of some users must be taken into account by favouring intuitive and simple solutions – relying on memory can be expected from the user even less than normally. It should be noted, that the gift giving support application under development is not meant to be able to compensate for e.g. full-blown Alzheimer’s or other extensive memory-affecting illnesses.

Since the age range of the users was wide, from teenagers to pensioners, familiarity with information technology could be a factor to consider. The application should be simple and simulate a real-life model of action, albeit some level of basic knowledge of how to use the underlying device is required. While special technical skills are not required, devices used by the users were not limited to desktop computers with keyboards and mice, but touchscreen devices such as tablets and smartphones must absolutely be taken into consideration in the design. Some of the users were quite used to computers and smartphones, which speaks for the need of offering shortcuts in addition to simple design, to avoid frustration.

A major feature separating the user types is the interest/motivation towards gift giving. Preference towards buying vs. self-made gifts (and their combinations) is another factor to consider. Crafting enthusiasm may lead to enthusiasm towards giving gifts, while users who buy gifts will value accounting-type functionality more, as a bought gift does not leave a memory trace as strong as the steps of designing, collecting materials for, and crafting a personal gift will. In other words, buyers will need the logging functions more, crafters use the organising features more. Some bought gifts are considered more thoroughly and for longer, while others may be easy and quick to acquire. Then some people simply prefer to have all their information absolutely organised.

Common concerns for the example users were forgetting about special days, which gifts/cards they had given and received, and remembering gift ideas.

The most likely end user was determined to be a person who has already been keeping (or has tried to keep) a log of some kind of their gift giving behaviour, using e.g. pen and paper or a digital documenting tool which concurs with the real-life examples of Chapter 4.1. Some level of deeper commitment or interest in gifts could therefore be assumed. The user may not need all of the specified functionalities of the application, or might start to use some of them upon discovery.

Possible categorisations for user groups based on tendencies could be

1. enthusiastic gift givers
2. crafters
3. gift-buyers
4. organisating enthusiasts.

Groups based on device usage tendencies could be

1. smartphone users
2. tablet users
3. desktop/laptop users.
In reality, these groups form endless combinations, who will use the functionalities of the application based on their specific personal needs, forming the main end-user group. It could be worthwhile to consider offering customisation options to cater to different styles of use more specifically.

4.4 Data model and functionality

The data model of the information the gift helper application needs to present and handle is defined in this chapter. The entities containing data were determined to be the profiles, gifts, and gift giving occasions. The latter is practically just an attribute of a profile – with the exception of the likes of Christmas and Valentine’s Day, which are not tied to any single profile and only need to be hard-coded into the application (with the option to turn them on/off, depending on preferences, religion, etc.). Calendar, gift list, and profile list were considered UI elements and were defined by the functionalities they offer. The data entities are presented next with their attributes and attribute types, while UI elements are presented with their relevant defined features (see Table 3).

Table 3. Entity attributes and their types.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Attribute</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile</td>
<td>Name</td>
<td>text</td>
</tr>
<tr>
<td></td>
<td>Birthday</td>
<td>date</td>
</tr>
<tr>
<td></td>
<td>Favourite colours</td>
<td>text</td>
</tr>
<tr>
<td></td>
<td>Hobbies/interests</td>
<td>text</td>
</tr>
<tr>
<td></td>
<td>Address</td>
<td>text</td>
</tr>
<tr>
<td></td>
<td>Custom notes</td>
<td>text</td>
</tr>
<tr>
<td></td>
<td>Related gift giving occasion</td>
<td>date + text</td>
</tr>
<tr>
<td>Gift giving occasion</td>
<td>Name</td>
<td>text</td>
</tr>
<tr>
<td>Calendar</td>
<td>View of the current month by default</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gift giving occasions of the current month visible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occasions that have been covered (i.e. a gift has been organised) indicated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can be navigated in both directions, future and past</td>
<td></td>
</tr>
</tbody>
</table>

Calendar

- View of the current month by default
- Gift giving occasions of the current month visible
- Occasions that have been covered (i.e. a gift has been organised) indicated
- Can be navigated in both directions, future and past
• Ability to view the details of any occasion in the calendar
• Ability to add new gift giving occasions

Profile list
• List of all profiles
• Alphabetised or otherwise sortable
• Searchable
• Ability to mark profiles as favourites (star)
• Ability to add new profiles

Gift list
• List of all gifts
• Alphabetised or otherwise sortable
• Searchable
• Filterable (type, given/ungiven/received, bought/self-made, giver/recipient)
• Ability to mark gifts as favourites (star)
• Ability to add new gifts

These definitions (both the table and the lists) should be used as a checklist when designing the UI.

4.5 User interface concepts

Based on the findings in Chapters 4.2 and 4.3 it was determined that the application should be designed considering three versions of viewports: a desktop computer screen, a mobile device in both portrait and landscape orientations. One concept was selected from each viewport category for prototyping. Section 4.5.1 outlines the design principles and requirements set for the application, while the proposed interface design concepts are presented in section 4.5.2. Section 4.5.3 presents the best concepts selected for prototyping as well as justifications for those selections.

4.5.1 Design principles and requirements

The target user group consisted of smartphone, tablet, and desktop/laptop computer users. Three variations were designed: a wider set for larger screens, and two smaller scale sets for mobile devices in portrait and landscape orientation. While sketching out different ideas on how to organise the information in the application for each viewport, it became abundantly clear that it was more important at this stage to design a unified style to present the information and elements (defined in Chapter 4.4) consistently on all viewports. All the variations needed to be consistent enough with each other to eliminate the need for the user to have to learn three different interfaces – i.e. use the same style of elements, layout, and logic. As a result, the applications views were designed in a web page format that could be scaled down to smaller screen sizes.

TAM and the derived requirements list described in Chapters 2.2 and 2.3 became especially important at this point. The UI must be simple and intuitive enough to require minimal remembering, meaning primarily that depth of hierarchy should be minimised, e.g. not constructing several levels of submenus or views that require the user to remember where each item is hidden. In addition to weakened memory, weakened eyesight should be considered by making text and UI elements like buttons large enough to easily comprehend, and selecting a clear font. Small text should be replaced with easily recognisable icons. Button-like elements are especially pleasant for
touchscreen use without hindering mouse use, but they should be large enough and sufficiently far apart to comfortably tap with a fingertip. Some of the users are males and therefore might have larger fingertips.

The main objects of the application are the calendar and the gifts, but also the profiles and through them gift giving occasions are important. At least the first two should therefore appear directly in the main view. The term gift is used here to refer to both gifts and greeting cards (i.e. Christmas cards), as the use of these objects in the design context is practically interchangeable.

4.5.2 Design concepts

Several quick concept sketches were drawn considering each viewport option. The sketches were intentionally fast and crude, so that many ideas could be explored fast without notable commitment to them, making it easy to scrap unsuitable ones without hesitation. The sketches were then evaluated against all of the set requirements for the interface, listing pros and cons. The goal was to select the best one from each viewport category for further development, taking into account the designs’ compatibility with one another. The selected concepts are shown and explained next, illustrated with Figures 9, 10, and 11.

The desktop concept in Figure 9 places the calendar at the centre of attention at all times, using areas on each side of it to show a list of profiles on the left and a list of gifts on the right. Right below the calendar in the centre area is a list of upcoming gift giving occasions of the current month. Control buttons for adding, filtering, sorting, etc. are placed at the bottom of the screen, below each of the three main areas.

![Figure 9. The desktop concept sketch.](image)

**Pros:** The calendar is the centre of attention, along with the most current gift giving occasions. All the most relevant information is readily available and visible to the user at a glance, but still grouped clearly. The symmetry is pleasing to the eye. The setup could be great for drag & drop capabilities, such as dragging items from the lists into the calendar, or from list to list. Lots of vertical space for the lists – scrolling as well as searching for wanted items becomes easier.

**Cons:** Possibly too much information is being shown at a time, it could cause confusion for a new or inexperienced user. Gifts and profiles are presented as a list of text items – icons or some sorts of buttons could be a way to display them if this design were to be adapted for touchscreen use.
Notes: It is good to consider the control functionality, but are the control buttons too small and tightly spaced? It makes using them harder, especially on a touchscreen or by people with weakened eyesight. The amount of information being displayed in general is quite high, although careful grouping and positioning may alleviate this. Presentation of the lists needs more work.

The landscape concept shown in Figure 10 has the same basic idea as the desktop concept: the calendar has a central positioning, and below it are listed the most current gift giving occasions. While there is not enough space to display both the gift and profile lists simultaneously, they have both been considered secondary elements and share the space on the right side of the calendar section, where they can be switched between by the two buttons on top. Another option in this design concept was using tabs instead of buttons. The items on the gift/profile lists are depicted with icons.

![landscape](image)

Figure 10. The mobile device landscape concept sketch.

Pros: There is reasonable space for both the calendar and one list to be shown side-by-side, no need to cram information so tight and small it would be difficult for large fingers to tap or those with weakened eyesight to see. The most important information is readily available, gift giving occasions that require attention are shown along with the calendar, and remain visible throughout use. Using icons instead of plain text makes it easier to comprehend the items on the list, as well as tap the entries with a finger – at least if they are kept big enough and sufficiently far apart from each other.

Cons: Cannot access both lists at the same time, which rules out drag&dropping between them. Using tabs instead of buttons would probably lead to the title texts becoming too small to read.

Notes: Would both lists need to be seen simultaneously, and do they need to be seen simultaneously with the calendar?

In the portrait concept illustrated in Figure 11 the contents are clearly divided into three sections: the calendar view, the gift list, and the profile list. The idea is largely the same as in the desktop concept, with the exception that only one section can be viewed at a time, and the views are navigated between by the icon buttons at the top of the screen. The active view is indicated by a border around the corresponding button/icon.
**Pros:** Space becomes more abundant when the compulsion to cram multiple sections into view simultaneously is dropped. UI elements can be larger and better spaced, which makes them easier to see, comprehend, and use. Provided that the indicative border is prominent enough, it is easy to see which section is currently open. There is enough space for scrolling vertical lists, as well as potential to navigate between the three views by swiping. Items are represented by icons, which makes it nicer to tap them with fingers. All elements are relatively large, with enough space between them to avoid a cluttered feel, which is also convenient for touchscreen use.

**Cons:** Cannot see the calendar and the lists simultaneously, making drag&drop functions impossible.

**Notes:** Filters, sorting, and the other control functions seem great in button-form, but will they be too small? Could they be replaced by e.g. a toggled/draggable panel that becomes hidden when it is not needed?

### 4.5.3 The chosen design concept

The UI elements and layouts were combined into a single design which could easily be scaled for each screen/device type. Increased consistency between UIs on different devices could be achieved this way, as the elements remained the same with only minor changes in how many sections out of the three could be visible at one time. Although not a direct consideration, this could also make actual programming work simpler.

The application has three sections as depicted in Figure 12: the profile list (right), the calendar with upcoming gift giving occasions (middle), and the gift list (left). Profiles, gifts and gift giving occasions have all taken rectangular button forms, with graphical icons embedded inside. The buttons are large enough to comfortably use with both fingers as well as mouse and keyboard, and text size can be large enough to easily read. Spacing between elements is generous, while still maintaining a clear enough grouping of similar elements. Due to tightness and clutter concerns, the multiple sort/filter buttons in the original sketches were replaced by larger single buttons that can be used to toggle between filtering/sorting options.
Figure 12. A more detailed sketch of the layout and positioning, as well as the UI elements.

The three-section layout clearly groups items that belong together, while providing an efficient overview of information on a wider screen, and is still easy to condense into the smaller spaces of mobile device screens by splitting views by section. The threat of information overload became obvious from the evaluation of the original sketches, and there was no clear guideline for that to be drawn from the user profiles nor requirements. It was decided, that all three categories of information could be presented at once if simplified, clearly divided and grouped, with the calendar placed at the centre and the lists symmetrically on the sides. Sufficient pacing calms the flow of elements and reduces the chance of misclicks or taps. Placing the main categories on the same level also flattens the hierarchy, reducing the need to navigate deep into the system to do tasks and find information. Thus, intuitiveness is increased and the need to remember decreased, which were deemed notable concerns due to possible weakened memory and unfamiliarity with IT during user group analysis in Chapter 4.3.

The functions of adding/creating, modifying, and deleting items were not addressed in any of the sketches, and were left to be carefully considered in the prototyping phase. The functions should be positioned in a similar way for all screen sizes, to uphold consistency.

4.6 Prototyping

For prototyping purposes, it was deemed the best approach to focus on how to best present and organise the information handled by the application with consistent UI elements. Since the concept sketches chosen for development all contained compatible elements and layout, this became an increasingly feasible goal. Detailed designs of the views related to the main view, the calendar, the profiles, the gifts, and the listings of the latter two are described and shown in the following sections.

4.6.1 Main view

As per the final design concept presented in Chapter 4.5.3, the interface was divided into three sections: the profiles, the calendar with the current gift giving occasions, and the gifts. The details were fleshed out and can be seen in Figure 13.
Profiles (Henkilöt) are represented by large rectangular buttons, with icons and names inside, in a list. For now, the icons are merely human silhouettes, but they could as well be pictures of the people they represent. On the left side of each profile button is a star which can be toggled on (orange) or off (empty/white), to indicate favourite/starred status. Favourited profiles always appear at the top of the list by default. The bottom area in the section has two buttons and a search field with a search button. The first button from the left controls the sorting of the list, with the star icon (default setting) representing showing the favourite items first, and the abc icon order by name. The “+” button next to it is used to initiate the dialogue for creating a new profile. Text can be typed in the search field, with the magnifying glass button to the right of it sending the search query, and causing the list to only show profile entries that match the search string. Tapping/clicking a profile button will open a view of the information contained by the profile (profile information view). A potential shortcut function could be tapping and holding a profile button to open a context menu with the possibility to modify or delete the profile.

The calendar (Kalenteri) section shows the calendar with the current month by default. The arrows around the month and year are used to navigate to the previous/next month. Below the calendar are rectangular buttons depicting the gift giving occasions coming up in the month currently shown by the calendar – with the corresponding dates highlighted in the calendar as well. The button can contain four types of icons depending on what kind of an occasion it is supposed to depict. They are shown on the far right in Figure 13: a birthday cake for birthdays, a flower for miscellaneous special days (such as anniversaries or name days), a Christmas tree for Christmas, and a heart for Valentine’s Day. In addition to the icon, the button has a date, the name of the occasion, and the name of the person it is for (if applicable). Tapping/clicking the buttons will open the profile of the person the occasion is set for.
The basic functions of the gift section (Lahjukset) are identical to the profile section. Gifts are represented by the same type of buttons as profiles and gift giving occasions. They contain an icon representing the type of the gift entry: a lightbulb for an idea, a gift box for a gift, and an envelope for a card. The bottom section is identical to the profile section’s: it has a sorting button, a button for creating a new gift, and a search function. The icons for different gift types can be seen listed in Figure 13, right below the sorting button. They function as additional sorting criteria for the gift list.

4.6.2 Profiles and gift giving occasions

There are three views related to profiles: a profile information view, a profile creation dialogue, and a profile modification dialogue to change the contents of an existing profile. The former two are shown in Figure 14, the latter in Figure 15.

Both the creation of a new profile and viewing the information in a profile are shown in Figure 14. The creation dialogue is basically just a form with different input fields for various information: name, birthday, favourite colours, hobbies, and other information. The last text field is freeform and can be used for any miscellaneous notes. The profile is created by tapping the Save button (“Tallenna”), or the process can be cancelled at any time by tapping the Cancel button (“Peruuta”) or the X at the top-right corner of the dialogue.

![Figure 14. The dialogue for creating a new profile (left), and the finished profile view (right).](image)

The profile information view shows all the information that has been entered into the profile, including gift giving occasions that may have been added, as well as gifts that may have been given. Next to each gift is a small icon depicting the type of occasion (listed and explained in Section 4.6.1), and the year of the occasion. Tapping a gift button will display the information of the gift in a separate view (gift information view).

The profile modification dialogue on the left in Figure 15 is very similar to the profile creation dialogue in that it has a collection of different input fields that have been prepopulated with the current state of the information, where they can be easily edited. Gift giving occasions specific to the profile and the gifts given can be modified and deleted through this dialogue as well, but the modifying and deleting functions for each
one must be accessed through the smaller buttons. The editing button has a pencil icon, whereas the deleting button has an X.

Figure 15. The dialogue for modifying a profile.

The arrows in Figure 15 point to the various smaller dialogues that open from each element in the profile modification dialogue: modifying an existing gift giving occasion related to the profile, deleting an occasion from the profile, and creating a new occasion for it. The different possible icons for gift giving occasions were shown in Section 4.6.1 in Figure 13, but all user-created occasions sport the generic flower icon as they are considered custom occasions (as opposed to Christmas or birthdays). It should be noted, that birthdays cannot be added via this process, as they are entered directly as a part of basic profile information at creation.

4.6.3 Gift views

The gift views and conventions are almost identical to the profile ones. Figure 16 shows the gift information view and its connection to the gift giving dialogue, while the gift creation and modification dialogues can be seen in Figure 17.
Figure 16. Gift information view (left) and gift giving dialogue (right).

The gift information view (in Fig. 16) shows the picture (if one has been added) related to the gift, followed by type icons (in this case it is a gift instead of a card, and also an idea). The description typed in by the user and a possible link come next. If the gift has been given to someone, the recipient will be shown as a profile button along with the corresponding gift giving occasion. A button after the recipients allows “giving” the gift to someone. The dialogue for gift giving is a simple list of profiles, selecting one will show the occasions available for the profile, one of which has to be selected for the gift before the process can be finished by either tapping the Give gift button (“Anna lahja”) or cancelling altogether via the Cancel button.
Creating a new gift is slightly different compared to creating a profile in that after a name the user must choose the type of the gift (see Fig. 17 – the radio buttons with gift and card icons) as well as toggle its idea status (the checkbox with the lightbulb icon), and optionally select an image file. Other than that, entering all relevant information works the same way: by filling fields.

4.6.4 Notifications and prompts

Several notification popups were designed to let the user know what happened after their latest action. Often these notifications were used to confirm that a new profile, gift, or gift giving occasion had been successfully created in the application database. Respectively, notifications telling the user an operation failed were added. The various notifications in Figure 18 make sure the user gets feedback and confirmation for their actions.
The first notification on the left column of Figure 18 confirms that a new profile has been successfully created, the one below it gives the same confirmation for creating a new gift, and bottom one confirms a new gift giving occasion added for a person. On the right column stand the corresponding error messages in case the new items could not be added to the database for some reason, thus causing the action to fail.

The first two prompts in Figure 19 are used to confirm the cancelling of creating a new item, be it a profile or a gift, if information has been entered in the creation dialogue by the user. This is to prevent frustration from accidentally hitting Cancel, or just to offer the user an extra moment to reconsider and make sure they realise what they are about to do.

These prompts could also offer the option not to show them in the future by crossing a checkbox, which is standard in many applications, in case the user finds the confirmations more annoying than helpful. The last prompt confirms deleting a given or planned gift from a profile (see Fig. 15). The user is also notified that this action does not delete the actual gift from the database, only the association between the profile and the gift.

4.7 Evaluation

The prototype of the gift giving support application was evaluated in two ways: by heuristic evaluation and user testing using a paper prototype. The evaluations were
conducted by two people: an information processing science major, and an expert with a PhD in applied psychology as well as years of experience working in the usability field. The findings of the heuristic evaluation are detailed in Section 4.7.1, while the heuristics used can be found in Chapter 3.3. The user testing produced even more findings and is detailed in Section 4.7.2. A comprehensive list of the findings of both evaluations with their effects can be found in Section 4.7.3.

4.7.1 Heuristic evaluation

Visibility of system status to the user did not pose any problems, the UI is very static and all events (such as opening and closing of dialogues/prompts) are initiated by user action, enforcing the feeling of being in control. The system gives feedback on the success or failure of all operations, and discarding of entered data without saving it is always confirmed. Removing a given gift is the only removal safeguarded by confirmation prompt, deleting a profile or a gift do not seem to have these confirmations – at least they have not been depicted in the prototype documentation.

UI elements are clear and easy to identify (icons for profiles, gifts, and gift giving occasions). The calendar element is also very standard in both look and function. Components that can be activated look like they can be activated. The presentation of items as icons inside panel-like buttons is consistent throughout the application. The bottom bars of the profile and gift lists look the same and function identically, increasing consistency even further. All the editable fields in the UI function identically.

In the gift information view (see Fig. 16) the picture has been placed first after the name, although during the adding and modification dialogues (see Fig. 17) it is placed last – in this case both ways of ordering can be determined to support the user’s primary goal and action, as seeing the picture first can be more useful when viewing a gift’s details. For consistency purposes the picture should also be placed first in the profile information view, but at least for now profiles do not contain an actual picture, and are only depicted by a generic human silhouette icon. Regarding gifts, it could be argued that the description should be placed before the type in gift creation and modification views, as it should be quickly available to make notes, and should therefore be prioritised in accessibility.

When comparing the different creation/adding dialogues, in the case of gift giving occasions (see Fig. 15) a generic “custom occasion” flower icon is visible, but other such dialogues do not display icons. The same icon is unnecessarily used on the “add new occasion” button of the profile creation dialogue, causing it to resemble an actual existing occasion. In other views using the same type of button with only text signifies emptiness, it could be justified to use the same principle for add/create buttons.

The system shows error messages when an operation has failed (see Fig. 18). Fault situations are primarily the result of problems with database connectivity, which is usually not within the user’s power to influence. A good solution could be to store data both locally and remotely (in the cloud), syncing local changes to the remote database whenever a connection is available.

There is no help or documentation, but on the other hand each button and entry field is clearly labelled, while minimalistic icons and layout make using the application simpler and faster. The content-first preference used in the design choices helps reduce the hierarchical depth, and the users who are assumed to use it probably acquire it knowing what it is intended for. Drag&drop is mentioned in the requirements several times, but
such functionality has not been indicated in the prototype at all, although such functionality would improve efficiency and offer shortcuts for experienced users. The placement of especially the item creation and sorting buttons (and the whole bar) at the bottom of a section does not match their importance and predicted frequency of use.

The prototype is missing quite a few of the functionalities mentioned in the requirements, the shortcomings are listed below (for the first four categories see Fig. 13):

**The main view:** The toolbar containing sorting and item creation buttons and the search function is quite important and should probably be given a more central location, e.g. at the top of the section instead of the bottom.

**Calendar:** There is no gift indicator associated with the current gift giving occasions. Occasions cannot be directly added to or removed from the calendar, nor opened for viewing their details.

**Profile list:** The only sorting criteria is alphabetising, but the prototype sorts profiles by favourite/starred status by default.

**Gift list:** The requirements speak of filtering, but the prototype clearly sorts items instead. The only sorting criterion mentioned in the requirements that is also present in the prototype is type (gift/card). Given/ungiven/received, bought/self-made, giver/recipient options for filtering/sorting are missing.

**Profile:** A list of gifts received from a profiled person is missing. A gift cannot be marked nor unmarked as received (from someone else). Profiles cannot be deleted.

**Gift:** The requirements use plural form when mentioning pictures and links, but only one of each can be added to a gift (see Fig. 17). There is no indication of whether a gift is self-made or bought, whether it has been received from someone or given to someone. Gifts cannot be deleted.

**Summary of findings in the heuristic evaluation**

- The fields in the gift creation dialogue are not prioritised properly. Description is more important than type. The description should be moved up second after the name, so that the most important information about a gift can be recorded as quickly as possible. You do not want to be writing down secondary details when you need to be making notes of the important ones before they are forgotten.
- The icon on the gift giving occasion creation dialogue negatively affects consistency, although it may look aesthetic.
- The icon on the “Add occasion” button on the profile modification dialogue may mislead the user into thinking the button is an actual existing occasion, and is not consistent with other similar views.
- Drag&drop functionality could offer shortcuts for experienced users.
- The main view and the purpose of the application are not necessarily obvious, even if the application was acquired for a specific need.
- Profiles and gifts cannot be deleted.
4.7.2 Usability test

The goal was to conduct an expert evaluation using a paper prototype (see Fig. 20) with only one representative user to quickly gauge the most obvious problems in the application UI. Luckily, the user selected happened to almost completely match Persona #1 described in Chapter 4.2.

![Paper prototype for usability test](image)

**Figure 20.** The paper prototype used to conduct the user test.

The user test task list is included in Appendix 1. It has been translated from Finnish (used in the test) to English. The application was dubbed “The Little Gift Helper”, or “Pieni Lahja-avustaja”, in the material for testing purposes.

At the beginning of the test the calendar in the centre beckoned the user, leading him/her to wonder aloud if it could be used for adding something (not specifying what, exactly). The user experienced some confusion over whether gifts in the gift list of the main view (see Fig. 13) were all connected to the profile visible under the calendar (a birthday coming up in the current month) in the centre section. By tapping the occasion in question, the user quickly discovered the profile information view (see Fig. 14). Afterwards the user had no trouble remembering tapping profile and gift buttons opened their information views, throughout the rest of the tasks.

The user also made note of the Given gifts section on the profile information view and wondered how to see if planned gifts had already been added to the profile. When asked to add a given gift to a profile (task 3), the user attempted to accomplish this via opening the profile information view of the profile in question, but was met with a dead end. The user noted they would have liked to press a button below the list of already given gifts to add a new gift. In the end, the user gave up and the task was left incomplete.

The task of creating a new profile based on given information (task 4) was also somewhat difficult for the user. He/she noted aloud that he/she would have liked to tap a date on the calendar (Fig. 13) and begin creating the new profile that way, via their birthday. The user unable to find any possible way to create profiles, the moderator eventually helped by asking the user to explain the icons on the bottom bar of the profile...
list section, and encouraging experimentation. After finding the sorting functionality confusing, the user eventually tapped the “+” button, and immediately remarked he/she “should have known – the plus sign is used in other applications to add things, too”.

As for the actual profile creation process (see Fig. 14), the user would have preferred to insert birthdays via text fields, but definitely preferred the set of drop-down menus to a visual calendar-based date picker. The creation process posed no problems, save for a notion of confusion over what exactly the Cancel button cancels. This was, however, quickly cleared up by experimentation, as the system presented the user with a confirmation dialogue on whether they really wanted to cancel the creation process and lose the data.

When asked to check if wrong information had been entered into a profile (task 5), the user accidentally discovered how the stars/favourites work, but did not consider it a useful feature. Instead he/she noted profiles should be alphabetised by default.

**Summary of findings in the user test**

- The fact that the gift list is a separate entity from the list of upcoming gift giving occasions was not obvious to the user.
- The user clearly expected to be able to use the application to plan gifts, as in associating potential gifts for a recipient or potential recipients for a gift.
- The user pondered if they could see whom a gift had been given to, if anyone.
- The user found it natural to add a new gift to a profile through the profile information view, but the system did not offer this functionality. They were not able to add a given gift to a profile at all, which is a serious concern.
- The connection between a search field and a magnifying glass icon was not clear to the user.
- A mere “+” icon for adding/creation was problematic – the user did not recognise the icon until they had found its function through experimentation.
- The user would have liked to begin creating a new profile by using the calendar to browse to the person’s birthday.
- Could birthdays be entered by a single text field instead of multiple pull-down menus?
- The idea of favouriting/starring items did not seem intuitive to the user.
- A Cancel button in the context of a creation dialogue caused momentary confusion.
- The user felt sorting profiles by name rather than favourite/starred status seemed more rational.

**4.7.3 Evaluation findings and effects**

The two types of evaluations found very different types of problems. Especially the usability test revealed some very interesting problems and one can only imagine what could have been found had the test been conducted with several users.

According to the heuristic evaluation the order of the entry fields for a gift should be changed. Creating a new gift was not a part of the user test, and could therefore not have come out in that context.

The icon on the gift giving occasion creation dialogue (see Fig. 15) is basically unnecessary. There is already a clear text label on the dialogue stating what is being
done. On the other hand, the icon looks nice on the otherwise dull dialogue – consistency might instead be achieved by adding icons as decoration to other similar dialogues as well. That solution would not work, though, because the icon of a new gift cannot be known beforehand, before its type has been selected, and the icons are visible on the dialogue for the purpose of that selection anyway. On the other hand, a gift giving occasion is not the same kind of entity as profiles and gifts are in the system; occasions do not have an independent status or even a separate view, they are only present as components of profiles and gifts. However, since the occasion creation dialogue is very simple, having a single icon as decoration should not hurt user comprehension – it might even help tell the small dialogue apart from the notification popups of the system (see Fig. 19), especially after the user has learned to associate the icon with gift giving occasions. In the end, it was decided to leave the icon as is.

The same icon also is present on the button to add a new occasion (see Fig. 15). In that case, the icon both decreases consistency and misleads the user, therefore warranting its removal.

In the case of the search field and button (see Fig. 13) a greater space between them and the sorting and creation buttons might make it easier to perceive grouping. Making the magnifying glass graphic slightly smaller and directly connecting it with the search field could also help express their relation. A button may not even be needed, if the search function was to filter the list contents as characters are being typed by the user, in real time, therefore making the purpose of the magnifying glass purely illustrative.

The creation icon must be improved. The user was able to recognise that a “+” sign is normally used to add things, but the appearance of the icon distracted them. The icons could be modified separately match the items they are used to create: the profile creation button could depict a human silhouette with a “+”, and the gift creation button a gift box with a “+”. Making the “+” signs green may further clarify the purpose of the buttons. The user would have liked to begin creating a new profile by finding their birthday in the calendar, but this could at least partly be rooted in the uncertainties regarding the creation buttons – mainly their obscurity and placement. Moving the toolbar to the top of each section could also help remedy this.

Adding favourites – or starring – was not a very familiar concept for the user, and they did not believe they would have a use for it. The existence of the functionality did not, however, disturb the user, and it can be argued even inexperienced users may find such a functionality useful after using the system more and discovering uses for it. For more experienced users the concept is likely already familiar, and they can opt to use it if it serves them. It could be justified to switch to alphabetising the profile list by default, so as to not force the favourite/starring feature on users. In the case of gifts, the feature did not matter to the user, but in the interest of consistency alphabetising the gift list by default as well is a reasonable change.

The user would have preferred to enter birthdays (see Fig. 14) by manually typing them into a text field, but did not shun the drop-down menus either. A drop-down menu effectively controls the format of the input entered by the user – a text field would have to have its contents rigorously scrutinised, for both sanity and date format. At best the system would be able to accept dates typed in many different formats, alas, the feature will likely have to be left for another version for the consideration of time and resources.
Several features defined in the requirements were missing from the prototype, some no
doubt due to carelessness, some may have been left out of the scope of the realisation of
the prototype without proper documentation.

Adding gift giving occasions directly through the calendar (see Fig. 13) was missing,
and the test user would have liked to use the calendar more diversely for adding and
creation, much as described in the requirements. The complicated way to begin creating
a new profile by starting with their birthday in the calendar does not seem feasible, but
adding a new occasion for an existing profile by tapping a date on the calendar would
seem quite logical, and should be added as a feature. A gift indicator on a button of an
upcoming occasion under the calendar is also useful and easily displayable information
and should be added to the interface.

The status of received gifts in the system was deemed a major concern from a design
point of view. Differentiating received gifts from user’s own created gifts would be
difficult, especially if the list should be kept simple. The most reasonable solution might
be to separate received gifts into their own section which would require major changes
in the prototype, albeit tracking received gifts has been established as an important
feature, and should definitely be added to the system. In the end, it was decided to leave
it for another version.

Opting to allow only one link and picture per gift (see Fig. 17) has been a scope
restricting decision on a feature with unknown usefulness. Reducing the number of
types for gifts was a similarly justified decision, to also help keep the list as simple as
possible at this stage of development.

When it comes to filtering vs. sorting, hiding the entries left outside the filtering criteria
instead of moving the matching entries to the top of the list can be frightening for an
inexperienced user, as it may seem like items are getting deleted while typing. By
hiding or darkening the non-matching entries instead of hiding them this threat can be
averted, as all entries will remain available.

The lack of a deleting functionality for profiles and gifts was clearly a result of
sloppiness, as these functions were clearly listed in the requirements, and leaving them
out would be highly unsmart. A logical solution would be a classic Remove button on
each information view.

It is illogical that a recipient can be added for a gift but not vice versa. This was
completely overlooked in the requirements. It had been assumed at the design phase that
giving gifts in the context of the system would start with the gift entity and not the
recipient – this assumption was clearly wrong. The best option is to add the
functionality desired by the user, i.e. the adding of gifts via profile, enabling both paths
to the goal.

While the benefits of drag&drop functionality have been documented since requirement
engineering and they cannot be denied, it was not deemed feasible to add it at this stage.
The importance should be noted, and made sure it is kept in the backlog at high priority.
Planning gift giving was also a requested feature by the user, and should be added, if at
all feasible.

The contents and structure of the main view (Fig. 13) may not be easy to comprehend
for a new user, which was clearly shown in the user test by the user’s inability to
perceive the separation of the list of upcoming occasions and the gift list at the start of
the test. A small-scale introduction into the application UI could ease the deployment of the application by the user. The easiest approach could be the use of a First Time Use (FTU) tutorial shown as a welcome screen at first start-up of the application that would not require much of the user’s time nor reading a manual. A short explanation of the purpose of the application could also be shown in the tutorial.

4.8 Iterative redesign

This chapter documents the changes made to the prototype based on evaluation findings. The changes made are detailed in the following sections. Section 4.8.6 collects the features and concerns left unaddressed in the form of a backlog.

4.8.1 Main view

The main view went through the most substantial changes. As can be seen in Figure 21, the toolbars on the profile and gift sections have been moved to the top for easier access. The search button (magnifying glass) has been removed and the icon has been moved inside the field to indicate search capability of the field. The search functions slightly differently, in that it starts filtering the list as the user types into the field. Placement of the sorting and adding icons has been slightly clarified, and the icons have been changed to look more informative – they now indicate the item that they add, instead only showing a generic “+” sign.

The lists of both the profile and gift sections are alphabetised by default, instead of showing the favourite/starred items first, otherwise the sorting function remains unchanged.

![Image](image.png)

**Figure 21.** The updated main view.

The creation of a new gift giving occasion can now initiated by tapping a day in the calendar, which will open a creation dialogue (see Fig. 22). The tapped date is
automatically inserted into the dialogue form, the user will select the profile from the list, and enter a name for the occasion.

![Profile Creation Dialogue](image)

**Figure 22.** The gift giving occasion creation dialogue.

These changes should clarify navigating the application as well as offer intuitive functionality through the calendar.

### 4.8.2 Profiles and gift giving occasions

The profile creation dialogue has not been altered. The profile information view and modification dialogues, on the other hand, have undergone some changes.

In order to bring related functions closer together instead of having them spread out everywhere, it was decided that the information from name to gift giving occasion are so specific to the person the profile represents that they can only be changed through the modifying function (see Fig. 23).

Given and planned gifts, however, can now be directly added and removed from the profile information view, as seen in the middle section in Figure 23. Being the most frequently needed functions it made sense to not hide them behind unnecessary button presses. A profile can also be deleted directly from the view. The buttons on the view were changed into *Modify*, *Delete*, and *Close*, with the *Close* button made larger and moved safely apart from the other two buttons, to reduce the chance of accidentally tapping the wrong button.
Figure 23. The updated profile dialogues.

The modification dialogue no longer shows gifts, as operations on them were moved to the profile information view. Associating a gift with a profile is initiated by tapping on the Give gift (“Anna lahjus…””) or Add planned recipient (“Lisa suunniteltu saaja”) buttons.

Figure 24 presents the gift giving and planning dialogues. The dialogues display the recipient first to make sure the user can see who the gift is being associated with. The gift is selected from a list next, and in the case of adding a given gift the related occasion is then selected. When adding a planned gift the last step is skipped.
Modifying a gift giving occasion is initiated by tapping the pencil button on the profile modification dialogue (Fig. 23). New occasions are added by tapping the *Add occasion* ("Lisää merkkipäivä") button below the list of existing occasions. The occasion dialogues remained unchanged. Being able to add gifts via profiles was previously missing from the design – a flaw immediately discovered by a single test user. Now both routes of connecting recipients and gifts are available to the user.

### 4.8.3 Gifts views

The gift creation dialogue remained unchanged, but the gift information view had some upgrades. Planned recipients have been added, and like the profile information view, gift giving and planning features are now accessible from the gift information view as well. Figure 25 depicts two different gift information views to illustrate the difference when a gift has been marked as an idea. An idea naturally cannot be given to anyone, therefore until the entry has been changed into a concrete gift by the user, it cannot have recipients. Planned recipients can, however, be added for an idea-stage gift.

**Figure 24.** The dialogues for adding given and planned gifts.
Figure 25. The updated gift dialogues.

Logically adding a recipient or a planned recipient for a gift functions exactly the same way as adding a gift or a planned gift to a profile, just reversed: instead of a profile entry being displayed first in the dialogue, the gift entry is displayed, after which the user selects a recipient from a list, and finally an occasion (see Fig. 26).
The only change to the gift modification dialogue (Fig. 27) was a rearrangement of fields. The description was moved below the name, to allow faster and more convenient access to it at times of spontaneous inspiration. No other changes were made.

All in all, the changes to gift handling were mainly minor tweaks in workflow: prioritised information and functions were made more accessible.
4.8.4 Notifications and prompts

Simple dialogues seen in Figure 28 were added to confirm the deletion of items. The dialogues show the item information, making sure the user knows exactly what they are deleting. In the case of deleting a given gift, the dialogue includes a note that the action does not delete the gift itself, only the association between it and the profile.

![Confirmation dialogues](image)

Figure 28. Confirmation dialogues.

Notifications were not altered.

4.8.5 FTU tutorial/instructions

A First Time Use tutorial (Fig. 29) was added to make it more convenient to begin using the application. It also acts as a welcome screen. It is simply an image laid over the UI, welcoming the user to the application. The main view is shown as it would appear at the very first start-up, when no entries have been added by the user, making it sure once the tutorial is closed the main view the user sees matches exactly what they just saw on the welcome screen. The image explains what each section does and what it can be used for.
Figure 29. The First Time Use tutorial image.

The introduction is not cluttered with explanations of every button, instead letting the user explore the features themselves, relying on their intuitiveness.

4.8.6 Backlog

Not all problems could be addressed nor all features included in the prototype, therefore the ones left over were added to a backlog for possible later development use. The list also contains random ideas spawned during the design process:

- Drag&drop functionalities
- Profile categories (e.g. family, friends, grandchildren)
- Budgeting
- Tracking of received gifts
- Less rigid input options for some data (e.g. dates)
- Handling of duplicate profile names
- Handling of duplicate gifts
- Advanced filtering/sorting (e.g. profile categories)

These features and concerns are likely the first on the list to be solved if/when development of the application continues in the future.
This research aimed to find an ICT based approach to helping people manage and track gift giving and planning, as well as record their ideas. The problem domain, while originally arising from personal experience, was also researched for wider cultural significance through a literature review, and at a practical level for concrete requirement identification, through user interviews. In this study, the focus was on identification of requirements and on demonstrating those requirements in a prototype and user interface design. The chosen method for the research was Design Science Research (Hevner et al., 2004).

The narrative literature review in Chapter 2.1 provided in-depth understanding of gift giving, and answers to the first research question: what are the main difficulties in gift giving? The examples of how such activities have been managed by the number of interview participants also went towards illustrating the multifaceted and interconnected nature of keeping tabs on gift giving, such as, how it was necessary to track people, be able to add people to the lists, and keep the organisation going over years. In other words, the main sources of difficulties appeared to be identity and management based. According to the literature, identity-congruence related matters are a major issue, such as the difficulty of selecting gifts that serve both the giver’s and the recipient’s self-identities (Paolacci et al., 2015). Giving a gift that only matches the giver’s own identity with no regard for the recipient is likely to cause discomfort in the recipient, harming the relationship between the two (Ward & Broniarczyk, 2011). If a gift is selected based only on the desires and identity of the recipient, the giver is then likely to experience an identity threat, again harming the relationship (Ward & Broniarczyk, 2011). Sufficient knowledge and consideration of both self and the recipient helps find gift ideas that can match both parties and thus solidify the relationship. Hence knowing both oneself and one’s gift recipients helps select gifts that work for the relationship instead of against it, suggesting it might be worthwhile to keep tabs on the personal details of one’s social circles. It should be noted, however, that despite the effort and help such ideal approaches are not always possible, as circumstances change, old friends are lost and new ones gained.

The interviews with an immediate sample of convenience revealed forgetting birthdays or procrastinating on them to be another major cause of difficulty. In-laws, stepparents, and certain relatives are the most common sources of hardship for gift-finding when it comes to people, but several other factors contribute to this phenomenon, too, such as fear, mismatching tastes, indifference, and simply not knowing the recipient well enough (Otnes et al., 1992).

Combining the findings with TAM early requirements were able to be derived to start solving the second question: how could the difficulties be alleviated by ICT? Using these guidelines, it could be possible to design an application that helps keep track of people and upcoming gifting days as well as ideas for gifts. If expanded with third party services (such as Amazon, Ebay, or Google), it could even directly help finding new gifts by generating suggestions based on combined data from other users and finding similarities. Overall it is possible to see the significance of user research in tandem with prior knowledge as well as a guiding theoretical framework, in this case TAM (Davis et al., 1989): by having a set framework to build upon, the requirements can be formulated
and aligned towards the intended outcome in a systematic and practical manner, as seen in Chapter 2.3.

While the literature and partly the interviews indicated that the proposed application needed to counter the difficulties related to ideation, identity, and gift giving management (or at least some of them), user analysis was needed to deduce how it should do what it needed to do.

Personas is a design technique that originated in the field of marketing, and was brought into design use by Alan Cooper. The basic idea is imagining a very limited set of pretend users based on real life samples, and then designing for them (Cooper, 2004; Cooper et al., 2007; Pruitt & Grudin, 2003). Cooper has three categories for personas: marketing personas, proto-personas, and design personas (Ilama, 2015). Proto-personas were used in this study (see Ch. 4.2) due to limited time and resources, as well as the limited nature of the user interviews. While not ideal like the other two persona types, Ilama (2015) reports that, according to Cooper, they are still better than having no personas.

The concept of user profiles was also used as guidance to help pinpoint useful content for the personas. While user profiles cannot account for every possible combination of characteristics in the actual users, they should only aim to describe and generalise the most difficult cases. They should contain IT skills, attitudes, as well as physical attributes. User profiles are especially useful for selecting participants, experts, and environments for user testing later on. (Lauesen, 2005.)

Once the literature-based preliminary requirements and the user analysis were combined into expanded requirements and a data model formed, it was possible to sketch concepts, compare them, and develop a prototype based on the best concepts.

The design took guidance from mobile-first design principles – although the main view was designed to be viewed on a bigger screen, the elements in it were designed to be adaptable to smaller screens, by showing only one section at a time, depending on screen size. In practice, the scaling of the UI for different devices on a website would probably be most conveniently achieved by the use of CSS3 Media Queries (Rivoal, Lie, Çelik, Glazman, & van Kesteren, 2012). While mobile-first design needs to also take other device features besides screen size into account, e.g. by leaving out resource-heavy items like large background images (Walsh, 2016), in the scope of the prototype it was not a necessary concern to consider.

Due to user characteristics such as possible weakening memory and inexperience with IT made flat navigation hierarchy one of the design goals to help simplify the UI. A flat hierarchy was especially suitable as the content was easily divisible into only three categories, contributing to reducing the need for the user to remember where specific items are. Fortunately, less clicking and digging also contributes to fast navigation between features, which pleases more experienced users. (Whitenton, 2013.)

Using the content-first approach on design decisions not only helped flatten the hierarchy, but also facilitate responsive design in regards to Media Queries (Hane, 2016). To further avoid common caveats in the design phase, note was made of Shneiderman and Plaisant’s (2010) Eight Golden Rules as well as common sense web usability by Krug (2014).
The prototype was evaluated using heuristics (Nielsen, 1994a; 1994b), as well as usability testing. The evaluations showed that most of the features based on literature research and user analysis did indeed serve the purpose they were designed for. Minor fluctuations were detected by both the heuristic evaluation and the user test of a paper prototype, albeit more significant findings might have resulted from a wider range and higher number of users for usability testing. The found problems, nevertheless, were fixed in the final version of the prototype for the scope of this study.

Regarding the research questions, the study was able to provide further understanding of the difficulties in managing gift giving, and to provide an ICT based solution for the problem.

5.1 Meeting the Design Science Research guidelines

As illustrated in Chapter 3, the present study used DSR framework by Hevner et al. (2004) as the chosen research method. One central element of the approach involves the seven DSR guidelines, and the present section presents an evaluation of how these guidelines were adhered to in the present study.

Guideline 1: Design as an artefact

In the present work, a prototype of a gift giving and planning application was produced as an artefact. The prototype fills the requirements set for it in design phase, in that it allows the user to not only plan what gifts could be given to whom in the future but also tracks what gifts have already been given to recipients in the past. Keeping gift-wise important information about recipients at hand was also deemed important, and this functionality is also offered by the application prototype.

Guideline 2: Problem relevance

The research problem was initially identified from author's personal needs, and its applicability to a larger audience was ascertained through further informal discussion with other people within the author's circle of acquaintances. The problem was one that persists over a long time span (years) with people who wish to be creative with their gifts, wish to avoid repeating a gift, and who want to make a note of possible gifts to give in advance. The narrative literature review supported the assumption that gift giving is indeed problematic in many ways, and carries a heavy cultural meaning with deep effects on social relationships.

Guideline 3: Design evaluation

Evaluation was the weakest part of this research. The evaluation of the artefact involved two elements: first the feature set of the system was evaluated using a heuristic evaluation approach with a representative sample of convenience. Another evaluation was a small user test with a paper prototype where a representative system user explored a number of tasks. This evaluation was moderated by the system developer and observed (and notated) by a user interface and user experience specialist (approx. 10 years of experience in research and development).

Guideline 4: Research contributions

The main contributions offered by the present research are the practical extension of the cultural gift giving knowledge base by means of user testing and transformation of this knowledge into system requirements in the given problem domain.
Guideline 5: Research rigor

Design rigor was achieved by means of using the DSR methodology, drawing in relevant knowledge from prior research, and by conducting user research with repeatable user research methods. The findings were used purposefully to base design decisions on.

Guideline 6: Design as a search process

The study employed existing literature and user research that focused on the specific problem domain in order to identify the system requirements. The variety of methods used to support the design process, for example the use of personas to assist in keeping the design process focused on the objectives of the systems and its user needs, meant that the process was continuously informed by a reasonably broad perspective on the problem. Such an approach also helped in identifying key elements in the materials so that, for example, a requirement identified from literature could be evaluated against the needs identified from user research.

Guideline 7: Communication of research

Main communication of the presented research work is this thesis, the course work that the thesis is based on and thus also the relevant presentations and communications (thesis seminar, course presentations).

5.2 Limitations

This study focused on identifying requirements (how to achieve the design objectives) and to create a concept of a system to a prototype stage. A larger usability study with the prototype would have, no doubt, provided more insights into how well the system concept matched perceived user needs. While the UI elements were designed to be readily adaptable to different devices, a separate test of especially smartphone-scaled prototype would probably have provided different results, as well as provided further proof of concept regarding design decisions.

More thorough research could have been done on the existing gift helping applications, even though there were very few real ones. Still, they may have functionalities or design ideas that work better, and have at least been put to the real test and hopefully developed further from design phase.

5.3 Future research

Proper evaluation could be achieved by actually producing the website and having users use it for at least one year, preferably two or more. This would allow researchers to gain data on whether (and how well) the application is able to support gift giving on all yearly repeating occasions, such as birthdays and Christmas. Extended use would also allow the users to truly experience the accumulation of ideas over a longer period of time.

It could be extremely useful to look into Behaviour Change Support Systems (BCSS) research for guidance to further develop the application. While the present prototype is enough to support people who already have enthusiasm or at least a positive stance towards gift giving, it could also be used to improve the gift relationships of people who are less excited or even pessimistic about the topic. There are many connecting points in
Oinas-Kukkonen and Harjumaan’s (2009) model where behaviour not fruitful for gift giving could be altered, especially via primary task and dialogue support, although hoping to go as far as attempting to change a negative attitude entirely would be quite ambitious – perhaps too ambitious.

Advanced support for gift ideation via cross-referencing of consumer data is also an interesting concept. Major companies such as Google and Amazon collect huge amounts of data on people’s buying behaviours via shopping and advertisements tracking. Using this data to triangulate specific and accurate suggestions for gift ideas to the user based on what other users gave people with similar recipient profile contents could be incredibly helpful. Profile information content should probably be nudged towards a tag-based format to make this feasible. This idea has its concerns, though: should gift giving process be automated? Going into an application to get a quick gift idea takes at least a part of the personal effort of the gift giver out of the equation, which could have devastating effects on the feeling of closeness gift giving traditionally aims to increase (Aknin & Human, 2015). Adding a social element of connected groups of users would open up the possibilities of learning from others and sharing ideas, as in services like Pinterest. Perhaps with some emphasis on non-traditional, non-material gifts that address ethical concerns.
6. Conclusion

The purpose of this thesis was to offer an ICT based solution for the difficulties regarding gift giving. A starting point was created by first researching gift giving literature and finding out that the difficulties mostly stem from the two-way identity-matching need of gifts, as well as management of gift ideas, history, occasions, and time. Combining the findings with the Technology Acceptance Model, a preliminary set of requirements for a gift giving support application was created. Taking a Design Science Research approach, the requirements were further expanded by user analysis via interview-based personas, and a prototype was designed to offer gift giving management, tracking, and ideation functionalities on both desktop/laptop and mobile devices.

The prototype was evaluated using heuristics and user testing, and several concerns with the initial design were uncovered. These concerns were then analysed and solutions formulated, partly redesigning the previously created prototype to fix the problems found via the evaluations. The study showed that tasks alleviating gift giving difficulties could indeed be supported by means of ICT with the application, although the prototype produced would require further corrective iterations to reach production level.
References


Cooper, A. (2004). *The inmates are running the asylum*. Indianapolis, IN: Sams.


Appendix 1: Interview guide

Age and occupation

What kind of family

Hobbies, interests, free time use

IT device usage – at home, work, school, etc.

What are they used for

Personal gift giving culture – gifts, cards?

Family gift giving culture

Are gifts/cards bought or made

How are gifts or ideas for them found

Are tools used to help with gifts

Feelings of panic, anxiety or distress (or other) about gifts

Any failed gift experiences

How to avoid panic or anxiety or other unpleasant feelings about gifts
Appendix 2: User test task list

1. *(At the beginning the user is allowed some time to get familiar with the main view.)* You get a creeping suspicion that your friend Tellervo Sorsa’s birthday is coming up. You decide to check this in The Little Gift Helper.

2. You decide to gift Tellervo one of the ceramic unicorns you have made earlier, but you want to make sure you had not already given a similar gift to your other friend, Tauno Tukkasotka, who happens to be a close relative of Tellervo’s.

3. Your friend Tellervo’s birthday has come and gone, and you now want to make a note of the gift you gave her (the ceramic unicorn).

4. You want to add your new friend Marjut Maakotka into The Little Gift Helper. Marjut’s birthday is 12.7.1949, her favourite colour is red, and she does yoga. Her address is Kellontie 6, 90500 Kello. Marjut is known to be a huge sneaker enthusiast, and her shoe size is 40.

5. You suddenly begin to doubt you may have slipped an error into Marjut’s information. You decide to check and fix the potential mistake. *(In the system her shoesize is shown to be 49 instead of 40.)*