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1. Executive summary

According to the description of Work, the objective of deliverable 9.3 is to evaluate software tools from the perspective of the user expectations, practices and context of use. Specifically, the deliverable consists out of three empirical studies. The third study is in a collaboration of researchers from two SPION partners: SMIT and DTAI. An introduction contextualizes the three studies and explicates our understanding of privacy, privacy problems and social requirement engineering. For a more elaborate view on our theoretical framework we refer you to deliverable 9.2 and below conference papers.

De Wolf, R., & Pierson, J. (2012). Privacy beyond the individual: analyzing group based access control models on social network sites from a user perspective. Paper presented at the IAMCR, Durban, South-Africa.

2. **Introduction**

2.1. **Evaluation framework**

In deliverable 9.2 we outlined a framework to analyze and evaluate privacy technologies for online social networks (OSN). We identified a number of steps that should be taken into account to guarantee privacy technologies that are both useful and used, leading to empowerment of users. Figure 1 gives an overview of the different steps.

![Figure 1. Four steps in evaluating privacy technologies from a user perspective](image)

The evaluation framework starts with defining a privacy problem. Defining the problem is never neutral but intertwined with norms and values of those who define the problem. Therefore, it is necessary to make the defining process as transparent as possible. The goal of the first step is to have a definition of a privacy problem that is holistic and user-centric. In a second step privacy technologies are constructed. In this particular case, technologies are constructed for OSN. The goal of the second step is to harmonize the solution for a privacy problem with the opportunities OSN have to offer. In a third step, the impact the privacy technology has on behaviour, attitudes and awareness is measured. Obviously, the goal here is to have an impact on the latter variables. In the fourth and final step the technology is brought into the everyday practices of users. The goal is to delineate the perceived value, perceived ease of use and adoption of the solution being used. In this deliverable we operationalize three steps of the evaluation framework.
2.2. Privacy (problems) and social requirements

2.2.1. Defining privacy

The concept of privacy is multifaceted and therefore difficult to define. Many privacy research paradigms accentuate the notion of ‘control’ and ‘personal information flow’ in defining privacy, but rarely focus on its meaning. Some argue that it is "the right to be left alone" (Warren and Brandies, 1890). Others claim that it is the "right of the individual to decide what information about the self should be communicated to others under what circumstances" (Westin, 1970). The communication privacy management theory conceptualizes privacy as boundary-regulating disclosure and “offers a privacy management system that identifies ways privacy boundaries are coordinated between and among individuals (Petronio, 2002 p. 2). Nissenbaum's (2004) contextual privacy approach states that privacy is the ensuring of the appropriate flows of information, based on norms of appropriateness and distribution.

There are many different definitions on privacy, by which some people claim that privacy is in disarray (Solove, 2006). Why people control their personal information flow, however, often remains unanswered. In the studies discussed in this deliverable we define privacy as controlling the personal information flow in the pursuit of developing personal and social identities, and is thus closely related to ‘privacy as practice’ (Agre and Rotenberg, 1998). We do not focus on the commodification of personal information or surveillance aspects of privacy.

2.2.2. Defining privacy problems on OSN

The context in which we act co-defines the self. The context in an offline environment is more or less fixed through spatial, temporal and social boundaries. On OSN, however, these boundaries are fluid and more difficult to draw. Context collision or context collapse (boyd, 2008; Vitak, 2012), invisible audiences (Litt, 2012; Papacharissi, 2012; Bernstein, Bakshy, Burke and, Karrer, 2013) and a merging between public and private sphere (boyd, 2008) have been indicated as typical privacy problems. Using Symbolic Interactionist terms (SI), a sociological discipline that focuses on the self and interaction, we state that OSN make it difficult for users to obtain a clear definition of the situation. A definition of the situation “tells who is present in a situation, what conduct to expect from others and what to do themselves, how events are likely to unfold over the course of the situation, where the situation is located in relation to other situations, and what goal are to be pursued by self and
others” (Hewitt, 2007 p. 74).

2.2.3. Social requirements

Engineers rely on requirement engineering in the development of new technologies. This refers to the process concerned with the transformation of needs of people and organizations expressed in natural language into a language that is precise enough to engineer systems (Gürses, 2010). Through evaluating technologies from a user perspective and translating them into social requirements, SMIT is contributing in the SPION engineering process. Social requirements are the requirements that can be extracted from the social background and everyday life of people, in particular the social interaction between people (Karahasanovic, Brandtzaeg, Låders, Vermeir, Pierson, Vanattenhoven, and Jans, 2009). In this deliverable we evaluate the software tools from a user perspective. In deliverable 7.6 we translate our findings into social requirements.

2.3. Evaluation studies

We have done three evaluation studies in total. In a first study we focused on the users’ mental model in categorizing friends offline and online, and their usage of Facebook features in doing so. A total of 10 young adults were interviewed regarding their grouping behavior on Facebook. The first study is most closely linked to the first and second step of the evaluation framework. Evaluating how and why users employ the settings of social network sites providers brings us closer in defining the privacy problem and identifying a possible solution. In a second study, we have gone beyond studying the practices of users on OSN and focused on how users could organize their audience, hereby questioning the technologies of social network site providers. Specifically, we let 18 Facebook users categorize 100 friends of their friends list, using card sorting as a research method. The second study is most closely linked to the second step of the evaluation framework, delineating various audience management strategies that can be used to develop new audience management technologies. In a third and last study we evaluated the ease of value and adoption of FreeBu, a semi-automatic and interactive grouping tool for managing one’s audience on OSN, developed by DTAI. This study is linked with the fourth step of the evaluation framework. Specifically, 12 participants tested and evaluated FreeBu, by means of a diary study and interview.
In what follows we outline the three different studies, by discussing the research questions, method, results and implications.

3. Study 1. Analyzing online and offline grouping models

3.1. Research questions

In an offline environment the context in which you approach your friends is more or less defined. In an online environment, however, the context is often more fluid. Not managing context could translate itself into context collapse, defined as the co-presence of multiple contexts. Our overarching research question aims to understand the users mental model in categorizing friends offline and online with what purpose.

**RQ1**: How do people group friends offline?

**RQ2**: How do users group friends online?

3.2. Method

3.2.1. Research sample

All interviews took place between December 2011 and January 2012 in Flanders (northern part of Belgium). The average length of an interview was about one hour and a half. Afterwards, the interviews were transcribed and analyzed using software for qualitative analysis (NVivo 9). The respondents were all members of one particular youth organization (KSJ-KSA-VKSJ). We interviewed boys (n=5) and girls (n=5) between the age of 16 and 23. The respondents were compensated with a cinema ticket worth €10.

<table>
<thead>
<tr>
<th>Pseudonym</th>
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<th>Occupation</th>
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<tr>
<td>Theo (M)</td>
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<td>High school student economics and mathematics</td>
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</tr>
<tr>
<td>Len (M)</td>
<td>18</td>
<td>Teachers primary) education</td>
<td>147</td>
</tr>
<tr>
<td>David (M)</td>
<td>23</td>
<td>ICT system engineer</td>
<td>458</td>
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<tr>
<td>Thom (M)</td>
<td>16</td>
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</tr>
</tbody>
</table>

Table 1. Respondent demographics (study 1)

M= male, F=female
3.2.2. Research method and procedure

We applied in-depth face-to-face interviews. These interviews all took place in a natural setting, like a library, bar or community youth center that was familiar to the respondent. A topic guide guided the interviews. We used a mind mapping technique, to explicit the cognitive structure of the respondents in grouping their friends. On the topic of conceptual mapping Novak and Cañas (2008, p. 31) state that “it may at first look like a simple arrangement of words into a hierarchy, but when care is used in organizing the concepts represented by the words, and the propositions or ideas are formed with well-chosen linking words, one begins to see that a good concept map is at once simple, but also elegantly complex with profound meaning.”

We presented the respondent with an empty mind map. To be precise, a sheet was provided with their name in the middle, which by a connecting line linked to several empty boxes. It was up to the respondents to fill the boxes with groups of friends. They could make the figure their own by drawing more categories or sub-categories. Upon completion of the mind mapping exercise, we interviewed the respondents on their grouping motivations. The respondents ended their mind mapping exercise with subdividing one particular group into different structures until no further categorizations could be made. Later on, we asked questions on their online grouping practices on Facebook and their usage of Facebook lists and groups.

3.3. Results

3.3.1. Grouping offline

We asked the respondents to make a mind map of groups of friends. All mentioned groups were connected to a certain community or institution, e.g. a basketball team or neighborhood. Not only did they mention the community, but also the structures within, e.g. class within a school.

The interviewees were involved in the same youth organization, and valued the role they were assigned within the youth organization. Overall, a distinction could be made between those who had a managerial function (leaders, young adults) and those who did not (members, children en adolescents). The relationship between the two can be compared to that of a teacher and their students, with the difference of being more informal and fluid. The main task of a teacher is to educate students, whereas the main task of a leader within the youth organization is to ensure fun in an
organized and educative way. Below quote illustrates the importance of the role the respondents got assigned within their organization.

Interviewer: You organize all kind of activities for the youngsters. Do you consider them to be friends?

David (7 years of experience as a leader, responsible for the oldest ban (+16)): Next year they’ll also be leaders.

Interviewer: How do you draw the line between being a friend and educator?

David: That’s a given. Because they are adolescents and I am their leader. You are right in saying that you can have a good relationship with them… maybe even consider them as friends. But sometimes, you have to be tough on them.

Some of the respondents who got assigned an educative function only differentiated a year in age with those who did not, which made it more difficult for them to carry out their role. Still, this division of roles was used to draw lines between groups. Within the youth organization, the leaders were also subdivided into different bans, depending on the age group for which they hold responsibility. Children from primary schools are subdivided into three bans: gnomes (6-8 years old), jumpers (8-10 years old), and young lads (10-12 years old). Adolescents are also subdivided into three bans: lads (12-14 years old), young renewables (14-16 years old), and renewables (16+). When constructing their mind map all interviewees referred to this subdivision.

A second important parameter was time. The respondents either referred to time as the amount of time spent with others (e.g. people they saw more frequently) or a specific period in time (e.g. people they knew from preschool) when constructing the mind map. The below quote of Elga illustrates the latter usage of time.

Elga (5 years of experience as a leader, responsible for the second oldest ban (12-14 years old)): Fanny is a person with whom I had a good relationship a couple of years ago. Last year, when I was still studying, we were always sending text messages to each other, as ‘what exam do you have tomorrow?’ and ‘good luck!’ We support each other during the examination period.

Similarity was a last parameter mentioned to categorize others. Examples of shared cognitions (e.g. same ideas,), emotions (e.g. mental support) and behaviors (e.g. dedication to community) could be delineated. In below quote, Hannah categorized
her sister into a different group because she finds that they often share the same opinion when it comes to being subjected to a heavy workload.

Hannah (5 years of experience as a leader, responsible for the youngest ban (6-8 years old)): When I feel like I have to do everything myself, I will probably go to my sister, because I know she will agree with me.

Interviewer: Because she is your sister or because she agrees with you?

Hannah: (Laughs) She does not always agree with me. Sometimes I get so frustrated because I’m doing so much in comparison with others. If you want to talk with someone, you’ll go to those who’ve invested the same effort as you.

In general, the respondents did not refer to demographical parameters to group their friends. Although they interacted more with people of the same gender, so they stated, they did not use gender as a parameter. The same is true for age. The conversation we had with Len illustrates this. Len is a 19-year-old boy who is responsible for the youngest age group within the organization (6-8 years old). It is his first year he got assigned with an educative function. His best friends within the organization are younger than him and do not have any such responsibilities. Yet, he did not use age as a parameter to categorize them into a different group.

Len (first year as a leader, responsible for the youngest ban (6-8 years old)): Although I am about the same age as them, my responsibilities as a leader are more important to me. Whenever an activity with the little ones (referring to youngest ban) ends, I make sure that they’ve all gone home before I go hangout with the others (referring to his younger friends who are still members without any responsibilities). Otherwise, we keep on talking and that’s no fun for the little ones.

3.3.2. Grouping online

In the second research question we shifted our scope from an offline to an online environment. More specific, we focused on how the respondents grouped their Facebook friends and which parameters they found important. To group Facebook friends users can employ Facebook ‘groups’ and ‘lists’. ‘Groups’ on Facebook help the user to demarcate their Facebook friends into smaller groupings. It can be used as a little private space secluded from the general newsfeed and other functions. The privacy settings of the groups have three different options: open, closed and secret.
Within the first option anyone can see the group, its members and their posts. Within the second option, postings are only visible for group members. Within the last option only members see the group, group members and their posts. Facebook lists give the user the possibility to manage the big group of people in the friends list better, by making sub-lists of people and attaching privacy settings.

The respondents indicated that most of their friends were not categorized into Facebook groups. All the groups that were created already existed in an offline environment, as a music band or basketball team.

Theo (member of the oldest ban): The groups that I have made online are groups that already exist and are those you have a lot of contact with. These are the groups that you can really perceive as groups.

The online groups all had a fairly clear function. For example, a sport clubs group was used to distribute training schedules and a music band group was used to post YouTube footage of songs they wanted to play. The groups served as a little private sphere to communicate with others you are currently communicating with in an offline environment.

In comparison with the Facebook groups, the Facebook lists were little or not used at all. The perception towards the smartlists was especially negative. These were perceived as too large, not always correct and not relevant, as the users would use other strategies in managing their information flow. As the smartlists (automatic lists), the manual lists were not used because the benefits were not recognized. Moreover, the respondents did not wanted to waste effort in creating them.

Hannah: Pff those smart lists…. Facebook puts all the people of the University of Ghent together. But I know these people in another way.

Interviewer: Do you make use of the lists option of Facebook?
Len: I found those lists really annoying. The lists indicate how many messages you’ve missed. Then you have the urge to look at those lists, when most of the time they are not at all interesting.
Accepting or declining friends into one’s Facebook profile, was used the most consciously. Every respondent had some sort of criteria in mind whether or not to accept friend requests. Two main criteria can be identified: you should have spoken with the other and know him or her from the offline environment. Once the respondents accepted people into their friendslist, most of the time no further categorizations were made.

Sandy (4 years of experience as a leader, responsible for the third youngest ban (10-12 years old)): I am not really going to use the lists. I see the use of it and they can come in handy, but I do not think that I would use them actively. I think I am selective enough to decide who I give access to my profile. So I do not have to go and work with these groups.

Because the respondents did not make use of the lists and groups for some of their friends, they adjusted their behaviour online so it was suitable for everyone in the friendslist. It seems that depriving yourself from announcing your identity online is self-evident in an environment with context collapse.

Katy (member of the oldest ban): I am never going to post something online if I know that others, who were not supposed to, could see it.

Our results indicate that not all friends are categorized into different groups. Therefore, as a final exercise, we asked to respondents to elicit the parameters they found relevant to categorize friends, without actually reflecting on their actual behavior in Facebook. As in the offline world, the respondents never referred to a demographical variable, except for one person who referred to age categories. Most respondents referred to the period you have known a person and the amount of communication spend with others. Eight out of ten respondents referred to the youth movement and its structures as being a relevant parameter. A minority referred to categorizing teachers and family separately. The respondents did not refer to abstract parameters, as cohesion and trust. Lizzy, a 16-year-old girl did not want categories based on trust. Especially when Facebook would automatically create them.

Lizzy (member of the oldest ban): No I don’t what that. How can a computer possible know in whom I trust? No way this can be right. No, that’s something that I do not want.
3.4. Discussion

3.4.1. Findings
In an offline environment, we could say that people refer to community roles, the amount of time spend with a person, a specific moment in time, or similarities with that person when grouping them. In an online environment, the respondents, most of the time did not make any further categorizations. Hereby, the respondents deprived themselves of putting information online that is not suitable for anyone who can see. Facebook groups were used more than Facebook lists. But most of the friends were not categorized at all. When the respondents did make use of Facebook groups, they often resembled offline groups, such as their youth movement, class or music band. The Facebook lists, on the contrary, were mostly not used. The manual lists asked too much effort and the smart lists were often incorrect.

3.4.2. Strengths and weaknesses
The present results do not allow us to generalize whether these results hold for the entire population of youngsters, as our research method is qualitative in nature and only 10 people participated in the study. Further research is needed to thoroughly investigate the mental models of users in order to develop new access control models. It should be noted that this research described the different categories that users found relevant to categorize others offline and online. This says nothing, however, about the privacy settings users want to tie with these categories, nor how it would affect their online behavior.

3.4.3. Recommendations
Many privacy problems are related to a definition of the situation that is lacking (e.g. blurring between public and private norms and values, unintended audiences). Hence, categorizing friends, to a certain extent, is necessary to manage the personal information flow. However, the respondents did not categorize all of their friends. Engineers should therefore invest in a tool that makes it ease and appealing for users to manage their friends. Moreover, they should find how users want to control their friends and to what extent a tool can guide them in this process. In the second study we outline different audience management strategies.
4. Study 2. How do Facebook users perceive and manage their audience?

4.1. Research questions

The privacy management settings on OSN, we argue, need to go hand in hand with the interpretations of users. Through elaborating the strategies that users employ in managing their friends, improved privacy management technologies can be created that make users (more) cognizant of their audiences on OSN. As such, the first research question aims at a greater understanding of the audience management strategies of users.

**RQ1:** What strategies do OSN users apply in categorizing their audience?

A better understanding of the various audiences on OSN can lead to a better practice of employing personal privacy rules. It is beyond the scope of this research to validate and generalize this claim. Rather, we explore how users perceive the relationship between audience management and the disclosure of private information. Our second research question is as follows.

**RQ2:** How do users perceive and interpret the relation between audience management and controlling the personal information flow?

4.2. Method

4.2.1. Research sample

We selected young adults (age 17 – 23) as our study population, because of two important transitions they experience during this period: the transition of high school to college or the transition of high school to work. These transitions may bring along many different audiences, e.g. college friends and colleagues. A total of 18 participants were recruited in the region of Flanders, in the city of Ghent (Belgium), both boys (n=10) and girls (n=8), with an average age of 18.4. The participants had an average of 500 friends in their friends list, indicating the presence of various audiences. The sessions were carried out in the natural setting of the households in the period of August, September en October 2012. Table 1 summarizes the participants’ demographics. The average length of a session was about 45 minutes. All sessions were tape-recorded and subsequently transcribed. To ensure the anonymity of the participants, we make use of pseudonyms in graphs and quotes. The participants were compensated with a cinema ticket worth €10.
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<th>Occupation</th>
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<td>Anton (M)</td>
<td>17</td>
<td>Scholar economy</td>
<td>851</td>
</tr>
<tr>
<td>Peter (M)</td>
<td>17</td>
<td>Scholar mathematics and science</td>
<td>419</td>
</tr>
<tr>
<td>Seth (M)</td>
<td>20</td>
<td>Student ICT</td>
<td>300</td>
</tr>
<tr>
<td>Carl (M)</td>
<td>23</td>
<td>Student industrial engineer</td>
<td>500</td>
</tr>
<tr>
<td>Len (M)</td>
<td>21</td>
<td>Student pharmaceutical science</td>
<td>600</td>
</tr>
<tr>
<td>Robert (M)</td>
<td>17</td>
<td>High school student languages and science</td>
<td>700</td>
</tr>
<tr>
<td>Ted (M)</td>
<td>17</td>
<td>High school student languages and science</td>
<td>460</td>
</tr>
<tr>
<td>Milly (M)</td>
<td>18</td>
<td>Student multimedia</td>
<td>700</td>
</tr>
</tbody>
</table>

Table 2. Participant demographics (study 2)
M= male, F=female

4.2.2. Research method and procedure
Within our research we focused on how users could manage and organize their audience, using the research method of card sorting. Card sorting has been established as a useful method to connect the users’ mental models with the design of the technology (Stone et al. 2005, Courage and Baxter 2005, Slegers and Donoso 2012). In this case the cards that had to be sorted existed out of the Facebook friends of the participants. We have chosen Facebook as OSN because it is the most popular OSN in Flanders (Belgium), and, relative to other OSN (like Twitter) its users articulate greater privacy concerns. We argue that card sorting can be used to find associations between people and to manage the audience present on OSN.
We asked the participants to send us their friend list of Facebook a day prior to the card sorting session, after explaining the design of the study. The overall goal of the session was to let the participants categorize their friends into different categories, based on criteria they found relevant and made sense to them. 100 friends of each participant were chosen at random. We divided the 100 friends into four categories of 25. The exercise consisted out of four consecutive phases. Within the first phase the user was commissioned to categorize 25 friends. Figure 2 gives a visualization of the starting point of the session.

![Figure 2. Beginning of the card sorting session](image)

In the second phase the user had to place another 25 friends into existing, subdivided or new categories, where we also asked to name the categories. In a third phase another set of 25 people had to be placed into already existing, subdivided or new categories. Within this phase we also probed the participants to think about their categorized friends and whether or not a further categorizing was necessary. In a fourth phase a last set of 25 people had to be organized. Overall, 1800 friends were categorized. Figure 3 gives a visualization of a possible end result. During the entire session we asked participants to think aloud, so we could better grasp their audience management strategies and probe them with questions. To analyze the data we coded the thinking aloud thoughts of the participants during the card sorting session on the type of strategy, its perceived difficulty, changes in categorizing and using the categories for controlling the personal information flow. Section 4.3.1 discusses the
five strategies that were identified. Section 4.3.2 discusses the relationship between audience and privacy management.

![Diagram of different cards sorted and labeled](image)

**Figure 3. The different cards sorted and labeled**

### 4.3. Results

#### 4.3.1. Five strategies in managing audiences

Trough the card sorting session, we were able to identity 5 different audience management strategies. The different strategies were used interchangeably. In this section we make use of quotes of the participants during the card sorting session, to illustrate the different strategies. Table 3 gives an overview of how many cards were sorted using various strategies. We counted the labels of the categories to measure the prevalence of the different strategies. Some participants, however, made further categorizations based on other strategies without labeling them differently, limiting these figures. Because the inner circle strategy is always used with another strategy, e.g. labeling football members and their friends – who are strictly speaking no football players, but do know each other – with the community label of ‘football teal’, we have no concrete figures of how many cards were categorized using the inner circle strategy.
<table>
<thead>
<tr>
<th>Audience Management Strategies</th>
<th>Amount of cards</th>
<th>Percentage</th>
<th>Example of labels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared community strategy</td>
<td>1254</td>
<td>69.67%</td>
<td>‘Class’ ‘football team’</td>
</tr>
<tr>
<td>Mutual friend strategy</td>
<td>119</td>
<td>6.61%</td>
<td>‘Joey’s friends’</td>
</tr>
<tr>
<td>Contact type strategy</td>
<td>301</td>
<td>16.72%</td>
<td>‘Best friends’</td>
</tr>
<tr>
<td>Evaluative strategy</td>
<td>11</td>
<td>0.61%</td>
<td>‘Snobs’</td>
</tr>
<tr>
<td>Mixed</td>
<td>84</td>
<td>4.67%</td>
<td>‘Best friends from school’</td>
</tr>
<tr>
<td>Unknown*</td>
<td>31</td>
<td>1.72%</td>
<td>‘?’</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1800</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. The amount of cards sorted using the different audience management strategies

*Not all participants recognized all of their friends, through which they categorized them as unknown

### 4.3.1.1. Shared community strategy

All participants referred to multiple communities with those they categorized during the session. Both communities of interest (e.g. youth community, music band) and communities of place (e.g. neighbors, holiday friends) could be delineated. Lilly, a 19-year old girl illustrates this approach.

Lilly: (…) Sally I know from Artevelde (university college) (…) Charlotte I know from the dance club I used to go to as well as Emilia (…) Randy is involved in a youth movement I’m part of (…) 

Most participants began with using this strategy and applied it to communities they were currently involved in as well as those of the past. Not only did they categorize friends that are or were part of a certain community, some also included those who have or had something familiar with that particular community. A conversation we had with Zachary, a 20-year old boy, illustrates this.

Interviewer: You doubted in placing Julie in your own movement?
Zackhary: She is not really involved in my boys youth movement, but in the female counterpart of it.

Others were stricter in applying the shared community strategy. Zachary placed Julie, a non-member, in his own youth movement, while Kyle, a 23-year old boy, chose not to.
Carl: This is a special case. This is someone that I met through my youth movement, but she does not really fit within this group. Maybe I’ll place her right next to it, but she is also not really involved with any youth movement I know.

The prevalence of the shared community strategy was demonstrated each time a participant did not immediately recall one of his or her friends. Lara, a 20-year old girl, only knew who someone was after checking Facebook during the session and applying this strategy.

Lara: I can’t recall who this is exactly.
Interviewer: You don’t who this person is?
Lara: (...) Ah now I know who she is. She goes to the same university as I do. (...) She follows the same classes.

4.3.1.2. Inner circle strategy
We found that the participants were not only using shared communities as a strategy to manage their audiences. Some were especially keen to categorize friends who knew each other into one category. This strategy often coincided with the shared community strategy, as people within a certain community will often know each other. Anton, a 17-year old boy, explained us why he preferred using this strategy.

Interviewer: What do you think of the categories you made?
Anton: I find it annoying that the different persons within a group do not know each other. (...) I have a different relationship with sixth graders in comparison with fifth graders. With fifth graders I just hang out, whereas with sixth graders I go out to party.
Interviewers: Do you want to keep those two contexts separated? Anton: For me that would be easier. It would be clearer. (...) They all have a different role to me and I prefer that those roles do not overlap.

4.3.1.3. Mutual friend strategy
Rather than focusing on shared communities or people that know each other, some participants chose to use one friend as a common denominator to categorize others. This common denominator, usually, was a closer friend than the people that were placed within this category. The latter were perceived as acquaintances. Some placed
these friends separately, combining the mutual friends strategy with the inner circle strategy. Others placed the mutual friends all together. Tom, an 18 year-old boy, illustrates the mutual friend strategy.

Interviewer: Who is this person?
Ted: I think I know him via Jill, but I am not really sure. I once went to a bar with this guy. (…) I think it’s also a friend of Tanguy but I do not know that for sure. (…) There are always people you have seen only once.

4.3.1.4. Contact type strategy
Although the shared community strategy was used the most, the participants also categorized others based on what type of contact they had with them. They used it to categorize their most significant others (e.g. best friends) as well as those they have quasi no bond with. The former went hand in hand with the inner circle strategy. The latter did not.

Lara: This is my close friends group.
Interviewer: Is this group related to another category you already made, as school or your youth movement”
Lara: “Actually, they are all in the same school as I am.
Interviewer: But you do not place them in this category?
Lara: Sally isn’t in my school anymore. She left in the third grade of high school.
But these friends are really my close friends. We occasionally go out and travel together. So… It is totally different.

Lara made it clear to us that there are friends that cannot be pinned down to a particular context: those who are very close to you and who you refuse to label in terms of situations or communities. Lara’s tight circle of friends also has a secret Facebook group that is only accessible to them. An important disadvantage of this strategy, however, was noticed later on during the session when Lara had to group a person that used to belong to this tight circle, but did not anymore.

Lara: This one is difficult to group. She used to be part of our close friends group, but not anymore. (…) I think I’ll put her in the school category.

The contact type strategy was also applied to categorize others you do not really know
that well. In contrast to significant others, less close friends were grouped together even if they did not know each other. Tessa, a 17-year old girl, mainly made use of this strategy. The following quote clarifies her approach.

Interviewer: (…) You made a categorization based on type of contact. Why didn’t you make one based on school and such?
Tessa: I think because I know people from all over (…) Like these people here, I don’t know where they go to school. I have met them once, but do not really have a connection with them. I think if I would make a categorization based on school and other places I’ve met others, it would become too much.

Tessa used the contact type strategy, because the shared community strategy would overwhelm her with various communities, so she claimed. Then again, we noticed that Tessa had a similar problem when making the categories based on contact, as the quote below illustrates.

Tessa: (…) This is a too broad categorization. These are people that I have spoken to once and these are people I know vaguely. Some of them I have never talked to, while with others I did. (…) With those I have a distant relationship.

### 4.3.1.5. Evaluative strategy

A final strategy that emerged during the grouping session was based on how the participants evaluated others. We could delineate positive and negative evaluations. Lizzy, a 19 year-old girl, labeled the first category she made as snobs.

Interviewer: The first group you’ve made, you denote as snobs.
Lizzy: (laughs) these are the snobs of Ghent. My boyfriend used to work in a bar, a real bar for snobs. (…) Those people are really ridiculous. They spend 100 euros for a bottle just to place it on the table so everyone can see. That’s not my style.

Tom used the shared community strategy in managing his audience, but shifted to an approach where he evaluated people based on whether they were cool or not.

Interviewer: Do you have a good relationship with these people? Tom: Good, but not that good. This person is in the same class as me. He’s all right. (…) Jafar is also a cool dude.
4.3.2. Controlling the information flow through categorizations?

During the grouping session we also posed questions on how these ready-made categories could function to control the personal information flow. This is a step further than audience management. In general we can state that all participants were able to distinguish close and distant categories, as well as what general information could be shared. Many participants, however, made it clear that not all friends within a group are equals and were referring to in-group variance.

   Interviewer: Are certain groups allowed to know more about your person than others?
   Peter: I don’t think that I can trust an entire group. (…) At certain moments I trust certain people, but those vary quite a lot. Never an entire group though.
   Interviewer: Can you indicate the groups in which those trusted persons are more prominent?
   Peter: I think a lot of people from high school and a couple of my neighborhood.

Although the participants indicated in-group variance, they were able to indicate which categories may have access to personal and sensitive information, such as having feeling for another, and which ones may not. Even though the participants could not always make a connection between ‘information flow’ and the ‘ready-made categories’, the latter helped them in knowing whom their audience was.

   Interviewer: Did you find this grouping experiment difficult to do?
   Anton: Sometimes it was hard. But I kind of liked it. It showed me what people are in my friends list.

4.4. Discussion

4.4.1. Objective of study

Previous research has shown that users do not simply accept the open nature of OSN. On the contrary, they develop strategies, even beyond the existing privacy setting available, to manage their personal information flow and privacy in general (boyd and Marwick, 2011; Hogan, 2011; Lampinen, Lehtinen, Lehmskallio, and Tamminen, 2011). Invisible audiences, however, makes it difficult to have a clear definition of the situation and to ensure privacy. Although, privacy management technologies exist, managing audiences can still be an additional effort for users, which they may not be
willing to invest. Hence, understanding the different audience management strategies users apply is of great value when developing privacy management technologies.

4.4.2. Results and implications

In the present study we examined the different strategies users applied when categorizing 100 of their Facebook friends. Using card sorting as research method, five different strategies were identified: shared community strategy, inner circle strategy, mutual friend strategy, contact type strategy and evaluative strategy.

The prominence of the shared community strategy in managing the cards was noticeable. Approximately 69.67% cards were labeled with a community of place or interest. Moreover, the shared community strategy was also referred to while applying other strategies at the same time, such as categorizing best friends from school.

Looking at the categorizing practices of the participants we found that it was relatively easy to categorize others based on shared communities, while it is often harder to group in another way (e.g. contact).

When studying the relationship between the ready-made categories and the personal information flow, the participants could distinguish those who were close to them and those who were not. Connecting the latter with privacy measures, however, they found difficult to do. Especially, because they found that there are always certain people within a group you trust more than others.

One of the major affordances of the card sorting session, perceived by the participants, is that it provided them with an overview of their friends. We argue that a simple visualization of those present in the friend list can also be privacy enhancing.

The different strategies, as indicated by the participants, can be used as a framework. Then again, once the categories were made, the participants were able to make some differentiation in terms of privacy. It can be assumed that when the user is supported in making categories based on the different strategies as previously described, it might as well be used for privacy management. Future research that examines the relationship between audience and privacy management, however, is necessary to support this assumption.

4.4.3. Strengths and weaknesses

The present study has explored the different strategies in managing audiences. The findings, however, should be understood and implemented in the light of its strengths
and limitations of the research approach.
On a research level, we have gone beyond studying current practices on OSN and focused on how users could organize their audience, hereby questioning the technologies of OSN providers. Our research approach can be labeled as bottom up, which we argue, has three main strengths: it questions the privacy policy of OSN providers; it broadens up the scope in privacy research and the user is brought into the development of new privacy solutions. CPM states that boundary management is necessary for developing and managing privacy rules. This research took into account on how users perceive the boundaries between their audiences on OSN. So technologies can be made in accordance with how they perceive and manage their audience and not the other way around.
Our research has limitations. Although our method of study (card sorting) makes a clear visualization of the audience and facilitates finding connections, there are some disadvantages. Instead of using the entire friend list, we limited the number of friends to 100. Some participants, however, still found it a challenging task and did not create new categories near the end of the session, although they claimed that they should have done so. Others indicated that their categories might have been different if they would have been presented with another friend first. Moreover, each friend was represented by one card only. Some participants indicated that they would want to add some friends to multiple categories. Others found it annoying that certain friends were categorized alone, after which they decided to merge them with other categories.
Within the grouping experiment we made use of the friend list of Facebook. It is, however, to be determined if these strategies are also applicable to other people and other OSN, such as a professional OSN like LinkedIn. Future research should focus on various OSN as well as populations other than young adults. Moreover, OSN, third party applications and advertisers could also be labeled as part of one’s audience and integrated into the card sorting session. All the more because research indicates that users are often not aware of these silent listeners as being a part of their audience (Stutzman et al. 2012).
5. Study 3. Developing and evaluating interactive grouping technology for privacy management in online social networks

5.1. Research questions

The dynamics of OSN challenge the privacy management of users. Moreover, invisible audiences make it difficult for users to know who has access to their online contributions. In the SPION project, DTAI has developed a semi-automatic and interactive grouping tool for managing one’s audiences on OSN (FreeBu). For more information on the functionality of the tool we refer you to deliverable 9.1. In this study we analyze and evaluate the perceived value and adoption of FreeBu by users. We study whether the potential users of FreeBu have a similar view on its functionality as the designers. Therefore, our first research question establishes a greater understanding of the perceived value of the technology. Perceived ease of use is defined as “the degree to which an individual believes that using a particular system would be free of physical and mental effort” (Davis, 1993 p.477) and has been confirmed to be one of the most important factors that influences user technology acceptance (Sun and Zhang, 2006).

RQ1: How do users perceive the value of FreeBu?

Taking the technology into use is a crucial component of embedding the privacy technology into everyday practices. OSN mediate the everyday routines of users. Hence, FreeBu should be integrated within these routines as well. Our second research question therefore aims to describe its appropriation process. Appropriation (as part of domestication) can be seen as the entry of a technology into the private household and making it (or not) acceptable and familiar (Silverstone and Haddon, 1996).

RQ2: How and why do users appropriate FreeBu in their everyday lives?

5.2. Method

5.2.1. Research sample

A total of 12 people participated in the evaluation study of FreeBu. Five were female. We selected young adults between the age of 17 and 23 as our population of study, because of the presence of various and shifting audiences (e.g. high school to university). The study took place between the end of August 2012 and the beginning of October 2012 in Belgium. On an average the respondents had 430 friends. Table 1
summarizes their demographics. Participants’ names were pseudonymized to protect their privacy. The participants were compensated with a cinema ticket worth €10.

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Age</th>
<th>Occupation</th>
<th>Facebook Friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uschi (F)</td>
<td>19</td>
<td>Student educational sciences</td>
<td>390</td>
</tr>
<tr>
<td>Linda (F)</td>
<td>18</td>
<td>Student art and drama</td>
<td>500</td>
</tr>
<tr>
<td>Lilly (F)</td>
<td>18</td>
<td>Student fashion and sales</td>
<td>312</td>
</tr>
<tr>
<td>Lissy (F)</td>
<td>19</td>
<td>Student social work</td>
<td>489</td>
</tr>
<tr>
<td>Li (F)</td>
<td>18</td>
<td>Student pharmaceutical sciences</td>
<td>390</td>
</tr>
<tr>
<td>Jonas (M)</td>
<td>17</td>
<td>High school student electricity</td>
<td>400</td>
</tr>
<tr>
<td>Zackhary (M)</td>
<td>20</td>
<td>Student dutch-english</td>
<td>400</td>
</tr>
<tr>
<td>Peter (M)</td>
<td>17</td>
<td>High school student mathematics and science</td>
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<td>Seth (M)</td>
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<td>Student ICT</td>
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<td>Carl (M)</td>
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<td>Student industrial engineer</td>
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<td>Len (M)</td>
<td>21</td>
<td>Student pharmaceutical sciences</td>
<td>600</td>
</tr>
<tr>
<td>Ted (M)</td>
<td>17</td>
<td>High school student languages and science</td>
<td>460</td>
</tr>
</tbody>
</table>

Table 4. Participant Demographics (study 3)  
M= male, F=female

5.2.2. Research method and procedure
After card sorting session (see previous study), which together lasted one hour, we installed the technology of FreeBu on the computer of those participants who had expressed their wish to take part in the FreeBu evaluation. The different steps of installing the technology will be explained in Section 4.5. We interviewed 12 participants. We chose a semi-structured interview, which allowed us to explore other content. Afterwards the interviews were fully transcribed and coded, following Strauss and Corbin’s approach (Strauss and Corbin, 1990).
Because we wanted to know how and why FreeBu is used in the home setting, we used a time-based diary completed weekly for four weeks, to measure the usage of FreeBu at home. We used a time-based diary completed weekly for four weeks, to measure the usage of FreeBu at home. 9 out of 12 participated. Only 3 participants completed the diary study every week. In total, the diary was filled in 25 out of 48 times (52.08%). The reasons for the other participants to drop out may have included usability problems of FreeBu. The diary focused on how FreeBu could be applied as an instrument that helps the user in accepting or declining friend request, but managing audiences proved to be only one among multiple factors that made the tool valuable for users. Hence, the second research question (how and why do users
appropriate FreeBu into their everyday lives?) remains unanswered. The diary study, however, did allow us to find a difference in motivations for accepting and declining friend requests.

To analyze the data we made use of NVIVO 9 and coded on participants’ think-aloud statements when clicking through FreeBu as well as the questions we asked them during their exploration. The coding had different phases. In a first phase of coding we maintained a close connection between the codes and data and picked out the one word that seemed significant. In a second phase we categorized and labeled these codes, such as ‘functionality’, ‘appearance’ and ‘usability’. In a third and last phase we further elaborated on the different dimensions and properties where necessary.

5.2.3. Installing FreeBu

In order to operate, FreeBu needs the personal data of the participant. The personal data was retrieved via the Facebook graph API, using the participants’ access tokens. Under the guidance of one of the researchers, participants installed FreeBu on their computers.

We will briefly discuss the different steps of the installing procedure and how we took into account the users’ privacy concerns. Before users installed FreeBu, we explained the whole installation procedure and asked for their general consent the different steps as described below.

In the first step, they logged into their Facebook account.

In the second step, they retrieved their access token through the Facebook graph API explorer, where they gave permission to the FreeBu to use user data, friend’s data and extended permissions. We made it clear to participants that through the application we would have access to all information for which they gave their consent. None of the users refused. They did, however, want to limit the visibility of installing and using FreeBu towards their friends. All participants chose the ‘me only’ option.

In the third and final step, they copy-pasted the access token into the token submitter through which the selected personal data was downloaded on their computers. Now they could access and experiment with FreeBu.
5.3. Results

5.3.1. The perceived value of FreeBu

Several of the questions asked the participants in what sense the technology could be relevant. We identified four categories of value. To elicit these categories, we make use of the quotes of the participants. The participants’ names are pseudonymized.

5.3.1.1. Deleting audiences

During the interviews, we analyzed the users’ view on existing grouping technologies on OSN. Many participants indicated how difficult it was to delete friends using the settings provided by Facebook. Several indicated that FreeBu would make it easy to delete friends, if it were integrated with the functionality of Facebook.

The visualization provided by FreeBu showed people with whom the participant did not have any affiliation, or in some cases was not familiar with at all. The conversation we had with Jonas (M; 17) serves as an example. “I think I know this guy through playing an online game, but I do not really know him.” When we asked him whether or not he would delete this person from his Facebook account, he replied “If I could see him like this I would.” The last sentence indicates that users need an extra push for managing their audience. Scanning the different categories, Len (M; 21) noticed that he added two persons with the same name, and that only one of these two was familiar to him. Like Jonas, he would also delete this person from his Facebook account.

5.3.1.2. Demarcating

Participants indicated that it would be easy to announce certain information to a limited audience. The quote of Linda (F; 18) illustrates this line of thought. “These people are all involved in my youth movement. This would make it easy to post something just for them, such as things we do in my youth movement.”

Some participants indicated that they would use the groups provided by FreeBu to decrease the visibility for certain audiences. For Lizzy (F; 19), the functionality was rather straightforward when we asked her why she would use this technology. “Ah, that’s a simple question. To better categorize your friends into different groups.” We noticed that users found the visualization of the different categories relevant in further demarcating their audiences and not starting on something without any preparation. When analyzing a large FreeBu-group of friends, Peter (M; 17) claimed that he could
easily subdivide further. “I could certainly make further categorizations. This guy used to be a member of our movement. This one is still a member. This one I got to know on Expies [a camp for youth movements]. So I would make a differentiation between all of these. Many people in this category apparently have people in it from KSA-KSJ-VKSJ [the overarching organization].”

5.3.1.3. Overviewing

Apart from deleting and grouping audiences for privacy reasons, most participants also identified the overview of one's audiences provided by FreeBu as valuable. The conversation with Li (F; 18) illustrates this. We asked, “If your friends were grouped on Facebook just as they are grouped right now, would you couple privacy settings to them?” Initially, she answered that she did not know why she would use the technology. After a moment, however, she made clear that she liked the grouping option, but not the thought on coupling groups with privacy settings. “I don’t actually think that I would use it for that purpose, because I consider all these people as my friends. They may know everything about me.” Linda (F; 18) also indicated the value of the people in her friends list, but preferred minimizing visibility to deleting persons. “I find it too harsh to just delete friends. It would be a shame if I started deleting friends.” When asked why, she replied with a laugh, “because then I would have fewer friends. I know that may sound foolish.”

Most participants liked the visualization of their friends provided by FreeBu. The tool provided them with an overview of who is present in their friends list, without any reference to grouping or deleting audiences. When asking Uschi (F; 19) whether she would use the tool to limit information access towards certain audiences she replied “no, it is just fun to see your friends like this.”

5.3.1.4. Reflecting

We noticed that the participants often mentioned that the categories were ‘correct’ or ‘wrong’, indicating that they were reflecting on the different categories. The reaction of Ted (M; 17) illustrates this. “This one is spot on. I know all of these people via my girlfriend. This one is her cousin. My girlfriend herself, however, is not in this category.” Although participants did not always consider the categories to be ‘correct’, they were looking for connections. When scanning the different groups, Lizzy (F; 19) mentioned the following: “This group consists of people who were
together with me in elementary school. This group consists of people of my youth movement and other youth movements. But this group is not correct. Different people are just thrown together. Maybe they are all residents of Ghent.” Through FreeBu, Seth (M; 20) also remembered that he once added someone who has the same surname as he does.

Most of the time the small groups were considered ‘correct’, while the larger groups were perceived as a merging of various audiences. Although this pushed participants to reflect on who was in the group and make further connections, several participants indicated they wanted to know how FreeBu made these categorizations. When asking Ted (M; 17) why certain people were grouped together, he guessed the following: “I don’t know, maybe because I don’t see them anymore.” Later, we asked whether he still knew those people. “I wouldn’t say that. A couple I know. Others do not ring any bells.”

5.3.2. How do users appropriate FreeBu into their everyday lives?

5.3.2.1. Accepting and deleting friends?

Most participants indicated that they did not use FreeBu to help them accept friend requests, although some stated that it would be useful to know in which category the potential friend would belong. Peter responded the following when assessing the usefulness of the tool for deleting and accepting friends: “Yes, I was able to see where a person belonged by means of those labels.” Carl (M; 23) mentioned, “the only thing I take into account when accepting or declining friendships request is whether I know the guy. For me, this is the easiest way. When I don’t know them I just send them a message.” The participants did not elaborate on whether they used FreeBu for deleting people.

5.3.2.2. Motivations for accepting and declining friend requests

One of the questions measured the motivations of accepting a friend request (‘did you accept any friend requests this week? If so, why was this person accepted?’). A total of 27 individuals were accepted during the four weeks of measurement. For all 27 accepted friend requests, the participants mentioned community roles (member of youth movement, classmate, neighbor) as a motivation for acceptance. In fact, this was the only motivation that was reported, except for two participants who also indicated that they talked much to one another or were commissioned a school group
assignment. We expected that the strength of the relationship would play a more prominent role. Most likely there is a correlation between the strength of the relationship and the communities one is involved in. Still, we find it significant that exclusively community roles were referenced.

Only two requests were declined (‘did you decline any friend requests this week? If so, why was this request rejected?’). The two participants did not refer to communities, but to the relationship they had with that person. For example, Linda (F; 18) indicated that she declined a friend request for following reason “I once deleted her. She’s the niece of my ex and I don’t want to see any more picture of him. Now she has sent me another friend request, but I refused”

The results indicate that individuals hold different views when motivating the declining or accepting of friends. Motivations for accepting friends are largely based on being in the same community, whereas motivations for declining friends are based on type of contact. FreeBu was not mentioned in connection with these motivations.

5.4. Discussion

5.4.1. Findings and reflection

From the responses, we identified four different reasons why FreeBu could be of value for users of social networking sites: (a) deleting audiences; (b) demarcating audiences and managing the information flow; (c) providing an overview of who is in the friends list and (d) reflecting on ones’ audiences. The diary study indicated different motivations between accepting and declining friends.

We would like to emphasize the importance of a clearly defined context in the development of personal and social identities. Although announcing one’s own identity towards multiple people at once can be liberating and free from certain constraints, some distinction between contexts remains necessary. FreeBu stimulates the users to announce their identity for a particular context, thus supporting identity formation needs.

Although FreeBu can facilitate the process of accepting and declining friends, our results provide no evidence that user employ the tool for this function. FreeBu visualizes a user’s friends list and provides the possibility to categorize these friends, but it does not require the user to do this task. Hence, FreeBu provides a clear overview of the audiences, without forcing the users to give input. Next to deleting and grouping audiences (privacy as control), the participants also indicated
overviewing and reflecting as important (privacy as practice). Adding the Privacy as Practice perceived values, FreeBu overcomes the deficiencies of current audience management settings provided by OSN providers, as Facebook lists or Google plus circles.

At the moment FreeBu does not explain to its users how it establishes the different groups of friends. It thus remains a black box. Several participants wished for an opening of this black box. Then again, the haziness of the underlying algorithm of FreeBu provokes users to reflect on their audiences. Future versions of FreeBu should take into account the trade-off between provoking users to reflect on their own behaviour through obscurity on the one hand, and providing them with a clear explanation of the algorithm’s working on the other.

Providing users with fine-grained control options can do more wrong than good. We argue that it is necessary to make the information flows and technical properties of SNS transparent and provide users with user-centered control options when developing privacy management technologies, so users can make the right decisions, whatever those may be.

Privacy management is more than managing your audience and deciding who has access to what personal information. Research indicates that users employ both social and structural strategies in managing their privacy. We found that FreeBu can be useful for deleting audiences or (further) grouping friends, but also for reflecting purposes or simple providing an overview, which can also be privacy enhancing.

5.4.2. Strengths and weaknesses

Developing privacy management technologies is not a neutral process. On the contrary, defining privacy problems and providing a solution is very normative. Hence, we consider it of utmost importance that users are brought into the development process from the beginning. This research explored the perceived value and appropriation of FreeBu in a very open way, bringing in the voice of users.

Gathering users’ information through APIs, even for scientific purposes, raises ethical questions. Our research approach allowed us to explain the data gathering process to users, thus stimulating informed consent.

Although participants rated the overall concept of FreeBu positively, many usability problems were found. First, when scrolling around or zooming in and out, the names and circles moved as well. This made the visualization less clear. Second, the names
of the friends often overlapped and were therefore unreadable. Third, the evaluated version of FreeBu was not fully integrated with the functions of any OSN. The diary study only included questions on declining and deleting friends. No questions were posed about the other factors of value that we found when analyzing the interviews (e.g. reflection). This limits our view on the appropriation of FreeBu.

5.4.3. Future versions of FreeBu

5.4.3.1. Finer granularity of the large groups
When the participants were thinking aloud while exploring FreeBu, they often suggested that small groups were “correct”, whereas the larger ones were perceived as a merging of various factual groups. This tells us that there is still space for further division of relatively large groups. It is worth investigating to what extent a participant thinks a group is small and correct or a group is large and heterogeneous. In any case, finer granularity of grouping is a desired feature for the participants.

5.4.3.2. Integration into Facebook
We noticed that most participants did not use FreeBu in helping them decide whether to accept friendship requests or not. However, some stated that it would be useful to know, in advance, which group a potential friend would belong to. This requires FreeBu to be integrated into the Facebook platform, so that whenever there is a new friend request, FreeBu can extract the potential friend’s public information, based on which he/she is put into the existing groups or a new group. The integration of FreeBu into Facebook would also promote daily access to FreeBu, which in turn is likely to increase usage frequency in future diary studies.

5.4.3.3. Augmented network perspectives
Because the current FreeBu does not offer an explanation on how it produces the groups, the underlying grouping mechanism remains a black box for users. To improve the transparency of the tool, we may augment FreeBu with a network perspective, in which the friends are not organized as bubbles in a star tree form. Instead, the friends are treated as nodes in a network, and edges are drawn according to the mutual connections among them. There exist abundant graph layout algorithms to draw a network structure (Battista et al., 1994). However, we note that in a graph layout, the clear sense of grouping is lost. It becomes more difficult for a user to
perform group-wise modifications. Moreover, as indicated before, an explicit presentation of network structure might interrupt the participants’ reflections on the grouping compositions. Thus, if to incorporate the network structure into the tool, a function that switches the visualization between network and grouping presentations may be required.

5.4.3.4. Usability improvements
We identified several usability issues in the current version of FreeBu. First, the grouping can be better organized. The bubbles should not overlap. Second, the usefulness of the labels can be further improved so that they match (as much as possible) the descriptions that the user has in mind. This may require modifications to the label derivation algorithm and the knowledge base from which the labels are derived. Third, the coloring of FreeBu can be unsuitable for people with color-blindness. We can make the color-coding of the visualization configurable by its users.

5.4.4. Conclusion
In this paper we studied the perceived value and appropriation of FreeBu, a semi-automatic and interactive grouping tool for managing one’s audiences on OSN, using interviews and a diary study. The interviews indicate that FreeBu has multiple factors of value, while the diary study excluded accepting and declining friends to be one of them. This study and its results were intentionally exploratory and relied on the in-depth study of a small sample of users. Future research will take into account the usability problems of FreeBu and evaluate the tool for a longer period of time on a larger scale. The latter will enable a more adequate insight in the appropriation of FreeBu in everyday practices.
6. References


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7. Notes

i We made use of MindNode for the card sorting session.


iii We do not perceive card sorting as a new way in managing audiences on OSN. Rather we consider it to be a research method that can expose the different strategies in managing one’s audience, which in turn can be used to develop user-centered privacy technologies.

iv It is unknown if Facebook organizes the friendslist in a particular order, e.g. based on interaction with that friend or when he or she has been accepted as a friend into the friend list. We chose to select the friends at random to avoid a selection bias.

v The quotes are translated from Dutch to English.

vi Categorizing different friends (audience management) does not automatically imply managing privacy rules (privacy management).