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From Travel Plans to Magic Wands: A Cross-Domain Study of Practices and Privacy Requirements for Sharing Emerging Types of Online Content

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Abstract. Online social networks have made sharing photos and other digital content a common activity. Recently, a range of novel online services and connected devices have expanded the set of "things" to share – ranging from new types of digital content like music preferences and workout data to physical things like household items ("sharing economy"). To understand user needs, concerns and preferences in such emerging sharing domains, we collected 200 responses about participants' experiences with sharing six categories of "things": music preferences; travel plans; sports activity; real-world items (e.g., rooms and vehicles); virtual items in online games; and dietary preferences. For each category, we systematically describe what our participants share and with whom. Additionally, we asked 56 "non-sharers" to describe their reasons to refrain from sharing personal content from these categories. Using qualitative analysis methods, we use information from both "sharers" and "non-sharers" to identify privacy concerns that frame content sharing, and we discuss how factors like audience perception and sharing controls should inform the design of newly emerging sharing services.

Introduction

Today, vast amounts of user-generated and user-mediated content populates social networks. Current research has focused extensively on needs, practices, and concerns surrounding the sharing of photos and videos, textual information (e.g., status updates), and documents. However, in recent years the scope of what is "shareable" has greatly increased, comprising not only audio-visual content but also preferences and tastes (e.g., playlists, food), physiological data (e.g., workouts), trips, and even information about and access to real-world artifacts (e.g., "couchsurfing"). To the best of our knowledge, no study so far has extensively investigated and compared such emerging types of shared content.

Using an online survey tool, we invited participants who had used one or more of such emerging sharing services to share their individual experiences, needs, preferences, and concerns with us. We have focused our investigation on six emerging types of content: (1) music preferences and playlists; (2) travel plans and trip details; (3) details of physical exercises and sports activity; (4) personal physical possessions such as apartments and vehicles ("sharing economy"); (5) virtual possessions in video games and virtual social worlds and (6) personal culinary and dietary preferences. The particular choice of content types is based on an initial literature review (see Related Work) and covers the wide range of online sharing services beyond traditional messaging and social media platforms. For each type, we asked participants what content they share, with whom, and whether they would like to share some content that a service does not provide.

This exploratory work reports our results related to privacy issues, while also reporting overall practices within six different sharing domains. Specifically, we

(1) Unveil common practices regarding sharing of emerging types of content.
(2) Identify common privacy concerns that frame the sharing of novel types of content.

After discussing related work below, we will describe our study design in detail. Our study description will suggest how these different types of content can be conceptually grounded and categorize them with respect to the sharing discourse in communication and media studies. We will then present our participants' practices of sharing different types of content, followed by our findings regarding privacy concerns across the six categories listed above. Finally, we conclude with a discussion on how to enable user control in emerging sharing services.

Related Work

Sharing Preferences and Personal Digital Content

The relevance of sharing for supporting social relationships has been well explored. Belk (2010) defines "sharing in" and "sharing out" as two types of interpersonal interactions, based on the relationship with and attitude towards the counterpart of a sharing transaction, and distinguishes the process of sharing from other consumer behaviors as gift-giving and reciprocal exchange of goods. John (2013) distinguishes two logics behind the term "sharing" – *distributive* and *communicative*. Sharing as an act of distribution (*distributive* sharing) means dividing a piece of something to someone, i.e., a shared item is a limited resource, e.g., an apartment that is rented to other person for a time it is not in use. Sharing can be also an act of communication (*communicative* sharing), where the shared item is not a limited resource, e.g., online photo sharing. John (2012) describes sharing as the fundamental and constitutive activity of Web 2.0 in general, and online social networking services in particular. He argues that sharing phenomena in Web 2.0 are not necessarily novel (sharing is seen as a type of communication). However, rebranding these activities under the term "sharing" (e.g. photo sharing) and using networked technologies within these activities – are new phenomena (John, 2012). Hence, we see the value in studying sharing practices in Web 2.0 to further our understanding of this emerging terrain. For our study, we selected six different types of emerging content sharing categories, which manifest both distributive and communicative logics of sharing (see Figure 1).

Olson et al. (2005) find that the willingness to share different types of meaningful information depends on who one is sharing that information with. Wiese et al. (2011) add that "willingness to share" is also dependent on the frequency of collocation, communication, and the overall closeness of the sharing participants. While these studies informed our initial categorization of personal content that people share, they nevertheless only inquired on participants' willingness to share a particular piece of information. In contrast, we focus on actual experiences (self-reported) of sharing individual types of content.

A large number of studies on sharing focus on personal digital data, e.g., files (Voida et al., 2006), photos (Miller et al., 2007), and videos (Lange, 2007). Equally wide attention is given to sharing (textual) information through social networking sites (SNS). Of particular relevance to our research is, e.g., the work by Acquisti and Gross (2006) on attitudes and privacy concerns among Facebook users and non-users within an academic institution. They found that students joined Facebook regardless their concerns about privacy. Given the amount of prior research on photo and video sharing, in particular on SNS, we explicitly focused on emerging content.

Studies of Emerging Types of Content

The content categories that we have examined have been studied individually with different levels of attention. However, so far no study has attempted to compare sharing across those different domains. In our previous work, we have investigated the device selection criteria to access six content sharing service categories (Fedosov et al., 2016), however, descriptive accounts of shared content in those domains and concerns of privacy are yet to be analyzed.

Sharing music preferences (i.e., not actual files but things like playlists) has been studied extensively. Well before music streaming services became popular, Voida et al. (2005) studied how users share their listening preferences using iTunes. Silfverberg et al. (2011) studied how users employ "profile work" to shape their online profile in a service that automatically shares their played music with others. Extending this previous work, we focus on emerging music preference sharing services that allow the sharing of self-made playlists with followers (e.g., Spotify).

Sharing travel information has seen somewhat less research. Aizenbud-Reshef et al. (2012) studied the sharing of travel information by interviewing employees regarding their willingness to share their past and future travel plans. Gretzel and Yoo (2008) studied how online reviews affect user travel decisions.

Sharing one's physiological data (e.g., workouts) is probably one of the most covered categories among those we have looked at. Ojala (2013) discussed motivations for tracking and sharing details of training routines and physical exercises in online sports communities. Prior work confirmed that social sharing contributes to the overall user experience and enjoyment of workouts (Mueller et al., 2010, Munson & Consolvo, 2009). A range of work has also looked at privacy concerns (Klasnja et al., 2009), associated risks (Raij et al., 2011) and preferences (Prasad et al., 2009) regarding the tracking (and potentially sharing) of personal health data. Epstein developed social sharing design framework in personal informatics (Epstein et al., 2015).

A very recent trend is the sharing of physical possessions, initially rooms and apartments (e.g., Airbnb), but more recently also rides (Uber), cars (Getaround), and household items (Snapgoods). Several researchers have studied such "sharing economy" services, in particular motivations to participate (Bellotti et al. 2015, Ikkala and Lampinen, 2015). Lampinen (2014) studied users on couchsurfing.com, focusing on reputations problems among users of shared accounts.

Somewhat more on the fringes lies the sharing of virtual goods in virtual social worlds (e.g. Second Life) and video games (e.g., World of Warcraft). Bakshy et al. (2009) examined an interplay of social networks and social influence in adoption and transfer of user-generated content among friends and strangers in massively multiplayer virtual world. Neustaedter and Fedorovskaya (2009) explored capturing and sharing memories through the medium of photos, conversation logs, diaries and landmarks in virtual social world. Odom et al. (2014) investigated the emotional attachment to virtual possessions, including online game avatars.

Sharing information about food and dietary preferences has grown in popularity ever since Grimes and Harper described design opportunities in the spaces (Grimes and Harper, 2008). Davis et al. (2014) investigated the design space for recipe sharing practices.

While the six different content categories we are describing here have thus individually been investigated with various degree of attention to sharing, user preferences and concerns were usually not the primary subject of inquiry, perhaps due to the complexity and ambiguity of the phenomenon itself (Kennedy, 2016). Our exploratory work suggests a possible direction to start a deeper discussion on sharing emerging content.

Selected Work on Privacy in Social Media and Beyond

Our empirical categorization on privacy draw on a number of prior publications. Palen and Dourish (2003) describe disclosure, identity and temporal boundaries as central characteristics of privacy management. Olson et al. (2005) provide guidance on how sharing services can incorporate personal privacy preferences. We incorporated those principles in our data analysis that appraised our findings.

Stuart et al. (2012) presents a "transparency framework" that articulates a continuum of identity from anonymous to real name, which informed our selection of target audiences. Furthermore, previous research identified how people address audience challenges while sharing on social media: they think of more general abstract audiences or imagined targeted audiences (Litt and Hargittai, 2016). In fact, these ambiguous audiences in SNS raised the issue of *context collapse*, where self-presentation and the distribution of information to distinct social groups (e.g. personal, professional) became difficult, that is "people from different context become part of a singular group of message recipients" (Vitak, 2012). Social media scholars identified several coping mechanisms to address context collapse through boundary regulation (Wisniewski et al. 2012) and suggested that control over the audience to access personal information is critical to address privacy concerns in SNS (Ellison et al., 2011). Tufekci empirically illustrates that undergraduate students in order to manage unwanted audiences adjust the visibility of their profiles on Facebook, but not regulate their level of disclosure with exception of phone numbers (Tufekci, 2008). Boundary regulation in online worlds has become challenging due to the context collapse. Hence, the designers of emerging sharing services need to account for audience control. Our work addresses this problem by eliciting the privacy needs and concerns for emerging types of data ranging from metadata about physical artifacts (e.g., apartments) to personal digital data (e.g., music preferences). Furthermore, we discuss four design themes stemming from privacy concerns across these six sharing domains.

Study Design

The selection of content types is based on the *communicative* and *distributive* logics of sharing (John, 2013) described above. The categories we selected cover a large area of personal content and differ in several sharing dimensions, e.g., type of audience or level of disclosed details, as well as encompasses wide range of personal possessions (Odom et al., 2014) in digital and physical realms. Hence, we selected both physical types of sharing (e.g., cars and apartments) and immaterial types of content within digital sphere (e.g., travel plans, workout data). Even though the different forms of sharing we selected might seem to be categorically at different levels, exploring sharing in different spheres helps us to unfold its "polysemic homonymity" , i.e., its diversity of uses and logics (John, 2017), as well as better understand the emerging sharing practices and their relations among each other.

To unfold this ambiguity of contemporary sharing, we followed John's descriptive account of sharing for Web 2.0 (John, 2012). Figure 1 shows how our six emerging content sharing categories can be classified using *communicative* and *distributed* logic of sharing (John, 2012, 2013). Note that both types of sharing foresee prosocial behavior that promotes openness, trust, commonality and understanding between people (John, 2017). Food and music preferences, as well as travel plans or physical exercise data, are mostly shared as an act for letting people know. In contrast, virtual possessions and even more so sharing economy services clearly represent sharing as an act of distribution. We deliberately left out traditional and popular content items such as videos, photos, documents and audio files, as sharing them has been studied widely. Similarly, due to the amount of previous studies, we also did not want to cover popular sharing platforms in our survey, such as social networks (e.g., Facebook) or messaging services (e.g., Twitter). For each of the six content types we selected, we created a set of survey questions to explore personal sharing practices and asked about privacy concerns that inhibit sharing.

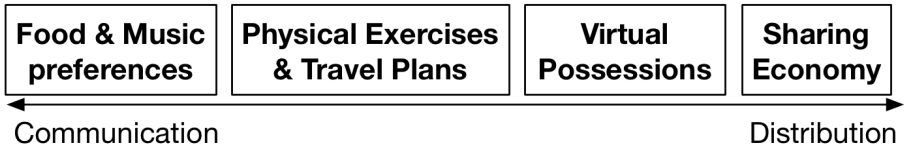

Figure 1. The communicative and distributed logics of sharing of selected emerging types of content.

Data Analysis and Methodology

We launched our online survey in spring 2015 and collected data for three months. We used Typeform (http://typeform.com) to administer the survey, as it features a modern design and a responsive (i.e., cross-device) interface. We distributed the survey URL through social media channels, mailing lists and forums, personal contacts, and by distributing printed flyers in our respective universities.

We collected 256 responses from 246 participants of our online survey. We particularly wanted to use an online survey as a method for collecting data since it can cover a diverse sample of sharing and non-sharing populations. Exactly 200 responses described participants' previous experience on sharing content in one (180 participants) or with exactly two (10 participants) of the six categories we listed (see Table I), while 56 participants did not have any such experience. For those without any experience, our online survey form branched to a single free-form text field, asking them why they did not yet use such services. All 56 provided this information, which helped us understand the privacy concerns and needs of non-sharers. Table I describes the survey demographics on all six content sharing categories, as well as for the 56 non-sharers. Of the 200 respondents who indicated prior experience, 125 (63%) were male and 75 female (37%), with the largest age group being adults of 25-34 years. Their occupations spanned a wide spectrum, including ICT jobs, researchers, educators, marketing professionals, and students; 84% of them have academic degrees (Bachelor, Master, or PhD). Note that 10 participants who completed the survey more than once are listed in Table I as an independent instance in a respective sharing category. In this exploratory work, we do not use collected data for identifying causal relationships or for doing statistical hypothesis testing, otherwise we would have needed to treat those instances accordingly, e.g., through repeated-measures experimental design or by using an individual profile as a covariate.

Following the approach in Olson et al. (2005), we first examined what content people share per category, and with whom such sharing takes place (see rows and columns in Figure 2). However, in contrast to Olson et al., our study focused on actual sharing behavior (self-reported), rather than "willingness to share". Participants selected several content items from a comprehensive list, which we extracted for each category from modern online platforms and services that facilitate sharing six types of content. For sharing workout statistics we examined popular smartphone apps like Endomondo, Runtastic and Sports Tracker; for food preferences sharing, we used the content from dish-finding apps such as Foodspotting and Yelp; for sharing music preferences, we evaluated music streaming (e.g. Spotify) and hosting services (e.g. Bandcamp); for sharing travel details with others, we looked at TripIt; for the "sharing economy" category, we used services such as Airbnb and Uber to build content items; and for the "virtual possessions" category, we looked at several examples of virtual social words and

game platforms that afford sharing digital artifacts. Participants were also able to provide their own examples in an "other items" field.

Table I. Survey demographics

	Music Prefe-rences	Travel Details	Physical Activity	Sharing Econ.	Virtual Posse-ssions	Culinary Habits	Non-sharers
Avg. Age	25.9	28.4	31.4	28.6	35.3	26.6	31.3
# Males	47	22	22	11	14	9	31
# Females	20	25	11	10	4	5	25
Total #	**67**	**47**	**33**	**21**	**18**	**14**	**56**

After collecting participants' demographic information and identifying the content items they have experience with, we subsequently asked more detailed questions about sharing these content items. For example, for a participant that had shared their travel plans with others we asked "What are your main privacy concerns about sharing these personal details, such as travel itineraries?". We further asked participants to describe any positive or negative experiences sharing this information in a free-form text field. Furthermore, we asked participants to specify an online service they are currently using (or have previously used) to share this type of information and indicate tools they access this service. For 'non-shares' we asked: "Why did you (so far) decide not to share that type of information?" Overall, we collected 340 instances related to participants' privacy concerns and needs. Two researchers on the team employed an open-coding technique from grounded theory (Glaser & Strauss, 2009) to analyze all open-ended survey questions. To draw out common privacy issues across our categories, we used affinity diagramming (Holtzblatt et al., 2004). In addition to counting instances of each factor, we also collected respondents' quotes to support each emerging empirical category.

Results

We first report statistics and other general findings about each content category, followed by a more comparison-oriented section that discussed differences and similarities of target audiences across the categories. We then report the needs and concerns of our participants regarding privacy. Note that we describe tools or services that support the sharing of emerging content in a separate publication (Fedosov et al., 2016).

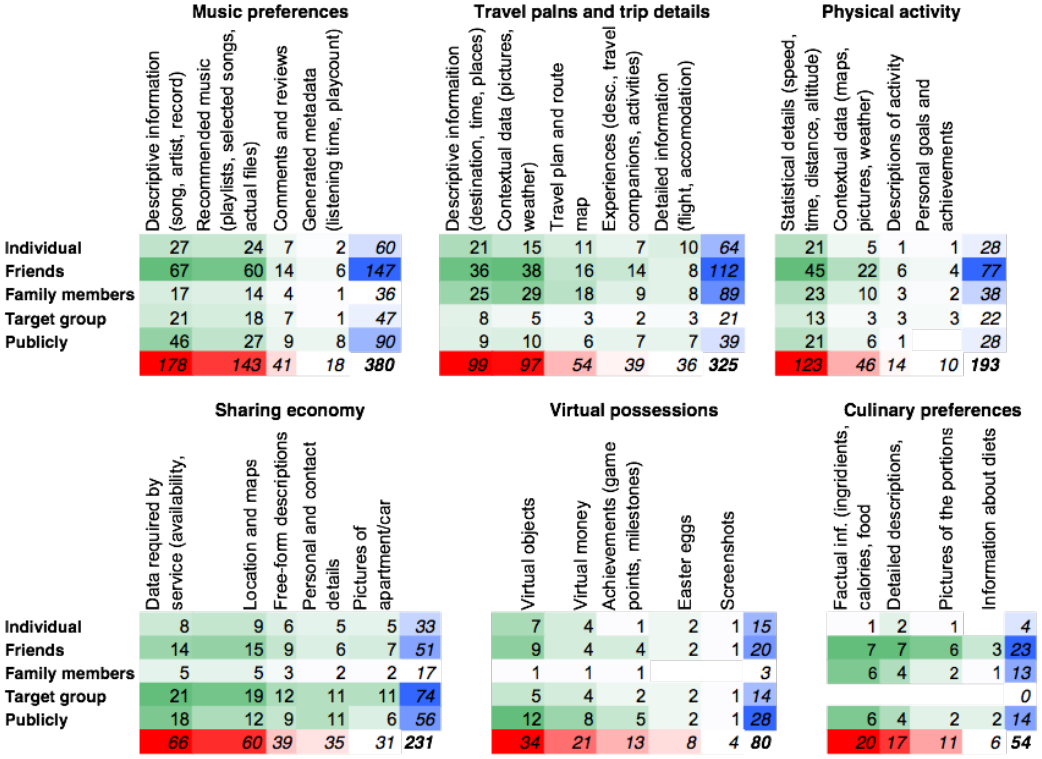

Figure 2. Aggregated table of content shared across different sharing categories

In Figure 2, each inner cell in a table gives the number of participants that reported to share a given content item with the respective recipients. Multiple selections were possible. In addition, participant could add items not covered in our set of choices using a text field. To facilitate visualization, we clustered similar content items in categories: descriptive information, metadata, contextual data etc. Then we ordered the clusters (columns) from most to least shared, and color-coded them in darker shades for higher item counts.

In the music preference category, most of the sharing happens with friends, followed by public sharing and sharing with other individuals. The most shared information were descriptive details, such as song title, record, and artist name.

The most shared content in category “travel plans and trip details” was pictures and names of destinations, followed by travel plans and descriptions of destinations. Recipients were mostly friends and family. Respondents preferred to share specific accommodation information mostly with individual recipients, though also sometimes published this publicly. Targeted sharing to a certain interest group or community was the least selected option.

Participants shared information about physical exercises (i.e., workouts) mostly in the form of duration, distance covered, and routes. Information such as heart rate, altitude drop or step counts was shared more rarely. Occasionally participants shared pictures, exercise descriptions, or general fitness goals. Physical exercises are primarily shared with friends, then with family members. In some cases, people

preferred to share data with individual people and publicly. Sharing with target groups with a common interest was rare.

Our "sharing economy" questions primarily asked about accommodation and car sharing experiences. Figure 2 shows that a description of the item to be shared, its availability, as well as its location are among most shared content, though the distribution among items is fairly even, including pictures, descriptions of conditions, maps, and contact details. Not surprisingly, participants shared such details with targeted groups and/or publicly, rather than with friends or family members. This might also be because these services usually enable only sharing with all other service members, in order to give a wider exposure. Participants complained about certain artificial constraints imposed by these services in order to anonymize listings, such as not being able to share an external URL that would describe the item in more detail, not being allowed to embed video, or not being able to provide personal contact details to directly follow-up with interested parties.

The most shared items in videogames and online worlds were virtual objects (hence the "magic wands" in the title of this paper) and virtual money, both actively shared with specific target groups and publicly. The fact that family members are the least frequent sharing audience might stem from the fact that few of these games are played within a family context. Participants would furthermore like to share videos and replays, as well as being able to export content from other services and virtual worlds.

The least used category of information being shared among our participants was food related information. Most participants reported sharing food-related descriptions and comments in this category, followed by pictures of portions and ingredients. Similar to music preferences, content in this category was most frequently shared with friends. This suggests that such information is considered less private, but instead is used for self-representation and to actively engage with others.

Across all sharing categories, respondents most often shared factual and descriptive information around shared artifact, with an exception of online games, where the most shared item were virtual possessions. Contextual details such as maps, pictures and supplemental information are being shared moderately. Personal details are being shared less frequently, and sharing of such details are usually dedicated only to some selected audiences.

Our empirically-collected data thus confirms our initial grouping of the six categories along the "two logics of sharing" (see Figure 1): We observe that sharing private information about trips and physical exercises, as well as personal preferences in food and music, are acts of communication that aim to inform, engage and stay connected. Instead, sharing content from "sharing economy" services and virtual possessions from videogames is clearly used to distribute a shared resource. Our findings also suggest that sharing for communication and

distribution not only vary across different motivating factors but also with respect to which audiences they target.

Privacy Concerns and Needs

The privacy concerns and needs that our 200 "sharers" articulated were mostly formulated around the concept of "content that is shared with a particular audience". However, some of our participants also mentioned privacy issues with respect to the actual service provider, in particular concerns about a less established provider (i.e., a startup) being acquired, or not being able to protect stored data to the same extent as a large company would.

When it came to concerns about the actual content being shared, our respondents were quite conscious about sharing information revealing their identity (such as phone number, email address, pictures etc.):

> [Concerns?] None, as long as the game prevents real identity and "real world" financial data from connecting to the actual sharing/transaction with other individuals and vice versa. (Male, 50, about sharing virtual possessions in a virtual world).

Additionally, participants also considered information that has embedded location in it to be critical (e.g., home address, map with current location, travel route). Some concerns related to a fear of being stalked, especially from respondents that shared data about physical exercises, travel details, and accommodation listings:

> [I fear] that people would know where I live or where I usually go when I go for a run. (Female, 20, sharing physical exercise data).

With respect to concerns about the recipient (audience) of a particular piece of information, our respondents stated three main issues: (1) that a particular individual or an unwelcomed group would gain access to the shared data:

> I don't like some specific persons [to] know about my ads. (Male, 32, sharing accommodation listing);

(2) concerns about misuse and violation of personal data as a result of fraud or safety issues (e.g., identity theft); (3) and acquisitions by a third party:

> This is why I no longer use a fitness tracker. I don't like wondering about who will get to use my data and why – one of the companies that had access to the data was purchased by another company I don't trust. (Female, 49, sharing physical exercise data).

We also found that self-representation to the wider audience and disclosing personal details too broadly also contributed to privacy concerns of being misjudged or laughed at:

> There have been some cases when I've shared too intimate information to too wide an audience. I slightly regretted after sharing. (Female, 28, sharing travels plans and details).

Olson et al. (2005) pointed out the need for various controls over content that would enable anonymous, coarse- and fine-grained sharing of details. Our findings confirm that this need also holds for emerging types of shared content:

> I try to eliminate information that makes me concerned about privacy beforehand. (Female, 23, sharing accommodation listing).

As anticipated, participants mentioned that audience control mechanisms should allow them to decide what audience can access shared content within a service. For example, having the ability to easily remove professional contacts from the list of recipients of a post would help with the following concern:

> Main concern is posting pictures of food during working hours, which may imply that I am not at work. (Male, 34, sharing culinary preferences).

On the other hand, participants also mentioned their willingness to share openly information that would be beneficial to some individuals and community:

> Information about production of foods and important foods that substitute meat and fish. (Female, 26, sharing dietary habits).

Finally, users mentioned an issue with overly flexible privacy policies and mechanisms to protect their sharing choices

> [I fear a] change of privacy policy that would allow a wider circle of people to see what I have shared without my consent. (Female, 32, sharing travel plans and details).

	Music preferences	Travel plans and trip details	Physical activity	Sharing economy	Virtual possessions	Culinary preferences	
Privacy concerns							
Misuse and violation of the shared data	1	10	2	1			*14*
Revealing identity and location	1	7	10	3		3	*24*
Unwanted access and unwelcome crowd		12	4	7			*23*
Acquisitions by a third party	2	1	1	1			*5*
Disclosure of personal details broadly	5	2		2	6		*15*
Self-representation to the wider audience	5	3					*8*
	14	35	17	14	6	3	**89**
Privacy needs							
Controls over the content	14	3	2	4	4	1	*28*
Access control mechanisms	4	10	1		1		*16*
Flexible privacy policies and mechanisms		1			1		*2*
Willingness to share openly	3				2	1	*6*
	21	14	3	4	8	2	**52**

Figure 3. Privacy concerns and needs of active sharers that inhibit sharing across different novel content categories.

Some of the aforementioned privacy needs and concerns were more present in one sharing domain than another. Figure 3 describes privacy needs and concerns on a per-content category basis. Each cell in the table gives the number of instances we encountered during our content analysis. Darker shades represent higher counts. We conducted a two-way contingency table analysis to test the dependency of these privacy concerns across different sharing categories, and found that there was a significant association – Pearson $\chi^2(25)=84.661$, $N=89$ and $p<0.001$. Similarly, we

found significant association among privacy needs and sharing categories – Pearson $\chi^2(15)=25.743$, $N=52$ and $p=0.041$. Looking further into this, we found that concerns related to revealing one's own identity and location, as well as a need to control the distribution of shared content, were most crucial across all emerging sharing domains. Preventing unwanted access is most important for services that share travel plans, physical possessions, and biometrical data. Looking at the detailed list of content categories presented in Figure 2, we can speculate about how specific content types prompt the needs and concerns listed in Figure 3. Sharing pictures, location, and descriptive information could prompt privacy concerns about the misuse and violation of the shared data in "travel plans", while triggering fear of unwanted access in the "sharing economy" category. Sharing descriptive information about songs or self-made playlists ("music preferences") may entail concerns about being misjudged by others, while information about personal workouts may lead to concerns related to revealing one's identity.

We also prompted the 56 respondents that did not report any experience of sharing emerging content to explain the reasons why they decided not to do so (information in this paragraph is not shown in Figure 3). For 16 of them, this behavior related to personal safety and their preference for limiting the spread of private information. These reasons match our above findings on privacy concerns related to misuse of the shared data and fear of revealing one's own identity or location.

> I don't share those [details] to anywhere. I like to keep most of my things private, even when it requires some work. I share some stuff to my friends, but even that is really limited. (Female, 30, not active sharer).

20 out of 56 "non-sharers" reported that they only share impersonal information (e.g. news, educational materials, useful tips), resonating with our findings on concerns over revealing identity and self-representation to a wider audience. Few participants found that sharing personal information offers no benefits to their community:

> It's information that none of my friends should have a practical use for. At times, I use such online services to keep track on my own, for myself. I don't consider my exercising private, just info no-one is interested in and thus I should not bother others with it. (Male, 27, not active sharer).

Implications for Design

Based on a qualitative analysis of our survey's open-ended answers across different content categories we distilled four initial design themes for designers and developers that are interested in building content sharing services for the distribution of emerging content types. Our design themes address the privacy concerns and needs identified in the Results chapter. In particular, we review (1)

different angles of access control; (2) privacy mechanisms; and (3) quality of controls; and (4) accessibility of shared data.

Firstly, our survey results show that people tend to share different personal content with various levels of details. Mechanisms that enable anonymization or vagueness can be useful in this context. For content related to sport activities, this could be an aggregated overview of a physical activity over a certain period (Epstein, 2013), with generic information that cannot be traced back to an individual.

> [Service] allows to remove any training as you want and to provide a border area. (Male, 30, sharing physical exercise data).

Furthermore, similarly to unwanted audience concerns in social media (Tufekci, 2008), users of emerging content services should be able to easily select the right target audience for a given piece of content, in order to prevent unwanted content access. Gradually unfolding shared content upon gained trust is another strategy to consider when sharing sensitive data. Some "sharing economy" services such as Airbnb are using this strategy already during their matching phase. This was brought up in the open-ended answers as an example of good practice.

> Couch surfers. If they are interested in staying and I with them, more details are shared (Male, 26, sharing accommodation listing).

Secondly, services should maintain easily comprehensible privacy policies. Information that articulates where and how content will be used, and whether and to whom collected data is sold, traded or exchanged should be provided.

> I do not wish to become a free agent for advertisers. Almost all services we use to share stuff use the data for companies to improve their advertising. If I wish to be utilized as a subject for marketing studies, I wish to control the data I share and get some kind of compensation of it. So I use social media to update quite vague stuff, however I'm aware I'm still sharing more to companies than I actually would like to (Female, 40, not active sharer).

Recent research has explored if short, standardized privacy notices (Kelley et al., 2009) can simplify this process (Kelley et al., 2010; Cranor, 2012), as standard free-form policies are typically difficult to read and comprehend (McDonald and Cranor, 2008). Also, obtaining explicit user consent is a good practice to follow when updating or making changes in the existing privacy policy, even if local laws do not require this. Note, however, that many scholars have started to question if consumers are actually able to take meaningful decisions based on privacy policies (Solove 2013; Acquisti et al., 2013; Acquisti et al., 2016).

> I understand its [service's] nature, functions, and policies and can choose how to use the service (Male, 52, sharing virtual possessions in a virtual world).

We found a need for providing adequate sharing controls for content sharing services. Our participants were easily frustrated when data was being automatically shared without their consent. To prevent such behavior, services periodically could help users review their automatic sharing settings. Furthermore, our respondents

were cautious about being marked as "spammers" if they would share too often or to the wrong audience. A service could offer certain policies that would allow only a limited amount of content to be shared within a certain period, protecting both posters (from oversharing) and recipients (from being spammed).

> I want to be in control of what I share to who. None of it should be automatic as such without my explicit consent (Male, 30, sharing music preferences)

Lastly, in order to amplify engagement with – and increase the attractiveness of – a service, designers should consider presenting certain shared content within the service to non-users. Potentially this technique will convert them into users of the service. Users would also benefit from sharing data openly for public use, e.g., for information that has a substantial value to a community. Examples of this type of shared content might be information about ingredients and substances of products or foods.

> Like McDonald ingredients, I like to explain to my cousins why it's dangerous (Male, 27, sharing dietary preferences).

Discussion and Limitations

In studying emerging sharing practices online, we were motivated by John's non-prescriptivist approach that inquired 'What do people call sharing?' rather than puristically interrogating 'What should we call sharing?' (John, 2017). Hence, our focus on practices let us explore the 'everydayness' and ubiquity of sharing. Drawing on John's communicative and distributed interpretation of sharing (John, 2017), we have classified six spheres of sharing into these two logics. We have adopted a pragmatic approach studying various emerging sharing practices enabled by networked technologies, from distribution of digital content (e.g., in the form of the metadata about real-work apartments and cars, and virtual possessions in videogames), to communication of personal achievements in sports, to individual preferences in music and food. We did not reveal the different logics of sharing to our participants and left the term 'sharing' up to their interpretation, allowing them to freely include any content items they shared under each category. Nevertheless, our analysis shows that the empirical data we collected supported our initial classification of emerging content into "two logics of sharing". While we have incorporated both material and immaterial objects of sharing in our survey, we have occasionally observed non-rivalry qualities of the content. For example, perceptions and privacy attitudes of sharing a car (where sharing is seen as an act of division) may differ from sharing digital information about the ride using that car (communicative model). Hence, the results we have presented here, albeit rich and descriptive, are rather exploratory and have to be interpreted with great caution while developing each sphere of sharing further. Future empirical work that aims

to compare and contrast "material" (zero-sum) and "immaterial" (non-zero sum) sharing should account for this difference in quality.

In a first step, we extracted factors surrounding privacy concerns surrounding emerging content sharing. Some of our findings about privacy concerns are in line with earlier work on traditional content, such as photo sharing practices. In our study, we expand the prior findings from Miller and Edwards (2007), which state "[photo sharing] solutions should also offer flexibility in the ability to control privacy and sharing", by illustrating several strategies for access control for novel content sharing services. We also extend prior work by Olson et al. (2005) (on how sharing services can incorporate personal privacy preferences) by including novel content categories. Finally, we augmented findings on privacy concerns about personal sensing (Klasnja et al., 2009) by providing design themes for emerging content sharing.

Our empirical data about emerging content suggests several insights that may merit further discussion in the community. For example, participants that shared music preferences and playlists specifically expressed the need for controls over the content. We speculate that online streaming platforms does not provide adequate mechanisms to ensure users control such sharing decisions. Furthermore, modern music streaming services (e.g. Spotify) often share content automatically without providing additional granularity, e.g., only music of a particular genre. These findings are comparable to sharing workout details from tracking devices and apps, where the balance between tracker-initiated and manually triggered posts has yet to be found (Epstein, 2015). Another example relates to privacy concerns of revealing identity or location while sharing trip details and travel plans. Similar to findings from social media research (Tufekci, 2008), our participants were very concerned about the potential misuse and violation of the shared data, and preferred to adjust their visibility to limit unwanted audience access.

It is important to note that our findings cannot be easily generalized: most of our participants were under 35 years of age and male. Moreover, online surveys also are known to bias towards highly educated populations (84% of our respondents have one or more academic degrees). However, this choice of method allowed us to reach a very international set of participants: our survey received replies from 15 countries across four continents. We also believe that our account of these new phenomena can still help researchers and practitioners reflect on current practices with respect to existing sharing conventions, especially regarding privacy. While we attempted to reach a wider community of sharers (especially in the "sharing economy" category, where, e.g., accommodation owners are usually older), most existing online platforms in these domains (e.g., Airbnb) do not allow one to contact an individual user without the aim to initiate a business transaction.

Finally, given the wide range of content items considered within the scope of our analysis, there were obvious differences in audience perceptions. For example, in culinary and diet preference sharing, the notion of a "target group" was not

present, while in the "sharing economy" category it was one of the largest recipient of shared content. Additionally, respondents argued that the concepts of "friends" in a social network service and "friends" in real-life differ. This was particularly visible in the travel category, where sharing to friends was frequent, but sharing to a "target group" was rare. From related work on social media, we know that determining audience perception is a complex task. Current research examines wide clusters of imagined audiences (Litt and Hargittai, 2016) or suggests to use computational techniques to define distinct sharing groups (Vitak, 2012). This question clearly merits further discussion when it comes to emerging online content.

Conclusions and Future Work

In this exploratory work, we discussed a set of six emerging types of content that is increasingly being shared online, based on self-reported behavior of 200 "sharing" responses from an online questionnaire. The selected domains not only represent different logics of sharing, communicative and distributed (John, 2013, Kennedy, 2016), but also diverge in the amount of disclosed details and types of audience. Also, they cover a variety of shared things from personal digital content to physical possessions (through their digital representations and contextual metadata). We identified content items that are being shared across various audiences within each individual domain. We also offer a descriptive comparison of those sharing categories, outlining similarities and differences. To further inform our findings regarding privacy concerns and needs, we also asked 56 "non-sharers" within our six emerging sharing categories about their reasons for not doing so.

Based on our empirically-collected privacy concerns we synthesized four design themes for emerging content sharing: holistic access control, privacy and safety, quality of controls, and open sharing. Our analysis showed that audience perception and sharing controls are key issues in successful service design – across all sharing categories we examined. We do not claim that those design themes are exhaustive. However, we believe they do provide a good starting point for discussion among researchers and practitioners interested in this space.

We plan to continue our qualitative analysis in order to develop more detailed design recommendations from the four "design themes" presented in this paper. We particularly believe that evaluating social and psychological complexities concerning privacy should benefit this initial attempt to map the emerging terrain of sharing services. Following research on social media, disclosures and privacy settings can be used in conjunction with one another (Ellison et al., 2011) to deal with boundary regulations online (Wisniewski et al., 2012). Therefore, as a next step, we see value in relating our findings to audience and disclosure management on SNS (Tufekci, 2008). Furthermore, future research could also explore the impact of content collapse on emerging sharing domains by utilizing computational

measures to determine audience diversity (Vitak, 2012). Eventually, we hope to be able to create an empirically validated cross-domain content sharing model. A useful point of departure could be extending Epstein's social sharing framework beyond personal informatics (Epstein, 2015).

We hope that our descriptive mapping of the emerging terrain can help with the design of future content sharing platforms and further frame design explorations in sharing beyond personal experiences to a broader sense of sharing things.

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