

# +Your Circles: Sharing Behavior on Google+

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## ABSTRACT

Users are sharing and consuming enormous amounts of information through online social network interaction every day. Yet, many users struggle to control what they share to their overlapping social spheres. Google+ introduces circles, a mechanism that enables users to group friends and use these groups to control their social network feeds and posts. We present the results of a qualitative interview study on the sharing perceptions and behavior of 27 Google+ users. These results indicate that many users have a clear understanding of circles, using them to target information to those most interested in it. Yet, despite these positive perceptions, there is only moderate use of circles to control information flow. We explore reasons and risks associated with these behaviors and provide insight on the impact and open questions of this privacy mechanism.

## Categories and Subject Descriptors

H.5.m. [Information Interfaces and Presentation (e.g. HCI)]: Miscellaneous

## General Terms

Design, Human Factors.

## Keywords

Privacy, Social Network Sites, Google+, Facebook.

## 1. INTRODUCTION

People are sharing information online to more and more people in unprecedented quantities. Facebook has reported that users are sharing more than 30 billion pieces of content each month on their site<sup>1</sup>, while Twitter reports its users generate 250 million tweets a day. Users form strategies as to what information they will share and to whom, and how and

<sup>1</sup><http://www.facebook.com/press/info.php?statistics>  
Accessed: 10/12/2011

when they keep up with other people's posts. However, as the volume of content and size of our social networks grows, managing the flow of all of that information can become a difficult task.

Early personal web pages and online social network sites had a simplistic sharing model. Users typically would make a decision to expose information to the public or not, and had to explicitly seek out information about others. Early Facebook adopters embraced being able to post information to smaller, more intimate audiences, initially the University they attended and later restricted to only friends. Yet friends on social network sites are not composed of true close ties, but may include hundreds of acquaintances and even strangers. Thus, users have difficulty determining the reach of their information, and as a result can experience accidental over disclosures, regrets [19], embarrassment, and other social problems. Many have learned cautious behavior, keeping anything truly personal or private off of social network sites. Studies have highlighted a number of coping strategies users employ to mitigate the social problems they face online [9, 11, 17, 20].

To help with these privacy struggles, users desire to adapt their sharing to different groups of people, as we do in the physical world [9, 14, 20]. Indeed, Facebook has offered such capabilities for several years through customized friend lists, yet many users have not taken advantage of them as the features were difficult to find and use. Recently, Google released a new social network site that introduces the concept of circles to enable users to easily group and classify online social network friends. Google+ circles can be used to both filter incoming stream messages and selectively post messages to appear on friends' streams.

While Facebook friend lists can provide this same functionality, the Google+ circles mechanism is more visible on the interface and is integrated in the initial setup of the user account. This paper presents one of the first explorations into how users of Google+ understand and react to circles. We sought to examine the effect produced by a usable method for grouping friends for privacy management. We also wanted to determine if the introduction of circles as a predominant feature influenced sharing behavior and the management of information flows.

In this paper, we present a qualitative study where we gather data from 27 Google+ users using semi-structured interviews. Our results indicate Google+ users have a positive perception of circles and understand how circles can be used. However, many people are not using circles to protect sensitive disclosures but instead use them to direct relevant

information to interested social groups. Our results highlight the challenges of designing sites for sharing and interacting that reflect users' social context and privacy desires.

## 2. BACKGROUND

Privacy is highly contextual; people will perceive privacy problems when information that is appropriate in one context is inappropriately shared in another [12]. Thus, in the physical world, decisions about social interaction and sharing information are impacted by the social context of those around us. Yet, one of the challenges of online social network sites and social media is managing relationship context, particularly when users have multiple groups of friends with differing expectations [18]. This becomes problematic once a social network has hit a critical mass and users have one public image within multiple social contexts [3]. Our varied and fluid relationships are often collapsed to simply "friend" and "not friend," leading to potential privacy problems. This reduces the kinds of interactions that take place, and as a result, users report self-censoring and only sharing information that can be public [9, 20], which in turn reduces the quality of the social interaction to the lowest common denominator. This can lead users to be dissatisfied with the quality and intimacy of the social interactions, and reduce the benefits of social network sites such as social capital and interpersonal well being [6].

Much research on privacy has focused on information disclosure—how people control the personal information they share about themselves. However, privacy can also be viewed as "an interpersonal boundary process by which a person or group regulates interaction with others," by altering the degree of openness of self to others [1]. Thus, privacy involves managing social interaction, whom we interact with, how and when, and not just who gets to see what piece of information. How users mediate their overlapping connections, whose posts they pay attention to, and how they communicate with others are all aspects of privacy management. Wisniewski et al. have identified the types of boundaries that are relevant on social network sites, and the many interface mechanisms and coping behaviors users employ to manage those boundaries [9, 20]. In addition to disclosure boundaries, they identify others such as the relationship boundary, where users regulate who is in their social network and the kinds of interactions that are appropriate based on the relationship. Thus, in this paper, we view privacy through this broader interactional lens.

### 2.1 Group-based mechanisms

Early studies have identified that users do take into account broad audiences for their posts and information on social network sites [4], yet can easily overlook these audiences during regular interactions with friends [16]. Users express a desire to group or categorize the intended recipients of their shared information [13, 14]. Several interfaces have been proposed to help users manage disclosures to different groups of people within their social networks. For example, AudienceView presented profile privacy settings as views of profile information from the perspective of various groups [15]. The interface provided a concrete and visual representation of information sharing, reducing confusion as to the outcomes of the privacy settings. In another example, Egleman et al. present a privacy setting mechanism using

Venn diagrams to improve configuration for overlapping social groups [5].

For years, Facebook has provided flexible and fine-grained functionality for grouping friends into lists (since 2007) and controlling the sharing of profile and posted content to those lists (since 2009). Yet, despite users' stated desires for such functionality, there is little evidence of usage of those features. In 2010, Facebook reported 5% of its users had created friend lists<sup>2</sup>, and research studies have reported 10% [20] and 17% [10] of participants using friend lists to manage sharing.

A key reason for the lack of use of the friends lists is a lack of visibility and usability. Facebook users have reported that they are unaware such functionality exists, or found it cumbersome and confusing to configure lists and customize privacy settings based on those lists [9, 20]. To reduce the burden of forming groups, researchers are examining automated means of group creation based on various network algorithms to provide semantically-meaningful groupings of connections [7]. Yet, it is not clear if these algorithms are accurate enough. However, since the launch of Google+, Facebook has enhanced the friends list feature to make lists easier to create and more visible. There are now automated lists based on profile and connection information—such as lists for one's school, workplace, and family, and the lists are more prominently displayed on a user's home page and in the privacy settings menu for posts. Much of this study was conducted prior to this change, so it is still unknown how this feature has impacted usage.

Beyond usability, many semantically meaningful groups may also not be adequate for users' privacy needs. For example, Kelley et al. asked people to create groups for all their Facebook friends [10]. As expected, many separated people by contexts such as family, high school friends, and co-workers. Participants were then asked to indicate which groups they would choose to share various information with. However, in many cases, the groupings did not reflect who the participants truly wanted to share the information with, and who they wanted to restrict it from.

Kairam et al. examined the selective sharing that Google+ early adopters engage in through a log analysis, survey, and interview study [8]. They reported patterns of public versus circle-based sharing, how users choose an audience, and the kinds of content shared. Many of our findings support Kairam et al., however, our results complement their findings by presenting additional insights into circle perceptions and behaviors from a privacy perspective.

### 2.2 Google+

Google+ was released on June 28, 2011 by invitation only, and was released publicly in late September 2011. Google+ provides a flexible social network site framework that allows for a wide variety of social interaction, similar to other social media sites. The site attempts to integrate two different models of social media usage: similar to Facebook where users communicate between friends, and Twitter where people publish information to followers. The primary differentiator of Google+ is circles, making this site the first with

<sup>2</sup><http://www.fastcompany.com/1693443/facebook-big-announcements-dashboards-personal-information-downloads-friend-group-lists>  
Accessed: 3/9/2012

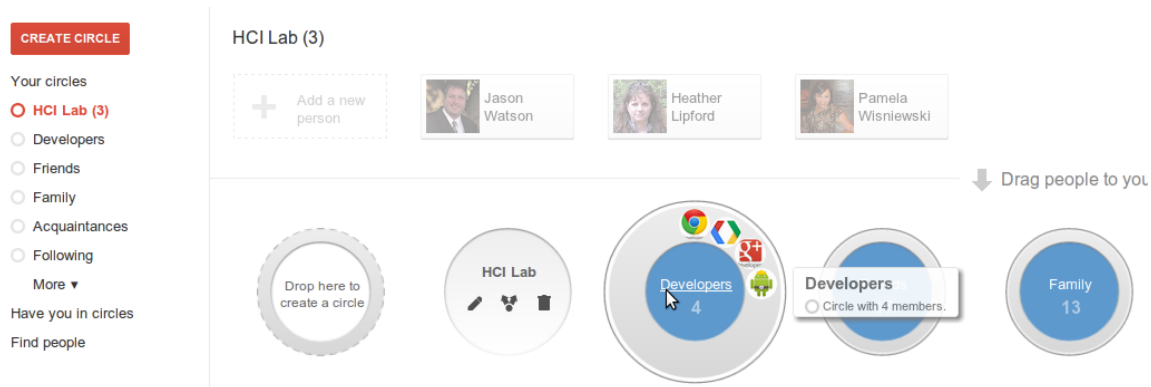


Figure 1: The Google+ Circles Implementation.

such a highly visible and integrated group-based sharing mechanism.

A circle is simply a named list of users, see Figure 1. To get started on the site, users choose from existing or recommended contacts, or search for people on the site and then drag and drop individuals into a circle. Google+ provides a starting set of circles, including Friends, Family, and Acquaintances, however users can easily create their own or rename existing circles. Unlike a Facebook “friend”, a person in a circle is not a bi-directional connection. Instead, it indicates who the user can send posts to. Users are notified if they are added to others’ circles, and then have the option to add them back or not. A default circle called *Following* is for people that the user wishes to follow, similar to Twitter, but does not necessarily wish to share information with.

Circles are used to both filter incoming streams and to target outgoing posts. Users can choose to view posts only from people in individual circles. This restricts the stream to just the posts from those groups of people. When sharing information, users must choose which circles to share with. This can include one or more individual circles, *My Circles*, *Extended Circles* to share with friends of friends, or *Public* to share with anyone who wants to view the post, see Figure 2. The default option is whatever was chosen for the previous post. The public option allows for a Twitter-style interaction, where users can place someone in their *Following* circle—such as a famous celebrity—and have that person’s public posts appear in their stream.

While posting information appears to be the primary interaction promoted by Google+, the site provides a limited profile, text and video chat features, and more recently a games platform with a separate game stream. Google+ also integrates with other Google products, such as Picassa and Android phones to easily share photos, and YouTube for videos. While users are logged in, Google search is now displaying results from posts made by a user’s Google+ connections.

While Facebook has since responded by making friend lists more visible on their site, Google+ users are forced to interact with circles, at least minimally, having to choose which circle to place any connection into, and having a circle choice prominently displayed on the posting interface. This level of integration of social context with the primary sharing task gives Google+ adopters a unique perspective on how they adapt to group-based sharing. Thus, we believe that

studying users of Google+ can provide a unique and valuable perspective on user behaviors and perceptions of group based sharing that is timely and relevant to social network site research and development.

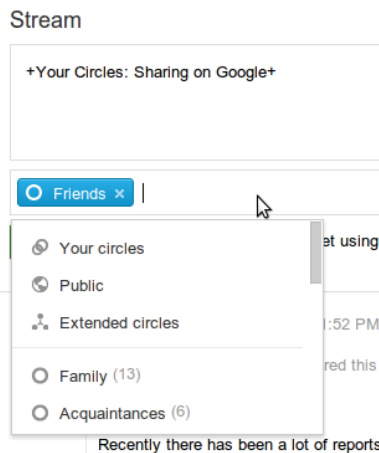


Figure 2: The Google+ Circles Implementation.

### 3. METHODOLOGY

In order to understand users of Google+, we performed semi-structured interviews with participants who had joined the social network site. In order to participate in the study participants had to be at least 18 years of age, not know the investigator, and have been a user of Google+ prior to the study. Additionally, participants needed to have access to Google+ Hangouts, other voice/video communication software, or a US-based phone line.

We conducted two sets of interviews, the first set during August and September 2011. We recruited participants using snowball sampling, starting with the investigators’ friends of friends. Participants were not compensated for taking part in the interview. Most interviews were able to be performed using Google+ Hangouts. After the connection with the participant was made, the participant was directed to a webpage containing our informed consent document. We quickly gave an overview of the expected participation and explained that the audio, not video, would be recorded

to later analyze participant data. Once the participant accepted the terms of the study, we began audio recording and started the interview by asking demographic questions such as occupation, age, gender, state, and social network site usage. We then asked participants to self report their level of technical skill on a scale from 1 – 10 with 10 being the most technical.

We asked a variety of questions regarding reasons for use, managing information flow, audience understanding and comparison between social network sites. For some questions, we gathered perspectives on how the participants use both Facebook and Google+ in an attempt to understand how the introduction of circles impacted social network behavior. These questions served as a starting point for discussion and as the participants answered, we probed any interesting or ambiguous responses.

Our first set of participants had a very high level of technical skill which may reflect the population of users at that time, but may also have been a result of our snowball sampling recruiting method. The initial interviews were gathered only a few months after the introduction of Google+ to understand the perspective of early adopters. Later, between February 14 and March 9, 2012, we gathered a second set of participant data. We modified some of the interview questions to focus more on Google+ and circle perceptions and less on differences between Facebook and Google+ behaviors. In order to get a wider representation of participants who use Google+, we recruited this set of participants via Amazon Mechanical Turk. Each turker was located in the United States and had been using Google+ prior to the study. Turkers were paid a small amount of money in exchange for their time participating in the interview. We did not run any of these interviews using Google+ Hangouts; all participants in the second set of interviews were contacted via phone. In addition to having read the informed consent as part of the HIT on Amazon Turk, participants of the phone call were notified a second time at the beginning of the call that they would be recorded for transcription and later analysis. During this interview, we also asked them to log into Google+ to discuss their circles and posts to provide more concrete comments on their posting behavior.

Once the interviewing phase was completed, we transcribed the recorded sessions and coded them using Atlas.ti. Two researchers performed open coding on the transcribed data, then resolved any coding differences, resulting in inter-coder reliability of 82.9% agreement between two independent coders. We developed concepts based on the agreed coding to examine common responses and better understand behavior.

## 4. RESULTS

We recruited 27 participants from throughout the United States, 15 in the first phase, 12 in the second. Participant ages ranged from 20 – 50 with  $\bar{x} = 31.12$  and  $Md = 29$ . The first set of participants had approximately one month experience using Google+ and the second set reported an average of five months experience. Participants came from a wide variety of backgrounds, however, many (10/15 in the first phase and 1/12 in the second phase) from the first phase reported themselves as working in a technology-related profession such as computer repair while the second phase participants reported more diverse backgrounds. Using a scale

from 1-10 with 10 being very technical, participants self-reported a high level of technical skill ranging from 5 – 10 with  $\bar{x} = 7.72$  and  $Md = 8$ . The high level of reported technical skill could be a result of our snowball sampling method used for the first group of participants, but we believe it is also likely related to a higher number of technically skilled early adopters of Google+.

### 4.1 General Google+ Perceptions

We began the interview asking participants why they joined Google+ and their overall perceptions of the social network site. While not directly related to their use of circles, we believe their perceptions highlight how users approached and used the site as a whole, which impacted their sharing behaviors.

Participants generally had favorable attitudes toward Google as a company, which led to their interest and willingness to try the new service. We found it interesting that some participants reported having a much higher level of trust in Google than Facebook. Although most participants mentioned trusting Google with their information, not all felt entirely comfortable with having so much information with a single provider. Some participants (2/15 and 2/12) even mentioned feeling like Google is controlling a large portion of their—often personal—data. For example, *P15* commented:

*P15: “I mean in the case of Google+ it’s Google and Google already owns my soul. I use all of their services they have all my emails dating back to 2004 or something so...”*

Few participants expressed privacy concerns with using Google+ (3/15 and 0/12) but almost everyone mentioned that one of the biggest disadvantages is that it lacks users and they use it less because not all of their friends have started to use it. Participants mentioned trying to encourage their friends to use Google+, however, only one participant used Google+ exclusively.

When asked about why they liked Google+, many participants (14/15 and 6/12) mentioned it was easy to use due to the interface design and responsiveness. Participants who commented about the look and feel mentioned the interface seemed clean and void of excessive clutter such as commercial advertisements, particularly in comparison to Facebook. Participants (10/15 and 9/12) also frequently reported that circles was a key advantage to Google+, indicating that they thought of this as a significant feature of the site.

Participants (7/15 and 3/12) also mentioned using Google+ because of how well it integrated with other Google products such as Picasa and YouTube. Only two expressed dislike with the product integration citing concerns about how photos from their smart phones had been automatically uploaded and linked to their Google+ profiles. These participants realized the photos were not shared by default, but still wanted more control over which photos appeared on their profiles.

As with other online social network sites, many of our participants (9/15 and 4/12) reported only brief interaction with their profile information. These participants mentioned creating their profile and never updating the profile information. However, a surprising number of participants (7/15 and 5/12) mentioned limiting profile information exposure

either by not entering some information or using privacy settings to control access. In the next section, we report the results on participants' attitudes and use of Google+ circles.

## 4.2 Circles

Participants had varying numbers of circles ranging from 2 – 12 with  $\bar{x} = 6.12$  and  $Md = 5$  (including circles that had no people in them). Google+ provides four circles by default: *Friends*, *Family*, *Following*, and *Acquaintances*. We noticed more use of just the default circles in the second set of participants ( $Md = 6$ ) compared to the first set ( $Md = 4$ ). This may be due to the lower level of technical skill in the second set of participants ( $Md = 7$  vs  $Md = 9$ ) reported on a 10-point Likert scale. This may also be due to a reduced desire to experiment with circles. Outside of the defaults, the circles varied widely, with one participant creating a boyfriend circle with a single person in it, to others who placed everyone in a single friends circle. We found many variations between these two extremes including a participant who separated church friends from church leadership, trying control information flows from smaller groups within their larger social categories.

Participants were then asked to report the number of people that they placed in each circle. We found that participants had on average  $\bar{x} = 53.4$ ,  $Md = 47$  people within all of their circles. Some participants (2/15 and 4/12) placed all of their Google+ social connections in a single circle. Some of this may be explained by the amount of effort required in order to configure circles—three of those participants complained about the amount of effort circles required.

While we did not directly ask participants to explain how circles worked, in talking about their use of circles, they were overwhelmingly able to articulate correct understanding (12/15 and 9/12) as they discussed how they could control incoming posts and outgoing information flows to their different groups of connections. Five other participants did not seem confused by how circles worked, but saw little need for them and thus had limited comments about their use. One participant, *P19*, was clearly confused. She made several posts to her Google+ stream with the expectation that she had made those posts public. When we discussed each of the posts with her, we determined that she had not actually shared these posts to a public audience. Additionally, she mentioned that she noticed people she did not know in her friends circle and had no recollection of how they were added.

Participants expressed a variety of reasons for liking circles. The most pronounced reason was increased information control, a clean interface, and having asynchronous relationships. We asked the participants to express dislikes about Google+ circles and the only dislike that was common between multiple participants was the lack of a private communication mechanism. Unlike Facebook, there is no separate feature to send a private message to someone. Some participants mentioned that the unidirectional relationships could be confusing, but for the most part participants seemed to understand them. Participants also indicated that unidirectional relations seemed more lightweight and experienced less pressure than “friending” on Facebook.

Interestingly a few participants (4/15 and 0/12) expressed concerns about users (including themselves) being able to infer how they were classified.

*P3: “...they post stuff all the time ... we transition over to Google+ and all of the sudden they’re posting like maybe once a week, you’re thinking to yourself, what circle am I in that before they were posting a lot, and now I’m not getting anything? ... So, am I in the circle that’s old friends? ... What am I?”*

Participants thought users might inadvertently learn that they did not receive a message someone else did or discover the message by monitoring traffic across social network sites. They imagined that those users would then be able to infer which circles they were placed in.

Most of our participants (10/15 and 9/12) deliberately used Google+ circles to post to different groups of friends, and two more mentioned the concept but had not actually done so yet. For example,

*P14: “I have a lot of SEO friends at work and I find an interesting SEO vulnerability I want to share with them. I would never post it on Facebook because 90% of my friends would be like, what is SEO? I don’t care, why are you telling me this? So Google+, I’m a lot more likely to share more information with a limited group based on their expectations of me.”*

These participants are using Google+ circles to selectively control information by making sure they are posting to an appropriate audience. This represents a desire to control information for the purpose of posting appropriate, but not necessarily private, messages. Kairam et al. also mention “relevance” as one of the major factors Google+ users consider in sharing behavior [8]. We additionally noted participants (5/15 and 1/12) commenting on using circles to control information for privacy purposes, such as one participant *P12* who mentioned not posting to everyone a message that she was leaving town because of fear that too many people might know her house would be empty. However, despite such a large number of participants who embraced the idea of circles and liked them, a number of participants (5/15 and 3/12) reported only rarely using them to selectively post content.

Google+ circles also provide the ability for users to easily control their incoming stream of posts on the social network site. The stream controls allow a user to instantly switch from an aggregated stream to a specific circles stream. Less than half of participants (5/15 and 5/12) reported using circles specifically for the purpose of filtering their incoming stream. One reason this use may be rather low is the large number of complaints received by participants about a lack of users on the site, resulting in a “wasteland” of few stream posts.

Finally, we asked participants about whether they noticed and understood the indication on each post, sent or received, that indicates the sharing level. Posts are labeled as *Public*, *Extended Circles*, or *Limited*. If a received post is *Limited*, the user can click on the label and see how many people the post is shared with, and up to 21 photos of those users. On their own posts, they can see the entire list of people the post was shared with. This allows users to review who they shared information with, and gives an indication as to who may see any comments they make on received posts. Most users had never noticed this feature (8/15 and 10/12). When

reviewing previous posts during the interview, participants occasionally had difficulty remembering which circles they shared with, as the *Limited* label does not divide people into circles.

### 4.3 Commenting/Resharing

Circles are used by the original poster of a message to control the sharing of information. However, through re-sharing and commenting, information can be shared beyond those specified circles. Similar to Facebook, Google+ users can choose to share a post they received with a broader audience. Additionally, users can comment on a post, where those comments are viewable by anyone who can see the original post. When commenting, users can refer to other Google+ users with *+Name* notation, which then additionally shares the post with that person. We asked participants about their understanding of resharing and commenting to see whether or not they understood the implications and ever took them into consideration when sharing and consuming information.

Google+ does provide a *Lock this post* feature restricting resharing as shown in Figure 3, however none of our participants mentioned this feature when discussing how they post content. It appears this feature is not particularly visible and it is not clear many users are aware of it. Google+ also supports social constraints on re-sharing, by providing a warning dialog to users who re-share a post originally intended for a limited audience. The dialog advises the user that the post was originally limited and that the user should be thoughtful about who it is re-shared with.

We asked the participants questions about their understanding regarding information flows and comments. About half (8/15 and 6/12) of participants were able to correctly describe who could see comments to their own posts or comments they added to others' posts. For example, after thinking long and hard, this participant incorrectly decided the comments could be seen by his friends list as well:

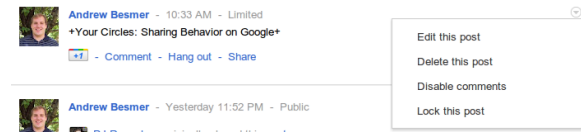
*P21: “[11 second pause] Anyone on both of my friends list. So anyone on their friends list maybe can see them and then anyone on my friends list could see them.”*

We considered the correct response to be the original post privacy settings. However, a more accurate response would include some knowledge of the potential that others may be added via the *+Name* functionality. None of the participants acknowledged the possibility of expanding access to a post by friends who have added additional people in comments.

Thus, while participants in general had accurate mental models of sharing with circles, the spread of information beyond those circles is not normally considered, still seems confusing and may additionally limit the extent to which information is targeted or restricted from certain groups of people.

## 5. DISCUSSION

The most common use of circles was not to restrict private information from certain groups of people, but was instead to direct information to those who would be most interested. While participants commented on the potential for both types of use, they overwhelmingly used circles to target information to appropriate audiences who they wanted



**Figure 3: Per post controls located on both the profile page and stream.**

to pay attention to it. A common pattern of the thought process for a post was to determine if the information was something they were comfortable with being online at all, and then who the appropriate audience was for that information, where circles were then considered.

*P18: “Like I said.. I usually take into mind who my target audience is, but at the same time, I do assume that people who it is not directly directed to are going to see it. I may change my wording on certain things or make a post more a vague or more specific. Because of that I assume that it is going to be seen by people outside the intended audience.”*

Thus, despite being able to share with only certain audiences, some participants still posted information with the expectation that the content could possibly be seen by everybody. This may be because of, or influence, the reasons for posting content on Google+. For example, Kairam et al. note that 59% of their survey participants reported sharing a particular post because it had value, such as being topically interesting, versus only 26% that was information about the self [8].

Participants also commented on the use of circles to help filter incoming feeds to pay attention to groups of people they most care about. Many participants compared this approach against Facebook’s “firehose” of feeds, where they felt overwhelmed by information that is too often irrelevant and annoying. Thus, circles may help users better control their feeds to perhaps improve the quality of the communication between people, but may not influence people to post more sensitive or personal information restricted to smaller groups of people.

However, despite the overwhelmingly positive perceptions of circles, there was still only moderate use of them. Many participants stated they had used whatever default settings were available when sharing and viewing posts, or just simply shared to all circles. There are several reasons for this low usage. The biggest reason is the lack of critical mass in people and activity on the site. Every participant commented on the lack of other users on the site, and that most of their friends were not yet using Google+. This was further evident in most participants stating that while they check Facebook everyday, most check Google+ only once or twice a week. Thus, users made few posts and received few in return, reducing the opportunity to utilize circles. In addition, since the connections on Google+ were only a subset of the user’s online social network, the site itself already presented the user with a focused audience for their posts, perhaps reducing the need for further customization. For example,

*P2: “So, if I post on Google+ it’s for everybody and right now because a lot of the people that are*

*on Google+ are my technical friends from my electrical engineering program or computer science.”*

Almost all users stated that they anticipated they would grow their circles and utilize them more frequently as the site scaled up. Participants indicated an expectation that people would use circles and this might result in more thoughtful posts on the site, as opposed to Facebook, where people just “throw it out there and see what sticks.”

Another factor that may impact circle use is that some users may just not see the need. Many users have grown accustomed to the social norm on other sites of sharing with all friends, and have already developed strategies of not posting problematic or very private content at all. Some participants (5/15 and 3/12) continued to use this strategy on Google+ by simply posting to all their circles. P<sub>4</sub> responded to a question about the process she used to post messages:

*P<sub>4</sub>: “So, it looks like I just shared it with everybody. Because I think it’s going to be the same thing. I think it’s going to be the same thing with Facebook. It’s like, I don’t feel comfortable posting things that I’m not comfortable with everybody seeing.”*

However, these desires may be influenced by the social norms of other sites, and may change if new social norms develop with the added capabilities. Other participants did indicate a certain perception that because circles were such an important part of the site, they should take more care of the posts they make and target audiences. In addition to these social norms, users may also choose to limit their use of circles because they are posting the same content on multiple online social networks. Previous research demonstrates users struggle to manage privacy on Facebook [16] and thus may not bother to use Google+ circles because cross-posted content is already shared with a large audience.

A final factor in the limited use of circles may still be the effort involved in maintaining circles and choosing circles for targeting posts. Google+ does seem to have significantly reduced the effort required to configure and use circles in comparison to Facebook’s friend lists (at least the previous version). Even though Google+’s interface reduced effort, we still encountered participants (4/15 and 3/12) who reported that the amount of effort to use circles was still too large. For example:

*P<sub>3</sub>: “I used to try and manage it, but it was a lot to think about, like because I felt like I was missing some... Do I post to friends? Do I post to family? But what if friends are in family category too? It just kind of got confusing so I just started posting to everyone under friends right now.”*

This participant estimated that she previously created 10 distinct circles to categorize her friends. After she decided it was too much effort to manage, she went back and moved all of her friends to a single circle and deleted the remaining circles. This behavior presents some interesting questions regarding the amount of mental effort required for managing information flows to groups of friends and if this effort might be excessive. In other words, even under the most favorable usability conditions, would some people consider

it too much additional effort to selectively manage friend groups and choose which groups to post to? This also reflects the conclusion of Kelley et al. that static friend groups may not adequately handle certain privacy decisions [10]. If so, friend grouping features like circles will only ever have limited impact on privacy and sharing behavior in social network sites.

## 5.1 Potential Unintended Disclosure

Users reported a sense of trust in Google, and liked the clean, easy to use interface of Google+, in contrast with the cluttered, annoying, and ever changing interface of Facebook. However, this trust and satisfaction could be eroded because of breaches in privacy from unanticipated sharing. And, if users do trust circles to selectively share more private information, those breaches may be more serious than similar breaches on other social network sites where users expect more public sharing. In addition, a loss of trust in Google does not just impact this one site, but potentially the entire set of Google products. Several participants expressed such a fear of privacy problems due to how much of their lives were on Google.

We have identified two areas where such privacy breaches may be likely to occur: resharing and commenting. Resharing is a popular and useful feature of many online social network sites. However, the ability to re-share posts presents two potential privacy issues. The first problem is non-repudiation—the system’s ability to definitively verify the originator’s identity of the post when someone decides to re-share that information. If unintended resharing occurs, the post remains re-shared and accredited to the originator even if they delete the original post.

The second is distribution potential. It is relatively easy to re-share content with a much larger audience than the original poster intended. This could be more problematic for users who have re-purposed streams to circumnavigate the lack of private messaging. While Google+ does provide controls to prevent re-sharing, it is not clear how noticeable those controls are. Instead, social constraints are more likely to limit re-sharing. Privacy mechanisms that rely on social constraints are beginning to be studied and early findings are positive, but also suggest that they can fail when there is little perceived reason to protect the content or there is a weak social connection between people [2].

A final source of potential unintended disclosures may arise from the challenges of keeping track of who is in what circle. Circles will grow organically, and if users are already complaining about the effort of categorizing people, they are unlikely to re-structure very often as their social network grows. They may inadequately place people, or forget who is where [10], and thus share with unintended people. However, while users did appreciate the ability to target information, many still behaved cautiously and perceived that information online could be shared with a broad and public audience. Thus, users may be less likely to be bothered by unintended sharing if they post in this manner.

## 5.2 Design Implications

Google+ has implemented good privacy control mechanisms for controlling the flows of information. Overall, our study indicates that these mechanisms are adequate and understandable for allowing the user to control incoming and outgoing messages. One interesting result of our study is



that users, even those who utilized circles, continued to perceive that they should not post information on a social network site that is still too personal or private. They did not seem to trust that their information on social network sites was protected. If the goal is to allow for more intimate and personal information sharing among people, the site may need to provide additional ways for users to build trust in how their information is shared and protected from those they do not wish to see it.

Additionally, there are several other improvements suggested by our study results.

- **Increased Awareness of Extended Sharing** - As discussed above, participants did not understand resharing and commenting, and how it can extend the post's original audience. The visibility of that expansion could be improved to provide a clearer mental model of the overall audience. While users are notified when a post is shared or commented on, the new audience from that is still unclear. Currently, the poster would have to notice that the people in the audience has grown by clicking on the *Limited* label of their own posts and viewing the list of users. However, this may be a relatively small problem since the main use of circles on Google+ is not restricting and hiding information, but appropriate sharing to interested people.
- **Increase Visibility of Fine-Grained Controls** - Figure 3 shows the drop down menu that enables the user to control what other Google+ users can do with that post. Users can view the audience of the post, disable resharing and prevent commenting. None of our participants mentioned using these features, and only one third of our participants (6/15 and 3/12) had previously noticed the *Limited* or *Public* labels next to each post. These features could be made more prominent on the user's own profile, and matched to their context of use. For example, the *Limited* feature only provides users with a list of all other users who can view that post, rather than the circles it was shared with. This makes it difficult to recall how it was shared, and to notice if users can now view it who are outside any of their circles.
- **Make modifying audiences easier** - While users are given the ability to edit the content of a post, they can not adjust who it is shared with. To limit a previous post, users must delete the post and manually repost it with new circle settings. To expand the audience, they can manually re-post or re-share their own post. In fact, we observed *P19* re-share all her own posts to reflect the desire to share publicly instead of with *My Circles* as she had done previously.

## 6. CONCLUSION

This study offers insight into the behavior of Google+ users and how they use group-based sharing. We found participants had strong positive attitudes towards using circles and generally understood the intended purpose of them. However, much of the use of circles was not to protect disclosures from certain people, but to increase the relevance of posting to people. Thus, users are still treating information they post as relatively public. While this may decrease the likelihood of accidentally oversharing, this also means

that users will continue to experience the issues from self-censoring, such as the inability to more deeply connect to close friends.

Also, despite user understanding, we still saw a disconnect in users' stated desires and behavior. While Google+ lowered the level of effort required to interact in contextually appropriate ways, many continued using strategies for privacy management they had formed by using Facebook and simply posted to all circles. In addition, some participants found that circle use increased the mental demand required for social network interaction. Similar to previous studies, the increased effort lead some of our participants to bypass the privacy mechanisms. In the case of this study, this meant collapsing friends into a single circle. Thus, Google+ users are not yet taking full advantage of the capabilities provided by circles for greater control over information flow. However, these results are also heavily influenced by the overall lack of people and activity on the site, which may have reduced the need for the use of circles. Yet, if site usage grows and users add more connections, the burden of managing circles is also likely to grow.

Additionally, while users understood circles there was still a general lack of understanding and concern about how information may spread beyond the intended audience through commenting and resharing. This may, in turn, lead to privacy breaches which reduce trust in the site and the positive impact of circles.

Google+ offers an interesting case study in providing users with a strongly desired feature—namely the ability to control how information is shared with different groups of friends. And indeed, our early adopters almost universally appreciated and liked this feature. Yet our results open some very interesting research questions. How much effort will it take to manage all the groups in a user's large social network? How much effort are users willing to put towards organizing their groups and what are their strategies for reducing that effort? Will users utilize group-based sharing to share more sensitive and intimate information to select people, or will they continue the self-censoring and careful posting behaviors found on other sites? All of this leading to the ultimate question of how can sites be designed to allow people to flexibly share and interact based on their social context? Our results indicate that circles is an important mechanism for social network site users and a step in the right direction, and the new emphasis on group based sharing features will enable additional exploration into their real-world use and impact.

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## APPENDIX

### A. INTERVIEW QUESTIONS

#### A.1 Demographics

- What's your occupation?
- What state do you live in?
- How old are you?
- Which social networking sites do you use?
- How often do you use each?
- How technical are you on scale from 1-10 where 10 is very technical?
- How long have you been using Google+?

#### A.2 Reasons for use

- ‡ Why did you join Facebook?
- ‡ How are you using Facebook?
- Why did you join G+?
- How are you using G+?

#### A.3 Comparison

- How would you compare Google+ to Facebook?
- ‡ What do you like about each?
- ‡ What do you dislike about each?
- ‡ Any concerns using Facebook?
- Any concerns using Google+?
- ‡ Do you plan on using both or keeping just one?
  - If converting to one:
    - \* Which one are you switching to?
    - \* Why are you keeping this one?
    - \* What strategy are you using?

#### A.4 Interactive

§ [Ask the participant to create a post about this interview experience and think aloud but stop her before she actually posts]

- § What did you write?
- § Who did you share it with?
- § Why did you decide to share it with them?

#### A.5 Managing Information Flow

§ [Ask the participant to review their last few posts.] Lets talk about the first post.

##### A.5.1 Post Questions

- § What is the post about?
- § Why did you decide to share that?
- § Do you recall anything about posting this that stands out in your mind?
- § What circles did you share this post with?
  - § Why did you share it with that circle/those circles? OR
  - § Why did you chose not to use any circles?

§ Ok. Lets talk about the second post on that screen. [Back to A.5.1]

§ Alright and how about the third post? [Back to A.5.1]

‡1st participant set only

§2nd participant set only

##### A.5.2 Profile/Circle Questions

- How are you managing your profile on Google+?
- How is this the same or different from how you manage your Facebook profile?
- What has your experience with circles been like?
  - How many do you have?
  - What names did you give them?
  - How many people are in each?
  - How did you select which person would go into each circle?
  - Are there any people in multiple circles? Why did you put them there?
- When you have very different social circles in your network that have different expectations of you, how do you handle this?
- Take a moment to think about how you manage what personal information you share about yourself on Google+ and try to describe how you manage sharing your personal information?
- How about personal information others share about you? How does this differ from Facebook?
- As Google+ scales up how do you envision your management of circles changing?
- Walk me through what you do when you make a post on Google+.
- How does this differ from Facebook?
- Do you use Facebook friend lists?
  - If so, how?
  - What do you think of them?

#### A.6 Audience understanding

- Have you ever noticed the word limited or public next to a post in your stream on Google+?
  - Have you ever explored it to see who an item was shared with? Why?/Why not?
  - What you think about the feature?
- When you write a post to a stream on Google+ and someone else comments on it who can see those comments?
- When you comment on another persons post in the stream on Google+, who do you think can see your comment?

#### A.7 Hangouts

- ‡ Have you used Hangouts?
  - Why/why not?
  - If yes, whats your experience been?
  - What do you like about it?
  - Dislike?
  - Any concerns using it?
- ‡ What types of people have you hung out with?
- ‡ What kinds of things are you doing with it?