

# Circles: An Online Platform Facilitating Social Connection Among Older Adults

## Problem Statement/Research Question and Background

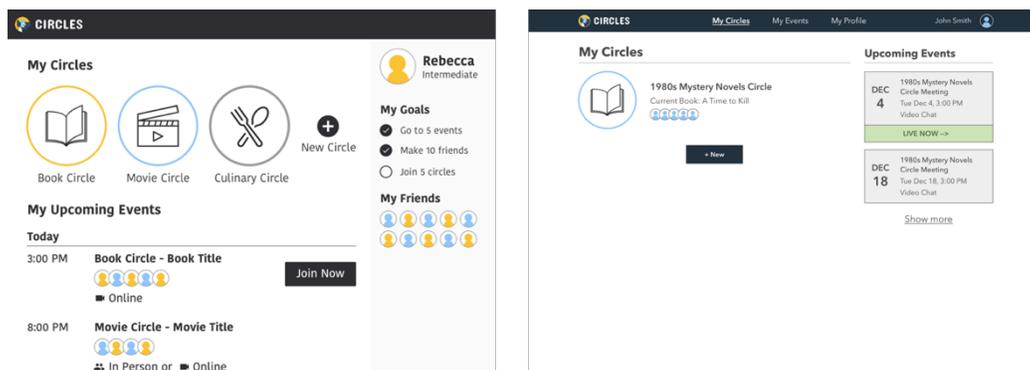
It is expected that by 2036, a quarter of Canada's population will be over the age of 65 [1]. As a result, significant effort is being invested to help older adults live happier and healthier lives, which is better for them, their families, and the healthcare system as a whole. One very important factor in aging well is to maintain a sense of engagement and purpose in life [2]. This is of critical importance because it has been shown that isolation and loneliness are associated with significant decreases in both physical and cognitive abilities as well as a 45% greater risk of death [3]. The most effective way of preventing loneliness and its associated declines in health is to engage in interesting and engaging social activities on a regular basis [4][5]. There are currently many different types of social programs aimed specifically at helping older adults maintain social connections, such as community dining, dancing, book clubs, and group excursions among many others. The design team interviewed a series of older adults, community organizations that run these types of activities, and physicians to understand how they could be improved. It was found that while these activities can be highly effective and very popular, their biggest challenge is that they require participation in person. This becomes very difficult for some older adults who are unable to leave their homes for reasons such as a lack of transportation or funds for transportation, not wanting to go out in inclement weather, living in rural areas far from activities, and having to stay home to care for a partner with more health challenges. Accessing these programs is easy for older adults living in retirement or assisted living homes; however, these facilities can be prohibitively expensive for a large portion of the population and many older adults prefer to stay in their own homes for as long as possible. This project investigates how technology can be leveraged to improve social engagement among older adults living at home who are unable or unwilling to leave their homes to participate in social activities with the ultimate goal of reducing isolation and loneliness in the target population. The target user group is limited to those who have either a computer or tablet and have high-speed internet access at home.

## Methods/Approach/Solutions Considered

To better understand the problem space, the design team spoke with experts at Waterloo Home Support Services and SPRINT Senior Care to understand the challenges of running social programs in Ontario. Many of the most successful programs have been groups focused on specific topics or interests in which participants have been able to connect on shared interest. This information coupled with a literature review allowed the team to develop a series of user requirements and engineering constraints. A competitive analysis was then performed to understand how others had tried to solve this problem previously. The most direct competitors are Stitch[6] and Grandpad[7] with video products such as Zoom, Google Meet, and FaceTime able to help older adults connect with each other. Stitch is a social network that "lets adults over 50 meet companions both locally and globally"[6] and Grandpad is a tablet designed

specifically for older adults to help them connect with loved ones[7]. Neither of these products allow users to connect in truly meaningful ways to their peers. A key requirement of Circles is that users connect as close to face-to-face as possible without leaving their homes since face-to-face is the gold standard for social interactions. To accomplish this, it was clear that circles had to use video call technology with an interface that put the focus on the conversation and connections between participants. From here, the team decided that a platform to support small group video discussions focused on specific topics such as book clubs, TV show clubs, current events discussions, and even caregiver support and bereavement groups was the best path forward.

Two sets of heuristics, “Design Principles to Accommodate Older Adults”[8] and “7p/45g”[9], were found and referenced throughout the design process to ensure that the solution would work for older adults. This includes best practices such as using sans-serif large font and black on white text. An initial set of sketches and wireframes were developed based upon the requirements and constraints. The team used a participatory design process because it is a “human-centered approach advocating active user and stakeholder engagement throughout all phases of the research and design process” [10]. Prototypes, such as those seen in Figure 1, were shown early and often to older adults and stakeholders to gain feedback, which was then incorporated back into further versions of the prototype.



**Figure 1: Circles Iterations 1(left) and 2(right)**

Figure 1 shows how the design evolved to be less confusing by having a static navigation bar and a very clearly designated areas on the screen for different types of information. Following the second iteration of the prototype, feedback was gathered from expert interviews at SPRINT Senior Care and a focus group with Bits & Bytes computer club to be incorporated into the final iteration. A thorough heuristic evaluation based upon the 7p/45g principles identified earlier was undertaken to improve usability before formal user testing. Changes were made to the overall layout and navigational flow as well as to the font size and overall colour scheme to optimize readability. The results of this final iteration are shown in figure 2.

## Description of the Final Approach and Design

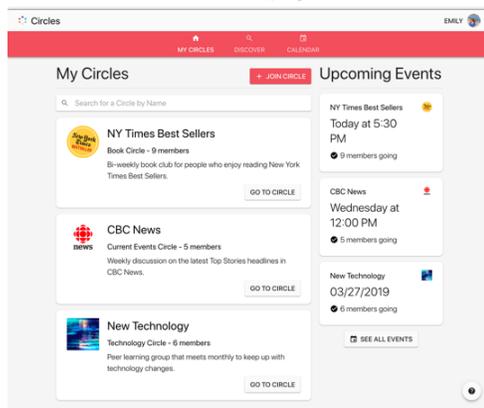
Circles is a web-based online platform for older to discover and engage in small-group, semi structured video discussions. While it is expected that many different types of activities would

ultimately be developed such as book clubs, TV clubs, current events discussions, bereavement, and caregiver support groups, the prototype focussed on book clubs due to time restrictions. Users log into Circles using either Google or Facebook. Each user can build a unique profile for other users to see and to help Circles suggest new groups to join. The home page (figure 3A) shows the list of circles that a user is a part of with information about the circle. A list of upcoming events is shown on the right side of the screen to ensure that users know when their next meetings are and what the topics are.

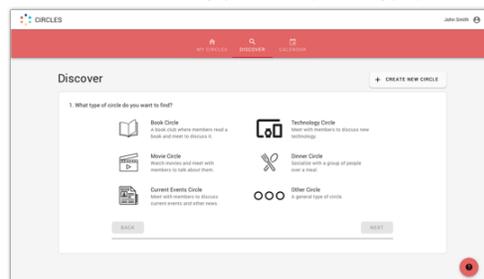
To find new circles to join, users use the “Discover” tab and can select the type of circle they are looking for (figure 2B.1) and input information on their interests. In the case of book clubs, users select the genre of book they are interested in and input their availability. Circles then display the groups matching their preferences (figure 2B.2). Groups can be previewed to see how often they meet, who the members are and their public profiles, the group description, the current book, and past topics.

Once in a circle, users can see when the next meeting is and what the topic is as well as any preparation they should do before the call. A discussion board is available for members to interact between calls. When it is time for the meeting, users receive a reminder call or text before the scheduled time prompting them to login to Circles. Once inside the call (figure 2C), the videos take the majority of the screen because they are the most important aspect. In the top right, there is an activity area that can have questions, pictures, videos, and live polls to help guide the discussion. This is setup before the call by the organizer depending on the activity type. In the bottom right, there is a list of participants and a chat to help troubleshoot any technical issues or share information between users.

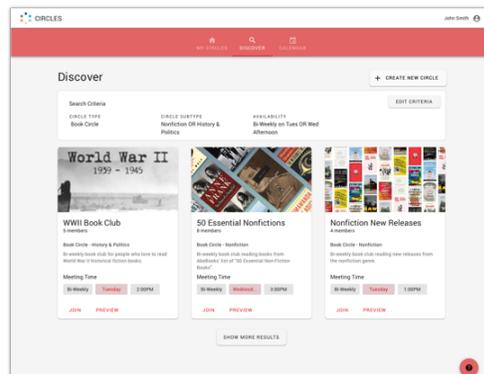
A. Home page



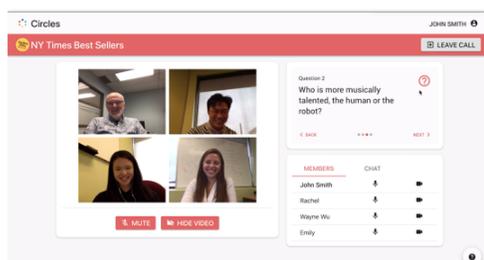
B.1 Discovery process (circle type)



B.2 Discovery process (results)



C. In-call screen



**Figure 2: Circles interface for a. home page, b. discovery, and c. in-call.**

## Outcome

Following the participatory design approach, every iteration of the design solution was shown to users and industry experts to collect feedback and evaluate the usability of the interface. In the early stages of the project, wireframes were shown to various stakeholders in walkthrough sessions and qualitative feedback was collected to assess the designs. Feedback was very positive overall, with all stakeholders validating that Circles was a good idea and it could easily be extended to support a wide variety of activities like communal eating, bereavement groups, and caregiver support groups. In terms of usability, many users reinforced the importance of keeping the product simple and consistent, with clear paths for important actions. Dr. Jenny Hsueh, a primary care physician specializing in the care of older adults in the community, recommended implementing a notification system that calls users to remind them of circle meetings. Once synthesized, the insights gathered in these feedback sessions were incorporated in the solution in subsequent design iterations.

In the third iteration of the project, a high-fidelity prototype of Circles was presented to a group of older adults at the Bits and Bytes computer club in Kitchener. The session was run as a focus group during which participants asked questions, provided feedback, and discussed Circles throughout a live walkthrough. Many older adults commented that the idea had tremendous potential, but some details in the interface could be improved to be more usable. Key topics of discussion were the need for a means of communication between Circle meetings, the role of a Circle organizer, the layout of the in-call screen, and the legibility of the text and buttons.

The fourth design iteration was tested most thoroughly to assess the usability of the interface. Prior to each testing session, participants were provided a short story to read. During each session, participants were asked to think-aloud as they completed a variety of tasks in the system like joining a new circle, reviewing the details of a circle, and joining a video call. In the video call, participants were given the opportunity to discuss the short story with members of the design team for 15-20 minutes. Afterwards, participants assessed Circles using the standardized System Usability Scale (SUS) questionnaire and a set of open-ended questions about their experience. Six older adults participated in testing either in-person or remotely.

The mean overall SUS score was calculated to be 67.9 (std. dev = 26.3), whereas the benchmark established by Sauro and Lewis for Web interfaces is 67.0 (std. dev = 13.4) [11]. Additionally, the mean usable and learnable sub-scale scores were calculated to be 70.8 (std. dev = 22.2) and 56.25 (std. dev = 47.3), respectively. These results indicate that the overall system usability is satisfactory, however the learnability of the solution could be improved. The variance of each score was also very high, which indicates a large discrepancy between how usable older adults with varying levels of technical ability found the system. Ideally, the variance of the scores would be reduced, suggesting that more design iterations are required to make the solution more usable for older adults with less technical literacy.

In terms of general feedback, the older adults who tested the prototype were very impressed by Circles, despite the usability concerns. The unanimous sentiment expressed by participants was the feeling that Circles supported organic interactions. Some of the comments shared were:

- “It’s interesting. It opens up a world of conversation with people. It’s great to have faces in front of you and it’s more human than talking on the phone or by email.”
- “The highlight was the discussion. The ability to dialogue, see expressions, see someone, detect if [someone has a reaction]. Wow, that’s real. That’s very real.”
- “It’s nice to know that people are working on a product like this. It’s a nice idea to help people talk to each other and stay social.”

Overall, these reactions validate the direction in which Circles is heading. If the usability of the solution can be improved in future design iterations, Circles has the possibility of reducing social isolation.

## Cost

Circles is a software solution and relies on existing technology owned by the user to help minimize the cost to the user. The main ongoing costs of the project are the hosting fees for the webapp, video cost through Twilio, and developer time. Starting with hosting fees, Circles is currently hosted on Digital Ocean on a very basic plan. If the product were to be launched, it would have to move to a more powerful virtual machine. Based upon current usage, it is expected that the 16GB 6 vCPU Standard Droplet could support a minimum of 1000 users at a total cost of \$USD 80/month. Circles uses Google Firebase for user and data management. The prototype uses the free version; however, the functional application would have to upgrade to the “Flame” plan at a cost of \$USD25/month. This cost would be spread between all users leading to a fixed cost of \$USD105/month.

Twilio is used to handle all video and audio during the call, the in-call chat, and reminder calls before the meeting. Assuming each user participated in 2 circles that meet twice per month for one hour, the video cost per user is \$USD2.40/month. Chat is charged at a rate of \$USD0.02/month and \$USD0.0008/message. The focus of Circles is on the video aspect, so it is expected that chat use would be very low. Assuming each user sends 10 messages per meeting, the total cost per user would be \$USD0.06/month. Finally, each reminder call would last approximately 30 seconds. The cost of making 4 reminder calls per user would be \$USD0.03/month. The variable cost for each user would then be \$USD2.49/month. Because of the community aspect of Circles, it must reach a certain critical mass of users to ensure that there are a sufficient number of different groups to match most users’ interests. For simplicity, we will assume that this number is 1000 users although more research is required to determine the actual critical number of users. With 1000 users, the total cost per user is \$USD2.60/month, which is approximately \$CAD3.40/month.

Circles is currently developed by a group of university students as a project. If it were launched, Circles would require a full-time software developer to ensure that new features are delivered

consistently and address bugs as they arise. It is expected that this maintenance could be performed by one FTE with the support of the project team. The approximate salary of an entry-level software developer in Toronto is \$75,000 per year. Circles would also require a full-time support analyst to help users learn to the tool and address issues as they arise. The approximate salary of a support analyst in Toronto is around \$60,000. Adding these fixed costs and spreading over 1000 users results in a monthly cost per user of approximately \$CAD14.65/month. This cost is an approximate figure due to the uncertainty in number of users and exact development and support requirements. More users would result in a significantly lower cost. If Circles were to be fully launched, more analysis would be required to determine a more accurate cost estimation.

Due to the ongoing cost associated with running Circles and the type of service provided, it would be run as a subscription model. Based upon the cost data, for Circles to be self sufficient it would have to cost at least \$14.99/month. This is on par with other subscription entertainment services such as Netflix(\$9.99-\$16.99), Spotify(\$9.99-\$14.99), Apple Music(\$9.99-\$14.99), and the video conferencing system Zoom(\$14.99-\$19.99). The most significant challenge related to pricing is determining how users would pay for Circles. User interviews have revealed that many older adults do not trust inputting their credit card information online. This could be addressed by either selling subscriptions through community partners or marketing to the children of older adults too sign their parents up for Circles.

## Significance

The goal of Circles is to help reduce social isolation and loneliness in older adults living at home. The link between loneliness and increased morbidity and decreased quality of life has been established by many studies [3][4][5][12]. Beyond quality of life reductions, in a 2012 study in with 43% of participants reported feeling lonely, isolation was “associated with all outcome measures,” resulting in decline in ADL, difficulties with upper extremity tasks, decline in mobility, difficulty climbing, and a 45% increased risk of death [3]. A reduction in loneliness has the possibility of significantly improving the lives and health of its users. As with any tool for social engagements, Circles will not be the ideal solution for all older adults but does have the possibility of improving the lives of at least some.

There can be significant inequality in access to services for older adults, with those living in cities or retirement homes having access to significantly more programming. This forces older adults who are unable to pay for services to miss out on the benefits. Circles requires only a computer and internet connection to use, reducing inequality in access to social programs. There is still a group without access to high-speed internet who will not be able to take advantage of the benefits provided by Circles; however, it is the team’s view that any action to reduce inequality in access to services is a positive even if it is not perfect. Isolation can be present for many reasons including caregivers who cannot leave their partners at home or are struggling after losing a partner or friend. Circles has the possibility of helping reduce social isolation due to a wide variety of causes.

## Acknowledgements

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