AGE-WELL Demos

1. **3-D Finger Trajectory Tracking, Modelling and Visualizing Tool for Accessible Touchscreen Interface for Older Adults**  
   *presented by Afroza Sultana, McGill University*

   The majority of older adults encounter difficulties to select targets, while interacting with touchscreen devices (e.g., tablets, smartphones). Finger trajectory analysis from touch interaction can help to understand the reasons behind such difficulties. One major obstacle is that commercial touchscreen devices can capture touch-interaction data when the finger is in contact with the screen, but not when the finger is in the air. To address this gap, we developed a novel finger trajectory tracking, modeling and visualizing tool that can collect finger-interaction data from a device that is equipped with motion sensors and cameras. Then, this data is integrated with the selection endpoint data collected from the touchscreen devices. The integrated data is then modeled to visualize the entire finger trajectory from touch-interaction for further analysis. This tool will be applied to improve the accessibility of older adults with any touchscreen devices.

2. **Braze Mobility**  
   *presented by Graham Browning, Braze Mobility*

   Braze Mobility is an AGE-WELL supported start-up that has successfully launched commercial products aimed at enhancing users’ access to safe and independent mobility. Our sensor systems are aftermarket retrofits for mobility devices like wheelchairs that alert the users to obstacles around the chair, and aid in maneuvering tight or unfamiliar spaces. Feedback is delivered with any of audio, visual, or vibration feedback modules. The systems are modular, expandable, and customizable such that from user to user, the experience can be modified to optimally suit their needs. We have several products in development and production and are eager to demonstrate our new and existing capabilities.

3. **Centivizers for Activation**  
   *presented by Mark Chignell, University of Toronto*

   We will show our latest product prototypes. The Centivizer Traveller consists of an elder-friendly driving simulator with built in travel experiences (360 degree videos) that can be explored using the steering wheel. The Centivizer Traveller demo will include the use of NFC figurines that can be used to switch easily between different travel videos (e.g. a gondola figurine goes to Venice and a helicopter figuring goes to a helicopter tour over Manhattan). We will show a serious game for cognitive assessment that is implemented on a tablet that has overlaid mechanical buttons to make playing the game easier for older people including people with dementia. We will also show research results on how the serious game predicts response inhibition ability, MMSE scores, and the presence or risk of delirium. We will also show a prototype chat bot that provides information, simple conversation, and manages communication with the family.

4. **CoPILOT Shared Control Powered Wheelchair**  
   *presented by Emma Smith, University of British Columbia*

   CoPILOT is a remote operated shared control system which allows a trainer to adjust a powered wheelchair’s speed and direction. We are currently evaluating CoPILOT as a training tool for new
powered wheelchair users in residential care who experience memory loss or difficulty learning. Individuals with cognitive limitations which impact memory and learning are often believed to have lost capacity to learn new skills, and are not considered for powered mobility. As a result, they may have limited independence, and experience declines in well-being and quality of life. Shared control allows trainers to use techniques which are more suited to this population, including errorless learning strategies. In this demo, attendees will have the opportunity to try ‘drive’ the CoPILOT system, and learn about the potential benefits of training using a shared control approach.

5. **DataDay: Co-Creating a Mobile Self-Management App for People with Dementia**  
*presented by Parminder Flora, Ontario Shores for Mental Health Sciences*

DataDay is a novel, innovative health behaviour self-management application (app) for people with dementia. This evidence-based app promotes quality of life, putting users in the driver’s seat for monitoring their own health. Users can track their health behaviours (physical activity, diet, mood, and cognition) and share their data with their healthcare providers. This tool addresses an important gap about patients’ health behaviours between doctor’s visits. This unique app was co-created by people with dementia for people with dementia, taking into account the unique needs and preferences of this user group. This is one of the first tools that targets the needs of people with dementia and will complement existing tools that target family caregiver needs. The app will be unveiled at AGE-WELL 2018 Drinks & Demos reception, where we will engage with peers to discuss the prototype. The finalized app will be deployed in memory clinics serving people with dementia.

6. **Demonstration of an Internet-based Intervention for Mobility Assistive Technology Users and Caregivers “MOvIT+”**  
*presented by Zineb Alliche, Centre de recherche interdisciplinaire en réadaptation du Montréal métropolitain CRIR*

MOvIT+TM is an Internet-based intervention developed to offer remote monitoring, training and support to older adults users of assistive technology (AT) and their caregivers. This hands-on demonstration will show the different steps of the intervention. The demonstration begins with user/caregiver registration, moves to the automated registration confirmation call, followed by the AT use and satisfaction questionnaire which is administered by interactive voice response system, web form or SMS. The last component is the demonstration of the clinical alerts and remote support (e.g., information/training videos, documents, and online exercises that address the issues identified). Attendees will see how clinicians are able to follow up the user and caregiver by consulting questionnaire results in order to provide recommendations by email, phone or videoconference to resolve the issues.

7. **Design, development, and usability of an alert system for missing older adults**  
*presented by Christine Daum, University of Alberta*

With increasing prevalence of dementia, is growing demand for strategies to help find older adults who get lost due to memory impairment. Three out of five persons with dementia will wander. Caregivers’ experiences of a missing loved one can be devastating. Most US states fund Silver Alert programs that broadcast information about vulnerable older adults who wander and get lost. While the literature supports community engagement in the search and rescue of lost older adults, publically-funded silver alert programs are associated with jurisdictional issues and alert fatigue. To reduce these limitations, a software platform, Community-ASAP, was developed to trigger alerts of missing older adults to community volunteers that are within specified geographic area(s). To date, Community-ASAP has undergone usability testing In Edmonton and Calgary, and will be evaluated in Coquitlam, B.C. and Toronto, Ontario this fall. In this session, we will
provide a demonstration of the Community-ASAP platform.

8. Exploring interactions of people with dementia through Mixed Reality technologies
   **presented by Shital Desai, Ontario Shores for Mental Health Sciences**

   Mixed Reality technologies could offer functional support to people with dementia to continue doing their everyday activities. We are studying feasibility of these technologies for people with dementia where we observe them playing games with Mixed Reality technologies that link physical and virtual worlds in different ways, i.e. through headsets, screens and physical objects. The observations are followed with an interview about their experience interacting with the Mixed Reality devices. The data will help us to identify which types of interactions and physical virtual integrations are intuitive for people with dementia. We present two Mixed reality technologies that we are exploring for people with dementia. Microsoft HoloLens is a holographic computer enabling augmented reality experience while Osmo integrates physical objects with virtual on iPad or iPhone. We invite the AGE-WELL community to experience the technologies at the drinks and demo session and tell us what you think of these technologies.

9. Famli.net Communications Inc.
   **presented by Maimu Molder, Famli.net Communications**

   Famli.net Communications Inc. is a communications software company dedicated to seniors’ needs. Today’s technology has created a hyper-connected society. Yet 1.1 billion people globally, primarily seniors, suffer from well-documented physical and emotional effects of isolation because they cannot use those technologies. We believe that the single most important contributor to quality of life for seniors is maintaining communication with their loved ones and their care givers. Our mission is to provide seniors with a communication system that overcomes barriers of vision, hearing, motor skills, literacy and minority language challenges. We will showcase our Connections messaging system – developed with University of Toronto TAGlab through intensive field research and user-guided design in five Ontario senior-care institutions. Connections is now being introduced to market in the Greater Toronto Area and will soon be entering field trials in Singapore. Connections is the first communications system that offers text, audio, picture, video and webpage messaging with a Voice-AI Interface that is accessible to people with diverse perceptual, physical, literacy and language challenges -- a “universal messaging system

10. How to strengthen the Spatial Orientation of seniors and those with dementia?
    **presented by Zahra Moussavi, University of Manitoba**

    A new virtual reality exercise that is designed to strengthen the spatial orientation of seniors and those with mild dementia. I will discuss what we learned by running a brain exercises program for seniors in terms of the characteristics that a game must have in order to be effective for seniors.

11. Interactive Web-based Platform of Privacy Laws, and Information and Training Resources in Canada
    **presented by Hajer Chalghoumi, University of Ottawa**

    The AGE-WELL 8.5-CAT project aims to develop a plan to better inform AGE-WELL members on relevant Canadian privacy regulations. This Drinks N’ Demos showcases one major output of this project. It consists of a web-based platform presenting a scan of Canadian privacy laws and related information and training resources relevant to technology developers. The purpose of this platform is to inform AGE-WELL members on the regulations existing in Canada to protect the
privacy of all citizens. The platform was designed to be interactive and engaging to allow individuals to navigate to sections that are of interest to them.

12. **MouvMat: The Interactive Digital Exergaming Surface for Older Adults**  
*presented by Arezoo Talebzadeh, OCAD University*

MouvMat is an interactive digital gaming surface to provide physical activity, cognitive stimulation, and social engagement to older adults. Our systematic review found that existing exergames have potential to improve physical and cognitive health of older adults in nursing homes. However, since these games are not designed for their specific needs and interests, older adults are less likely to engage with these games to achieve the benefits. Uniquely, MouvMat has been co-created with older adults living in nursing homes, along with their healthcare professionals and healthcare administrators. It features illuminating interface and provides visual feedback to older adults during the game. The Players interact directly with the digital surface which display simplified games that are familiar and geared toward older adults. By providing older adults a fun and social way to increase their physical activity, MouvMat optimizes their physical and social health and their ability to age gracefully.

13. **Older Adults as Experts in Technology Research and Development Projects: OA-INVOLVE**  
*resources guiding older adults’ engagement*  
*presented by The OA-Involve Team*

The mandate of OA-INVOLVE is to study engagement methods and develop resources to facilitate older adults’ engagement throughout the process of technology research and development. We continue to address the identified needs of researchers and older adults, and fill literature gaps in our diversified products, encompassing brief practical guides, information-rich animation videos, webinars, and reports. The Drinks & Demos event will allow us to showcase these resources, as well as stimulate discussion about key learnings and experiences regarding the active engagement of older adults as participants, advisors, and co-producers within our project and across the AGE-WELL network. The highlight of the presentation will be the Photovoice project on older adults’ experiences of the AGE-WELL 2017 Conference, created with and co-presented by older adult members of the OA-INVOLVE Older Adult Research Partner Group.

14. **People with Dementia Creating Digital Stories**  
*presented by Yuhan Pan, Ontario Shores for Mental Health Sciences*

Digital Storytelling is a form of active reminiscing that uses digital tools to create a narrative from a person’s life. This process fosters self-expression, positive communication and social connection. This project explored the experience of people with dementia actively participating in the creation of their digital narratives. Twenty participants were recruited from dementia support programs across Canada, Edmonton (n=7), Toronto (n=7), and Vancouver (n=6). At the Toronto site, participants were prompted with images, music and verbal questions to share their stories in weekly one-to-one sessions. Each participant co-created their own digital story video with the researcher, which was later showcased to their family. All participants enjoyed the creative process and the video-viewing experience. This demonstration will showcase a selection of digital stories and a thorough overview of the digital story-making process, providing guidance to interested organizations and individuals.
15. **PhotoFlow: Speech-Enabled Family Picture Browsing and Reminiscence**

*presented by Benett Axtell, University of Toronto*

Sharing memories from family pictures is an enjoyable and important social activity, especially for older adults. Managing these collections, however, is a time-consuming and effortful process. As these collections continue to grow, it is increasingly difficult to simply browse pictures and share memories, especially digitally. Such easy and enjoyable activities, traditionally done with simple photo albums, are split into separate digital processes for storage and reminiscence. We present PhotoFlow, which combines photo organization and oral reminiscence in the same natural way as paper photo albums. Large picture collections are made browsable with automatic speech processing to organize pictures based on the shared oral memories. This browsing uses an intuitive dust and magnet metaphor that leverages the speech processing to locate a meaningful subset of pictures for reminiscence. This novel interaction brings activities of browsing, reminiscing, and organizing pictures back together into a simple, digital, and social process.

16. **PostureCoach LITE**

*presented by Megan Kamachi, University of Toronto*

PostureCoach LITE is a wearable device designed to reduce prevalence of lower back injuries amongst family caregivers. It does this by monitoring the user’s lower back flexion angle and provides immediate vibrotactile and/or auditory feedback when the angle is too high, which is when the user is at a high risk of injury. Motor learning principles state that feedback frequency should be reduced (not constant) to maximize long term retention of a new motor skill. The feedback frequency of PostureCoach LITE is adjustable. This study will determine the optimal feedback frequency for long term retention of safe lifting postures for caregivers.

17. **Posture Shirt by Adrenalease Inc.**

*presented by Noureddin Chahrour, University of Toronto*

Adrenalease Posture Apparel is seamless and adjustable making it easier for the user to comply with wearing our apparel rather than having to put a brace on and take it off every 30 mins. It is patent-pending in 40 countries.

18. **Serious Games Hub : Play, have fun, replay, learn, play again, socialize**

*presented by Pierre-Olivier Dionne, TELUQ*

In this demo, we will present the new Serious Games Hub. People will be invited to play games with our tablet or by installing the games on their mobile device. It will be possible to play alone, in multiplayer mode, or against our artificial intelligence Well-A. Following user tests and the redesign of our marketing plan, we have completely changed the way we access our games. Instead of having one app per game, we went back to the drawing board and proposed a centralized app. This app makes it possible to develop marketing strategies (credit purchases, advertising, weekly challenges, etc.), but above all, to increase the number of seniors and their active participation.

19. **Sharing of a video database of real-life falls in older adults for research and education on falls management and prevention**

*presented by Stephen Robinovitch, Simon Fraser University*

Falls are a major source of morbidity and mortality in older adults. Video footage of real-life falls provides a rich source of information for examining the biomechanical and behavioural contributors to falls in older adults. WP5.2 researchers have amassed a unique collection of videos of real-life falls experienced by older adults in long-term care. To increase the potential of
this evidence to drive improvements in prevention, we are sharing the videos with other researchers through Databrary (databrary.org), a web-based library for open sharing of research videos with a community of authorized investigators. In this demo, I will:
(1) guide researchers in how to become authorized to access the videos in the Databrary library;
(2) describe the nature of sharing and reuse of videos in Databrary;
(3) describe the characteristics of the falls video dataset; and
(4) show several examples of the real-life fall videos included in the database.

20. Steadiwear Inc.

*presented by Mark Elias, Steadiwear & Emile Maamary, Steadiwear*

Steadiwear Inc. caters to the dexterity needs of hand tremor sufferers. We have developed the Steadiglove, a glove that intelligently stabilizes the wrist joint in Essential Tremor and Parkinson’s disease patients using vibration damping technology. This will allow users to go about their daily activities with significantly less negative side effects. Steadiglove is affordable, lightweight, compact and battery-free. Early beta results show 80% amplitude reduction in tremors.

21. TicTacTDR: A digital educational game about transdisciplinary research

*presented by Pia Kontos, Toronto Rehab – UHN; & Mineko Wada, Simon Fraser University*

In this demo we are introducing a new digital educational game developed by the CC3 Transdisciplinary Working team in collaboration with WP4. Entitled “TicTacTDR”, this is a trivia-based game that supports multi-player engagement and enhances learning about and implementation of transdisciplinary research (TDR). Created specifically for AGE-WELL members, it is a great resource for individual learning or as part of training sessions and stakeholder engagement events. This game will be demonstrated during the Drinks N’ Demos session and the CC3 team members will be available to answer any questions and provide guidance on the applications of its use.

22. Two tablet games for older adults

*presented by Louise Sauvé, TELUQ & David Kaufman, Simon Fraser University*

Two games for older adults will be demonstrated here: Solitaire Quiz and TicTacQuiz. Both games can also run on tablets and we will bring two tablets but will also demo the games on a laptop with 17” monitor. These games are ‘frame games’ which means that players must respond to popup questions during the gameplay. The questions are created by the game developers and for this demo will be about various aspects related to Canada.

23. User-centred design of a decision aid to facilitate the cross-cultural adaptation of existing or novel health technologies

*presented by Claudine Auger, Université de Montréal*

Careful consideration is required when introducing health technologies into different cultures to ensure successful adoption and avoid costly mistakes. Based on a user-centred design approach, partakers of this drink and demo session will be asked to provide feedback about the content and format of preliminary wireframe versions of a website mock-up that will facilitate the cross-cultural adaptation of health technologies. Partakers will be asked to indicate their preference for three main approaches to the decision aid: 1) a linear approach (normative) in which users respond to a fixed series of questions, 2) a matrix-based approach in which questions are organized by technology readiness level and 3) and algorithmic approach in which recommendations are provided based on user responses. Partakers will be asked questions about their anticipated user experience using each approach. We will integrate their suggestions
and feedback into future iterations of the decision aid.

24. Using Smart Home Technologies to Monitor Night Time Wandering in Persons with Dementia
   presented by Laura Ault, Bruyère Research Institute

Night time wandering is one of the leading causes in institutionalization of Persons with Dementia (PWD) and caregiver burnout. With the use of off-the-shelf motion and contact sensors and other various Smart home technologies we have created a system that works towards protecting PWD who wander at night, while allowing them to age gracefully in the comfort of their own home. For the demo I will illustrate a PWD getting out of bed in the middle of the night and with the use of motion sensors and smart outlets to turn on lights, guiding them to the bathroom. I will also show how a voice recording played on a speaker is used if the PWD heads towards a house exit, or a location that is unsafe in the house. I will then explore other other specifications and rules that can be implemented to meet the different needs of different families.

25. Vibrant Minds – A suite of serious games for older adults
   presented by Christine Daum, University of Alberta

Computer games for cognitive assessment and therapy are becoming more common. Recent studies demonstrate that computer games can improve memory, attention, and processing speed. Our team has developed a suite of four games (Whack-A-Mole, Word Search, Bejeweled, Mahjong) specifically for older adults. Older adults were also co-developers of these games. A two-phase study is underway to examine how playing this suite of games improves engagement and cognitive functions in older adults with and without dementia. Participants in this Drinks & Demos reception will have the opportunity to play the serious computer games and also to rate their perception of engagement during the play experience.

26. Virtual coaching for older adults and caregivers about tilt-in-space wheelchairs
   presented by Austin-Didier Tran, Université de Sherbrooke

Tilt-in-space wheelchairs can improve the quality of life older adults with mobility limitations. There is, however, a significant gap between the prescribed and actual use. Our team is designing a system that tracks usage and sets customizable goals by clinicians and users with the help of sensors and a web platform. We will demonstrate how the system can track wheelchair tilt (timing, angle, duration) and skin management with a web platform that allows clinicians, older adults and caregivers to set goals and view their daily and monthly results.

27. Virtual Gym
   presented by Victor Fernandez, University of Alberta

Virtual-Gym is a kinect-based platform designed to help older adults exercise at home. The system supports the specification of exercises as a series of stretching/balancing postures through a coach driven avatar. New modifications include a second exercise modality based on PhyDSL. This setting places users in an environment where they are encouraged to interact with moving objects. The user’s ability to react to the game actions and their movement rhythm and scope can be evaluated. Both Virtual-Gym functionalities are automatically constructed through a model-driven methodology, enabling personalization of the activity to the user’s ability. The two exercise modalities represent two complementary types of exercise on different ends of the structure vs. fun spectrum, with the avatar being on the structured end and the PhyDSL-based games being more fun. We are in the process of conducting a study to evaluate the effectiveness
of two functionalities to engage users in exercise.

28. Welbi Software System for Retirement Community Staff, Residents, and Family Members

presented by Elizabeth Audette-Bourdeau, Welbi & Amy Lam, Welbi

Welbi will be demoing its senior living software system. The system is designed for residents and staff in senior living facilities such as retirement homes. Welbi assists staff by automating tasks and providing deep insights. Welbi also keeps residents’ family members informed on the status of their loved ones, and helps improve resident quality of life through improved social integration. Welbi’s platform includes an administrative dashboard for staff, a mobile app for family members, and a tablet app for residents. Welbi’s CEO Elizabeth Audette-Bourdeau will give a demonstration of the system and participants will be invited to interact with the system and try it themselves.
1. **A machine learning technique for enhancing electrode implantation for deep brain stimulation**  
*presented by Mahsa Khosravi, Western University*

A novel technique is proposed for localizing the Subthalamic Nucleus (STN) during deep brain stimulation (DBS) surgery. DBS surgery is performed on individuals living with Parkinson's Disease (PD) to permanently implant stimulation electrodes for managing their motor symptoms. Micro-electrode recordings (MERs) are interpreted intraoperatively to estimate the location of electrodes and detect the borders of STN. The technique automates the process of localizing the STN by analyzing MER recordings using a machine learning approach. This method is capable of detecting the borders of the STN with an accuracy of up to 90%.

2. **A private health data repository for older adults**  
*presented by Abidin Akkok, Ryerson University*

The older adults frequently interact with multiple health providers and often try to cope with new or chronic illnesses that affect their well-being. One way of coping or learning to live with these situations is using personal health devices and apps, such as diabetes monitors. Also, there is a high degree of interest in making data collected through those devices available to healthcare providers. However, while each device has its own proprietary data storage and information retrieval system, there is no unified framework for communicating patient collected data to healthcare systems. We are developing a prototype based on a conceptual framework for a patient owned private health data that is currently in a needs gathering and system design stage. The poster contains a system diagram of the conceptual framework showing the relationships and information flow between patient, devices, data repository, providers as well as a brief summary of the concept.

3. **A rapid review of research on “usability” of technologies for older adults living with dementia**  
*presented by Kynan Ly, University of Alberta*

This rapid review focuses on the term "usability" and how it is defined and used in studies on technologies for older adults living with dementia. This review includes academic and review articles published since 2010. Articles include at least one older adult with dementia. The 11 publications that meet the inclusion criteria have a wide range of definitions, associated words, and themes related to the term "usability". The International Organization of Standardization (ISO) defines usability as the "Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use", but this definition is not always used. Associated words include acceptance and adoption. Themes include physical limitation, friendly user interface, familiarity, and lifestyle. In conclusion, the term usability lacks standardization and clarity in definition in the research literature when applied to technologies for older adults with dementia.
4. **Addressing the Challenge of Aging: The Silver Economy**  
*presented by The STAR Institute Team*

Collaboration and partnerships amongst various stakeholders is critical in developing technological innovations that will be responsive to older adults needs within society. In response to this, the STAR Institute has developed partnerships and projects with the mission to support optimal healthy living, develop talent and stimulate technology innovation. The STAR Institute is proud to recognize their partnerships with the Canadian Institutes of Health Research (CIHR) – Institute of Aging, the work with Mitacs Canada, the Canadian Consortium of Neurodegeneration in Aging (CCNA) and AGE-WELL, and is excited for the future collaboration with Singapore University.

5. **An in-home robotic rehabilitation system for upper and lower limb post-stroke therapy**  
*presented by Chloë Nicholson-Smith, Western University*

The increasing rate of age-related neuromuscular disabilities such as those due to stroke places a significant burden on healthcare systems. Robotic systems provide an effective means of addressing the problem but can be bulky and costly. This poster describes our work on the design, control, and evaluation of a novel robotic neurorehabilitation system for delivering both upper and lower limb therapy. Our work has focused on developing technology that can be used at home. The resulting system is low-cost, portable, lightweight and inherently safe, with five degrees-of-freedom and mechanical characteristics that can be modified to suit different modes of therapy.

6. **An online digital storytelling course for older adults**  
*presented by Diogo Silva, Simon Fraser University*

The purpose of this proposed project was to develop and evaluate an online version of a digital storytelling course. In digital storytelling, participants create a short movie using relatively simple video editing software that provides an opportunity to share life lessons and leave a legacy. The target audience comprised 15 older adults between 60 and 75 years old. A Research Assistant (RA) provided online assistance when requested using Skype. A qualitative approach was employed to collect data, including a demographic questionnaire, course evaluation survey, and individual interviews. The findings of our evaluation showed that nine of the 15 participants were able to complete the online course in varying timeframes. Participants’ feedback was very positive and all participants who completed the course reported that they would recommend it to a friend. Conclusion. The results appear to provide support for offering the digital storytelling online course to older adults.

7. **Analysis of mobility of older adults with dementia using GPS technology**  
*presented by Sayeh Bayat, Toronto Rehab – UHN*

Persons with dementia (PWD) must eventually stop driving, which poses challenges to maintaining their mobility. Out-of-home mobility is frequently measured in terms of life-space, defined as the spatial area through which a person moves. Life-space is traditionally self-reported using questionnaires or travel diaries and is thus subject to inaccuracies. The objective of this research is to develop and validate GPS-based life-space measures, assess the feasibility of using GPS technology to measure different dimensions of mobility, and compare mobility patterns between PWD and controls. Two dyads of PWD and their caregivers and two controls carried the
GPS device when traveling outside their homes for 4 weeks. Spatial and temporal features of mobility, including area, perimeter, and frequency of trips, were measured from the GPS trajectories. Participants’ transportation modes were also detected.

8. Analysis of the association between injury patterns and the mechanics of falls in older adults captured on video

*presented by Aleksandra Dojnov, Simon Fraser University*

Falls are a leading cause of injuries in older adults. This study aimed to identify fall characteristics that influence injury patterns during falls in older adults in long-term care (LTC). Over 11 years, we video-captured 2146 falls by 591 individuals in two LTC facilities. We analyzed videos using a questionnaire to determine biomechanical fall characteristics. We used Generalized Estimating Equitation models to examine fall characteristics and injury patterns associations. We found that 35% of falls resulted in injury, including 3% having a hospital visit. Among all injuries, the head was the most common injury site (35%). Falling from standing height or falling forwards increased injury risk (odds ratio 1.8, 95% CI 1.4-2.2 and 5.5, 3.8-7.9, respectively). Backwards rotation decreased injury risk (0.4, 0.2-0.8). Based on real-life observations, our results suggest that fall characteristics influence injury patterns. These findings may guide the development of new strategies for injury prevention in LTC.

9. Application of Cloud based Data Analytics for the processing of Sensor Mat Data

*presented by Bruce Wallace, Carleton University*

**Background:** In-home monitoring sensors have the potential to enable extended independence but require scalable Data Analytics processing. **Objectives:** The project focuses on the use of IBM Data Analytics platform and cloud services for processing of bed based pressure sensor data to analyze and classify bed exit events. **Approach:** The project will focus on the integration of the data and algorithms and subsequent analysis of a longitudinal sit to stand data set using a cloud based data analytics processing model. **Finding:** Initial findings related to the integration of the sensor data and migration of Matlab algorithms to the cloud framework will be presented. **Conclusion:** A solution and services model that allows cloud based processing of sensors will provide a truly scalable model for the application sensors to support independent living, delaying the need for assisted living.

10. Automated Detection of Head and Body Position during Sleep

*presented by Sina Akbarian, Toronto Rehab – UHN*

Obstructive Sleep Apnea (OSA) is a respiratory disorder characterized by interruption to breathing during sleep. It is estimated that about 20 percent of older adults suffer from OSA. The severity of OSA is often associated with sleeping in the supine head and body position. Therefore, monitoring the sleeping position is useful in providing feedback for positional therapy. In this work, three approaches to detect head position during sleep were examined. In the first two, supervised classifiers were trained to estimate head position based on features extracted from IR images. In the third method, three different convolutional neural network structures were trained to predict head position during sleep. To detect body position, the same convolutional neural network architectures were trained. The best performing model, tested on data of 19 participants, correctly estimated lateral vs. supine head position with 92% accuracy and lateral vs. supine body position with 87% accuracy.
11. Can Meditation Improve Attention in Older Adults at Risk for Falls?

*presented by Sabrina Ford, Western University*

Literature suggests that falls among older adults are caused by intrinsic factors, such as poor attention. A strategy that can improve attention is meditation. Meditation involves bringing awareness and focus to the present. This study examines whether using meditation training in older adults with a history of falls would improve attention. We are conducting a four-week intervention where participants practice focused attention (FA) meditation, or listen to music three times a week. Before and after the intervention we assess attention using the Sustained Attention to Response Task (SART), and EEG with individual alpha peak frequency (iAPF). Our results will likely show improvement in SART performance, and an increase in iAPF in the FA group. The FA group will trend towards improvement in mobility. These results suggest that FA meditation can increase attention in older adults, possibly decreasing risk of falls, and therefore improving independence and quality of life.

12. Caregiving burden and correlates of assistive technology use among family caregivers

*presented by Atoyebi Oladele, University of British Columbia*

**Background:** Assistive technology (AT) has been shown to relieve caregiving burden. **Objectives:** (1) to assess caregiving burden and (2) to identify the correlates of AT use among family caregivers. **Methods:** The Caregiver Burden Inventory (CBI) was used to assess caregiving burden and the Caregiver Assistive Technology Outcome Measure identified participants’ use of AT. **Results:** Sixty participants were recruited, their average age being 62.4±10.7 years; 68% were female; and 48% were spouses. Average weekly duration of informal care provided was 36.5±37.1 hours (median=25hours). Mean CBI score was 38.5, and 60% of participants had a score ≥36. More caregivers used ATs to assist with bathing (81%) and mobility (78%). Assisting with bathing (r=0.346), toileting (r=0.416), and negotiating stairs (r=0.652) correlated with more AT use (p<0.01). **Conclusion:** Our findings indicate that family caregivers commonly experience burden and use ATs to assist more with certain caregiving activities.

13. Case Studies in Smart Wheelchair Technology

*presented by Madeleine Rawling, Braze Mobility*

Power Wheelchairs enable people with limited mobility to independently engage in the community and perform activities of daily living essential to health and wellbeing. However, people who otherwise may benefit from the use of power mobility may be excluded from access due to safety concerns, especially in institutions and long-term care homes with high densities of power wheelchair users. Reasons for exclusion often include the effects of age-related diseases, including Alzheimer Disease and stroke (Simpson, LoPresti, and Cooper 2008). Braze Mobility Inc. emerged out of over a decade of research focused on improving safety outcomes for power wheelchair users, translating cutting edge research into commercial products. This poster will present real life case studies that evaluate challenges of operating power wheelchairs in the home and the community. It will highlight the efficacy of Smart Wheelchair Innovations in improving safety and independence outcomes for people with mobility challenges.
14. **Co-creating engagement practices with older adults: OA-INVOLVE**  
*presented by The OA-Involve Team*

OA-INVOLVE is a project in which academic researchers and Older Adult Research Partner Group (OARPG) members study and document older volunteers’ engagement practices in technology research and development projects with the overarching goal of understanding and supporting processes of active engagement. Using participatory methods, we co-designed with 7 older adults a poster showcasing key messages about practices of engagement in technology research and development projects. The co-designing activity was facilitated during a cross-national OA-INVOLVE OARPG videoconference. Using arts-based techniques, local teams worked together in-person to capture participants’ engagement experiences. The four local teams identified their own content ideas about engagement, how to visually depict these as part of the poster and documented the process. The designs were amalgamated into a single poster highlighting key engagement processes. Here we will present the co-produced poster. "

15. **Computer games for older adults – engagement as an outcome**  
*presented by Adriana Rios-Rincon, University of Alberta*

Computer games for cognitive assessment and therapy are becoming common. Recent studies demonstrate that computer games can help improve memory, attention, and cognitive processing speed. Our team has developed a suite of four serious games specifically for older adults. We evaluated the usability of computer games for cognitive assessment and therapy for older adults. We also developed an adapted engagement scale. Six older adults have been recruited from senior-serving organizations. Participants play games for 30 minutes twice a week for 3 weeks. The adapted engagement scale and the Positive and Negative Affect Scale were administered after each game-play session. Participants could successfully play these games although some were easier to play than others. The adapted engagement scale seems to be appropriate for use with older adults but would need further adaptation for those with moderate dementia.

16. **Context Awareness system to favor night behaviors for Alzheimer people**  
*presented by Hubert Ngankam, Université de Sherbrooke*

To foster the aging of elderly people with cognitive impairment at home, it is desirable to make their home smarter. With Ambient Assisted Living system, it is possible to define intelligent environments, taking into account the constraints of people with Alzheimer disease. The aim of this study is to favor good night behaviors by monitoring nocturnal wandering for elderly people suffering from Alzheimer. A non-intrusive technology system, Nocturnal Assistant System (NAS), collects behaviors during night with sensors. It also provides cues to avoid wandering. The goal is to create an environmental context for data acquisition focusing on process and execution. Environmental cues are inferred using a rule-based reasoning. Those must be adapted for ensuring a convivial environment. NAS has been installed for five weeks at home of a senior living alone. Caregivers got more accurate information about the habits of their mother. Senior is more sensible to the advices provided.
17. **Cycled lighting in the senior home: effect on rest-activity, sleep, performance and psychological well-being**  
*presented by Myriam Juda, Simon Fraser University*

Insufficient and/or mistimed artificial lighting can disrupt circadian rhythms, adversely affecting sleep, mood, and cognition. Older adults are more susceptible due to age-related changes in the circadian and ocular systems. In a collaboration between Simon Fraser University, the University of British Columbia, Nano-Lit Technologies, Fraser Health Authority and the Nimi Nikkei Home, this Age-well funded study is the first of its kind to examine the effects of a novel Quantum Dot lighting technology - changing in colour temperature (2700-7000K) over the 24-hour day in promoting circadian entrainment, cognitive performance and psychological well-being in older adults. Participants’ rest-activity cycle and sleep (tracked with actigraphy), cognitive performance (NIH toolbox) and psychological well-being (sleep, mood, and fatigue) will be compared in a within-subject-design consisting of four weeks of original lighting (control condition) and four weeks of cycled lighting (experimental condition), in counterbalanced order.

18. **DataDay: Co-Creating a Mobile Self-Management App for People with Dementia**  
*presented by Erica Dove, Ontario Shores Centre for Mental Health Sciences*

**Background/Purpose:** Engaging knowledge users in joint creation of technology can satisfy preferences and encourage adoption. DataDay is a health behavior self-management application (app) for people with dementia. A complementary web-based portal enables clinicians to observe DataDay user data. We examined the usability of the app and portal which were co-created with knowledge users. **Method:** Five people with dementia and fifteen clinicians participated in four co-creation workshops to provide feedback on the app and portal respectively, and complete the System Usability Scale (SUS). Workshops were video-recorded, coded, and analyzed using Observer XT. **Results & Discussion:** Qualitative and quantitative usability data from both user groups will be presented. Themes related to acceptability and adoption of the app and portal will be described and prospective SUS scores will be reported. Implications of these findings on design decisions will be discussed along with the importance of interactive approaches to co-create technology with users.

19. **Design Heuristics for Conversational Voice Interfaces for Older Adults**  
*presented by Christine Murad, University of Toronto*

Conversational voice interfaces are becoming more prevalent as speech as an interaction technique continues to be explored, with devices such as Google Home, Amazon Echo, and Siri entering the commercial market. These interfaces have great potential for improving socialization and independence of older adults, and for addressing digital accessibility barriers specific to seniors, such as loss of vision, mobility impairments, etc. As this technology continues to develop however, older adults are seldom considered when designing these products. This risks digitally marginalizing older adults, for whom usability is critical to adoption. While the design of visual/graphic user interfaces is informed by well-established usability principles/heuristics, we do not currently have a set of principles for designing speech interfaces. Our goal is to develop design principles for conversational voice interfaces that help solve current usability and learnability issues that exist in these devices, making speech interaction more usable for aging populations.
20. Designing for People with Dementia to Create and Share Personal Stories

*presented by Jiamin Dai, McGill University*

With an aging population in many parts of the world, chronic and progressive syndromes such as dementia are affecting increasing numbers of people. Exploring Information and communication technologies (ICTs) to help people with dementia (PwD) reminisce and communicate will benefit a growing population living with dementia, improve quality of life, and relieve some caregiving burdens. Reminiscing, storytelling, and sharing could be brought together by ICTs and become a personalized process to kindle meaningful dialogues and build an engaging space. So far, a variety of devices and technologies (e.g., ambient display, life-logging, touchscreens, websites, and virtual reality) have been mobilized, drawing multimedia materials from local archives or participants’ life experiences. This overview of current ICT tools for PwD’s creating and sharing maps ICTs’ contributions to PwD’s quality of life and identifies emerging challenges in design and research, including better personalization, continuous updating, and social sharing.

21. Development of a multimodal approach to managing patients with multiple sclerosis

*presented by Amine Choukou, University of Manitoba*

**Context:** ASPE (http://www.spestrie.ca/) is a non-profit organization that takes charge of people with multiple sclerosis (MS) in Quebec. ASPE has developed a multimodal approach to help patients with MS improve their quality of life. Objectives: To help patients with MS improve their autonomy, mobility and social participation. **Methods:** 60 adults with MS are trained indoor 2 to 3 one-hour practice a week. ASPE program is tailored to each participant and aims to improve gait, power, coordination, proprioception, aerobic capacity, balance, motor learning, posture, and perception of the spatio-temporal scheme. Part of the training relies on ZENITH, a gait rehabilitation device developed by ASPE including a suspension unweighting system. **Results and discussion:** A tailored and MS-specific training program seems efficient to help patients improve their autonomy, mobility and social participation and, in some cases, “relearn” how to walk. Approximately 90% of the MS patients reported increase in their walking ability.

22. Digital storytelling and older adults with dementia: A systematic literature review

*presented by Adriana Rios-Rincon, University of Alberta*

Digital storytelling involves the use of technology in the process of creating and telling stories, allowing stories to be preserved and shared with family, friends, and future generations. The use of digital storytelling has grown rapidly in recent years. We conducted a systematic review in which we examined 42 publications out of 3,366 references obtain from multiple databases. Digital storytelling is used for reminiscence therapy, life review, and as a means of enhancing social connections in older adults with typical aging and with Alzheimer’s disease and mild cognitive impairment. Technology is used to assist family members to tell their life stories even when they are geographically distant, and to facilitate older adults ability to accurately recall life events. In this poster we will describe the state of research on this topic and suggest future directions.

23. Digital Storytelling for Intergenerational Engagement

*presented by Julija Jeremic, Simon Fraser University*

The purpose of this study was to explore how an intergenerational digital storytelling course affects the interactions between older adults and younger people. Six older adults (75+), all
diagnosed with mild cognitive impairment, and nine high school students formed six intergenerational groups. The group members worked together to create a digital story over a period of 10 sessions. The results indicated that an intergenerational digital storytelling course has the potential to facilitate interaction between older adults and younger people, as older adults can play an important role in transmitting their knowledge and life experience to younger people while the younger people can teach older adults how to use technologies. Also, intergenerational interaction is beneficial to the civic engagement of younger people. However, some challenges did occur during the process as seniors sometimes had issues with staying focused on their story and difficulties in comprehending the use of technology.

24. Digital Storytelling in Models of Indigenous Dementia Care (MInD) Care: Critical steps in Engaging First Nations communities for Community-Based Participatory Action Research

 presented by Andrea Martel, Health Sciences North Research Institute

Our project builds on story as a tool of data collection and knowledge transfer using. This project supports a community-driven approach for gathering knowledge and mobilization to enhance the lives of Indigenous persons and families living with dementia through Digital Storytelling. First Nations communities have requested training that would engage youth with the elders to support wellness initiatives within the community. A Digital storytelling workshop will involve community participants who will be taught to use digital media to create short audio-video stories about their lives and caregiving experiences and gain insight into how their caregiving roll is supported within their community. Youth will be engaged as helpers to assist participants throughout the workshop. This presentation will highlight the importance of self-determination, flexibility, responsiveness and trust to address community-identified needs in the research process.

25. End-user perceptions of a family caregiving App

 presented by Sander Hitzig, Sunnybrook Health Sciences

Information communication technology (ICT) systems for supporting older adults living with chronic conditions in their homes are growing, which helps to alleviate some of the burden being experienced by caregivers. However, there are a number of barriers to widespread implementation and avoiding these challenges requires insights from 'real-world' applications. Mavencare (www.mavencare.com) offers an innovative technology-enhanced homecare service whereby Mavencare staff providing care inputs regular updates via an App that family caregivers can access. The present study evaluated end-user perceptions of the App via qualitative interviews with Mavencare staff (n=22) and family caregivers (n=5). A general inductive content analysis was used to analyze the data. The main themes that emerged from the interviews were: 1) App usage; 2) Improvements; 3) Change in beliefs; and 4) App benefits. The findings suggest the App is well-received by end-users and that it greatly enhances communication; thereby improving the continuity of care.

26. End-users’ and clinicians’ perspectives regarding the viability of a wearable functional electrical stimulation garment

 presented by Saima Ali, University of Toronto

Functional electrical stimulation (FES) is used to restore function in individuals with paralysis due to spinal cord injury (SCI) or stroke (ST). Patients are often incapable of independently applying FES with gel electrodes. A novel FES-garment with embedded stimulating electrodes was developed to address this problem (Myant Inc.). To further develop the FES-garment for the
commercial market, a qualitative study was undertaken to determine the needs of targeted end-users and clinicians. Data were collected via semi-structured interviews (1 SCI, 1 ST) and focus groups (4 groups; 2 SCI, 2 ST; 13 end-users and 6 clinicians). Content analysis was used to identify relevant codes, and focus groups were conducted iteratively until saturation was achieved. The identified themes included: 1) potential use of the garment; 2) design considerations; and 3) the acquisition process. The findings of this study provide a guideline for FES-garment development by obtaining a better understanding of end-user needs.

27. Evaluating the Design of a Contextual Aid for Older Adults Learning to Use Tablets

*presented by Sho Conte, University of Toronto*

Older adults are considered to be less frequent adopters of digital technologies due the increased effort required to learn a new interaction paradigms, especially for those users who need to overcome existing mental models of technology use. Current mobile interfaces do not incorporate design principles that are well aligned with older adult's mental models of use. We present the motivation and rationale for an integrated learning and support system for tablet devices, designed to provide older adult users with relevant help at the time of need. Variations in the presentation and invocation styles developed for the help system were evaluated with a formal usability study conducted with older adult users. This poster will also present the results of the study, and our quantitative findings.

28. Evaluating the impact or website design cues on feelings of trust for family caregivers of people with dementia

*presented by Thana Hussein, University of Waterloo*

CARE-RATE is an online assistive-tool being created to support caregivers of people living with dementia in the community to search for resources that fit their individualised needs. While trustworthiness of web-based information has been identified as a key concern for caregivers, little work has been done to explore how website interface design affects trust for caregivers of people with dementia. This research explores what and how design features on a search engine results page (SERP) impact trust for family caregivers of people with dementia. 20 at-home caregivers are being asked to complete a set of search-based tasks through CARE-RATE and Google and asked to identify cues that impacted their decision to select a source. The data derived from this study will be consolidated into a modified Lens Model to further understand how cues impact source selection and trust, which will be used to refine CARE-RATE’s interface design.

29. Evaluating the usability of interactive mobile technology for driver rehabilitation after stroke

*presented by Michael Cammarata, McMaster University*

**Background:** For older Canadians, the ability to drive is important for completing everyday activities that support aging-in-place. Unfortunately, age is also a strong predictor of stroke, which can negatively impact driving. Retraining behind-the-wheel skills can be challenging due to stroke-related deficits. However, the rapid emergence of technology platforms such as the iPad™ can provide a new way for individuals to re-train this activity. To date, research concerning the use of this technology for the purpose of driver rehabilitation remains limited. **Objectives:** Our Catalyst-funded study is investigating the experience of using 'DriveFocus®' a commercially available iPad™ application by individuals with stroke and their caregiver. **Methods:** A sequential
mixed-methods design involving paired participants (person with stroke and caregiver; n=20) will explore their usability experience. Discussion: This poster highlights how this technology can be used post-stroke to address the activity of driving and the importance of gathering direct user feedback.


*presented by Gordon Tao, University of British Columbia*

**Purpose**: Assistive technologies (AT) help older adults with cognitive and physical limitations. Given the increasingly complex AT landscape, evaluating the usefulness of current and emerging ATs is crucial. We aim to consolidate evaluation tools of ATs across disparate fields. **Methods**: We performed a scoping review of evaluation tools (ETs) for ATs through multiple database searching as well as manual searching and citation linkages. **Results**: Our preliminary results identified 61 AT-ETs across 17 fields. Specificity of tools ranged from single to general ATs over 20 identified AT categories. Acceptance, Satisfaction, and Utilization were the most common constructs of 73 identified. 29 ETs included end-user input during development and 43 were validated. **Conclusion**: We have delineated AT-ETs developed by fields ranging from rehabilitation science to human-computer interaction. The multifarious constructs identified will be used to inform the development of a generalized end-user driven ET as part of the AGE-WELL ELEVATE project.

31. Examining the influence of advanced vehicle technologies on driving behaviour in older adulthood help older drivers be safer behind the wheel?

*presented by Tara Kajaks, Toronto Rehab – UHN*

For older Canadians, driving is critical to their community mobility, independence, and identity. Advanced vehicle technologies (AVTs) may facilitate behind-the-wheel safety. A scoping review was conducted of major research databases to understand the state of evidence concerning AVTs and safety. Data specific to study design, population, alongside objective and subjective measures were extracted for comparison across different AVTs. Of 325 eligible studies only 31 either studied older adults (aged 65+) exclusively or included this age group in their analysis (n = 21). Most investigated a single AVT, with adaptive cruise control (n = 4) and non-forward collision warning systems (n=4) being the most common. Only one or none of the other AVT-related studies included older drivers (e.g., park assist, blind-spot detection) suggesting a substantial evidence gap. Given the rapid escalation of AVTs alongside the growing aging demographic, understanding their impact on the safety of older drivers is warranted.

32. Exploring Fluid Changes in Complex Continuing Care In-patients Using Sensor Technology

*presented by Madison Cohen-McFarlane, Carleton University*

**Background**: Congestive Heart Failure (CHF) is a world-wide problem with significant impacts on patients and cost impacts for society. CHF is monitored by shortness of breath and accumulation of fluid in patients. Compliance in self-weighing is a challenge, and increases in weight could be related to other causes. Our team has designed a Pressure Sensitive Mat (PSM) that is able to detect pressure variation related to fluid changes in the laboratory setting. **Purpose**: To determine whether PSM can detect fluid changes in hospital inpatients that may reflect acute heart failure. **Method**: PSM will be installed under the bed mattresses of hemodialysis inpatients and inpatients with no-known fluid problems to differentiate PSM pressure changes associated with fluid
changes vs. normal day to day weight variation in Phase 1 of this two phased pilot study. If Phase 1 is successful, in Phase 2 the PSM will be placed under bed mattresses of CHF inpatients to detect fluid overload related to acute heart failure events, or worsening of symptoms. **Results:** We will show preliminary data from the PSM in hemodialysis patients.

33. **Exploring interactions of people with dementia through Mixed Reality technologies: an Observational Study**  
*presented by Shita Desai, Ontario Shores Centre for Mental Health Sciences*

Mixed Reality technologies could offer functional support to people with dementia to continue doing their everyday activities. We are studying the feasibility of these technologies for people with dementia where we observe them playing games with Mixed Reality technologies that link physical and virtual worlds in different ways, i.e. through headsets, screens and physical objects. The observations are followed by an interview about their experience interacting with the Mixed Reality devices. The data will help us to identify which types of interactions and physical virtual integrations are intuitive for people with dementia. We present the methodology of the study and the preliminary results from sessions with people with dementia interacting with two Mixed reality technologies – Hololens and Osmo. Microsoft HoloLens is a holographic computer enabling augmented reality experience while Osmo integrates physical objects with virtual on iPad or iPhone.

34. **Exploring the Role of Technology at Work among People with Dementia or Mild Cognitive Impairment**  
*presented by Parminder Flora, Ontario Shores Centre for Mental Health Sciences*

Many working individuals with dementia and mild cognitive impairment (MCI) may experience symptoms that impact workplace performance and functioning. Technology can be a work barrier or facilitator, although its technology as it relates to dementia in the workplace has not been systematically investigated. This multidisciplinary, international study will explore the experiences of people with dementia/MCI related to technology at work. Approximately 6 focus groups (N=48) with individuals from 3 participant groups (individuals recently diagnosed with dementia/MCI, families/informal supporters, employers of people with dementia/MCI) will share their experiences as they relate to technology use and dementia at work. Focus groups are being recorded and transcribed for inductive, thematic analysis via Observer XT v12.5. We will report initial findings from this proposed study. This work addresses a gap in the current understanding about technology. Insights may inform emerging workplace practices and policies and occupational accommodations and/or transitions.

35. **Factors affecting information technology use from the perspective of aging persons with cognitive disabilities: A scoping review**  
*presented by Jessica Rocheleau, Carleton University*

Aging persons with cognitive disabilities (PWCD) benefit from the use of information technologies (IT) to simplify everyday tasks; yet, there is a lack of uptake and high abandonment of IT by this population. Researchers have investigated this phenomenon, but most have focused on caregivers’ perspectives, without examining the lived experiences of aging PWCD themselves. To gain an accurate understanding of the lack of IT use by PWCD, it is crucial to understand the barriers and facilitators of IT use from the users’ perspective. Our objective is to shed light on factors affecting IT use from the viewpoint of aging PWCD. We conducted a scoping review of
qualitative studies that focus on IT use by aging PWCD. Eight articles met our inclusion criteria. Through a thematic analysis, we identified technology-related (e.g., usability), social (e.g., support) and personal (e.g., experience) factors impacting IT use by this population. Implications will be discussed.

36. Fall and injury prevention in older adults: real world data to support safety flooring and virtual reality applications

*presented by Taylor Cleworth, University of Waterloo*

Falls in residential facilities can cause injuries and decreased quality of life. As fall and injury rates are increasing, novel fall and injury prevention approaches are required to reduce social and economic costs. The objective of this project is to use multi-disciplinary approaches, partnered with Schlegel-UW Research Institute for Aging and Schlegel Villages, to reduce the risk of falls and related injuries in older adult residential facilities. By characterizing high-risk zones within retirement facilities, we can provide stakeholders with real-world evidence to support implementation of fall and injury prevention strategies including: a) safety flooring, a promising intervention to reduce fall-related injuries; and b) virtual reality, which has the potential to provide insight into fall-related risk factors, and promote mobility enhancement and fall-prevention interventions. This three-tiered project will identify high fall rate locations, identify the success rate of fall/injury prevention strategies, and promote the implementation of novel interventions within these.

37. Feasibility of Using Android Smartwatches For Nearly Continuous Monitoring Of Patients With COPD

*presented by Robert Wu, University of Toronto*

Acute COPD exacerbations lead to diminished quality of life, and higher mortality. This can be prevented with early treatment. Wearable technology allows for continuous monitoring of physiological COPD symptoms, which combined with predictive analytics may detect early exacerbations. We conducted a feasibility study to determine if patients with COPD would wear a smartwatch, which collects and transmit sensor data. Patients with COPD wore and charged a smartwatch for 90 days that recorded audio, heart rate, and accelerations. At the end of the study, participants were asked what would motivate them to use a wearable for monitoring COPD. Sixteen participants completed 90 days, average age was 68.5 years, 36% were women. Survey, heart rate, and activity data were available for on average 66.4, 70.7, and 64.8 days respectively. Participants indicated they wanted to engage with the smartwatch and receive feedback about their activity, heart rate, and how to better manage symptoms.

38. Gaming, Learning and Profitability: Bending the Arc for an Ethical Monetization Model For Serious Games

*presented by Patrick Plante, TELUQ*

The goal of this project is to create, research and commercialize digital games to enhance older adults’ quality of life. In order to do so, we have conceptualized and implemented an ethical economic model that is the basis of our offering and permits high flexibility to improve user experience and fun in a digital economy. The modelization promote users’ interaction via cooperative and competitive behaviour. Moreover, the platform integration enhance the player’s interactions by offering him multiple incentives to return to our games. This users’ behaviour will increase our player base and will give us the opportunity to experiment other commercialization
39. Identification of Innovative Technologies to Support Family Caregivers

*presented by Maude Beaudoin, Laval University*

**Background:** With the Innovative Technology for Caregivers (INToCARE) project, activities considered burdensome by family caregivers and their preferences in terms of technologies were identified. The objective was to identify innovative technologies to support caregivers.

**Methods:** Caregivers completed questionnaires and qualitative interviews on their needs and technologies to address them. Based on participants’ responses, the research team suggested technologies to meet each caregiver’s needs. To shorten the list, technologies were rated on four items (novelty, coverage, impact, simplicity of use) and were ranked. A meeting was held to confirm which technologies would be included in the final list. **Results:** The initial list included more than 50 ideas that were divided in three categories: devices, programs and policies. The final list includes 7 devices and 3 programs. **Conclusion:** This is the first step in identifying innovative technologies that could be developed for family caregivers. Feedback from caregivers and stakeholders will be solicited.

40. Identifying the Factors Influencing Older Adults’ Perceptions of Fully Automated Vehicles

*presented by Shabnam Haghzare, Toronto Rehab – UHN*

While Fully Automated Vehicles (FAVs) have the potential to significantly expand older adults’ access to mobility, limited research has focused on older adults’ perceptions of such technology. The current driving simulation-based study will investigate factors that may govern older adults’ perceptions of FAVs with respect to trust, acceptability, and safety. Participants (65+) will experience scenarios of manual and fully automated driving in a high-fidelity driving simulator. Their perceptions of the FAV will be measured before and after the driving experiences using questionnaires. Physiological and behavioral data will also be collected throughout the driving sessions to investigate whether perceptions of technology are associated with behavioral or physiological responses. In addition, driving performance and driving styles of participants will be captured during manual driving to investigate whether an alignment between an individual’s driving style and the FAV driving style will lead to a more positive perception towards the technology.

41. Implementation of Remote Monitoring and Telehealth Technologies to Reduce Diabetic Foot Amputations and Adverse Cardiac Events for Rural and Indigenous Populations

*presented by Ryan Buyting, Dalhousie University*

New Brunswick is home to ~124,000 people >65 years old, of which only 3% are nursing home residents, suggesting a strong desire among our elderly population to maintain independence and remain in their communities as they age. Our team will conduct a pilot study that seeks to reduce cardiac complications associated with high blood pressure and amputations associated with poor diabetic foot care within rural and Indigenous communities. Through culturally appropriate partnerships, we will employ innovative medical technologies including a vital sign monitoring device, a telemedicine solution and a home support system, in order to bypass the need for long commutes to the hospital. The long-term outcomes of these patient populations will be compared to those in urban settings to assess the efficacy of this practice. It is our hope that the data produced from this project can aid the widespread implementation of these tools in our province.
42. Improved Pain Assessments Following Implementation of an Online Training Program and Standardized Protocol in Rural Long-Term Care Facilities

_presentation by Natasha Gallant, University of Regina_

**Aims:** In long-term care facilities (LTCs), and especially in rural areas with limited access to continuing education, pain remains underassessed. Our goal was to develop and evaluate an interactive online training program for LTC staff to facilitate state-of-the-art pain assessment protocol implementation. **Methods:** We studied 7 rural LTCs and evaluated the implementation of a pain assessment protocol compared to baseline. **Results:** Following implementation, the average percentage of pain assessments with specialized assessment tools on admission remained at 100% for three LTCs and showed improvements for another LTC (67% to 100%). The average percentage of residents who underwent weekly pain assessments increased from baseline to implementation (0–76% to 35–100%). Improvements in treatment plan documentation were not consistently found across LTCs. **Conclusions:** Technology allowed us to carry out the implementation of a pain assessment protocol remotely, resulting in improvements in pain assessment rural LTCs.

43. In-Home Radiographic Services For Urgent Situations: A Possible Role for Paramedics?

_presentation by Victoria Young, University of Toronto_

In Ontario and other parts of Canada, marginalized and vulnerable populations, such as the elderly and individuals with mental health or addiction concerns, have been identified as having the greatest difficulty accessing quality, comprehensive medical care, and access to care after-hours. Inevitably, when acute illness or chronic disease exacerbations arise, these individuals end up in hospital emergency departments in order to access required primary care including medical assessment (e.g., diagnostic testing) and treatment (e.g., intravenous therapies). Research studies have shown a majority of patients transported to hospital emergency departments by emergency medical services are not admitted to hospital and a large proportion of these patients were further identified as needing radiography services. This research explores available evidence surrounding the need for provision of radiography services pre-hospital, in addition to implementation considerations (e.g., barriers/facilitators, feasibility, options) for paramedics to be involved in radiography service provision.

44. Indigenous Older Adults Requiring Dementia Care: Making Space for Technology

_presentation by Danette Starblanket, University of Saskatchewan_

Accessibility and readiness are key areas that require attention and strategic approaches in order to incorporate AGE-WELL technologies and improve the current quality of life for Indigenous older adults requiring dementia care. The purpose is to identify technology use in dementia patients using Indigenous community-based research methodologies. We partnered with Indigenous older adults, caregivers, health practitioners and a Community Research Advisory Committee in southern Saskatchewan. Using a combination of Indigenous research methods and community-based involvement, interview participants were recruited through a purposive sampling procedure. Interview data was gathered in focus groups and individual interviews with caregivers, health care providers and older adults living with dementia. We examined the barriers to access caused by infrastructure and cultural appropriateness. Indigenous older adults requiring dementia care and residing in rural areas require specific technology in order to improve their quality of life and in order to age in place.
45. Investigating the feasibility of smart activity trackers for research use by older adults

*presented by Ben Kim, University of Waterloo*

This study investigated older adults' use of wrist-worn activity trackers to assess their feasibility for gerontological research. A secondary data analysis was conducted of a smart activity tracker dataset that contained ~3 weeks of accelerometer data (range 19 to 28 days) collected from Xiaomi bands worn by 19 community-dwelling participants aged 55 and older (mean age 64; 11 female). Use of the devices was assessed by examining device wear and non-wear time, using a validated wear and non-wear detection algorithm. On average, participants wore the smart activity tracker for 21.8 days and 93.6% of the day (1348.2 minutes), ranging from 57.8% to 100.0%. Daily wear time was at the lowest on the first day at 73.3% (1055.4 minutes); the highest on day 7 at 93.6% (1347.7 minutes). This study provides support for future use of smart activity trackers in gerontological research.

46. Lessons learnt from adapting and testing a self-care app for older adults with cognitive challenges

*presented by Anar Dilara, Ontario Shores Centre for Mental Health Sciences*

Increasing numbers of cognitively challenged older adults are using modern apps and devices that require testing for their suitability among seniors. Contents of an existing self-care app were modified based on user-feedback followed by its feasibility among cognitively challenged seniors and their family caregivers. Irrespective of cognition or previous app experiences, all participants found the app difficult to learn. Using complex password, scheduling appointments or setting-up reminders for daily tasks were most difficult functions within the app. Unavailability of instruction materials or support during usage mostly contributed to decision of abandoning the app for future use. Skill based training and re-training based on user’s abilities would result in better performance of participants. However, this has major resource implications, which may be better addressed through simplification. In terms of co-creation, observing how people learn and interact with apps rather than what they say they would like may be more useful.

47. Making Connections: A community workshop to build novel solutions to address social inclusion for older adults

*presented by Melissa Koch, University of Waterloo*

In collaboration with regional partners, we held a community workshop to explore how technological innovation could be used to address challenges related to social inclusion and social isolation of older adults. The workshop drew on AGE-WELL WP7 research on development of supportive regional innovation ecosystems; policy and regulatory issues related to technological innovation; and the role of ‘big data’ in supporting/developing innovative technologies. Engagement with regional stakeholders working on the issue of social inclusion created an opportunity for practical application of our research for older adults in our local ecosystem. Sixty participants attended the workshop, where identified regional priority areas (related to older adults and social isolation) and WP7 findings guided participant discussion and the development of novel solutions for older adults who are socially isolated. Proposed solutions and recommendations of the workshop will guide future work of WP7 working in partnership with regional stakeholders.
48. Making the invisible VISIBLE: BrainFx Screening and Risk Management Program

*presented by Josephine McMurray, Wilfrid Laurier University*

Early identification of declining cognition is crucial to delivering evidence-based interventions that may enhance coping strategies and slow disease progression. The novel BrainFx Screen was designed to improve detection of early signs of mild cognitive impairment (MCI) and is digitally administered via tablet in 10 minutes. Each Screen generates a report identifying functional deficits that are used to tailor treatment interventions towards improving brain health. The presented study is a concurrent, mixed methods, prospective study assessing the sensitivity/specificity of the Screen against a validated MCI tool in people asymptomatic for cognitive impairment (CI), aged 55 and older. We also measure 1) participants experiences implementing the Screen and perceived utility of treatment interventions and 2) associated costs to care. By improving detection and allowing for earlier intervention, the BrainFx Screen may enhance the quality of life for people living with CI, their caregivers, and reduce long-term healthcare costs associated with its progression.

49. MapIt: Exploring with professionals the requirements for a 3D mapping tool for older adults’ home assessment

*presented by Manon Guay, Université de Sherbooke*

Introduction: MapIt is a new App generating 3D models of rooms using a smartphone equipped with motion tracking and depth camera technology. Objective: To establish functionalities that could be made available in MapIt to assist rehabilitation professionals in completing home assessments. Methods: Crowdsourcing and open-ended interviews with one occupational therapist having used MapIt over a one-month period. Results: Four themes emerged: see it ("to be able to visualise with the client"), measure it ("to measure the environment."), try it ("add some common assistive devices and people in the 3D environment to simulate home adaptation options"), document it ("demonstrate the actual [clients'] needs"). Conclusion: MapIt makes it already possible to 'see it' without a home visit. Future development of MapIt should consider a) adding measurement functionalities, b) making it possible to add and move representations of assistive technology or environmental elements, and c) generating easy-to-share reusable confidential 3D models.

50. Measuring engagement, emotional states and cognitive function with wearable EEG, EOG and motion sensors while playing a serious game

*presented by Dillam Diaz Romero, University of Alberta*

In this study, 26 participants were presented with a series of images from the IAPS database. Wearable sensor devices collected electroencephalography (EEG), electrooculography (EOG), and kinematic motion data as participants viewed the images; the participants also characterized their own emotional responses to the images. Participants were then presented with the serious game “Whack-a-Mole”, developed for the assessment and intervention of visuomotor, cognitive and mental-health conditions. Wearing the sensor devices, participants played three levels of the game that required different levels of cognitive effort. In this poster, we describe our method for classifying engagement among participants as they played the game. The results demonstrate that cognitive engagement with a task can be accurately determined using data collected from wearable sensor devices, with and without self-reported measures.
51. Measuring Foot Clearance in Outdoor Walkways

*presented by Ghazaleh Delfi, University of Toronto*

Over half of falls in older adults are caused by tripping. Many of these trips are caused by small obstacles on outdoor walkways. The existing evidence reporting foot clearance of younger and older adults include only lab-based measurement - many measure foot clearance from participants walking on a treadmill. There are no existing studies that report on measurement of foot clearance of real-world pedestrians. To address this gap, our team recently developed a device for measuring foot clearance on outdoor walkways. The benefits of this system are that it can easily collect large amounts of video data quickly from many pedestrians without the need for applying any markers to the participants or the environment being controlled in any way. The objective of this study is to develop an automated method for extracting foot clearance estimates from the collected video data using computer vision and machine learning techniques.

52. Mind Over Matter: Memory Self-Efficacy is Predictive of Memory Performance

*presented by Becky Horst, Western University*

Cognitive decline is a concern for healthy aging and the desire of older adults to protect their memory performance is strong. Multiple variables have been associated with memory performance. However, how these variables compare in their predictive value against each other is unknown. Memory self-efficacy (MSE), one’s perceived memory ability, could be a significant predictor of memory performance beyond previously explored variables. Community dwelling older women (age 65-80) with probable Mild Cognitive Impairment were asked to evaluate their MSE. Structural imaging and BOLD signal fMRI were obtained during an associative-memory task. Multiple linear regression models were constructed for the prediction of memory performance. Our results found that MSE added significant predictive value beyond global cognition and functional activation. Based on these results it appears that one’s perceived efficacy about their memory ability is associated with how they will perform on a memory task regardless of cognitive status or physiological differences.

53. Mobile Robots for Remote Homecare Applications - From Telepresence Toward Advanced Perceptual and Inference Capabilities

*presented by Jean Massardi, Université du Québec à Montréal*

This poster presents WP3.1 progress in designing key components for mobile robots to be used in remote homecare applications. SAM is a telepresence robot with wireless internet connectivity, allowing a clinician or a caregiver assist seniors in their homes. SAM is able to navigate and recharge itself autonomously, localize sound sources for improving situation awareness, and monitor vital signs taken using bluetooth medical devices. Luke is an expressive robot to engage users in assistive Human-Robot Interactions. An emotional model determines the robot’s emotional states based on user affect, its own drives and emotional history, while considering user and robot safety. PARC is a Plan and Activity Recognition software Component designed to observe seniors’ daily living activities to recognize their goals and to infer their intents. When anomalies are detected in seniors’ plans, PARC can provide assistance like proposing actions that are required to achieve basic goals of daily living.
54. NEARS, an Ecosystem for Ambient Assisted Living

*presented by Hélène Pigot, Université de Sherbrooke*

To help people creating useful ADL assistance components, we built the iNnovative Easy Assistance Reassuring System (NEARS). It helps caregivers to design assistive systems for seniors living at home to foster their autonomy. NEARS is built around five modules: Assistance decision making, Smart home configuration, Devices installation, Behaviors monitoring and Smart home maintenance. NEARS sets up an ecosystem with tools that enable each user to create useful, personalized and innovative assistance components. Semantic models ensure the assistance fulfills the senior needs to help achieving specific scenarios, such as returning to bed during night. An ontology-reasoning engine ensures the consistency and execution of the assistance rules. For ease of use and setup, NEARS can be used in conjunction with augmented reality system for environment scanning, devices selection and location, for defining scenarios and validating the setup.

55. Older Adults’ Acceptance of Virtual Doctors

*presented by Jaisie Sin, University of Toronto*

The use of virtual doctors is increasing; yet, we have not fully studied their impact and how they are perceived by the public, especially by digitally-marginalized users such as older adults. We also do not know how virtual doctors compare to other technology-mediated alternatives, like traditional telemedicine. This research studied the way older adults engaged with different versions of telemedicine setups. The results show that older adults are most confident and comfortable with speech-only machine-powered interfaces for general healthcare information, and with video-based links with human doctors for specific healthcare information. The results also show that to be accepted by older adults, virtual doctors need to complement older adults’ visits to their existing doctors, fit their existing information practices for gathering healthcare information, and have perceived value compared to their currently available alternatives.

56. Older adults’ use of an on-line decision support system: Usability and stability of recommendations

*presented by Noemie Séguin-Tremblay, Université de Sherbrooke*

We studied the usability and stability of recommendations for assistive technology (products and advice) generated by an online decision support system (DSS) for seven common bathing challenges for older adults. Forty-threeparticipants navigated independently to respond to the DSS questions twice over a one-week period, while observed by a research assistant. Half of the participants (n=22; 51%) received “product recommendations” from the DSS on both visits, of which 50% had full (n=6) or partial (n=5) agreement. Almost all participants (n=42; 97.7%) received “advice recommendations”, and 93% had full (n=17) or partial (n=23) agreement. In general, the system was perceived as easy to use, although usability issues were noted mostly in relation to the environmental measurements taken. In conclusion, our findings suggest that refining eligibility for DSS self-navigation, additional supports, and changes to the DSS could facilitate system usability and improve stability of recommendations.
57. Olfactory e-Training: Feasibility of a Technology Based Intervention for Cognitive Decline

presented by Jamie Knight, University of Victoria

Research suggests that olfactory pathways are highly sensitive to neurodegenerative changes. Due to easy detection of changes using olfactory tests, olfactory degeneration may be an excellent early indicator of cognitive decline and dementia. With no known cure, early indicators of cognitive decline and dementia are crucial. We reviewed existing literature examining olfactory neuroanatomical pathways, relationships between cognition and olfaction, and olfactory training programs. Findings indicated (1) olfactory decline precedes onset of cognitive impairment by 5-15 years, (2) olfactory and cognitive scores fluctuate together, and (3) improvements in olfaction occur after olfactory training. No study has yet examined the impact of olfactory training on cognitive performance. This review suggests that olfactory degeneration precedes cognitive decline. Since olfactory and cognitive scores fluctuate together, and olfaction can be improved through olfactory training, this study presents justification for development of olfactory e-training programs aiming to diminish cognitive decline in older adulthood.

58. Perceived needs for mobile robots for telepresence and activities of daily living assistance

presented by François Michaud, Université de Sherbrooke

This poster presents results from a descriptive qualitative inquiry about perceived needs for mobile robots for telepresence and activities of daily living assistance. The objectives of these interviews were to gather the perspectives of potential users of mobile telepresence and social robots on their potential uses, benefits, concerns about their use, and feedback regarding the functions, performance, and appearance of robots already in development. As part of WP3.1, elderlies and managers of seniors' Chartwell residences in Québec and Ontario participated in group or individual interviews. The key emerging uses of the robot were to facilitate daily tasks (e.g. cleaning, personal hygiene), to provide a presence for single people, during convalescence or showing signs of dementia. Social robots should be small, easily programmable and interactive. A humanoid appearance was not deemed necessary, but the aesthetic side of the device was of concern. Affordability of the devices were also mentioned.

59. Perspectives on information and communication technologies (ICT) for daily activities and social inclusion among older Canadians with cognitive impairments and their caregivers

presented by Amélie Gauthier-Beaupré, University of Ottawa

This project explores perspectives of older adults 55 years and older with cognitive impairments and their caregivers on ICT access and use. Semi-structured interviews are conducted with older adult ICT users and non-users, and caregivers, to explore and identify 1) perceived, valued, and real opportunities for ICT to support daily activity participation and social inclusion, and 2) perceived and experienced challenges, concerns, and enablers for ICT access and use. Participants, 30 targeted from each of three groups, are recruited from Toronto, Ottawa and Montreal. Eight older adult users, two older adult non-users, and 16 caregivers have been interviewed so far. Thematic analysis is in progress and preliminary themes are pending. Understanding these users’ perspectives can help to better orient development of sustainable services and supports for this population and to advance policies to enable Canadians’ daily activity participation and social inclusion through better access and use of ICT.
60. **PhotoFlow: Designing for Family Picture Reminiscence with Older Adults**  
*presented by Benett Axtell, University of Toronto*

Sharing memories from family pictures is an enjoyable and important social activity, especially for older adults. Managing these collections, however, is a time-consuming and effortful process. As these collections continue to grow, it is increasingly difficult to simply browse pictures and share memories, especially digitally. Such easy and enjoyable activities, traditionally done with simple photo albums, are split into separate digital processes for storage and reminiscence. Our Contextual Inquiry into older adults’ reminiscence and interactions with family pictures reveal that there is no digital equivalent to current photo-prompted storytelling activities and that structured picture organization tools limit storytelling. Our tool, PhotoFlow, focuses on free-flowing, speech-enabled storytelling by using the oral reminiscence to organize family picture collections through that enjoyable social activity rather than manual tagging. This novel interaction brings activities of browsing, reminiscing, and organizing pictures back together into a simple, digital, and social process.

61. **Potential for wearables and self-management apps in COPD: a qualitative study**  
*presented by Robert Wu, University of Toronto*

Acute COPD exacerbations lead to diminished quality of life, and higher mortality, which can be prevented with increased self-management. A wearable to detect early exacerbations, paired with a self-management app can provide patients with feedback on their symptoms and tools to manage them. However, these tools are only effective if they are used. We conducted semi-structured interviews to explore how a self-management tool could help them, and what they would find easy to use. We interviewed 14 COPD patients, interviews were 45 minutes to 1 hour in length. Half of participants were female and average age was 69 years. We found that patients with COPD face challenges managing their condition, they often did not have an action plan and many wanted more knowledge of COPD. Participants felt that a wearable that monitored their symptoms could provide a sense of security and a self-management app could alleviate some of their challenges.

62. **Predicting conversion from Mild Cognitive Impairment (MCI) to dementia using two types of technology: preliminary data**  
*presented by Madison Cohen-McFarlane, Carleton University*

**Background:** ERPs and computer-based card sorting have been able to differentiate between healthy older adults and older adults with cognitive impairment. What has not been determined, is how these tests change over time and if their results can be used to differentiate between persons whose cognition will likely stay stable, vs. those likely to decline. **Objectives:** Our study intends’ to explore ERP variabilities in subjects with MCI using the NeuroCatch™ Platform (NCP), and the Cognigram® card sorting software, to assess their respective capacities to detect cognitive decline, and predict conversion to dementia in 30 MCI subjects over 3 years. **Approach:** We will conduct NCP and Cognigram and a number of cognitive tests at baseline, 6, 12, 24, and 36-months for MCI participants. We will compare the abilities of NCP and Cognigram to predict decline in cognitive testing. **Finding:** Comparative baseline data of NCP and Cognigram and MoCA results will be presented. **Conclusions:** Prospective longitudinal validation would increase confidence in using NCP and/or Cognigram in a clinical setting for the assessment of MCI subjects, allow early capacity for predicting future clinical outcomes, and help develop preventive
therapeutic strategies.

63. Promoting quality of life through creative and collaborative music-making with an assistive digital music technology  
*presented by Andrea Creech, Laval University*

This research explores the use of an assistive music technology (Soundbeam) in creative arts-based approaches to enhancing the quality of later-life. The Soundbeam uses motion sensors to translate body movements into music and sound, enabling both touch and touch-free interaction in unlimited musical styles. The feasibility of such technologies as tools to support creativity and quality of life amongst older people in assisted living contexts remains under-researched. Accordingly, we aim to improve the lives of Canadian seniors by: 1) engaging seniors in creative social practice through music and sound, by developing novel musical practices and artefacts using the Soundbeam; 2) fostering creative musical collaborations, learning, and play that harness the potential of an assistive music technology within later-life contexts; and 3) exploring the feasibility of the Soundbeam as a tool that can contribute to enhanced quality of later-life. Our project will therefore make an original contribution to knowledge concerning.

64. Science and Technology for Aging Research (STAR) Institute  
*presented by The STAR Institute Team*

Collaboration and partnerships amongst various stakeholders is critical in developing technological innovations that will be responsive to older adults needs within society. In response to this, the STAR Institute has developed partnerships and projects with the mission to support optimal healthy living, develop talent and stimulate technology innovation. The STAR Institute is proud to recognize their partnerships with the Canadian Institutes of Health Research (CIHR) – Institute of Aging, the work with Mitacs Canada, the Canadian Consortium of Neurodegeneration in Aging (CCNA) and AGE-WELL, and is excited for the future collaboration with Singapore University.

65. Soundscape and Dementia  
*presented by Arezoo Talebzadeh, OCAD University*

Noise is an important sensory trigger in any environment, especially in unfamiliar settings. Sound is impossible to be ignored, and any disturbing noise or constant sound can be agitating, disturbing, and confusing for people who cannot escape the environment. People with dementia may already feel strange, isolated and captivated inside care facilities; uncontrolled sound can add to their anxiety and agitation. Recently, there has been interest in sound mapping and soundscaping of care facilities, however there is a lack of research specific to dementia care units. Soundscape refers to human perception of sonic environment in context, it is not only relying on the subjective quality of sound through measurement of sound level, but also objective quality based on people perception. This study aimed to develop a soundscape of dementia care unit at Toronto Rehabilitation Institute through data collection and observation, and to evaluate the quality of soundscape in the unit.
66. **Staff Perceptions of Facilitators and Barriers to iPad Implementation in Long-Term Care**  
*presented by Morgan Steele, Ontario Shores Centre for Mental Health Sciences*

Touch screen games can provide independent engagement or shared play in long-term care. Sustainability requires buy-in and support from management and adoption by staff. Here, we examine staff perceptions of facilitators and barriers to iPad game implementation in long-term care. A 5-day implementation period was facilitated during which staff were invited to play iPad games with the residents of a dementia care unit. Post-implementation interviews were conducted with the staff members to determine perceived barriers and facilitators to iPad play. Staff were then invited to continue to playing iPad games with the residents over the next month. A follow-up interview was then conducted to further identify facilitators and barriers to gameplay. Thematic Analysis of the staff interviews illuminate barriers and facilitators in long-term care for successful implementation. The findings also deliver practical processes for introducing and supporting touchscreen apps in long-term care, creating guidelines for other service providers.

67. **Stakeholder perspectives on user adoption of wander-management strategies**  
*presented by Lili Liu, University of Alberta*

This project aimed to describe the spectrum of risks and wander-management strategies associated with dementia-related wandering. A total of 36 phone interviews from across Canada were conducted with stakeholders including persons with dementia, formal and family caregivers, clinicians, police, and Alzheimer Societies. Questions ranged from strategies that have been used to manage dementia-related wandering, and how the perception of risk, culture, stigma, and geographical location may influence strategy adoption. Overall, a wide range of high and low tech solutions were used or suggested by participants, and factors such as risk, culture, and stigma were considered essential elements to successful adoption of these strategies. Data from this study was used to assist in the development of a conceptual model of wandering that would be used to identify what strategies may be used to mediate the risks associated with wandering.

68. **Supporting Intergenerational Acculturation of Immigrant Families**  
*presented by Amna Liaqat, University of Toronto*

Nearly one million immigrants will move to Canada over the next three years in search of better economic, educational and social opportunities for themselves and their families. Acculturating to a new society presents many challenges. Language is one major barrier. Individuals who do not speak English or French have higher poverty rates, higher unemployment and greater isolation. New immigrants may not be familiar cultural norms, and have a small social circle, leading to isolation from society. What is less visible is how acculturation challenges impact the relationship immigrant parents, and grandparents, have with their children, and how these challenges may alienate older adults from both society and their families. As such, there is a clear need to help new immigrant families navigate the acculturation process to foster healthy familiar relationships. This poster identifies the acculturation challenges faced by immigrant parents and grandparents, and the effects this has on their children.

69. **Teaching and Engaging People with Dementia through Motion-Based Technology**  
*presented by Erica Dove, Ontario Shores Centre for Mental Health Sciences*

Motion-based technologies (MBT) can provide cognitive, physical and leisure activities to people with dementia. However, the ways people with dementia learn to use and engage with MBT are
underexplored. Here we examine the implementation of MBT with people with dementia in terms of learning and engagement. Participants (n=38; mean age=75.4 years; mean MoCA=12.43) played a bowling game on Xbox Kinect 2x/week for ten weeks. Sessions were video-recorded to capture indicators of learning and engagement. Analyzed video recordings were compared pre-, mid and post using paired t-tests. Analysis of the learning data revealed a significant decrease in assistive prompt frequency (p<.000), turn duration (p<.000), and a significant increase in the percentage of independent turns (p<.000). The engagement data (analysis currently underway) suggests that participants displayed high levels of engagement throughout the sessions. These results highlight the benefits of using MBT with people with dementia.

70. The effect of shape and size of handrail on grasping reactions following induced balance loss

*presented by Philippa Gosine, Toronto Rehab – UHN*

Falls are a major cause of injury and 13% of older adults' injurious falls occur on stairs. Handrails are effective tools to prevent a fall on stairs. However, the effect of handrail cross-sectional design on grasping reactions during balance loss is not well understood. The objective of this study is to classify younger and older adults' grasping reactions of handrails of different shapes and sizes during induced balance loss. Healthy older and younger adults experienced perturbations in the forward and backward directions in increasing intensity until they were no longer able to successfully recover their balance. Handrail force, grasp type, grasping errors and comfort ratings of several handrail cross-sections were determined. Preliminary results indicated that grasping type and error rates were dependent on shape and size of the handrail. By providing evidence about how handrail characteristics affect grasping reactions, we can inform building code regulations to reduce injuries on stairs.

71. The positive effects of caregiving for family caregivers of older adults: A scoping review

*presented by Alex Pysklywec, Centre de recherche interdisciplinaire en réadaptation du Montréal métropolitain (CRIR)*

A scoping review was conducted to gain an understanding of the positive effects of family caregiving for carers of older adults and to explore how technology can enhance these positive effects. Twenty-seven studies published after 2000 were reviewed. A data extraction table was created documenting the participant characteristics, study objectives, methodology and relevant results. These results were coded and thematically analysed. Our analysis found that the positive effects of caregiving are relational to the caregiver. Three themes emerged: the relationship the caregiver has with one’s self, with the care-recipient, and with other people. Several factors shape these positive effects for example the care-recipient’s condition and the duration of the caregiving episode. No studies addressed the role of technology. With an awareness of the positive effects of caregiving, technology can be developed to enhance these positive effects.

72. Three-Dimensional Finger Trajectory Models to Understand Touch Interaction Difficulties of Older Adults

*presented by Afroza Sultana, McGill University*

Many older adults encounter selection difficulties while interacting with handheld touchscreen devices (e.g., tablets, smartphones). Results from mouse trajectory sub-movement analysis with both able-bodied, and motor impaired users implied that similar analysis of finger trajectory sub-movement from older adults may help to understand the reasons behind age-related target
selection difficulties with touch interaction. This poster presents three-dimensional finger trajectory sub-movement models for older adults that are extended from the two-dimensional mouse trajectory sub-movement models. These three-dimensional finger trajectory models not only aim to indicate the presence of any selection difficulties, but also aim to understand why such difficulties occur (e.g., longer selection time because of too many selection re-entries, slipped or missed target selection because of too much or too little pressure applied on the touchscreen). Understanding the reasons behind user-specific selection difficulties will work as a stepping-stone towards designing adaptive and customized accessible touchscreen interfaces for older adults.

73. Touchscreen Gameplay in Chinese-speaking People Living with Dementia

*presented by Yuhan Pan, Ontario Shores Centre for Mental Health Sciences*

While approximately 3.25% of all Canadians speak the Chinese languages, few dementia interventions have focused on this population. This study examines how Chinese-speaking people with dementia learn to play tablet games over time, and the types of games that interest them. Chinese-speaking participants with dementia were recruited from long-term care facilities. In Part one of the study, participants were assigned to play either a familiar game or an unfamiliar tablet game. Video recordings were collected and analyzed using behavioural coding software to identify learning and indicators of engagement. In Part two of the study further participants were recruited to explore their game preferences using a selection of traditional and new games. The results indicate that Chinese participants learn to play and are engaged by digital games. The findings provide guidance on creating a repertoire of activities for residents of Chinese heritage in long term care facilities.

74. Towards Guidelines for Using Face Tracking Technology to Study Orofacial Impairments

*presented by Andrea Bandini, Toronto Rehab – UHN*

The combination of depth sensors and face alignment algorithms is an affordable alternative to the expensive marker-based techniques currently used in the objective assessment of speech and orofacial impairments. Measuring the performance of 3D video-based approaches is essential to provide guidelines for the optimal use of the technology. In this work, we assessed the optimal range of distance from the camera for studying facial movements, using a depth sensor specifically developed for face tracking applications. Moreover, we compared the performance of five face alignment algorithms in tracking facial movements in healthy subjects and patients with orofacial impairment due to stroke. The results showed that the optimal range for face tracking applications is 300-600 mm, with face alignment based on convolutional neural networks that outperformed the other approaches. These results support the use of this technology studying orofacial movements in patients with neurological diseases and healthy older adults.

75. Training Caregivers to Prevent Back Injuries

*presented by Megan Kamachi, University of Toronto*

Family caregivers frequently suffer from lower back injuries that result from the awkward postures and heavy loads required to perform on-the-job tasks. Family caregivers assist their loved ones with daily tasks such as toileting, bathing, and bed transfers. This study aims create a multi-component training intervention to improve the postures of caregivers, which will reduce the prevalence of back injuries. In this study, a training intervention using PostureCoach LITE will be
evaluated. PostureCoach LITE is a wearable device that measures the user’s lower back flexion angle and provides immediate vibrotactile and auditory feedback when the angle is too high, which is when the user is at a high risk of injury. This study involves the evaluation of a caregiver training program including a back-injury prevention educational video and PostureCoach LITE to determine its effectiveness on long-term retention of the use of safe postures.

76. Transdisciplinary design of use cases using the BIT model to develop a system for monitoring the use of tilt-in-space wheelchairs

*presented by Austin-Didier Tran, Université de Sherbrooke*

Tilt-in-space wheelchairs perform many functions. There is, however, a significant gap between the use of the tilt as prescribed by clinicians and its actual use by users. The objective of this study is to develop a prototype of a system monitoring the use of tilt-in-space wheelchairs. We formed a team from across the fields of rehabilitation science and engineering. We then reviewed the literature on the different functions of the tilt-in-space wheelchair and the behaviour change techniques to be recommended in an eHealth intervention. A series of use cases were developed based on the Behavioral Intervention Technology model: data entry of clinical recommendations and user/caregiver preferences; synchronous alerts to the user/caregiver; transmission of results to the user/caregiver and the clinical team. This monitoring prototype is unique given that installation can be done without permanent modification on any model of tilt-in-space wheelchairs.

77. Understanding and Advancing Canadian Policies to Enhance Access to Assistive Technology

*presented by Natalia Zdaniuk, University of Toronto*

Assistive technology (AT) can compensate for limitations and enhance activity performance and participation. However, AT access remains challenging, raising equity concerns for those in need (e.g., older adults and/or people living with disabilities). Our objective was to conduct qualitative interviews with a purposive sample of policymakers and stakeholders from across Canada to identify AT funding/service gaps, and ethical, social and policy issues and priorities. Interview questions explored participants’ perceptions about policy, service and funding gaps, extent and sources of unmet needs, enablers and barriers to AT access for different consumers, ethical and social issues relevant to inform policy for equitable access, and proposed solutions. We conducted 29 interviews, which we thematically analyzed using a constant comparative approach. Data analysis is in progress, but will be completed by the time of the conference. Our findings will ultimately inform efforts to align policies for improving AT access.

78. Usability testing of a mHealth application and internet portal for managing chronic arthritis and joint health

*presented by Weina Jin, Simon Fraser University*

This study aims to evaluate the mobile application LiveWith Arthritis Plus (LWAP) designed and developed by eTreat Medical Diagnostics Inc. (eTreatMD). The goal is to ensure that the device's user interface has been designed so that user errors that occur during use of LWAP that could cause. The intervention of the study is the LWAP mobile application. The application performs digital image processing that spatially calibrates the image, locates hand fiduciary features, and quantifies hand features to identify abnormal distal and proximal interphalangeal joints. It also enables users to self-manage their conditions by recording data of their daily lifestyles.
The proposed study procedure is as follows: 1) application installation; 2) training; 3) use scenarios and critical tasks. The project is currently at the recruitment stage, and we will report the primary results by the conference date.

79. User perceptions of sensor-based wheelchair skill training games

*presented by Ed Giesbrecht, University of Manitoba*

Serious gaming is an emerging resource to improve and maintain health and participation among Canadian older adults. Use of mobile devices (mHealth) for learning and practicing wheelchair mobility skills can incorporate gaming to increase engagement and persistence, with greater flexibility compared to console type games. To optimize the training benefit and user experience, Bluetooth sensors can be mounted on the wheelchair to control gaming activity. This mixed-methods study investigated perceptions of older adult novice \( n = 9 \) and experienced \( n = 4 \) wheelchair users playing training games with and without sensors. Quantitative evaluation of each game, using the Player Experience of Need Satisfaction (PENS) questionnaire, and content analysis of qualitative semi-structured interviews are reported, highlighting constructs of immersion, competence, autonomy and intuitive control. Older adult participants provided specific insights into the feasibility and structure of wheelchair-based video games, affirming their application as a strategy for skill development as well as a leisure activity.

80. User-centered study design protocol for an exergaming technology for older adults in long-term care

*presented by Charlene Chu, University of Toronto*

User-centered design (UCD) is an important methodology to ensure that technological innovations meet the needs of end-users. Exergaming platforms that aim to support active and healthy aging are available, but few have applied UCD to iteratively co-design exergames with older adults in long-term care homes (LTCHs). This poster describes the usability study protocol to develop an innovative exergaming technology designed for older adults in LTCHs. Two rounds of usability testing will be conducted in two LTCHs with older adult residents, their families, administrators and healthcare professionals \( N = 70 \). The talk-out-loud method, interviews, and validated standardized measures will be applied to gauge usability, functionality, acceptability, accessibility, enjoyment, and design of the exergame. Results will be used to refine this exergaming technology to promote older adults’ physical activity and cognitive stimulation, and may also have important implications for future exercise-promoting technologies for older adults.

81. Using artificial intelligence to augment caregiver search quality and confidence in the CARE-RATE web-search tool

*presented by Ben Eyre, University of Toronto*

Caregivers of people living with dementia have ever-changing information needs, requiring highly specialized, individualized, and reliable knowledge. Artificial intelligence can be a useful tool in facilitating the complex and onerous search tasks performed by carers; however, in order to properly benefit from such tools, users must trust the system’s judgements or recommendations. We present augmentations to CARE-RATE, a web-search tool for carers of people living with dementia, to incorporate uncertainty into our algorithms and to transparently present uncertainty in search results so as to increase users’ trust in the system. Specifically, this involves re-ranking search results using the confidence level from classifying web pages according to the user’s
specific needs, then proceeding to iteratively refine results as the user’s need is clarified through the interactive search process. The next stage in our research is to evaluate this approach through user testing and also using a large web search corpus.

82. Validation of a Machine Learning Method for the Analysis of Public Health Data

*presented by Ali Arab, Simon Fraser University*

Rates of dementia are increasing rapidly and there are no current solutions to address this epidemic. It is hoped that behavioral changes through lifestyle activities can delay the onset of dementia, but current experimental models are limited and don’t allow us to understand the benefits of such activities. We hypothesized that machine learning (ML) coupled with specific longitudinal studies could allow us to investigate this question. Here, we developed a machine-learning algorithm that analyzed longitudinal health data and identified similar clusters of seniors who either implemented a lifestyle change or who did not. Our results first validated this method by confirming past results of the literature. Then, our exploratory analyses revealed that increasing participating in education, art, or music classes also led to improved cognitive health. These early findings validate the use of ML as a valid method and indicate that lifestyle changes can result in seniors’ cognitive health improvements.

83. Wellness App Rating Scale

*presented by Peyman Azad-Khaneghah, University of Alberta*

Over 300,000 wellness apps are available online through app stores. However, the majority of these apps are not classified as medical devices and hence are not subjected to legislation and guidelines. With no regulation, low quality and harmful apps may exist on the app markets. It is challenging for patients, clinicians, and other end users to identify good quality apps that meet their needs. We have created a rating scale based on the quality criteria from technology acceptance models, mobile app evaluation frameworks, and app users’ opinion. The scale is used to rate: privacy, security, trustworthiness, usefulness, ease-of-use, user engagement, aesthetics, customizability, functionality, and affordability. The scale can be an educational tool to teach users (e.g., older adults) what characteristics to consider when they seek wellness apps. The scale can also help users rank different apps based on quality indicators.
1. The privacy of persons with cognitive disabilities when using IT: why should we care?

   presented by Hajer Chalghoumi, University of Ottawa

   Information Technologies (IT) can help persons with cognitive disabilities deal with cognitive demands (i.e., information storage and easy recall, and communication), and may therefore substantially enhance their functioning and independence. However, persons with cognitive disabilities are among the most vulnerable to privacy threats, such as cyberbullying, financial fraud and sexual exploitation online. IT developers play a crucial role in making technology respectful of the privacy of the end-users. Yet, the majority of the security measures they implement increase the complexity of the technology and make it difficult to use for persons with cognitive disabilities. In addition, IT developers often have limited knowledge of cognitive disabilities and how to protect their privacy, leading to ill-informed practices that create a dilemma between protecting privacy (through strong security measures) and ensuring technology usability. As part of the cybersecurity awareness month, this talk will present lessons that our team learned on how to balance privacy protection and usability within the AGEWELL WP8.3 project.

2. Uncovering Needs of Chinese Seniors as Tablet Users

   presented by Yuhan Pan, Ontario Shores Centre for Mental Health Sciences

   Many of us can master a new tablet game fairly easily, and often take this privilege for granted. However, operating the tablet and learning those games may be difficult for someone who has cognitive impairment. Thus there are many factors to consider when designing and choosing accessible tablet games for people living with dementia. This presentation will highlight the process of identifying user needs of people with dementia for playing tablet games, players' preference, and interaction with the games. While approximately 3.25% of all Canadians speak the Chinese languages, few dementia interventions have focused on this population. Chinese-speaking participants with dementia were recruited from long-term care facilities. They were invited to play a tablet game three times over a 7-day period. In Part one of the study, participants were assigned to play either a familiar game or an unfamiliar tablet game. Part two of the study explored participants' game preference amongst selections of two or four games. Video recordings were collected and analyzed using behavioural coding software to look at learning and indicators of engagement. The results identified features that make games accessible for Chinese-speaking people living with dementia and strategies for introducing tablets to them. The findings also provide insight into the types of activities people enjoy and guidance on how to choose accessible games for people with dementia which can inform future developments of games and other apps.

3. Harnessing the Power of Community in Empowering Carers

   presented by Andrew Magnaye, University of Alberta

   For the 5.4 million caregivers in Canada caring for an older adult (aged 65 and over) with a long-term health problem, disability or age-related condition, time is a valuable resource. These caregivers spend at least 44.2 million hours in an average week on care. Given the significant impact on carers’ employment, health, social and financial well-being, carers are often viewed through a lens of deficit, isolation and need. Our project instead sought a new perspective of caregivers as a powerful, goal-oriented community ready to be heard, seen and empowered. In our recent online survey on enhancing caregiver well-being, more than 700 caregivers from across Canada told us about their own personal goals and priorities. Caregivers painted vivid pictures of how they envisioned nurturing their own physical, mental, emotional and social health – their top ranked goal areas. While almost 60% of carers were interested in using digital technology to support their caring, several barriers to adoption were identified including a belief
that technology will not help them achieve their main goals. Involving carers meaningfully in all stages of the development process, from problem identification to product design and testing, addresses these issues. Leveraging the engagement of those in attendance, this Science Slam presentation will demonstrate the power in listening to and then building collaborative, multi-stakeholder networks around caregivers’ self-reported goals. Partnering with Huddol, Canada’s first bilingual collaborative network for caregivers, we will show the scalable impact of co-creating solutions to caregiver’s greatest health and wellness challenges.

4. Teaching and Engaging People with Dementia through Motion-Based Technology
   presented by Erica Dove, Ontario Shores Centre for Mental Health Sciences

   Background: Motion-based technologies (MBT; e.g. Xbox Kinect) can be used to provide cognitive, physical and leisure activities to people with dementia. However, to do so requires an understanding of how to introduce, teach and support people with dementia to use MBT, as well as an understanding of the ways people with dementia engage with MBT. Here we examine the implementation of motion-based group activities for people with dementia in terms of learning and engagement. Methods: Participants (n=38; mean age=75.4 years; mean MoCA=12.43), recruited from three adult day programs, were invited to play a digital bowling game on Xbox Kinect twice per week for ten weeks. All sessions were video-recorded to capture aspects of learning such as assistive prompt frequency, independent turn completion, and turn duration, and categories of engagement such as active, passive and non-engagement. Video recorded were analyzed using behavioral coding software and compared pre-, mid and post-group participation using paired t-tests. Results: Analysis of the learning data revealed a significant decrease in the frequency of assistive prompts required (p<.000), turn duration (p<.000), and a significant increase in the percentage of independent turns (p<.000). Analysis of the engagement data, while currently underway, suggests that participants displayed high levels of engagement throughout the sessions, which was evident through actions such as clapping, cheering, and conversing. Discussion: People with dementia can learn to use MBT and enjoy doing so in a group setting. These results highlight the feasibility of implementing MBT in adult day programs.

5. Dementia and mild cognitive impairment at work
   presented by Karan Shastri, University of Waterloo

   Work and engaging in activities give people a purpose in their lives. When people are not able to work due to a disabling condition like dementia, it takes away their sense of purpose and contribution to the society. There are around half a million people living with dementia in Canada, about fifteen to twenty percent of this population is diagnosed with early onset dementia. Assistive technology is playing an integral role in supporting people with dementia; however, the emphasis is on security, care, and safety. Often in the early stages of dementia, the person is high functioning and retains sufficient skills garnered from years of employment experience. Dementia@Work is a digital tool being created for employees with different dementia/MCI diagnosis and their employers to collaboratively identify and develop strategies to support the individual’s vocational goals in sustaining paid work. The goal of this research is to identify, create, and evaluate functionalities for the Dementia@Work tool that enable it to support different abilities of employees living with early onset dementia and mild cognitive impairment. The transdisciplinary, international research will also explore the meaning of work as part of occupational and social life for people with early onset dementia/MCI, their families, as well as employers of people with dementia/MCI, as they relate to the experience of dementia/MCI in the workplace.
1. **Analysis of the effect of holding and grasping objects on risk for head impact during falls in older adults captured on video**  
*presented by Vicki Komisar, Simon Fraser University*

Falls account for nearly 80% of traumatic brain injuries in older adults, and head impact occurs in one-third of falls in long-term care (LTC) residents. Grasping objects while falling may affect upper limb fall arrest strategies and risk for head impact during falls. We analyzed videos of 1238 real-life falls from standing-height in LTC residents, to determine whether falling with the hands free versus grasping objects affected the odds of head impact. Holding weight-bearing objects (chairs, tables, counters, walkers, handrails, wheelchairs, canes, other people, or equipment) at the onset of a fall was associated with reduced odds of head impact (odds ratio=0.666; 95% confidence interval=0.528-0.840 by Chi-Square analysis). Conversely, holding non-weight-bearing objects (e.g., cups, purses, magazines, toys, clothing) or hand(s) in pockets increased odds of head impact (1.464; 1.071-2.001). Odds for head impact were decreased by maintaining grasp during descent of weight-bearing objects (0.554; 0.393-0.781), and increased by maintaining grasp of non-weight bearing objects, during backward falls (4.583; 1.235-17.008). Successful attempts to reach and grasp weight-bearing objects after loss of balance (e.g., chairs/wheelchairs (n=48), walkers (n=14), handrails (n=11), other people (n=10), and tables/counters (n=10)) decreased odds for head impact (0.558; 0.348-0.893). Our results can inform strategies to reduce the consequence of falls, by showing that odds for head impact during falls in LTC residents were strongly influenced by holding objects, the nature of the object, and whether the object was maintained or released during descent.

2. **Designing the Future of Conversational Interfaces with Older Adults**  
*presented by Benett Axtell, University of Toronto*

Older adults can face many barriers to technology use, limiting their ability to connect with the world. At the same time, various technologies are being heralded as support tools for older users, such as Amazon Alexa and other conversational agents. Yet, use of these speech-based tools are low, especially for older adults, and despite all the recent technology advances, we are still mostly using the existing conversational devices as mere voice-enabled vending machines. Our research works with underserved users, like older adults, leading to novel and diverse opportunities for speech interactions that expand the possibilities of speech-enabled tools and improve the experience for all users. New interactions like organizing and browsing family pictures and supporting social family read alouds have larger applications to the vast world of speech interactions - from the advancement of how speech is processed by computers to how museums are making their exhibits more accessible. In this slam we will present several user-centred design methods that we have developed in our AGE-WELL research on conversational interfaces for older adults. These illustrate how involving older users in the design process not only improves their adoption of such novel technologies, but improves the user experience for broader populations.

3. **Driving the prevention of fall-related brain injuries in older adults with a falling dummy**  
*presented by Karam Elabd, Simon Fraser University*

**Introduction:** Falls are the number one cause of injury among adults over age 65, including 80% of traumatic brain injuries. In the long-term care environment, 37% of falls lead to head impact, and the back of the head is the most common site for impact. Our project involves the development of novel testing methods that improve on existing approaches to simulate the dynamics of head impacts in falls, for evaluating the benefit of interventions for protecting the brain of older adults during falls. **Methods:** A dummy was developed to simulate the dynamics of
successive contact to the pelvis, torso and head during backward falls, and evaluate the effect of floor stiffness on head impact severity. The dummy includes a Hybrid III head and neck, and an array of nine accelerometers for measuring linear and rotational accelerations of the head. To guide the design of the dummy's torso, measures were made of the time-varying geometry of the torso during backward falls. A segmented model of the torso was developed based on digitized video footage of real-life falls. Results: A first iteration of the dummy was built and used to examine the effect of floor stiffness on peak head accelerations during falls on a linoleum floor and a stiff foam floor. When compared to linoleum, with rigid foam the peak resultant linear acceleration was 39% lower (p = 0.007), and the peak angular acceleration was 29% lower (p=0.039). Currently, efforts are improving the match between the dummy and real-life falls.

4. **Examination of the role of vision in coordinating body movements during falls**
   *presented by Nataliya Shishov, Simon Fraser University*

Falls are the number-one cause of unintentional injuries among older adults in Canada. Visual impairment is a leading risk factor for falls and fall-related injuries. We are examining how vision contributes to injury risk during falls, by analyzing real-life fall videos in older adults, and by using eye tracking technology to determine “where people look” during falls in the laboratory environment. We will probe the validity of a conceptual model based on evidence that humans draw upon a repertoire of protective movements (“safe landing” responses, such as upper limb fall arrest) to avoid injury during falls, and tailor these responses based on visual information of the situational demands of the fall (e.g., falling in a crowded versus empty room). Based on analysis of 515 videos of forward and sideways falls in older adults in long term care, we found an association between visual disease (cataract, macular degeneration or glaucoma) and head impact during falling (X²=5.08,p=0.024). In 154 falls where contact occurred to a nearby object, individuals with visual disease had 2.3-fold higher odds for head impact than individuals with intact vision. Guided by these observations, we are conducting lab experiments with young adults, to monitor gaze behaviours with eye-tracking technology, and determine how vision contributes to body movements while falling in different environments. This research should inform improved screening and visual training techniques for the management and prevention of fall-related injuries in older adults.

5. **Investigating the feasibility of smart activity trackers for research use by older adults**
   *presented by Ben Kim, University of Waterloo*

This study investigated older adults’ use of wrist-worn activity trackers to assess their feasibility for gerontological research. A secondary data analysis was conducted of a smart activity tracker dataset that contained ~3 weeks of accelerometer data (range 19 to 28 days) collected from Xiaomi bands worn by 19 community-dwelling participants aged 55 and older (mean age 64; 11 female). Use of the devices was assessed by examining device wear and non-wear time, using a validated wear and non-wear detection algorithm. On average, participants wore the smart activity tracker for 21.8 days and 93.6% of the day (1348.2 minutes), ranging from 57.8% to 100.0%. Daily wear time was at the lowest on the first day at 73.3% (1055.4 minutes); the highest on day 7 at 93.6% (1347.7 minutes). This study provides support for future use of smart activity trackers in gerontological research.
1. **Brain Fitness APP for Aging with a Healthy Brain and Detecting Cognitive Declines**  
*presented by Zahra Moussavi, University of Manitoba*

While currently there is no cure or “vaccine” against dementia, there are hopes to delay the onset or progression of the disease by living a brain-healthy lifestyle. In this study, we developed 7 games in a Brain Fitness App based on the premise of brain plasticity, targeting spatial orientation, associative memory and short-term memory that are known to decline with normal aging and dementia. Twenty cognitively healthy individuals (69.8 ± 5.9 yr) and 20 (68.9 ± 8.2 yr) with mild cognitive impairment (MCI) or mild stage of Alzheimer’s were enrolled in the study. Cognitively healthy participants used the App at home at their own pace but were advised and encouraged to use it daily. The MCI/Alzheimer’s group mostly (n=15) used the App in a supervised manner (with a tutor) 5 day/week for 4 consecutive weeks, two blocks of 30 minutes per day with half an hour break in between. The tutors were 5 different young students. The assessor also helped with tutoring one of the participants. The remaining 5 of the 20 in this group used the App at home with the help of their caregiver. The cognitive function of both groups’ participants was assessed by using WMS-IV at baseline and immediately post-intervention. Half of the healthy group was assessed at two baselines to establish the practice effect on the WMS-IV score. The results of the healthy group, on average, indicate a significant improvement in cognitive functioning from baseline to post-intervention; however, not significant when accounting for the practice effect of the WMS-IV test. For the MCI/Alzheimer’s group, we did not expect any practice effect for the assessment and that was apparent among the 4 individuals who used the App at their home with their caregiver at their own pace (less regimented and less frequently); they showed no difference in scores after the intervention. However, the group who were tutored showed a significant improvement post-intervention. The total score of their WMS-IV test increased by 22.6 on average (p<0.02, paired t-test). Having a tutor may be considered as a placebo effect for the main effect. While we believe the observed improvement is beyond the placebo effect (2 participants did not improve despite enjoying their sessions), we believe especially for MCI and Alzheimer’s individuals having a tutor for brain exercises and having a regimented tutoring/learning is the key for the brain exercises to be effective in improving the cognition. The results of the healthy group also indicate that when individuals use brain exercises at their own pace, the majority do not challenge themselves and do not use the games as frequently as instructed; thus, not surprising that those individuals do not benefit as much from any brain exercises. Our results, overall, indicate delivery of brain exercises by a personal trainer (tutor) can be the key for a beneficial outcome.

2. **Online Assistive Technology Rating and Recommending System for Caregivers**  
*presented by Jennifer Boger, University of Waterloo & Ian Goldman*

Caregivers of people living with dementia need to find accurate, current, and trustworthy information to support themselves and their care partner’s particular situation. CARE-RATE is an online tool that leverages artificial intelligence to perform customised, iterative searches to help caregivers find the information they are looking for more quickly and easily. Developing CARE-RATE has involved intensive consultation, participatory design, and crowdsourcing to create a tool that reflects caregivers’ needs, perceptions, and abilities. The project began with focus groups that identified key challenges faced by caregivers when seeking online information: 1) finding situation-specific information; 2) locating relevant and trustworthy information, and; 3) connecting with other caregivers. Using these themes to guide development, we established an advisory committee of eight members (six current or past caregivers and two Alzheimer Society staff) to collaboratively engage in several design stages: 1) create scenarios for testing phases; 2) design an interface that supports the evaluation of trust and credibility of information; 3) define the crowdsource task; and 4) preliminary testing the CARE-RATE prototype. We are currently...
working with caregivers globally through a crowdsourcing task to create (to our knowledge) the first caregiver-labelled dataset of online information. Upcoming work includes piloting CARE-RATE with 20 caregivers in the community prior to deployment of CARE-RATE to the internet for testing and eventual use by caregivers around the world. In addition to presenting research results, we will discuss the process of involving the advisory committee and caregivers as partners in the design and development of CARE-RATE.

3. **The associations between injury patterns and the mechanics of falls by older adults captured on video in long-term care homes**  
   *presented by Yijian Yang, University of British Columbia*

**Background:** Falls are common in older adults, and while most do not cause injury, the cumulative toll makes falls the number one cause of unintentional injury. A better understanding of how risk for injury depends on the mechanics of the fall should inform improvements in prevention. In this study, we analyzed video footage of falls experienced by older adults in long-term care (LTC), to determine how fall height, fall direction, and protective responses associate with risk for injury during falling.

**Methods:** Between 2007-2018, we video-captured 2146 falls by 591 residents (mean age=83.3 (SD=8); 58% female) of two Vancouver-area LTC facilities. We analyzed videos using a structured, validated questionnaire, and used Generalized Estimating Equations to test for associations between fall characteristics and injury patterns. **Results:** 35% of falls resulted in at least one injury, and 3% resulted in “serious” injury (hospital visit). 35% of injuries were to the head. The odds for injury were increased by falling from standing height or greater, versus a lower height (odds ratio 1.8, 95%CI 1.4-2.2), and for landing forward (3.4, 2.6-4.6) or sideways (1.9, 1.5-2.3) versus backward. Arresting the fall with the elbow(s) decreased risk for head injury (0.1 (0.01-0.85), but not other injuries. Odds for head injury were decreased by rotating backward during descent (0.2, 0.1-0.5), and increased by rotating forward (5.2, 2.3-11.4). **Conclusion:** This study of real-life video-recorded falls in older adults shows that risk for injury during falls depends on fall height, fall direction, upper limb protective responses and rotation during descent.

*presented by Michael Wilson, McMaster University*

**Introduction:** Although research and development of assistive technologies continues to increase, policies on access and procurement have not kept pace - despite growing demands from users. Understanding the ethical challenges underpinning approaches for the provision of assistive technologies is key to informing policy development. The purpose of this scoping review is to identify and map the relevant literature on ethical challenges related to assistive technology access and procurement. **Methods:** We applied Arksey & O’Malley’s (2005) scoping review methodology and in 2017 conducted searches of nine relevant academic databases: MEDLINE; EMBASE; CINAHL; PsycInfo; Sociological Abstracts; AMED; AGELINE; Philosopher’s Index; and the Cochrane Library. In addition, we conducted targeted searches of the grey literature (e.g., CADTH, UN DESA and WHO). **Results:** A total of 6,348 unique documents were retrieved through electronic searches, of which 66 grey literature reports. For inclusion, the documents had to focus on: 1) assistive technology; 2) ethical concepts or frameworks; 3) English language; and 4) adult population. After independent screening by two members of the research team, 84 documents were included in the scoping review. **Discussion:** The majority of the documents reviewed focused on high-income country settings and on neuromusculoskeletal and movement-related functions, as defined by the WHO’s World Report on Disability. Most explored ethical concepts in the literature related to assistive technology access and procurement were justice (56%), autonomy (48%) and equity (42%). Ethical concerns related to privacy (accessibility, informational and decisional privacy) also emerged, with a particular focus on the ethical implications of home surveillance technologies.

2. Practical Guidance for Dementia Technology Development: The Ethical Adoption Concept

*presented by Julie Robillard, University of British Columbia*

Assistive technologies (ATs) are promising in their potential to compensate for cognitive and physical limitations of persons with dementia, reduce carer burden, promote independence and well-being, and manage risks in the environment. Despite these benefits, ATs for dementia remain mostly in the realm of research due to low adoption rates and critical ethical considerations. To close the gap between adoption research, ethics and practice, here we introduce the concept of “ethical adoption”: the deep integration of ethical principles into the design, development, deployment, and ongoing usage and management of technology. Ethical adoption proposes 18 practical recommendations distributed across five pillars which span the technology research and development process: 1) inclusive participatory design; 2) emotional alignment; 3) adoption modelling; 4) ethical standards assessment; 5) education and training. Through the implementation of these recommendations, AGE-WELL researchers and technology developers alike can benefit from evidence-informed guidance to ensure their technology solutions are adopted in a way that maximizes the benefits to people with dementia and their carers while minimizing possible harms.

3. Promoting Social Connectedness through Collaborating on Digital Storytelling and Knowledge Creation and Sharing

*presented by Cosmin Munteanu, University of Toronto*

Older adults (65+) are at increasing risks of being “digitally marginalized” or “digitally isolated”. This results in seniors having difficulties in transitioning their use of essential services to online, affecting key areas: taking financial decisions, understanding health information or accessing health services, staying connected to families, or simply doing online shopping. In our AGE-WELL WP4.3 research we investigate and design interactive, multimodal, and connected technologies,
that are inclusive of older adults’ needs, abilities, and contexts. The aim for these technologies is to address some of the consequences of digital marginalization. We have uncovered several barriers toward the adoption of such technologies: mental models with respect to technology adoption; behaviours and attitudes related to critical decision making; privacy concerns related to accessing information online; and overall cybersafety concerns preventing seniors from engaging with such resources online. To overcome these barriers we implemented several methodological approaches that empower older users and put them in the lead for designing interactive technologies that assist with reducing their digital marginalization and isolation. In this presentation, we reflect on how industry sectors and community practices can incorporate our approaches, designs, and concrete technologies into services and applications that better serve the needs and constraints of older adults.

4. Support/Disrupt: How can we support aging in place in rural and remote Anishinaabe communities?

presented by Louise Jones, Laurentian University

Aging Technologies for Indigenous Communities in Ontario (ATICON) explores the technology needs for healthy aging with Indigenous older adults in the Manitoulin region of Northern Ontario. This research responds to inequitable access to health care and supportive technologies experienced by Indigenous peoples seeking to successfully age in place. Using Indigenous research methodologies and community-based participatory research (CBPR), focus groups and case studies were conducted in four geographically distinct areas of this region. Focus groups (n=40) consisted of open discussion between older adults, caregivers, health care providers, and natural helpers. Case studies (n=4) were constructed through in-depth home-based interviews with older adults and their caregiver(s). Themes emerging from the focus groups were integrated to the case studies using within-case and cross-case analytic strategies. The social and geographic context of the participants were mapped with a focus on identifying protective factors and barriers to healthy aging in place. Key findings from the analyses and mapping exercise highlighted the role of culture, family, and networks of care that helped support aging in place, and outlined the need to consider the impacts of colonial policies, outside government, and organizational regulations when developing assistive technologies. Rural and remote Indigenous communities in Canada can benefit greatly from innovative technology to support aging in place. Understanding the care networks utilized by older Indigenous adults is important for developers, health care providers, and policy makers to take into consideration to ensure assistive technologies are culturally safe and appropriate to support aging in place, without disrupting cultural connections.
1. **Developing User-Centred Digital Supports for Informal Networks that Provide Care for Elders: A Co-Design Approach**  
*presented by Myles Leslie, University of Calgary*

In this paper we describe adjustments to a particular software design process aimed at developing technology to support family caregivers. Our case study focuses on the co-design of a smartphone application to assist caregivers in managing and coping with the work of caring for older adults. We use the specifics of this case study to shed light on the technology development benefits of framing user-centered design (UCD) through caregivers’ goals rather than their needs. We show how this re-framing of the co-design process away from a deficit, or needs-based approach and towards a strength, or goal-oriented approach is central to developing technologies that caregivers are more likely to commit time and resources to learning and integrating into their lives.

2. **Engaging Older Adults in Aging and Technology Projects: Highlights from AGE-WELL Case Studies**  
*presented by Susan Kirkland, Dalhousie University*

Active engagement of older adults throughout the technology research and development process is recognized as a promising practice in generating new knowledge and products relevant to older adults. OA-INVOLVE’s mandate is to research the practices of older adults’ engagement and support researchers, developers and wider community organizations and individuals in achieving the best engagement outcomes. We employ participatory approaches and work in partnership with the pan-Canadian Older Adult Research Partner Group (OARPG) to attain these goals. AGE-WELL affords a unique opportunity to study older adult engagement within its projects. We, therefore, designed a three-phase, longitudinal Case Study project to explore the benefits, challenges and best practices for the involvement of older adults in AGE-WELL projects. Members of the OARPG were involved in this research process by developing research questions; selecting cases; designing interview questions; conducting interviews, and interpreting data and discussing findings. Here, we present the results of phase 1 (semi-structured interviews with researchers and older adults engaged in technology projects) and phase 2 (workshops with researchers) of our case study project. The interview findings are organized into seven themes and three domains which relate to older adults’ engagement in the research process: involvement along a continuum; relational processes; and institutional systems. Further, the results of a SWOT analysis and analysis of the notes from the workshops demonstrate the expertise and engagement challenges at individual, team, institutional and structural levels – thus shedding light on potential opportunities and recommendations for the AGE-WELL Network.

3. **Technologies to enhance cognitive and mental health**  
*presented by Mark Chignell, University of Toronto & Lili Liu, University of Alberta*

WP6.1 has collaborated with end-users, companies, community organizations, and other stakeholders to develop and deploy technologies to enhance cognitive and mental health of older adults. We will present two of these projects: (1) Development of a strategy guide to address dementia-related wandering, and (2) Development of Serious Games for Cognitive Assessment with applications to delirium risk assessment. Dementia-related wandering guide: 3 in 5 Canadians with dementia wander and become lost. In recent years hundreds of intervention strategies have been developed to manage this issue, however no guideline exists to guide end users on the selection of appropriate strategies. The purpose of this project is to develop a conceptual model and guideline that will help stakeholders choose strategies to manage challenging behaviours related to dementia-related wandering. Surveys on antecedent critical
wandering behaviours and semi-structured individual phone interviews were conducted with stakeholders from across Canada. Responses from the surveys and interviews were used to develop a conceptual model and guideline for strategy adoption of wander-management strategies. Overall, a wide range of high and low tech solutions were suggested by participants, key antecedent behaviours were identified, and factors such as perceived risk were considered essential to successful adoption of strategies. Information from this study was used in the development of the conceptual model and guideline. Serious games for cognitive assessment: Cognitive impairment and decline is a major concern in the elderly and cognitive assessment is a potentially important tool in screening for delirium as well as in checking cognitive status in general. We have developed two versions of the Whacamole game, one (based on the Go/No-Go task) that assesses the executive function of response inhibition, and the other that assesses working memory (based on the N-Back task). The Go/No-go game has been used with hundreds of elderly emergency patients and has shown promise as a screening tool for delirium, Go/No-Go game performance is also significantly correlated with MMSE scores (a standard clinical cognitive test). The Go/No-Go and N-back games are being incorporated into a battery of cognitive assessment tests being developed by Dr. Bruce Morton at Western University. We will also introduce a new mechanical device that can be overlaid on tablets to make Whacamole games for cognitive assessment easier for elderly people to play.
1. **A practical EOG device for activity and emotional-state recognition**  

   *presented by Eleni Stroulia, University of Alberta & Dillam Diaz Romero, University of Alberta*

   The long-term objective of our work is to develop an inexpensive and easily available hardware-software system to recognize changes in the functional ability and emotional state of seniors. Such changes correspond to useful indicators of potential future decline and can inform decisions around additional supports required or possibly transitions to different types of care. This work is at the core of the AGE-WELL vision “to help older Canadians to maintain their independence, health and quality of life through accessible information communication technologies that increase their safety and security.”

   In two recent studies, we asked participants to wear a commercially available smart eyewear that measures EOG and kinematic motion data, while the wearers performed activities of daily living and played tablet-based games. We have now developed two different analysis methodologies to extract indicators through which we can reliably recognize (a) the activities performed and (b) the emotional state and valence of the wearer during gameplay. Our initial results, obtained through a realistic simulation of activities of daily life with adults, demonstrate that this practical device can provide valid information on two important aspects of a person’s quality of life: functional independence and emotional well-being.

   We intend to validate these results with a similar study with seniors in the future.

2. **Are older adults willing to use wrist-worn activity trackers?**  

   *presented by Joon Lee, University of Calgary*

   While wrist-worn activity trackers can potentially support aging-in-place, their utility is highly dependent on older adults’ willingness to wear them on a daily basis. Despite the importance of this issue, older adults’ acceptance of commercial activity trackers is poorly understood. The aim of this study was to investigate acceptance and usage of wearable activity trackers in Canadian community-dwelling older adults, leveraging the technology acceptance model. A mixed method design was used, and a total of 20 older adults were recruited from Southwestern Ontario. Participants used 2 different activity trackers (Xiaomi Mi Band and Microsoft Band), one at a time for 3 weeks each. A questionnaire was used to capture acceptance, opinions, and experience for each activity tracker. Furthermore, semistructured interviews were conducted with 4 participants to dive deeper into some issues. The Mi Band gained higher levels of acceptance (80%) compared with the Microsoft Band (50%). The equipment characteristics dimension scored significantly higher for the Mi Band (p<.05). The amount a participant was willing to pay for the device was highly associated with acceptance (p<.05). Logistic regression achieved an AUC of 0.79 in predicting acceptance. Content analysis on the interviews identified the following main themes: (1) smartphones as facilitators of activity trackers; (2) privacy is less of a concern for activity trackers; (3) self-awareness and motivation; (4) subjective norm, social support, and sense of independence; and (5) equipment characteristics are important. The findings from this study can inform wearable vendors and mHealth researchers targeting older adults.

3. **Use it or lose it: Carers’ ICT literacy, ICT use and labor force exit**  

   *presented by Choong Kim, University of Alberta*

   Information and communication technologies (ICTs) increasingly are perceived as offering solutions to challenges faced by family carers. But whether they offer actual solutions rests on Canadian carers having the requisite skills to effectively access, use and comprehend digital information and tools (ICT literacy). ICT literacy should facilitate use of technologies to enhance carers’ own health and social well-being, balance paid work and care responsibilities, and support their care provision. Yet we know little about caregivers’ ICT literacy skills or their implications for the consequences of caregiving. The present study uses Canadian data from Statistics Canada’s
2012 Longitudinal and International Study of Adults (LISA) which includes ICT literacy scores measured by the problem solving in technology-rich environments module of the Program for the International Assessment of Adult Competencies (PIAAC) survey – a survey created by the international intergovernmental Organisation for Economic Co-operation and Development (OECD) and its member countries. We conducted path analysis on a sample of 1,400 Canadian carers from the LISA, representing over 5 million Canadian carers aged 16 to 65 years, to determine whether ICT literacy is associated with carers’ decision to stop working for pay to provide (unpaid) family care, and whether ICT usage mediates this relationship. Ordinary Least Squares regression results indicate that carers who are older, have lower educational attainment and income (obtained from administrative income tax files), are unemployed or landed immigrants scored lower on the ICT literacy scale than other carers. Sex and living in a rural community were not significant predictors of ICT literacy, but they did predict internet use. We also found that the relationship between ICT literacy and carers’ decision to leave the labour force to provide care is fully mediated by ICT product usage. Carers who scored as more proficient users of ICT are likely to use more ICT products/services in their daily lives, which in turn is associated with lower likelihood of labor force exit.