Leading the Way in Gerontechnology: New Approaches and Promising Solutions

Alex Mihailidis, PhD PEng
Professor & Scientific Director
University of Toronto / AGE-WELL NCE
There is **STRONG POTENTIAL** for Gerontechnology to support **HEALTHY & ACTIVE AGING**...However
We NEED to do BETTER
“Healthy aging” is the ability to remain independent in our lives, and to actively participate in society (the way we want to)

We can all age well, even in the face of disease, impairment, and disability
Gerontechnology as a Solution
Failure to Launch

There are very few solutions available, with many of them being too expensive and difficult to use.
Why is it like this?

The needs of older adults are complex, and are even more so in the face of specific impairments and diseases.

More often than not, an understanding of these users’ needs is not part of a project.

There has been a “siloh” mentality in this field that has resulted in poor outcomes.
Current technologies are stigmatizing
It’s a moving target

Older adults (and their caregivers) are becoming more tech savvy

There are growing expectations on the integration of technologies into their daily lives
Disruption
NEXT EXIT
Disruptive Technologies

….when introduced, either radically transforms markets, creates wholly new markets or destroys existing markets for other technologies.
Our goal MUST BE to develop disruptive technologies that can enable aging-in-place, and to support caregivers and families.
Disruption requires INSPIRATION
Disruption requires NEW WAYS OF THINKING
Learning from other Disciplines

New technologies and approaches are emerging from other fields (e.g. AI, cognitive computing, business, ethics)

These new technologies have the potential to address several of the limitations of current approaches
Promising Areas & Solutions

New approaches are leading to new promising areas of research and leading edge technologies

Smart Homes  
Robotics  
Big Data
Smart Homes
Areas of Use

Support through daily activities (e.g. prompting systems)

Monitoring of activity levels and patterns of living

Measuring health parameters (e.g. physiological data)

Smart homes have the ability to combine various data sets and to determine context of measurements
These ARE the droids you are looking for....
Potential Robotic Approaches

Social Robots  Cognitive Robots
Making Robots a Reality...For Older Adults

For robots to become useful we must drive the costs down, and their functionality up.

We need to better understand exactly the role of robots and the level of complexity that is needed.

Can a robot be just another sensor in a smart environment?
“The self-driving car — a godsend for older Americans — is now on the horizon”
– AARP (2015)
Imagine the Potential

The combination of different approaches, modalities, and sensors allows us to collect data!
Big Data in the Home

- Actigraphy devices
- Localization sensors
- Bed sensors
- Physiological sensors
- Phone sensors
- Walking sensors
- Activity sensors
- Cell phone as prompting device and for location tracking
- User PC: Experience sampling; cognitive testing; social engagement; coaching
- Door sensors
- Medication tracking device
Big Data – Patterns of Living

Kaye et al. (OHSU)
Being Proactive, not Reactive

Big data allows us to look forward and predict changes in health before they even occur.
Predicting Changes in Wellness

Changes in state of chronic conditions, like congestive heart failure or diabetes

Adverse events, like falls and other medical conditions

Prevention of dangerous behaviours, like agitation and aggression

Changes in cognition, and onset of dementia

<table>
<thead>
<tr>
<th>ML Algorithm</th>
<th>Areas Under Curves</th>
<th>Sliding Window Size (in months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>SVM</td>
<td>AUC_{SS}</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>AUC_{PR}</td>
<td>0.26</td>
</tr>
<tr>
<td>RF</td>
<td>AUC_{SS}</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>AUC_{PR}</td>
<td>0.16</td>
</tr>
</tbody>
</table>
The current landscape needs to change in order for these new innovations to make it to the marketplace.
The Technology is not enough...

We have to examine issues around service delivery, practice, & policy
New Delivery Models

The majority of new technologies to support older adults are NOT medical devices

They are being developed as consumer products that could be purchased directly by the consumer

More importantly, there is a grassroots movement in the field where consumers (e.g. caregivers) are building their own solutions
BEST BUY ASSURED LIVING

At Some Point, a Phone Call Just Isn't Enough

Best Buy Assured Living is an affordable new service that helps you proactively monitor your parent's safety in their own home.

See how Assured Living works

Call 1-855-569-6538

Available in select markets

or request a call

Chat with an Advisor
BEST BUY ASSURED LIVING

At Some Point, a Phone Call Just Isn't Enough

Best Buy Assured Living is an affordable new service that helps you proactively monitor your parent's safety in their own home.

See how Assured Living works

Call 1-855-569-0787 or request a call

Wellness Support Included

Ask Mayo Clinic Online
Get access to this trusted online tool that asks relevant questions about your loved one's health concerns, evaluates symptoms and suggests appropriate next steps.

Wellness Coaching
This service sponsored by UnitedHealthcare includes 24/7 phone access to wellness coaches, senior-focused health education, and referrals to local community resources.
HOW DO WE STAY RELEVANT?

NEED MORE HERE
Evolving Designs for our FUTURE SELVES
The Innovator’s Dilemma

We put too much emphasis on customers’ current needs, and fail to adopt new technology that will meet their unstated (or unknown) future needs.

Christensen, 1997
Is Innovation Being Stifled?

- James Dyson
Disruption requires a COLLABORATIVE and TRANSDISCIPLINARY approach
AGE-WELL – Canada’s Tech & Aging Network

AGE-WELL was established in March 2015 with funding from the Networks of Centres of Excellence (NCE) Program through the Canadian Federal Government.

The goal of an NCE is to bring together the best and brightest in a specific sector, working towards having social and economic impact.

AGE-WELL received $36.6M (2nd largest in NCE history) from 2015-2020, with a potential 15 year mandate.
by the Numbers*  
*as of September 2017

398 HIGHLY QUALIFIED PERSONNEL (HQP)

141 Industry & Community Partners  
44 Federal & Provincial Departments & Agencies

$36.6M FUNDING [2015-2020] from the Networks of Centres of Excellence (NCE)

150+ RESEARCHERS

$22M+ CASH AND IN-KIND Contributions from Partners

Canada's Technology and Aging Network

37 MEMBER UNIVERSITIES AND RESEARCH CENTRES across Canada
We Produce Real-World Products

Technologies  Services

Policy & Practice
Innovations being Developed

- New tools for the inclusion of end-users
- New novel sensors to measure activity levels
- Non-contact physiological monitoring systems
- Social and personal robotics
- Technology to monitor and assess mental health
- Technologies for socialization and connectedness
- Understanding policies and regulatory issues
Going Forward

The time is now!

Being incremental in our field is no longer acceptable

The technology may be the easy part – the ethical, social, and cultural aspects need to be considered and incorporated throughout the process
For More Information

Alex Mihailidis, PhD PEng
alex.mihailidis@utoronto.ca
@agewell_nce / @iatsl
www.agewell-nce.ca / www.iatsl.org