USABILITY OF GPS TECHNOLOGY TO SUPPORT PEOPLE WITH DEMENTIA LIVING IN THE COMMUNITY: CLIENT AND CAREGIVER EXPERIENCES

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The Team

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- **Funding** (2013-2015): Alberta Innovation and Advanced Education

Why focus on Wandering?

- Over 40,000 Albertans, or 500,000 Canadians have dementia
- Number of Alberta seniors with dementia to exceed 100,000 by 2038
- 3/5 seniors with dementia in community wander
- Caregiver stress, client safety, costs to first responders and health care

Background

- **Alberta's Continuing Care Strategy:** Aging in the Right Place (2008)
- Health Technologies Roadmap (2009)
  - http://eae.alberta.ca/economic-development/technology/industry/ict/programs.aspx
  - Address *Risk Factors* and support *Aging in Place* (Caregiver stress, Dementia, Falls, Social Isolation, ADLs and Medication Management concerns)

Continuing Care Technology Innovation (CCTI) Project (2010-2012)

- Field-test market ready technologies in Alberta
- 3 vendors selected through RFP process offered forms of home-based monitoring sensors, fall detection, medication support:
  - Maintain client independence and safety
  - Support informal caregivers
  - Support community tenure

Objective

To determine usability of GPS technology to support home care clients at risk of wandering.

Usability: Effectiveness, efficiency and satisfaction with which specified users achieve specific goals in particular environments (ISO 9241).

April 2014 to April 2015

Methods

- Wearable GPS devices for dementia clients and their caregivers (dyads)
- 2 sites: Grande Prairie (Rural) and Calgary (Urban)
  - Community residing participants
  - Actively mobile outside of home
  - Including Designated Supportive Living Levels 1-4
  - Risk of wandering or history of wandering

Technology
(Vendor selection)

Participants demographics (45 dyads)

	Client	Caregiver
Gender %Male/Female	59/41	24/76
Age	mean 76 yrs (SD=11.5)	41-50 yrs: 11% 51-50 yrs: 35% 61-70 yrs: 32% 71 yrs & older: 15%

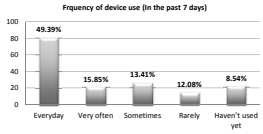
Clients

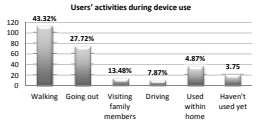
MMSE mean (SD) (mental status)	15.8 (5.35)	low
SAS mean (SD) Safety Assessment Scale	21.82 (3.69)	medium
Wandering risk	74%	At risk
Wandering RAS:CV Rev'd Algase Wandering Scale (Community Version)	1.99 (.55)	moderate
Has primary caregiver	100%	30.4% has 2nd caregiver
Living arrangement	70% spouse or children	22% alone

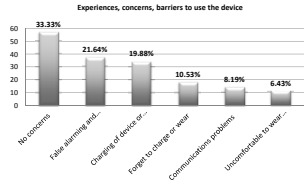
Caregivers

Relationship to client	63% spouse 26% children
Employment	54% paid work 44% retired
Mean work hrs per week (SD)	64 (58)
Mean caregiving hrs per week Retired: mean (SD), [95% CI] Employed: mean (SD), (95% CI)	63.9 (58.0) [46.5, 81.4] 87 (60.7) [59.4, 114.6] 43.8 (24) [23.4, 64.1]
Mean Zarit Burden Scale (SD)	41.36 (13.4) moderate 40.1 (16.4)

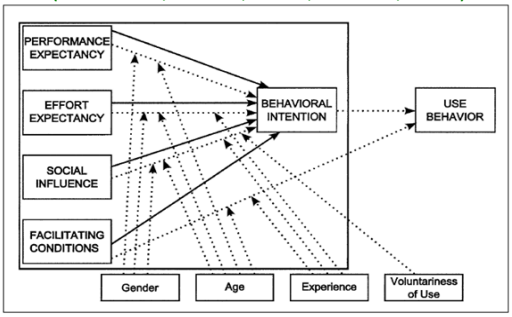
Frequency of use, activities performed, and barriers to use







Usability: UTAUT
(Venkatesh, Morris, Davis, & Davis, 2003)



Revised Sept 22, 2014(2)

Client (GPS User) Exit Questionnaire

This questionnaire helps us understand what factors affect your use of GPS in daily life. Please rate items 1 to 32 using the scale to show your level of agreement. Mark only one X in a box per item. Provide comments for items 33-39.

Item	Disagree	Neutral	Agree
1. By using the GPS, I had increased independence.			
2. Using the GPS helped me with daily activities outside of the house (e.g., shopping, transportation)			
3. The GPS was useful to inform my caregiver where I am.			
4. When I was lost, the GPS helped me contact my caregiver. Check if Not Applicable ☐			
5. Learning to use the GPS was easy for me.			
6. I found the system flexible to use.			

PE: 1, 2, 3, 4; EE: 5, 6, 7; SI: 8, 9, 32; FC: 10, 11, 16; FC-C: 12, 13, 14; 15; BI: 17, 18, 19; U: 20, 21, 22, 23, 24, 25; ATT: 27, 28, 29; ANX: 26, 30, 31 1

Revised Sept 22, 2014 (2)

Caregiver or Proxy Exit Questionnaire

This questionnaire helps us understand what factors affect your relative's or care recipient's (replace "_____" with name) use of GPS in daily life. Please rate items 1 to 42 using the scale to indicate your level of agreement. Mark X in one box per item. Provide your comments for items 43-50.

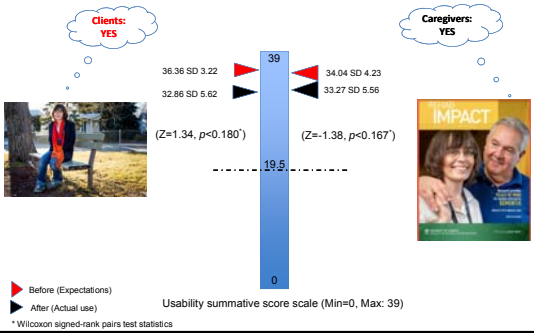
Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. By using the GPS, _____ had increased independence.					
2. Using the GPS helped _____ with daily activities (e.g., shopping, transportation).					
3. The GPS was useful to inform me where my relative was.					
4. In general the GPS assisted in the all daily activities _____ did outside of the home.					
5. Use of the GPS increased the quantity and quality of _____'s daily activities (e.g., shopping, transportation).					
6. When _____ was lost, the GPS helped him or her contact me as a caregiver. Check if Not Applicable					

PE: 1, 2, 3, 4, 5, 6; EE: 7, 8, 9, 10, 11, 20; SI: 12, 13, 15; FC: 22, 23, 24, 28, 29; FC-C: 25, 26, 27; U: 34, 35, 36; ATT: 38, 39, 40; ANX: 37, 41, 42 1

Are constructs of UTAUT model similar between clients and caregivers?

Performance expectancy: Clients and caregivers thought that the locator device (LD) was useful *(p<0.693)*.
Effort expectancy: Clients thought that the device was free of effort while caregivers did not (0.000).
Social influence: Clients and caregivers thought that the influence of other is important *(p<0.504)*.
Facilitating conditions: Clients and caregivers thought that they have necessary resources *(p<0.354)*.
Anxiety: Clients and caregivers did not feel anxiety toward use *(p<0.878)*.
Attitude: Clients and caregivers had a positive attitude toward use *(p<0.273)*.
Behavioral intention to use: Clients and caregivers are similarly willing to use the device in the future (p<0.539).

Dyads' expectations about GPS device met?



* Wilcoxon signed-rank pairs test statistics

USABILITY

- Did clients and caregivers meet their expectations about the GPS device(s)?
  - Yes, clients and caregivers rated 33/39 on the usability summative score scale.
  - Compared to the beginning of the trial, there was no change in dyads' expectation of the device performance, effort to use the device, and their attitude toward the device.
  - Caregivers: anxiety about using the device decreased at the end of the trial - stat sig).
- Text Analysis Portal for Research: *"It gave freedom and peace of mind"; "Provided a sense of security" "Gave me comfort to know where he was at all the time", "Peace of mind that if he got mixed up or lost that we would have a way of locating him".*

Caregiver intention to use GPS technology

- Positive correlations between performance expectance (p<.00), social influence (p<.03) and behavioural intention to use the GPS
- Negative correlation between effort expectancy and intention to use GPS (p<.05)

Caregiver actual use

- Positive correlation between actual use of GPS and facilitating conditions (p<.01).
- Behavioural intention to use was correlated with actual use of GPS (p<.01)

Who should pay for the technology?

- Would dyads consider paying for a GPS device and service?
  Yes: 89%, No: 11%
- How much would dyads consider be an appropriate monthly fee?
  $30
- Should another organization pay for the GPS service?
  Yes: 75%, No: 25%
- Which organization?
  Government or AHS should pay

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Focus Groups

- Conducted in February 2015: 3 in Grande Prairie and 4 in Calgary; 15 caregivers, 9 stakeholders
- Introduce GPS in early dementia
- Gap in services that support technology use – opportunities
- Suggested payment strategies
- Roles of stakeholders such as police/RCMP, Alzheimer Societies

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Final Remarks

- The UTAUT – framework to examine usability, intention to use and actual use of GPS
- Dyads considered usability of Locator device high.
- Main determinants on usability of locator device did not differ between client and caregiver groups, except for *effort expectancy*.
- Implementation must address access and user support.

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