

InTouchFun, a Pervasive Collaborative System to Cope with Elder's Isolation and Cognitive Decline

Victoria Meza-Kubo, Alberto L. Morán, Marcela Rodríguez

Autonomous University of Baja California, UABC

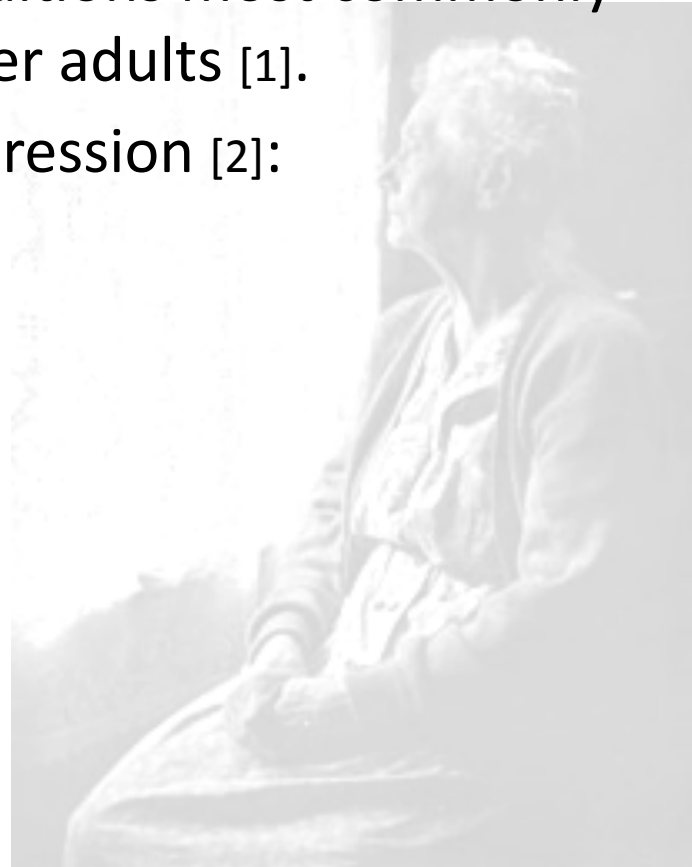
Ensenada, México

{mmeza, alberto.moran, marcerod}@uabc.edu.mx



Introduction: Setting the context

- Depression, is one of the conditions most commonly associated with suicide in older adults [1].
- Causes and risk factors of depression [2]:
 - Disability.
 - Low educational level
 - Loneliness and isolation.
 - Cognitive impairment.
 - Others



[1] Conwell Y., Brent D. Suicide and aging. Patterns of psychiatric diagnosis. *International Psychogeriatrics*, 1995; 7(2): 149-64.

[2] Forsell Y. Predictors of depression, anxiety and psychotic symptoms on a very elderly population: data from a 3-year follow-up study. *Soc Psychiatry Psychiatr Epidemiol* 2000; 35: 259–263

Depression treatments

- Treatments for depression include pharmacological and non pharmacological interventions [3].
- Non pharmacological interventions address two specific factors:
- *Social Interaction*
 - Integrate the elder into social groups to increase his contact with friends and family, thus reducing isolation [4].
- *Cognitive stimulation*
 - A kind of “brain gymnastics”, works with the remaining skills of the elder, delaying the onset of cognitive impairment [5].

[3] Irene Elkin, et al. General Effectiveness of Treatments. Archives of General Psychiatry. November 1989, Vol. 46.

[4] Margaret E.Morris. Social Networks as Health Feedback Displays. IEEE INTERNET COMPUTING. SEPTEMBER • OCTOBER 2005 .

[5] Tárraga L, M., et al. A randomized pilot study to assess the efficacy of an interactive, multimedia tool of cognitive stimulation in Alzheimer’s disease. J. Neurol. Psychiatry, 2006. 77(23): p. 1116-1121.

Technological solutions

- Communication Technologies for Elders
 - Messaging and email applications for elders [6].
 - Shared Calendars to inform the elder about relatives schedules [7].
- Technologies for cognitive stimulation
 - Applications with cognitive stimulation exercises e.g. SmartBrain [8].
 - CIRCA project, Computer Interactive Reminiscence and Conversation Aid [9].
 - Computer games [Jimison, 2006].



[6] Dickinson, A., A. F. Newell, et al. (2005). "Introducing the Internet to the over-60s: Developing an email system for older novice computer users." *Interacting with Computers* 17(6): 621-642.

[7] Plaisant, C., A. Clamage, et al. (2006). "Shared family calendars: Promoting symmetry and accessibility." *ACM Trans. Comput.-Hum. Interact.* 13(3): 313-346.

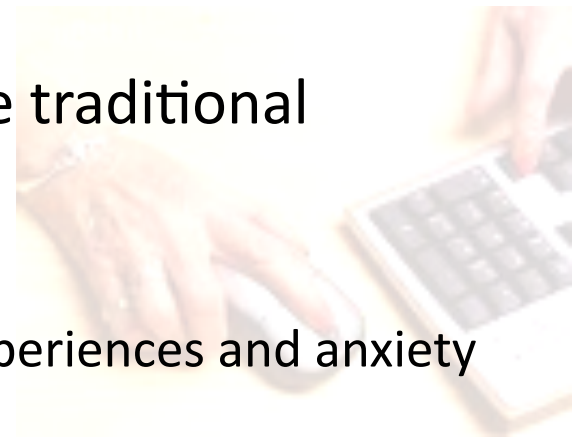
[8] www.smartbraint.net

[9] Gowans, G., et al. 2004. Designing a multimedia conversation aid for reminiscence therapy in dementia care environments. In *CHI '04 Extended Abstracts* (Vienna, Austria, April 24 - 29, 2004).

[10] Jimison, H., M. Pavel, et al. (2006). Embedded Assessment of Cognitive Performance with Elders' Use of Computer Games in a Residential Environment. *Proceedings of the Workshop on The Cognitive Science of Games and Gaming*, Vancouver, British Columbia, Canada.

Limitations of these technologies

- Most technologies provide a solution considering one side of the problem.
 - Some provide communication tools to connect elders with relatives, and others provide activities for cognitive stimulation.
- It is well known that elders have problems to use traditional interfaces such as the keyboard and mouse [11].
 - Difficulties to control their movements.
 - Lack of experience and support generates negative experiences and anxiety on computer use.
- There is a lack of interest about the use of technologies, or resistance on its use [12].
 - Ignorance about the benefits that technology may provide.
 - In Mexico, this is worst due to the low educational level among the elderly.



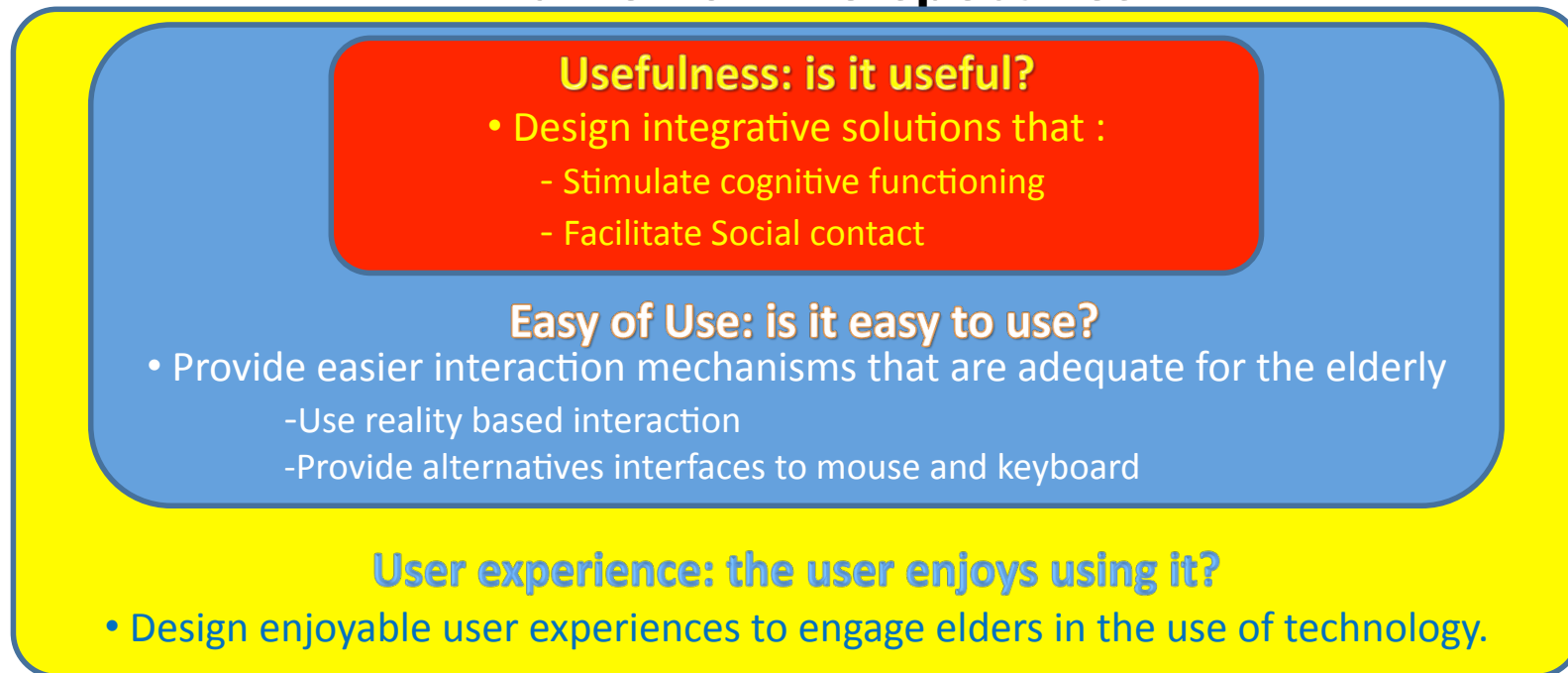
[11] Czaja, S.J., 1997. Computer technology and the older adult. In: Helander, M.G., Landauer, T.K., Prabhu, P.V. (Eds.), Handbook of Human–Computer Interaction. Elsevier, Amsterdam, pp. 797–812.

[12] Marquie, J.C., Jourdan-Boddaert, L., Huet, N., 2002. Do older adults underestimate their actual computer knowledge? Behaviour and Information Technology 21 (4), 273–280.

Conceptual framework

Based on preliminary studies [13,14, 15], we proposed a conceptual framework to inform the development of technologies to cope with elders' isolation and cognitive decline.

Framework Perspectives



[13] Moran, A. L. and V. Meza-Kubo (2009). Towards a Tele-assistance Service for the Cognitive Stimulation of Elders with Cognitive Decline. International Conference on eHealth, Telemedicine, and Social Medicine, 2009. eTELEMED '09. , Cancun, Mexico, IEEE Computer Society

[14] Rodríguez, M. D., A. Aguirre, et al. (2007). Dealing with Computer Literacy and Age Differences in the Design of a Ubicomp System to Cope with Cognitive Decline in Lonely Elders Usability and Internationalization. Global and Local User Interfaces, Springer 4560/2007: 451-459.

[15] Meza-Kubo, V. and A. L. Moran (2009). Elder's Performance and Preferences on the Use of Digital vs. Physical Objects to Perform a Cognitive Stimulation Activity. HCI International 2009 , San Diego, USA, Springer: 618-622.

Projected scenario

- Jose is a 70 year-old elder, and he's playing the Tangram Game with Pancho, his 22 year-old grandson.
- Jose is using *InTouchFun*, a pervasive collaborative system that allows touch and tangible interaction through a TableTop and augmented Tangram pieces.
- Pancho is not in the same place with Jose, he is using a remote client of the application where he can see all Jose's moves and can interact and provide help to his grandfather.
- This way Jose may keep in touch with his siblings and grandchildren and talk of other issues meanwhile they enjoy the game.

Elder Client

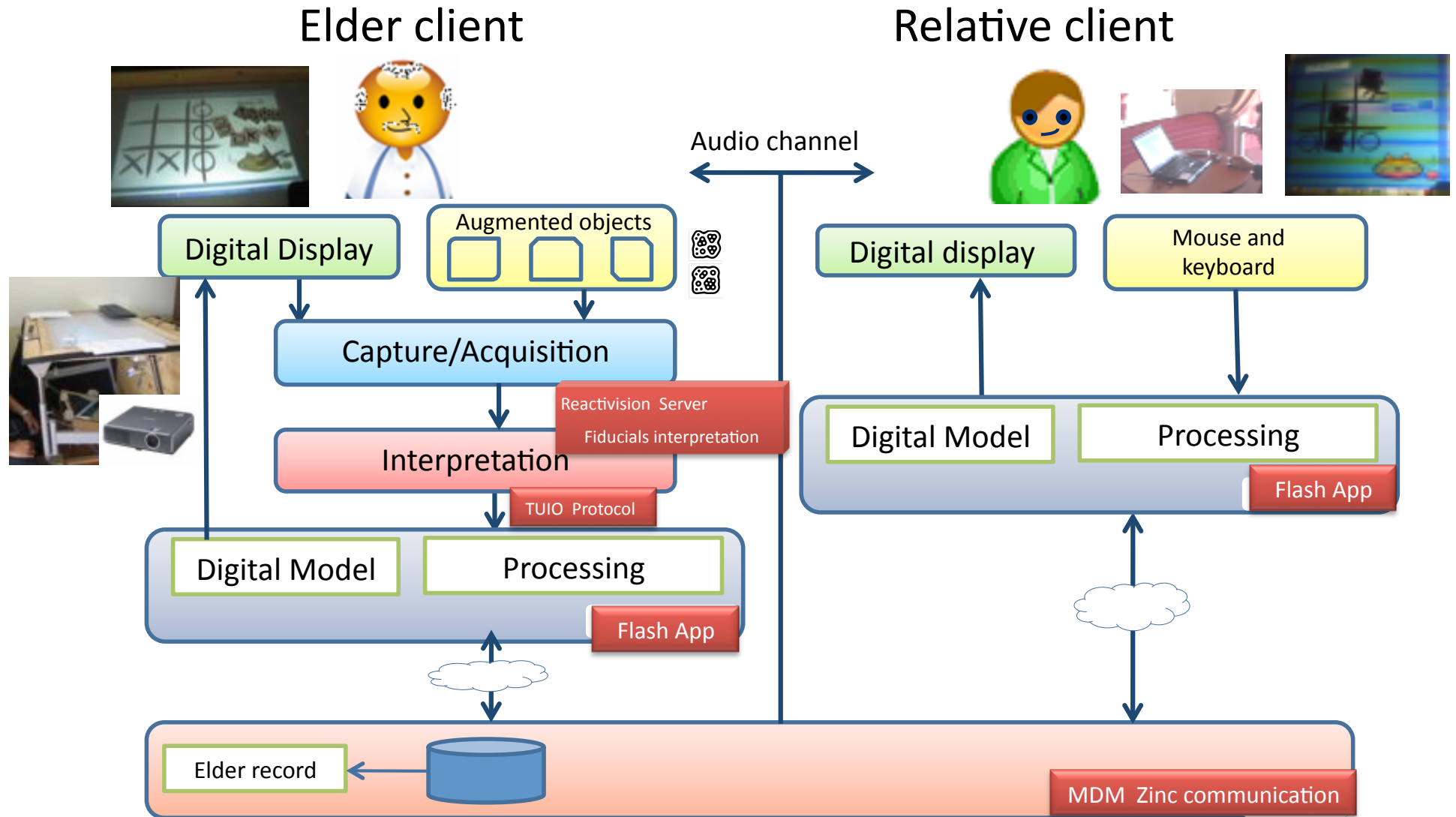


Collaboration Client

InTouchFun: main features

- Keeps the elder in contact with his relatives,
 - Providing a pervasive collaborative platform to perform activities between both the elder and his relative.
- Allows for the cognitive stimulation of elders,
 - Performing activities that include several cognitive stimulation tasks, including following instructions and manipulating physical objects.
- Provides the elder with easier interaction mechanisms through multimodal interfaces,
 - Implementing a touch and tangible interface on a Tabletop,
 - Using an audio channel for verbal remote communication
- Promotes engagement of the elders and their relatives through enjoyable activities
 - Using the game concept where participants can collaborate, compete, and socialize.
 - Using traditional and preferred games known to all participants.

System architecture



Evaluation of InTouchFun

Objectives:

- Evaluate users' interaction with technology.
- Identify the users' preference about the type of activity.
- Determine the benefits of integrating the relatives into the elder's cognitive stimulation activity.

User	Interface
Elder	Tangible + touch
Relative	GUI + Mouse

Type of activity	Game
Cognitive Activity	Tangram
Entertainment Activity	Checkers, tic-tac-toe, connect four

Participants:

- A set of 14 participants (7 elder-relative couples)

Procedure:

1. Presentation of video scenario
2. Cognitive stimulation activities
3. Exit survey (TAM-based questionnaires, 7 point Likert scale)

Main findings

- The system was perceived as useful by all participants (6.40).
 - The cognitive activity (6.55) was perceived as more useful to cognitively stimulate the elder than entertainment activity (6.26).
 - The entertainment activity was perceived as more useful for socialization and having fun.
- The system was perceived as ease to use by all participants (6.61).
- The system was perceived as enjoyable by all participants (6.52).
 - The entertainment activity was more engaging to both of them as it represented a competition challenge between the elder and his relative

Conclusions

- The proposed solution allows:
 - Promoting and maintaining social contact with friends and family while performing cognitive stimulation activities.
 - Facilitating the use of cognitive stimulation technology through a tangible and touch interface.
 - Engaging participants through entertainment activities that enable collaboration and competition.
- The proposed framework facilitates:
 - The design of solutions from three perspectives: usefulness, easy of use, and user experience.
- There is evidence that the proposed solution allows to maintain social contact and cognitive stimulation.

Thank you

