

The Evidence Base for Home Health Technologies

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The Future of Home Health Care: A Workshop
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Technology in the Home

- Pervasive, ubiquitous computing is affecting home health care
- Bridge geographic distance, increase access to information and experts
 - In 2003 a total of 556 Medline indexed articles on home care AND technology were published; in 2013 that number rose to 1390.
- *Active vs. Passive* Technologies in the Home

Examples

	Active Monitoring	Passive Monitoring
Physiological Monitoring	Integrated Solutions that can be operated by patients and/or their families and caregivers to measure blood pressure, pulse oximetry, weight etc. .	Sensor based tools that passively measure vital signs. Example: Bed sensor that measures respiration, restlessness at night, sleep interruptions 
Functional monitoring/ Emergency detection and response	Wearable systems that detect emergencies such as falls	Gait monitors that detect falls or near falls, sensor based systems that detect sedentary behavior

Examples (cont.)

Safety monitoring and assistance	Alarm systems that detect fire or flooding, systems that support hands free communication with safety professionals  A photograph showing an elderly person lying in bed, partially covered by a white blanket. On a bedside table next to the bed is a white, rectangular emergency communication device with several colored buttons (red, green, blue). A warm, glowing lamp is also visible on the table.	Stove sensors (combining heat and motion sensors) to detect and distinguish between meal preparation and having forgotten the stove on for too long
Security monitoring and assistance	Camera-based monitoring systems that allow for remote monitoring of residential space and visitors  A photograph of a black, dome-shaped security camera mounted on a stand. Next to it is a tablet computer displaying a live video feed from the camera, showing an interior room with people.	Sensor based system that captures level of activity, number of visitors or if abnormal/unusual patterns of activity are recorded  A photograph of a white, rectangular sensor device, likely a motion or activity sensor, with a small display screen on its front.

Examples (cont.)

Social interaction monitoring and assistance	Use of social network software platforms, social media, using software that assesses self-perceived social connectedness	Sensor based systems that track number of visitors, time inside and outside the home, sedentary behavior
Cognitive and sensory assistance	Technologies that generate alerts and reminders, locators for lost objects, medication dispensing units 	Automated features that operate in the background and trigger warnings, alerts and reminders. 

Evidence Base

- Growing
- At times contradicting
 - Steventon et al. BMJ. 2012; 344: e3874.
 - Takahashi et al. Arch Intern Med. 2012; 172(10):773-9
- Technology developments more rapid than research grant cycles
- Tailoring sometimes prohibitive in research

Lessons Learned

- Technology does not need to be sophisticated to be effective

PISCES

- **Problem Solving Intervention to Support Caregivers in End of Life Care Settings**
- Use of video to deliver PST
- 3 arm clinical trial (N=500)



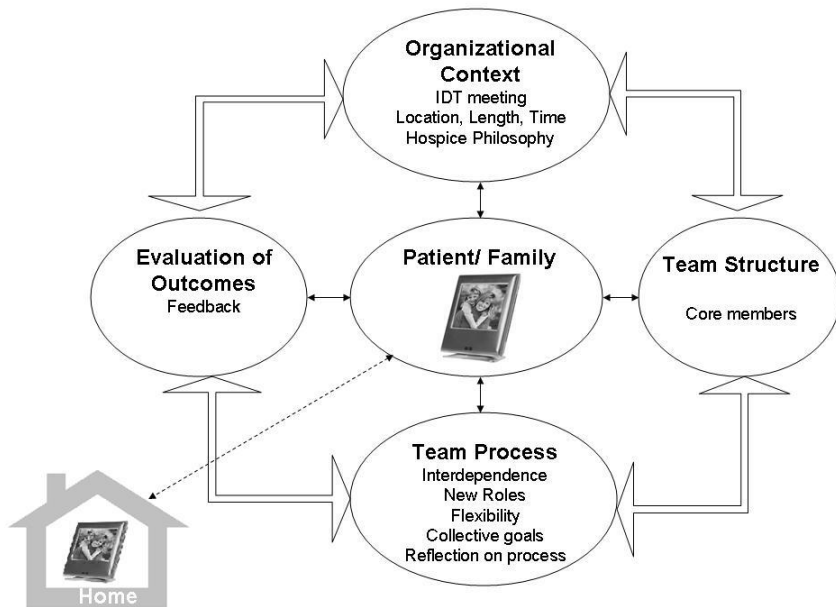
<http://www.telehospice-project.org>

Funded by NIH (R01NR012213)
Clinical Trial Record NCT01444027

Problem-solving
Intervention to
Support
Caregivers in
End of Life Care
Settings

The ACTIVE Intervention

- Assessing Caregivers in a Team Intervention through Video Encounters
- Family caregivers become team members

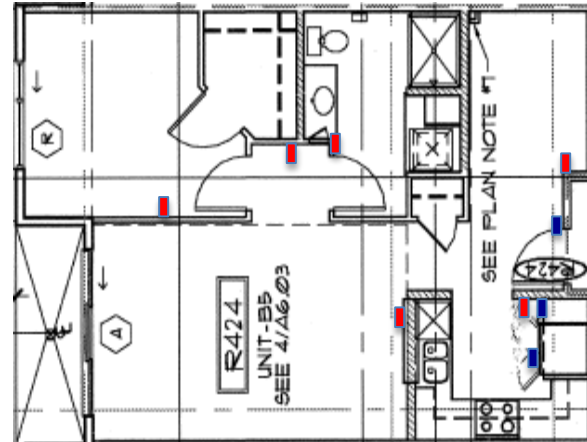


Lessons Learned

- Technology does not need to be sophisticated to be effective
- Tools to capture what we have always captured, more efficiently and tools to capture new knowledge

Smart Home Study

- Stove sensor
- Sensor mat
- Motion sensors
- HydroSense
- ElectroSense



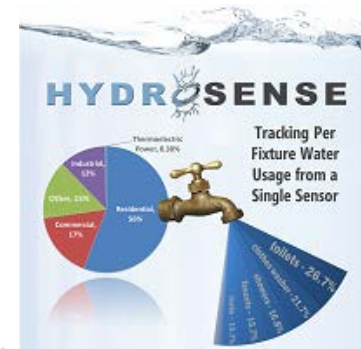
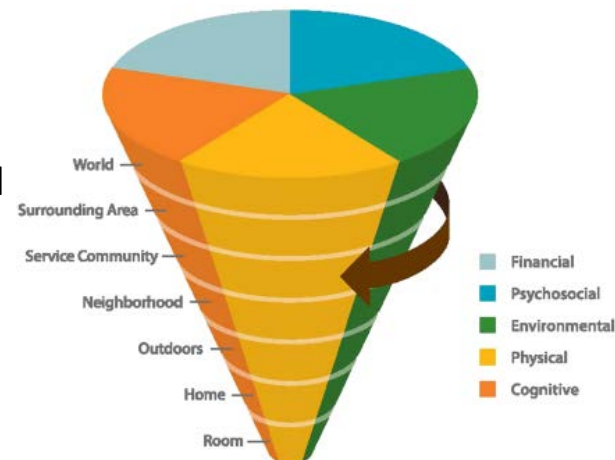
Door sensor
Motion sensor

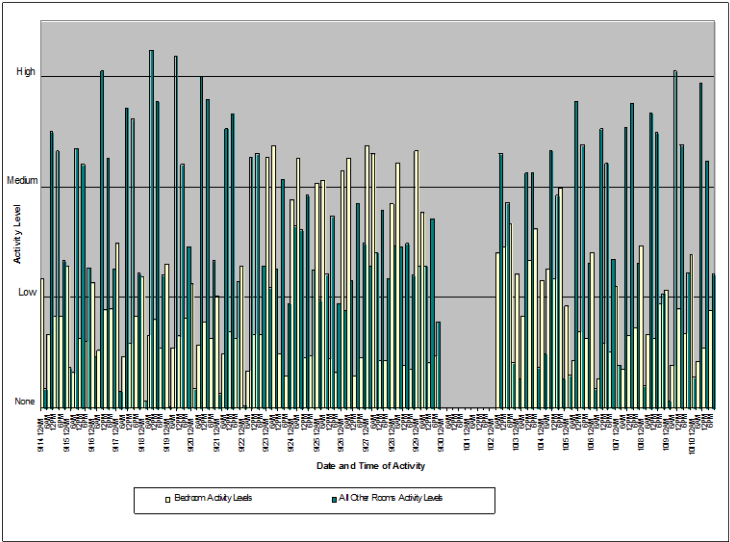


Funded by:

-NSF-CDI-1028195: Transforming Community-Based Elder Care through Heterogeneous Activity Sensing Analytics

-NSF-CNS-1405682: HomeSHARE - Home-based Smart Health Applications across Research Environments





“New” data

- Sleep quality
- Bathroom visits
- Restlessness at night
- Sedentary behavior
- Hygiene patterns
- Meal preparation
- Detecting patterns and deviations from what would be the norm for that participant

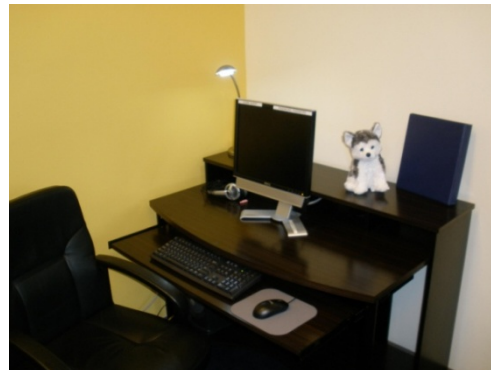
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- **Interface Design**

Tailoring hardware and software

Addressing:

- Functional limitations
- Hearing impairment
- Cognitive decline
- Prior experience with computers
- Visual impairment



health●e

home-based environmental assisted living
technologies for healthy elders

<http://www.health-e.info>



Laura Fisher

My Wellness

Last updated:

5 days ago on Oct 17, 2011

Doctor's Note 1

Results looking good!

Oct 21, 2011

Hi Laura, I just reviewed the CT result and looks good to me...

Calendar

TODAY

Jane's Birthday
4:30 pm Hair Cut

TOMORROW

6 pm Jane's Birthday Party

Next Week

MONDAY

10:30 am Doctor's Appointm...
12 pm Lunch with Paul, Harry...

TUESDAY

7 pm Movies night

THURSDAY

8 pm Happy Hour

FRIDAY

11 am Lunch with Amy, Sam
3 pm Shopping

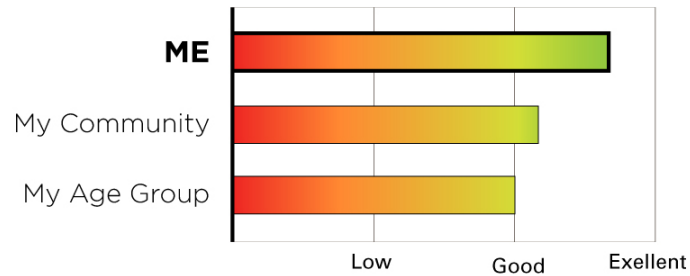
Messages 3

Re: Happy Birthday Jane!

27 mins ago

Thanks, Laura :) I am having a wonderful day. Are you comi...

My Wellness in October 2011



previous month



October 2011



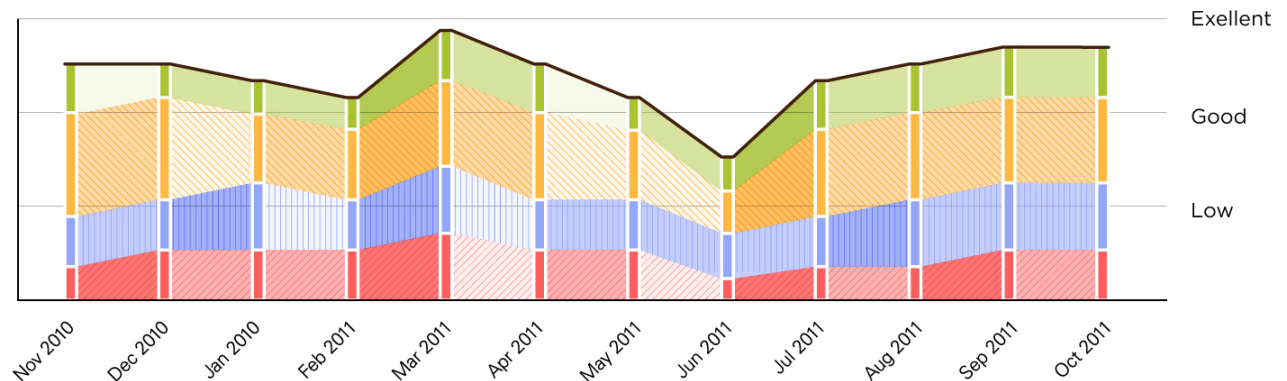
next month

My Wellness Score Is

81.5/100

PHYSICAL 78	COGNITIVE 82
SOCIAL 95	SPIRITUAL 71

My progress over the last 12 months



Overview

Physical

Cognitive

Social

Spiritual

Lessons Learned

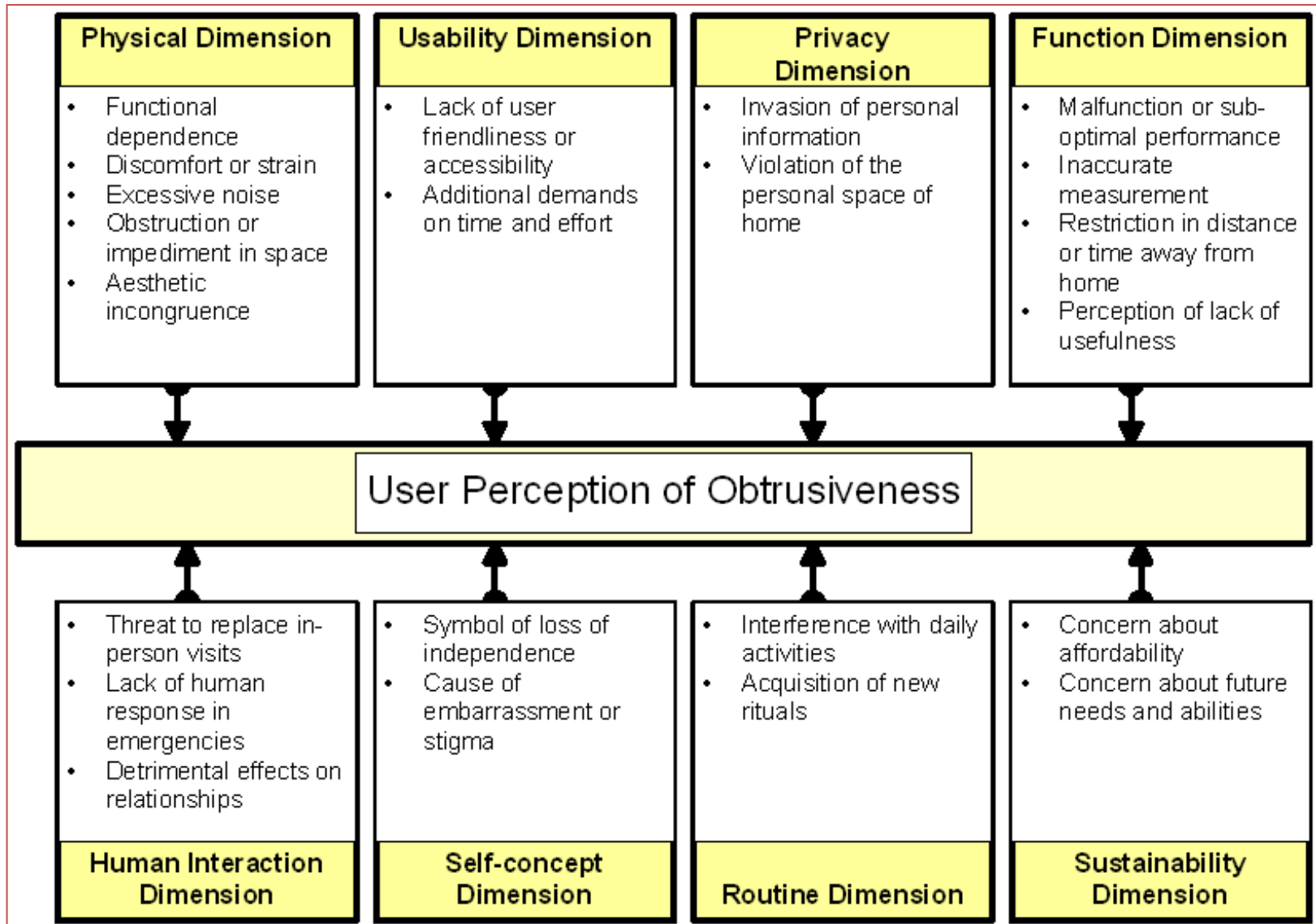
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- Tools to capture what we have always captured, more efficiently and tools to capture new knowledge
- Interface Design
- Understanding Acceptance

Obtrusiveness

- A summary evaluation by the user based on characteristics or effects associated with the technology that are perceived as undesirable and physically and/or psychologically prominent



Obtrusiveness Framework



Obtrusiveness Dimensions

- Physical
 - Physical aspects of a technology and their effects on users or the home environment
- Usability
 - Accessibility for users and the additional demands on time and effort associated with using a technology
- Privacy
 - Informational and physical privacy of the individual
- Function
 - How the equipment works, including its perceived reliability and effectiveness

Obtrusiveness Dimensions

- Human Interaction
 - Negative effects on human interactions, responses, or relationships
- Self-concept
 - Self perception as physical, social, and spiritual or moral being and how you think you are perceived by others
- Routine
 - Effects on users' daily routines or rituals and/or the acquisition of new ones.
- Sustainability
 - Concerns about keeping or maintaining the technology in the future related to affordability or their own functional ability

Thank you

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