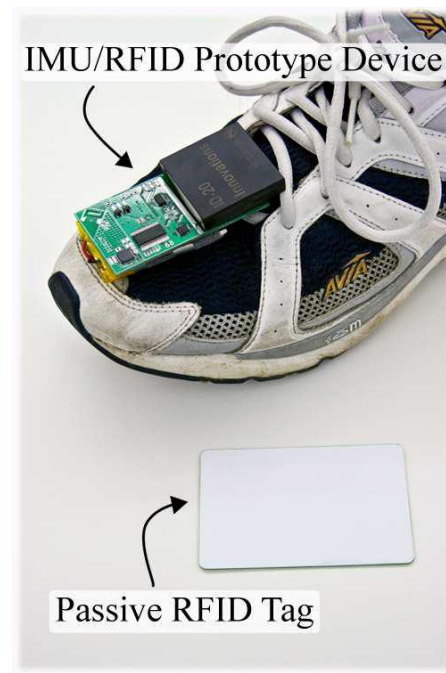
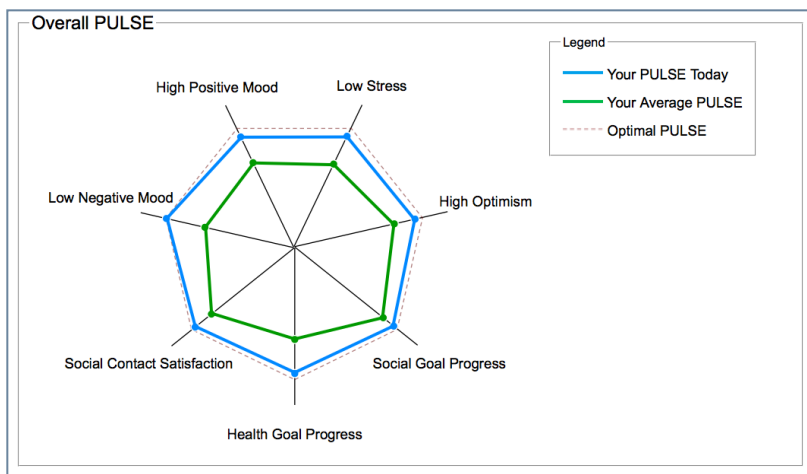


IGERT in Healthy Aging Gerontechnology Core Research

Ronald A. Metoyer
Associate Professor
School of Electrical Engineering
and Computer Science



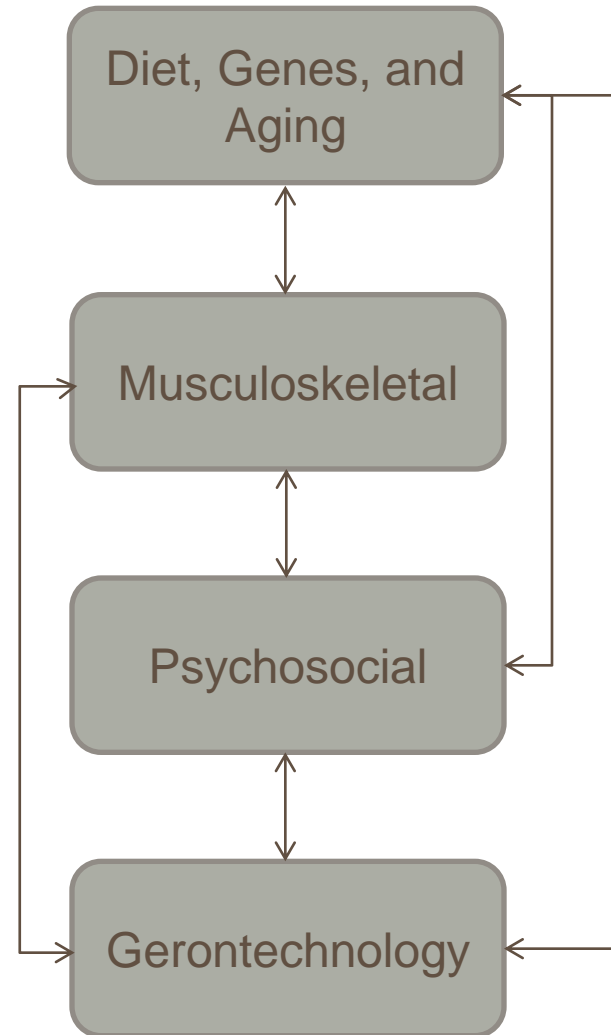
OSU IGERT

Life in an Aging Society

PI: Dr. Karen Hooker

Fall 2011

9 Students

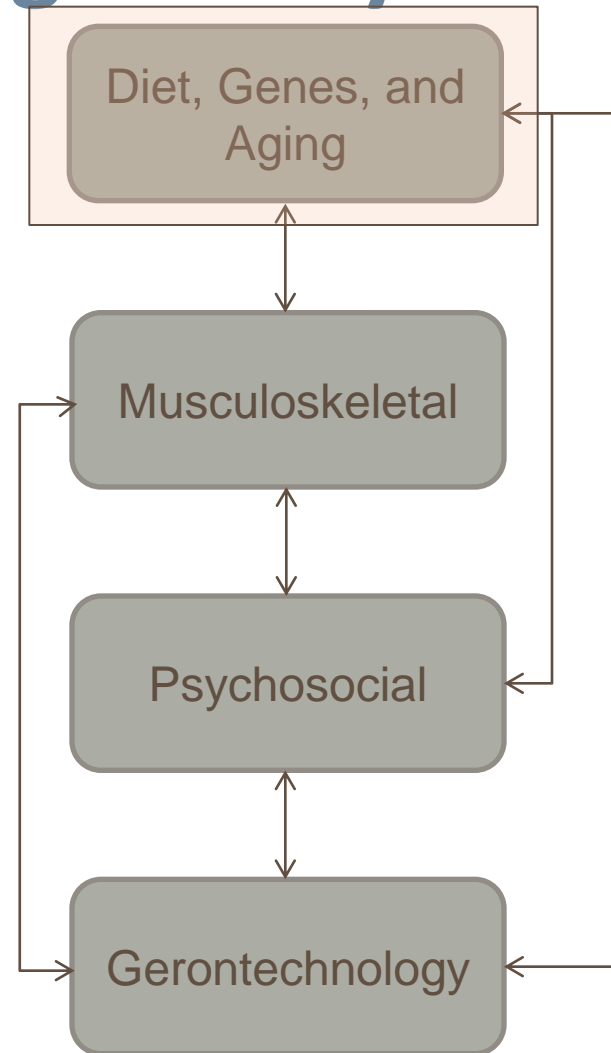


OSU IGERT

Life in an Aging Society

Biological mechanisms
underlying aging
processes

Strategies for
maintaining and
promoting good health

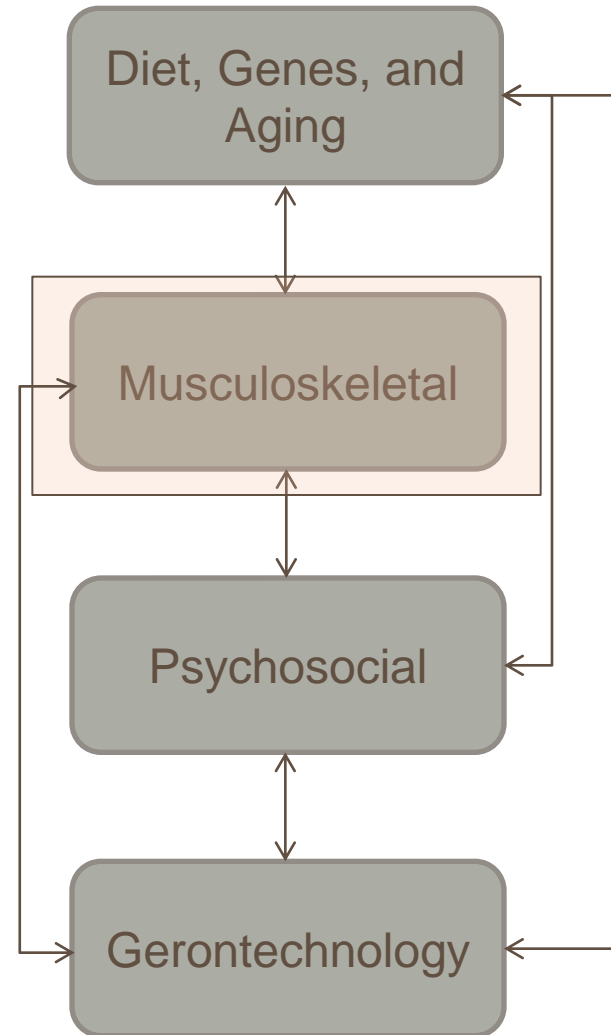


OSU IGERT

Life in an Aging Society

Methods to preserve functioning, prevent disability, and optimize overall well being

Bone health, fall prevention, interventions to promote exercise

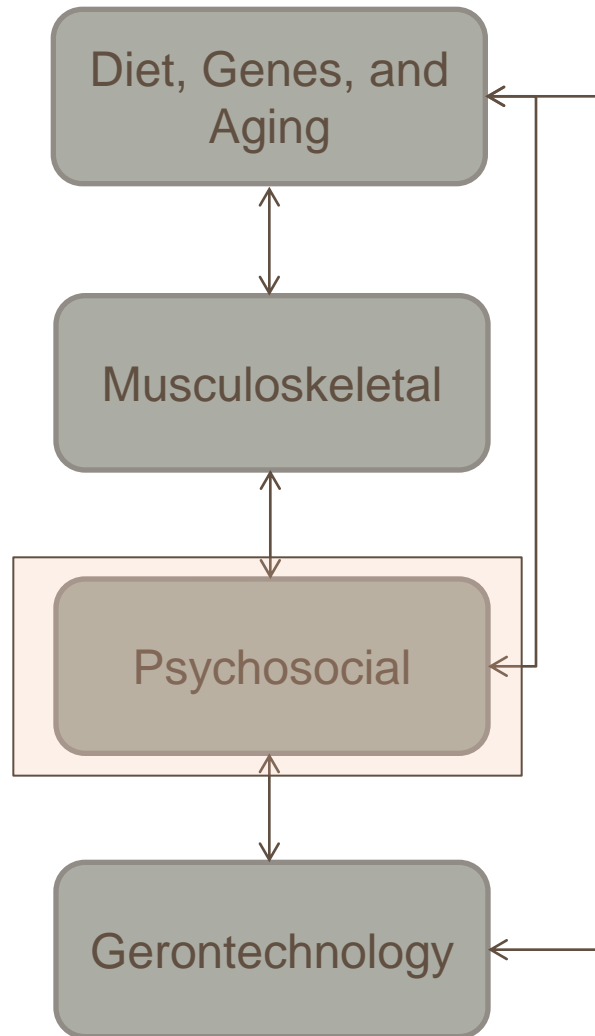


OSU IGERT

Life in an Aging Society

Aging individuals and their families in social contexts

How aspects such as stress affect aging and how individual cope with and self-regulate successfully



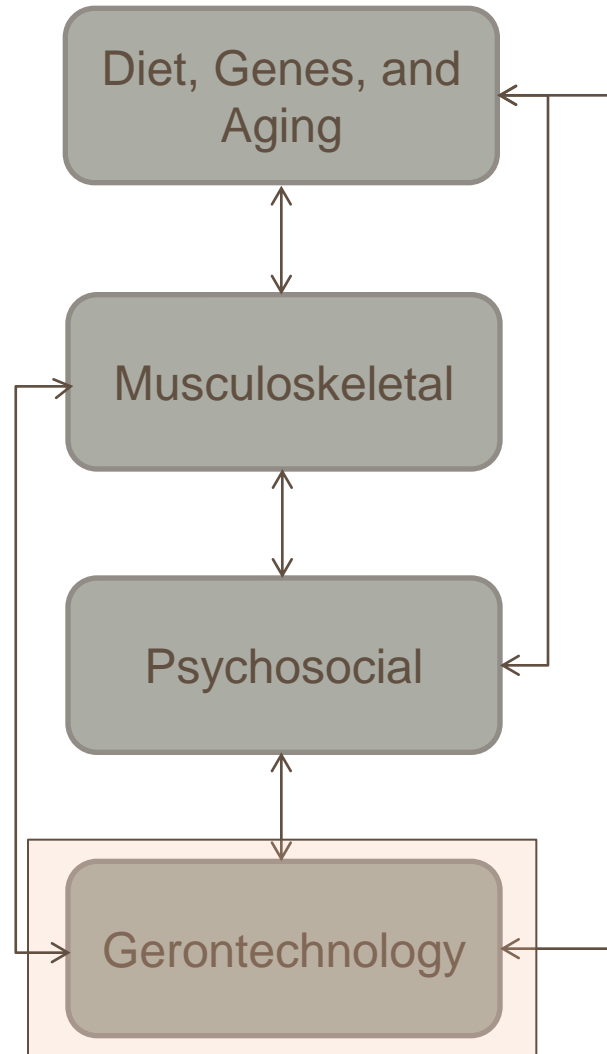
OSU IGERT

Life in an Aging Society

Investigation and
design of supportive
technologies

Caretakers, to enable
research, enhance living

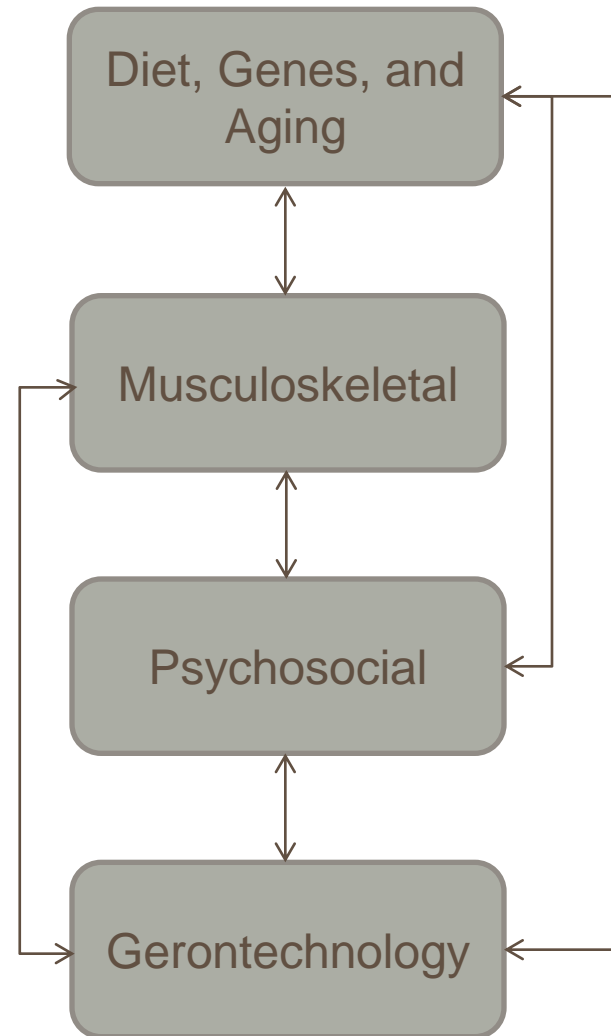
Privacy, social and
ethical ramifications of
wellness monitoring



OSU IGERT

Life in an Aging Society

Rate of Aging
Engineering Aging



Person Environment (PE) Fit

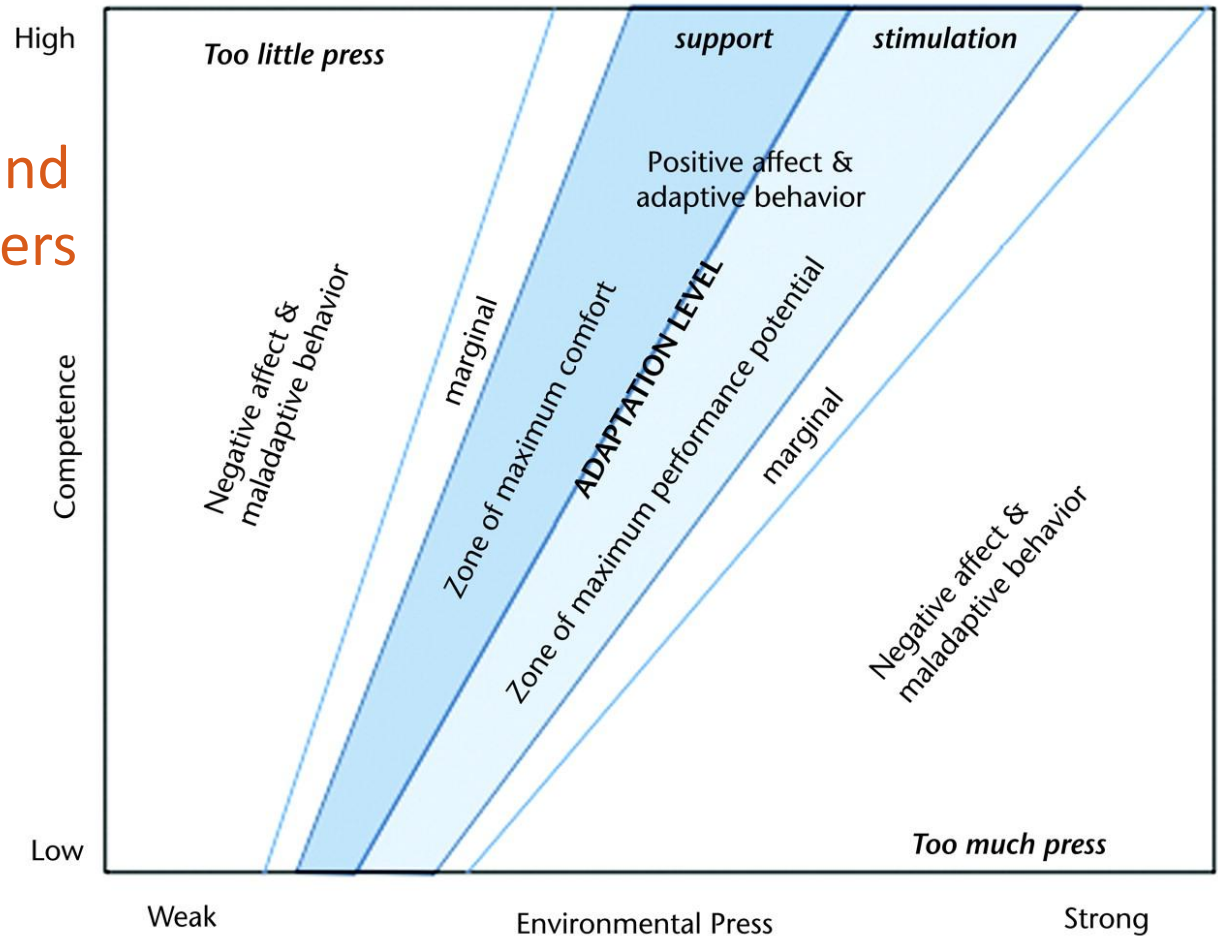
Steggell & Lien

Can we identify problems in the fit between the individual and his/her environment so that the appropriate environmental interventions can be made

PE-Fit theory

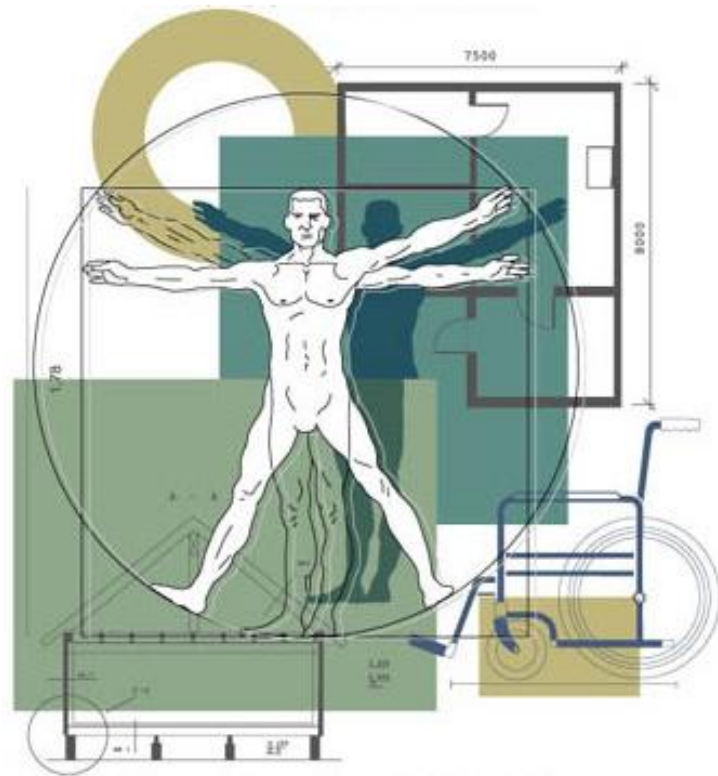
A measure of the physical capacities and environmental barriers present in one's surroundings

Utilizes Lawton & Nahemow's (1973) press-competence model



PE-Fit methods

Housing Enabler
(www.enabler.nu)



Developed in Sweden

Assess PE-Fit of homes for
older adults

Needs adaptation to the US

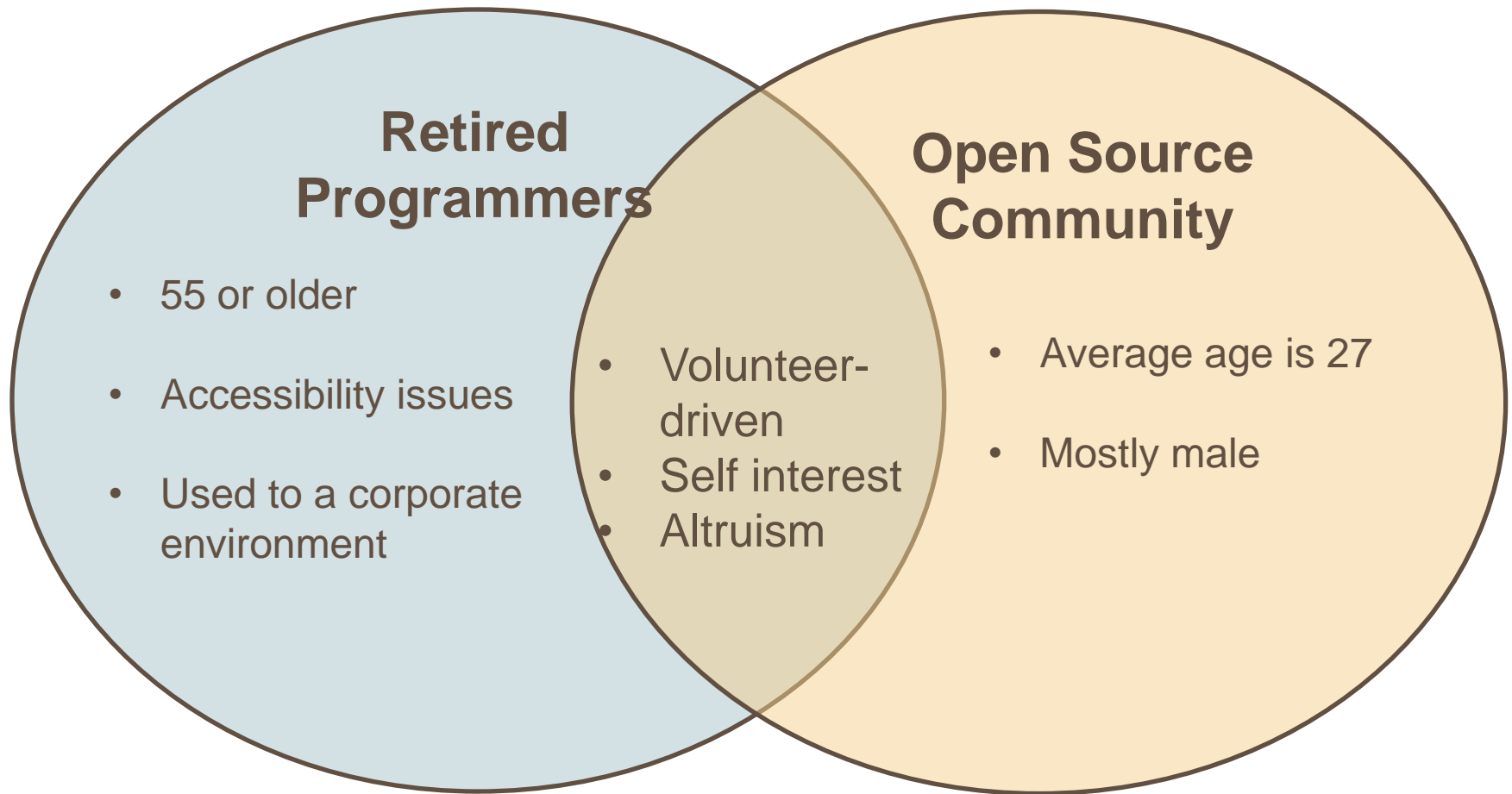
Modifications to include
measures of emotional and
cognitive aspects of
meaning of home

OSS & Aging

Jensen and Davidson

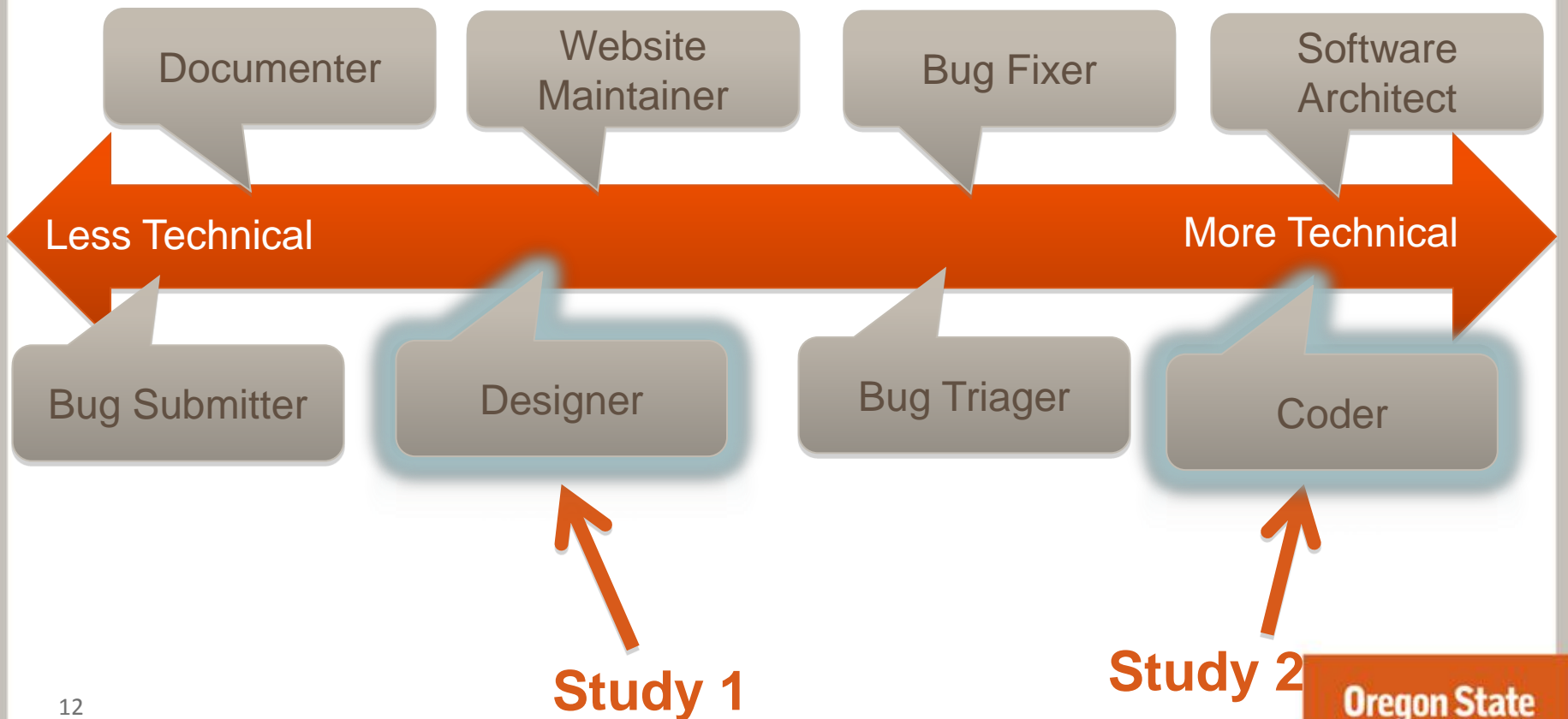
Can we utilize retiring programmers to
1) improve the diversity and
productivity of open source software
projects and possibly 2) maintain the
cognitive skills of the programmers

Why Retired Programmers?



Studies

Open Source Continuum

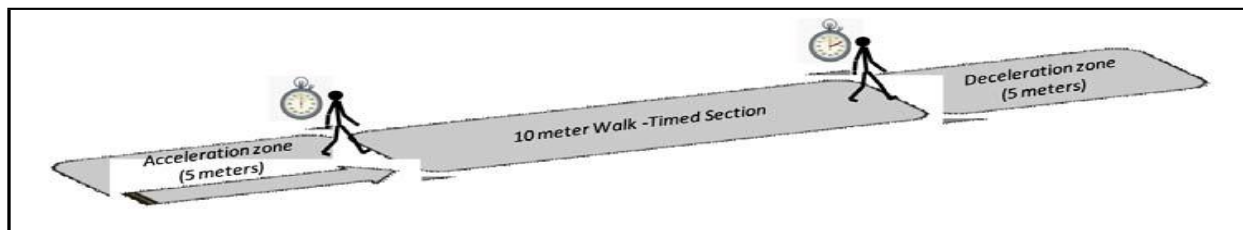
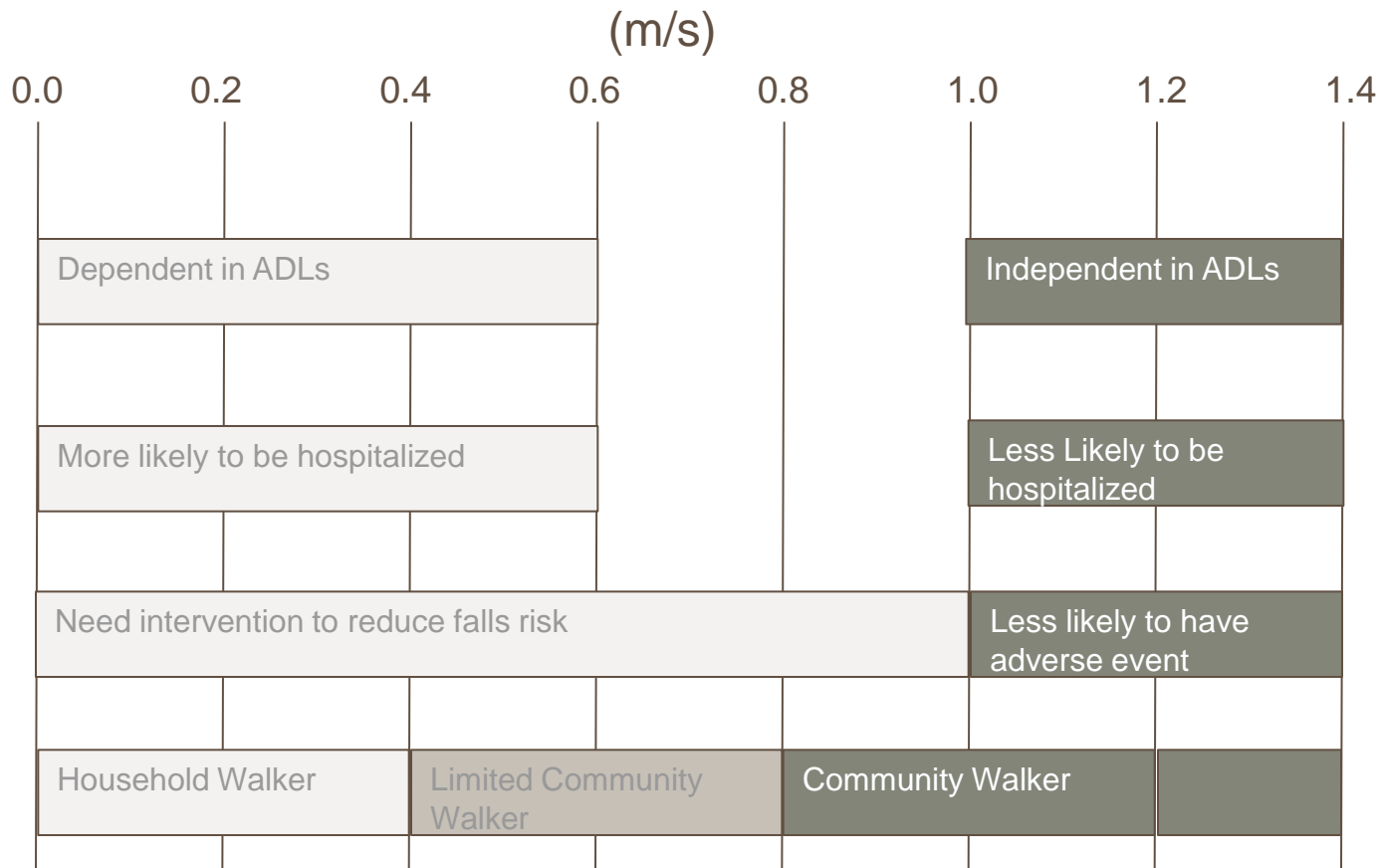


Non-invasive Monitoring

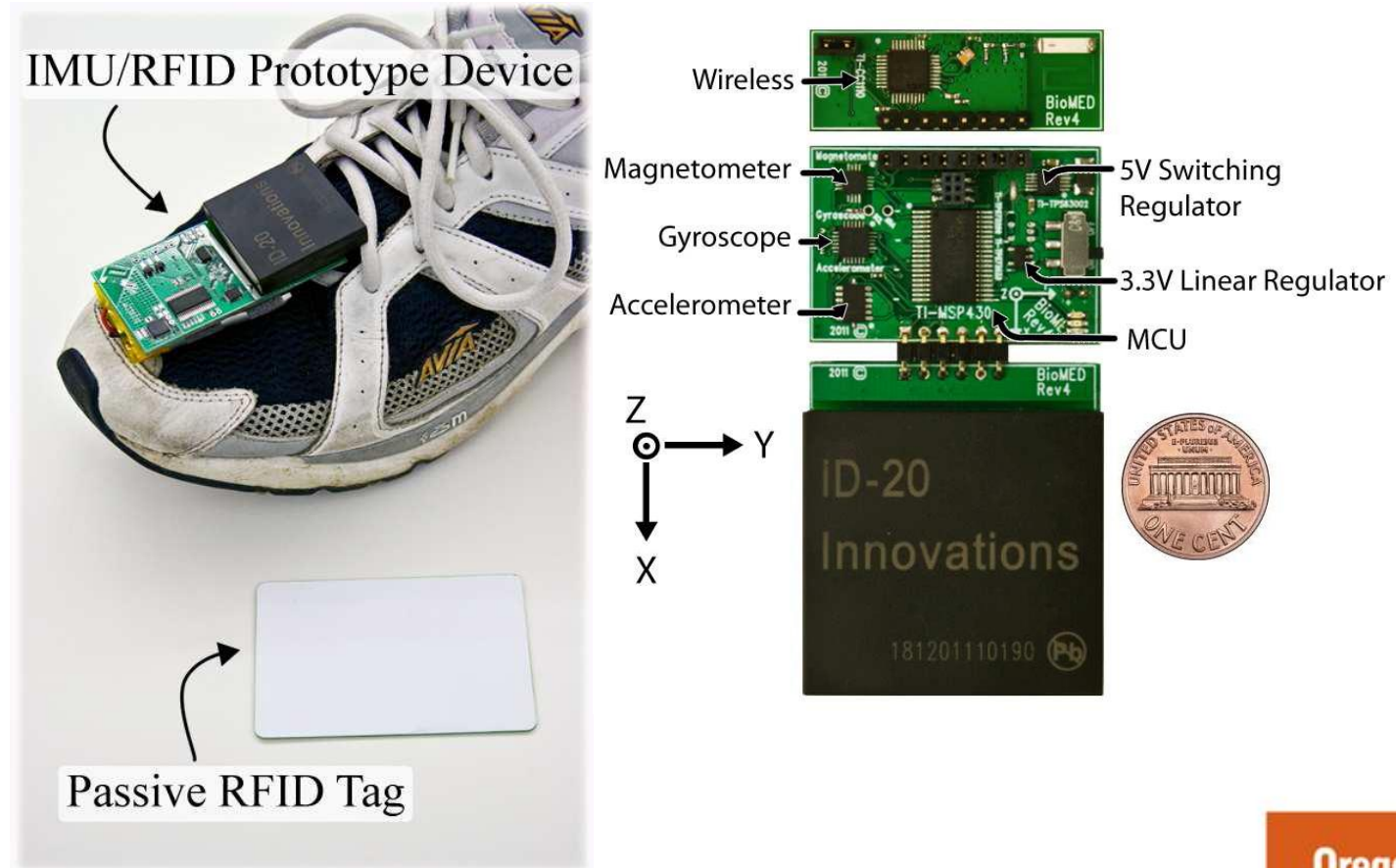
Patrick Chiang

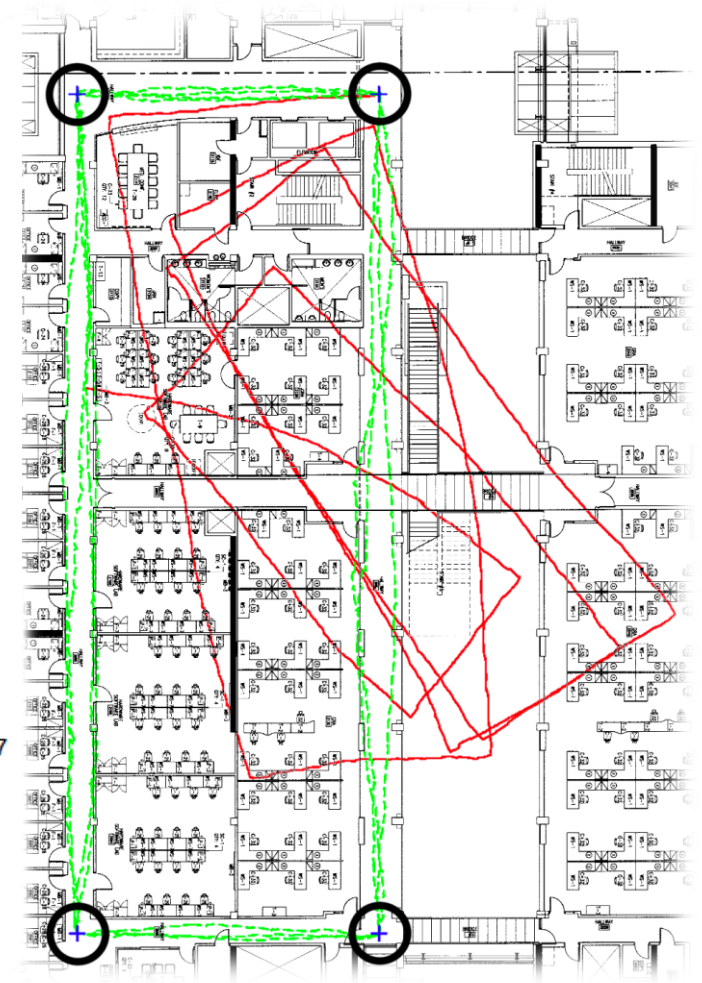
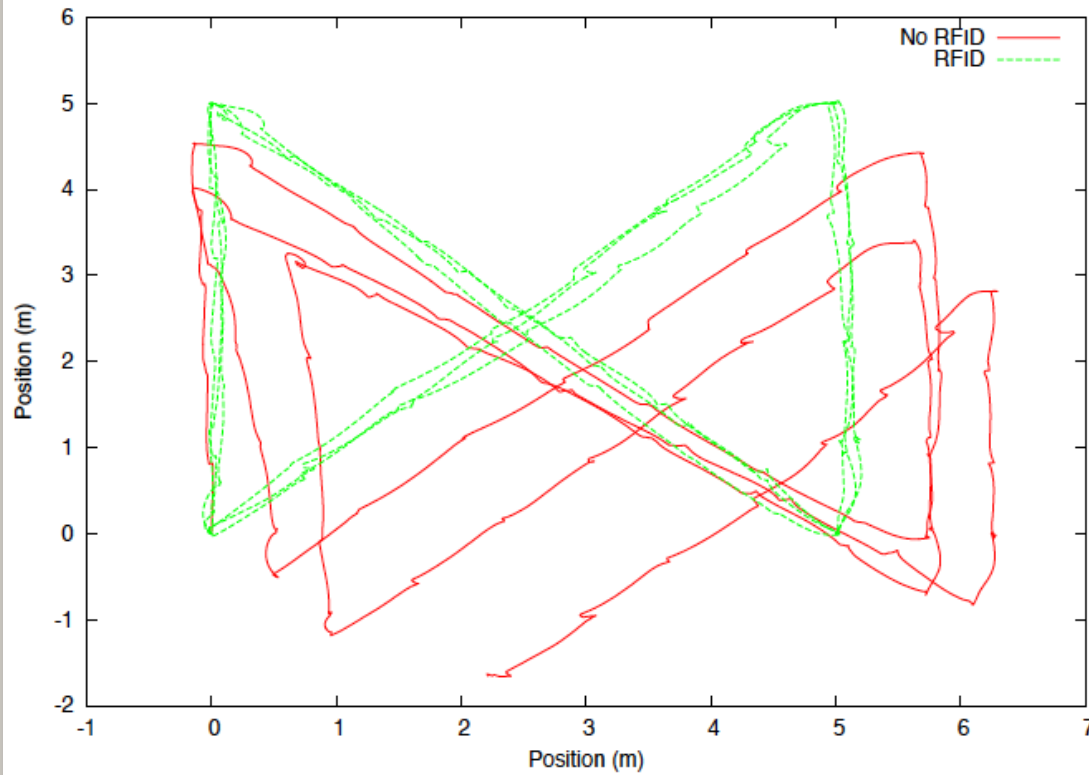
How do we build low-cost, scalable, non-invasive monitoring solutions to both study aging and to improve independent living

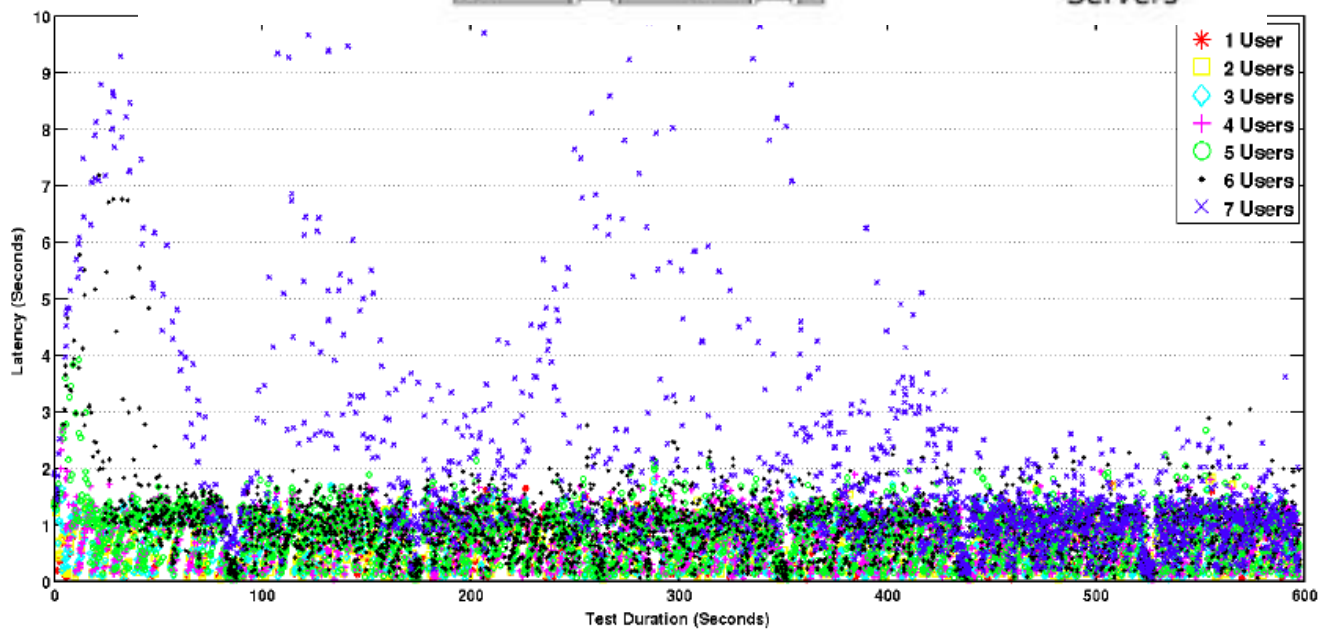
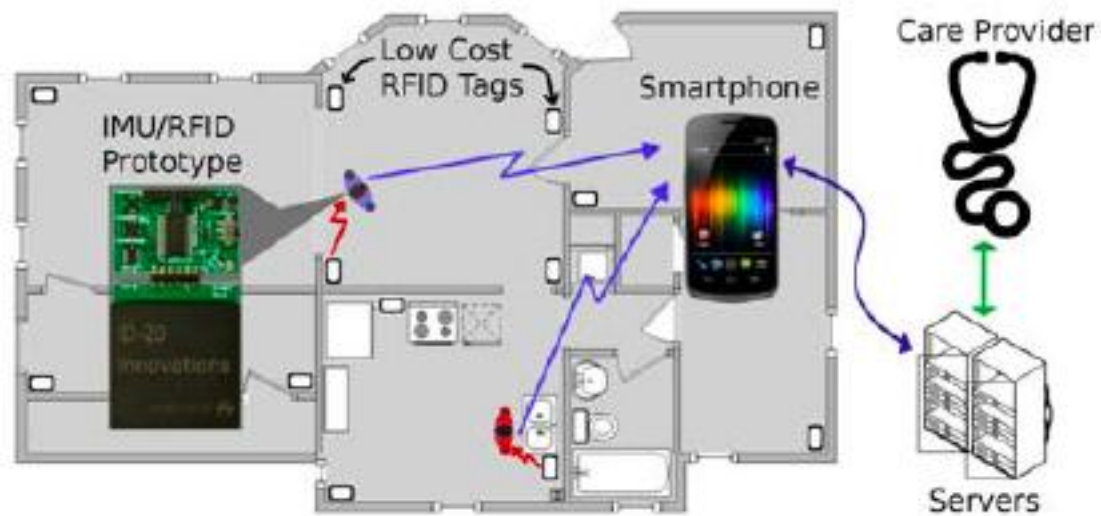
Walking Speed



Foot Mounted Indoor tracking







PULSE

Hooker, Mejia, Metoyer, & Pham

How can we effectively study the behavioral and social mechanisms driving healthy aging processes using online measurement tools?

PULSE Goals

Study linkages between personality processes and health using intraindividual variability design

Self-regulation of goals

Engage participants through data visualization feedback

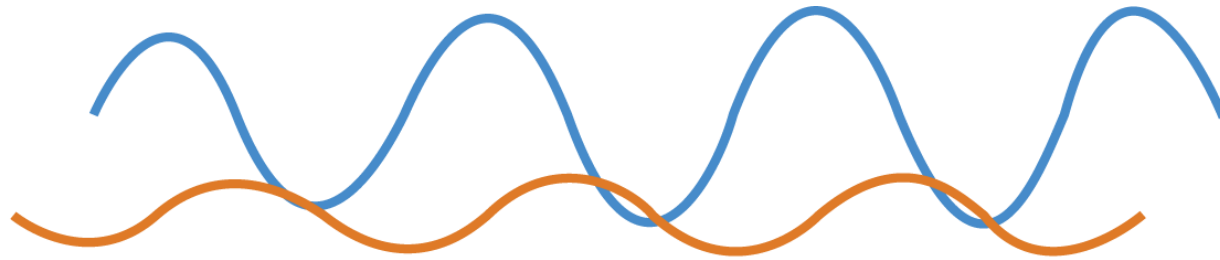
Explore temporal frame necessary for reliably capturing intraindividual variability (burst vs. daily over 100 days)

Variability vs. Change


The content on this slide was removed due to
copyright concerns


Dynamic Process coupling:

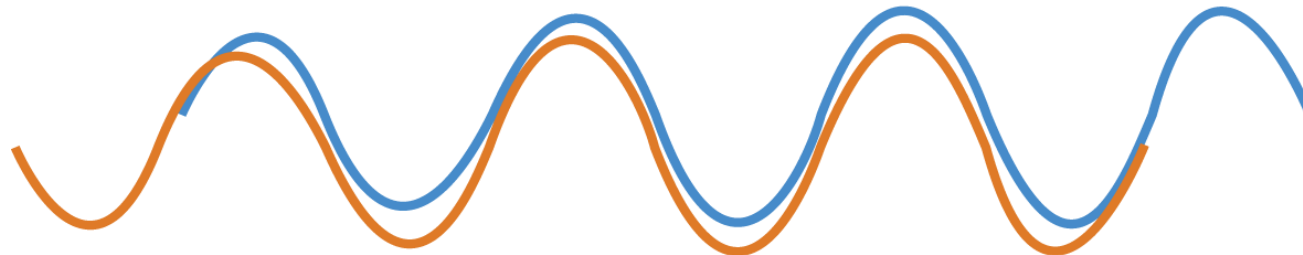
Cognitive functioning and stress



Cognitive resilience

 cognition

 = stress



Cognitive context dependency

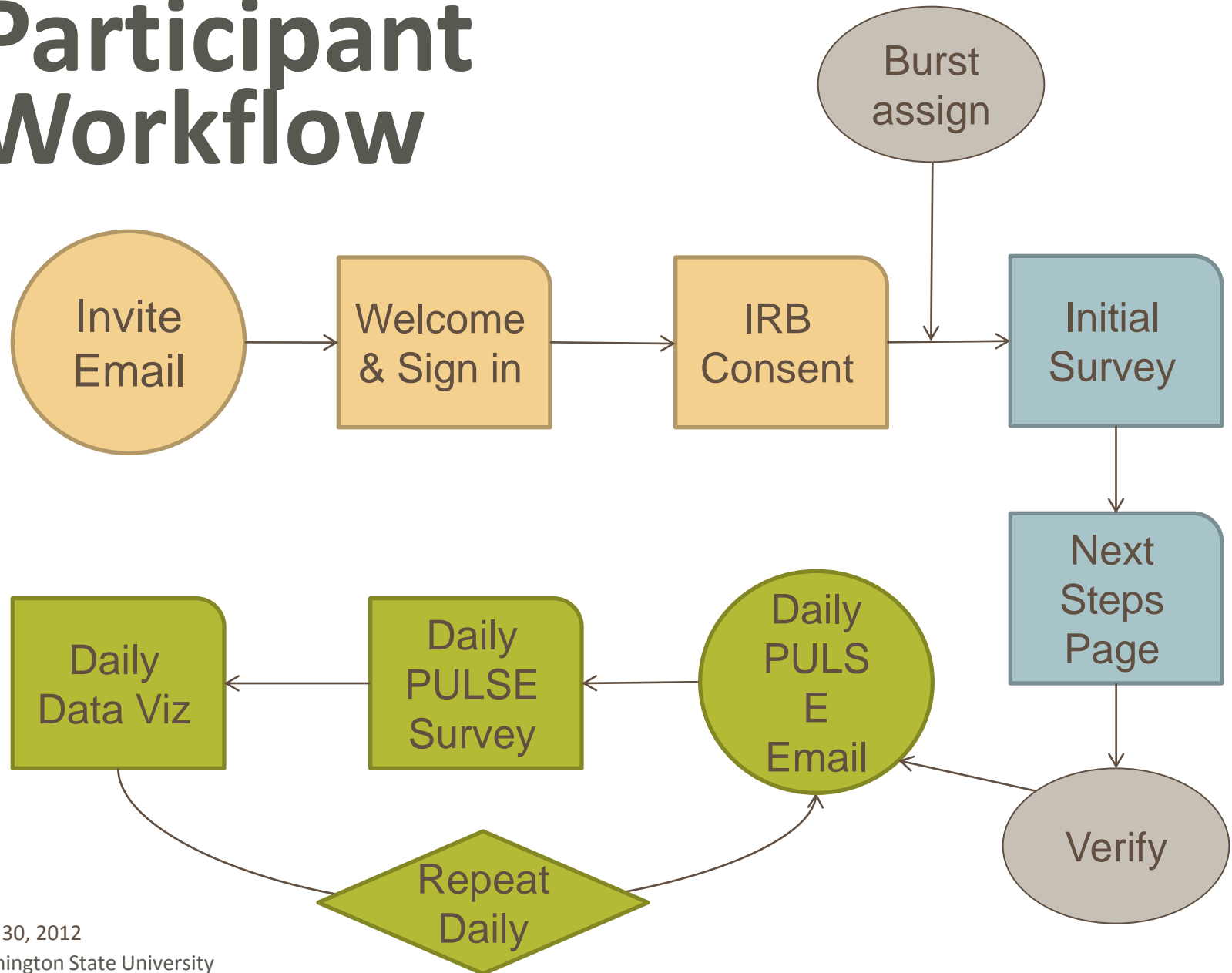
PULSE Design

Initial Survey {
Goals Populate Daily
Social Contacts Populate Daily

Daily Survey {
75% 100 Daily Surveys
25% Four 7-day Measurement Bursts

Post Survey (Project Feedback)

Participant Workflow



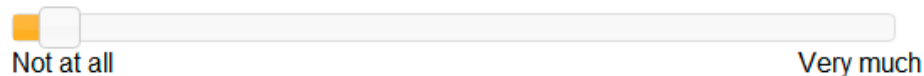
1. Rate your progress towards your goal of maintaining healthy weight



1.1. Did you receive any practical or emotional assistance towards your health goal today?



1.2. Did anyone in your social network create tension, arguments, or time constraints that impeded progress towards your health goal today?



2. Rate your progress towards your goal of my new daughter



2.1. Did you receive any practical or emotional assistance towards your social goal today?



Health Goal Progress

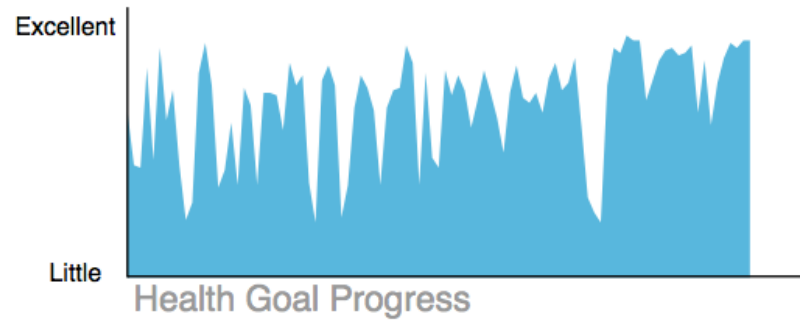
No Progress

Great Progress

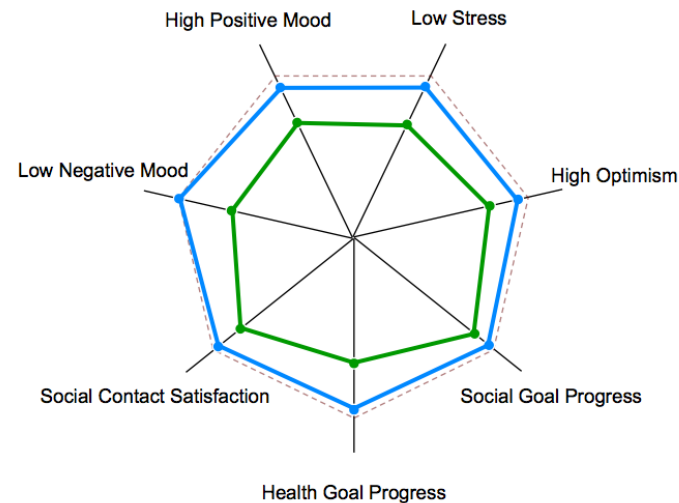
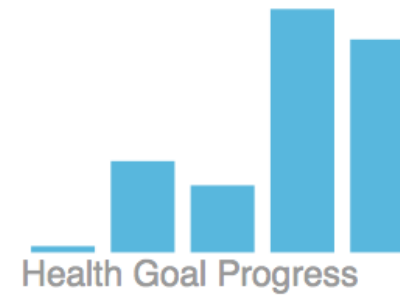


Legend

- ▼ Your Answer Today
- Your Average Answer



[Click to Hide Detail](#)



- Your PULSE Today
- Your Average PULSE
- - - Optimal PULSE

Effects of Visualization

- Q1 What is the association between today's goal progress and using the personal feedback portal?
- Q2 Is below-average goal progress on the previous day related to current goal progress?
- Q3 Is the lag-effect of poor goal progress yesterday attenuated when participants interact with their personal feedback portal?

T. Pham, S. Mejía, R. Metoyer, K. Hooker, "The Effects of Visualization Feedback on Promoting Health Goal Progress in Older Adults", Short Paper in *Proceedings of Eurographics Conference on Visualization (EuroVis)*, 2012.

Feedback

Association of Progress to Visual

On days when you do poorly, you are more likely to use the feedback visualization

What is the association between today's goal progress and using the personal feedback portal?

Feedback Lag Effect

If you did poorly yesterday, you more than likely did poorly today as well

Is below average goal progress on the previous day related to current goal progress?

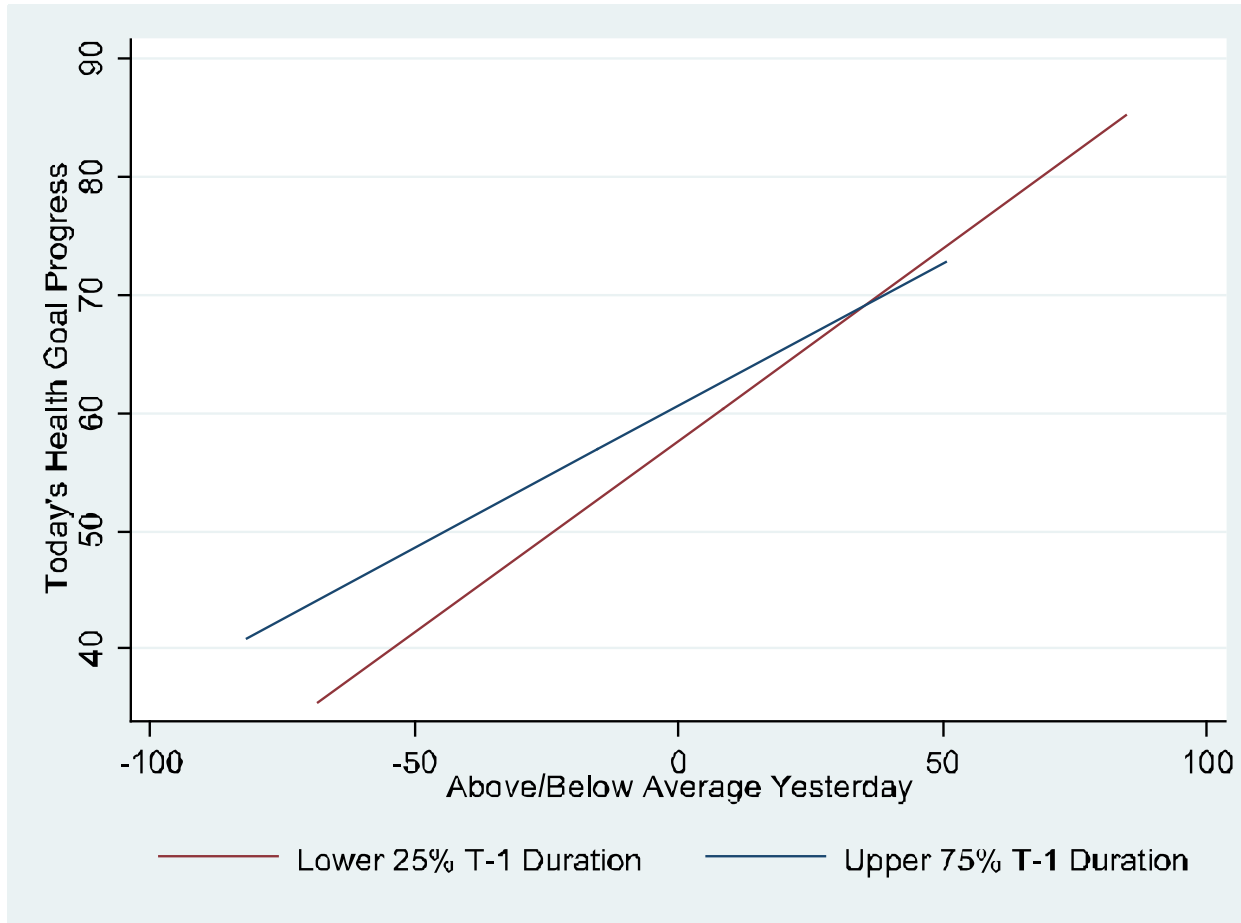
Feedback Moderation Effect

Today's goal progress is linked to yesterday's goal progress. Those who did poorly yesterday are likely to also do poorly today, however, the effect is weakened when the visualization is used

Is the lag effect of poor goal progress yesterday attenuated when participants interact with the feedback portal?

Feedback

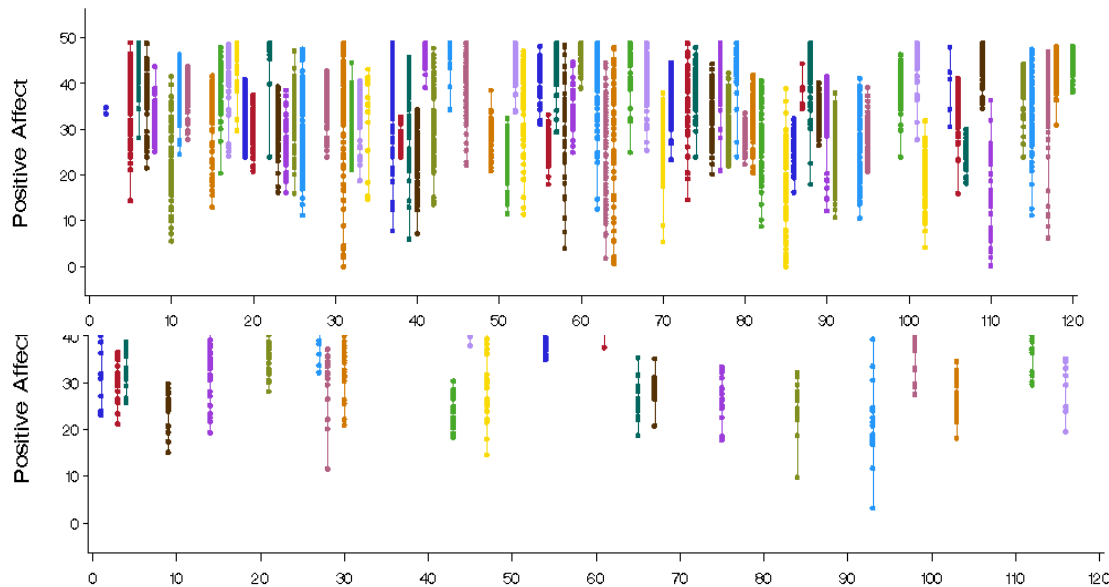
Moderation Effect



Temporal Frame

Intraindividual Variability


The burst group statistical distributions were positively correlated with the continuous group




Consumption Feedback

Metoyer & Riche

How do we effectively use monitored data as visual feedback to inform behavior change in home inhabitants



How can
interactive systems
help people adopt more
sustainable
electricity consumption behaviors



How can
interactive systems
help older adults adopt more
independent/maintainable
health behaviors



Whole home

FIGHT PHONE SCAMS. REPORT CALLS SEEKING CREDIT CARD INFORMATION AT 684-3000.
 Rate discounts available for income eligible seniors and other customers. Call 206-684-3000.
 Avoid late charges - make timely bill payments or payment arrangements. (Accounts on Budget Billing are not eligible for alternative payment arrangements.)

DETAILED BILLING INFORMATION

Electric Service

Service From	Service Through	Previous Reading	Current Reading	KWH Multiplier	KWH Usage
				1	

Meter Number: _____ Service Category: KWHC
 Base service charge _____
 Winter Residential Energy _____ KWH @ \$0.0386 per KWH
 Winter Residential Energy _____ KWH @ \$0.0803 per KWH

Current Electric Service: _____

CURRENT BILLING:

No. of days this period: 63
 kWh consumption this period: _____
 Avg kWh per day: _____
 Avg kWh cost this period: \$ _____

Same period last year: n/a
 Same period last year: n/a

Compare Your Electricity Usage

Always-On

Intermittent



Based on standard U.S. Government tests

ENERGYGUIDE

Refrigerator-Freezer
 With Automatic Defrost
 With Side-Mounted Freezer
 Without Through-the-Door Ice Service

XYZ Corporation
 Model ABC-10
 Capacity: 23 Cubic Feet

Compare the Energy Use of this Refrigerator with Others before You Buy.

This Model Uses
 776 kWh/year

Energy Use (kWh/year) range of all similar models:

Uses Least Energy	Uses Most Energy
742	836

kWh/year (kilowatt-hours per year) is a measure of energy (electricity) use. Your utility company uses it to compute your bill. Only models with 22.5 to 24.4 cubic feet and the above features are used in this scale.

Refrigerators using more energy cost more to operate. This model's estimated yearly operating cost is:

\$68

Based on a 1992 U.S. Government national average cost of 8.24¢ per kWh for electricity. Your actual operating cost will vary depending on your local utility rates and your use of the product.

Refrigerator Energy Use (kWh/year) range of all similar models: 742 to 836



Oregon State UNIVERSITY

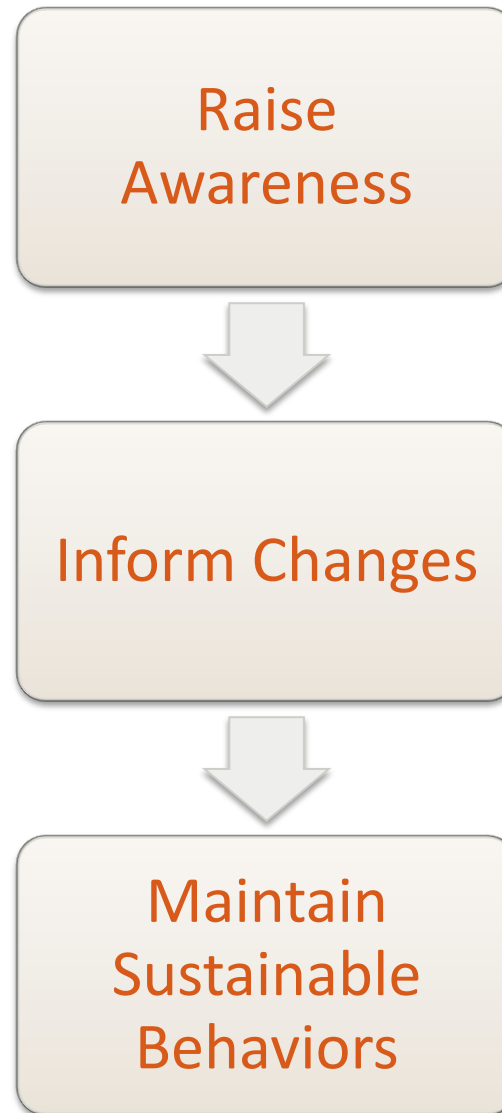
Appliance specific

EFFECTIVE ASPECTS OF FEEDBACK

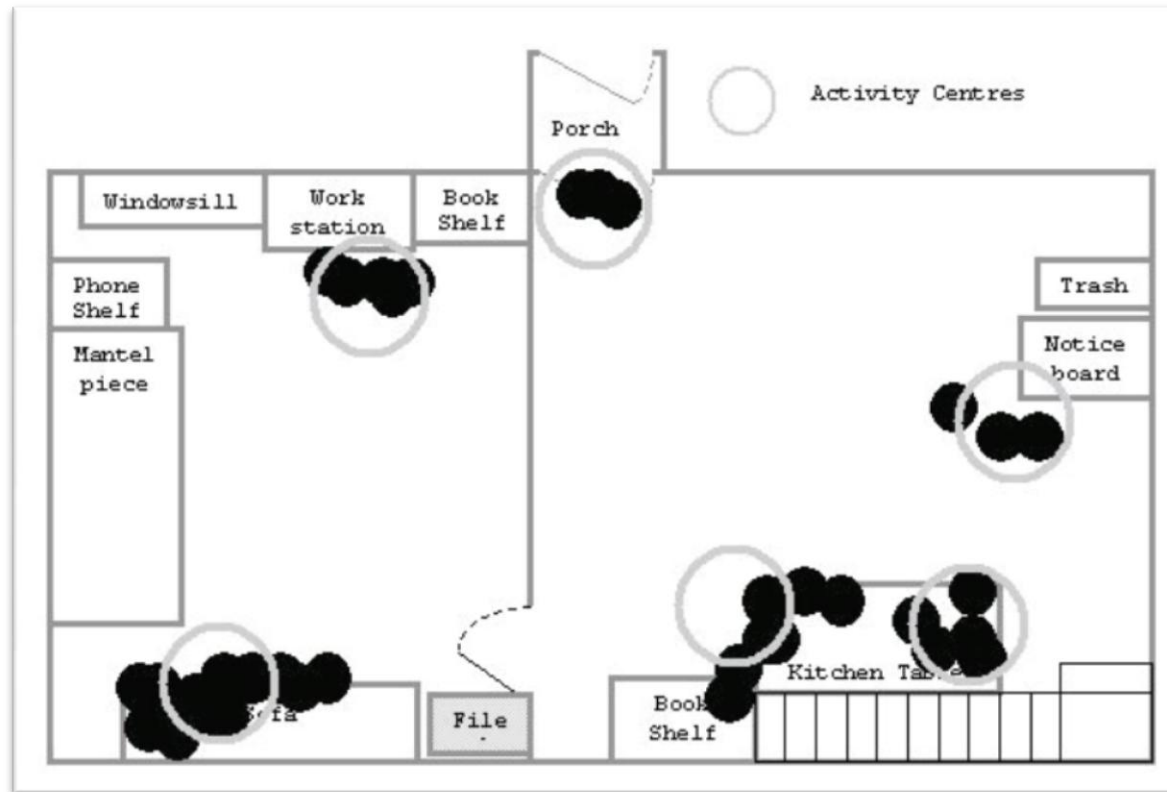
[FISHER 2008]

- Frequently updated,
- Interactive,
- Appliance-specific,
- Historical or normative comparisons, and
- Longitudinal feedback

A Three Step Approach



Location



Leverage people's intimate knowledge of what is happening in a location

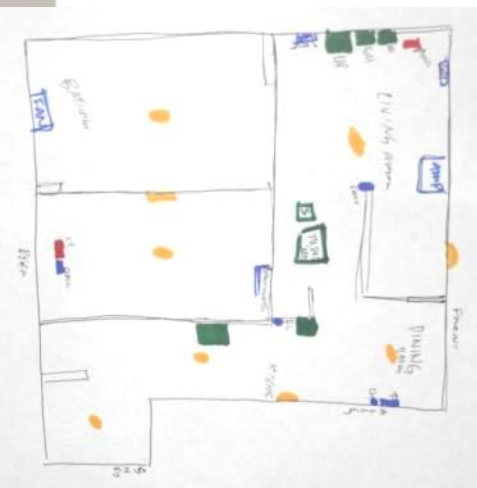
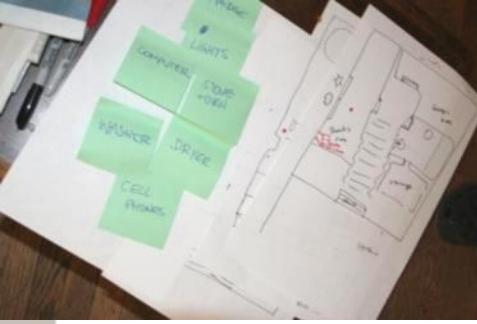


Always-On Interactive Information Visualization

Field Study

Always-On Feedback

What do you know about how electricity is consumed and how do we integrate an always on device into the home



4 households

3 couples, 2 housemates

4 students and 4 professionals

Contextual
Interviews

Electricity conservation
practices

Current awareness of electricity
consumption

Participatory
design

Always-on visual
feedback



*I don't really know
what appliances
really use...I'd like
to think that I do,
but I probably don't*



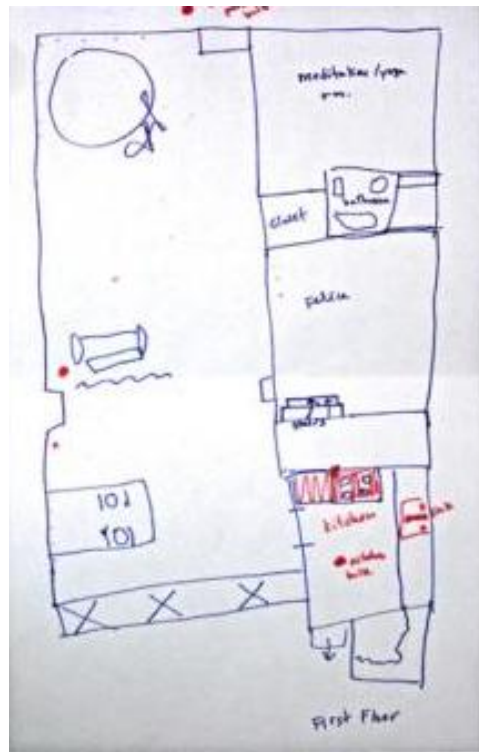
Reconcile household members' awareness of consumption



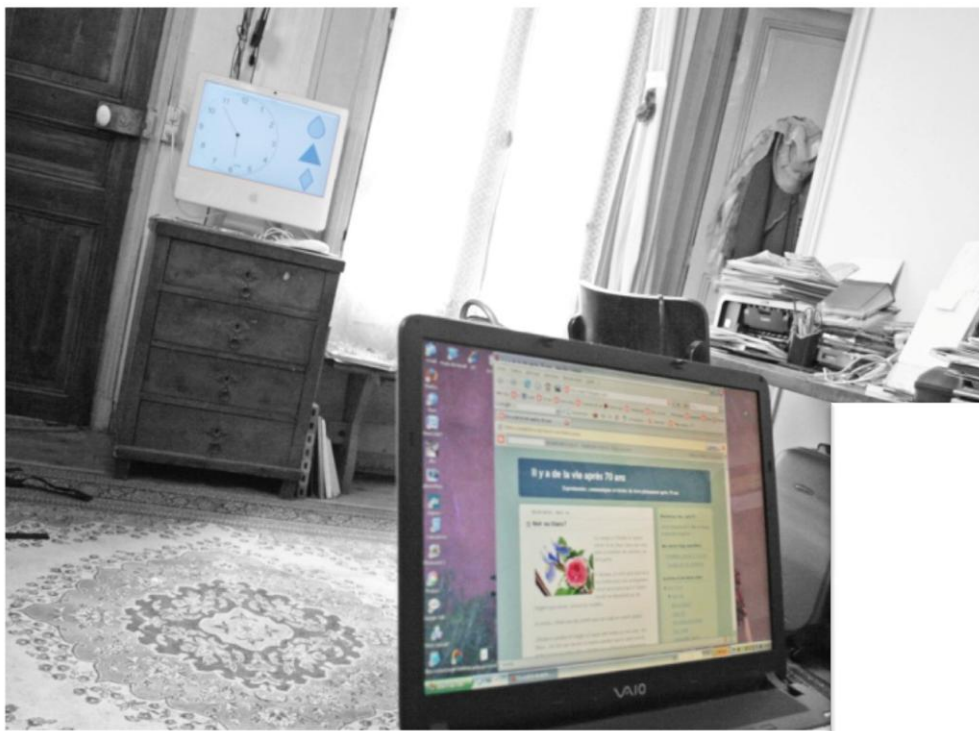
Provide self-comparison
to motivate change



Challenges for adoption



Personalization and Mental Models



Integration in the Home

*I would frame it,
lamininate it,
and it would
be color coded*



Energy Consumption

2-year NSF Project



Aesthetics

Comparisons

Goal setting

Privacy

Groups/Families

Routines

Location

Info Bandwidth

Play/Fun

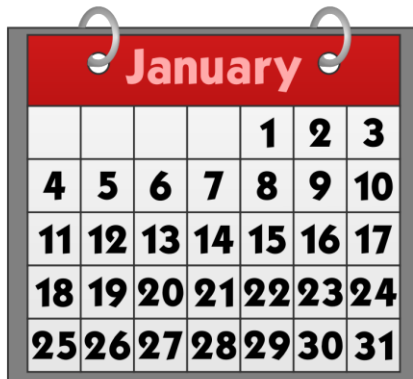
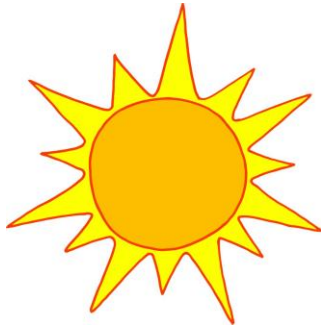
47 Stages of change

April 30, 2012

Washington State University

Time

An Analogy – An Architecture



	8 Wednesday	9 Thursday	10 Friday		
8 am	Opening Keynote	ARC306 - UX - Microsoft Interface AU Central A	BOF04 - Microsoft Innovation AU Meeting	ARC312 - Make your Customer's AU Arena 1A	DAT318 - Writing Applications AU Arena 1B
9 am					
10 am	ARC301 - Software + Services: Microsoft's vision for SOA, SaaS and AU Central A	DEV301CT - Xbox Development with XNA Games Studio Express AU Meeting Room 5	DAT309 - Implemented Scale-Out AU Meeting	DEV309 - Best Practices for AU Arena 1B	
11 am	DAT302 - Titans Data BI and AU Mee	ARC308 - Software Factories AU Central A	WEB302 - Mastering Virtual Earth AU Arena 1A		
12 pm					
1 pm		Blogge lunch Meetin			
2 pm	DAT303 - Microsoft Business Intelligence Roadmap: What's Next? AU Meeting Room 7	ARC309 - Using the Web to build connected systems AU Arena 1A	SEC303 - Securing Your Friends and Family AU Central A		
3 pm					
4 pm	WEB314 - Web 2.0 Programming AU Arena 1B	ARC311 - Windows Client .NET: Introducing the "Astropolis" Client AU Central B/Cabana 3		Closing Locknote	
5 pm	ARC305 - Lap Around Real World OBA Architectures AU Arena 1B	ARC310 - Learning to live with the Static-typing Fascist and the AU Cabana 1			
6 pm	Ask the Experts	Final Party			

Summary

Awareness is necessary for self regulation

Technology can help promote awareness

Technology can inform behavior change

We need to understand how to build ecosystems to manage change based on data feedback

Energy

ADLs

Social / Health goals, etc.

Thank You

- NSF – DGE 0965820 IGERT Life in an Aging Society
- NSF-HCC 1018963 Supporting Self-Awareness in Everyday Data Consumers Through Appropriate Interactive Visualizations

Karen Hooker
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Tory Hagen

Tuan Pham
Karl Smeltzer
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Andrew Atkinson
Catharina Vijay
Yann Riche
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Carmen Steggell
Laura Lien
Carlos Jensen
Jennifer Davidson
Patrick Chiang
Shannon Mejia

