Doing What You Want To Do

Leveraging and Replacement in Aml:

Some Thoughts About Design

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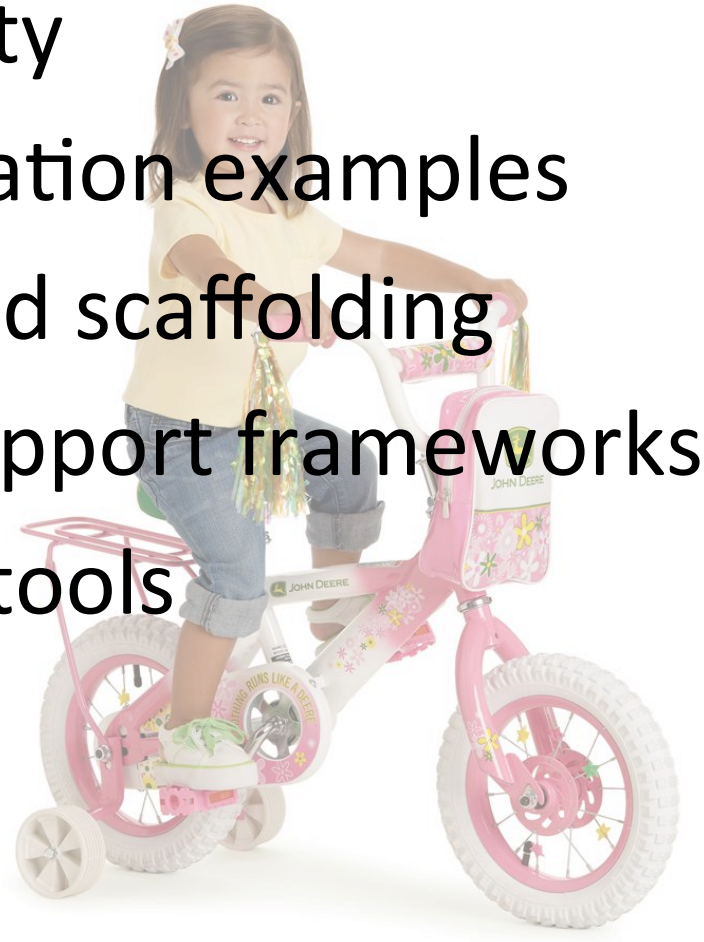
From Computers in Walls to Things I Want to Do

- Kinds of AmI functionality
- AmI task support application examples
- Distributed cognition and scaffolding
- The two kinds of task support frameworks
- Designing with the two tools



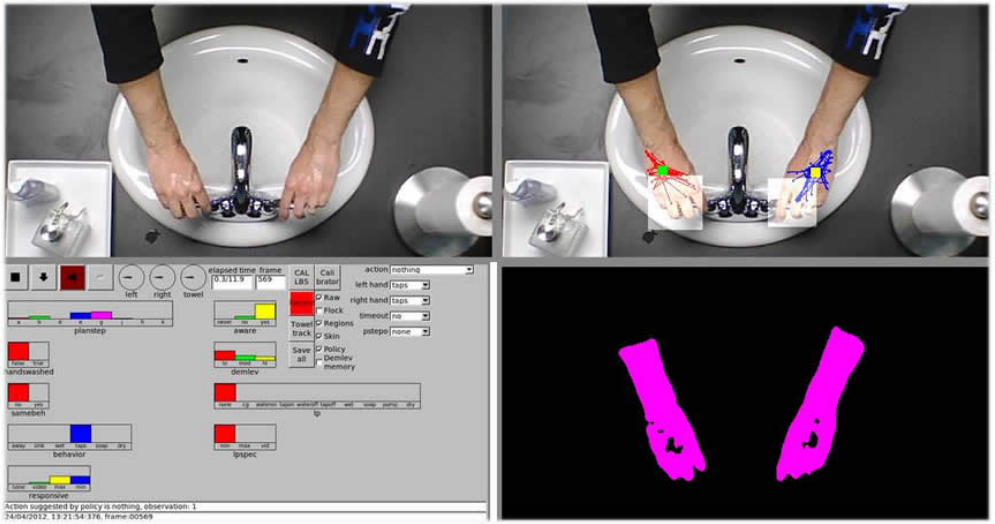
AmI Systems / Environments

- Pretty much similar to any computer system
  - But is invisible, pervasive, and just-in-time

- Typical types of AmI systems
  - Communication
  - Sensoring and deducing state
  - Task support

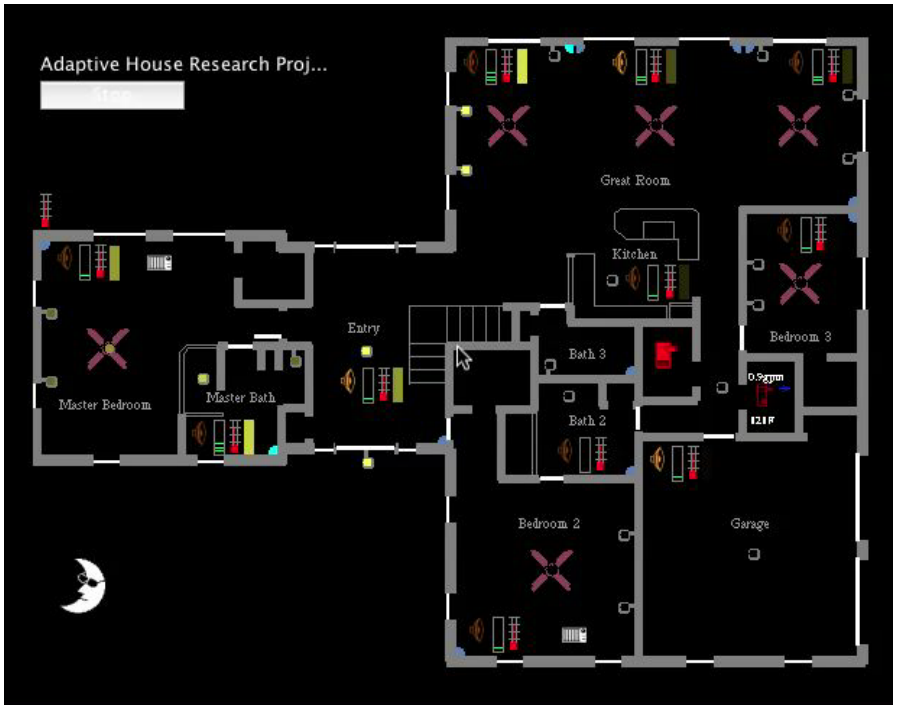
AmI systems – Task Support

- COACH
  www.tinyurl/coachHoey2010



- Adaptive House
  www.tinyurl/AdaptiveHouse

- MAPS Task Support
  www.tinyurl/Maps2008



- ASSISTANT Travel Aid
  www.aal-assistant.eu/

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AmI systems – types of support

- Task support styles
  - Replacement
  - Leveraging and learning

- Echoes similar styles in AI systems
  - Artificial Intelligence does the task for you
  - Intelligence Augmentation extends your ability to fit the task

Scaffolding in Task Support

- Provides bridge from existing knowledge to new tasks
- From education domain
- System provides significant help in task accomplishment
  - And a little less
  - And a little less
  - And then none…..

Distributed Cognition (DC)

- Cognitive acts are result of cognition spread across actor(s) and artefact(s)
- Using DC often changes the nature of the task but the goal stays the same

Memorize the Iliad

learn to read

'memorize'
the library

- Examples of distributed cognition are
  - Reading
  - Using a map – plotting a nautical course before GPS
  - Calculating a physics problem
  - This talk

The two tools concept

- For Learning
  - An artifact or system that changes the user allowing them to do what they could not do before
  - Scaffolded
  - Acknowledges change is inherent to human condition

For Living

- An artifact that replaces functions or augments a user to do what they could not do alone
- Closely fitted to user

Two Tools Examples

- Bicycle
  - Learning version – trainer wheels
  - Living version – adult trike
- Walker
  - Kid's support while learning balance
  - A walker for a child with cerebral palsy
- Task support
  - Memorize prompt sequence
  - Smartphone delivers prompts

12	Return broom/dustpan to storage
11	Disposes of dirt
10	Sweeps dirt into dustpan
9	Sweeps entire surface
8	Sweeps to opposite corner
7	Starts in corner
6	Holds brrom with both hands
5	Place dustpan aside
4	Chairs on table, if any
3	Move items from floor
2	Go to designated room
1	Locate broom/dustpan

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Tools for Learning

- Is your skill significantly greater as a result of using this tool?
- Is there a method of having this tool disappear?

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Tools for Living

- You require this tool to accomplish this task - otherwise you cannot
- The tool rarely changes or graduated from
  - No matter how long you use it you don't get *better* at it
- It is specifically tailored to *you* (if not then you <u>will</u> abandon it)
- Your use of it does not typically change over time

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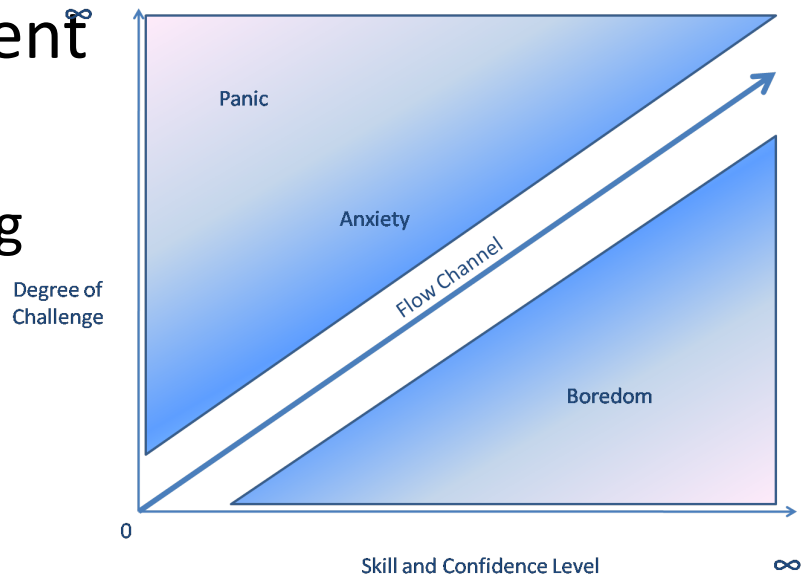
The Two Tools: Dangers in Misidentification

- Tools for Learning
  - Scaffolding is not retractable
  - Flow issues cause abandonment
    - Challenge too much ⇒ anxiety
    - Skills too high for task ⇒ boring



- Tools for Living
  - Learned helplessness
  - Once tightly fitted, adjustment becomes very difficult

Design implications - Interesting idea but what of it?

- If you are making a tool for learning think about:
  - How will the person ‘graduate’ from your environment.
  - How will you gradually remove supports / fold individual prompts in to reminders of sequences?

- If you are making a tool for living system think about:
  - Can you easily deeply personalize the tool?
  - Do you have enough understanding of what the user actually does to provide this as an alternative?
  - Be aware of:
    - Unintentionally deskilling (GPS, calculator, dyslexic reader)
    - The change in the nature of task (memorizing ⇒ reading)

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The Two Tools in Collision

- There are tools for living that need to be perfectly fitted but also need to be scaffolded
  - Senior with declining cognitive ability needs extending scaffolding

- There are tools for learning that need to be tightly fitted to the user
  - Prompting pictures of actual places/things for young adults with developmental disabilities

An example of the struggle between tool perspectives – the pocket calculator

Do we allow calculators in school? Possible answers -

1. Ban hand-held calculators from schools
2. Allow the use of hand-held calculators *after* they have mastered arithmetic
3. Create new calculators that by using them learners would acquire the skills and eventually independent them.
4. Find new ways to distribute responsibilities between humans (qualitative reasoning) and machines (detailed quantitative computations)

What *did* happen was that the US National Council of Teachers decided that the availability of calculators is assumed and attention is shifted to estimation activities and a focus on the meaning of operations and selection of appropriate calculation methods