The Influence of Display Medium and Design on Energy-Saving Technology Adoption

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- Users will spend only about **1** minute per day monitoring their energy use! (Froehlich, BECC 2010)
  - *How can we maximize feedback effectiveness in such a short amount of time?*
    - Look at different designs
    - Look at different media
    - Learn about user preferences
    - What is most <u>actionable?</u>

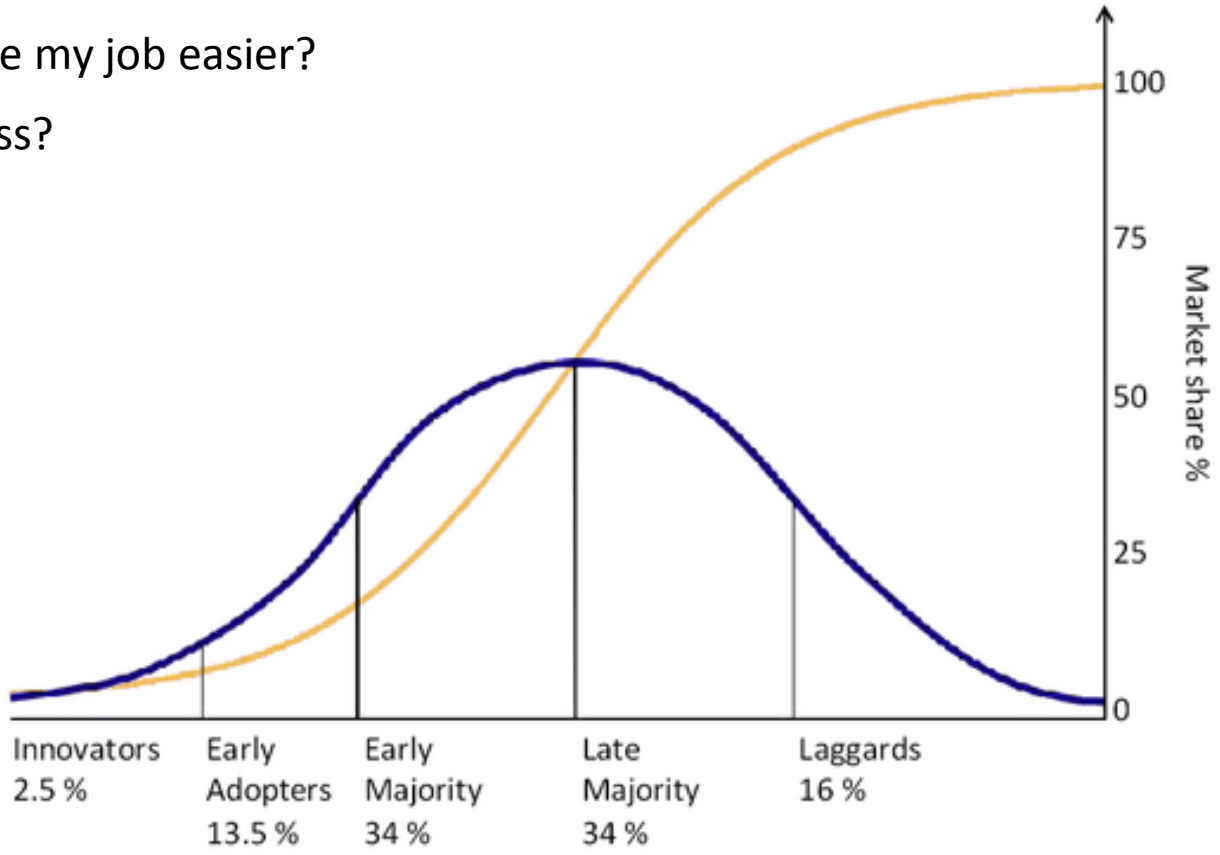
Joining Forces

- The fields of sustainable energy and media design are becoming more and more interconnected…

- Research to date has not fully examined how the medium of energy display influences consumer preferences about technology adoption.

Technology Adoption

- Adoption: An individual's decision to become a regular user of a product
  - Does it make my job easier?
  - Is it effortless?



Rogers, 1962, Davis, 1989

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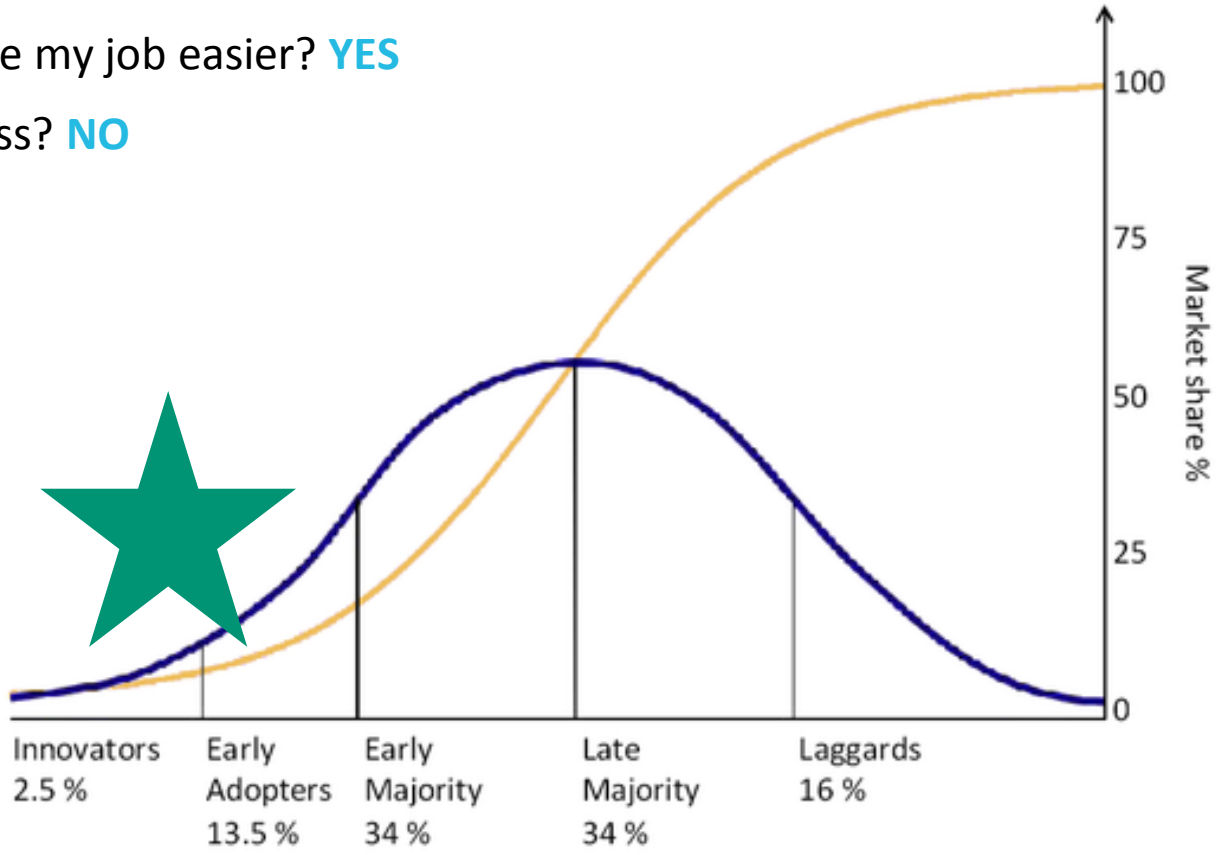
Technology Adoption

- Adoption: An individual's decision to become a regular user of a product
  - Does it make my job easier? **YES**
  - Is it effortless? **NO**

Home energy management technologies have a long way to go…start with the early adopters!



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Methods Overview

- Sample size: **50**
- 74% owners, 26% renters
- Geographical spread, 9 states
- Mean Age: **35** Range: 21-67

- Online survey!
- Early adopters rated 12 home energy management (HEM) systems across 3 different media (in-home, web, phone).
  - Is it nice to look at? Understandable? Want to explore more?
  - Hypothetical "length of use" (mins.) was used as a loose metric of adoption
    - *How long/day would you be willing to use this?*
  - Open-ended responses optional

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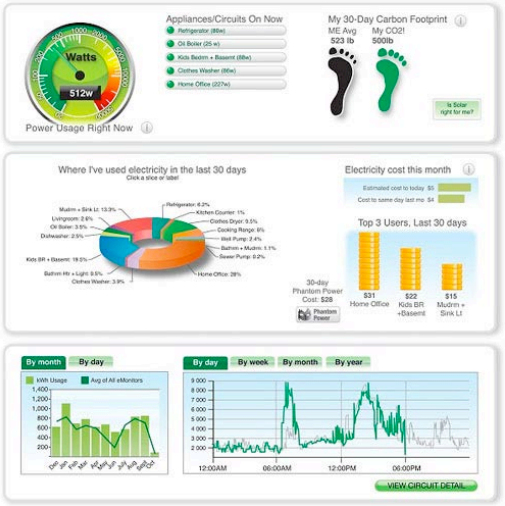
“OLD SCHOOL”

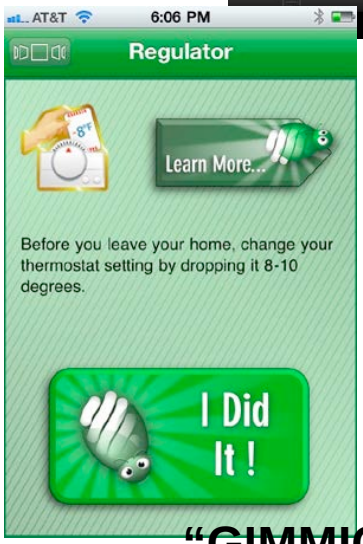
“This makes me dizzy”

“HIDEOUSLY illegible, my eyes are bleeding”

“I LIKE THE FEET!”



“Reminds me of an iPhone. I can haz for my apartment?”



“GIMMICKY”

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- Results by medium:

Time willing to spend using:	IN-HOME	WEB	PHONE
None	14%	8%	**30%**
1-5min	**65%**	**53%**	56%
10-15min	19%	35%	13%
Over 15 min	2%	4%	2%

Mean of the 4 exemplars rated for each of the three mediums

Largest percentages for all media fall within the expected 1-5 minute category

A large percentage of users are willing to spend more time with web portals (this could be due to screen size:content)

Interestingly, a large percentage of users are not even willing to interact with current energy smartphone apps

Results by ‘usability’

	GOOD	BAD
None	6%	**28%**
1-5min	**63%**	57%
10-15min	27%	14%
Over 15 min	4%	1%

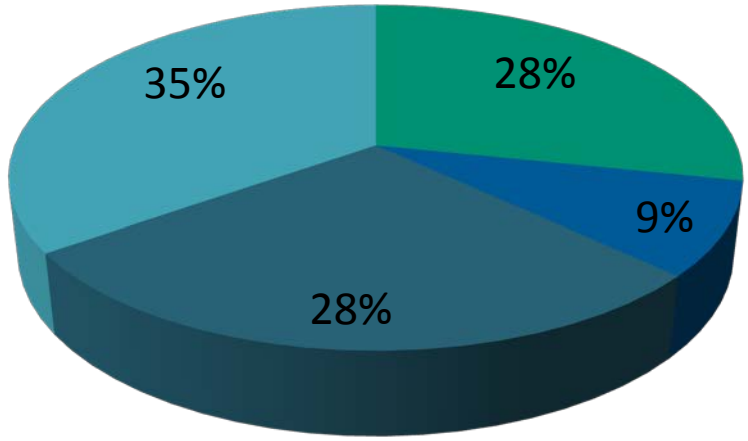
Across media, mean of the top or bottom rated collapsed across our three questions

(note: all questions have a similar pattern on their own)

Usability is a good predictor of time willing to spend using

Users are more willing to spend time with an energy feedback device if it rates highly on aesthetics, ease of understanding, and prompts exploration

Which medium of HEM do you think you'd most prefer?



- A display that sat on your counter or wall
- A web portal you could log into
- A smart phone application
- I'd like them all

Surprisingly, web portals are the least preferred medium of energy feedback!

Wait, didn't I just say users want to spend more time with them?

It's more likely that users just want multimedia options, which is most preferred…

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- What can we take away?
  - The “1 minute” may vary depending on medium as well as usability factors
  - Current HEM products (e.g. home energy displays) are not fulfilling user needs
  - Multimedia is NECESSARY, users want flexibility
  - At this point, apps aren’t where they need to be, but they are highly desired
  - Web portal looks + mobility is the way of the future for energy monitoring

- Next steps
  - Providing multimedia options in-field and observing frequency of use/medium
    - Task specific?

  - **More research is needed that examines how design and user behavior jointly influence HEM technology adoption**