Who Designs for Whom?

Designers

Users

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University of Colorado
CMCI 1020: Concepts and Creativity
Important questions for Information Technology design

• Who are the users?

• Who are the designers?
Questions to think about

• How can we ensure technology is inclusive?
  – How do we design for diverse users?

• What does it mean for a computer to be racist?
  – Can algorithms discriminate?
Important questions for Information Technology design

• Who are the **users**?

• Who are the **designers**?
Important questions for Information Technology design

• Who are the **users**?
  – Potentially, everyone

• Who are the **designers**?
  – Generally: the tech industry
Important questions for Information Technology design

• Who are the users?
  – Potentially, everyone

• Who are the designers?
  – Generally: the tech industry
  – On average: male, under 40, white, Californian, highly educated
What happens when **users** look and think differently from the **designers**?
Face Recognition

HP computers are racist

wzamen01

3,000,289

18,526

905
We got our Mom a new Nikon S630 digital camera for Mother's Day and I was playing with it during the Angels game we were at on Sunday.

As I was taking pictures of my family, it kept asking "Did someone blink?" even though our eyes were always open.

Sheesh! RACIST! 😕

from: Joz Wang
Face Recognition

Google Photos, y'all fucked up. My friend's not a gorilla.
7:22 PM - 28 Jun 2015

3,325 retweets
1,937 likes
Voice Recognition

Some voice recognition systems don’t work well for women, or people with accents

Example: OnStar
Voice-activated phone system for cars

“When evaluating the technology, husbands and wives are often divided.”  
Source: http://www.autoblog.com/2011/05/31/women-voice-command-systems/
Voice Recognition

OnStar optimized their system for different groups over time:

1. Men
2. Women
3. Midwest accents
4. Southern accents
5. New England accents

and there’s still more to do... (e.g., foreign accents)
Wearables/Devices

One big problem for lefties: In landscape mode, the dock is far from the dominant thumb.

Source: Mic
Wearables/Devices

Japanese company creates thumb extension for new iPhone owners with small hands
Wearables/Devices

Whatever smartwatch that is looks gigantic on a woman's wrist #IO14
Wearables/Devices

Source: http://smartwatches.org/learn/finding-smartwatch-as-a-woman/
Accessibility

Full color:

With red-green color blindness:

Source: http://www.digitalartsonline.co.uk/news/graphic-design/how-design-for-colour-blind/
“We are smart enough, we are compassionate enough, to figure out how to balance the legitimate Second Amendment rights with preventive measures, and control measures, so that... we will not see more deaths.”

Hillary Clinton
August 27, 2015

Jeffrey P. Bigham @jeffbigham · Aug 30
@HillaryClinton another tweet missing alt text. blind users can't read these posts. doesn't speak highly for your respect for accessibility

LIKES
3

10:26 AM - 30 Aug 2015 · Details
Name Validation

These unlucky people have names that break computers
Name Validation

“When Jennifer Null tries to buy a plane ticket, she gets an error message on most websites. The site will say she has left the surname field blank and ask her to try again.”
Name Validation

Some systems will reject other types of names

- Too long
  - Keihanaikukauakahihulihe'ekahaunaele
- Special characters
  - Hyphenated last names (e.g., Jordan Boyd-Graber)
- Non-English alphabet
Name Validation

I Can Text You A Pile of Poo, But I Can’t Write My Name

We can’t ignore the composition of the Unicode Consortium’s members, directors, and officers -- the people who define the everyday writing systems of all languages across the globe.

—by Aditya Mukerjee on March 17th, 2015

https://modelviewculture.com/pieces/i-can-text-you-a-pile-of-poo-but-i-cant-write-my-name
Name Validation

“We have an unambiguous, cross-platform way to represent PILE OF POO, while we’re still debating which of the 1.2 billion native Chinese speakers deserve to spell their own names correctly.”
How can technology designers avoid these problems?
How could this happen?
Didn’t they test the product?
How could this happen? Didn’t they test the product?

They surely did, but:

• Maybe they didn’t “train” it on black faces
• Maybe they didn’t test it on black faces
• Maybe they didn’t know about the failure
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“Training Data”

Algorithms are “trained” on example data

How do you build a face recognizer?
Feed the algorithm examples of faces
How could this happen?
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Important to have representative data for training algorithms!
• Need to collect data beyond the research lab
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User-Centered Design (UCD)

Designing for the **end user**

Iterative process:

- **Designing** with users in mind
- **Evaluating** user satisfaction
User-Centered Design (UCD)

Why is UCD important?

• User needs may differ from business needs
• User interests may differ from designer intention
• Hard to anticipate user expectations, reactions

“What happens when designers look different from users?”

• UCD can help – if done right
User-Centered Design (UCD)

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Designing

- Important concept: **usability**

Usability principles:
- Efficient
- Easy to use/learn
- Satisfying

Not usable:
Designing

There are a number of **guidelines** for good and usable design

Resource: usability.gov
Designing

• Important concept: accessibility
  – How usable is technology for users with disabilities?

Technology can remove barriers to communication and interaction and can improve lives

Technology can also create barriers and leave people behind if it is poorly designed
Designing

A number of small things can make websites and apps more accessible...

Accessibility principles:
• adjustable font sizes
• alternate text for images
• organized navigation
• navigable without mouse
• avoids epilepsy triggers

Not accessible:
User-Centered Design (UCD)

Designing for the end user

Iterative process:

Designing with users in mind
Evaluating user satisfaction
Evaluating

How can we measure the usability of a product?

Some possibilities:
• Ask the users about their experience
• Observe/record the users in action
• Measure how successfully a product is used
Evaluating

One approach: Follow-up with users after they’ve used your product/system

- e.g., surveys, interviews, focus groups
Evaluation

Another approach:
Learn from users **while they’re using** your product/system
• observation, testing
Evaluation

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Think-aloud protocol:
Users narrate their thoughts and actions while they use a system
Evaluation

Another approach: Learn from users while they’re using your product/system

• observation, testing

Task completion:
Users complete a task (e.g., find directions to a restaurant) and the designer measures how long it takes
User-Centered Design (UCD)

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User-Centered Design (UCD)

Designing for the end user

Iterative process:
- Designing with users in mind
- Evaluating user satisfaction

Key question: Who is the user?
User-Centered Design (UCD)

Who is the target user? Who are we designing for?

What if we are designing for...

• Teenagers?
• Pregnant women?
• War veterans?
• The “general public”?  
  – Is there such a thing?

Users will vary by:
• age, gender, race, ethnicity
• education level, income level
• language, nationality
• marital status, number of children
• job history
• health history
• familiarity with product
• familiarity with technology in general
User-Centered Design (UCD)

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Important to test on the target user!
Many companies test on other employees at the same company
• where certain groups are often underrepresented
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User-Centered Design (UCD)

Be sure to evaluate on the target users

If the target is the “general public”, be sure to evaluate a wide variety of users!

Users will vary by:
- age, gender, race, ethnicity
- education level, income level
- language, nationality
- marital status, number of children
- job history
- health history
- familiarity with product
- familiarity with technology in general
User-Centered Design (UCD)

Also keep in mind:
Target users are a moving target

Example:
• Facebook was originally designed for college students
• Now it’s used heavily by older age groups
Social networking site use by age group, 2005-2013

% of internet users in each age group who use social networking sites, over time

Source: Latest data from Pew Research Center’s Internet Project Library Survey, July 18 – September 30, 2013. N=5,112 internet users ages 18+. Interviews were conducted in English and Spanish and on landline and cell phones. The margin of error for results based on internet users is +/- 1.6 percentage points.
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Evaluating Technology

Suppose you test your product on different users:

Accuracy is 90%
• Is that good?
Evaluating Technology

Scenario 1:

Accuracy is 90%
• Is that good?
Evaluating Technology

Scenario 1:

Scenario 2:

Accuracy is 90%
- Is that good?
Evaluating Technology

Scenario 1:

Scenario 2:

A small error overall might be a huge error for a minority group.
Evaluating Technology

How could this happen?
Didn’t they test the product?

They surely did, but:

• Maybe they didn’t know about the failure

Important to understand the whole picture!
It can be hard to know what’s going on with algorithms
Evaluating Technology

• People are not great at interpreting statistics, so problems like this are common
  – The human aspect can get overlooked

• People also have a tendency to trust numbers without thinking about their deeper meaning
Evaluating Technology

• Another problem: it’s hard to understand algorithms
  – Hard to predict how they will perform
  – Hard to understand why they make mistakes

• There’s also a pervasive belief that algorithms are objective and neutral
  – They are, and they aren’t
Algorithmic Discrimination

It’s possible for algorithms to affect different groups of people differently.
Algorithmic Discrimination

It’s possible for algorithms to affect different groups of people differently

• Biases aren’t intentionally written into algorithms
• But they can still perform in ways that inadvertently discriminate
  – **Disparate impact:** when there is a discriminatory effect, even if there was no discriminatory motive
Algorithmic Discrimination

**Ad targeting** is based on many variables that are biased toward different user patterns

- Sometimes ads are targeted to specific demographic groups
- Sometimes ads are algorithmically targeted based on who the algorithm predicts are most likely to click
  - These factors might be biased toward different demographic groups
Algorithmic Discrimination

Ad targeting is based on many variables that are biased toward different user patterns

- A recent study found that Google presented ads for high-income jobs to men more than women
  - A career coaching service was advertised to men 1,852 times; to women 318 times
Algorithmic Discrimination

Are search results diverse and representative?

Consider:

About 5% of Fortune 500 CEOs are women

• In a search for “ceo”, you might expect about 5 in 100 images to be of women
Barbie

Martin Shkreli, since arrested by the FBI

A woman’s hand

Carly Fiorina, former HP CEO, 2016 presidential candidate
• First woman after 206 images!
Algorithmic Discrimination

Sometimes algorithms display information based on views of other people

• If those people are biased, then the information will be biased too
women need to]
women need to be put in their place
women need to know their place
women need to be controlled
women need to be disciplined

women need to be seen as equal

unwomen.org
Algorithmic Discrimination

How does algorithmic discrimination arise?

Main causes:

1. Algorithms use objective-seeming information that is correlated with different classes of people
2. Data-driven algorithms reflect the potentially-biased views of society
Algorithmic Discrimination

How does algorithmic discrimination arise?

1. Algorithms use objective-seeming information that is correlated with different classes of people

For example:

- Browsing behavior used for ad targeting
- Zip codes used for financial decisions
Algorithmic Discrimination

How does algorithmic discrimination arise?

2. Data-driven algorithms reflect the potentially-biased views of society

How?
• Most algorithms are based on data
• Data is created by people
• Algorithms then reflect the biases of people
Algorithmic Discrimination

How does algorithmic discrimination arise?

2. Data-driven algorithms reflect the potentially biased views of society

How?

• Most algorithms are based on data
• Data is created by people
• Algorithms then reflect the biases of people
Summary

• Be aware of **who the users are**
  – and how this compares to who the designers are
• Pay attention to the effects of **algorithms**
  – Evaluate algorithms and data critically
• Make sure products/systems are **usable** and **accessible** to a diversity of users