A walk through my house
Looking for design examples
A walk through my house
Looking for design examples

That I find very annoying
A walk through my house
Looking for design examples

Assume I am not a groucher...
Actually not my house
A clock radio
Another clock radio
How do you sleep if you are worrying about whether the alarm will go off . . . ?
Compare Alarm function with Iphone, Android etc.
A 1950s radio

Worked until last year
A 1970s radio
A 1990s telephone
A 21st century tuner
Two showers
A vacuum

Now

Then
Internet music controller
2002 Toyota Prius
Hose and Reel
My wife’s work station
TV
Controls
Reliability
Kitchen knife
A Desk Lamp
Dishwasher
Oven
Microwave
Garden Tool Rack
What do these bad designs have in common?

• Assume you will use features that no one will use
• No prioritization of importance
• Perception of user hostility
• Not obvious
What do these bad designs have in common?

• Over-engineered complexity
• Labels don’t make sense
• Design with poor knowledge of how the device will actually be used and no knowledge of customer’s needs
• Form over function
• Lacks simplicity
Why did engineers do this?
Why did engineers do this?

• Look cool
• Impress other engineers
• Disconnect with real customers
Bad Design

“Product features whose only virtue is that they are possible”
Discussion

• Take a minute
• Discuss 3 really bad designs
  – Why do they stink?
  – What was the designer thinking of?
  – What you would do to improve them?
Examples
• Automatic non-adjustable water
• Air dryers
• Bar on door which says pull should be on the right side
• Automated answering machine
• Central heating too hot/cold
Designs that stink

• Instructions don’t match product
• Pens explode in the washing machine
• Street lights are yellow not sufficiently bright
• Paper receipts
• Weak cables
Human Factors and Industrial Design

- Consider an automobile. What are the types of driver interaction with the vehicle?
- Source of power
- Source of braking
- Visibility
- Guidance (Controller)
- Sensors
- Safety
- Occupy space in (or around) the vehicle
- Need to consider each in turn
Industrial Design
Definitions

• Industrial Design
  – Creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems

• Human Factors (or Ergonomics)
  – Those aspects of the product that relate to human interfaces including
    • Ease of use
    • Ease of maintenance
    • Safety
Human Factors and Industrial Design

**A Central Tenet**

- Human Factors must be accounted for every person who comes in contact with the product
- Manufacture (including sourcing)
- Operation
- Maintenance and Repair
- Disassembly and disposal
Human Factors and Industrial Design

• What are some examples of good Human Factors Considerations in a product?
Human Factors and Industrial Design

• What are some examples of good Human Factors Considerations in a product?
  – Ease of use gmail, thunderbird
  – Automobile “blind spot” elimination
  – ABS braking systems
  – Power steering
  – Things that wont break when dropped
Human Factors and Industrial Design

• What are some examples of good Human Factors Considerations in a product?
  – A Search engine which earns your habits
  – Variable sized text displays
  – Display brightness automatically adjusts to viewing conditions
  – Uncluttered screens
Ease of Use

• Friendly interface between mechanical/physical and human worlds
  – Communicates function intuitively
  – Short time to learn
  – Retention of knowledge
  – Ease of apprehension by five senses
  – Psychological satisfaction
Human Factors and Industrial Design

• Some questions to ask
  – Is the product intuitively easy to use if the manual is lost?
    • Displays
    • Operations
    • Controls
  – The virtue of simplicity.
  – Can the product be used by the intended user?
    • Forces required
    • Motions required
    • Thought required

• Consider importance in “Design for the disabled”
Human Factors in Design for the Disabled

• Watch/Talk to intended customer
• Watch/Talk to therapists/caregivers
• Put yourself in intended customers place
• Design/Test/Redesign/Test etc - But with rapid turnaround
• Monitor product until end-of-use
Human Factors in Design for the Disabled

• Questions to Ask
  • Does the product do what you expect it to do?
  • Does the product have other uses that you had not planned?
• Does the product give satisfaction to the user
  – Empowers user
  – Gives a sense of satisfaction
  – Does not embarrass – causes the user to be defined by disability
Human Factors in Design for the Disabled

- Consider limitations of product as it applies to people with variations in disability addressed
- Consider expanding the intended user base with product add-ons
- Consider expanding the product user base with periodic product upgrades
What about the financial Rewards?

Does good human design pay off?
Consider I Phone Simplicity

1. Camera
2. Time: Clock/Watch/World Clock, Alarm/Stopwatch
3. Calendar
4. Landline and Skype
5. Music library
6. Address Book/Contacts
7. Weather
8. Calculator/computer
9. Maps/GPS
10. Notebook/Sticky-notes
11. Recorder
12. Wallet/Banking
13. Portable Flash Drive
14. Flash Drive
15. Flashlight
16. Bubble Level
18. Radio/TV
20. Magazines/Newspapers
Consider I Phone accessibility

<table>
<thead>
<tr>
<th>General</th>
<th>Accessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VISION</strong></td>
<td></td>
</tr>
<tr>
<td>VoiceOver</td>
<td>Off</td>
</tr>
<tr>
<td>Zoom</td>
<td>Off</td>
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<tr>
<td>Invert Colors</td>
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<tr>
<td>Grayscale</td>
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<tr>
<td>Speech</td>
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<tr>
<td><strong>Larger Text</strong></td>
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<tr>
<td>Bold Text</td>
<td>On</td>
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<tr>
<td>Button Shapes</td>
<td></td>
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<tr>
<td>Increase Contrast</td>
<td></td>
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<tr>
<td>Reduce Motion</td>
<td>Off</td>
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<tr>
<td>On/Off Labels</td>
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<tr>
<td><strong>HEARING</strong></td>
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<tr>
<td>Hearing Aids</td>
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<tr>
<td>LED Flash for Alerts</td>
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<tr>
<td>Mono Audio</td>
<td></td>
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<tr>
<td>Phone Noise Cancellation</td>
<td>On</td>
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<tr>
<td>Noise cancellation reduces ambient noise on phone calls when you are holding the receiver to your ear.</td>
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<tr>
<td><strong>MEDIA</strong></td>
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<tr>
<td>Subtitles &amp; Captioning</td>
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<tr>
<td><strong>VIDEO DESCRIPTIONS</strong></td>
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<tr>
<td><strong>LEARNING</strong></td>
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<tr>
<td>Guided Access</td>
<td>Off</td>
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<td><strong>INTERACTION</strong></td>
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<tr>
<td>Switch Control</td>
<td>Off</td>
</tr>
<tr>
<td>AssistiveTouch</td>
<td>Off</td>
</tr>
<tr>
<td>Call Audio Routing</td>
<td>Automatic</td>
</tr>
<tr>
<td>Home-click Speed</td>
<td>Default</td>
</tr>
<tr>
<td>Reachability</td>
<td>On</td>
</tr>
<tr>
<td>Double-tap the home button to bring the top of the screen into reach.</td>
<td></td>
</tr>
<tr>
<td><strong>ACCESSIBILITY SHORTCUT</strong></td>
<td>Invert Colors</td>
</tr>
</tbody>
</table>
Does Good Human Design pay off

Fourth Quarter 2015

• Apple sold more than 34,000 iPhones every hour, 24 hours a day,

• Earned $18 billion in the quarter — more than any company ever
Closer to home

• Today’s New York Times – a 3D printed prosthesis for Children

smprod=nytcore-iphone&smid=nytcore-iphone-share&_r=0
Closer to home

• Today’s New York Times – a 3D printed prosthesis for Children

https://www.youtube.com/watch?v=3rXZ7IHIX-Q
Crowd-sourcing the Technology

http://enablingthefuture.org
Each hand takes about 20 hours to print and another two or three hours to assemble. (Designs also can be downloaded from Thingiverse, a website run by MakerBot, a manufacturer of 3-D printers.) Assembly tutorials are available on YouTube.

It is not much harder than putting together a complex Lego kit, said Ivan Owen, one of the inventors of the 3-D printed hands, who made Dawson’s hand. “We released the designs into the public domain so there’d be no patent and everyone could do whatever they wanted with it,” he said. “So many people contributed their time to improve on the initial design. I feel blessed.”
Human Factors

• What are some of the unsafe ways the product could be used or misused (by a disabled user or anyone else such as children)? Can you make the product use robust against these modes?
  – Is the product itself robust against misuse?
  – Is there only one obvious way to use the product?
  – How can it be misused
  – Varying complicating external conditions
    • Climate
    • Culture
    • Concentration

Examples: Consider improving I Phone
Misuse

• Think through the ways the product might be misused (renders the product ineffective or even dangerous)
  – Can the product be designed to discourage misuse?
  – Examples of misused products
Apply to your product

• For your projects take 10 minutes and brainstorm Human Factors considerations