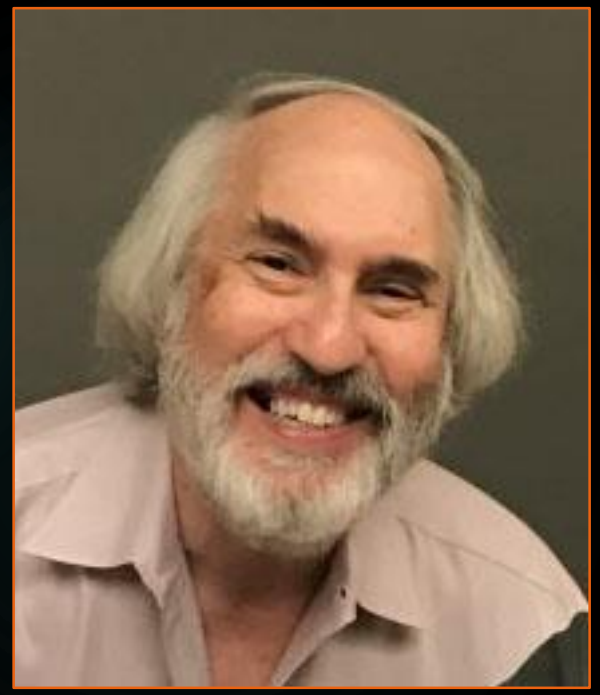
January 11, 2022

Creating Assistive Technologies - Understanding the Problem

ENGR110/210
Perspectives in Assistive Technology



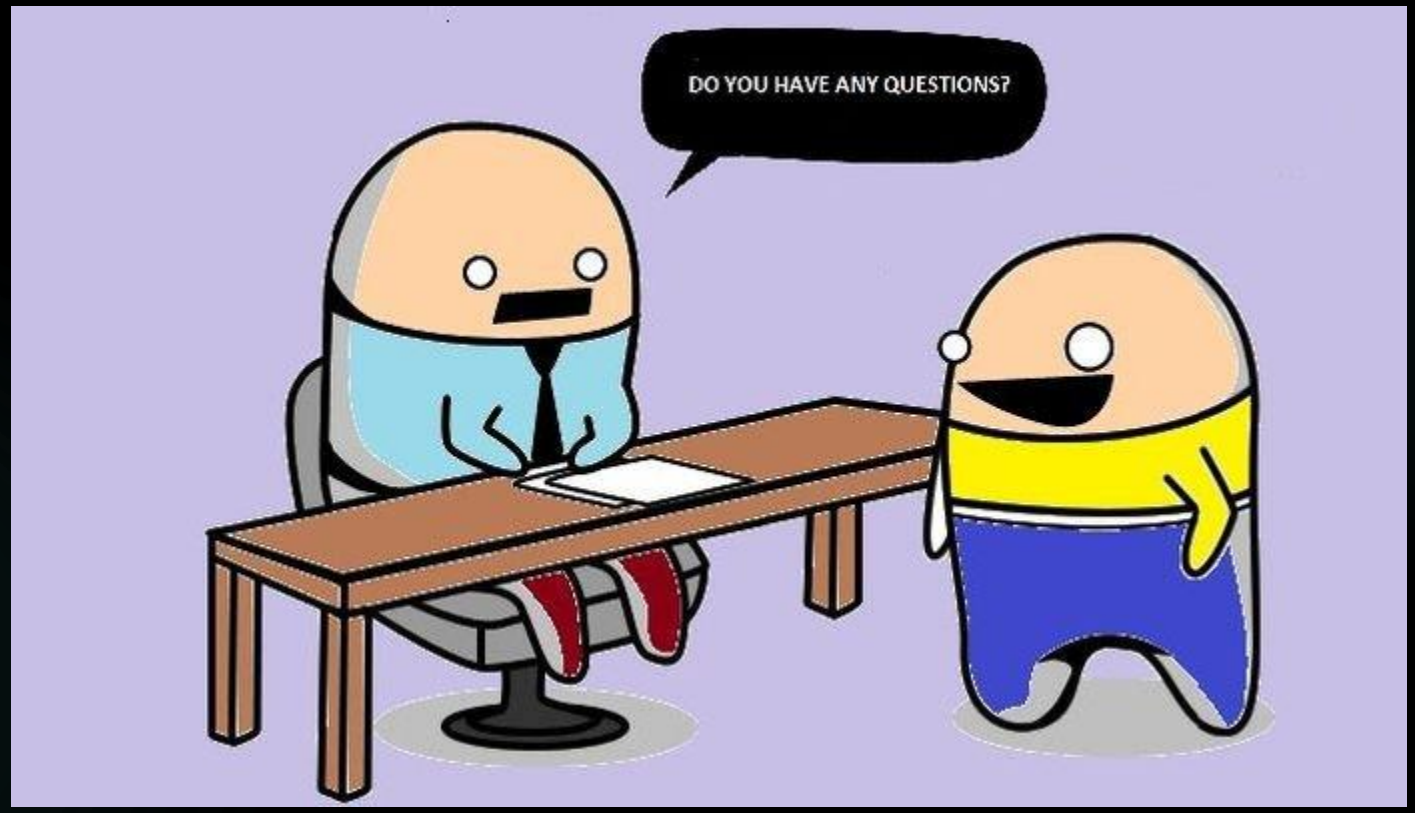
David L. Jaffe, MS

Instructor

16

Years

Do You Have Any Questions?



Apologies

- Lack of Stanford bandwidth caused video problems
- Week 1 in Review sent late

Attendance Sheet, Evaluation Form, and Meet with Dave Signup

For all students:

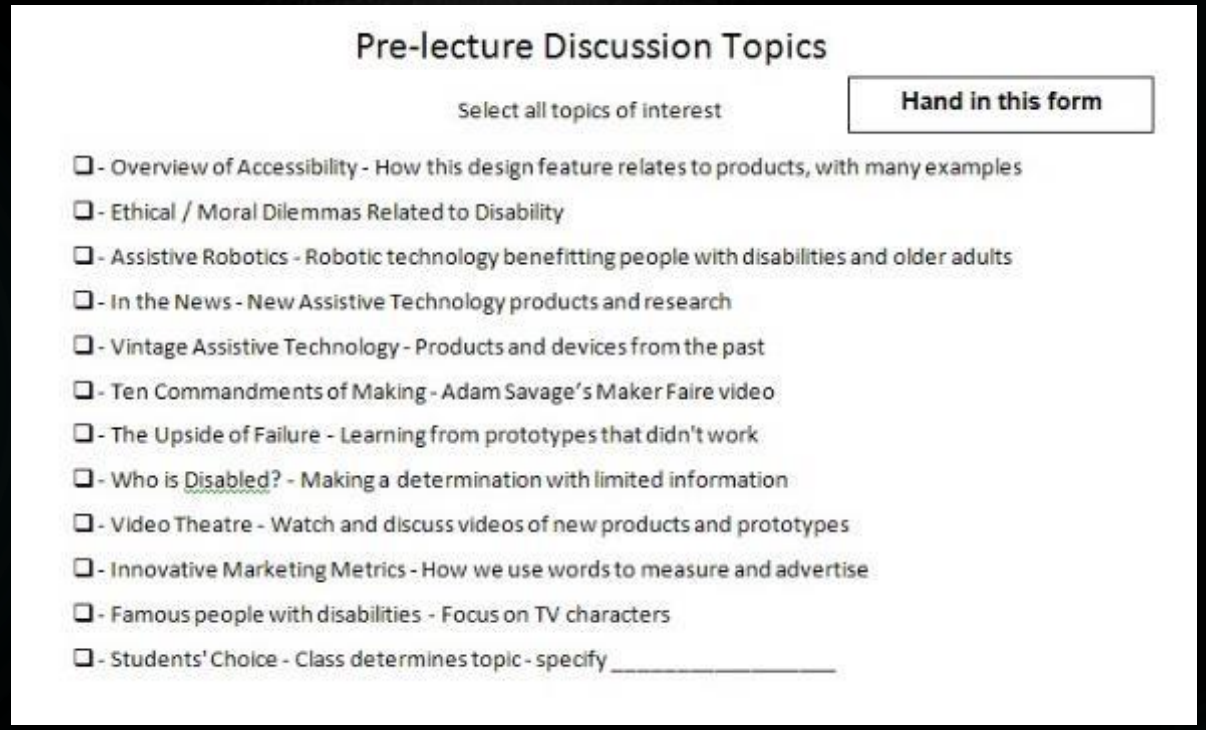
- Sign Attendance Sheet - important to verify your attendance
- Sign up to meet with Dave for lecture makeup, Individual Project discussion, or Team Project updates

For everyone:

- Fill out Class Session Evaluation Form

Pre-lecture Discussion Topics

Select all topics of interest – Google Form



Pre-lecture Discussion Topics

Select all topics of interest

Hand in this form

- ❑ - Overview of Accessibility - How this design feature relates to products, with many examples
- ❑ - Ethical / Moral Dilemmas Related to Disability
- ❑ - Assistive Robotics - Robotic technology benefitting people with disabilities and older adults
- ❑ - In the News - New Assistive Technology products and research
- ❑ - Vintage Assistive Technology - Products and devices from the past
- ❑ - Ten Commandments of Making - Adam Savage's Maker Faire video
- ❑ - The Upside of Failure - Learning from prototypes that didn't work
- ❑ - Who is Disabled? - Making a determination with limited information
- ❑ - Video Theatre - Watch and discuss videos of new products and prototypes
- ❑ - Innovative Marketing Metrics - How we use words to measure and advertise
- ❑ - Famous people with disabilities - Focus on TV characters
- ❑ - Students' Choice - Class determines topic - specify _____

For Students working on Team Projects

- Consider these options:
  - Projects suggested on Pitch Day
  - Student defined project
- Make your selection by the end of today
- Fill out Project Preference Form
- Schedule and meet with Dave to discuss project

Deliverables

- Weekly meetings with Bennett or me and emailed project progress reports (alternate weeks)
- Mid-term presentation & report
- End-of-term presentation and report

Project Documentation

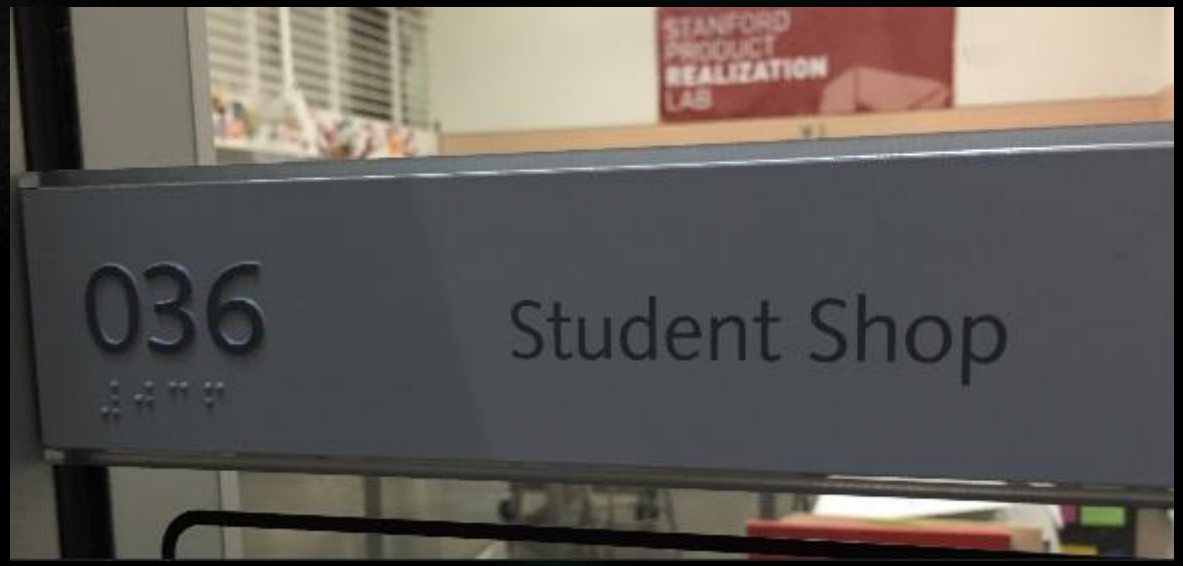
- Lab notebooks are not required
- Optional diary for your Individual Reflection
- Take photos and short videos:
  - Working with a person with a disability
  - Illustrating your design process
  - Prototypes

Work with Diligence

- Time is your team's most precious resource
- 7 weeks of class left to work on your projects
- Mid-term presentations in 4 weeks!

Miscellany

1. Weblinks and slides linked on lecture webpages
2. Last bits:
   - I have difficulty remembering names
   - I am totally supportive
   - I want to award good grades



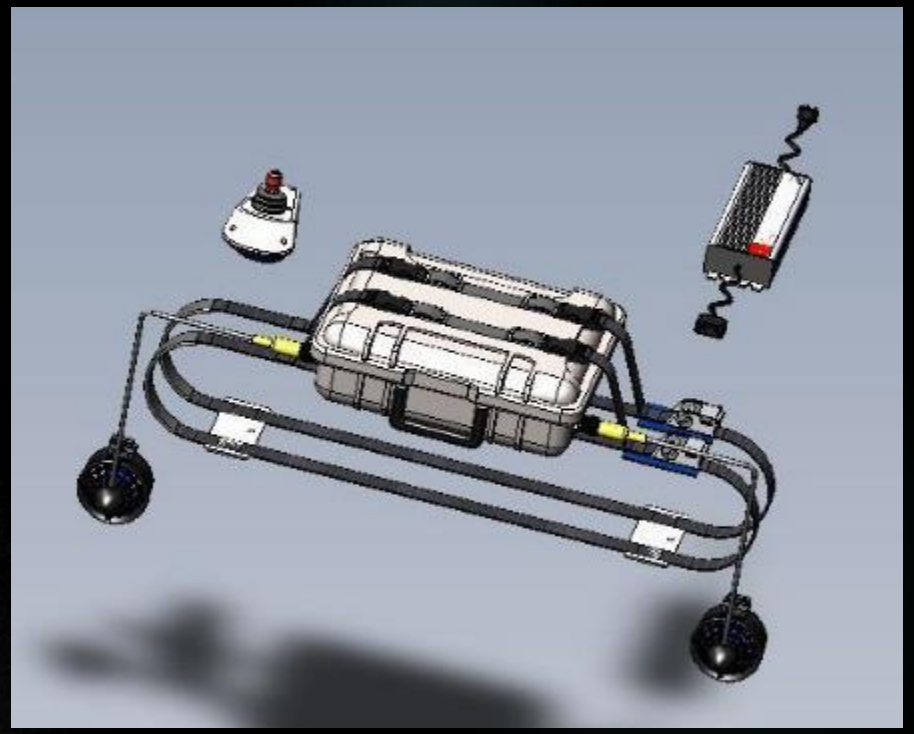
Student Project Preferences

Open Projects:

- http://web.stanford.edu/class/engr110/preferences.html#preferences

Other Items

- Your project effort is largely self-directed
- Weekly progress reports
- Keep your receipts
- Your class participation is appreciated



Questions?


discover
questions
how?
asking questions
where?
?
why
challenge
who?
QUESTIONS
clues
ask
who?
discover
what?
when?
Knowing
investigation
?
clues
how
why?
ask
knowing
investigation

Design Process

- Gayle & I have similar - but not identical - thoughts about Design Process
- I have an engineering outlook based on teaching this course
- Gayle has a Product Design view

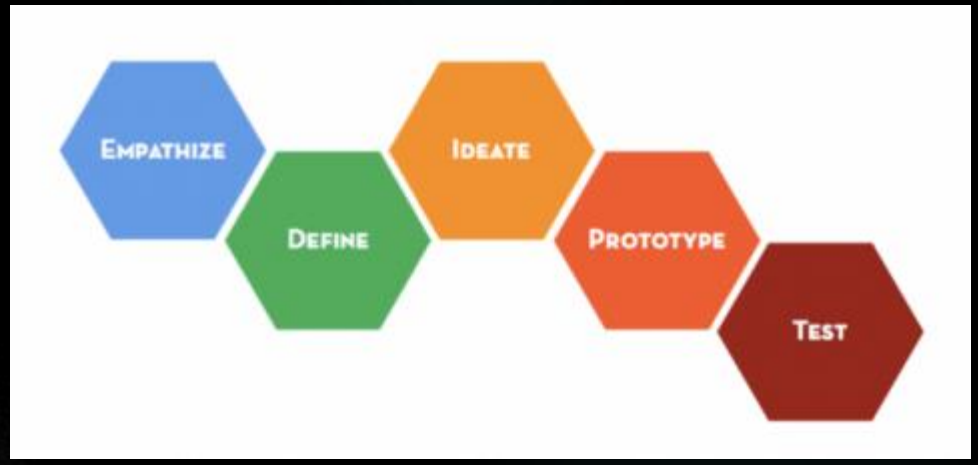
THE DESIGN PROCESS

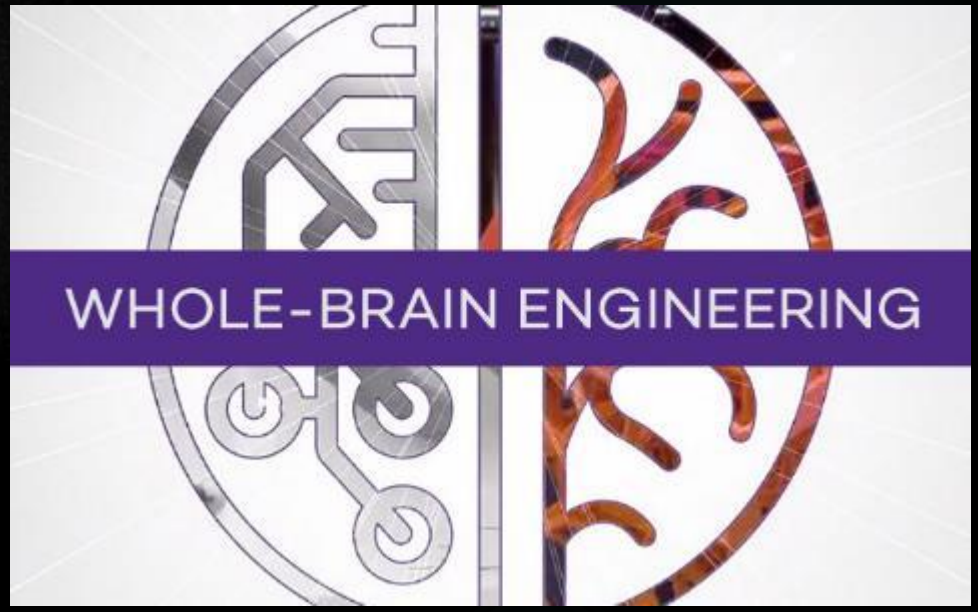
- A process is a step-by-step plan of action employed by makers, designers, or engineers to achieve a goal.

- Using a structured process increases the chances of success - and getting a good grade.

Design Processes

- Design Thinking - d.school
- Whole-Brain Engineering - Northwestern
- Human-Centered Design
- User-Centered Design
- Empathetic Design
- Compassionate Design
- Co-Design
- Cooperative Design
- Bystander Design
- Biological Design Process = Evolution

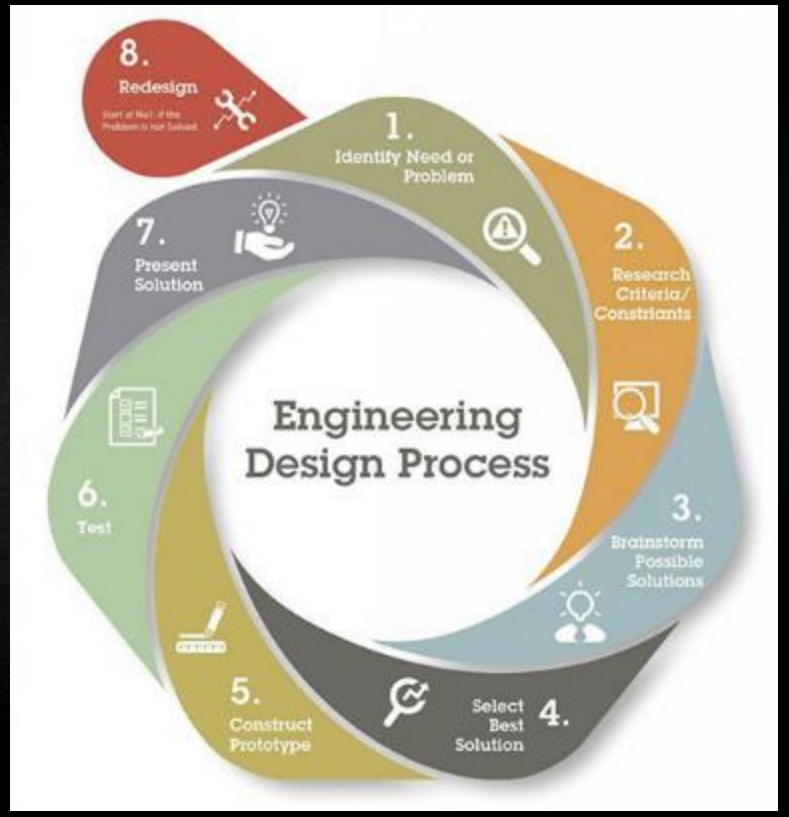


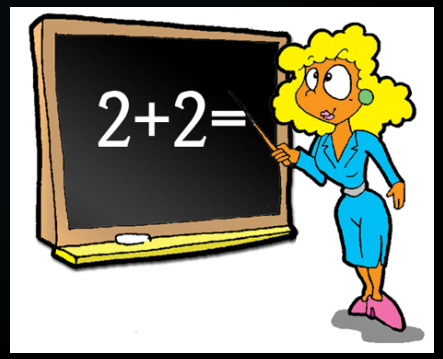


The Engineering Design Process
Activities

- **The Problem / Challenge**
- Brainstorming
- Selecting Design Concepts
- Prototyping (5 sub-activities)
- Communication (4 sub-activities)
- Role of the User

DESIGN SQUAD

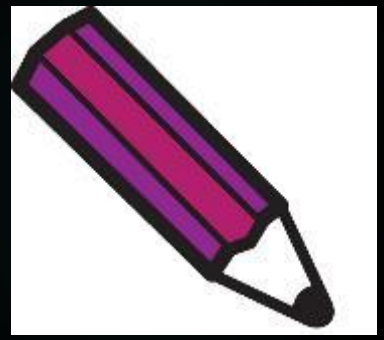




The Design Process

The Problem / Challenge

1. Search for the Problem
2. Identify the Problem
3. Describe the Problem
4. Understand the Problem
5. Determine the Need

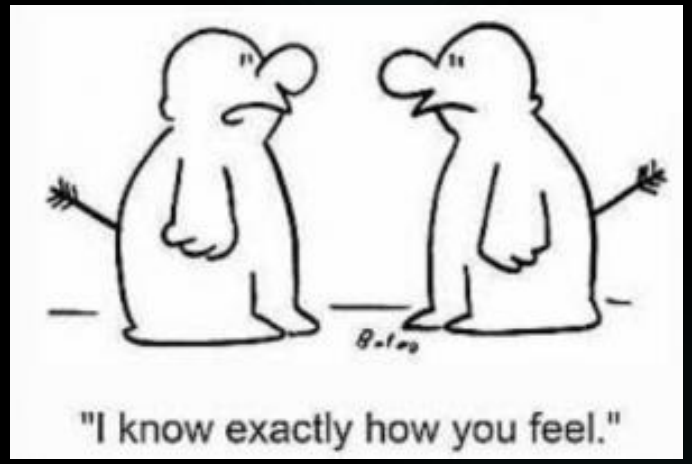


The Design Process
Understand the Problem

- Clarify goals and objectives
  - Incorporate users' perspectives and standards of care
- Gather information
  - WWW, library, journals (research)
  - Product catalogs (existing products)
  - Stakeholders
  - Experts & health care professionals

AbleData
Tools & Technologies to Enhance Life

The Design Process
Understand the Problem



- Often called "Empathy"
- Find out as much as you can
- User's specific background and situation
- Review information on the disability condition
- Solicit the perspectives of people with disabilities and older adults, family members, friends, health care professionals, colleagues, researchers, engineers, product suppliers
- Query professionals via online listservs

The Design Process
Understand the Problem

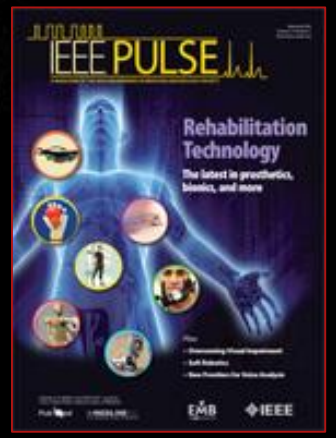
- *"While a user may have a good handle on The Problem, he/she may not fully appreciate the benefits and limitations of technology."*

- *"Since each person has his/her own circumstances, desires, and sense of aesthetics, a solution for one user may not be applicable for the entire user population."*

The Design Process
Understand the Problem

Research current solutions

- Published research
- Articles in popular media
- Previous student projects
- Product catalogs



The Design Process
Understand the Problem

Research current solutions

- What products currently address the problem?
- What products are most commonly used?
- What is considered the standard of care?
- You may not want to reinvent what already exists or has already been tried
- Build on existing solutions

"Sometimes the only problem is a lack of awareness of a suitable existing solution."

AbleData
Your Source for Assistive Technology Information

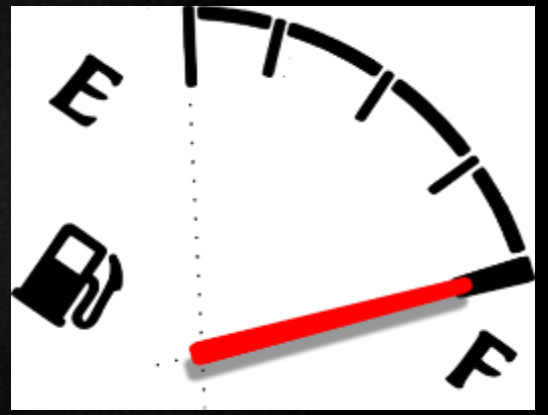
The Design Process
Understand the Problem

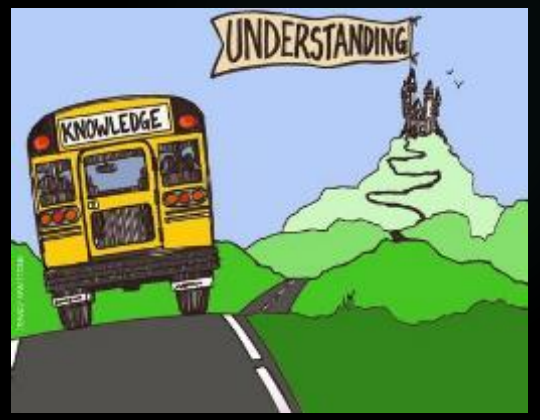
- Determine why current "solutions" don't work
  - Important to find limitations of current products:
    - High cost, weight, reliability, etc
    - Ineffectiveness
    - Non-compliance or non-use
    - Poor aesthetics, functionality, durability, fit
    - Does not take advantage of current technology
- Why a new solution may not work

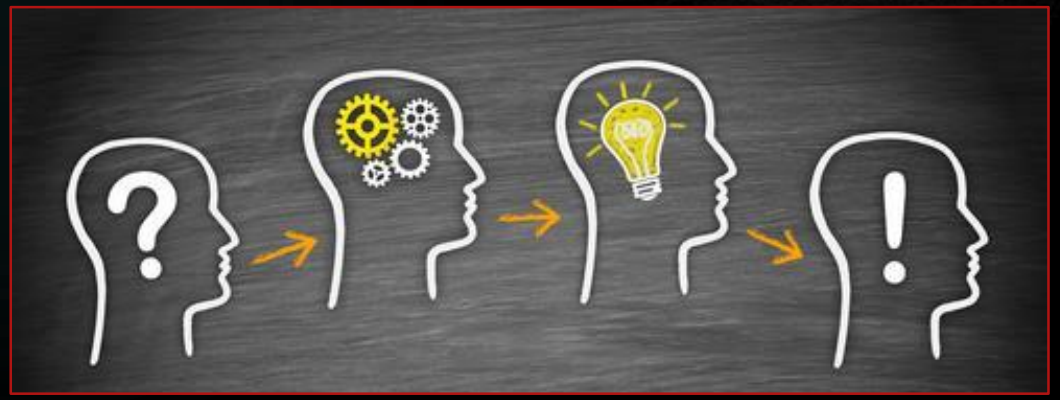
"The old shoe is more comfortable."
Barbara (age 92)

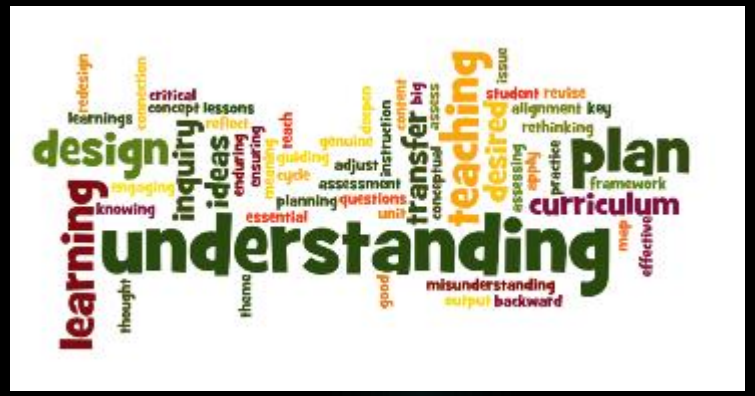
The Design Process
Judge the Need

"Judge what is needed from a full understanding of the problem."

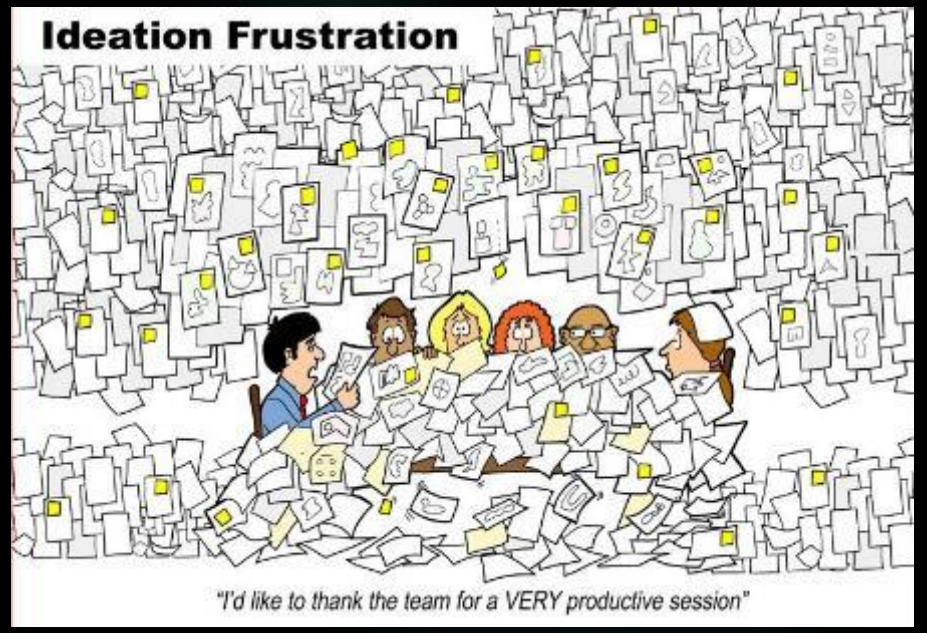




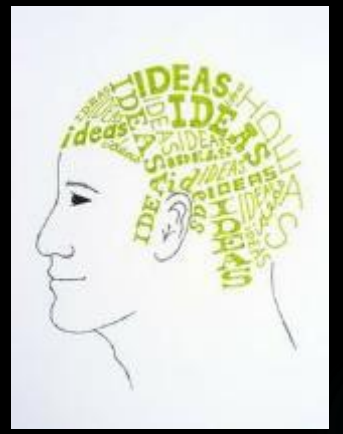




The Design Process
Brainstorming



- Idea Generation - also know as "Ideation"
  - Morphological charts
  - Brainstorming
  - Other techniques
- Develop multiple preliminary ideas, concepts
- Don't get stuck on your original idea - Anchor Effect



The Design Process
Survey Technology

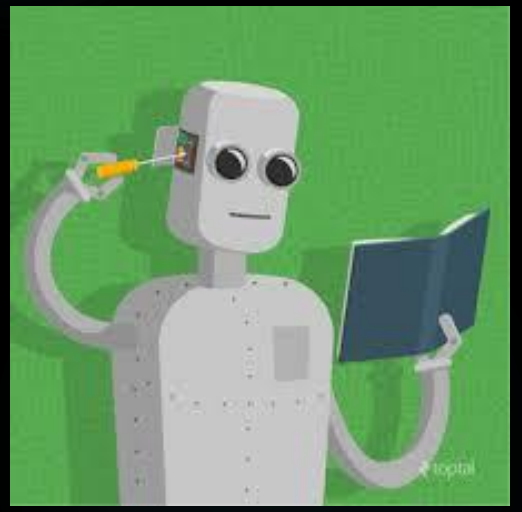
- Seek out technology - including existing products - that could be brought to bear on the problem

How to interact with users

- Observe the problem / challenge firsthand
- Encourage them to tell a story
- Understand what a solution should do, but not how to do it
- List design features - don't forget the "coolness factor"
- Recognize that you may not be aware of the limitations and benefits of technology
- Interact with user / suggestor

Engineering Design Process

- Does not include:
  - Building to another's vision
  - Making incremental improvements
- Utilize project resources and team skills
  - Person who suggested project
  - Course resource people
  - PRL & its CAs
  - Classmates
  - Dave
- Make and justify all your project decisions

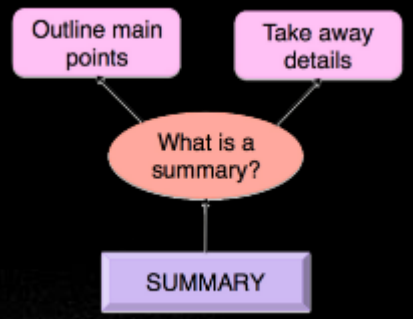


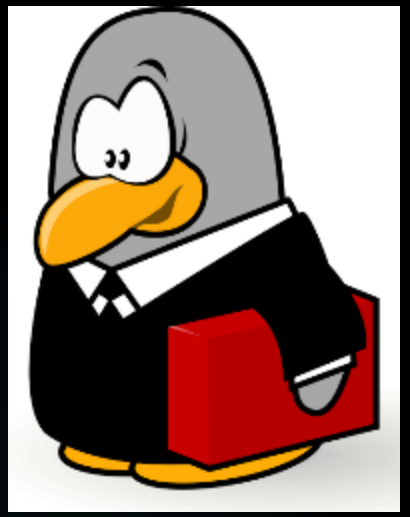
Other Observations

- Assistive Technology is a highly fragmented market
- A small market means high prices
- Avoid getting stuck in one aspect of the design process

"It's not a failure if you learn something."

SUMMARY





- Describe the problem
- Understand the problem
- Survey technology that addresses the problem
- Very few design concepts make it to market
- Advice for student engineers:
  - Employ users, caregivers, heath care providers, and experts at each stage of the design process
  - Anticipate and plan for both successes and setbacks during development
  - "Fail" early and learn from "failures"
  - Start prototyping with low cost materials

Thursday, January 13th

Bridging the Gap between Consumers and Products in Rehabilitation Medicine

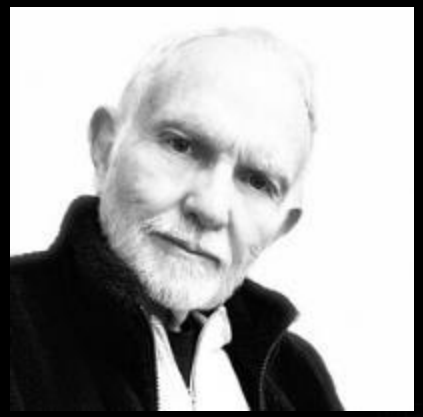
Deborah E. Kenney, MS, OTR/L

Stanford University

VA Palo Alto Health Care System

Foothill College

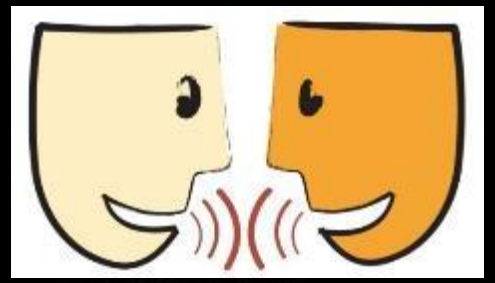
Today



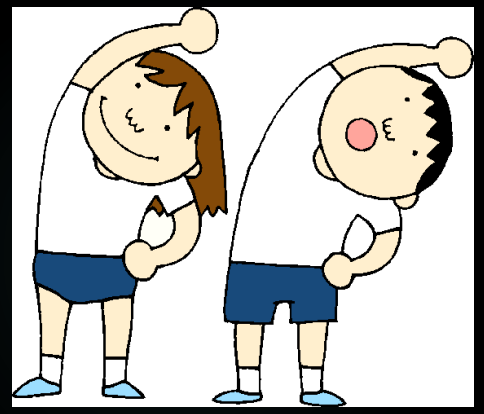
Creating Assistive Technologies - Understanding the Problem

Gayle Curtis, MS - UX Design Consultant

Break Activities



- Fill out forms
- Attendance sheet
- Stand up and stretch
- Take a bio-break
- Text message
- Web-surf
- Respond to email
- Talk with classmates
- Reflect on what was presented in class



Short Break