

# Today's Agenda

- Project examples
- Human abilities – Auditory systems

# Announcement

Exam 1 is scheduled on **Thursday, Sep. 28, 1:15pm -2:30 pm** in class through Blackboard

Cover materials until Sep. 26

Most of materials from class lecture notes

Open-book and open-notes

Make-up exams are not allowed except excusable absences ([http://bulletin.sc.edu/content.php?catoid=52&navoid=1280#Attendance Policy](http://bulletin.sc.edu/content.php?catoid=52&navoid=1280#Attendance_Policy)) with appropriate documentation and advanced notice.

# Paper Reading Proposal (Graduate Only)

- A literature review on your selected HCI research topic
- A proposal including
  - The topic
  - A brief background introduction
  - A list of papers (tentative) – you can add more papers later
  - You are expected to include 15+ papers in your final list
  - **Proposal due 11:59pm EST, Friday, Sep. 15, 2023**

# Top HCI Journals/Conference Proceedings

**Journals:** (UofSC has subscriptions to these journals)

- *ACM Transactions on Computer-Human Interaction*
- *Computer in Human Behavior*
- *International Journal of Human-Computer Studies*
- *AIS Transactions on Human-Computer Interaction*

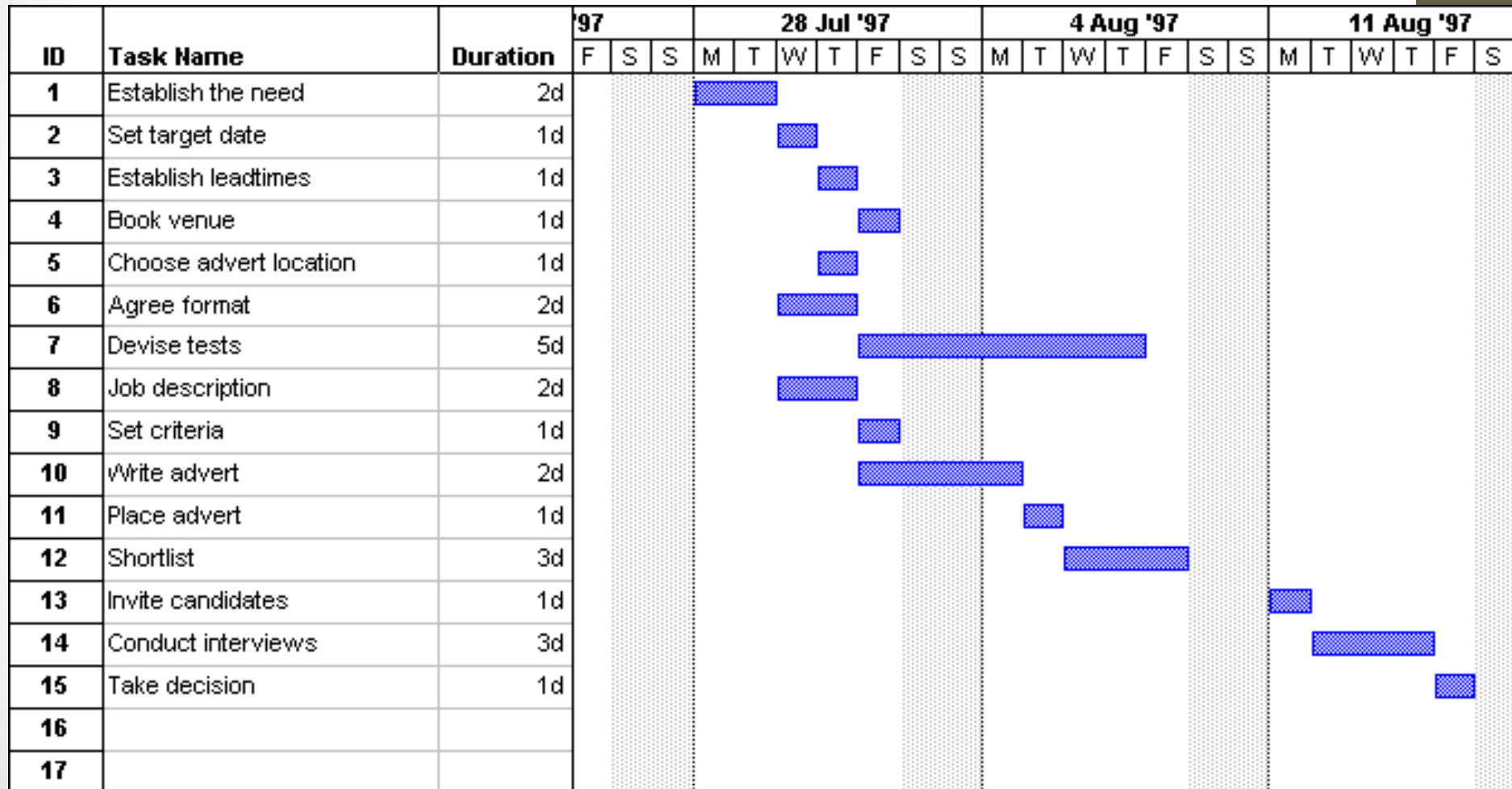
## Conferences

- *ACM CHI* (free proceedings available)
- *ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)* (open TOC available)

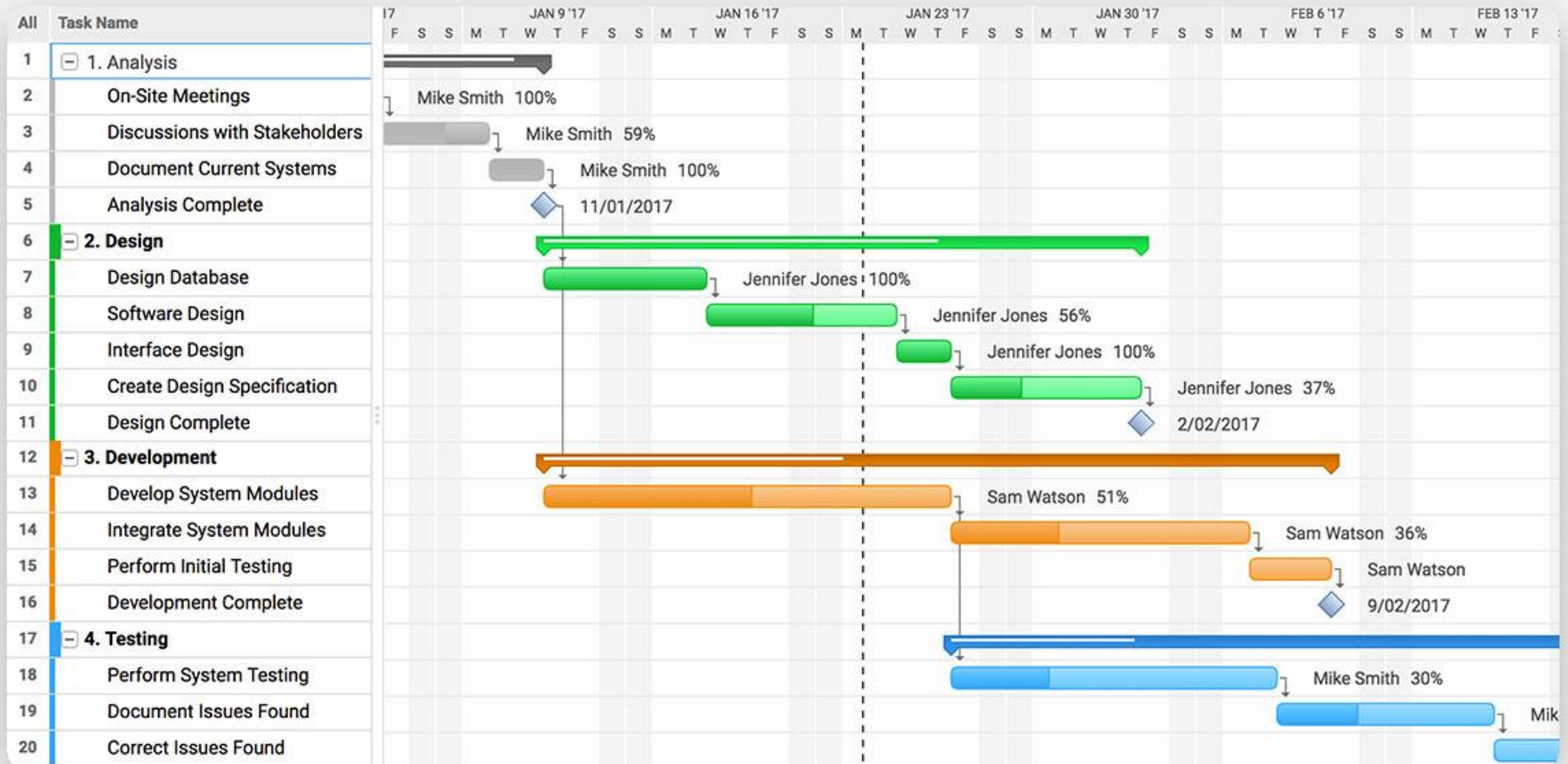
# Task Timelines (Gantt Charts)

- Temporal view of the entire lifetime of the project
- Show when tasks take place and complete
- Useful for tracking progress: How does the actual progress compare with the planned schedule?
  - The timeline can show graphically how much of each task has been completed at a given time
  - Revisit the timeline as the project progresses

# Gantt Chart (example 1)



# Gantt Chart (example 2)



<https://www.projectmanager.com/gantt-chart>

# What Dr. Tong expects to see

- Gantt Chart
  - Refer to this EVERY TIME YOU MEET WITH YOUR GROUP



# Note taking - Document

## Responsibilities, due dates, goals

- I expect you to do this....
  - Who does What
  - Person, task, dependencies, who impacted
- Example
  - *“Georgette will interview 5 subject matter experts by this upcoming Friday and send the materials to Stephanie, who will transcribe the data. Transcription is planned to be done on the following Tuesday. Coding with the group is set for Wednesday.”*
- **Document everything**

# **Examples of Projects (Ideas)**



# LiveFREE

*live free from chemicals and allergens*



## Our Mission

We **connect** people who strive to **live free of harmful chemicals and allergens**. We make **dining** less stressful, finding **safe products** easier, and create a **network** of individuals who all want to live free.

# The Problem



- 15 million Americans
- 1 in every 13 children
- food prepared outside of the home = ½ fatal reactions
- Trace amounts of allergens can trigger a severe reaction
  - “May contain” or “processed in a facility that also processes” labeling not required

## Food Allergy Symptoms

Mild	Severe
Hives	Swelling of lips, tongue, throat
Eczema	Shortness of breath
Vomiting	Loss of consciousness
Diarrhea	Chest pain
Runny nose	Death

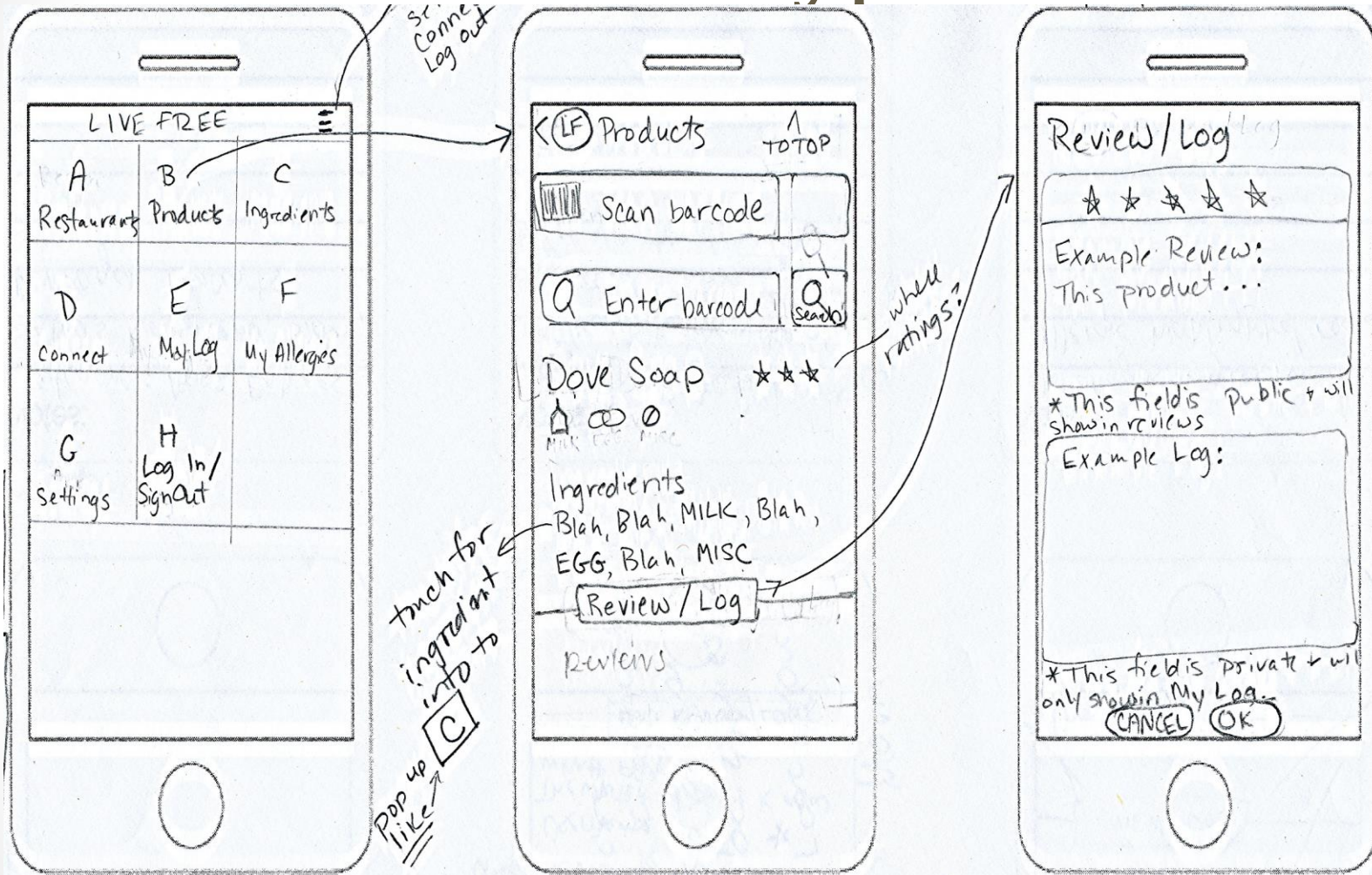
# Food & Personal Product Additives

Additive	Reported Reactions	Purpose	Found in
Sulfites	Chest tightness, hives, stomach cramps, diarrhea, breathing problems, anaphylaxis	Preservative	Wine, dried fruits, white grape juice, frozen potatoes, maraschino cherries, fresh shrimp, and certain jams and jellies
Aspartame	Hives, headaches, swelling of the eyelids, lips or hands	Sweetener	Diet foods
Parabens	Severe contact dermatitis (redness, swelling, itching and pain)	Preservative	Sunscreens, shampoos, foods, medications
Tartrazine	Hives, swelling, asthma attacks	Dye	Beverages, candy, ice cream, desserts, cheese, canned vegetables, hot dogs, salad dressings, seasoning salts, catsup
MSG	Hives, headache, burning sensation on back of neck, chest tightness, nausea, diarrhea, sweating, more severe asthma attacks	Enhance flavors	Oriental foods, manufactured meat, poultry.

# Food & Personal Product Additives

Additive	Reported Reactions	Purpose	Found in
Nitrates and nitrites	Headaches and hives	Preservative, prevent botulism, enhance flavors, color foods	Hot dogs, bologna, salami and other processed meats and fish.
BHT and BHA	Chronic hives and other skin reactions	Prevent color, odor, & flavor changes	Breakfast cereals and other grain products
Benzoates & preservatives	Hyperactivity, hives, itching, pain, headaches, more severe asthma attacks. May be carcinogenic.	Preservative	Soft drinks, cakes, cereals, salad dressings, candy, margarine, oils, dry yeast

# Wireframe Prototype



"a wireframe is a visual illustration of a web page... to show you where each item should be placed on a page." [Usability.gov](http://Usability.gov)



# Evaluation Methods

## 1. Card Sorting

1.1 Main Menu

1.2 Restaurant Page

1.3 My Allergies

1.4 Menu Categories

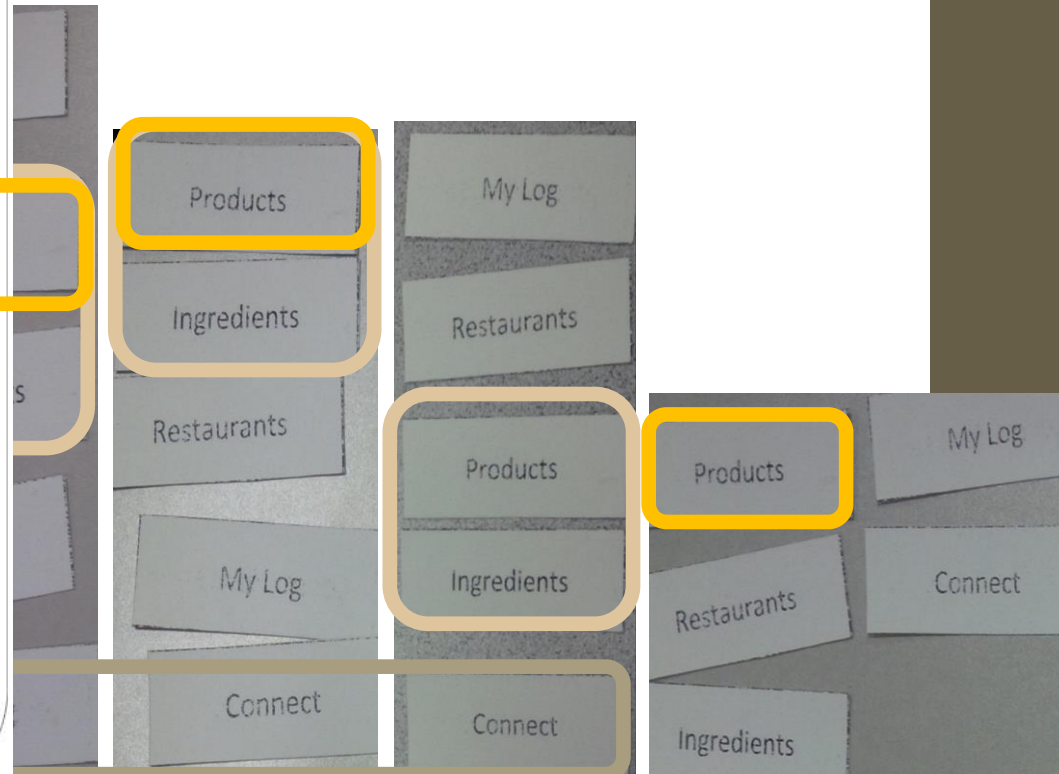
## 2. Questionnaire

## 3. Heuristic Evaluation

# 1. Card Sort Trends

## 1.1 Main Menu

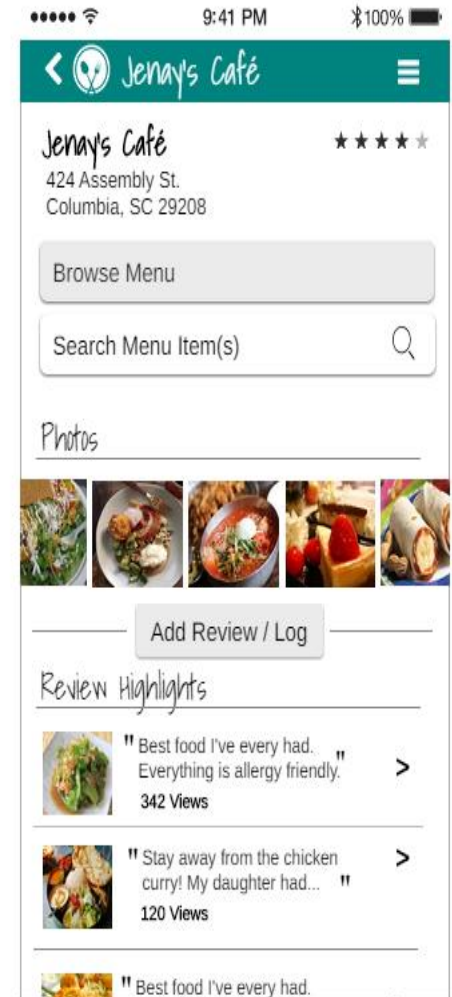
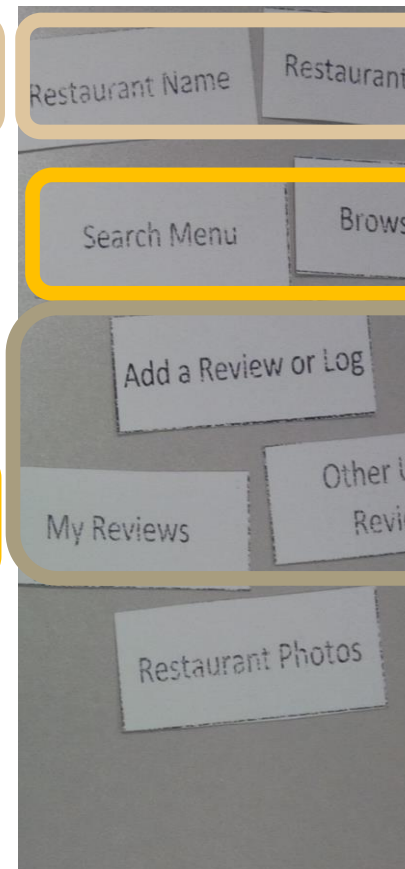
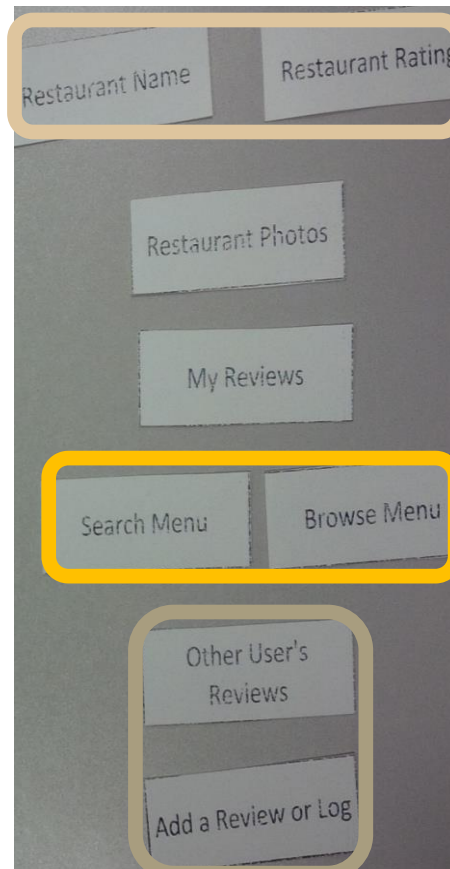
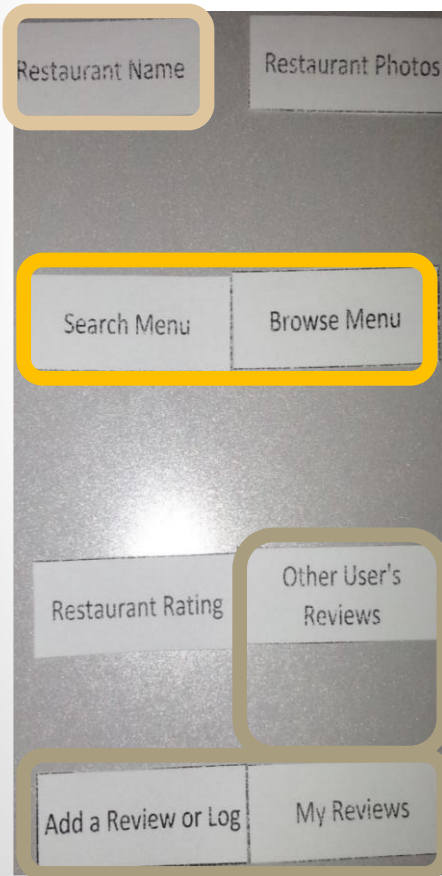
Help design or evaluate the information architecture of a website



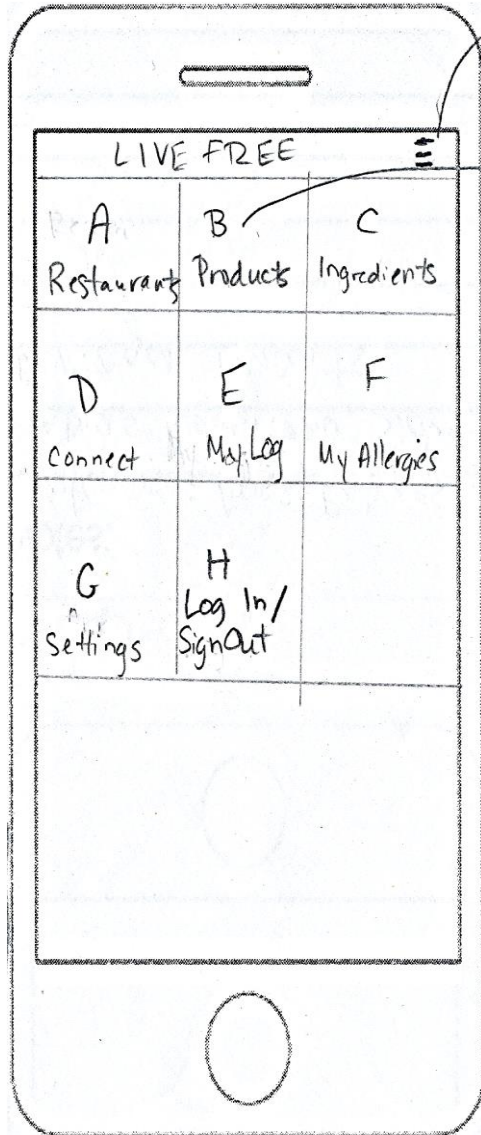
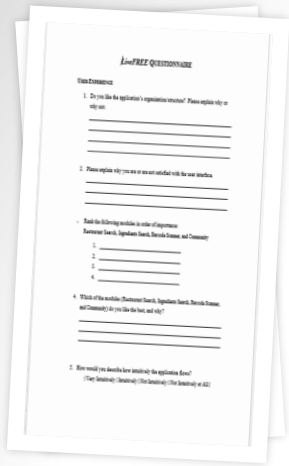
# 1. Card Sort Trends

## 1.2 Restaurant

- 1 Restaurant name and rating first
- 2 Search Menu and Browse Menu together
- 3 Review related items together and last

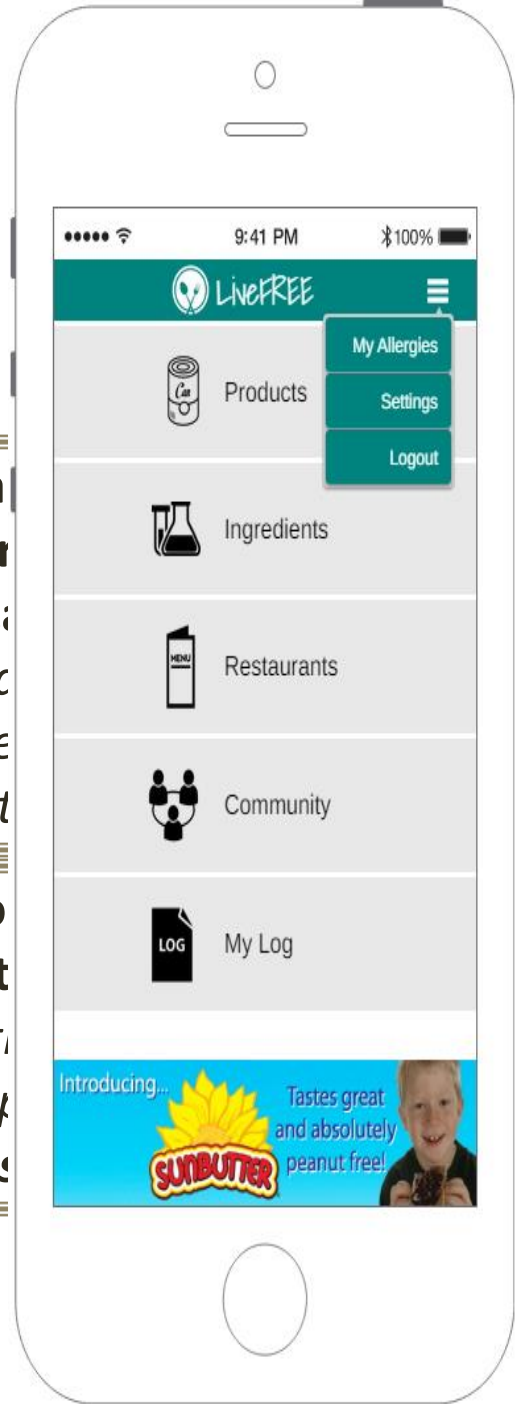


# 2. Questionnaire

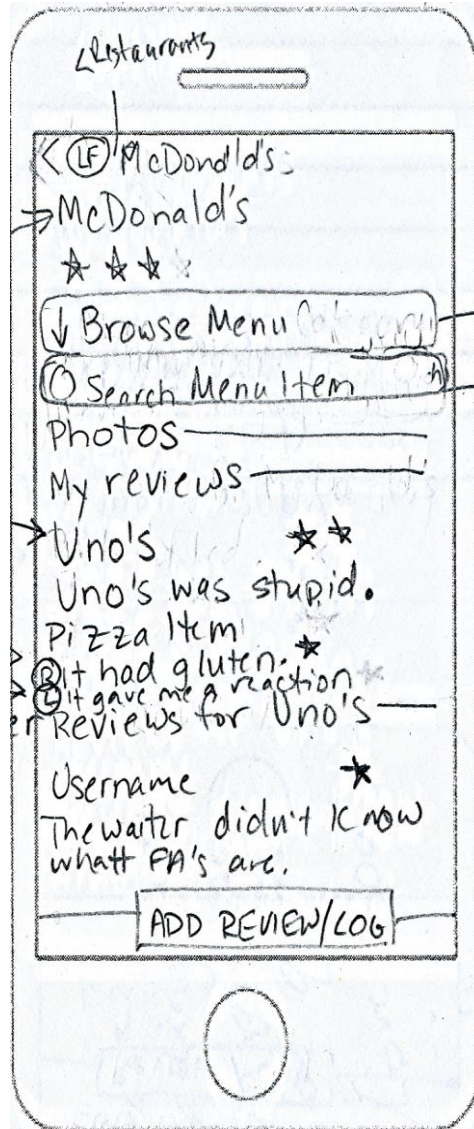
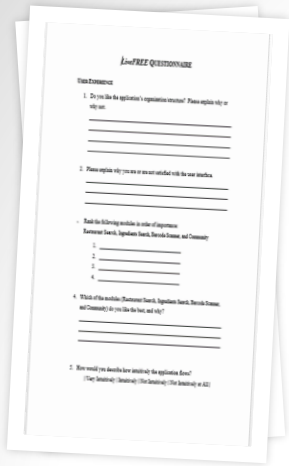


Please provide a  
you may have for  
mobile applica  
“Move settings c  
out to more  
administrat

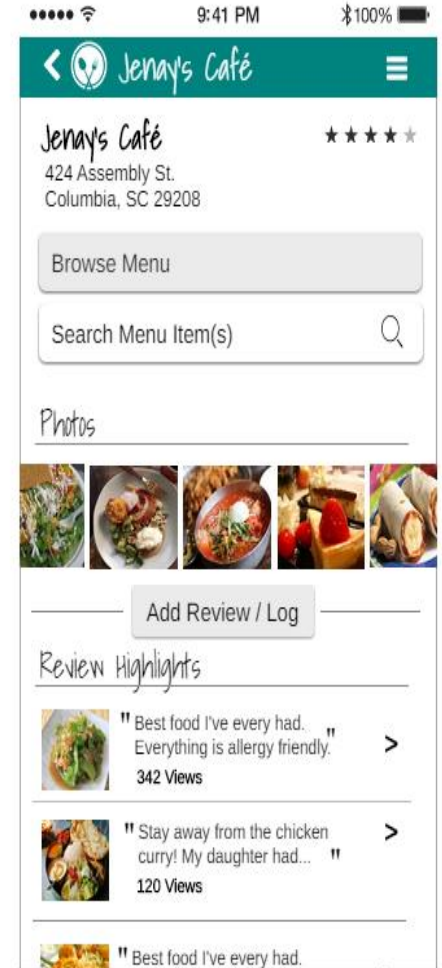
Any other co  
suggest  
“I am a little part  
page. I might p  
squares or a lis



# 2. Questionnaire



Please provide suggestions for improving the application interface. "Restaurant seems a bit cluttered"



# 3. Heuristic Evaluation

## 1. *Visibility of system status*

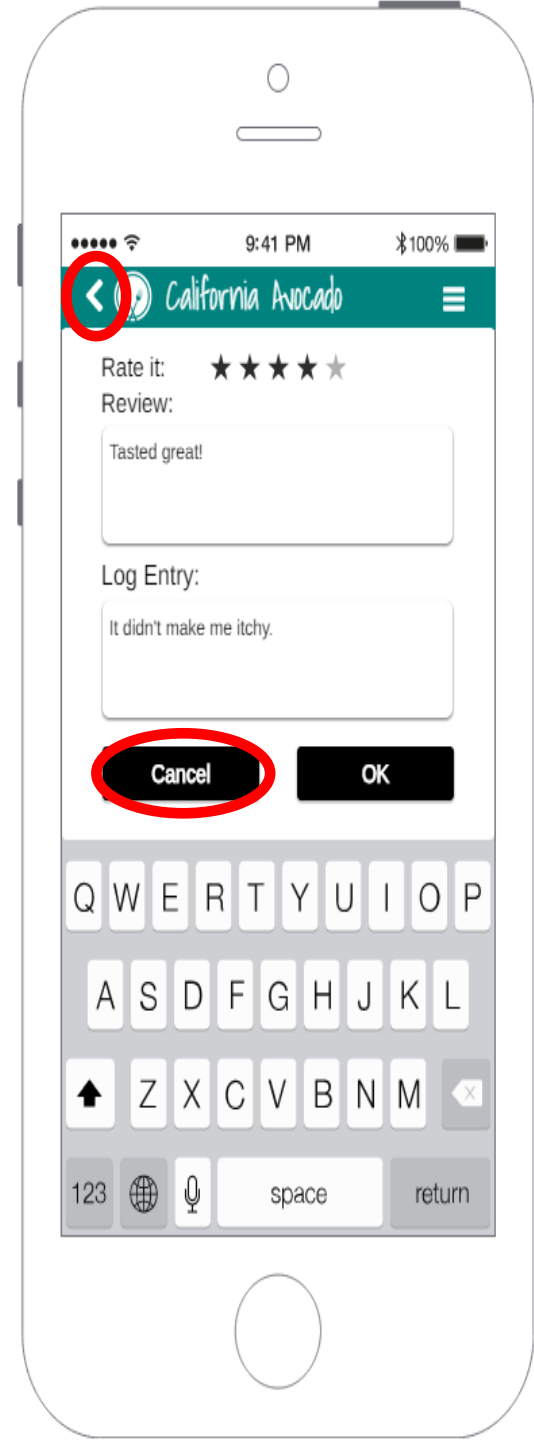
- *My Allergens: the buttons of each allergen remain highlighted in a toggle functionality*

## 2. *Match between system and the real world*

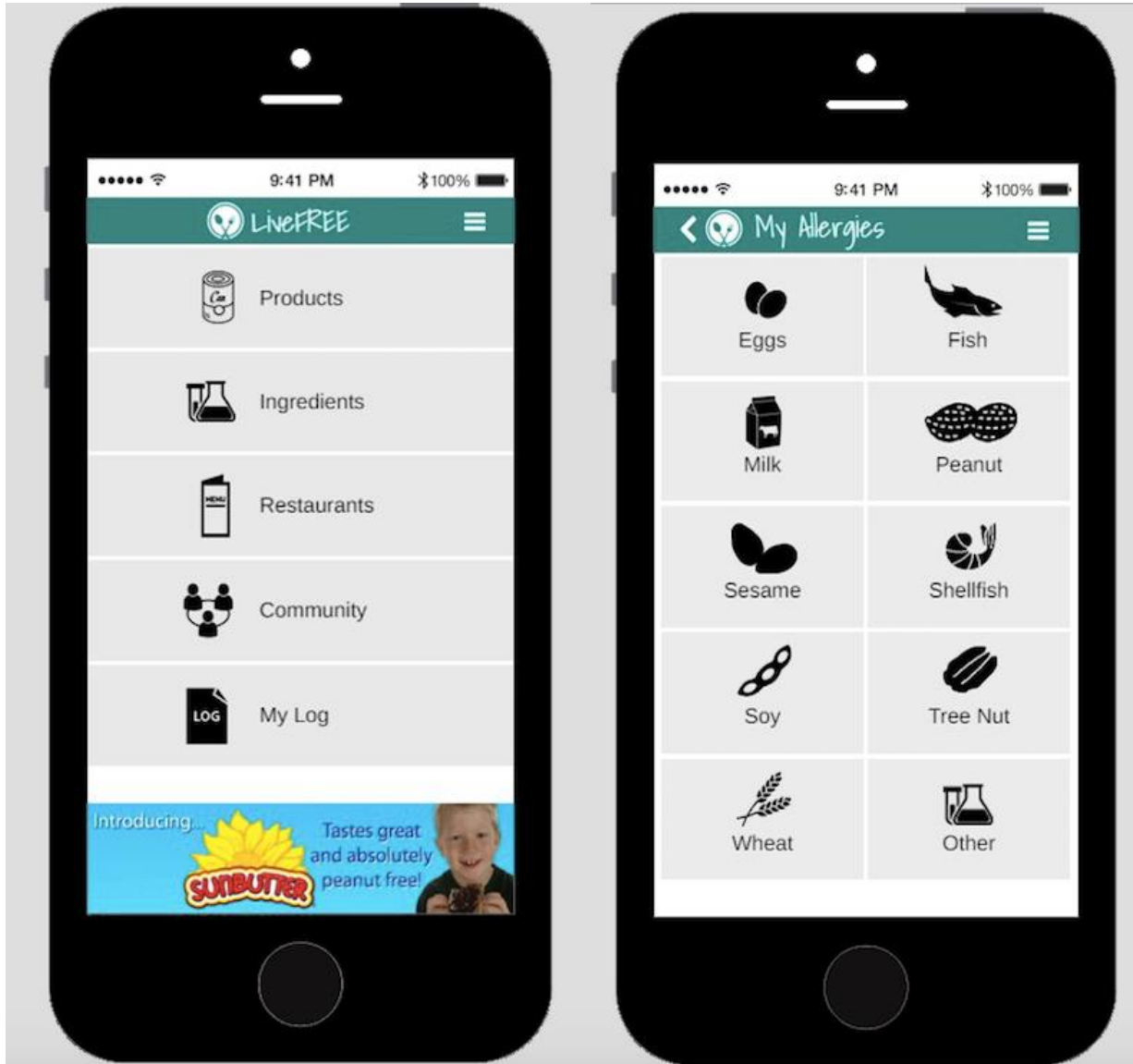
- *Users didn't always know what Connect was*
- *Term “Community” used more than connect to represent social interaction between users*
- *Renamed Connect to Community*

## 3. *User control and freedom*

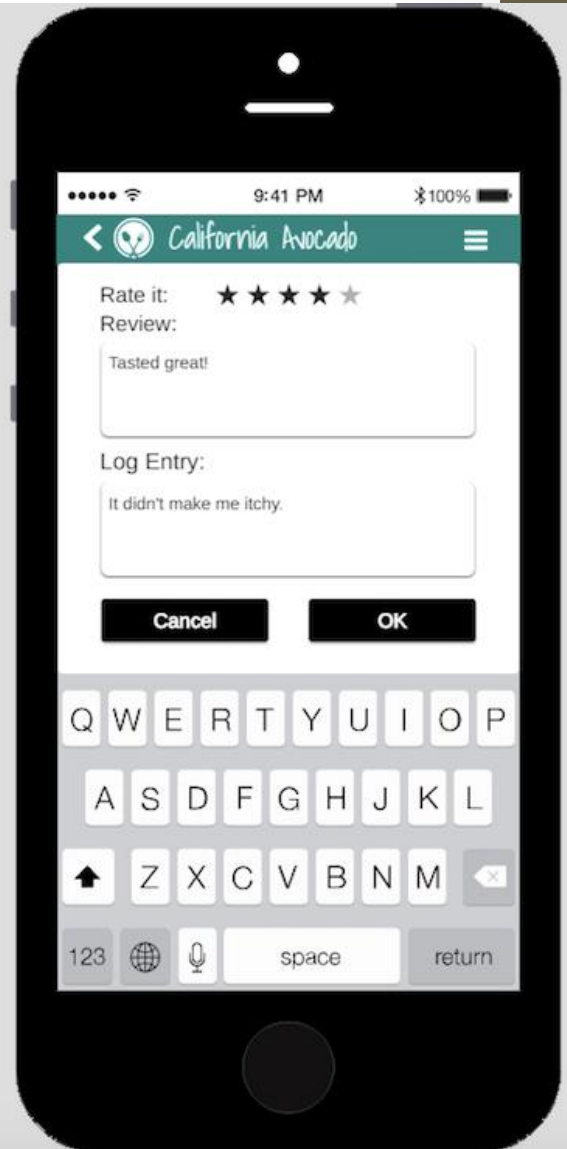
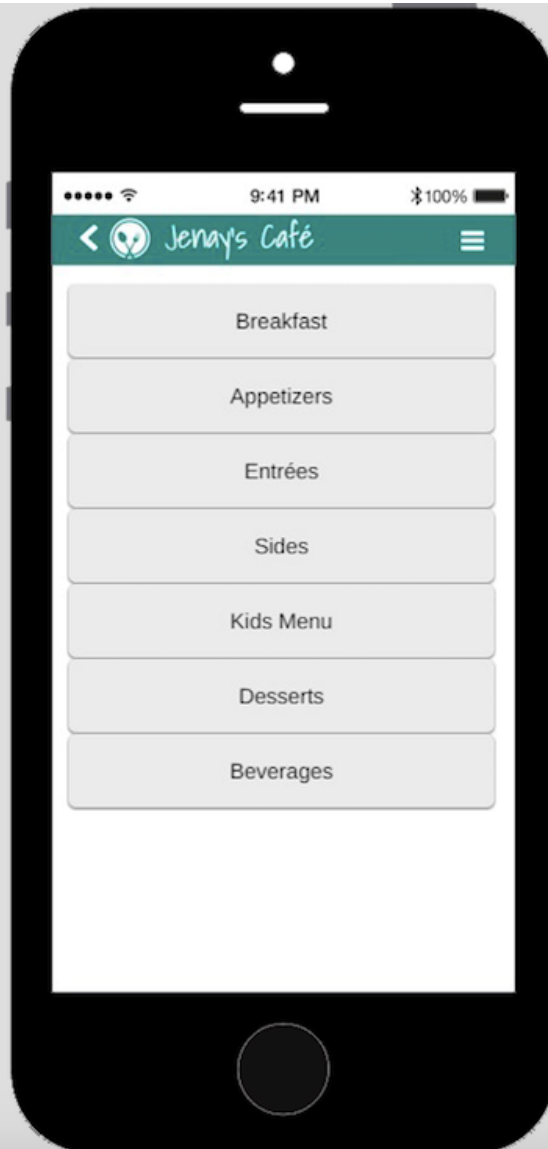
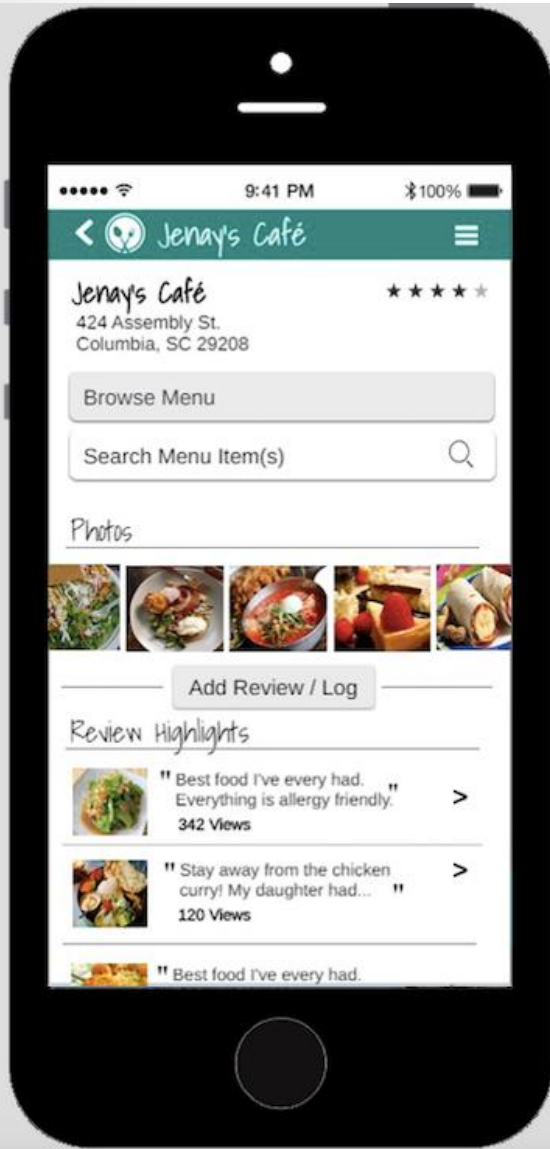
- “Back” functionality on each page. “<” is a common convention
- **Review/Log pop up:** features a “Cancel” button.



# High Fidelity Prototype Demo







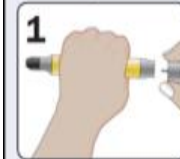
# Future Content: Anaphylaxis Emergency

## Action Plan

- Provide Symptoms
- Provide Epinephrine Demonstrations
  - Epi-Pen
  - Adrenaclick
  - Auvi-Q
  - EpiPen Jr
- Instructions to call 911
- Store doctor contact info

Area	Symptom
MOUTH	itching, swelling of lips and/or tongue
THROAT*	itching, tightness/closure, hoarseness
SKIN	itching, hives, redness, swelling
GUT	vomiting, diarrhea, cramps
LUNG*	shortness of breath, cough, wheeze
HEART*	weak pulse, dizziness, passing out

### How to give EpiPen® or EpiPen® Jr



**1**  
Form fist around EpiPen® and PULL OFF GREY SAFETY CAP.



**2**  
PLACE BLACK END against outer mid-thigh (with or without clothing).

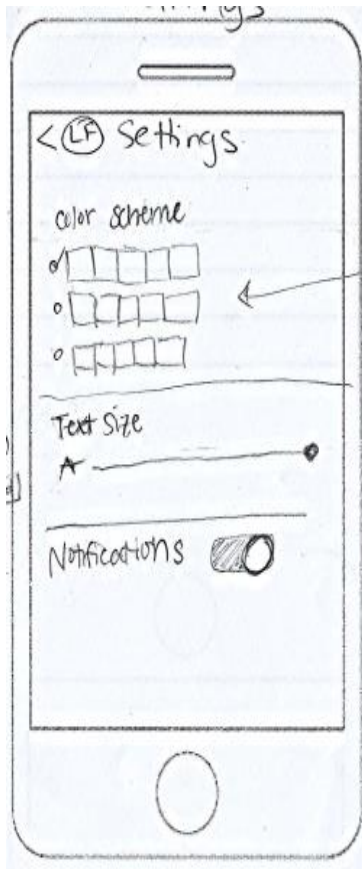


**3**  
PUSH DOWN HARD until a click is heard or felt and hold in place for 10 seconds.



**4**  
REMOVE EpiPen® and DO NOT touch needle. Massage injection site for 10 seconds.

# Future Content

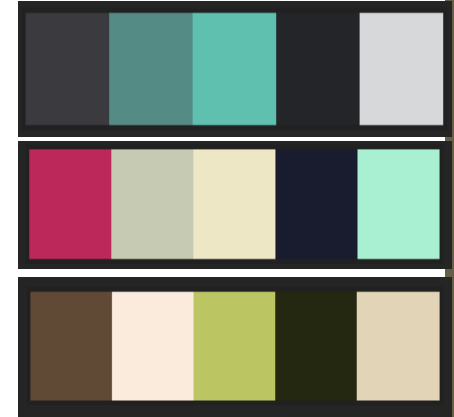


## Customization

- Color Scheme
- Font size

## Improvements

- Include "Add menu item"



# References

1. FARE Medical Advisory Board. “Food Allergy Facts and Statistics for the U.S.” Food Allergy Research & Education. 2013.  
<http://www.foodallergy.org/document.doc?id=194>.
2. Fenton, Nancy Elizabeth, Cicutto, Lisa, Clarke, Ann E., Elliott, Susan J., Harada, Laurie and McPhee, Elizabeth. “Illustrating Risk: Anaphylaxis Through the Eyes of the Food-Allergic Child.” Society for Risk Analysis, 10.1111/j.1539-6924.2010.01488.x. 2010.
3. Morris, M. “Food Allergies, Sensitivities & Intolerances.” The Root of Health. 2011. <http://www.therootofhealth.com/food-allergies-intolerances/>
4. AAFA Editorial Board. “Food Additives.” Asthma and Allergy Foundation of America. 2005.  
<http://www.aafa.org/display.cfm?id=9&sub=20&cont=285>.

# The Registration Kiosk

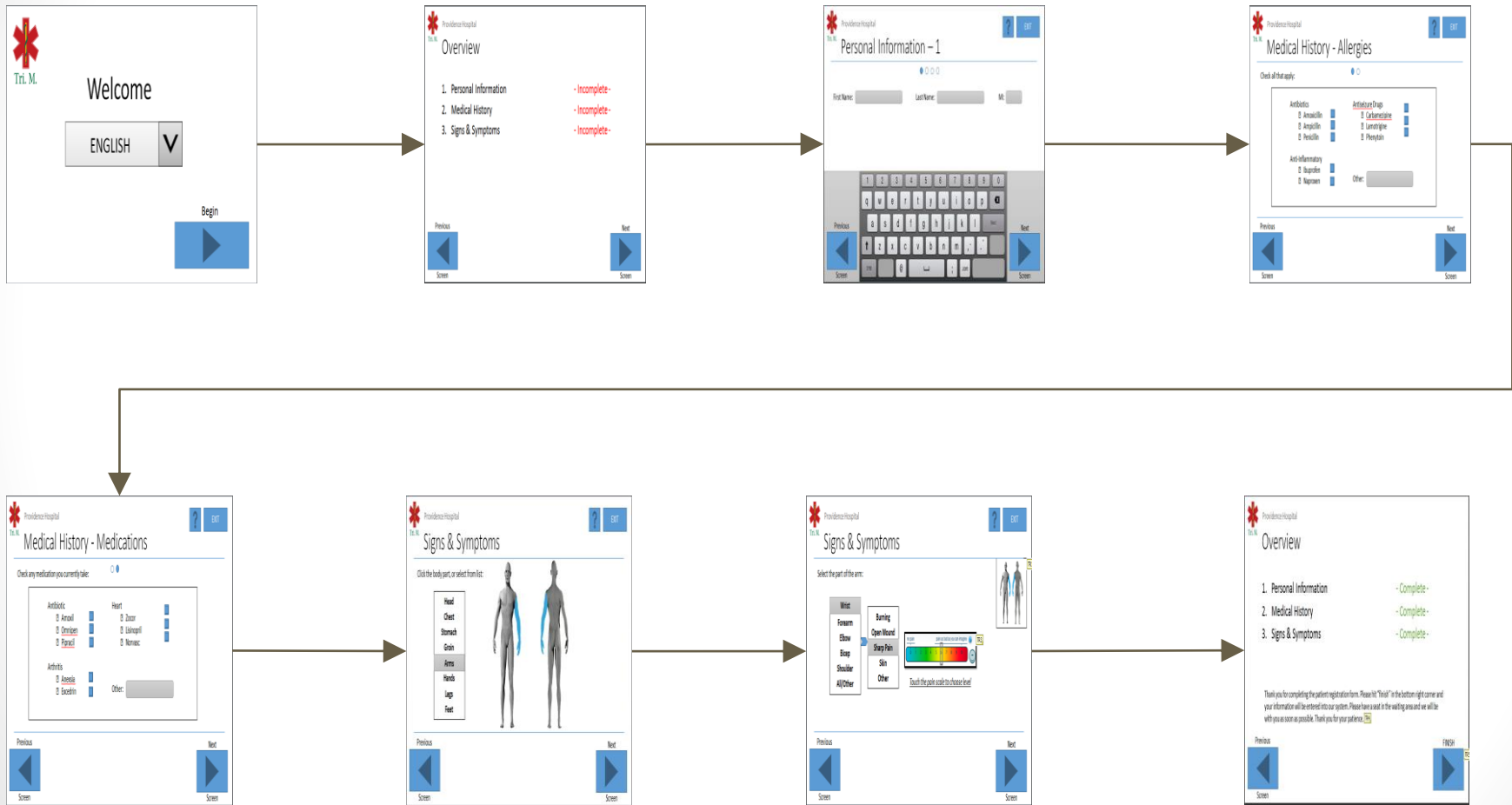
by The Triage Musketeers

# What is the Problem?

- Mean wait time in US emergency departments has increased 25% from 2003-2009, from 46.5 - 58.1 minutes [1]
- Mean number of visits to EDs increased by 32% from 1999-2009, from 102.8 - 136.1 million [1]
- SC has many areas in emergency care which can be improved (disaster preparedness, access to emergency care, and public health and injury prevention) [2]



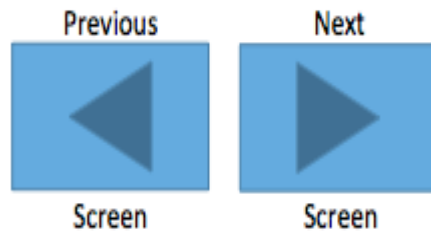
# Prototype - Version 1.0



# Usability Considerations

- Large buttons

- Progress indicator



- Dropdowns

Height:

Weight:

Sex:



# Evaluation Methods

Once prototype was created, we moved into evaluating it using:

- Heuristic Evaluation
- Cognitive Walkthrough
- User Testing

# Heuristic Evaluation

Providence Hospital  
Tri. M.

## Medical History - Allergies

● ○

**Antibiotics**

- Amoxicillin
- Ampicillin
- Penicillin

**Antiseizure Drugs**

- Carbamezipine
- Lamotrigine
- Phenytoin

**Anti-inflammatory**

- Ibuprofen
- Naproxen

**Other:**

Previous Next

○ ○ / Screen Screen

Before

Providence Hospital  
Tri. M.

## Medical History – Drug Allergies

Check all that apply: ● ○

**Antibiotics**

- Amoxicillin
- Ampicillin
- Penicillin

**Antiseizure Drugs**

- Carbamezipine
- Lamotrigine
- Phenytoin

**Anti-inflammatory**

- Ibuprofen
- Naproxen

**Other:**

Previous Next

○ ○ / Screen Screen

After

Slide #	Problem	Heuristic Violated	Severity
10	Allergies page needs instructions	10 Help and documentation	3

# Cognitive Walkthrough Findings

Providence Hospital  
Tri. M.

## Signs & Symptoms

Select the part of the arm:

- Wrist
- Forearm
- Elbow
- Bicep
- Shoulder
- All/Other

- Burning
- Open Wound
- Sharp Pain
- Skin
- Other

no pain | pain as bad as you can imagine

0 1 2 3 4 5 6 7 8 9 10

*Touch the pain scale to choose level!*

Previous Screen Next Screen

Before

Providence Hospital  
Tri. M.

## Signs & Symptoms

Select the part of the arm:

- Wrist
- Forearm
- Elbow
- Upper Arm
- Shoulder
- All/Other

- Burning
- Open Wound
- Pain
- Sprain/Fracture
- Other

0 1 2 3 4 5 6 7 8 9 10

*Touch the pain scale to choose level!*

Previous Screen Next Screen

After

# User Testing Findings

Providence Hospital  
Tri. M.

## Overview

1. Personal Information - Complete -
2. Medical History - Complete -
3. Signs & Symptoms - Complete -

Previous FINISH

Screen

Before

Providence Hospital  
Tri. M.

## Summary

Please review the following information:

First Name: <b>Tom</b>	Street Address: <b>821 Cedar Branch Rd</b>	Drug Allergies: <b>Penicillin</b>
Last Name: <b>Jones</b>	City: <b>Brightsville</b>	Medications: <b>Zocor</b>
MI: <b>C</b>	Zip code: <b>81732</b>	
DOB: <b>7/6/1968</b>	State: <b>MO</b>	Body Part: <b>Left Arm</b>
Height: <b>5ft 6in</b>	Primary Doctor: <b>Charles Tanner, MD.</b>	Reason: <b>Sprain/Fracture</b>
Weight: <b>190 lbs</b>		Pain: <b>9/10</b>
Sex: <b>M</b>	Emergency Contact: <b>Lisa Jones (Wife)</b> <b>981 - 215 - 3395</b>	

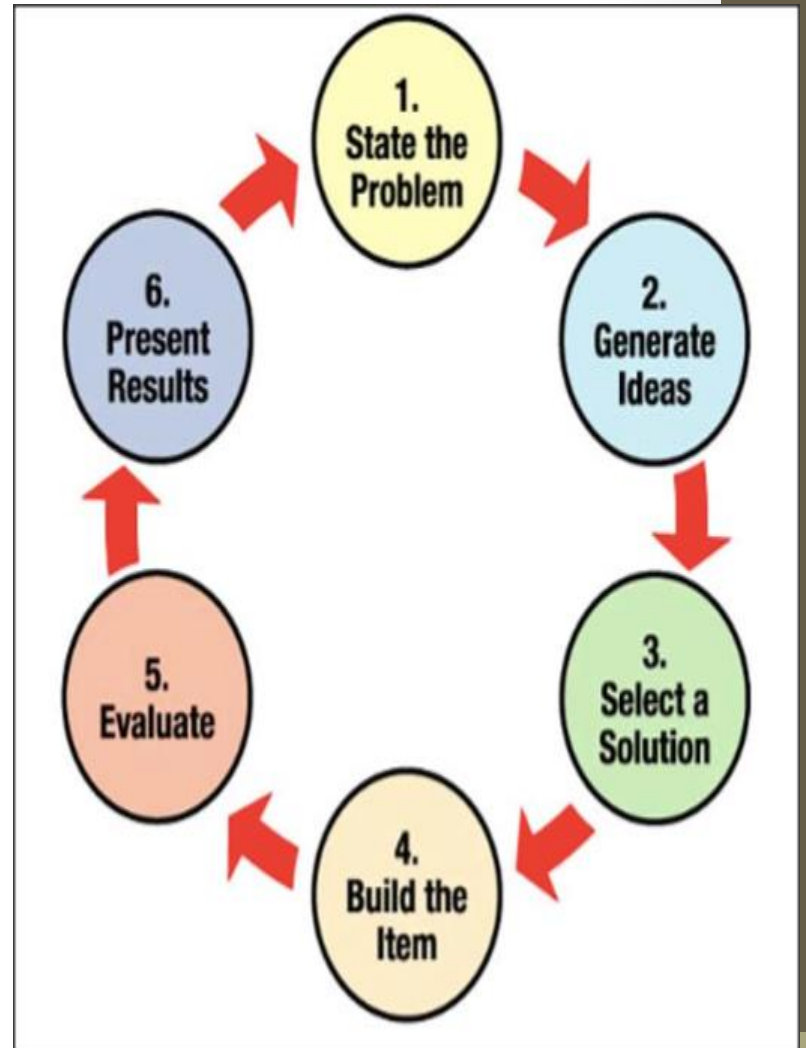
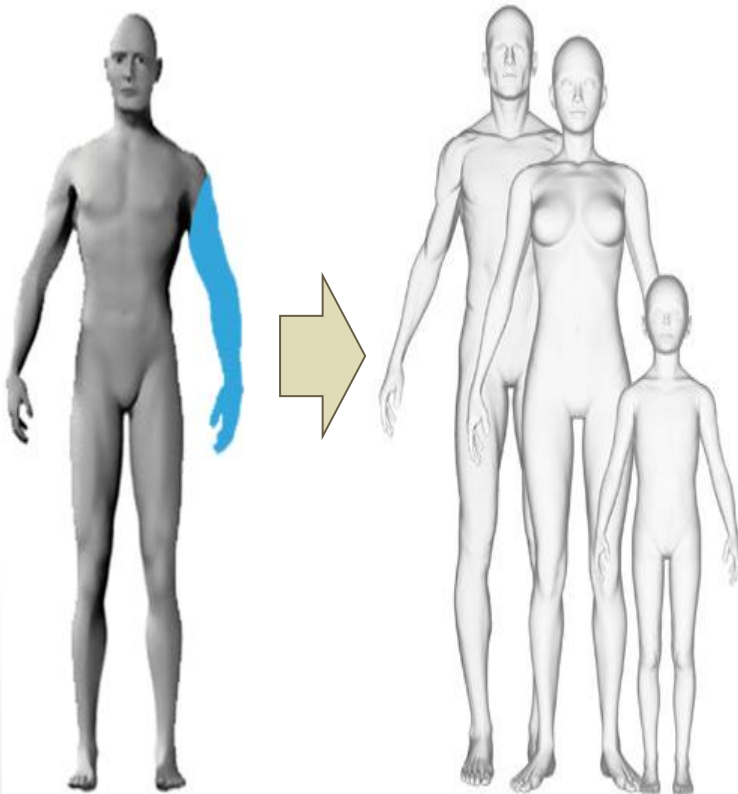
Previous Next

Screen

After

# Future Plans

- Continue prototyping



<http://www.drugs.com/symptom-checker/>

# Hardware

- System usability
- Universal Design
- Accessibility
  - Visual impairment
  - Motor and dexterity impairments
  - Hearing impairment



<http://www.deepcreekdigital.com/products/>

# Implementation

A screenshot of a web-based form titled 'Personal Information' from Providence Hospital. The form includes fields for Street Address, Zip, Apt. #, City, State (dropdown), and Primary Doctor (dropdown). There are also navigation icons and a help icon.A photograph of a physical 'PATIENT REGISTRATION FORM' from Lahi Imaging, LLC. The form includes fields for Today's Date, Patient Name, Date of Birth, Sex, Primary Phone, Referring Physician, Responsible Party, and Relationship to Patient. There is also a section for 'HISTORY' with a question about job-related injuries and employer information.

<http://afterhoursimaging.com/patient-information/patient-registration-form>

# References

- [1] Hing, E., & Bhuiya, F. A. (2012). *Wait Time for Treatment in Hospital Emergency Departments, 2009*. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.
- [2] Hirshon, J. et al (2014, January 16). State Rank by Category. Retrieved October 1, 2015, from <http://www.emreportcard.org/default.aspx>.
- [3] Taylor, C., & Bengner, J. (2004). Patient satisfaction in emergency medicine. *Emergency Medicine Journal*, 21(5), 528-532. doi:10.1136/emj.2002.003723
- [4] Wright, G., Causey, S., Dienemann, J., Guiton, P., Coleman, F., & Nussbaum, M. (2013). Patient Satisfaction With Nursing Care in an Urban and Suburban Emergency Department. *JONA: The Journal of Nursing Administration*, 43(10), 502-508. doi:10.1097/NNA.0b013e3182a3e821

# Image References

- Slide 12:
  - Process Cycle: Slide 29 (2 - What is HCI and design cycle\_2015)
  - Improved models: <http://www.drugs.com/symptom-checker/>
- Slide 13
  - paper hospital record: <http://afterhoursimaging.com/patient-information/patient-registration-form/>
  - man in wheelchair beside two kiosks: <http://www.deepcreekdigital.com/products/>

# Potential Issues in Topic Definition and Understanding of the Problem

- Project title is missing or not informative
  - Need a specific title related to your project topic
- Missing a discussion of the system's requirements and constraints
  - Who are the users
  - What are the system's major functions
  - What are the environmental conditions and constraints



# Potential Issues in Topic Definition and Understanding of the Problem

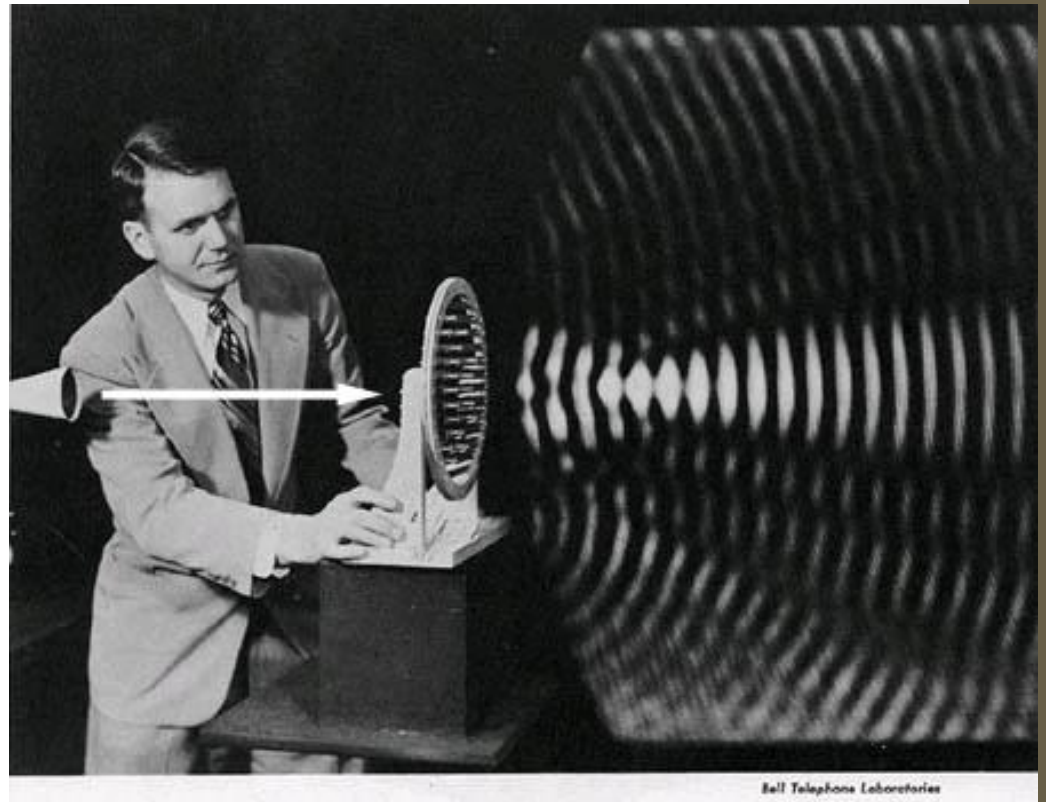
- Project management plan
  - Lack of details in tasks
  - Unclear roles of team members
  - Not cover the whole project period

# Tips for Topic Definition and Understanding of the Problem

- Organize your report in sections
  - Introduction of the problem & the project objectives
  - System requirements & constraints
  - Project management plan
  - Reference
- Figures are always helpful to demonstrate the problem

# Human Abilities

- Auditory system
- Vision system
- Cognition

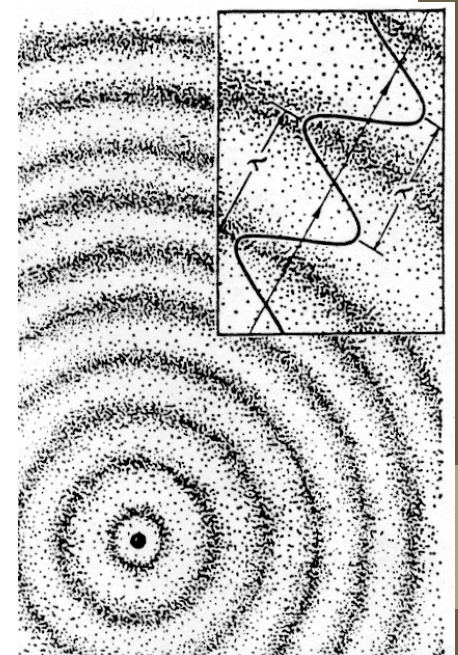
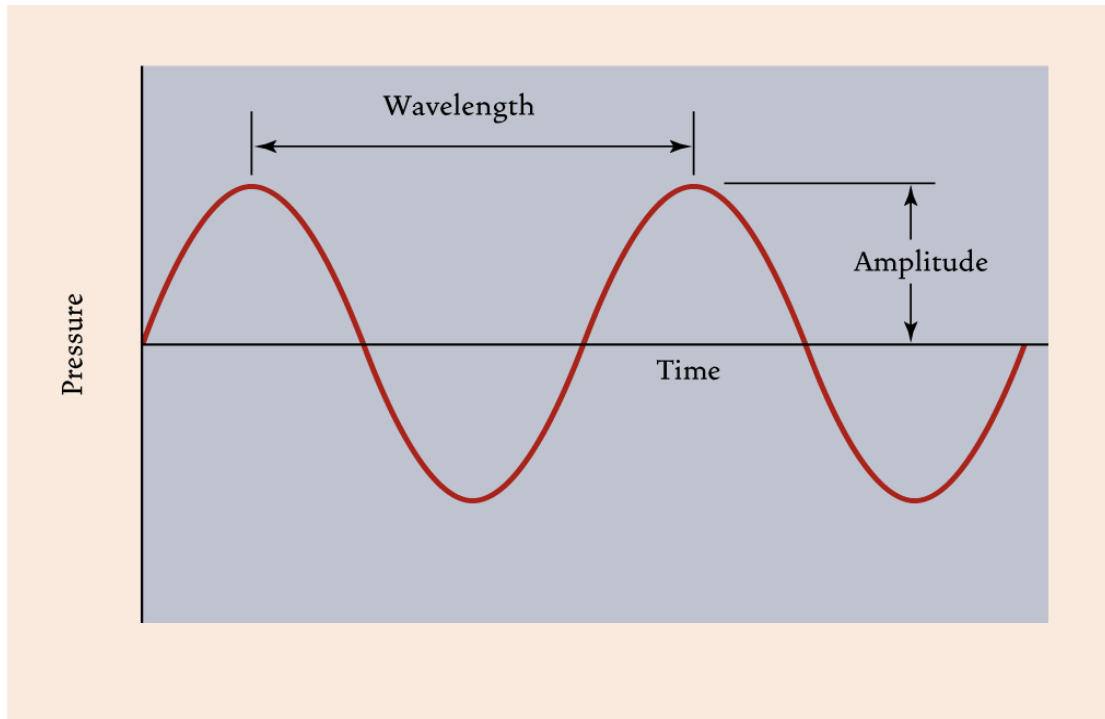


# HUMAN ABILITIES - THE AUDITORY SYSTEM

# Sound

A wave of pressure created when an object vibrates

- Compression and rarefaction of air molecules



# Physical

amplitude

frequency

waveform complexity

physical location

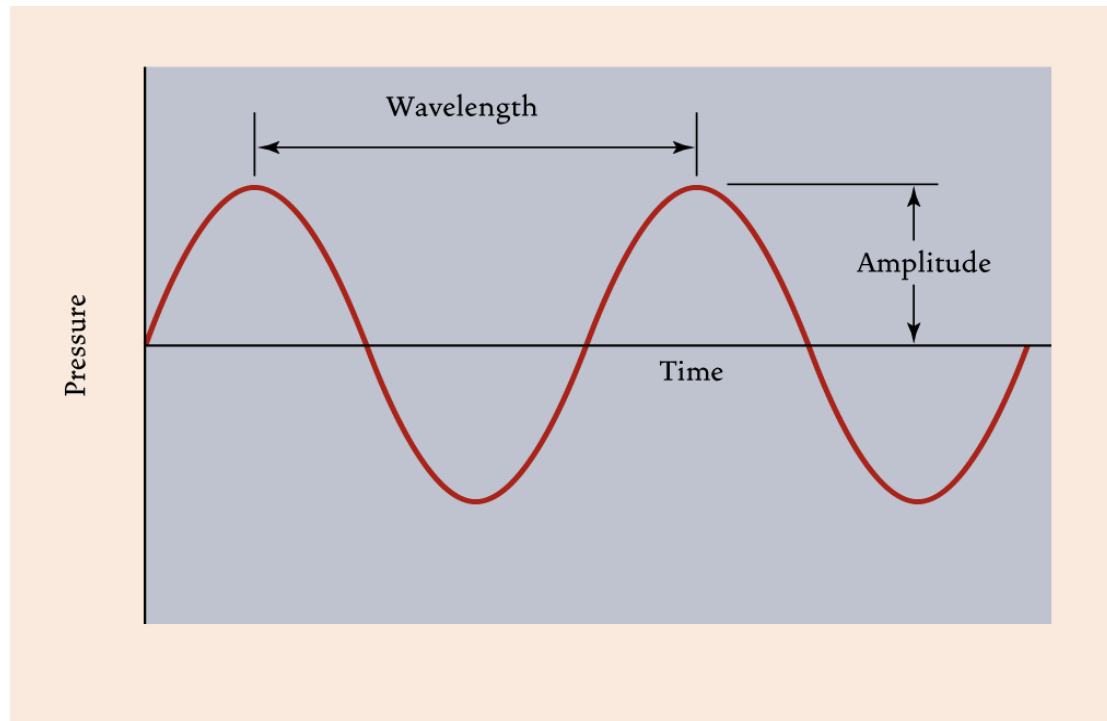
# Perceptual

→ loudness

→ pitch

→ timbre

→ apparent location



# Amplitude & loudness

Physical Characteristic (objective)	Psychological Experience (subjective)
<b>Amplitude</b> intensity of pressure wave measured in decibels (dB)	<b>Loudness</b> absolute threshold = 0 dB (measured in sone)

# Common sounds (dB)

0 – lowest sound audible to humans - watch ticking 20 feet away

50 – rainfall or hear the refrigerator running

60 – conversation, sewing machine

80 – heavy city traffic, alarm clock

90 – lawnmower; blender

100 – chain saw; subway train

120 – rock concert in front of speakers

140 – gunshot blast; jet plane at 50 feet)

180 – rocket launching pad

 **130 dB =  
Painful Sound**



# Frequency & pitch

Physical Characteristic

Psychological Experience

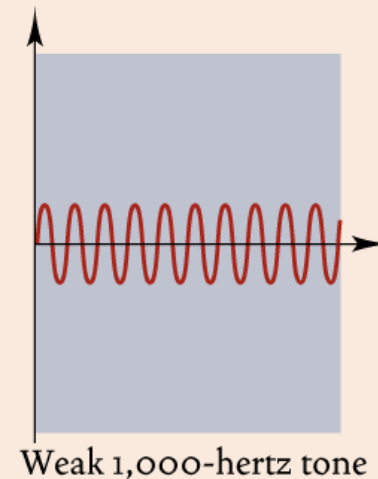
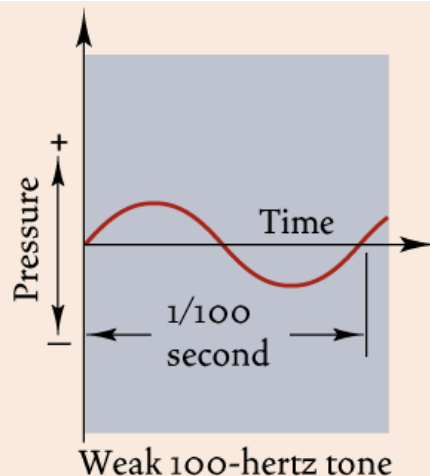
## Frequency

how rapidly air vibrates

human range: 20-20,000 Hz

## Pitch

highness or lowness of sound



# Waveform complexity & timbre

Physical Characteristic	Psychological Experience
<p><b>Complexity</b> waveform</p> <p>combination of fundamental &amp; harmonics (of different frequencies and amplitude)</p>	<p><b>Timbre</b> distinct quality of a sound</p> <p>violin vs. tuba</p>



# What is Timbre

Each instrument emits a complex tone containing more than one frequency simultaneously



**Harmonics**

**Fundamental  
frequency  
(slowest rate,  
loudest)**

Q: Okay... How is sound used in design?

A: Auditory alarms!

Examples of auditory alarms ???



(C) 2007 Daniel Friedman www.inspect-ny.com



# Auditory alarms

## Benefits?

1. Omnidirectional
  - Useful when eyes are busy
2. Induces greater compliance
  - If an alarm is very important, use auditory alarm
3. Can't close our ears

But if too loud, can startle, disorient

- When OK, not OK?

# Auditory alarms

## Designing good alarms

1. Not above danger level for hearing (85-90 dB)
2. Not startle (rise time)
3. Not disrupt understanding of other signals
4. Should be informative

# Making Alarms Informative

## Earcons

- Sound like the condition they represent
  - Deleting files = crushing paper



## Voice / Speech Alarms

- More information
  - BUT confusable with other voice communication, multilingual considerations





Design

Consideration: False

Alarms

# False alarms

- Alarms are automated to detect a signal
  - Can sometimes go off when nothing is wrong
  - False Alarm
- False alarms - consequences?
  - Distrust
  - Ignore
  - Try to disable

- NPR News Clip

<http://www.npr.org/2011/02/15/133785372/Report-Nurses-Can-Become-Desensitized-To-Monitor-Sounds>