

# Class 5 CS545

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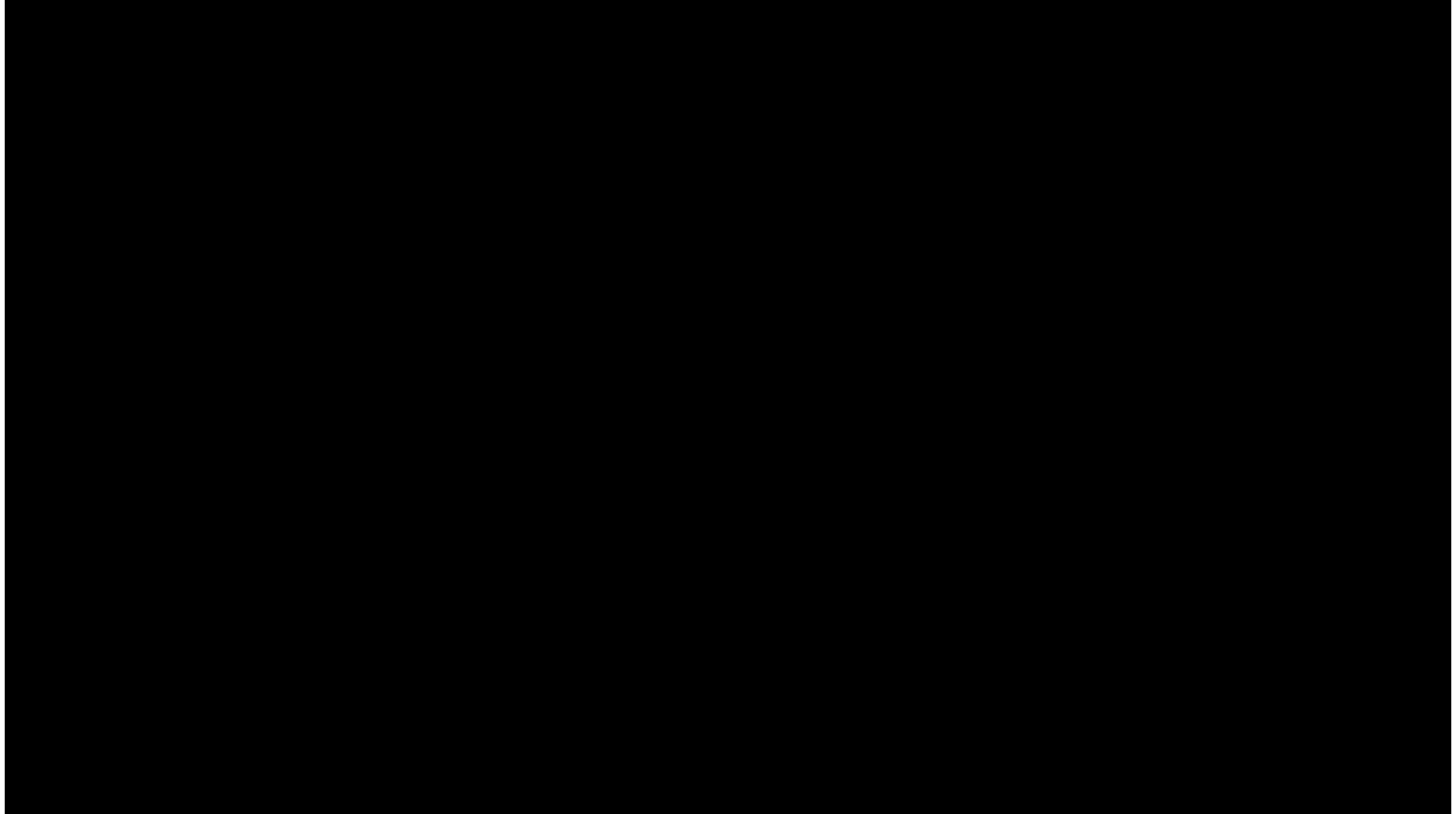
# Roadmap

- Log
- Statistics
- Tidwell 2
- Rapid Contextual Design -> Design
- State machines and State Charts
- The Project
- Readings this class: Tidwell Chapter 3
- Readings next class :Norman chapters 3 & 6, Stone et.al. chapters 10-13, Tidwell chapter 8

# Schedule

- Labor Day, September 2<sup>nd</sup> – no class
- Good, bad or ugly web site evaluation September 9<sup>th</sup> next class, in class
- Project topic selection and team due September 9<sup>th</sup>
- Tuesday, October 15<sup>th</sup> lecture class instead of Monday, October 14<sup>th</sup>
- Mid Term, October 21<sup>st</sup> in Moodle no Hoboken Class
- Project report every session in class starting Sept 16<sup>th</sup>
- moodle class November 25<sup>th</sup>
- Project reports Dec 2<sup>nd</sup>, **Friday December 6<sup>th</sup> last day of classes**
- **Final on Moodle Dec 2<sup>nd</sup> – December 9<sup>th</sup>**
- Missing schedules will result in grade deduction unless a prior arrangement has been made - I am flexible but ...

# Microsoft Natal -1



# Natal-2

"Project Natal":  
controller-free gaming and entertainment

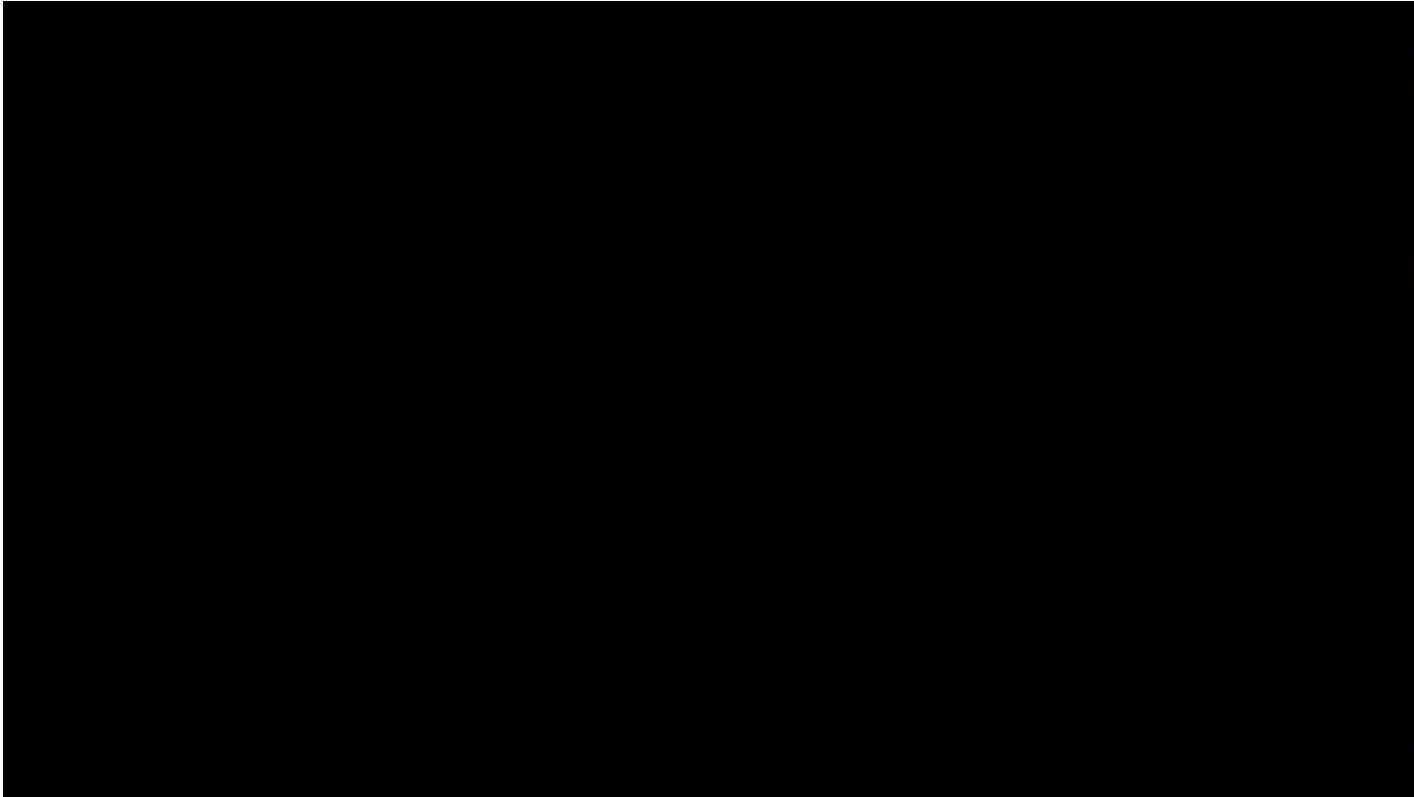
"Project Natal" - the current code name for a revolutionary new way to play, completely transforms social gaming and entertainment.

- Nothing to hold, no buttons to push.
- You control the experience with full body, voice and facial recognition.
- All you need is life experience.

## FOOTAGE

- Family playing Ricochet
- Family playing Paint Party
- Soundbites Don Matrick

# Natal-3



# HCI Use - kinect



# Some other information

1. <http://blog.ted.com/2010/08/18/meet-milo-the-virtual-boy-peter-molyneux-on-ted-com/>
2. History of project:  
<http://www.wired.co.uk/wired-magazine/archive/2010/11/features/the-game-changer>
3. If interested in programming kinect : <http://www.openni.org/>

## Your log book entry



# Simple Statistics

- Mean, median & mode
- Standard deviation
- Correlation

# Measures of Central Tendency

- Measures of central tendency are a summary of a whole distribution of events or measurements.
  - Mean (aka average) just add and divide by number of scores:  $8, 5, 5, 4, 3, 2, 2, 1 = 31/8 = 3.75$
  - Median is the middle value when scores are sorted in order
    - What happens if you have an odd number of scores, even number of scores?
    - Answer to above is 3.5
  - Mode is the number that occurs most frequently - what is the mode for the series above?

# Why 3 Measures of Central Tendency?

- Mean is the most common
- But if there are outliers – one, or a relative few, very high or very low numbers they will influence the mean and the median is a better choice
- For categorical data (non numeric), e.g., colors the mode, most frequent, is the obvious choice, but also can be instructive on numerical data – bi-modal

# Measures of Dispersion

- Range - difference of largest and smallest, 8, 5, 5, 4 , 3, 2, 2, 1: range =  $8-1 = 7$ , but it is best to also show the range 1-8
- Mean deviation - calculate mean get absolute difference of each number from mean (3.75) and divide by number of scores:  $(4.25+1.25+1.25 +.25 + .75+1.75+1.75+2.75)/8 = 1.75$
- Standard deviation is square root of the variance, variance =  $\Sigma(x-\mu)^2/n-1 =$  , std dev = 2.252
  - If I added more variability in the data 12, 5, 4, 3, 2,2,1,1, even though mean is same, standard deviation is 3.6154 and mean deviation is  $(8.25 + 1.25 + .25+ .75 + 1.75 + 1.75 + 2.75 + 2.75)/8 = 2.438$

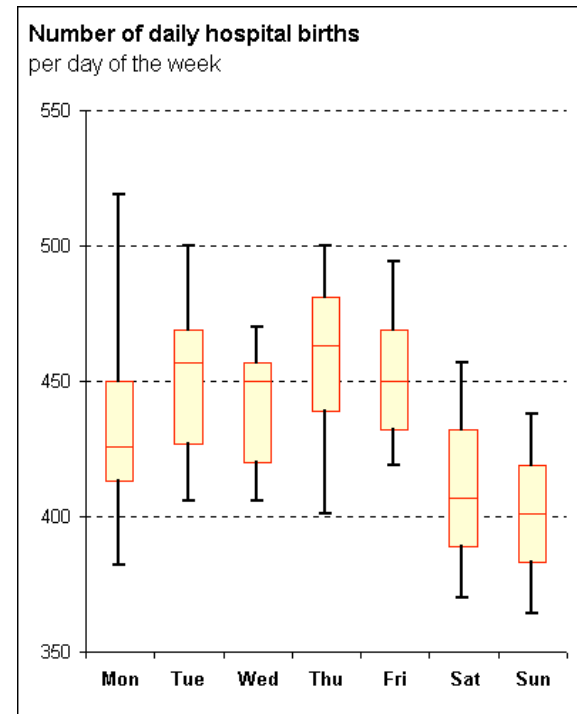
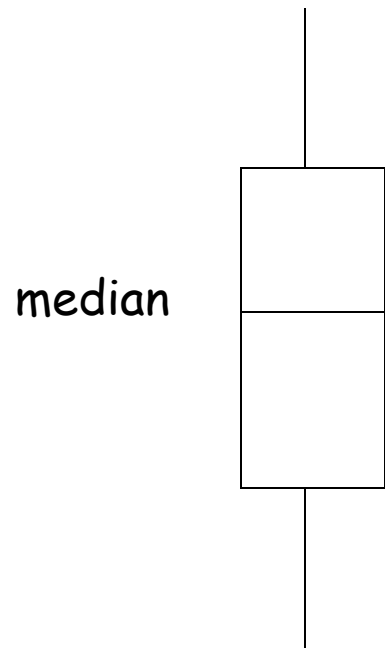
# Correlation

$$r = \frac{\Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{n}}{\sqrt{(\Sigma X^2 - \frac{(\Sigma X)^2}{n})(\Sigma Y^2 - \frac{(\Sigma Y)^2}{n})}}$$

- Correlation coefficient,
- Data set 1: (1, 8) (2, 15) (3, 20) (4,25) r=.996
- Data set 2: (10, 5) (20, 3) (30, 2) (40, 1) r=-.982
- “inferring causality from simple correlations is an extremely dangerous pastime!”- Underwood

# Simple Box Plots

- A method for combining descriptive statistics



# Graph Conventions

Dependent  
Variable



Independent Variable  
(discrete:continuous::bar:chart:line)

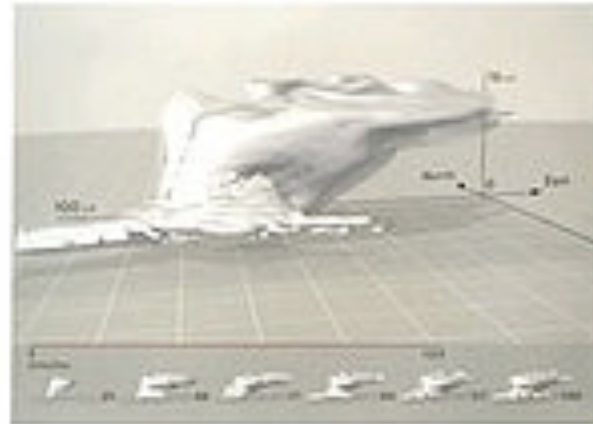
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# Visual Depiction

- Tufte is the master

EDWARD R. TUFTE

VISUAL EXPLANATIONS



IMAGES AND QUANTITIES. EVIDENCE AND NARRATIVE



# Users

- Characteristics
  - Disabilities -- countries report that between 15 & 35% of the population have some sort of disability or impairment
- Questionnaire Completion
- Segment your user base into groups (ATM example) - not enough - but data derived
- Personas, imaginary examples of real users, a precise description of a user and what the user wishes to do with the system -- a set of personas

RAPID CONTEXTUAL DESIGN  
As a stage setter

# Setting the stage

- “thinking aloud and problem solving”
- “thinking aloud about thinking aloud”
- Registering for classes

# Rapid Contextual Design- Alternatives

- Stone has related techniques with different nuances - cognitive walk throughs, ...
- Questionnaires
- Web/industry trolling (careful) consumer data
- Anthropological, ethnography

# Overview of Rapid Contextual Design

- Contextual Inquiry - one of many ways - be eclectic over time
- Interpretation sessions and Work Modeling
  - Flow, cultural, sequence, physical environment and artifact models
- Model consolidation and affinity diagram building
- Personas
- Visioning
- Storyboarding
- User Environment/**User Experience** Design
- Prototype testing

*(embedded in your current process)*

# Rapid CD Style

- Lightning Fast (4 wks), Lightning Fast +(4-8 wks), Focused Rapid CD (6-10 wks)
- Target a few well defined tasks
- Dedicate a room or electronic space (wiki, web site, email list) to the team
- Day by day scheduling versus weekly goals

# Contextual Interviews

- Contextual interviews with 3 to 4 users doing each task (personally the more the better - depends on length of interview and industrial vs consumer, regardless interviewing 3 to 5 is much better than no data)
  - Small numbers are sufficient, variation in users vs similarities
  - Key task dimensions - it is an abstraction of the task (these may change)

# Interview Styles

Task Type	Interview Technique
Extremely long task(wks-mos)	Sample stages
Mobile	Longer “interview” only data relevant to task focus
Extremely focused, can’t interrupt	video
Environment centered interviews	Interviewing context -catch who is there, video, permission
Uninterruptible	Pre meeting, post meeting, notes during

# The Interview

- “a representative interview never is :-)”
- Tacit knowledge - difficult to articulate
  - Cognitive walkthroughs
  - “John Henry” prototyping
- Intact environment - no “in-law” behavior
- **Contextual interviews are in the context!**
- Check out the work environment/space/culture
  - Anti taping



# While Interviewing

- Focus on the task
- Share observations and offer hypotheses about why user is doing X
- Focus on role not title
- Be curious!
- Capture: roles, responsibilities, type of communication, culture, physical space, aids (distributed cognition)
  - Note this must be adjusted for consumer tasks
- Photos and sketches may help (if you have permission)

# Advice

- If possible interview while doing
- Analyze the task together, collect the “why” work with user, hypothesis then let user tune
  - But don’t interrupt or influence analysis, a tightrope
- Expand focus if things seem strange - be curious
- Cognitive walkthroughs as alternative or addition

# Interpretation Session

- As soon as possible - w/in 48 hours, may have to review materials collected
- During debrief take notes - should last as long as interview but your mileage may vary (short takes longer, longer may take shorter! First ones are always longer)
- Capture in team room or by electronic means - everyone should see progression of notes/insights
- The team - 2 at minimum, 4 to 6 at most (schedule separate share sessions with curious stakeholders). More a separate moderator.
  - Designated note taker, beware talking stick syndrome
    - Snow cards or computer
  - Beware “squeaky wheel” - insure equal participation (delphi technique)

# Interpretation Session - 2

- Interviewer recounts interview, is not passive, decides what enters affinity notes
- Affinity notes - observations, issues, questions. Gaps, insights & design ideas - complete thoughts
- Session progression:
  - Demographics of user job title responsibilities, organization profile
  - Work model, photos of environment, perhaps onto sequence model, steps of task
  - Walk group through interview - balance between dissecting and telling

# Affinity Note

- Complete short thought - should fit on snow card (5x8). 50-100/user is too high!
- Record:
  - Interpretations of events, artifact use, problems
  - Characteristics of work (analytic, rote, intense ...)
  - Breakdowns
  - Cultural influences - worker interaction
  - Design ideas
  - Questions to improve future interview
  - Insightful customer quotes
  - Insights - patterns, situations and needs

# Affinity (Snowcard) example



# Modeling

- Physical model - work space
- Artifact model - job aids and the like
- Sequence model - step by step recording of what happens
- Consolidated sequence model - smashing all interviews together
- **Flow model** - macro behaviors people's responsibilities and coordination required to do a job
- **Cultural model** - influences on a person including values, attitudes and morale
- Story board is future scenario

# Sequence Model

- Intent - why is the activity being done?
- Trigger - situation that triggered activity
- Stating the users goal would be another way to attack this
- List the steps at a relevant level of detail to your goals
- Then consolidate, not condense



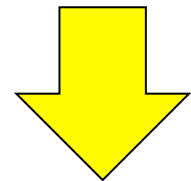
# Analysis

- Flow model: roles and responsibilities
- Sequence model: captures tasks and relations
- Cultural model: captures values
- Affinity diagram: captures issues

# At This Point

- You have some data
  - Industry competitive product survey
  - Local Interviews
  - Day in the Life
  - Fly on the wall
  - Guided tour
  - Shadowing
  - ...
- Framework – now Ask and Try

Learn  
and  
Look  
(passive)



**Experience  
and  
Absorb!  
(active)**

# Rolling Stones

What they say they need, what they feel they need -- get to the point of what would be most helpful for them!

You can't always get what you want  
You can't always get what you want  
You can't always get what you want  
But if you try sometimes you just might find  
You just might find  
You get what you need  
--Rolling Stones

# Task Analysis

- What the computer system must do and the functionality it must provide
- Goals, Tasks, and Actions
- In order to do the tasks that accomplish the goals, a person will need to physically interact with the system by performing actions
  - Goal - end result to be achieved
  - Task - a structured set of related activities
  - Action - an individual operation or step that needs to be done as part of the Task

# Task Analysis - 2

- Work flow analysis as a horizontal picture of how work moves across people and job analysis as a vertical picture of all types of work done by individuals as part of their role
- Look for problems and difficulties and discover the artifacts and “work arounds” that remediate them

Next term work flow?

# Descriptions

- Scenarios and use cases
  - Later used for testing
- **Task scenarios** are narrative descriptions of CURRENT tasks – personalized
- **Concrete use cases** - detailed features and behavior of the user interface (more general than task scenarios)
- **Use scenarios** - detailed level but describes anticipated use of the system
- **User stories** – both current and anticipated – motivated to what is to be built, at least in agility
- Leads to cognitive walkthroughs with low fidelity prototypes

# Next Term Registration Process

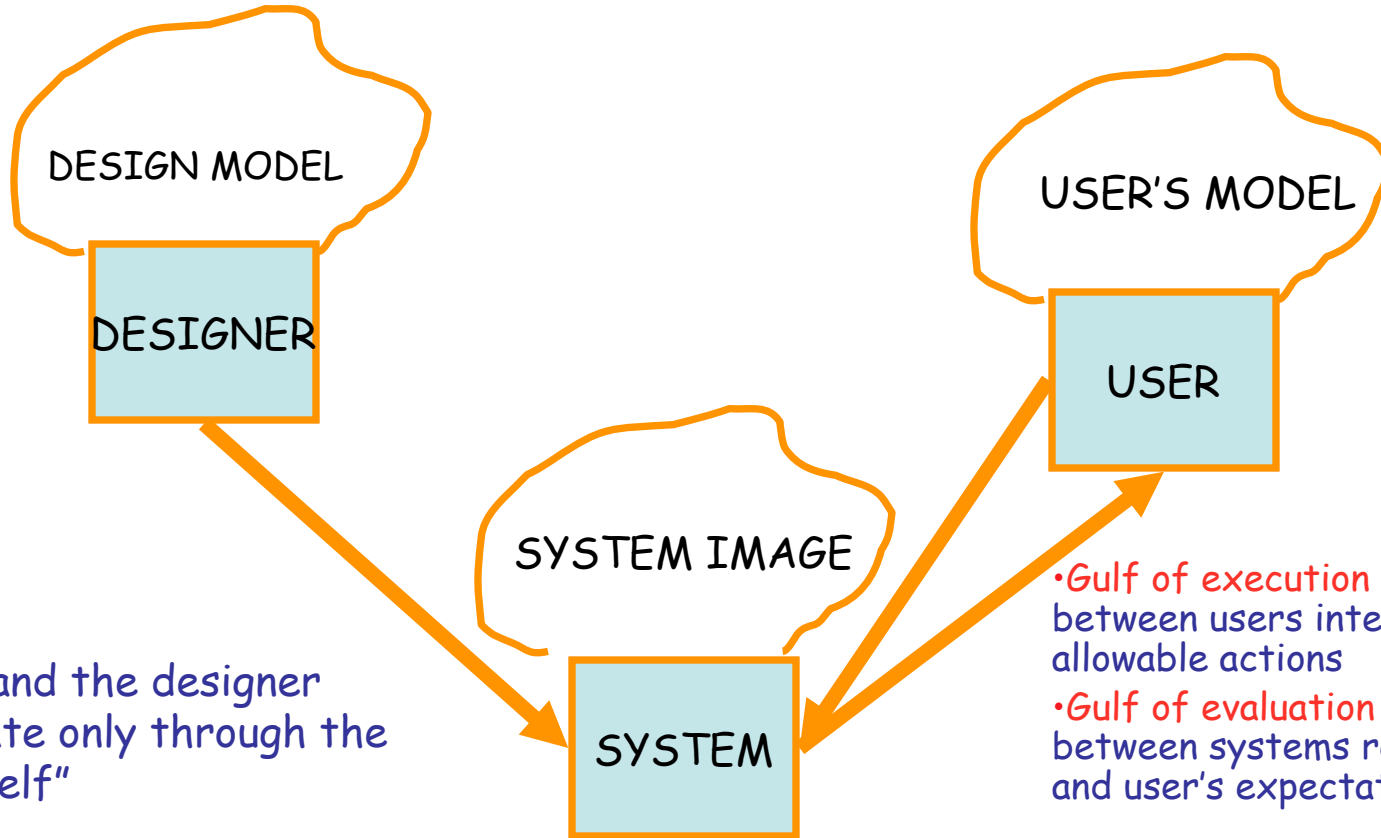
- Task Scenario (personal)
- Concrete use cases (general)
- Use scenarios (future) –security track, media track
- User stories

# Cognitive Walk Throughs

- How folks do the task: decisions on what button to press, what knowledge is used, .. **Examines** cognitive rather than physical operation.
- Evaluates the steps required to do a task and attempts to uncover mismatches between how users think about a task and how the UI designer thinks about the task



# Knowledge in the World and in the Head



"the user and the designer communicate only through the system itself"

- **Gulf of execution** - mismatch between users intention and allowable actions
- **Gulf of evaluation** - mismatch between systems representation and user's expectations

The Design Challenge

# Cognitive Walkthroughs

- User selects task to do and writes down all steps in the task
- For each action in the task
  - User looks for the action in the “simulation” that would enable him or her to do the task(1)
  - User selects the action that seems to match what she or he is trying to do(2)
  - User interprets “system” response and determines if progress has been made on task(3)
- For each action evaluator determines
  - How does the user know what to do next? Is the correct action evident or does user have to recall from memory?(1)
  - Does the user connect the description of the correct action with what he or she is trying to do?(2)
  - Given the system’s response does user know if he or she has made the right choice?

*“no” answers indicate problems with the UI*

# Preliminary UI Design Knowledge

- 4 Psychological Principles:
  - Users see what they expect to see
    - Principles of consistency and exploiting prior knowledge
  - Users have difficulty focusing on more than one activity at a time
  - It is easier to perceive a structured layout
    - Gestalt principles
  - It is easier to recognize than recall (in vast majority but ...)

## Preliminary UI Design Knowledge -2

- Experience Principles
  - **Visibility** - it should be obvious what a control is used for
  - **Affordance** - it should be obvious how a control is used
  - **Feedback** - it should be obvious when a control has been used

# Normanizing

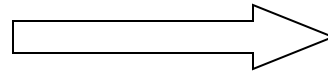
- Design should make sure that the user can determine what to do and what is happening:
  - Make it easy to determine what are the possible actions (use constraints to simplify)
  - Make things visible including system's conceptual model, alternative actions and results of actions
  - Make it easy to understand current state of system
  - Follow natural mappings: **between** users intentions and required actions, **between** actions and the resulting effect and **between** what is visible and the system's state

# Normanizing 7 Principles

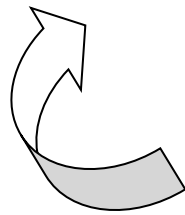
- Use both knowledge in the world and knowledge in the head
- Simplify the structure of tasks
- Make things visible: bridge the gulfs of Execution and Evaluation
- Get the mappings right
- Exploit the power of constraints both natural and artificial
- Design for error
- When all else fails, standardize
- (Deliberately making things difficult) – power switch in comp centers

# Prototyping-1

Listen to customer



Build/revise mockup



Customer test drives mockup



When finished: **Design**, Implement, Test, Maintain

# On prototyping

- Low fidelity versus high fidelity prototypes
- Great when few initial requirements
- People (dev and users) like prototype
- Danger of feature creep
- Customer and management may think it is done
- Quality can go either way



# Current State

- Select topic, Target E's
- HCI development report
- Industry + questionnaire + ? data -> persona
- Begin thinking about collecting your first bit of data
- Initial data collected
- Persona in definition
- Initial steps toward design
  - Decide what data next to collect from users

**DATA**

# Chapter 1 Patterns(Tidwell)

- Safe exploration
- Instant gratification
- Satisficing
- Changes in Midstream
- Deferred Choices
- Incremental construction
- Other People's advice
- Habituation
- Microbreaks
- Spatial Memory
- Prospective memory
- Streamlined repetition
- Keyboard Only
- Personal Recommendations

## Chapter 2 – The Big picture

- Show 1 single thing
- Show a list of things
- Provide tools to create a thing
- Facilitate a single task

# Chapter 2 Patterns

- Feature search and browse
- News stream
- Picture manager
- Dashboard
- Canvas plus palette
- Wizard
- Settings editor
- Alternative views
- Many workspaces
- Multi-level help

# Tidwell – Chapter 3

## Navigation

### keep distances short!

- Clear entry points
- Menu page
- Pyramid
- Modal panel
- Deep-linked state
- Escape hatch
- Fat menus
- Sitemap footer
- Sign-in tools
- Sequence map
- Breadcrumbs
- Annotated scrollbar
- Animated transition

# Current State

- Select topic, Target E's
- HCI development report
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- Begin thinking about collecting your first bit of data

# Today

- Dev report

# Projects

TEAM	TOPIC	MEMBERS
KiddieCity	Educational location based app on cities	Liangyu Xiao, Thoka Alowaid, Weijing Zhao, Chia-Wei Chiang, Wan-Ting Chang, Jingying Wang
Wordcraft	Learn words, social media, multiple languages	Meng Wang, Ruixiang Chu, Jingzhe Tian, Praneeth Ammineni, Srihari Natarajan, Alexander Gurski
Stevens Yard Sale	Make friends, sell goods within Stevens COmmunity	Cheng Liu(wc), Jingjing Lan, Nan Xie, Ruo Jia, Rui Ma, Xintong Wang
icrib	Find a place to live	Madhura Kamat, Muath Khawaji, Swati Mittal, Himabindu Chaturvedula, Richard Sass, Aakash Yatish,
iHouse	Intelligent house with energy conservation	Xiaoran Liu, Ke Lei, Miao Li, Shanmiao Liang, Zhoushuo Wang , Mengyi Gong,
h2oken	Find essential items	Krzysztof Jordan, Zachary Smith, Michael Peleshenko, Dane Pilcher, Ryan Phillips, Guanyi Li, Jing Yang
My Travel	Share travel planning with friends	Guangji Wang, Zhengfei Duan, Xiao Han, Hao Wu, Tingxue Li



# References

- Holtzblatt K., Wendell, J. and Wood, S. Rapid contextual design, Morgan Kaufmann, 2005, ISBN: 0-12-354051-8.