



**NANYANG**  
TECHNOLOGICAL  
**UNIVERSITY**

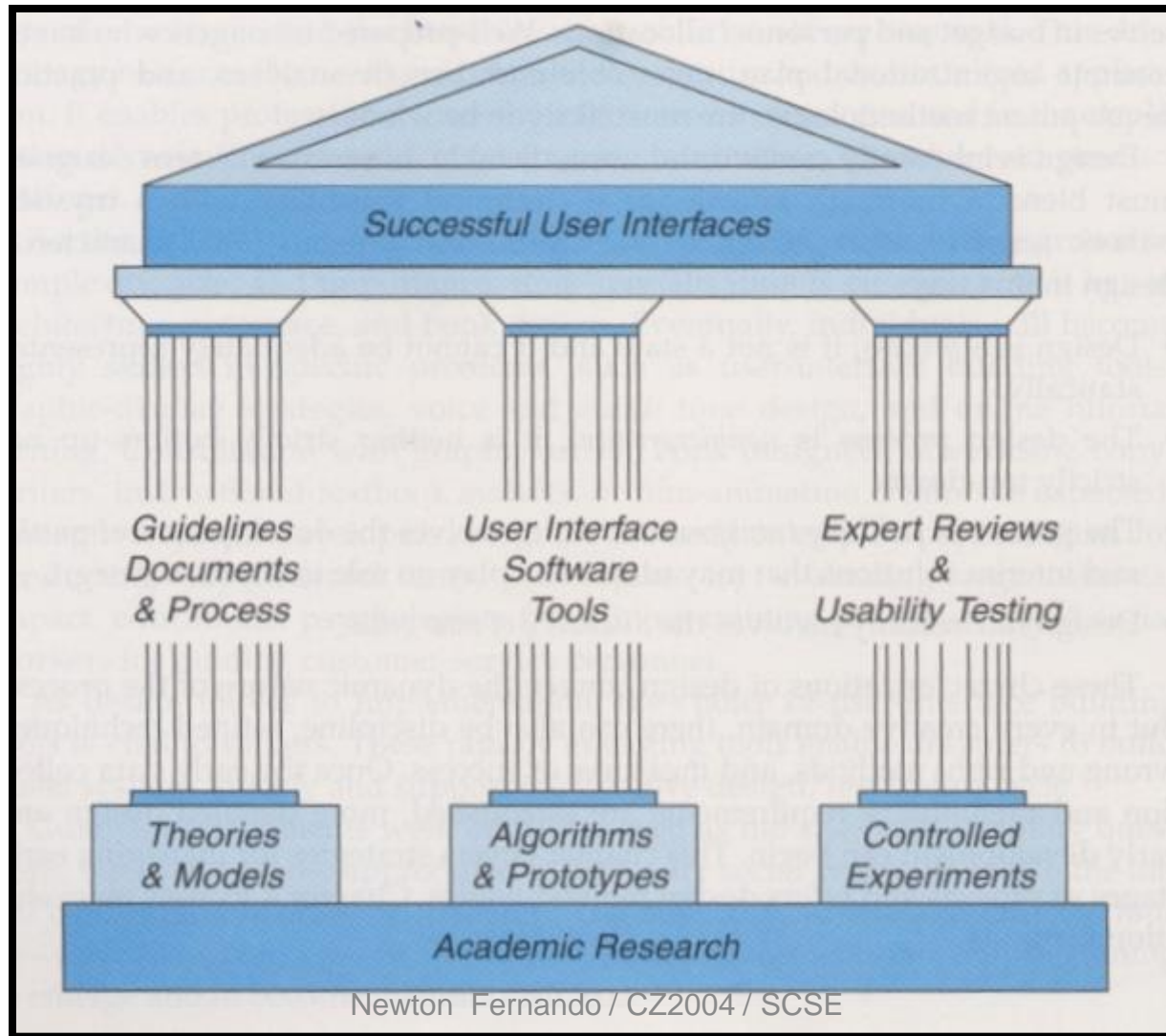
# **Prototyping & Evaluating**

CZ2004 Human–Computer Interaction

# Prototyping and Evaluating an Interfaces

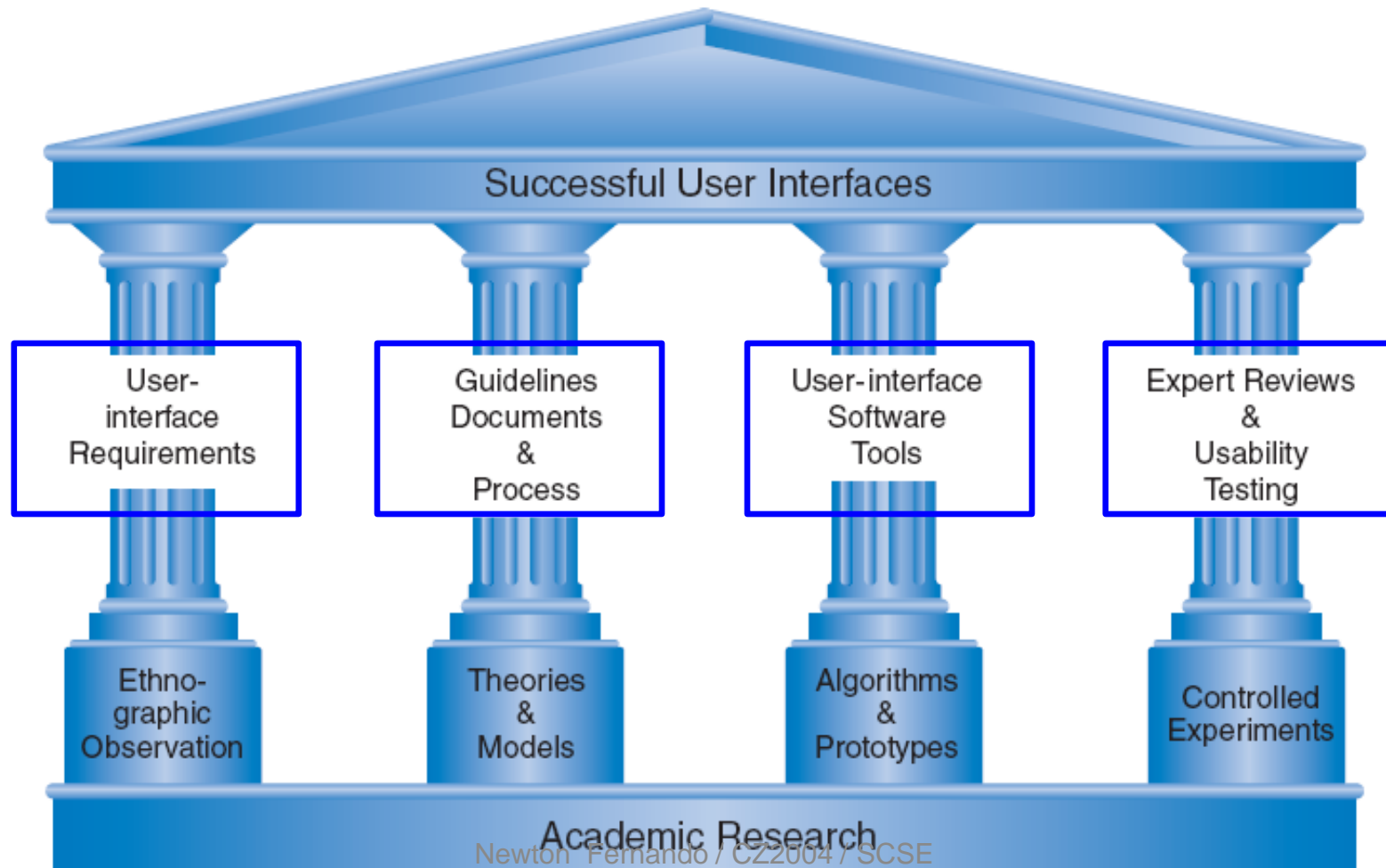
- Reading - Textbook
  - Chapter 3.1, 3.3, 3.5, 3.9,
  - Chapter 4.1, 4.2, 4.3, 4.4, 4.5, 4.6
- Goal:
  - Familiarize yourself with ethnography, prototyping techniques and evaluation strategies
  - Topics to be overviewed
    - Ethnographic observation
    - Prototyping
    - Evaluating

# The Design Process: *Three Pillars of Design*



# Wait, or, *Four Pillars?*

- HCI is changing, rapidly!



# Methods for involving the user

- At the very least, talk to users
  - surprising how many designers don't!
- Contextual interviews + site visits
  - interview users in their workplace, as they are doing their job
  - discover user's culture, requirements, expectations,...



# Methods for involving the user

- Explain designs
  - describe what you're going to do
  - get input at all design stages
    - all designs subject to revision
- Important to have visuals and/or demos
  - people react far differently with verbal explanations
  - this is why prototypes are critical



# **One way to know your users: Ethnographic Observation**

- Ethnographic observation steps
- Participatory design
  - Meaning
  - Pros and cons

# Meaning of the word

- Ethnography
  - from Greek
  - ἔθνος **ethnos** = folk/people
  - γράφω **grapho** = to write
  - A **qualitative** method aimed to learn and understand cultural phenomena which reflect the knowledge and system of meanings guiding the life of **a cultural group**
  - Can be *participatory* or *non-participatory*
  - <http://en.wikipedia.org/wiki/Ethnography>



# Ethnographic Observation



STANFORD  
TECHNOLOGY  
VENTURES PROGRAM

**Tom Kelley**

General Manager, IDEO

Author of *The Art of Innovation*

*November 12, 2008*

# Ethnography

- Long-term observation of users in their natural environments
- Gives lots of information about users, their habits, workplaces, and artifacts



# (General) Ethnographic Observation Steps

- Preparation
  - Understand organization policies and work culture.
  - Familiarize yourself with the system and its history.
  - Set initial goals and prepare questions.
  - Gain access and permission to observe/interview.
- Field Study
  - Establish rapport with managers and users.
  - Observe/interview users in their workplace and collect subjective/objective quantitative/qualitative data.
  - Follow any leads that emerge from the visits.

# Ethnographic Observation Steps (cont.)

- Analysis
  - Compile the collected data in numerical, textual, and multimedia databases.
  - Quantify data and compile statistics.
  - Reduce and interpret the data.
  - Refine the goals and the process used.
- Reporting
  - Consider multiple audiences and goals.
  - Prepare a report and present the findings

# Participatory Design

Observe “real world” users in their home or office environment



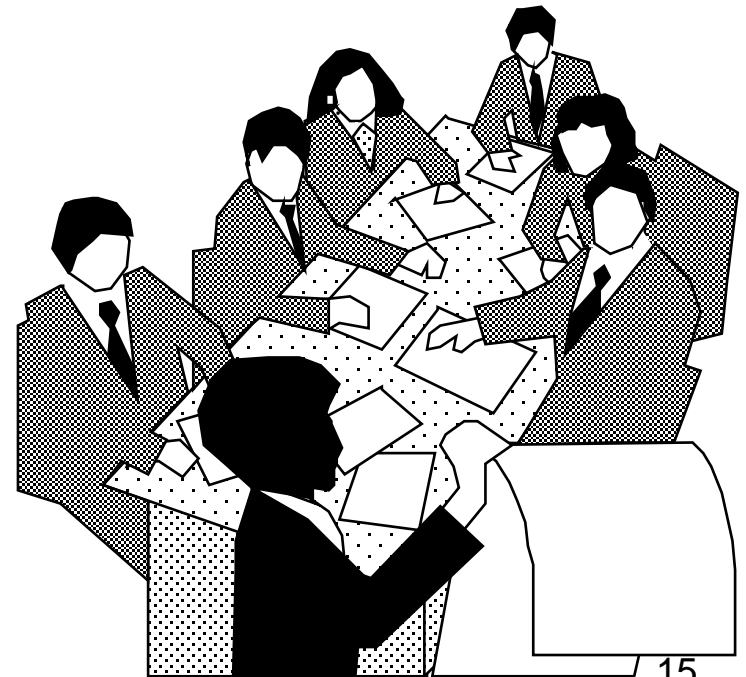
Sends observers to people homes and offices to quietly observe user habits and methods

# Participatory Design (cont.)

- An approach to design attempting to actively involve all stakeholders (e.g. employees, partners, customers, citizens, end users) in the design process
  - to help ensure the product designed meets their needs and is usable
- Participants (potential or future) are invited to cooperate with designers, researchers and developers during an innovation process
  - they participate during several stages of an innovation process:
    - they participate during the initial exploration and problem definition both to help define the problem and to focus ideas for solution,
    - and during development, they help evaluate proposed solutions.

# Participatory Design (cont.)

- Users are 1<sup>st</sup> class members in the design process
  - active collaborators vs passive participants
- Users considered subject matter experts
  - know all about the work context
- Iterative process
  - all design stages subject to revision



# Participatory design: Pros and cons

- more user involvement brings
  - more **accurate** information about tasks
  - more **opportunity** for users to influence design decisions
  - a sense of participation that builds users' ego investment in successful implementation
  - potential for increased user **acceptance** of final system
- on negative side, extensive user involvement may
  - be more **costly**
  - **lengthen** the implementation period
  - build antagonism with people not involved or whose suggestions rejected
  - force designers to compromise their design to satisfy incompetent participants



# Comparing the techniques presented

	Ethnography	Participatory
User involvement	Low	High
Role of designer	Uncover findings about users' world	Being an equal partner with the user
Length of study	Extensive – several months	Short interviews
Benefits	Wealth of information	Keeps users' expectations in check
Drawbacks	Requires experience Hard to translate findings to design	Users' thinking can be constrained to what they are used to
When to use	When there is sufficient time and no current solution	Whenever users are available and willing to take part in the design

# PROTOTYPING

- What is prototyping & Why do we prototype?
- Fidelity
  - Meaning
  - Low-fi
  - Hi-fi
  - Their pros and cons
- Feedback
- *Remember to **apply** what you learn to labs*

# User Interface Software Tools (Pillar II)

- UI Prototype (“mock up”)
  - Does **not** have to be functional
  - Simply design the buttons, menus, etc
  - Can well be a hand drawn picture
- Develop prototypes early
  - Very difficult and costly to make changes near the end of a project
- Provides a “vision” for both developers and clients

# Why Do We Prototype?

- Traditionally users lack the ability to envisage designs conceptually
- Alternatively there may be a conceptual mismatch between the designer and the user
- This may not manifest itself until very late
- Users often lack the ability to imagine the ramifications of design decisions
- Users are often unable to comment on technical design documents
- A prototype provides users with a concrete representation of the proposed design

# Why Do We Prototype?

- Get feedback on our design faster
  - saves money
  - Aka, *rapid* development
- Experiment with alternative designs
  - to resolve a hard design decisions
- Fix problems before code is written
- Keep the design centered on the user
- Easier to change or throw away
  - important not to commit strongly to design ideas
  - creative freedom
  - is this the case with 1k lines of code?

<http://www.cc.utah.edu/~asn8200/rapid.html>

[http://en.wikipedia.org/wiki/Rapid\\_prototyping](http://en.wikipedia.org/wiki/Rapid_prototyping)

<http://www.youtube.com/watch?v=Ps0DSihggio>

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# What is a prototype?

- A series of screen sketches
- A storyboard, i.e. a cartoon-like series of scenes
- A PowerPoint slide show
- A video simulating the use of a system
- A cardboard mock-up
- A piece of software with limited functionality written in the target language or in another language

# Fidelity in Prototyping

- Fidelity refers to the level of detail (LoD)
- High fidelity
  - prototypes look like the final product
- Low fidelity
  - artists renditions with many details missing



# Fidelity: Low or High?

**Attendance List**

Sort By: Last Name    Show: Enroll

Last Name	First Name	SID #	Enrollment	Section	Major	Level
Lee, Benjamin						
Santos, Allen						
Schwartz, Jonah						
Vermette, Joshua						
		12345678				Junior
		23456789				Senior
		34567890				Senior

Go to Attendance View

Back to main menu    refresh w/ new info

38 Present, 2 Absent    **Take Attendance**

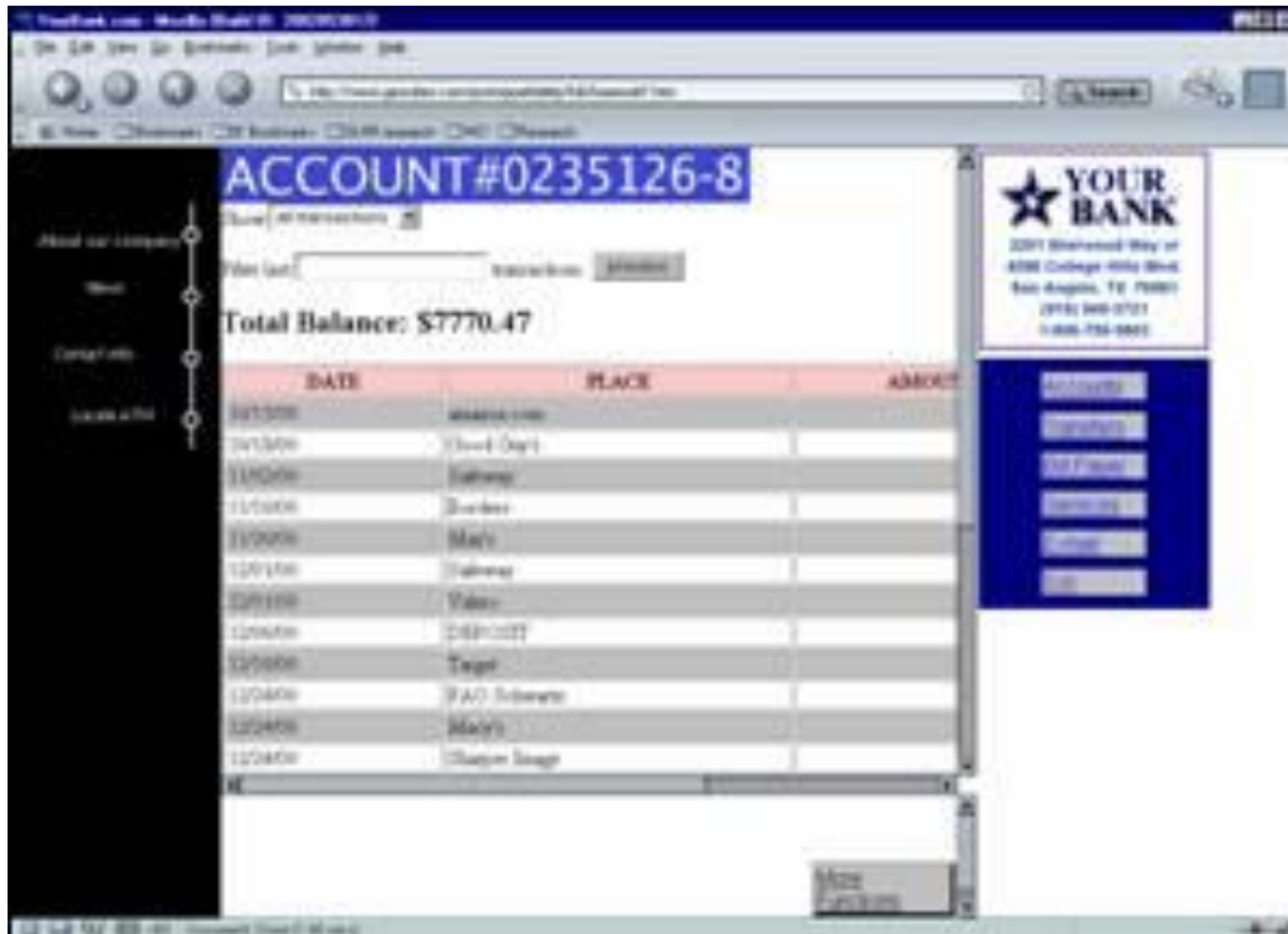
**Done**    Look Up: Sc

from students' POA

highlight student



# Fidelity: Low or High?

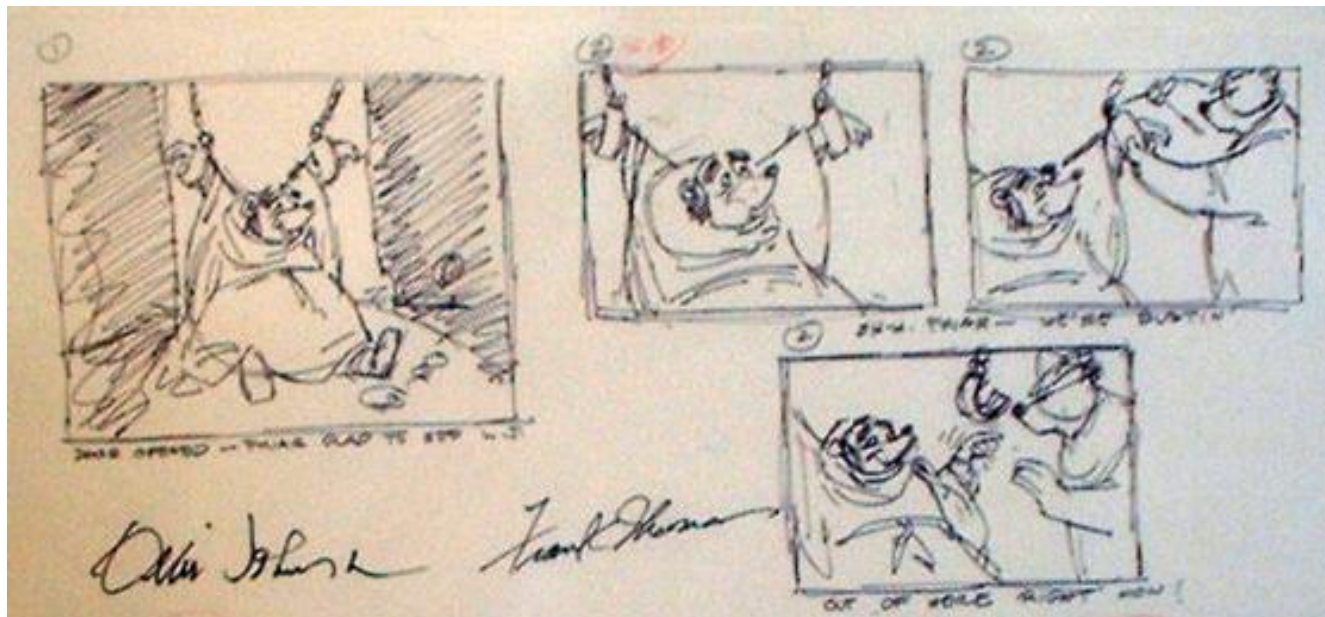


# Low-fi Storyboards

- What are storyboards?
  - high-level representation of important user actions & consequences
- Where do storyboards come from?
  - Film & animation
- Give you a “script” of important events
  - leave out the details
  - concentrate on the important interactions

# Storyboarding

- Often used with scenarios, bringing more detail, and a chance to role play
- It is a series of sketches showing how a user might progress through a task using the device
- Used early in design



# Sketches & Low Fidelity Prototypes



Sketching is about Design



# Sketching is about design

- Sketching is not about drawing It is about design.
- Sketching is a tool to help you:
  - express
  - develop, and
  - communicate design ideas
- Sketching is part of a process:
  - idea generation,
  - design elaboration
  - design choices,
  - engineering



# Why Sketch?

- Create
  - early ideation
  - think openly about ideas
  - think through ideas
  - force you to visualize how things come together
  - brainstorming: generate abundant ideas without worrying about quality
  - invent and explore concepts
- Record
  - ideas you develop
  - ideas that you come across
  - archive ideas for later reflection
- Reflect, share, critique, decide
  - communicate ideas to others
  - invite responses, criticisms, and alternatives;
  - choose ideas worth pursuing

# Why Use Low-fi Prototypes?

- Traditional methods take too long
  - sketches → prototype (*real code*) → evaluate → iterate
- Can simulate the prototype
  - Sketches (mockup) → evaluate → iterate
  - sketches act as prototypes
    - designer “plays computer”
    - other design team members observe & record
- Kindergarten implementation skills
  - allows *non-programmers* to participate

# High-fidelity prototyping

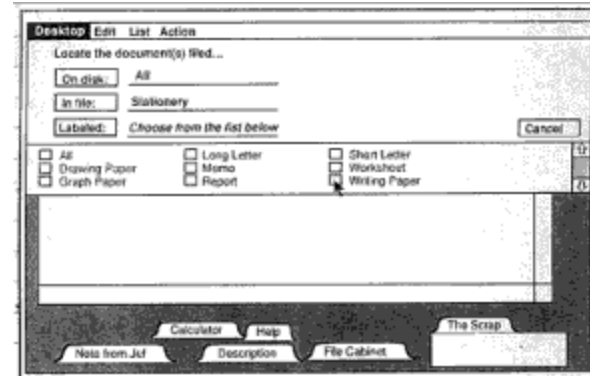
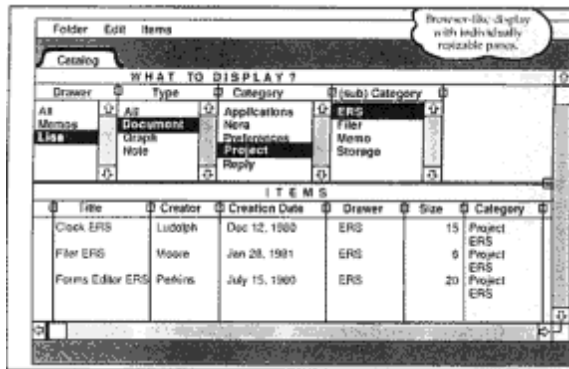
- After interface is established, still room for more mockup
- High-Fidelity can look much more similar to final product
- Paper-based may still be used OK, but most likely using real code and software



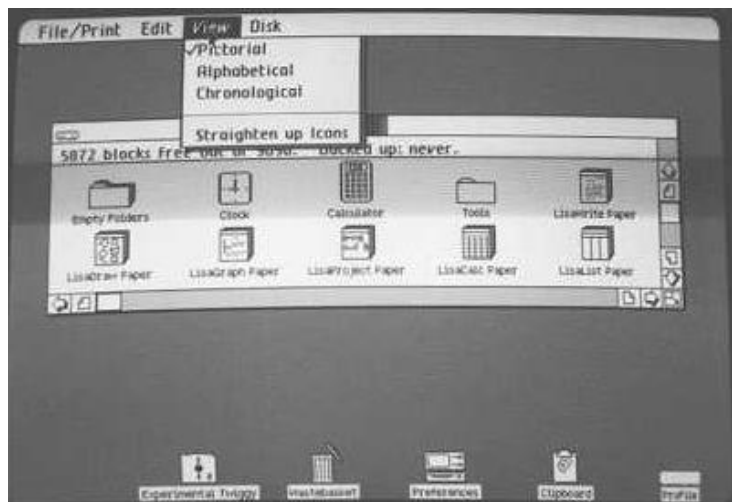
# High-fidelity prototyping

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# Mac (LISA) Prototypes



Paper-based high-fidelity “mock ups” from 1980 and 1981 Apple OS



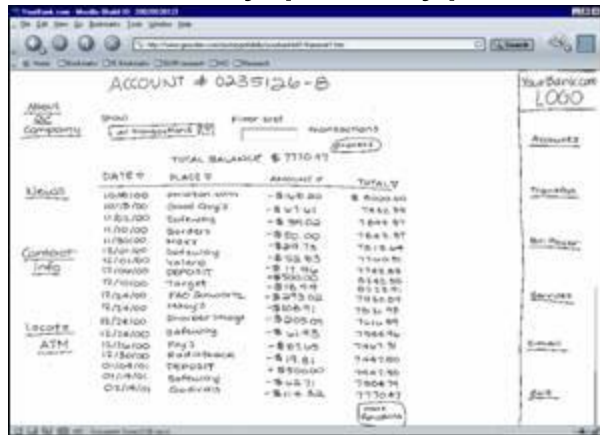
Lisa release 1983



OSX (2000)

# Difference

## Low-fidelity prototype



## High-fidelity prototype



# Advantages/Disadvantages

Prototype	Advantages	Disadvantages
Low-fidelity prototype	<ul style="list-style-type: none"><li>• Low development cost</li><li>• Evaluate multiple design concepts</li></ul>	<ul style="list-style-type: none"><li>• Limited error checking</li><li>• Navigational and flow limitations</li></ul>
High-fidelity prototype	<ul style="list-style-type: none"><li>• Fully interactive</li><li>• Look and feel of final product</li><li>• Clearly defines navigational scheme</li></ul>	<ul style="list-style-type: none"><li>• More expensive to develop</li><li>• Time consuming to build</li><li>• Developers are reluctant to change something they have crafted for hours</li></ul>

# Prototypes Feedback

- Previews and feedback from prototypes is crucial
  - Even low fidelity mockups
  - If possible, get feedback from experts & average users
- Large websites carry out “pilot” launches to get feedback and find bugs
- Google “Gmail” is a great example
  - Request feedback and requests/suggestions for improvements
  - Launched April 1, 2004, throw away “beta” on July 7, 2009
  - 260 million users (Oct. 2011)

# EVALUATING

- Expert Review
- User Labs
- Questionnaires/Surveys
- Acceptance Testing
- Continuous feedback (evaluation during active use)

# Evaluation: Introduction

- Designers can become so entranced with their creations that they may fail to evaluate them adequately.
- Experienced designers have attained the wisdom and humility to know that extensive testing is a necessity.
- The determinants of the evaluation plan include:
  - stage of design (early, middle, late)
  - novelty of project (well defined vs. exploratory)
  - number of expected users
  - criticality of the interface (life-critical medical system vs. museum exhibit support)
  - costs of product and finances allocated for testing
  - time available
  - experience of the design and evaluation team

# Evaluation: Introduction (cont.)

- The range of evaluation plans might be from an ambitious two-year test to a few days test.
- The range of costs might be from 20% of a project down to 5%.
  - Budget for user evaluation!
- Is it worth it? Well, remember this . . . good design pays off.





# Evaluation: Introduction (cont.)

- Troubling aspect of testing: uncertainty remains even after exhaustive testing by multiple methods.
  - Perfection is not possible in complex human endeavors, so must **continue assessing** and repairing problems during lifecycle of interface
  - Decision must be made about **completing prototype testing** and delivering the product, even though problems may continue to be found
  - Most testing methods will account for normal usage, but performance in **unpredictable situations** with high levels of input such as nuclear reactor control, is extremely hard to test.

# Expert Reviews

- Expert reviews entail one-half day to one week effort, although a lengthy training period may sometimes be required to explain the task domain or operational procedures
- There are a variety of expert review methods to choose from:
  - **Heuristic evaluation**
    - Experts reviewers personal critic
  - **Guidelines review**
    - Make sure UI adheres to established guidelines
  - **Consistency inspection**
    - Check for consistency through-out interface
  - **Cognitive walkthrough**
    - Simulate performing certain tasks
  - **Formal usability inspection**
    - UI designers defend their choices against a “hostile” expert

# 1. Heuristic evaluation

- Expert reviewer gives personal criticism
  - Could be expert designer – like Alan Cooper
  - Could be expert “user” (i.e. doctor for medical product)
  - Often have more than one reviewer
- The expert reviewer spends time evaluating your interface
  - Gives feedback, overall impression, concerns, maybe according to ‘eight golden rule’
  - Remember this is an expert, so you are **paying** to hear what they say
- “**heuristic**” evaluation
  - No true formal approach – thus the term “heuristic”
  - But effective
  - This is often called “**Discount Evaluation**” because it is typically cheaper than a full user study

## 2. Guideline Review

- Assume you have a guideline document
- Scrutinize the UI to make sure it adheres to the guidelines
- May require a “bird’s eye” view of the UI
  - This is where all possible windows of the UI are printed out, laid out on the floor or pinned to walls.
- The guideline may be of a thousand items, so it may take expert reviewers sometime to master the guideline, and days or weeks to review a large interface.
- Interface is checked against organizational guidelines.
  - Military
  - Government
  - Security
  - Education

### 3. Consistency Checking

- Similar to “guideline review”, but check for consistency in the UI
- Consistency involves:
  - Terminology, icons, color scheme, layout, input/output format, etc
  - Within the interface as well as in the training materials (e.g. tutorial) and online help
  - Software tools may help automate the process

## 4. Cognitive Walkthrough

- Ask expert reviewer to perform certain tasks, stimulating users walking through the interface
- Watch how they do it
- See if they behave the way you thought they would!
  - Get verbal feedback
  - User talks out loud the whole time explaining his/her thought process
- May see usage patterns you didn't expect!
- Useful if application is geared for group the designers might not be familiar with:
  - Military, Assistive Technologies

## 5. Formal usability inspection

- Courtroom like setting
- Expert reviewers ask questions to the designers to justify their design decisions in an adversarial manner.
- A lengthy process, but can be educational to inexperienced designers.



# Expert Reviews

- Can be conducted at any time in the design process
- Focus on being comprehensive rather than being specific on improvements
- Example review recommendations
  - Change log in procedure (from 3 to 5 minutes, because users were busy)
  - Reordering sequence of displays, removing nonessential actions, providing feedback.
- Also come up with features for future releases



# Expert Reviews – issues

- Expert reviews can be scheduled at several points in the development process when experts are available and when the design team is ready for feedback.
- Different experts tend to find different problems in an interface, so 3-5 expert reviewers can be highly productive, as can complementary usability testing.
- The dangers with expert reviews are that the experts may not have an adequate understanding of the task domain or user communities.
  - Coming in many flavors, experts may give conflicting advice
  - “For every Ph.D., there is an equal and opposite Ph.D.”
- Even experienced expert reviewers have great difficulty knowing how typical users, especially first-time users will really behave.

# Usability Testing and Laboratories

- The emergence of usability testing and laboratories since the early 1980s.
  - IBM early leader
  - Microsoft next (>25 labs)
  - Now hundreds of companies
- Usability testing not only sped up many projects but has also produced dramatic cost savings.
  - Traditional managers and developers resisted at first, saying the usability testing may take time and resource away from development
  - They changed their mind when experience grew and successful projects gave credit to the testing process.
- The movement towards usability testing stimulated the construction of usability laboratories.

# Usability lab

- A typical modest **usability lab** would have two 10 by 10 foot areas, one for the participants to do their work and another, separated by a half-silvered mirror, for the testers and observers
- **Participants** should be chosen to represent the intended user communities, with attention to
  - background in computing, **experience** with the task, motivation, **education**, and ability with the natural language used in the interface.



Newton Fernando / CZ2004 / SCSE

# A case study: Make users work for you

- [Google](#), in 2005, has taken its first foray into the physical world with the launch of an Internet cafe-style computing booth in [London's Heathrow Airport](#).
- Although the search specialist claims the project is primarily about helping travelers use their time more productively at the airport, it admitted that [Google Space](#) will also act as a physical testing lab for its new applications.
- "Google Space will help people make wasted time more useful. And for Google, Space is a [live lab](#) where people can [test](#) our most-up-to-date products, and give us their feedback," said Lorraine Twohill, Google's European director of marketing.



# Issues in usability testing and labs

- Participation should always be **voluntary**, and **informed consent should be obtained**.
- Professional practice is to ask all subjects to read and sign a statement like this one:
  - I have freely **volunteered** to participate in this experiment.
  - I have been **informed** in advance what my task(s) will be and what procedures will be followed.
  - I have been given the opportunity to ask questions, and have had my questions answered to my satisfaction.
  - I am aware that I have the right to withdraw consent and to **discontinue** participation at any time, without prejudice to my future treatment.
  - My signature below may be taken as affirmation of all the above statements; it was given prior to my participation in this study.

# Usability lab variations: videotaping

- **Videotaping** participants performing tasks is often valuable for later review and for showing designers or managers the problems that users encounter.
  - **Reviewing** videotaping is **tedious**, so careful logging and annotation is vital on finding critical incidents
    - **Tools** for automatic time stamping activities (typing, mousing, reading manuals, etc.)
  - Participants may be anxious about the video camera at the start of the test...minutes later, focusing on the tasks



# Usability lab variations: Think Aloud

- **Think Aloud:** participants carry out tasks while saying what they are thinking, and tester records thoughts
  - Tester does not take over or give instructions, but prompt and listen for clues how they are dealing with the interface.
    - “tell me what you are thinking”
    - “...so this is?”
  - Think-aloud technique yield interesting clues for the tester
    - *For example, “This web page text is too small...so I am looking for something on the menus to make the text bigger...maybe it’s on the top in the icons...I can’t find it...so I’ll just carry on”.*
  - Concurrent think aloud
    - Invite users to *think aloud*
    - Nothing they say is wrong
    - Don’t interrupt, let the user talk
    - Spontaneous, encourages positive suggestions
    - Can be done in teams of participants



# Usability lab variations: more

- Variant forms of usability testing:
  - Paper mockups
    - Inexpensive, rapid, very productive
    - Low fidelity is sometimes better
    - Flipping the (mockup of) screen displays to get reactions to wording, layout, etc.
  - Discount usability testing
    - Test early and often (with 3 to 6 testers)
    - Pros: Most serious problems can be found with 6 testers (early).
    - Cons: Complex systems can't be tested this way (late).
  - Competitive usability testing
    - Within-subjects is preferred
    - Comparing new interface to previous versions or to similar products



# Usability lab variations: more..

- Universal usability testing
  - Test with highly diverse
    - Users (experience levels, ability, etc.)
    - Platforms (mac, pc, linux)
    - Hardware (old (how old is old?) -> latest)
    - Networks (dial-up -> broadband)
- Field test and portable labs
  - New interface to work in realistic environments for a fixed trial period.
  - Test of new software or consumer products
  - Beta tests

# Usability lab variations: more..

- Remote usability testing
  - Recruited via online communities, email
  - Tests online; less control over user behavior and observation of reaction
  - Difficulty in logging, validating data
  - Software can help (NetMeeting, WebEx, Sametime)
- Can-you-break-this tests
  - Challenge testers to break a system
  - Game design: challenge energetic teenagers to beat new games, finding fatal flaws

# Survey Instruments

- Written user surveys are a familiar, **inexpensive** and generally acceptable companion for usability tests and expert reviews.
- Keys to successful surveys
  - Clear **goals** in advance
  - Development of **focused items** that help attain the goals.
- Users could be asked for their subjective impressions about specific aspects of the interface such as the representation of:
  - task domain objects and actions
  - syntax of inputs and design of displays.

# Survey Instruments (cont.)

- Other goals would be to ascertain
  - users **background** (age, gender, origins, education, income)
  - **experience** with computers (specific applications or software packages, length of time, depth of knowledge)
  - job responsibilities (decision-making influence, managerial roles, motivation)
  - **personality** style (introvert vs. extrovert, risk taking vs. risk averse, early vs. late adopter, systematic vs. opportunistic)
  - reasons for not using an interface (inadequate services, too complex, too slow)
  - familiarity with **features** (printing, macros, shortcuts, tutorials)
  - their feeling state after using an interface (confused vs. clear, frustrated vs. in-control, bored vs. excited).

# Survey Instruments (cont.)

- Online surveys avoid the cost of printing and the extra effort needed for distribution and collection of paper forms.
  - [surveymonkey.com](https://www.surveymonkey.com)
- Many people prefer to answer a brief survey displayed on a screen, instead of filling in and returning a printed form,
  - Easy to grasp for many people
  - although there is a potential bias in the sample.

# Designing survey questions

- Ideally
  - Based on existing questions
  - Reviewed by colleagues
  - Pilot tested
- Direct activities are better than gathering statistics
  - Fosters unexpected discoveries
- Important to pre-test questions
  - Understandability
  - Bias

# Survey Example

10. Please rank your use and usability of each page: (1=Minimal/Difficult, 5=Extensive/Easy)

	Use	Usability
Home page	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
About the Coalition	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Member governors	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Representatives	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Publications	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
News Releases	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Letters/Speeches	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Ethanol Information	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
State/Federal Legislation	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Comments	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Members Only	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Links	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
Search	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

11. Please rate the site on these features:

Layout and design	<input type="radio"/> Poor	<input type="radio"/> Fair	<input type="radio"/> Good	<input type="radio"/> Excellent	<input type="radio"/> Don't Know
Ease of finding information	<input type="radio"/> Poor	<input type="radio"/> Fair	<input type="radio"/> Good	<input type="radio"/> Excellent	<input type="radio"/> Don't Know
Usefulness of information	<input type="radio"/> Poor	<input type="radio"/> Fair	<input type="radio"/> Good	<input type="radio"/> Excellent	<input type="radio"/> Don't Know
Login feature	<input type="radio"/> Poor	<input type="radio"/> Fair	<input type="radio"/> Good	<input type="radio"/> Excellent	<input type="radio"/> Don't Know
Getting assistance with the website	<input type="radio"/> Poor	<input type="radio"/> Fair	<input type="radio"/> Good	<input type="radio"/> Excellent	<input type="radio"/> Don't Know
Timeliness of information	<input type="radio"/> Poor	<input type="radio"/> Fair	<input type="radio"/> Good	<input type="radio"/> Excellent	<input type="radio"/> Don't Know
Navigation	<input type="radio"/> Poor	<input type="radio"/> Fair	<input type="radio"/> Good	<input type="radio"/> Excellent	<input type="radio"/> Don't Know

# Acceptance Test

- For large implementation projects, the customer or manager usually sets objective and measurable goals for hardware and software performance.
- If the completed product fails to meet these acceptance criteria, the system must be reworked until success is demonstrated.
- Rather than the vague and misleading criterion of "user friendly," measurable criteria for the user interface can be established for the following:
  - Time to learn specific functions
  - Speed of task performance
  - Rate of errors by users
  - Human retention of commands over time
  - Subjective user satisfaction
  - Well, do you remember the above 5 items? (Five Usability Measures)



# Acceptance Test (cont.)

- Example:

“Ten participants will be recalled after one week, and asked to carry out a new set of benchmark tasks. In 20 minutes, at least 8 of the participants should be able to complete the tasks correctly.”
- In a large system, there may be 8 or 10 such tests to carry out on different components of the interface and with different user communities.
- Once acceptance testing has been successful, there may be a period of field testing before national or international distribution.

# Evaluation During Active Use

- Successful active use requires **constant attention** from dedicated managers, user-services personnel, and maintenance staff.
- Perfection is not attainable, but percentage **improvements** are possible.

# Evaluation During Active Use: strategy

- Interviews and focus group discussions
  - Interviews with individual users can be productive because the interviewer can pursue specific issues of concern.
  - Group discussions are valuable to ascertain the universality of comments.
- Continuous user-performance data **logging**
  - The software architecture should make it easy for system managers to collect data about
    - The patterns of system usage
    - Speed of user performance
    - Rate of errors
    - Frequency of request for online assistance
  - A major benefit is guidance to system maintainers in optimizing performance and reducing costs for all participants.

# Evaluation During Active Use: strategy (cont.)

- Online or telephone consultants
  - Many users feel reassured if they know there is a human assistance available
  - On some network systems, the consultants can monitor the user's computer and see the same displays that the user sees
  - Cheaper version are Bug Report systems
    - Windows, Chrome, Bugzilla
- Online suggestion box or e-mail trouble reporting
  - Electronic [mail](#) to the maintainers or designers.
  - For some users, writing a letter may be seen as requiring too much effort.

# Evaluation During Active Use: strategy (cont.)

- Discussion group and newsgroup
  - Permit postings of open messages and questions
  - Some are independent, e.g. America Online and Yahoo!
  - Topic list
  - Sometimes moderators
  - Social systems
  - Comments and suggestions should be encouraged.

# Summary

- Four pillars
  - How do they form a design process
  - How do they relate to our lecture modules
- Ethnographic observation
- Prototyping
  - Importance and Significance
  - Fidelity
  - Feedback
- Evaluating
  - Importance and Significance
  - Several different approaches outlined
    - Expert Review
    - User Labs
    - Questionnaires/Surveys
    - Acceptance Testing
    - Continuous feedback (evaluation during active use)