IN4MATX 148: Ubiquitous Computing Prototyping and Projects

Week 10: Individual project crit, Involving others (Wizard of Oz, think aloud, etc.)

4 June 2012

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On Deck for Tonight

- Part I: Logistics, logistics, logistics…
- Part II: Individual project design crit
- Part III: Involving others (Wizard of Oz, think aloud, etc.)
- Part IV: Wrapping up

Course Logistics

- Video sketch exercise (5) graded
- Extra-credit prototyping exercise (6) due **now!**
  - *Email files to svoida@acm.org and nsylvest@uci.edu*
  - *Graded ASAP*
- What's left?
  - Individual design project — portfolio
  - Group project presentations/portfolio
  - Online evaluation forms for the course (please!)

Individual Design Project

- Talk through your ideas (showing intermediate work, if that's useful) tonight during the crit
  - *Your opportunity to help your peers to improve their work and to make sure that your own project is strong*
- Build on one of the previous weekly exercises
  - May utilize existing work, but the expectation is for **high-quality** sketches/prototypes
  - If building off of group project (video/interactive), must clearly communicate individual work in submitted artifacts
  - Looser constraints (ubicomp *anywhere* in the home)

Individual Design Project

- Deliverable:
  - Portfolio of your sketches/prototypes
  - At least 20 individual artifacts captured (*can reflect multiple facets of a single prototype*)
  - At least 3 different sketching/prototyping techniques represented
  - Electronic/interactive artifacts excerpted, link provided
  - 2–3 page narrative document explaining why you chose to do what you did, how the design process unfolded

Individual Design Project

- Portfolio due **at the beginning of the final exam period** next week
- Grading criteria
  - *Quality* and *orginality* of each of the 20 sketches
  - Well-written, nicely argued overview document
  - Interesting, compelling, realistic **ubicomp** technology design
  - Clearly organized and professionally prepared portfolio
- Details: https://students.ics.uci.edu/~svoida/Teaching/IndividualDesignProject

Group Project

- Deliverables:
  - 15-minute presentation during the final exam period
    - Talk about the research problems/questions
    - Talk about your design constraints
    - Talk about your audience for the prototypes
    - Talk about the design process
    - Talk about why you chose (or were asked) to create the sketches/prototypes that you did
    - Show-and-tell (visuals! demos!)
    - Talk about other research work you were involved in

Group Project Presentation Schedule

Time Slot	Group
7:00–7:15	Digital Classroom Economy
7:15–7:30	Videodome
7:30–7:45	Diesel iPad
7:45–8:00	…Food Bank Donations
8:00–8:15	Mobile Chat Reader
8:15–8:30	Capturing “Sparks” in the Wild
8:30–8:45	Something Happened Here
8:45–9:00	…Borrowing Privacy Expertise

Group Project

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- Details: https://students.ics.uci.edu/~svoida/Teaching/INF148#Project

Name: _____ Student ID #_____ Group: _____

IN4MATX 148 Spring 2012 Group Project Peer Review Form

Team member name (NOTE: *Use one of the four rows to evaluate your own contribution to the group.*)	**Tasks they led/completed**	**What they did well**	**What they could improve**	**On a scale of 1–5 (1 = low, 5 = high), how many points would you give this person for their contribution to the group project?**

IN4MATX 148 Spring 2012 Group Project Mentor Review Form Group: _____

Overall group performance

On a scale of 1–5 (1=low, 5 = high), how would you rate the group's effectiveness in *creating prototypes for you*? _____

On a scale of 1–5 (1=low, 5 = high), how would you rate the group's effectiveness in *communicating their progress to you*? _____

Comments about the quality/quantity of work produced by the group: _____

_____

_____

_____

_____

On a scale of 1–5 (1=low, 5 = high), how many points would you give this group for their overall participation in the research project over the course of the quarter? _____

Individual group member contributions

Team member name	Tasks they led/completed	What they did well	What they could improve	On a scale of 1–5 (1 = low, 5 = high), how many points would you give this person for their contribution to the group project?

Course Logistics

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  - Group project presentations/portfolio
  - Online evaluation forms for the course (please!)
- Questions? Comments?

Part II: Individual Project Crit

Individual Project Design Crit

- Presenters, explain by introducing: *~ 3 minutes*
  - What you are aiming to produce and why
  - How you imagine the technologies would be used
  - What is novel about the idea
    (what boundaries are being pushed?)
- Critics, constructively interrogate the work: *~ 4 minutes*
  - *What is going on?*
  - *What is the flow of the interaction?*
  - *What can be changed to make it more original?*
- (Politely) Push to make the designs clearer, stronger!

Part III: Involving Others

Wizard of Oz, Think Aloud, et cetera

But, first, a tangent…

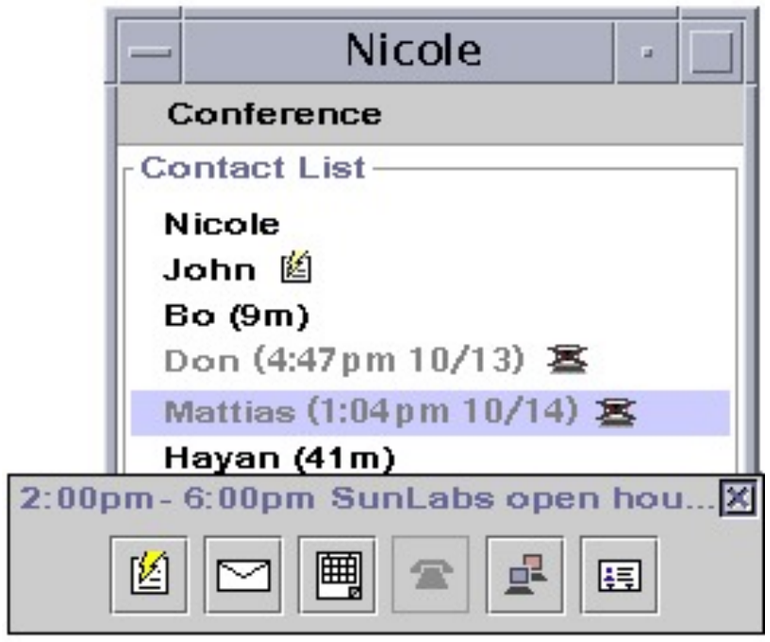
Alternatives: How to find the interesting “holes”?

Form studies for a digital alarm clock

(Photo taken from: http://people.cs.vt.edu/~srh/SteveHarrisonProjectsPARC.html)

Fish et al. 92 and Tang et al 94

ConNexus



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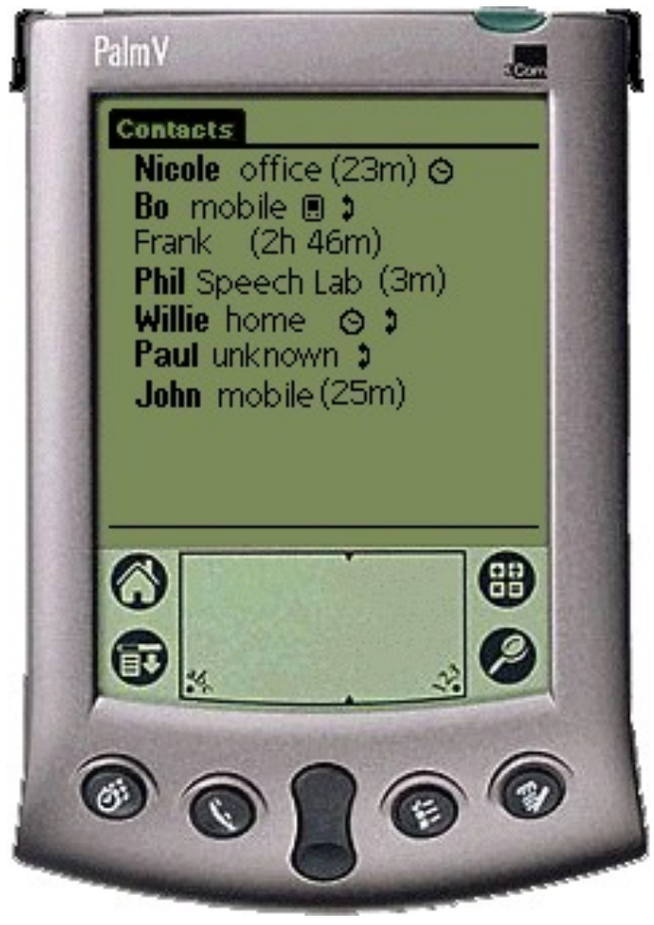

Tang et al. 01

McFarlane ’97, McFarlane and Latorella ´02, Matthews et al. ‘04, Pousman and Stasko ‘06, Tomitsch et al. ‘07, Jonsson et al’ 08, Markopoulos ’09, Garcia et al. ‘10

Source of the Interruption	Context Awareness	Location
Characteristics/Interruptee	Abstraction	Dynamism of Input
Method of coordination	Notification Level	Source
Meaning of interruption	Transition	Precision
Method of expression	Abstraction	Notification Level
Channel of conveyance	Notification Level	Private-vs-Shared
Human activity changed	Information Capacity	Place-vs-People
Effect of interruption	Aesthetic Emphasis	Input Automation
Personal-vs-Public	Abstraction	Accuracy
Focus-Peripheral	Notification Level	User Control Level
Explicitness	Transition	Notification Level
Modality	Modality	Localization of the AIS
Information Filtering	Temporal Gradient	Strategy to Assist
Coordination and Freq.	Representation	Orientation of the Activity

McFarlane ’97, McFarlane and Latorella ´02, Matthews et al. ‘04, Pousman and Stasko ‘06, Tomitsch et al. ‘07, Jonsson et al’ 08, Markopoulos ’09, Garcia et al. ‘10

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Context Awareness

Abstraction

Method of coordination

Notification Level

Dynamism of Input

Source

Precision

Method of expression

Abstraction

Notification Level

Channel of conveyance

Notification Level

Information Capacity

Personal-vs-Public

Abstraction

Accuracy

Focus-Peripheral

Notification Level

User Control Level

Explicitness

Notification Level

Modality

Modality

Temporal Gradient

Coordination and Freq.

Representation

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Abstraction

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Abstraction

Information Delivery

Values			
Sensor Data	Availability	Natural	MultiMedia
Continuous	Discrete		Literal
Always On	Almost AO	On Request	Implicit
Symm-Trac	Symm-Blind	Asymm-Trac	Asymm-Blind
Focal	Selec-Focal	Secondary	Peripheral
Historical	Recent	Current	Predicted

Symmetry

Obtrusiveness

Temporal Gradient

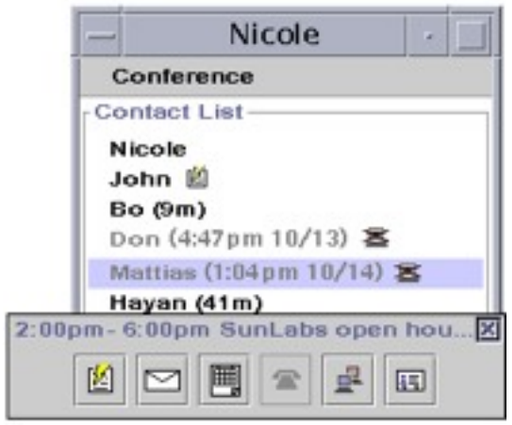
Presentation

Design Tradeoffs – M.S.

Dimension	Values			
Abstraction	Sensor Data	Availability	**Natural**	MultiMedia
Presentation	Continuous	Discrete		**Literal**
Inf. Delivery	**Always On**	Almost AO	On Request	Implicit
Symmetry	**Symm-Trac**	Symm-Blind	Asymm-Trac	Asymm-Blind
Obtrusiveness	Focal	Selec-Focal	**Secondary**	Peripheral
Temporal Gradient	Historical	Recent	**Current**	Predicted

Interrupter 

Interruptee 



Design Tradeoffs - App

Dimension	Values			
Abstraction	**Sensor Data**	Availability	Natural	MultiMedia
Presentation	Continuous	**Discrete**		Literal
Inf. Delivery	Always On	**Almost AO**	On Request	Implicit
Symmetry	Symm-Trac	**Symm-Blind**	Asymm-Trac	Asymm-Blind
Obtrusiveness	Focal	**Selec-Focal**	Secondary	Peripheral
Temporal Gradient	Historical	**Recent**	Current	Predicted

Interrupter 

Interruptee 

Tradeoffs - Interruptee

Dimensions	Optimal Values—Interruptee			
Abstraction	Sensor	**Avail.**	Natural	MM
Presentation	**Cont.**	**Discrete**		Literal
Information Delivery	Always	Almost	Request	Implicit
Symmetry	S(T)	S(B)	A(T)	A(B)
Obtrusiveness	Focal	Selective	Appliance	Periph.
Temporal Gradient	**Hist.**	Recent	**Current**	**Predict.**

Tradeoffs - Interrupter

Dimensions	Optimal Values—Interrupter			
Abstraction	Sensor	Avail.	Natural	MM
Presentation	Cont.	Discrete		Literal
Information Delivery	Always	Almost	Request	Implicit
Symmetry	S(T)	S(B)	A(T)	A(B)
Obtrusiveness	Focal	Selective	Appliance	Periph.
Temporal Gradient	Hist.	Recent	Current	Predict.

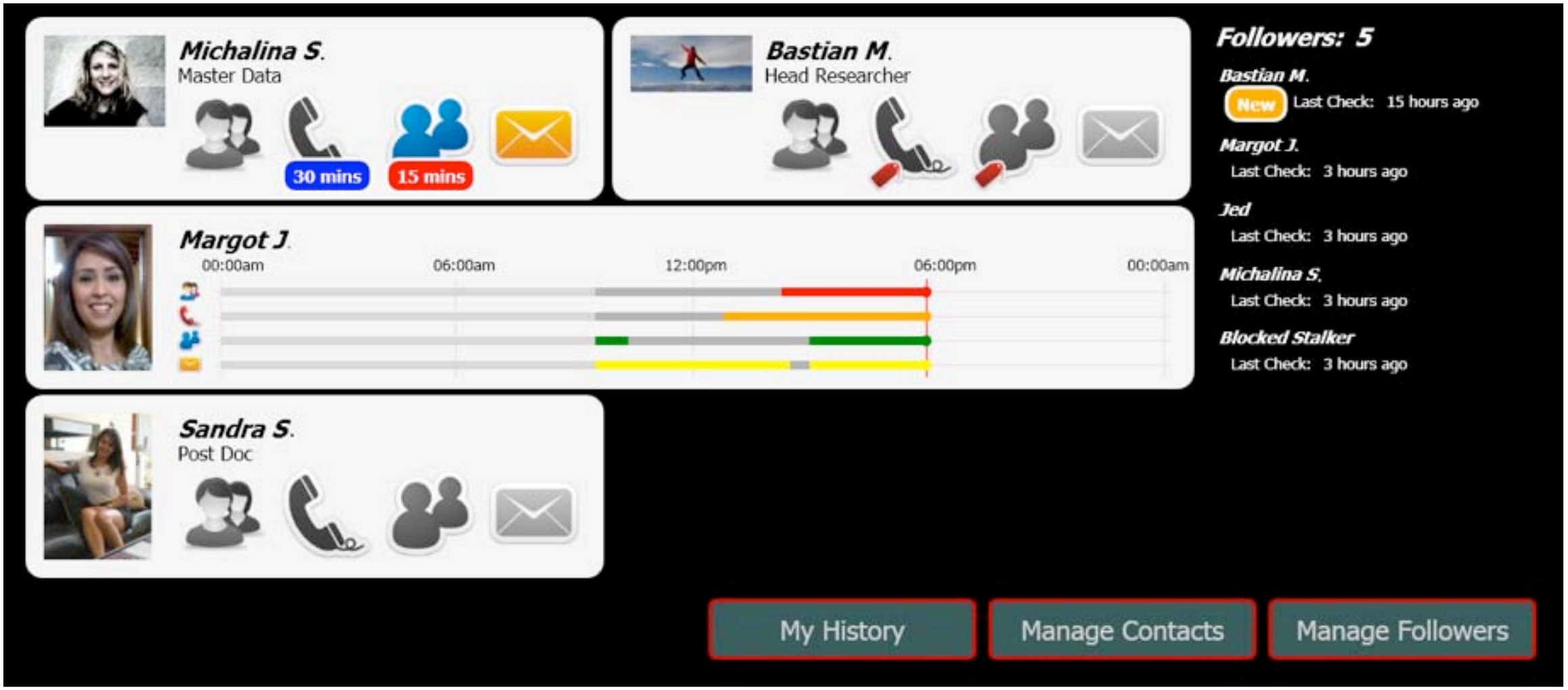
Dimensions	Design Solution—InterruptMe			
Abstraction	Sensor	**Avail.**	Natural	MM
Presentation	Cont.	**Discrete**		Literal
Information Delivery	Always	Almost	**Request**	**Implicit**
Symmetry	S(T)	S(B)	**A(T)**	A(B)
Obtrusiveness	Focal	**Selective**	**Appliance**	Periph.
Temporal Gradient	Hist.	**Recent**	**Current**	Predict.

Information Delivery

IT UNIVERSITY OF COPENHAGEN

UNIVERSITY of CALIFORNIA • IRVINE

System Design - InterruptMe



What can we *do* with a sketch?

- Capture our own ideas
- Communicate our ideas within our design team
- Communicate our ideas to clients, managers, VCs
- *Refine our ideas by presenting it to potential end users*
  - Interviews or focus groups
  - Uncover a mental model
  - Wizard of Oz
  - Think aloud

Uncovering a user's mental model

- Essentially, a supervised design critique with a non-expert
- Step 1: Introduce the method
- Step 2: Introduce the system
- Step 3: Marching orders
  - Clear instructions
  - *What do you want to know/learn about the design?*
- Step 4: Review notes/recording of the interaction
- Step 5: Determine the user's model, refine, iterate

Wizard of Oz

Wizard of Oz

Image © Warner Bros.

Wizard of Oz

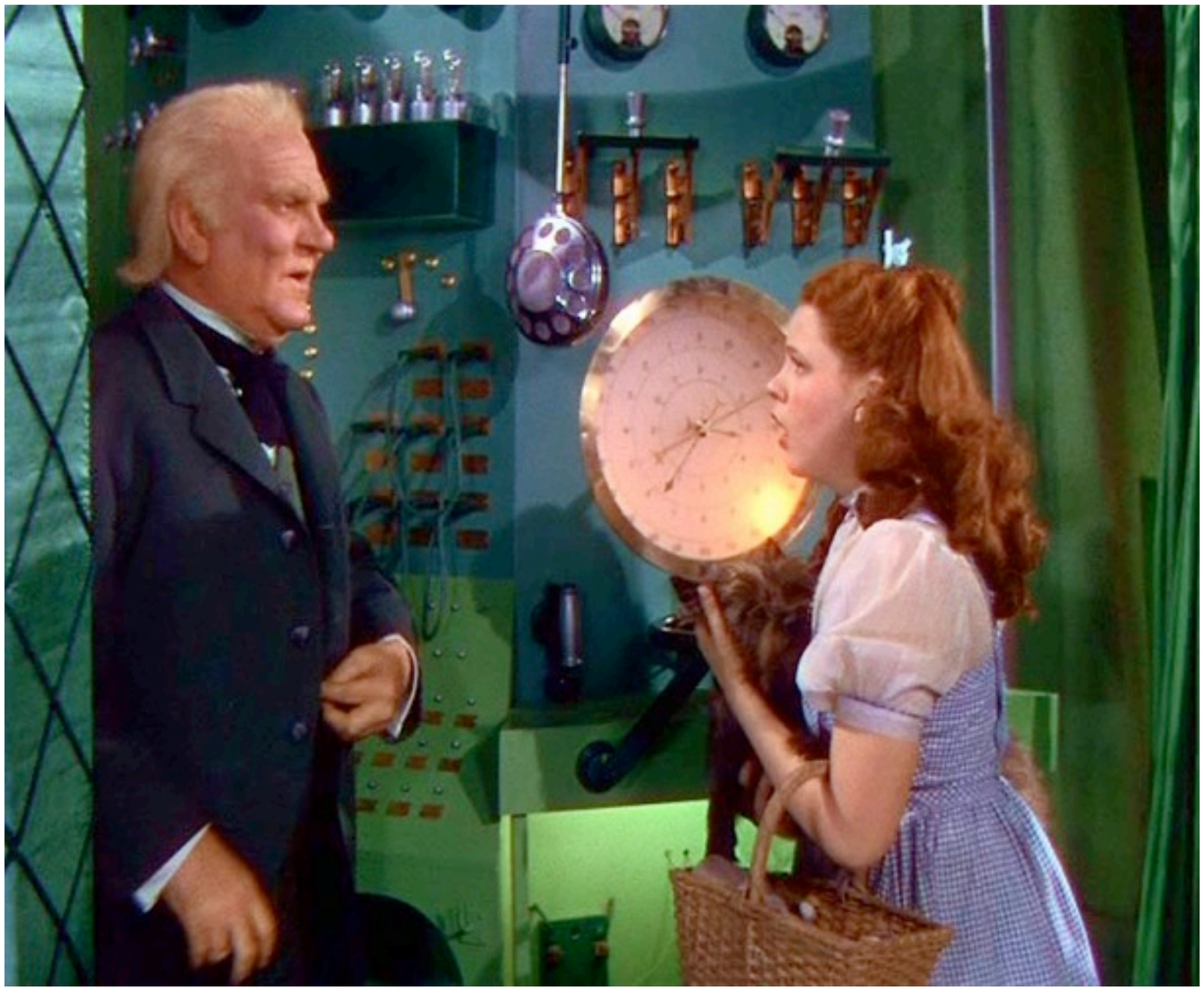


Image © Warner Bros.

Wizard of Oz

- Develop a limited-functionality prototype
- A human actor (secretly) stands in for the novel, complex technology that's not fully implemented (or not possible!)
- Evaluate the design by allowing a user to interact with the partial system as if it were complete
- Allows refinement of approaches to dealing with
  - …complex, unstructured, natural input
  - …seeing how users react to a particular dialog sequence

Research Questions

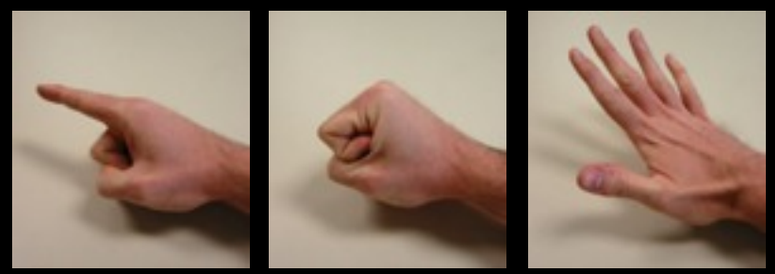
- How do users *intuitively* interact with projector/ camera–based augmented reality (AR) environments?
- Can interaction techniques from research in virtual reality (VR) be used to inform these interactions?
- Which technologies should we (and others) pursue in order to provide the right building blocks for the next generation of augmented workspaces?

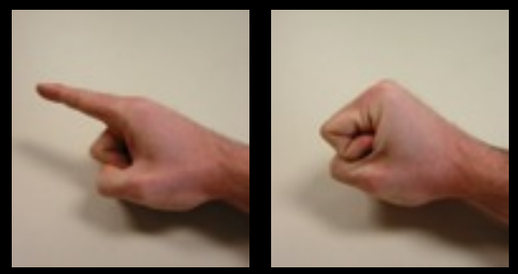
Interaction Design: Initial Considerations

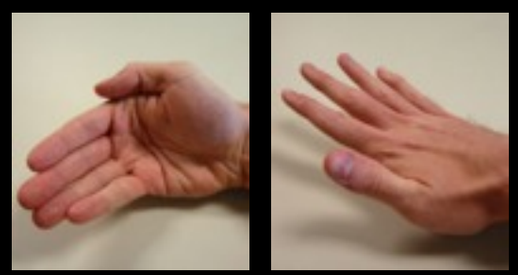
- Distance to the object
  within reach ⇔ beyond reach
- User's spatial model of surfaces
  surface–oriented ⇔ continuous
- Indications of discrete events
  pause, movement, hand shape, location…
- User's willingness to move

Interaction Design: Four Gestures

- Point/touch and drag
  direct manipulation of objects
- Grab and throw
  quick movement over distance
- Pantograph/virtual mouse
  object follows magnified hand motion
- Flick
  rapid dispatch of irrelevant object

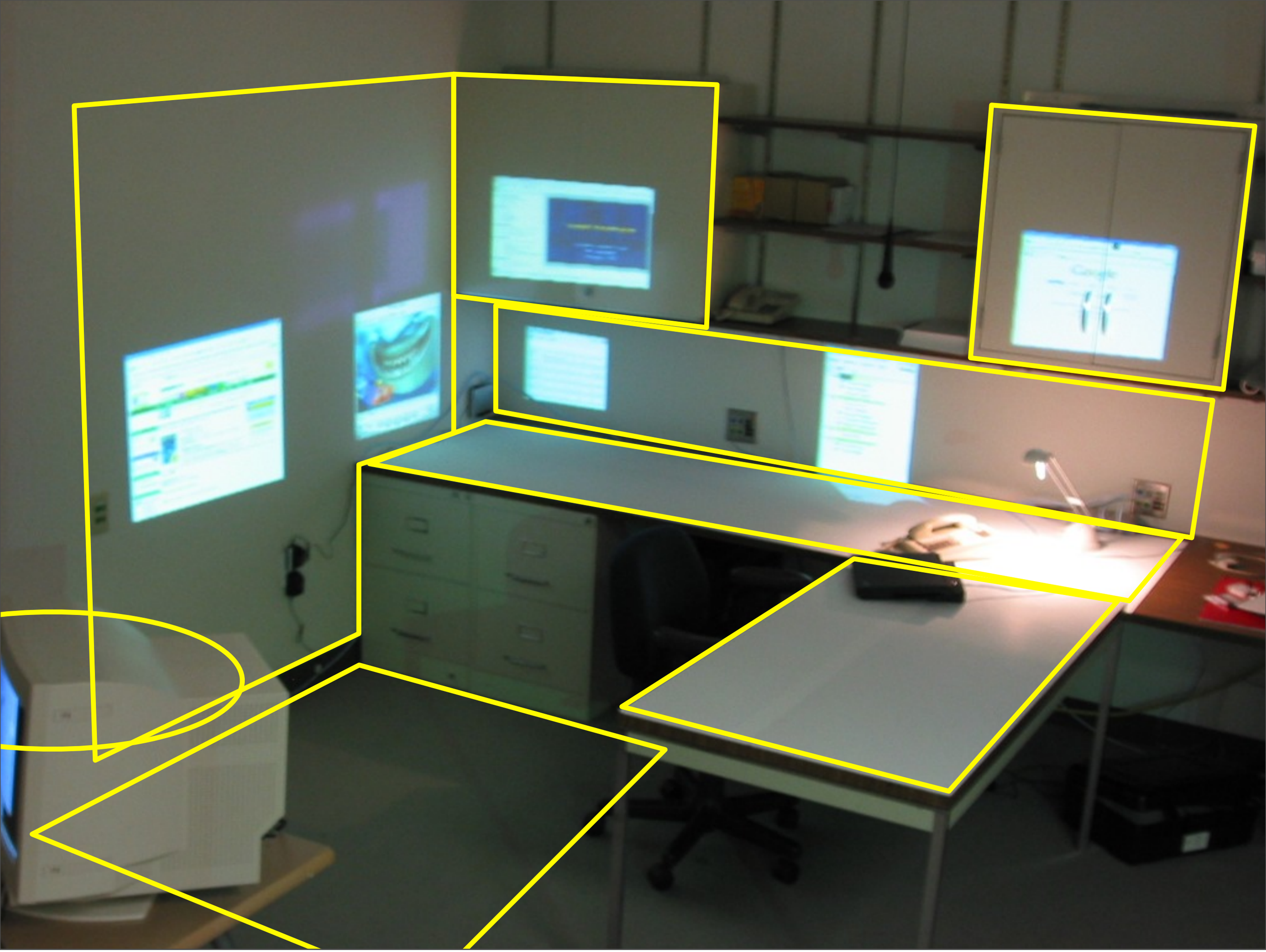




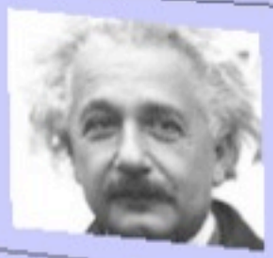


Interaction Design: Four Gestures

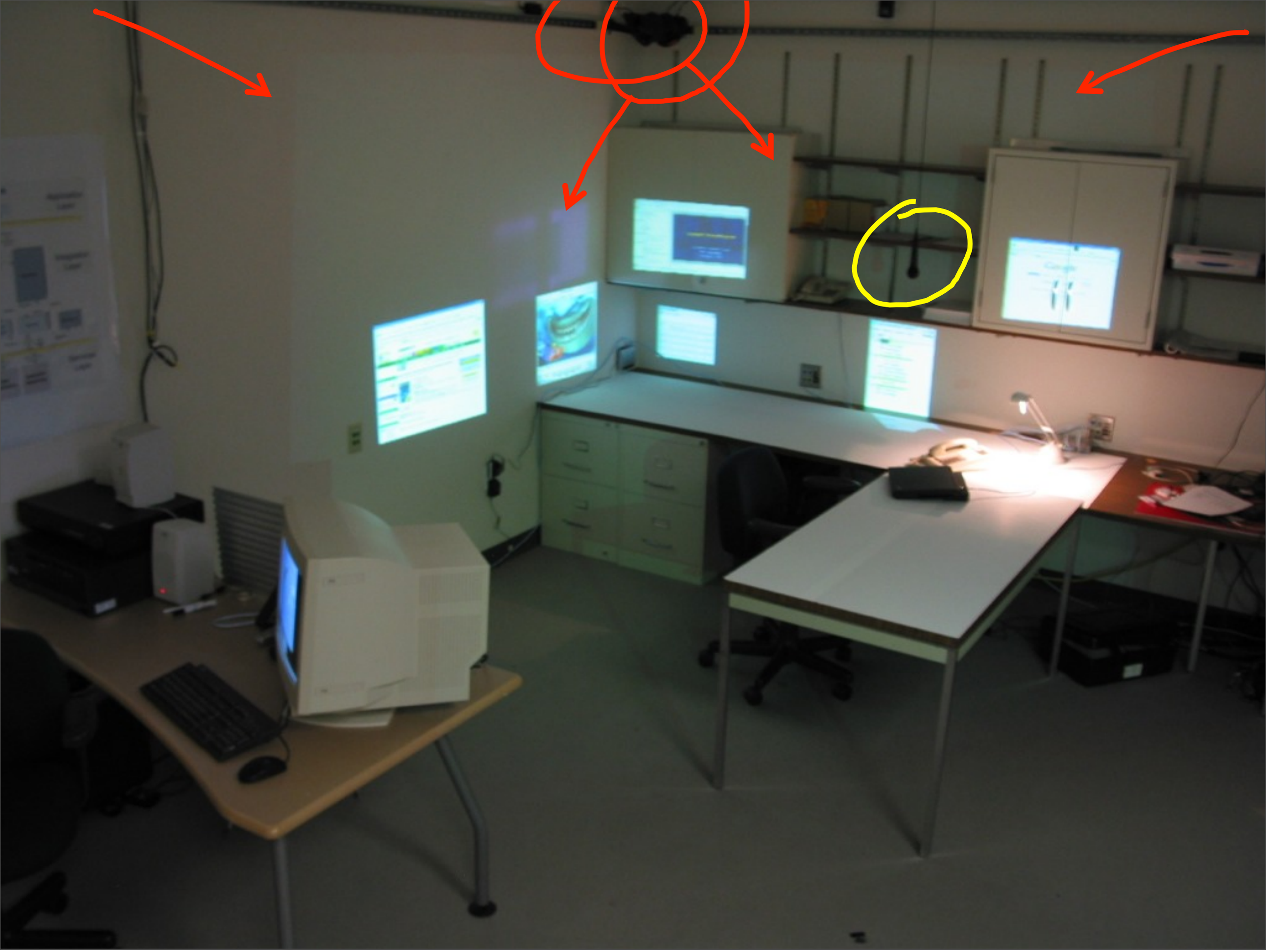
Gesture	Suitable for *distant objects?*	Affiliated *spatial model of surfaces*	How *discrete events* indicated
Point/touch and drag	yes	continuous	pauses, retraction
Grab and throw	yes	surface–oriented	hand shape
Pantograph/ virtual mouse	yes	continuous	hand shape
Flick	no	surface–oriented	hand shape, location



ED Interaction Experiment



Show Object Borders | Show Selection Borders | Play Sound Effects | Toggle Proctor Frame



Study Design: Procedure

~60 minute session: introduction, four phases, debrief

1. *Exploratory Phase*
   Participant "trains" the system with their own interactions
2. *Sharing Phase*
   A confederate demonstrates our set of gestures to the participant
3. *Structured Tasks*
   Participant moves objects as directed using their gestures or ours

- *Unstructured Tasks*
  Participant completes puzzle task on their own

ED Interaction Experiment

Show Object Borders | Show Selection Borders | Play Sound Effects | Toggle Proctor Frame

ED Interaction Experiment

Show Object Borders | Show Selection Borders | Play Sound Effects | Toggle Proctor Frame

Study Design: Procedure

~60 minute session: introduction, four phases, debrief

1. *Exploratory Phase* (Elicit intuited interactions)
   Participant "trains" the system with their own interactions
2. *Sharing Phase* (Expand gesture repertory)
   A confederate demonstrates our set of gestures to the participant
3. *Structured Tasks* (Minimize learning effects)
   Participant moves objects as directed using their gestures or ours
4. *Unstructured Tasks* (Observe more realistic use)
   Participant completes puzzle task on their own

Results: Exploratory Phase

- Majority of subjects defined 3 techniques
- Voice was most common first response (6/9)
  "move object–x *to* surface–y*"*
- Pointing manipulations *similar to* ours were also dominant (5/9)
- Some multimodal interactions
  e.g. "Put–that–there"
- Two subjects "re–appropriated" the study conductor's laser pointer to select and manipulate objects

Results: Structured Phase

Source	Dist.	A	B	C	D	E	F	G	H
desk	0	Grab	Laser	Touch	Touch	Point	Voice	Voice	Touch
desk	0	Panto	Laser	Grab	Touch	Point	Touch	Voice	Touch
round tbl	2	Point	Laser	Grab	Touch	Voice	Voi-Poi	Point	Point
round tbl	2	Touch	Laser	Grab	Touch	Touch	Point	Voice	Point
counter	2	Voice	Laser	Grab	Laser	Point	Touch	Point	Voice
floor	3	Point	Laser	Grab	Laser	Point	Point	Voice	Point
floor	3	Voice	Laser	Grab	Laser	Point	Point	Voice	Point
counter	4	Voice	Laser	Grab	Point	Voice	Voice	Voice	Point
back wall	4	Point	Laser	Point	Point	Point	Point	Point	Point
back wall	4	Point	Laser	Grab	Point	Panto	Voi-Poi	Voice	Voice
back wall	5	Point	Laser	Grab	Laser	Point	Point		Point
left cab	5	Voice	Laser	Point	Point	Point	Point	Point	Voice
right cab	5	Voice	Laser	Point	Laser	Point	Point	Point	Point

Wizard of Oz

- Challenges with undertaking a Wizard study
  - Still have to partially develop the system
  - Have to train the wizard (harder than you might think!)
  - Have to debrief the participants (deception study!)
  - Not always possible to make the leap from the Wizard's behavior to an actual system implementation

Think Aloud

- Have a user walk through an interaction using a sketch
- Have them talk about what they're thinking—and why they're doing what they're doing—along the way
- Need to clearly define the tasks
- Need to have an appropriate sketch ready to go
- Need to *refrain from stepping in to help*
- Often, need to remind the participants *to keep talking!*
- Faster and cheaper than Wizard of Oz, doesn't present an illusion that anything (in particular) is real

Part IV: Wrapping Up

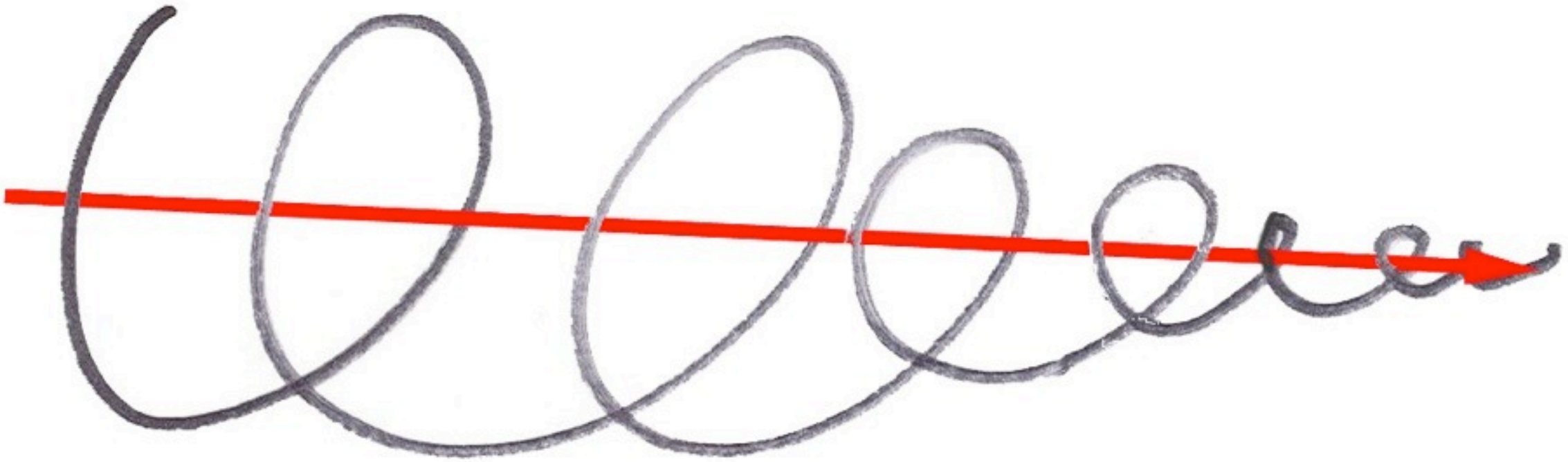
Sketching is about Design

From Bill Buxton slide deck. Need to attribute the photograph.

...And Design is About Considering Alternatives

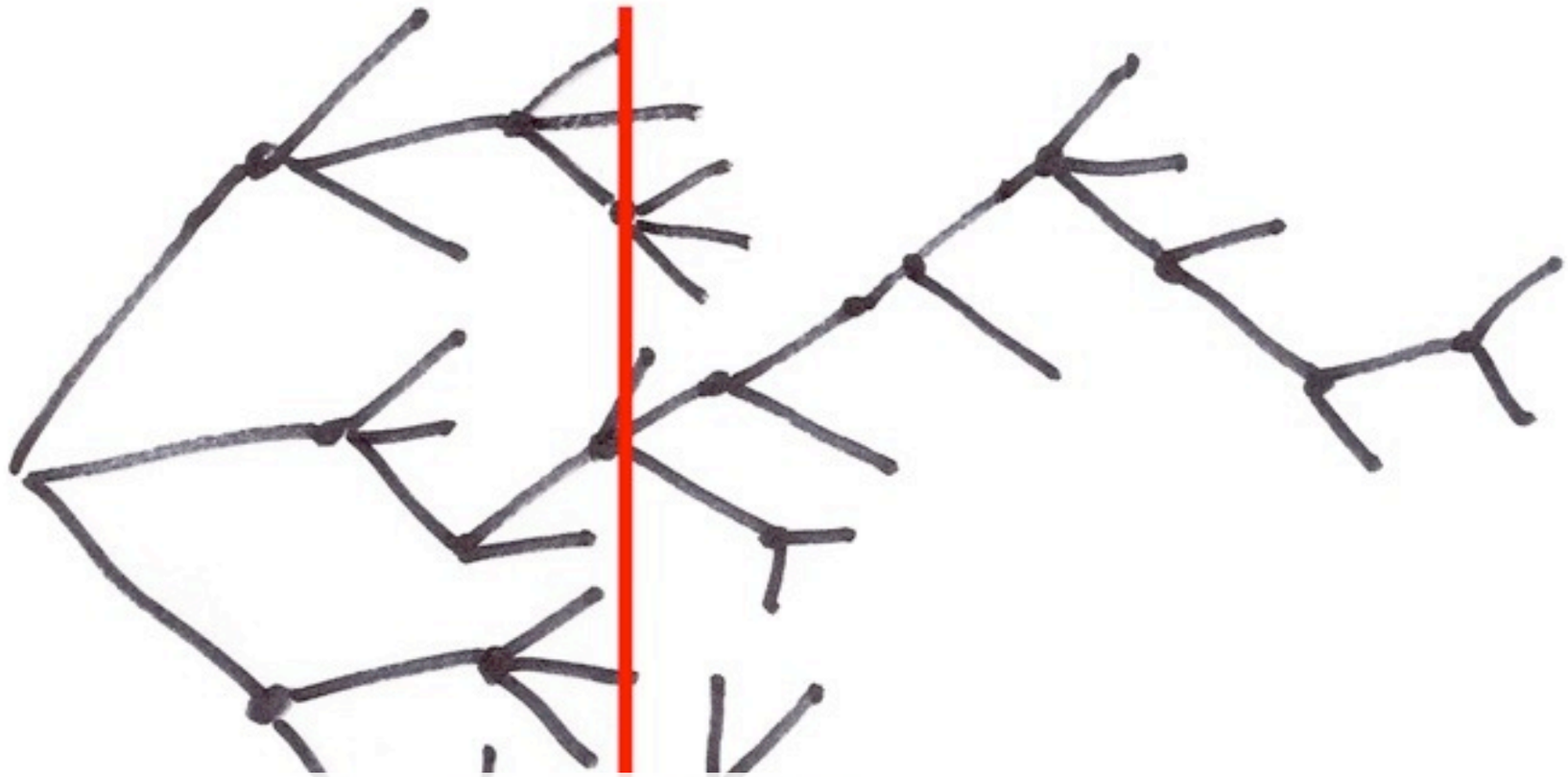
Form studies for a digital alarm clock

Exploration of a single idea



Slide contributed by Bill Buxton

Exploration of Alternatives



… a designer that pitched three ideas would probably be fired. I'd say 5 is an entry point for an early formal review (distilled from 100's) … if you are pushing one you will be found out, and also fired … it is about open mindedness, humility, discovery, and learning. If you aren't authentically dedicated to that approach you are just doing it wrong!

Alistair Hamilton
VP Design
Symbol Technologies

Slide contributed by Bill Buxton

The Attributes of Sketches

- **Quick**
  - to make
- **Timely**
  - provided when needed
- **Disposable**
  - investment in the concept, not the execution
- **Plentiful**
  - they make sense in a collection or series of ideas
- **Clear vocabulary**
  - rendering & style indicates it's a sketch, not an implementation
- **Constrained resolution**
  - no higher than required to capture its concept
- **Consistency with state**
  - refinement of rendering matches the actual state of development of the concept
- **Suggest & explore rather than confirm**
  - suggests/provokes what could be i.e., they are the catalyst to conversation and interaction
- **A catalyst**
  - evokes conversations & discussion

Concepts from Bill Buxton's Book Sketching User Experiences (2007) Morgan Kaufmann

From Sketches to Prototypes

Early design

Brainstorm different ideas and representations	Multitude of sketches
Choose a representation	
Rough out interface style	Sketch variations and details
Task centered walkthrough and redesign	Sketch or low fidelity prototypes
Fine tune interface, screen design	Low to medium fidelity prototypes
Heuristic evaluation and redesign	
Usability testing and redesign	
	High fidelity prototypes
Limited field testing	
Alpha/Beta tests	Working systems

Late design

Design Crit: Instructions for Presenters

- Be creative and communicative
- Remember: “...evaluated primarily on the creativity of thinking represented and the communicative effectiveness of the deliverable; less focus will be placed on the artistic merit of the submissions.”
- Explain by introducing:
  - What the design exercise is of
  - What it is supposed to do for the user
  - The novelty of the design; where your idea(s) came from

Design Crit: Instructions for Critics

- *What is going on?*
  - Does the prototype communicate what is intended?
  - What would the design make/have the user do?
- *What is the flow of the interaction? Does it remind you of something?*
  - What would it be like to use the design?
  - Would you use the designed prototype?
  - What do you (not) like about it?
- *Does it follow a creative purpose? Is it quality work?*
  - Is it original?
  - Is it similar to another product or person's work?
  - What can be changed to make it more original?

The Vision of Ubicomp

- Many computers
- Many users
- Technology embedded in the world

> The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.
>
> –Mark Weiser, 1991

Facets of a Ubicomp World

- Computing technologies that…
  - …are wearable
  - …are found in the home/part of our lived experience
  - …augment our experience of the world
  - …use our location to provide targeted services
  - …allow us to play and interact with digital content
  - …provide us with continuous information in the background

Designing Interaction for Ubicomp

- What is a computer?
- Where will we use it?
- Who will be around?
- What information will I have access to (that I didn't before)?
- What else will I be doing at the time?

Next Week: Final Exam Week (Final Presentations)

- **Monday, June 11, 7:00pm–9:00pm, DBH 1300**
- **All students are REQUIRED to attend presentations**
- Be prepared to…
  - …present your group project (15 minutes, professional)
  - …submit your group project portfolio
  - …submit your individual design project portfolio
  - …submit your completed self-/peer-evaluation form
- **PLEASE** submit a course evaluation form via EEE