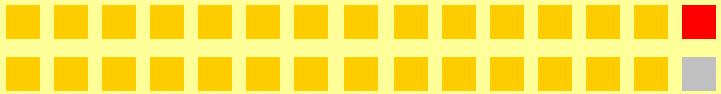
week
15



Summary

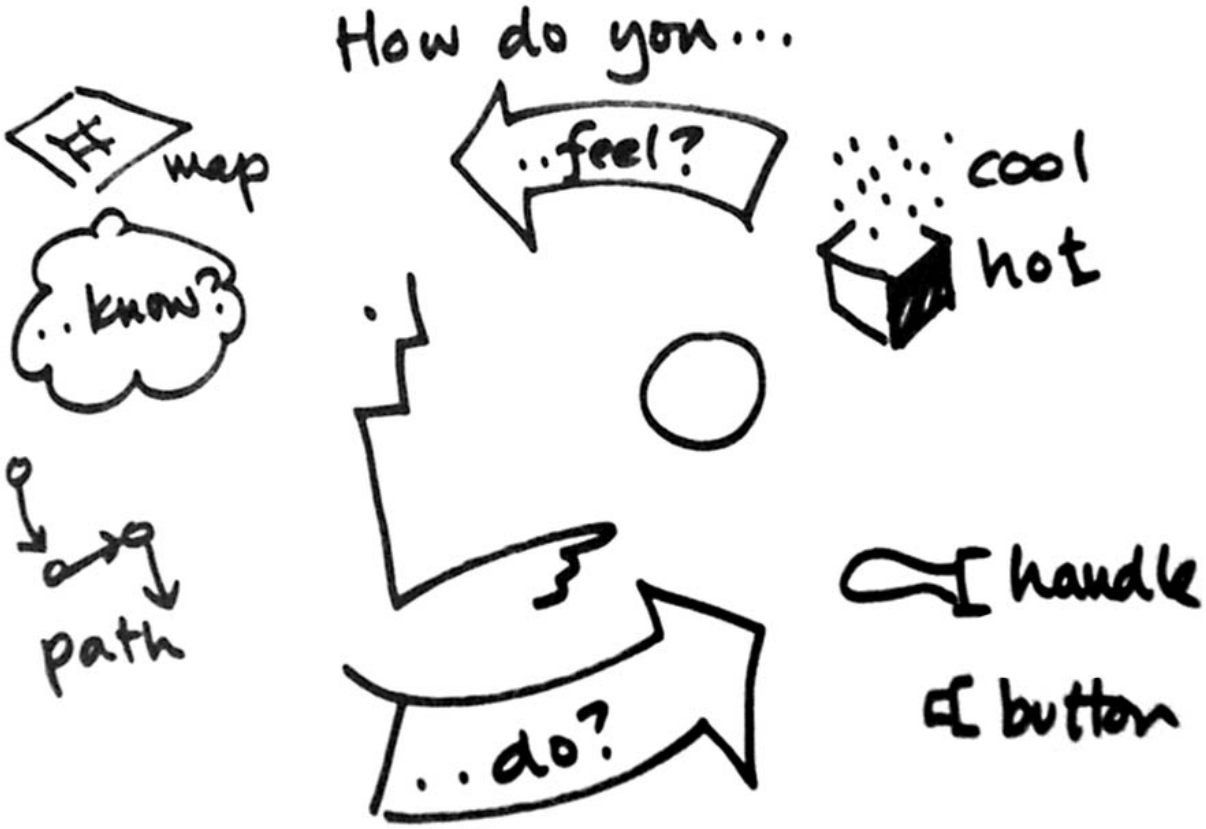
TUI and Interaction Design Research

Lecture Outline

- TUI and Design Research
- Summary
- Course evaluation
- Office hours

Tangible UIs in Design Research

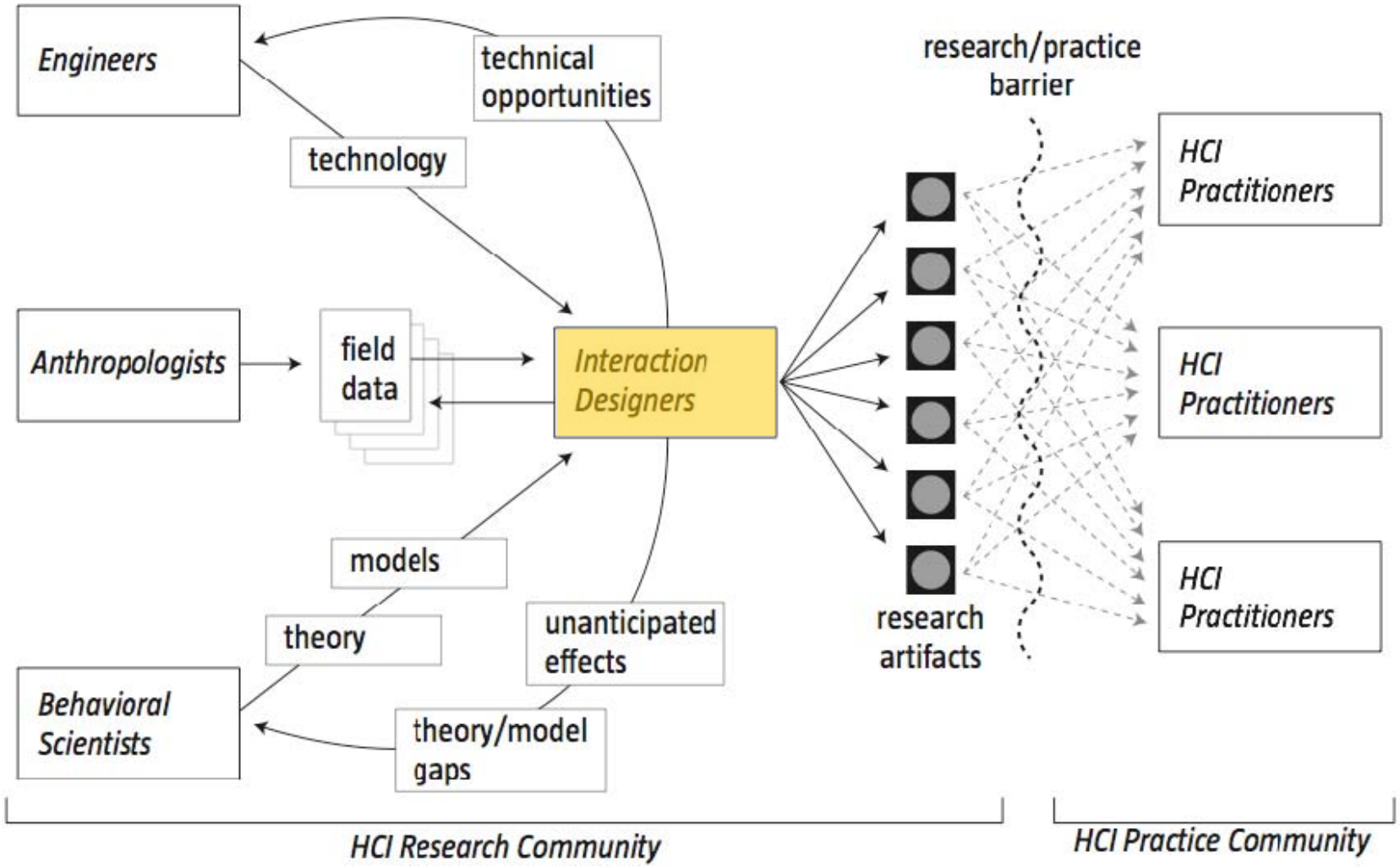
Designing Interactions



Bill Verplank from Moggridge, 2006

WHO WHAT HOW

Interaction Design Researchers



[Zimmerman et al., 2007]

WHO

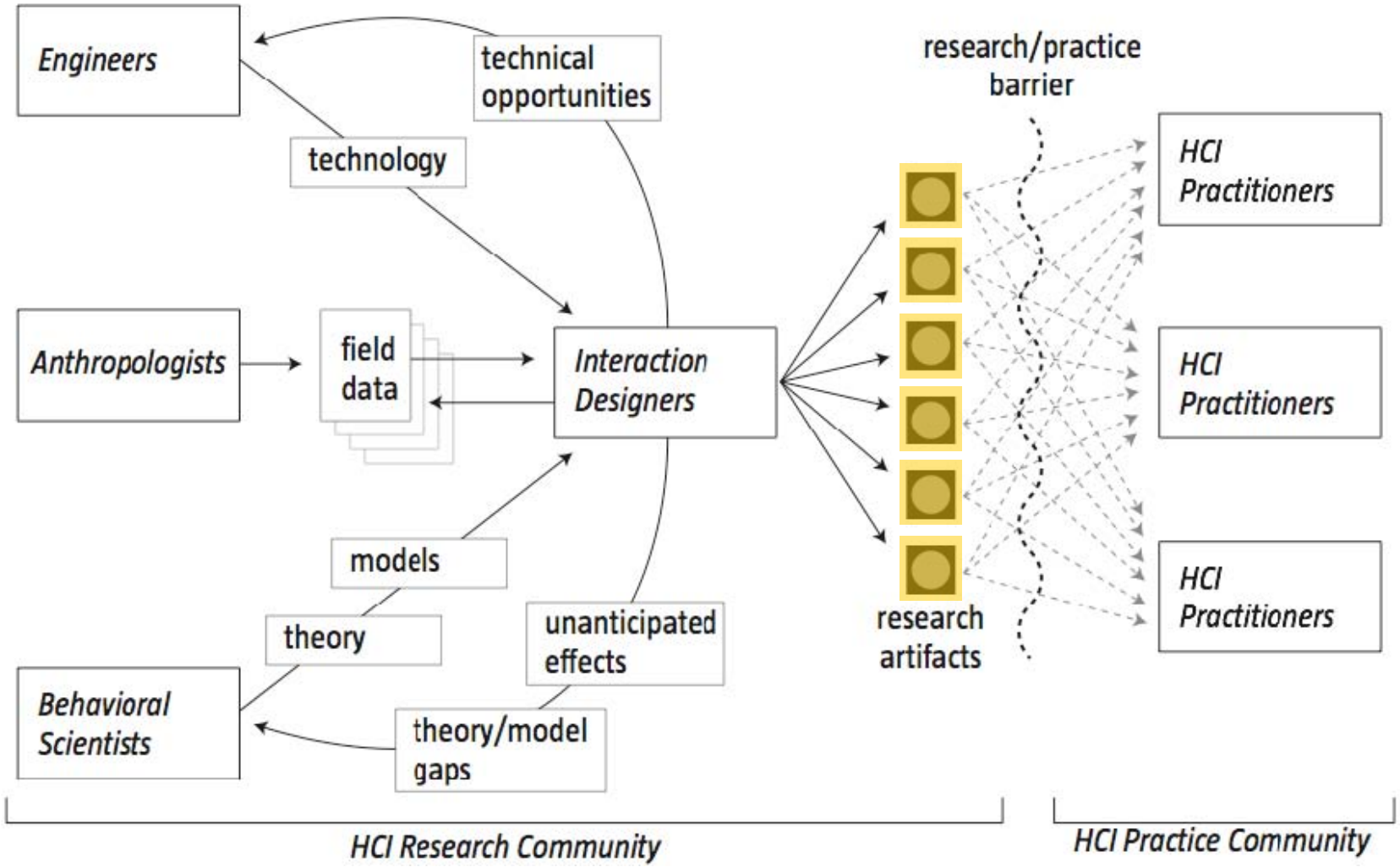
Interaction Design Research

Interaction design researchers integrate the **true** knowledge (the models and theories from the behavioral scientist) with the **how** knowledge (the technical opportunities demonstrated by engineers).

Through an active process of **ideating, iterating, and critiquing potential solutions**, design researchers continually reframe the problem as they attempt to make the right thing.

WHO **WHAT** HOW

Tangible UIs as Design Artifacts



[Zimmerman et al., 2007]

WHAT

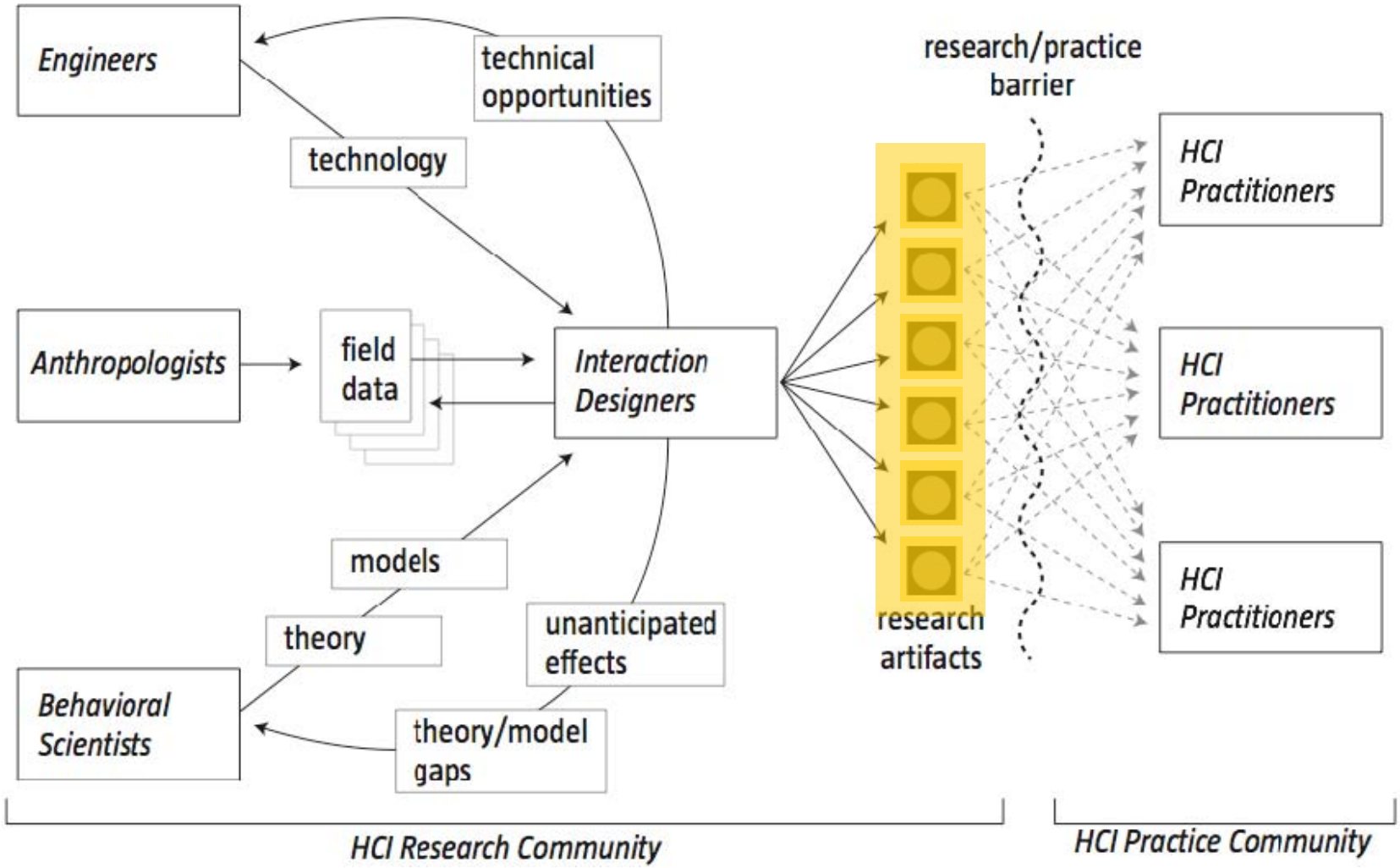
Design Artifacts

Interaction design researchers create artifacts that provide **concrete embodiments of theory and technical opportunities**.

Design artifacts are the **currency** of design communication.

WHO WHAT **HOW**

Currency for Design Communication



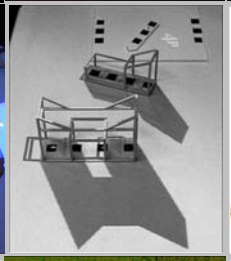
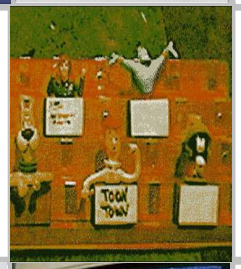
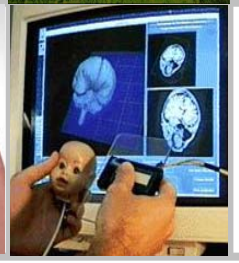
[Zimmerman et al., 2007]

HOW

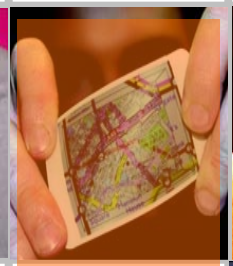
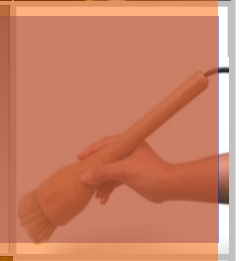
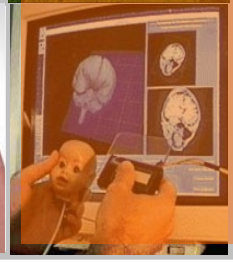
Currency for Design Communication

These **research artifacts** provide the catalyst and subject matter for discourse in the community, with each new artifact continuing the conversation.

Unexplored territories?

Embodiment \ Metaphor	None	Noun	Verb	Noun and Verb	Full
Full					
Nearby					
Environ-ment					
Distant					

Unexplored territories?

Metaphor / Embodiment	None	Noun	Verb	Noun and Verb	Full
Full			 Containers		
Nearby	Tools				
Environ-ment		Tokens		 Tokens	
Distant					

Theory and Practice of Tangible User Interfaces

	Tuesday LECTURE		Thursday LAB	
Week 1	08/28	Introduction	08/30	Introduction to Physical Computing
Week 2	09/04	Activity Theory and HCI	09/06	Hello World with Arduino Boards
Week 3	09/11	Tangible Bits	09/13	Sensor 1: Potentiometers
Week 4	09/18	Containers, Tools, and Token: Taxonomy of TUIs	09/20	Sensor 2: Force sensors and photocells
Week 5	09/25	Calm Computing and Ambient Media	09/27	Output 1: Piezo speakers
Week 6	10/02	Human Centered Design	10/04	Output 2: Servo motors
Week 7	10/09	Design and Innovation	10/11	Output 3: DC motors
Week 8	10/16	Midterm Project Review	10/18	Output 4: Simple Mechanics
Week 9	10/23	Mixed / Augmented Reality	10/25	Synthesis 1: Invent a music instrument (group work)
Week 10	10/30	Guest Lecture by Eric Paulos	11/01	Synthesis 2: Invent a music instrument (group work)
Week 11	11/06	Technology in Domestic Space	11/08	Guest Lecture by Tod Kurt (ThingM)
Week 12	11/13	Guest Lecture by Wendy Ju	11/15	Final Project Progress Report and Critique
Week 13	11/20	Guest Lecture by Dave Nguyen	11/22	No class: Thanksgiving holiday
Week 14	11/27	Evaluating TUIs	11/29	Work on final project
Week 15	12/04	Summary	12/06	Final Project Exhibition

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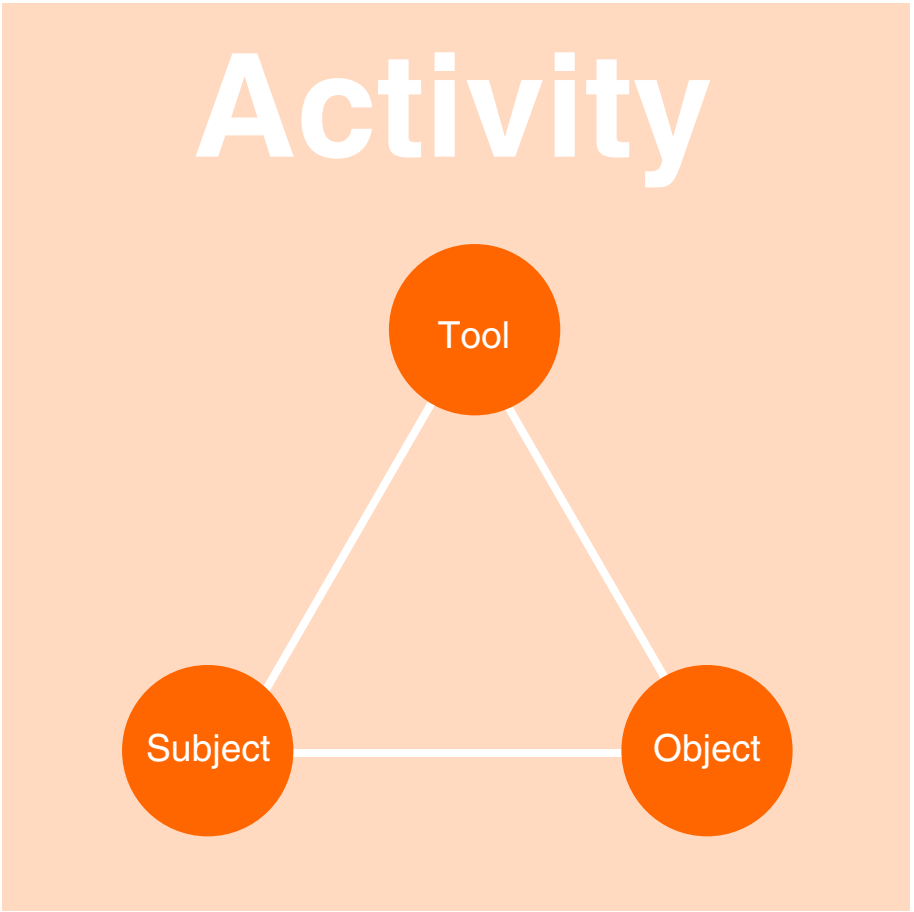
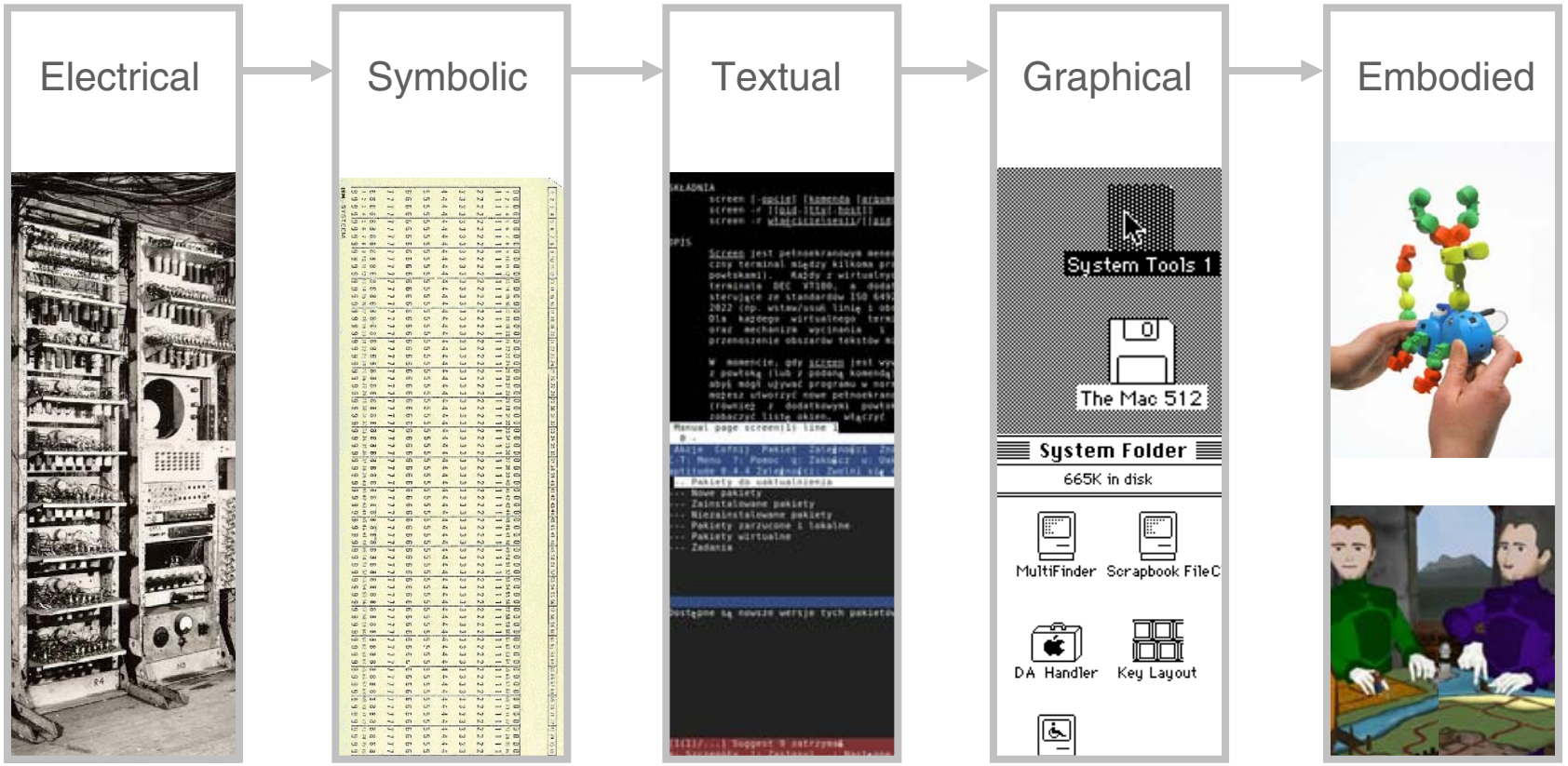


“Computer reaching out”

The scope of human-computer interaction is expanding to include larger-scale, longer-term phenomena of computer use. Interaction moves from being directly focused on the physical machine to incorporating more and more of the user’s world and the social setting in which the user is embedded. (Dourish, 2004)

Historical Development of UI



From *Where the Action Is* (Dourish, 2001)

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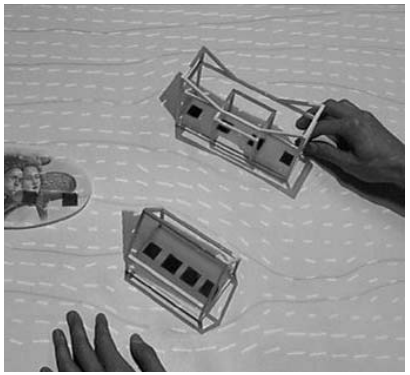

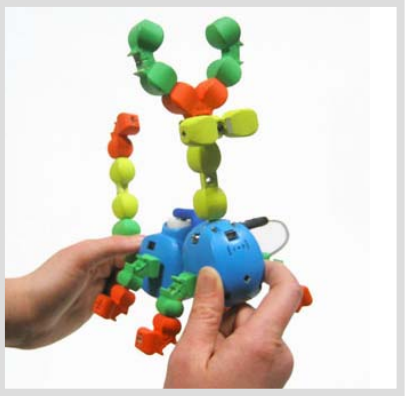

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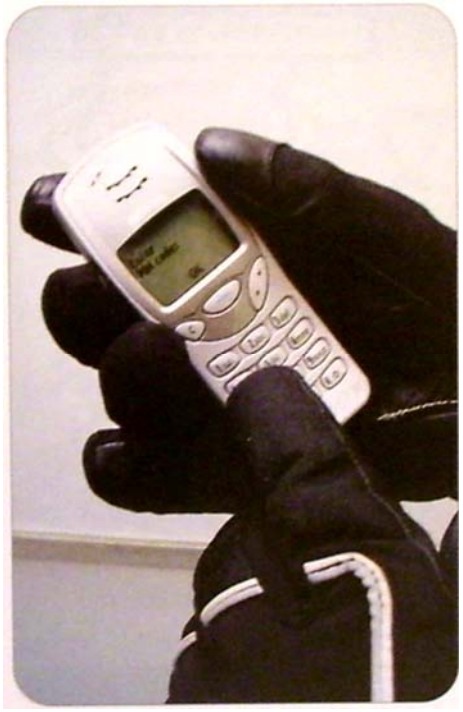

Empathy Tool from
IDEO Method Cards


Thoughtless Acts captured by Aylin Selcukoglu

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Designer as Curious George

[Boym & Boym, 2002]

“Curious George is driven by curiosity to play and experiment with elements of his daily environment. He finds new uses for familiar objects, invents different ways of doing things, and tests the limits of materials and objects. Many of his experiments do not work, and he routinely gets in trouble, but occasionally he reaps praise or a medal.”

Avoiding Cargo Cult Design

Principles (adapted from Feynman and Holmquist)

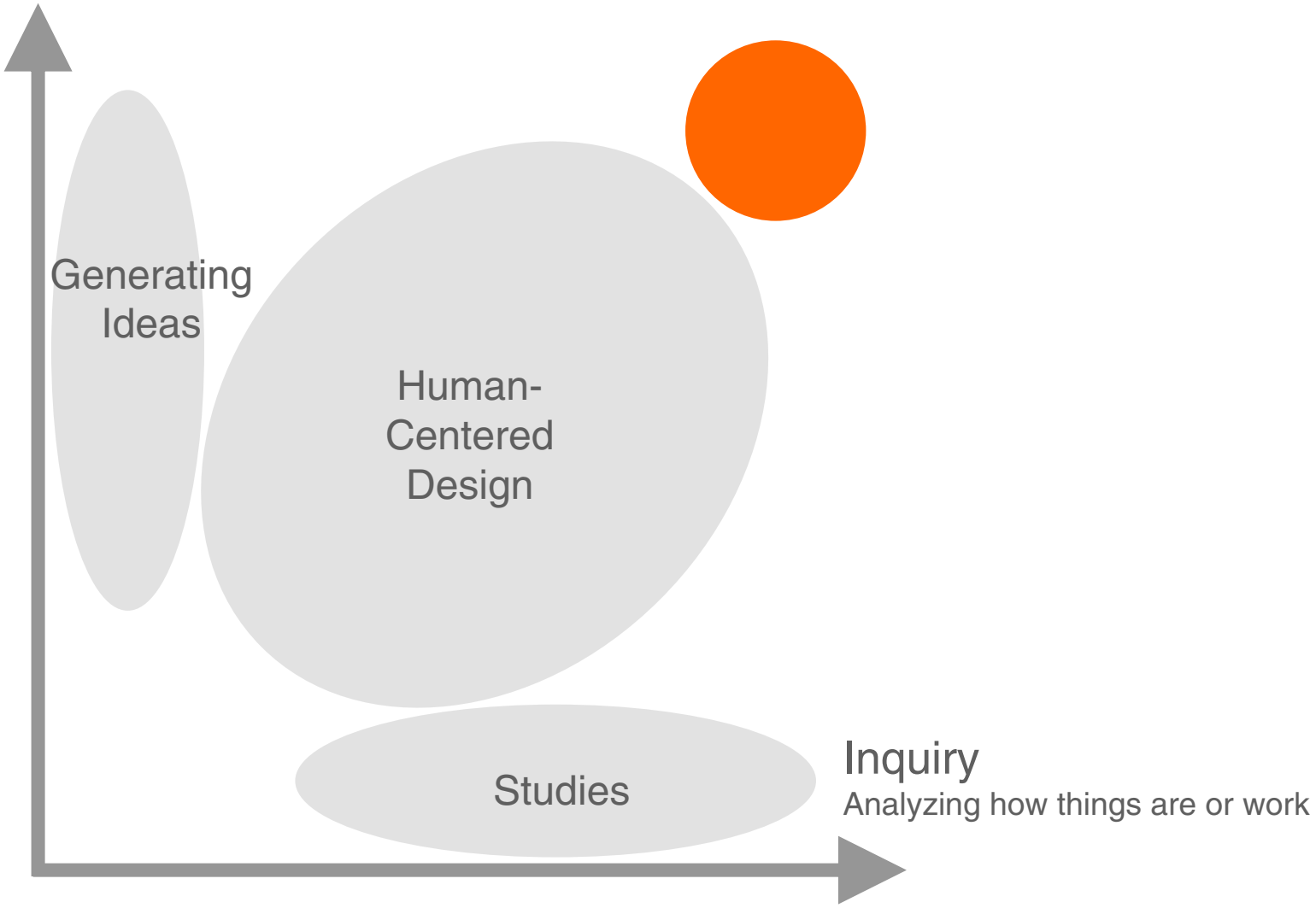
Am I fooling myself?

- Do I really have enough knowledge of the technology and potential users to say this will work?

Am I fooling the layman?

- Is there a risk that people will believe the representation is the real thing?

Invention
Coming up with new and original ideas



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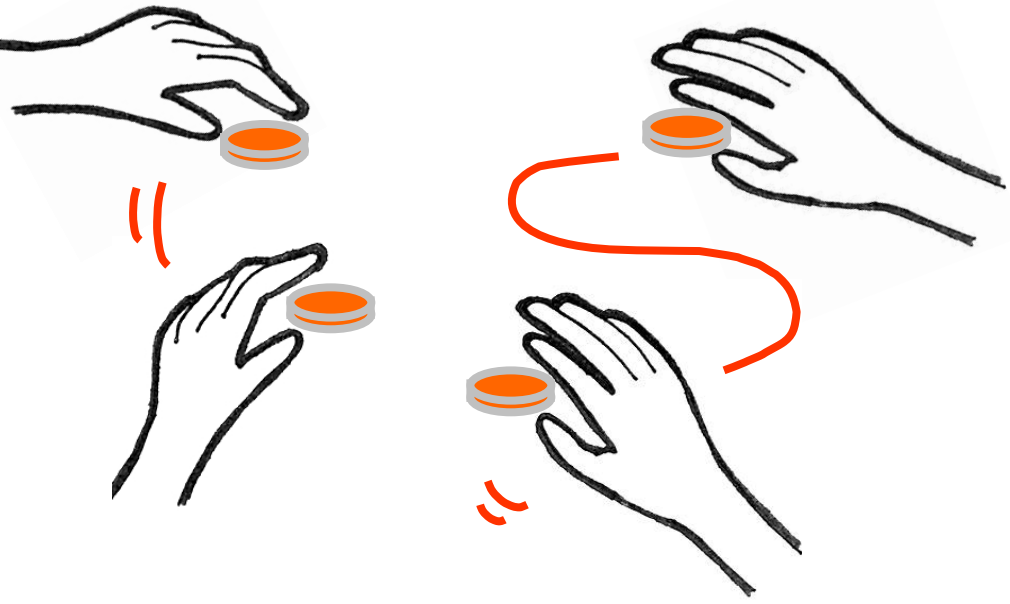
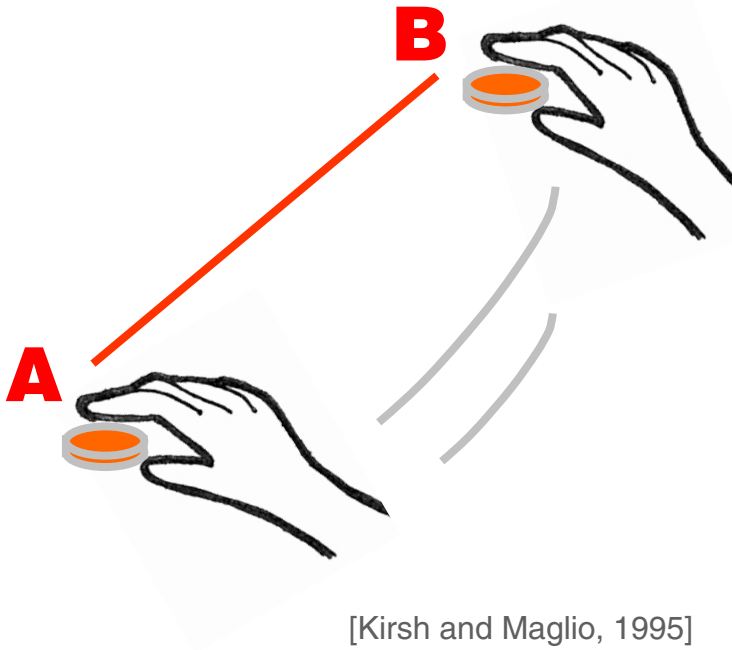
Epistemic Action

Users change their environment to search for the best solution or strategy to perform a task.



Pragmatic Action

Action taken to actually perform the task.

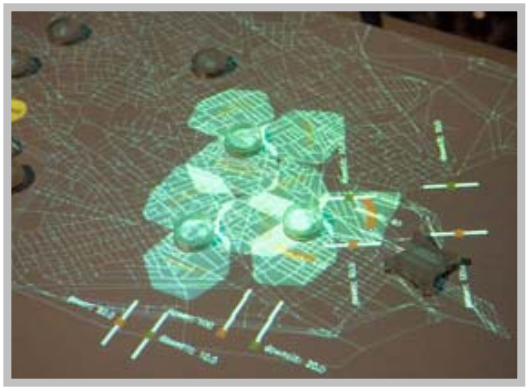


[Kirsh and Maglio, 1995]

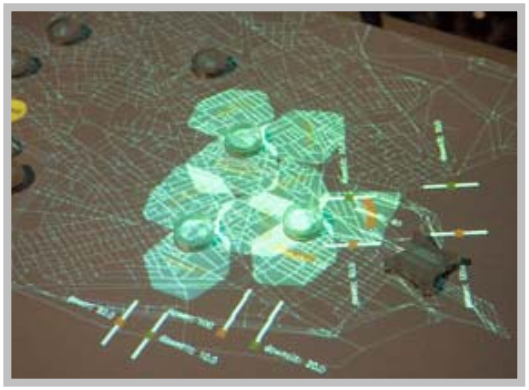
PICO Study [Patten & Ishii, 2007]

- 15 participants, within-subject study
- Position the towers to reach an optimal coverage under 4.5 minutes

Screen



Pico w/o actuation



Pico

Open to Interpretations

Specifying clearly usability without constraining use.

[Sengers & Gaver, 2006]

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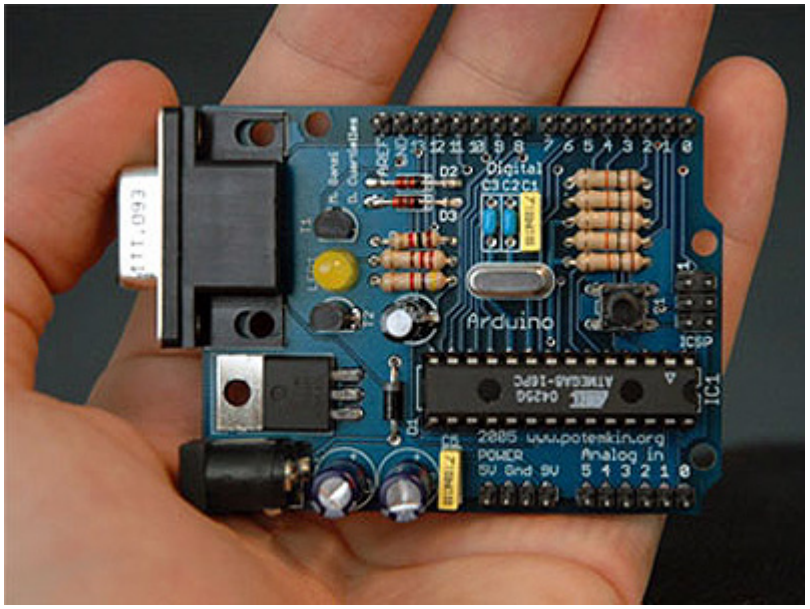

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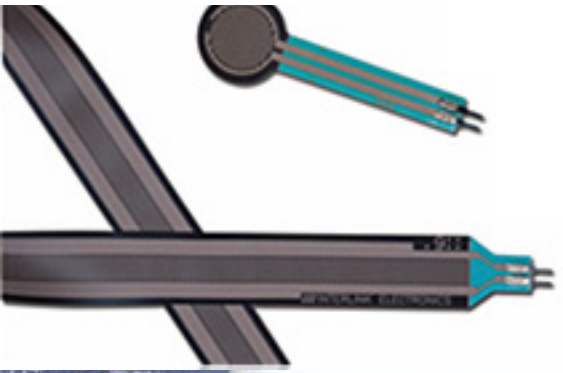

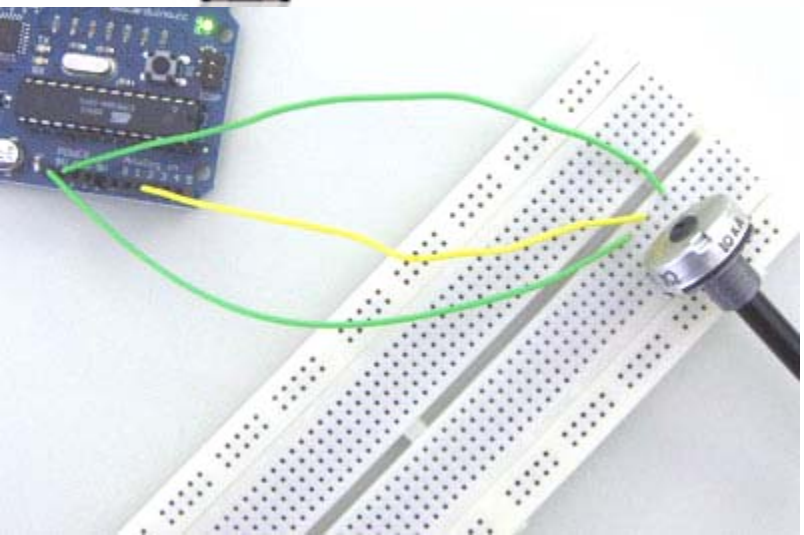

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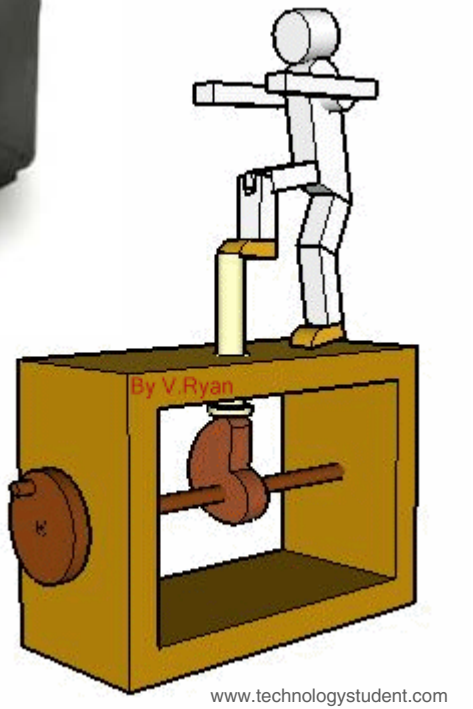

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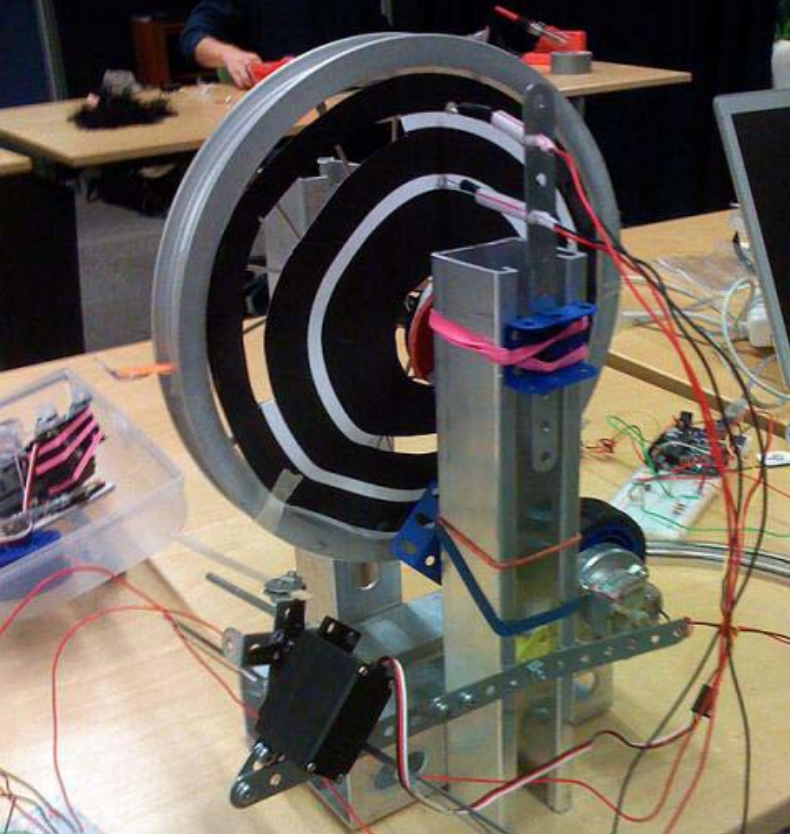

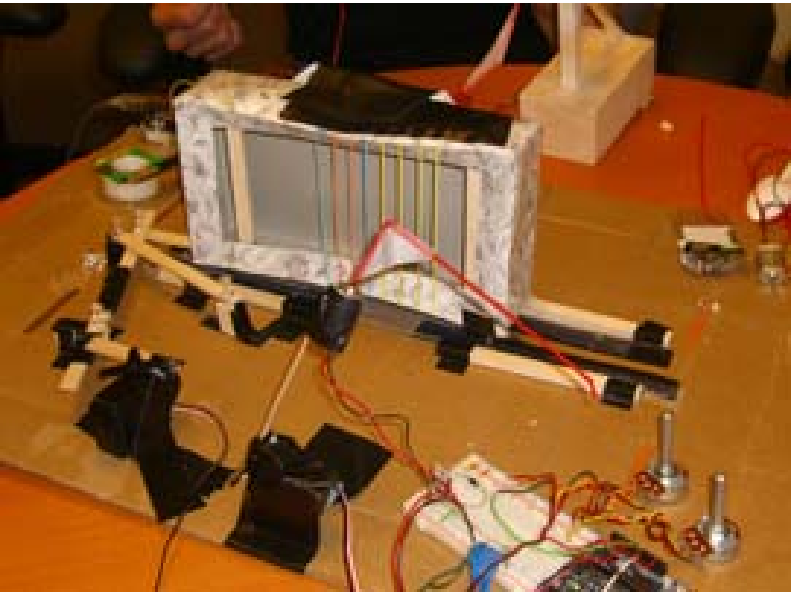

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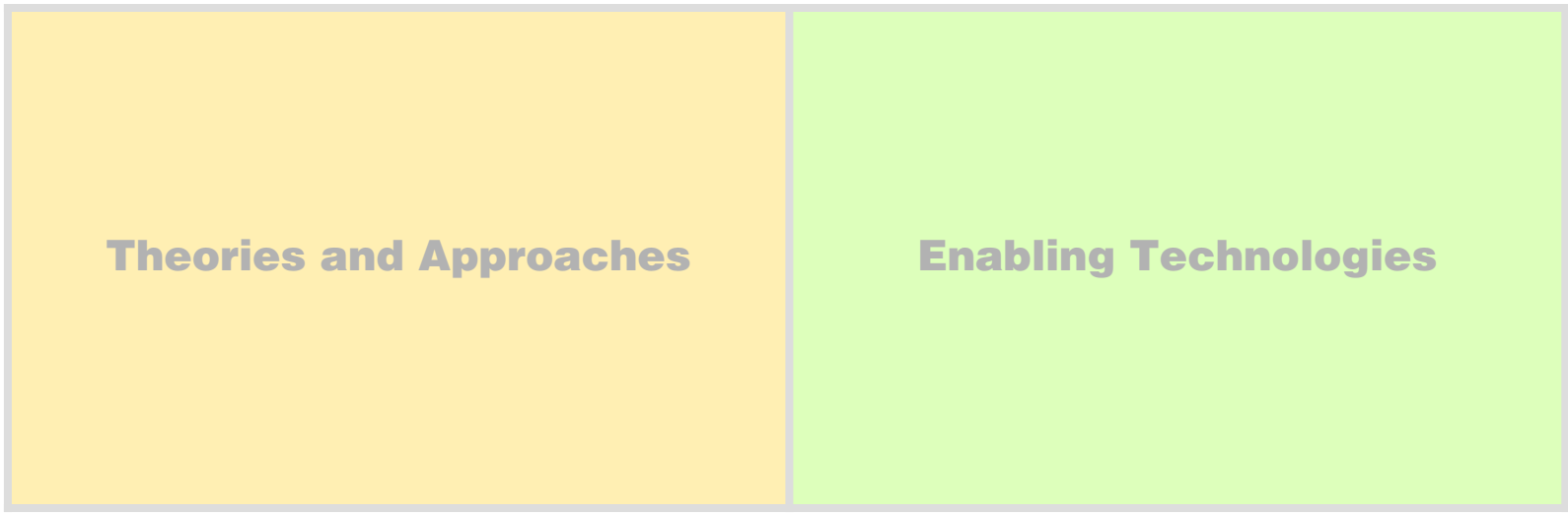
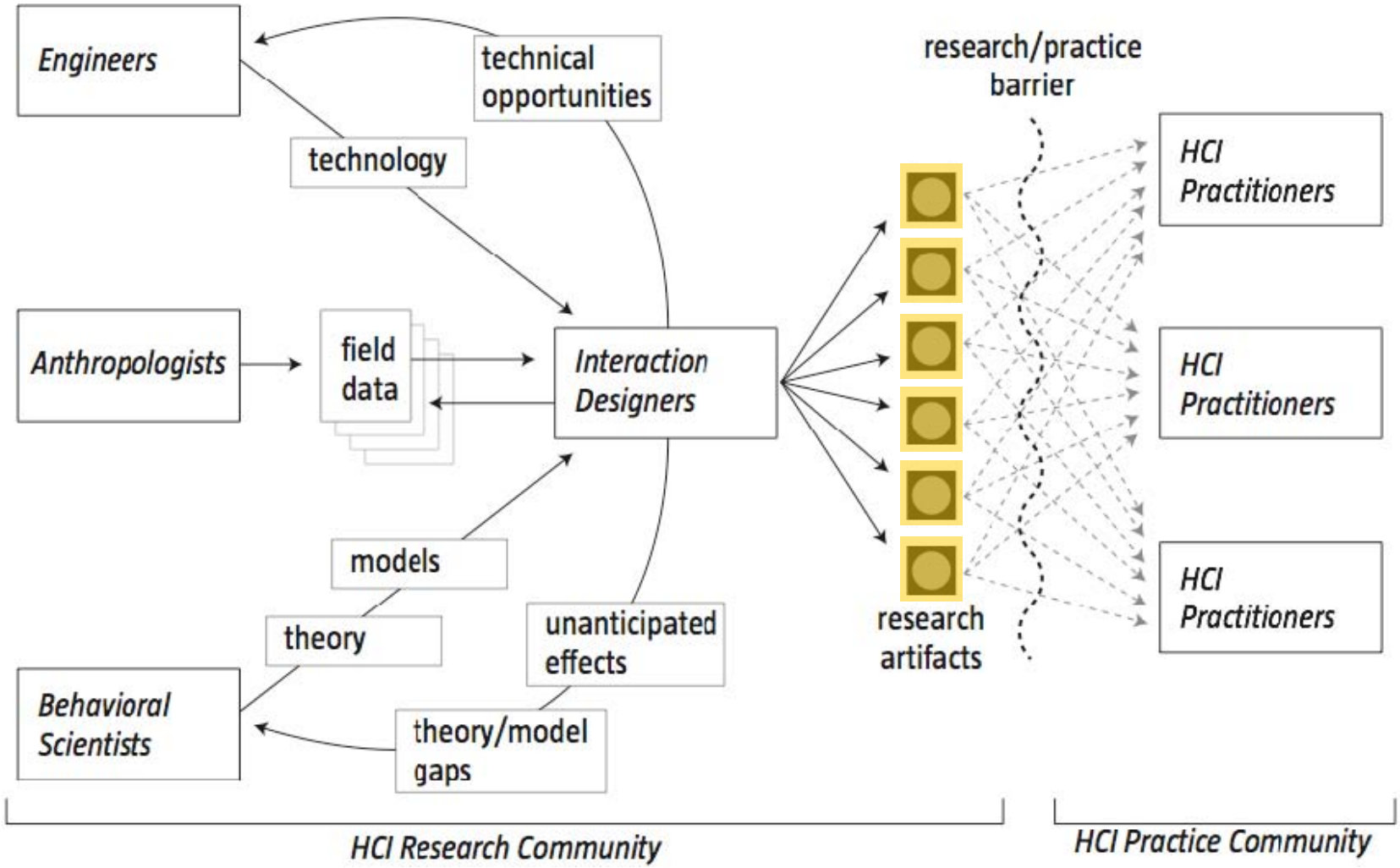
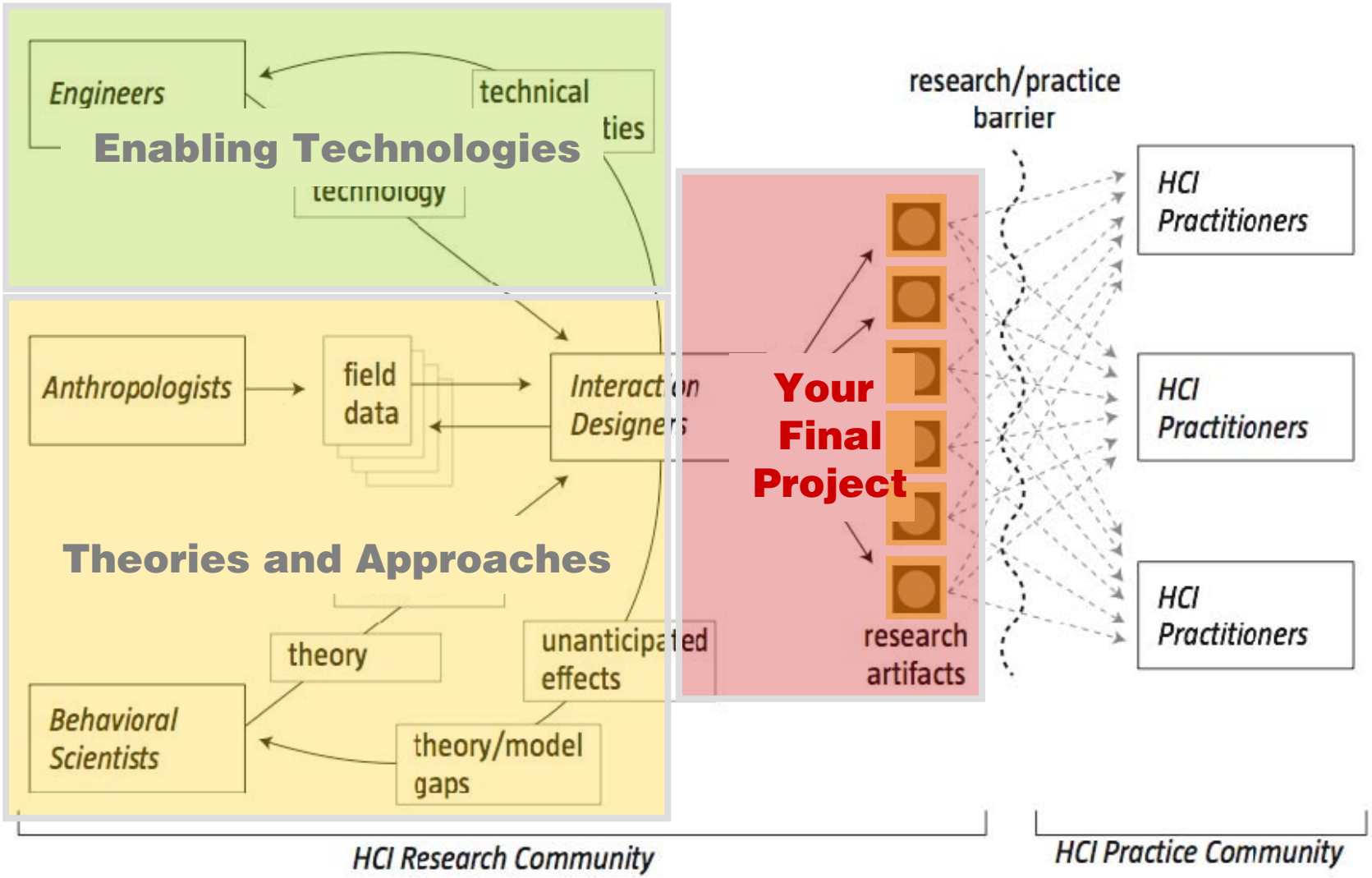

Theories and Approaches
Enabling Technologies

Your original IDEA!

Theories and Approaches

Enabling Technologies


Engineers
technical opportunities
technology
research/practice barrier
HCI Practitioners
Anthropologists
field data
Interaction Designers
HCI Practitioners
models
theory
unanticipated effects
research artifacts
HCI Practitioners
Behavioral Scientists
theory/model gaps
HCI Research Community
HCI Practice Community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Final
Project
Theories and Approaches
theory
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effects
research
artifacts
Behavioral
Scientists
theory/model
gaps
HCI Research Community
HCI Practice Community

Your Final Project Exhibition

- Your final project exhibition on both **Thursday December 6th** and **Tuesday December 11th**.
- On Tuesday December 11th we will have the Berkeley Center for New Media Faculty:
  - Ken Goldberg (IEOR)
  - Greg Niemeyer (Art Practice and Film Studies)
  - Rick Rinehart (BAM)
  - Lisa Iwamoto (Architecture)
  - Shannon Jackson (Performance Studies)
  - Maneesh Agrawala (EECS)
  - Nancy Van House (Information School)

Your Final Project

- Your final project write up (4-6 pages) in ACM SIGCHI Extended Abstract format: http://www.chi2008.org/chi2008extendedabstracts.doc
- We are available during our office hour and by appointment. (Please ask early about resources.)

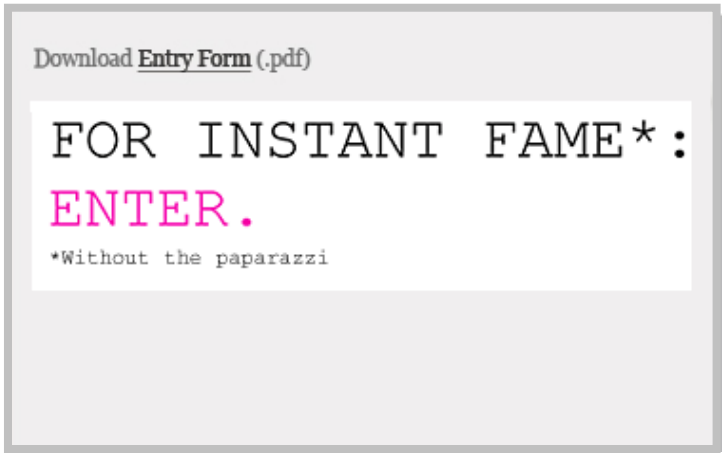
Beyond the Course: Possible Venue 1

Conference paper submissions

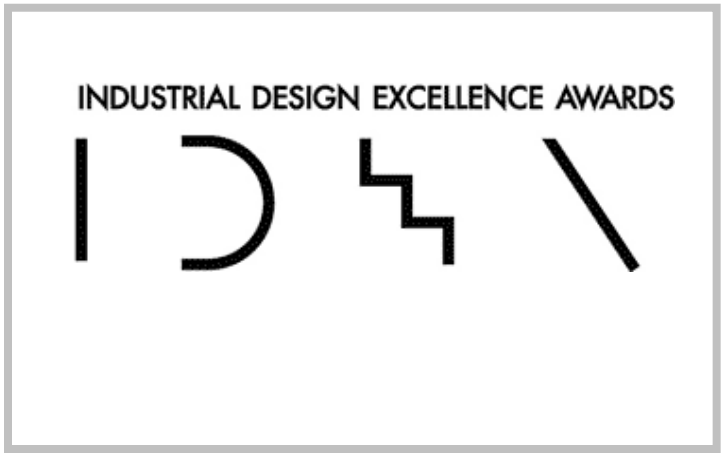
- **CHI** (Alt CHI, deadline Jan 8, 2008, and full paper for 2009)
- **UIST** (around March 2008)
- **Ubicomp** (around March 2008)

Beyond the Course: Possible Venue 2

Student design competitions



ID Magazine Student Competition
Deadline February 1, 2008



Industrial Design Excellence Awards
Deadline early spring 2008

Acknowledgments

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- Tod Kurt, Wendy Ju, Eric Paulos, and Hiroshi Ishii
- And YOU!

Thanks!