# Research Topics in Human-Computer Interaction

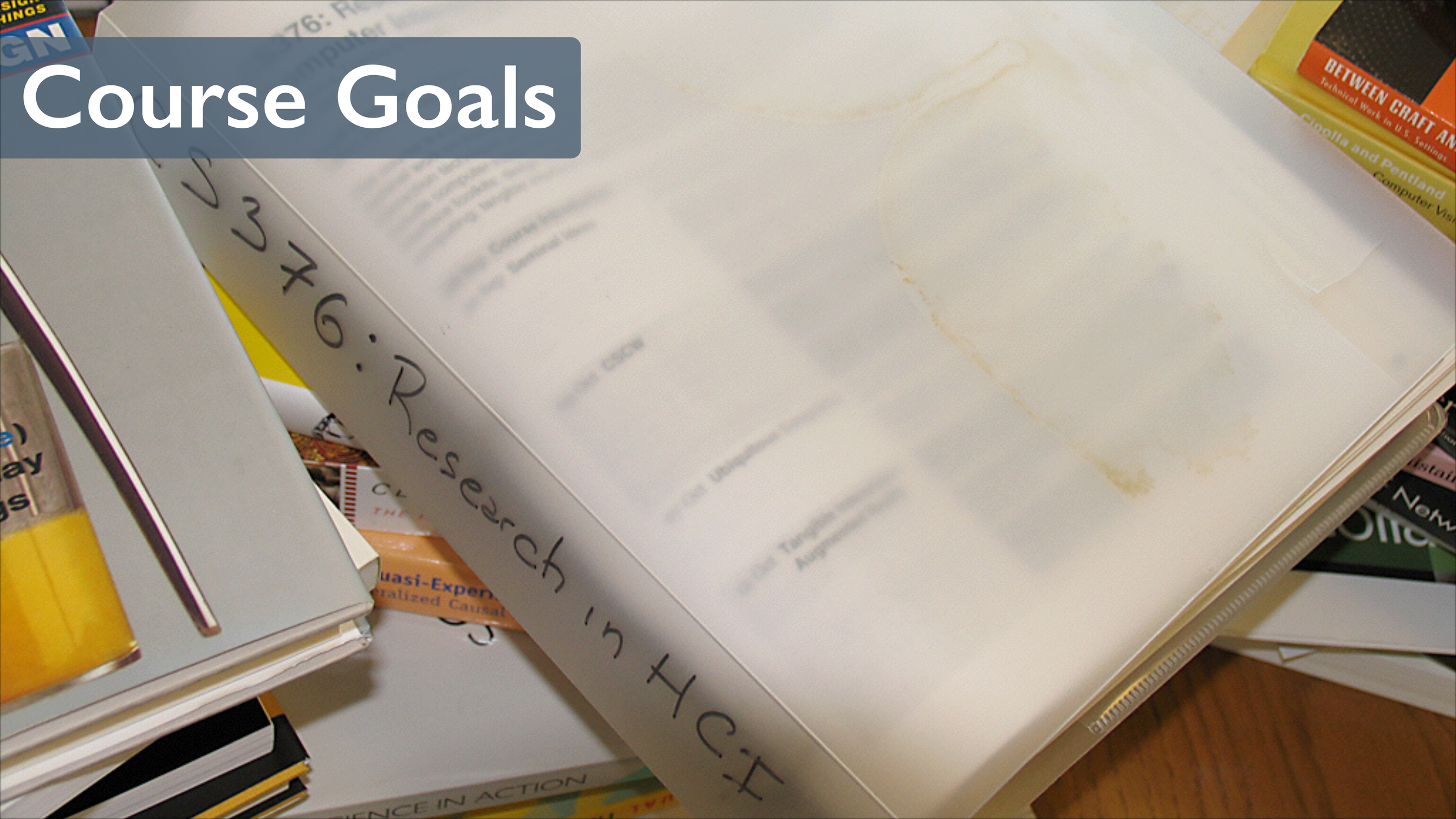

MICHAEL BERNSTEIN

SPRING 2014

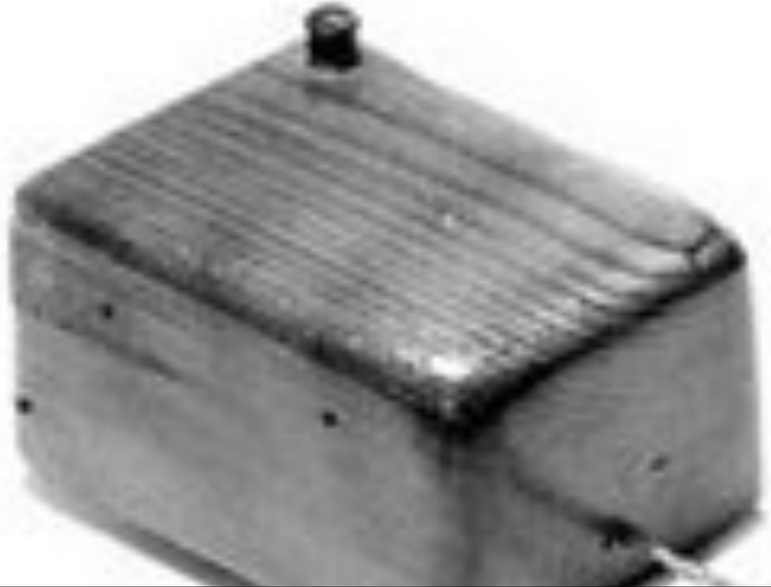
cs376.stanford.edu

# Introductions

# Course Goals



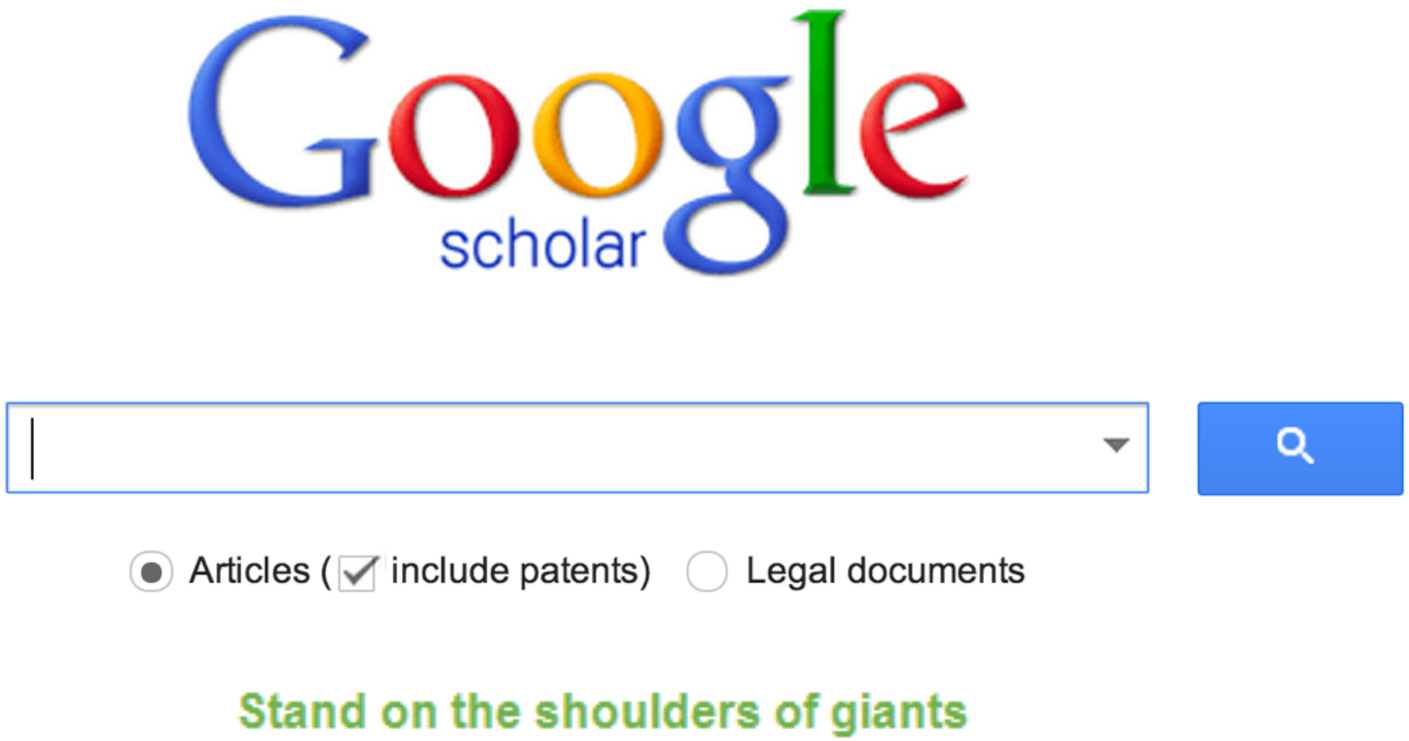
# Contributions to HCI



# Primary Source Material

# Literature Index

# Literature Index



# Research Methods


reading
doing

# Writing
# Technical Presentation
# Critical Thinking

# Expected background

- Most important: are you prepared to complete a mini-research project of your own choosing?
- Helpful:
  - Depth in at least one of {programming, social science methods, design, STS}
  - Experience in HCI (e.g., cs147, cs247)
- Required:
  - Undergraduates: A- or better in cs147

# Syllabus

# CS 376 in three acts

1. Introduction
2. Depth
3. Breadth


# Ubiquitous Computing

# Social Computing


# Design and Creation

| | | |
|---|---|---|
| research | methods | global citizenship |
| models | programming | collaboration |
| intelligent user interfaces | visualization | creativity tools |

# Course Overview

| | |
|---|---|
| 31 MAR | Seminal Ideas |
| 2-9 APR | Intros: Ubicomp, Social, Design |
| 14-16 APR | Ubiquitous Computing |
| 21-23 APR | Social Computing |
| 28-30 APR | [CHI] |
| 5-7 MAY | Design+Creation |
| 12-14 MAY | Methods |
| the rest | Breadth |

# Administrivia

## Course Info

Mondays & Wednesdays 1:15-3:05pm, Littlefield 103

4 units

http://cs376.stanford.edu

cs376@cs.stanford.edu

## My Info

Office Hours: Wednesdays 3:05-4:15pm, Gates 308

http://hci.stanford.edu/msb

msb@cs.stanford.edu

# Format

| | |
|---|---|
| 1:05-1:35 | Instructor-led area overview |
| 1:35-1:40 | Break |
| 1:45-2:30 | Student-led reading discussion |

# Grading

25% Paper Critiques
5% Participation
10% Leading an in-class discussion
60% Original research project

# Readings

# Reading: come prepared!

- Typically two readings per class meeting
- I strongly suggest hiding in the library, distraction-free

# Critiques

- For selected readings, submit your critique at http://cs376.stanford.edu
- Due at 1:00am, the day of class

# Writing Critiques

- Future research directions that this paper inspires for you
- Why the paper does/doesn't seem important
- Observations of novel methodology or methodology that seems suspect
- Why the paper is/isn't effective at getting its message across
- How the paper has changed your opinion or outlook on a topic

~~“This paper has so many problems:”~~

“This inspired me to develop an idea:”

# Example Length

- As We May Think
  Rating: 5/5

This paper was fascinating because it forces us to consider technologies that nowadays we take for granted. In some ways Bush was overly optimistic; for example walnut-sized wearable cameras are uncommon (even though they are possible), likely because optical and physical constraints favor handheld sizes. In other ways he underestimated, such as the explosion of data. For example, some modern cameras can store ten thousand photos rather than a hundred.

Underestimating the data explosion is also apparent in the disconnect between the initial problem description ("publication has been extended far beyond our present ability to make real use of the record") and the first two-thirds of the paper, which describe technologies that would (and did!) exacerbate the issue by further proliferating data. Yet, he recognizes this issue later in the paper, and then goes on to predict search engines

It is remarkable how many technologies are predicted in this paper: digital photography, speech recognition, search engines, centralized record-keeping for businesses, hypertext (even Wikipedia?). At the same time, many of the predicted implementations are distorted by technologies and practices common at the time, like "dry photography" or "a roomful of girls armed with simple keyboard punches". While these presumably served to make the hypotheses more accessible to readers of the time, is it even possible to hypothesize technology without such artifacts.

Aside from predictions, this paper is important for the way Bush frames science in the support of the human race, by augmenting the power of the human mind. It is likely that many of the scientists (and physicists in particular) that were his audience felt guilt and despair from the destruction wrought by advances in nuclear, and even conventional, weaponry in the war. In that social context, seeing science described as a powerful constructive tool for good must have been inspiring.

# Discussants

# Leading a discussion

- You have 45 minutes during the second half of class
- Briefly summarize readings (≤ 10 min)
- Identify points of interest, be prepared to spur and lead in-class discussion
- Incorporate critiques submitted by the class
- Full description on the class web site

# Projects

# Research Projects

- The “doing” part of the course
- Working in threes is strongly encouraged
- A project related to your research (or another course project) is great

# Make use of mentors

- Research area mentors available to help guide you
  - Online tutorials
  - Crowdsourcing
  - Mobile input
  - Physical interaction design
  - &etc.

# Project Timeline

| | |
|---|---|
| 4 APR | Ideas, round one |
| 11 APR | Form teams + Ideas, round two |
| 18 APR | Abstract draft |
| 25 APR | Abstract revision |
| 5-29 MAY | Meetings |
| 7 MAY | Project faire, round one |
| 21 MAY | Project faire, round two |
| dead week | Project paper due |
| finals | Final project presentations |

# Ideas, Round One due Friday

# Visimu: A Game for Music Color Label Collection

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## ABSTRACT

Based on previous studies of the associations between color and music, we introduce a scalable way of using colors to label songs and a visualization of music archives that facilitates music exploration. We present Visimu, an online game that attracted users to generate 926 color labels for 102 songs, with over 75% of the songs having color labels reaching high consensus in the Lab color space. We implemented a music archive visualization using the color labels generated by Visimu, and conducted an experiment to show that labeling music by color is more effective than text tags when the user is looking for songs of a particular mood or use scenario. Our results showed that Visimu is effective to produce meaningful color labels for music mood classification, and such approach enables a wide range of applications for music visualization and discovery.

consistent correlation between emotional ratings for music and the emotional ratings for colors [7]. Bresin found that people choose different color to classify the same piece of music when the instruments in the music or the interpretations of the musician's emotion are different [8].

From these observations, we think using colors to represent mood in music can leverage the abstract nature of colors while we can study the concrete relationships between them and the mood of the music. We developed Visimu, a game that uses the theoretical foundations regarding the associations between color and music, and provides a scalable way to label songs with colors. We show that the visualization of music archive using color labels generated from Visimu is a better alternative than text-based music archive.

## GAME DESIGN

# Brainstorm, Define, Prototype: Timing Constraints to Balance Appropriate and Novel Design

**Andrew Nicholas Elder**
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**Elaine Zhou**
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## ABSTRACT

We present the results of a human creativity experiment that examined the effect of varying the timing of narrowed constraints. Participants were asked to create a static web ad for Stanford University guided under a timed design process and were introduced to a narrowed constraint either at the beginning, middle, or end of the prototyping process. The narrow constraint addressed goal and task constraints by specifying the target audience and ad size. We find that groups introduced to narrow constraints prior to the brainstorm yielded more appropriate results, while those introduced prior to the final production yielded more novel results. Our results suggest that effective timing of design constraints may further optimize ideation and design methodologies.

seeks a richer theoretical understanding of utilizing the time frame of narrowing constraints in order to help individuals yield more effective results.

Creativity as explored by current literature can be defined in two main aspects: novelty (the degree to which the product is unexpected and distinctive) and appropriateness (how useful, or good according to some reference group) and we define creativity similarly in his study [3], [5], [7]. Constraints can be classified under two categories; *input restrictions* and *input requirements*. [6]. We focus on Goal Constraint as an input requirement, outlined as the most crucial type of constraint, and the task constraint as an input restriction, which deals with design's concrete dimensions and quantitative aspects. [4]

# Project Inspiration

STANFORD HCI GROUP

COURSES PEOPLE RESEARCH CONNECT DIRECTIONS


PEOPLE Michael Bernstein · Stu Card · Monica Lam · Terry Winograd · Affiliated Faculty · Students · Visitors · Alumni

CO-CONSPIRATORS

d.school · Liberation Tech · Graphics · Visualization ·

## PAPERS

CHI 2014

**Emergent, Crowd-scale Programming Practice in the IDE,** Ethan Fast, Daniel Steffee, Lucy Wang, Joel Brandt, Michael Bernstein

**Twitch Crowdsourcing: Crowd Contributions in Short Bursts of Time,** Rajan Vaish, Keith Wyngarden, Jingshu Chen, Brandon Cheung, Michael Bernstein PROJECT

**Scalable Multi-label Annotation,** Jia Deng, Olga Russakovsky, Jonathan Krause, Michael Bernstein, Alex Berg, and Li Fei-Fei

L@S 2014

**Scaling Short-answer Grading by Combining Peer Assessment with Algorithmic Scoring,** Chinmay Kulkarni, Richard Socher, Michael S. Bernstein, Scott R. Klemmer PROJECT

**Talkabout: Small-group Discussions in Massive Global Classes,** Julia Cambre, Chinmay Kulkarni, Michael S. Bernstein, Scott R. Klemmer PROJECT

CSCW 2014

# cs547: HCI Seminar

Fridays 12:50-2:05pm, Gates B01
http://hci.st/seminar/

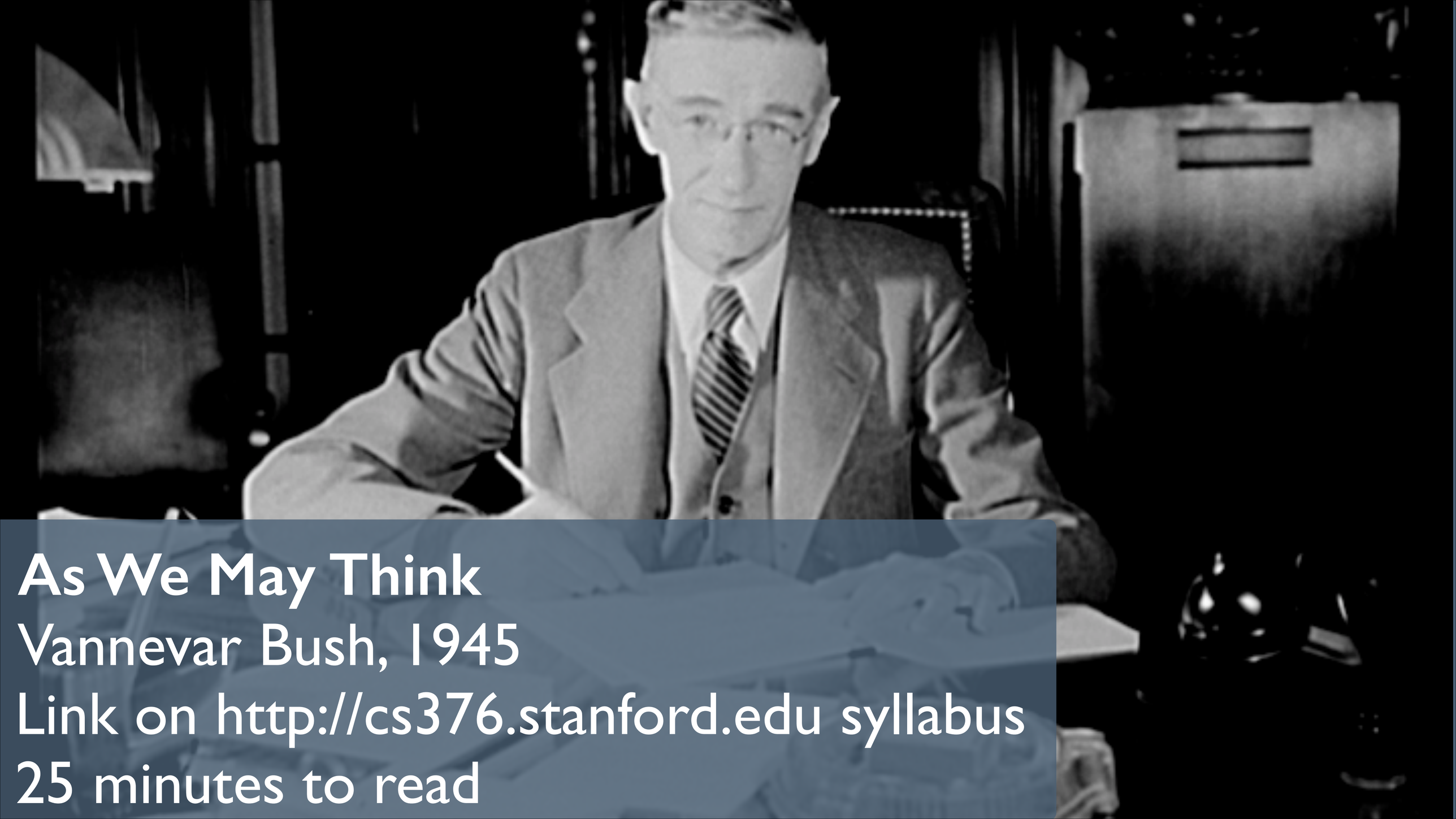
This quarter's guests include leading luminaries in social computing, data science, usable security, tangible interaction and play, and accessibility.

# To take cs376, you must apply by 11:59pm today.

http://hci.st/376apply

# Questions?

# In-class reading



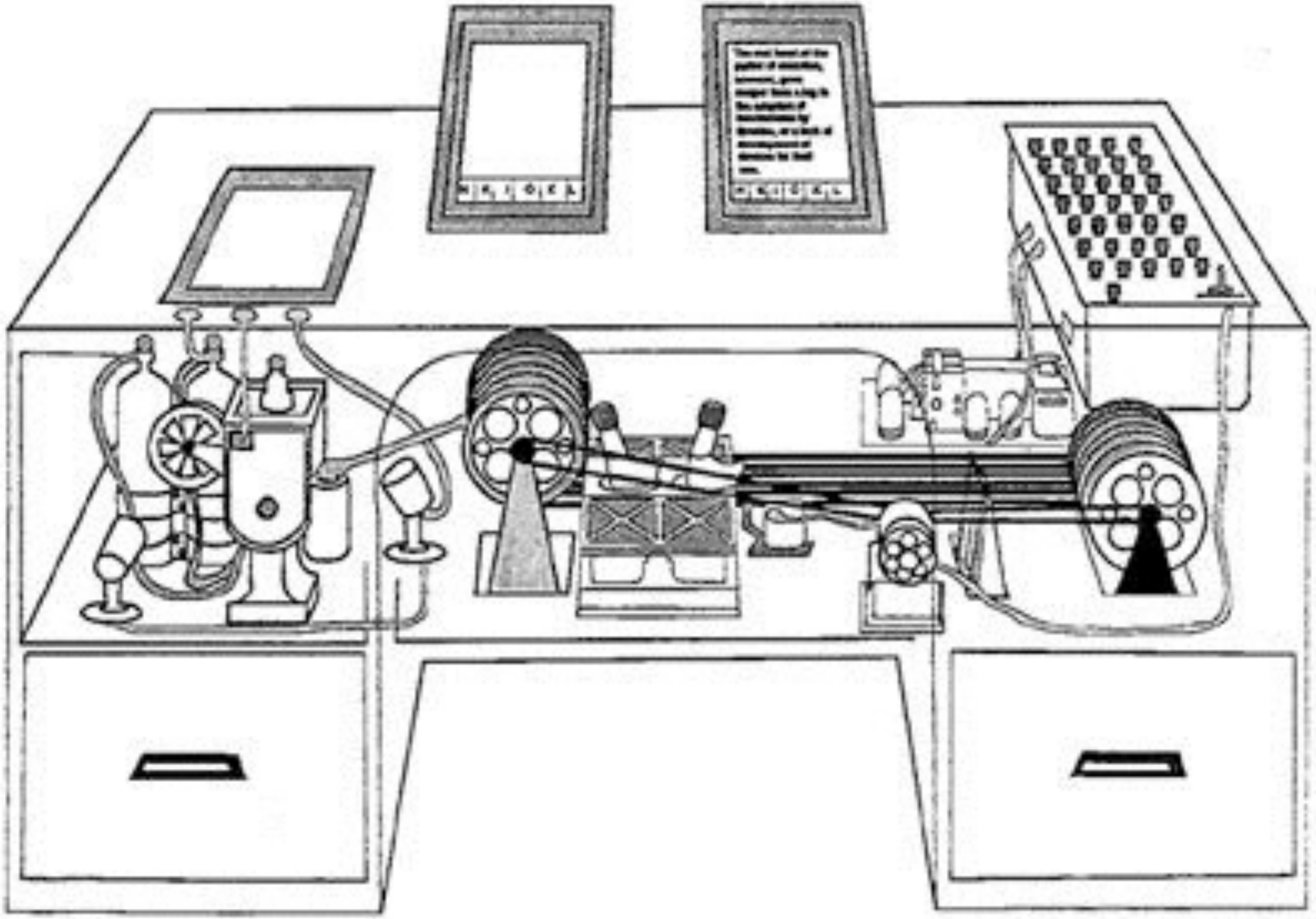
**As We May Think**
Vannevar Bush, 1945
Link on http://cs376.stanford.edu syllabus
25 minutes to read

# 10 minutes

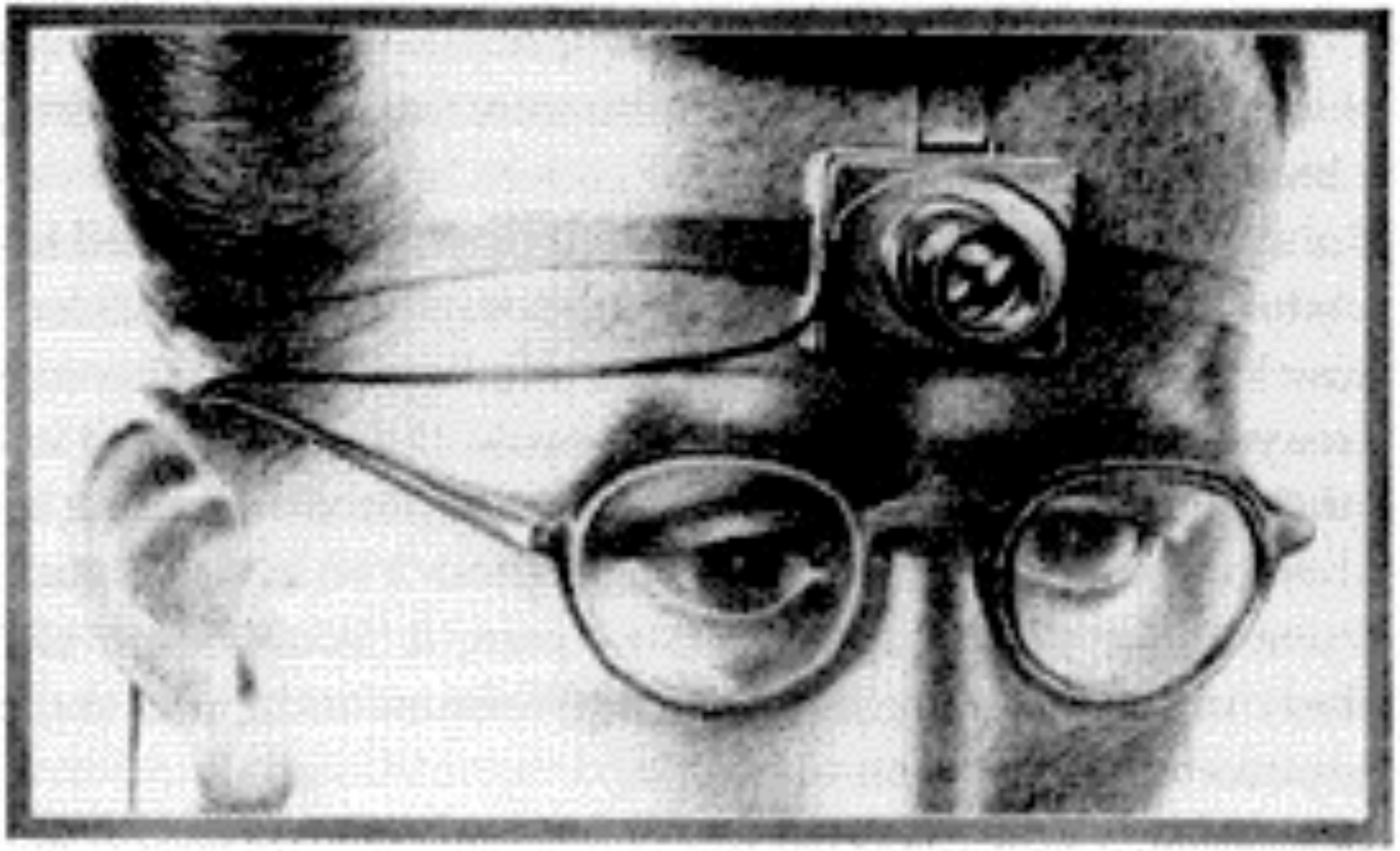
jump to Section 6 now (you can go back later)

# 5 minutes

# 1 minute



# What innovations did Vannevar Bush foresee?



A scientist of the future records experiments with a tiny camera fitted with universal-focus lens. The small square in the eyeglass at the left sights the object (*LIFE 19*(11), p. 112).

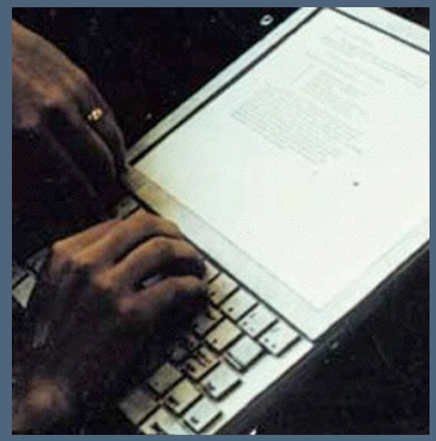
"There is a new profession of trail blazers, those who find delight in the task of establishing useful trails through the enormous mass of the common record. The inheritance from the master becomes, not only his additions to the world's record, but for his disciples the entire scaffolding by which they were erected."

# The inheritance of the Memex

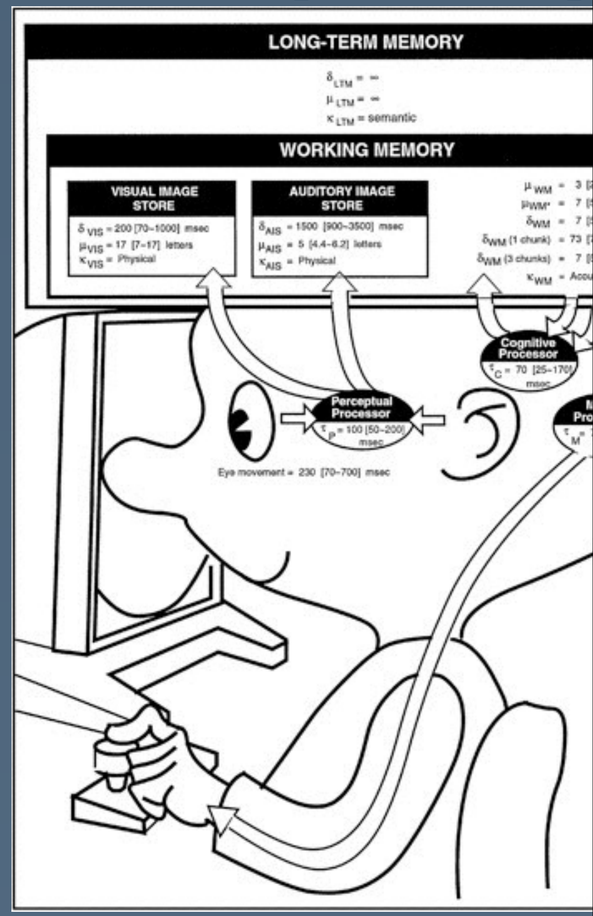
Sketchpad [Sutherland]

NLS [Engelbart]


Dynabook [Kay]

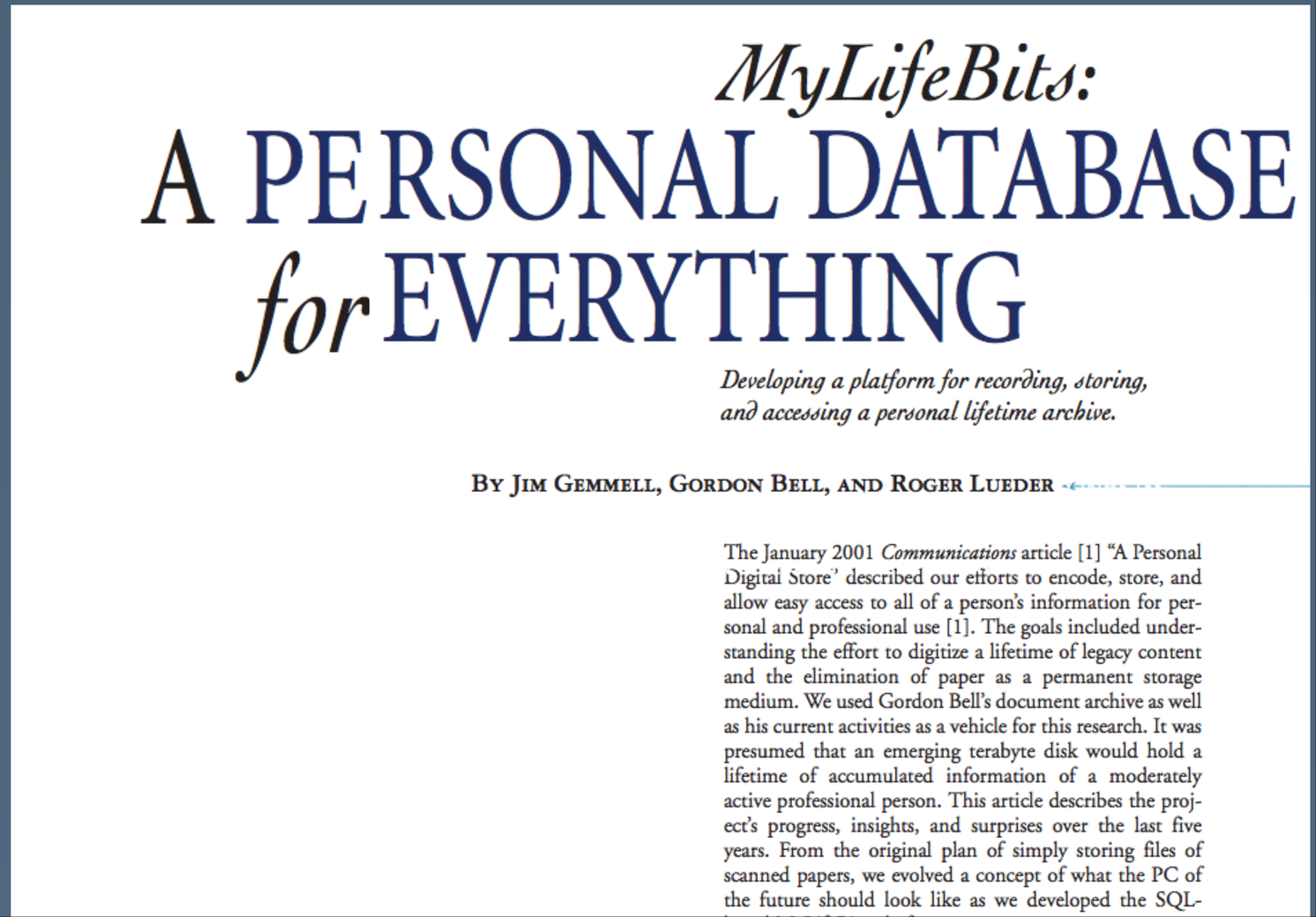


Model Human Processor [Card et al.]



# MyLifeBits [Gemmell et al. 2006]

- Record everything you've ever seen!
- Problem: retrieval?



*MyLifeBits:*
# A PERSONAL DATABASE *for* EVERYTHING

*Developing a platform for recording, storing, and accessing a personal lifetime archive.*

BY JIM GEMMELL, GORDON BELL, AND ROGER LUEDER

The January 2001 *Communications* article [1] "A Personal Digital Store" described our efforts to encode, store, and allow easy access to all of a person's information for personal and professional use [1]. The goals included understanding the effort to digitize a lifetime of legacy content and the elimination of paper as a permanent storage medium. We used Gordon Bell's document archive as well as his current activities as a vehicle for this research. It was presumed that an emerging terabyte disk would hold a lifetime of accumulated information of a moderately active professional person. This article describes the project's progress, insights, and surprises over the last five years. From the original plan of simply storing files of scanned papers, we evolved a concept of what the PC of the future should look like as we developed the SQL-

# What components of Bush's vision are still missing?

# Wednesday: Introduction to Ubiquitous Computing