Human-Centered Design

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Autumn 2009

Recap: Course Overview

- Project-based course
- Weekly assignments, due Thursday noon
- Two weekly lectures, studio
- Final project presentations:
  Tuesday 12/8, 7p-10p

Human-Centered Design

- Users' tasks and goals are the driving force behind development
- Users are consulted throughout development
- All design decisions are taken from within the context of the users, their work, and their environment
- Attentive to human abilities, goals, and desires

Why is HCI Important?

- Major part of work for “real” programs
  - approximately 50%
- Bad user interfaces cost
  - money
    - 5%↑ satisfaction → up to 85%↑profits
    - finding problems early makes them easier to fix
  - reputation of organization (e.g., brand loyalty)
  - lives (Therac-25)
- User interfaces hard to get right
  - people are unpredictable
  - intuition of designers often wrong

Studies have shown that the design, programming, and evaluation of the UI can take up to 50% of the project time and cost for a wide range of commercial and in-house software

Nearly 25% of all applications projects fail. Why?

overrun budgets & management pulls plug

others complete, but are too hard to learn/use

Solution is user-centered design. Why?

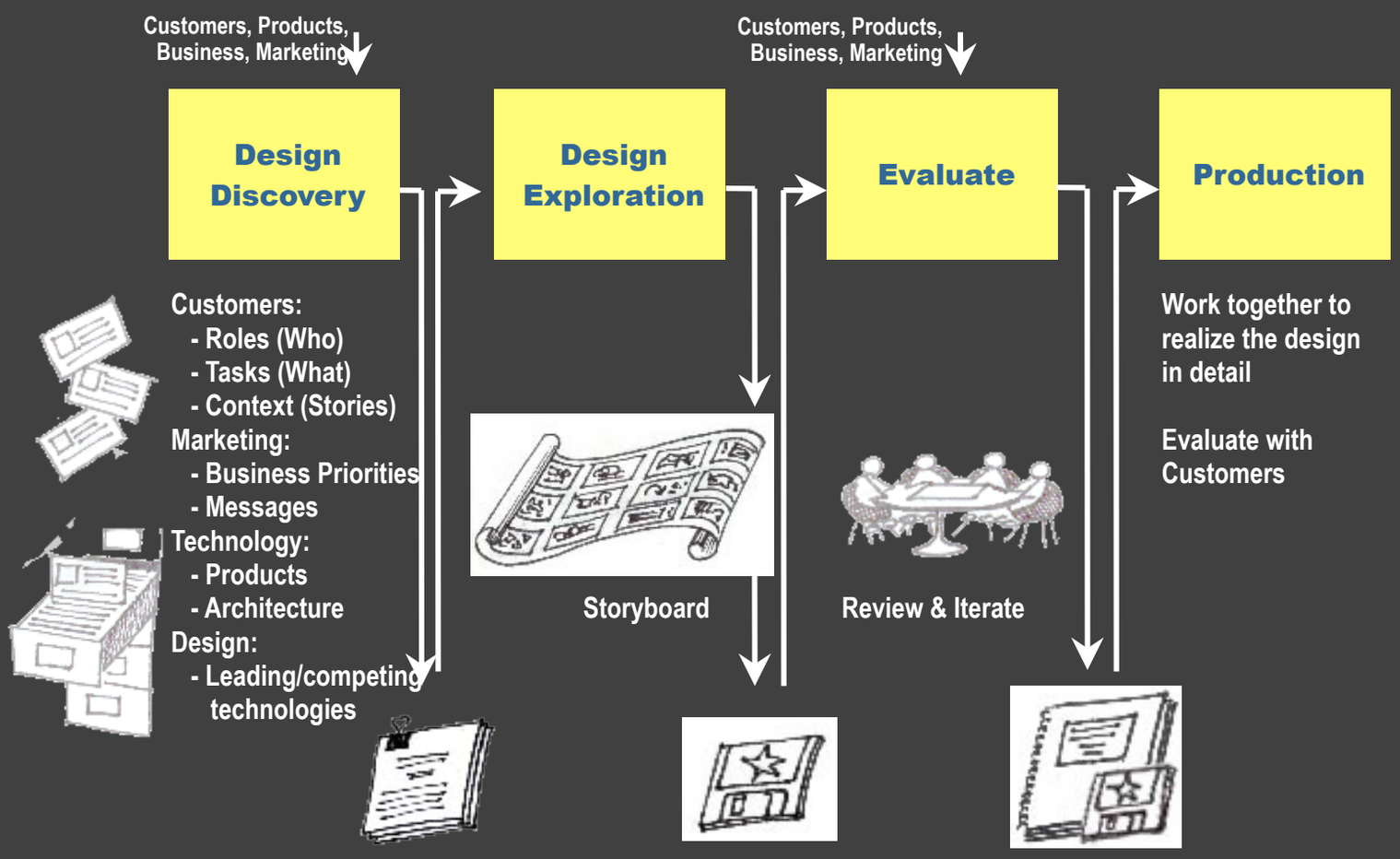
easier to learn & use products sell better

can help keep a product on schedule

finding problems early makes them easier to fix!

training costs reduced

User Interface Development Process



based on slide by Sara Redpath, IBM & Thyra Trauch, Tivoli

Usability

According to the ISO:

The *effectiveness*, *efficiency*, and *satisfaction* with which specified users achieve specified *goals* in particular environments

- This does not mean you have to create a “dry” design or something that is only good for novices – it all depends on your goals

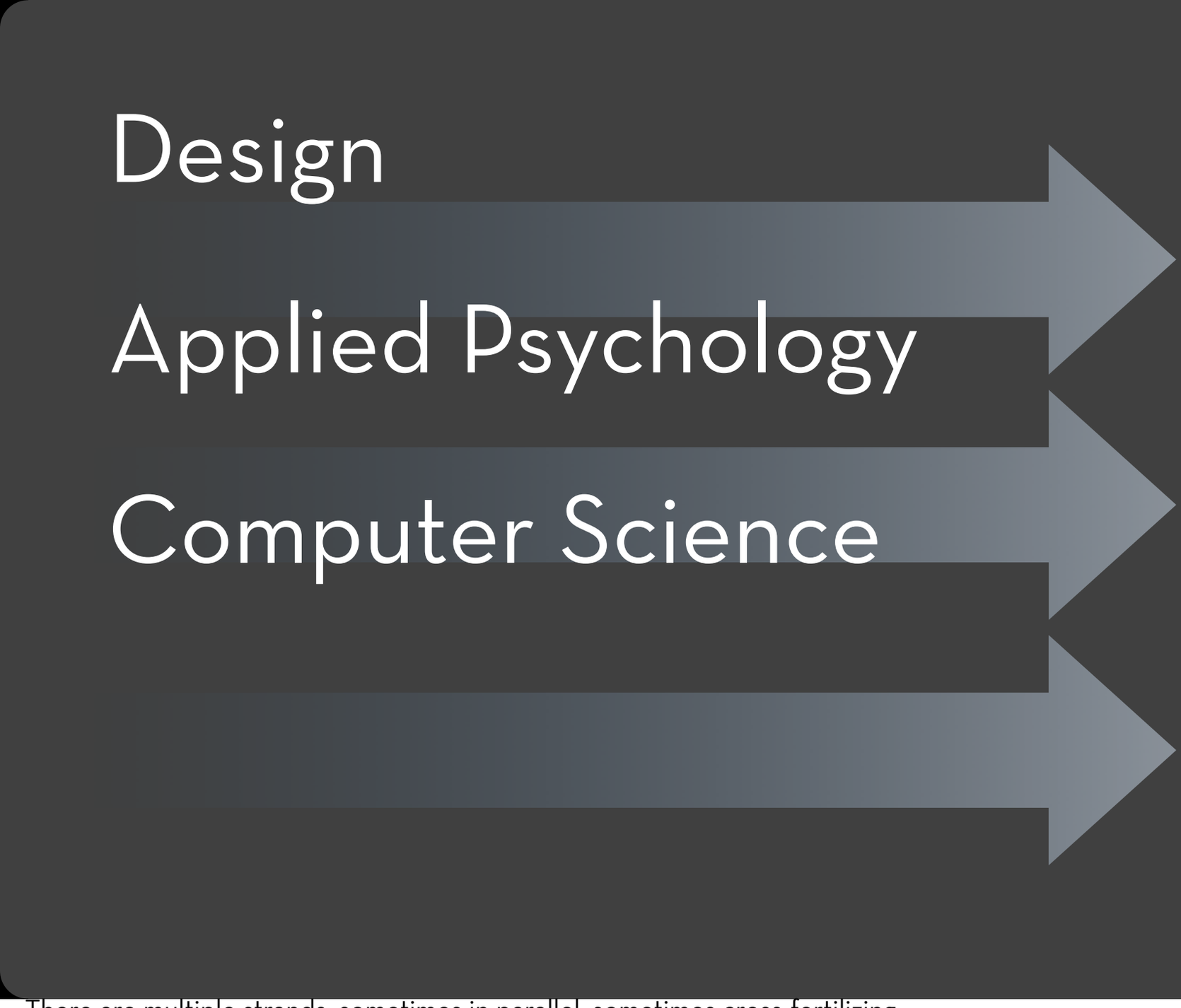
Usability/User Experience Goals

- **Set goals early & later use to measure progress**
- **Goals often have tradeoffs, so prioritize**
- **Example goals**
  - Learnable
    - faster the 2nd time & so on
  - Memorable
    - from session to session
  - Flexible
    - multiple ways to do tasks
  - Efficient
    - perform tasks quickly
  - Robust
    - minimal error rates
    - good feedback so user can recover
  - Discoverable
    - learn new features over time
  - Pleasing
    - high user satisfaction
  - Fun

Who Creates UIs?

- A team of specialists (ideally)
  - graphic designers
  - interaction / interface designers
  - information architects
  - technical writers
  - marketers
  - test engineers
  - usability engineers
  - software engineers
  - customers

In this course you will wear the hats of many of these specialists.



There are multiple strands, sometimes in parallel, sometimes cross-fertilizing.

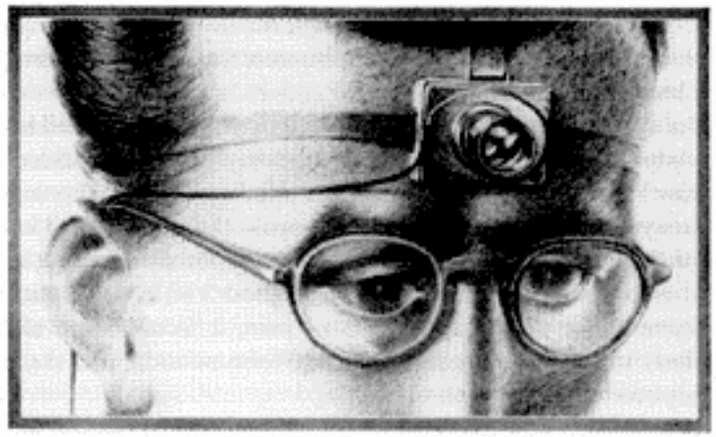
* Goal is not to advocate, but explain.

Walter Gropius
“Form Follows Function”
Design for People, design for manufacturing.
Le Corbusier’s assertion that “a house is a machine for living in.”
http://en.wikipedia.org/wiki/Bauhaus

Among other things, famous for modernist typography. (directed by Jan Tschichold)

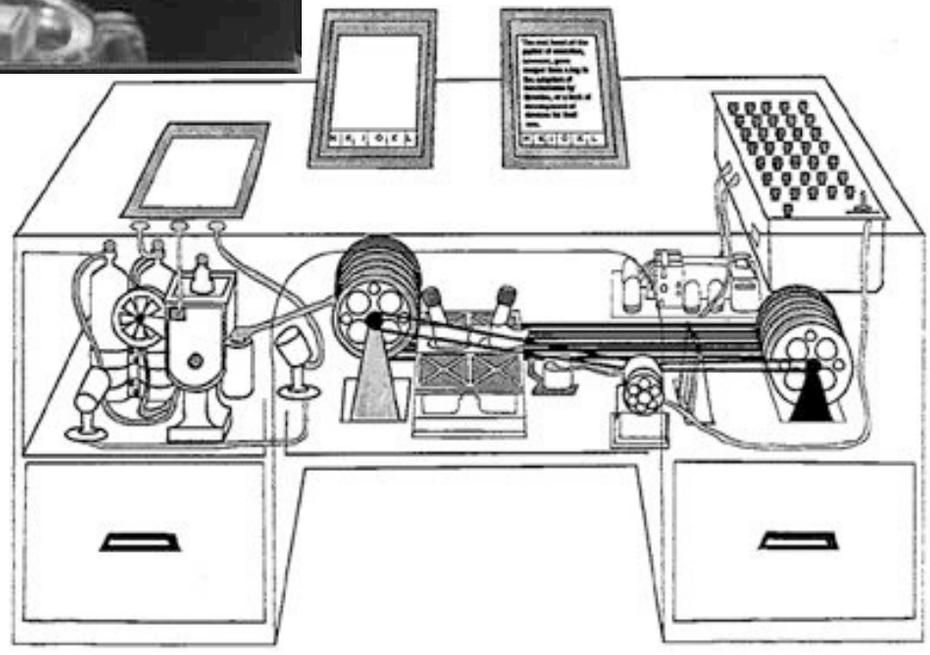
Then, in 1933, the Nazi party comes to power, forcing the Bauhaus to close. many such as Walter Gropius, eventually land in the US, especially at Harvard and in Chicago.

Asymmetric, san serif typography.



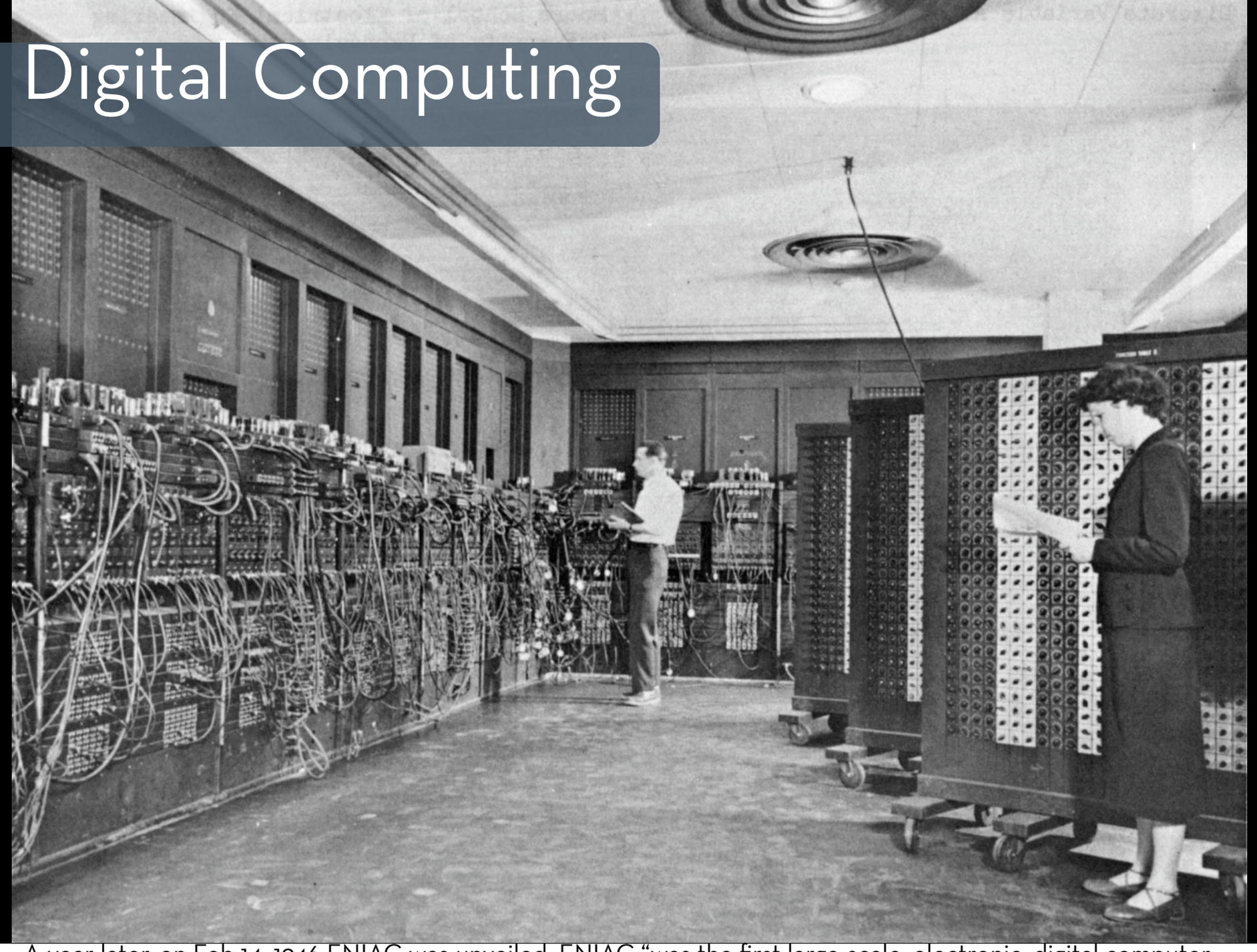
A scientist of the future records experiments with a tiny camera fitted with universal-focus lens. The small square in the eyeglass at the left sights the object (*LIFE* 19(11), p. 112).

Vannevar Bush
As We May Think



WWII is ending
Capturing, Storing, Retrieving, Sharing Information
Interactive!
Human-Centered
Founds NSF/DARPA
- was Fred Terman's advisor
- Sets up the notion of Gov't funding (NSF/DARPA)
- and of University research at scale as forming the leading edge of applied research

Digital Computing



A year later, on Feb 14, 1946 ENIAC was unveiled. ENIAC “was the first large-scale, electronic, digital computer capable of being reprogrammed to solve a full range of computing problems”

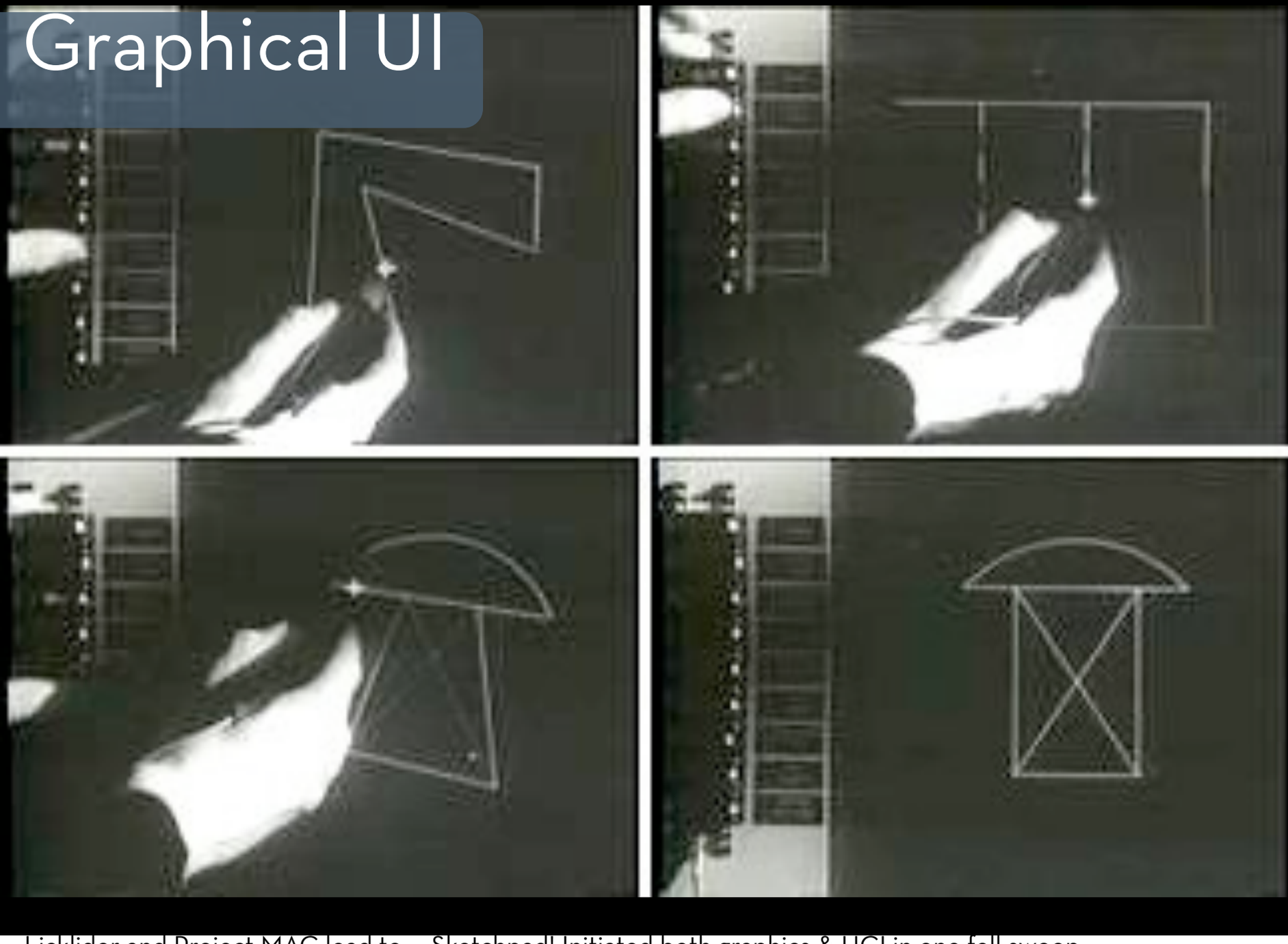
Unveiled on Feb 14, 1946. Designed by John Mauchly and J. Presper Eckert. It weighed almost 30 tons. Input was possible from an IBM card reader, while an IBM card punch was used for output.

Compilers

Now, this idea of creating tools to empower users has a long and storied history, beginning with Grace Hopper's invention in the early 1950s of the first compiler. What's inspirational for me is that she conceptualized how improved tools could provide a much wider audience with access to computation.

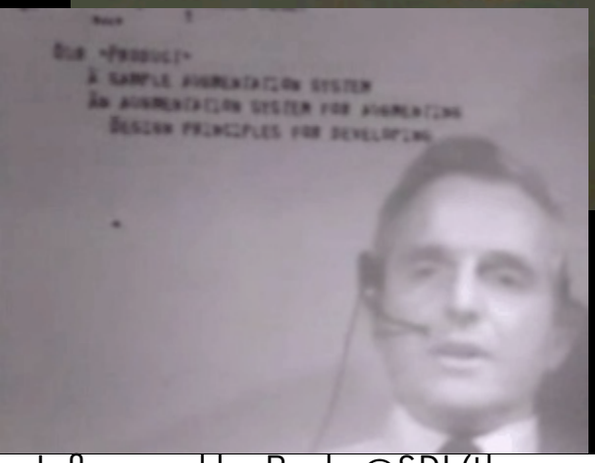
In the intervening years, good programming environments for the desktop and web enabled legions of developers to create the content that helped put a PC on every desk, and the goal of my group's research is to enable an analogous success for ubiquitous computing. Specifically, our interest lies in the move from tools for technology experts toward tools for domain experts, designers.

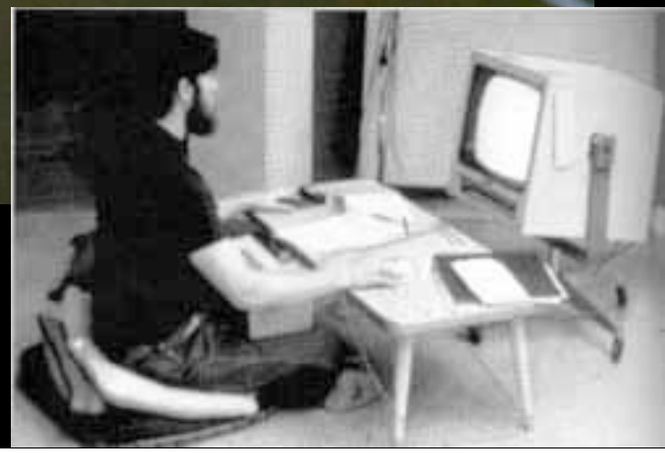
Graphical UI



Licklider and Project MAC lead to … Sketchpad! Initiated both graphics & HCI in one fell swoop.
Was also Alan Kay's advisor.

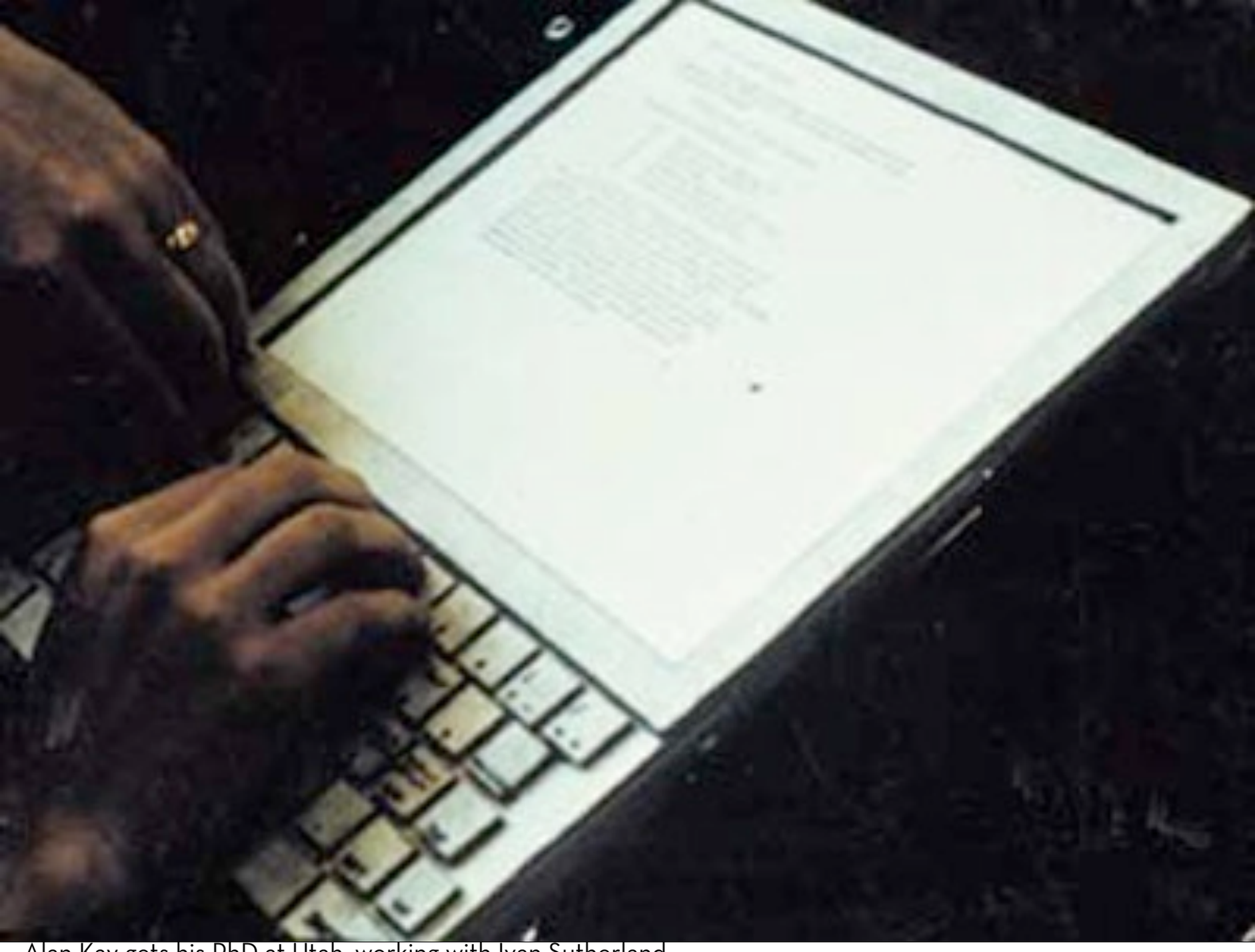
Mouse, Hypertext





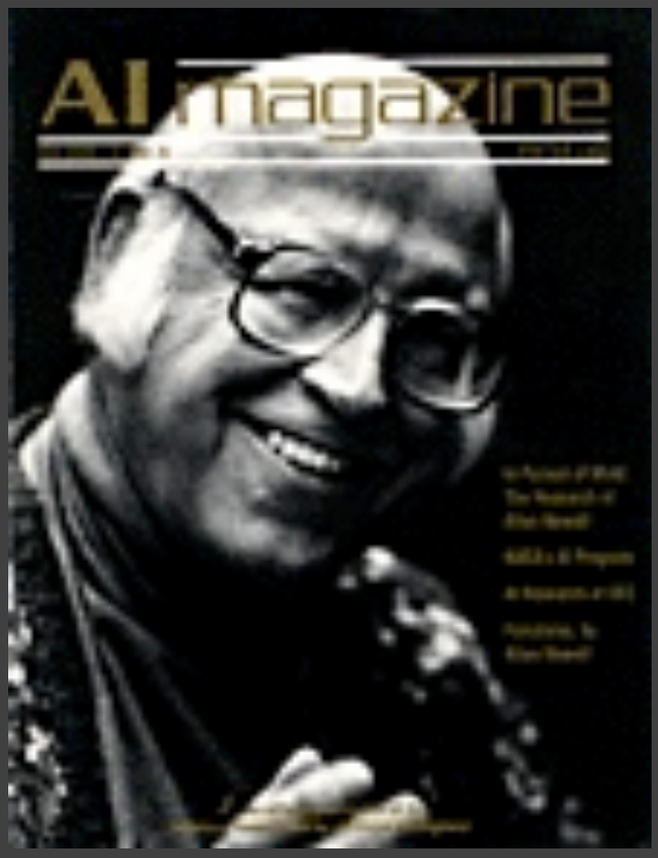
Influenced by Bush, @SRI (then part of Stanford)

- Hypertext
- Mouse – did informal testing, tried multiple versions
- Fall Joint Computer Conference



Alan Kay gets his PhD at Utah, working with Ivan Sutherland.
Spends two years at SAIL, then leaves for newly created PARC, headed by Bob Taylor.

AIP MEMO 1



Xerox
Note 1
(Correction Copy)

Allen Newell
(retyped 11 Feb 73)

Notes on a Proposal for a Psychological Research Unit

The purpose of these notes, of which this is the first, is to act as a working vehicle to explore the notion of a psychological laboratory within a computer science oriented industrial research laboratory. The specific context is the Xerox Research Laboratory in Palo Alto.

I consider these notes to be working documents -- not the record of prior analysis, but an integral part of an analysis in progress. Hence ideas expressed in them may be exploratory and stipulative, to be contradiced by ideas expressed subsequently. They may also be somewhat discursive.

Basic proposition. The central idea that these notes are to explore is contained in a set of somewhat independent propositions:

(1) There is emerging a psychology of cognitive behavior that will permit calculation of behavior in new situations and with new humans (called information processing psychology currently).

(2) Several of the tasks that are central to the activities of computing -- programming, debugging, etc. -- are tasks that appear to be within the early scope of this emerging theory.

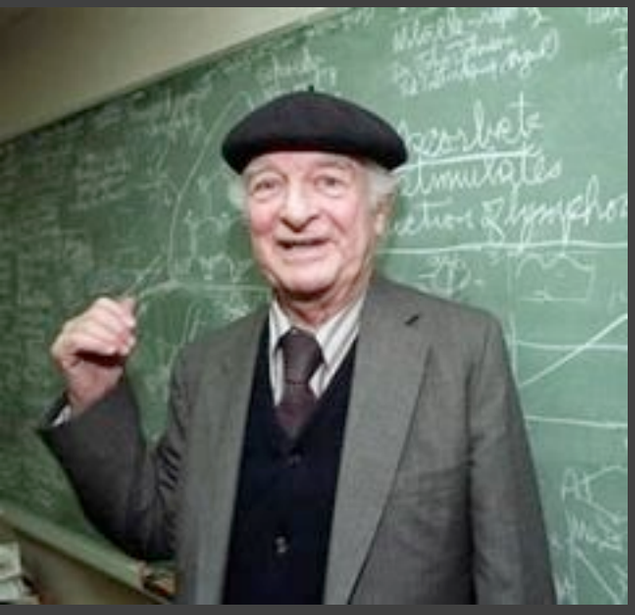
(3) Computer science in general is extremely one-sided (for understandable reasons) in the treatment of its phenomena: almost no effort goes into understanding the nature of the human user. This applies to the design of programming languages, debugging systems, operating systems, etc.

(4) There is a substantial payoff (in dollars) to be had by really dosigning systems with detailed understanding of the way the human must process the information attendant thereto.

Emerging theory permits calculation of behavior.
Computing tasks within early scope of theory.
Computer science one-sided.
Payoff for knowing how humans process.
An Applied Psychology Unit would is ultimately profitable.

“The best way to have a good idea is to have lots of ideas.”

-Linus Pauling



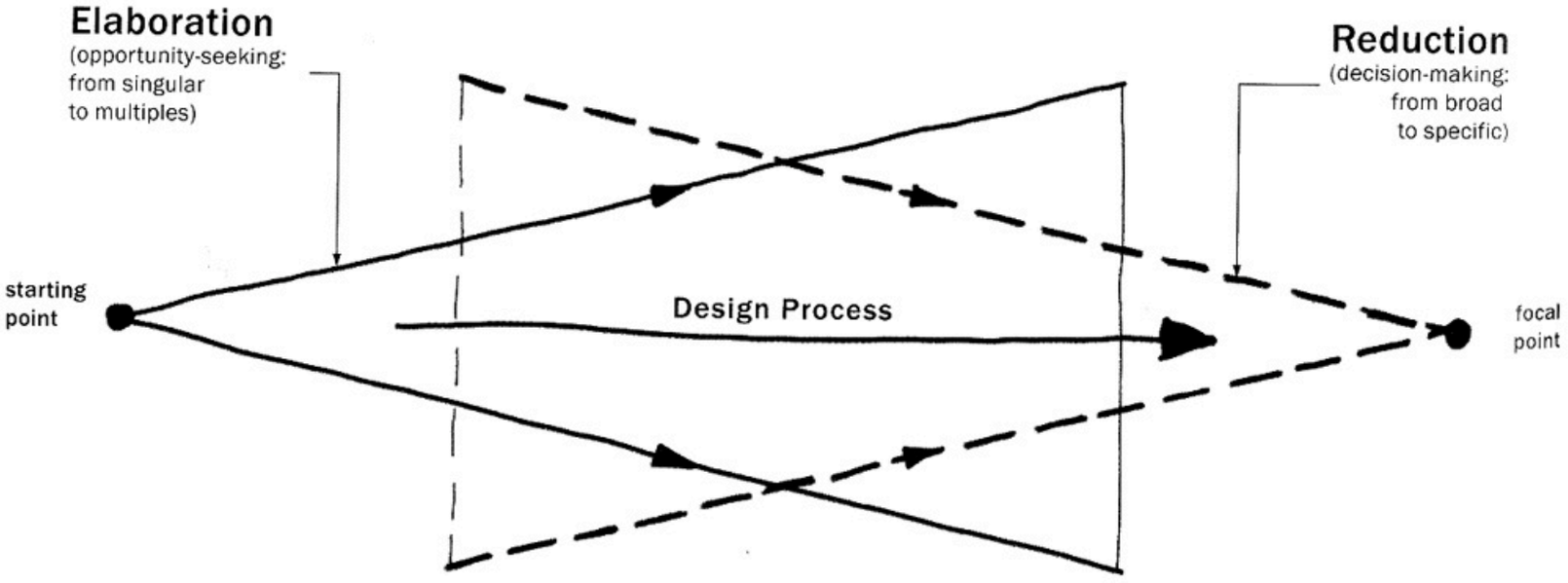
Linus Pauling may be the premier chemist of the twentieth century. He was awarded the Nobel Prize for his work on describing the nature of chemical bonds.

What his work philosophy shares with that of professional de signers is the practice of trying out multiple alternative ideas, approaches, solution strategies. (rewrite)

Prototypes for the Microsoft mouse From Moggridge, Designing

There are three specific ways in which construction of multiple alternatives is important in design:

First, designers may build dozens of prototypes **to get a more complete understanding of a design space**.
For example, Paul Bradley at IDEO built about eighty foam models for the original Microsoft mouse to quickly explore different directions.



[Buxton, Sketching User Experiences]

Bill Buxton and many other reflective designers see the core of design as consisting of two activities: generating multiple possible solutions to a problem (divergence), followed by a selection of desirable solutions from that set (or convergence).

Inspiration

“Good artists borrow, great artists steal”
- Pablo Picasso

Les Demoiselles d'Avignon

19th century Fang sculpture

Self-assessment

You'll get better with time
Our goal is for this experience to be authentic
(It's more work for us)
The TAs are your safety net. They'll steer you right if you go wrong.
You can use the rubric to guide your work.

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