### CS160: User Interface Design

#### Historical Perspective

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<th>4/12/2010</th>
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<td>Berkeley University of California</td>
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#### Due Soon

- **Team Assessment (Apr 19)**
  - Short individual assignment
  - Tell us how your team functions

- **Pilot Usability Study (Apr 19)**
  - Refine your implementation
  - Evaluate your implementation

### Topics

- **Precursors**
  - 1940's Early Visions
  - 1960's Visionary Demos
  - 1970's Personal Computing
  - 1980's Graphical User Interfaces
  - 1990's Mobile and Ubiquitous
Astrolabe (Middle Ages)

Convenient interface to complex computation

Mechanical Control & Computation

Jacquard Loom (1804)

Babbage Difference Engine (1849)

Hollerith Punch Cards (1890)


Teletype (ca. 1910)
1940's Early Visions

ENIAC (1943)
World's first numerical integrator and computer

Harvard Mark I (1944)
55 feet long, 8 feet high, 5 tons

Harvard Mark I (1944)

Hardware
- Physical switches (before microprocessors)
- Paper tape

Uses
- Ballistics calculations
- Simple arithmetic & fixed calculations (before programs)
- 3 seconds to multiply
Adm. Grace Murray Hopper
First programmer of Mark I

Vannevar Bush
Name rhymes with "Beaver"
Faculty member MIT
Coordinated WWII effort with 6000 US scientists
Social contract for science
Federal government funds universities
Universities do basic research
Research helps economy & national defense

As We May Think
Published in the Atlantic Monthly in 1945!
What will the computer of the future look like?
Wearable cameras for photographic records
Encyclopedia Britannica for a nickel
Automatic transcripts of speech
Memex
Trails of discovery
Direct capture of nerve impulses
Memex

Store all personal books, records, communications
Items retrieved through indexing, keywords, cross references...
Can annotate text with margin notes, comments...
Can construct a trail through the material and save it
Acts as an external memory

1960's Visionary Demos

Context - Computing in 1960s

Transistor (1948)
ARPA (1958)
Timesharing (1950s)
Terminals and keyboards

Computers still primarily for scientists and engineers
Sketchpad (1963)

Ivan E Sutherland’s PhD thesis
Modern pen-based system
CAD design
3D modeling
Key: Interactivity
Real-time computing was non-existent

Ivan Sutherland (1938 - )
Established Computer Graphics
Turing award 1988
Now a fellow at Sun and until recently a visiting Professor at Berkeley

Doug Engelbart (1925 - )

Strongly influenced by Bush
How would you implement the Memex in 1963?

NLS: oNLine System (1968)

1968 Fall Joint Computer Conference (SF)
Demonstrated NLS to 1000 computer scientists
Video screen, chording keyboard, mouse, videoconferencing, hyperlinking, word processing, email,
User testing
Chording Keyboard and Mouse

Advantages/Disadvantages?

Doug Engelbart (1925 - )
Graduate of Berkeley (EE '55)
bi-stable gaseous plasma digital devices
Stanford Research Institute (SRI)
Augmentation Research Center 1959
ARPA funding in 1963
Starts work on NLS
Funding dwindles in 70's, AI↑ HCI ↓
McDonnell-Douglas 1984-1989
Worked on open hypertext systems
Started Bootstrap institute in 1989
Turing award 1997

1970's Personal Computing

Altair (1975)

Apple I (1976)

Personal Computers

VisiCalc (Bricklin, 1979)

1980's Graphical User Interfaces
Xerox Star (1982)

Bitmapped display, windows, icons, menus, pointer, desktop, direct manipulation, WYSIWYG …

Designing the Star

Design team developed new methodology
Task analysis
Wide range of users
Usage scenarios
Decomposition of design:
Display and control interface
User’s conceptual model
Many prototyping cycles

User centered design

Star → Mac

But the Star was expensive and slow ($25k).
Steve Jobs visits PARC in 1979
Sees Alto (precursor to Star)
Lisa ships in 1983 at $10,000,
1-button mouse
Menu bar (instead of pop-up menus)
Fails in marketplace

Macintosh ships in 1984 at $2500
Most consistent WIMP UI
Look and feel guidelines
Personal computing market changes for good

1990’s Mobile & Ubiquitous
Personal Digital Assistants

Apple Newton (1993)

Palm Pilot (1996)

Mobile Devices

Ubiquitous Computing (1991)

Marc Weiser’s vision

100s of computers work together

Will disappear (invisible)

Context awareness through active badges

Privacy and security
Marc Weiser (1952 – 1999)

Ph.D Univ. of Michigan 1979
Prof at Univ. of Maryland 79-87
Joined Xerox PARC 1987
Head of Computer Science Lab 1988

Coined term “ubiquitous computing” in 1988

What's Next?

Smart rooms, cars & homes
Wearable computers
Multimodal and tangible UIs
Context-aware and “anywhere” interfaces

Summary

Many seminal ideas came from early years of computing
Considering the user leads to new ideas
Innovation happened in bursts
A modern design process led to GUI (the Xerox Star)
User-centered design
Some appealing kinds of interaction haven’t taken over
VR
Speech
Agents
Beware naïve models of human behavior

Next Time

Design Help and Program Flow

The Need for Web Design Standards, Usert.com
Jakob Nielsen.