CS 160: Lecture 2

Professor John Canny
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Personalities:

* Vannevar Bush - Universal information access
* J.C.R. Licklider - Networking, Agents
* Ivan Sutherland - Sketchpad
* Doug Engelbart - Mouse, GUI, Word proc...
* Ted Nelson - Hypertext
* Alan Kay - OO programming, Laptops
* Don Norman - Cognitive principles
* Jacob Nielsen - Usability
History of HCI

✔ Systems:

* Memex - 1945 (concept)
* Sketchpad - 1963
* NLS (oNLine System) - 1963-68
  + (mouse '64)
* Xerox Alto '72, Star '81
* Grid Compass 1983
* Apple Lisa '83, Mac '84, NeXT '88
* Powerbook 1991
* HTML, HTTP 1994

1968
Dynabook
1983
Politics

* Military Funding
  + NDRC - OSRD - ARPA - DARPA
* Elite universities (MIT, Stanford, CMU, Berkeley)
* NSF 1950 → present
* Xerox PARC - 1970 → present
* Apple - NeXT
* Hypertext 1967...
  + Prototypes: HES 1969, ZOG 1975...
  + Xanadu 1981, not funded 'til 87 (Hypercard 1987)
  + 1989 Xanadu -> Autodesk, WWW proposal
Vannevar Bush (1890-1974)

* Engineer by training (MIT)
* Differential analyzer - 1930
* Led computing research in '30s
* Created military research
  + NDRC '40, OSRD '41-47
* Managed nuclear weapons research throughout the 40’s
* Wrote “science - the endless frontier” 1945
* Military consultant through 50’s
Bush’s “as we may think” 1945
  * Proposed the “Memex” a very modern computer
Bush’s Memex

- individuals store all personal books, records, communications
- items retrieved rapidly 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
Post-Memex

✔ After WWII, Bush continued to push for analogue computers (and against digital).
✔ You can’t win ‘em all!
J.C.R. Licklider
1915-1990

✔ Ph.D. 1942 Rochester, Psychologist
✔ Started “Human Engineering group” at MIT’s Lincoln labs in 1951
✔ Tried to evolve psych. into a department within Electrical Engineering
✔ With ARPA sponsorship, the first CS programs were created:
  * MIT, CMU, Berkeley, Stanford
At Arpa, Licklider promoted computing research and sponsored:
  * Time-sharing
  * Networking
  * Engelbart’s and Sutherland’s online computing work
J.C.R. Licklider publications

✓ Man-computer symbiosis - 1960
✓ Libraries of the future - 1965
✓ The computer as communication device - 1968
✔ Did self-observation of his daily work.
  * Observed that much work was mundane and related to accessing and organizing information

✔ Proposed:
  * Digital libraries
  * Display screens with pen input and character recognition
  * Wall displays for collaborative work
  * Speech recognition and production for HCI
The Computer as a Communication Device - 1968

- Cooperative work with shared and individual screens
- Pen chat
- Online communities
- Agents - OLIVERs On-Line Vicarious Expediter and Responder
Networks, Time-sharing

✔ Much of Licklider’s sponsored research was unpopular in the engineering community:
✔ “Time-sharing is a waste of valuable computer time”
✔ “Why are we doing this?”
  * BBN engineer about the first computer network
Ivan Sutherland
1938 -

✔ MIT Ph.D. in 1963
✔ Ph.D. work was “Sketchpad”
✔ Pioneered computer graphics and CAD
✔ Started Evans and Sutherland in 1968
Doug Engelbart
1925 -

✓ Ph.D. UC Berkeley (EE) in 1955
✓ Thesis on “plasma digital devices”
  - a way into computing
✓ Strongly influenced by Bush’s article
✓ Moved to SRI, started formulating
  human augmentation ideas in 1959
✓ Funding from ARPA in 1963
✓ NLS (oNLine System) demo 1968
Engelbart’s innovations

✓ NLS (1968) featured:
  * Video screen and keyboard
  * Mouse and chordal keyboard
  * Videoconferencing
  * Hypertext linking
  * Word processing
  * E-mail
  * A window system
  * User testing!
Engelbart’s work

- Continued at SRI, worked on network extensions
- Funding dwindles through the 70’s..., AI ↑ HCI ↓
- NLS project sold in 1977 to Tymshare
  * Half of the (~40) NLS engineers moved to Xerox PARC, others to Tymshare
  * Engelbart fired from SRI in ’77, moves to Tymshare
- Migrated to McDonnell-Douglas in 1984, until 1989 pushed for open hypertext systems
- Started Bootstrap institute in 1989
Engelbart’s work

✔ 80s and 90s: Personal computing and the web happen
✔ Engelbart Receives the ACM Turing award in 1997

“For an inspiring vision of the future of interactive computing and the invention of key technologies to help realize this vision”
Ted Nelson
1937 -

✔ M.A. Sociology, Harvard ’63
✔ Coined “hypertext” in 1960
✔ Worked with Van Dam at Brown on HES - 1967
✔ Designed Xanadu in 1981
  * Global hypertext
  * Pay-per-view
  * Not funded until 1987
✔ Hypertext as a more natural medium than linear text for creative writing
✔ “I build paradigms. I work on complex ideas and make up words for them. It is the only way.”
Alan Kay
1940 -

✓ In 1968, met Seymour Papert (LOGO) in the MIT AI Lab.
  - kids can program!
✓ Moved to Xerox PARC in 1972
✓ Started developing “Smalltalk”, in the Learning Research Group
✓ First general OO programming language
✓ Influenced by Simula
  * Engineers can program!
✔ Dynabook (laptop computer) conceived in 1968, well ahead of its time.

✔ As interim steps, Kay develops the Xerox Alto (1972) and Star, the first real personal computers.
The Star (1981 and begun in 1975) in particular was a very advanced machine. It had most of the “WIMP” elements we know today.

The Star was the result of extensive user testing, and its design has stood the test of time (Liddle article).

Many design features were better than its successors (e.g. object-oriented editing features)
The Star design team developed a new methodology for system design:

- Task analysis
- Wide range of users
- Usage scenarios
- Decomposition of design:
  * display and control interface
  * User’s conceptual model
- Many prototyping cycles
- Desktop metaphor, direct manipulation, WYSIWYG
Alan Kay @ PARC

- But the Star was expensive and slow ($25k).
- Steve Jobs and Apple engineers visited PARC in 1979, and that set the path for Apple
- 15 PARC engineers migrated to Apple
- Apple Lisa ships in 1983 at $10,000, and fails in the marketplace

- The Apple Macintosh ships in 1984 at $2500, and the personal computing market changes for good
Kay worked briefly at Atari, then became an Apple fellow in 1984. Often visited the MIT Media Lab in the 80's and 90's.

In 1996 he left for Disney to become a Disney fellow.

Left Disney because of cutbacks, joined HP labs in 2002.
Alan Kay quote

✓ "Don't worry about what anybody else is going to do... The best way to predict the future is to invent it. Really smart people with reasonable funding can do just about anything that doesn't violate too many of Newton's Laws!"
Small Devices

✔ The Apple Newton was the first "PDA" (1993) but didn’t succeed commercially.
✔ Still popular, though out of production.
✔ Has achieved a kind of cult status.
Jeff Hawkins was an EE with an interest in cognitive science and the brain.

Worked at GRiD.

Wrote Ph.D. proposal at Berkeley in Biophysics in 1987 - rejected.

Back to GRiDPad - first pen computer?

Developed a handwriting recognizer based on his interests in the Brain.
Next try “Zoomer” 1993 - a failure commercially
Intensive studies of Zoomer users began in 1994.
Decided the PDA should be a paper replacement, not a PC replacement.
Switched to graffiti.
Shrank to pocket size.
Unveiled the Palm Pilot in 1994.
Tablet PC

✔ Excellent writing surface, pen, digital ink.
✔ Compromise on:
  * Keyboard
  * Weight
  * Battery life
✔ Still trying to be a PC.
✔ Many formats, will natural selection choose a winner? - or is it headed the way of the Newton?
Smart phones

✔ Qualcomm’s PDQ 1999 (Jacobs) - phone with a complete Palm Pilot inside. Other models followed.
✔ Latest generation of phones support “applets”.
✔ Motorola J2ME phones.
✔ Qualcomm’s BREW (binary) environment.
✔ GPS will enable location-based services.
HCI principles

✔ Don Norman introduced many principles from cognitive science:
  ✔ Mental representation.
  ✔ Gibson’s affordances.
  ✔ Direct Manipulation (WYSIWYG).
  ✔ Human-centered design.
HCI principles

✔ Jacob Nielsen fostered a science of “Usability”.
✔ Structed processes for evaluation and development of UIs and web sites.
✔ Pioneered “heuristic evaluation” and other low-cost usability methods.
The future?

✔ Smart rooms

✔ Multi-modal interaction

✔ Wearable computers
Many seminal ideas came from the very early years of computing.

Considering the user (even if it's yourself) leads to new ideas.

Innovation happened in bursts, depending on funding and the right environment.

A modern design process led to a very modern design (the Xerox Star).