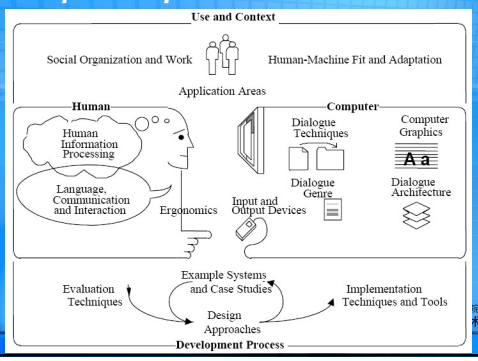
Interaction Design : Recap

- Interaction design
  - Designing interactive products to support people in their everyday and working lives.
- Goals of ID
  - Allows users to carry out tasks safely, effectifvely, efficiently, and enjoyably.

HCI Map: Recap



RECAP: Why is HCI important?

- Computers (in one way or another) now affect every person in society
- Product success may depend on ease of use, not necessarily power

Why Study Human Use of Computers?

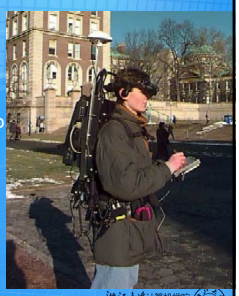
- **Personal view:**
  - people view computers as appliances, and want it to perform as one

Why Study Human Use of Computers?

- **Marketplace view:**
  - everyday people using computers
    - -- now expect "easy to use system"
    - -- not tolerant of poorly designed systems
    - -- little vendor control of training
    - -- heterogeneous group
  - if product is hard to use, people will seek other products
    - -- eg Mac vs PC

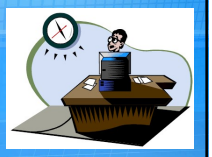
Why Study Human Use of Computers?

- **The *system view:***
  - complex human
  - complex computer
  - complex interface between the two



Why Study Human Use of Computers?

- **The human factors view:**
  - humans have necessary limitations
  - errors are costly in terms of
    - -- loss of time
    - -- loss of money
    - -- loss of lives in critical systems
    - -- loss of morale
  - design can cope with such limitations!



Why Study Human Use of Computers?

- **The social view:**
  - **Computers contribute to critical parts of our society, and cannot be ignored**
    - -- educate our children
    - -- take medical histories and provide expert advice
    - -- keep track of our credit worthiness
    - -- play(?) war games (and help form policies)
    - -- control air and ground traffic flow
    - -- book travel
    - -- control chemical/oil/nuclear plants
    - -- control space missions
    - -- assist humans with their everyday tasks (office automation)
    - -- control complex machines (aircraft, space shuttles, super tankers)
    - -- help control consumer equipment (cars, washing machines)
    - -- entertainment (games, intellectual stimulation)….

Why Stud…ters?

- **Business …**
  - - to use huma…
  - - the human … software costs

Why Study Human Use of Computers?

- **HCI is worth studying because it aligns both human interests and economic interests.**
- **The HCI discipline includes the study of:**
  - the use and context of computers
  - human characteristics
  - computer system and interface architecture
  - the development process

History of HCI

- Key people, events and ideas

History of HCI

- References
  - Saul Greenberg, **History of Human Computer Interaction**
    - http://pages.cpsc.ucalgary.ca/~saul/hci_topics/topics/history.html
  - **Brad A. Myers. "A Brief History of Human Computer Interaction Technology." *ACM interactions*. Vol. 5, no. 2, March, 1998. pp. 44-54.**
  - …

History of HCI

- Main theme
  - Human → computer
    |
    |
    |
  Computer → Human

History of HCI

- Five stages
  1. Manual work
  2. Command line
  3. GUI
  4. Network UI
  5. Multi-modal UI

History of HCI

- Input/output devices

Year	Input/Output/Information
1970	Keyboard, alphanumeric display, text
1985	Keyboard/mouse, graphics display, icons
2000	Handwriting/speech recognition, speech synthesis, multimodal
2015	Position sensing/eye tracking, stereo audio/video, 3d virtual reality

History of HCI

- Input/output devices
- The lesson
  - keyboards & terminals are just artifacts of today's technologies

History of HCI

- Input/output devices
- The lesson
  - keyboards & terminals are just **artifacts** of today's technologies

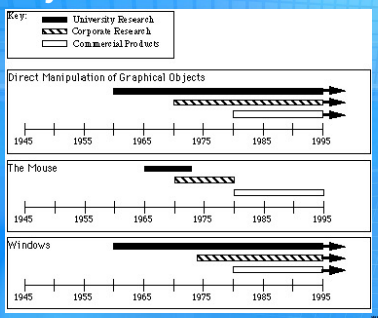
History of HCI

- Input/output devices
- The lesson
  - keyboards & terminals are just artifacts of today's technologies
  - new input/output devices will change the way we interact with computers

History of HCI

- Basic Interactions
  - Direct Manipulation of graphical objects
  - The Mouse
  - Windows

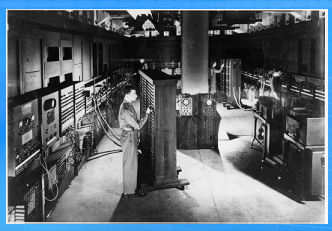
History of HCI



History of HCI

- Eniac (1943)

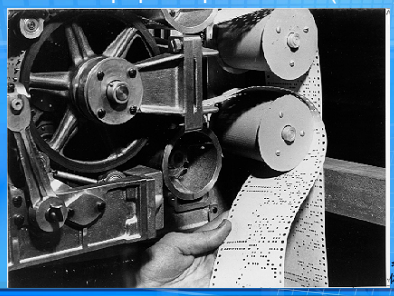
A general view of the ENIAC, the world's first all Electronic Numerical Integrator And Computer.



University of Pennsylvania

History of HCI

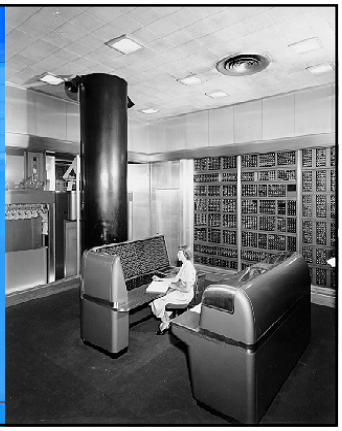
- The Mark I paper tape readers (1944)



History of HCI

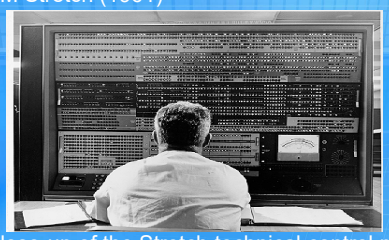
- IBM SSEC (1948)

IBM's Selective Sequence Electronic Calculator (SSEC), built at IBM's Endicott facility under the direction of Columbia Professor Wallace Eckert and his Watson Scientific Computing Laboratory staff in 1946-47, shown here after it was moved to the new IBM Headquarters Building at 590 Madison Avenue in Manhattan [4], where it occupied the periphery of a room 60 feet long and 30 feet wide [4:2] (Herb Grosch [58] estimates the dimensions of its "U" shape at 60 + 40 + 80 feet, 180 feet in all, about half a football field!)



History of HCI

- IBM Stretch (1961)



A close-up of the Stretch technical control panel

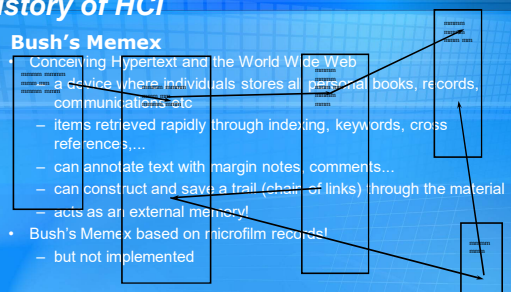
History of HCI

- Vannevar Bush (1945)
  - 1890-1974
  - "As we may think" article in Atlantic Monthly
    - Doug Engelbart (mouse)
    - Ted Nelson (hypertext)
  - Identified the information storage and retrieval problem: new knowledge does not reach the people who could benefit from it

"publication has been extended far beyond our present ability to make real use of the record"

History of HCI

- **Bush's Memex**
  - Conceiving Hypertext and the World Wide Web
  - a device where individuals stores all personal books, records, communications etc
    - items retrieved rapidly through indexing, keywords, cross references,...
    - can annotate text with margin notes, comments...
    - can construct and save a trail (chain of links) through the material
    - acts as an external memory!
  - Bush's Memex based on microfilm records!
    - but not implemented



History of HCI

- J.C.R. Licklider(March 11, 1915 – June 26, 1990)

Much like Vannevar Bush, J.C.R. Licklider's contribution to the development of the Internet consists of ideas not inventions. He foresaw the need for networked computers with easy user interfaces. His ideas foretold of graphical computing, point-and-click interfaces, digital libraries, e-commerce, online banking, and software that would exist on a network and migrate to wherever it was needed. He has been called, "Computing's Johnny Appleseed," a well-deserved nickname for a man who planted the seeds of computing in the digital age.

History of HCI

- J.C.R. Licklider (1960)
  - Outlined "man-computer symbiosis"

"The hope is that, in not too many years, human brains and computing machines will be coupled together very tightly and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today."

History of HCI

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n.[生]共生(现象), 合作(或互利,互依)关系

History of HCI

- J.C.R. Licklider (cont.)
  - Produced goals that are pre-requisite to "man-computer symbiosis"

History of HCI

- J.C.R. Licklider (cont.)
  - Immediate goals:
    - time sharing of computers among many users
    - electronic i/o for the display and communication of symbolic and pictorial information
    - interactive real time system for information processing and programming
    - large scale information storage and retrieval

History of HCI

- J.C.R. Licklider (cont.)
  - intermediate goals:
    - facilitation of human cooperation in the design & programming of large systems
    - combined speech recognition, hand-printed character recognition & light-pen editing

History of HCI

- J.C.R. Licklider (cont.)
  - long term visions:
    - natural language understanding (syntax, semantics, pragmatics)
    - speech recognition of arbitrary computer users
    - heuristic programming

Syntax: The study of the rules whereby words or other elements of sentence structure are combined to form grammatical sentences.
Semantics: The study or science of meaning in language forms.
Pragmatics: The study of language as it is used in a social context and affects the interlocutors (对话者) and their behavior.

History of HCI

•Mid '60s
- computers too expensive for a single person

•Time-sharing
- the illusion that each user was on their own personal machine
- led to immediate need to support human-computer interaction
  - dramatically increased accessibility of machines
  - afforded interactive systems and languages *vs* batch "jobs"
  - community as a whole communicated through computers (and eventually through networks) via email, shared files, etc.

History of HCI

- Ivan Sutherland's SketchPad-1963

History of HCI

- Ivan Sutherland's SketchPad-1963
  - Sophisticated drawing package

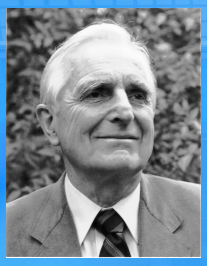
  introduced many ideas/concepts now found in today's interface
  - **hierarchical structures** defined pictures and sub-pictures
  - **object-oriented programming**: master picture with instances
  - **constraints**: specify details which the system maintains through changes
  - **icons**: small pictures that represented more complex items
  - **copying**: both pictures and constraints
  - **input techniques**: efficient use of light pen
  - **world coordinates**: separation of screen from drawing coordinates
  - **recursive operations**: applied to children of hierarchical objects

History of HCI

- Ivan Sutherland's SketchPad-1963
  - Parallel developments in hardware:
  - "low-cost" graphics terminals
  - input devices such as data tablets (1964)
  - display processors capable of real-time manipulation of images (1968)
  - HMD (1968)
  - ACM Turning Award (1988)

History of HCI

- Douglas Engelbart



1997 ACM Turning Award

History of HCI

- Douglas Engelbart
  - The Problem (early '50s)

"...The world is getting more complex, and problems are getting more urgent. These must be dealt with collectively. However, human abilities to deal collectively with complex / urgent problems are not increasing as fast as these problems.

If you could do something to improve human capability to deal with these problems, then you'd really contribute something basic."

...Doug Engelbart

History of HCI

- Douglas Engelbart
  - The Vision (Early 50's)

...I had the image of sitting at a big CRT screen with all kinds of symbols, new and different symbols, not restricted to our old ones. The computer could be manipulated, and you could be operating all kinds of things to drive the computer

... I also had a clear picture that one's colleagues could be sitting in other rooms with similar work stations, tied to the same computer complex, and could be sharing and working and collaborating very closely. And also the assumption that there'd be a lot of new skills, new ways of thinking that would evolve "

...Doug Engelbart

History of HCI

- Douglas Engelbart
  - A Conceptual Framework for Augmenting Human Intellect (SRI Report, 1962)

"By *augmenting man's intellect* we mean increasing the capability of a man to approach a complex problem situation, gain comprehension to suit his particular needs, and to derive solutions to problems.

One objective is to develop new techniques, procedures, and systems that will better adapt people's basic information-handling capabilities to the needs, problems, and progress of society."

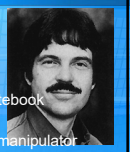
...Doug Engelbart

History of HCI

- Douglas Engelbart (1964)

History of HCI

- The Personal Computer
  - Alan Kay (1969)
    - Dynabook vision (and cardboard prototype) of a notebook computer:

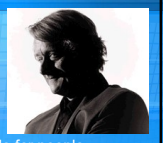


"Imagine having your own self-contained knowledge manipulator in a portable package the size and shape of an ordinary notebook. Suppose it had enough power to out-race your senses of sight and hearing, enough capacity to store for later retrieval thousands of page-equivalents of reference materials, poems, letters, recipes, records, drawings, animations, musical scores..."

- Smalltalk (OOP)
- Multi-window system

History of HCI

- The Personal Computer
  - Ted Nelson
    - 1974: "Computer Lib/Dream Machines"
    - popular book describing what computers can do for people (instead of business!)
    - Coined the term "hypertext"
    - "one of the most influential contrarians in the history of the information age."
    - His four maxims
      - Most people are fools.
      - Most authority is malignant.
      - God does not exist
      - Everything is wrong.



History of HCI

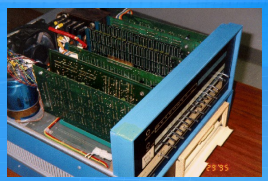
- The Personal Computer
  - Xerox PARC, mid-'70s
    - Alto computer, a personal workstation
      - local processor, bit-mapped display, mouse
    - modern graphical interfaces
      - text and drawing editing, electronic mail
      - windows, menus, scroll bars, mouse selection, etc
    - local area networks (Ethernet) for personal workstations
      - could make use of shared resources

History of HCI

- The Personal Computer
  - The MITS ALTAIR 8800 (1975)
    - **Approx. Value :** $1200
    - **First year of production :** 1975
    - **Manufacturer :** MITS (Micro Instrumentation and Telemetry Systems)
    - **Number Produced:** Unknown

History of HCI

- The Personal Computer
  - The MITS ALTAIR 8800 (1975)



History of HCI

- Commercial machines: Xerox Star-1981

•First commercial personal computer designed for "business professionals"

•First comprehensive GUI used many ideas developed at Xerox PARC
- familiar user's conceptual model (simulated desktop)
- promoted recognizing/pointing rather than remembering/typing
- property sheets to specify appearance/behaviour of objects
- what you see is what you get (WYSIWYG)
- small set of generic commands that could be used throughout the system
- high degree of consistency and simplicity
- modeless interaction
- limited amount of user tailorability

History of HCI

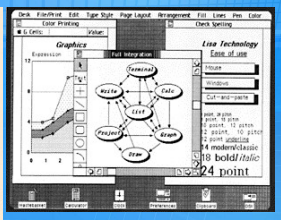
- Xerox Star (continued)
  - First system based upon usability engineering
    - inspired design
    - extensive paper prototyping and usage analysis
    - usability testing with potential users
    - iterative refinement of interface

History of HCI

- Xerox Star (continued)
  - Commercial failure
    - cost ($15,000);
      - IBM had just announced a less expensive machine
    - limited functionality
      - e.g., no spreadsheet
    - closed architecture,
      - 3rd party vendors could not add applications
    - perceived as slow
      - but really fast!
    - slavish adherence to direct manipulation

History of HCI

- Commercial Machines: Apple Lisa (1983)



History of HCI

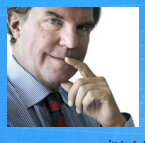
- Commercial Machines: Apple Lisa (1983)
  - based upon many ideas in the Star
    - predecessor of Macintosh,
    - somewhat cheaper ($10,000)
    - commercial failure as well

History of HCI

- Commercial Machines: Apple Macintosh (1984)
  - "Old ideas" but well done!
  - succeeded because:
    - aggressive pricing ($2500)
    - did not need to trailblaze
      - learnt from mistakes of Lisa and corrected them; ideas now "mature"
      - market now ready for them
    - developer's toolkit encouraged 3rd party non-Apple software
    - interface guidelines encouraged consistency between applications
    - domination in desktop publishing because of affordable laser printer and excellent graphics

History of HCI

- MIT Architecture Machine Group
  - Nicholas Negroponte (1969-1980+)
  - many innovative inventions, including
    - wall sized displays
    - use of video disks
    - use of artificial intelligence in interfaces (idea of agents)
    - speech recognition merged with pointing
    - speech production
    - multimedia hypertext
    - ....



History of HCI

- N.Negroponte 1990s
  - co-founder and director of the MIT Media Laboratory
  - Multi-modal UI (voice, gesture, agents, etc.)
  - founder and chairman of the One Laptop per Child non-profit association

History of HCI

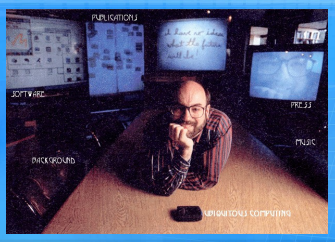
- ACM SIGCHI (1982)
  - special interest group on computer-human interaction
  - conferences draw between 2000-3000 people
- HCI Journals
  - Int J Man Machine Studies (1969)
  - many others since 1982

History of HCI

- Tim Berners-Lee 1989
  - Network UI
  - CERN, Genever
  - HTML+HTTP→ WWW
  - Director of the World Wide Web Consortium

History of HCI

- Mark Weiser 1990s
  - Xerox PARC
  - Ubiquitous Computing



History of HCI

- HCI importance result of:
  - cheaper/available computers/workstations meant people more important than machines
  - excellent interface ideas modeled after human needs instead of system needs (user centered design)
  - evolution of ideas into products through several generations
    - *pioneer* systems developed innovative designs, but often commercially unviable
    - *settler* systems incorporated (many years later) well-researched designs
  - people no longer willing to accept products with poor interfaces

Online Resources

- **ACM SIGCHI**
  - http://www.acm.org/sigchi/
  - http://www.sigchi.org/

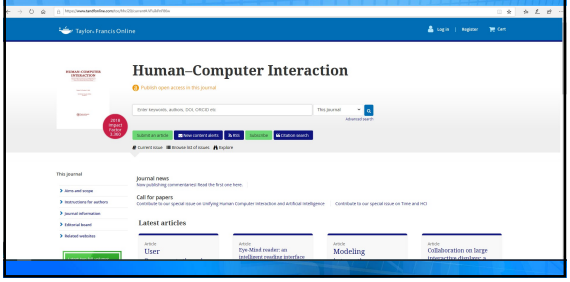
ACM SIGCHI, the ACM's Special Interest Group on Computer-Human Interaction, brings together people working on the design, evaluation, implementation, and study of interactive computing systems for human use. ACM SIGCHI provides an international, interdisciplinary forum for the exchange of ideas about the field of human-computer interaction (HCI).

Online Resources

- **Human Factors & Ergonomics Society**
  - http://www.hfes.org/web/Default.aspx
    - mission: to promote the discovery and exchange of knowledge concerning the characteristics of human beings that are applicable to the design of systems and devices of all kinds.
    - founded in 1957, has has 22 technical groups and numerous local and student chapters.

Online Resources (cont.)

- **HCI Journal**
  - http://hci-journal.com/

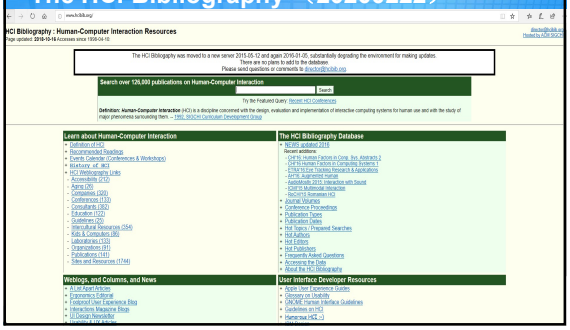


Online Resources (cont.)

- **The HCI Bibliography**
  - http://www.hcibib.org/
    - over 126,000 publications about HCI （2019.3.6）
      - over 104,000 publications about HCI （2014.2.24）
      - over 118,000 publications about HCI （2015.3.11）
    - Gary Perlman

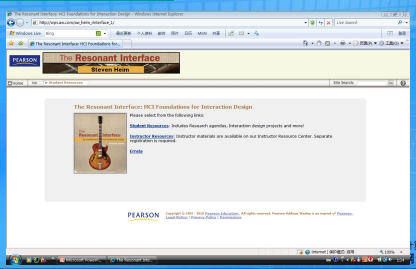
Online Resources (cont.)

- **The HCI Bibliography （20200222）**



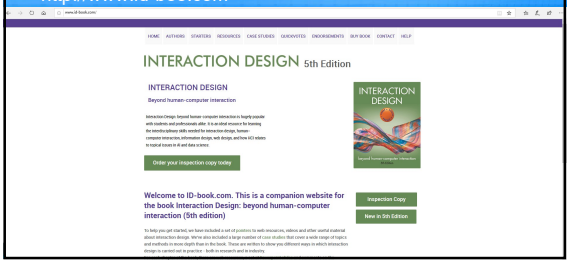
Online Resources (cont.)

- **Resonant Interface Book**
  - http://www.aw.com/heim



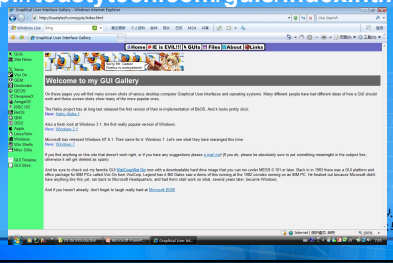
Online Resources (cont.)

- **ID Book**
  - Interaction Design: beyond human-computer interaction
  - http://www.id-boo.com



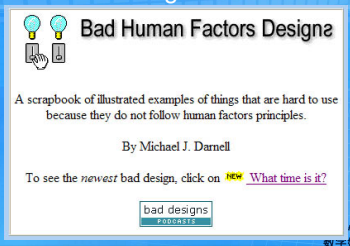
Online Resources (cont.)

- GUI gallery
  - http://toastytech.com/guis/index.html



Online Resources (cont.)

- Bad UI designs
  - http://www.baddesigns.com/



Online Resources (cont.)

- Bad UI designs
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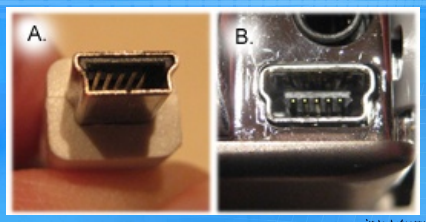

Project Team

Thank you.