

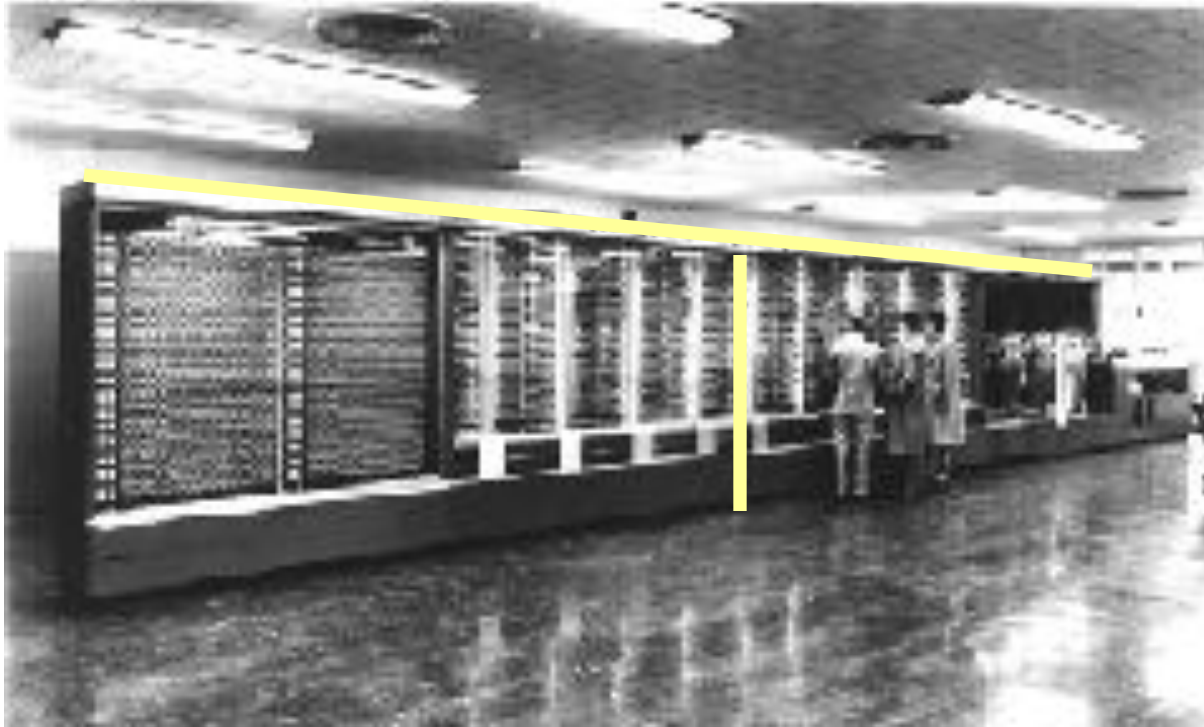


## chapter 4

# Paradigms

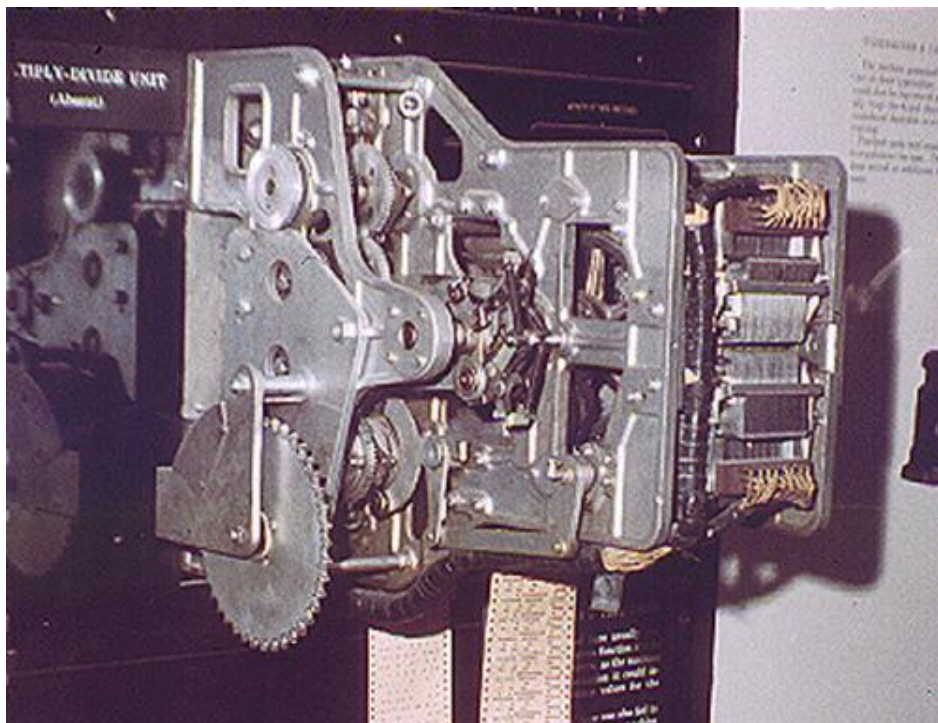
(additional materials)

# Beginnings - Computing in 1945



- Harvard Mark I
  - Picture from <http://piano.dsi.uminho.pt/museuv/indexmark.htm>
- 55 feet long, 8 feet high, 5 tons

# Context - Computing in 1945



Picture from <http://www.gmcc.ab.ca/~supy/>

- Ballistics calculations
- Physical switches (before microprocessor)
- Paper tape
- Simple arithmetic & fixed calculations (before programs)
- 3 seconds to multiply

# Batch Processing

- Computer had one task, performed sequentially
- No “interaction” between operator and computer after starting the run
- Punch cards, tapes for input
- Serial operations



# People

- Who are the people associated with various interactive paradigm shifts?

# Other Resources

- Howard Rheingold – *Tools for Thought*
  - History of interactive breakthroughs

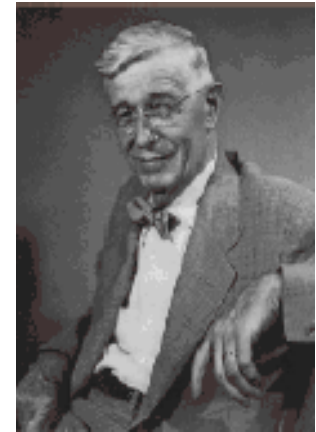


- On-line at

<http://www.rheingold.com/texts/tft/>

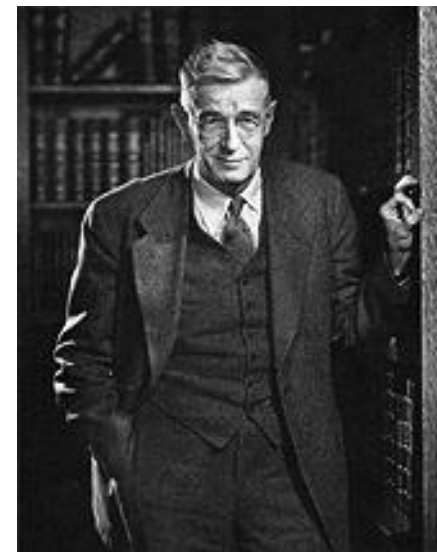
# Innovator: Vannevar Bush

- “As We May Think” - 1945 Atlantic Monthly
  - “...publication has been extended far beyond our present ability to make real use of the record.”
- Postulated **Memex** device
  - Stores *all* records/articles/communications
  - Items retrieved by indexing, keywords, cross references (now called hyperlinks)
  - (Envisioned as microfilm, not computer)
- Interactive and nonlinear components are key
- <http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm>



# More About Vannevar Bush

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





# Innovator: J. R. Licklider

- 1960 - Postulated "man-computer symbiosis"
- Couple human brains and computing machines tightly to revolutionize information handling



# Innovator: Ivan Sutherland

- **SketchPad** - 1963 PhD thesis at MIT
  - Hierarchy - pictures & subpictures
  - Master picture with instances (ie, OOP)
  - Constraints
  - Icons
  - Copying
  - Light pen input device
  - Recursive operations



# Innovator: Douglas Englebart

- Landmark system/demo:
  - hierarchical hypertext, multimedia, mouse, high-res display, windows, shared files, electronic messaging, CSCW, teleconferencing, ...

Inventor  
of mouse



# About Doug Engelbart

- Graduate of Berkeley (EE '55)
  - "bi-stable gaseous plasma digital devices"
- Stanford Research Institute (SRI)
  - Augmentation Research Center
- 1962 Paper "Conceptual Model for Human Intellect"
  - Complexity of problems increasing
  - Need better ways of solving problems



Picture of Engelbart from bootstrap.org

# Innovator: Alan Kay

- Dynabook - Notebook sized computer loaded with multimedia and can store everything
- @PARC
- Personal computing
- Desktop interface
- Overlapping windows



# Innovator: Ben Shneiderman

- Coins and explores notion of direct manipulation of interface
- Long-time Director of HCI Lab at Maryland



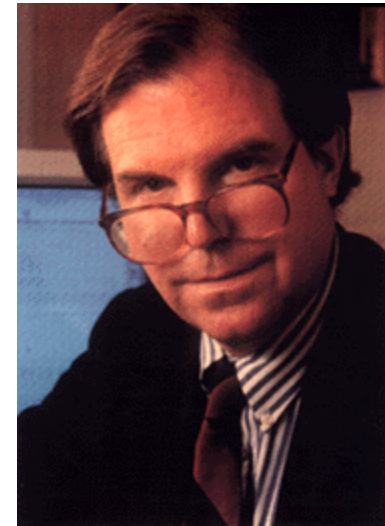
# Innovator: Ted Nelson

- Computers can help people, not just business
- Coined term "hypertext"



# Innovator: Nicholas Negroponte

- MIT Architecture Machine Group
  - '69-'80s - prior to Media Lab
- Ideas
  - wall-sized displays, video disks, AI in interfaces (agents), speech recognition, multimedia with hypertext
  - Put That There (Video)





# Innovator: Mark Weiser

- Introduced notion of *Ubiquitous Computing* and *Calm Technology*
  - It's everywhere, but recedes quietly into background
- CTO of Xerox PARC

