

# Paradigms for Interaction

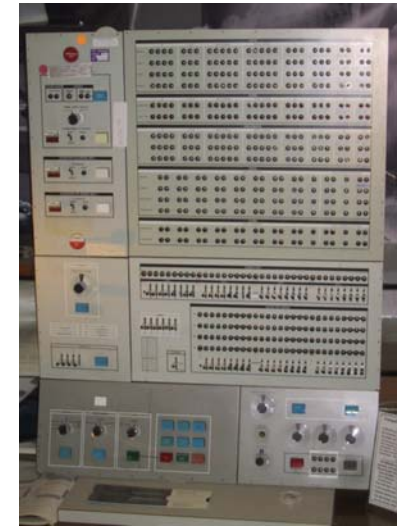
- New computing technologies arrive, creating a new perception of the human-computer relationship
  - Batch processing -> Impersonal computing
  - Time sharing -> Interactive computing
  - Networking -> Community computing
  - Graphical displays -> Direct manipulation
  - Microprocessor -> Personal computing
  - WWW -> Global information
  - Ubiquitous computing -> ???

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# Time-sharing

- 1940s and 1950s – explosive technological growth
- 1960s – need to channel the power
- Single computer supporting multiple users



IBM 360

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# Video Display Units

- More suitable medium than paper
- 1962 – Sutherland's Sketchpad
- Computers for visualizing and manipulating data
- One person's contribution could drastically change the history of computing



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# Programming toolkits

- Engelbart at Stanford Research Institute
- 1963 – augmenting man's intellect
- 1968 NLS/Augment system demonstration
- The right programming toolkit provides building blocks to producing complex interactive systems
  - The tablet sdk makes developing for the tablet relatively easy

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# Personal computing

- 1970s – Papert's LOGO language for simple graphics programming by children
- A system is more powerful as it becomes easier to user
- Future of computing in small, powerful machines dedicated to the individual
- Kay at Xerox PARC
  - Smalltalk – first OO language – visual interface
  - the Dynabook as the ultimate personal computer (better than today's PDAs)

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# Window systems and the WIMP interface

- Humans can pursue more than one task at a time
- Windows used for dialogue partitioning, to “change the topic”
- 1981 – Xerox Star first commercial windowing system
- Windows, icons, menus and pointers now familiar interaction mechanisms



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# Metaphor

- Relating computing to other real-world activity is effective teaching technique
- LOGO's - turtle dragging its tail
- File management on an office desktop
- Word processing as typing
- Financial analysis on spreadsheets
- Virtual reality – user inside the metaphor
- Paper - tablet
- Problems
  - Some tasks do not fit into a given metaphor
  - Cultural bias

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# Direct(?) manipulation

- 1982 – Shneiderman describes appeal of graphically-based interaction
  - Visibility of objects
  - Incremental action and rapid feedback
  - Reversibility encourages exploration
  - Syntactic correctness of all actions
  - Replace language with action
- 1984 – Apple Macintosh
  - The model-world metaphor
  - What You See Is What You Get (WYSIWYG)



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## More Direct Tablet

- Stylus direct onto output surface
- Inking
- Recognition



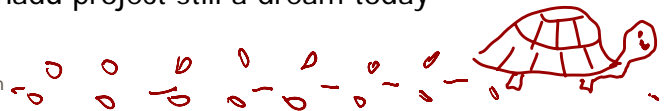
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## Hypertext

- 1945 – Vannevar Bush and the memex
- Key to success in managing explosion of information
- Mid 1960s – Nelson describes hypertext as non-linear browsing structure
- Hypermedia and multimedia
- Nelson's Xanadu project still a dream today

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## Computer Supported Cooperative Work (CSCW)

- CSCW removes bias of single user / single computer system
- Can no longer neglect the social aspects
- Electronic mail is most prominent success

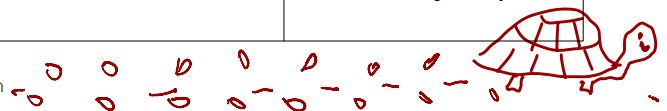
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## Groupware Taxonomy

	Same place	Different place
Same time	“Synchronous, co-located” <ul style="list-style-type: none"> <li>• Whiteboard</li> <li>• Lecture/tutorial</li> <li>• Meeting</li> <li>• Decision Support Systems</li> </ul>	“Synchronous, distributed” <ul style="list-style-type: none"> <li>• ICQ/IRC chat</li> <li>• MS Netmeeting</li> <li>• (Internet) Phone</li> <li>• Video conferencing</li> </ul>
Different time	“Asynchronous, co-located” <ul style="list-style-type: none"> <li>• “Sticky notes”/annotations</li> <li>• Whiteboard, cabinet</li> <li>• Shared PC</li> </ul>	“Asynchronous, distributed” <ul style="list-style-type: none"> <li>• Email, Newsgroups</li> <li>• ICQ message</li> <li>• Document repository</li> </ul>

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# The World Wide Web

- Hypertext, as originally realized, was a closed system
- Simple, universal protocols (e.g. HTTP) and mark-up languages (e.g. HTML) made publishing and accessing easy
- Critical mass of users lead to a complete transformation of our information economy
- Browser centric desktop

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# Agent-based Interfaces

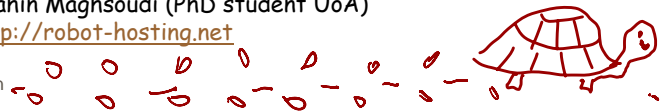
- Original interfaces
- Commands given to computer
- Language-based
- Action based
- Agents - return to language by instilling proactivity and “intelligence” in command processor
- Avatars, natural language processing



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<http://robot-hosting.net>

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# Ubiquitous Computing

“The most profound technologies are those that disappear.”  
Mark Weiser, 1991

- Late 1980's: computer was very apparent
- How to make it disappear?
- Shrink and embed/distribute it in the physical world
- Design interactions that don't demand our intention

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# Sensor-based and Context-aware Interaction

- Humans are good at recognizing the “context” of a situation and reacting appropriately
- Automatically sensing physical phenomena (e.g., light, temp, location, identity) becoming easier
- How can we go from sensed physical measures to interactions that behave as if made “aware” of the surroundings?

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