

Mensch-Maschine-Interaktion 1

Chapter 1 (May 5th, 2011, 9am-12pm):
Introduction, Motivation, History

Vorbemerkung: Deutsch und Englisch

- Viele Materialien sind nur in englischer Sprache verfügbar
 - ...oder in besserer Qualität/Aktualität
- Wissenschaftliches Arbeiten ist international
 - Die Wissenschaftssprache ist englisch
 - Austausch von Materialien zwischen Lehre und Forschung in deutscher Sprache ist schwierig
 - Viele Begriffe sind in englischer Sprache geprägt und schwer zu übersetzen
- Konsequenz:
 - Lehrmaterialien in englischer Sprache
 - Vortrag in deutscher Sprache

Organisatorisches

- Die Lehrveranstaltung (3V+2Ü) ist eine Mischung aus:
 - Vorlesung (voraussichtlich 11 Termine)
 - Übungen (ca. 10 Aufgabenblätter)
 - Einem großen begleitenden UI-Design-Projekt mit Abschlusspräsentation
- Vorlesung: 3 x 3/4h mit 2 Pausen zu 10 min.

Organisatorisches

- Informationen zu Vorlesung & Übung
<http://www.medien.ifi.lmu.de/lehre/ss11/mmi1/>
- Übungsblätter
 - Zu Beginn und als Einschub: Verständnis-/Klausuraufgaben (**freiwillig**)
 - Ab Mitte: Ein größeres Gruppen-Projekt (am besten zum Thema des 1.ÜB) (**freiwillig**)

Schein und Benotung

- Teilnahme an Klausur -> **Note**

Gruppeneinteilung

- besuchen gemeinsam eine Übung
- zufällige Zusammenstellung von 4er-Gruppen
- wird ab Mitte des Semesters bekannt gegeben

Overview

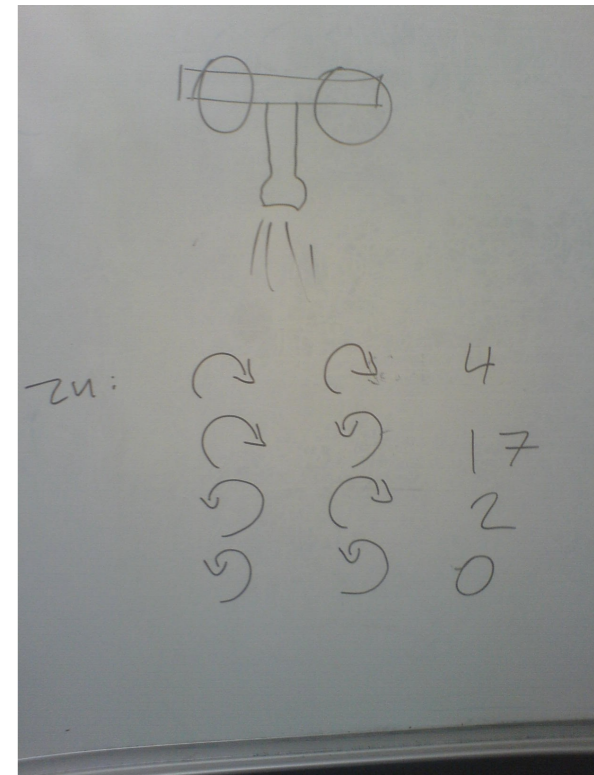
- ***Introduction***
- Basic HCI Principles (1)
- Basic HCI Principles (2)
- User Research & Requirements
- Designing Interactive Systems
- Capabilities of Humans and Machines
- Implementing Interactive Systems
- User Study Design & Statistics
- Basic HCI Models
- User-Centered Development Process

Website

- <http://www.medien.ifi.lmu.de/lehre/ss11/mmi1/>
- Content
 - General Information / news
 - Lecture Slides (night before)
 - Podcast (night after, unless Keynote produces havoc)
 - Exercises (when given)
 - Literature
 - Links

„Intuitive User Interfaces“ - aren't.

- Given: old style water faucet
 - 2 valves, 1 outlet
 - Cylindrical, next to each other
 - Left warm, right cold
- Question: In which direction does each valve close?
- Homework: find such faucets, determine which are „intuitive“ and why (not)



Why is Usability Important?

- Improving usability can
 - increase productivity of users
 - reduce costs (support, efficiency)
 - increase sales/revenue
 - E.g. web shop: In the web, the competitor is just one click away!
 - enhance customer loyalty
 - win new customers
- Several case studies show the benefit of usability
- Usability studies can trigger new ideas
- Usability is often considered a sign of quality

Interaction Design and Product Design

- Product design determines the appearance of the product
- Interaction design determines the usability of the product
- Both are closely coupled



Bildquellen: Apple, BMW

Sophisticated Design does not entail Usability



CS Building in Saarbrücken



DFKI in Saarbrücken

(Photos A. Butz)

Sophisticated Design does not entail Usability



Siemens Neuperlach, München



Apartment Building (built 2010)

(Photos F.Echtler)

Usability applies to a wide range of systems

- Signs and explanations for things that are usually obvious are an indicator for a potential problem.
- Not having (necessary) explanations is also not a solution



(German Rail IC-Train)



(CS Building, Lancaster University)



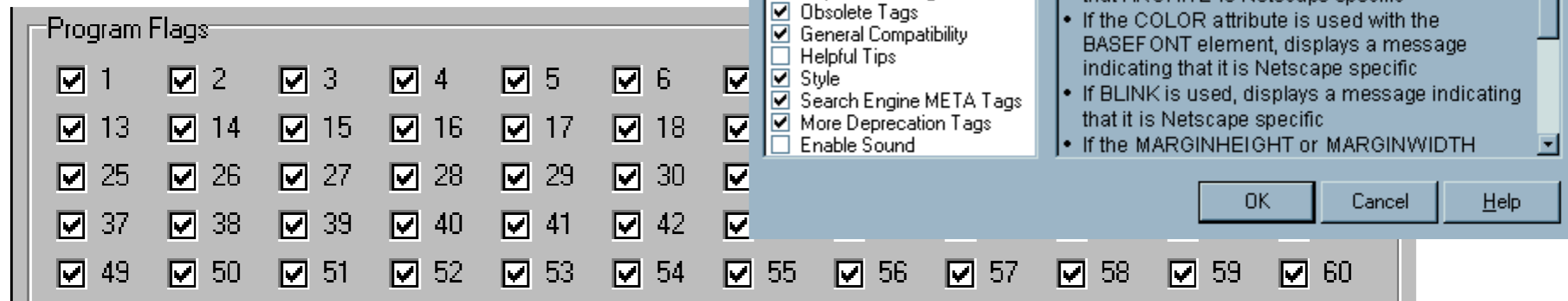
(Photos A. Butz)

Usability applies to a wide range of systems

CSE HTML Validator v3.05



CSE HTML Validator v4.0



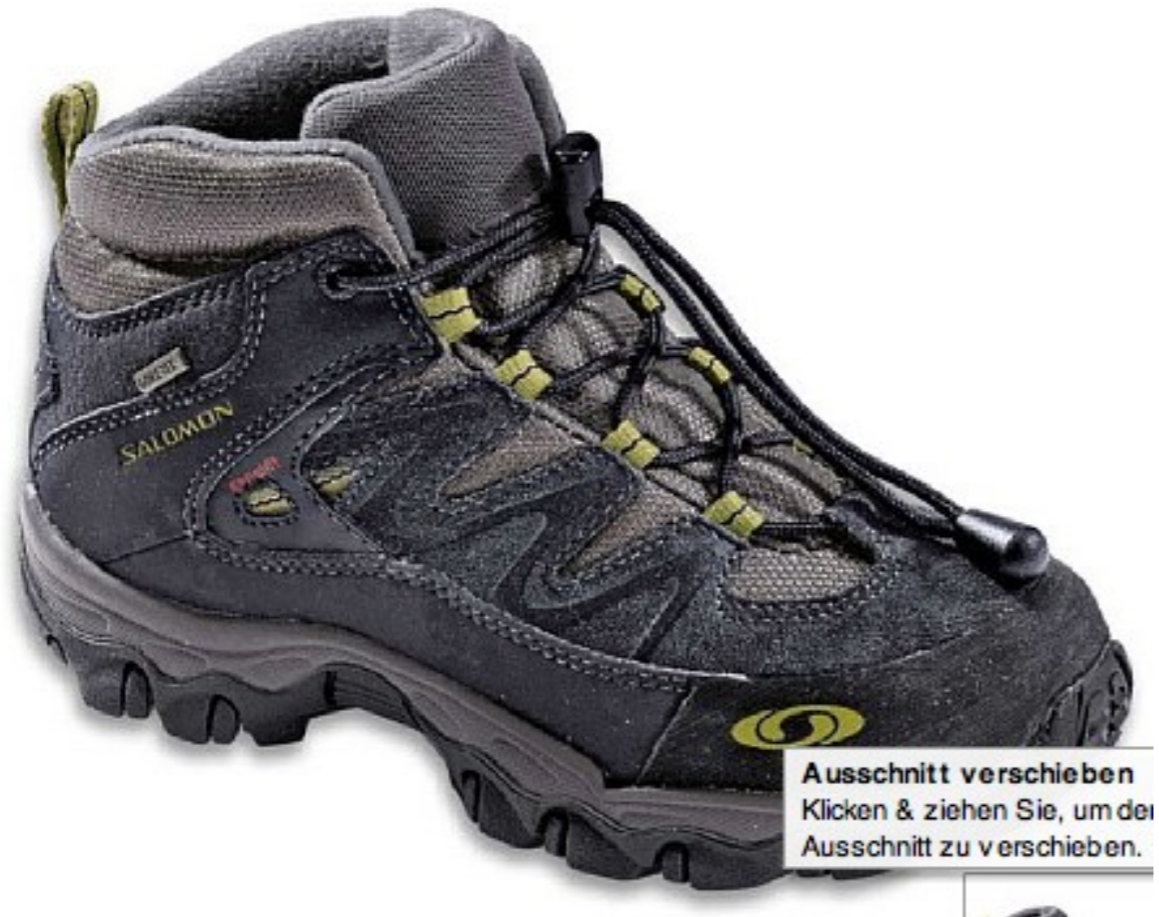
<http://homepage.mac.com/bradster/iarchitect/clarity.htm>

Usability can communicate attitude



Das ist nicht der offizielle Webauftritt der Verwaltung. War es noch nie...

Usability can make all the difference



Bildquelle: Neckermann.de, screenshot



<http://ecx.images-amazon.com/images/I/41typn4wgnL.jpg>

Usability can make all the difference



<http://www.fabrikshop.info/12/610831g.jpg>



(Photos F.Echtler)

Many jobs require an understanding of usability

- Interaction designers: people involved in the design of all the interactive aspects of a product
- Usability engineers: people who focus on evaluating products, using usability methods and principles
- Web designers: people who develop and create the visual design of websites, such as layouts
- Information architects: people who come up with ideas of how to plan and structure interactive products
- User experience designers: people who do all the above but who may also carry out field studies to inform the design of products

Exercise: Currency Converter

- Design a user interface for the following scenario:

Scenario 1: Mary needs a currency converter tool.

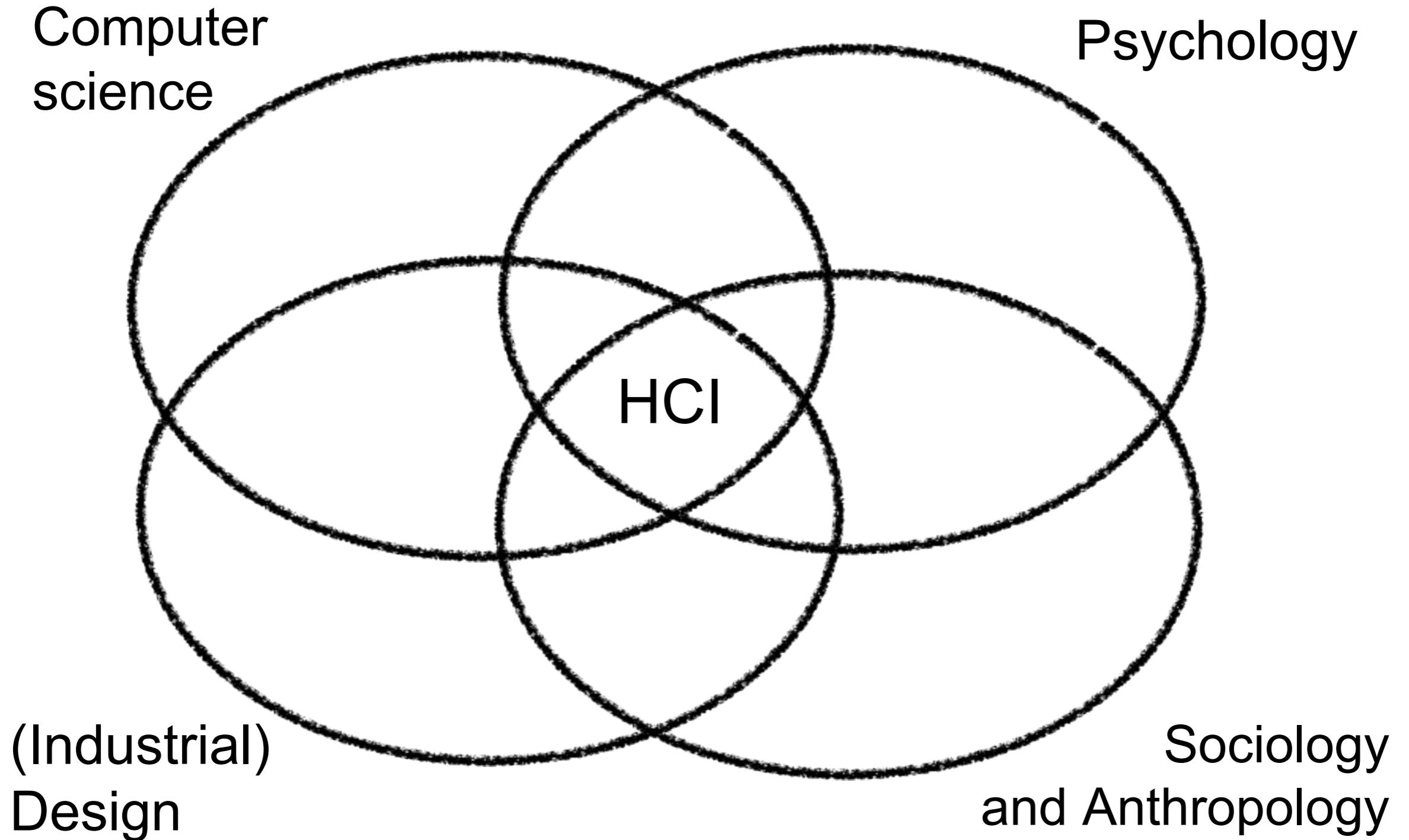
Scenario 2: Mary works at XY-import-export GmbH in Munich. On her laptop, she frequently checks prices for goods in the USA and in Japan. For calculating her budget she needs to convert these into Euro. Sometimes when she writes offers, she converts her company's sales prices (which are in Euro) into US\$ or Yen.

- Task: draw a sketch of a user interface for an application that supports Mary in her work.
- Think about how you would integrate such an application with her current computer system and software infrastructure

What is the right title for the lecture?

- Mensch-Maschine-Interaktion (MMI) / Human-Machine Interaction (HMI)
 - “Man-Machine Interaction” politically incorrect
 - Study of the ways how humans use machines
- Mensch-Computer-Interaktion (MCI) / Human-Computer Interaction (HCI)
 - More special, main focus of this lecture
 - “Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them”
(working definition in the ACM SIGCHI Curricula for HCI)
- Interaktionsdesign / Interaction Design
 - More general than HMI
 - “designing interactive products to support people in their everyday and working live”
(Sharp, Rogers, and Preece, 2002)
 - “interaction design is related to software engineering in the same way as architecture is related to civil engineering” (Winograd, 1997)
- Benutzerfreundlichkeit / Usability
 - The overall goal of interaction design

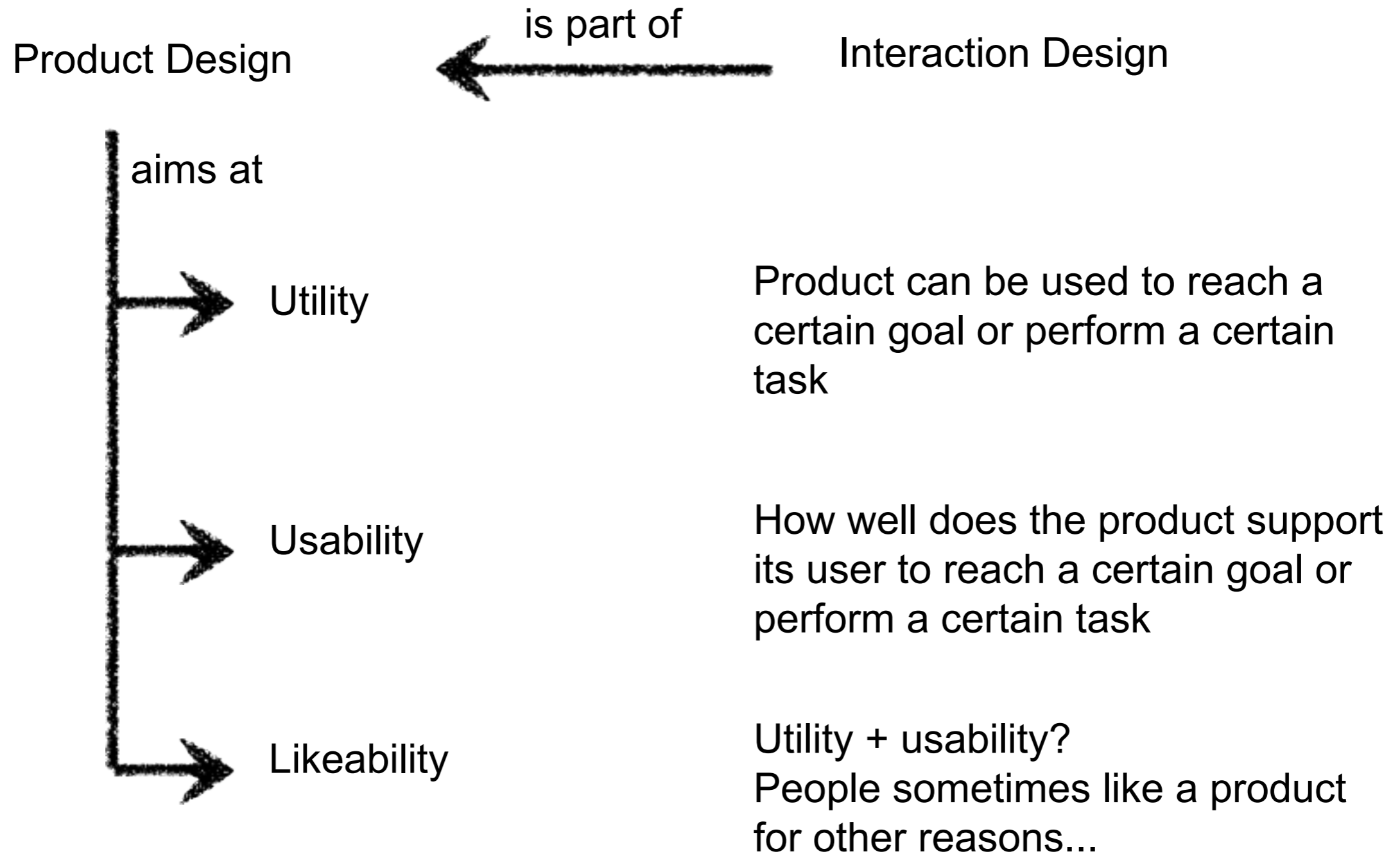
HCI as an interdisciplinary field



Elements of HCI

- Joint performance of tasks by humans and machines
- Structure of communication between human and machine
- Human capabilities to use machines
(including the learnability of interfaces)
- Algorithms and programming of the interface itself
- Engineering concerns that arise in designing and building interfaces
- Process of specification, design, and implementation of interfaces
- Design trade-offs

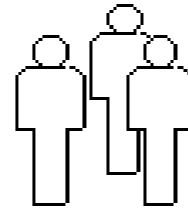
Aspects of Product Design



from the ACM SIGCHI Curriculum for HCI

Use and Context

U1 Social Organization and Work



U3 Human-Machine Fit and Adaptation

U2 Application Areas

Human

H1 Human Information Processing

H2 Language, Communication and Interaction

H3 Ergonomics

Computer

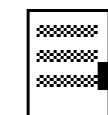
C2 Dialogue Techniques

C4 Computer Graphics



C3 Dialogue Genre

C5 Dialogue Architecture



C1 Input and Output Devices



D3 Evaluation Techniques

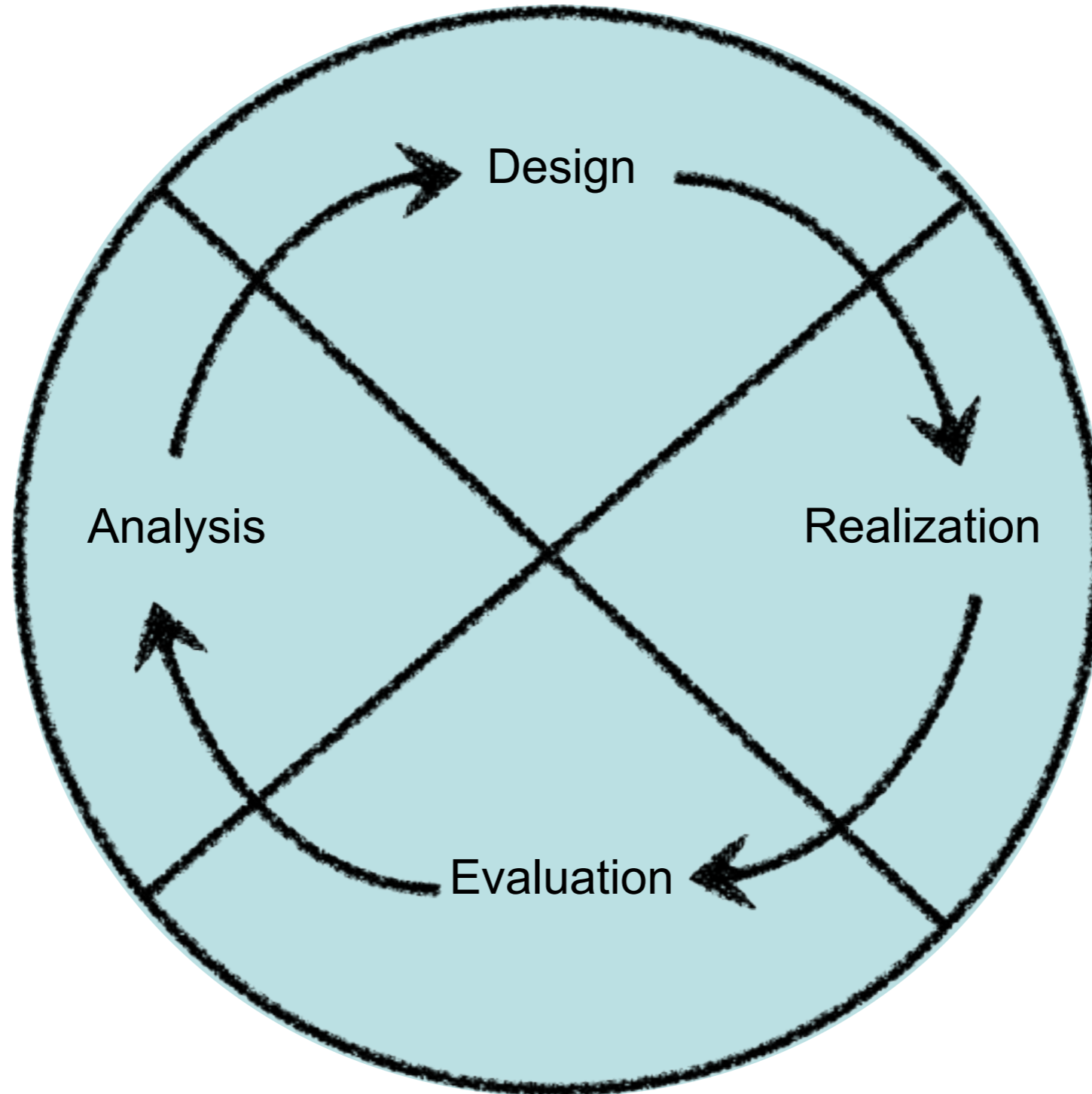
D4 Example Systems and Case Studies

D2 Implementation Techniques and Tools

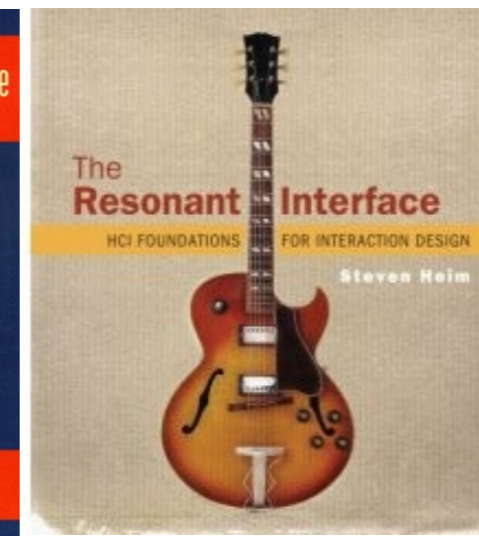
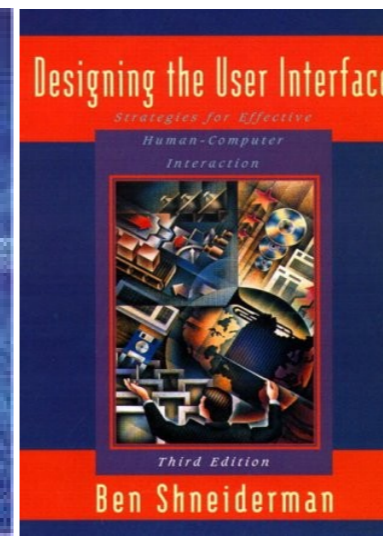
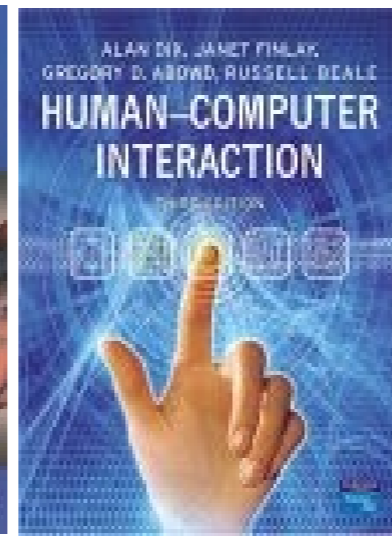
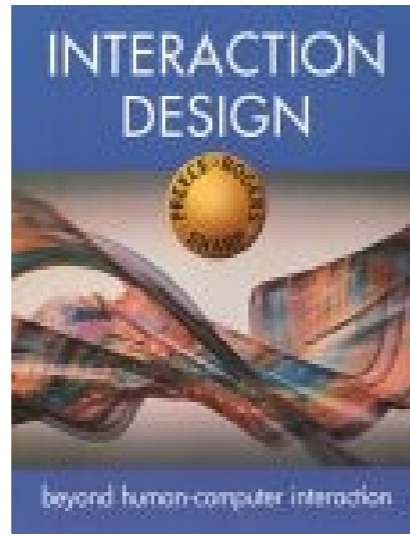
D1 Design Approaches

Development Process

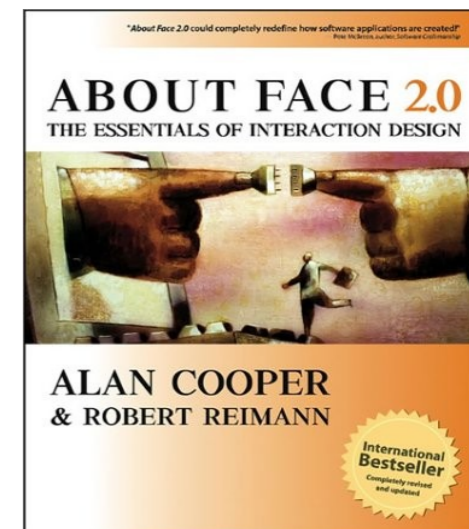
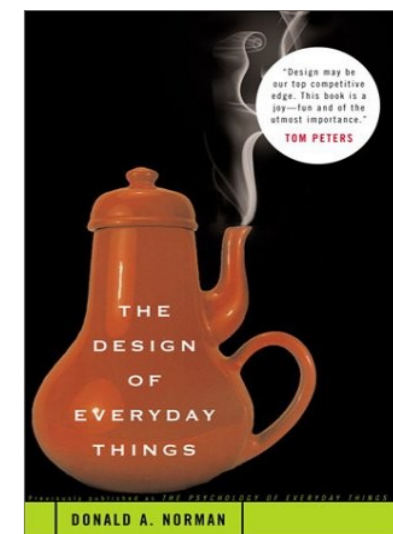
The Development Process



Books Selection



- Jennifer Preece, Yvonne Rogers, Helen Sharp (2002). Interaction Design. ISBN 0471492787
- Alan Dix, Janet Finlay, Gregory Abowd and Russell Beale. (2003) Human Computer, Interaction (third edition), Prentice Hall, ISBN 0130461091
- Steven Heim (2007). The Resonant Interface: HCI Foundations for Interaction Design. Addison-Wesley; ISBN 978-0321375964
- Markus Dahm (2005). Grundlagen der Mensch-Computer-Interaktion. Pearson Studium; ISBN 3827371759
- Ben Shneiderman. (2004) Designing the User Interface, 4th Ed., Addison Wesley; ISBN 978-0321197863
- Donald A. Norman. (1990) The Design of Everyday Things; ISBN 0465067107
- Alan Cooper, Robert M. Reimann. (2007) About Face 3.0: The Essentials of Interaction Design; ISBN 978-0470084113



Evolution of HCI ‘interfaces’

- 50s: Interface at the hardware level for engineers (switch panels)
- 60-70s: interface at the programming level (COBOL, FORTRAN)
- 70-90s: Interface at the terminal level (command languages)
- 80s: Interface at the interaction dialogue level (GUIs, multimedia)
- 90s: Interface at the work setting (networked systems, groupware)
- 2000s: Interface becomes pervasive (‘allgegenwärtig’)
 - RF tags, Bluetooth technology, mobile devices, blogging, user generated content, consumer electronics, interactive screens, embedded technology, sensor networks
- 2010s: ???

HUMAN COMPUTER INTERACTION

a brief history

- editorial ::
- home ::
- links ::

Intro

the first mouse::1963

Xerox Altos 3-button-mouse::197

the first commercial mouse::1981

Lisas mouse::1983 ←

Macintosh with mouse::1984

rubberball::1985

trackball::1989

radio mouse::1991

3D mouse::1992

scrollwheel::1996

USB mouse::1997

optical mouse::1999

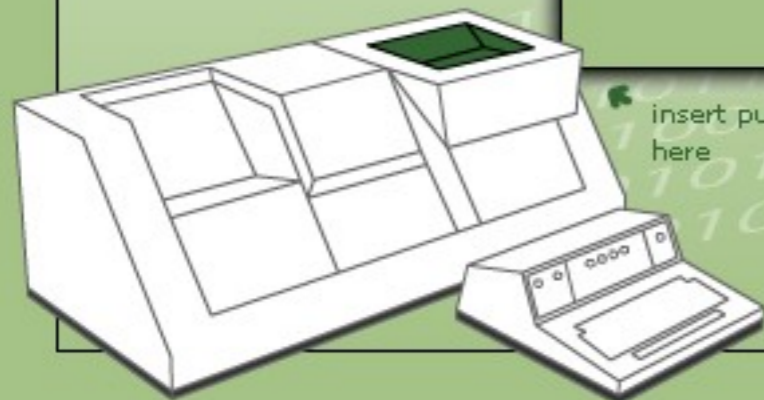
ID mouse::2001

optical radiomouse::2001

1983 Apples Lisa erscheint mit Maus

In January 1983 Apple releases "Lisa" the first mouseoperated personal computer. This highly praised computer indeed was no success as well. Again because of its high price with 10.000,-\$ no "normal people" could afford it.

By the way apples mouse was produced by Logitech with only one key, and it still mactos get along with only one key on their latest mice.



VisiCalc - Widespread use of an Interactive Application

PAYEE	CHECK	DEPOSIT	BALANCE
SEARS	14.22		1111.11
VISA	50.75		1111.11
JOES MKT	20.11		1111.11
GAS CO.	19.84	250.94	1111.11

01/04/79 8544.4

VisiCalc Screen, early Alpha 1/4/79

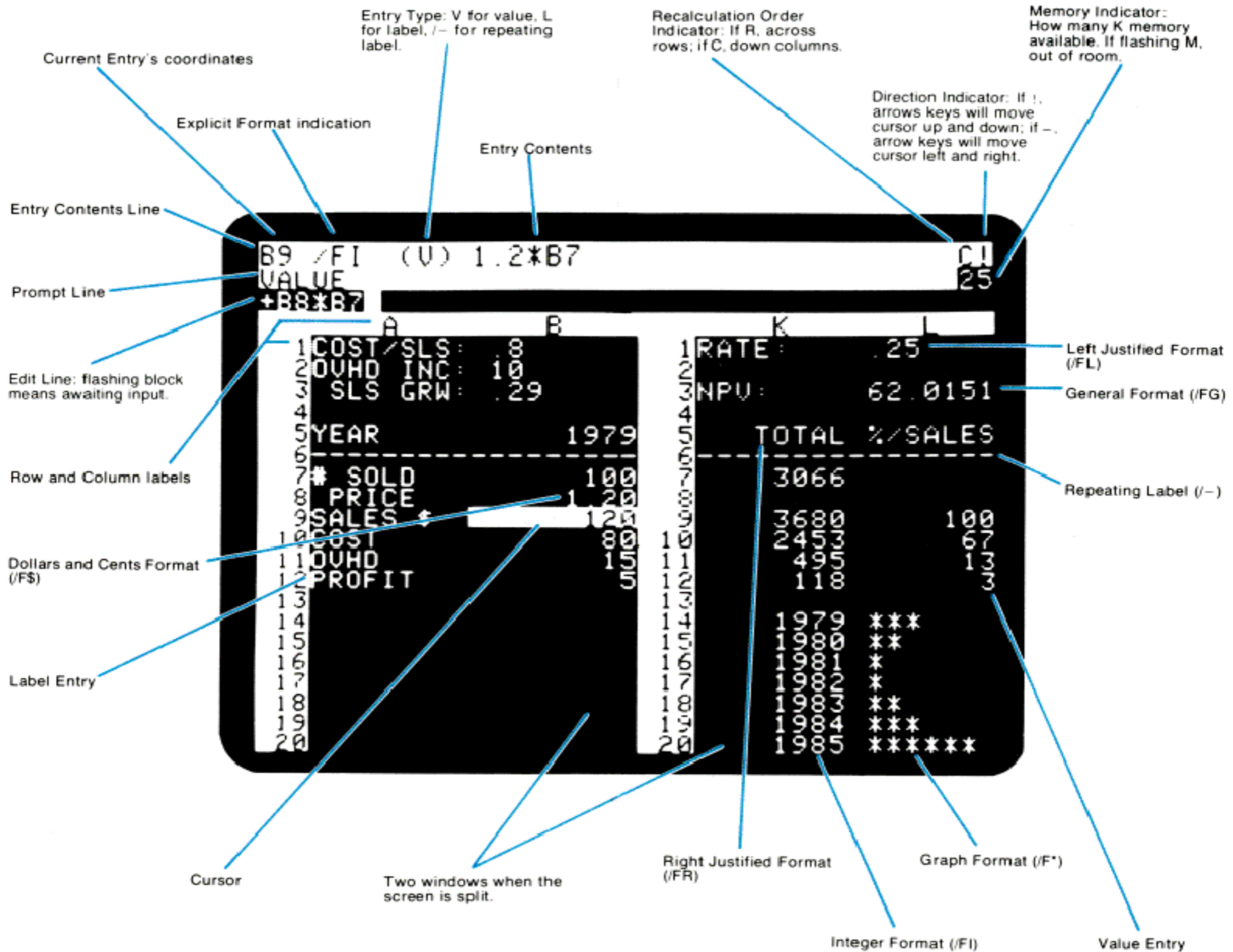
- Instantly calculating electronic spreadsheet
 - D. Bricklin/J. Frankston 1979
 - For Apple II computers
- Significant value to non-technical users
 - Usability was key...
- Early killer app for PCs
 - Motivated IBM to enter the PC market

MONTH	NOV	DEC	TOTAL
SALARY	2500.00	2500.00	30000.00
OTHER			
INCOME	2500.00	2500.00	30000.00
FOOD	400.00	400.00	4800.00
RENT	350.00	350.00	4200.00
HEAT	110.00	120.00	575.00
REC.	100.00	100.00	1200.00
TAXES	1000.00	1000.00	12000.00
ENTERTAIN	100.00	100.00	1200.00
MISC	100.00	100.00	1200.00
CAR	300.00	300.00	3600.00
EXPENSES	2460.00	2470.00	28775.00
REMAINDER	40.00	30.00	1225.00
SAVINGS	30.00	30.00	300.00

First version of VisiCalc screenshot

<http://www.danbricklin.com/visicalc.htm>

A VISICALC™ Screen:



Changing Interaction Paradigms

- Replacement of command-language
- Direct manipulation of the objects of interest
- Continuous visibility of objects and actions of interest
- Graphical metaphors (desktop, trash can)
- Windows, icons, menus and pointers
- Rapid, reversible, incremental actions
- Origins of direct manipulation and graphical user interfaces
 - Ivan Sutherland's Sketchpad, 1963, object manipulation with a light pen (grabbing, moving, resizing)
 - Douglas C. Engelbart, 1968, Mouse
 - XEROX ALTO (50 units at Universities in 1978)
 - XEROX Star (1981)
 - Apple Macintosh (1984)

XEROX ALTO



- Photos from
- <http://members.fortunecity.com/pcmuseum/alto.html>

Start

Ready:
Select file names with the mouse
Red-Copy, Yel-Copy/Rename, Blue-Delete
Click 'Start' to execute file name commands

Quit
Clear
Type

Pages: 832 Files listed: 60 Files selected: 0 Copy/Rename: 0 Delete: 0 Copy: 0 LOG

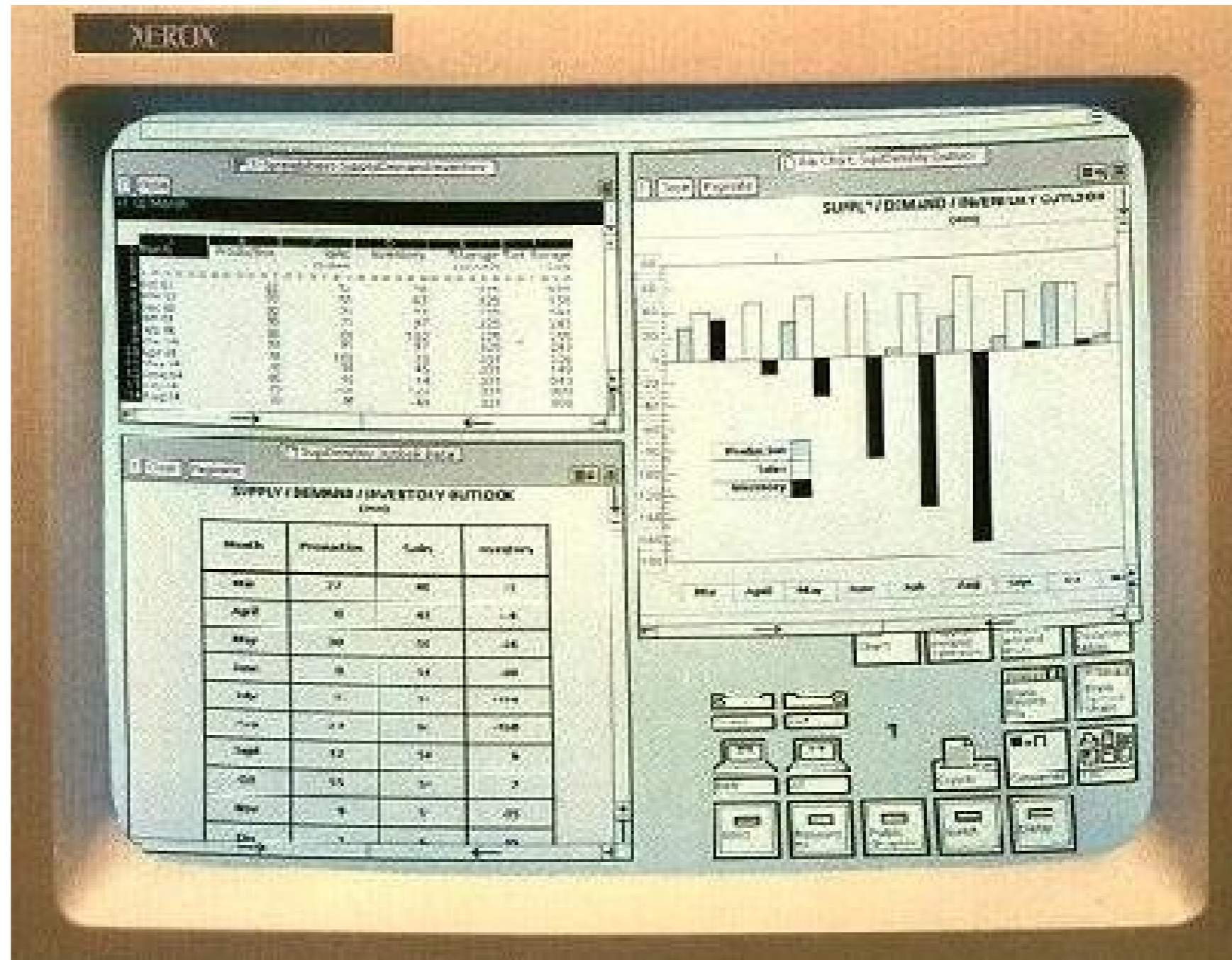
Pages: 0 Files listed: 0 Files selected: 0 Copy/Rename: 0 Delete: 0 Copy: 0 LOG

DPO: <SysDir.> ^,^

-- BEGINNING --
1012-AstroRoids.Boot.
Anonymous.1.
BattleShip.er.
BattleShip.RUN.
BlackJack.RUN.
BuildKal.cm.
CalcSources.dm.
Calculator.RUN.
Chess.log.
Chess.run.
Com.Cm.
CompileKal.cm.
CRTEST.RUN.
DMT.boot.
EdsBuild.run.
empress.run.
Executive.Run.
Fly.run.
galaxian.boot.
Garbage.S.
Go9.run.
GoFont.AL.
Invaders.Run.
junk.
junk.press.
Kal.bopl.
Kal.cm.
KalA.asm.
KalMe.mu.
Kinetic4.RUN.
LoadKal.cm.
MasterMind.RUN.
maze.run.
Mesa.Typescript.
Missile.run.
NEPTUNE.RUN.
othello.run.
Pinball-easy.run.
POLYGONS.RUN.

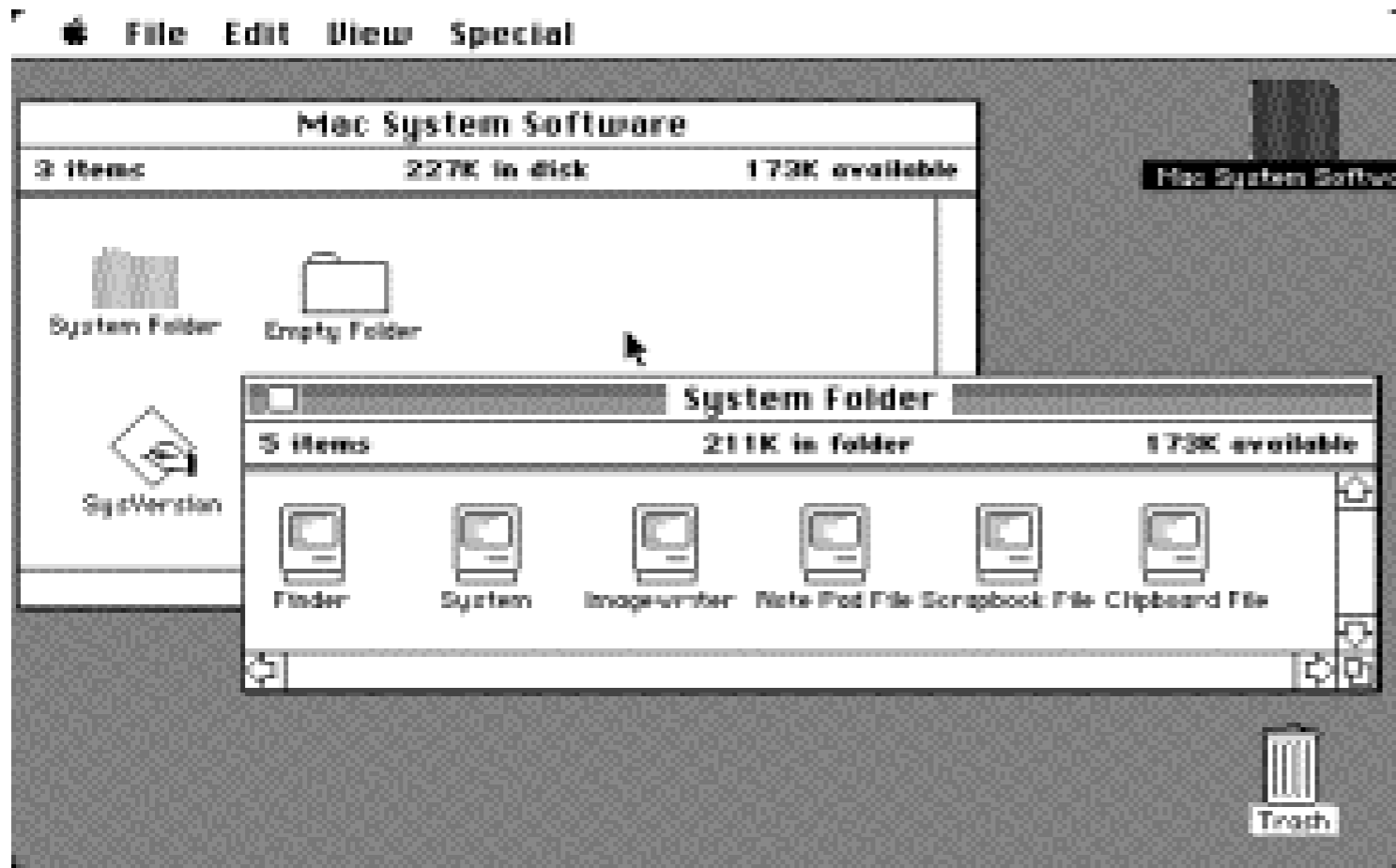
No Disk: <SysDir.> ^,^

XEROX Star



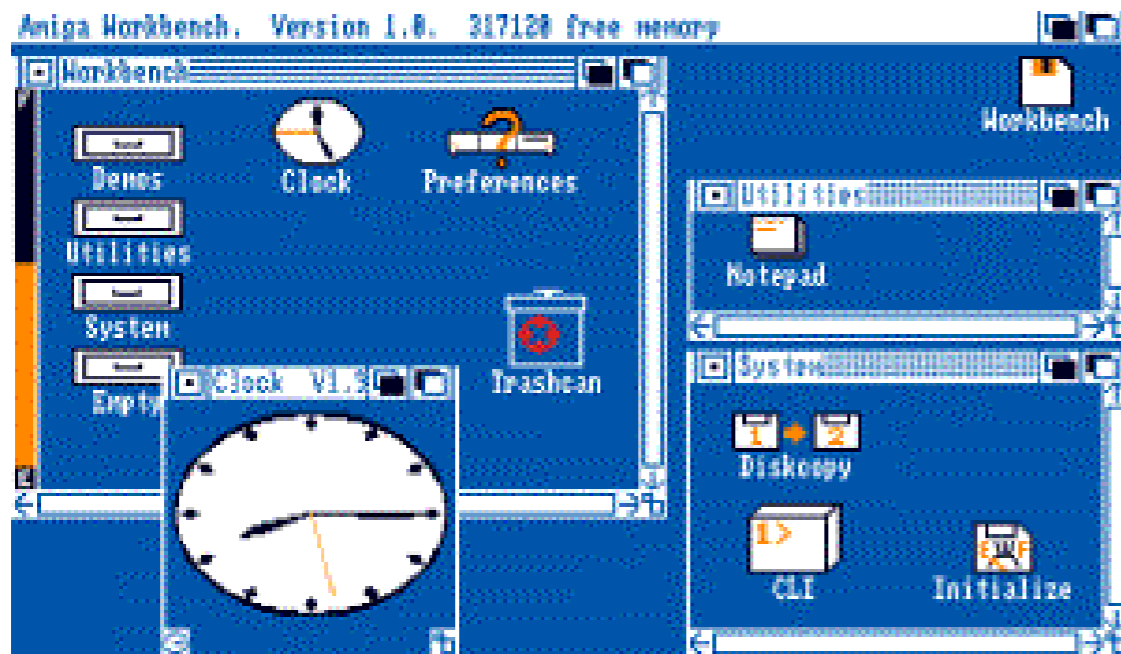
- Photos from <http://members.fortunecity.com/pcmuseum/alto.html>

Apple Macintosh

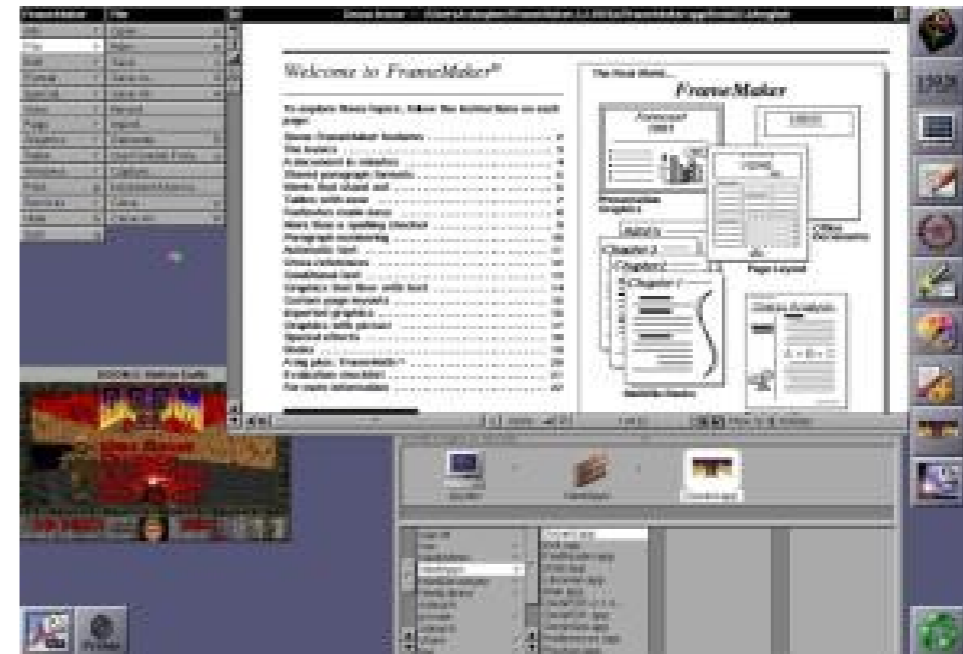


- 1984 – commercially successful GUI

More GUIs



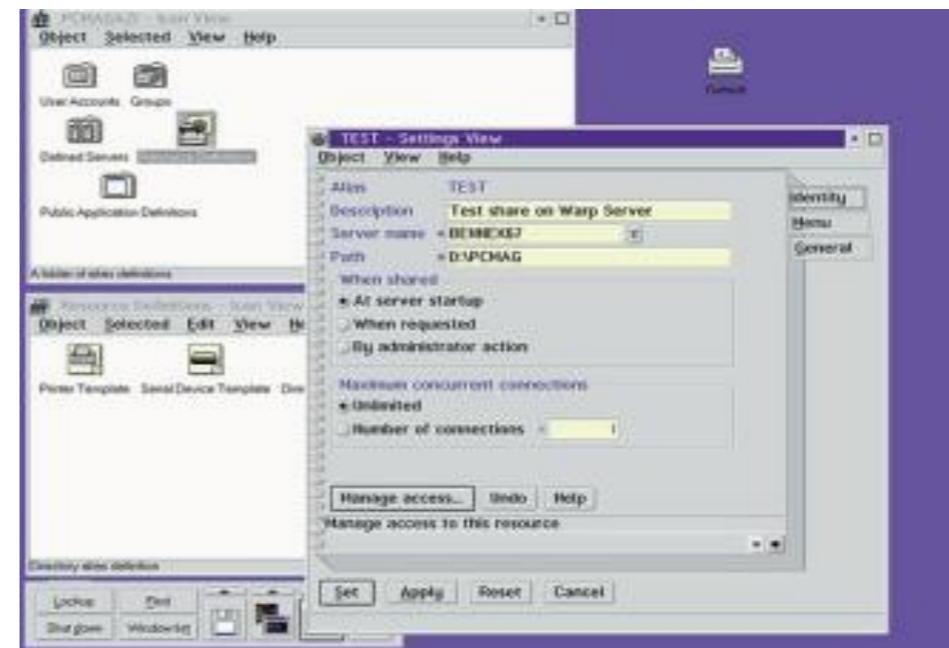
Amiga 1985



NextStep 1989



Win 3.11 1992

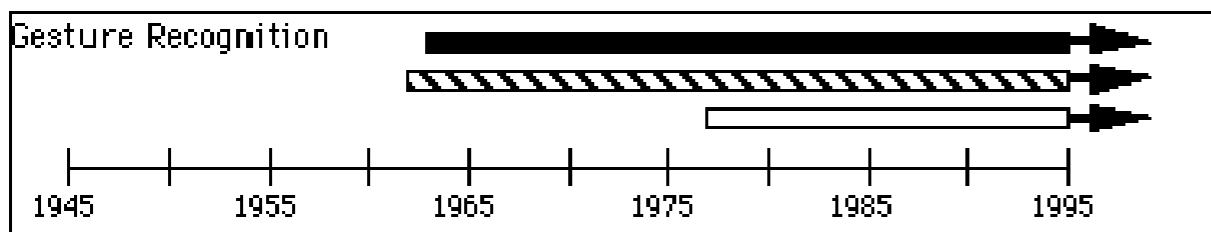
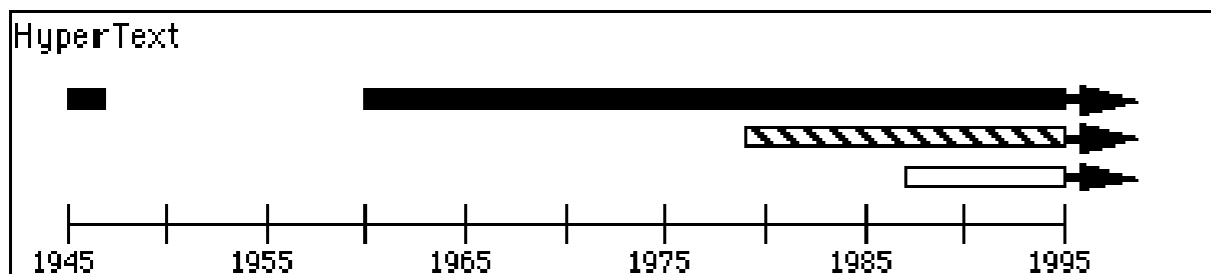
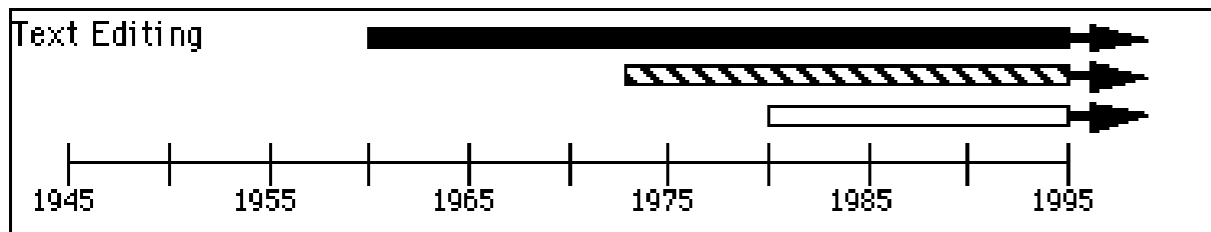
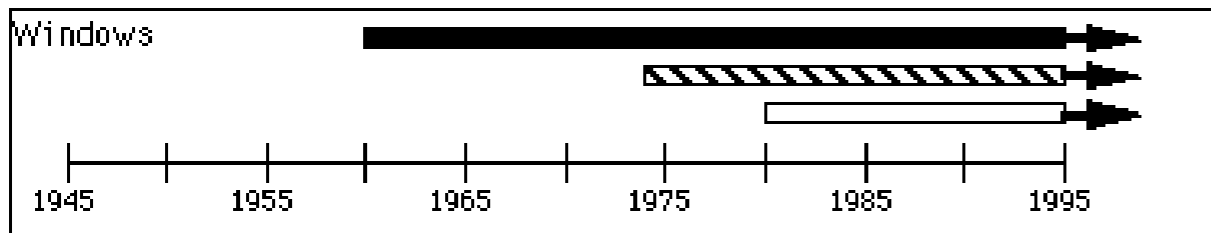
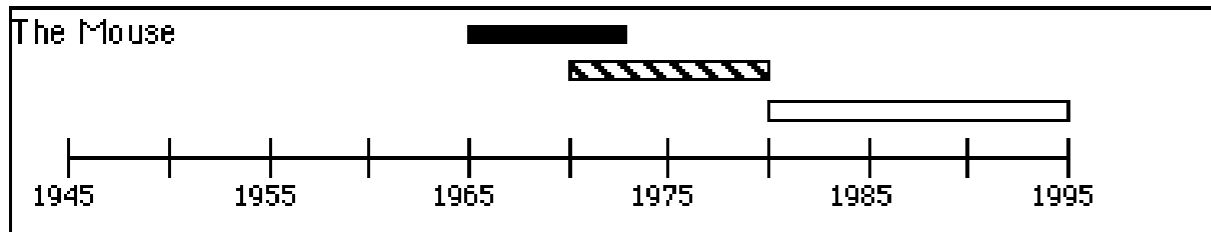
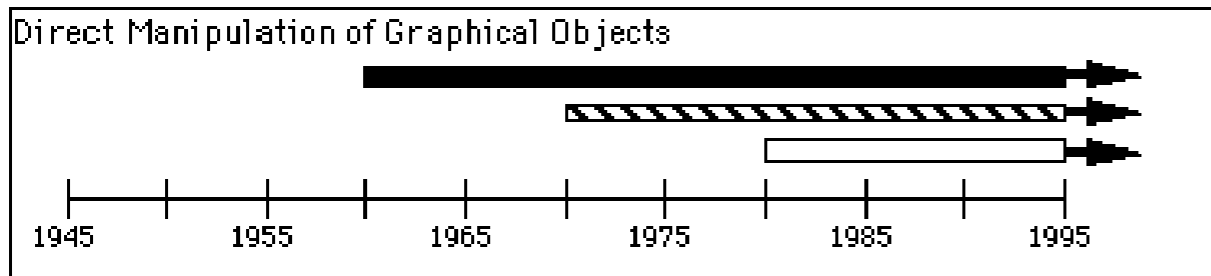


OS/2 1992

Research and Products

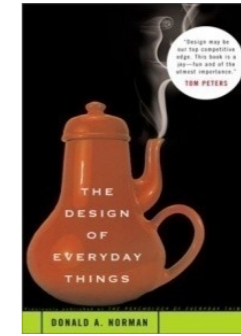
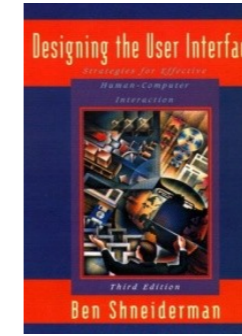


From B. Myers
"Brief History of HCI"



- Early machines used batch processing (e.g. punch card machines)
- Terminals with command line interfaces
- Graphical user interfaces with pointing device
- Multimodal user interfaces

References



- D. A. Norman. The Design of Everyday Things. Basic Books 2002. ISBN: 0465067107
- B. Shneiderman. Designing the User Interface: Strategies for Effective Human-Computer Interaction , Third Edition. 1997. ISBN: 0201694972
- Alan Dix, Janet Finlay, Gregory Abowd and Russell Beale. (2004) Human Computer Interaction (third edition), Prentice Hall, ISBN 978-0130461094
- Preece, J., Rogers, Y. & Sharp, H. (2002) Interaction Design: Beyond Human-Computer Interaction. New York, NY: John Wiley & Sons
- Winograd, Terry (1997), "The Design of Interaction ,," in Peter Denning and Bob Metcalfe (eds.), Beyond Calculation, The Next 50 Years of Computing, Springer-Verlag, 1997.
- Jef Raskin, The Humane Interface, ACM Press 2000
- Brad A. Myers. "A Brief History of Human Computer Interaction Technology." ACM interactions. Vol. 5, no. 2, March, 1998. pp. 44-54.
<http://www-2.cs.cmu.edu/~amulet/papers/uihistory.tr.html>
- Software Arts and VisiCalc
<http://www.bricklin.com/history/intro.htm>