Human Computer Interaction (HCI, HCC)

AN INTRODUCTION

Human Computer Interaction

Why are we here?

- It may seem trite, but user interfaces matter: For efficiency, for convenience, for accuracy, for success, even for life and death
  - The Vincennes, and Aegis RADAR system

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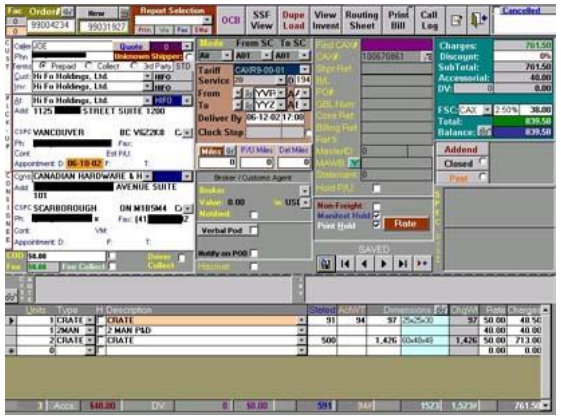
- It may seem trite, but user interfaces matter: For efficiency, for convenience, for accuracy, for success, even for life and death
  - The Vincennes, and Aegis RADAR system

- People time is more expensive than computer time (normally)
- Everyone has a story of a bad interface, and the trouble it caused
- A well-designed interface makes for a good system, and a happy (and efficient) user



(This is a bad interface)

Human Computer Interaction

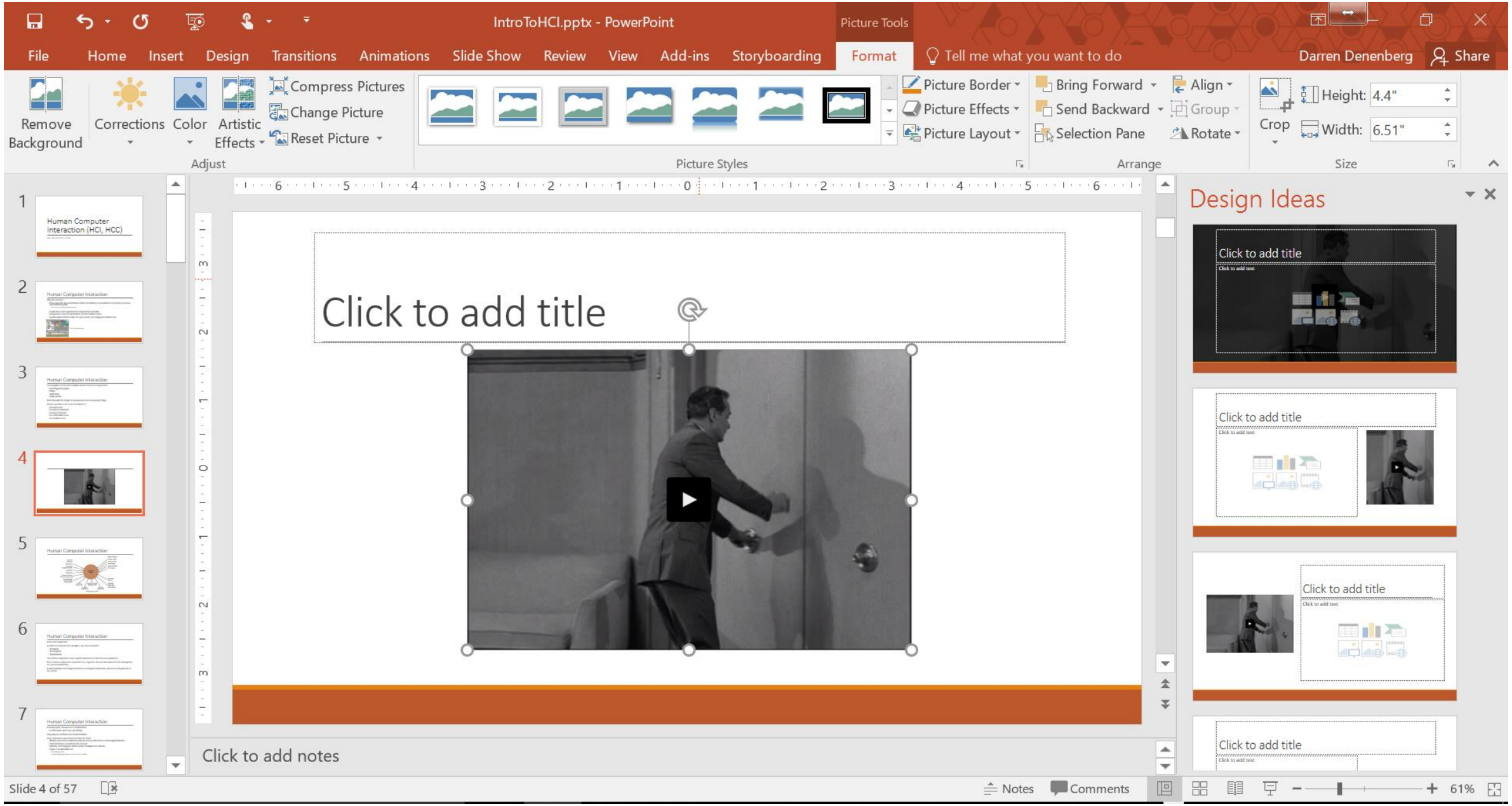
Sub-discipline of the multi-discipline Human Factors and Ergonomics

- Psychology (many types)
- Design
- Engineering
- Social sciences

Both deal with the design of everyday (and not-so-everyday) things

Involve questions such as, but not limited to:

- Is it easy to use?
- Is it easy to understand?
- Is it easy to discover?
- Is it comfortable to use?
- Is it sensible to use?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Tell me what you want to do
Darren Denenberg
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Human Computer Interaction (HCI), HCC)
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Design Ideas
Slide 4 of 57
Notes
Comments
61%

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File Home Insert Design Transitions Animations Slide Show Review View Add-ins Storyboarding Format Tell me what you want to do Darren Denenberg Share

Remove Background | Corrections | Color | Artistic Effects | Compress Pictures | Change Picture | Reset Picture — Adjust

Picture Border | Picture Effects | Picture Layout — Picture Styles

Bring Forward | Send Backward | Selection Pane | Align | Group | Rotate — Arrange

Crop | Height: 4.4" | Width: 8.26" — Size

1 Human Computer Interaction (HCI, HCC)

2 Human Computer Interaction

3 Human Computer Interaction

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5

6 Human Computer Interaction

7 Human Computer Interaction

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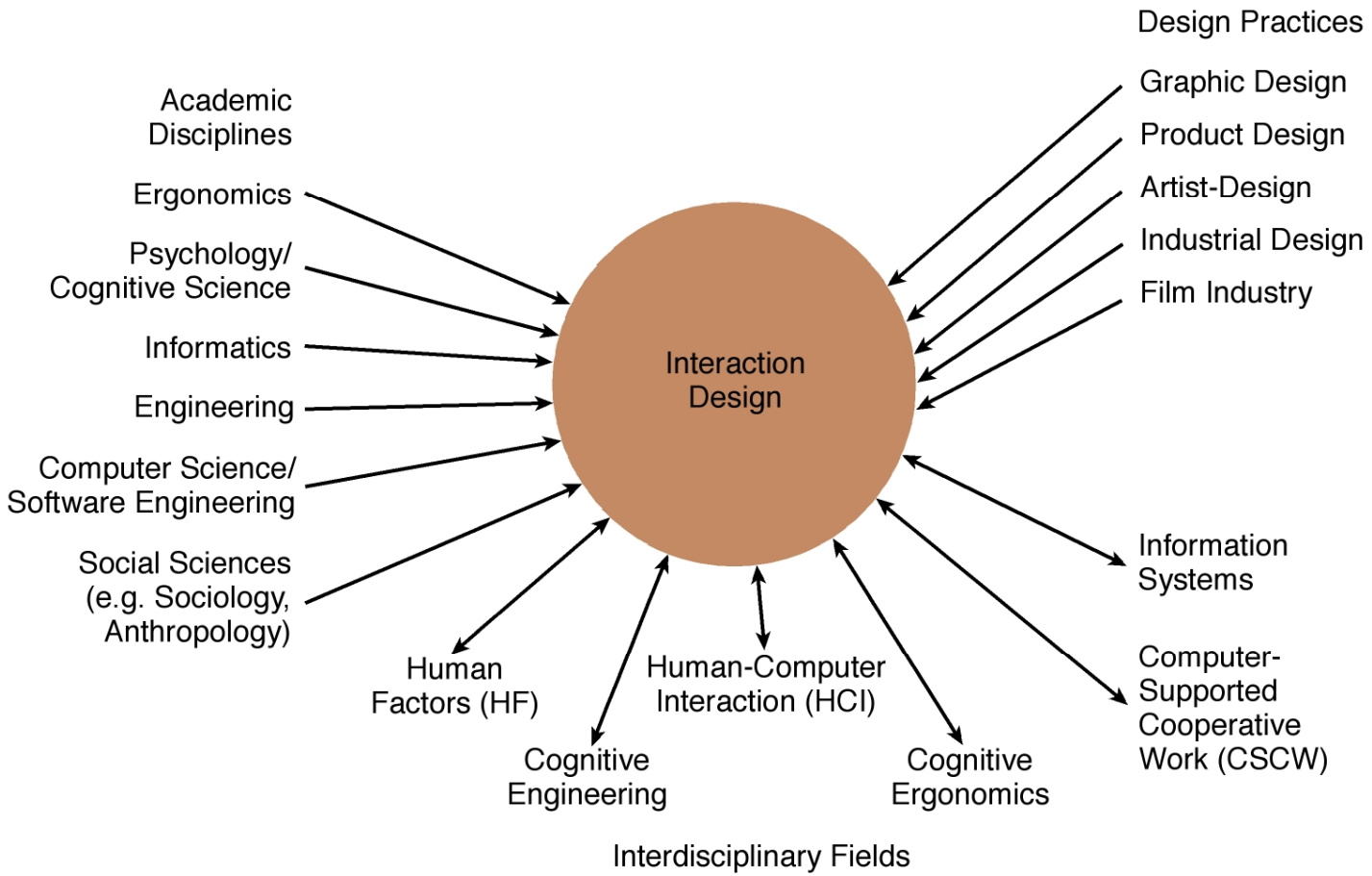
Human Computer Interaction



Human Computer Interaction

Each word is important

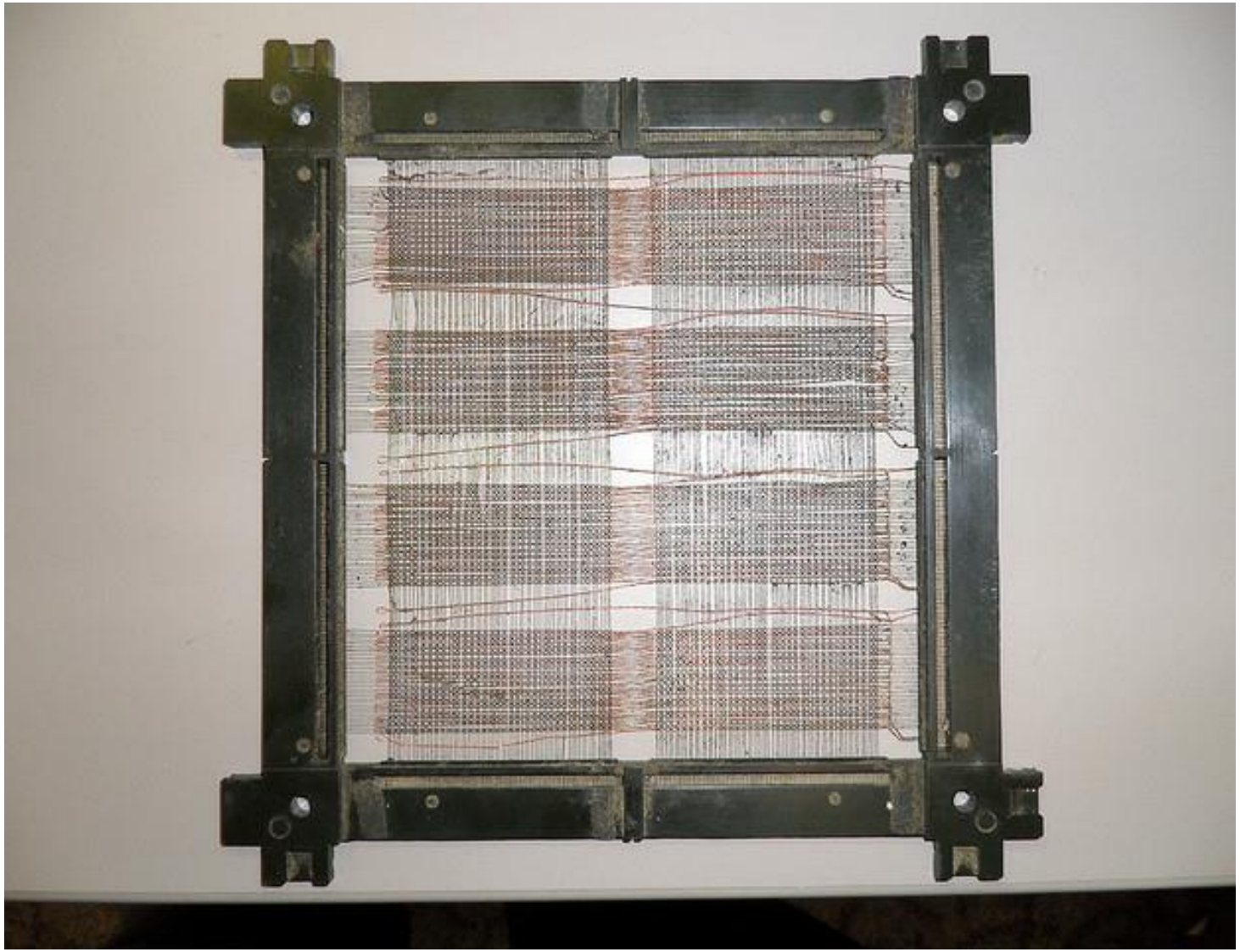
In order to understand the discipline, we must understand:

- The Human
- The Computer
- The Interaction

These three components come together (interact!) to form what will hopefully be the User experience

None of these components can be left out, or ignored, they are all required for the development of a successful interface

A well-developed and designed interface is of singular importance, because it is the *sole gateway* to any system



Human Computer Interaction

For many years, this was not a consideration

- In other words, what it was, was nothing

Very early on, machines had to be hardwired

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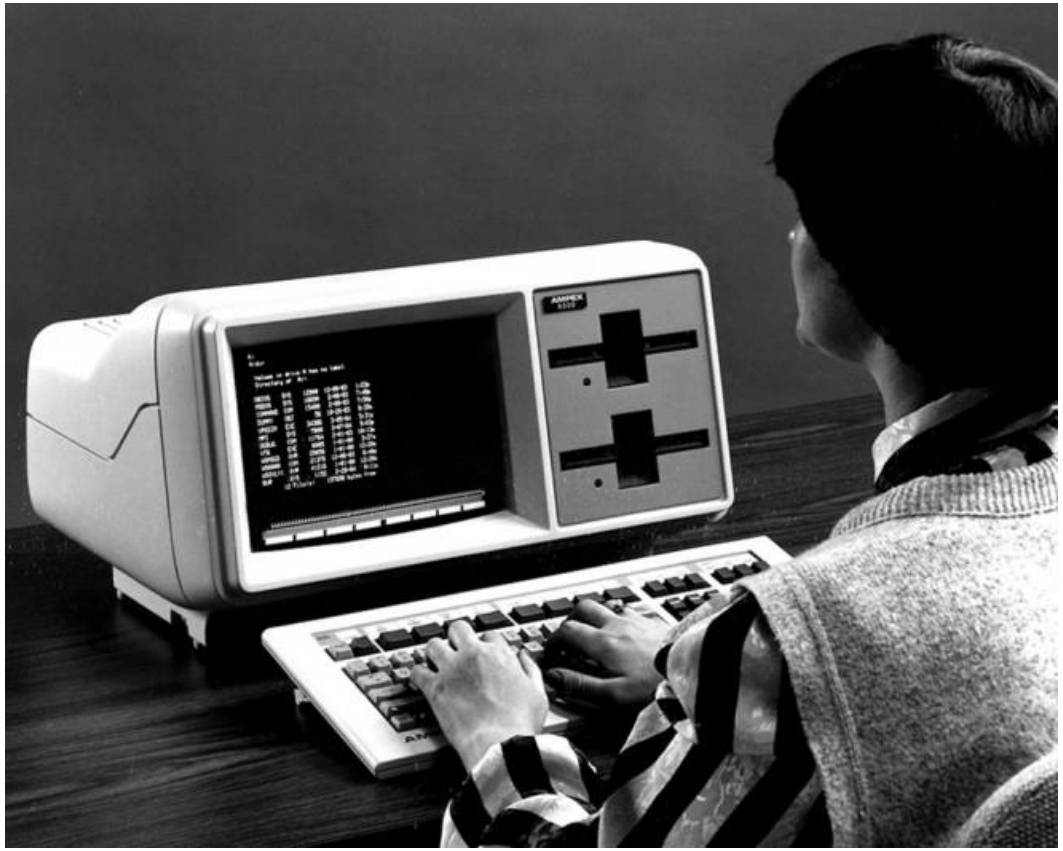
Very early on, machines had to be hardwired

Later, commands were entered one line at a time

- Attempts were made to make this easier, but that was difficult due to technological limitations
- Some intuitiveness was included, but not much
- Still early, and in large part still the domain of hobbyists and scientists
- Cryptic, undecipherable code
  - “The Software Crisis”
  - Can have long-lasting impacts, as seen in the Y2K problem

Human Computer Interaction

Human Computer Interaction



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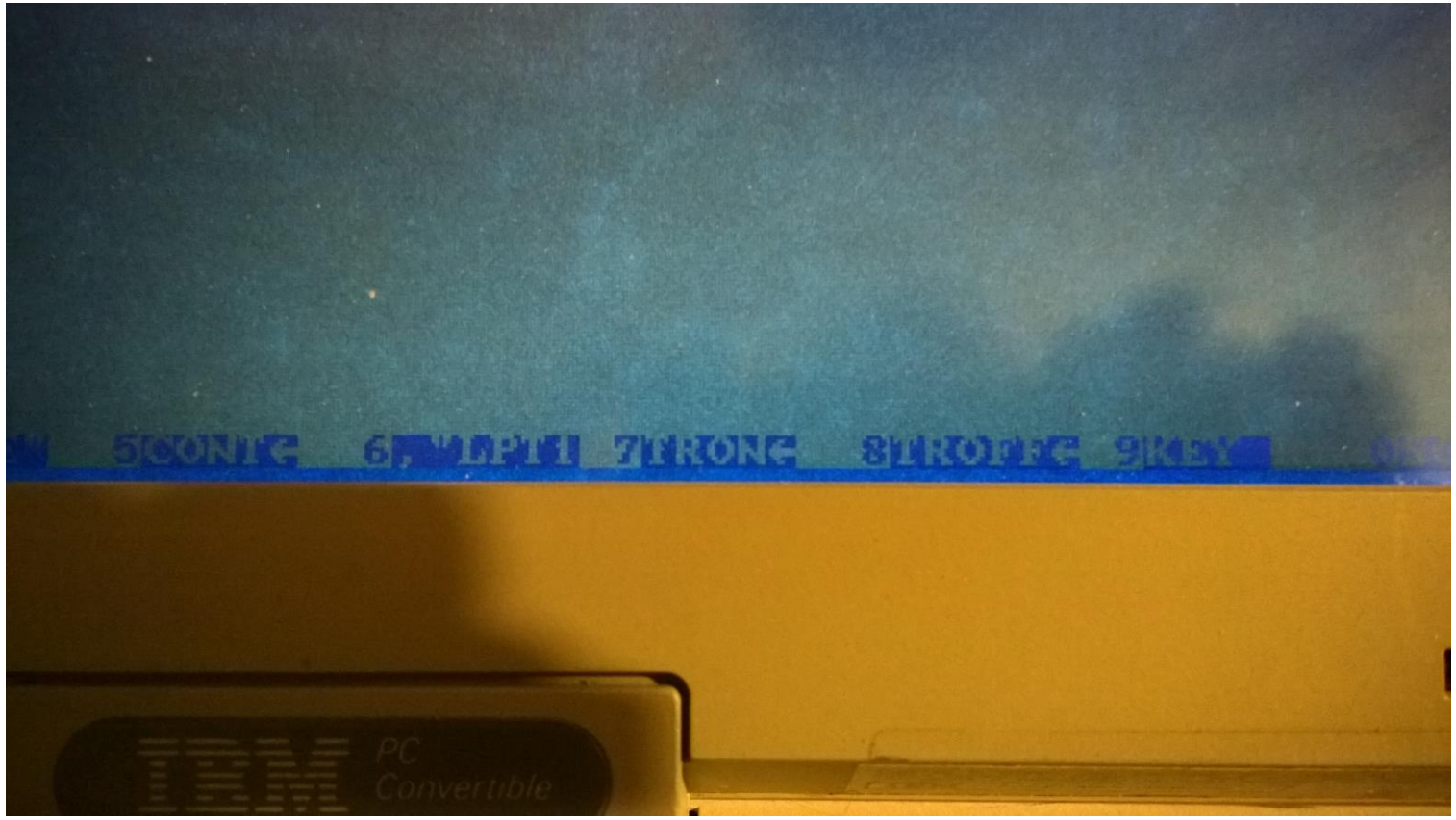


Human Computer Interaction

Human Computer Interaction

Human Computer Interaction

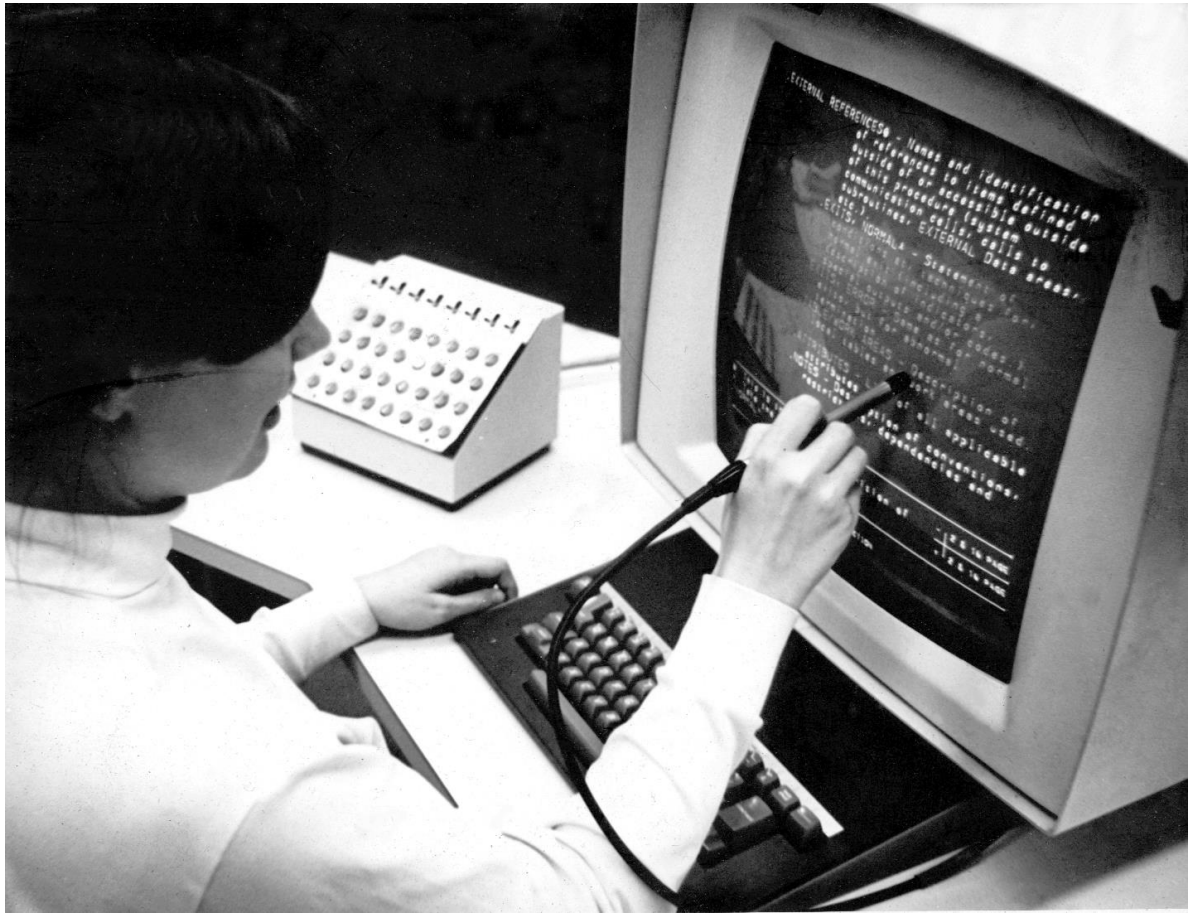
However, this time period also saw expansion of the field of ergonomics, HCI, and the disciplines involved

Originally used primarily for word processors and spreadsheets

- Still very cumbersome to use
- Often required many-key combinations to perform tasks
- Keyboard overlays were standard
- This was all a result of, but also evolution of, the interface

A slow movement away from technical manuals, and towards user manuals, was also budding

Human Computer Interaction



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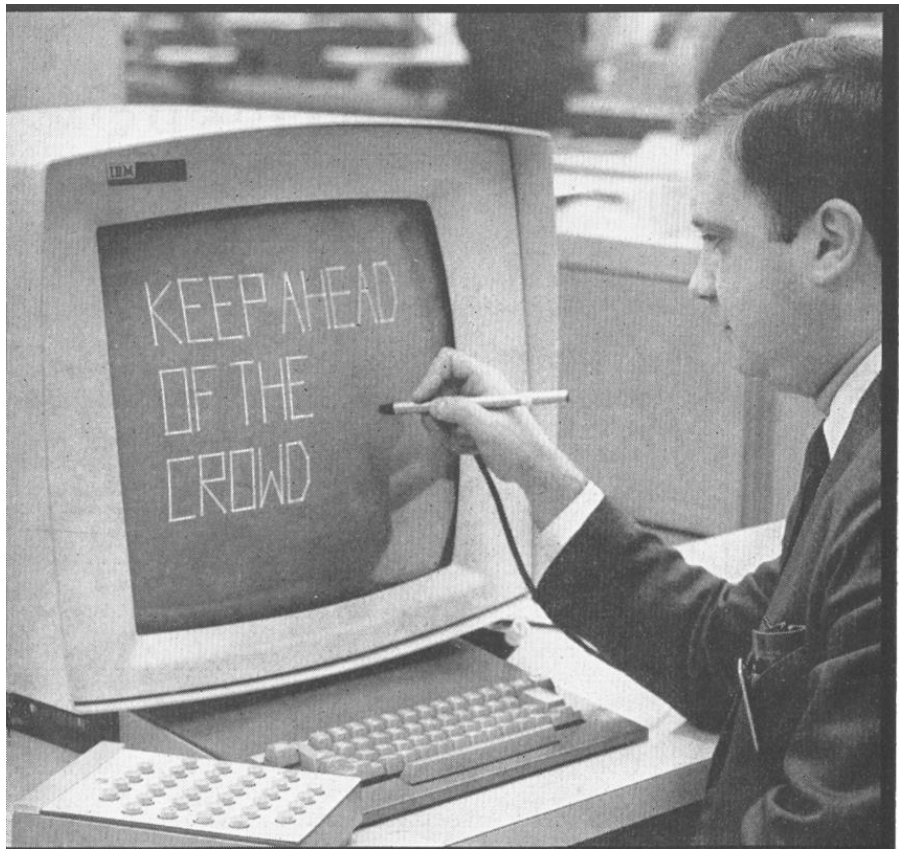

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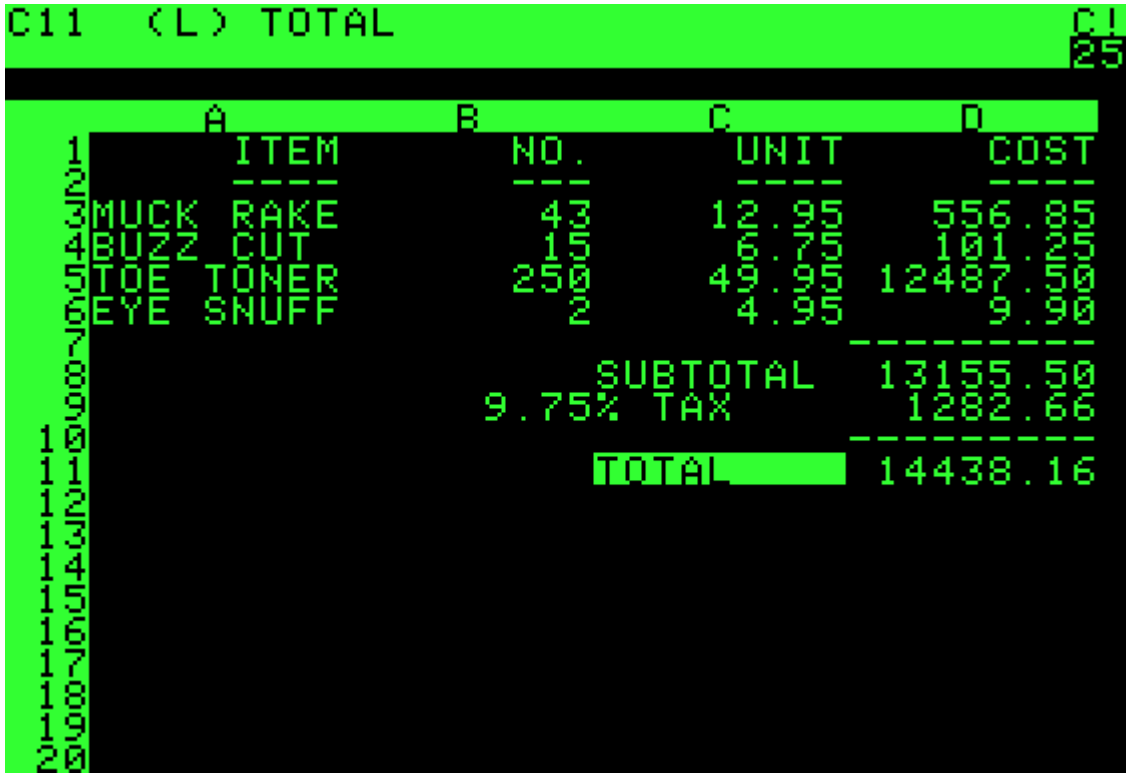

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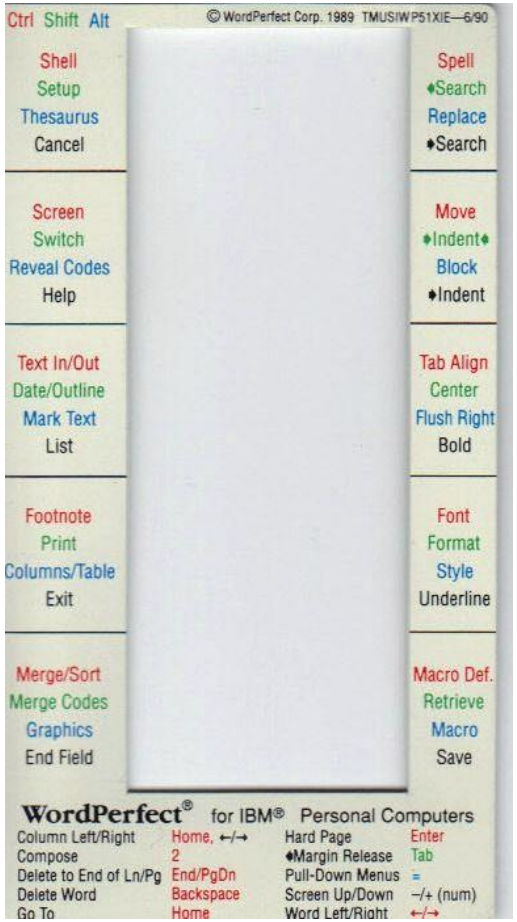

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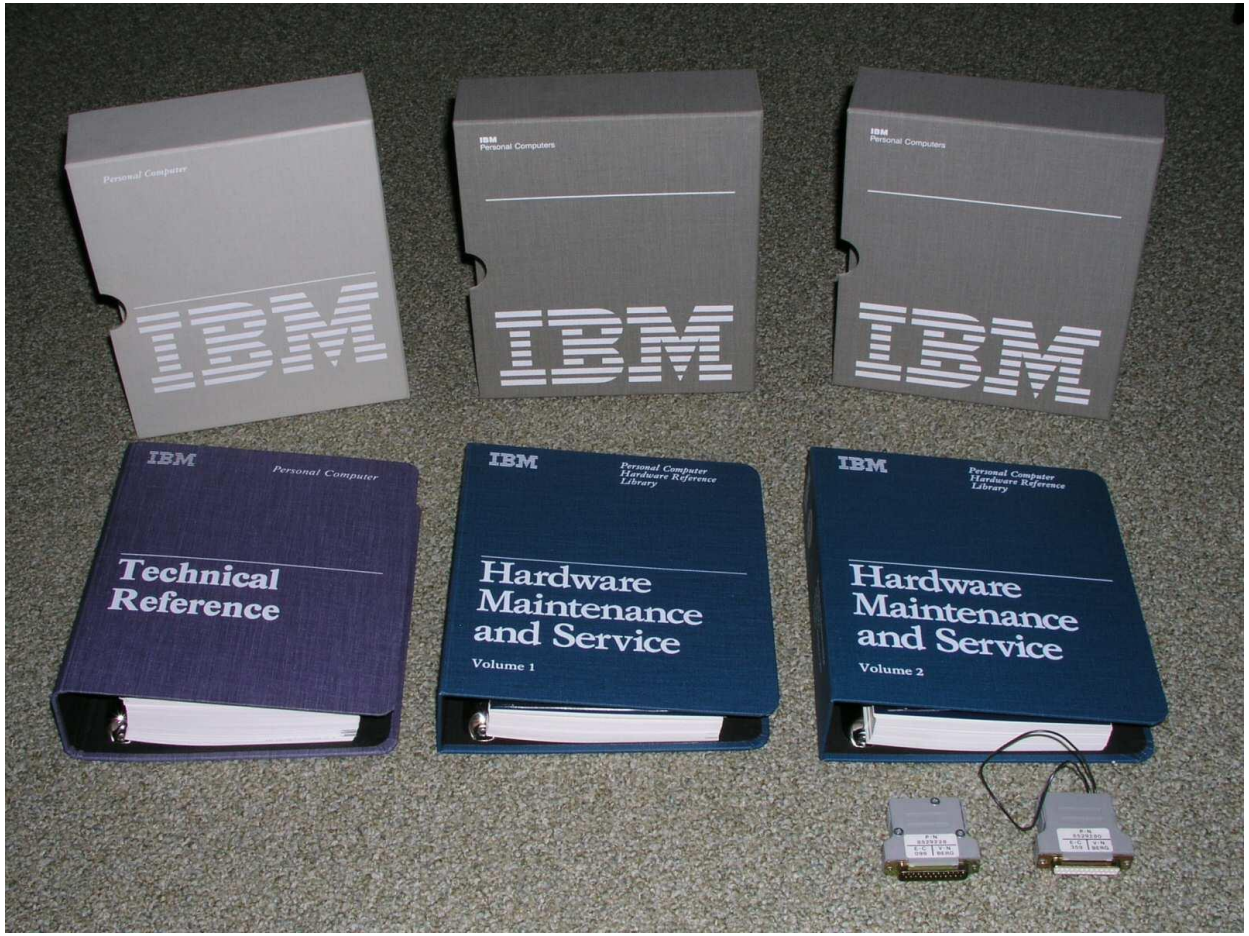

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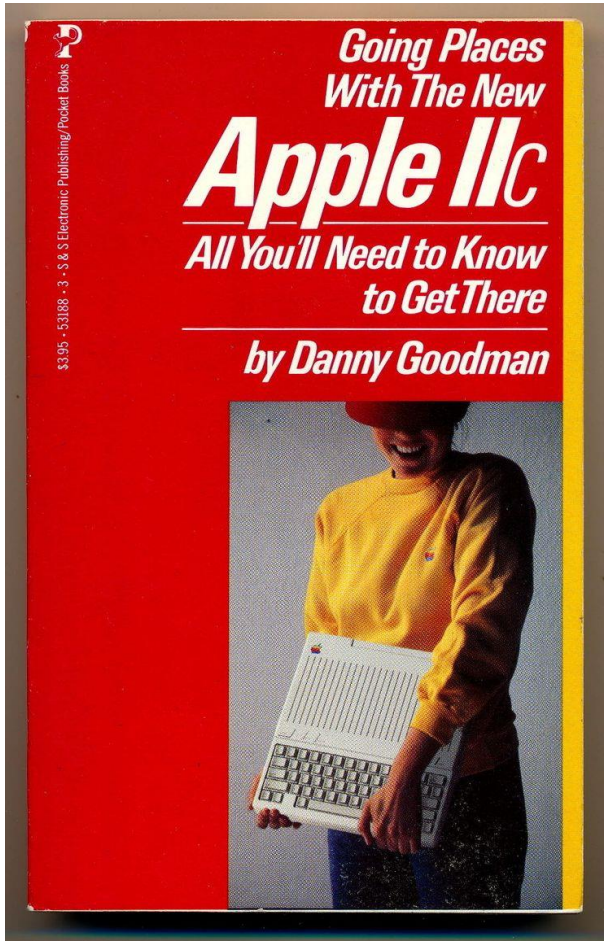

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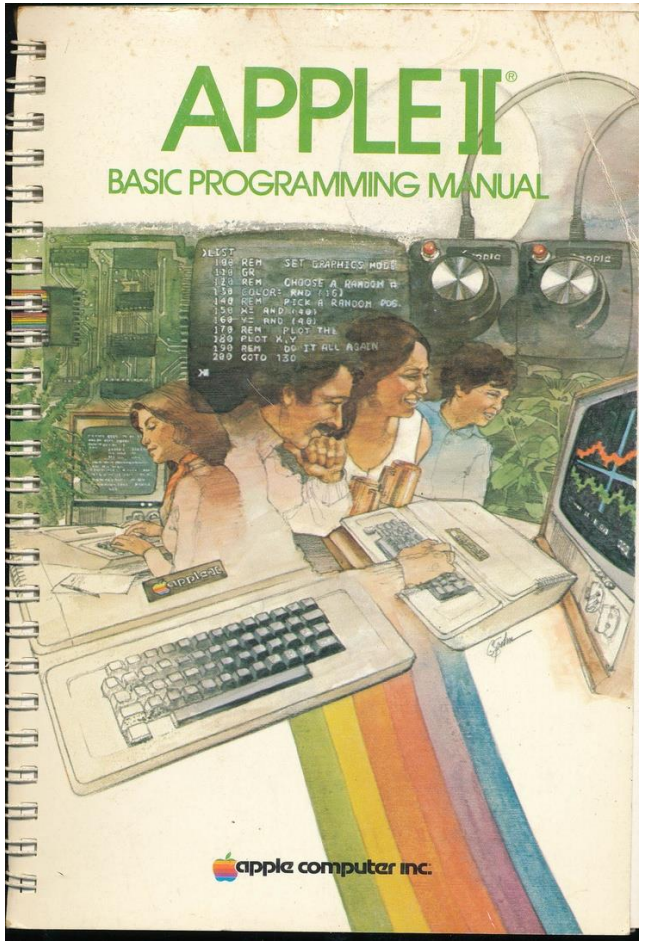

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Most importantly, system and software design and development began to focus on the experience, as opposed to just the hardware and software

- Usability
- Maintenance / Support
- Graphical interface
- All of which end at the user
  - Understanding them
  - Listening to them
  - Designing for them

Human Computer Interaction

Usability is really the ultimate focus, the ultimate goal

But what does it mean?

The term is a nebulous, living thing

- Frequently changing
- Frequently expanding
- Frequently being added to

Usability doesn't mean simply 'able to be used.'

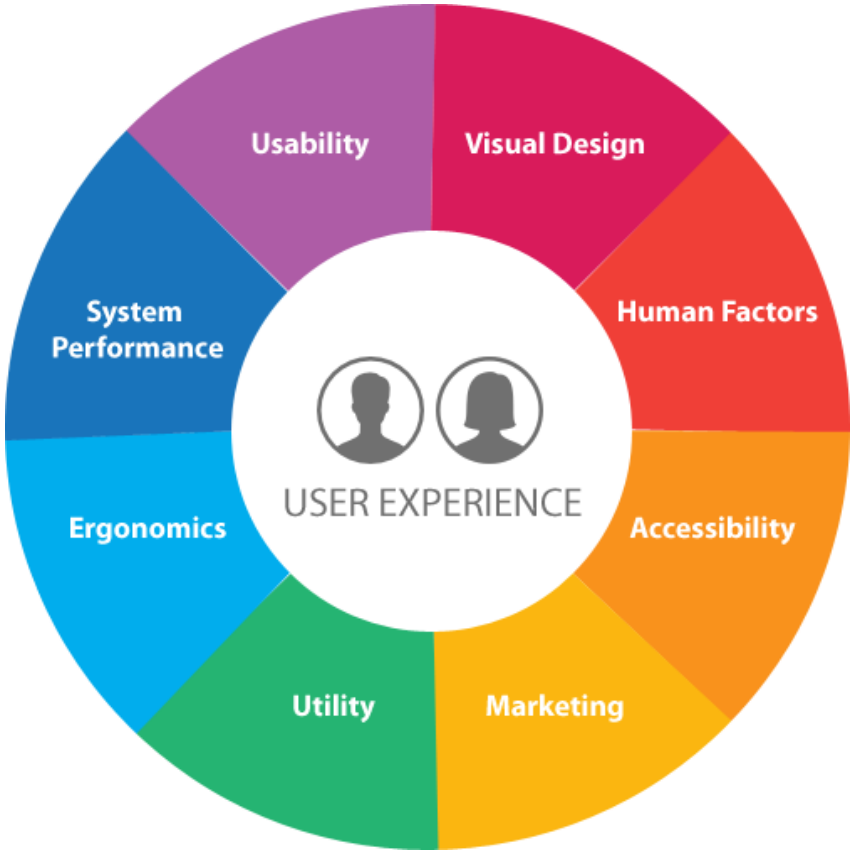
- Distinction between UI/UX

HCI's multidisciplinary nature can lead to complexities in approach and definition

HCI (Human Factors, really) is also one of the most co-opted and diluted disciplines there is

- However that also gives it its strength

Human Computer Interaction



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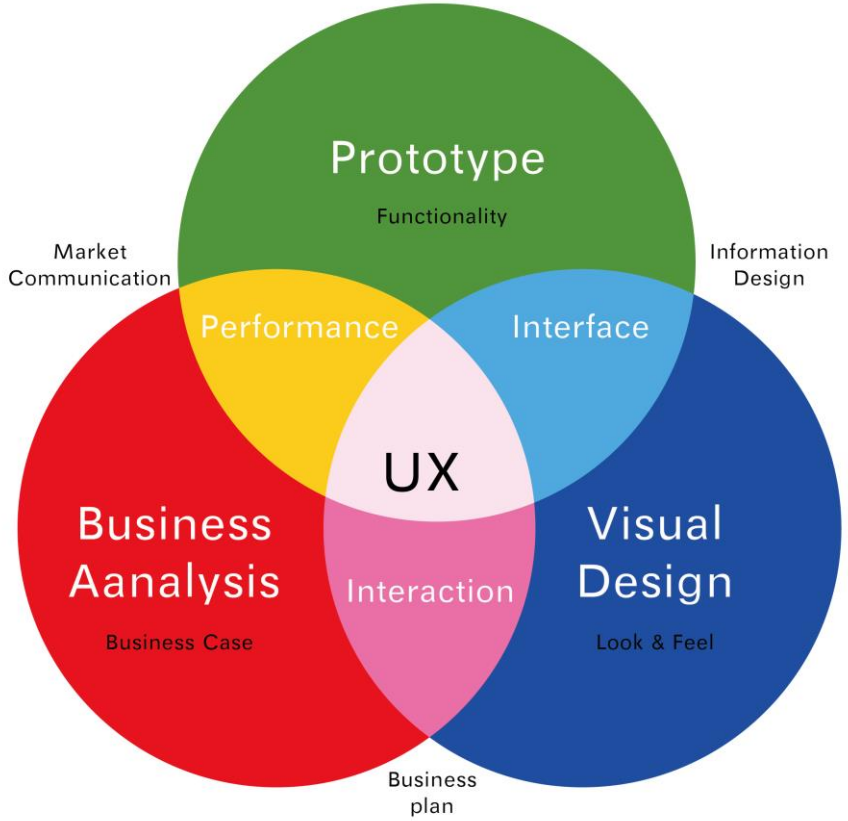

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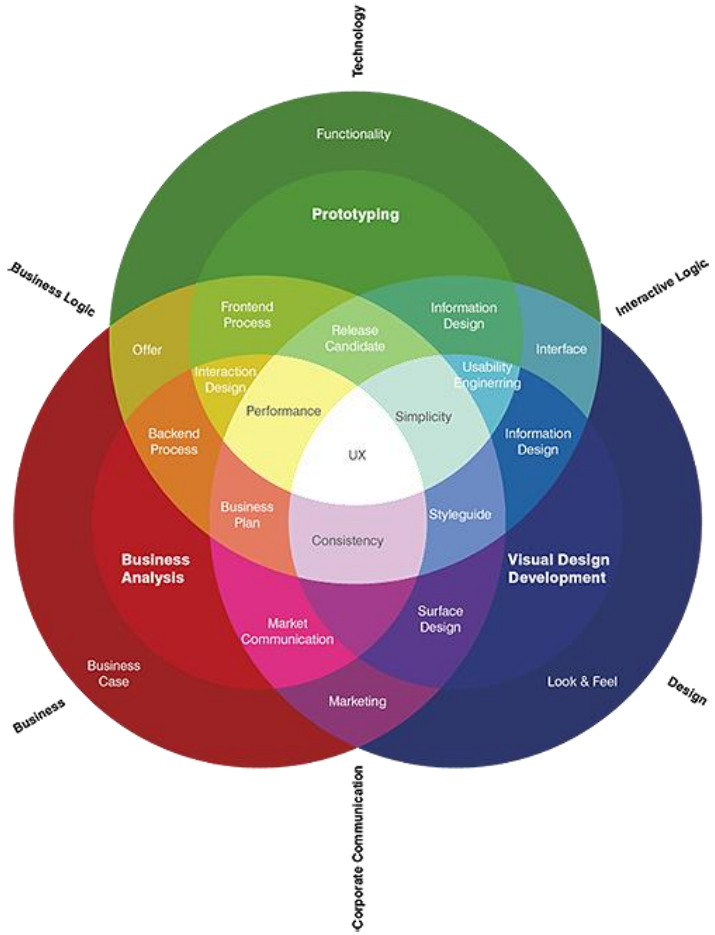

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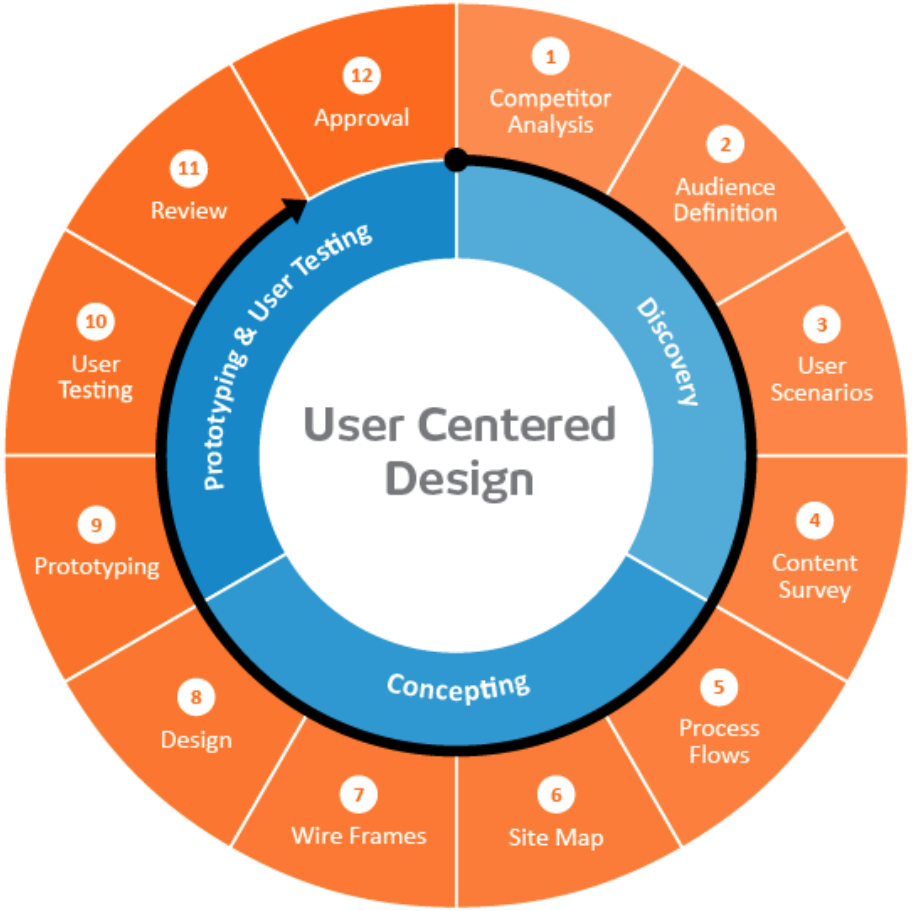

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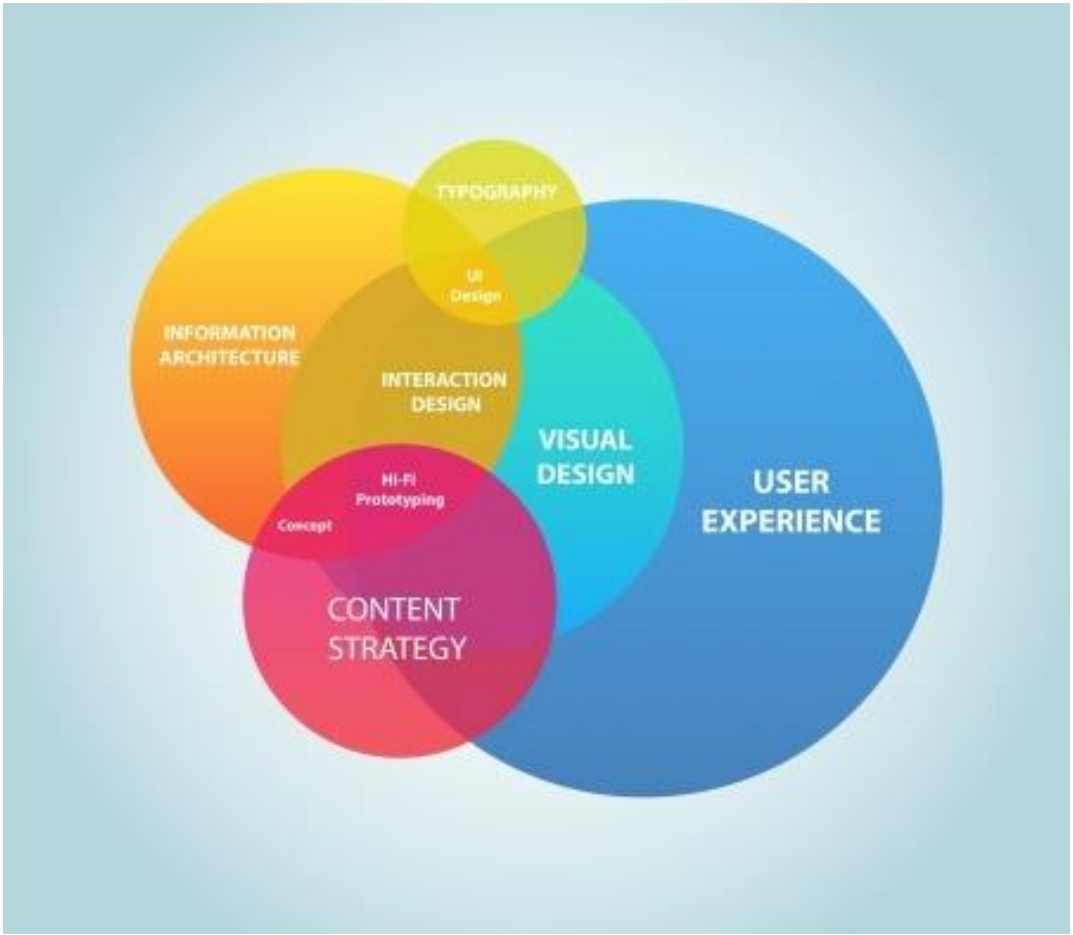

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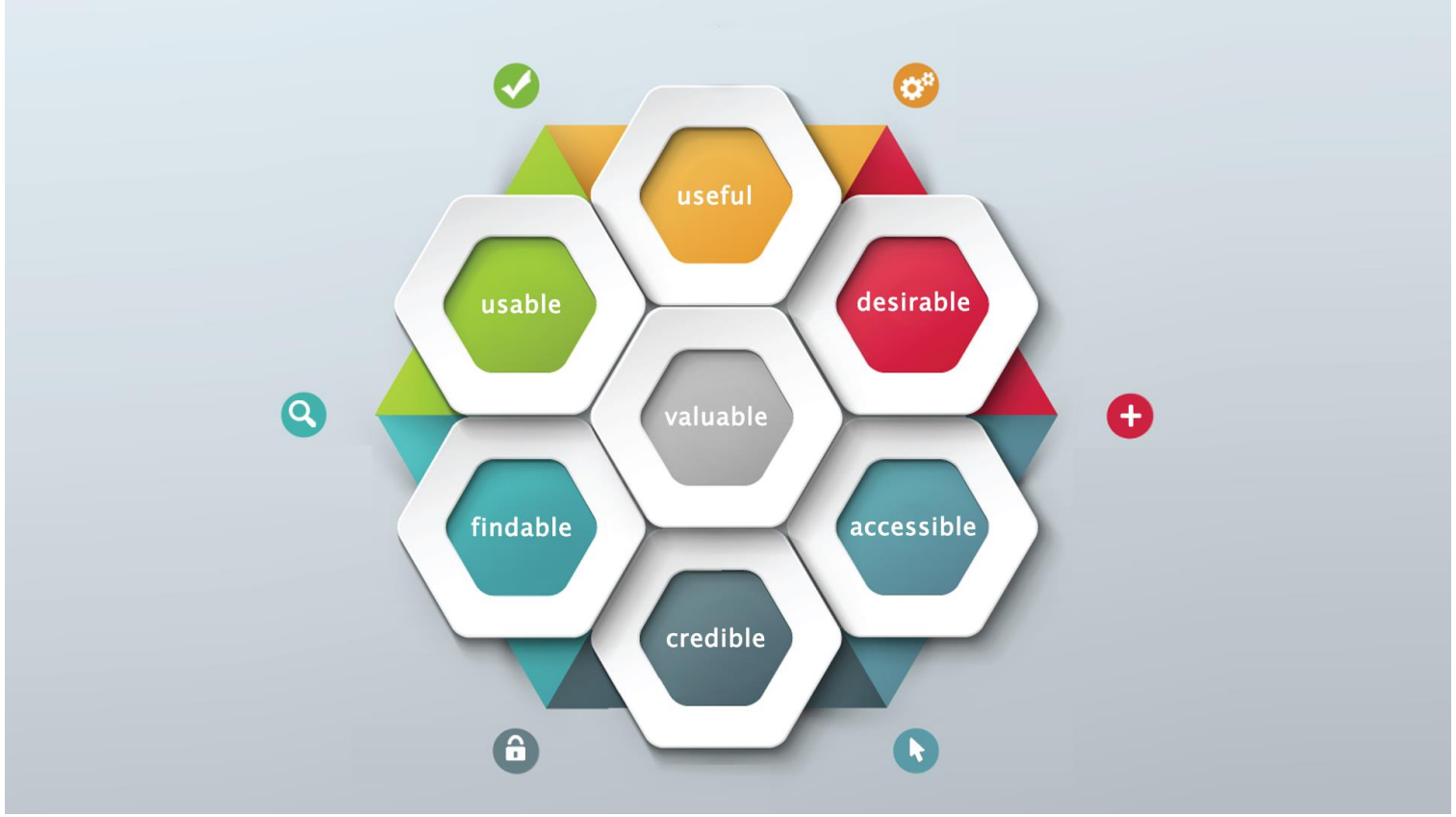

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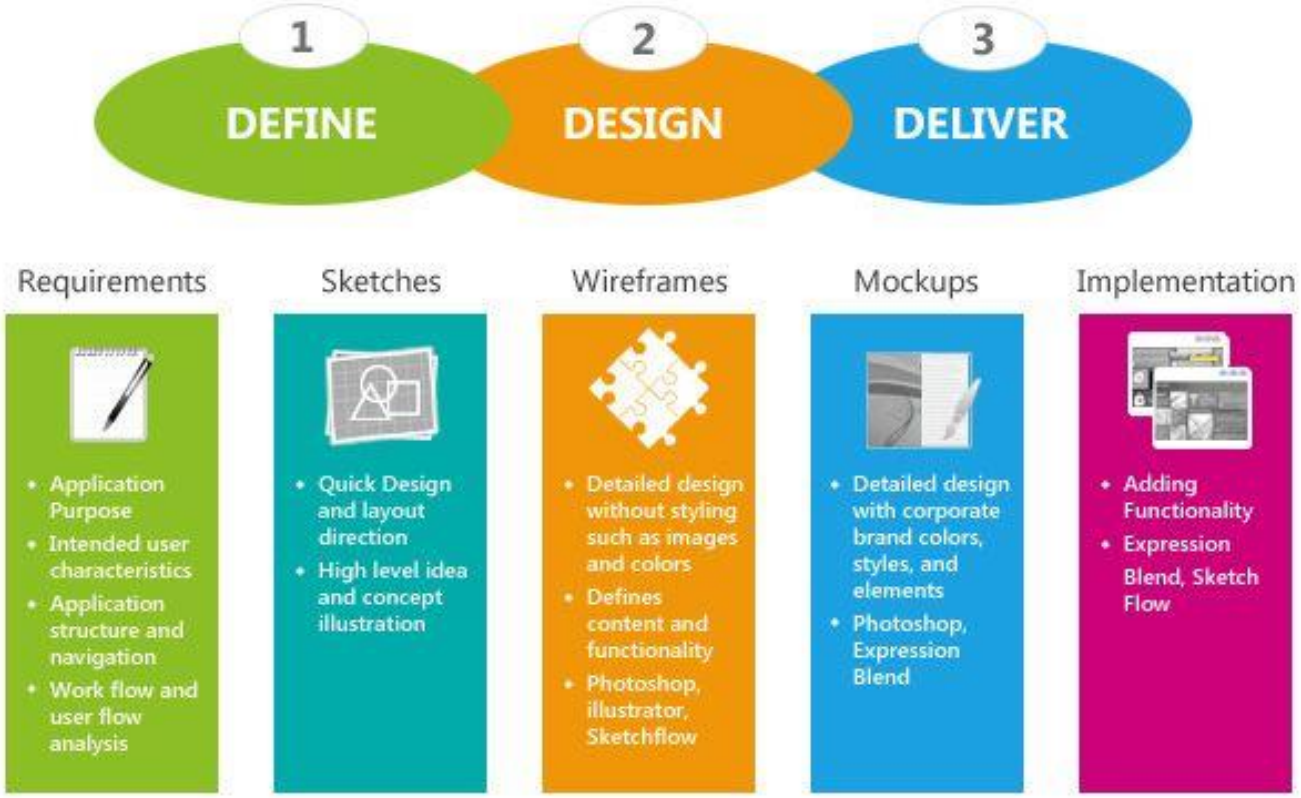

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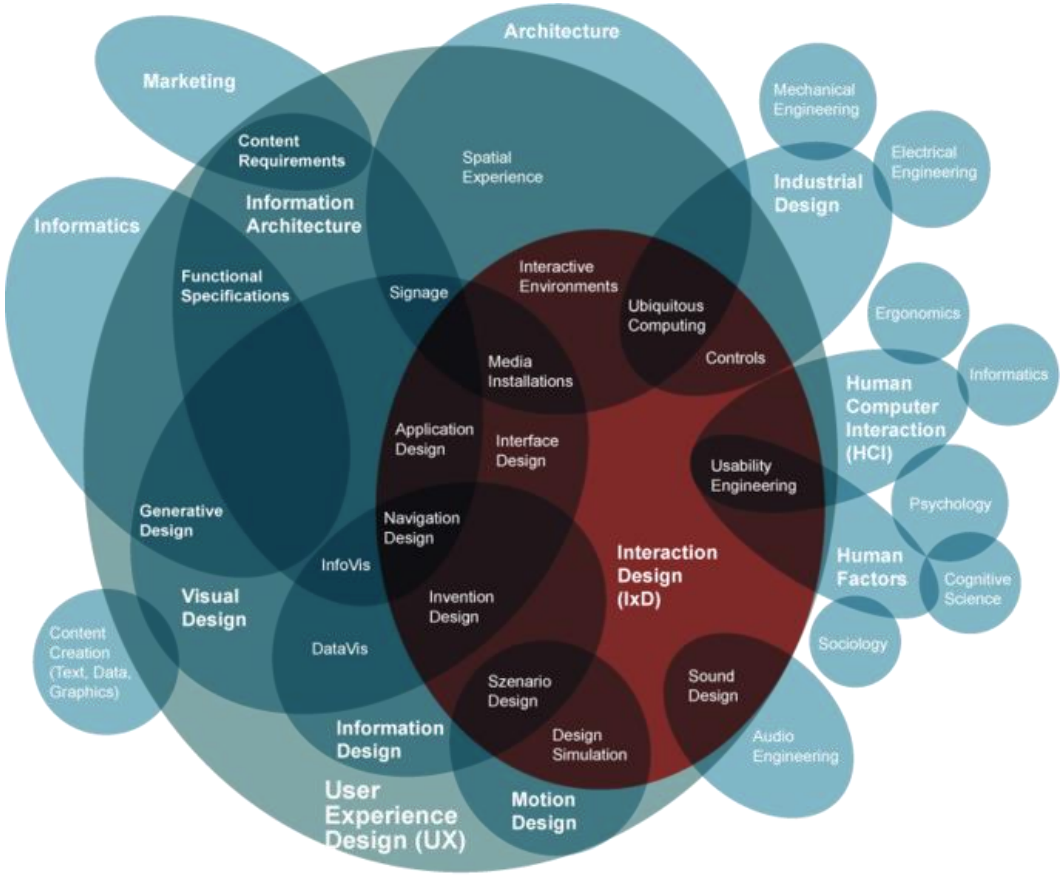
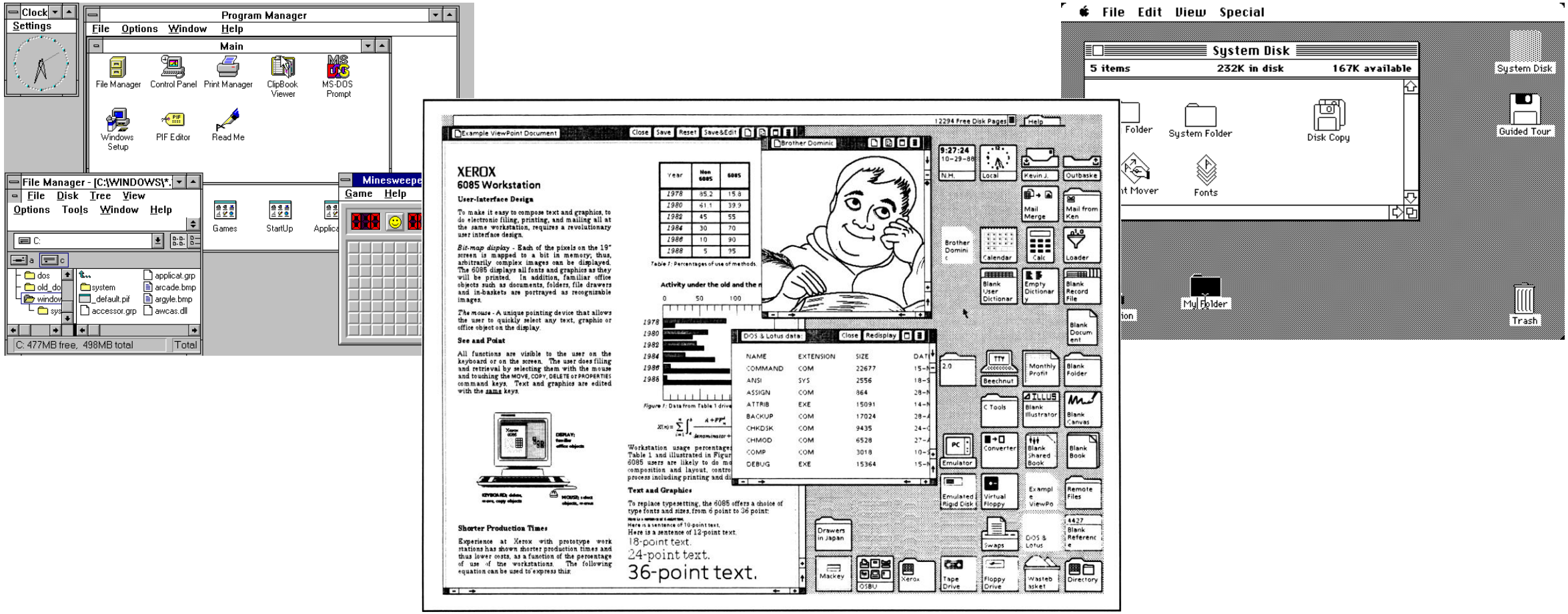


Human Computer Interaction

Eventually, there was a sea change

- Xerox Star
- Apple Macintosh
- Microsoft Windows

Human Computer Interaction



Human Computer Interaction

Provided brand new methods of interaction

- WIMP

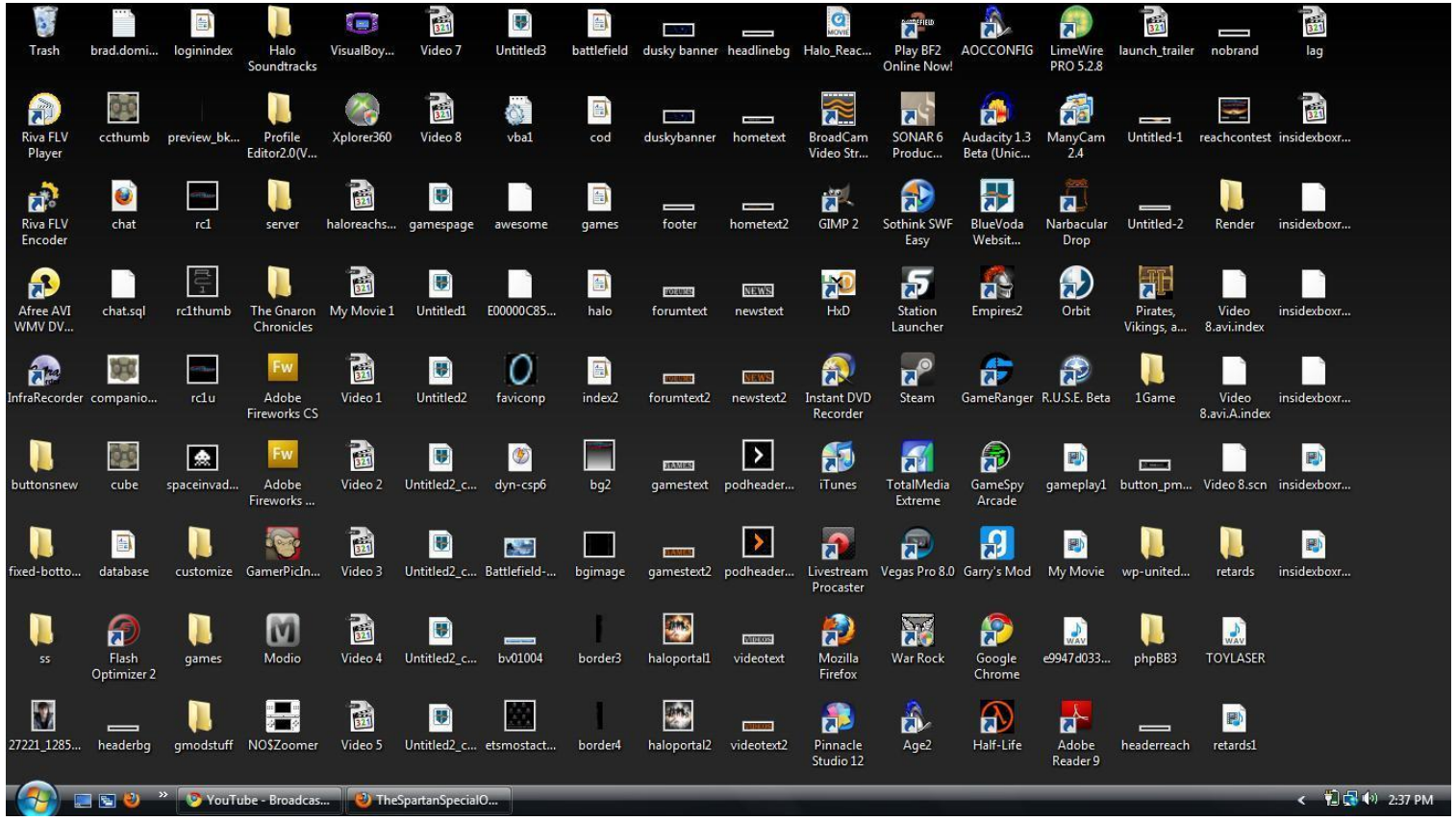
New interaction types

- Instructing
- Conversing
- Manipulating
- Exploring

This led to an explosion in HCI, in all areas

- New interaction methods
- New conceptual models
  - Metaphors
  - Affordances
- Increased accessibility, and also increased accessibility
- This also led to a host of new problems

Human Computer Interaction



Human Computer Interaction

Standards and guidelines have been developed and incorporated into interface design for decades

However, two researchers have contributes sets of rules that have been tested, verified, and incorporated more than any other

Jakob Neilsen

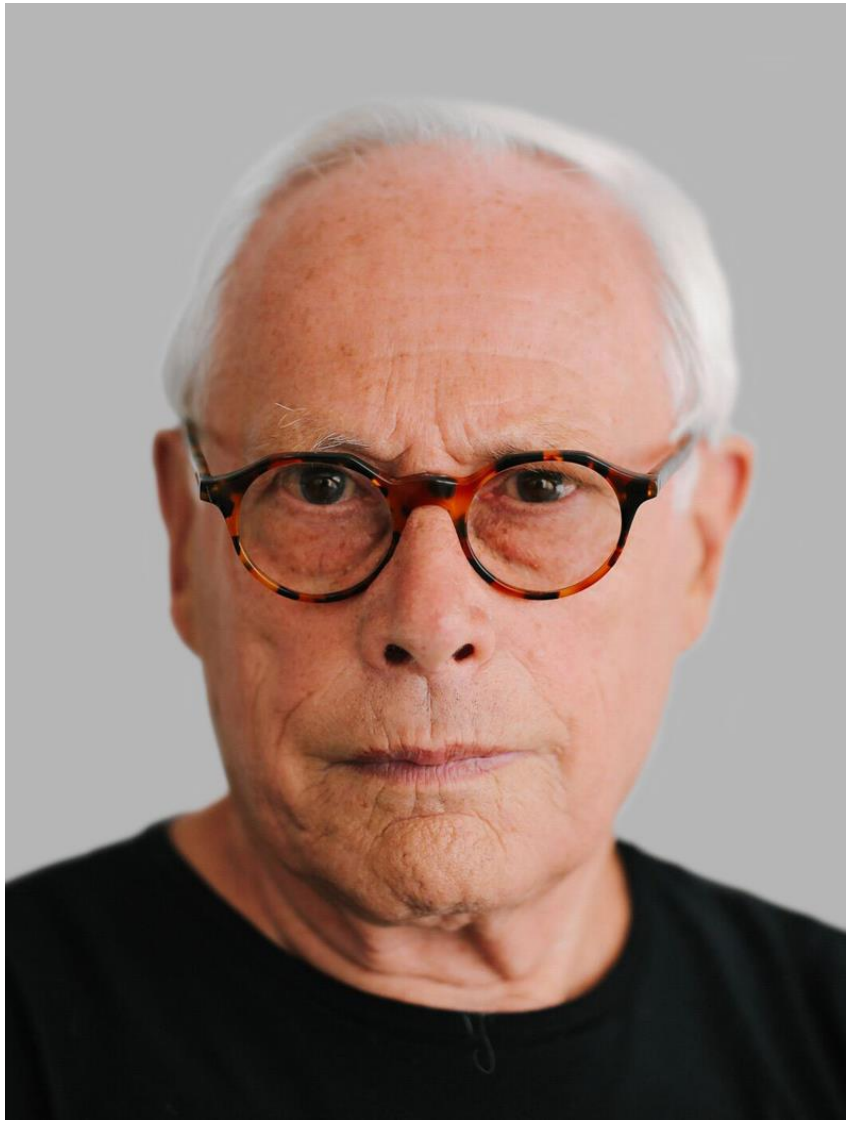
- 10 Usability Heuristics for Interface Design

Ben Schneiderman

- The Eight Golden Rules of Interface Design

Each of these are considered canon in the design field

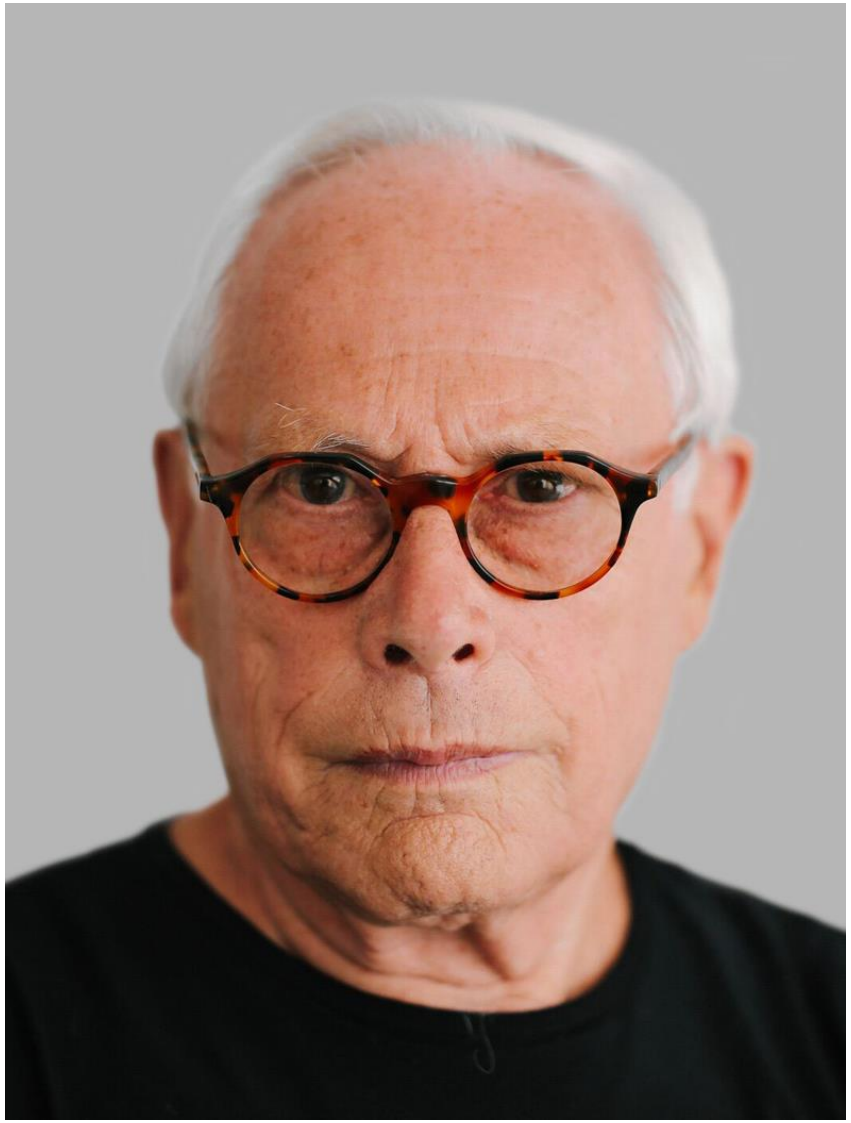
But first, Dieter Rams



Human Computer Interaction

Dieter Rams

- Trained as an architect
- Believes that:
  - Form follows function
  - People inform the form and function
  - Good design necessarily comes from teams
- Everything has purpose
- Also believes in the Ulm School approach to design
  - Post Bauhaus
- Made his design mark at Braun
- Developed the “Ten Principles for Good Design”



Human Computer Interaction

Dieter Rams – Ten Principles of Good Design

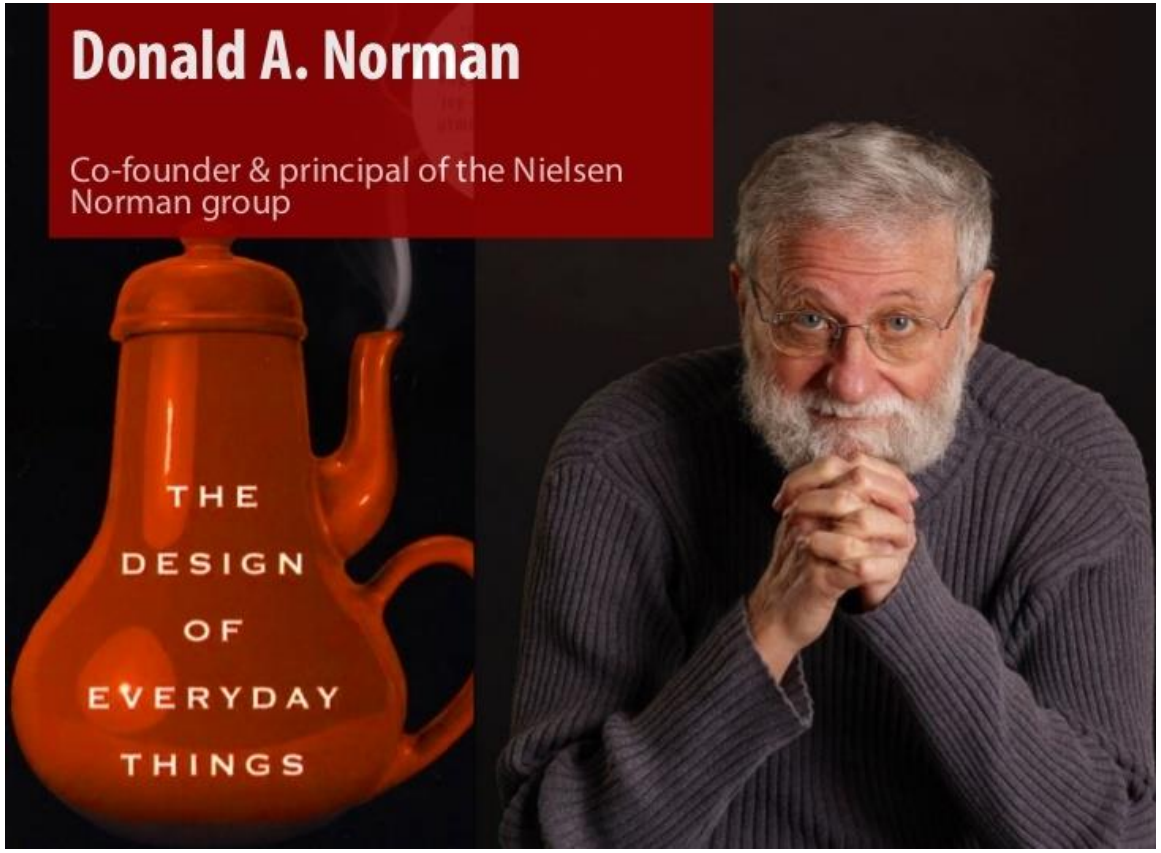
- Good Design is Innovative
- Good Design Makes a Product Useful
- Good Design is Aesthetic
- Good Design Makes a Product Understandable
- Good Design is Unobtrusive
- Good Design is Honest
- Good Design is Long-Lasting
- Good Design is Thorough
- Good Design is Environmentally Friendly
- Good Design is as Little Design as Possible

Human Computer Interaction

Jakob Neilsen

- Ph. D. in Human-Computer Interaction from the Technical University of Denmark
- Founder of the Neilsen-Norman Group, a global usability consultancy
- Author of numerous books and publications on usability
- Repeatedly referred to as a usability guru, and was once even called the usability Pope!
- Developed the “10 Usability Heuristics for User Interface Design”

Human Computer Interaction



Human Computer Interaction

The 10 Usability Heuristics for User Interface Design

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

Human Computer Interaction

Ben Schneiderman

- Professor at the University of Maryland Institute for Advanced Computer Studies
- Founder of U of M's Human-Computer Interaction Lab
- Recognized as one of the leading global authorities on interface design
- Author of numerous books and publications on usability
- Developed the concept of "treemapping," which displays hierarchical data as groupings
- Developed the "Eight Golden Rules of Interface Design"

Human Computer Interaction

The Eight Golden Rules of Interface Design

- Strive for consistency
- Cater to universal usability
- Offer informative feedback
- Design dialogs to yield closure
- Prevent errors
- Permit easy reversal of actions
- Support an internal locus of control
- Reduce short term memory load

Human Computer Interaction

Usability goals

- Effectiveness
- Efficiency
- Safety
- Utility
- Learnability
- Memorability

User experience goals

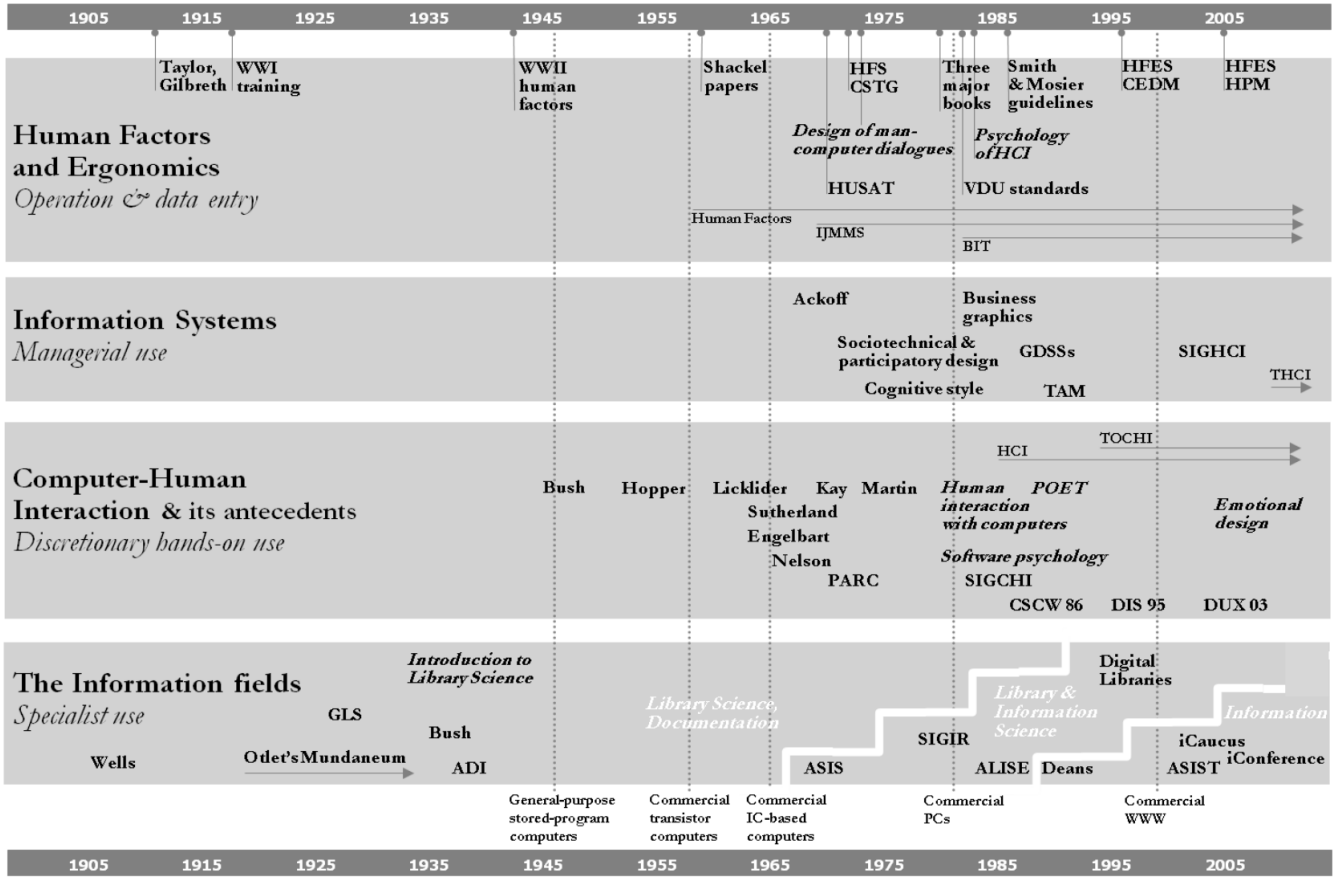
- Desirable aspects
- Undesirable aspects

Human Computer Interaction

Eventually, there was movement beyond the PC

- How do we address the nearly infinite amount of objects we can store?
- Internet (Command to graphical, Lynx to browsers)
- Communication / Collaboration
  - LOL U WOT M8
- Evolution and place of the computing environment
  - Background devices
  - Used by everyone (and why?)
  - Significant functionality in individual devices
  - Embedded systems
- With this evolution, the discipline evolves as well

Human Computer Interaction



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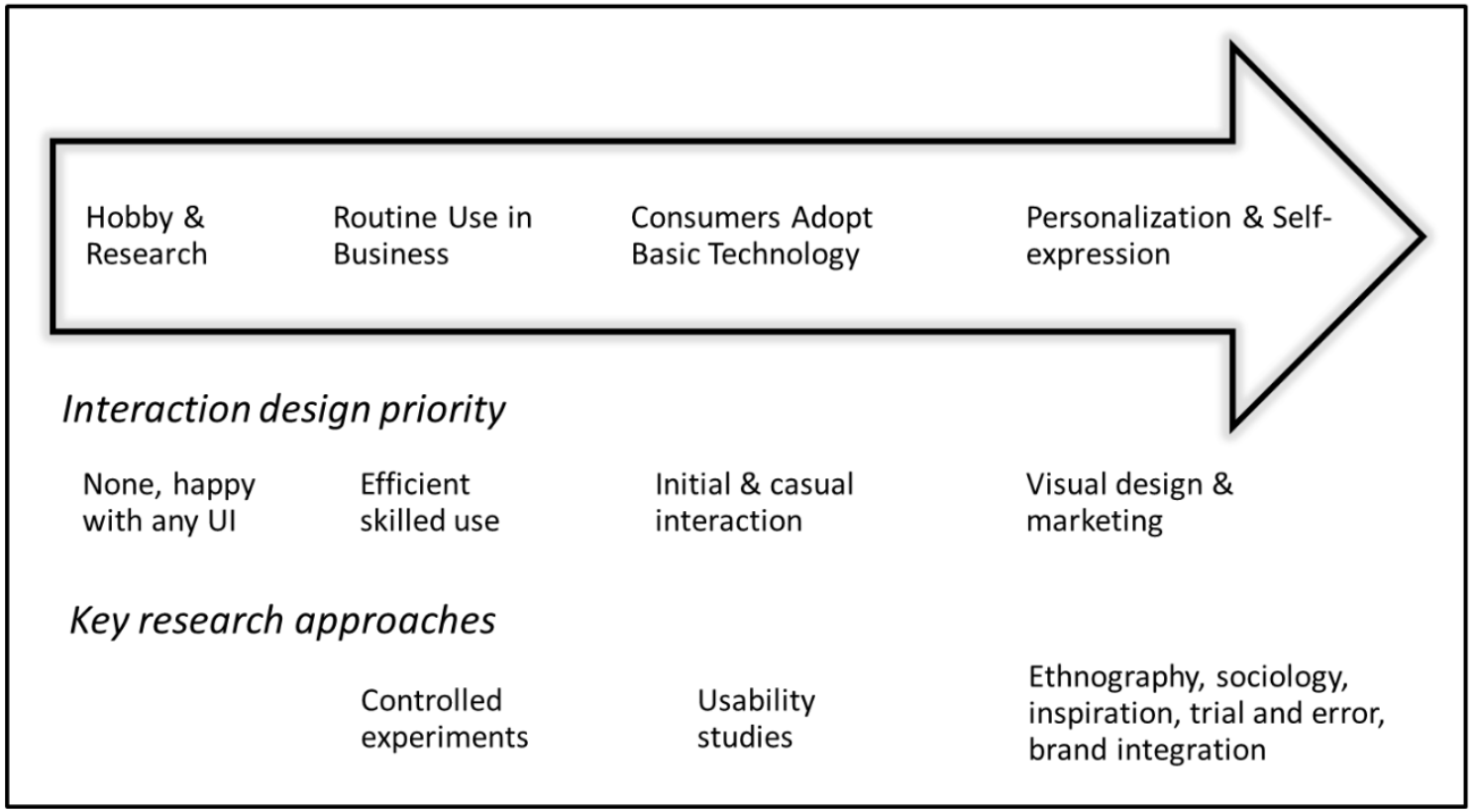

Invention to Maturity

Human Computer Interaction

With the increase in user-generated content, and the evolution of ‘Web 2.0,’ there has become a drastic increase in the need to access, manage, display, and manipulate the vast amounts of data available to us

Russell Ackoff addressed the handling of computer-generated information back in 1967

- Five assumptions
  - Decision makers lack relevant information
  - Decision makers need information they want
  - Needed information leads to better decisions
  - Better communication among decision makers leads to better decisions
  - How the IS works is less important than how to use it

Human Computer Interaction

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How did we do it before?

- File cabinets
- Ledgers
- Index cards / card catalog

Operating computers was a specialized affair

- Programmers
- Keypunchers
- Computer operator

Human Computer Interaction

1970s

- User manuals
- Testing labs
- Prototypes
- Goal-oriented design

1980s

- Research began on VDTs
- General design guidelines were first published
- ANSI standards were first developed

Human Computer Interaction

With the increase in user-generated content, and the evolution of ‘Web 2.0,’ there has become a drastic increase in the need to access, manage, display, and manipulate the vast amounts of data available to us

As storage capacity increased, data increased, and our ability to use that data increased

- Punch cards

Human Computer Interaction

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- Punch cards
- Magnetic media

Human Computer Interaction

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- Magnetic media
- Optical media

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- Magnetic media
- Optical media
- Cloud
- How do we interact with all this information?

Human Computer Interaction

Now, HCI applies to many types of systems, interactions, and experiences

- Medical information systems / equipment
- Accessibility (Blind, deaf, infirmed, incapacitated)
- Gaming
- Large information environments (cockpits, power plants)
- Social media
- Smart TVs
- Portable devices
- Education
- Military
- Hard sciences
- Business / Manufacturing

Human Computer Interaction

What about the future?

- Artificial intelligence
- Virtual reality
- Ubiquitous systems
- Autonomous vehicles (planes too? Maybe boats?)
- Cybernetics

How will we interact with these?

How will we design these systems so we *can* interact with them?

Ultimately, who will be in control? Can we maintain control? Do we want to?