From HCI to CHI

The evolution towards computer-human interaction
Human Factors and Ergonomics
Operation & data entry

HCI in MIS
Managerial use

Computer-Human Interaction & its antecedents
Discretionary hands-on use

Jonathan Grudin, 2005
HCI

- Human Factors (HF)
- Information Systems (IS)
- Computer Human Interaction (CHI)
WWI & II

WWI training requirements accelerated efficiency efforts in Europe and the US. WWII prompted intense interest in engineering psychology as complex equipment tested human capabilities. A single aircraft ergonomic design flaw led to thousands of casualties. After the war, aviation psychologists created the Human Factors Society. Two legacies of WWII were awareness of the potential of computing and an enduring interest in behavioral requirements for design and training.
ENIAC, 1946

• 1st general purpose electronic computer
• 10 feet tall, covered 1000 sq. ft.
• Consumed as much energy as a small town
• 50 spent tubes had to be found and replaced on an average day

NEEDED OPERATORS
3 Functions

• **Operation**
  Reset, changed vacuum tubes, developed stored program computers that could be loaded by tape.
  “knobs and dials” human factors tradition

• **Management**
  Oversaw design, development, and operation.

• **Programming**
  Languages, compilers, and constructs as subroutines.

“Freeing mathematicians to do mathematics.”  Grace Hopper, 1950’s
1945-1958: Managing Vacuum Tubes

1958-1965: Transistors Open New Vistas

Helping Operators

“In the beginning, the computer was so costly that it had to be kept gainfully occupied for every second; people were almost slaves to feed it.” - Brian Shakel

Books such as ‘Man-Computer Symbiosis’, ‘Augmenting Human Intellect’, and ‘A Conceptual Framework for Man-Machine-Everything’ described a world that did not exist, in which people who were not computer professionals were hands-on users of computers out of choice.
1965-1980: HCI before personal computers

• **Operation**
  Maintenance, loading and running of programs, filing printouts, entering punchcards. “Feed the computer”.

• **Management**
  Oversaw hardware acquisition, software development, operation, and routing and using output. Not hands-on users.

• **Programming**
  Programs flowcharted and written on paper, punched onto cards. Not hands-on until the end of this period. Computer use costly.
• 1968 DEMO, Doug Engelbart

• 1970 Xerox Parc founded to advance computer technology by developing new hardware, programming languages, and programming environments.
1980-1985: Discretionary Use Comes into Focus

1980: IBM added software to hardware as a product focus.


HCI groups formed at APU, Bell Labs, UCSD-Norman, DEC-Whiteside.

1981: ACM sig on Social and Behavioral Science Computing (SIGSOC) extended their workshop to cover interactive software design and use.

1982: The group shifted to latter focus and adopted the name Computer Human Interaction (SIGCHI).


1984: Interact first held in London drew HF&E and CHI researchers.
1985-2005: GUI, Internet, and WWW

GUI’s did not attract significant attention until Windows 3.0 succeeded in 1990.

Web had less impact on HF&E

Research into computer supported meeting facilities flourished

Web became business tool

1986: Computer Supported Cooperative Work (CSCW) 
    added social theory and methods, ethnography

1987: Hypertext

1995: Designing Interactive Systems (DIS)

1999: Ubicomp

2003: CHI co-sponsors Designing User Experience (DUX)
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Projects
Hear & There
iSpace

Social Spaces Group, CS-UIUC
Motorola Research Labs
Mental Maps
Reflective of my mental model of the space around me.

Map is not accurate. (Brothers is not across Legends.)

Some landmarks are missing. (The game shop I have never visited is not shown here.)

Map is personalized. (I sometimes go to OISA.)

Essential details are not shown. (Roads are not shown here.)

• Limited number of landmarks.
• Show landmarks that are relevant to me.
FIG. 2. Outline map of the Boston peninsula

FIG. 5. The visual form of Boston, as seen in the field

FIG. 5. The Boston that everyone knows
Situation: Done teaching CS105 at 5:10. Have to meet Brian at 6:00.

What is my context?
- Current time: 5:10, Sept. 15, ‘05
- Current location: Undergrad Library
- Last activity: Teaching CS105
- Next activity: Meet Brian
- Most likely activity
  - During 5-6: Food
  - On Thursdays: Free food in Siebel
  - At Undergrad Library: Go home
Project how to...

• **...get information about landmarks?**
  – Landmarks usually have some description of them in the web. This is usually a few paragraphs of natural language text.

• **...get user behavior?**
  – We collect GPS information about the user for a week. We use this data to simulate more data for experiment purposes.

• **...social relations?**
  – If two users’ temporal-spatial behavior resembles each other, particularly, they spend time at a common location, we infer...
Mental maps - nearness

- **Temporally near**
  - Landmarks visited around the same time of day, day of week etc.

- **Conceptually near**
  - Landmarks visited that have the same conceptual function. E.g. Coffee shops.

- **Spatially near**
  - Landmarks that are near each other in a spatial location.

- **Socially near**
  - Landmarks that are visited by friends/family etc.
Traditional map

- Static
- Crowded
- Not pleasing to the eye
- Not sensitive to user context
Our Solution

- Lots of bars
- Main Quad
- Undergrad library
- CRCE
- Krannert Center
- Tony's house
Telelogs
Given that his friends are always late, he decides to record a log on his cell phone using Telelogs.
After a short period of time and much to his surprise he has received a public comment from one of his local strangers. He chooses to read it.
Welcome to The Presentation Of Telelogs
What is Telelogs?

• Hybrid between a blog and mobile telephone

• Mobile Devices actively seek one another

• Upon a second crossing, two mobile devices register one another as familiar strangers and permit one another to listen to the audio log of the other

• After listening, one can send public or private comments to the creator of the log
PortalFrame
Ambient Presence

• Daily presence is gone
• For a low maintenance connection
• Personal Privacy Scope
PortalFrame
Sound Representation
Spectrum Analysis
Isochords

Warum sollt ich mich denn grämen - J.S. Bach
Motivation

- Makes musical structure salient
- Shows changes that occur over time
- Multi-modal reinforcement for ear-training
Chord Quality

G Major

G minor

G diminished
Chord Quality

G Major

G minor

G diminished
Seventh Chords

- **Major 7**: 
- **Maj/min 7**: 
- **diminished 7**: 
- **min/Maj 7**: 
- **minor 7**: 

Music engraving by LilyPond 2.6.3 — www.lilypond.org
Seventh Chords

- Major 7
- Maj/min 7
- Diminished 7
- Min/Maj 7
- Minor 7
Imagine - Lennon
Giant Steps - Coltrane
- Each color represents a different person
- Length of bar represents volume
- Dots represent moments of silence
Augmented Social Cues

- Turn Taking
- Interruption
- Conversational Dominance
- Silence
- Agreement
- Aural Back-channels
- Mimicry
- Rhythm and Flow
- Time Span
Social Mirror

- Reflection of Interaction
- Self Reflection
- Persistent History
- Context of Conversation
Conversation Votes
Conversation Votes

- Anonymous Back-channels
- Context and Meaning