Intelligent User Interfaces Design and Implementation

http://www.dfki.de/~sonntag/courses/WS14/IUI.html

Specific Objectives of the Course

Upon completion of the IUI course, students are expected to have:

- Interdisciplinary knowledge and understanding of IUI topics

- Skills to engage as active participants in critical reflection and debate

- The intellectual capabilities inherent in reading and interpretation, written argument, qualitative/quantitative critique, and creative thinking required for further IUI scholarship

- … which means:

Upon completion of the IUI course, students are expected to have:

- **Understanding of:**

    - importance of IUI design and implementation issues

    - limitations of presented algorithmic solutions (and in general undecidable/untractable)

- **Ability to:**

    - participate in large-scale IUI programming/implementation projects.

    - communicate effectively in a professional environment & work in IUI group projects

    - review and evaluate IUIs (to a certain extend)

    - recognise the need to keep up to date with developments in IUI

    - participate professionally in industrial research and development (after taking related information science courses).

Grading

- Credit points: 4 ECTS-CP (2C+1R)

- Grading will be based on the assignments, the recitations (required prerequisite for final examination), and the oral or written examination.

  - Readings Critiques (**6** assignments); Readings critiques must be submitted in hardcopy at due date, don't worry: Critiques will be graded as "check", "check minus", or "check plus" (extra credit).

  - Recitations (up to three students, but: 50% of points required prerequisite for final examination)

  - Software project (up to three students)

  - 100% the oral examination

- Regular class attendance (and active participation) is expected.

Recitations

- exercise sheets / Übungsblätter

- you will like it: it includes **video** projects: for each HCI video, explain what the IUI aspect is, and if there is none, describe how the HCI application presented in the video "product" could have been designed to include IUI.

IUI

Design and Implementation
Lecture 1: Overview and Design
Daniel Sonntag, DFKI
E-mail: sonntag@dfki.de
WWW: http://www.dfki.de/~sonntag

Interdisciplinary Field and Transcommunity

AI   IUI   HCI
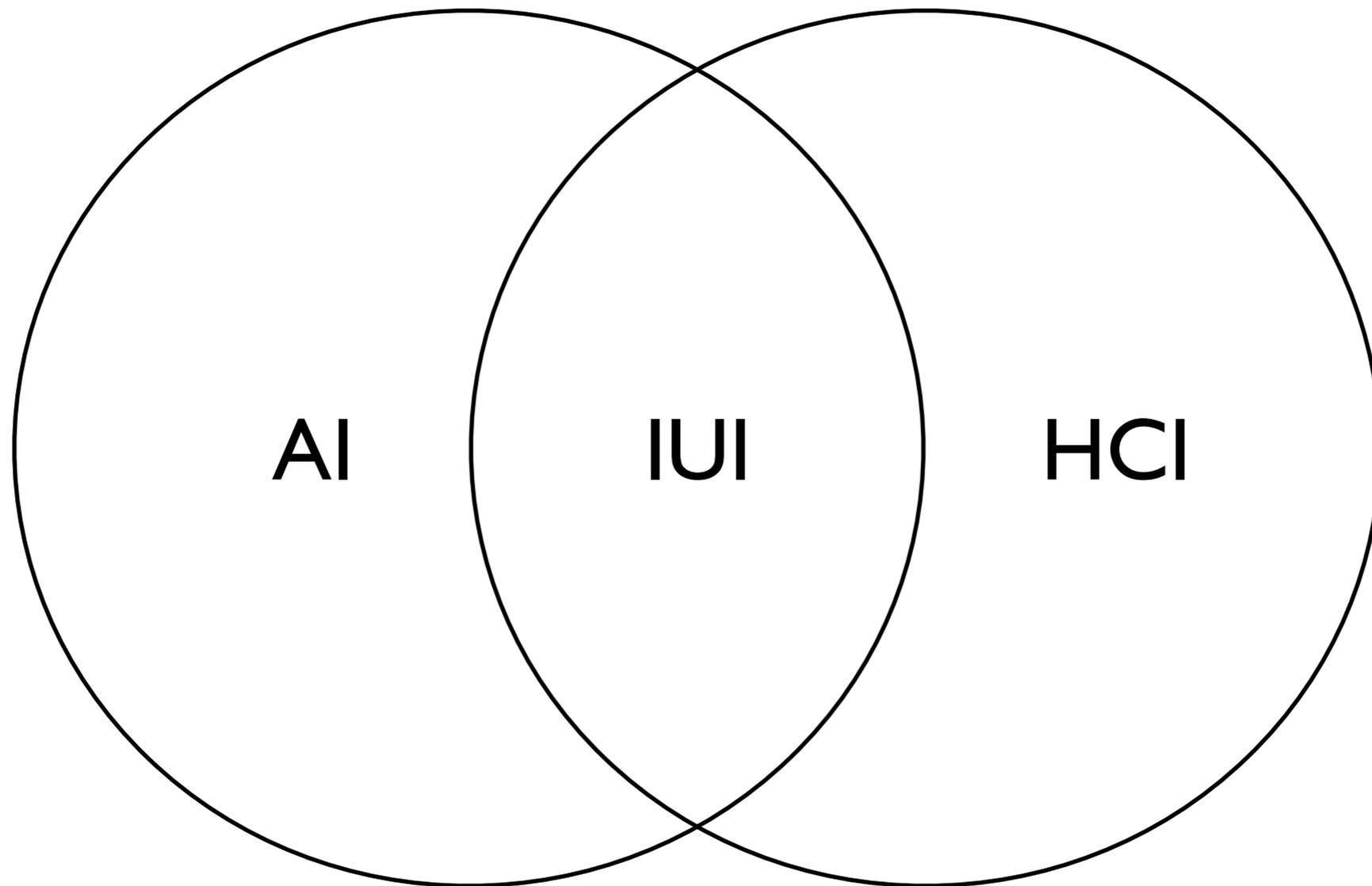
Some IUI Objectives

⬤ Increase productivity

⬤ Decrease expenditures

⬤ Improve efficiency, effectiveness, and naturalness of interaction

⬤ How?

– for example, use knowledge representation, reasoning, ML, adaptation, adaptivity

 – Example Email Filter / Email Response System / Dialogue System / AR orientation help

Smartweb and Siri

Question Answering Functionality

2006 WM Demonstrator

..Ill Telekom.de   15:38

Hat Kansas City gewonnen?
Sport

Wie komme ich nach Hause?
Karten

Poste auf Twitter
Twitter

Neuer Facebook-Status
Facebook

Finde eine gute Pizzeria
Restaurants

Zeige mir witzige Filme
Filme

Spiele Norah Jones
Musik

OK, I found four theaters not far from Anchorage:

CENTURY 16 ANCHORAGE
301 E. 36th Ave (2.3 mi)

REGAL DIMOND CENTER 9 CIN...
800 E. Dimond Blvd. Ste 210 (3.5 mi)

REGAL TOTEM 8 THEATRES
3131 Muldoon Rd. (7.2 mi)

REGAL TIKAHTNU STADIUM 16 &...
1102 N. Muldoon Rd. (7.4 mi)

I found quite a number of movies:

25 MOVIES

THE ODD LIFE OF TIMOTHY...   PG
Released August 15   75%

BRAVE   PG
Released June 22   77%

JOHN CARTER   PG-13
Released March 9   51%

THE MUPPETS   PG
Released November 23, 2011   96%

WINNIE THE POOH   G
Released July 15, 2011   91%

'2001: A Space Odyssey' was directed by Stanley Kubrick.

METRO GOLDWYN MAY...
2001: A SPACE ODYSSEY
DIRECTOR
Stanley Kubrick
STARRING
Keir Dullea
Gary Lockwood
William Sylvester

Runtime: 2h 19m   96%   G

A pair of astronauts heads to Jupiter to investigate a radio signal sent from a mysterious monolith on the moon, but their tranquil trip is endangered when their on-board computer begins acting oddly. The simple plot of director Stanley Kubrick's inspired space adventure (co-scripted with noted science fiction author Arthur C. Clarke) belies the profound philosophical implications of this classic film, which inspires viewers to ask questions about the na...

'The Big Lebowski' stars Jeff Bridges, John Goodman and Julianne Moore.

POLYGRAM FILMED EN...
THE BIG LEBOWSKI
DIRECTOR
Joel Coen
STARRING
Jeff Bridges
John Goodman
Julianne Moore

80%   R

Runtime: 1h 57m

'The hilariously twisted comedy-thriller stars Jeff Bridges, John Goodman, Steve Buscemi and Julianne Moore. Join the "Dude" and his bowling buddies on their journey that blends unforgettable characters, kidnapping, a case of mistaken identity and White Russians. Enter the visually unique and entertaining world from the creative minds of the Coen brothers and re...

Here's 'The King's Speech' which won the Oscar for Best Picture in 2011:

BEDLAM PICTURES
THE KING'S SPEECH
DIRECTOR
Tom Hooper
STARRING
Colin Firth
Geoffrey Rush
Helena Bonham Carter

94%   R

Runtime: 1h 58m

After the death of his father King George V (Michael Gambon of HARRY POTTER AND THE HALF-BLOOD PRINCE) and the scandalous abdication of King Edward VIII (Guy Pearce of MEMENTO), Bertie (Academy-Award®-winner Colin Firth) who has suffered from a debilitating speech impediment all his life, is suddenly crowned King George VI of...

I found a few movies coming out last Monday to Sunday:

13 MOVIES

WON'T BACK DOWN   PG
1:25   4:15   7:15   10:15   25%

LOOPER   R
1:40   2:45   2:50   3:50   4:30 ...   92%

HOTEL TRANSYLVANIA   PG
1:50   2:00   2:20   2:55 3D ...   55%

THE PERKS OF BEING A...   PG-13
Coming September 28   80%

THAANDAVAM
Coming September 28

Augmented and mixed reality examples

http://www.dfki.de/~sonntag/siemens-talk.pdf
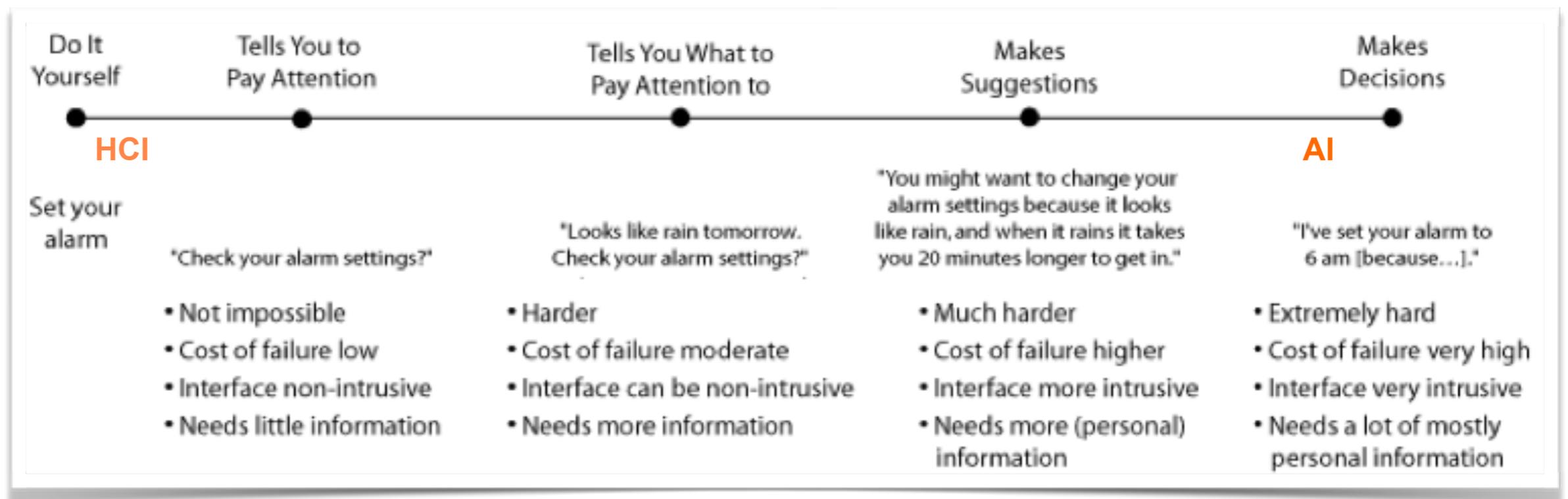
Introducing aspects of IUIs

Classification Example: IP Continuum for Adaptive Interface Design

⬤ Interface-proactivity (IP) continuum between the user and the system (Isbell and Pierce) from HCI perspective (2005)

⬤ Vocabulary for discussing and comparing **adaptive** interfaces

Do It Yourself	Tells You to Pay Attention	Tells You What to Pay Attention to	Makes Suggestions	Makes Decisions
HCI				**AI**
Set your alarm	"Check your alarm settings?"	"Looks like rain tomorrow. Check your alarm settings?"	"You might want to change your alarm settings because it looks like rain, and when it rains it takes you 20 minutes longer to get in."	"I've set your alarm to 6 am [because…]."
	• Not impossible	• Harder	• Much harder	• Extremely hard
	• Cost of failure low	• Cost of failure moderate	• Cost of failure higher	• Cost of failure very high
	• Interface non-intrusive	• Interface can be non-intrusive	• Interface more intrusive	• Interface very intrusive
	• Needs little information	• Needs more information	• Needs more (personal) information	• Needs a lot of mostly personal information

http://www.cc.gatech.edu/~isbell/papers/IPContinuum-IsbellPierce.pdf

IUI Design Opportunities

● Risks (examples):

  ● Don't do what the user wants

  ● Sometimes this is okay

  ● Interrupt the user at a bad time

  ● Frustrate user

  ● Loose user trust

● How should the system decide?

– Design opportunities: needs and technique driven

– Explore in student projects!

IUI Design Opportunities

⬤ What are some specific UI components that you/others interact with?

OLD SCHOOL

- ⬤ Desktop/Web apps
- ⬤ Ubiquitous and pervasive apps
- ⬤ Mobile apps
- ⬤ Very large displays (Informatik Spektrum 5/2014)

⬤ In the future?

- ⬤ Speech based multimodal dialogue systems
- ⬤ Cyber-physical Systems, e.g., MedicalCPS
- ⬤ Towards **user-environment interaction, collaboration, and decision support**

Towards automation and mixed initiative interaction

- Roughly, input processing requires system to "understand" input

- Likewise, output display requires system to "generate" output

  - Historically, canned output is used (parse tree not required)

  - **Reaction on the fly**

  - Generation on the fly

  - Requires common representation of knowledge

  - Towards model−based solutions

ELIZA's Canned Text

- Psychotherapist who repeats your thoughts
  - "Yes, tell me more about _____"
  - "Do you think it is _____ to _____"
  - "I understand. I am listening."
- Simple "parsing" and substitution of key words into canned phrases.
- Try it out at: http://nlp-addiction.com/eliza/
- Counterexample!

Some Major IUI Challenges

- Mixed-initiative dialogue (will be discussed)
- Modelling what users want
- Eliciting what users want
- Not knowing the "true" world state (partial observability) and acting
- Planning and reasoning ahead
- Continually learning model parameters or whole models (never ending learning)
- Speech understanding and activity recognition
- Address this in Software Project!

Medium and Modality

- Medium
  - Material object used for presenting, saving, or handling information, e.g., paper, CD, microphone, mouse
- Modality
  - Human senses used to process information, e.g., vision, audition, olfaction, touch, taste
  - Also called mode

Intelligent Help Agent

- "What do you want to do?"
- "Copy a videotape to a DVD"
- "First, insert a blank DVD in the recorder"
- "OK, what next?"
- "Push the button marked IN/REC on the DVD recorder."

Some Examples of IUIs

- Radspeech (Video)
- ERmed (later ...)
- DigitalPen (Demo later)
- Smartweb Design (later ...)

Student Projects!

- Eye Tracking and Eye Gaze in IUI (Toyama)

- Pen Gestures and HWR / gesture recognition (Weber) -> Dementia Test

- NAO speech interaction and choreography (Sandrala)

- The tutors will meet with each project team (of three to five students) individually a couple times during the semester to provide advice, answer questions, etc.

Student Projects!

- Count as 3 recitation!

- Phase 1: Topic Selection & Task Analysis
  Identify a type of technology to investigate and begin thinking about tasks and (possibly hypothetical) set of users that you will support with your intelligent user interface. Determine what is difficult (and easy) about the current task and how it can be supported.

- Phase 2: Initial Design and Implementation
  Specify system design goals and create an initial conceptual design and implement it together.

- Phase 3: Final Report and Presentation (due Dec. 2)
  Write a report describing the users, their tasks, your technological solution to supporting them (including design and prototype implementation), and how the system is expected to be used. Also include an empirical or observational study of how you would evaluate your system's success in meeting its goals of supporting users.

Student Projects!

- What you turn in: 8 to 12 page final report

  - Two to three page description of the task being supported, how users currently perform this task, and the type of technology you wish to investigate. This should include some indication of how a system might augment current work practices -- remember to respect current tradition while looking for ways to transcend current practice.

  - Description of the system goals and conceptual design. This should include diagrams/drawings of the interface or interactions between system components and users in order to provide a sense of what the system might look like.

- Formal presentation in class