

## Mind the gap!

- From data to intelligence...



## Conceptual Considerations to Describe Relevant Process Sequences from Data to Labour Market Intelligence

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## Agenda

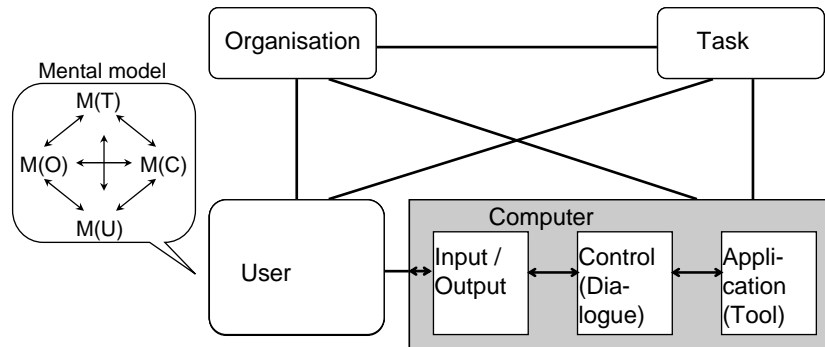
- Working with computers – roles and models
- Human-Computer Interaction
- Pitfalls and mistakes
- Computer Supported Cooperative Work
- Lacks and problems
- From data to intelligence and vice versa
- Attempts to bridge the gap

## Working with computers – roles and models (1)

- Computer as a tool for working on a task
  - predominant model in Human-Computer Interaction
  - different sub-models
    - computer as toolkit, application as tool
    - application as toolkit, procedure / function as tool
- Computer as a medium
  - of communication
  - of cooperation
  - often used in Computer Supported Cooperative Work / Groupware

## Working with computers – roles and models (2)

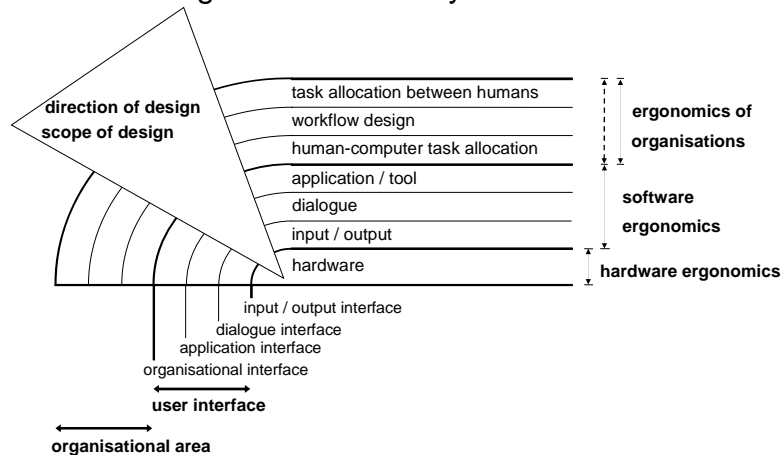
- Computer use in context



according to  
H. Oberquelle: Formen der Mensch-Computer-Interaktion.  
In: E. Eberle, H. Oberquelle & R. Oppermann, Einführung in die Software-Ergonomie. Walter de Gruyter, Berlin 1994.

## Working with computers – roles and models (3)

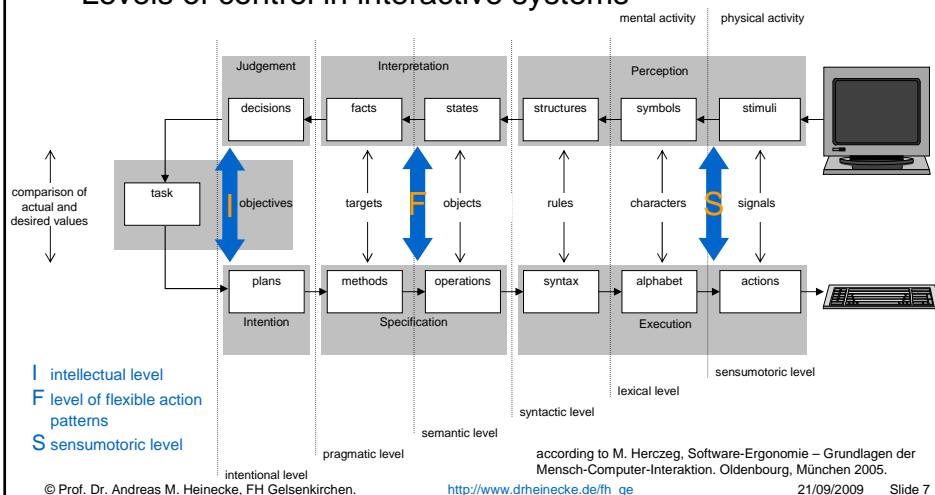
- Levels of design of interactive systems



## Human-Computer Interaction

(1)

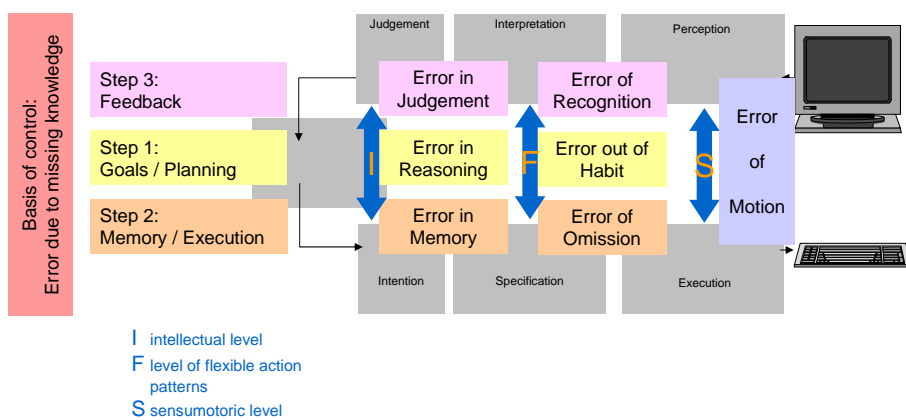
- Levels of control in interactive systems



## Human-Computer Interaction

(2)

- Errors on different levels of control



## Human-Computer Interaction

(3)

- Strategies against errors (1)

Basis of control:  
Error due to missing knowledge

- help systems, tutorials, Computer Based Training

**I** Error in  
Reasoning

- minimising consequences: undo, transactions, backups

Error in  
Memory

- reducing memory load: menus instead of commands, e.g.

Error in  
Judgement

- thorough design of output: messages, codes etc.

## Human-Computer Interaction

(4)

- Strategies against errors (2)

**F** Error out of  
Habit

- thorough design of dialogues: avoid confusion, use confirmations etc.

Error of  
Omission

- thorough design of dialogues and input: check completeness etc.

Error of  
Recognition

- thorough design of output: colour perception, Gestalt theory etc.

**S** Error of  
Motion

- thorough design of controls, adequate i/o devices

## Human-Computer Interaction

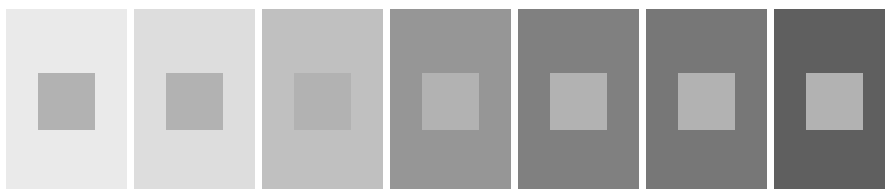
(5)

- Strategies against errors (3)
  - lexical checks are very simple
    - during input
    - input field for time doesn't accept characters, e.g.
  - syntactic checks are simple
    - when a control loses focus
    - format of a field for time is 99:99, e.g.
  - semantic checks are more difficult
    - when a control loses focus or a form is submitted
    - hours must be < 24, minute must be < 60, e.g.
  - pragmatic checks are often difficult, depending on context
    - usually when a form is submitted
    - continuation of the journey not before 8 minutes after arrival, e.g.

## Pitfalls and mistakes

(1)

- Visual perception
  - Be careful using colour / brightness as a code

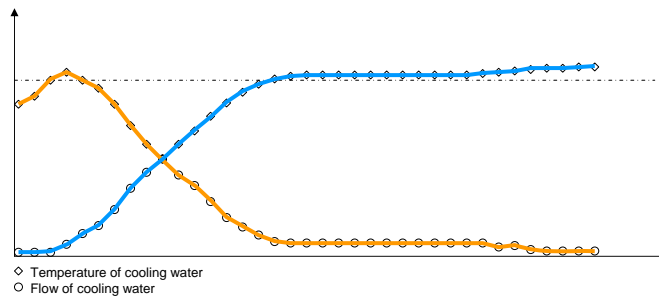


The middle squares are  
of same brightness and same size.

## Pitfalls and mistakes

(2)

- Gestalt theory (1)
  - Law of continuity

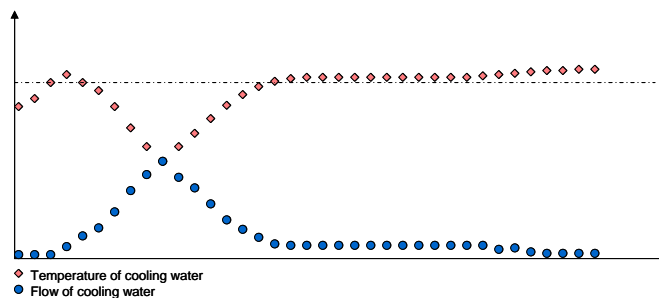


Objects, which appear in a **simple, harmonic, consistent sequence** in space or time, are regarded as **belonging together** and thus as a figure.

## Pitfalls and mistakes

(3)

- Gestalt theory (2)
  - Law of continuity interferes with law of similarity



Similar shape has a weak effect, similar colour has a strong effect.

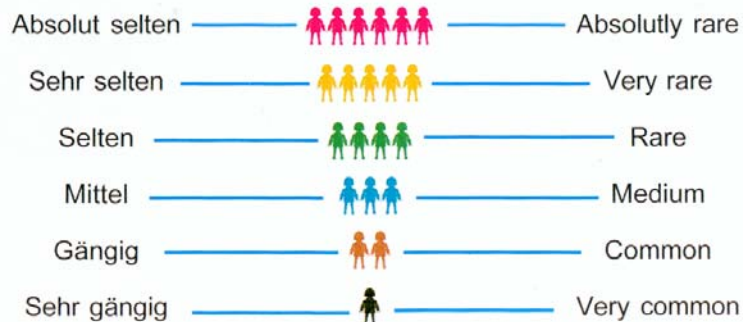
## Pitfalls and mistakes

(4)

- Using symbols and colours as codes

### Bewertungssystem

### Rating System



Many are few, and absolutely rare is critical (red), whereas rare is good (green) !?

## Pitfalls and mistakes

(5)

- Designing dialogues

- Dialogue 1

```
;TF
```

```
TF: CD
```

```
COPY DISK FROM: FIX
```

```
COPY DISK TO: D0
```

```
COPY DISK FROM FIX TO D0 YES / NO? Y
```

- Dialogue 2

```
;CD
```

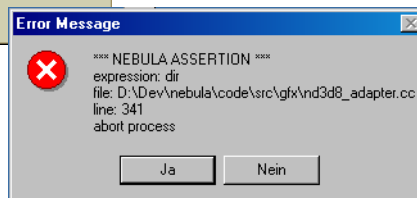
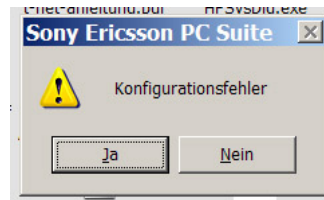
```
CLEAR DIRECTORY YES / NO? Y
```

Sooner or later this will result in a fatal error on Friday afternoon.

## Pitfalls and mistakes

(6)

- Designing messages and texts

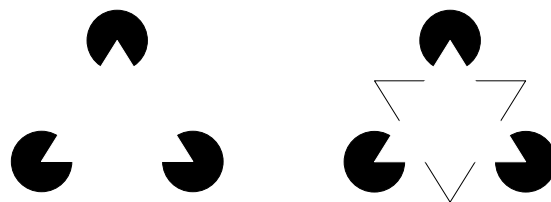


Now I see.

## Pitfalls and mistakes

(7)

- The influence of mental models



- What you see is what you are accustomed to see.
  - Need for the concept of a triangle
- What you understand is what you want to understand.
  - The epicycle problem

## Computer Supported Cooperative Work (1)

- **CSCW**
  - A generic term which combines the understanding of the way people work in groups with the enabling technologies of computer networking, and associated hardware, software, services and techniques (Wilson 1991).
- **Groupware**
  - A generic term for specialised computer aids that are designed for the use of collaborative work groups. Typically, these groups are small project-oriented teams that have important tasks and tight deadlines. Groupware can involve software, hardware, services and/or group process support (Johansen 1998).

## Computer Supported Cooperative Work (2)

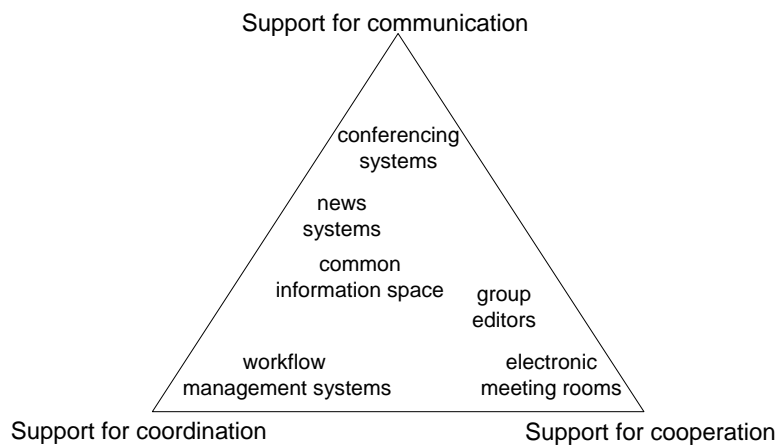
- **Classification with respect to space and time**

	Same time	Different time
Same space	Group moderation Brainstorming support Voting systems	Bulletin board Group workspace
Different space	Video conferencing Application sharing Virtual meeting rooms	Electronic mail Newsgroups Knowledge management systems Group portals

## Computer Supported Cooperative Work

(3)

- 3-C-Classification



## Computer Supported Cooperative Work

(4)

- Awareness

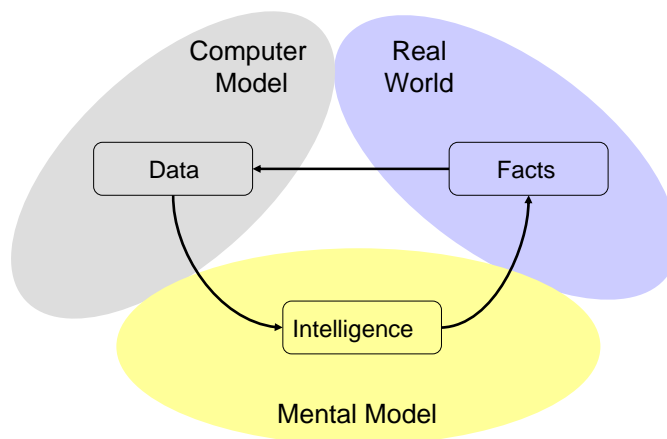
- group awareness as an understanding of the activities of others which provides a context for your own activity (Dourish and Bly 1992)
- main difference to conventional multi-user systems like distributed database systems, e.g.
- different types of group awareness
  - informal awareness
  - group-structural awareness
  - social awareness
  - work space awareness

## Lacks and problems

- Loosely connected groups
  - changing demands depending on tasks and data
    - within the space-time-classification
    - within the 3-C-classification
  - difficulties in choosing adequate groupware
- Intercultural groups
  - different mental models
  - difficulties in supporting awareness
- Usability of groupware
  - problems like in any other application
  - additional technical efforts

## From data to intelligence and vice versa

(1)



## From data to intelligence and vice versa

(2)

- From facts to data
  - abstraction of real world objects and relationships
  - measurement and digitalisation
  - following an explicit or implicit model of the world
  - using software for data entry and storage
- Some possible problems
  - insufficient usability of software
  - insufficient communication
  - inadequate model
  - bias between soft facts and hard data

## From data to intelligence and vice versa

(3)

- From data to intelligence
  - data mining
  - data analysis
  - interpretation and judgement
  - deriving strategies and plans
- Some possible problems
  - insufficient usability of software
  - insufficient communication
  - different mental models
  - ambiguity of data
  - missing awareness

## From data to intelligence and vice versa

(4)

- From intelligence to facts
  - plans and actions
  - implementation of procedures
  - legal issues
  - financial issues
- Some possible problems
  - insufficient communication
  - insufficient cooperation
  - inconsistent strategies
  - undesired side effects

## Attempts to bridge the gap

(1)

- Validation of models
  - Questions
    - Do all actors share the same mental model?
    - Do mental model and computer model match?
    - Do all computer applications implement the same model?
    - Does the computer model contain all relevant data?
    - Does the computer model allow predictions and simulations?
  - Strategies
    - Discuss mental models
    - Explicate the computer model, data objects and relations
    - Verify models by simulations
  - Support
    - User-centred design process
    - Groupware, communities
    - Multi-media documentation, CBT

## Attempts to bridge the gap

(2)

- Data input
  - Questions
    - Are data complete?
    - Are data up-to-date?
    - Are data correct?
    - Are data consistent?
  - Strategies
    - Check input for all criteria mentioned above
    - Ensure usability of computer applications for data input
    - Hide details of implementation
  - Support
    - Client software which is suitable for the task
    - Reliable server software (distributed data bases, e.g.)

## Attempts to bridge the gap

(3)

- Data analysis
  - Questions
    - Which data are relevant for the task?
    - Are there new data which are relevant?
    - What do these data mean?
  - Strategies
    - Provide notification to interested users
    - Provide adequate tools for analysis
    - Provide adequate tools for discussion
    - Ensure usability of all tools
  - Support
    - Data mining, query languages
    - Visualisation software
    - Groupware, communities

## Attempts to bridge the gap

(4)

- Decision making
  - Questions
    - Do all actors agree on the results of data analysis?
    - Do all actors agree on the action to be taken?
  - Strategies
    - Provide tools for knowledge management
    - Provide adequate tools for discussion
    - Ensure usability of all tools
  - Support
    - Knowledge base
    - Simulations
    - Groupware, communities

## Attempts to bridge the gap

(5)

- Crucial points
  - Usability of application software
    - data input
    - data analysis
    - data presentation
  - Usability of groupware
    - communication
    - cooperation
  - Awareness
    - other actors
    - new data
  - Models
    - consistency