

## Lecture 7

### Educational Software IN4145

#### Manuals

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## Today

- Types of Manuals
- Manual use
- Minimal Manual
- Case Study of multimedia maintenance manual

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## Learning outcomes of the lecture

After today's lecture you should be able to:

- Explain principles for designing minimalist instruction
- List at least 4 manual types
- Explain two different uses of manuals
- Describe ways how manuals can help to avoid omission of important steps
- Describe way to overcome mode errors in manuals

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## Class question

- What types of manual do you know?

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## Manual types

- **Getting started**
- Tutorial / Learning Guide
- User Guide
- Reference Guide

### Target group

- Experienced computer users without knowledge of this application, or previous version of the application

### Supports

- Installation, first exploration, immediate use

(Steehouder & Jansen, 1997)

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## Manual types

- **Getting started**
- Tutorial / Learning Guide
- User Guide
- Reference Guide

### Target group

- Novice users of this application with varying computer experiences

### Supports

- Learning of the main functions; practising

(Steehouder & Jansen, 1997)

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## Manual types

- Getting started
- Tutorial / Learning Guide
- **User Guide**
- Reference Guide

### Target group

- User that already had first experience with the application

### Supports

- Use of all relevant functions of the application

Task oriented

(Steehouder & Jansen, 1997)

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## Manual types

- Getting started
- Tutorial / Learning Guide
- User Guide
- **Reference Guide**

### Target group

- Expert users of the application

### Supports

- Understanding of functioning of the application; solving problems

- System oriented

(Steehouder & Jansen, 1997)

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## Type of learning

### Receptive learning

- People follow the instruction from the manual step-by-step in order to learn one-by-one the individual functions of the application

### Explorative learning

- People learn by trying things out and along the way discover the working of the application

(Steehouder & Jansen, 1997)

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## Mental processes

### Model formulation

- Users establish a mental model of the application and the task

### Goal determination

- Users establish which task/function they want to master

### Hypothesis formulation

- Users make prediction how goals can be obtained

### Test

- Users learn by doing, and testing their hypothesis

### Process

- Users master using the system

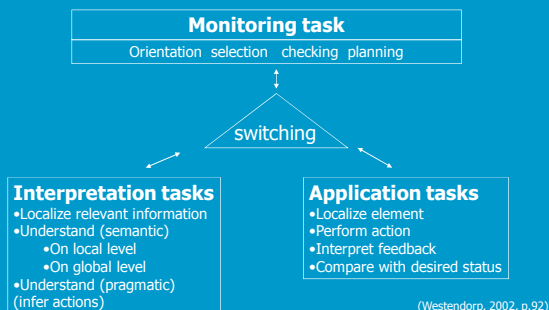
(Steehouder & Jansen, 1997)

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## Instruction-action model



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## Online help

Type of online help information

- Help message generated by selecting a desired object
- Context-sensitive help
- Extended help screen
- Extended written online documentation

(Preece et al., 1994)

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## Online help – user questions

Typical users' questions:

- **Goal exploration;** What can I do with this program?
- **Definition and description;** What is this? What is it for?
- **Task achievement;** How do I do this?
- **Diagnostics;** How did that happen?
- **State identification;** Where am I?

(Preece et al., 1994)

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## User interaction with manuals and help system

- **Realisation** of information need
- **Formulation** of information need
- **Search** for information relevant to a specific need
- **Read** the instruction
- **Understand** the information
- **Remember** the information
- **Apply** the procedure as described in the manual
- **Evaluate** the outcome

Each step prone for error, and manuals should be designed to avoid or overcome them.

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## Design Reference Guide (example for OS)

- **Name;** name of the command
- **Explanation;** short explanation of the effect of the command
- **Syntax;** how can the command be given
- **Parameters;** possible parameters and their effects
- **Results;** the effect of command
- **Comments;** warnings, details, limitations etc
- **Example;** example of command and result
- **Reference;** where more information can be found

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## Design Instructions (user guide)

1. **Title;** reference to function of the module
2. **Application;** for what application can this function be used?
3. **Explanation;** how does the function work?
4. **Starting point;** when can the function be used?
5. **Illustration;** which elements are relevant?
6. **Instruction;** which steps are needed to use the function?
7. **Check;** how can you check that the function is correctly executed?
8. **Problems;** what are common problems during execution?
9. **Next;** what can be done after the function is completed?
10. **Example;** concrete example of use of the function
11. **Warning;** what are the potential risks when using the function?
12. **Advice;** how can the function best be performed?
13. **Reference;** where can you find additional information?

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## Minimalist Instruction

- "An approach to learning that can also be applied on the design of training manuals. Aims to reduce the amount of information required, to focus on real work activities, and to emphasize how to recover from errors" (Preece et al., 1994, p. 716)

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## Minimalist Instruction

1. **Choose an action-oriented approach**
  2. **Anchor the tool in the task domain**
  3. **Support error recognition and recovery**
  4. **Support reading to do, study and locate**
1. Provide an immediate opportunity to act
  2. Encourage and support exploration and innovation
  3. Respect the integrity of the user's activity

(Van der Meij & Carroll, 1993)

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## Minimalist Instruction

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Choose an action-oriented approach</li> <li>2. <b>Anchor the tool in the task domain</b></li> <li>3. Support error recognition and recovery</li> <li>4. Support reading to do, study and locate</li> </ol> | <ol style="list-style-type: none"> <li>1. Select or design instructional activities that are real tasks</li> <li>2. The components of the instruction should reflect the task structure</li> </ol> |
|--|--|

(Van der Meij & Carroll, 1993)

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## Minimalist Instruction

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Choose an action-oriented approach</li> <li>2. Anchor the tool in the task domain</li> <li>3. <b>Support error recognition and recovery</b></li> <li>4. Support reading to do, study and locate</li> </ol> | <ol style="list-style-type: none"> <li>1. Prevent mistakes whenever possible</li> <li>2. Provide error-information when actions are error-prone or when correction is difficult</li> <li>3. Provide error-information that support detection, diagnosis and recovery</li> <li>4. Provide on-the-spot error information</li> </ol> |
|--|---|

(Van der Meij & Carroll, 1993)

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## Minimalist Instruction

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Choose an action-oriented approach</li> <li>2. Anchor the tool in the task domain</li> <li>3. Support error recognition and recovery</li> <li>4. <b>Support reading to do, study and locate</b></li> </ol> | <ol style="list-style-type: none"> <li>1. Be brief; don't spell out everything</li> <li>2. Provide closure for chapters</li> </ol> |
|--|--|

(Van der Meij & Carroll, 1993)

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## Class question

- How can these principles be applied in multimedia maintenance manual?

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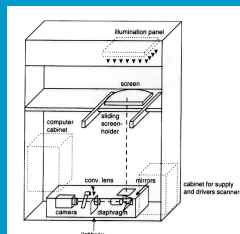
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## Case study – online multimedia maintenance manual

- Design-out and preventive maintenance -> maintenance engineers become casual users
- No time to read and learn the whole manual
- Case study manual for replacing a camera in a machine

(Brinkman et al., 2001)



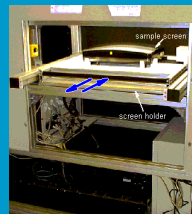




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## Environment

 Camera monitor	 Clean room	 Layer Inspection System
 Online manual	 Machine control	

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## Initial thoughts

Casual users would use the manual as reference guide (not reading it from start to end)

Online manual could support searching in manual

Improving a paper manual with photo's, video's, and animations would:

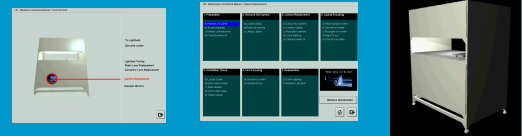
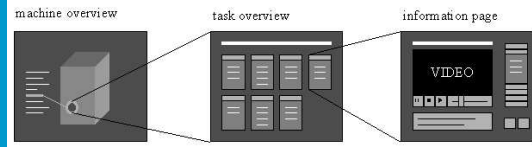
- Make it easy to explain spatial and dynamic operations on hardware
- Be more clear for non English speakers

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## Prototype 1



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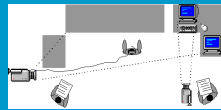
## Prototype 1 - evaluation

Formative usability evaluation:

- 6 mechanical/electrical maintenance engineers
- On the production floor
- Thinking-aloud protocol
- Recording 2 cameras

**Findings**

- Users used manual as a reference guide (starting with task, and only searching manual when stuck)
- Omitting necessary tasks (8 unrecovered Omissions)



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## Prototype 2 – Design information page

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## Prototype 2 – task overview

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## Prototype 2 - evaluation

Formative usability evaluation:

- 8 mechanical/electrical maintenance engineers
- On the production floor
- Thinking-aloud protocol
- Recording 2 cameras

**Findings**

- Users used manual as an instruction guide (step-by-step from start to end)
- 6 Omissions (2 Recovered, 4 Unrecovered)

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## Mode errors

- 4 participants had tried to do something in the machine while they should have used the machine control
- 1 participant had tried to do something in manual while he had to use the machine control
- Aim: Combining machine control and manual to reduce modes



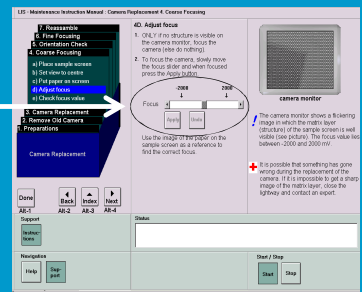
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## Wizard Concept

- Task oriented
- Machine control embedded in the manual
- Only the relevant machine control element is visible



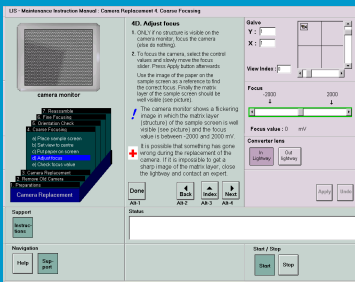
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## Advisor Concept

- Multi-purpose machine control
- Machine control and manual side by side visible
- First machine control element mentioned in instruction is indicated by green and flashing



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## "Empirical" Cognitive Walkthrough

- 11 software engineers used one of the 2 mock ups to perform task
- Engineers explained:
  - what they wanted to do at each step
  - how they thought they could do this
  - explain the system's response on their actions

### Findings

- First switch situation: physical action in machine instead of computer (potential mode error)
- Advisor: 1 out of 6 engineers made mode error first time
- Wizard: 3 out of 5 engineers made mode error first time

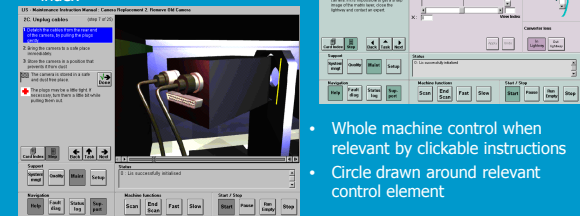
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## Prototype 3 - Design

- Efficient use of screen real estate: video, pictures, machine control, detailed information, and card index



- Whole machine control when relevant by clickable instructions
- Circle drawn around relevant control element

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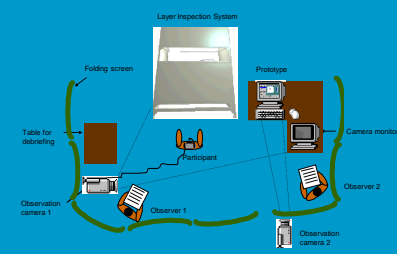
## Prototype 3 - evaluation

### Formative usability evaluation:

- 8 electrical engineers
- Design office

### Findings

- 2 Mode errors, set camera manually, instead with computer
- clickable instructions not often used



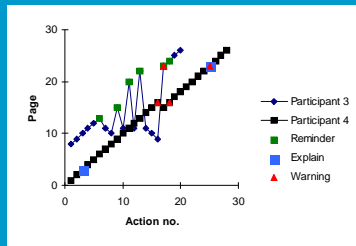
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## Prototype 3 – use of manual

- 7 engineers used manual as an instruction guide (see participant 4)
- 1 engineer (participant 3) used manual as a reference guide



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## Summary

### Minimal Manual

1. Choose an action-oriented approach
2. Anchor the tool in the task domain
3. Support error recognition and recovery
4. Support reading to do, study and locate

### Manual types

- Getting started
- Tutorial / Learning Guide
- User Guide
- Reference Guide

### Different uses of manuals

Receptive learning, Explorative learning (instruction vs reference manual)

### Avoid omission of important steps

- User ticks of completed steps
- System reminders to complete imported preceding steps

### Way to overcome mode errors in manual

- Combining manual and machine control with direct references

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## Next time

Serious Gaming by Broekens (19 April 2010 – 10:45-12:45 EWI Coll G)

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## Reference

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