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Knowledge about ecological product design is becoming more important for employees of manufacturing companies. Because of organizational reasons these employees often are prevented from attending courses of this topic. E-learning can be a solution for this problem. We describe the design process for an e-learning system about ecological product design.

The Ecodesign e-learning system has been implemented from scratch using the open source platform Zope and Python. The basic functionalities it offers are access to examples, various kinds of material, and communication with other members of the group or teaching staff (utilizing discussion forums, chat and e-mail). Consequently, it consists of three sections: examples/tasks, materials, and communication. The main concept of the system is to present the learning material in an interactive manner which emphasizes concrete examples. The trainees, for example, have to improve the design of an electrical water kettle according to ecological standards.

The Ecodesign e-learning program uses an office metaphor to make it easier for learners to understand the system. In the first pre-implementation tests with 5 persons, the subjects found this metaphor rather attractive. Contradictions in the metaphor, which were confusing for the users, had to be omitted. The users chose a navigation system which resembles the Windows Explorer, probably because they are familiar with this method.

To avoid high drop-out rates we adopt two strategies: blended learning and active tutoring. The latter means that tutors support the learners online. They organize electronic meetings and answer all the questions the trainees have when they are not in the face-to-face meetings.

Our experience indicates that constant testing can help to make the design of an e-learning system clearer and easier to understand. This is especially important because the ideas of content providers, potential users, and e-learning experts often diverge quite considerably.

## REFERENCES

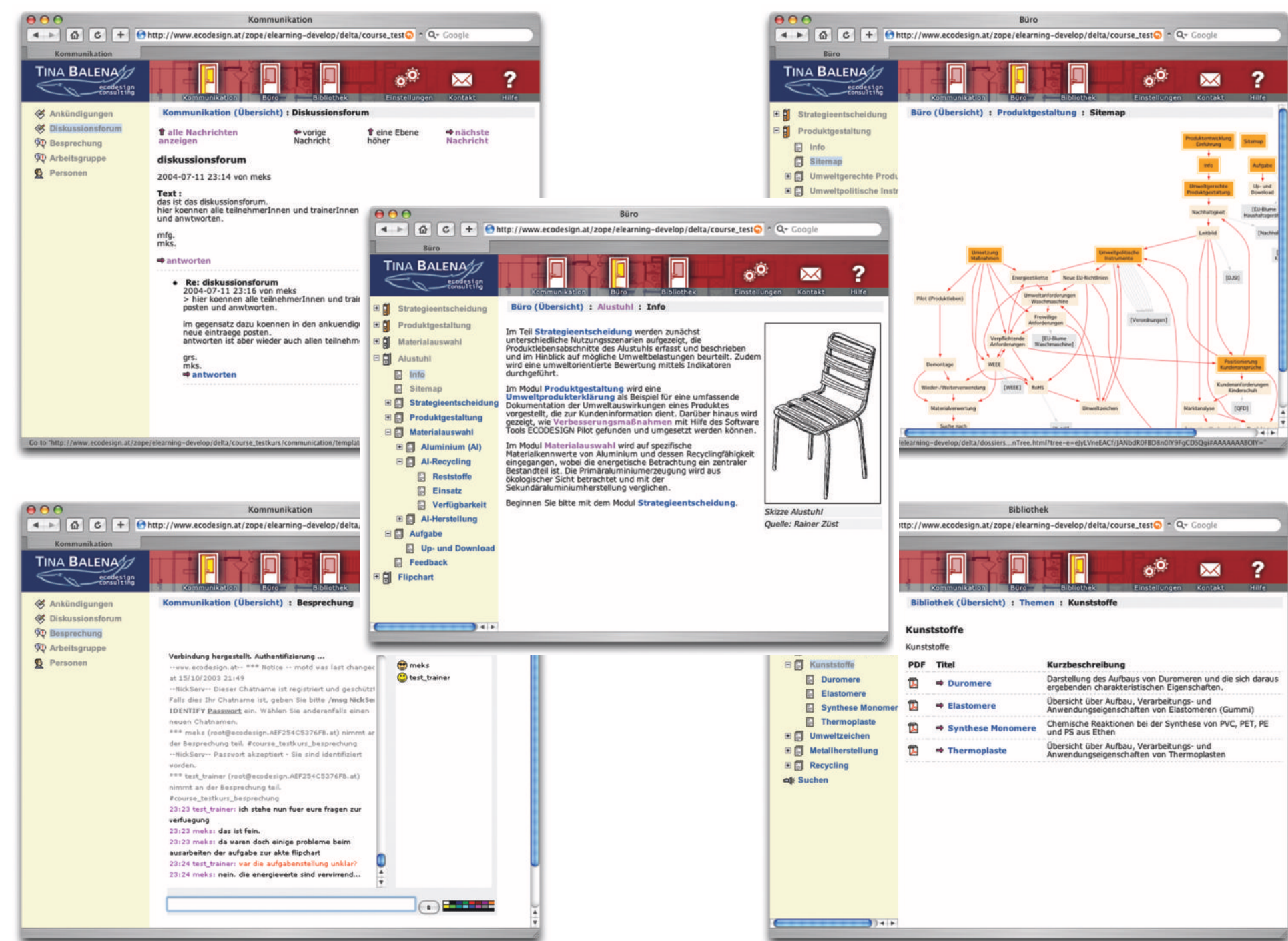
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## ACKNOWLEDGEMENT

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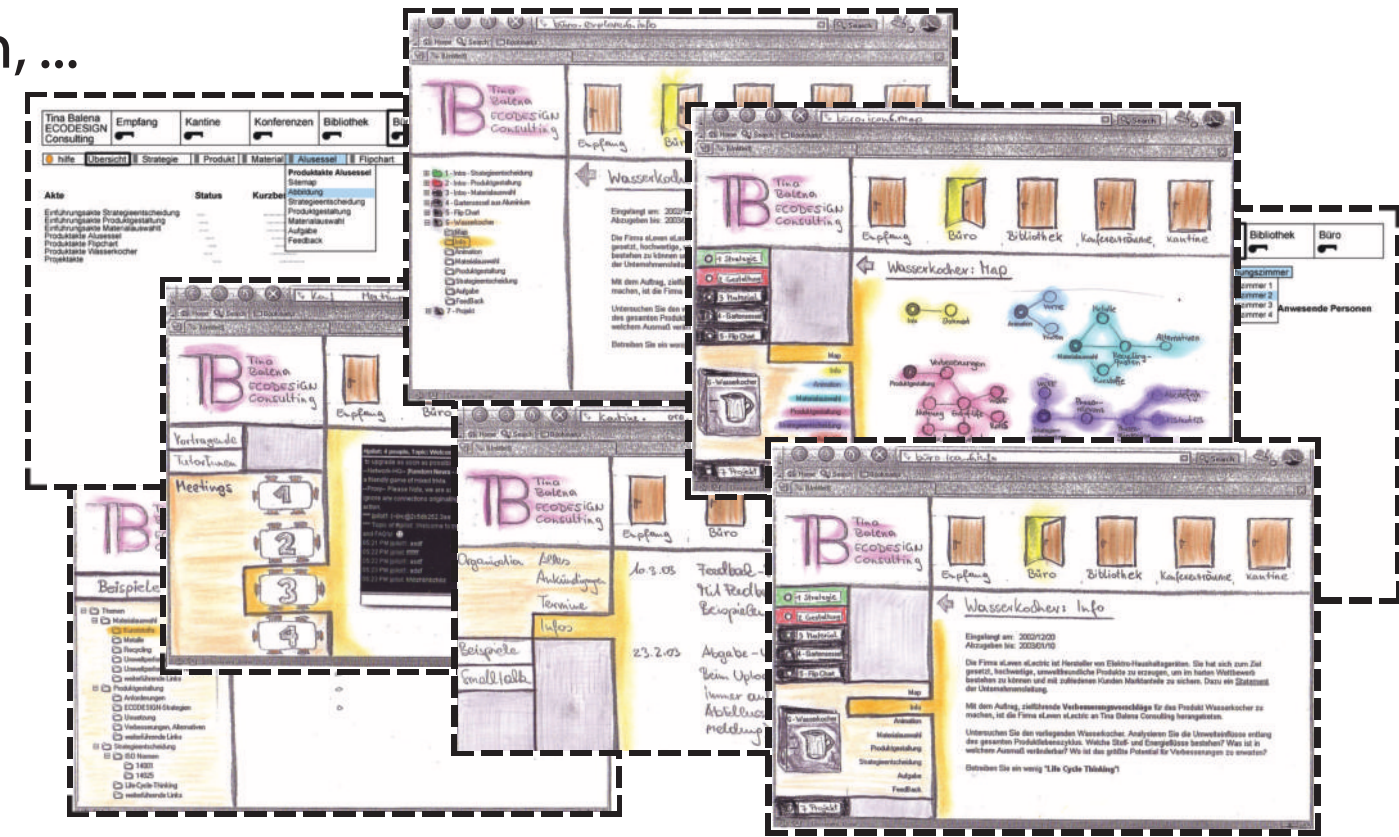
## Ecodesign E-learning System



## Pre-implementation User Tests

- In-Depth Testings (2 hours) by Scribbles with 2 Subjects
- Brief Questioning of 3 more Subjects

- Decision on Navigation Concepts  
Tree, ~~Menus~~, ~~Icon-Based Tabs~~, Sitemap, Breadcrumbs
- Careful Examination of Intended Metaphor  
Rooms, Doors, Dossiers, Conferences,  
Library, ~~Canteen~~, ...



## HOWTO - Make ECODESIGN Content

- Analysis of Pre-Implementation User Tests
- Experts' Knowledge/Input
- Discussion Process (Developers and E-learning Experts)
- Definition of a Pseudo-Markup-Language

- Guidelines for Content Providers  
Hypertextual Structure  
Inclusion of Images and Movies  
Avoidance of Scrolling  
From-Bin Transfer of Large Documents



## Interviews

- Extensive Interrogation (1+ hour) of 5 Users
- Demonstration of Problems by Subjects
- Rhetorical Transcription and Analysis of Interviews

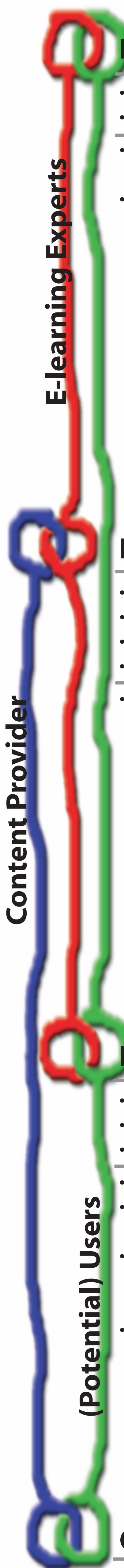
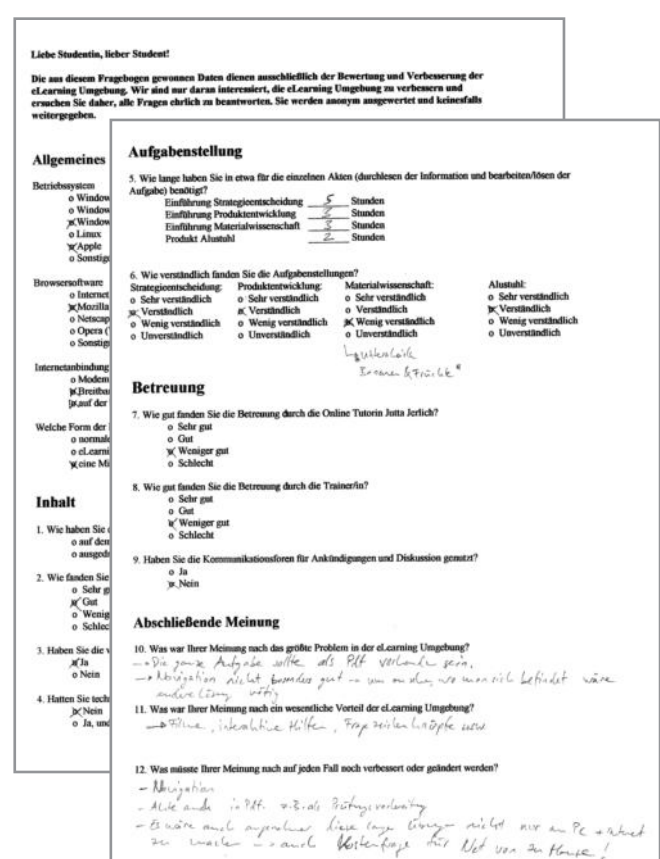


- Encouragement to Keep Diverse Navigational Approaches
- Basic Necessity to Revise Learners' Tasks  
Shorten and State More Precisely
- Revealing of Important Navigational Trivia  
Consequent Naming of Nodes  
No Duplication of Tree in Content-Frame
- Feedback on Technical Problems, Implementation Bugs, ...

## Questionnaires

- 19 Questions  
General Information  
Content Preparation  
Understandability of Tasks  
Support by Trainers and Tutors  
Pros, Cons and Problems of the System
- 16 Subjects (Equals 40% Rate of Return)

- Commendation of Active Tutoring
- Criticism on Trainers' Response Time
- Feedback on Technical Issues



E-learning Experts

Content Provider

(Potential) Users