How can the empowerment of employees with intellectual disabilities be supported?

Frauke Fuhrmann¹, Margit Scholl¹, Rainer Bruggemann²

¹Technical University of Applied Sciences Wildau
²Leibniz-Institute of Freshwater Ecology and Inland Fisheries
1. Introduction
2. Methods
3. Main Results
4. Conclusions
**Research Background**

- People with intellectual disabilities suffer structural discrimination
- Demographic change leads to labour shortage
- Innovative assistive technologies could foster the inclusion in working life of people with intellectual disabilities
- Lack of research work that focuses on technical innovations to support people with intellectual disabilities in their working life

Ethical and economic need to include people with intellectual disabilities in working life
Support of employees with intellectual disabilities in operating computer-controlled machines to foster their social integration and acceptance

**Barrier-Reduced Machines in Innovative Interaction**

**Requirement Analysis**
- Employees’ needs and skills
- Demands on the hardware, software and design development of disabled-accessible control panels for computer-controlled machines

**Matching control panels to user profiles**
- Relevant indicators to characterize control panels and user profiles
- Assign (sub)optimal control panels to diverse employees with intellectual disabilities

**Follow-up Project: Prototype Development**

**Aims**

- Fuhrmann et al.
- Dealing with Complexity in Society
Empirical Procedure

Requirement Analysis
Participative Research Approach

- Interviews
  - Production and factory supervisors, team leaders
  - Participants
- Observation of work flows

Matching
- Workshops/ Seminar
  - Creative Laboratory
  - Tablet-Usability-Test
  - Design Thinking
- Heterarchy
  - Partial Order

Development
- Follow-up Project
- Prototype Development

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Fuhrmann et al.  Dealing with Complexity in Society
COMPLEXITY OF USER PROFILES

- Needs
- Skills
- Preferences
- Learning aptitude
- Impairments
- Requirements
- Abilities
- Motivation

Needs: changeable and dependent
**Complexity Of DESIGN Demands**

- **Personalized display interface**
- Modular design: Single elements (instructions, support, error message, feedback, etc.) can be chosen according to the needs and skills of the employee.

- Different kinds of keys and knobs (press, turning, control lever)

- Display interface with tactile feedback and different independent areas to visualize tasks, working process incl. progress, etc. with icons, pictures, easy-to-read text.

- **Standardized processes in the background (e.g. safety protection)**
- Documentation of errors to identify learning needs and to initiate learning processes.

- Ergonomic aspects: Adjustability of height, angle of inclination, etc. by swivel arm.

**High level of flexibility and adaptability**
Which control panel is optimal for a certain user profile?

Heterarchy Concept → Partially ordered sets

Objective characterization of complex user profiles and complex control panels by means of indicators (multi-indicator-system)

Matching process
Establishing both profile systems

Matching Matrix: relational assignment of indicator types of control panels and user profiles

Combinations of control panels and user profiles (Matching Matrix as operator)

Identification of the best combination by means of for example the Copeland’s method

Plurality and complexity of iBaMs

rUP, nCP → r*n assignments

Synthetic indicator
CONCLUSIONS

- Proof of concept that employees with intellectual disabilities are able and motivated to use digital technology to expand their range of tasks and responsibilities.
- Concept of the matching methodology was successfully applied to solve the complex problem.
- That enables the development of a control panel prototype that does not depend on the randomness of the user group, but rather creates a generalized basis.
- Demonstration of the general applicability of the software tool PyHasse for the selection of an optimal control panel under consideration of economic restrictions.
- Future research projects as well as organizations can develop a prototype of a disabled-accessible control panel on the basis of the results of iBaMs.
- Good prospect of success for a prototype of a disabled-accessible control panel because workshops for adapted work have similar business areas.
PyHasse modeling should be applied in the follow-up project for selecting the optimal prototype concept.

Development of alternative, more flexible matching methods to respond to the complexity of the iBaMs issue better.

People with intellectual disabilities are valuable employees whose employability has insufficiently be considered so far.

Constantly rising level of performance requirements and high level of information density lead to “new disabilities” in terms of physical, intellectual and mental impairments → creation of working conditions that maintain and enhance the abilities of employees.
Thank You for Your Attention!

Frauke Fuhrmann
frauke.fuhrmann@th-wildau.de
+49 3375 508-574

Technical University of Applied Sciences Wildau
Hochschulring 1
15745 Wildau
Germany
APPENDIX: REFERENCES


# Appendix: Workshop for Adapted Work

## Workshop for Adapted Work

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<tr>
<th>Integration into the open labour market</th>
<th>Working Section</th>
<th>Special Section for persons with severe and/or multiple disabilities or day-care centres (in case an occupation in the working section is not possible)</th>
<th>Attendant Services (rehab services)</th>
<th>Medical Services</th>
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<td>Other rehabilitation institutions in case terms of admission are not fulfilled</td>
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### Vocational Training Section
Preparation for the working section or the open labour market

- Advanced course
- Basic course

### Admission Procedure
(4 weeks to a maximum of 3 months) decision if and which kind of employment is possible

### Admission to Workshops

#### Terms of Admission
A minimum of economically viable work performance (after participation in the measures of the vocational training section), no need of extraordinary care, no existing danger for other persons or the person concerned, no constraints due to the kind or gravity of the disability

#### Registration
By rehab team staff from the Federal Employment Agencies