

## Who we are...



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# Fields of Research: Educational

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- Engineering education
- Holistic engineering education
  - Interdisciplinarity, diversity, critical thinking
  - Implementation of advanced didactic aspects
- Learning with laboratories
  - Problem based and scenario based aspects
  - Research based learning → scientific research
  - Implementation of tele-operated labs (  )
    - Separate, integrated
- Engineering communication

# Fields of Research: Technological

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- Objective-based conceptualization of labs
- Development of new tele-operated labs
- Automation of classic labs for tele-operative use
  - Engineering & design of machine parts
  - R&D and implementation of new measuring techniques
  - Integration of robotics
- Modular software development
  - Interaction with machine control, interface dev.
  - Usability of tele-operated labs
- Integration in a shared environment



# Platform for e-learning and telemetric experimentation

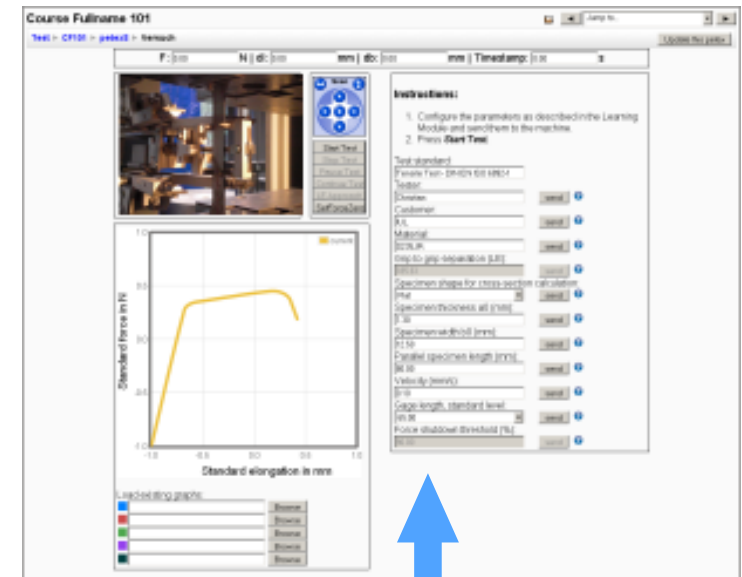
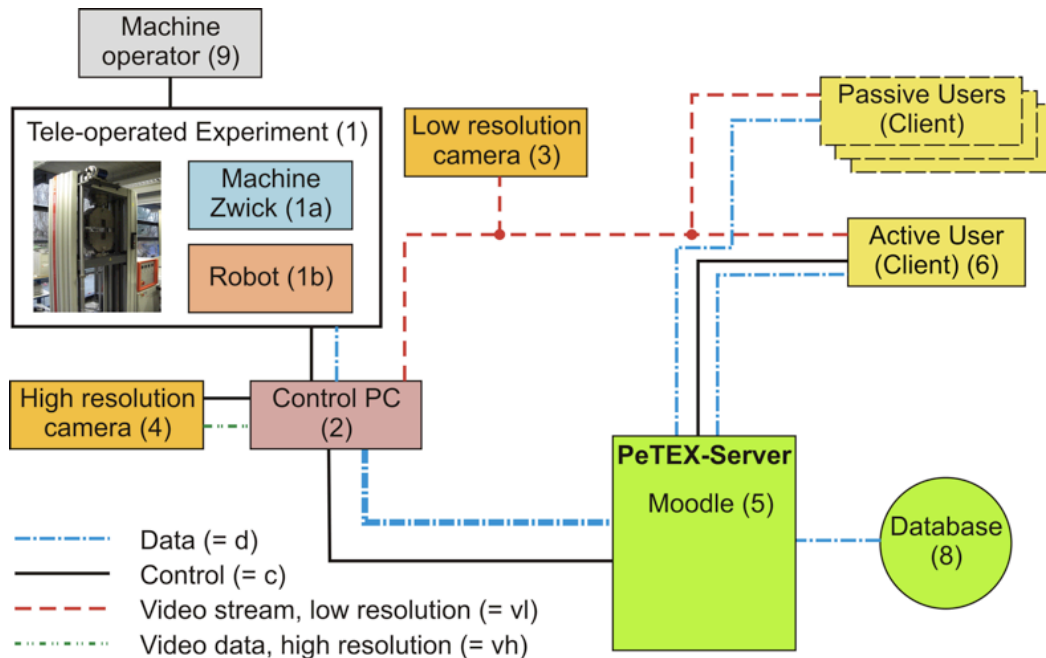
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- Funded by European Union, 2 years duration
- First approach in manufacturing technology
  - Material char. for forming (tensile/compression)
  - Joining (FSW), Cutting (machining)
- Stepwise approach in developing
  1. The procedure for interaction
  2. The realization of automation
  3. The socio-technical backbone
  4. Merging the pieces → working environment

# Technological system structure

System interaction → user interaction

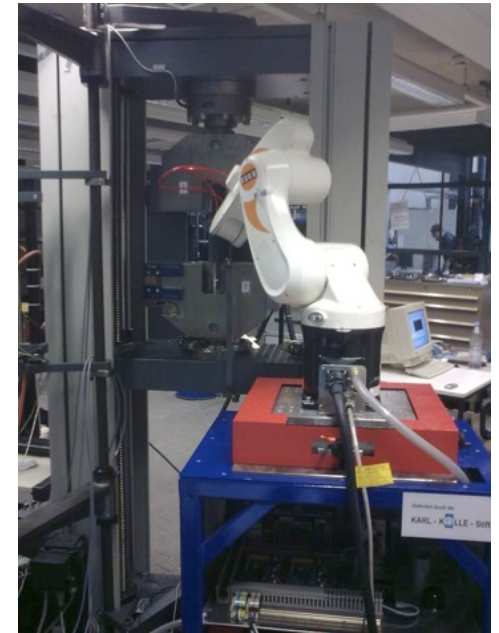
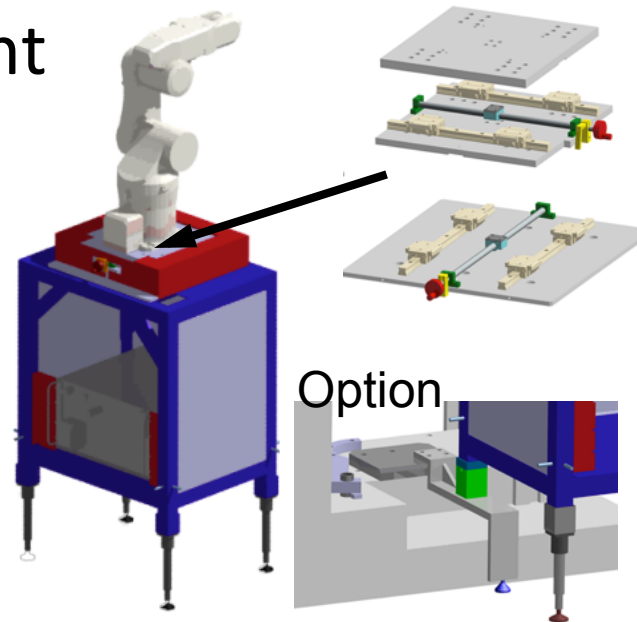
- Tele-operative approach needs bidirectional communication
- Div. levels for tensile & compression test
- Complete integration in the learning environment



# Automation & Measurement

- Automatic placement

- 6 axes robot
- Pneumatic gripper
- Modular routines



- Automatic clamping

- Clamping all kind of specimen
- Exact positioning and measurement of clamping force
- Control engineering with LabView

# Learning in Socio-Technical Systems

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Socio-technical systems consist of a combination of organizational, technical, educational and cultural structures and interactions.

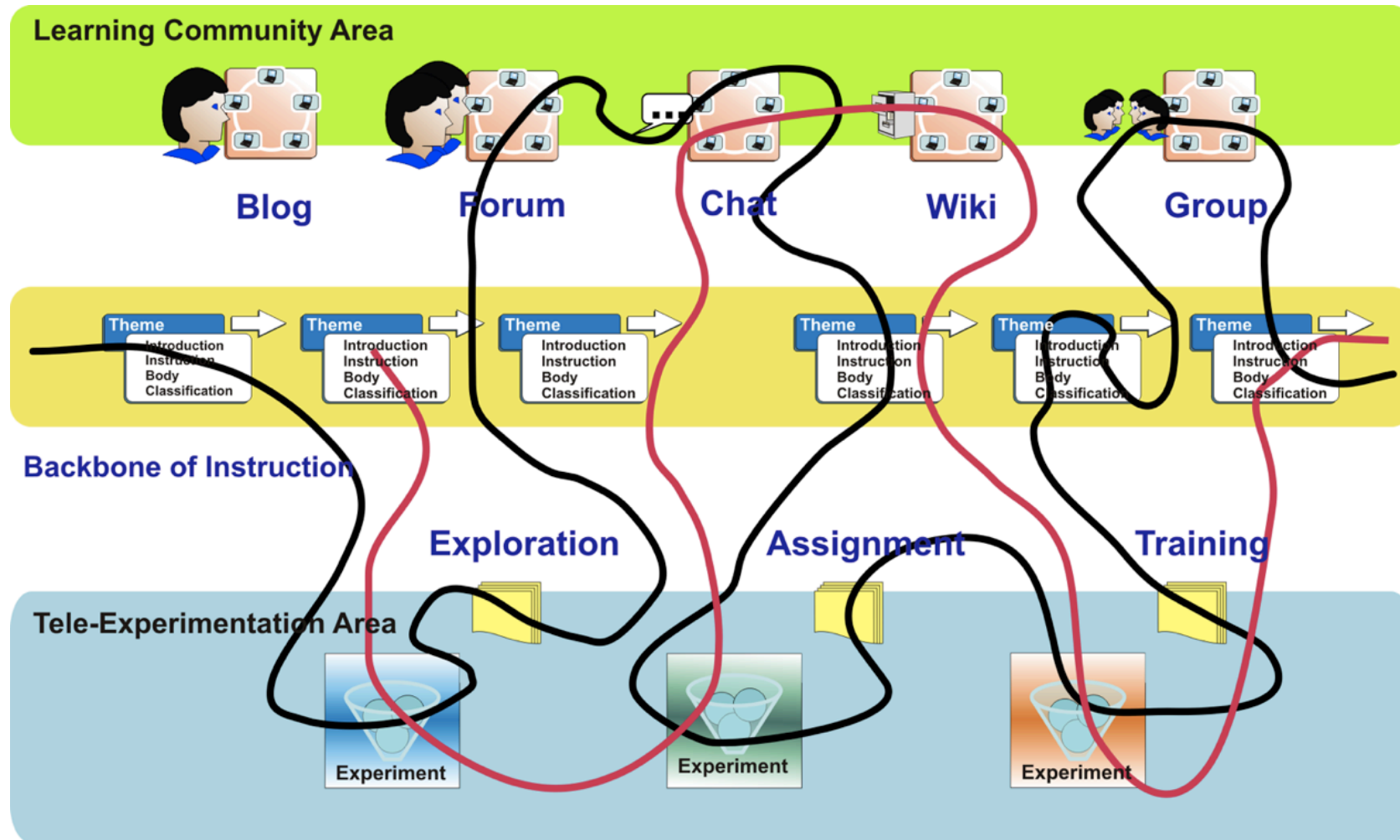
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- Design of **technical interaction** (e.g., interfaces to the actual labs), and
- Design of **social interaction** for online learning (e.g., communication, different social modes, contact to community)
- **educational design** (e.g., whole learning walkthrough with guided discovery learning, learning modules)
- **institutional implementation** and adaption (study and training regulations, learning objectives, credit points, Bologna etc.)
- **an appropriate interplay** of all four dimensions.



# Guided and Selfdirected Learning

(Framework to enable and embed different learning walkthroughs and scenarios)





# Merging the pieces

- Learning modules are organized with *LernBar* inside of *Moodle*
- Tele-operated Exp.
  - Configuration within or in the end of the modules
  - Interaction increases complexity
- Final report

Learning Modules

Set-up and Doing of Exp in different levels

Reflecting and forming new theories (by writing a report, getting reviews, rethinking...)

# Resumé

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- Further research & development in objective-based tele-operated experiments
- Target-orientated implementation of tele-operated exp. into eng. education
- Platform-orientated development
- Contribution to and learning from the co-operation with the:
  - GOLC - Technical Committee
  - GOLC - Education Committee