

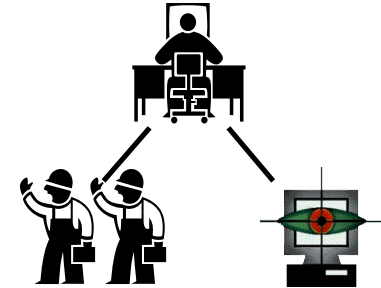
# The Extended Teamwork 2004 Experiment

Stine Strand

# Background

## *Teamwork is necessary for NPP operation*

- Between Control room operators
- Between control room operators and field operators
- Between control room operators and automatic system

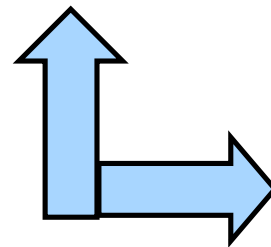


## *Challenges for cooperation between the team members:*

- 'Silent' automation (poor feedback about automation activities)
- Communication problems + poor understanding about the other team members' tasks/activities/problems

## *Possible future NPPs*

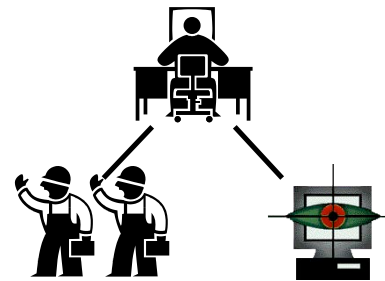
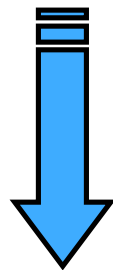
- Increased level of automation
- Staff reduction
- Changes in roles



***How will this affect teamwork?***

## Properties of the design solution

- Represents a possible future design solution
  - High levels of automation (turbine)
- Try to overcome some of the teamwork challenges
  - Explicit representation of the automatic system
  - Explicit representation of team member activities

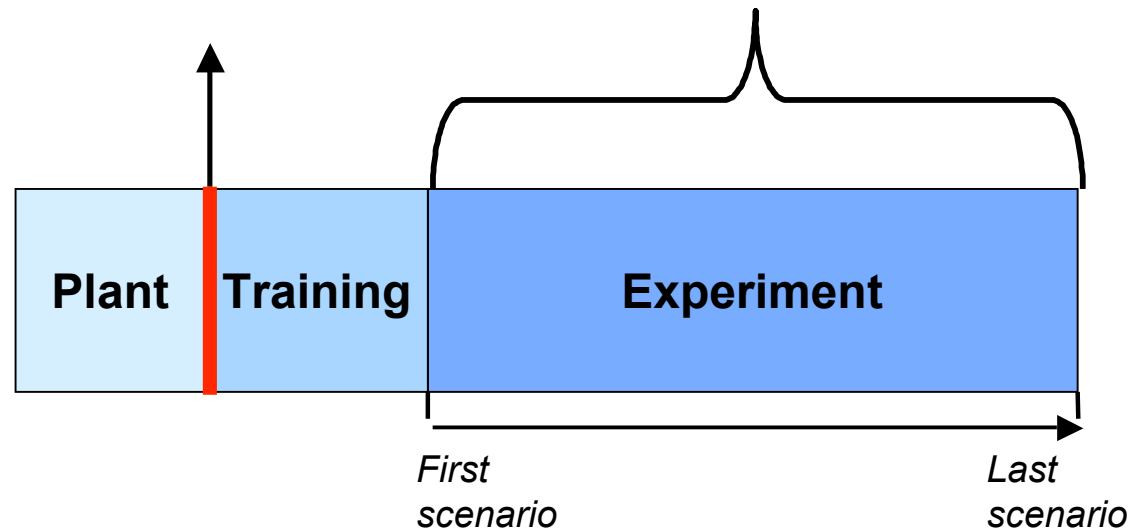


### **Redefinition of traditional NPP team composition:**

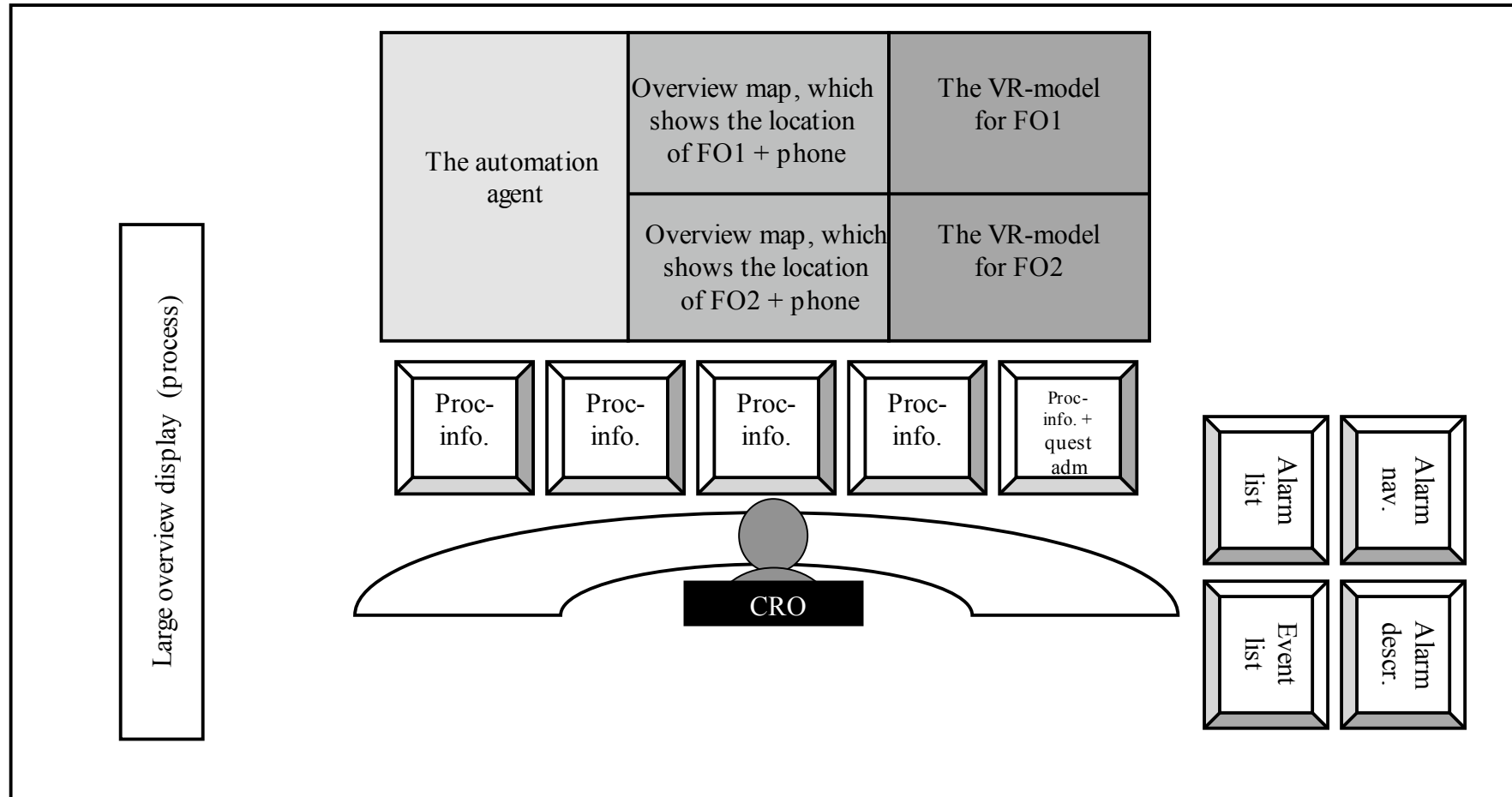
- 1 Control Room Operator (licenced RO/SS)
- 2 Field operators (1 FO + 1 CRO – with high level process knowledge)

# Specific purpose of the 2004 experiment

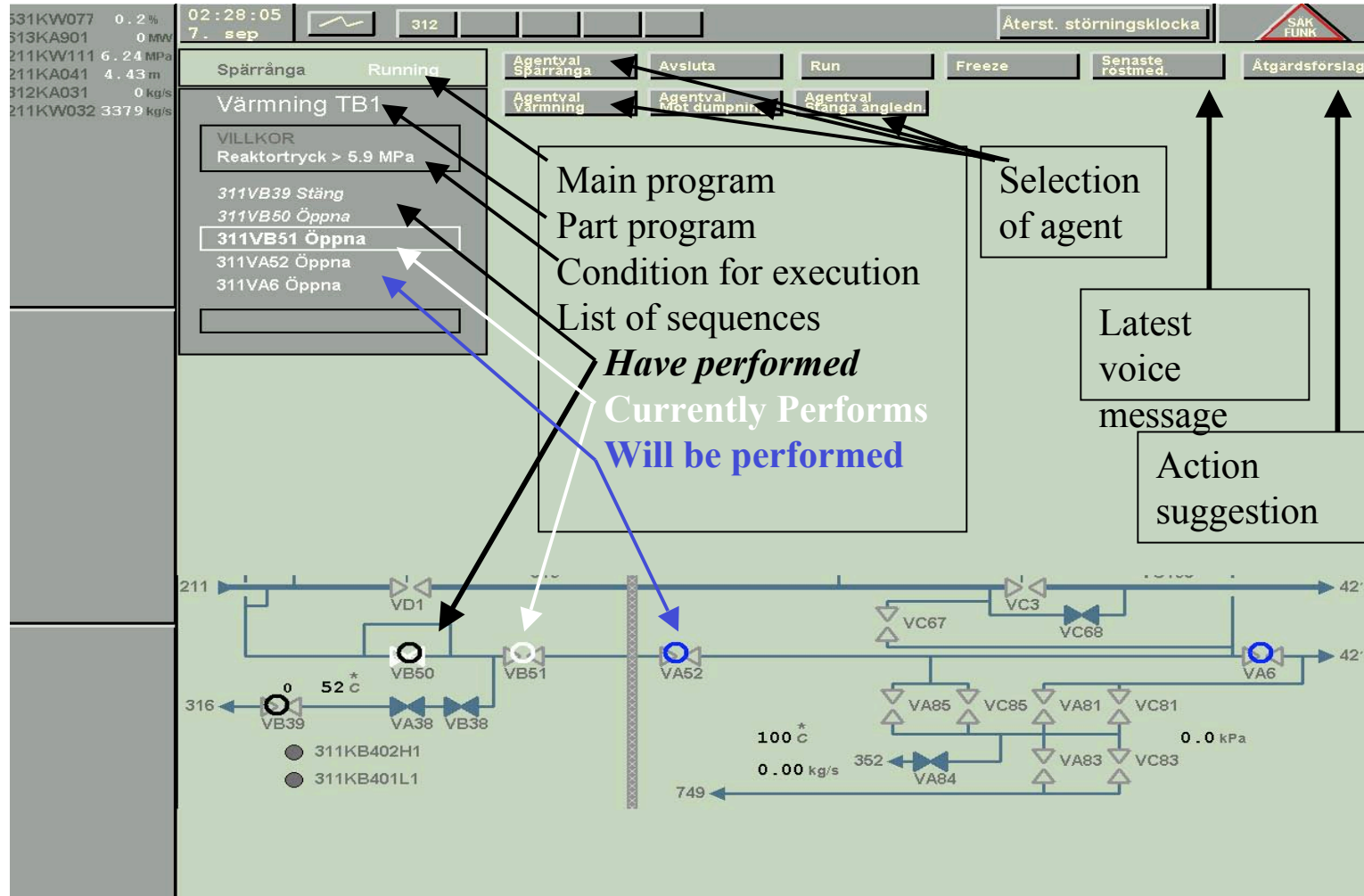
1. How do operators handle the *transition* from operating in a conventional control room to operating in an Extended Teamwork setting?
2. Which implications do operating in such a setting have over time? (after increased *exposure* to and *familiarity* with the design)



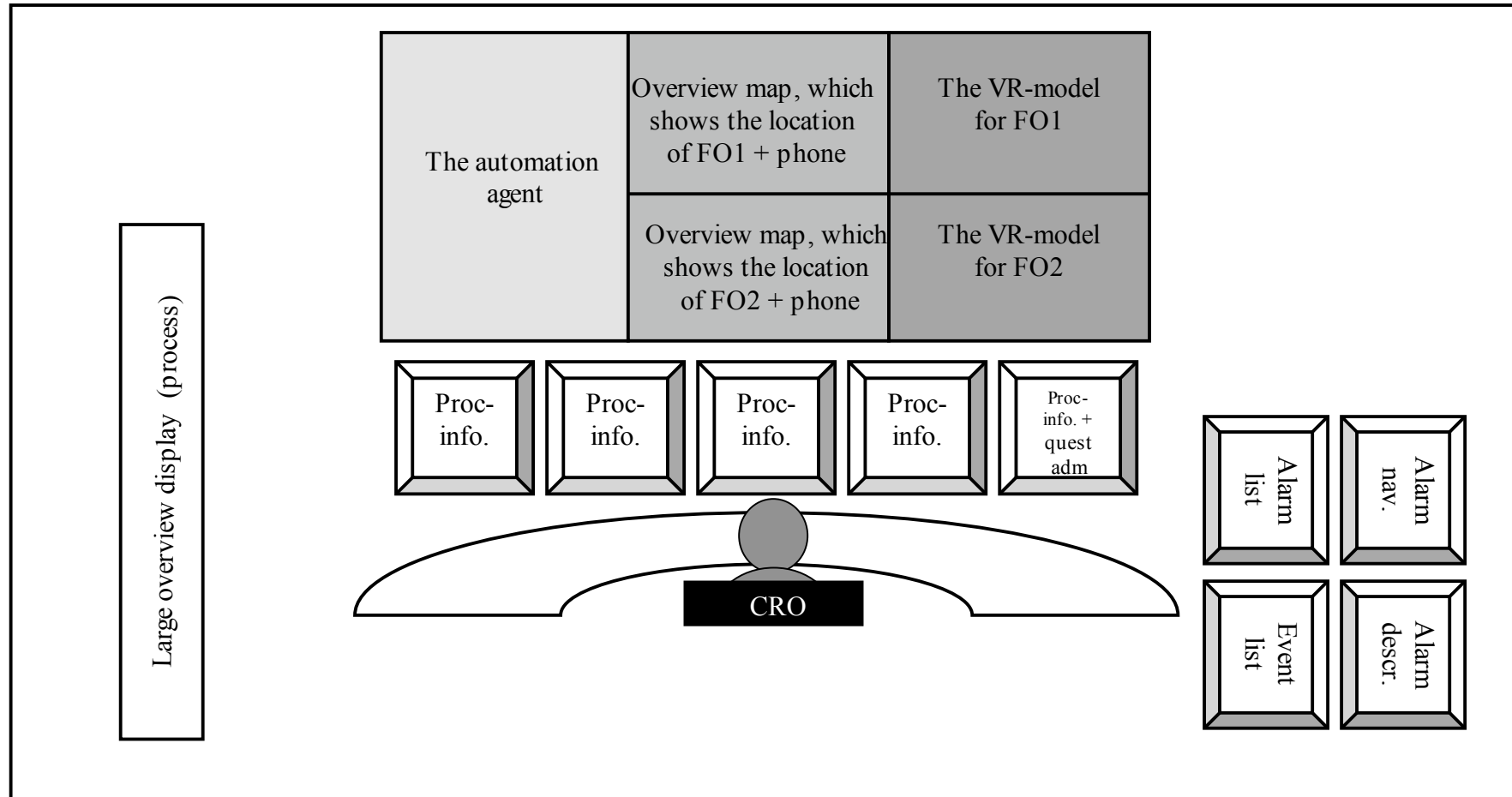
# HAMMLAB Control room set-up



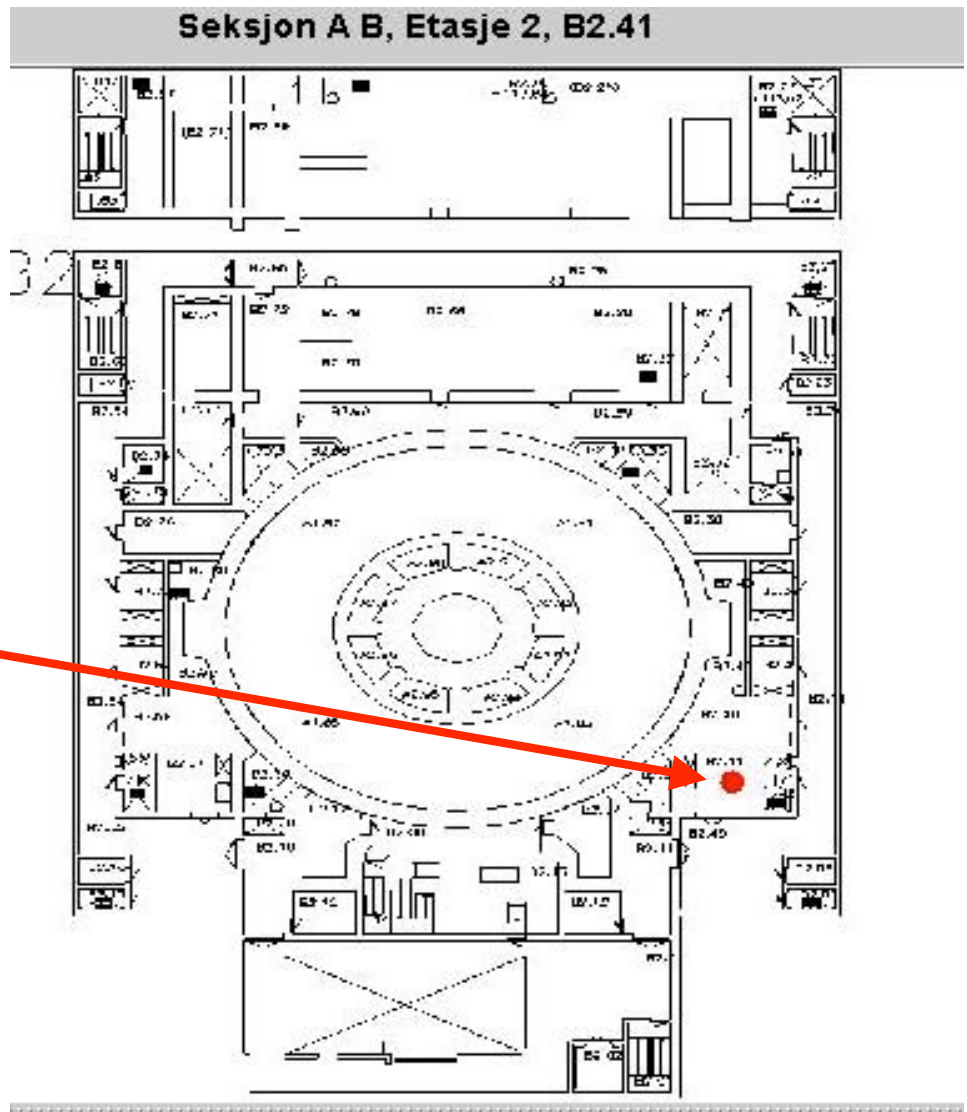
# Representation of the automatic system



# HAMMLAB Control room set-up



# Overview map in Control Room



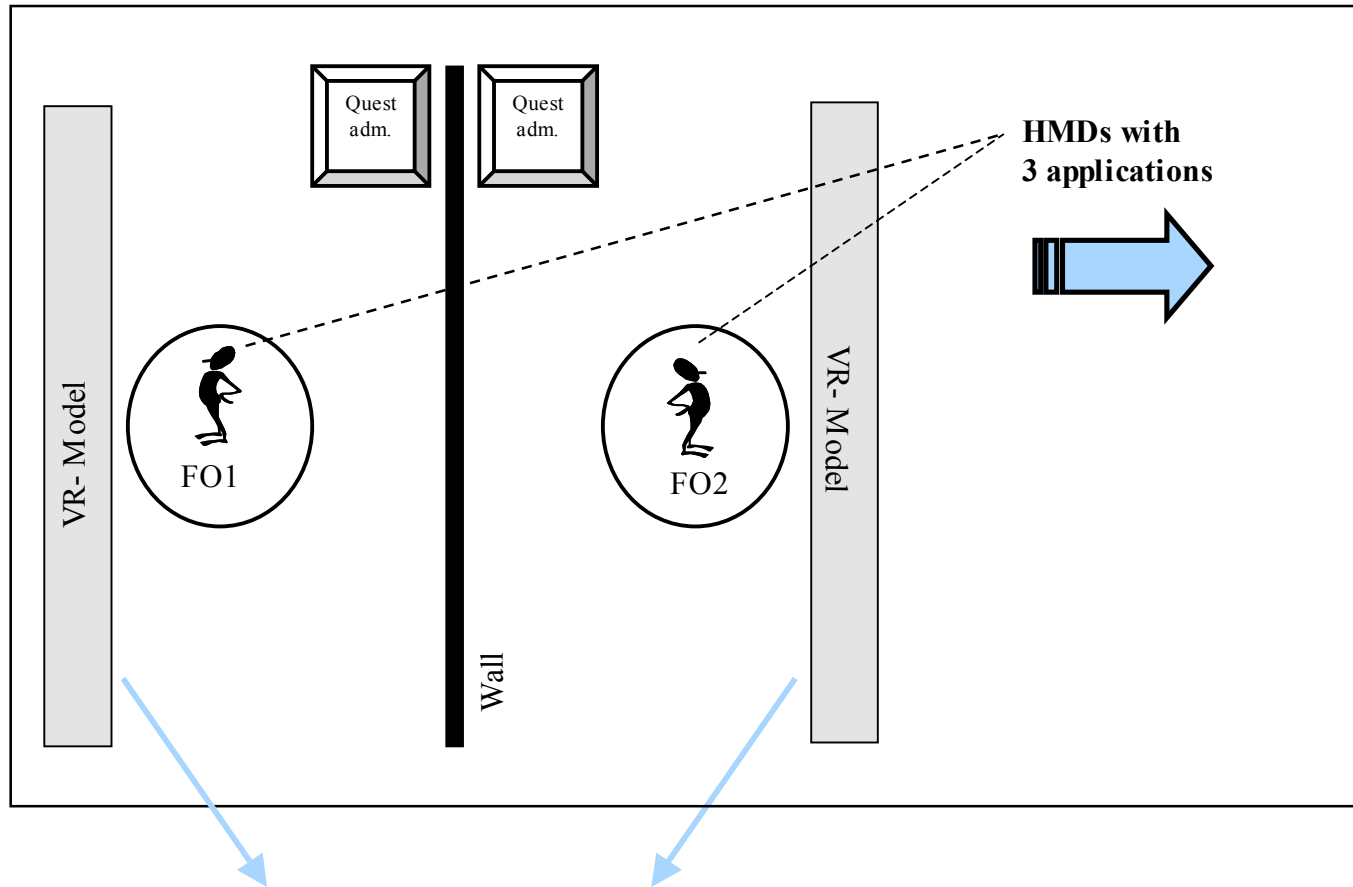
FO



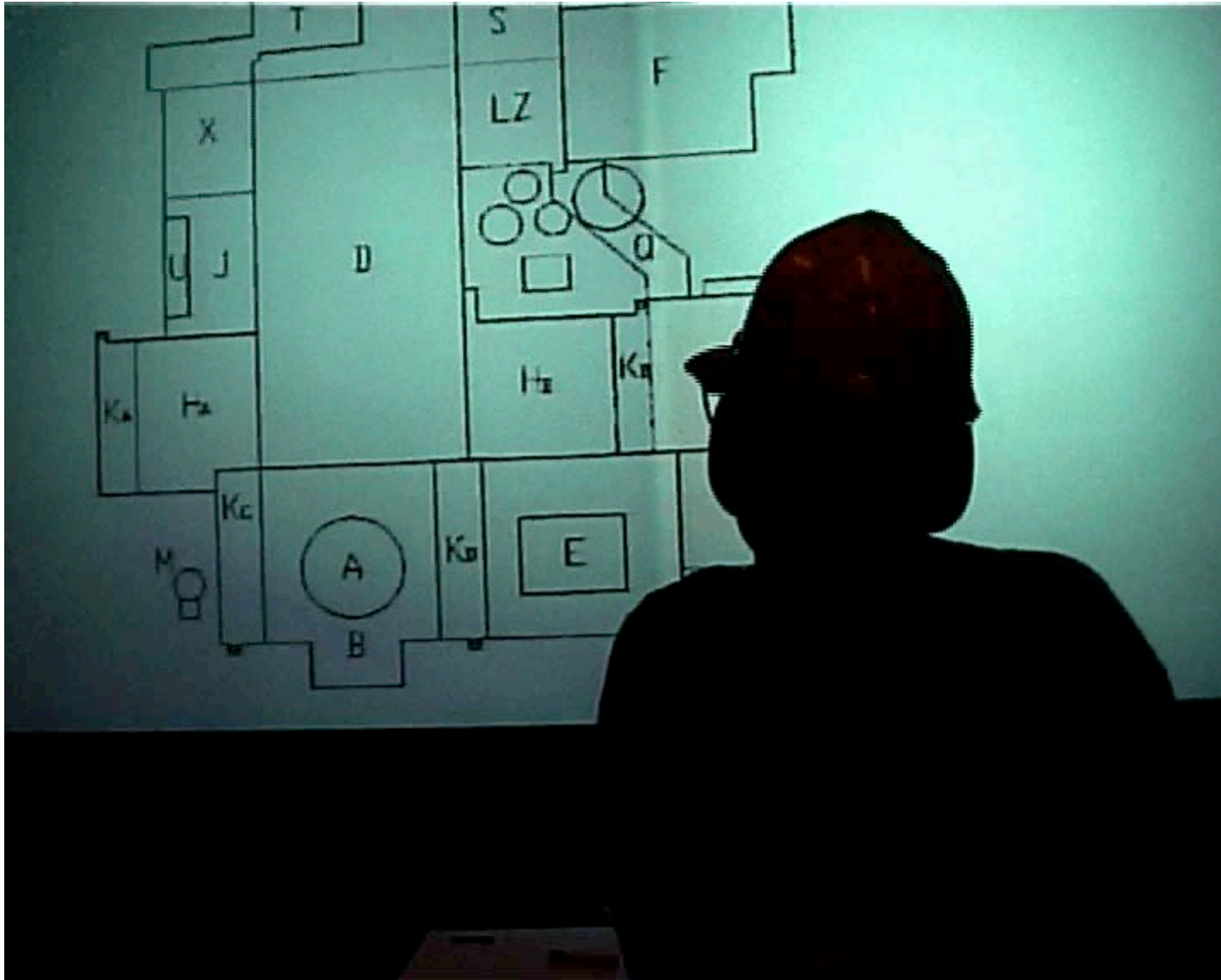
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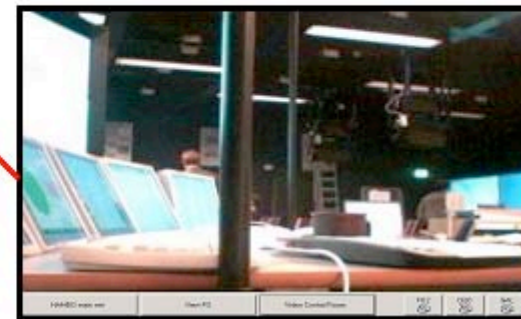
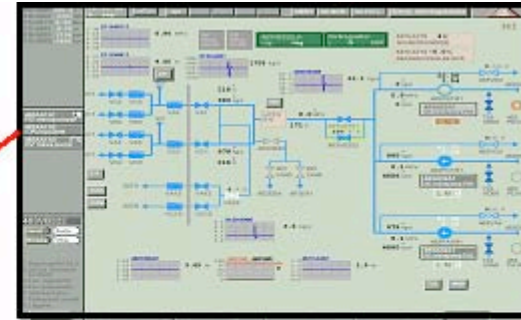
# Set-up VR-lab



***Operations performed directly in the VR model – connected to simulator***



# HMDs: 3 applications



+ Communication system

# Data collection techniques

- **Field Study** (Interview + observation on the plant)
- **Background questionnaire** (age, gender, experience +++)
- **Questionnaires** (after scenarios)
  - Trust, Cooperation Quality, SA, Workload/complexity
- **Semi-structured interviews** (After training, after experiment)
- **Online scoring of observable teamwork activities**
  - Psychologist (communication, ideas, task allocation etc.)
  - Process expert
- **Self-evaluation**
  - How the team handled the scenarios
- **Simulator Logging**
  - Communication, performed actions, events, use of the displays

# Sum

- The Extended Teamwork Experiment represents an example of a possible future design solution
  - Use of new new technology to support teamwork between operators with different locations
- New technology can be utilized for...
  - Improvement of the communication between teammembers
  - To establish a mutual understanding of the process
  - Improve the possibilities for continuous update on the situation/activities/problems/challenges of other team members
    - Improve the basis for teamwork and performance
- Connection between simulator and VR → particularly useful for operator training

**End of presentation**