

The Change Laboratory as a tool for labour-safety work

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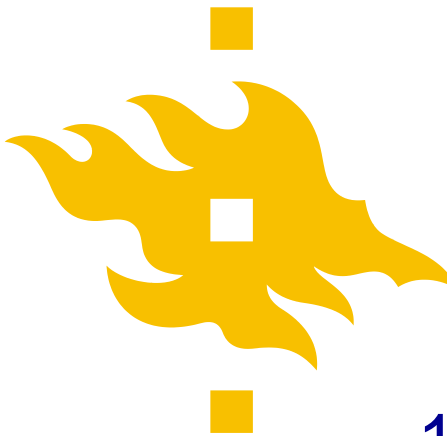
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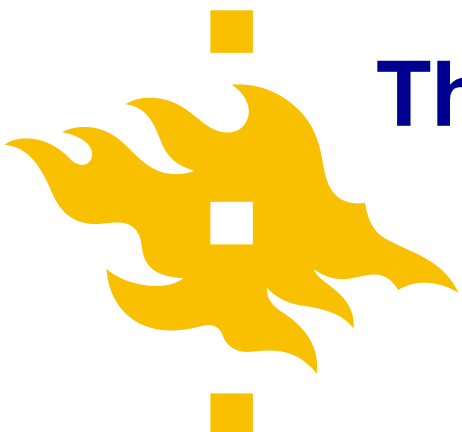
Wicked safety problems are challenging traditional accident prevention approaches

The increase in the complexity of production systems creates safety problems that are difficult to solve because of continuous change and multiple interdependencies that can be hard to recognize. Such wicked safety problems challenge the way we think about accidents, accident prevention and labour safety work.



In this presentation, I will

- 1 discuss three generations of accident-prevention thinking and construct a draft model of a fourth generation as the zone of proximal development of accident prevention and safety work
- 2 present the Change Laboratory method as a potential fourth generation tool in safety work and research



The zone of proximal development of accident prevention - a draft model

THE BREATH OF THE CONTEXTUALISATION OF SAFETY PROBLEMS

Analysing and mastering system-level causes of safety problems

"Safety/risk management"
(The application of systems thinking)

"Developmental safety research"
(The Change Laboratory method)

3G

4G

1G

2G

"Safety inspection & safety propaganda"
(The Safety-first movement)

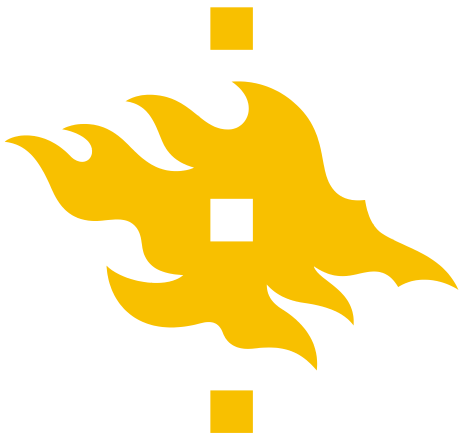
"Participatory safety work"
(the application of quality-circle methods)

Solving separate safety problems

LEVEL OF COLLABORATION IN LABOUR SAFETY WORK

Individual responsibility of safety

Collaboration and shared agency in safety work



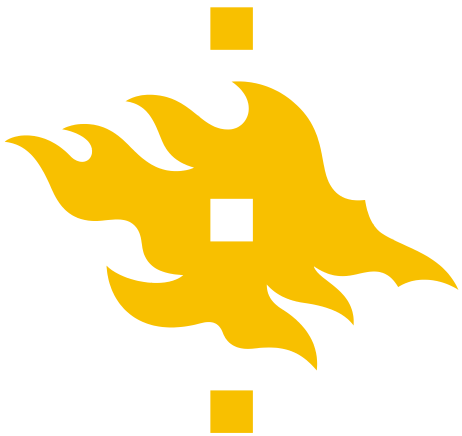
Safety approaches' underlying conceptions of causality: From mechanical to systemic and dialectical views



The mechanical view of the world and causality behind early safety approaches

In Galilei's and Newton's mechanical view the world consists of separate objects the causal relationships of which determine their behaviour. To explain means to identify cause-effect relationships between objects.

Securing labour safety calls for identifying possible causes of injuries, occupational diseases and accidents and preventing them from affecting workers.



From immediate causes to chains of causes and probability

Toyota's approach to quality in flexible mass production can be seen also as a model of participatory safety work. Its main features are:

- 1) the search for the root cause of a defect (accident) in the causal chain of actions instead of focusing on the immediate cause (the fish-bone analysis of causes backwards from the immediate defect)
- 2) emphasis on the analysis on statistical variation in work processes
- 3) worker team's that carry out analyses and design improvements in collaboration with engineers

This approach can be characterized as a kind of participatory risk management

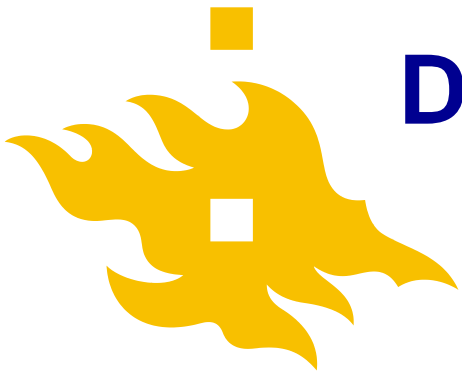


Cybernetics and systems thinking

(R. Ashby, L. von Bertalanfy, J. Forrester, and others)

The qualities and behaviour of separate objects do not directly determine the qualities and behaviour of the system that they are parts of. These are determined by the dynamic patterns of repeated interactions and interplay between the elements of a system. Focusing on two-way causality and feedback loops in sustained interaction instead of immediate one way causes.

Enhancing labour safety calls for revealing dysfunctional patterns of interplay and self amplifying feedback loops (vicious circles) in the organization's activity and making them stable or turning them into benign cycles of learning and improvement.



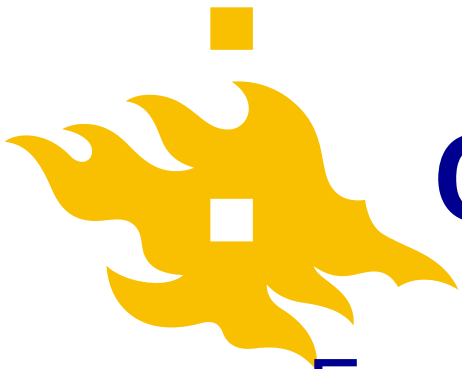
Dialectical view of complex, developing systems

Darwin, Hegel, Marx, Iljenkov, Prigogine

- The world consists of historically developing systems of interaction between objects.

Objects and their qualities evolve within a system. As parts of a system objects have qualities (behaviours) that they do not have when removed from the system.

A robust relationship of interplay can only evolve between parts that complement each other, that is to say, have opposite qualities.



Causality vs. mediation

- Functional interaction between opposites becomes possible through mediation, a third element that can be connected to both the opposites.

A mediator is neither a cause nor a consequence but ties two phenomena together into interplay and co-evolution and changes the system.

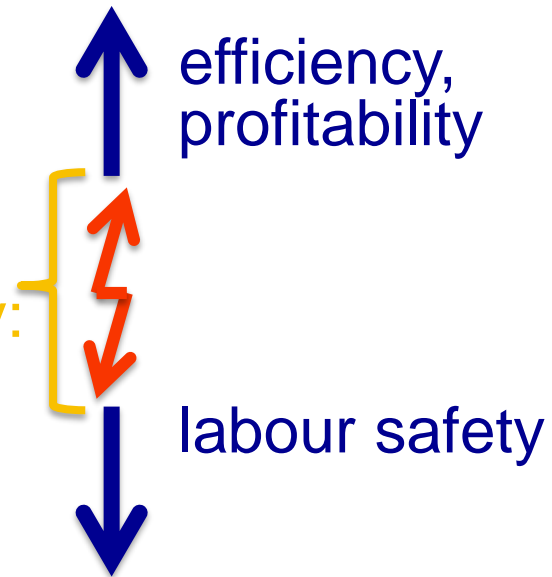


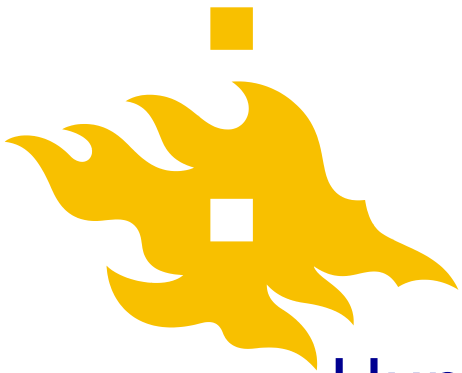
Mediation between the contradictory requirements of profitability, efficiency, and labour safety in production

MEDIATOR

An instrument and method of securing labour safety without losing efficiency and profitability: a labour safety approach

PRODUCTION (of X)



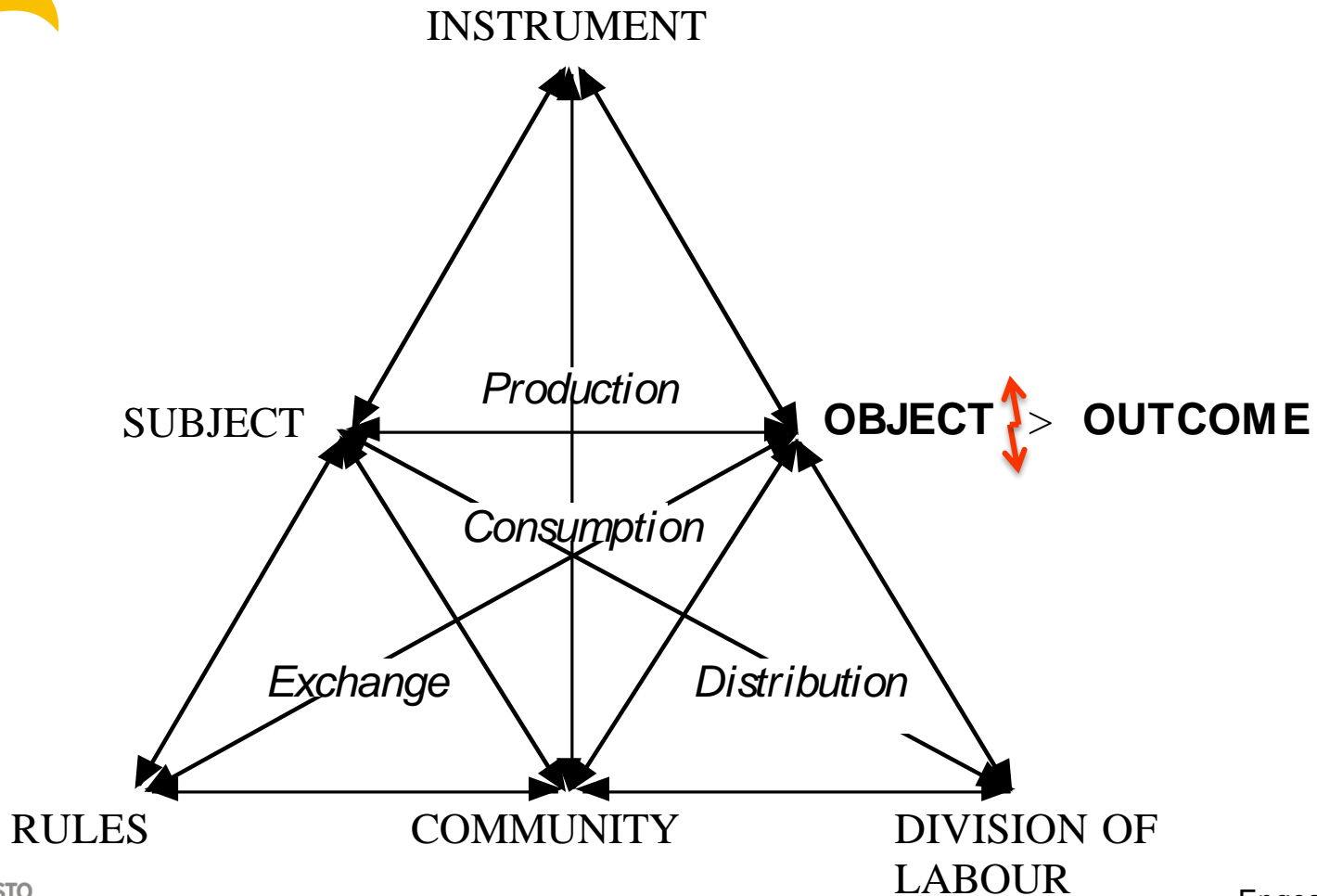


Human Activity – a culturally mediated system

- Humans' interaction with nature and with other humans is culturally mediated through signs (language) and instruments within historically evolved **systems of joint, object-oriented activity** between specialized persons.

The object of joint activity is always a mediated **unity of contradictory tendencies and requirements**. The most general basic contradiction is the one between the use value of the product and its exchange value in markets.

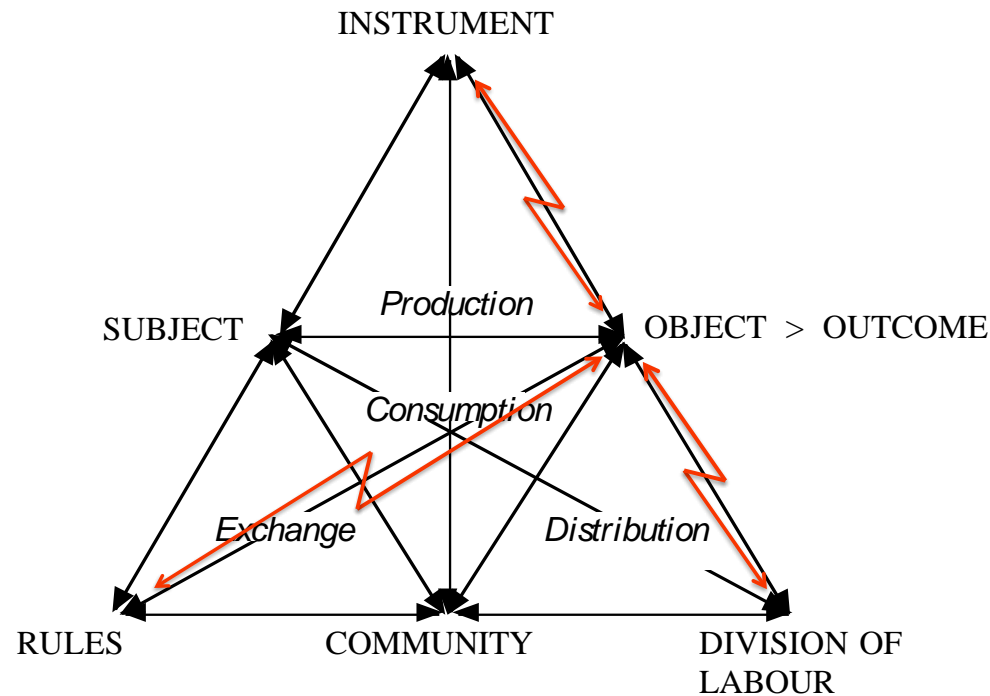
Complex relationships of cultural mediation in an activity system





Historical change and secondary contradictions within the activity system

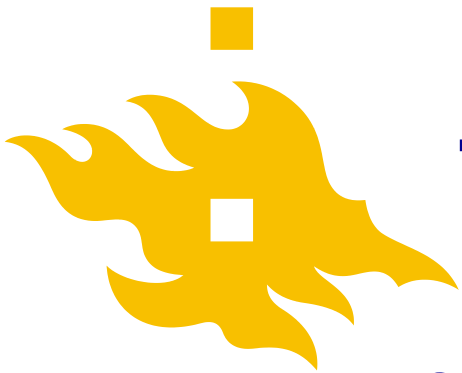
As the elements of the system of joint activity change, old forms of mediation can lose their capacity to tie opposing tendencies together creating secondary contradictions between the elements of the system.





Manifestations of secondary inner contradictions within an activity

- 1. Deviations from planned/prescribed processes:**
 - ruptures in communication and work process
 - disturbances and accidents
 - innovative actions
- 2. Inaction, lack of agency due to paralyzing conflicts between individuals' work-related motives (double binds) that leave no acceptable alternative open for action**



Three layers of causality in human activity

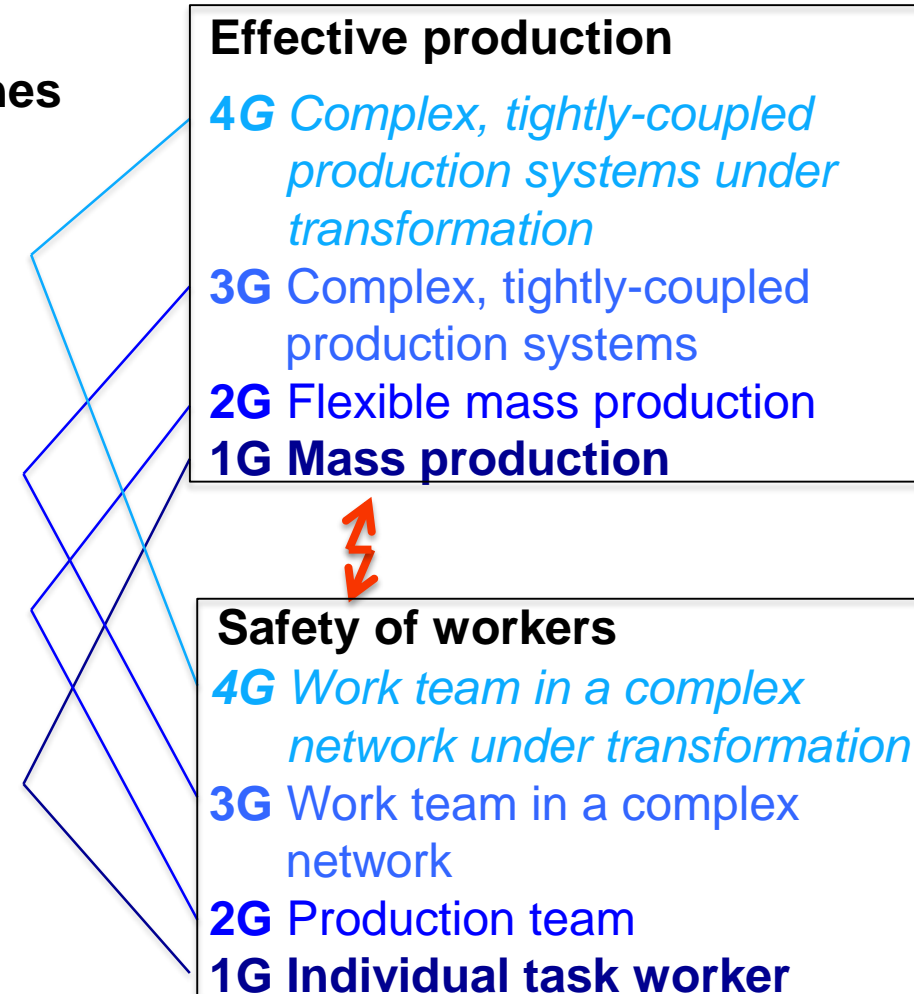
1. **Causal layer:** Individuals base their actions on generalizations concerning cause-effect relationships.
2. **Contradictory layer:** In collective work activities, individuals are often driven by contradictory motives and pressures and can act in unpredictable ways when trying to find a resolution.
3. **Agentive layer:** People can proceed from the contradictory situation to taking transformative actions by *inventing and using artefacts to control their behaviour from the outside*. That is, by resolving the contradiction by re-mediating their action (Engeström, 2011)

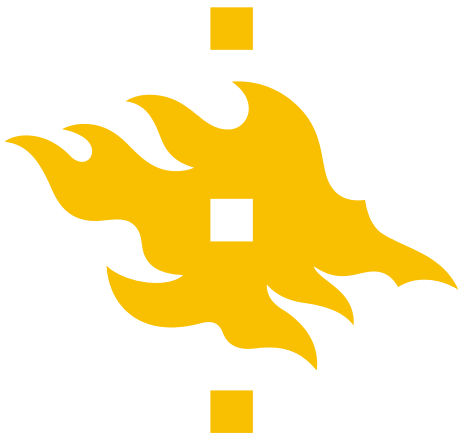


Generations of mediation of the labour-safety contradiction

Generations of Mediating safety approaches

- 4G** *Developmental Work Research and the CL method as tools for finding solutions to overcome secondary contradictions in activity systems and creating shared transformative agency.*
- 3G** System-models as tools for safety and risk management
- 2G** Continuous improvement through "quality circles" as a way of enhancing safety
- 1G** **Linear, one cause-one effect models of the occurrence of accidents and safety problems and of improving safety**

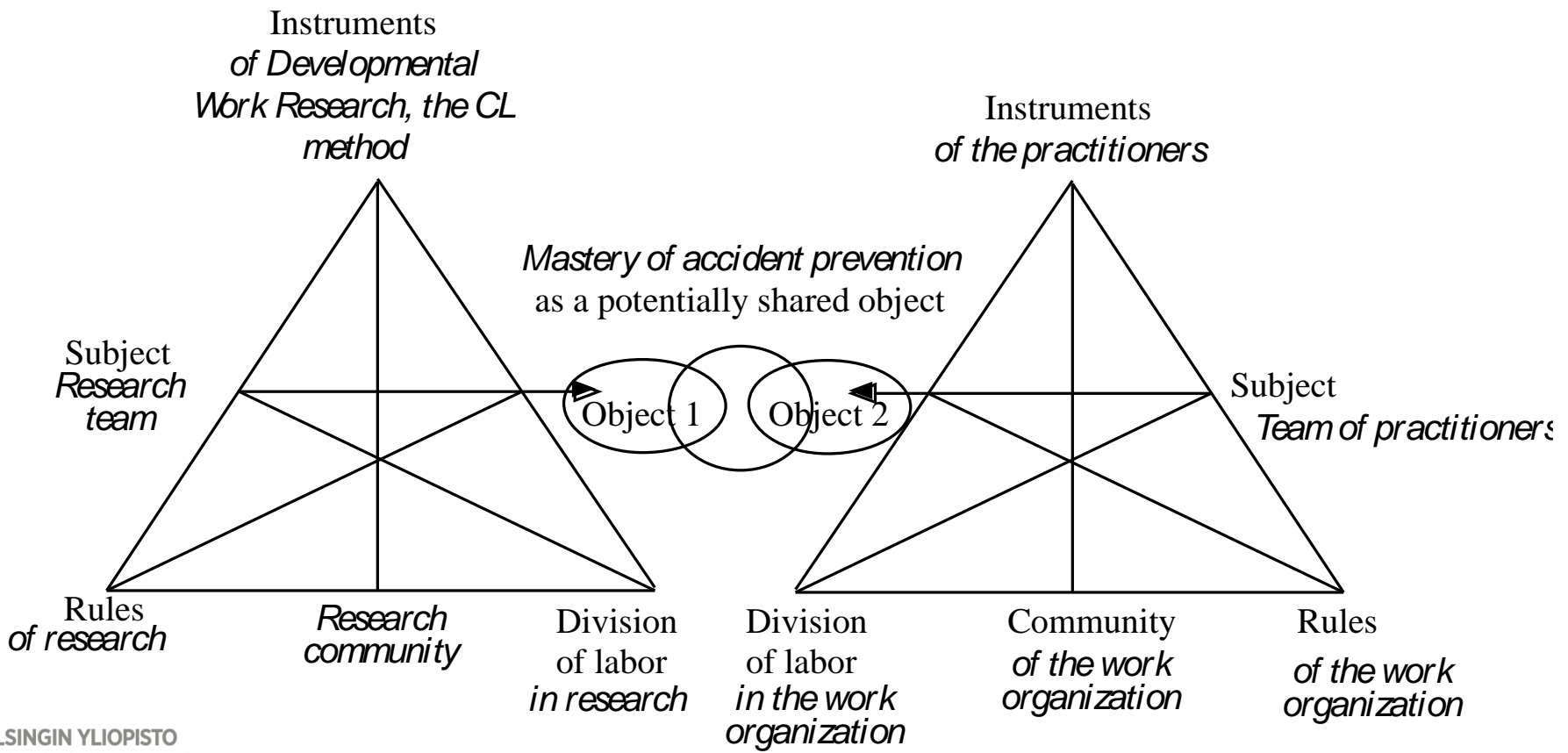


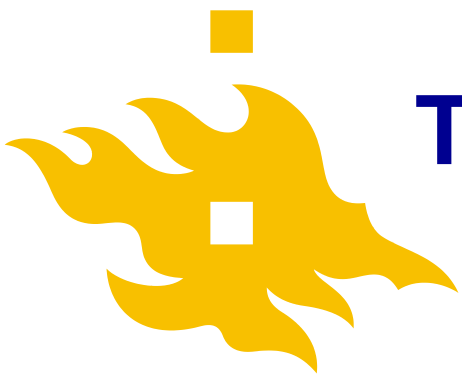


The Change Laboratory as an instrument in safety work and research



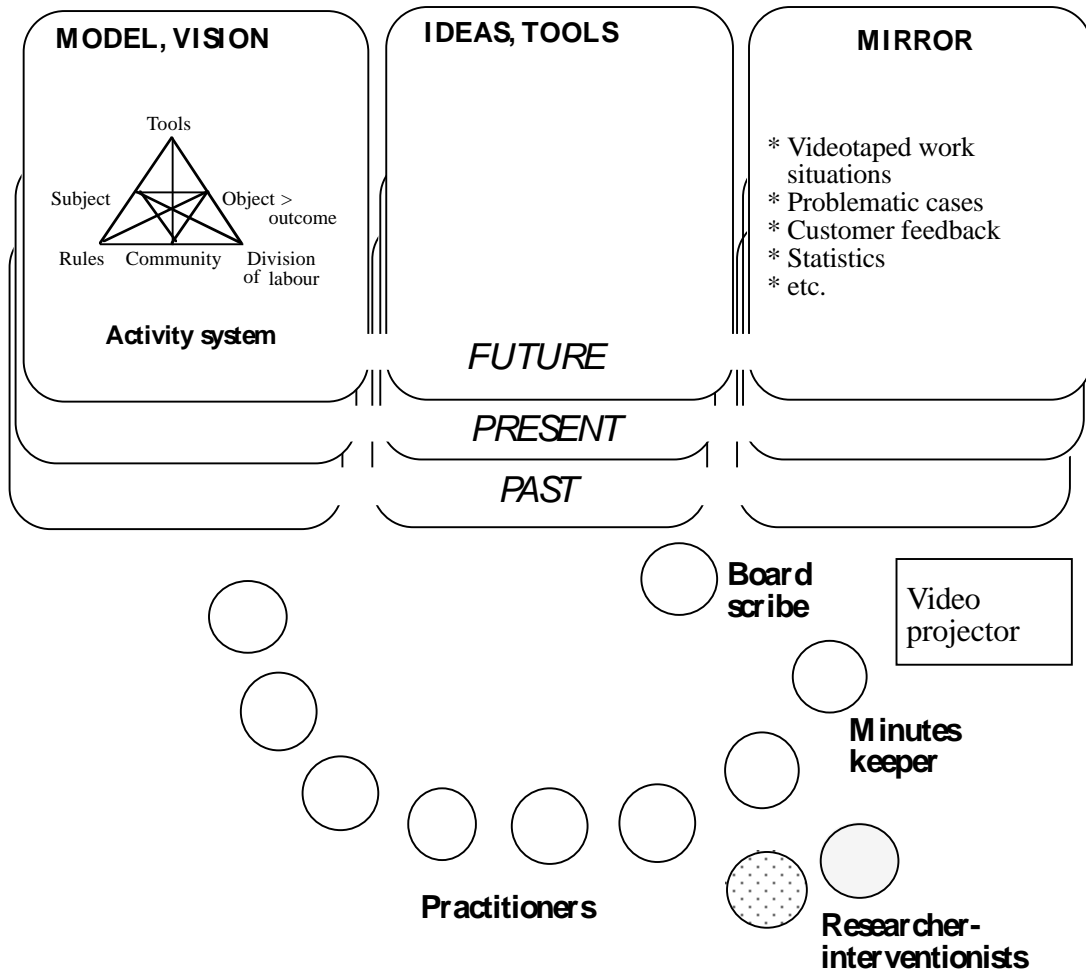
Labour safety as a partly/potentially shared object of researchers and practitioners





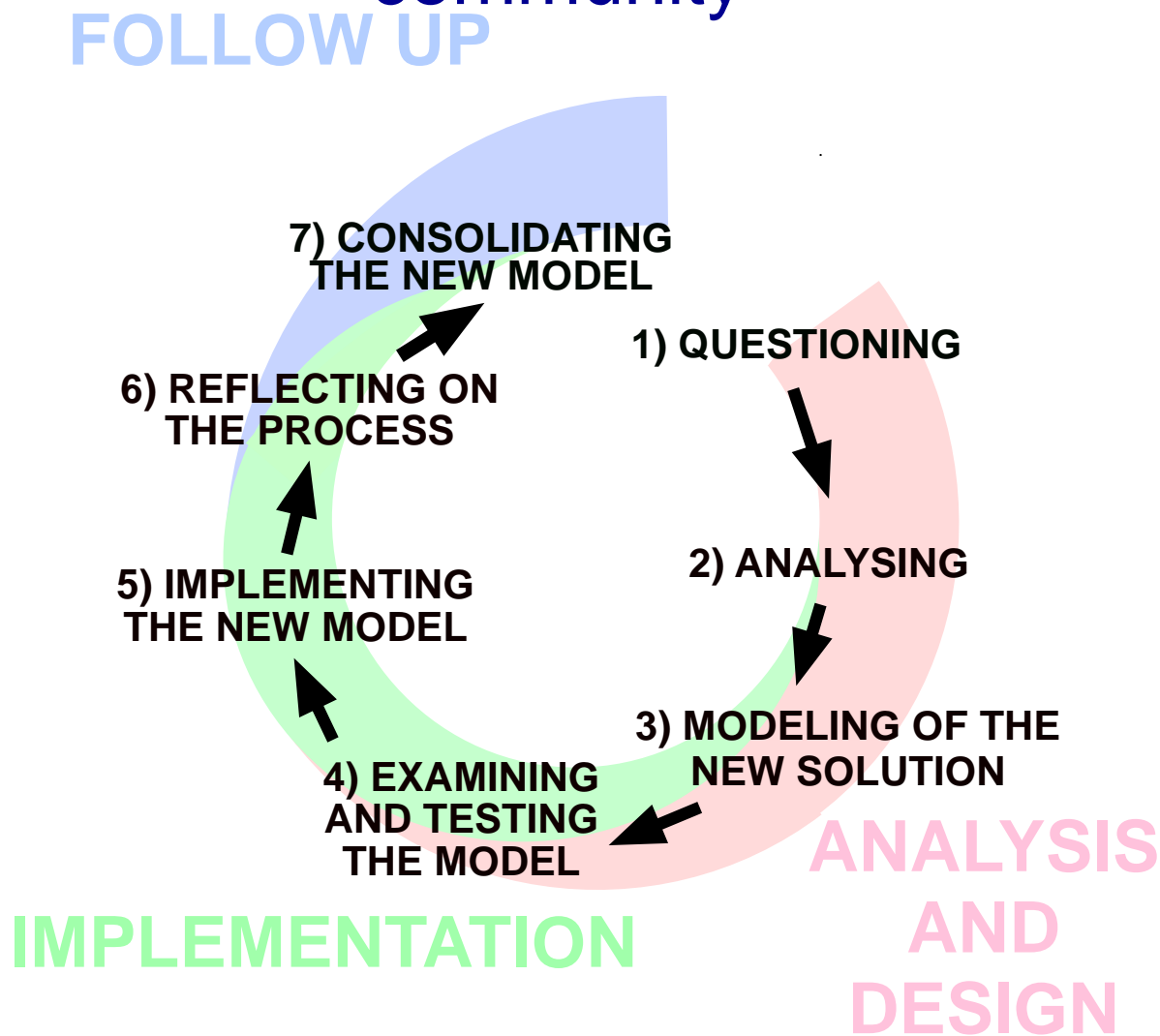
The setting and principles of the Change Laboratory

- 1) System of object-oriented activity as the basic unit of analysis and development
- 2) Historical-developmental approach (to reveal inner contradictions in the activity system)
- 3) Double stimulation: interplay between concrete observational data (first stimulus) and models as intellectual tools (second stimulus)
- 4) Joint carrying out of an expansive learning process in the activity by taking jointly expansive learning actions





The Change Laboratory process as a cycle of expansive learning in a work community



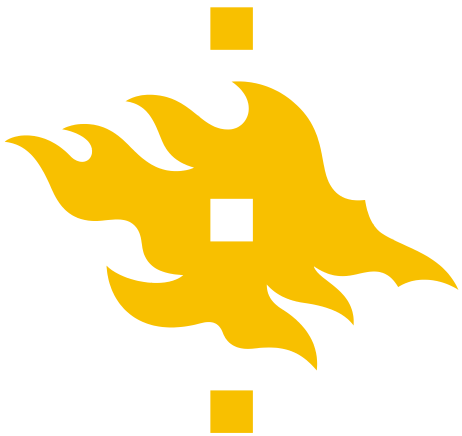


The Change Laboratory process in a team of Tele Technicians

	MODEL/VISION	IDEAS/TOOLS	MIRROR
FUTURE	8	7 Ideas of new tools and practices: - form and system of problem solving - standardization - collaboration	9 Follow-up data concerning the changes and the activity
PRESENT	6	2 Clusters of recurring disturbances, dilemmas, and double binds	1 A graphic representation of a technician's installation journey to the client's the ruptures and disturbances that took place during the installation process
PAST	5 Identification of the double-bind phase of development of the activity in the expansive cycle 	4 Characterization of the way of working in the early days: learning by trying and discussing Identification of major changes	3 Data concerning historical changes in the team's activity system and way of working

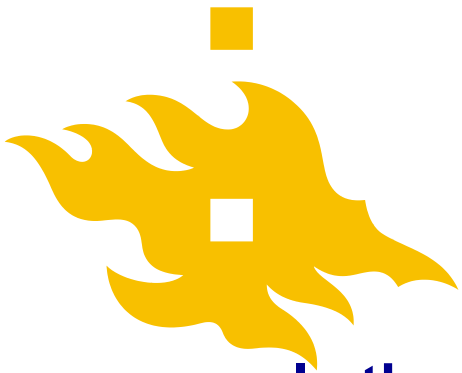
Legend:

- = an element of the activity system that had changed
- = an element of the activity system that was changed



Typical phases of a Change Laboratory intervention

- 1 Negotiation about an intervention with an organization.
- 2 Preliminary data collection: "Ethnography of problems", mirror data.
- 3 Change Laboratory sessions of analysis and design (5-12, 2 once a week). *The video of previous session is analysed when the next is prepared. Additional data may be collected between sessions.*
- 4 A period of experimenting with the created new model and its implementation.
- 5 Collection of follow-up data. Sessions of reflection on the process and outcome. Later, consolidation of the outcomes.
- 6 Research analysis of the data produced in the intervention.



The outcomes of Change Laboratory interventions

In the client organization

- an understanding of the systemic causes of problems in the activity
- a new, shared model/vision of the future form of the activity: new tools, forms of organization and practices that help to overcome a threat of crisis and progress in a new line of development
- a shared transformative agency of the participants, a new subject of change
- a new way of collaborative learning and development

In the industry (type of activity)

- deepened understanding of the ongoing historical change and, causes of problems and ways of overcoming them

In scientific research

- data and insights concerning the dynamic of expansive learning processes and ways of supporting them