Management principles and safety culture in complex projects (MAPS)

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The goal of MAPS was to enhance nuclear safety by developing knowledge that supports high-quality execution of complex projects in the nuclear industry.
Safety in inter-organizational project networks
Methods

Systematic literature reviews

Case studies

System dynamics modelling

Benchmarking

Research and industry-oriented workshops
Governance in project networks

- **Project management** focuses on rational planning and technical implementation from a single actor’s perspective.

- **Project governance** refers to coordination, adaptation and safeguarding mechanisms internal to a project network that enable multiple independent organizations to work towards shared goals.

  - A core function of project governance is to **align project stakeholders to work together**.
  
  - Although there is a focal actor (owner), **no single organization has full control over the project**.
System dynamics modelling

Focus on **system’s dynamic behaviour over time**, not on individual events.

Focus on system’s structure: multiple **feedback mechanisms, time delays, accumulations**

Using **diagramming tools** (causal loop, stock/flow diagrams) can help in improving the understanding of a complex system

→ Simulations can help to reveal e.g. **tipping points**, conditions under which the behaviour of a system radically changes after a certain threshold.
RESULTS

Source: Hendrik Morkel, Unsplash
Key dimensions of governance in inter-organizational project networks

(based on Kujala et al., 2016)
Goal setting

To create shared performance goals for the project that are understood by all project actors: both short-term goals focusing on project implementation process and long-term goals related to use and benefits from the end-result.
To raise awareness of risks of organizational accidents or unwanted events, to ensure that stakeholders act as expected.
Roles and decision-making

To ensure decisions are made promptly based on up-to-date information and effect of decisions to overall performance and safety is taken into account.
To align stakeholders’ goals with project goals by means of incentives, such as monetary rewards/penalties linked to joint performance goals, conditional future payments and work prompting a life-cycle approach, or reputational scoring systems.
To align behavioral patterns of stakeholders to effectively work together, based on adapting tools and work processes that are to a certain extent standardized, or at least compatible, across project actors.
Capability building

To ensure that project stakeholders have adequate capabilities to meet performance expectations; skills and expertise, tied to the project at an early stage, and sufficient attention is given to resourcing and learning.
To enhance safety in project networks

- Extend the perspective from organizational to **inter-organizational factors** and focus on building healthy inter-organizational relations.
- Monitor and enhance **non-technical capabilities**, such as communication and collaboration, to align different and often fragmented perspectives and sensemaking processes.
### Principles of methodical safety culture change

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<th>Culture in socio-technical system</th>
<th>Safety culture change tools</th>
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<tr>
<td>Select the boundaries of the system you want to change</td>
<td>Identify the assumptions embedded within safety culture change tools</td>
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<td>Consider the dynamics between classes of system elements</td>
<td>Acknowledge that safety culture cannot be directly changed</td>
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**Interactions**

- Understand what organizational members actually do
- Involve the target group
- Consider the influence of power relations
- Acknowledge that safety culture cannot be directly changed
- Information acquired in safety culture activities may be useful in the future

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**Culture in socio-technical system**

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**Safety culture change tools**

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**Interactions**

- Do not expect rapid change in values and assumptions
- Understand what organizational members actually do
- Involve the target group
- Consider the influence of power relations
Assumption
Systems consist of a diverse set of elements that define how safety culture develops

Principle
Consider the dynamics between classes of system elements

Assessment Questions
- What kinds of behavior patterns and structures exist in the organization?
- What do they imply about the underlying values or assumptions?
- How do the underlying values or assumptions influence behavior or structures?
- How are the values and assumptions connected to each other?
- Which values and assumptions are particularly strong (or weak)?
- Which are shared by everyone, which only by subgroups?
Goal setting
- Participation in goal setting and shared understanding of safety goals
- Alignment of performance goals with project goals
- Processes to change project goals/flexible contracts

Monitoring
- Formal and informal practices for monitoring safety performance of all actors
- Adequate monitoring system for overall project performance and performance of each actors
- Third party monitoring and auditing practices

Roles and decision-making
- Roles and responsibilities for each stakeholder are defined
- Decision-making processes include all relevant actors
- Project’s overall management system and each stakeholder’s system are aligned

Rewarding
- Incentives to work toward achieving shared project goals
- Understanding that project success is good for all actors
- Key project stakeholders have stake/ownership in the end product

Coordination
- Common project management practices to facilitate coordination and work together
- Practices to develop a good safety culture of stakeholders
- Processes to improve project and change management, and conflict resolution

Capability building
- All stakeholders have adequate capability to meet project goals and are willing to learn
- All stakeholders assign most competent personnel to project
- Subcontractors selection is based on capabilities to meet project goals
Project governance self-assessment tool

- Provides structure to describe the project context
- Creates shared language, understanding and learning
- Increases understanding of management practices
- Raises awareness that actors and their relationships affect safety
- Allows for various applications in a project lifecycle
Insights from system dynamics modelling

- Helps to understand the project context and visualize to see a pattern in complex cause-effects.

- Helps to recognize the potential of reinforcing mechanisms to affect safety through unintended consequences – the more complex the project, the more buffers are needed to manage surprises.

- Facilitates the understanding of assumptions and reaching agreement: project actors understand better how they can affect the system.
Interactive simulation game

Web user interface of MAPS interactive simulation game
https://forio.com/app/sruutu/maps/
Future avenues for research and practice

- Validate the **project governance model**
- Study further the links between **governance, management, leadership and safety culture**
- Test the **self-assessment tool for project governance** (e.g. modernization project)
- Utilize the guidelines for implementation of **safety culture ambassadors** as an improvement method
- Refer to **principles of safety culture change** when planning and implementing safety culture improvement activities
- Apply the **system dynamics interactive simulation game** as a training tool and to support management
Thank you for your attention!

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