Safety culture

MEC-E3004 Safety management in complex sociotechnical systems

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1. 2.3. Introduction and the basic concepts of safety management
2. 9.3 Basic concepts: Human Factors and Safety Management (Douglas Owen)
3. 16.3 Accident models
4. 23.3 Accident case (BP Texas City refinery explosion in 2005)
   - Mid-term assignment
5. 30.3 Organizational learning

6.4 NO LECTURE

13.4 Returning the mid-term assignment

6. **13.4. Safety culture**
7. 20.4. Safety leadership
8. 27.4. The basic principles of safety management
9. 4.5 Safety management systems
10. 11.5. Tools of safety management
11. 17.5 Future challenges and new directions of safety management (TIME!)
12. 25.5 Recap and Q&A
    - Deadline for returning the paper 31.5.2023

Potential topics for the final paper

The idea of the final paper is that you select a case and analyze that case with the models and theories introduced in this course:

- Accident case (e.g. Deep Water Horizon, Columbia, Boeing 737 Max)
- A successful case / company (e.g. “safety management at company x”, “Succesfull shutdown of Onagawa NPP after the Great Japanese tsunami)
- A neutral case (e.g. “pros and cons of safety management at company x”)

You can also select the theoretical concept first and then apply it to a selected case, e.g.

- Different accident models (e.g. “Three Mile Island accident in light of epidemiological and systems accident models”)
- Safety culture models and theories (e.g. “safety culture in construction industry“, “safety culture in company X”)
- Safety leadership (“safety leadership in company X”)

- However, whatever the selected theory / concept, remember to consider it critically, based on the “adaptive age” of safety management

- In addition to analyzing the causes of the accident, consider also the needed corrective actions – what should be done to improve safety at the case organization, and generally
- If you report a successful case, consider the indicators of success and the needed actions to maintain success

Learning logs

- Can an organization learn? Organizations as complex adaptive systems, hyperobjects
- Single vs double loop learning – how to facilitate double loop learning in organizations, how do we know when to apply double-loop learning?
- Questions
  - Why is learning important?
    - Drift, habits, new hazards, complexity
  - How can we avoid the success traps?
  - Does too high psychological safety lead to success traps?
  - How can we measure learning on a personal and organizational level?
  - Which one is the real cause of accidents, communication (or lack of it), or complexity? => communication is important precisely because of complexity (VUCA, see Edmondson 2019)
  - “Safer the system, less opportunities to learn from failures” – this may facilitate the success traps, as there is little to wake up the organization. Also, if a system is not developing, it is typically degrading.

Learning from incidents – summary of previous lecture

- Our learning is always based on our model of safety and accidents
  - AND, we ignore most of what happens around us
  - THUS, we need to reflect on what is our model of safety (and accidents)
- Two types of learning, single-loop and double-loop
  - Single-loop aims to accomplish the current task with small adaptations
  - Double-loop questions the premises, looks deeper into causes of failure
- There are multiple barriers to organizational learning
  - Deficient learning process – unclear roles, superficial analysis, ineffective corrective actions, failing to distinguish between single and double-loop learning, lack of a systems view
  - Good news culture, “shoot the messenger” culture, or lack of psychological safety preventing employees from speaking up
  - Denial, complacency, attribution error, preventing organization from taking issues seriously
  - Hurry and lack of resources lead to missing time to reflect
  - Lack of coordination and local silos prevent local learnings from becoming organization-wide, and may lead to local drift

Culture for learning (e.g. Schein 2017, Esreda 2015; Reiman et al. 2015)

1. **Systems thinking**
   - Understanding the complexity of issues, avoiding ”easy fixes” to complex problems
   - Also ability to avoid ”analysis paralysis” by complicating simple issues
   - Ability to apply both single-loop and double-loop learning when applicable
2. **Psychological safety and open climate**
   - Willingness to speak up and report
   - Respect for others, genuine willingness to listen and learn, a no-blame attitude
3. **Questioning attitude**
   - Questioning routines, trying to imagine ways that things can go wrong
4. **Systematic and usable processes for learning**
   - Including dedicated resources and competence as well as ways to institutionalize lessons (e.g. as procedures, instructions)
   - Diverse ways to learn: benchmarking, external events, internal events, independent assessment, audits, etc.
   - Easiness of reporting
5. **Integration of learning to everyday work and organization**
   - Having time to practice, ease the unlearning
   - Learning from success and daily work – integration of individual, group and organization level learning
   - Incentives and leadership that support organization-level learning

What is safety culture – history

Safety culture is a concept originating from the nuclear industry in 1986 after the accident at the Chernobyl nuclear power station

Nowadays the concept of safety culture is used in many industries, and can refer to many types of safety (e.g. occupational safety, process safety)

It is also often used without making explicit what is meant by “safety” in this case. For this reason, e.g in the nuclear industry the term “nuclear safety culture” is often used.

Deficiencies in safety culture have also been found in many recent accident investigations (e.g. Fukushima Daiichi, BP Deep Water Horizon, Boeing 737 Max)

But, it can also be used proactively, to prevent accidents and improve organizations

Safety culture combines two very complex concepts

SAFETY

and

CULTURE

Safety culture can be approached as the organization's view on safety

But, do we know what 'safety' is?

Has our understanding of safety improved as much as our understanding of sources of accidents?

- Safety is not only an absence of events, incidents or accidents!
  - Events might have been barely avoided, luck might have played a part, or personnel have ”saved the day”
  - Safety is something that is ”present”, something that is ”done”, not something that is ”missing” or ”absent” (cf. Safety as lack of an accident)
- Good safety can manifest as few incidents, but measuring only incidents does not give an understanding of the level of safety
- Safety is not a stable thing that can be implemented or reached. Safety has to be created everyday.
- Safety manifests in action and it is action. Thus people and work communities are key to understanding and managing safety.
- Organization has to create the preconditions for achieving safety. People in the organization create safety as well as risks.

Safety science is moving from seeing safety as an absence of negative to safety as an ability to succeed, as a presence of organizational capabilities

(modified from Hollnagel, 2008)

Safety = Absence of errors / deviations	Safety = Hazard control	Safety = Ability to succeed under varying conditions
Remove **individual** errors and deviations as much as possible, avoiding that something goes wrong	Remove / decrease **hazards,** reduce their probability and minimize the consequences of actualized hazards	Improve the **organization's** ability to anticipate and monitor hazards, respond to events and learn from the past; ensuring that everything goes right

What do we mean when we speak about safety culture?

- No universally accepted definition or model of safety culture exists in research or practice
- One of the earliest definitions of safety culture was provided by the International Atomic Energy Agency (IAEA) in 1991:

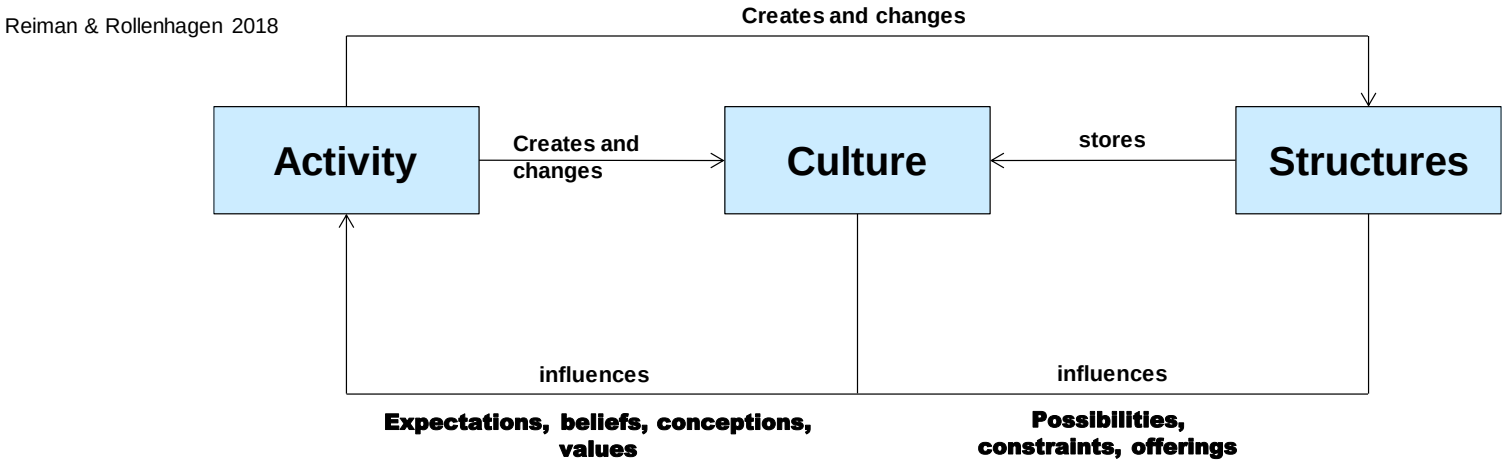
  “safety culture denotes the assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.”
- Pidgeon (1998) defines safety culture as the “set of assumptions, and their associated practices, which permits beliefs about danger and safety to be constructed”.
- Antonsen (2009): “the frames of reference through which information, symbols and behavior are interpreted and the conventions for behaviour, interaction and communication are generated.”
- Clarke (1999): “a subset of organisational culture, where the beliefs and values refer specifically to matters of health and safety”.
- Guldenmund (2000):‘those aspects of the organisational culture which will impact on attitudes and behaviour related to increasing or decreasing risk’.

=> Safety culture is closely related to the concept of ”organizational culture”

=> Two main approaches to organizational culture, functionalist (organisation has a culture) and interpretative (organization is a culture)

What is culture

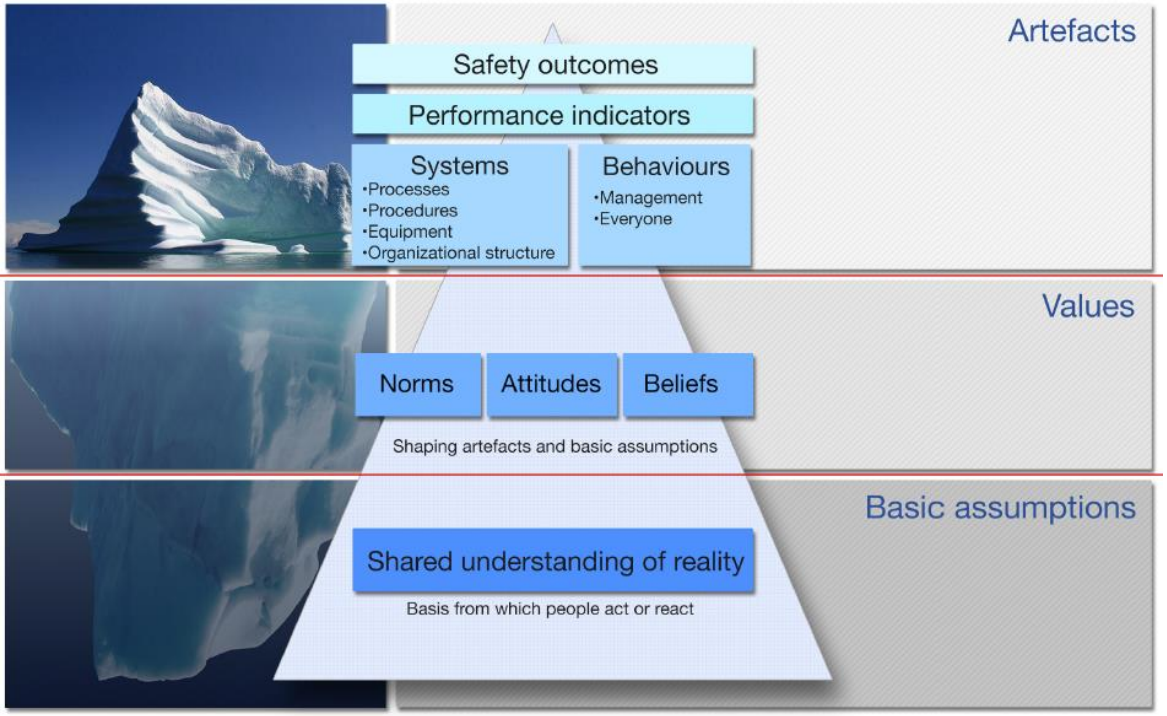
- Culture is created by an organization / group, but it also affects the group's future behavior
  - The behavior of the group continues to change (or reinforce) the existing culture
- Behavior also creates and changes the organizational structures
  - These structures "store" culture, e.g., the assumptions embedded in organizational structures, rewarding systems, procedures etc.
- To change culture, we need to change both activity and structure



Dynamic definition of culture by Edgar Schein (2017, p. 6)

The culture of a group can be defined as the accumulated shared learning of that group as it solves its problems of external adaptation and internal integration; which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, feel, and behave in relation to those problems. This accumulated learning is a pattern or system of beliefs, values, and behavioral norms that come to be taken for granted as basic assumptions and eventually drop out of awareness.

Levels of safety culture according to Edgar Schein, and as visualized by IAEA



Schein's original model refers to organizational culture. Safety culture covers those aspects of organizational culture that are relevant for safety – in safety critical industries, in practice organizational culture and safety culture refer to the same phenomenon.

"Culture as a set of basic assumptions defines for us what to pay attention to, what things mean, how to react emotionally to what is going on, and what actions to take in various kinds of situations" (Schein 2016, p. 22).

Deepest level of culture: assumptions

- **What do we mean when we talk about ‘safety’?**
- **Why failures happen? What is the role of people in successes and failures?**
- **Are things safe until proven otherwise (or vice versa)?**
- **What is acceptable evidence of danger / risk?**
- **What is an event, and what is ‘business as usual’?**
- **What things are NOT important to us?**
- What is needed to ensure safety? Is safety a purely technical issue?
- What are the characteristics of a professional? Do professionals make mistakes?
- How to advance one’s career in this organization?
- What is the role of a supervisor versus an employee in managing safety?
- How to talk to, and how to disagree with your superior? Is supervisor always right?
- What is good leadership? How should leaders behave towards their subordinates?
- Are disagreements and diverse opinions a sign of internal discord or a sign of healthy culture?
- How work should be organized to ensure quality and safety?
- How safe are we? How do we know that? Is it possible to improve still?
- Is there something we do not understand or know?

Characterizations of good safety culture – normative models

- Good safety culture has been characterized in
  - Scientific safety culture models (e.g., resulting from systematic meta-analyses, literature reviews, factor analyses, etc.)
  - Models or policies used and/or produced by practitioners (e.g., International Atomic Energy Agency, companies, etc.)
  - Regulation or legislation (e.g., STUK regulations and guides)
- Characterizations of good safety culture can, for example, be used for
  - Developing a shared understanding of what safety culture means and what phenomena it encompasses
  - Providing a normative framework for evaluating the strengths and weaknesses of the organization in self-assessments, external reviews or event investigations
  - Acting as a starting point or guidance in organizational development
  - They should NOT be used as checklists to verify compliance, or as items in questionnaire to “measure” the level of safety culture

Safety culture models: World Association of Nuclear Operators (WANO) ”traits of a healthy nuclear safety culture”

Individual Commitment to Safety

- Personal Accountability (PA)
- Questioning Attitude (QA)
- Safety Communication (CO)

Management Commitment to Safety

- Leadership Accountability (LA)
- Decision-Making (DM)
- Respectful Work Environment (WE)

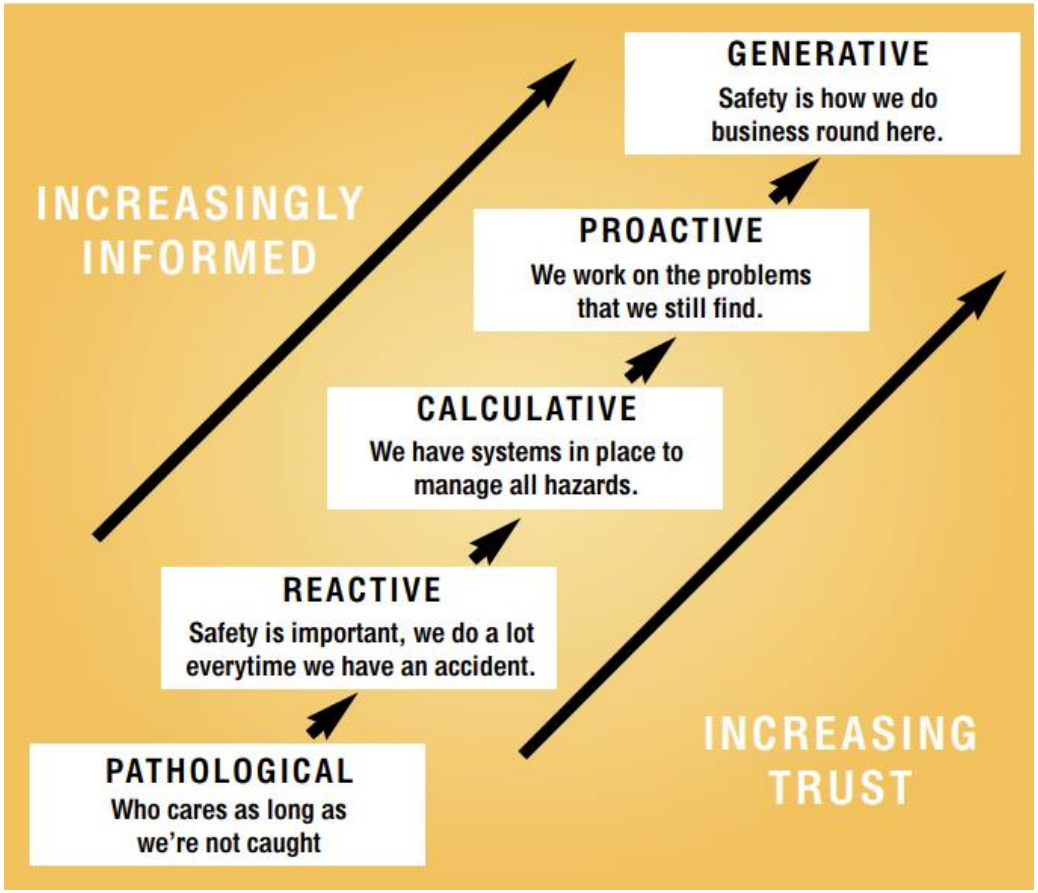
Management Systems

- Continuous Learning (CL)
- Problem Identification and Resolution (PI)
- Environment for Raising Concerns (RC)
- Work Processes (WP)

Safety culture cannot be measured

- But it can be assessed
- Safety climate, denoting the perceptions of safety among personnel, can be measured with attitude surveys
- Assessment of safety culture requires multiple methods and an iterative approach
- There are also several development stage models of safety culture, which can be useful, but also risky as they can oversimplify the concept (and imply that it can be measured)

Development stages of safety culture as proposed by Hudson (2001)



For a critique of safety culture maturity models, see Filho and Waterson 2018.

An iterative and multi-method approach to safety culture assessment

Methods

- Focus groups
- Interviews
- Document analysis
- Observation
- Questionnaires

Approach

- Iteration with multiple methods: characteristics of culture
- Normative model: evaluation of strengths and weaknesses of the characteristics

Summary: safety culture

- Culture for safety is created by all employees, yet it also influences how the employees behave in future – reflect how your behavior affects the behavior of others, what norms and expectations you are creating
- Leadership shapes culture, management system supports its development, technology creates both constrains and opportunities – systems view is needed
- Healthy culture includes few blindspots and encourages questioning, raising of concerns and speaking up – Psychological safety and respectful work environment
- Assumptions are at the core of culture – what do we take for granted, what is important and what is not important to us?
- Healthy culture avoids complacency and normalization – safety requires constant effort to maintain, it is about the presence, not absence
- Culture changes whether we pay attention to it or not – systematic approach is needed to monitor and develop culture, leadership & the management system

Features of good safety culture summarized (see e.g. Reiman & Rollenhagen 2014,2018)

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