IMPROVING TEAM RESILIENCE BY SUPPORTING MINDFUL COOPERATION AWARENESS

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Abstract

Due to increasing complexity and changes of work in safety critical systems, organizational resilience is strongly influenced by the resilient cooperation in teams consisting of several experts. Through this cooperation, collective tacit knowledge evolves. A lack of systematic cultivation of such knowledge may cause disruptions in cooperation, finally reducing team resilience. Against this background in this project a method was developed and piloted that supports systematic cultivation of collective tacit knowledge. The method incorporates three parts: a pre-job workshop, a systematic exchange of cooperation relevant information during job execution, and a post-job workshop. The pilot showed that the method improves team resilience with regard to disruptions in cooperation. This can be achieved by systematic elicitation, sharing and joint handling of collective tacit knowledge. In this process, mindfulness with regard to (in-)compatibility of mutual expectations between team members and awareness regarding successful cooperation (cooperation awareness) are systematically fostered. Furthermore, organizations get the opportunity to learn from tacit knowledge based local adaptations as well as to identify conflicts between being resilient and ensuring compliance to standards at the sharp end. This enables taking the right measures to foster team resilience by supporting mindful cooperation awareness.

1   INTRODUCTION

Increasing complexity of technical facilities and organizational processes changes work in safety critical systems. In respective organizations, many tasks have become too complex to be successfully performed by only one person. This brings about both, an increasing specialization regarding expertise as well as increasing division of labor. Consequently, many tasks have to be performed by teams consisting of several experts with specific expertise. This makes cooperation of different experts more needed, but also more demanding.

Hence, cooperation of experts has become a crucial success factor for the achievement of common objectives in complex, safety critical systems. For this reason, the resilience of an organization is strongly influenced by the resilient cooperation in teams consisting of several experts. At the same time, many organizations - maybe trapped in Safety-I thinking (Hollnagel, 2012) - aim at assuring safety by implementing more prescriptive standards and by expecting experts to comply with those. Thereby, the teams' ability to adapt to dynamic work conditions may be impeded, and, thus, the teams cannot cope resiliently with challenges and opportunities of the work context. Resilience potential of teams and organisations can hardly be enacted that way.

1.1   The Role of a Team's Collective Tacit Knowledge Regarding Resilient Cooperation

Resilient teams are able to adapt to dynamic work conditions (Rankin, Lundberg & Woltjer, 2014). This ability emerges from team members' cooperation. Through cooperation teams also develop collective (embedded, see Lam, 2000) tacit knowledge.

Collective tacit knowledge is the situated and coordinated interaction of different experts' individual tacit knowledge with regard to the achievement of common objectives in a certain work process. It evolves from the repeated cooperation of the same experts in a particular team. It incorporates individual tacit knowledge regarding jointly developed local adaptation strategies which have (unconsciously) creeped in over time, and which are aligned with actual work requirements at the sharp end. This kind of knowledge qualifies a team and

its members for synergetic acting based on respective adaptation strategies. It enables successful cooperation without the requirement for explicit coordination. This makes a team more resilient, i.e., more adapted to actual work requirements and more effective with regard to the achievement of common objectives.

Key aspects of collective tacit knowledge are (a) team specific cooperation patterns, (b) individual experiences from previous cooperation and mutual expectations regarding future cooperation in the team, (c) mindful cooperation awareness and compatibility of individual expectations and, thus, (d) synergetic acting in cooperation. In the following, the key aspects and their interrelations are outlined. Furthermore, it is described, why a systematic cultivation of collective tacit knowledge is crucial for fostering resilient cooperation in teams.

a) Team Specific Cooperation Patterns

When the same people repeatedly work together over a longer time period, team specific patterns of cooperation evolve. Team specific cooperation patterns are coordinated behaviour patterns (routines, see Grote, 2009) - e.g. for cooperatively mastering certain tasks or problems - which over time consciously or unconsciously creeped in cooperation. These patterns reflect cooperative adaptations to dynamic work conditions thereby fostering team resilience (see Rankin et al., 2014). Over time these adaptation strategies are individually - and mainly unconsciously - considered normal and taken for granted (Grote, 2009). Sometimes these adaptations do not entirely comply with prescriptive standards. An example is, when two experts first work together according to prescriptive standards and fail to achieve objectives in the required time and - over time - learn (consciously or unconsciously) that cooperation is more resilient (i.e. adapted to time pressure) when they deviate from the standard. As a consequence, this deviation may become normalized and hence create the basis for a tacit pattern of cooperation among the involved experts.

b) Individual Experiences from Previous Cooperation and Mutual Expectations Regarding Future Cooperation in the Team

On the basis of the team specific cooperation patterns, team members - over time and with repeated cooperation - develop specific experiences regarding the cooperation in the team. On that basis, they individually and often unconsciously develop specific expectations regarding future cooperation within the team as they expect that cooperation in future will work very similarly as in the past. Such, team specific cooperation patterns, which creeped in over time, trigger mutual expectations among team members (see Spiess, 1998; Tjosvold, 1988; Weick & Sutcliffe, 2007). According to Weick and Sutcliffe (2007) expectations are built into organization roles, routines, and strategies. They create the orderliness and predictability that people count on when they work together. They serve as implicit assumptions that guide behavioural choices. Therefore, individual cooperation behaviour is guided by the individual (and mainly unconscious) expectations every team member has developed regarding successful cooperation with the other team members.

c) Mindful Cooperation Awareness and Compatibility of Individual Expectations

Team specific cooperation patterns, individual experiences regarding these cooperation patterns and the triggered mutual expectations regarding future cooperation in the team are key elements of successful cooperation. However, individual experiences regarding these team specific cooperation patterns and, thus, the team members' mutual expectations regarding cooperation can be more or less compatible. Incompatibilities can lead to disruptions in cooperation because mutual expectations and the following cooperation behaviour do not sufficiently interact. However, the compatibility of mutual expectations is according to the Distributed Situation Awareness Theory (Salmon, Stanton, Walker & Jenkins, 2009) paramount for successful cooperation and, consequently, for the resilience of teams.

Mindful cooperation awareness is the continuously and mindfully updated and reconciled awareness of team members regarding successful cooperation, especially regarding (in-)compatibility of (tacit) mutual expectations in cooperation (Salmon et al., 2009; Weick & Sutcliffe, 2001, 2006, 2007). "Reconciled" means, according to Salmon et al. (2009), that cooperation relevant information is systematically exchanged and concerted between cooperation partners.

Incompatibilities of mutual expectations can be recognized when team members are mindful regarding such incompatibilities. Mindfulness is according to Krieger (2005, p. 127, quoted by Weick & Sutcliffe, 2006) "a psychological state in which individuals engage in active information processing while performing their current tasks such that they are actively analyzing, categorizing, and making distinctions in data (p. 516)". According to Weick and Sutcliffe (2001, p. 42) mindfulness furthermore is "the combination of ongoing scrutiny of existing expectations, continuous refinement and differentiation of expectations based on newer experiences, willing-ness and capability to invent new expectations that make sense of unprecedented events, a more nuanced appreciation of context and ways to deal with it, and identification of new dimensions of context that improve

foresight and current functioning". Mindful teams are regularly and robustly discussing potential threats to reliability, develop a nuanced and current understanding of the context by frequently questioning the adequacy of existing assumptions (expectations) and integrate these understandings into an up-to-date big picture (Vogus & Sutcliffe, 2012). Regarding collective tacit knowledge, mindful teams uncover early signs that expectations are inadequate. Therefore, individual uncertainties regarding cooperation are early signs (leemers, see Weick & Sutcliffe, 2007) that mutual expectations regarding cooperation may not be compatible. Such, uncertainties are an indicator for potential threats to successful cooperation in the team (Vogus & Sutcliffe, 2012; Weick & Sutcliffe, 2007).

According to these concepts, mindfulness in cooperation is an active processing of cooperation relevant information especially regarding (in-)compatibility of (tacit) mutual expectations among team members. In this process, awareness regarding successful cooperation is created in a mindful way, or, i.e., mindful cooperation awareness is built (Salmon et al., 2009; Vogus & Sutcliffe, 2012; Weick & Sutcliffe, 2001, 2006, 2007).

d) Synergetic Acting

Synergetic acting is the result of successful cooperation in a team when aiming to achieve common objectives. It emerges from collective tacit knowledge on the basis of team specific cooperation patterns (routines, see Grote, 2009), mindfully reconciled cooperation awareness, and, thus, compatible mutual expectations regarding cooperation in the team (Salmon et al., 2009; Spiess, 1998; Tjosvold, 1988). It enables a team to successfully cooperate without the requirement for explicit coordination. This makes a team efficient and effective regarding achievement of common objectives and fosters team resilience.

A lack of systematic cultivation of collective tacit knowledge in a team may cause disruptions in cooperation, e.g. in case of staff fluctuation. New team members unfamiliar with the team specific cooperation patterns may base their actions on prescriptive standards while, at the same time, long-time team members behave according to the patterns that creeped in over time. This can lead to an incompatibility in mutual expectations causing disruptions in cooperation (e.g. misunderstandings, unintentional negligence or omissions). Such, disruptions can reflect conflicts between being resilient and complying with standards. This is the case, when team specific cooperation patterns - which reflect cooperative adaptations to dynamic work conditions thereby fostering team resilience (Rankin et al., 2014) - are not reconciled with prescriptive standards and, thus, do not entirely comply with those. As a result, the gap between work as done and work as imagined increases (Dekker, 2006). Incompatibilities which are not recognized and the potentially resulting disruptions can finally reduce team resilience. Therefore, a systematic cultivation of collective tacit knowledge is crucial for fostering resilient cooperation in teams (team resilience) and, thus, an organization's resilience. In this process, mindful cooperation awareness is built.

2 DEVELOPED AND PILOT TESTED METHOD

On the basis of the descriptions above a method was developed and piloted in this project that supports systematic cultivation of collective tacit knowledge. It is presented in the following sections.

2.1 The Method's Basic Concept And Goals

The method developed in this project supports the elicitation (Nonaka & Takeuchi, 1995), the sharing and the joint handling of collective tacit knowledge as well as of potential uncertainties (leemers, see Weick & Sutcliffe, 2007). Elicitation means according to the SECI-Model of Nonaka & Takeuchi (1995) to grasp and to document experience-based knowledge of experts - that is tacit and therefore difficult to articulate - in a systematic way that enables further use. Beside this, the aim of the systematic cultivation of collective tacit knowledge is (a) to systematically enhance the team members' mindful cooperation awareness regarding successful cooperation, (b) to reveal and to deal with incompatible expectations, and (c) to prevent potential disruptions in cooperation in a proactive manner.

The method incorporates three parts: a pre-job workshop, a systematic exchange of tacit knowledge and mutual expectations during job execution and a post-job workshop. The three parts build on one another supporting a stepwise deepening of a mindful cooperation awareness.

2.2 Pre-job workshop

The pre-job workshop is a workshop with all members of a team the particular work process of which is subject of the method's application. The aims are (a) the first-time elicitation of individual as well as collective tacit knowledge, (b) the documentation of the elicited knowledge using specific template cards, and (c) the team members' sensitization regarding aspects relevant for successful cooperation.

The workshop's methodology is based on group discussions (Flick, 2009) as well as on the principles of storytelling (Nielsen & Madsen, 2006), group storytelling (Santoro & Brézillon, 2005), causal mapping (Ambrosini & Bowman, 2001), and the self-q-technique (Katenkamp, 2011). According to these methods, tacit knowledge can be elicited by generating story-like narratives as well as by a stepwise question-based deepening approach.

In the first workshop-part individual tacit knowledge is elicited by discussing a fictitious but realistic scenario facilitated by reflection-promoting questions. The fictitious scenario contains a short-term absence of an experienced team member who is replaced by an unexperienced colleague. Every team member thereby takes - fictitiously - the role of the experienced and the absent person. Based on this scenario it is individually reflected and subsequently discussed where the unexperienced colleague could disrupt cooperation if he bases his actions on prescriptive standards only (e.g. work instructions or checklists), which experiences the unexperienced colleague would initially be lacking for successfully cooperating with the other experienced team members, and which important and success relevant advice, that can't be find in any official document, the unexperienced colleague needs for successfully cooperating in the team. The stepwise elicited knowledge is individually documented on specific template cards.

In the second part of the workshop the team's collective tacit knowledge is elicited. In detail, mutual expectations as well as uncertainties regarding the cooperation (leemers, see Weick & Sutcliffe, 2007) are elicited by using question-based group discussions. The questions guide the team members to imagine the upcoming cooperation in the team and to think about; (1) which team specific cooperation patterns exist in the cooperation, (2) thus, which concrete mutual expectations regarding upcoming cooperation in the team exist, (3) what new team members, that are not yet familiar with these cooperation patterns, can't know regarding these patterns, (4) which kind of disruptions in cooperation could occur because of incompatible experiences and expectations between team members, and finally (5) which uncertainties regarding the upcoming cooperation team members have at the moment. Discussing these questions enables an elicitation of collective tacit knowledge, i.e. of concrete expectations regarding the cooperation in the team. Furthermore, uncertainties regarding upcoming cooperation are revealed. The elicited expectations as well as uncertainties are finally documented in the form of messages between team members using specific template cards.

2.3 Systematic Exchange of Cooperation Relevant Information During Job Execution

The systematic exchange of cooperation relevant information during job execution builds on the elaborated content from the pre-job workshop. It contains an exchange and answering of the individually developed messages. Therefore, three short interviews (10 - 15 minutes) with each team member are conducted. The interviews are optimally timed shortly before cooperation starts, during cooperation, and shortly after cooperation has finished. The aims are (a) to recognize and to deal with incompatible expectations among team members in a mindful and resilient way, (b) to resolve uncertainties regarding upcoming cooperation, (c) to develop and to document individual learnings regarding past cooperation in the team, and thereby (d) to support team members' mindful cooperation awareness.

The short interviews are based on interview guidelines containing three parts. The first part is a look back to the cooperation experienced in the team up to the moment of the interview. It contains questions regarding the reasons for successful or not successful cooperation in the past and the learnings that can be taken for future cooperation. The learnings are documented in a personal learning form. The second part focuses on the messages elaborated in the pre-job workshop. Together with the interviewee, the messages he received from the other team members containing concrete expectations as well as uncertainties are processed and answered. The third part contains a quick outlook to the upcoming cooperation. Thereby, remaining or newly recognized uncertainties regarding the cooperation in the team are elicited and, again, documented in the form of messages to the respective team member(s).

2.4 Post-Job Workshop

The post-job workshop builds on the elaborated content from the pre-job workshop and the short interviews. It is - like the pre-job workshop - a workshop with all members of a team the work process of which is subject of the method's application. The aims are (a) to derive collective learnings from the elicited knowledge as well as from the cooperation experienced in the working process and (b) to define concrete measures to promote the interpersonal knowledge exchange as well as to improve the cooperation within the team.

In the first part of the workshop, collective as well as individual learnings based on the elaborated content are

derived and documented using a facilitated group discussion based on specific questions. For doing this, the messages and related answers (see method of the systemic exchange above) are studied by all team members and emerging questions are answered. Then, the team members are instructed, first individually and then together in the group, to identify conclusions for future cooperation in the team. The group discussion is guided by the questions regarding: (1) what needs to be considered particularly in future cooperation (2) what are areas for improvement regarding successful cooperation, and finally (3) what was successful and therefore needs to be sustained in future cooperation. The collective learnings are documented using specific template cards.

On this basis, in the second part of the workshop, collective and concrete measures to promote the interpersonal knowledge exchange as well as to improve the cooperation within the team are defined. The concrete measures include clear responsibilities as well as deadlines for implementation.

2.5 Result of Pilot Test

The pilot showed that the method supports systematic cultivation of collective tacit knowledge. It supports the elicitation, the sharing and the joint handling of collective tacit knowledge as well as of potential uncertainties regarding cooperation. By doing this, team specific cooperation patterns that consciously or unconsciously creeped in over time, mutual expectations regarding future cooperation that team members often unconsciously developed (on the basis of the cooperation they experienced in the team) as well as uncertainties regarding upcoming cooperation are elicited and jointly handled.

Furthermore, the pilot showed that implementing a systematic exchange of the elicited cooperation relevant information enables an ongoing monitoring of mutual expectations and uncertainties regarding cooperation. Thereby, individuals engage in active information processing (Weick & Sutcliffe, 2006) enabling a continuous update and reconciliation of cooperation relevant information between team members. Ongoing scrutiny of existing expectations and continuous refinement and differentiation of expectations based on newer experiences (see Weick & Sutcliffe, 2001) are stressed. Such, incompatibility in mutual expectations can be revealed and proactive measures can be taken to avoid disruptions in cooperation. In this process, mindfulness regarding (in-)compatibility of expectations among team members and awareness regarding successful cooperation are systematically supported (see Salmon et al., 2009; Vogus & Sutcliffe, 2012; Weick & Sutcliffe, 2001, 2006, 2007).

3   CONCLUSION

A regular application of the developed and pilot tested method and in doing so a systematic cultivation of collective tacit knowledge provides the following advantages.

On the individual level, employees continuously learn from cooperation in the team. They are - individually and in exchange with their cooperation partners - on a regular basis systematically guided to question the adequacy of personal experiences from previous cooperation with regard to local adaptation strategies as well as of mutual expectations regarding future cooperation. They become increasingly sensitized to success-relevant aspects in cooperation which normally are not taken into account. Thereby, they develop more and more mindfulness regarding these aspects, especially regarding (in-)compatibility of (tacit) expectations among team members. As a result, they develop mindful cooperation awareness and capabilities to uncover early signs for potential threats to successful cooperation in the team (Vogus & Sutcliffe, 2012; Weick & Sutcliffe, 2007).

On the level of teams, team specific cooperation patterns that unconsciously creeped in over time and that may not entirely comply with prescriptive standards can be jointly revealed. Thereby, conflicts between local adaptation and compliance with prescriptive standards are identified. Furthermore, implementing a continuous and systematic exchange of cooperation relevant information fosters a mindful update and reconciliation of cooperation awareness (Salmon et al., 2009; Vogus & Sutcliffe, 2012; Weick & Sutcliffe, 2001, 2006, 2007). This has the potential for improving team resilience: actual cooperation can be continuously monitored on the basis of elicited, cooperation relevant information (i.e. individual experiences, expectations as well as uncertainties). Thereby, incompatibility in mutual expectations can be recognized and potential disruptions can be anticipated early. This enables taking of proactive measures to avoid disruptions in cooperation (e.g. in case of staff fluctuation), i.e. responding to anticipated disruptions to promote safe and successful cooperation. Teams and its members are empowered to recognize conflicts between being resilient and ensuring compliance at an early stage.

On the organizational level, the opportunity to learn from tacit knowledge based local adaptations is created. This in turn can be taken as an opportunity for questioning the adequacy of prescriptive standards in view of

actual requirements at the sharp end. Conflicts on various levels between being resilient and ensuring compliance can be recognized. Furthermore, organizations can learn from what goes right thereby adopting more and more Safety-II thinking (Dekker, Hollnagel, Woods & Cook, 2008; Hollnagel, 2012). On that basis measures can be taken for balancing the pressure of being resilient and, at the same time, ensuring compliance. Such, resilient adapting and complying with prescriptive standards are not necessarily contradictive. Teams can be explicitly supported in their ability to resiliently adapt to dynamic work conditions (Rankin et al., 2014), when adaptation strategies are elicited and systematically reconciled with prescriptive standards. By doing so, the team can cope resiliently with challenges and opportunities in the work context and conflicts between being resilient and ensuring compliance can be resolved. Hence, the gap between work as imagined and work as done (Dekker, 2006) can be reduced and the resilience potential of teams can be enacted by supporting mindful cooperation awareness.

REFERENCES

Ambrosini, V. & Bowman, C. (2001). Tacit Knowledge: Some Suggestions for Operationalization. *Journal of Management Studies, 38*, 811-829.

Dekker, S. A. (2006). Resilience Engineering: Chronicling the Emergence of Confused Consensus. In E. Hollnagel, D. D. Woods & N. Leveson (Ed.), *Resilience Engineering - Concepts and Precepts* (pp. 77-92). Farnham, UK: Ashgate.

Dekker, S. A., Hollnagel, E., Woods, D. D. & Cook, R. (2008). *Resilience Engineering: New directions for measuring and maintaining safety in complex systems* (Final Report, November 2008). Lund, Sweden: Lund University, School of Aviation.

Flick, U. (2009). *Qualitative Sozialforschung: Eine Einführung (2. Auflage)*. Hamburg: Rowohlts.

Grote, G. (2009). *Management of Uncertainty: Theory and Application in the Design of Systems and Organizations*. London: Springer.

Hollnagel, E. (2012a). *A Tale of Two Safeties. The Resilient Health Care Net*. http://www.resilienthealthcare.net/A_tale_of_two_safeties.pdf, accessed on 10-04-15.

Katenkamp, O. (2011). *Implizites Wissen in Organisationen*. Wiesbaden: VS Verlag.

Lam, A. (2000). *Tacit Knowledge, Organizational Learning and Societal Institutions: An Integrated Framework*. http://oss.sagepub.com/content/21/3/487, accessed on 04-02-17.

Nielsen, L. & Madsen, S. (2006). *Storytelling as Method for Sharing Knowledge across IT Projects*. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1579677&tag=1, accessed on 15-03-17.

Nonaka, I., Takeuchi, H. (1995). *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation.* Oxford: Oxford University Press.

Rankin, A., Lundberg, J. & Woltjer, R. (2014). A Framework for Learning from Adaptive Performance. In C. P. Nemeth & E. Hollnagel (Ed.), *Resilience Engineering in Practice, Volume 2, Becoming Resilient* (pp. 79-96). Farnham, UK: Ashgate.

Salmon, P. M., Stanton, N. A., Walker, G. H. & Jenkins, D. P. (2009). *Distributed Situation Awareness: Theory, Measurement and Application to Teamwork*. Farnham: Ashgate.

Santoro, F. & Brézillon, P. (2005). *Group Storytelling Approach to Collect Contextualized Shared Knowledge*. http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=1508303, accessed on 16-03-17.

Spiess, E. (1998). *Formen der Kooperation - Bedingungen und Perspektiven*. Göttingen: Hogrefe.

Tjosvold, D. (1984). Cooperation theory and organizations. *Human Relations, 37*, 743-767.

Vogus, T. J. & Sutcliffe, K. M. (2012). Organizational Mindfulness and Mindful Organizing: A Reconciliation and Path Forward. *Academy of Management Learning & Education, Vol. 11*, No. 4, 722-735.

Weick, K. E. & Sutcliffe, K. M. (2001). *Managing the Unexpected.* San Francisco: Jossey-Bass.

Weick, K. E. & Sutcliffe, K. M. (2006). Mindfulness and the Quality of Organizational Attention. *Organizational Science, Vol. 17*, No. 4, 514-524.

Weick, K. E. & Sutcliffe, K. M. (2007). *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*. San Francisco: Jossey-Bass.