

MODELLING ORGANIZATIONAL LEARNING FROM SUCCESSES IN THE NUCLEAR INDUSTRY – STAFF MEETINGS AS FORUMS OF KNOWLEDGE SHARING AND ACQUISITION

Kaupo Viitanen¹, Hanna Koskinen¹, Ann Britt Skjerve², Christer Axelsson³, Marja Liinasuo¹ and Rossella Bisio²

¹ VTT Technical Research Centre of Finland LTD, P.O. Box 1000, FI-02044 VTT, Finland

¹ kaupo.viitanen@vtt.fi

² Institute for Energy Technology, Norway

³ Vattenfall AB, Sweden

Abstract

Utilizing lessons learned from successful experiences in the context of safety-critical organizations has been receiving increasing interest among both scientific and practitioner communities. However, despite the attention, there is a need to better understand how success-related knowledge can be utilized to ensure safety and what tools and practices can be used to facilitate this process. In this paper, we focus on staff meetings as forums of knowledge sharing and acquisition. We describe staff meeting practices from empirical case studies, carried out at two Nordic nuclear power plants, and examine how the staff meetings contribute to organizational learning from successes. Based on these insights, we propose an integrative framework that aims to identify the factors that facilitate or hinder organizational learning from successes.

1 INTRODUCTION

During the past decade, there has been a growing interest in utilizing lessons learned from successful experiences to ensure safety. In the scientific community, the Resilience Engineering research tradition has put effort on providing an alternative approach to safety management for high-risk industries. For instance, Safety-II (i.e., ensuring that things go right) emphasizes understanding successes as a basis for ensuring safe activities (Hollnagel, 2014). The general ability to learn has also been established as one of the cornerstones of resilience (Hollnagel, Parihès, Woods, & Wreathall, 2011). In the practitioner community, interest in successes is reflected, for example, in the nuclear industry Operating Experience guidelines (e.g., IAEA, 2008), local initiatives in some nuclear power plants (NPPs), and in the institutionalized practices of collecting and sharing industry best practices by umbrella organizations such as WANO.

Organizational learning refers to the creation, acquisition and sharing of knowledge between the organizational actors, and acting upon it (e.g., Garvin, 1993). In order to avoid the accumulation of success-related knowledge (i.e., what success took place, and how) only in individuals, it is important to ensure that the organizational structures and learning processes that relate to successes exist and are effective. However, there are challenges in organizational learning from successes. For example, success-related knowledge does not naturally mobilize institutional processes, tends to get stored in individuals or in non-codified structures and thus might not get shared with others in the organization (Madsen & Desai, 2010; Viitanen et al., 2016). Therefore, there is a need to understand how success-related knowledge is managed in organizations and what tools or practices can be used to facilitate this process.

We define *success* as exceeding, matching or returning to an expected level of performance (Viitanen et al., 2016). Expected performance is understood loosely here and can include, for example, safety as measured by leading or lagging indicators, or performance as measured by traditional project management measures such as schedule, cost and scope. This definition results in three types of successes: *extraordinary successes* that are characterized by exceeding the expected performance (e.g., creating new practices or processes, or improving the existing ones); *normal successes* that are characterized by matching the expected performance (e.g., daily routine work, nothing out of the ordinary appears to happen); and *recovery successes* where the performance returns to the expected level (e.g., recovering from adversity, solving problems, repairing broken equipment). We have found that extraordinary successes are most likely to be acknowledged and noticed, while normal successes remain mundane and are thus often ignored; recovery successes – while potentially noteworthy – are also frequently neglected because the failures or breakdowns that led to the adverse event usually take precedence in terms of attention (Viitanen et al., 2016).

This paper is based on the findings from our ongoing study (for further details see Viitanen et al., 2016) where we aim to provide insights into how successes can be identified and utilized for learning purposes in the nuclear industry. We conducted a literature review and theoretical work on the concept of "learning from

success”, and two empirical case studies at Nordic nuclear power plants to identify successes, lessons learned, and the learning practices utilized. The analysis of the empirical data revealed that a multitude of tools or practices exists that either can be used or are already used at the NPPs for the purpose of learning from successes (e.g., staff meetings, information and reporting systems, newsletters, bulletin boards, emails, training sessions). In this paper, we will not report the study in its entirety but rather focus on staff meetings as a tool for enabling organizational learning from successes. Staff meetings are chosen due to their apparent prevalence and potential usefulness for various knowledge management functions, including knowledge acquisition and sharing (e.g., identifying and reflecting successful experiences), knowledge creation (e.g., joint innovating) and storage (e.g., minutes of meetings). For this paper, we analysed the data collected in interviews, field observations and workshops with plant personnel with a focus on identifying the factors that influence the realization of these functions. In this paper, we will present the main findings from the analysis of staff meetings and propose an integrative framework that aims to help identify the factors that facilitate or hinder organizational learning from successes.

2 EMERGING THEMES

When we discussed the viability of including success-related items in staff meetings (e.g., attempt to capture successes after a task, identifying and sharing insights from past successes, etc.) with the interviewees, the following main themes emerged. First, the *cultural influence* on sharing success-related knowledge was underlined. For instance, several interviewees found that making a big deal of one’s own successes is frowned upon within their culture. It was also implied that culture may have an effect on receiving feedback. Especially in situations where positive feedback is given in the presence of the whole group feedback, it may be perceived as uncomfortable. In fact, one of the supervisors we interviewed suggested a “de-personified” approach to sharing successes: avoiding discussing the individual’s actions but instead focusing on the practices utilized in the particular situation. In addition, if a success was presented and attributed to individual excellence, this was believed to result in negative atmosphere in the group. A potential workaround for this was noted by one of the experts who commented that individual successes are typically discussed with the immediate supervisor rather than the whole group. Another potential workaround mentioned was that the successes are highlighted by someone else (i.e., a “proxy”) instead of the first-hand succeeder. Personification of successes was thus clearly seen an issue and something to avoid in this particular NPP. On the other hand, several interviewees brought up the potential usefulness of promoting successes for *motivational* purposes, which leads to a difficult dilemma for organizing staff meetings: how to promote the successes of the succeeders without offending the others? The cultural influence was most often attributed to national culture by the interviewees; however, we hypothesize that other cultures, such as micro-cultures within teams or departments may also play a role. These findings resonate with previous literature on the influence of culture on knowledge management, which, for example, highlights culture as a context for how knowledge is created, shared and used (e.g., De Long & Fahey, 2000).

Secondly, we observed that promoting learning from successes may benefit from *contextualizing the concept of success*. While this theme was not explicitly mentioned by the interviewees, context seemed to be an important underlying factor influencing the way in which they viewed the concept of success. We found that the interviewees from various departments defined success in their work quite differently – undoubtedly due to the different objectives and environmental characteristics of their tasks, and the problems they cope with in their work. For instance, an IT expert related success to troubleshooting (i.e., “recovery successes”) and mentioned that their practice of discussing solutions to fault conditions in group meetings is a natural way of sharing successes – he contemplated that re-labelling this practice as “learning from successes” might not make sense to the group. This relates to a third emerging theme, which was the notion that success items should, if possible, be *naturally integrated* into existing meeting practices to be accepted. Another interviewee pointed out that a structured sharing of successes in meetings might not be a good idea because it would be perceived as artificial. This interviewee thought that if the success item was perceived as an “authentic” part of the everyday work (as opposed to something that is forced upon the staff) then it might be more likely to be embraced by the staff.

We also found that integrating a success item in the scope of staff meetings was often considered viable by the interviewees. However, the overall data gave an impression that currently successes were included either on a superficial level (i.e., they were merely identified without an overt purpose of generating lessons from them or identifying the success factors behind the tasks), or unsystematically (e.g., not explicitly part of meeting agendas). Certain level of steering – if not enforcing – might thus be beneficial in ensuring that the success-related data available in the organization is actually used to its fullest potential. This has implications regarding

the *formality* of promoting learning from successes: a formal introduction without due attention on the prevailing culture and practices might put the staff in an awkward situation where the espoused practices might be at odds with the existing ones; and conversely, a too lenient promotion of learning from successes may result in haphazard and unsystematic utilization of the successful experiences.

The contextual nature of the concept of success also brings attention to the importance of *translating* “success” to staff meeting participants in a meaningful way. For instance, a mechanic from reactor maintenance viewed successes as uneventful tasks that have proceeded as described in the work plan (i.e., “normal successes”). In such cases, using the concept of success to prompt discussion may be unfruitful since the path to success is perceived as known and evident (i.e., following the procedures) and nothing special had happened. A more complicated example was provided by a Quality Control (QC) engineer who viewed successes as both the condition where a fault *is* discovered (success of QC) and where a fault *is not* discovered (success of the overall system, assuming that the QC’s finding is not false negative). These examples suggest that the mere instruction to consider successes in staff meetings might be too abstract to be usable as such. Rather, it might be preferable to translate the concept of success to the end-users, or creating the means to help the end-users contextualize the concept themselves.

The *choice of forum* for discussing successes also received some attention. In our data, we identified various types of staff meetings that can be distinguished by (at least) the following dimensions (see also Table 1):

- *Primary purpose*: problem-solving meetings (e.g., ad hoc meetings during an event), coordination meetings (e.g., pre-job briefings, project preparation meetings), information collection or sharing meetings (e.g., trainings, educative segments in team or group meetings, post-outage reviews)
- *Frequency*: e.g. daily team meetings in the morning, weekly or monthly group meetings, annual post-outage reviews, one-off modernization project feedback meetings
- *Trigger*: proactive (e.g., planning meetings), reactive (e.g., problem-solving meetings), periodical (e.g., scheduled team and section meetings), continuous (e.g., non-scheduled acquaintances, team work)
- *Formality*: informal (e.g., corridor talks), formal (e.g., pre-job briefings, post-job reviews)
- *Participants*: functional group (e.g., specific team or department), temporary groups (e.g., project meetings), internal (e.g., organization-wide events), external (e.g., industry-wide seminars)

The general observation was that a success item was not found suitable for just any staff meeting. When we enquired from the interviewees whether a particular type of meeting would be suitable for examining successes, we received mixed responses. For instance, an interviewee suggested that successes could be formally brought up in cross-departmental trainings, but not necessarily in weekly or monthly internal team meetings. Then again, another interviewee found that internal group meetings are actually rather good forum for sharing success stories. This discrepancy relates to the formalization issue, and indicates that there is a difference between the formality of the meeting itself, and the formality of discussing successes. It is thus possible that successes are better suited as an informal part in meetings that, regardless of whether they are formal or not, allow informal progression (e.g., internal group meetings), or formally in sessions that are characterized by exclusively formal progression (e.g., cross-departmental trainings).

Table 1. Examples of staff meetings and their relevance to organizational learning from successes

Meeting	Purpose	Frequency	Trigger	Formality	Participants	Relevance
Project manager (PM) meets with colleagues to discuss previous tasks	Information collection	One-off	Proactive (to project challenges)	Informal	PM and colleague	Collect best practices to ensure project success
Lifting team gathers together to solve an issue during a lifting task	Problem-solving	One-off	Reactive (to the issue at hand)	Formal	Task team	Innovating to ensure successful recovery
Solutions to failures are discussed in weekly IT group meetings	Information sharing	Weekly	Periodical	Formal	Functional group	Share information about successful recoveries
Operating engineers from the neighbouring units meet casually	Information sharing	Daily	Continuous	Informal	Peer	Share information about good practices across units

Another interviewee noted that lessons learned are rarely shared outside the team because they are too specific; respectively, lessons learned are not received from other groups because they are often specific to them. Therefore, common interests might not be easily found. On the other hand, an example case of successful cross-organizational information transfer was demonstrated by a project manager who was preparing an unprecedented modernization project that involved performing challenging tasks such as transporting and lifting of heavy machinery. In order to ensure the success of these tasks, the project manager utilized his social network within the plant to identify people that had carried out comparable tasks previously

and organized informal meetings with them to collect best practices. These findings suggest that one of the factors influencing the use of staff meetings for transferring success-related knowledge is related to the selection of participants. As exemplified by the project manager’s case, the nature of the task also plays a role: an extensive and complex task is probably more likely to gain from useful input from others. This underlines the issue of *cross-organizational generalizability* of success-related knowledge, which ultimately may limit the scope of information sharing activities, i.e. if the knowledge is not perceived as useful to another department, there might be no reason to bring the success-related knowledge to a wider forum, and vice versa. Strategies such as abstraction (e.g., the lessons learned would be abstracted by the sender, and then transferred to the receiver, who would then translate the abstract lesson to practice) might be viable workarounds for the issue. However, they are likely to be too laborious and would most likely require motivational support to the parties that pre-process and make the information available. The example of project manager actively collecting information from others illustrates a case where he directly benefits from the information, which provides motivation for any additional effort required to adapt the lessons learned in other contexts.

Finally, some interviewees brought up that the mere sharing of success-related knowledge is not enough for it to be embraced. Rather, it was found that any *initiatives should be well-justified* to others. It was, however, also agreed that there is no fundamental resistance to initiatives – they just need to be properly explained and rationalized. An interviewee described this as a request to explicate what the added value of the initiative is, as opposed to just ordering the change without explanation. This observation highlights the idea that if successes were to be used for the purpose of learning or organizational change, a staff meeting practice of only bringing up the lesson learned from success might not be sufficient and the potentially useful success-related information might be disregarded because it would be perceived as insufficiently justified. Instead, a joint analysis with multiple parties with a focus on how others could benefit from this particular success might be necessary for the success-related information to be actually internalized by those that receive it (cf. joint stakeholder analysis in Skjerve et al., 2017).

3 INTEGRATIVE FRAMEWORK AND DISCUSSION

Since we view successes in relation to expected performance, what is defined a “success” becomes dependent on the perspective of the stakeholders involved. This leads us to utilize a stakeholder-based approach and view staff meetings as potentially serving multiple knowledge management functions depending on what the role of the actor is in relation to the success-related knowledge. For instance, a group meeting can provide a forum for sharing for the individual that possesses success-related knowledge, or a forum for acquisition for another group member.

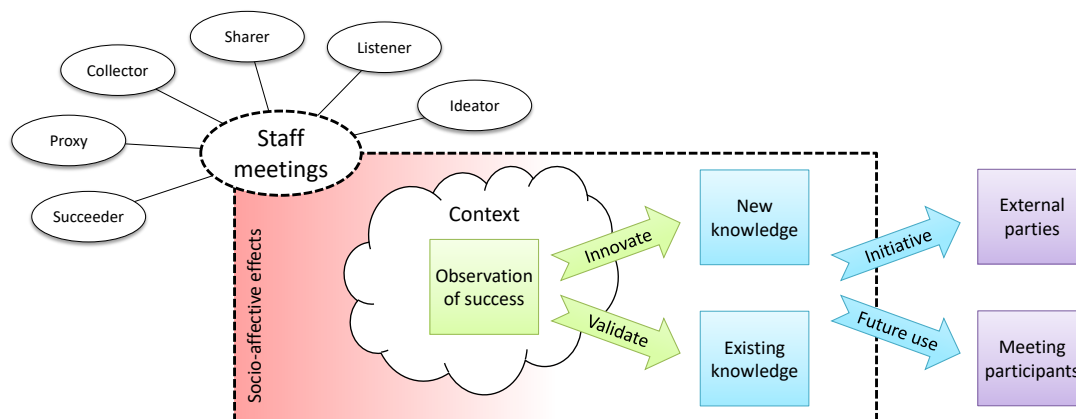


Figure 1. A stylized illustration of the integrative framework describing the roles and functions of staff meetings

We propose the following generic functions of success items in staff meeting: a) reinforcement, where successes confirm that the existing knowledge is valid; b) innovation, where the successes provide input for creating new practices and eventually good and best practices through validation; c) socio-affective influences, where successes are utilized for the development of social processes (e.g., culture or team spirit) or for affective responses (e.g., motivation or well-being); d) creating initiatives, where the successes are communicated to external parties; and e) creating knowledge for future use by the meeting participants. These categories serve as the basis for the integrative framework and are illustrated in Figure 1. Based on the findings of our empirical studies, we propose six knowledge management related roles for staff meetings (cf. also Table 1). We view these roles as person-independent, i.e. an individual can assume several roles during a

meeting. The list of roles and the potential facilitators and hindrances for the realization of the roles are presented in Table 2, which aims to provide suggestions and ideas regarding how to develop staff meeting practices so as to include a success item.

In this framework, the success item of a staff meeting begins with capturing the observation of success. Depending on the role of meeting participant, this function of the staff meeting can be realized by the roles of Succeeder (optionally facilitated by a Proxy), Sharer, or Collector. The Succeeder is characterized by having the first-hand knowledge of the success. The Succeeder also gains direct motivation from the acknowledgement of the success. However, the Succeeder's role might be affected by the possible cultural influences that inhibit sharing one's own successes. A Proxy can be in an important role in, for example, overcoming the cultural inhibitors to sharing successes, helping staff avoid becoming blind to their successes by questioning or otherwise facilitating the discussion of successes. It is likely that the role of Proxy has some relation to team leadership (either formal or informal), and therefore the Proxy might also have a role in ensuring that right lessons are learned (e.g., avoid complacency and organizational drift) and managing team social dynamics (cf. cultural and social acceptance of sharing successes). The Sharer is in a similar role as Succeeder, but shares someone else's success. By sharing someone else's success, the adverse cultural influences might be overcome. The Collector, unlike Succeeder and Sharer, actively attempts to find other's successes. An individual in such a role can initiate a meeting (or a part of a meeting) for the very purpose of discussing successes another party has achieved. The Collector is also characterized by having a clear learning motivation for the success item, unlike Succeeder and Sharer, who might be motivated by organizational or team-development (e.g., sharing good practices and initiatives) or possibly for receiving praise. Collector, like Succeeder and Sharer, can also relay the knowledge created in one context to another and thus form as a bridge between organizational silos.

Table 2. Description of the roles, function of staff meetings from the perspective of each role, and potential facilitators and hindrances for the realization of the staff meetings' functions

Role	Description	Function	Potential facilitators or hindrances
Succeeder	Has first-hand success-related knowledge	Sharing own success experiences	<ul style="list-style-type: none"> • What cultural influences regarding the acceptability of sharing successes are there?
Sharer	Actively shares success-related knowledge collected from others	Share existing success-related knowledge	<ul style="list-style-type: none"> • Are successes understood as meaningful or worthy of mentioning? • Is it natural to share the successes in that particular context?
Proxy	Highlights someone else's successes	Share existing success-related knowledge	<ul style="list-style-type: none"> • Is there blindness towards success-related knowledge (i.e., successes are seen as "business-as-usual")? • Is there reluctance to share successes?
Collector	Actively initiates the collection of success-related knowledge from others	Acquire success-related knowledge from others to serve own goals	<ul style="list-style-type: none"> • Are those with success-related knowledge known and willing to share their knowledge? • Are there opportunities to initiate the collection of success-related knowledge?
Ideator	Generates new success-related knowledge	Creating new knowledge to solve a problem or to innovate	<ul style="list-style-type: none"> • Are there methods/tools/capabilities to identify the innovation potential of successes? • Are there methods/tools/capabilities to understand and analyse the success-related knowledge provided by others?
Listener	Receives success-related knowledge from others without actively seeking it	Receive success-related knowledge from others	<ul style="list-style-type: none"> • What cultural influences are there that affect how receiving the success-related knowledge is perceived? • Is the success-related knowledge perceived as relevant to own work? • How well is the success-related knowledge justified?

The success items in staff meetings can also involve knowledge creation, which is realized by the role of Ideator. For the Ideator, one of the challenges is the initiation of the analysis. Namely, unlike for analysing failures, there are relatively few actual analysis methods with a success focus. Successes – especially if "normal" – are also often hard to grasp analytically in order to create new knowledge.

The Listener is in a relatively passive role in the sense that individuals in this role do not collect, share or create knowledge, but receive the information shared or created by the others, evaluate its usefulness and then utilize it in their own work afterwards. For this role, it is important to get sufficient justification from the sharers or creators for the information to be truly internalized. The information also needs to be both actually relevant, but also perceived as relevant. This means that the sharers or creators of the information need to understand the needs of the Listener.

One of the main insights of the framework comes from the stakeholder approach, which aims to uncover *what*

the meaning and the perceived value of success-related information is to each actor that is reached by the tool. This directs attention to topics such as: a) the translation of the concept of success to context (e.g., explaining what types of successes there are and how they relate to a given actor's task); b) the identification of those to whom the success-related knowledge can be beneficial and thus should be shared to (e.g., creating generalizations and links within and outside the particular staff meeting); c) the justification of the success-approach and the relevance of lessons learned from successes to others; and d) the identification of those who possess relevant information. The stakeholder approach also reveals that there can be interrelations between the roles (e.g., the role of Proxy in overcoming cultural bottlenecks of sharing success-related knowledge).

Another important insight from the framework is that success items in *staff meetings can serve multiple functions* (i.e., reinforcing existing knowledge, creating new knowledge, or inducing socio-affective effects), and that the interrelation of these functions can have adverse consequences to safety if not properly managed. For example, if a successful outcome has been achieved by means of cutting corners or other bad habits, acknowledging the success will reinforce these practices. Thus, especially when using past successes for inducing positive socio-affective effects (e.g., improving motivation or building team spirit), one should at the same time ensure that the processes that led to a successful outcome are properly understood, i.e. that not only the outcome was successful, but also the way in which it was achieved.

4 CONCLUSIONS

In this paper, we have described the results of a modelling exercise with the purpose of shedding light on how a concrete knowledge management method – staff meetings - can facilitate organizational learning from successes. We propose that the resulting integrative framework and the principles utilized in this exercise could be, with some modifications, also usable for modelling other methods (e.g., formal reporting systems or internal communication practices). The modelling exercise can be a potentially useful tool for safety practitioners, supervisors and other experts in safety-critical organisations aspiring to implement activities that facilitate learning from successes. The insights presented in the framework can also be useful in ensuring that the potential positive effects of success items are achieved and the potential negative ones are avoided. Balancing this trade-off is also important in ensuring that striving towards the approaches suggested by modern safety management approaches such as Resilience Engineering and Safety-II result in improved safety.

Acknowledgements

The work presented in this paper is based on a research project funded by SAFIR2018, Vattenfall AB and NKS. The authors are grateful to the power companies for their cooperation and support during the case studies.

REFERENCES

- De Long, D. W., & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. *The Academy of Management Executive*, 14(4), 113–127.
- Garvin, D. A. (1993). Building a learning organization. *Harvard Business Review*, 71(4), 78–91.
- Hollnagel, E. (2014). *Safety-I and safety-II: the past and future of safety management*. Farnham, Surrey: Ashgate Publishing, Ltd.
- Hollnagel, E., Pariès, J., Woods, D. D., & Wreathall, M. J. (2011). *Resilience Engineering in Practice: A Guidebook*. Great Britain: Ashgate Publishing, Ltd.
- IAEA. (2008). *Best practices in identifying, reporting and screening operating experience at nuclear power plants*. Vienna: International Atomic Energy Agency.
- Madsen, P. M., & Desai, V. (2010). Failing to learn? The effects of failure and success on organizational learning in the global orbital launch vehicle industry. *Academy of Management Journal*, 53(3), 451–476.
- Skjerve, A. B., Viitanen, K., Axelsson, C., Bisio, R., Koskinen, H., & Liinasuo, M. (2017). *Learning from Successes in Nuclear Operations – A Guideline*. Presented at the ESREL2017, Portorož, Slovenia.
- Viitanen, K., Bisio, R., Axelsson, C., Koskinen, H., Liinasuo, M., & Skjerve, A. B. (2016). *Learning from Successes in Nuclear Power Plant Operation - Intermediate Report from the NKS-R LESUN (No. NKS-354)*. NKS.