



Learning from Success in NPP Operation to Enhance Organisational Resilience

NKS-R project LESUN

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Learning from Success in NPPs: LESUN

- NKS Project:
 - Partners: VTT, Vattenfall (Ringhals), IFE
- Started: January 2015
- Goal: Understanding how positive outcomes in NPP operation can be analyzed and provide important lessons to *learn*, improving the *organizational performance*
- Background: Resilience engineering, Safety I – Safety II (Hollnagel)
 - No simple Cause-event chains
 - Complex events tend to be unique
 - Negative outcomes are rare

Hollnagel, E. (2013). A tale of two safeties. Nuclear Safety and Simulation 4: 1–9.

LESUN, the study

- Literature review
 - Success
 - Organizational learning
- Two field studies, at two different NPPs
 - Focus on maintenance activity during outage
 - Data gathering
 - Interviews of involved personnel and leaders
 - Direct observation of task performance
 - Analysis of operating experience reports
- Intermediate report
 - Summarizing the preliminary results
 - First draft of principles for capturing success

Learning in NPP

- Operating experience (safety culture)
 - Regulations, guidelines (IAEA, WANO, INPO)
 - Mainly institutionalization of knowledge
 - Mostly from negative events
- Informal learning in daily operation
 - It is going on, triggered by (successful) adaptive behaviour
 - There are plenty of opportunities to learn something useful
- Learning after emergency,
- Training on the job ...

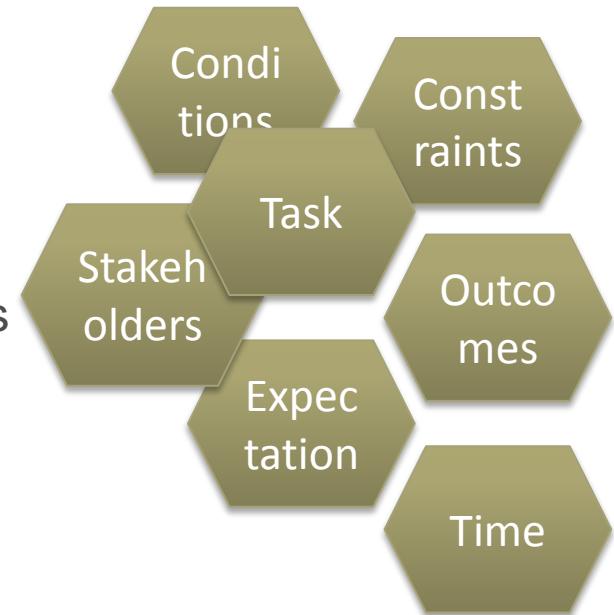
Generalized
learning process



Looking for success, and learning from it

- Adaptation
 - Maintenance: unclear situations, unexpected resources conditions, abstract guidelines, interleaving activities

Problem solving, inventing solutions, managing coordination
- Success
 - How to recognize a success
 - How to describe a successful episode
 - How to investigate the enabling/promoting factors



Learning from success vs. learning from failure

Salience and negative bias

“Organisational and individual learning appears to be more likely to be initiated by negative and disruptive events. This suggests that *in order to initiate conscious learning from successes, the successes need to first be made salient, secondly the possible negativity bias needs to be considered and thirdly there needs to be a starting point of some sort that would help people analyse the success* ”

Challenges and warnings from learning from success

- Over-reliance, unwanted phenomena of drifting into failure / failures are believed lead to a search for alternative practices
- Failures contain richer cues regarding causality
- Generalization / reproducibility

Learning from success as an additional learning approach, a supplementary analysis perspective

Observed reasons to study success

- To share good ideas
- Repeat success
- To improve the global ability of the group to adapt
- To learn to work better together (**team learning***)

And more reasons, emerged from the study:

- To feed system thinking (Senge*)
- To evaluate the role and impact of safety measures
- To gather more data
 - to uncover conditions where chance plays a role
 - Not exclude opportunities
- To recognise the mechanisms to protect
- To refine corrective actions

* Senge, P. M. (1994). *The fifth discipline: the art and practice of the learning organization*. New York: Doubleday/Currency.

Fukushima

Need to be prepared for the unexpected

Ensure that licensees have a deep understanding of their plants.

[1] Presentation M.R. Johnson "Ensuring Safety and Preparing for the Unknown" At EHPG Røros, Sept. 2014
[2] R. Kubota, "Investigation on Operating Procedures related to Lessons Learned from the Fukushima accident presented at "Severe accident management and operation" workshop (HRP) 20 May 2015

There is a need for more ways to build safety

Learning from successful adaptive performance can be an important tool to support this process

Looking for learning opportunities in adaptive behavior at task level

- Factors promoting well performed subtasks
 - Historical comparison (simpler, more frequent)
 - Relevance, impact on outcomes, in different conditions
- Factors inducing a better response to same event in other groups *

Perspectives

Technical

- Components
- Processes

Organisational

- Remote distributed location
- Nationalities, cultures
- External organisations
- ..

Human

- Manning
- Competence development
- Limits
- ..

* R. Kubota, "Investigation on Operating Procedures related to Lessons Learned from the Fukushima accident presented at "Severe accident management and operation" workshop (HRP) 20 May 2015

Open issues, future work

- Learning for successful adaptation happens
 - Is it possible to monitor drifting into failures? Over-reliance?
 - Is this compatible with possible emergency situations? Is the transition from normal to emergency supported or hindered?
- Opportunities
 - Often success is simply assumed as 'normal'
 - Positive psychology *
- Operating experience
 - Well structured organizational learning process
 - Incident investigation methods
 - Learning potential
- Transferring competence

* Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. Vol. 55. American Psychological Association

Conclusions

- Resilience engineering and experience from accident like Fukushima indicate the need to develop ability to adapt for facing the unexpected, more tools to build safety and safety culture.
- In LESUN we have started to look into the possibility to exploit success as a source of lessons to learn
 - NPP maintenance context
 - Open issues remain
 - There is a mine of information still under exploited: successful performance
 - A source for a better understanding of the complex behavior of the organization

thank
you!