Discussion Paper for Future Water Association

Strategies to combat knowledge loss

Whilst knowledge management (KM) is not new to the water sector recent interest has focused attention to a significant risk to organisations in the sector, that is knowledge loss.

At a recent conference to mark the 30th anniversary of the Piper Alpha tragedy, the Chair of the UK's Health & Safety Committee stated that:

> "What we want from to get out of today is the transfer of knowledge from people who were there at the time, those people who have come along the journey of learning for the oil and gas industry and actually handed over the baton to those younger people that they carry on this legacy and also with young eyes look forward to the health and safety of the future."
>
> (Martin Temple, Safety 30, Aberdeen, 5-6 June, 2018)

The potential loss of safety knowledge is critical to the oil and gas industries, where ensuring access to lessons learned and transferring knowledge about assets and processes will make a significant contribution to a safe and sustainable future.

If you look at "risk" as a knowledge domain, then many of the KM practices are clearly applicable. If an organisation ignores the need to manage knowledge effectively, it faces the risks of:

- Increasing the non-productive time of assets due to unexpected failures or sub-optimal operations;
- Duplicating mistakes, because earlier ones were not recorded or analysed;
- Reinventing the wheel, because people are not aware of activities, projects in the past or their outcomes;
- Not sharing good ideas and best practices, which raises overall costs;
- Losing critical knowledge due to retirement and mobility of work force;
- Concentrating critical knowledge into 1 or 2 key employees, continuity risks;
- Slowing innovation, which results in delayed product development or missed opportunities;
- Frustrating employees because it takes too long to find validated content or the right experts.

These 'costs of ignorance' have consequences for the effectiveness of organisations and this paper will explore how the loss of critical knowledge can severely impact on a company's safety and business performance.

1. THE CHALLENGE

As the nuclear, oil & gas, pharmaceutical, financial and public sectors face enormous challenges in confronting the challenges of unprecedented levels of retirement, they too have to address the challenges of rebuilding their corporate memories and building strategies for retaining knowledge critical for performance.

The water industry and utilities at large are not immune from this phenomenon and all organisations need to understand their own specific challenges and develop strategies to mitigate the inherent costs of ignoring the issues.

The current contractions across industry will inevitably compound the problems first exposed by those earlier crises. The loss and attrition of business-critical knowledge and experiences can expose organisations to safety, continuity and performance risks. In addition, the average age within the industry is relatively high, resulting in even more potential knowledge loss due to retirement. How can the employees who remain within the company still build on that experience?

The realistic answer is that it is impossible to retain all knowledge and experience. A company must understand which knowledge is critical and which is less critical, e.g. because it is readily available on the market when needed. This critical knowledge must be managed properly within the company and retained for future operations.

Given the earlier quote from the Chair of UK's HSE, a focus on storing and re-using safety-related knowledge proposes a specific business case for knowledge retention activities. Long-term collective learning takes place through structured evaluation and debriefing of activities. The lessons identified during this evaluation process should be transformed into reusable knowledge and fed back again into operations and made accessible for re-use across the organisation. The focus here, is on ensuring that lessons about risks are not lost to the corporate memory.

The ISO 9001:2015 section on organisational knowledge focuses on knowledge that is necessary for an organisation to fulfil its most important workflows/processes in the best possible way and to meet the organisational goals. In other words, what do people in our organisation need to know, how do we maintain that knowledge and make it available to the right people at the right time in order to achieve our organisational goals?

Thus, it is not about all of the knowledge available in the organisation but only about the critical knowledge. The knowledge necessary for the most important workflows, products, processes and services, etc. If this knowledge disappears, is difficult to find or is not used to its full extent, the quality of products and services are likely to diminish and can damage the reputation of the organisation and impact its overall results and performance.

For example, in a typical asset rich organisation, the following knowledge areas could be critical for front line staff:

- Knowledge of asset inspection, testing and maintenance management;
- Knowledge about asset risk exposure;
- Knowledge in how to use asset integrity management system review and development;

- Knowledge of asset life management;
- Knowledge related to governing documents for maintenance strategies.

However, for the environmental management team, different knowledge areas would be critical. For example, although not exclusive:

- Knowledge of how to conduct an environmental impact assessment;
- Knowledge about air modelling;
- Knowledge about implementing an integrated pollution prevention and control system;
- Knowledge about the organisation's environmental management systems and related ISO standards.

The determination of what type of knowledge is critical, depends in the first place on the specific goals and targets of an organisation and in the second place on the most important work flow/ processes that lead people to reaching these goals in the most effective way.

In stressing this, the ISO standard has clearly recognised the importance of appropriate and clearly defined work flows and processes for a qualitative strong organisation. It is also clear that the ISO standard stresses an emphasis on the importance of the way the most important knowledge is developed and used.

2. HOW DO YOU DEVELOP INSIGHTS INTO YOUR CRITICAL KNOWLEDGE?

Most organisations do have an idea, an overview - perhaps implicitly or maybe explicitly - of their critical knowledge areas. However, it is important to refresh this picture and update this view on a regular basis with the latest insights and developments from inside and outside of the organisation. Only if organisations have an explicit view of their critical knowledge can they create a framework to understand and manage it.

WHAT TO DO WITH THIS CRITICAL KNOWLEDGE?

When it comes to organising critical knowledge, what do you actually do? Emphasis and focus should be on making sure that:

- There is a common understanding of what knowledge is required in the organisation to execute processes and work in the best way and that it is secured that this knowledge is available;
- You understand what you do not need to know by looking at priorities, accuracy of information or possibility and availability of alternative resources who could handle this information better;
- The knowledge is:
    - Ready to use, suitable for those who need;
    - it in their daily operations and at the level of proficiency;
    - Made available in a way that makes it easy to re-use. Make it easy for people to use and adapt this knowledge in their work at the time they need it. Make the content of the knowledge adjustable to the organisation's operations;

- Available for people and that they know how to use the organisational social and technical infrastructure easily, such as meetings, peer reviews, databases, intranet, etc., to easily get to this knowledge in a timely fashion;
- Easy for people to find;
- People use the knowledge from the organisation's collective memory;
- People use validated knowledge and not define their own versions as there will be strong chance of multiple, perhaps inconsistent or even divergent approaches;
- New insights and developments, from inside and outside the organisation, if relevant, are included in the organisational memory. Update and make your critical knowledge concrete in real contexts by explaining your approaches and ways of working with new experiences and ensure that updates are validated.

3. How to address the challenge

There are four, not mutually exclusive, areas of application: people, assets, projects, incidents.

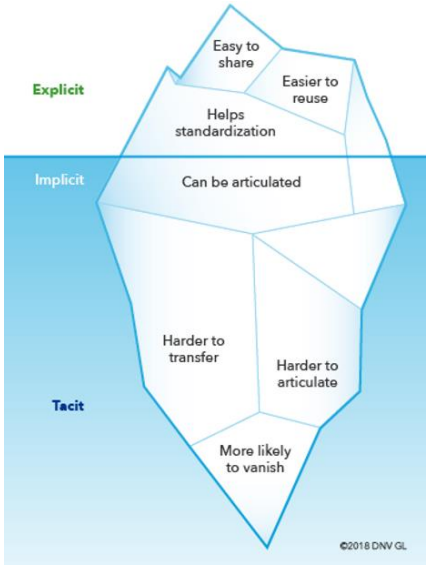
People

Who holds the knowledge you have identified as critical? Once the organisation understands the answers to that fundamental question, it is then important to evaluate the potential risks of losing that knowledge. What is the level of risk and the potential impact that such loss has on the organisational performance. Answers to this questions will help the organisation to prioritise a programme of knowledge retention and transfer exercises with those individuals identified during the risk identification phase.

It is at this new stage that we should distinguish between three types of knowledge. As Figure X alludes, different types of knowledge will require different methods to help capture and transfer that knowledge.

1. **Explicit** - manifested in documents, images, reports, drawings, etc., should be consolidated in one location, organised in structures recognisable and accessible by users and be easily retrievable to support their re-use.

2. **Implici**t - can be captured in artefacts such as files, personal network maps, concept maps, etc. These can be added to the library of explicit knowledge and also stored and found via ‘expert pages’ centred on individuals.
3. **Tacit** - requires a focus on peer-to-peer approaches ensuring that the donor transfers his or her knowledge to colleagues and this is most frequently undertaken via ‘communities of practice’.



Assets

Asset registers are typically used to help business owners keep track of all their fixed assets and the details surrounding them. It assists in tracking the correct value of the assets, which can be useful for tax purposes, as well as for managing and controlling the assets. A fixed asset register provides a single location to quickly learn about any asset owned by the business

However, if not managed carefully, asset knowledge may be lost, resulting in higher lifetime costs, performance gaps or increased exposure to safety risk. Poor asset knowledge utilisation, improvement and hand-over to new owners or operators hampers operational excellence and introduces risk for asset safety and availability. The knowledge most vulnerable relates to any unique characteristics or non-routine maintenance issues.

Projects

Projects provide new insights on new technologies, application of rules, legislation, market developments etc etc. All new insights provide opportunities to further improve or services to our clients. However challanges need to be overcome: with hundreds, if not thousands of colleagues across the country, how do you find the new knowledge and insights that could be relevant for your project for your customers? Typical hurdles included; not knowing who to ask, not knowing where to start in the 10,000 of documents that where reurmed by the search engine.

To facilitate better reuse of knowledge and experience across the organisation, it is worth exploring how to introduce a project knowledge retention programme, tailored to the specific characteristics of the organisation. It would need to cover elements like improved description of our services, clearer roles with respect to learning and sharing. To facilitate sharing a common language is there a defined single taxonomy?

In a project organisation, extracting lessons learned is a challenge. At the end of the project, when the 'customer is happy', team members tend to move on the next project, with new exciting challenges. Lessons learned are important but are rarely urgent. How can you encourage project members to ensure lessons are captured and shared to enhance the corporate memory?

Incidents

Incident Investigation is one of the main feedback loops for a safety management system. Hopefully we are able to feedback through near-miss events rather than actual events. Companies who do this best often 'make strong responses to weak signals' – in other words, they treat serious near-misses with the same severity as if the event had actually happened. That way they ensure that the maximum learning and knowledge is retained and hopefully the likelihood of the event occurring again, perhaps with far greater consequences, is reduced.

4. Conclusions

Controlling knowledge loss is a multi-dimensional task. This paper has argued that knowledge risks can be related to different domains in organisations:

- **Management systems:** through not evaluating and controlling the risks associated with sub-optimal approaches to managing knowledge;
- **People:** through retirements, lone experts, career mobility, etc.;
- **Assets:** through a lack of recognition of any unique characteristics, non-routine maintenance or site access , safety and security matters;
- **Projects:** through not capturing and sharing learning from successes as well as failures;
- **Incidents:** through taking a narrow perspective on lessons learning.

Each of these domains requires attention and, often, different toolkits to focus on their risks and types of knowledge 'bytes' that can be captured and shared.

Those organisations that have embraced the need to adopt knowledge risk management practices will have done so assuming that deploying resources and undertaking some actions makes business sense. Many of those organisations will adapt or adopt tools and processes based on further assumptions that by doing so knowledge retention and transfer goals will be successful. Adopting that philosophy will ensure compliance with the new section of ISO 9001:2015. For those organisations not seeking accreditation to that standard the benefits stem from ensuring that critical knowledge is available at the right time and in the right place.

How can the water industry develop robust approaches to the management of its knowledge? What are the next steps in developing a coherent understanding of good practice int his field and promoting ambitions to achieve that status?

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