

Retaining and sharing valuable knowledge and applying lessons learned should be part of an essential process in any successful organisation's operations. Filippou Prouzos, quality assurance specialist at Consolidated Contractors Company – an engineering and construction business in the Middle East, explores organisational knowledge management in the construction industry and explains how his firm implemented an effective programme

BUILDING BLOCKS

For any enterprise, determining and maintaining organisational knowledge should be an essential part of their operation and one of the foundations for continuing success and maintaining quality standards. Organisational knowledge is the sum of all knowledge

contained within that organisation that can provide value to the business. This includes: the collective knowledge and abilities accumulated from a range of sources, such as intellectual property; the experience of skilled people; lessons gained from success and failure; information about products and processes, and the facility to share that through mentoring or knowledge-sharing programmes.

The importance of determining and maintaining this knowledge is clearly defined in ISO 9001:2015 Quality management systems – Requirements (clause 7.1.6), as a necessity for any company to operate its processes and achieve conformity of its products and services. However, in my experience, many construction firms have realised recently that their collective knowledge is disappearing as a result of poor knowledge management and lack of transfer of knowledge within the organisation.

Failures that occur at various phases of projects can have an impact on the overall cost and financial status of a construction business that is so severe that it may threaten its ability to continue. These failures may also deliver such reputational damage to the company that its relationship with potential future customers will be jeopardised.

So, one of the keys to the quality standards and long-term success of any construction firm is its ability to ensure all knowledge is captured properly, shared and used within the organisation. This knowledge is obtained through: the management of ‘lessons learned’; good practices and successful experiences; process or product failures; and the implementation of innovative methods during the initiation, planning and execution of projects.

Factors impacting organisational knowledge

A number of factors, as outlined below, are at play in determining whether construction companies are able to capture and transfer their organisational knowledge and, ultimately, deliver successful projects.

- **High turnover of the personnel involved in the industry.** Many experienced personnel leave projects before completion to work on other assignments within

the same organisation, or to provide their services to other companies in the same, or different, fields. Organisations often fail to capture and record their lessons learned, practices and other experiences on the project, which are then lost when employees disengage.

- **Processes for continuous learning and improvement for inexperienced personnel.** Often in construction industry projects, a large number of employees, who are new to the organisation, are allocated to the projects or the scope of works that is being executed. The learning curve of the new personnel has a direct impact on the quality of the works and, ultimately, the quality of the end product delivered to the customer. Construction companies must establish programmes to provide continuous training around proven construction practices and methods, right from when personnel are engaged on the initial stages of projects. Also, lessons learned and own experience and practices should be cascaded to relevant employees for continuous improvement of their works.
- **Application of experience.** Construction firms often engage qualified and experienced personnel to projects only at later stages, to reduce costs and achieve budget savings. It should, however, become a lesson learned for firms to engage highly qualified people in the early stages of a project, to provide knowledge and experience, train new employees, improve performance, and minimise failures.
- **Process to capture lessons learned from experienced, short-term personnel or contractors.** Construction businesses often engage personnel on projects for two to four years, and may not have projects of similar scope for reallocation of experienced personnel within the organisation after their demobilisation from completed projects. It is essential that their personnel’s lessons learned, practices and innovative methods are captured and maintained, even if the employees are no longer in the organisation. Relevant tools and programmes should be in place to manage the process.
- **Internal communication, transfer of knowledge and sharing information.** As construction companies become multinational organisations – with various departments or disciplines, locations of operations, nationalities of employees, and levels of hierarchy ▶

and expertise within the organisation – they have to develop communication channels and establish an open-door policy to facilitate the capture and transfer of organisational knowledge. This should remove obstacles – such as personality and culture-barrier issues – that might get in the way of employees sharing their knowledge with colleagues. When employees realise they may retrieve any piece of knowledge from the organisation, it is more likely they will be willing to share their own knowledge.

To overcome these issues, and to ensure all knowledge obtained during the life of a project is properly captured, shared and used across an organisation, construction companies need to develop and implement an effective knowledge management programme.

Knowledge management programme

Such a programme has been developed and initiated at the firm where I work, Consolidated Contractors Company (CCC), which has a workforce of more than 70,000 representing more than 80 nationalities.

CCC established its knowledge management process in 2007, with the assigned process owner being the corporate learning and innovation department. Since then, it has developed as a mature knowledge management platform and been further implemented as a well-structured, effective programme that helps the organisation accomplish its strategic objectives, delivering projects to customers in an effective and efficient manner.

The objectives of CCC's knowledge management programme are to:

- capture and share lessons learned across the organisation in a consistent, repeatable and traceable manner;
- use lessons learned within day-to-day operations, learn from past mistakes, and reduce failures and waste;
- continuously increase the participation and contribution of employees to the organisation's knowledge management programme;
- assist employees to prepare project documentation after reviewing the available ones;
- connect employees with company experts who can help solve their problems and improve project performance;
- create an innovation platform by gathering company experts to share and implement new ideas.

CCC implements various methods and processes to successfully achieve its knowledge management programme objectives.

Sources of lessons learned

The main source of lessons learned is CCC employees, who upload them directly onto the organisation's knowledge management platform.

Lessons learned are also identified by extracting information from the following sources:

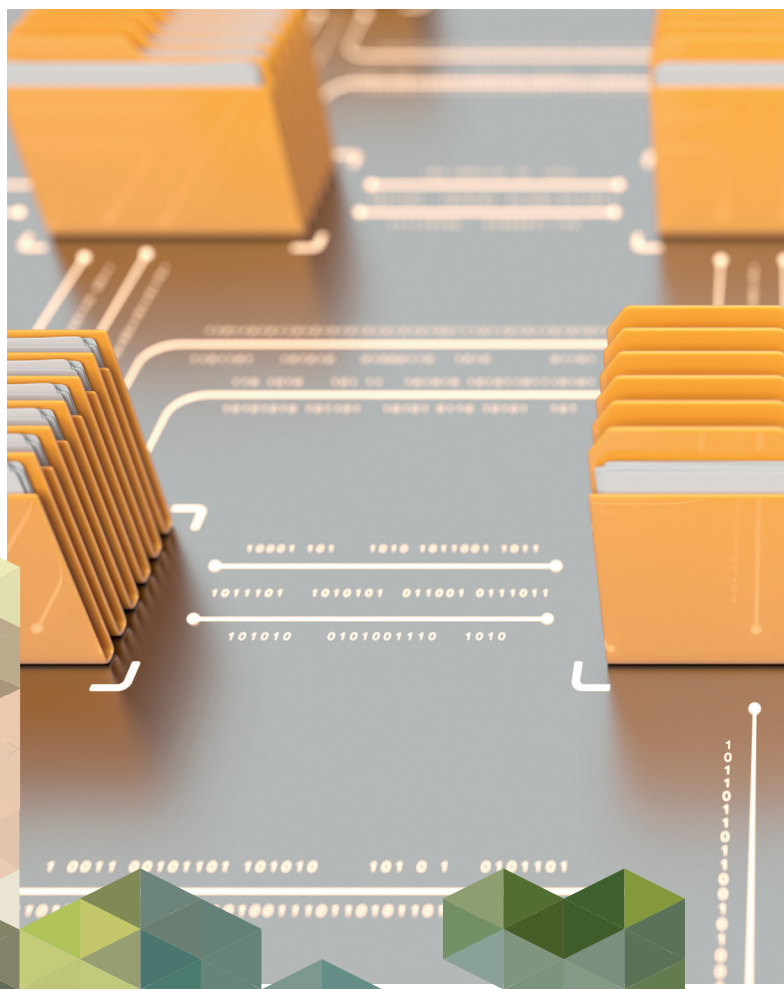
- **project completion workshops** conducted towards the end of works (around 90% progress)

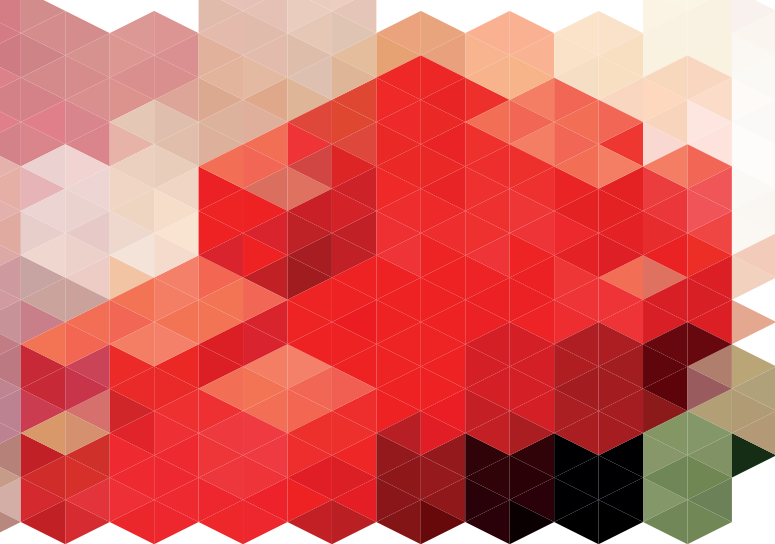
to capture all lessons learned and best practices acquired through the execution of the project;

- **quality management system and health, safety and environment (HSE) audits** conducted by corporate and third-party auditors on whether the project quality management and HSE system is effectively established, implemented and maintained;
- **internal audits** conducted by corporate internal auditors on the economic and efficient use of project resources, safeguarding of assets, reliability and integrity of information, and accomplishment of the established project objectives;
- **site visits** conducted by the assigned corporate project coordinators, based on the criticality and complexity of the project, to assess the overall performance of the project operations;
- **lessons learned exchanges** with clients or other entities (such as joint-venture partners, consortiums, and so on);
- **Other sources**, such as improvement initiatives and discussions on the organisation knowledge management platform.

Lessons learned are submitted on the organisation knowledge management platform via the online 'lessons learned input form', then reviewed by assigned coordinators and forwarded to the respective project managers or department managers for validation and approval. The

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platform uses machine learning tools to avoid repetition of lessons learned.

When deemed necessary, lessons learned are sent to the appointed subject matter experts (SME) for further validation, approval or technical feedback.

Upon final approval, lessons learned are published on the organisation knowledge management platform, where

“This is an effective way to cascade knowledge down through the project”



they can be reviewed by all users, who may further engage, comment and contribute ideas, recommendations or similar experiences.

Knowledge management platform

CCC uses a commercial platform that has been customised to support the knowledge management programme. The following key features are applicable in the platform for the successful implementation of the organisation knowledge management programme.

- A centralised system that provides a user-friendly environment to capture, store and share lessons learned.
- Support for the lessons learned review and final approval process.
- Keyword search capability to trace and retrieve the appropriate lessons learned, document or article.
- Identification of repeated lessons based on lessons learned context.
- Alert users by email when a new lessons learned entry is put into the system.
- Establishment of communities of practice (CoPs), where employees can communicate and cooperate.
- It allows employees to identify colleagues based on experience or expertise.
- Q&A section, where employees on site can ask technical questions and receive feedback from SMEs.
- It conducts knowledge management analytics and generates automated or on-demand charts and graphs.
- Mobile compatibility and ease of access from a mobile browser or mobile app.

Methods for sharing lessons learned

CCC has taken its own lesson from the lessons learned process experience. The initial policy of limited access to lessons learned, and keeping the content protected and accessible only to a restricted number of people – such as project managers and senior executive management – has been replaced by an open knowledge management platform, accessible to all employees.

In this way, the process became more valuable and effective, with high visibility by the employees, who also engage by providing their comments and feedback.

In addition, a number of actions are taken at different timeframes of projects to promote the lessons learned process, all of which can have a positive impact on quality standards.

- **Project lessons learned workshops** are conducted at the early phases with all team members, to present and discuss lessons learned relevant to the project works. The assigned project coordinators liaise with the project management and the learning and innovation department to conduct the workshop.
- **Internal lessons learned staff workshops**, conducted by department managers to present and discuss lessons learned relevant to their scope. This is an effective way to cascade knowledge down through the project.
- **Corporate lessons learned workshops** conducted by corporate staff on specific segments or topics, such



as civil, mechanical, airports, HSE, quality, engineering, procurement, and so on. The workshops are also used to promote our knowledge management programme and provide an update on the latest developments.

- **New activity kick-off meetings**, conducted by the project team, to ensure that relevant lessons learned are presented and discussed with key internal and external project stakeholders (for example, customers, suppliers and subcontractors).

The strong commitment and active participation of the project management team is critical for the accomplishment of the objectives of the lessons learned workshops. Emphasis is placed on preparing and conducting the workshops in a thorough manner at the earlier stages of projects, otherwise they lose out on the lessons learned opportunity.

Lessons learned add value

CCC uses several methods to add value within the organisation after capturing and sharing the lessons learned. For example, lessons learned are converted into risk items – the estimation department at the initial stages and, upon award of a project, the project management team review the lessons learned relevant to the project scope and convert them into risk items that are managed through the project risk management process. The contracts manager also evaluates the need for transferring lessons learned/risks to other parties, such as suppliers, vendors, contractors, and so on, through contract terms.

Lessons learned are also converted into process improvement initiatives – for example, the development of a centralised suppliers and subcontractors electronic management system.

In addition, organisation manuals and procedures are revisited to incorporate best practices as extracted from the lessons learned. During the lessons learned review and approval cycle, the appointed SMEs identify best practices and propose them to the quality management department for incorporation into the relevant documents.

Engagement

One of the main challenges CCC had to overcome was the initial low participation and contribution of employees to the knowledge management programme. To address this, several methods were deployed to foster greater engagement with it.

Training sessions for employees were introduced by the learning and innovation department to raise awareness

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and use of the knowledge management platform.

Communications were also an important element, with employees getting regular knowledge management updates in their email inboxes and on the knowledge management platform, while a weekly knowledge newsletter highlights success stories with new and valuable content.

Employees also receive automatic notifications when new questions or content items are posted in their communities or in their topics of interest. Knowledge management is accessible through mobile versions of the platform, with Q&A options available. Meanwhile, the learning and innovation department looks at well-designed activity metrics and analytics for further improvements.

Another element of the engagement strategy is knowledge management participants being recognised, through their peers, for contributing innovative ideas, providing input with business impact, and answering technical and expertise questions. Participants also receive recognition in



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published success stories on the company newsletters, and on the knowledge management platform.

Project documentation

CCC maintains a large source of its organisational knowledge as part of the project documentation – such as manuals, procedures, method statements, plans, and so on – which is uploaded upon completion of the project in the knowledge management platform, under the responsibility of the corporate quality department.

Access to documented organisational knowledge is provided to all employees for their reference, review and use as required, to facilitate preparation of new project documentation.

Communities of practice

CCC has also established several key communities of practice (CoPs) within the organisation knowledge management platform for subjects such as risk management, HSE, quality, contract administration, project controls, concrete works, piping, and so on. This is to promote communication, knowledge sharing, and cooperation among the employees, and provide them with in-house expertise and knowledge when requested.

CoPs rely on in-person community meetings two or three times a year, as well as on the organisation knowledge management platform to communicate, connect and conduct community activities.

Monitor and control of knowledge management programme

CCC's learning and innovation department tracks engagement by monitoring activity on the knowledge management platform, surveying project teams and collecting success stories. It also monitors metrics related to the:

- number of users, by project, disciplines, areas, and so on;
- content items published, most reviewed or commented on;
- interactions between users, with queries and replies or comments;
- system interactions, such as 'likes' or 'forwards' to other personnel.

This information helps determine where improvements and investments are required, which content is to be highlighted, and where further engagement of the executive management is required.

In addition, the quality management department conducts audits to evaluate the level of implementation of the knowledge management programme and identify opportunities for improvement.

CCC knowledge management programme – key success factors

In summary, the success of CCC's knowledge management programme for organisational knowledge is the result of a number of essential factors. These include:

- the strong commitment and active participation of the organisation's executive management;
- the establishment of a dedicated knowledge management organisation with clear roles and responsibilities;
- using a customisable knowledge management platform to manage organisational knowledge;
- access to the knowledge management content and lessons learned for everyone in the organisation;
- use of lessons learned workshops to capture and record lessons learned before project completion and to motivate sharing;
- the use of lessons learned workshops and kick-off meetings in projects to reinforce sharing of lessons learned to all personnel;
- the application of lessons learned within the organisation's operations (such as risks, methods of works, and documentation);
- access to past project documentation for all employees;
- the establishment of CoPs and SMEs to promote communication and cooperation among the organisation's employees, and provide them with in-house expertise and knowledge;
- the development of peer-to-peer recognition for valuable input and contributions within the knowledge management programme.

Any organisation in the construction industry, no matter the size, may utilise the aforementioned methods and processes to achieve an effective knowledge management programme. ■