



**PROJECT EVALUATION AND LESSONS LEARNED
USING ISO 21500 AS AN ADAPTIVE FRAMEWORK**

Anna Katrín Einarsdóttir

Thesis of 12 ECTS credits
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Thesis of 12 ECTS credits submitted to the School of Science and Engineering
at Reykjavík University in partial fulfillment
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Supervisor:

Þróstur Guðmundsson, PhD Materials Engineering Design
Reykjavík University, Iceland

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ABSTRACT

Project Management and Total Quality Management methodologies have a close resemblance in fundamental areas such as leadership, customer focus and aiming for continuous improvements. Continuous improvement is considered to be the highest level of project management maturity where organizations evaluate and identify the information obtained with processes such as project evaluation and lessons learned.

An investigation whether ISO 21500 can be used as an adaptive framework for systematic implementation of project evaluation and lessons learned in projects was conducted. The use and selection of informative tools and techniques in ISO certified organizations and the main perspectives on the subject were also mapped.

Using a qualitative research approach, information was obtained with interviews in order to gain insight and understanding on current practices and perspectives. Results show that project evaluation, lessons learned and knowledge management processes are considered to be challenging and not as effective as could be expected in matured ISO certified organizations. Standardized processes combined with adaptive Agile processes could fit into the ISO 21500 with continuous evaluation and lessons learned iterations in each PM process providing an adaptive learning project life cycle.

Keywords: Project Evaluation, Lessons Learned, ISO 21500, Continuous Improvements, Knowledge Management

¹ Reykjavík University, School of Science and Engineering, Iceland

1. INTRODUCTION

Organizations operate in an increasingly complex environment. The rapid rate of change has created a need for rapid response and adaptability in an ever-changing competitive environment.

Organizations often face challenges that involve obtaining better control of processes and making the most of the existing resources by looking internally, rather than externally, for solutions. Internal solutions are achieved by taking a look at the ways processes are managed and evaluated in order to support informed decision making based on knowledge (Kerzner, 2009). Knowledge is a vital organizational resource from a strategic perspective (James, 2004) and the basis for improvements that support competitive advantage (Erden, Von Krogh & Nonaka, 2008).

As project management (PM) aims for continuous improvement (CI) it is important to manage it successfully in order to learn from one project to the next (Collison, 2001). Often when projects are reviewed, the methods do not explain root causes, providing limited value for future improvements (MacMaster, 2000). Schindler & Eppler's (2003) research shows that knowledge gathered in projects is not systematically integrated into other projects and processes.

The International Organization for Standardization (ISO) newly published ISO 21500:2012 Guidance on Project Management (ISO, 2012) that is a general guidance on basic PM concepts and processes that provides a high level description of what is considered to be good PM practice.

Project evaluation (PE) in context with lessons learned (LL) are processes that together provide valuable information when learning is necessary in order to make an informed decision that leads to action (Russ-Eft & Preskill, 2009). These are the building blocks for organizational learning (OL) (Berke, 2001) that support CI and long-term success (Sense, 2004). CI is a complex process that needs to be managed and is the highest level of PM maturity in organizations according to the Project Management Maturity Model (PMMM-model) (Kerzner, 2009). Studies show that there is a high correlation between PM maturity and performance (Jugdev & Thomas, 2002).

The research questions this paper intends to answer are:

1. What informative tools and techniques are currently used for PE and LL in ISO certified organizations and what are the perspectives on the subject?
2. Can ISO 21500 be used as an adaptive framework for systematic implementation of PE and LL in projects?

2. LITERATURE REVIEW

2.1 Project Management Concepts

Organizations generally establish their strategy based on values, mission, vision and role, in context with opportunities in their internal and external environment (Johnson, Scholes & Whittington, 2009). Identifying strategic opportunities, organizations are increasingly realizing the importance of PM, whereas projects are often the means to accomplish strategic goals and beneficial change. Projects should

therefore be evaluated and selected in the context of programs and portfolios that represent organizational strategy (Kerzner, 2009).

ISO defines a project as: "a unique set of processes consisting of coordinated and controlled activities with start and end dates, performed to achieve project objectives" (ISO, 2012).

Projects of all sizes and complexity go through phases, from initiation to closure, known as the project life cycle. These phases provide better control of resources to achieve and monitor progress towards project objectives.

Project stakeholders are individuals, groups or organizations that can be impacted by projects. Understanding stakeholders interface and communication within a project is critical to project success (Kerzner, 2009; Meredith & Mantel, 2009; Thomas, 2011). Each project stakeholder has a key role that should be clearly described and understood in order to act accordingly. It is also important that project stakeholders have a common language, understood by everyone. This is a key factor for facilitating communication, increasing speed, quality and changes of project deliverables (Zandhuis & Stellingwerf, 2013).

2.2 Total Quality Management

Organizations can be perceived as process-driven entities (Kerzner, 2009). "Total quality management is the integration of all functions and processes within an organization in order to achieve continuous improvement of the quality of goods and services. The ultimate goal is customer satisfaction" (Ross, 1994).

One of the fundamentals in Total Quality Management (TQM) is quality leadership. TQM should be implemented through long-term CI planning based on employee active participation, supportive culture and customer satisfaction (Dahlgaard, Kristensen & Kanji, 1995). TQM processes are divided into four categories: plan-do-check-act, seen in Figure 1, known as the PDCA cycle for improvements. This model was introduced by William Edwards Deming and provides a CI focus in every task within the context of quality, performance, learning and the involvement of people in the process (Deming, 1986; Jashapara, 2004). This was considered to be the first step towards a more comprehensive quality management (QM) and a building block in the TQM based management system (Majerczyk & DeRosa, 1994).

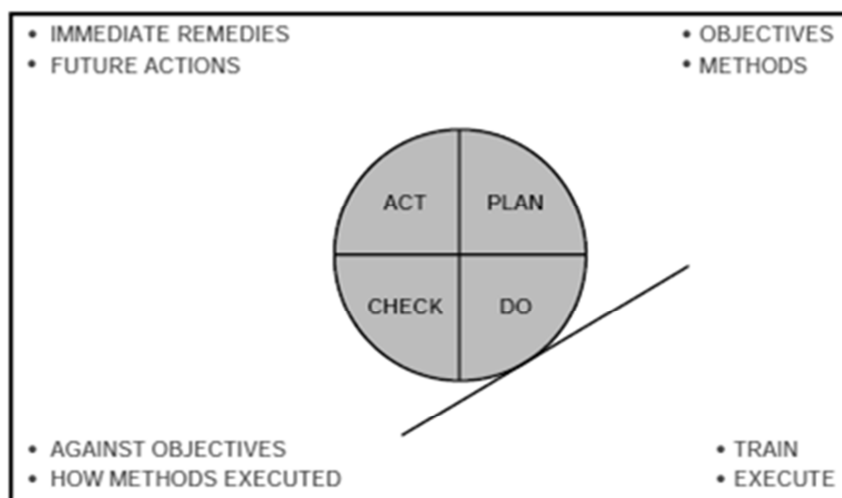


Figure 1 - Cycle for Improvements (Kerzner, 2009, p 878)

CI never reaches its end-state as customer requirements are forever changing. The organizational motivation for the constant search for improvement is competition and increasing standards of customer satisfaction (Reid, 2006). Organizations that consider their QM systems successful say that their organizational culture supports CI (Oliver, 2009).

2.3 ISO 21500:2012 Guidance on Project Management

ISO 21500 was developed over a period of six years, involving representatives from over 30 countries, many of whom are from large professional organizations and associations such as the International Project Management Association (IPMA). One basic concept that the stakeholders agreed upon is the "value creation framework" that identifies opportunities in the environment in context with organizational strategy and validates the selection process of projects (ISO, 2012; Grau, 2012).

In ISO 21500 there are 39 processes, consisting of coordinated and controlled activities throughout the project lifecycle (ISO, 2012). A process consists of one or more activities that increase value by combining people, methods and techniques. Its aim is to transform input to a form of output that may be used to determine impact and meet project goals (Gunnarsdóttir & Ingason, 2007).

The standard addresses PM from two perspectives, referred to as Process Groups (PG) and Subject Groups (SG). The five PG represent the project processes performed in projects, logically arranged during the project life cycle that drive the project near its objectives and to completion. The PG phases are initiating, planning, implementing, controlling and closing. The ten SG are required PM-activities that are defined in terms of purpose or description and have primary inputs and outputs creating value. The SG include; integration, stakeholder, scope, resource, time, cost, risk, quality, procurement and communication. ISO 21500 can be used in any type of organization and project, regardless of complexity, size or length of time (ISO, 2012). Amongst other already existing PM standards there is a high level of similarity but with very different origins. Examples of other widely used PM standards are; PMBOK – Project Management Body of Knowledge (PMI, 2013), PRINCE2 – Projects IN Controlled Environments (OGC, 2009), ICB 3.0 – International Competence Baseline (IPMA, 2006) and Agile PM that is a term used for several iterative methods (Augustine, 2005).

2.4 Project Evaluation

PE and project success can mean different things to different organizations due to variable perception and point of view. (Liu & Walker, 1998). PE in context with LL is the determination of quality, value or importance of the information used to prove or make judgements that support OL and CI (Scriven, 1991; Russ-Eft & Preskill, 2009; Thomas, 2011).

Project success can be a multi-dimensional, strategic concept that often requires more than one dimension for evaluating success. According to Shenhar & Dvir (2007) projects should be evaluated based on their contribution to and impact on the overall organizational results. Project benefits can also be apparent in many forms, some are immediate, while others may be realized later, long after a project's closure.

Evaluation provides information that support decisions about future projects and increase knowledge and understanding (Patton, 2008). Success criteria must express the strategic intent of the organization and its objectives. Project success should also

reflect the interests of different stakeholders who will be influenced by the project’s deliverables (Kaplan & Norton, 1996).

According to O’Dell & Grayson (1998) information cannot be perceived as knowledge until people use it. There is often confusion between the terms *data*, *information* and *knowledge*, in relation to evaluation that often leads to collecting more quantity than quality information. An adapted model describing a logical structured relationship for use with PE in context with LL is shown in Figure 2. Data transforms into information, when given meaning, in the context of process, project, program or strategy. Then it becomes a source of knowledge when it interacts with a user. Knowledge then transforms to further understanding in a cognitive process that results in taking accountable decisions supporting CI (Davenport & Prusak, 2001; Russ-Eft & Preskill, 2009; Thomas, 2011).

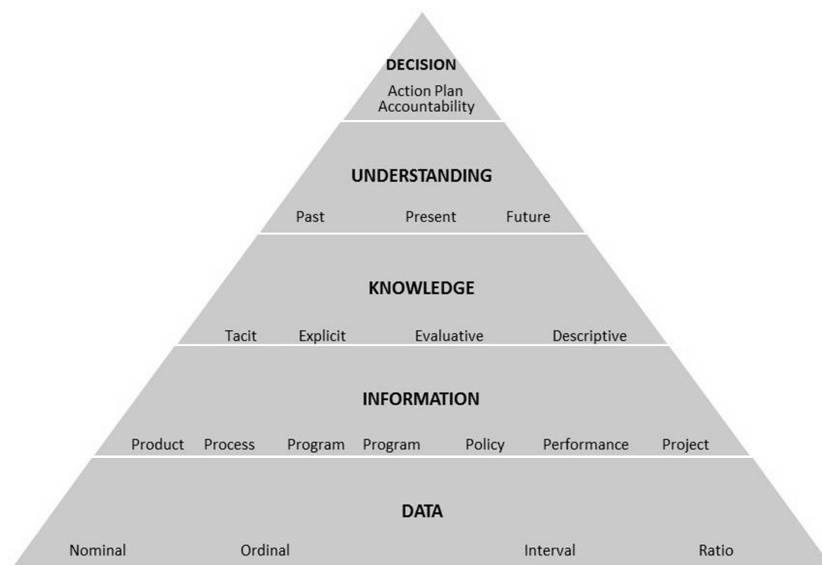


Figure 2 - Adapted model to use with PE and LL (Thomas, 2011)

A utilization-focused evaluation can be used for identifying primary intended users and use of the information serving as knowledge-building evaluation. The two main purposes are for summative and formative utilization. Summative evaluation focuses on determining the *accountability* for making short-term judgement. The process often provides quantitative information for project justification or the continuing existence of a project. Formative evaluation focuses more on long-term impact and is conducted for the purpose of project *improvements*. The process often reduces the possibilities of repeating mistakes and uses mistakes as critical learning opportunities (Patton, 2008; Thomas, 2011).

2.5 Lessons Learned

The Project Management Institute (PMI) defines LL in the *Project Management Body of Knowledge* (PMBok) as “the knowledge gained during a project which shows how project events were addressed or should be addressed in the future with the purpose of improving future performance” (PMI, 2013, p 544). This definition suggests that future projects can benefit from implementing LL and provide an understanding of what has been learned from previous projects. Nevertheless, the PMBoK and ISO

21500 give no guidance on the transfer of knowledge or how it should be implemented (Reich & Wee, 2004; ISO, 2012).

LL refers to procedures that are carried out during or after project closure to identify, retain and disseminate project learning experiences, both the positive and negative, in order to improve future PM procedures (Kerzner, 2009; Larson, 2011). Related LL terms found in PM literature have a broad reference to the term, for example; post-project mortem, case study, debrief, retrospective review, project review and intra-project learning, just to name a few (Meredith & Mantel, 2009; Thomas, 2011). When LL is done regularly over the project life cycle it increases discipline and accuracy in practices, more than doing a post-mortem at the closing of a project (Carillo, 2005).

Brady, Marshall, Prencepe & Tell (2002) furthermore describe similar barriers to learning in projects with long life cycles where a long time passes before lessons are harvested. Permanent organizations usually have a mechanism built in for learning but project-oriented organizational structures are action- and task- oriented and therefore not as prepared for learning (Ekstedt, Lundin, Soderholm, & Wirdenius, 1999). Others say that specifically due to their secondary type of organisational form (e.g. limited time and resources, complexity, new teams) projects are especially suitable for learning (Damm & Schindler, 2002; Smith & Dodds, 1997).

2.6 Best Practice and Benchmarking

There are multiple definitions of Best Practice (BP) found in the literature. According to Kerzner (2009) BP is defined as "actions or activities undertaken by organizations or individuals that lead to a sustained competitive advantage in project management". There is a difference between LL and BP; whereas LL refers to success and failure, BP is usually successful outcome. Benchmarking (BM) is a process used for measurement purposes with the objective of comparing similar variables, i.e. performance or results. BM can involve looking at past projects to recognize ideas for improvement on the current project and provides a basis to use in the measurement of quality performance (Mulcahy, 2005). BP and BM processes have a close connection, where BP makes effective use of BM, directed towards process excellence and CI (Reider, 2000).

2.7. Knowledge Management

Knowledge can be classified in two dimensions; explicit and tacit. Explicit knowledge is relatively easy to codify, store and retrieve, while others say the holy grail of competitive advantage may be related to exploiting the complex and social aspects of tacit knowledge (Jashapara, 2004; Tywoniak, 2007). It is often considered that where explicit and tacit knowledge intersect, one finds the optimum solution for growth and development. According to Thomas (2011) there is also a third knowledge dimension known as embedded knowledge, referring to the decisions and understanding linked to processes, practices and procedures, as well as culture and structure. According to Davenport and Prusak (2001) knowledge management (KM) is based on existing resources that organizations have in place such as information systems, change management documentation and human resources practices.

Studies show that project learning is a deciding factor in OL and development in PM maturity. The temporary nature of projects and the risk of loss of memory when project teams break up at project closure are the main reasons for the importance of collecting LL continuously from projects. Furthermore, these studies show that in most cases the recommended LL processes are rarely used due to lack of time for

review sessions and therefore experiences are not collected or integrated into other processes (Williams, 2008; Keegan & Turner, 2001; Schindler & Eppler, 2003). Furthermore, the research of Lipshitz, Popper & Friedman (2002) shows that the two most fundamental elements that can hinder OL lie at the core of every organization; the culture and organizational structure.

3. RESEARCH PROJECT

3.1 Project description and objectives

The aim of this research is to identify current practices and main perspectives on PE and LL processes in ISO certified organizations. The research is also intended to investigate if ISO 21500 can be used as an adaptive framework for systematic implementation of PE and LL in projects.

Information was obtained with interviews in order to gain insight and understanding on current practices and perspectives on PE and LL. Participants were all working in ISO certified organizations in highly advanced QM and PM business sectors. They were chosen for their experience and professional status to provide a view of how highly experienced professionals in their fields perceive and conduct PE and LL in their organizations. This approach was designed to find common themes and answers to the research questions presented in Section One.

An overview of the interview participants, shown in Table 1, provides information about position, interview type, business sector, ISO certification and level of project management maturity, according to the PMMM. The Software Engineering Institute (SEI) is a five-step scale (Humphrey, 1989) used to evaluate and determine the level of maturity of organizational processes. It consists of five levels that each represent a different degree of PM process maturity, starting at level one (ad hoc, basic knowledge), being the lowest value, level two (repeatable), level three (defined), level four (managed) and level five (CI), being the highest level of PM maturity. In level five, organizations evaluate the information obtained through BM in order to enhance their PM business process maturity (Kerzner, 2009).

Participants	Position	Interview type	Business sector	ISO certification	PMMM Level PM maturity*	SEI scale Processes
A	Quality Manager	Group	Environmental	ISO 14001	3-4	Defined/Managed
B	Quality Manager	Group	Industrial	ISO 9001, ISO 14001, OHSAS 18001	4-5	Managed/Optimizing
C	Quality Manager	Group	Health Care	ISO 9001	3-4	Defined/Managed
D	Product Manager	In-depth	Financial	ISO 27001	3-4	Defined/Managed
E	Product Manager	In-depth	Engineering	ISO 9001	3-4	Defined/Managed
F	Product Manager	In-depth	Information technology	ISO 9001, ISO 27001	3-4	Defined/Managed
G	Product Manager	In-depth	Energy	ISO 9001, ISO 14001, OHSAS 18001	4-5	Managed/Optimizing

* based on information from interviews and authors evaluation

Table 1 - Overview of interview participants

3.2 Research methodology

The research was based on a qualitative exploratory approach that is commonly used in research of this type. The main purpose was to gain insight and as much information as possible from the participants' experiences and knowledge on the subject (Cooper & Schindler, 2011; Cresswell, 2009).

Information collection was carried out firstly in the form of a one group-interview with quality managers as participants (A, B and C). Secondly, by conducting four separate in-depth interviews with project managers as participants (D, E, F and G), all B-certified (IPMA) and two having recently completed their MPM degree.

All participants provided valuable insights and a broad perspective on the subject of PE and LL. The aim was to encourage discussions about the subject during a one-hour interview. Participants were provided with definitions and descriptions of the subject at the beginning of each interview, gathered earlier from the literature review, to ensure common understanding.

During the group interview quality managers were asked to brainstorm and write their thoughts down on paper, within a given timeframe. In order to obtain a more definite substantive result, the participants sorted their findings in suggested subject categories obtained from the literature review. The subject categories consisted of PE, LL, BP, BM, PM, KM and ISO. These categories were then used as basis for identifying the status of each subject based on the participants' perspectives. Red representing challenging subjects (-), yellow representing subjects in place (+/-) and green representing subjects in good practice (+). For consistency and comparison the in-depth interviews results were categorized in the same subject categories. These categories could also be seen as different processes contributing to OL.

4. RESULTS

In this chapter the main results from the research are presented based on answers from the seven participants.

4.1 Tools and techniques

All participants generally felt that their organizations provided a wide range of tools and techniques for PE and LL in their management systems. Table 2 shows examples of tacit and explicit tools and techniques currently used in ISO certified organizations.

Quality Managers			Project Managers		
Categories	Tools and techniques	tacit/explicit	Categories	Tools and techniques	tacit/explicit
LL/KM	Meetings	(tacit)	LL/KM	Meetings	(tacit)
PE/LL/KM	Formal CI project process	(explicit)	PE/LL/KM/PM	Formal PM process	(explicit)
PE/LL/KM	Audit / Defect reports	(explicit)	PE/LL/KM/PM	Post project reviews	(explicit)
LL/KM	Consulting individuals	(tacit)	LL/KM	Consulting individuals	(tacit)
PE/LL/KM/PM	Intranet/Project database	(explicit)	PE/LL/KM/PM	Risk analysis	(explicit)
LL/KM	Visual Boards	(tacit)	PE/LL/KM/PM	Checklists	(explicit)

Table 2 - Examples of tacit and explicit tools and techniques

The most commonly used tacit tools are meetings (which refers to a range of meetings throughout the life cycle) and consulting individuals, followed by visual boards as a source of improvement points from employees. Participant C emphasized the importance of communication in meetings when sharing and transferring LL and said: *"The best way for distributing lessons learned and knowledge are meetings*

where all project stakeholders are participating in discussions and contributing to the learning". Also mentioned was the importance of employee contribution as being one of the vital success factors for process improvements. It was considered more likely to become a part of daily routine when improvement points emerged from employees.

The most used explicit tools by quality managers was formal CI project process and audit/defect reports, followed by intranet/project database. Project managers' most used explicit tools were a formal PM process, post project reviews, followed by risk analysis and checklists. Documentation is one of the basic elements in ISO standards and therefore becomes a part of daily procedures embedded in organizational processes. Participant B said: "Regarding the learning aspect in projects we do not have formal processes, but we discuss LL from projects as a community of practice on our Lean visual boards".

Overall, the most used procedures are explicit knowledge sharing tools and techniques used for sharing information. Quality managers use a more balanced set of procedures with an emphasis on community learning, documentation in databases and transferring LL through embedded processes. A formal PM process was not in place and only used in projects of a certain size and complexity. Project managers used more of explicit tools and techniques with an emphasis on individual documentation and transferring LL mostly by consulting individuals. All participants acknowledged the importance of using informative tools and techniques – but agreed there is still a long way to go in finding the best way of evaluating and transferring LL into future projects.

4.2 Interviews

When asked about PE and LL processes in the organizations, participant A said there were formal processes in place. An evaluation committee then assessed project success during the closure-phase. Participants B and C said there were no formal PE and LL processes in place, but as the organizations operated after the ISO 9001 standard the processes were informal and therefore embedded in other processes according to quality requirements. Participant D said there was a formal PM and PE processes but the LL process was an informal one, undertaken at closure-phase in project review meetings. Participants E, F and G also followed a formal PM process in most projects, but procedures were more based on ISO 9001 that required change management documentation and informal PE and LL processes.

In spite of LL transfer often being embedded in CI processes, quality managers' perspectives, shown in Figure 3, indicate that PE and LL are the most challenging processes in the organizations. It was a general perspective that PE was mostly based on financial criteria or the triple constraints, time, cost and scope, focusing on efficiency and estimated savings. Participants found it often challenging to find the right criteria and guidelines for the PE, sometimes leading to individual assessments and even collecting general information in databases without context. Quality managers' perspectives on the subject of BP/BM and ISO were considered to be according to good practice and KM and PM to be in place.



Figure 3 - Quality managers' perspectives

The importance of the human and social aspects was also mentioned in context of the subject and considering employees' values and standards when establishing criteria for PE and identifying LL in projects. All quality managers identified the transfer of LL as being one of the most challenging aspects, but pointed out that the knowledge and learning mostly took place in an informal LL process and in the form of communications. LL was often transferred by "learn by doing" according to procedures, and CI projects often undertaken as a result of improvement points from employees. Participant B perspective on the subject: *"In formal improvement projects we have an informal LL process. When it comes to sharing the information it is embedded into the process. That way employees learn by doing things a certain way from when a new process is established. I think when working in a certified project-oriented organization, with well-established processes, it can capture and store the information in a structured way"*.

Employees had access to project databases were information were available regarding project status and progress. Databases also provided information about implementation and project learning. Participants considered it important that employees realize the purpose of the ISO quality system, where it was not something on the side of the organization, but rather to be considered as the backbone of the organization. It was also considered important for project stakeholders to speak the same language and have a common understanding and consensus about the purpose and outcome of CI processes. When asked about their opinion on ISO 21500 all quality managers agreed that the standard was a good addition to the ISO family of standards serving as best practice PM guidelines. They had not examined the standard in detail but believed that it could serve as a framework when implementing PE and LL in projects, providing a well-structured PM process and discipline.

Project managers' perspectives on the subject, shown in Figure 4, indicate that PE and LL processes remain the most challenging, in addition to the KM process that they also perceived as challenging. The project managers' perspectives mostly mirror the quality managers' on PE, often lacking relevant evaluation criteria. The value of LL was often not recognized and therefore difficult to identify what information to consider relevant or important for future projects. Subjects on BP/BM and PM were considered to be according to good practice and ISO was considered in place.



Figure 4 - Project managers' perspectives

All project managers mentioned the transfer of LL as being one of the most challenging subjects – as it was often based on individual assessment. *"The transfer of knowledge is challenging. We have compiled all the results of the final LL review but the project managers have different representations of this so it is difficult to transfer and create knowledge and support learning"* (Participant D). The general perspective was that this was often the end of the LL process, without further actions for systematically integrating LL into other organizational processes. The main barriers for PE and transfer of LL were considered to be lack of time and management support. It was also mentioned as one of the barriers that customers often had no interest in collecting and reviewing LL and were therefore not willing to spend resources on the post project review report. Most participants considered the post-project review to be wrongly situated in the PM life cycle at closure-phase.

Project managers have often started working on other projects that makes it difficult to remember events and LL from previous projects.

On the subject of KM, three project managers mentioned the importance of management realizing that documenting LL was not a “tick the box” procedure. Also mentioned was that management needed to use the existing documented LL information in order to support KM. Participant E reflected on this in the in-depth interview and said: *“The project managers are responsible for documenting and gathering LL information – but they need to have the sense that this information is being used for further improvements – not just for the sake of documenting LL”*.

When asked about their view on ISO 21500 based on their PM experience and knowledge, most of the project managers had a positive attitude towards the standard and said it could serve as a framework for a systematic implementation of PE and LL in projects. Other benefits mentioned was the importance of having one single methodology that is easily understood by everyone.

Key results summarized from the group interview and in-depth interviews indicate similar findings. The PE and LL processes are commonly considered to be the most challenging processes, in addition to the KM process according to the project managers’ perspective. PE criteria was mostly based on time and cost and not in place resulting in LL in databases sometimes being perceived as a collection of general information with limited value and which was rarely being used for future projects. Informal LL processes were often embedded in other processes and knowledge often transferred as “learn by doing” according to procedures. Identification of LL and documentation were often based on individuals and were not being systematically stored or transferred to other projects.

5. DISCUSSION

There is a considerable potential for improvements in learning from projects within ISO certified organizations based on efficient and disciplined processes. The PE, LL and KM processes are considered to be challenging and not as effective as could be expected in ISO certified organizations. Reasons may vary but considering that ISO certified organizations provide employees with a balanced range of tacit and explicit tools one could expect the processes not to be as challenging as results indicate.

This leads to speculation about the real root causes of the main challenges. Organizations might need to ask themselves critical evaluation questions prior to the initiation of the PE process. The critical questions could be based on the project character or classifications, depending on the type of information the processes are expected to provide. Results indicate that root causes might be found early in the initiation of the PE process. Therefore it might be important to base PE criteria on project objectives and definition of primary use and users of the information, in order to collect relevant and valuable LL for future projects. This might also reflect the participants’ perception on not knowing what LL information to collect and not knowing the value for future projects. Reasons could also be that when LL is not embedded in processes, it is often based on individual evaluation and experience, resulting in different representations and making it difficult to transfer knowledge. This could also explain why the LL process often ends after documentation, where the information lacks organizational significance and relevant links to other projects.

Organizations operating in competitive environment need to be flexible and have the competence to learn faster from projects than their competitors. Adaptive and change-driven project life cycles may respond to a high level of change and on-going

stakeholder involvement. Adaptive methods are iterative where the scope of the project is broken down in smaller components into a set of highest priority requirements where the most valuable work is performed. This approach could be supported by Deming’s cycle of improvement which provides a CI focus in every task (Deming, 1986). This could provide efficient learning procedures and inquiries on things that were not accounted for within the project scope and planning phase. This iterative and Agile mind-set might fit into a PM standardized ISO 21500 value-creating framework, serving as an adaptive life cycle enhancing the utility and use of evaluations and continuous LL with iterations in every process.

This is more or less the same conclusion (based on an organizational level) as Sutherland, Jakobsen & Johnson (2007) suggest for combining iterative Agile methods with standardized methods in mature organizations (Level 5). Their results showed a significantly improved performance while maintaining PMMM compliance. Managing complexity requires process discipline while managing change requires adaptability. High PM maturity provides process discipline and Agile methods enhance adaptability, using Lean methods for identifying improvement opportunities. This approach could be applied in ISO 21500 serving as an adaptive framework for the systematic implementation of PE and LL in projects, based on the fundamentals of the PDCA cycle of improvement.

Learning processes often assume that LL identification, retention and dissemination are central to the learning. Project teams could therefore be encouraged to constantly be conscious of *lessons learning* as a *community of inquiry* throughout the project lifecycle (Jónasson, Gíslason & Ingason 2010). The PDCA cycle could furthermore help individuals to understand their strengths and weaknesses in the learning process. One of the main criticisms is that it ignores the organizational or individual motivation to learn. Without motivation or drive, it is unlikely that individuals will have any incentive to learn. This could be the reason why leadership and culture are often considered deciding success factors when implementing PE and LL in projects. When employees do not recognize the value in conducting LL review after project closure it might be demotivating and the reason why they are not willing to spend time and effort in reflecting on project LL.

5.1 Answers to the research questions

Research question number 1 in Section One, was aimed at understanding how ISO certified organizations handle PE and LL processes to benefit and support CI. The purpose of research question number 2 was to investigate if ISO 21500 could support implementation of PE and LL in projects in a structured and systematic way. The answers to the two research questions are as follows:

1. "What informative tools and techniques are currently used for PE and LL in ISO certified organizations and what are the perspectives on the subject?"

Quality Mananagers			Project Managers		
Categories	Tools and techniques	tacit/explicit	Categories	Tools and techniques	tacit/explicit
LL/KM	Meetings	(tacit)	LL/KM	Meetings	(tacit)
PE/LL/KM	Formal CI project process	(explicit)	PE/LL/KM/PM	Formal PM process	(explicit)
PE/LL/KM	Audit / Defect reports	(explicit)	PE/LL/KM/PM	Post project reviews	(explicit)
LL/KM	Consulting individuals	(tacit)	LL/KM	Consulting individuals	(tacit)
PE/LL/KM/PM	Intranet/Project database	(explicit)	PE/LL/KM/PM	Risk analysis	(explicit)
LL/KM	Visual Boards	(tacit)	PE/LL/KM/PM	Checklists	(explicit)

Same as Table 2 - Examples of tacit and explicit tools and techniques

The most used procedures are explicit knowledge sharing tools and techniques for PE and documenting LL information. Quality managers use a more balanced set of procedures with an emphasis on community learning, documentation in databases and transferring LL through embedded processes. Project managers use more of explicit tools and techniques with an emphasis on individual documentation and transferring LL mostly by consulting individuals. All participants acknowledged the importance of using informative tools and techniques – but agreed there is still a long way to go in finding the best way of evaluating and transferring LL into future projects. Examples of tacit and explicit tools and techniques are summarized in Table 2.

Results from the group interview with quality managers and in-depth interviews with project managers indicate similar findings on the subjects. The PE and LL processes are commonly considered to be the most challenging processes, in addition to the KM process according to the project managers' perspective. PE criteria was mostly based on time and cost and not in place resulting in LL in databases sometimes being perceived as a collection of general information with limited value and which was rarely being used for future projects. Informal LL processes were often embedded in other processes and knowledge often transferred as "learn by doing" according to procedures. Identification of LL and documentation were often based on individuals and not systematically stored in databases or transferred to other projects.



Same as Figure 3 - Quality managers' perspectives



Same as Figure 4 - Project managers' perspectives

2. *"Can ISO 21500 be used as adaptive framework for systematic implementation of PE and LL in projects?"*

The ISO 21500 can be used as an adaptive framework for systematic implementation of PE and LL in projects. Results show the post-project review is considered by some participants to be wrongly situated in the project life cycle. It could therefore be important to focus on each and every PM process as a learning initiative with a specific learning objective and definition of the information use and users, when implementing the PE and LL in projects.

The iterative Agile mind-set can fit into PM standardized ISO 21500 serving as a value-creating framework with constant LL iterations throughout the project life cycle. Combination of processes from different methodologies could optimize the learning processes based on the fundamentals of the PDCA cycle. Managing complexity requires process discipline while managing change requires adaptability. High PM maturity provides process discipline and Agile methods enhance adaptability, using Lean methods for identifying improvement opportunities.

6. CONCLUSION

This paper has investigated whether ISO 21500 can be used as an adaptive framework for systematic implementation of PE and LL in projects. Furthermore, the paper has identified the most used informative tools and techniques in ISO certified organizations and the main perspectives on the subject.

A disciplined ISO standardization methods combined with adaptable iterative methods, can fit into ISO 21500, serving as a value-creating framework with learning iterations in each PM process. The PDCA cycle could be the building block for constant iterations in processes throughout the project life cycle.

Research results highlight that PE, LL and KM processes are challenging in ISO certified organizations. It is possible that LL could be perceived as a short-term concept instead of long-term whereas criteria is mostly based on short-term measurements such as time and cost while long-term improvements are often harvested long time after project closure. Employees might therefore not recognize the benefits or have the motivation to review LL without management committing to the process and creating supportive learning culture. There are some indications that databases in ISO certified organizations may store change management documents and histories of audits, without being reused in future projects. The explicit and tacit LL information could be considered as one of the most valuable organizational resources if reused in future projects.

The transfer of LL from one project to the next should not be considered as a single process gathering organizational experience and knowledge to store in databases. It would be interesting to investigate further how integration of organizational processes could contribute to learning and CI in mature organizations.

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APPENDIX A

List of glossary of acronyms frequently used.

BM:	Benchmarking
BP:	Best Practice
CI:	Continuous Improvements
ISO:	International Organization for Standardization
IPMA:	International Project Management Association
KM:	Knowledge Management
LL:	Lessons Learned
OL:	Organizational Learning
PDCA:	Deming Cycle for Improvement (Plan–Do–Check–Act)
PE:	Project Evaluation
PG:	Process Groups
PM:	Project Management
PMBok:	Project Management Body of Knowledge
PMI:	Project Management Institute
PMMM:	Project Management Maturity Model
SEI:	Software Engineering Institute
SG:	Subject Groups
TQM:	Total Quality Management
QM:	Quality Management