# DISSEMINATING PROJECT LEARNING IN CONTRACTING FIRMS

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## ABSTRACT

The construction industry is highly competitive with its clients demanding continuous improvement and highly innovative construction projects that are delivered to key performance indicators such as less time, reduced costs, high quality and fewer accidents. Capturing and disseminating lessons learned is one way of fostering project learning which in turn can contribute positively to continuous improvement. This paper proposes a roadmap that can foster project learning by addressing the challenges of capturing useful lessons learned and disseminating these in an effective manner.

The data collection was done in three stages. Firstly a questionnaire survey was sent to the top 122 UK construction contractors to understand current lessons learned practices; this included what the processes were, why they were used, how they were carried out, their usefulness and the perceived barriers to dissemination. Secondly, nine interviews were undertaken to gain a more detailed understanding of companies' lessons learned practices and the challenges experienced. The interviewees consisted of individuals based in the head offices of construction contractor organisations with responsibility for lessons learned practices. These respondents therefore provided the corporate view of what the organisations did. Thirdly, three focus group interviews where held with site based project teams. This provided a comparison between the corporate views and what happened on construction sites.

The roadmap proposed addresses the needs of both corporate and site teams for (1) identifying what is relevant, (2) the processes that should be adopted, (3) the content and format of lessons learned, (4) the types of repositories, (5) the dissemination mechanisms and (6) the feedback loops. Each of these stages is accompanied by checklists to provide examples of typical tools.

**Keywords:** Dissemination, Lessons Learned, Roadmap

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## INTRODUCTION

The construction industry, like other commercial sectors, is driven by the need to improve profitability and client satisfaction. Continuous improvement is therefore expected to form an important part of all company processes. Public clients are also increasing their demands for savings in their construction costs. For example, the UK government has stated their expectation to reduce construction costs by 20% by the end of the 2015 parliament (Cabinet Office, 2011). One way of achieving these saving is by being smarter in delivering projects and reducing wasted effort; this may be accomplished by exploiting the lessons learned from previous projects.

Many companies undertake some form of lessons learned. These may be either at intermediate stages e.g. stage gate project reviews or at the end of project e.g. post project reviews, post mortems, etc. However, as highlighted by authors such as Gibson et al. (2007), Bakker et al. (2010) and Carrillo et al. (2011), the transfer of learning between projects is problematic. These authors have concluded that the potential for improvement have not been realised. Organisations have an increasing number of competing priorities; the focus is on winning new work and completing existing projects. Little attention is given to looking back, analysing performance and integrating lessons learned into new projects to maximise its reuse potential. The motivation for this paper is therefore is "Why are lessons learned so problematic?" and "What are the reasons that they are not effective?" Hence, the aim of this paper is to provide a structured approach for companies to improve their lessons learned practices; the scope extends from identifying which lessons are most relevant through to capturing and disseminating those lessons learned.

This paper introduces a Project Learning Roadmap that is expected to improve companies' lessons learned practices. It draws both on literature and a multi-method data collection approach. The study focuses on the practices of large UK construction contractor organisations. The paper is divided into six sections including this Introduction. Section two provides the theoretical base for justifying why lessons learned are important. The third section describes the research approach adopted and the data collection methods used. The fourth section explains the findings and the fifth section describes the development of Project Learning Roadmap. Finally, conclusions are drawn whilst highlighting the limitations to the work undertaken.

## THE IMPORTANCE OF LESSONS LEARNED

Weber et al. (2001) provide both a historical perspective to lessons learned and a good critique of the numerous definitions available. They propose Secchi et al. (1999) as providing the most complete definition. Secchi et al. (1999) define lessons learned as *"A lesson learned is a knowledge or understanding gained by experience. The experience may be positive, as in a successful test or mission, or negative, as in a mishap or failure. Successes are also considered sources of lessons learned. A lesson must be significant in that it has a real or assumed impact on operations; valid in that is factually and technically correct; and applicable in that it identifies a specific design, process, or decision that reduces or eliminates the potential for failures and mishaps, or reinforces a positive result."* This definition emphasises lessons can be positive or negative and that they must have impact.

Lessons learned are able to provide competitive advantage if used properly. They also overlap with the broader areas of knowledge management and organisational learning which helps promote innovation depending on the organisation's absorptive capacity (Cohen and Levinthal, 1990). Knowledge management is the identification, optimisation and active management of intellectual assets to create value, increase productivity and sustain competitive

advantage (Webb, 1998). In this context, lessons learned are the intellectual assets used to create value based on past experience. Likewise, lessons learned contribute to the organisation learning agenda. Numerous authors have discussed the need for organisational learning such as Argyris and Schon (1978), Fiol and Lyles, (1985) and Senge (1993).

Several sources of literature recommend how lessons learned should be conducted. However, as Fisher et al. (1998) and Weber et al. (2001) point out, lessons learned appear to be having limited impact despite organisations recognising the significant role they can play.

Research in the construction industry have largely focused on the loose use of the terms "lessons learned" as a way of dissemination outcomes of bodies of work. Thus, although a few articles use the terms lessons learned in their titles, many of these are not "lessons". These document research in a particular domain that is unlikely to be repeatable in another domain. Within the construction industry, a few authors have addressed the issues of lessons learned with regard to specific industry problems such as site productivity (Hsieh, 1998), reducing construction duration (Chan and Kumaraswamy, 2002), benchmarking (Costa et al. 2006) use of IT applications (Staub-French and Khanzode, 2007; and Khanzode and Fischer, 2008), etc. Very few have focused on lessons learned processes, how these can be applied to construction and why these have not fulfilled expectations. Kartam (1996) introduced a prototype for constructability improvement but this has not had any take up. Two of the most relevant works is that undertaken are by Carrillo (1995) Gibson et al. (2007); both are based on North American studies. Carrillo (1995) investigated the lessons learned practices of Engineering, Procurement and Construction firms in Canada and made recommendations on how these can be improved. Gibson et al. (2007) conducted a study of organisations belonging to the US's Construction Industry Institute. The authors suggest three key steps to (1) Assess the current state of lessons learned program; (2) Establish a vision for the lessons learned program; and (3) Define a process for how the organisation will reach the vision. They conclude by proposing the adoption of a Maturity Model matrix to improve the process. The Maturity Model Matrix comprises seven characteristics that can be assessed. These include leadership, lesson collection, lesson analysis, lessons implementation, resources, maintenance and improvement and culture.

## RESEARCH METHODOLOGY

Creswell (2009) recommended a qualitative approach for this type of study which seeks to understand the abstract nature of research. Fellows and Liu (2008) also recommended a number of suitable data collection methods when using a qualitative approach e.g. questionnaire surveys and interviews.

Data collection was undertaken in three different phases as shown in Figure 1. Stage 1 was used to investigate UK contractors' view of the lessons learned processes. Kotari (2004) recommended questionnaire surveys as a way of accessing a large amount participants thereby leading to dependability and reliability of the results. An electronic questionnaire survey was sent to 122 UK construction companies in the New Civil Engineer's Contractors File 2010 (New Civil Engineer, 2010). The target respondents were those in middle manager positions who could offer a view of companies' approaches to lessons learned; they included managers in the areas of business improvement, knowledge management, value and quality assurance, procurement and technical services. The main areas of questioning were as follows:

- Reasons for conducting lessons learned;
- Usefulness of the methods and tools used;
- Participants in lessons learned;

- When lessons learned are conducted; and
- Access to lessons learned.

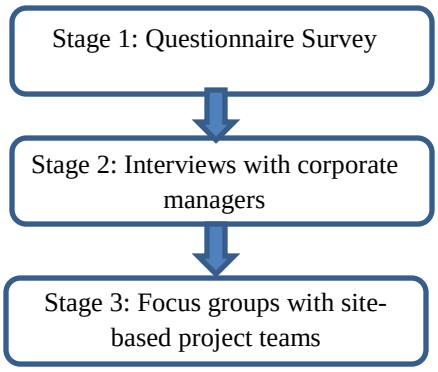


**Figure 1: Three stage Data Collection**

A total of 41 responses were obtained thereby giving a response rate of 34%. The results of the questionnaire survey are discussed in the next section.

Stage 2 of the data collection was based on interviews with a selected number of the questionnaire respondents who had signalled their willingness to be interviewed to provide a more detailed explanation of their company's approach to lessons learned. In total nine managers were interviewed. The findings from the company's questionnaire responses were analysed to investigate the key themes to be addressed in the interviews. The key themes addressed at the interviews were:

- Current practices for recording and disseminating lessons learned; and
- Barriers and Improvements for current process.

Stage 3 investigated the views of the site-based project teams with regard to their perspective on the company's provision of lessons learned. Sillars and Hallowell (2009) recommended the use of focus groups as a mechanism for seeking consensus on a large group of participants. This stage therefore provided triangulation between the company and site personnel perspectives. Both the findings of the questionnaire and the results of the Stage 2 interviews were used to inform the questions asked. Three focus groups were held; the participants' organisations had taken part in the questionnaire survey and were proposed by the Stage 2 interviewees who were willing to let the research team interview one of their project team. Each focus group consisted of between five to seven personnel and lasted 1.5 to 2 hours. The focus groups were made up of Project Managers, Site Managers, Site Agents, Quality Managers, etc. The key lines of questioning covered:

- Current lessons learned processes activities; and
- The challenges of conducting lessons learned and how they could be improved.

Based on the above data collection, a Project Learning Roadmap was developed. The Roadmap drew on the data collected from the three stages to provide checklist for companies to use.

## RESULTS AND DISCUSSION

The results of each of the three modes of data collection are described below.

### Questionnaire Results and Discussion

The questionnaire targeted a wide audience to obtain the views of a large population; a summary of the key results follows.

*Reasons for conducting lessons learned*

Figure 2 shows the main reasons cited for conducting lessons learned.

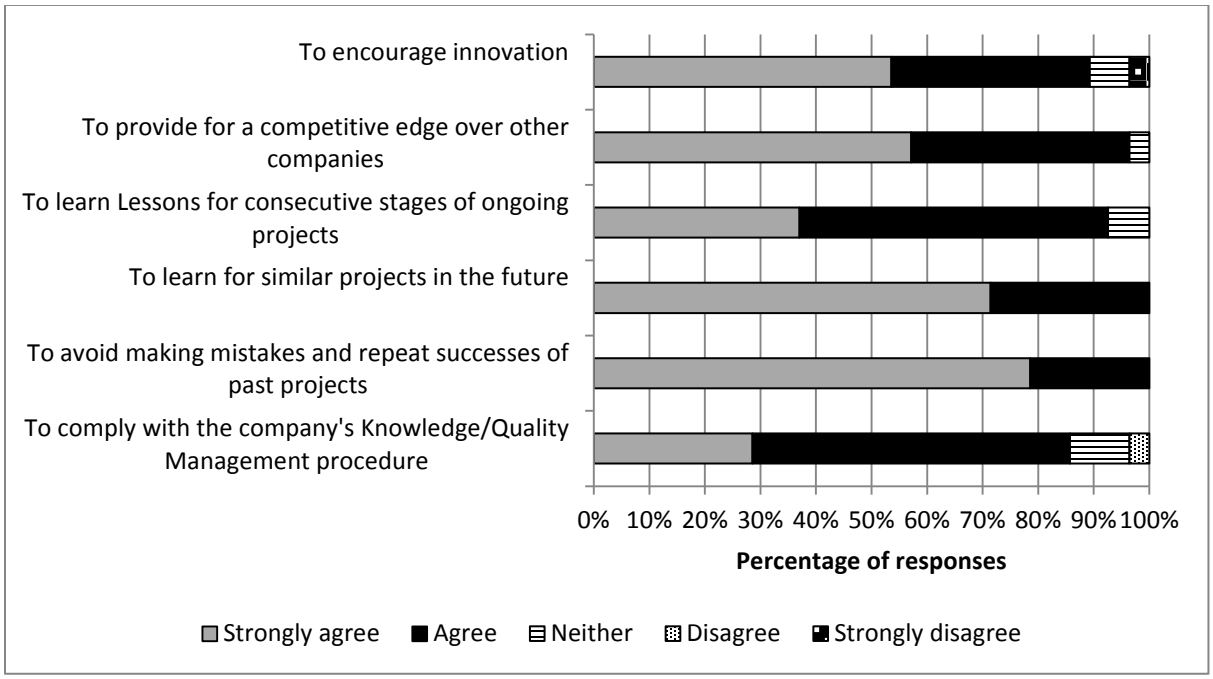


**Figure 2: Reasons for conducting lessons learned**

The results show respondents believe that the main reasons for conducting lessons learned are (1) to learn for similar projects in the future (100%); (=1) to avoid making mistakes and repeat successes (100%); and (2) to provide a competitive edge over other companies (96%); and (3) to learn lessons for consecutive stages of ongoing projects (93%). The above shows that there are a number of different reasons for undertaking lessons learned. Thus, any lessons learned systems should ensure that these are addressed.

*Usefulness Of The Techniques Used*

Table 1 shows the respondents' view of the techniques used to capture lessons learned.

**Table 1: Usefulness of methods and tools techniques**

| Technique | Percentage commonly used | Percentage most informative |
|---|---|---|
| Post project reviews | 68 | 52 |
| Company intranet/ extranet | 64 | 40 |
| Face to face meetings with project team | 62 | 52 |
| Telephone conversations | 38 | 33 |
| Brainstorming | 32 | 54 |
| Knowledge repositories | 32 | 53 |
| Minutes of meetings | 30 | 26 |
| Project files | 30 | 20 |
| Communities of practice | 26 | 56 |
| Technical forums | 22 | 42 |
| Skills and expertise database | 20 | 30 |
| Video conferencing | 9 | 28 |

The most commonly used practices for lessons learned activities include post project reviews (68%), company intranet/ extranet (64%), and face-to-face meetings (62%). Apart from these three tools and techniques, the rest are not widely used. The top five ranking most informative methods included two of these, post project reviews (52%) and face-to-face meetings (58%) (both =4). The top three most informative categories were Communities of Practice 56% (1), brainstorming 54% (2), knowledge repositories 53% (3).

*Participants in Lessons Learned*

Table 2 shows the respondents' rating the attendance of staff to lessons learned sessions between 1 (Never) and 5 (Always).

**Table 2: Participants of Lessons Learned**

| Likelihood of participation | Rating Average |
|---|---|
| Project manager | 4.6 |
| Contract manager | 4.3 |
| Quantity surveyor | 4.0 |
| Design co-ordinator | 4.0 |
| Commercial manager | 4.0 |
| Design and Build manager | 3.8 |
| Health and Safety co-ordinator | 3.7 |
| Regional managers | 3.6 |
| Client's representatives | 3.3 |
| Sub-contractors' representatives | 3.1 |
| Business improvement manager | 3.1 |

The results show the core project team (project managers, contract manager, etc.) were most likely to attend lessons learned sessions but those members considered as peripheral to the core project team such as business improvement managers, sub-contractor representatives (surprisingly!) and client's representatives were less likely to participate.

*When Lessons Learned Are Conducted*

Figure 3 shows when project teams captured lessons learned. The results show that lessons learned are not confined to any particular project phase. However, it is noted that a lot of informal lessons are captured during the bidding stage whereas formal lessons learned are captured at the end of the project.

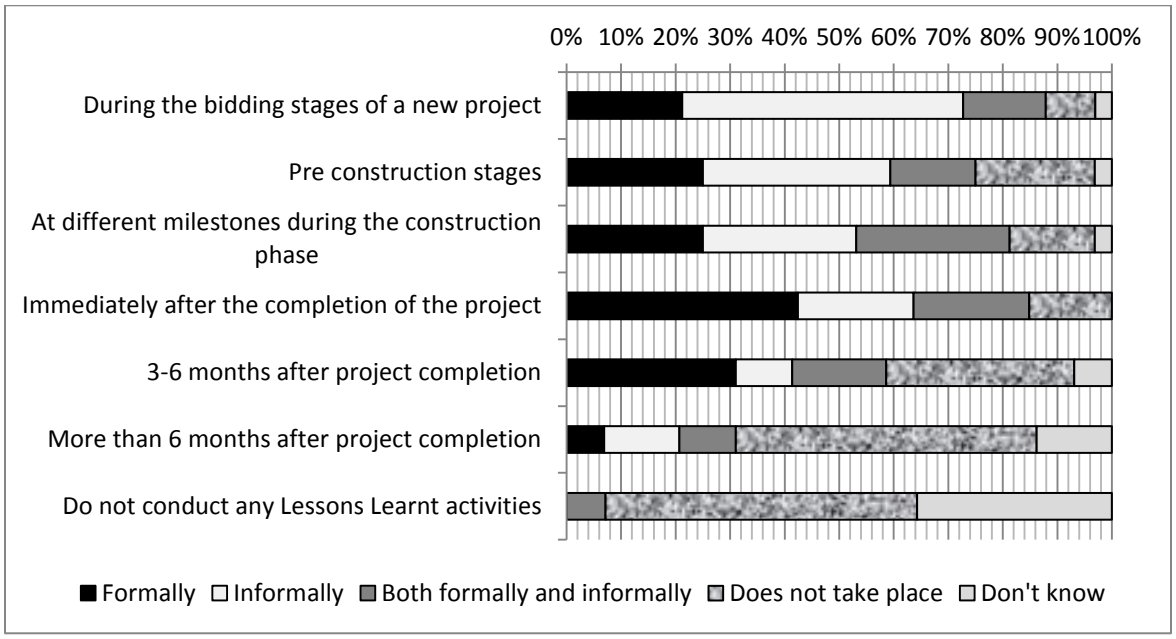


**Figure 3: Time of Capturing Lessons**

*Access to Lessons Learned*

Figure 4 shows accessibility to lessons learned; it shows most companies have open access to their lessons.

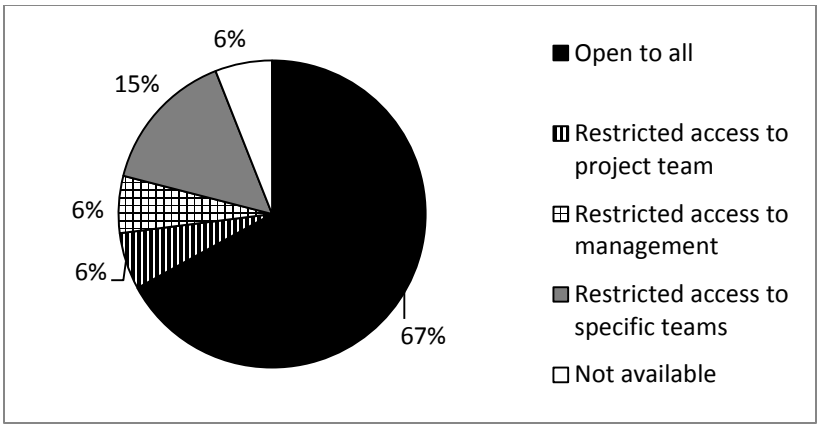


**Figure 4: Accessibility to lessons learned**

The questionnaire results show current practice; this was supplemented by interviews from company personnel as shown in the next section.

**Interview Results and Findings**

Interviews lasting one to two hours were held with the nine participants shown in Table 3. The interviewees were all managers based at regional or head offices. They were able to provide a more detailed account of company practices for lessons learned and the issues arising.

**Table 3: Interviewees' Position**

| Company | Position | Approximate Annual Turnover (£M) |
|---|---|---|
| A | Business Systems Manager | 1000 |
| B | Chief Engineer | 1700 |
| C | Head of Value | 7600 |
| D | Head of Business development and IT | 100 |
| E | Business Development Director | 10000 |
| F | Knowledge Manager | 1600 |
| G | Associate Director | 900 |
| H | Managing Director | 100 |
| I | Business Development Director | 1200 |

All interviewees were very passionate about discussing lessons learned and recognised the need to improve. Interviewee G stated they undertook lessons learned to improve efficiency by cutting out the learning curve. He stated *"We are reinventing the wheel in every part of our business. Region [x] will experience a difficulty and another office can experience the same problem"*.

*Current Practices for Recording and Disseminating Lessons Learned*

*Process:* None of the companies had a dedicated system that was labelled "lessons learned". Instead, the interviewees described a number of different initiatives; some of which fall under the broad umbrella of knowledge management e.g. discussion forum. The practices were varied from individuals visiting project sites to capture experiences on paper to numerous forms that promoted the collation of lessons learned such as Post Project Review Forms, Project Data

Capture Forms, Lessons Learned Cards, Activity Sheets, Best Practice Sheets, End of Contract forms, etc.

*Use of ICT:* Many of the lessons learned outputs are placed on ICT systems e.g. spread sheets, databases, the intranet, bespoke systems, etc. Examples of these are Interviewee I's 25 notebooks of Top Tips that is transferred onto the company's server, systems administered by international facilitators to send global requests to known experts and communities of practice, numerous project folders stored in different parts of the company's intranets, etc. Interviewee G also described his company's use of wikis to exchange lessons. He stated that this had a much larger participation rate than the use of previous Best Practice documents.

*Retrieval Process:* Whilst some companies are embracing ICT technologies, others highlighted companies' archaic approach to ICT. In several cases company intranets are seen as a dumping ground that makes it difficult to deliver value. Interviewee I stated *"Staff do not bother looking at it [the intranet] because, as in all intranets, the amount of information on there is vast and that's probably the problem with capturing knowledge because it goes on the intranet and no one can get at it."*

*Personal Interaction*: Several of the interviewees stressed the importance of people-to-people interaction including visiting site and speaking to people, the use of Communities of Practice to learn from one another, forums to discuss project issues, spending time with existing project teams ahead of new projects, etc. Interviewee H emphasises *"A lot of the knowledge is never committed to paper, it is never in the records"* and thus they encourage communication between individuals.

*Barriers to Current Process*

The barriers highlighted are multi-faceted. A summary of some of these are:

*Process:* Whilst many companies accept lesson learned are best done at project stage gates, there are still many that rely solely on the project's completion to generate lessons learned. This means that many key project staff are not available. Because of the time requirement, one company allows one member of staff to produce a project review, solely on his view, from which lessons are drawn. These lessons then remain within the region and are not shared externally. Another company had a contractual requirement to produce an agreed number Best Practice sheets each month. This meant staff were pressured into generating more quantity than quality.

*Reluctance to obtain external advice:* Several interviewees described the reluctance to accept help from others; not wanting to share their problems or not willing to learn from other people's mistakes. Some Project Managers were not interested in documenting lesson learned because it reflected poorly on them. There is also an ingrained culture of looking forward to new projects, not back to completed projects.

*Duplication of Workload:* Interviewee I stated a lot of the lessons learned already exist in numerous other reports, but in a different format because they are required for a different audience, the typically management board. Site staff therefore resent the extra administrative burden of having to produce similar information in a different format for a different audience.

*Lack of Perceived Value:* Companies do not always recognise the value of lessons learned and in some cases only do them when requested by clients. In other cases, extra overheads are needed to police staff to do the lessons learned. Also, there are no formal processes to encourage new teams to consult previous lessons learned. Interviewee H was convinced that lessons learned are project-specific. In his view, only repeat projects could benefit from lessons learned. This

means there is little enthusiasm to invest time and expenditure for reviews that are seen as having little value.
*Internal Competition:* Interviewees A and G cited internal competition as a key barrier to sharing lessons. One business unit would never ask another business unit for advice or help. It also means that failures are never discussed.
*Legal Issues:* Interviewee E's legal department had advised them to word lessons learned very carefully. They were not allowed to identify causes of problems because of the potentially negative consequences of using the UK's Data Protection Act. This means that there is no record that thoroughly reflects the lessons learned context.

Generally, the interviewees felt their companies have provided a wide range of corporate tools for capturing lessons learned. However, they acknowledged that their processes are not enforced and they still have a long way to go in finding the best way of communicating those lessons learned with their employees. This is where the next batch of data is relevant. It highlights the needs of the site-based project teams and their views of the corporate systems provided.

**Focus Groups**

Three focus group meetings were held. This provided a different perspective to the views of the office-based managers. The meetings involved the employees from the same companies as interviewees A, F and G.

*Current Lessons Learned Processes*
*Personal Interaction:* The three focus group participants were very strongly in support of the need to learn lessons, not by the use of ICT systems, but using personal interaction such as speaking to more experienced personnel or via team meeting. For example, all three groups had staff who had visited similar projects before commencing on site to learn about the project. Junior staff were comfortable about learning from more experienced members if they had previously met; they would not wish to contact someone that did not know or post questions on various ICT forums. Although company ICT systems, mainly the intranet, were not highly regarded, two of the groups mentioned Google was a greater source of information, once they know what they were looking for.
*Ad hoc use of tools:* Two of the three participants agreed they knew about the range of lessons learning initiatives available, provided by the head office teams, but those tools were not used and there was no enforcement. For instance, one company had lessons learned cards and Activity Sheets for disseminating lessons but staff preferred to circulate emails with the project team because this was considered a simpler, more transparent process.
*Communication of results:* Two groups were aware of lessons learned sessions undertaken by senior management but they were disappointed that none of this filtered down to the site staff. In addition, there was the perception that these sessions were heavily focused on high-level commercial issues not on site-based issues. Instead, teams depended on key staff such Contracts Manager (who had an overview of multiple projects) to disseminate any lessons learned informally; they were the link between site teams and the head office. This was done in an ad hoc manner because the perception was that many Contract Managers would not want to highlight perceived failures.

*The Challenges of Conducting Lessons Learned Activities*

These were numerous and a subset is described below.

*Inadequate communication:* This is a major issue; it is twofold. Firstly, there is a difference between what the site teams see as useful and what the corporate systems demand. Two site teams were aware of only some of the facilities offered by the head office to promote lessons learned, the third was completely unaware. For example, what head office thought was useful was considered not relevant. Secondly, there is a lack of transparency in the outcome of some of the processes site team undertake e.g. completing a requisite number of lessons learned cards. These are considered to disappear into a "black hole"; they are aware that meetings occur at regional level but they are not party to the outcome. One suggestion is that these collations should at least be accessible to the project managers

*Silo Environment:* Site teams operate in a silo environment with little contact with other projects within their business units and have remote and tenuous links with the head/regional offices. They would highly value more opportunities to interact with other site teams who may have similar problems.

*Little Value Added:* The perception is that lessons learned documents provide little added value; site teams are being asked to generate documents but they see no evidence of them being useful and they do not have access to the outcomes.

*Time Constraints:* Site teams considered there to be few opportunities to share lessons. The expectation is that you get on with the job and everything else is peripheral. For this reason, any dissemination activity e.g. post project reviews only occur if forced.

*Too Process Driven:* Site Teams B and I thought their companies were process-driven, but in the wrong sense; it was more important to complete the correct documents and submit them in the right format than it was to have a look at the "big picture". Associated with this was the sense that head office staff should have a greater awareness of what was happening on site.

*Culture:* This is manifested in a number of ways. Site team G was convinced that there needs to be a change in mind-set to encourage others to learn and to be willing to offer/take advice. *"People do not like being told what they are doing is wrong so the sharing process falls down"* (site team A). For site team F there is a culture of blame when things go wrong and the sense that some senior project managers believe "knowledge is power". There is also needs to be support from the senior management team to support learning. This is very detrimental in company G where competitiveness between business units means there is a disincentive to share learning.

The above statements show that there is lot to be done to encourage site teams to adopt corporate lessons learned processes. Whilst none of these are new issues, it shows that organisations are yet to address these challenges. There is clearly a lack of communication and transparency between site teams and head-office teams that needs to be addressed. There is also a strong emphasis on people-to-people dissemination despite corporate office providing what they regard as a set of useful tools. Moreover, a culture of encouraging the collection and dissemination of lessons needs to be addressed. Time is always a factor but it masks the issue of site teams not recognising the value in collating lessons. To cope with the multifaceted challenges to improving project learning, a roadmap is proposed. This offers a solution that are logical, flexible and scalable without being dogmatic. A roadmap will allow organisations to customise their solution based on individual motivation, priorities and culture.

## A PROJECT LEARNING ROADMAP

The roadmap (Figure 5) was developed based on the literature and data collected from the three main sources; it consists of three main components as follows:

1. The *Key Elem*ents required to bring about change in lessons learned practice;
2. The *Actions* that need to be undertaken by leaders at both corporate and project levels within the organisation; and
3. An *Implementation Guide* which provides supporting advice and information in the form of checklists from which each organisation could choose the best approach for their specific context and needs.

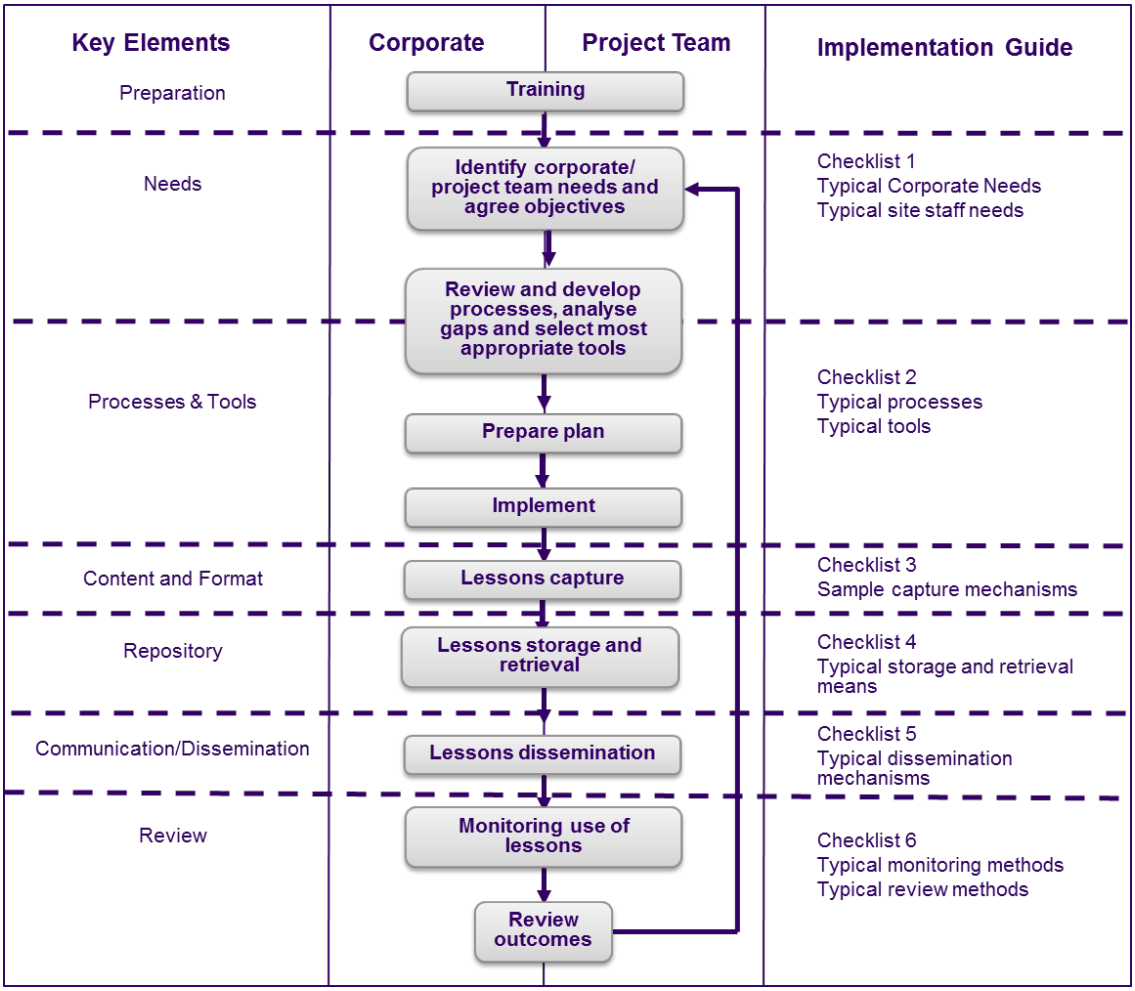


**Figure 5: Project Learning Roadmap**

### Key Elements

The left column addresses the issues raised. These include:

*Preparation:* This ensures all stakeholders are briefed on the importance of lessons learned and why it is of value to individuals and the company. It also provides a common understanding of the company's approach to lessons learned and the opportunities available.

*Needs:* This helps to eliminate the silo effect where the head office requests data for which the site team does not see any value. This attempts to ensure the data collected is relevant to both parties.
*Processes and Tools:* The interviewees and site team highlighted the ad hoc implementation of processes. Site teams disregard the processes in place because they have no ownership. This step assists in making ownership common with a recommended list of tools to be used.
*Content and Format:* Different types of content are needed and companies need to agree what contents are useful as lessons learned and the most appropriate format to collect and disseminate those lessons.
*Repository:* There is little doubt that ICT can play a valuable role but it is not yet exploited because of the perception that everything is contained within the "black hole" of the intranet. There are now numerous ways to index and tag documents to make access easier; companies need to be more intelligent in how their lessons learned can be stored and accessed.
*Communication and Dissemination:* This helps to push lessons learned to the people who need it most. This stage recognised that lessons learned generate value only if they are accessible and re-used.
*Review:* A review process is required to ensure that the lessons are re-used; or according to Secchi et al. (1999) they have a real or assumed impact.

**Actions Required and Implementation Guide**

In addition to identifying Key Elements, the Roadmap also identifies specific actions that need to be undertaken. These Actions, in the form of a flow chart, are aimed at ensuring there is a structured and coherent manner to address the collection and dissemination of the lessons learned. Following the advice of Von Krogh et al. (2012), it comprises two halves as a reminder that those activities are required to address both the corporate and site teams' needs.

The Actions are also supported by an Implementation Guide. This has been collated for each Key Element and comprises checklists that were obtained from the data collection phases. Where relevant, the checklists indicate whether the items are suitable for small and medium-sized organisations (SMEs) or are more suited to large organisations. The European Commission's (2003) definition of SMEs (turnover less than €50m) was used. For example, under Processes and Tools, the checklist provides a list of tools appropriate to company size. Table 4 shows an excerpt from the checklist for tools. It is envisaged that the Roadmap, due to its flexibility and checklist would guide companies to improving their lessons learned practices.

**Table 4: Excerpt from checklist for Tools available**

| Typical Tools Available | SMEs | Large Orgs. |
|---|---|---|
| Post Project Reviews | X | X |
| Community of Practice | | X |
| Electronic Discussion | | X |
| Document Management Systems | X | X |
| Knowledge Mapping Tools | | X |
| Project Databases | X | X |
| Project Extranets | | X |
| Skills Yellow Pages | | X |
| Text Mining Tools | | X |
| Video Conferencing | | X |
| Workshops | X | X |

## CONCLUSIONS

The research was aimed at providing construction organisations with a better understanding of the issues surrounding lessons learned and a means of improving their processes in this area. This resulted in the subsequent development of a roadmap for organisations to use when reviewing their lessons learned activities in order to improve their take up and effectiveness. To do this data was collected about current lesson learned practices. This was supplemented by interviewees with head office personnel and focus groups with site-based project teams to gain more in-depth views of existing practices and barriers to the dissemination of lessons learned. It was quickly realised that many of the dissemination issues were impacted by what lessons learned were collected, how they were collected and disseminated. Thus, to improve dissemination, a root and branch review had to be undertaken. With this in mind, a Project Learning Roadmap was developed. This encourages companies to look at their entire lessons learned process with the aim of collating useful lessons so that there is improved dissemination and re-use. The Roadmap consists of three main components. Key Elements describe the process stages, Actions cover the individual tasks that need to be done and an Implementation Guide proposes a check list of options based on the company size to allow scalability of solutions.

A limitation of the study is that the interviews and the focus groups can be considered as biased since they were selected from the list of respondents who completed the questionnaire. Conversely, this can be considered as an advantage because it provides the basis for triangulation of the results obtained. Another limitation is the evaluation of the Roadmap. This will be the next stage of the research; it will be conducted using workshops with process managers and project teams. The participants will consist of those who took part in the Stages 2 interviews, Stage 3 focus groups and others not yet consulted to provide unbiased views of the approach, contents and ease of use.

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