

1

Introduction

This chapter briefly introduces the background and justification for the 'live' capture and reuse of project knowledge. It outlines the importance of the methodology developed and provides a summary of the book's objectives and a guide to its contents.

1.1 Background

According to Drucker (1993), we have entered the age of the knowledge economy where knowledge has sidelined both capital and labour to become the 'sole factor of production'. In a knowledge economy, knowledge is regarded as the single most important asset of organisations (Stewart, 1997). An organisation's competitive advantage lies in the knowledge residing in the heads of its employees and the capability to harness the knowledge for meeting its business objectives, for continuous improvement and for avoiding the repetition of past mistakes (Davenport *et al.*, 1997; Demarest, 1997; Drucker, 1998; Bollinger and Smith, 2001). Related to this, some companies have started to audit the value of their knowledge and include this information in the annual report to stakeholders (Davenport *et al.*, 1997).

Given the growing importance of knowledge towards the success and even the survival of an organisation, it is not surprising that the significance of a systematic or organised knowledge management (KM) approach is being increasingly recognised. KPMG's (2003) survey results revealed that the KM practice in the organisations surveyed had improved from one mainly characterised by the lack of an established implementation strategy in 1998 to one approaching a higher maturity level with greater board/management support in 2002/2003. In the context of the construction industry, a survey of construction organisations revealed that about 80% perceived KM as having the potential to provide benefits to their organisations (Carrillo *et al.*, 2003). However, in terms of implementation, KM in the industry is still at its infancy with various shortcomings in the practice for managing knowledge relating to and arising from a project (Khalfan *et al.*, 2002). The rationale for this book

hence stems from the need to provide guidance to organisations interested in the management of knowledge within a project environment, such as in the construction industry. It focuses on the 'live' capture and reuse of project knowledge. The reasons for this are discussed below.

1.2 The need for live capture and reuse of project knowledge

The shortcomings of KM practices in construction are closely related to the industry's characteristic of a predominantly project-based industry. A typical construction project involves many people and organisations with different specialisations or expertise forming a virtual organisation for the duration of a project. These projects are usually unique, very complex and require the combined knowledge and expertise of all the project team members in order to deliver the project successfully. Hence, it is not surprising to find that most of the knowledge of the construction industry is generated in projects, by staff belonging to different disciplines, during the process to deliver a custom-built facility in accordance with the client's requirements and business objectives.

The knowledge generated from a project can be about the best practices learned on how to carry out tasks in a more efficient way, or some negative lessons learned which have led to losses and slowed down the progress of the project. The ability to manage the knowledge generated from the projects (including the capture of project knowledge and its subsequent transfer) not only can help to prevent the 'reinvention of the wheel' and the repetition of similar mistakes, but also serves as the basis for innovation and overall improvement. This is crucial in view of the fact that knowledge, particularly the lessons learned, is actually acquired from both the positive lessons learned and the mistakes made at a cost to the organisation. However, recent evidence has revealed that the ability to learn from within and across projects is critical but difficult to achieve (Kamara *et al.*, 2003). This is mainly due to the following reasons:

- In a project, each individual only knows bits of the whole story of the project (Kerth, 2000). Knowledge created in a project is scattered in the memory of various project team members but none retains a complete set of the knowledge created. Therefore, when the virtual organisation or the project team formed for a project is disbanded upon the completion of the project, the knowledge retained by each member is likely to be minimal. Most of the knowledge gained from the project is not shared and is therefore lost.
- Some companies have tried to address the aforementioned knowledge loss problem by conducting post project reviews (PPRs) after the completion of a project so as to capture the knowledge gained or the lessons learned. However, the success of PPRs is often undermined

by the lack of time for conducting it as other project team members may be transferred to and therefore involved in new projects. The effectiveness of PPRs in facilitating the capture and reuse of knowledge learned is also affected by the lack of a suitable format for representing the knowledge captured, and a mechanism for sharing the knowledge captured across projects for reuse. In addition, humans are not without weaknesses and this is particularly so when it comes to memorising facts (Ebbinghaus, 1885). The time lapse in capturing the knowledge gained through PPRs and the current practice of condensing the knowledge into bullet points have led to the loss of important details about the knowledge (Kamara *et al.*, 2003).

- The reassignment of individuals or even the whole project team from one project to another as an attempt to transfer the knowledge acquired makes organisations vulnerable when there is a high staff turnover (Kamara *et al.*, 2003). This is substantiated by the persisting high staff turnover rate, which was 20.2% in 2003, in the UK's construction industry (CIPD, 2004). In addition, this method does not proactively facilitate the sharing of knowledge acquired from a project with others who are not involved in that project. Furthermore, it also suffers from the aforementioned human weakness in memorising facts.
- Reluctance to share knowledge amongst the project team members due to commercial sensitivity, corporate restrictions as to the sharing of information and knowledge (Barson *et al.*, 2000) and the fact that the organisations collaborating in one project may actually compete elsewhere (Kamara *et al.*, 2003).

One potential solution for the above problems could be a methodology that is capable of:

- Facilitating and encouraging project team members to share important knowledge;
- Storing the knowledge learned in a format that helps the sharing and understanding of its content;
- More importantly, enabling the capture and reuse of knowledge in real time (i.e. 'live') or as soon as possible after the knowledge is created to address the knowledge loss problem due to time lapse in capturing that knowledge.

The importance of 'live' capture of knowledge is supported by the recent survey of construction and client organisations involved in PFI (Private Finance Initiative) projects where it was identified as crucial by over 70% of the organisations (Robinson *et al.*, 2004). Kamara *et al.* (2003) contend that a methodology that facilitates the 'live' capture and reuse of project knowledge allows the knowledge captured from the initial stages of a project to be reused at subsequent stages of a project (intra-project

knowledge transfer), and helps to ensure that a more complete set of project knowledge is captured. Using the term 'information' synonymously with 'knowledge', McGee (2004) also states that the capture and presentation of real-time 'information' is crucial in helping to:

- Prevent mishaps from happening owing to the capability to share lessons learned and critical information in real time;
- Seize the opportunities to reuse the knowledge captured by making knowledge available for reuse once it is captured;
- Maximise the value of reusing knowledge, particularly if the benefit brought about through reusing the knowledge is time-related.

A review of the existing literature indicates that a number of research projects have been undertaken to help improve the management of knowledge in construction and other project-based industries. These research projects focused only on either specific types of knowledge [e.g. C-SanD (2001)], specific project phases [e.g. KLICON (McCarthy *et al.*, 2000)], specific types of construction organisations [e.g. SMEs in Boyd *et al.* (2004)] or strategic issues of managing knowledge in construction [e.g. CLEVER (Kamara *et al.*, 2003)]. The need for an approach which is capable of the 'live' capture of project knowledge, however, has not been adequately addressed. This book therefore addresses the importance of developing a methodology that facilitates the 'live' capture and reuse of project knowledge in construction and other project-based industries.

1.3 The objectives and contents of the book

This book covers the development of a methodology for the 'live' capture of reusable project knowledge that reflects both the organisational and human dimensions of knowledge capture and reuse, as well as exploiting the benefits of technology. The 'live' capture of reusable project knowledge is defined in this context as the capture of knowledge as soon as possible after it is created or identified. This methodology was developed in response to the various shortcomings of current practices in managing project knowledge (previously outlined) and the benefits offered by the ability to facilitate the 'live' capture, sharing and reuse of project knowledge within a dynamic and challenging project environment. The background study, development, testing and evaluation of the methodology are described in the various chapters of this book as follows:

- *Chapter 1 – Introduction:* This chapter provides the background to the studies that led to the writing of this book. It justifies the need for a methodology for the 'live' capture and reuse of project knowledge in construction and other project-based industry sectors, and introduces the contents of the book.

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- *Chapter 2 – Knowledge Management – Key Concepts:* This chapter reviews the definition of knowledge, the different perspectives and processes of KM, shortcomings of current practice for knowledge capture and reuse in construction, KM research projects in construction and the importance of the 'live' capture and reuse of project knowledge in construction.
 - *Chapter 3 – Knowledge Capture and Reuse:* This chapter presents the reviews of the potential types of reusable project knowledge in construction, the learning situations where most of the new learning are created, the current practice for the capture of knowledge focusing on the capability to facilitate the 'live' capture of project knowledge and the soft (organisational, cultural and human) issues that affect knowledge capture and reuse.
 - *Chapter 4 – Collaborative Learning:* This chapter reviews the concept of Collaborative Learning (CL) and discusses its importance in a project environment. Drawing on the construction industry as an example of a project-based industry, it explores how CL can be implemented in project teams and presents the benefits of this approach.
 - *Chapter 5 – Knowledge Reuse Requirements:* This chapter presents case studies on the current approaches for knowledge capture, and the end-users' requirements for knowledge capture and reuse. The development of the methodology that facilitates the 'live' capture and reuse of project knowledge based on the case study findings is also explained.
 - *Chapter 6 – Development and Operation of a 'Live' Capture Methodology:* This chapter presents the structure of the 'live' capture and reuse of project knowledge framework, and the system architecture, software development as well as the operation of the prototype application. The results of the evaluation are presented and analysed in detail.
 - *Chapter 7 – Conclusions and Recommendations:* This chapter brings together the findings and draws conclusions from the book. It also discusses further research that can be conducted to enhance the methodology and the functions of the prototype software application.

