Second International Conference on Construction in the 21st Century (CITC-II)
"Sustainability and Innovation in Management and Technology"
10-12 December, 2003, Hong Kong

CLEVER_KM - An Innovative Tool to Assist in the Development of Knowledge Management Strategy

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Abstract

CLEVER_KM is an innovative knowledge management system that has resulted from the EPSRC-funded CLEVER (Cross-sectoral Learning in the Virtual Enterprise) project at Loughborough University. The project delivered a framework for supporting the implementation of Knowledge Management (KM) within any business organization to ensure that the solution(s) adopted match an organization's KM problem and its business objectives. It was developed following a study investigating knowledge management practices and processes in the construction and manufacturing sectors. This paper describes the CLEVER framework from a system viewpoint and shows how it could assist in the development of knowledge management strategy.

Keywords

CLEVER_KM; CLEVER Project; Knowledge management strategy; Organizational knowledge management

1. Introduction

Knowledge is the primary economic unit of business in the twenty-first century, and the management of that knowledge is essential for any company that hopes to compete effectively. Within the project-based construction industry, the need for knowledge management (KM) is fuelled by the drive for innovation, improved business performance (Carrillo *et al,* 2002; Anumba *et al,* 2002) and customer satisfaction within a dynamic and changing business environment. It is recognized that the management of project and organization knowledge is crucial if construction businesses are to be competitive and adequately respond to the market changes (Kamara *et al*, 2000).

The significant growth in knowledge management (KM) literature in the past few years is a reflection of its strategic importance to modern organizations. Corporate spending on KM activities is expected to increase significantly over the next few years. Leading US and UK analysts predicts that the market for KM software and services will be over US $12 billion by 2004 and the stage is finally set for large organizations to start serious investments (Ovum, 2003; IDC, 2003). KM services is estimated to account for a significant proportion of this investment to deal with associated issues such as cultural, organizational and change management. However, a major problem for organizations is not only to understand the nature and dimensions of KM, but the people and organizational context, and then developing appropriate KM strategies in response to their business needs.

Previous work on KM, however, focused mainly on the delivery of technology solutions based on the use of expert systems (Carrillo *et al*, 2000), or IT solutions in general often without adequate consideration to wider organizational and people issues. It is now recognized that this approach is insufficient in the delivery of good knowledge management as organizational and people issues are not adequately addressed (Davenport, 1997; Stewart, 1997).

The CLEVER (Cross-sectoral Learning in the Virtual Enterprise) framework was developed at Loughborough University to assist in the development of KM strategy where organizational and people issues are crucial (Kamara *et al*, 2002). Following numerous evaluation of the extended framework, CLEVER_KM is developed to address organizational and people issues and to ensure that KM strategies are successfully implemented. CLEVER_KM is underpinned by knowledge processes, tools or techniques that are required to understand and structure a knowledge management problem reflecting critical people and organizational dimensions.

This paper describes the CLEVER framework from a system viewpoint and shows how it could assist in structuring and developing a knowledge management strategy. Following the introduction, Section 2 is an overview of the framework. Section 3 is a demonstration of its application based on the CLEVER_KM system. Section 4 provides a discussion on issues relating to the system and some of the benefits to organizations. The paper concludes with some suggestions for further development of CLEVER_KM.

2. The CLEVER Framework

The aim of the CLEVER framework is to clarify a 'vague' knowledge management problem(s) in an organization into a set of specific knowledge management issues in a business context. The framework consists of four stages as follows: (1) Define KM Problem; (2) Identify 'To-Be' Solution; (3) Confirm Critical Migration Paths; and (4) Specify KM Processes.

2.1 Define KM Problem

The aim of this stage is to review and define the overall KM problem in a business context. It involves a description of the perceived problem and identifying the business drivers underpinning it. The characteristics of the knowledge are defined and the potential users and sources of this knowledge are identified. The potential enablers and resistors that may positively or negatively influence the KM processes (e.g. locate and transfer knowledge) are also identified. The output of this stage is a clarified KM problem and a set of knowledge management issues.

2.2 Identify 'to-be' Solution

This stage highlights the problem areas represented on a number of knowledge dimensions where the user wishes to focus. It is used to confirm the characteristics of the current knowledge 'as-is' position, and

identify the required 'to-be' position on each dimension with regard to organizational strategy and policy. The output of this stage is a set of concerns of the overall problem, which the user wishes to focus on.

2.3 Confirm Critical Migration Paths

This stage focuses on the confirmation of user defined current 'as-is' situation to the required 'to-be' position. A set of 'squares' that related to each knowledge dimension are given, in which the knowledge migration paths that are generated based on the current 'as-is' and required 'to-be' situations are required to be confirmed by the user in order to move on to the next stage.

2.4 Specify KM Processes

This stage deals with the specification of a set of appropriate KM processes selected based on the information captured from previous stages. The potential resistors and enablers that may facilitate or inhibit the implementation of the selected processes are provided. The possible mechanisms to deal with the resistors as well as the potential tools or techniques that may be required in performing processes are provided during the specification. Therefore, user can specify each process accordingly.

3. The CLEVER_KM System

The CLEVER_KM system is designed to be used by KM consultants, knowledge managers as well as others with responsibilities for developing and implementing KM. It is based on a system driven approach, and guides a user on each stage of the framework, provides supporting information at each step, and finally generates a KM strategy report. The system is divided into four parts and each part represents a stage of the framework. These stages are: (1) Problem Definition Template (PDT) to define the KM problem; (2) Knowledge Dimensions Guide (KDG) to identify 'to-be' solution; (3) Migration Path View (MPV) to review and confirm the critical migration paths; and (4) KM Processes (KMP) to specify the appropriate KM processes.

3.1 The Problem Definition Template

The PDT consists of a structured set of questions which are divided into four sections: (A) Type of knowledge; (B) Characteristics of knowledge; (C) Sources and users of knowledge; and (D) Re-statement of KM problem. These questions assist users to 'think though' a KM problem within their organization, and are not designed to elicit 'precise' information for quantitative analysis. Figure 1 shows the third section of the PDT, which identifies the knowledge source(s) and user(s) in a matrix together with the resistors and enablers for each combination. System will provide a list of potential resistors and enablers for user to select, and if necessary additional resistors and enablers can be added. Based on section C, the system will identify the type of knowledge sharing activities, e.g. from people to people, in a particular situation and the resistors and enablers associated with these activities in the organization. Such information captured in this stage will be used in the later stages of the framework. Other sections of the PDT provide different analysis of the problem to enable users to develop a clear and agreed statement of the KM problem, and finally a Problem Definition Report (PDR) will be generated.

Figure 1. Section C of the PDT (Sources and users of knowledge)

3.2 The Knowledge Dimensions Guide

A knowledge dimension is a sliding scale with pre-defined knowledge characteristics on which the current 'as-is' KM positions captured from section B in PDT are given, and user are required to indicate

the required future 'to-be' KM positions. The knowledge characteristics are grouped into two types: core KM characteristics and complimentary characteristics as shown in Figure 2. Core characteristics refer to attributes of knowledge types that are considered central to an organization's KM problems and business activities. Complementary characteristics, although not central to developing an organization's KM approach, provide an additional context for understanding knowledge problems. There are circumstances where it is important for an organization to know whether a particular knowledge is critical, rapidly changing, or very specific as this could impact significantly on future business prospects. The core knowledge dimensions can be prioritized based on the differences between the current and required positions. The greater the difference between the current and required position, the higher the priority or urgency associated with that particular dimension. However, the user is not imposed to address the highest priority first.

3.3 The Confirmation of Migration Paths View

The migration paths are presented on a two square matrices that define the possible implications for migrating from the current position to the desired knowledge solution. The migration paths are automatically generated based on the current 'as-is' situations and required 'to-be' positions given in KDG. An example migration path is presented in Figure 3 based on the dimensions selected in Figure 2. The required positions on both squares is the bottom right hand corner (explicit/internal and explicit/shared), and this can be achieved by 'migrating' from the top left of the 'square' in the directions indicated. Additional issues that have to be taken into account when performing the migration are also given. The user has to understand and confirm the migration paths in order to start the final stage.

Figure 2. Knowledge Dimension Guide

Figure 3. Migration path view for 'tacit/explicit', 'external/internal', and 'individual/shared'.

3.4 The KM processes

The final stage in the CLEVER framework is the KM processes. Depending on the current situation in the organization and the agreed migration paths, a set of KM processes will be selected to enable the user to further develop specific plans to implement the selected strategies that relate to their stated KM problem. Figure 4 shows the specification of a particular task in the knowledge sharing process. The possible factors that could facilitate ('enablers') and hinder ('resistors') the performances of a particular task are also provided for user's consideration. Finally, a KM strategy report will be generated (part of it shown in Figure 4).

Figure 4. Specification of a KM Process and KM strategy report.

4. Discussion

The CLEVER framework focuses on structuring a knowledge problem in order to facilitate the development of an appropriate KM strategy within an organization. The system helps organizations to understand their KM problem, by identifying the nature and dimensions of knowledge as well as potential

enablers and resistors associated with any business problem, and to formulate appropriate KM processes necessary for a strategy. CLEVER_KM is an automated tool that provides flexibility and incorporates some intelligent features to facilitate the development of a KM strategy.

The framework consists of four main stages, and a series of steps associated with each stage. CLEVER is based on a hierarchical waterfall model, where the output of one stage is used as the input to the later stages. However, this could create inconsistencies if changes made at a latter stage are not reflected in the earlier stages. Further improvement in the system, is therefore, required to allow data entered at any stage to be updated at anytime, and more importantly, inconsistencies caused should be handled appropriately. For example, if people-to-software knowledge transfer was defined in PDT (stage 1) as the major concern of a KM problem, but it was later discovered in stage 3 that people-to-people knowledge transfer is more appropriate, and thus can be changed. Some results from later stages will be affected. Thus, the system should point out the implications of a change at different stages and then guide the user through the changes.

Initial evaluation with industry shows that the early CLEVER prototype was rated well and users were highly satisfied with the performance in terms of its capability for clarifying KM problems, identifying goals for KM, and developing a strategy for implementation.

Using the CLEVER_KM system could provide several benefits including:

- Exploration of the key knowledge issues on which the future business prospects of an organization could depend on.

- Supporting the development of KM at strategic level unlike other KM tools focussing at the operational level. The use of CLEVER_KM could complement such KM tools;

- Facilitating the identification of organizational goals, associated business drivers and their knowledge management implications; and

- Solving specific KM problems in a highly structured and innovative way by allowing users to navigate between different stages in order to formulate a KM strategy using built-in generic models and supporting information.

The system is able to produce a report containing a clarified KM problem and a refined set of KM issues including goals and their priorities, knowledge migration paths and the KM sub-processes involved. This could help in putting a KM problem in its strategic context and, more significantly, in convincing the senior management of an organization about the need for a strategy.

Finally, a number of areas for potential improvement have been identified to make the system more intelligent, and these additional features are being incorporated into the system.

5. Conclusion and Further Works

This paper has described the CLEVER_KM system for the development of a knowledge management strategy. The system provides support to clarify, within a business context, a vague knowledge management problem into a set of specific knowledge issues, which forms a basis for developing a KM strategic plan. Preliminary evaluation of the first version is planned with a number of leading manufacturing and construction organizations.

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