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# Introducing Technical Knowledge Management System in development project

## ~A Case in World Heritage Site in Luang Prabang, Lao PDR~

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### 1. Introduction

Information and Communication Technology (ICT) has a dramatic impact on achieving specific social and economic development goals as well as playing a key role in broader national development strategy (Digital Opportunity Initiative, 2001). However, it is said that 85% of e-government project was partially or completely fail in developing countries (Heeks, 2003). Heeks (2003) mention that *“central to e-cogernment success and failure is the amount of change between ‘where we are now’ and ‘where the e-government project want to get us’.* *eGovernment success and failure therefore depends on the size of gap that exists between ‘current realities’ and ‘design of the e-government project’.*”

Department of Luang Prabang World Heritage (DPL) in Lao PDR and Tokyo Institute of Technology (Tokyo Tech) have conducted ICT application project for heritage management since the year 2004. Development and maintenance of heritage database is a core activity in the project (Sittithirath, 2010). Tokyo Tech conducted technical training ICT implementation to the local staffs in DPL. However, there is knowledge gap whenever new staffs join in the project development. Furthermore, several documents have been prepared, some have been lost and some were not shared.

In this paper, the authors propose a system, in the form of application software, to implement project knowledge management model proposed by Milton (2009). The model has a knowledge transfer cycle from providers to users: verbal communication, knowledge bank by provider, reorganization, and reuse by users.

Although the system is now under development, the preliminary results of the introduction of system in the local site will be presented in this paper.

### 2. Project knowledge management

#### 2.1 Theoretical concept

Knowledge management is a systematic approach for personal or team in the organization to optimize access for appropriate and workable advice, knowledge and experience (Gorelick, 2004). It is generally said that implicit knowledge is difficult to stack as visible property. However, Milton (2009) proposed knowledge management models to transfer implicit knowledge (Fig. 1). Knowledge transfers implicitly from providers to users, or explicitly through formalization and schematization between them. There are two approaches. Connection approach transfers knowledge directly, which is the most efficient way. But it works under limited environment. On the other hand, collection approach composes formalizing knowledge, stacking into “knowledge bank”, and reuse when knowledge is needed (Milton, 2009).

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## 2.2 Case in Luang Prabang

Three major issues are identified in maintaining ICT services in the project site (Okumura, 2011). First issue is technical factor such as suspension of Free and Open Source Software (FOSS) development and lack of demand of FOSS resources in Lao. Second, there is human resource aspect which means limited technical skills for local staff to replace the current FOSS system and difficulty in succession of technical skills. Third, external factor is stated which is difficulty to access online materials and insufficient availability of reference materials.

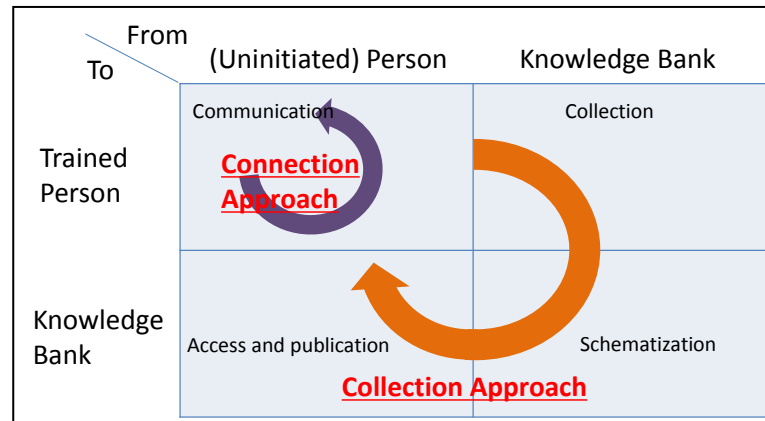


Fig1. Knowledge management model

Source: Project knowledge management (Milton, 2009)

Tokyo Tech has conducted technical training since 2005. In the technical training, local staffs had hands-on lectures to manipulate server built on Linux, build database application, Geographical Information System (GIS). While some documents such as operational manual in GIS training since 2008 and database diagram to describe database structure remain, other documents have lost due to failure of backup. For example, there was a weblog system that recorded training activities of local staffs. The weblog, however, cannot be accessed any more, because core data have been broken. In addition, data are kept in individual computers, and were not being shared within the team (Ooka, 2007). Furthermore, data were prone to destruction in accidents such as infection by computer viruses. Moreover, since local staffs working in ICT center are government servants, they might be moved to other departments.

Similarly, every year new students from Tokyo Tech join the development project in Luang Prabang. This has given rise to a challenge to transfer project knowledge to new student at different project phase.

Therefore, it is urgent for the project to introduce the knowledge management system.

## 3. Knowledge management system

### 3.1 Requirements

The author and local ICT team discussed about the knowledge management. The required functionalities of the system are summarized as follows:

- 1) The system can be accessed from all the computers within the team, and therefore it should run on the server machine to be accessed from clients.
- 2) User can store the technical documents and descriptions comprising text, pictures, diagrams, and specific type of data files such as Microsoft Excel.
- 3) User can modify and update these contents. To grant write or edit rights on established documents, there should be the mechanism of user account. To avoid the loss of the documents, editing history might be stored.
- 4) User can find the documents easily. Search function should be equipped so that user can obtain target data by various categories, such as project name, project term, staff member, and technical term.

- 5) Administrator can easily backup data to avoid the loss data due to wrong operation or virus.

### 3.2 System implementation

To operate the knowledge management system in the project site, the following technical conditions should be satisfied: a) Free and open source software for sustainable operation without additional cost, b) Accessibility via web browser to support both Windows and Linux clients, c) Support of Lao characters.

Currently there are three options to implement the system:

- 1) In-house system: Local team members can build their own knowledge management system by utilizing PHP with PostgreSQL. PHP is a script language to build web application. PostgreSQL is a database server. Both are widely used in the world.
- 2) Free and open source software: Free software named MediaWiki, which is a wiki package written in PHP and is originally developed for Wikipedia, has all the required functionalities (MediaWiki). *“Wiki is a website that allows the creation and editing of any number of interlinked web pages via a web browser using a simplified markup language or a text editor”* (Wikipedia).
- 3) Cloud computing: Internet services to share the documents, such as Google Group, can also fulfill all the requirements.

### 4. Discussion

This chapter discusses advantages and difficulties of suggested solutions from three aspects: i) ease of system introduction, ii) ease of system operation, iii) possibility to sustain the system.

The local team has already introduced PHP and PostgreSQL for the database development and management (Okumura, 2011), they can implement the knowledge management system with the flexibility to match their own needs. In contrast, the technical succession of this system itself is an additional burden to the local team. Considering software development, PHP and PostgreSQL will be possible to update for long term because they have large number of users and developers. Therefore, sustainability of this solution depends on fitting design with local needs.

MediaWiki requires PHP and PostgreSQL, but the team does not need to launch a new server. MediaWiki is equipped with full-text searching functionality. MediaWiki can handle text, graphics and data files, and user can edit the contents easily. Although it is free software, customization to respond the specific local needs is difficult.

Cloud computing does not need any local server at all. Instead, everything is accessed via Internet. There are free services that satisfy the requirements. In the developed countries, the introduction of cloud computing is massive as they can drastically save the cost for system administration. However, it is not a feasible solution in the project site due to very slow Internet connection. It is considered that this solution is sustainable way to keep data.

Now the project team is implementing a trial system to compare these three solutions for evaluation.

Nonetheless there is a need to ensure data quality to be used as knowledge. At this point, the local team and Tokyo Tech team should discuss following points: 1) identify documents which would be used for new staffs and new students, 2) establish rules for documentation, 3) create form of documents.

## 5. Conclusion

Knowledge management is a systematic approach to optimize access to appropriate and applicable advice, knowledge and experience for personnel and whole team in the organization. This paper authors introduced knowledge management system for deployment of ICT in Luang Prabang World Heritage, Lao P.D.R. As a result of local survey, three possible solutions were identified for applicable knowledge management system. Further field works are needed to test the approaches comparatively to identify the best way to be deployed in the project site for sustainable operation of information systems.

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