



UNIVERSITI PUTRA MALAYSIA

**A FRAMEWORK FOR MANAGING KNOWLEDGE AND
COMPETENCIES IN A GROUP PROJECT IMPLEMENTATION**

MARZANAH A. JABAR.

FSKTM 2007 11



**A FRAMEWORK FOR MANAGING KNOWLEDGE AND COMPETENCIES
IN A GROUP PROJECT IMPLEMENTATION**

By

MARZANAH BINTI A. JABAR

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfilment of the Requirement for the Degree of Doctor of
Philosophy**

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*I have learnt silence from the talkative,
toleration from the intolerant,
and kindness from the unkind;
yet strange,
I am ungrateful to these teachers.*

Kahlil Gibran



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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MARZANAH BINTI A. JABAR

October 2007

Chairman: Associate Professor Hj. Mohd. Hasan Selamat

Faculty: Computer Science and Information Technology

Every organisation realizes that its organisational knowledge which resides in individual brain or stored in organisational processes, products, facilities, systems and documentation is quickly becoming a sustainable competitive advantage. This growing attention has lead to the idea that these resources must be protected, cultivated and shared among its members. As organisation's knowledge is built upon these human resources, and effective way of managing these resources is a challenge. The challenges poses problems such as when knowledge can be lost when people leave the organisation, problem in difficulties to manage tacit knowledge and also in managing the competencies, expertise and capabilities of the organisation. The research has explored and proposed a framework to achieve its objectives, in capturing, and structuring knowledge in acquiring competitiveness edge in an organisation. KEPSNet (Knowledge Extract,



Profiling, and Sharing Network), has approached the problems in managing knowledge and competencies based on three key elements of people-process-product, conceptual theory and by prescribing a knowledge model of five layers: knowledge object, agents, knowledge functionalities, knowledge services and knowledge application. KEPSNet provided a practical application of knowledge capture and reuses of relevant know-how, experiences, best practices from a group project implementation. KEPSNet implementation as a Portal provided functionalities, for group project to capture and retain their knowledge in group repository with the use of concept maps, thus providing facilities for retrieving and sharing knowledge, structured and retained in the group knowledge repository. Two software agents introduced in KEPSNet implementation: the Profile Agent and Knowledge Agent has shown that it has adopted an autonomous way of managing knowledge, maintaining competency profile to reflect the level of knowledge of the expertise and to support knowledge sharing during group project implementation. KEPSNet Portal and agents were developed on Domino Lotus Notes, while Cmap Tool was used as the knowledge modeling tool for knowledge capture in this research.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**A FRAMEWORK FOR MANAGING KNOWLEDGE AND COMPETENCIES
IN A GROUP PROJECT IMPLEMENTATION**

Oleh

MARZANAH BINTI A. JABAR

Oktober 2007

Pengerusi: Profesor Madya Hj. Mohd. Hasan Selamat

Fakulti: Sains Komputer dan Teknologi Maklumat

Setiap organisasi menyedari yang pengetahuan yang dimiliki oleh setiap individu di dalam organisasi tersimpan didalam kemahiran/pengalaman individu, berada di dalam proses-proses organisasi, produk, sistem dan dokumentasi yang mana ia merupakan satu kelebihan untuk bersaing bagi organisasi tersebut. Ini mencetuskan kepada satu keperluan supaya sumber-sumber ini mesti dilindungi, dan di kongsi di kalangan ahli-ahlinya. Mengurus sumber pengetahuan organisasi yang terbina dari sumber manusia ini, secara efektif adalah merupakan satu cabaran. Cabaran ini terdiri dari masalah seperti pengetahuan dan kepakaran yang hilang apabila individu meninggalkan organisasi tersebut, masalah dalam kesulitan untuk mengurus pengetahuan yang tersirat serta masalah dalam menguruskan kecekapan, kepakaran dan kemampuan yang ada di dalam sesebuah organisasi. Penyelidikan ini telah meneroka dan mencadangkan satu

rangkakerja untuk mencapai objektif, dalam penyimpanan, dan mengstruktur pengetahuan dalam menyelesaikan masalah tersebut untuk memperoleh kelebihan untuk bersaing. KEPSNet (Mengekstrak pengetahuan, membentuk profil, dan rangkaian perkongsian maklumat), telah melihat permasalahan dalam menguruskan pengetahuan dan kecekapan-kecekapan berdasarkan tiga elemen penting iaitu menerusi pendekatan individu-proses-produk dan menterjemahkan pendekatan ini menggunakan lima lapisan pengetahuan: objek pengetahuan, ejen, fungsi pengetahuan, perkhidmatan pengetahuan dan aplikasi pengetahuan. KEPSNet menyediakan satu amalan pengurusan pengetahuan, penggunaan semula pengetahuan berdasarkan pengalaman lalu, amalan terbaik daripada pelaksanaan projek. Portal KEPSNet telah menyediakan fungsi pengurusan pengetahuan untuk implementasi projek kumpulan untuk mengekalkan pengetahuan kumpulan ke pangkalan data pengetahuan untuk kumpulan tersebut menggunakan peta konsep. Ia juga menyediakan kemudahan dapatan semula pengetahuan dan perkongsian pengetahuan. Dua ejen perisian telah diwujudkan dalam pelaksanaan KEPSNet: Ejen Profil dan Ejen Pengetahuan dalam membuktikan bahawa ia telah menggunakan satu kaedah mengurus yang 'autonomous', sebagai satu cara baru menguruskan pengetahuan, memelihara profil kecekapan bagi mencerminkan tahap pengetahuan kepakaran dan menyokong perkongsian pengetahuan untuk kumpulan pelaksanaan projek. Portal ini telah dibangunkan menggunakan perisian Lotus Notes Domino manakala penyimpanan pengetahuan dilaksanakan

menggunakan CMAP Tool sebagai permodelan pengetahuan untuk penyimpanan maklumat.

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I certify that an Examination Committee has met on 4th October 2007 to conduct the final examination of Marzanah binti A. Jabar on her Doctor of Philosophy thesis entitles "A Framework for Managing Knowledge and Competencies in a Group Project Implementation" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the student be awarded the degree of Doctor of Philosophy.

Members of the Examination Committee were as follows:

Norwati Mustapha, PhD

Lecturer

Faculty of Computer Science and Information Technology
Universiti Putra Malaysia
(Chairman)

Md. Nasir Sulaiman, PhD

Associate Professor

Faculty of Computer Science and Information Technology
Universiti Putra Malaysia
(Internal Examiner)

Masrah Azrifah Azmi Murad, PhD


Lecturer

Faculty of Computer Science and Information Technology
Universiti Putra Malaysia
(Internal Examiner)

ABDULLAH EMBONG, PhD

Professor

Faculty of Science Computer and Software Engineering
Universiti Malaysia Pahang
(External Examiner)



HASANAH MOHD. GHAZALI, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 17 December 2007



This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Hj. Mohd. Hasan Selamat

Associate Professor
Faculty of Computer Science and Information Technology
Universiti Putra Malaysia
(Chairman)

Abdul Azim Abd. Ghani, Phd

Associate Professor
Faculty of Computer Science and Information Technology
Universiti Putra Malaysia
(Member)

Hamidah Ibrahim, Phd

Associate Professor
Faculty of Computer Science and Information Technology
Universiti Putra Malaysia
(Member)

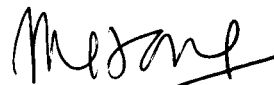


AINI IDERIS, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 22 January 2008

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



MARZANAH BINTI A. JABAR

Date: 14 November 2007

TABLE OF CONTENTS

	Page
DEDICATION	ii
ABSTRACT	iii
ABSTRAK	v
ACKNOWLEDGEMENTS	viii
APPROVAL	ix
DECLARATION	xi
LIST OF TABLES	xiv
LIST OF FIGURES	xvi
LIST OF ABBREVIATIONS	xix
 CHAPTER	
1 INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	3
1.2.1 Organisational Changes	4
1.2.2 Difficulties in Managing Tacit Knowledge	4
1.2.3 Building Organisation Competencies Capabilities	5
1.3 Research Objectives	6
1.4 Scope of the Research	6
1.5 Research Methodology	8
1.6 Contributions in the Research	9
1.7 Organisation of the Thesis	10
 2 LITERATURE REVIEW	 13
2.1 Introduction	13
2.2 Managing Group Knowledge	14
2.3 Theoretical Foundation of Knowledge	15
2.4 Group Knowledge Repository	19
2.5 Competence Management	22
2.6 Knowledge Management Framework	22
2.7 Conceptual Framework	31
2.8 Managing knowledge: Existing researches and approach	34
2.9 Summary	39
 3 RESEARCH METHODOLOGY	 41
3.1 Introduction	41
3.2 Research Method in Information System (IS)	41
3.3 Research Plan	42
3.4 Research Approach	44
3.5 Research Framework	47
3.6 Summary	51

4	TOWARDS A FRAMEWORK IN MANAGING GROUP KNOWLEDGE	52
4.1	Introduction	52
4.2	Conceptualizing the Theoretical Framework: The KEPSNET Approach	52
4.2.1	Knowledge Object Level	57
4.2.2	Agents	66
4.2.3	Knowledge Services Level	68
4.2.4	Knowledge Functionalities Level	91
4.2.5	Knowledge Application Level	94
4.3	Prototype Design	98
4.3.1	System Goals	99
4.3.2	System Functionalities	102
4.3.3	Scenarios	104
4.3.4	System Design	107
4.3.5	Agent Design	111
4.4	Summary	129
5	EVALUATION AND DISCUSSION	131
5.1	Introduction	131
5.2	Evaluation Approach	131
5.3	Evaluation Criteria	133
5.4	Evaluation Process	134
5.5	Evaluation Task	138
	5.5.1 Evaluation Result and Discussion	138
5.6	Summary of the Evaluation	160
6	CONCLUSION AND FUTURE WORK	164
6.1	Conclusion	164
6.2	Contributions	166
6.3	Limitations	168
6.4	Future Works	169
	REFERENCES	170
	APPENDICES	177
	BIODATA OF THE AUTHOR	187
	LIST OF PUBLICATIONS	188

LIST OF TABLES

Table	Page
2.1 Elements in KM Framework	29
3.1 Research Methodologies Clarke (1999)	42
3.2 Research Plan	43
3.3 Research Approach	45
3.4 Assessment of the proposed research using the Action Research Framework	48
4.1 KM Functionalities within KEPSNet Framework	93
4.2 KEPSNET (Knowledge Extraction, Profiling and Sharing Network)	98
4.3 Goal Present Information	100
4.4 Goal Access Available Knowledge	100
4.5 Goal Register User Profile	100
4.6 Goal Recommendation	101
4.7 Update Knowledge to User Profile	101
4.8 Update Competencies to User Profile	101
4.9 Capture Knowledge	101
4.10 Goal Obtain User Input	101
4.11 Functionality Online Interaction	102
4.12 Functionality Profiling	103
4.13 Functionality Structuring Knowledge and Competencies	103
4.14 Profile Agent Description	109
4.15 Knowledge Agent Description	110
5.1 Group Knowledge Description Repository	139

5.2	Steps taken to complete Task 2	147
5.3	Value Creating Capabilities of KEPSNet	152
5.4	Various Management Reports prepared by the Project Manager	153
5.5	Summary of KEPSNet Evaluation	161

LIST OF FIGURES

Figure	Page
2.1 Organisational Knowledge Classification	17
2.2 Managing Knowledge by Integrating the People, Product and Process Centric Approach	32
4.1 High Level View of Knowledge Extraction Profiling and Sharing Network (KEPSNet) System	54
4.2 Knowledge Model for (KEPSNet)	56
4.3 Concept Map for System Development Process	59
4.4 Concept Map Transformation	60
4.5 Knowledge Assets in the Group Knowledge Repository	61
4.6 User Knowledge Profile	64
4.7 User Competency Profile	65
4.8 User Competency Profile Generation	67
4.9 Knowledge Activities Profile Concept Map and the Annotation Section	69
4.10 Knowledge Asset	72
4.11 Knowledge Activity Profile (KAP)	73
4.12 List of User Profile	74
4.13 User Profile	75
4.14 User Competencies Profile	76
4.15 Knowledge Domain Concept Map	78
4.16 Overlapping of two concept maps	80
4.17 User Profile ranking and matching	82
4.18 User Profile Matching and Grouped	83

4.19	User Profile and Knowledge Asset Matching	85
4.20	User Knowledge Needs Profile (Knowledge Recommendation)	86
4.21	Project Profile Concept Map	87
4.22	Project Profile (PP)	88
4.23	Project Profile (PP) and User Profile Matching	88
4.24	Project Profile (PP) and Knowledge Activities Profile (KAP) Matching	88
4.25	Project Profile (PP) and Knowledge Asset (KA) Matching	89
4.26	Recommendation for Project Who (People)	89
4.27	Recommendation for Project What (Product)	90
4.28	Recommendation for Project How (Process)	91
4.29	KEPSNet Portal	96
4.30	Knowledge Capture in KEPSNet	97
4.31	Goal Overview Diagram	99
4.32	Functionalities Diagram	102
4.33	Data Coupling	106
4.34	System Overview Diagram	108
4.35	Profile Agent	108
4.36	Knowledge Agent	110
4.37	Use case diagram showing interactions with Knowledge Agent	111
4.38	Use case diagram showing interactions with Profile Agent	112
4.39	The UML state diagram of the Knowledge Agent	114
4.40	The UML state diagram of the Profile Agent	115
4.41	Capture Concept Map	119
4.42	Create User Profile	120

	xviii	
4.43	Compare user profile with knowledge domain	121
4.44	Knowledge Profiling	122
4.45	Knowledge Asset Matching	123
4.46	Knowledge Asset Recommendation	124
4.47	Knowledge Recommendation based on user profile	125
4.48	Expert Recommendation	126
4.49	Knowledge Activities Recommendation	127
4.50	Knowledge Asset Recommendation	128
5.1	Evaluation of KEPSNet Prototype Implementation Versus Current Group Project Management Practice	132
5.1a	Expertise Profile	140
5.1b	Competencies Profile	141
5.1c	Knowledge Asset	142
5.1d	Knowledge Asset Repository	142
5.1e	Knowledge Activities	143
5.1f	Knowledge Domain	144
5.2	Questionnaire on current implementation	136
5.3	Questionnaire on KEPSNet implementation	137
5.4	Evaluation of Knowledge Capture Process	145
5.5	What to do	150
5.5a	Knowledge for Activities	150
5.5b	The Expert	150
5.6	Evaluation of Managing Knowledge Process	155
5.7	Evaluation of Knowledge Networking Process	157
5.8	Results of the knowledge process activities.	158



LIST OF ABBREVIATIONS

e-SPRINT2	Sistem Pengurusan Rangkaian Integrasi Talian Terus
AR	Action Research
DB	Database
CSCW	Computer Supported Cooperative Work
IC	Intellectual Capital
ICT	Information Communication Technology
IR	Information Retrieval
IS	Information System
IT	Information Technology
KA	Knowledge Asset
KAP	Knowledge Activity Profile
KEPSNet	Knowledge Extraction Profiling and Sharing Network
KM	Knowledge Management
PP	Project Profile
R&D	Research and Development
RDF	Resource Description Framework
TFIDF	Term Frequency Inverse Document Frequency
XML	Extensible Markup language
UPM	Universiti Putra Malaysia
URL	Uniform Resource Locator

CHAPTER 1

INTRODUCTION

1.1 Background

According to Nonaka and Konno (1998), knowledge is created in a knowledge platform emerged in individuals, working groups, project teams, informal circles, meetings, virtual groups and when in contact with the customer. As organisation's knowledge is built upon these human resources, and effective way of managing these resources is a big challenge. In an information era, where these knowledge-based core competencies are key organisational assets, restructuring or high rate of turnover can lead to problems of knowledge retention. Knowledge management has emerged as a mechanism for an organisation to remain intelligent and competitive in the current turbulent market (Davenport and Prusack, 1998). Organisations are realizing how important it is to "know what they know" and be able to make maximum use of the knowledge. The field of knowledge management (KM) is exploring methods of discovering, codifying, storing, and automating knowledge. (Alavi and Leidner, 2001), stressed that knowledge that cannot be spread within an organisation remains the property of a few people, rather than of the organisation and will have limited impact on the organisation's ability to create value. As the objective of an enterprise today is to increase its productivity through an improvement in its organisation, one way to



achieve this is by reducing overheads by reusing its knowledge and the competencies of its employees, and setting up a system for bringing the right information at the right time to the person who needs it to make a decision, is regarded as a goal. In addition, if such a system were available, it could be used to store the enterprise knowledge considered as intangible assets.

There is an increasing interest in the capitalization of know-how of groups of people in an organisation. This know-how may relate to problem solving expertise in functional disciplines, experiences of human resources, and project experiences in terms of project management issues, design technical issues and lessons learned. Managing knowledge in a group implementation is the process to be able to reuse in a relevant way, the knowledge of the group domain previously stored and modeled in order to perform new tasks

Knowledge in the form of skills and competencies can only be transferred from one person to another through interaction. Information management on the other hand deals with knowledge that can be captured, processed and managed. Sveiby in (1997) proposed the Information Technology (IT) track and the People Track approach to knowledge management. The IT track focuses on the management of information. The knowledge management activities comprise the construction of information management systems, artificial intelligence, data mining and other enabling technologies. In this case knowledge can be treated as objects that can be identified and handled in an information system. The People Track focuses on the management of

people, and activities that encompasses of assessing, changing and improving human individual skills and or behavior. Therefore KM can be seen as an approach for handling knowledge in an organisation, which addresses not only the culture, the dynamics of the organisation and Information Communication and Technology (ICT) infrastructures.

1.2 Problem Statement

Utilizing knowledge accumulated and generated within the organisation can be a strategic way to acquire the competitiveness edge for an organisation. Organisations have numerous kinds of knowledge resources which can be categorized into two categories: explicit or tacit. Explicit Knowledge can be easily communicated and shared, while tacit knowledge is highly personal, available within the individual and difficult to capture and manage. Tacit knowledge within the organisation when captured and processed into knowledge is important as it formed the knowledge capital of the organisation. Organisations need to react to the organisational changes when people leave the organisation as they are the people with knowledge of the organisation, and people attrition contributes to knowledge loss in the organisation. Nordhaug (1992) has conceptualized competencies as concepts of knowledge, skills and aptitudes. Competencies as abstraction of task related have emerged as a concept for making human abilities and knowledge manageable and addressable.

1.2.1 Organisational Changes

Valuable human and knowledge resources will be wasted unless management openly accepts and supports efforts to gather, sort, transform, record and share knowledge. Tacit knowledge can be lost through outsourcing, downsizing, mergers and terminations. According to Rus and Lindvall (2002) in a knowledge intensive environment, there is a need to build structures and frameworks for capturing key information that can help retain some knowledge when employees leave or become unavailable.

1.2.2 Difficulties in Managing Tacit Knowledge

Difficulties in managing tacit knowledge are due to the reason of tacit knowledge that is inherently elusive, and in order to capture, store, and disseminate it, it is argued that it first has to be made explicit. According to Stenmark (2001) such a process is difficult, and often fails due to three reasons that:

1. People are not necessarily aware of their tacit knowledge,
2. People do not need to make it explicit in order to use it, and
3. People may not want to give up a valuable competitive advantage.

In our daily work, our tacit knowledge informs our activities without us thinking it as knowledge, as it is manifested through our actions. Tacla

(2001) in his work in knowledge management systems has discussed the limitation of current technologies in managing tacit knowledge. According to him the tools used while performing regular activities is not adequately taken into account, though this may be an important source of tacit knowledge. It may not have an intelligent behavior, to suggest some action or propose a service to the user, with limited pro-activity and autonomy.

1.2.3 Building Organisation Competencies Capabilities

Another problem that initiated the research is to provide a guide to human knowledge resources in the organisation as mentioned by Lindgren et al (2003). The concern is how to create a manageable list of knowledge categories in that will be widely understood and will accurately reflect organisational broad universe of knowledge. Most of the contributions have dealt with knowledge in a broad sense or with expertise, which is individually held work-related knowledge. According to Nonaka (1994) the competencies of an organisation include tacit and explicit knowledge, and should be conceived of as a mix of skill and technologies. Haerem (1998), Lindgren and Stenmark (2002) and Lindgren et al. (2003) stressed that knowledge and competencies are closely related and not much and little attention is being paid for managing competence, therefore there is a need for additional research addressing the support for managing competence.