IADIS International Journal on Computer Science and Information Systems
Vol. 12, No. 1, pp. 1-13
ISSN: 1646-3692

A NEW PARADIGM FOR INFORMATION SYSTEMS PROJECTS MANAGEMENT BASED ON A KNOWLEDGE MANAGEMENT APPROACH

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ABSTRACT

The undertaking of managing the Information systems projects has become a critical challenge for many information technology companies. This is due to the fact that these projects are complex with many diverse phases and activities; knowledge-intensive that depends heavily on the people's knowledge; and collaborative that involve many people working hand-by-hand for long periods of time. Therefore, there is a need for best utilizing the knowledge of all members of the project during all phases in order to get it done as needed. Actually it is the role of knowledge and its management as valuable resources for guaranteeing the success of these projects and avoid repeating past mistakes. This paper attempts to present a new paradigm that combines the knowledge management processes (discovery, capture, sharing, and application) with the phases of information systems project management (initiation, planning, execution, and closing-down). It is expected that the application of the new paradigm by IT companies might improve the success rate of IS projects, through enhancing the activities of combination, exchange, socialization and transfer of knowledge and experience among project members. This might also lead to developing an organizational memory of a knowledge repository that shall serve as a reference for best practices and lessons learned that might in turn support the decision making process for further projects.

KEYWORDS

Knowledge, Knowledge Management, Information Systems, Project Management

1. INTRODUCTION

In today's information technology business environments, many information systems projects are failed behind their allocated budget, time and other limited resources. This is mostly referred to the shortage of discovered, captured, and shared knowledge for the project team members, and as a result lack of shared knowledge among the project members and finally would lead to inappropriate application of knowledge during all phases of the project.

Fuller, Valacich, and George (2008) were in agreement with this where they stated that “A project failure can be the result of capturing the appropriate knowledge at an inappropriate time". Therefore, knowledge has to be systematically collected, stored in the corporate memory, and shared across the organization Alawneh, Hattab, and Al-Ahmad (2008).

Davenport and Prusak (1998) described knowledge as a "mix of framed experience, values, contextual information and expert insight that provides a structure for evaluating and integrating new experiences and information". Kim, Lim, and Mitchell (2004) defined knowledge management as "the methodical means of administrating this valuable resource, by promoting an incorporated approach to identifying, capturing, structuring, organizing, retrieving, sharing, and evaluating an enterprise's knowledge assets".

The basic assumption of KM is that organizations that manage organizational and individual knowledge better will deal more successfully with the challenges of the new business environment. It is seen as a key factor in realizing and sustaining organizational success for improved efficiency, innovation and competition Alawneh, Abuali, and Almarabeh (2009).

Knowledge has been becoming a key asset in today’s business organizations since it can give competitive advantage and strategic position to those organizations compared with their competitors in the market. Holsapple and Joshi (2002) confirmed that "for organizations in order to have a lasting competitive advantage they will have to be knowledge driven". In accordance with that, knowledge management is playing a critical role for discovery, capture, sharing and application of knowledge among all team members and stakeholders engaging in information systems (IS) projects. Information systems projects are characterized as being knowledge intensive where knowledge is vital during all project phases (Initiation, Planning, Execution and Closing-down). Karadsheh, Al-hawari, El-Bathy, and Hadi (2008) asserted that "knowledge management can have a great influence on reducing organizations’ risks". In conformity with the aforementioned, this study attempts to present a new paradigm that integrate the capabilities of knowledge management with the phases of IS projects in a bid to enhance the level of success of these projects and improve the effectiveness, efficiency and innovativeness of their outcomes and deliverables.

According to Marchewka (2013), knowledge management is "a systematic process for acquiring, creating, synthesizing, sharing, and using information, insights, and experiences to transform ideas into business value". In conformity with this, Alhawari, Karadsheh, Talet, and Mansour (2012) stated that “in order to execute a task or process successfully, it seems essential to have the appropriate and the right knowledge that allow to make the right decision and responses called for during the execution”. In line with that, the authors in this study argue that knowledge is crucial and must be considered during IS projects management. Meanwhile, Massingham (2010) was in agreement with this where he noted that “there has been increased attention in application of knowledge management in managerial issues”.

Many information technology (IT) companies suffer from the high turnover rates of their employees. This resulted in attrition of knowledge and lost of experiences to competitors. Thereby the IS projects undertaken by those companies will be negatively affected and might increase the possibility of projects' failure. This is because the experiences and the knowledge gained from these experiences are fragmented through the company either internally to other departments or externally to other companies.

Another issue facing IT companies is the differences in level of knowledge and expertise among the project's members through all phases of IS project. Additionally, the intangibility nature of IS projects and inability of assessing their outcomes enforces the need to fully utilize the knowledge of project's members during all project phases in order to get deliverables of the project with a good enough quality, minimal risk and adaptable to business and technology changes.

Furthermore, IT companies have been struggling with the scarcity of their resources in terms of time, money, technology and people. Moreover they need to deliver the project deliverables to the customer on time with high quality and low risks. Thereby it is the role of knowledge management (KM) to best utilize these resource and get the most benefits out of them for boosting the success rate of the IS project.

2. RELATED PREVIOUS WORKS

Worldwide, there is an increasing demand for IS projects and the demands for skilled, knowledgeable and experienced employees is increasing as well Alawneh et al. (2008). With reference to that, many scholars in IT and management domains have been conducting many works in the area of Information systems projects management from many perspectives. Below is a summary of some of these works.

Alawneh et al. (2008) suggested a new conceptual framework for application the knowledge management processes in software development and engineering contexts. They argue that the new conceptual framework for application the knowledge management processes in software development will be helpful for concerned people in the software development industry in knowing and determining the critical knowledge areas and types available during software development and selecting the right process of knowledge management for the right knowledge area in the right phase of software development lifecycle.

Alhawari et al. (2012) introduced a conceptual framework called knowledge-based risk management (KBRM) that utilizes knowledge management processes in risk management processes to improve the efficiency of risk response planning process and thereby improving the effectiveness and increase the likelihood of success in innovative Information technology projects.

Reich, Gemino, and Sauer, C. (2012) suggested and empirically tested a model of knowledge management and project-based knowledge in Information technology projects. They conceptualized knowledge management as a three dimensional concept comprising knowledge stock, enabling environment and knowledge practices. Further they proposed that knowledge management supports the creation and alignment of three types of project based knowledge that are critical to achieving desired business outcomes: technical design knowledge, organizational change knowledge and business value knowledge. The results

statistically supported the model's conceptualization of the key constructs and showed that knowledge management within Information technology projects contributes to the creation and alignment of the important project-based knowledge.

Neves (2014) analyzed the integration of knowledge management techniques into the activity of risk management as it applies to software development projects of micro and small Brazilian incubated technology-based firms. They found that the main risk factor for managers and developers is that scope or goals are often unclear or misinterpreted. For risk management, firms have found that knowledge management techniques of conversion "combination" would be the most applicable for use; however, those most commonly used refer to the conversion mode as "internalization."

Mehta, Hall, and Byrd (2014) explored the role of project uncertainty in Information technology projects and knowledge in software development teams. The results indicated that both exchange and combination are necessary to fully explain the relationships and that the consideration of a project's outcome is also important.

Terzieva (2014) examined knowledge management in particular on project knowledge management and how organizations turn into practice learning from experience in order to capture, share and save knowledge in time. The results indicated that both failures and success stories are sources of new knowledge that can be lost if not captured and stored by those who have experienced a specific situation, and shared with all others who have worked on the project or will work on the future ones.

3. INFORMATION SYSTEMS PROJECT MANAGEMENT

Project management is arguably the most important aspect of an information systems projects. Effective project management helps to ensure that information systems projects meet customer expectations and are delivered within budget and time constraints. Creating and implementing successful IS projects requires managing the resources, activities, and tasks needed to complete the that information systems project. According to Marchewka (2013), a project is "a planned undertaking of a series of related activities to reach an objective that has a beginning and an end". While project management is "a controlled process of initiating, planning, executing, and closing down a project". On the other hand, Project Management Institute (PMI, 2008) defining project as "a temporary endeavor undertaken to accomplish a unique product, service or result". While project management is " the application of knowledge, skills, tools and techniques to project activities to meet project requirements".

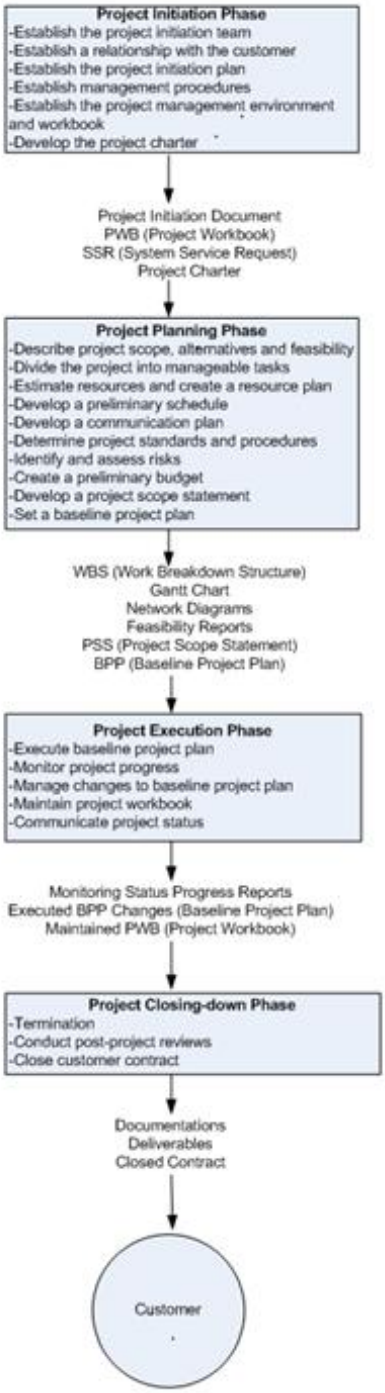

Figure 1. The Project Management Conceptual Framework (by Researchers)

Based on the Marchewka (2013) definition, Figure 1 above presents project management as four related phases with each phase has outputs to the next one. Specifically, during project initiation, the project manager performs several activities to assess the size, scope and complexity of the project and to establish procedures to support subsequent activities. The next phase in the project management process is project planning which involve defining clear, discrete activities and the work needed to complete each activity within a single project. It often requires you to make numerous assumptions about the availability of resources such as hardware, software, and personnel. Moreover, it has been found a positive relationship between effective project planning and positive project outcomes. The third phase of the project management process is the project execution in which the baseline project plan is put into action. For IS projects, project execution occurs during the analysis, design and implementation activities. The final phase of the project management process is the project closing down which focuses on bringing a project successfully to its end through meeting the requirements of the project within the available resources Aljawarneh, Alshargabi, Hayajneh, and Imam (2015).

4. KNOWLEDGE MANAGEMENT

Knowledge management may simply be define as doing what is needed to get the most out of knowledge resources. Although knowledge management can be applied to individuals, it has recently at traced the attention of organizations as it promotes the creation, sharing, and leveraging of the organization's knowledge Becerra-Fernandez, Gonzalez, and Sabherwal (2004). For purposes of this study, knowledge management is defined as "performing the activities involved in discovering, capturing, sharing, and applying knowledge so as to enhance in a cost-effective fashion the impact of knowledge on the unit's goal achievement.

Based on Figure 2 below, knowledge management relies on four main kinds of processes through which knowledge is discovered, captured, shared and applied. As shown in Figure 2, knowledge resides in several different locations or reservoirs encompass people including individuals and groups; artifacts including practices, technologies and repositories; and organizational entities including organizational units, organizations and inter-organizational networks. The four knowledge management processes are supported by a set of seven sub processes, the socialization sub process supporting two knowledge management processes (discovery and sharing). The other sub processes focus on the ways in which knowledge is converted through the interaction between tacit and explicit knowledge. These are externalization, internalization, combination, direction and routines Becerra-Fernandez et al. (2004). For each sub process, there is a mechanism that facilitate that process and a technology that support the process. A knowledge management mechanisms are organizational or structural means used to promote knowledge management. A knowledge management technologies also support knowledge management systems and benefit from the knowledge management infrastructure, especially the information technology infrastructure.

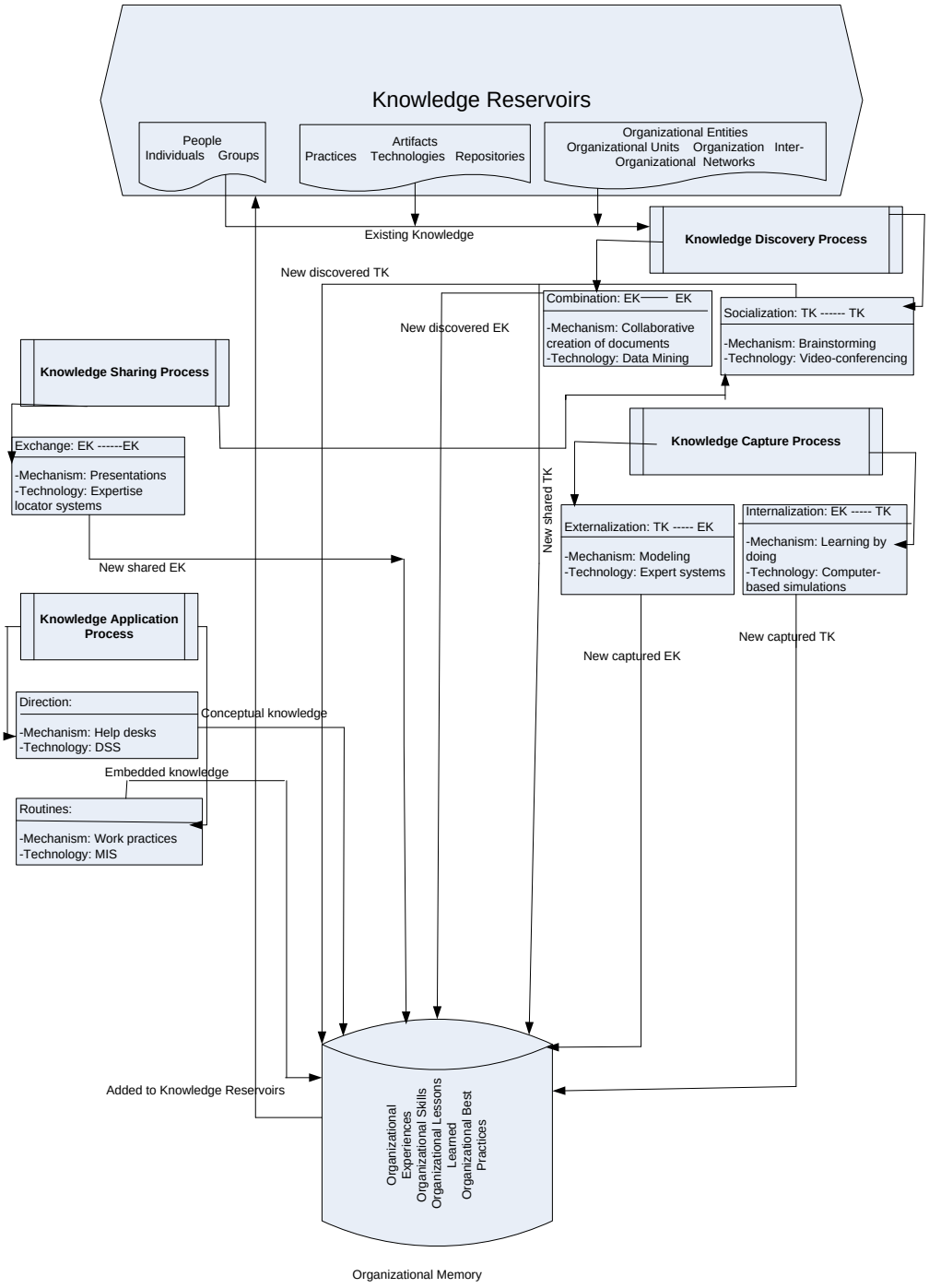

Figure 2. The Knowledge Management Conceptual Framework (by Researchers)

5. THE NEW PARADIGM FOR INFORMATION SYSTEMS PROJECTS MANAGEMENT BASED ON KNOWLEDGE MANAGEMENT APPROACH

As shown in Figure 3, The High-level representation of the proposed paradigm elucidates the role of KM processes in supporting the all phases of IS project management. It is expected that IT companies can utilize this paradigm for any IS project. This paradigm will help individuals who are working in IT companies to identify and catalog the different types of knowledge that are appropriate for IS projects in a bid to discover, capture, share and apply that knowledge during the different phases of IS projects management (initiation, planning, execution and closing down).

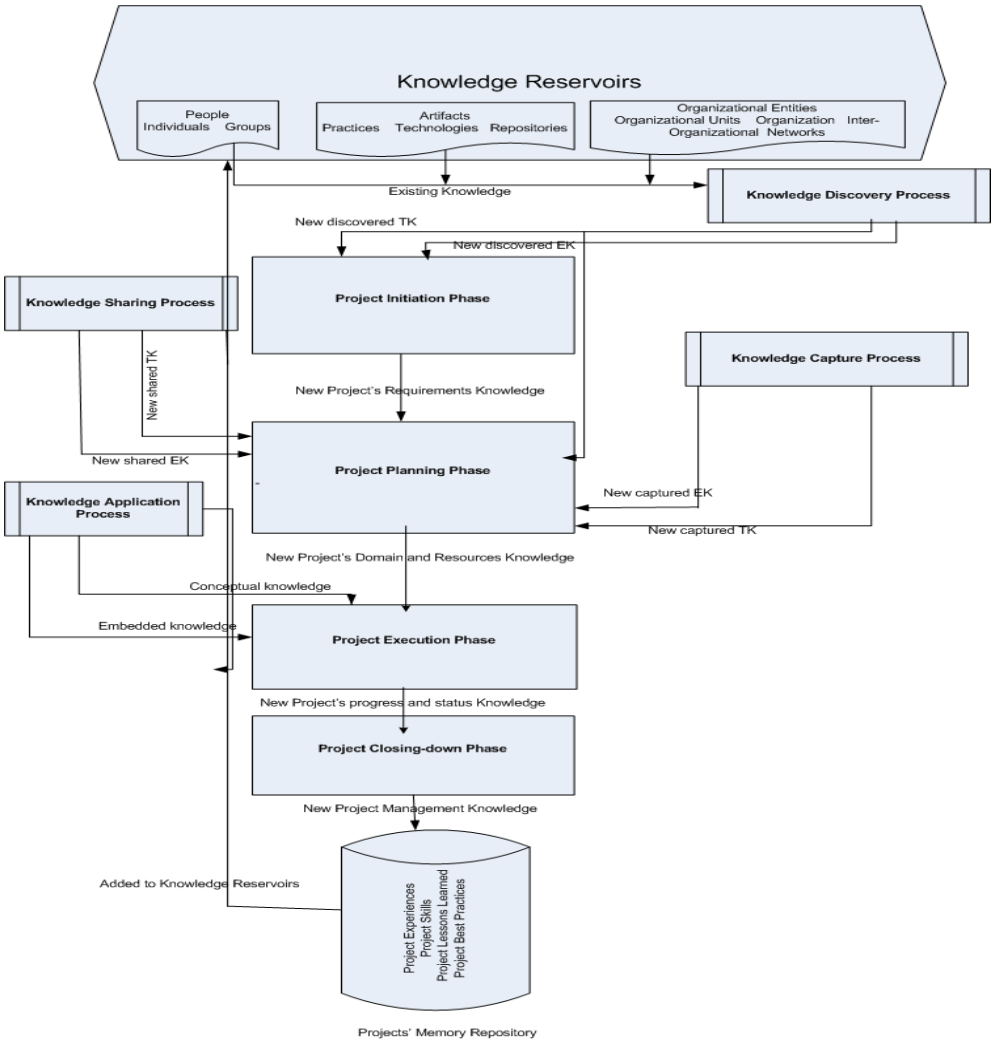

Figure 3. The High-level Proposed Paradigm (by Researchers)

The low-level representation of the the proposed paradigm is shown in Figure 4. It begins with the identification of knowledge locations as knowledge mainly resides in people, artifacts and organizational entities. All of these reservoirs of knowledge are used as inputs of the existing knowledge available in organization.

The first component of this conceptual paradigm is the knowledge discovery process. It includes two modes of conversion, the combination sub-process that leads to development of new explicit knowledge (EK) from the existing knowledge located in artifacts and organizational entities using collaborative creation of documents as a mechanism and data mining (DM) as a technology . And the socialization sub-process that leads to development of new tacit knowledge (TK) from the existing knowledge in people minds using brainstorming as a mechanism and video-conferencing as a technology. These two sub-processes support the project initiation phase where the new discovered knowledge is extended to the project team members to perform the specific tasks of project initiation phase as illustrated on Figure 4. After completion the all tasks of the initiation phase, a new knowledge is resulted there called new project's requirements knowledge that can serve as input to project planning phase.

Next component is the knowledge capture process which focuses on capturing both the new explicit and new tacit knowledge that were discovered previously in knowledge discovery process. It includes two modes of conversion, the externalization that involves converting tacit knowledge into explicit knowledge through the mechanism of modeling and expert systems technology. The externalized knowledge is called conceptual knowledge. While the internalization sub-process that includes converting explicit knowledge into tacit knowledge using the mechanism of learning- by- doing and computer-based simulations technology. The internalized knowledge is called representational knowledge.

These two sub-processes support the project planning phase where the captured conceptual or representational knowledge is employed by the project team members to perform the specific tasks of project planning phase as illustrated on Figure 4.

The following component in the paradigm is the knowledge sharing process which focuses on spreading the captured knowledge among all project team members. It includes two modes of conversion, the exchange sub-process that tends to communicate, disseminate and transfer of the captured explicit knowledge (EK) about the project planning phase among the team members using the presentations as a mechanism and expertise locator systems as a technology. And the socialization sub-process that which concerns the face-to-face meetings among team members to share their tacit knowledge (TK), using brainstorming mechanism and video-conferencing technology as stated earlier. These two sub-processes also support the project planning phase where the shared collective knowledge is distributed to the project team members to perform the tasks of planning phase. Therefore, the project team members engage in the IS project can share their experiences in the planning phase. After completion the all tasks of the planning phase, a new knowledge is resulted there called new project's domain and resources knowledge that can serve as input to project execution phase.

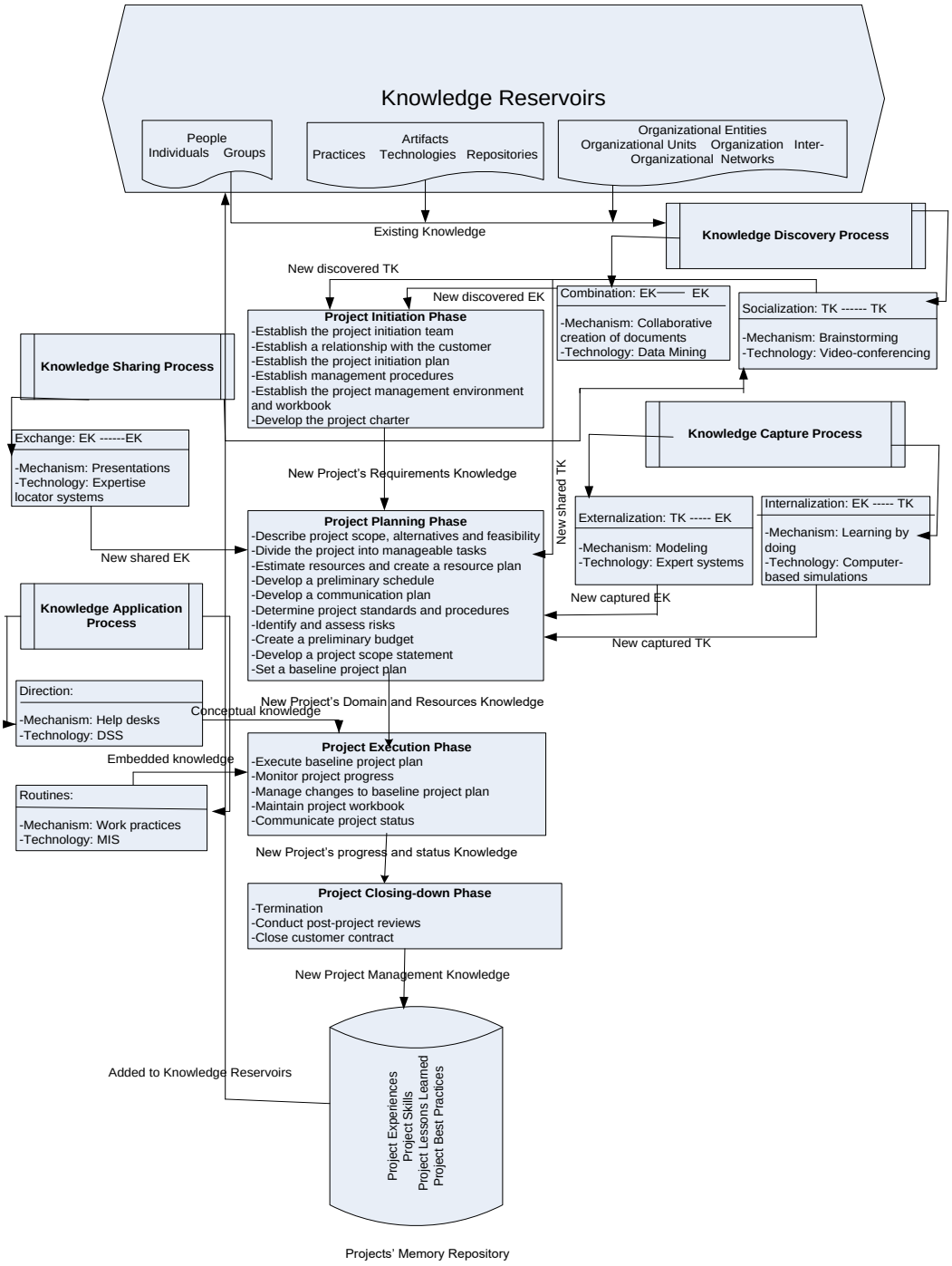

Figure 4. The Low-level Proposed Paradigm (by Researchers)

Finally, the knowledge application process which intends to fully utilize and employ the shared knowledge to make decisions, guide actions and perform tasks of organizations in order to contribute directly to organizational performance. It includes two modes of conversion, the direction sub-process through which individuals possessing the knowledge direct the action of another individual without transferring to that individual the knowledge underlying the direction using help desks mechanism and decision support systems (DSS) technology. And the routines sub-process that utilizes the knowledge embedded in procedures, rules, and norms that guide future behavior using work practices as mechanism and management information systems (MIS) as a technology. These two sub-processes support the project execution phase to perform its tasks through the conceptual knowledge and embedded knowledge resulted from the knowledge application. Therefore, the project team members engage in the IS project can share their experiences in the execution phase. After completion the all tasks of the execution phase, a new knowledge is resulted there called new project's progress and status knowledge that can serve as input to project closing-down phase which in turn after completion its tasks will result in new project management knowledge which will be stored in the projects' memory repository.

At the end of the paradigm is the project memory repository that includes the projects' experiences, skills, lessons-learned, and best practices which will be added to the organizational locations of knowledge. As such if any knowledge or expertise needed during an upcoming project, the repository is being called to search through previous similar projects in order to retrieve the appropriate previous lessons-learned or best practices to help in dealing with the situation. Knowledge and experience in the form of lessons learned can be documented and made available through the technologies accessible today such as the web. These lessons learned can document both reasons for success and failure to be valuable assets if maintained and used properly. An IT company that learns from its experiences can be more mature in its processes by taking those lessons learned and creating best practices for doing things in the most efficient and effective manner. In terms of managing IS projects, managing knowledge in the form of lessons learned can help IT companies develop best practices that allow all of the project teams to do the right things and then to do them right.

This is to enhance the team members' knowledge for future encountered projects' circumstances that closely match previous practices. Moreover, the project memory repository helps in providing references and guidelines to deal with any challenges, difficulties and gaps that might occur in future projects in order to avoid mistakes or threats happened. This enables the team members to be better prepared and fully qualified for future projects, which in turn result in increasing the success rates of projects and reducing the failure ones.

6. CONCLUSIONS

Information systems projects are considered an organizational investment for many Information technology (IT) companies, because implementing these projects requires considerable time, money, IS/IT people, hardware, software and other resources with an expectation of getting revenues from that. Although the Information and communication technologies are becoming more reliable, faster, and less expensive, but the costs, complexity, and risks of managing IS projects continues to be a challenge in terms of getting deliverables with high quality, meeting customers' expectations on time within the available organizational

resources. In a bid to improve the likelihood of IS projects success, this study will introduce a new paradigm for integrating the capabilities of knowledge management with the Information systems projects management processes.

Inevitably, the intensive rivalry among IT companies has drawn the attention of their managers, decision makers and investors in the IT sector to be more awareness toward the pressures that threat the success of IS projects undertaken by their IT companies. Thereby this paper aimed to integrate the KM processes with project management phases in a bid to enhance the efficiency and effectiveness of IS projects management by discovery, capture, share and application of relevant knowledge based on the IS project goals and objectives.

For IT companies as a Hi-Tech knowledge-intensive ones, knowledge is considered the only key resource where the intellectual capital assets outperform the structural capital assets. Therefore, The proposed paradigm for IS projects can be a baseline for IT companies to ensure that the knowledge from one IS project is ready for use in similar future projects in order to reduce the rework and repetition, mistakes, gaps and duplication of similar tasks. Furthermore, the proposed paradigm has the potential to alleviate the possibility of IS projects failure, delay, stoppage, inefficiency and ineffectiveness.

Thereby, the proposed paradigm would be helpful in encompassing all the best practices and lessons learned for the sake of IT companies in their future projects. It can assist in smoothing all phases of IS project by enabling all project members to create, capture, share and apply the needed knowledge of the project. This will be eligible in case of any new knowledge or expertise needed during the IS project then the organizational memory repository will be called to search and retrieve of previous practices and lessons learned to assist in dealing with that situation. Therefore, the proposed paradigm would be vital to provide real-time, up-to-date knowledge and experiences to handle, absorb and adapt to all environmental and organizational changes in business organizations due to employees' job rotation, retirement and attrition to competitors.

It is hoped that this work will bring the attention of a wider population of IS managers, CIOs (chief information officers) CKOs (chief knowledge officers) and projects managers to help revise and validate the proposed chief information officers introduced in this paper. As future work, the authors will be investigating thee practical aspect of the proposed chief information officers by implementing it as a pilot project and consequently design a prototype and develop it as a computerized system.

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