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KASL-II: a dynamic four-loop model for knowledge sharing and learning

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SUMMARY

Knowledge sharing is by far the most important component of a knowledge management programme. Organizations strive to gain competitive advantage through efficiencies. When organizations realize that organizational knowledge is by far the most valuable resource, they need to find ways for efficient and effective knowledge sharing. We explore the barriers to knowledge sharing especially in virtual and multicultural teams. In particular, we unfold the human and cultural challenges that can create added competitive value for virtual and networked organizations. We conclude that the ideal environment and working practices will be to change the mindset and behaviour of team members so that instead of perceiving knowledge sharing as an extra task for the team members, isolated from the knowledge of other team members, it (knowledge sharing) becomes the natural way to work for everyone. Finally, we propose the dynamic knowledge acquisition and sharing lifecycle (KASL-II) model for aiding the knowledge sharing process by showing the stages of translating an organization's mission and goals into objectives, and how decisions and actions operate for materialising these objectives. Copyright © 2010 John Wiley & Sons, Ltd.

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1. INTRODUCTION

In today's highly competitive and rapidly changing global environment, more and more organizations strive to form virtual teams comprising experts situated in different locations, organizations, countries and time zones. The increased complexity of international organizations and worldwide business relationships has become a dynamic business reality with intensified competition. Outsourcing and distributed teams that seldom meet face-to-face is the common practice today. Teamwork is essentially a result of human interaction. Virtual teams are teams of people who primarily interact electronically and who may meet face-to-face occasionally and in some projects not at all. In a virtual team, the team members work interdependently towards a shared goal using webs of information and communication technologies (ICTs) across time and space and often across organizational boundary [1–4].

Despite the many technologies that support collaboration among distributed work groups, organizations still face difficulties building online work environments. What is lacking in most virtual workplaces is a proven methodology for identifying and converting individual expertise, skills

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and experience into organizational knowledge and to strategically align organizational knowledge transfer and learning investment with organizational value outcome.

Harorimana [5] argues that it is impossible to transfer knowledge that is not embedded in local cultural practices and settings because reciprocity norms dominate successful knowledge transfer. We believe that it is only a challenge that we can face by raising cultural awareness. By sharing information across the organization, virtual teams naturally build their own knowledge bases that are consistent with the rest of the company. The ideal environment and working practices will be to change the mindset and behaviour of team members so that instead of perceiving knowledge sharing as an extra task for the team members, isolated from the knowledge of other team members, it (knowledge sharing) becomes the natural way to work for everyone. The result will be a well-integrated, highly responsive organization whose employees can quickly take action regardless of the location.

In this paper, we propose a knowledge acquisition and sharing lifecycle (KASL-II) for use in virtual organizations. The application of the model to everyday processes will ensure that the output of every team adheres to the company's overall strategy.

2. KNOWLEDGE MANAGEMENT CONCEPTS

Knowledge management (KM) can be defined as the management of '*processes by which knowledge is created and applied*' [6], though there is no commonly agreed definition. KM can be viewed as the process of turning data into information (data in context) and, further on, to knowledge (use of information) [7, 8] or as the organizationally specified systematic process for acquiring, organising and communicating both tacit and explicit knowledge of employees so that other employees may make use of it (knowledge sharing) in order to be more effective and productive [9]. Tacit or implicit knowledge is context-specific, personal and subjective including cognitive elements and thus difficult to formalize and communicate [10, 11].

KM is a business philosophy. It is an emerging set of principles, processes, organizational structures and technology applications that help people share and leverage their knowledge to meet their business objectives [12]. This focuses the individual and places responsibility on the individual, the knowledge worker. At the same time KM programmes in organizations emphasize the holistic nature of creating, sharing and managing knowledge.

Knowledge sharing (transfer) is the process where individuals mutually exchange both tacit (feel or sense for something [13] and explicit knowledge (codifiable knowledge [13]), and jointly create new knowledge. This process is essential in transferring individual knowledge into organizational knowledge. The capability of an organization to create, recognize, widely disseminate and embody knowledge in new products and technologies is critical when faced with turbulent markets, high competition and financial instability [14]. Continuous knowledge creation requires voluntary actions including openness, scrutiny, trust and tolerance towards different views and interpretations. Organizations expect employees to keep professionally up-to-date by continuously obtaining internal and external information relating to their profession. Knowledge evolves continuously as the individual and the organization adapt to influences from the external and the internal environments. Elron and Vigoda-Gadot [15] found that when ICTs are used as the main communication channel between team members the limitations of the communication increase, as technology cannot provide the same richness as face-to-face interactions and potentially hinder the effectiveness of knowledge sharing. They also found that influence tactics and political processes in virtual teams are more restrained and mild than in face-to-face teams. This seems to indicate that bottom–up empowerment should be encouraged to improve interaction and communication richness.

2.1. KM and ICTs

Organizations are facing a new challenging environment characterized by globalization, dynamism and increasing levels of complexity due to rapid changes in technology and its connected intricate knowledge.

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KM plays an important role in software development [16]. The literature emphasizes mainly the implementation of new information technology (IT) systems and technical solutions. Organizational and cultural aspects are usually neglected. Organizations formally capture, manage and store knowledge explicitly with the help of computer-based systems, such as Management Information Systems (MIS), Decision Support Systems (DSS) and Expert Systems (ES), which today are becoming ubiquitous in organizations [17]. However, technology by itself does not solve an organization's inherent problems relating to intellectual capital, knowledge and information management. Davis *et al.* [10] argue that KM is based only up to 30% on implemented systems and the rest is based on people. The fact is that the view of knowledge is changing and today it is seen as human capital that 'walks out the door at the end of the day' [8]. ICTs seem to enhance the KM capabilities of organizations [9, 18].

Internet-based virtual tools have created new opportunities for rapid access to business information worldwide. Identifying potential business partners and developing business links with organizations in other countries has become easier for organizations that are experienced in monitoring web-based information sources, and are able to combine tacit knowledge with new knowledge sources that are enabled by ICTs, such as internet, intranet, groupware and computer-supported co-operated work (CSCW) systems. Explicit knowledge is transferable through formal and systematic languages. Organizations try to gain business advantage by using knowledge creation processes (KC) in order to 'capture' knowledge and use it to make wiser decisions about strategy, competition, products, production and service life cycles [19], as well as to improve their effort in today's very competitive and uncertain environment. Organizational knowledge is created by an organizationally specified systematic process for acquiring, organising and communicating both tacit and explicit knowledge of employees so that other employees may make use of it in order to be more effective and productive [9]. This experience is documented and stored in a knowledge management system (KMS) preparing the organization to react in the future, based on the knowledge that is acquired from its own organizational experience.

Views on KM and ICTs are wide ranging between two poles—one considering the relationships between KM and ICT incidental—the other considering IT being the core of KM [20]. This paper considers KM as being a social and human phenomenon which, by using ICT as a tool, can improve the efficiency of knowledge creation, visualization, transfer and preservation. ICTs facilitate the amplification, augmentation and leverage of innate human knowledge-handling capabilities. Advances in ICTs provide organizations with increased flexibility and responsiveness, permitting them to rapidly form dispersed and disparate experts into a virtual team that can work on an urgent project. ICTs support faster, cheaper and more reliable knowledge work on a large scale and the existence of efficient ICT is inevitable and an imperative requirement for the existence of virtual collaboration. However, the emphasis in this paper is to unfold the human and cultural challenges that can create added competitive value for virtual and networked organizations.

2.2. KM—communities of practice and social computing

Communities of practice (CoP) are defined by Lave and Wenger [21] as 'an aggregate of people who come together around mutual engagement in an endeavour' and by Bettoni *et al.* [22] as '*the participative cultivation of knowledge in a voluntary informal social group*'. The highlight in both definitions is on a type of social construction or community leading to a kind of culture including common practices that emerge in the course of the mutual endeavour. The community is usually born around a shared profession and its topics of discussion are outside the traditional structural boundaries. However, both experience and research show that our knowledge for designing online CoPs is limited [23]. Some researchers even claim that enthusiasm about CoPs is well beyond the empirical evidence [24]. In fact, many communities lack sustainability by falling apart soon after their initial launch due to lack of adequate energy and synergies or by adopting a short-term opportunity-driven behaviour, which in turn leads to uncertainty and mistrust between the members and consequently to low quality of shared work results [22]. The benefits of CoPs seem to include the facilitation of greater variety in the knowledge domains of the members [25].

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Social computing refers to the use of social software within networks for creating and maintaining mutual social connections among individuals [26]. Such contemporary networks are learning communities in the sense that they evolve through collective building and transfer of knowledge. The degree of participation of members is shifting depending on motivation factors, perceived advantages and other commitments. Social computing includes CSCW and learning and is mediated through e-mail, wiki (a collaborative technology that allows for linking among any number of pages, for organising information on Web sites), blogs (a Web site where entries are written in chronological order and displayed in reverse chronological order), instant messaging, videoconferencing, etc.

The potential role of social computing and CoP enables a bottom–up approach for supporting knowledge creation and knowledge sharing activities in contrast to the hierarchical control of central knowledge repositories.

3. UTILISING KM FOR IMPROVING THE EFFECTIVENESS OF VIRTUAL TEAMS

tra2The characteristics of virtual teams identified by Bal and Teo [27] are as follows: Virtual teams consist of goal-oriented team members/knowledge workers, who are dispersed geographically and work supported by ICT more often apart than in the same location. They solve problems and make decisions jointly; they are involved in a coordinated undertaking of interrelated activities and are mutually accountable for the team results. The virtual teams have usually a finite duration (few teams are permanent). The primary motivation is to gain access to world class capabilities to lower costs and to integrate diverse perspectives [28]. Virtual teams, by their very nature, imply the presence of a group of geographically dispersed individuals often from different cultural, educational and professional backgrounds. They work on a joint project or a common task and communicate, mainly by using e-mail, for the duration of a specific project [29]. A potential conflict arises when the team members belong to different organizational and cultural units, because the team mates do not know where to place their loyalty [30]. In virtual environments this is exacerbated, because informal communication is reduced, due to the fact that members rarely meet face-to-face. A successful leader of a virtual team must excel in applying the right choice of ICT to enable effective communication and knowledge sharing. Communication, and thus also knowledge sharing, in virtual teams in a global context is considerably much more difficult due to language, culture, time issues and distance. Knowledge sharing with bad communication is a big challenge and a difficult issue to achieve. Teams lacking communication and knowledge sharing will turn into detached groups of uninvolved strangers without leadership and cooperation. The individuals of the virtual team and the leader must build a unified team committed to the common goal and through interdependent interaction generate group identity and create the feeling of belonging to a group [30].

In today's competitive environment increasingly large numbers of IT organizations use virtual teams in their international operations, which can constitute subsidiaries, outsourcing relationships or global partnerships [31]. A sense of identity is important because it determines how an individual directs his or her attention [32]. Identity shapes what one pays attention to constitute a primary factor in learning and sharing of personal experiences (knowledge transfer). It is proved that strong identity within CoP contributes towards better collaboration, learning and innovation. However, individuals of virtual teams and communities of dispersed workers show difficulties in interacting with colleagues and keeping themselves up to date.

Social computing and CoPs develop spontaneity for solving professional daily problems and can, to some degree, substitute informal discussions of co-located teams. Subsequently, this kind of social networking is an important source for building trust, creating reciprocal esteem, as well as for developing a feeling of identity and group-belonging [31, 33]. If the relationships and social rules are based more on professional than on personal or affective factors, the social networking can constitute an important, yet often unrecognized, supplement to the value that individual members of a community obtain in the form of enriched learning and a higher motivation to transfer what they learn and in this sense even substitute formal teaching programmes [25]. Also there is an evidence asserting that CoPs create organizational/institutional value [32, 34]. Social networks

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function at a higher level of abstraction and contribute to a high degree of tacit knowledge sharing. We need to understand that CoPs are governed by mutual benefit norms in which the community welfare takes priority over individual interests.

4. A KNOWLEDGE ACQUISITION AND SHARING LIFECYCLE

Reflecting on the literature review regarding KM and the personal experience from working in multicultural environments, as well as from teaching multicultural groups of students, Georgiadou *et al.* [35] developed the KASL lifecycle for knowledge acquisition and sharing, which they used initially in the academia to model the knowledge processes involved in student group work. In this paper, KASL is extended to encompass industrial situations that are almost always based on team work including work carried out by virtual, dispersed and diverse teams. Individuals learn and contribute to the group, the group learns and contributes to the organization and the organization facilitates/sponsors the processes in a perpetual virtuous circle of exchange of information, sharing of knowledge and process improvement.

The vision refers to mental images of the future, which become tangible in the form of mission statements. The mission statements define the primary purpose and articulate the responsibilities to its stakeholders. Goals are attempts to improve the performance by making mission statements more concrete. Objectives represent the operational definitions of goals in more precise terms and describe what needs to be accomplished in order to reach the goals. Plans and tasks are developed usually by managers to help accomplish higher-level intentions.

KASL-II (Figure 1) depicts four knowledge sharing and learning loops that involve individuals, groups, groups of groups (departments/divisions) and the whole organization. Knowledge is captured, stored and accessed for improved decision making.

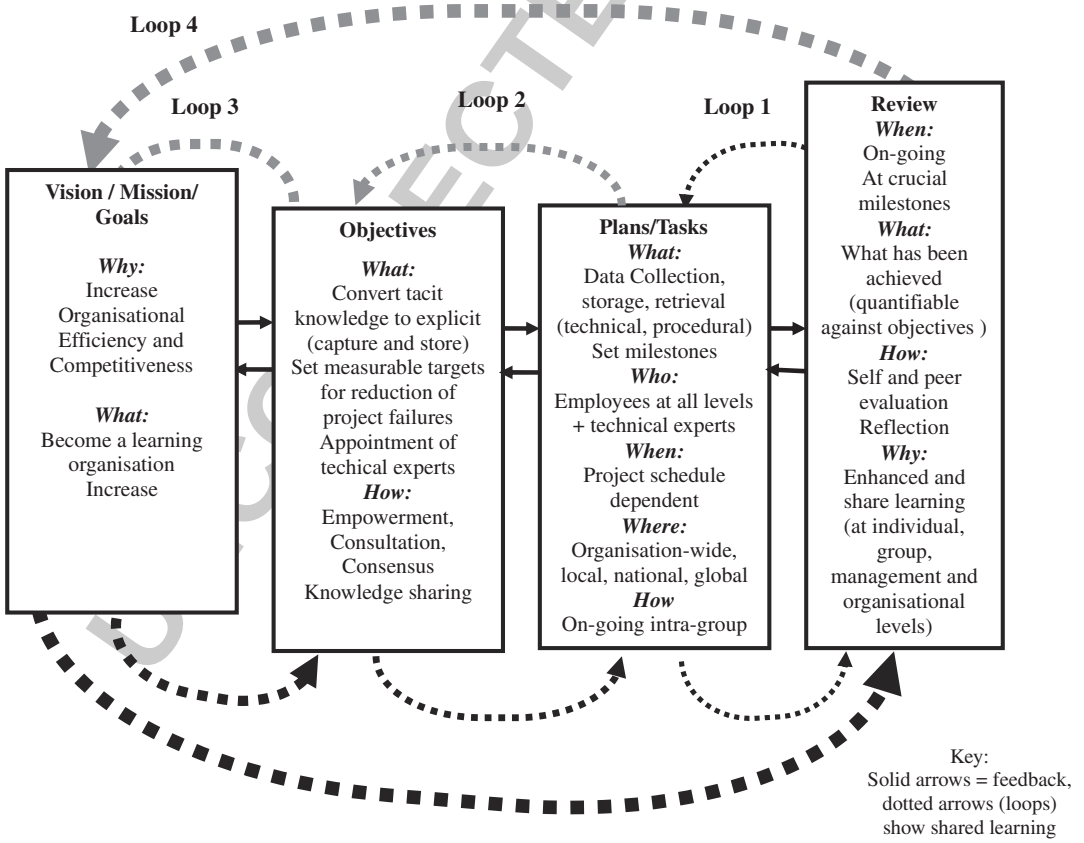

Figure 1. KASL-II, a dynamic four loop model for knowledge sharing and learning.

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The KASL-II model depicts the stages of translating an organization's vision and goals into objectives and the objectives into tasks. At each stage, feedback loops to the preceding stage ensure that omissions and problems are captured at the earliest opportunity; modifications to the schedule, resource allocation and quality monitoring are enabled through these feedback mechanisms. Measurable targets are set and monitored; hence, the process is controllable and is likely to achieve maximum improvements.

Learning loops show the granularity of activities through detailed and systematic posing of relevant questions, which need to be addressed at each stage.

Loop 1 shows the learning gained by individuals who engage in the tasks and activities (smallest granule). Here, individual employees (learners) have opportunities for self and peer assessment, reflection and reporting of measurable results.

Loop 2 shows the learning gained by groups (second level of granule) on clusters of activities (parts of projects). Feedback from individuals, groups, management and the organization contributes to the setting of objectives.

Loop 3 shows the learning gained by larger groups such as departments/sections/divisions (groups of groups) where objectives are set, revised and assessed. This phase also encapsulates at the organizational level (granule) process management, process improvement, setting of measurable targets, prioritising objectives, allocating/reallocating resources and facilitating conflict resolution.

Finally, loop 4 shows the organizational learning which is the vehicle for achieving the organization's vision and goals. A learning organization is able to reflect and capitalize on the achievement of targets, which in turn enhance the organization's competitiveness. When all the employees feel empowered and have responsible ownership of the process (they are involved with) and when they shed the old way of thinking by replacing the belief in knowledge sharing rather than in knowledge hoarding, the organization will move from 'knowledge is power' to 'shared knowledge is power'. Improvements in learning at all four levels move an organization from data handling, through to information, knowledge and wisdom ensuring the competitiveness of the organization. Individuals feel valued and work for the benefit of the organization, which is no longer in conflict with their own ambition. As early as 1981 Mumford [36] identified the concept of knowledge fit, job satisfaction, technical fit and the benefits of this approach to everybody involved. Nearly 30 years later, the KM community is putting these ideas into practice.

The KASL-II model aims to make the process of knowledge sharing and learning process explicit at all levels of granularity by going back to first principles of asking those 'honest serving men' who according to Kipling .. taught him all he knew ... (http://www.kipling.org.uk/poems_serving.htm last visited on 07/03/2010).

I keep six honest serving-men
(*They taught me all I knew*);
Their names are What and Why and When
And How and Where and Who.
I send them over land and sea,
I send them east and west;
But after they have worked for me,
I give them all a rest.
(*Rudyard Kipling, 1902*)

In addition, the KASL-II model depicts the different dynamics involved in knowledge acquisition and knowledge sharing on four different abstraction levels, namely the individual, the group, departments (groups of groups) and the organization. The organization works towards realising its vision and achieving its mission. Objectives are achieved through consensus. Normally when the workforce is involved in setting the objectives, they have ownership of the project and hence they work collaboratively. Individuals' tacit knowledge is externalized, shared and formalized (changed to explicit knowledge) initially with the direct collaborators (such as a project team). Different project teams share knowledge through integrated repositories. Thus, the organizational knowledge grows all the time. The attitudes of the staff change from individualistic to collectivistic.

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The 'enemy' is the competition and hence it is not internal. Employees feel valued and secure in sharing their knowledge with their colleagues. Issues of intellectual property rights (IPR), exploitation rights (ER), ethics and culture need to be addressed particularly as knowledge sharing takes place at intra-organizational and inter-organizational levels and across national boundaries, national cultures and languages.

The knowledge cycle within organizations includes mechanisms of recording the ownership of knowledge, its capturing, organising, representing and storing, its retrieving and the creation of new knowledge. Within a learning organization, each employee becomes a knowledge worker. Organizational memory is valued and shared using management and technical tools. Appropriate techniques and tools for KM Programmes through the use of empirical data and the use of evaluation frameworks are selected. Neches *et al.* [37] presented a vision of the future in which the knowledge-based system development and operation is facilitated by infrastructure and technology for knowledge sharing. Within and beyond the organization's boundaries, the contemporary employee will increasingly use social computing for knowledge sharing.

Empowering all the stakeholders to engage in externalising and sharing data, information and knowledge results in a learning organization. Progressing from data to information answers the fundamental questions of 'who', 'what', 'where' and 'when'. Going from information to knowledge we need to be able to answer the 'how' question, whereas understanding requires an appreciation of the 'why'. According to Ackoff [38] wisdom is evaluated understanding. The first four categories i.e., data, information, knowledge and understanding relate to the past; they deal with what has been or what is known. Only the fifth category, wisdom, deals with the future because it incorporates vision and design. With wisdom, people can create the future rather than just grasp the present and past.

'*But achieving wisdom isn't easy; people must move successively through the other categories.*' [http://www.systems-thinking.org/dikw/dikw.htm—last accessed 07/03/2010].

5. MODEL CREDIBILITY

The credibility of the proposed model was established by a verification and validation process. The verification of the KASL-II model was carried out using an interpretive research method whereby five experts were interviewed by the authors. At the beginning of each interview, an explanation of each component depicted by the model including all four learning loops and the various feedback loops was given to the interviewee. According to Macal [39] 'Model verification attempts to establish whether the model implements the assumptions correctly i.e., verification addresses the following questions:

(i) Does the model solve an important problem?
(ii) Does the model contain errors, oversights, or bugs?
(iii) Does the model meet a specified set of requirements?
(iv) Does the model perform as intended?'

The grading scale given was S = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree. The experts' responses are shown in Table I.

The responses to Questions (i) and (iii) were either an Agreement or Strong Agreement, which were encouraging. The responses to Question (ii) were emphatically Strongly Disagree or Disagree, which means that there were no errors, oversights or bugs. There followed a round table discussion of the experts and the researchers. The main issues discussed were the variation of responses to Question (iv) i.e., Does the model perform as intended?

The essence of the discussion is summarized in the following comments:

The model seems workable.
The processes depicted make sense.
The question should have been 'Do you expect the model to perform as intended?'

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Table I. Model Verification.

	Q(i)				Q(ii)				Q(iii)				Q(iv)			
Expert	S	A	D	SD	S	A	D	SD	S	A	D	SD	S	A	D	SD
A	√							√		√				√		
B		√					√			√				√		
C	√							√	√				√			
D	√							√	√							√
E		√						√	√							√

Basically performance can only be judged / measured after use, indeed after repeated use, hence we are undecided.

It depends on what you mean by performance

– time will be the judge of this.

The efficiencies of the model will become evident with use.

Model validation depends on the purpose of the model and its intended use. It can be considered as an exercise in 'thought space' to gain insights into key variables and their causes and effects [39]. Model validation attempts to establish whether the assumptions that were made are reasonable to the real world. We need to address the following questions:

(i) Can we ensure that the model meets its intended requirements in terms of the methods employed and the results obtained?
(ii) Is the model useful i.e., does the model address the right problem and does it provide accurate information?

The KASL-II model was validated by applying it to a case study 'Managing a franchise partnership' (Middlesex University, London, U.K.). Each partnership is managed according to the University's Quality Assurance procedures and to the specific terms agreed at the validation of the link and the programme(s)

(e.g., University of Nicosia, Cyprus and Regional IT Institute, Cairo, Egypt) (http://www.mdx.ac.uk—last accessed on 07/03/2010).

Individual, groups, departments (who) involved have defined roles and responsibilities (what). The methods used (how), the sequence and timing of events such as boards of study (when) as well as the location (where) agreed and are planned. In carrying out their activities, all individuals and groups involved gain knowledge and experience that is explicitly documented and shared. Opportunities for reflection and evaluation (self and peer) are informed and supported by quality assurance mechanisms, reporting templates and reports, committee meetings, boards of study, examination boards, Individuals involved are learning and sharing knowledge through the use of ICTs (the internet, Virtual Learning Environment, Video-conferencing, webcams, etc.), which engender and facilitate the creation and progress of a CoP. There remains one question namely the ***why.*** This is the reason why we engage in such a provision as a School and as a University. The answer to this is encapsulated in the University's mission to serve the local, national and international communities with high-level education provision. Students want to:

Loop 1 (Operational)–Individuals involved:

- Link Tutor (at Middlesex and at partner institutions);
- Administrator (at Middlesex and at partner institutions);
- Programme Leader (at Middlesex);
- Module leader (at Middlesex);
- Module Tutor (seminars/laboratory sessions at partner institution);

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- Technician (at Middlesex and at partner institutions);
- Learning resources officer (at Middlesex and at partner institutions);
- Student (based at partner institutions).

Loop 2 (Operational)—Groups involved:

- Students (cohort);
- Teams (within modules mainly for group coursework activities);
- Lecturers (module leaders and seminar/tutorials leaders);
- Support staff (Administrators, Technicians, Librarians).

Loop 3 (Tactical)—Entities involved:

- The Department;
- The School (Faculty);
- The teaching team;
- The support team;

Loop 4 (Strategic)—Entities involved:

- The School (Faculty);
- The University;
- Higher Education Sector;
- Society at large.

The results of both the verification and the validation exercises gave clear indications that the model is both useful and workable.

The limitations of this investigation are due to the limited number of experts participating at the verification stage, and the fact that the model was applied to one case study. According to Galliers [40] case studies are 'an attempt at describing the relationships which exist in reality, usually within a single organization or organizational grouping'. Although case studies is by far the most frequently used research method that captures reality, generalizability is difficult due to the problems relating to acquiring the same or similar data from a statistically meaningful number of cases. In this type of studies, a degree of subjectivity creeps in due to different interpretations of events by individual researchers and respondents.

6. CONCLUSIONS AND FURTHER PERSPECTIVES

In this paper, we provided the background for supporting the view that in workplaces in general but particularly in virtual workplaces there is a need for a methodology for identifying and converting individual expertise, skills and experience into organizational knowledge that is strategically aligned with organizational knowledge transfer and learning investment into organizational value outcome. We proposed the dynamic four-loop model for knowledge sharing and learning (KASL-II) for aiding the knowledge sharing process and hence learning through showing the stages of translating an organization's mission and goals into objectives, and how decisions and actions operate for materialising these objectives. The application of the model to everyday processes will ensure that the output of every team adheres to the company's overall strategy.

In future, the KASL-II model will be applied in industrial, training and additional educational institutions in order to obtain process improvement metrics that will in turn improve the maturity of the organizations involved. **Q2**

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