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一、報告內容

1. Introduction

With globalization and organizational expansion, attention on knowledge management is gradually shifting from within a single organization to across multiple organizations. Orlikowski [11] observed how members of global product-development organizations generate and sustain knowledge in their distributed operations. She proposed the concept of "distributed organizing," which is the capability of operating effectively across the temporal, geographical, political, and cultural boundaries, a situation routinely encountered in global operations. The authors viewed this "distributed organizing" as the capability of creating new knowledge based on existing knowledge, with the intention of solving problems.

Organizational performance is commonly linked to its ability to manage knowledge well. Nickson and Zenger [8] stressed a viewpoint about effective organizations, one which focuses on the efficiency of alternative organizational forms in generating knowledge or capability. They divert the focus from the role of organizations in providing efficient knowledge exchange to their role in efficiently producing knowledge or capabilities. They argued that a problem's complexity influences the optimal method of solution search with the problem as the basic unit of analysis. From this problem-solving perspective, the important issues are what can improve the efficiency of collaboration across multiple organizations and how to enhance the efficiency of knowledge creation.

For collaborations across multiple organizations to be efficient and effective, the impact of boundaries should be reduced and the support of boundaries be greatly enhanced. Because boundaries always exist in multiple-domain collaboration, the choice is either to break them or to try to find a way to cross them. Star and Griesemer [12] stated that we should respect the different views arising from the many worlds of different actors at the points where the worlds of those actors intersect. In fact, they believe that it is unnecessary to break boundaries. They have determined that communication across multiple domains by means of boundary objects is an efficient way to reduce obstacles.

Interactions take place when knowledge actors in different organizations communicate with each other. Although actors are performing the interactions, the resources that are involved in the interaction are actually knowledge, and therefore the interaction is called a knowledge interaction.

Hedlund [6] proposed a model of knowledge categories and transformation processes in which eight processes are defined: articulation, internalization, reflection,

extension, appropriation, dialogue, expansion, and assimilation. In other words, these transformation processes can be viewed as different kinds of knowledge interactions. Hedlund also pointed out that the quantity and quality of "dialogue" and "reflection" are important determinants of the type of knowledge management needed and whether the prescribed knowledge management is effective. For this reason, in effective interactions, "dialogue" and "reflection" play important roles which influence the efficiency of knowledge management as boundary objects function. They in fact can be regarded as additional kinds of boundary objects.

As new knowledge is generated from existing knowledge under knowledge interactions, whether the interactions are effective is crucial to new knowledge creation. Moreover, boundary objects are media of interactions and tightly coupled with the output performance, thus greatly influence the efficiency of knowledge interactions. This study first summarized types of boundary objects, and then applied a max-min methodology to measure the efficiency of each knowledge interaction. Our objective is to answer the question as to what kind of boundary objects lead to more efficient knowledge interactions.

2. Literature review

Boundary objects

Scientific work requires collaboration which is carried out by diverse groups of actors of different disciplines. Those actors who share a common goal must create common understandings, ensure reliability of communication across domains, and gather information which retains its integrity across time, space, and local contingencies. Star and Griesemer [11] proposed the concept of "boundary objects," which are adaptable to different viewpoints and robust enough to maintain identity across them, as a means of translating between different viewpoints. Boundary objects are therefore designed for communication between actors. They inhabit multiple worlds simultaneously and meet the demands of each of them. These objects mean different things in different worlds and might be simultaneously concrete and abstract, specific and general, conventionalized and customized. Actors must reconcile these different meanings to collaborate successfully. In Star and Griesemer's work, four categories of boundary objects are defined: repositories, ideal types, coincident boundaries, and standardized forms. These four types of boundary objects are all explicit in nature. The "tacit" type of boundary object seems to be missing from Star and Griesemer's work. An example of this tacit type of boundary object is described by Cook and Brown [5] in the "machine design" case [10], genre is a kind of boundary object that straddled bread-making and machine-making. Another tacit type

of boundary object is viewed as "organization's memory" by Ackerman and Halverson [1].

Many different types of boundary objects are still unknown or less discussed. Koskinen [7] addressed the question of what role metaphoric boundary objects play in knowledge sharing within and between organizations' innovation processes. He believed that the better an organization understands the nature of existing boundary objects, the more effectively it can take action to overcome existing barriers. In contrast, without the use of boundary objects, the possibility of arriving at common understandings is limited, and the opportunity to achieve a successful innovative process is reduced. Boundary objects can be artifacts, documents, and even vocabulary that can help people from multiple domains to build a shared understanding. Koskinen [7] focused on vocabulary-based boundary objects including figurative language and symbolism and dealt with the role of metaphors in the creation of boundary objects. He believed that a strengthened metaphoric boundary object will become better able to support the organization's innovation process. In summary, boundary objects are those objects, whether explicit or tacit, which enhance mutual understanding and communication in the process.

Boundaries of knowledge management

Carlile [4] examined the management of knowledge across three knowledge boundaries: syntactic, semantic, and pragmatic. He pointed out the importance of clarifying the relationships between actors in order to manage knowledge effectively across boundaries. He observed that actors need to not only share their own knowledge, but also assess each other's knowledge during interactions. Carlile [3] also adopted Star's list of boundary objects in describing the uses of boundary objects by individuals in the settings that he observed. According to Star's classification, there are four categories of boundary objects: repositories, ideal types, coincident boundaries, and standardized forms. In Carlile's classification, there are three categories of boundary objects, namely, syntactic, semantic, and pragmatic.

Table 1. Categories of boundary objects and specific objects

Categories of boundary objects	Specific objects
Syntactic boundary objects	Repositories
Semantic boundary objects	Standardized forms and methods
Pragmatic boundary objects	Objects, models, and maps
Metaphoric boundary objects	Figurative language and symbolism, genres, non-verbal expressions, visionary objects

Our study identifies more boundary objects and expands Carlile's categories to include a new metaphoric category. This new category includes boundary objects such as figurative language and symbolism (Koskinen, [7]), genres (Cook and Brown,[5]), nonverbal expressions (Nosek, [9]), and visionary objects (Briers and Chua, [2]). Table 1 shows the specific objects in each category.

Knowledge interaction

While the actors in a collaborative interaction, be they individuals or groups, are communicating with each other, boundary objects are also being generated.

The existence of boundary objects themselves is useful to the assimilation and dissimilation of knowledge. Consider the collaboration between two organizations as an illustration of where boundary objects can be created. When collaboration occurs between organization A and organization B, the knowledge which will be used in the collaboration comes from three different sources (Figure 1). Two of these sources exist in organization A and organization B separately, and the third source is generated only from the interaction, at the point where the two organizations collaborate. Let the outer rectangle in Figure 1 represent all the knowledge used during the collaboration. Then the rectangle can be divided into three parts according to the sources of the knowledge. Part 1 represents the original knowledge from the actor in organization A, and Part 2 represents the original knowledge from the actor in organization B. Part 3 represents the new knowledge created during their interactions. It can be inferred that this new knowledge is generated by the actors from both organizations based on their existing knowledge, and that each boundary object generated bridges across these sources and functions as a carrier of one or more kinds of knowledge. However, identical boundary objects can have different effects on actors, because the actors' existing knowledge may not be similar and their cognitive activities are not uniform.
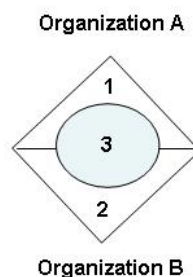

Figure 1. Three different sources of interorganizational knowledge

Our study focuses on identifying the relationship between the performance of collaborative interaction and the occurrence of various boundary objects.

Although the context is described with "actors" in mind, the unit of analysis is

"knowledge" itself, rather than "actors." While actors interact with each other across boundaries, knowledge, rather than actors, is the source of knowledge interaction. Yet, knowledge may not be always beneficial to knowledge interactions; there are also poor interactions in which the actors' existing knowledge turns out to be the barrier of knowledge interaction. We posit that knowledge boundaries and boundary objects are helpful in explaining why knowledge is both a barrier to and a source of knowledge interactions, just what Carlile [3] insisted in his study. Therefore, we observe how boundary objects are in action in each interaction, with the belief that some boundary objects are crucial to effective collaboration, while others are not as crucial [25][26].

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三、計畫成果自評部份：

1. *研究內容與原計畫相符程度*

本計畫原為三年期之計畫，規劃以四種不同的情境探討知識如何藉著互動擴散至其它情境，這四種情境分別對應於一種管理模式(分別為 heuristic reaction、paradigm shift、product/process innovation、以及 routine operation)。

目前已經完成 routine operation 情境下之部分實驗，對於知識的 boundary objects 已有確實的掌握。由於在組織中 routine operation 這一種管理模式是必然存在的，所以有豐富的資料可供觀察與蒐集，在知識管理研究的階段也是屬於較成熟，因此採用實驗研究。在實驗設計方面，原訂以三個學期的時間觀察三種不同層次的互動，分別為個體與個體、個體與群體、群體與群體的互動，且每一學期進行一種層次的知識互動的觀察，目前已完成八十六筆「個體與個體」的知識互動之研究，在 interaction 和 project performance 的客觀評分方式上，本研究採用 Talluri and Narasimhan(2003)所提出的 Max-Min 方法，對知識工作者之間的知識互動進行評估及同質性分析，以找出知識互動高低效能在 boundary objects 之詮釋，目前已有初步成果發表於 2009 HICSS42 國際研討會 [25]。

因此，本研究內容乃依據原計畫執行，原計畫的三年期計畫內容，在經過一年的執行後，目前業已完成一年半的進度，不但進度超前，且與原計畫的相符程度甚高。

2. *達成預期目標情況*

在本研究計畫的甘特圖中，第一年規劃為文獻整理及理論架構的建立，第二年開始進行第一種情境(routine operation)下的實驗研究，為期三個學期，每學期分別觀察個體與個體、個體與群體、群體與群體的知識互動，以得到驗證性的結果，並對其他三種情境之探索提供可能的觀察點，例如更確切的掌握重要變

數和關係，以及值得觀察之現象，截至目前已完成「個體與個體」之研究，因此，相當於已經跨入原訂規劃的第二年進度。

3. *研究成果之學術或應用價值*

截至目前，本研究成果彙整了知識互動的相關文獻，並提出後續可供觀察與研究的方向，未來落實在應用價值上，則在於提供組織一個具體可行的評估 knowledge interactions 的方法，從中發現不同型式的 boundary objects 對於 knowledge interaction 績效的影響，以作為組織營造高效率 knowledge interaction 環境之參考。

4. *是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等*

本研究所提出的 knowledge interactions 的觀點，是從近期有關知識管理領域的文獻對於 interactions 的關注而推導而來的。例如，Bhatt(2003)提到大多數的組織認為只要將焦點放在人員(people)、科技(technologies)和技術(techniques)上，就能夠作好知識的管理，但是過度將焦點放在這三者上，並不能夠讓組織持續維持其競爭優勢，而是要將焦點放在這三者的 interaction 上，才能夠更有效率地管理知識[27]。Smoliar(2003)則認為知識管理之下一個必要的階段就是 interaction management，組織不必致力於將人員的 tacit knowledge 轉換成 explicit knowledge，也不必將這些 explicit knowledge 跟其他工作團隊分享，而是應該設法營造出能夠讓這些 interactions 充分作用的工作環境[29]。這一點與本研究的主張不謀而合。

在 Chua(2002)的研究中更指出組織成員間的 social interactions 會影響知識產生的品質[28]，其研究對象是同一個組織的成員，觀察的單位是 social interactions 的多個構面，而本研究想探討的是來自兩個不同組織的角色(個體或群體)，在彼此互動之下的成效。我們研究的單位是知識，並以 boundary objects 作為觀察的元件，在二維的知識分類（individual/group、

tacit/explicit)上,將這兩個不同組織的角色互動,彙整成十種知識互動型式,並進一步歸納為三種層次(個體與個體、個體與群體、群體與群體),初步相關研究架構之構想已發表於 2008 年 7 月多倫多舉行之 ACME 國際研討會[26]。其次,本研究進一步對這十種不同的知識互動型式以不同的(knowledge)boundary objects 作描述,探究這些 boundary objects 的存在與知識互動型式之績效表現的關係,目前也有初步成果發表於 2009 HICSS42 國際研討會[25]。

本研究提出的 knowledge interactions,從宏觀的角度是看到組織的個體或群體在互動,但從微觀的角度則是在 boundary objects 看到互動之展現,相信若能逐步按照原三年計畫執行之後,應該能夠驗證相關的發現,並歸納出 knowledge interaction 的相關理論,屆時期望能將研究成果發表於 Knowledge Management 相關之國際知名期刊。

DSI 2008 Annual Meeting Conference 心得報告

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發表論文：

Huang, E. Y., Lin, Eric Sheng-Wei, How personality affects time control over e-mail use: The mediating process. *Proceedings of 39th Annual Meeting of the Decision Sciences Institute*, Baltimore, November 22-25, 2008.

　　DSI (Decision Sciences Institute Annual Meeting) 研討會迄今已三十九屆，是一個歷史悠久的研討會， 也是 information system (IS) 領域之主流研討會之一 ，今年於 Maryland 的 Baltimore 舉辦，研討會地點為 Marriott Waterfront 飯店，主辦單位是 Decision Sciences Institute，舉辦時間為十一月二十二至二十五日。會中除了研究論文的發表，還有 Placement 的活動，提供大學、公司尋才的管道，全球管理學界的學者、教授、以及博士班學生參加的人數眾多。此外，在美國任教的華人學者也大都以 DSI 年會為每年聚首的主要場合，在研討會第二天的華人學者晚宴是傳統的盛會。

　　此次 2008 年是本人第四次參加 DSI 研討會，由於本人十分鼓勵博士班學生參加國際研討會，增廣知識領域，並鍛鍊以英文發表論文與簡報的能力，儘早與國際 IS 研究領域接軌。因此，此次本人與所指導的博士生林勝為一同參加 DSI，我們共同發表的論文題目為「How Personality Affects Time Control over E-mail Use: The Mediating Effect」，發表於 Organization Behaviors 中「Virtual Behavior – The Devil's Workshop?」場次，時間是研討會第一天下午的一點至兩點半的場次，該場次的 Session Chair 為來自 Nebraska University 的 Silvana Trimi 教授，是位優雅、見解活潑、能有效帶領討論的主持人，會中大約有七、八個提問的問題，得到了許多寶貴的意見，充分地交流、討論。由問題中發現，很多數學分析工具，原來認為是不需介紹說明的，卻發現分析工具並非人人熟悉，甚至是在同一個領域常見的分析工具也是需要加以介紹、說明。另外，有兩位與會學者提出本文在量表製作上的相關問題，都在席間獲得滿意的回應。

　　由於 ICIS 研討會的內容完全是 IS 領域的研究、教學相關主題，相對地，DSI 涵蓋很多其他的管理議題，因此，目前 IS 研討會的重心已轉移至 ICIS，以致於 DSI 研討會中，IS 領域的論文不若以往眾多，雖然如此，DSI 卻仍是海外華人管理界的學者嶄露頭角的重要場域，而國內學者與國外華人學者的互動是有其必要性的，因此雖然 DSI 的規模不再驚人，它仍是具有指標性的大型、重要的研討會，未來若有機會本人仍然會考慮參加，。