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A light gray world map is centered in the background of the page, showing the outlines of all continents and major islands.

Integrating Knowledge Sharing Implementation: Toward An Institutionalised Symbiotic Model

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Abstract

With the advent of the knowledge economy and the rising importance of knowledge societies, today's organisations are constantly seeking new ways of leveraging knowledge assets to reap benefits such as cost savings, improved productivity, and enhanced corporate competitiveness. In a highly competitive global environment, organisations are now seeing an urgent need to institutionalise knowledge sharing (KS) as a means of getting the best value from all available knowledge assets. Given the expanded use of the Internet and Intranets in the corporate sector, the integration of knowledge sharing implementation and how it could be instituted effectively has yet to be fully addressed.

This article first explains the motivation behind the significance of effective implementation in knowledge sharing. It then turns to describe the role of the Internet and intranets in relation to enhancing knowledge sharing capability. Next, it identifies and outlines the vital agents for effective knowledge sharing implementation, namely: enabling ICT infrastructures, IT tools and supporting technologies, communities of practice, and knowledge repositories. The article proposes a management framework, termed the institutionalised symbiotic model, in which the "degree of symbiosis" between pair-wise agents could be evaluated and diagnosed institutionally. Finally, it concludes with the challenges facing organisations to implement knowledge sharing more effectively.

Keywords:

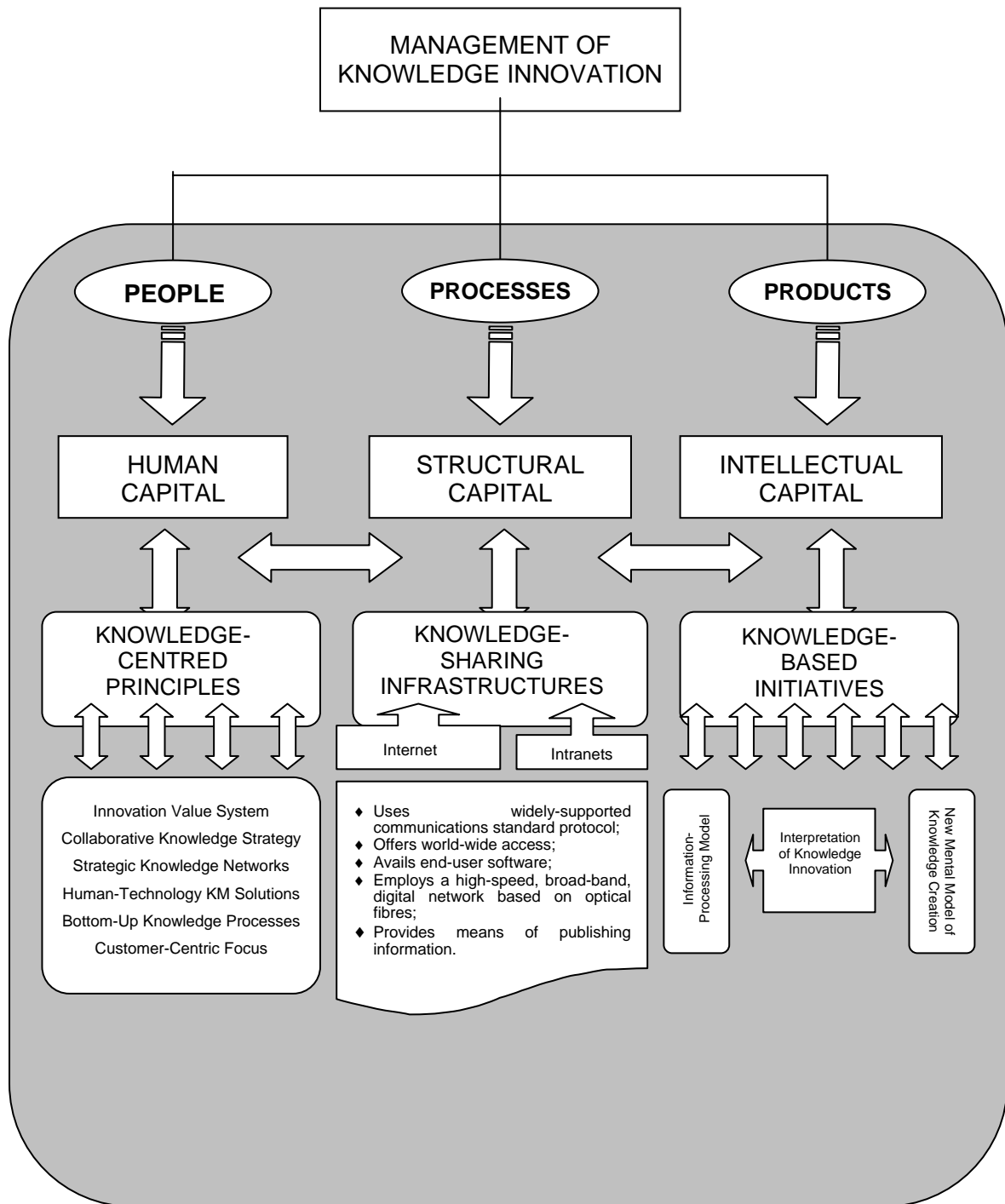
Knowledge economy, knowledge society, knowledge management (KM), knowledge sharing, knowledge assets, knowledge repositories, knowledge sharing implementation, information and communication technologies (ICT), enabling ICT infrastructures, information technology (IT), IT tools and supporting technologies, communities of practice, the Internet, and intranets.

Introduction

In recent years, a plethora of conceptual models have been developed to help organisations frame, rationalise and deliver knowledge management (KM) projects for various corporate functions. Yet, a majority of these conceptual models tend to be limited in scope of application or simply lack the breadth of management considerations to incorporate a range of knowledge-related issues. Research works have thus focused on enhancing the “state of knowledge” of these conceptual models through widely varied efforts along themes such as “redesigning modelling archetypes” or “integrating modelling streams”. While these research efforts are commendable, the results have been less encouraging and are generally perceived to be attaining only partial success. One example of such a conceptual model is the integrated strategic management framework for knowledge innovation, as illustrated in Figure 1, which extends beyond KM practices, information technology (IT) tools and physical systems to purposefully incorporate perspectives and considerations relating to principles, infrastructures and initiatives (Goh, 2004a; 2004b). Although the conceptual model provides a managerial tool for an organisation to analyse whether its role on strategic aspects of knowledge management (KM) has been fulfilled, one drawback is its limited coverage on knowledge sharing implementation. Besides, extant literature on knowledge sharing lacks in-depth elaboration on enabling information and communication technologies (ICT) infrastructures, IT tools and supporting technologies, communities of practice and knowledge repositories.

For some time now, it has been argued that knowledge is as good as its “ability to be shared”; and the debate surrounding the “best means” of knowledge sharing remains largely unresolved. Given that a major proportion of an organisation’s activities in a knowledge economy are centred on knowledge sharing and the benefits are enormous, its emergence as an integral part of best knowledge management (KM) practices has become significant (Gupta and MacDaniel, 2002; Clarke and Rollo, 2001; CIO, 2000). Currently, the dominant driving force behind the transformation to greater inter-connectivity, accelerated data transmission and reduced costs of communications is none other than ICT. For more than three decades, ICT has played the role of a force multiplier for most knowledge societies – providing efficient means of accessing and transmitting information and real-time communications. Out of the all ICT options available today that has the most profound impact on knowledge sharing is that of the Internet – which has evolved steadily since its origins in the US APRAnet project. Besides its “global reach”, the Internet offers an incredible information source direct to the end-users without the need to involve an intermediary (Holland and Picard, 1996). While the actual nature of ICT may vary depending on the organisational context, resource constraints and business objectives, understanding how knowledge sharing implementation could be instituted effectively is vital. In particular, how knowledge sharing agents should be integrated in a symbiotic manner need to be better addressed.

Figure 1: A Strategic Management Framework



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(Source: Goh, 2004b)

Use of the Internet and Intranets

The Internet possesses two strategic levers over other forms of knowledge sharing implementation. One, it offers an “infinitely expansible” platform for information dissemination. Two, its knowledge sharing capability proliferates with usage. While the Internet has been growing in stature, the knowledge sharing applications have been largely confined to its “information role”. But increasingly, knowledge sharing in the corporate sectors has made extensive use of the Internet to implement collaborative activities and distributed knowledge to both internal partners and external stakeholders. These activities are now reflected by the growing emergence of best practices aimed at developing knowledge sharing (KS) competencies in companies like General Motors, IBM, Daimler-Chrysler, Lucent Technologies and Intel (Lindgren and Henfridsson, 2002; Allee, 2000). With the heightened interest to share information under “protected conditions”, knowledge sharing implementation has gradually expanded to include intranets (e.g. to improve accessibility in a corporate environment). The benefits of using intranets are similar to those of the Internet in terms of external information access and communications. Because end-users are familiar with browser interfaces, information can be shared across different local area networks and computer platforms, and published information is instantly available over the entire network. Besides, intranets can also host transaction and database applications with the Web browser being the universal interface to different “back-end” systems (O’Brien, 2002; Dutta and Segev, 1999).

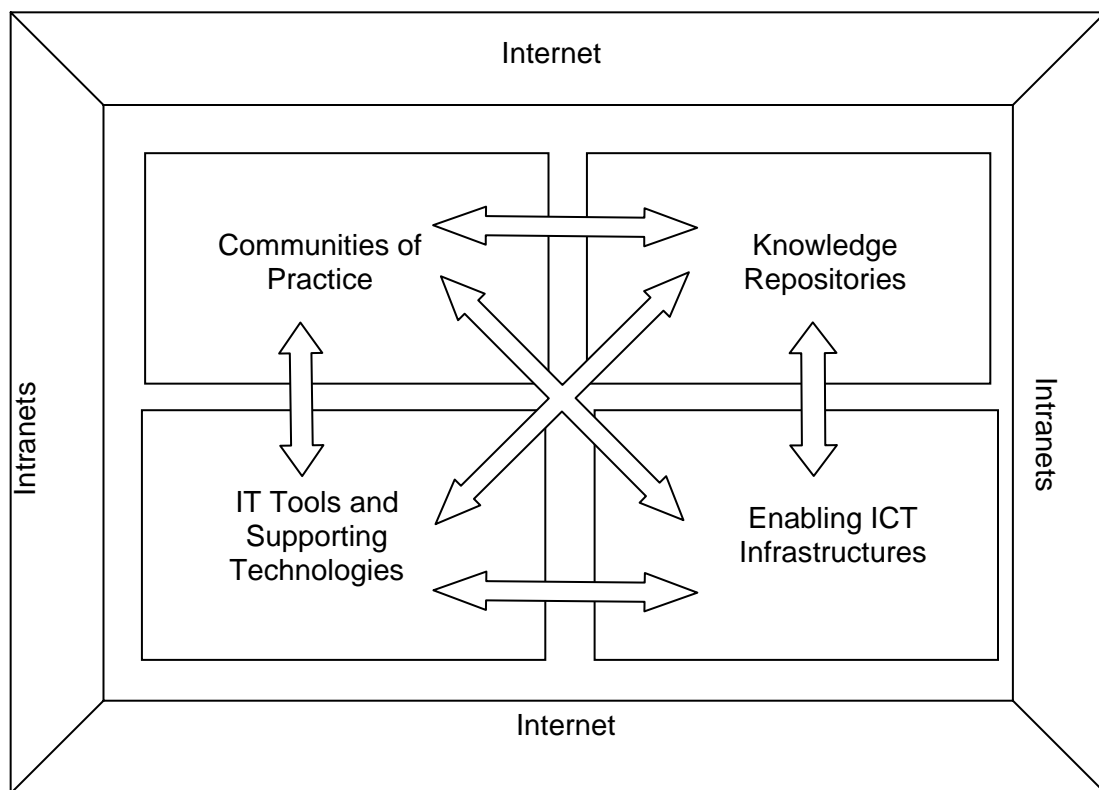
In today’s workplace, the Internet and intranets herald the means for knowledge sharing amongst professionals of accounting, insurance, securities, banking and information technology. Whatever the content, intranets facilitate the sharing of specific types of internal information (e.g. staff bios or case studies), while the Internet gateways external information. Yet, one shortcoming of the intranet is that it is usually designed with rigid templates and often requires constant updates, and as a result, unformatted content may not readily make it onto an intranet site. In recent years, we see the emergence of extranets that are enabling individuals to share knowledge with counterparts all over the world (e.g. for clients to post information and access both internal and external storehouses of information). Given that a great deal of knowledge exists “out there” but in format that made it difficult for access, the challenges facing the Internet and intranets include gathering codified knowledge and then disseminate it as knowledge products or as website content. One example is the creation and distribution of newly packaged knowledge in formats such as toolkits, briefs and newsletters within a web-based environment – which had generated a substantial rise in online Internet distribution of development knowledge. However, whether knowledge created and distributed in such a manner constitutes “effective implementation” is still subject to debate, as knowledge management (KM) critics hold the view that it lacks “symbiotic co-ordination” across knowledge sharing agents to deliver the best returns knowledge could offer (Goh, 2004b; Gold, Malhotra and Segars, 2001; Malhotra, 2000; Probst, Raub and Romhardt, 1999).

Towards an Institutionalised Symbiotic Model

Knowledge sharing exists at all organisational levels, in all sorts of situations and entails all types of transactions. But fundamentally, it involves the interactive process of making the right information available at the right time to enable individuals to act judiciously on the benefits of knowledge – to enrich the value of an organisational mechanism, process or system. In recent years, the increased attention on

knowledge sharing resulted from rising optimism that knowledge management (KM) tools offer “intelligent means” of retrieving, filtering and disseminating knowledge. In particular, the widespread use of the Internet in information retrieval has defended its role as a highly efficient knowledge sharing vehicle. In fact, the phenomenal growth of the Internet over the years has been primarily dependent on the use of standard network protocols and a consistent set of tools to access information over a variety of platforms (Barth, 2000b; Blumentritt and Johnston, 1999; O'Dell, 1996). However, as any information hosted on the Internet automatically falls in the hands of the public domain, the main objection to most organisations employing the Internet for knowledge sharing has been primarily related to security issues. Hence, to capitalise on the knowledge sharing capabilities of the Internet and yet enjoy some semblance of security at the same time, organisations are increasingly relying on in-house intranets using standard Internet technologies built on their corporate networks.

Figure 2: An Institutionalised Symbiotic Model



While knowledge sharing does not necessarily have to be implemented through the Internet, its relative ease of use, cost-effectiveness and immediate availability to a global audience of over 190 countries offer tremendous leverage. Furthermore, it provides a platform for enterprise-wide knowledge activities to be accomplished via groupware systems like Lotus Notes. But for knowledge sharing (KS) to be truly effective in an organisation via the Internet or Intranets, strategic concerns relating to the “knowledge ecology” should be looked into, whose overriding objective is to progress beyond “identifying new practices” to “institutionalising architectures”. To this end, several aspects of knowledge sharing implementation that require specific attention are singled out whereby organisational resources should be specially allocated. Current thinking places strong emphasis on integrating vital agents, which must co-exist in symbiosis, to be instituted for knowledge sharing (Goh, 2004b;

Storey and Barnett, 2000; Davis and Botkin, 1999; Davenport, 1996). They are identified as follows: (1) Enabling ICT Infrastructures; (2) IT Tools and Supporting Technologies; (3) Communities of Practice, and (4) Knowledge Repositories, as depicted in Figure 2, which collectively offers an institutionalised symbiotic model for knowledge sharing implementation across organisational boundaries, hierarchical layers and physical borders. From the conceptual model, organisations may institutionally evaluate the “degree of symbiosis” between pair-wise agents. To provide an example, a simplified evaluative sample is shown in Figure 3. While the effective knowledge sharing implementation is inherently complex, in general, the higher the “degree of symbiosis” between agents means a better chance that the organisation’s potential of knowledge sharing would be harnessed.

Figure 3: A Simplified Evaluative Sample

	Enabling ICT Infrastructures	IT Tools and Supporting Technologies	Communities of Practice	Knowledge Repositories
Agent(s)	“Degree of Symbiosis” (L- Low, M-Medium, H- High)			
<i>Enabling ICT Infrastructures</i>	<i>n.a.</i>	<i>H</i>	<i>M</i>	<i>M</i>
<i>IT Tools and Supporting Technologies</i>	<i>H</i>	<i>n.a.</i>	<i>M</i>	<i>H</i>
<i>Communities of Practice</i>	<i>M</i>	<i>M</i>	<i>n.a.</i>	<i>M</i>
<i>Knowledge Repositories</i>	<i>M</i>	<i>H</i>	<i>M</i>	<i>n.a.</i>

n.a.: Not Applicable

Enabling ICT Infrastructures

In knowledge sharing implementation, the potential offered by enabling ICT infrastructures should be fully exploited. Otherwise, knowledge sharing will be hampered by the “digital barrier” as had occurred in various parts of the undeveloped world where ICT penetration has been very low. Currently, about 50 percent of all Internet users are in the United States, around 25 percent are in Europe, with 12 to 13 percent in Asia. Since ICT can break the social, cultural and hierarchical barriers to knowledge sharing in an unprecedented manner, the implementation of an enabling ICT infrastructure is vitally crucial. While the cost of building an enabling ICT infrastructure may be high, there are hardly any cost-effective technological alternatives available today; and the costs of not investing in such an infrastructure can sometimes be even higher. For example, in countries where ICT infrastructure is weak (no optical fibre link to world’s information superhighway, for instance), the dial-up access charges may be several times higher than the Internet usage costs itself. But once an ICT infrastructure has been established, the costs of propagation technologies are very low. To put in place an enabling ICT infrastructure,

organisations should consider, at the very least, ample support for the processes of codifying and storing knowledge, creation of knowledge maps (or corporate directories), and developing knowledge networks (Maryam and Leinder, 2001; Davenport and Prusak, 1998). To make better use of the Internet and intranets to enhance knowledge sharing (e.g. in areas like distance learning and access to market information), the enabling ICT infrastructure should possess the following five characteristics (Goh, 2004a, 2004b, Barth, 2000a; Miller and Morris, 1999; Strassmann, 1997):

- It uses a widely-supported communications standard protocol – which means that it is universally accessible from multiple locations and through different computer platforms;
- It avails end-user software, such as electronic mail and World Wide Web browsers to be universally available at low cost – which means that it is cost-effective to implement on an enterprise-wide basis;
- It uses a high-speed, broadband, digital network based on optical fibre cables with virtually limitless bandwidth – which means that it provides quick access at an affordable cost;
- It offers world-wide access, with increasingly more international service providers – which means that individuals, who travel a lot, can use the Internet like a corporate network without building an in-house option;
- It provides a quick means of publishing information, through the World Wide Web, that can be shared globally – which means that the universal repository of information resources can be updated and widely shared at an attractive cost.

IT Tools and Supporting Technologies

Due to today's ubiquitous knowledge creation, finding the most efficient IT tools and supporting technologies to implement knowledge sharing is highly critical. The quantum leaps of technological revolution have created a diversity of technical tools to amalgamate knowledge residing in remote databases and repositories. Three kinds of IT tools and supporting technologies are required for effective knowledge sharing across continents, time zones and language barriers, namely: capture tools, communication tools and collaboration tools (Goh, 2004b; Davenport, 1993). Indeed, organisations are now employing on-line technologies, shared database solutions and community-based systems to support knowledge sharing activities using advanced expertise in IT architecture and software design. In the context of web-based environment, there are also enterprise-wide solutions that cater specifically to knowledge sharing. For instance, the web-based KSS Tech TracS® which automates the entire research and intellectual asset management life-cycle of an enterprise – from research (e.g. invention disclosures) to intellectual protection (e.g. legal filings) to technology marketing and licensing (e.g. technology transfer agreements). Yet, for effective knowledge sharing to take place, six features of IT tools and supporting technologies are deemed essential for implementation (Malhotra, 1997; Skyrme and Amidon, 1997; Stewart, 1997):

- Supports the sharing of information systems including the capturing, annotating and updating of knowledge base systems.
- Provides content management solutions to effectively manage a variety of unstructured and unformatted content and multiple content-centric applications within enterprise-wide architectures like intranets or public websites.

- Facilitates better interactive communications and provides flexibility across communities and different contextual settings such as community-centred knowledge sharing.
- Offers knowledge sharing methodologies and highly customisable technologies to support software solutions for distributed work. For example, building knowledge bases for call centres.
- Enables on-line collaboration technologies of best practices for different knowledge sharing purposes including storage and project documentation, project management and information management.
- Avails scalable technological solutions to cater to a diverse set of knowledge sharing needs, with the potential for expansion. For example, an organisation may employ IT tools and supporting technologies for an intranet by enabling access to corporate information, industry news and information resources.

Communities of Practice

As today's workers are constantly involved in knowledge activities, they need to harness communities of practice for knowledge resources, and knowledge sharing must come from these communities that create, use and transform them (Allee, 2000; Stewart, 1997; Skyrme, 1991). Examples of these communities are newsgroups and discussion groups, which possess boundless potential for one to obtain specialised information or vital knowledge assets. In a truly ICT-enabled world, anyone can be both a potential recipient and generator of knowledge and this offers opportunities for one to absorb knowledge and triangulate knowledge received from various sources. In a knowledge society, the community of practice constitutes the defining organisational form that possesses vast untapped knowledge. These communities constitute centres of expertise that should be properly leveraged by organisations to harness the value of knowledge for all opportunities. It is by participating in these communities of practice as knowledge sharing agents or evolving learning networks that members may create new knowledge products and services. However, the distinction between ordinary work groups and communities of practice (COP) should be highlighted. Etienne Wenger, a renowned expert in community of practice, has described three dimensions for these communities (Allee, 2000; 1997; Holtshouse, 1999; Etienne, 1998; Stewart, 1997):

- **Domain:** People organise themselves around a domain of knowledge with a sense of joint ownership. Members thus identify themselves with this domain of knowledge based on a common mission and shared understanding.
- **Community:** People function as a "community" through relationships of mutual engagement that bind them together into a social entity. Apart from knowledge sharing, they also interact regularly and engage in activities that build trust.
- **Practice:** It builds capability in its practice by developing a shared repertoire and information resources such as tools, documents, routines, vocabulary, symbols or artefacts that embody the accumulated knowledge of the community for future learning.

Merely forming work groups alone does not automatically create a community of practice. Rather, communities of practice require a strong sense of belonging and mission arising from shared understanding to accomplish something together. To cite an example, Xerox, which is an organisation that strongly supported research at the Institute for Research in Learning, is now deeply embedded with communities of practice as part of the company's working culture. Another example is British

Petroleum, which requires all company's employees to be both a member of a functional work group and an active participant in at least one community of practice. Besides being effective for knowledge sharing, a community of practice, as a knowledge sharing agent, offers a rich source of tacit insights and advanced tradecraft for an organisation.

Knowledge Repositories

For knowledge to be shared, it is crucial to assemble together reusable components of knowledge bases and inter-operate with existing knowledge-based systems. Therefore, there should be common agreement on vocabulary, syntax, semantics and context on the standards of knowledge representation – which is an important issue of concern to enable declarative knowledge, problem solving techniques and reasoning systems to be shared. However, there exists a wide variety of approaches in knowledge representation; and the choice of an approach over another may have significant implications on the performance of knowledge repositories. Besides, software solutions need to be developed to aid knowledge acquisition and knowledge base construction. Otherwise, the expenses of duplication can be exorbitant and if left unresolved, the cost of knowledge sharing may even be prohibitive. In fact, knowledge repositories must be facilitated by common knowledge representation systems and means for translation between them. Four complementary areas in relation to knowledge repositories, whereby conventions should be developed to enhance “transactable knowledge” for sharing, are outlined (Neches, 1993; Swartout, Neches and Patil; 1993; Brachman, 1990; Swartout and Smoliar, 1989):

- Description and exchange of content: Knowledge content must be described and accessed in standardised ways to facilitate consensus on sharable knowledge bases; otherwise, manual recoding or translation from one representation to another representation would be required.
- Interaction with and tracking of content: For users to interact with content effectively, the results should be tracked in ways that are independent of the technology platform being used.
- Applications systems interoperability: Electronic knowledge repositories should have standardised interfaces to enterprise systems; and protocols and conventions must be developed for run-time interactions (e.g. KB-to-KB and for KB-to-DB) to take place.
- Infrastructure interoperability: Technologies used for e-knowledge must employ industry-standard methods to interface with institutional ICT infrastructures and with each other.

If these complementary areas are resolved, the use of knowledge repositories can be made much easier as portions of existing knowledge bases could be reused and special-purpose reasoning systems could also be similarly employed. However, these systems must be connected together to create a “custom shell” with preloaded knowledge so that system developmental efforts may be focused on creating new knowledge and reasoning systems for specific tasks. Extensions to knowledge bases could be added into shared repositories as accumulated knowledge; and because the system comprise of well-tested sub-systems, the robustness of knowledge repositories is also greatly enhanced.

Conclusion

Given that knowledge societies are pivotal to the creation of resilient economies; and that these societies need knowledge sharing to occur incessantly, the rising significance of knowledge sharing implementation is understandable. With the expanded use of the Internet and Intranets, the benefits of knowledge sharing should no longer be reserved for knowledge enterprises with deep pockets and substantial resources. Rather, it is through best practices in knowledge sharing (such as integration) that organisations could deliver higher returns on investment. There is no “silver bullet” for knowledge sharing implementation to produce the best results in organisational performance, and even the most knowledge-intensive organisations have much to learn about knowledge sharing. This article has thus conceptualised an institutionalised symbiotic model as a management framework for integrating knowledge sharing implementation. Using the proposed model, the “degree of symbiosis” amongst pair-wise knowledge sharing agents can be institutionally evaluated and diagnosed - so that organisations may focus on how to navigate its journey to knowledge sharing excellence.

In conclusion, knowledge sharing in the context of the Internet and intranets has an important role to play in today’s organisations; and there are many challenges facing organisations that aspire to be effective in knowledge sharing. To cite a few areas that merit attention: (1) linking core operational knowledge work directly to knowledge sharing; (2) capturing lessons learned and good practices in knowledge sharing systematically; (3) strengthening the management of supporting technologies to raise the quality of distributed and shared knowledge; and (4) designing new innovative organisational structures suitable for knowledge sharing. This article has, nevertheless, provided some insights for organisations to implement knowledge sharing institutionally and that it should be seen in the light of digital business transformation that requires a symbiotic integration amongst knowledge sharing agents involving enabling ICT infrastructures, information technology (IT) tools and supporting technologies; communities of practice and knowledge repositories.

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