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Evolving E-Health System Symbiosis: Theoretical Constructs in International Realpolitik Space

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ABSTRACT

The 21st century continues to witness the transformation of organizational systems globally through the deployment of information and communication technologies (ICT). The emerging future is witnessing the convergence of artificial intelligence, biotechnology, nomadic information systems, and nano-technology. This promises to further compel inter-organizational and inter-sectorial interactive transformations. The health care sector is no exception to the inter-organizational dynamic imperatives driven with ICT innovative advances. This article proposes a conceptual model of symbiotic e-health networks in a meta-cultural domain that goes beyond the realm of extant literature on dyadic relationships. The model dimensions are posited on a key informant approach and content analysis of the strategic perceptions of international ICT and health care executives interacting through dyadic partnerships. The findings and implications of the study for the model and further information management research are underscored. The underlying meta-cultural frame is characterized by public governance values and the article explores its perceived role in sustaining symbiotic e-health networks in Canada and Sweden.

Keywords: e-health networks; international key informants; transactional powers and skills; transformational powers and skills

INTRODUCTION

The 21st century continues to witness the transformation of organizational systems globally through information and communication technologies (ICT), which drive and evolve systemic goals. The implementation of ICT, such as business intelligence systems, knowledge man-

agement, data mining and warehousing, supply chain management, systems development and implementation, systems integration, and security systems continue to compel different sectors to engage in challenging inter-organizational relationships (Senge, Carstedt, & Porter, 2001). With the cogent and ubiquitous developments in

nomadic information systems and wireless and wearable technologies, the emerging future is witnessing the convergence of artificial intelligence, biotechnology, and nano-technology (Orlikowski & Iacono, 2001; Pearson, 2001). This promises to further propel inter-organizational and inter-sectorial interactions. Strategic dyadic partnerships, with its characteristics of longevity, management control and direction, mutual beneficence, and stability, exemplify one type inter-organizational relationship. The literature underscores the critical role of strategic inter-sectorial partnerships in fostering efficiencies, sectorial growth, and social actualization through innovation and mutual organizational learning (Burgelman & Doz, 2001; Etamad, Wright, & Dana, 2001; Kodama, 2001; Nooteboom, 2000; Oliver, 2001; Robinson, Savage, & Campbell, 2003). These linkages have the potential to liberate thinking beyond closed organizational paradigms and embrace complex changes and uncertainty extra-organizationally and proactively (Dickson, Farris, & Verbeke, 2001).

The health care sector is no exception to the inter-organizational change imperatives driven through ICT innovative advances. Regionally integrated e-health networks promise less resource duplication, lower operational costs, reduced clinical waiting times, and lengths of stay and greater quality care in the face of care provider and clinician shortages. E-health is the transformational wave of the future in health care systems (Adewale, 2004; Gutierrez, 2001; Sahney, 2003). The upcoming generation of consumers and providers instinctively understand the transformational power of ICT to improve delivery efficiencies and quality of health care regionally through inter-organizational interactions. On the basis of extant literature, this article proposes a conceptual model of symbiotic e-health networks. The model dimensions are posited on a key informant approach and content analysis of the strategic perceptions of international ICT and health care executives interacting through dyadic partnerships. The findings and implications of the study underscore directions

for future international research in information management.

INTER-SECTORIAL DYADIC RELATIONSHIPS: GENERIC AND THEORETICAL PERSPECTIVES

This article posits that strategic partnerships and alliances are, in essence, symbiotic information networks. These are, in essence, mutually advantageous inter-organizational systems between informational cultures differing in values, missions, perceptions, and evolutions. Moreover, these informational cultures incubate and thrive in informational cultural polities, which are articulated through the governance organizations. Networks are systems of interconnected individuals and organizations through which informational and resources flow (Ford, Wells, & Bailey, 2004). These networks interact and coalesce through an exchange of informational, relational, and transactional capital, and sustained through transactional and transformational processes. Moreover, these processes are articulated through skills sets exercised through system participants, called executives. Tight coupling of different sectors occurs when relational capital and transactional capital is leveraged through transactional and transformational skill sets. Where the capital and process resources are inadequate, a supra-level (governance agents) foster and leverage evolving symbiotic information network. Symbiotic information networks are the result of the interplay of management and technical processes.

The extant literature on strategic partnerships and alliances is germane to the evolution of inter-sectorial symbiotic information networks that incubate in meta-cultural information domains. In so doing, the article subsumes a realist approach, rather a strictly positivistic, or phenomenological, one to the exploration of inter-sectorial networks (Stiles, 2003). It responds to the call for a polity system perspective, where social-political elements influence

inter-sectorial network behavior and integrate elements of trust within economic, political, socio-cultural and strategic dimensions. Moreover, the underlying model reflects a pluralist epistemology, where the emphasis is on an understanding “of-the-becoming” (de Rond & Bouchikhi, 2004). Moreover, it views the organizational and national cultures as heterogeneous elements that interact dialectically and dynamically in the evolution of information networks (Townsend, 2003).

The literature points to management control factors that implicitly form the basis for effective inter-sectorial strategic dyadic partnerships (Dyer, Prashant, & Singh, 2001; Judge & Ryman, 2001; Weech-Maldonado & Merrill, 2000). Such elements include leadership with executive vision, solid strategic and operational planning constructs, rigorous feasibility studies and cost-benefit analyses, stable financing through a range of innovative and flexible financial instruments, and specific performance metrics and targets. Other extant elements to effective inter-sectorial dyadic links, or strategic partnerships, include the mutual understanding of business models, motivations, priorities, resource strengths, and limitations; the clear and explicit definition of mutual benefits, expectations, and priorities; and the mutual sharing of financial and political risks (Das & Teng, 2001). Structural bonding (economic and functional factors that involve explicit benefits) and social bonding (emotional and affective resources) are the prerequisites to relationship cohesion (Rodriquez, 2002). Mutual trust, or relational capital, fosters a climate of good faith and open collaboration in forging congruent goals and objectives.

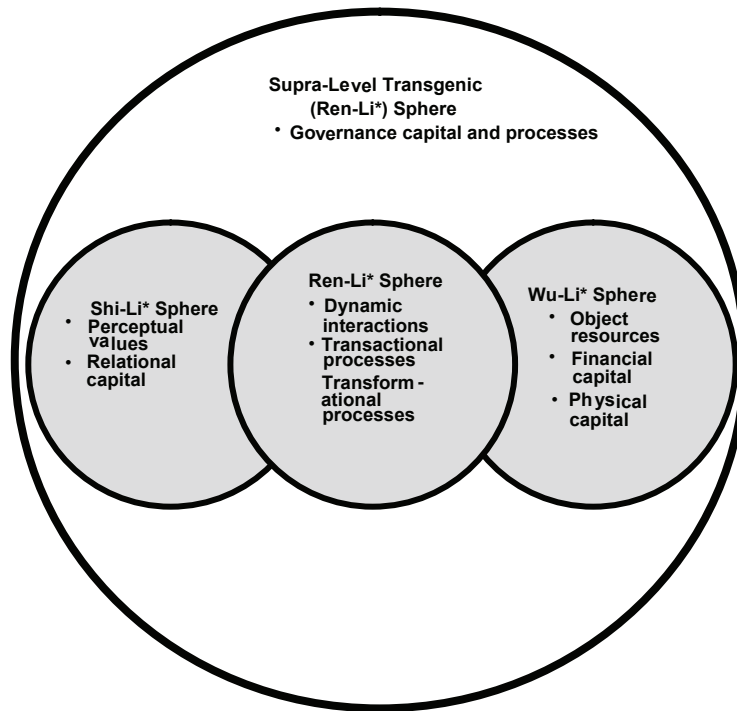
Perception, mutuality, trust, and understanding are the drivers of organizational system behaviour. This points to the critical need to understand the inter-sectorial cultural and organizational climates. Zhu’s Wu-Shi-Ren (WSR) Li-stage model underscores the perspectives, sensing and the psycho-cognitive elements (Shi-Li) which interact synergistically with socio-political elements or power structures (Ren-Li) to release technical ICT resources

(Wu-Li) forces (Zhu, 2001). “Sensing and caring” transform the “knowing” (Zhu, 2002). This study explores inter-sectorial informational networks transcending national cultural contexts. It extends Zhu’s WSR-Li framework into the Realpolitik of e-health systems transnationally. In particular, the proposed model in this study centers on five symbiotic information network dimensions, which are not explicitly reported in the extant literature.

1. **Relational capital (Shi-Li) dimension:** The extent to which inter-sectorial executives harmonize perceptions, values and motivations in an atmosphere of trust and benefit to effect symbiotic information networks;
2. **Transactional capital (Wu-Li) dimension:** The extent to which inter-sectorial executives effectively avail and access strategic resources to effect symbiotic information networks;
3. **Transactional skills (Ren-Li) dimension:** The extent to which inter-sectorial executives mobilize internal power resources to effect symbiotic information networks;
4. **Transformational skills (Ren-Li) dimension:** The extent to which inter-sectorial executives exercise vision and strategic leadership to effect external symbiotic information networks; and
5. **Supra-network transgenic (Supra-Ren-Li) dimension:** The extent to which external third parties engage, enable, and sustain symbiotic information networks through transactional capital and fostering transformational skills externally.

This fifth dimension extends Zhu’s WSR-Li framework to an external power element, which becomes manifest in culturally influenced socio-political dynamics. It is posited that this dimension is a particularly potent transgenic Ren-Li force that reflects the importance of the socio-cultural context in which symbiotic information networks evolve. The Wu-Shi-Ren-Li dimensions in Zhu’s model constitute “bubble entities” (Zhu, 2002). It appears that

Figure 1. Transgenic symbiotic dyadic information network model



*From Zhu's WSR-Li Model (Zhu, 2002)

a transgenic, or transcending, supra-level Ren-Li bubble encompasses the three. Building on Zhu's WSR-Li model, Figure 1 proposes a generic transgenic symbiotic information network model.

SYMBIOTIC E-HEALTH NETWORKS MODEL

The symbiotic information network model is applied to the context of strategic e-health partnerships, as an illustration of symbiotic dyadic networks, between the health care and information communication technology (ICT) sectors. Strategic partnerships give active expression to the ICT sector to fulfill social responsibilities and meet community needs, while increasing long-term return on invest-

ments, market visibility, and revenues. The health care sector seeks strategic partnerships in order to capitalize on core ICT competencies and services that lower operational costs, increase system efficiencies, and improve quality of care. The actualization and expression of the dyadic e-health network model is articulated through participants, which include health care and ICT executives respectively. These parties exchange relational capital in the form of informational capital, knowledge and resources through transactional and transformational processes. In certain socio-political cultures, these processes are further enabled through a supra-network level articulated through governance executives. The extant literature does not report on the interplay of perceptual and experiential

dimensions of ICT and health care executives engaged in such dyadic strategic partnerships transnationally. In response to the dearth of investigation in this area, this study proposes the following model dimensions to characterize the inter-sectorial interplay between the health care and ICT sectors to develop effective symbiotic e-health networks.

1. **Relational capital dimension:** ICT and health care executives harmonize perceptions, values, and motivations in an atmosphere of mutual trust and benefit.
2. **Transactional capital dimension:** ICT and health care executives avail and access “intra-sectorial,” or internal, resources, such as finances and human resources, within their respective sectors.
3. **Transactional skills dimension:** ICT and health care executives effectively mobilize “intra-sectorial,” or internal, power processes, such as internal co-optation and cooperation.
4. **Transformational skills dimension:** ICT and health care executives exercise vision, leadership, and effective negotiation skills interactively.
5. **Transgenic supra-network dimension:** External governance executives enable, leverage, and sustain symbiotic e-health networks through “extra-sectorial,” or external, transactional capital, and transformational skills.

Table 1 summarizes the symbiotic e-health network dimensions consonant with Zhu’s WSR model equivalents (Zhu, 2002).

Table 1. Symbiotic inter-sectoral network dimensions in an e-health context

Symbiotic Intersectorial Network Dimensions	Zhu’s WSR-Li Stage Model Equivalence*	Characteristics	E-Health Network Articulation
1. Relational Capital	Shi-Li	Sensing Perspectives Psycho-cognitive Weltanschauungen	Mutual understanding between the ICT and health care domains Intersectorial understanding
2. Transactional Capital	Wu-Li	Knowing Resources Conditions	Resourcing e-health networks
3. Transactional Skills	Ren-Li	Internal Socio-political	Internal cooptation of care providers and clinicians
4. Transformational Skills	Ren-Li	Dyad External Socio-political	ICT-health care dyadic partnership leadership
5. Transgenic Level	Ren-Li	Triad External Socio-political	Governance countervailing forces Supra-cultural Interaction and understanding

*From Zhu’s WSR-Li Model (Zhu, 2002)

KEY INFORMANT STUDY DESIGN AND METHOD

This study specifically examines the perception of select ICT and health care executives of the management challenges in sustaining symbiotic e-health networks in Canada and Sweden, using a key informant approach. The current literature underscores the relevance of key informant methodologies in settings such as health informatics (Buckeridge & Goel, 2001), health promotion (Robinson & Elliott, 2000), international business (Shi & Wright, 2001), mental health services (Toward & Ostwald, 2002), and pharmaceutical services (Schmidt & Pioch, 2001).

In both nations, the number of ICT firms with an initial public offering (IPO) designation that play a significant role in health care systems is limited. This made it possible to invite all the major ICT firms in Canada, including multinational corporations such as EDS, EMC, IBM, MDS, Microsoft, and Oracle. Each major multinational subsidiary in Canada has a health market division led by a senior ICT executive lead was interviewed. In Sweden, the Ministry of Health and Social Affairs and the county health organizations play a significant part in ICT decision-making with the private sector (Glennard, et al., 2005). The Ministry assisted in identifying the key ICT firms with an IPO designation and the key senior executives engaged in the development major health care/ICT partnerships. These lead executives were invited to participate in one-on-one interviews in the study. In effect, these executives represented the most central and key strategic parties in both Canada and Sweden, who were engaged in all partnership developments between the health care ministries on the one hand and the private IPO ICT firms on the other.

Only OECD member nations were considered for this study. Time constraints limited this study to Canada and Sweden. Canada was the research base and Sweden was chosen having as similar publicly funded health care system. Both Canada and Sweden are technologically advanced with cogent socio-political traditions of public support and financing of health

care services. Moreover, regional governance organizations in Canada and Sweden have major decision-making involvement in ICT development of the health care systems.

To be included in the key informant study, ICT executives had to be a senior lead ICT executive at an ICT firm with an IPO designation; actively engaged in the development of ICT/ health care partnerships in the select nation; and willing to participate in the study. Health care sector participants had to be senior health care executives; actively engaged in the development of ICT/health care partnerships in their respective jurisdictions; and also available within in the study parameters.

A total of 49 semi-structured interviews were conducted over a 15-week period. Of these eight were in Sweden and 41 in Canada. Each participant received a pre-tested questionnaire in advance. Interview results were duly recorded, summarized, and analyzed. Thirty-one senior ICT executives from organizations with IPO designations and were actively engaged in strategic partnerships with the health care sector. Of these, 27 were in Canada and four in Sweden. Eighteen were senior health executives active in ICT strategic partnerships. Of these, 14 were in Canada and four in Sweden. Table 2 highlights the salient study dimensions of the semi-structured interviews.

Content analysis of qualitative data from this key informant study was particularly useful both the ICT and health care management community in Canada. All the major key decision-makers, who interact with and play negotiating roles in Canada, were contacted.

KEY INFORMANT PERCEPTUAL FINDINGS

Content analysis of the semi-structured interview summaries indicated perceptual agreement on management challenges of forging strategic partnerships between the ICT and health care sectors across the two OECD nations. The major findings of this study in the light of the symbiotic e-health network model follow.

Table 2. Key informant semi-structured interview focus sample questions

Theoretical Dimensions	Key Perceptual Focus
Relational Capital	<ul style="list-style-type: none"> As an executive, what management challenges do you perceive that executives of the other sector face in strategic partnerships with your sector? To what extent are these differences, if any, important? Are these differences unique to your particular national region?
Transactional Capital	<ul style="list-style-type: none"> What is the role of resource availability and accessibility of resources to the evolution of strategic partnerships between ICT-health care sectors from your perspective? From your personal experiences as an executive involved in strategic partnerships, what are the key management lessons you have learnt?
Transactional Skills	<ul style="list-style-type: none"> To what extent are care providers and clinicians important in the evolution of strategic partnerships between ICT and health care sectors, from your executive perspective?
Transformational Skills	<ul style="list-style-type: none"> As an executive, what do you see as the key management catalysts/ inhibitors to ICT development in health care?
Transcending SupraNetwork Transformational Leverage	<ul style="list-style-type: none"> What is the role, if any, that governance bodies play in the evolution of ICT and health care partnerships in your nation, from your executive perspective?

Inter-Sectorial Relational Capital Dimension

Inter-sectorial executives must invest the time, energy and effort in understanding each other's Weltanschauung (views of the world), or paradigms. Parties need to explicitly define their respective parameters, roles, and responsibilities. Inter-sectorial executives must work towards win-win partnership agreements, where there is significant relational capital in the form of mutual trust and understanding to promote sectorial benefits. All key informants underscored the existence of a significant perceptual divide between the respective ICT/health care sectors. Forging relational capital was difficult in the evolution of symbiotic e-health information networks. All participating ICT executives

perceived radically different inter-sectorial assumptions, political motivations, organizational pressures, values, and views. Table 3 highlights a sample of the most frequently articulated views and perceptions of ICT executives of the paradigms in their interaction with health care executives. ICT executives felt strongly that health care executives needed a greater appreciation; involvement and knowledge of the potential of ICT technology to effect substantial benefits in the health care system.

Inter-Sectorial Transactional Capital Dimension

There were perceived differences in inter-sectorial transactional capital that posed major challenges to the evolution of symbiotic e-health

Table 3. *ICT and health care relational capital drive*

CHARACTERISTICS	ICT SECTOR	HEALTH CARE SECTOR
TIME DIMENSIONS	“Web” time Rapid and volatile pace	“Bureaucratic” time Deliberate slow pace
STRATEGIC PARTNERSHIP MOTIVATIONS	Client satisfaction Long-term profitability Market growth	Cost-effective operations Health care outcomes Patient /care provider Satisfaction
DECISION POWER FOCUS	Corporate governance	Diffuse political power Public governance
MANAGEMENT CULTURES	Competitive Fluid and dynamic Growth-driven Innovative Predominantly proactive	Care provider-driven Compliance-driven Conservative Ideological-driven Predominantly reactive

networks. Participating ICT and health care executives understood that stable and consistent transactional capital such as financial and human resources, is crucial to the evolution of dyadic partnerships. All key informants acknowledged resource limitations in the health care system, which often hindered the growth of effective strategic dyadic partnerships. ICT executives underscored their perception that unstable prospective health care financing is a powerful disincentive to investing significant resources, time, and energies to the formation of partnerships in health care. In both Canada and Sweden, public budgeting systems limited the availability of capital and operational financing for ICT development. All interviewees acknowledged that the deployment of skilled ICT professionals is essential in effective e-health systems deployment. In the light of pressing clinical staff shortages, health care executives emphasized that doing so at appropriate compensation rates presented significant challenges.

Executive Transactional Skills Dimensions

The sustainability of symbiotic e-health networks is dependent on generating sufficient

transactional capital in the form of internal co-optation of care providers and clinicians. Swedish executives maintained that effective strategic partnerships are ones where care providers and clinicians see demonstrable and direct benefit to patient care and participate actively in all partnership initiatives. For example, ICT executives at Alleto AB worked closely in cooperation with clinicians at the Huddinge and the Karolinska Hospitals in Sweden. The resulting ICT partnership fostered clinical research, promoted evidence-based medicine and enhanced patient care with fewer resources. Interestingly in Canada, key informants underscored that the role of care providers are less engaged in IT partnerships. It would appear that transactional skills set demands in Canada and Sweden differs. These apparent clinical environmental differences in both nations deserve further study it would appear.

Executive Transformational Skills Dimension

There were noted differences in inter-sectorial transformational skills that also posed major challenges to the evolution of symbiotic e-health networks. All inter-sectorial informants

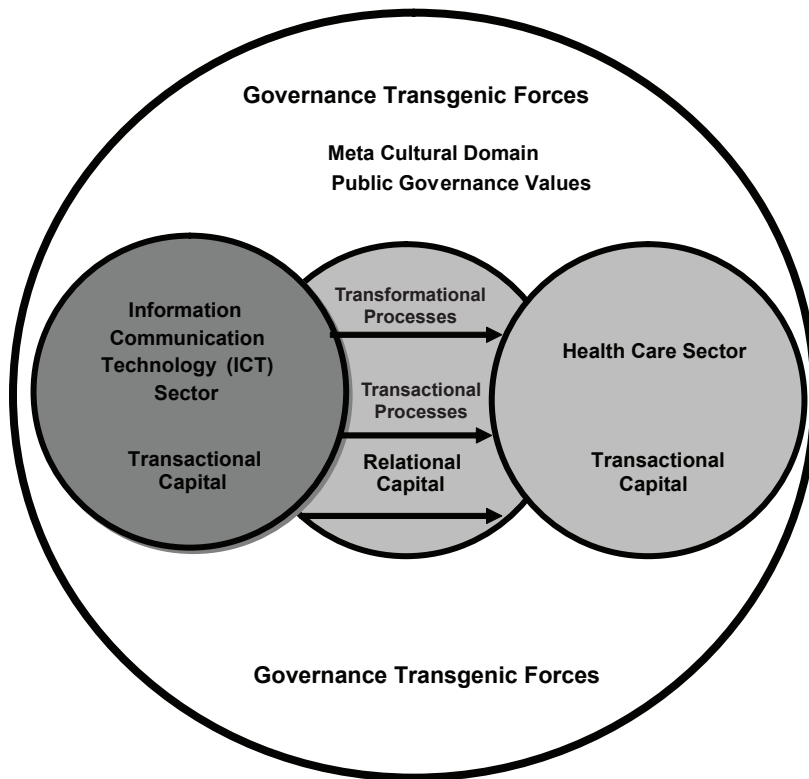
unanimously asserted that effective executive leadership and transformational skills are a crucial ingredient to bridging perceptual divides and building shared visions in strategic dyadic partnerships. Reengineering of internal operations and management processes become important as health care organizations evolve to capitalize on IT advancements. The question is who should lead IT initiatives? For 31 technology executives, the answer was unanimous: the vision and leadership for strategic partnerships rests entirely with health care executives. ICT executives maintained that health care executives were central change agents who initiate and lead significant socio-cultural and process changes within their sector. ICT executives perceived their own roles as strictly supportive of the leadership they expected from

their health care counterparts. In contrast, 18 health executives were not as emphatic on the importance of their specific leadership roles in strategic partnerships with the ICT sector. Eight health care executives perceived their involvement as primarily monitoring parties to assure that privacy legislative standards were adhered to. These transformational skill set differences posed challenges for ICT executives, particularly where health care counterparts did not appear to have the requisite knowledge base, experience and core competencies in ICT management.

Transgenic Supra-Level Transformational Power

All key informants stressed the need for a third party, or a supra-network level, in the form of a

Figure 2. Symbiotic e-health network model



*From Zhu's WSR-Li Model (Zhu, 2002)

governance body to galvanize and support the evolution of symbiotic e-health networks. All stressed the need for active engagement and financial and political support of governance bodies was of paramount importance to the evolution to effective inter-sectorial partnerships. This “transgenic” supra-level, public governance, is essential in fostering, stabilizing and evolving symbiotic e-health networks, by setting strategic e-health directions and providing needed transactional capital and encouraging innovative reengineering of health systems for the public benefit. Governance policy in public financing, technological standards, bidding processes, information management, privacy, and security all have a paramount place in the positive transformation in e-health systems. This legislative power accentuates the transformational, or transgenic, potential of this supra-level, as in Figure 2.

IMPLICATIONS AND CONCLUSION

It was clear from the effective partnerships in Canada and Sweden that examining inter-sectorial perceptions, assumptions, and values is crucial in creating ICT/health care partnerships. Value and perceptual differences need to be recognized and explicitly and opening communicated a priori for full inter-sectorial partnerships to be fostered and effectively implemented. Inter-sectorial executives must invest the time, energy, and effort in understanding each other’s *Weltanschauung* (views of the world), or paradigms. Inter-sectorial executives must understand the transformational power of ICT to promulgate quality health care services. They must deploy effective transactional and transformational skill sets in creating symbiotic e-health networks. The growth of symbiotic e-health networks mandates the development of relational capital consonant with positive transactional processes and transformational processes. The sustainability of such networks is also dependent on generating sufficient transactional capital.

The most effective and stable symbiotic e-health networks are ones where ICT and

health care executives collaborate directly and closely with governance agents. Cogent public governance values form the underlying meta-cultural frame of this exploration of the inter-sectorial perceptions of symbiotic e-health networks in Canada and Sweden. Symbiotic e-health networks are the lodestar of future e-health systems. It is axiomatic that where the ultimate transactional power rests, there rests the ultimate transformational base. Canada and Sweden have solid and cogent values in public governance of health care systems. The governance bodies in effect hold the transgenic power to leverage the growth, stabilize, sustain, and transmute symbiotic e-health networks into a public value.

This key informant study of inter-sectorial executives provide support for Zhu’s WSR-Li model and metaphorical “bubble entities” in the Realpolitik world of ICT and health care. It would appear that transgenic supra-level bubble, or the governance “Ren-Li” forces, are relevant in nations with public social governance values, for effective ICT/health care partnerships to take form. This study points to the need for further information management research in the area of symbiotic e-health networks internationally. Other OECD nations with noted health care systems, such as Australia, France, Germany, Japan, and the United Kingdom have been relatively under-represented in the extant literature hitherto. Further studies would shed light on symbiotic information networks as inter-organizational learning paradigms that foster innovation, growth, and social responsibility.

The symbiotic e-health network model has potential relevance as a transmuted information network model in other sectors in an internationalizing community. This study focused on the strategic perceptions of Canadian and Swedish executives engaged in symbiotic e-health networks in cultures where public governance is a profound and cogent value. It is postulated that the same dynamics described propel international symbiotic e-governance networks in an internationalizing world with converging transnational values and imperatives. This scenario remains an unexploited and

titanic area for future exploration and research in information management.

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