Business Papers and Journal Articles

School of Business

2008

Devising and testing an instrument designed to mitigate the paradox between the traditional disconnected world and the evolution in collaborative ICT

Peter Gall

University of Notre Dame Australia, Peter.Gall@nd.edu.au

Devising and Testing an Instrument Designed to Mitigate the Paradox between the Traditional Disconnected World and the Evolution in Collaborative ICT

Abstract

This paper begins by defining ontology of ICT concepts including virtual organisations, living labs and digital ecosystems in an effort to identify practical answers to the paradox between the traditional disconnected world and collaboratively networked, open, loosely coupled environments. The paper then introduces a framework and case study that devises a new instrument designed to enable organisations in unleashing the power of their ICT infrastructure to take advantage of the values of the globally competitive networks in the 21st Century. The pervasive use of modern infrastructure and collaborative ICT frameworks have the potential to create sustainable multi-organisation, multi-institution, multi-linkage industry and research and development collectives to open up opportunities for the design and development of revolutionary products and services.

Key Words: ICT, Digital Ecosystems, Living Labs, Virtual Organisation, Readiness

INTRODUCTION

In 2007 there were 1.17 Billion Internet users, 109 Million websites and four Billion access devices e.g. mobile phones, palm pilots, laptops, PC's etc. The number is set to increase 50% by 2011 (Brodie, 2007). The traditional disconnected world is fast disappearing as new Information Communication Technologies ICT enable the sharing of information across vast distances instantly. This enablement also allows organisations globally to collaborate on a scale never before imagined. In an effort to qualify these concepts a shared vocabulary or ontology has evolved for enabling knowledge sharing and reuse. An ontology is defined as an agreement to use a vocabulary i.e. ask questions and make assertions, in a way that is consistent with respect to theory specified by an ontology (Gruber, T. R. (1993).

Three concepts seem be at the core in making sense of the paradox between the traditional disconnected world and collaboratively networked, open, loosely coupled environments; Virtual Organisation, Living Labs and Digital Ecosystems. The standard definition of a 'virtual organisation' is one with few or no tangible assets, existing in virtual space created through ICT (Warner & Witzel, 2004). This is not a new concept; twenty years ago a virtual organisation was defined as an organisation employing ICT for the majority of its communications, asset management, knowledge management and resource management, across a network of customers, suppliers and employees (Venkatraman & Henderson, 1998).

The second definition is the concept of living labs. A living lab is defined as an open innovation ICT, in which companies, governments and industries interact around complex projects in different societal domains (Katzy et al., 2006). The third concept in the vocabulary is the digital ecosystem. A digital ecosystem is defined as a self-

organising ICT infrastructure aimed at creating a digital environment for networked organisations that support cooperation, knowledge sharing, development of open and adaptive technologies and evolutionary business models and frameworks (Brodie, M. 2007: Chang, E. 2008).

The significance of this paper is that it describes a framework devised by the author and undertakes a case study of the Health Industry to determine whether or not the instrument that evolved out of the framework can assist organisations in exploring the paradigm of collaborative sustainability as a means of exploiting global opportunities. The paper seeks to answer the question; can an instrument be devised that enables collaborative networks to maximise the return on their ICT assets?
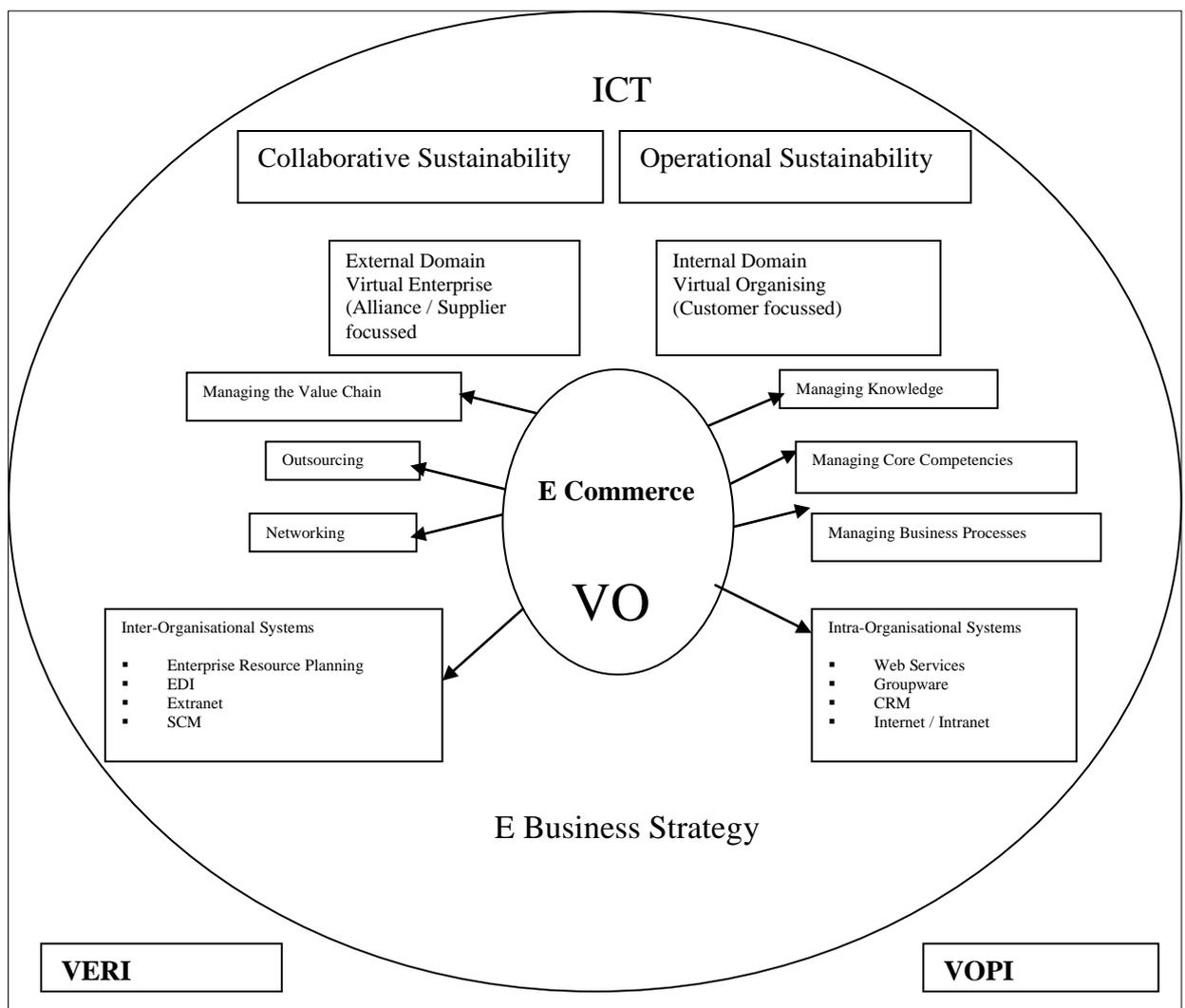

Figure 1   **Research Model Framework**

Organisational needs will be addressed in vastly different ways in future as collaborative networks of otherwise independent economic entities become the accepted norm (Leliaert, et al. 2003). Innovations in organisation and management coevolving with ICT make it possible to reorganise business and society. Complicated organisations require adaptable and responsive management processes, especially in our increasingly digital world where activities require the development of ICT services that triangulate tasks, time and organisations (Zigurs et al., 2006). The

central role of alliances in business is such that companies need to consider the concept of the virtual organisation and the implications of strategy formulation and delivery (Rowley, 2002).

Figure 1 details the framework devised to depict two paradigms; operational sustainability and collaborative sustainability. This paper focuses on the right hand side of the framework which introduces paradigm of collaborative sustainability. This paradigm focuses on three key dimensions; managing the value chain, outsourcing and networking. The dimensions were then used to create a new instrument that embodied the key elements of the collaborative sustainability paradigm; the VERI. A methodology was devised to test the validity of the instrument.

Methodology

A Health Case Study was performed at one of the largest private health care providers in Australia, with 11 hospitals in Victoria and Western Australia. It also has the 3rd biggest pathology practice in Australia. The organization is split into many divisions, based mainly around its hospitals or groups of hospitals. There is also the National division which manages the organization as a whole. This health provider has been in existence for 110 years. It is based around a collaborative network of hospitals

The strategy adopted for the case study was to identify an organisation that had a high degree of reliance on ICT. The premise to be tested was, could the instrument; the VERI be applied as a modular self-contained tool that 'any' organisation, large or small could apply? The E Health case study was considered an ideal pilot to test the portability of the instrument. What follows is an overview of how the instrument was devised. The instrument was designed to identify gaps in collaborative sustainability.

Collaborative Sustainability

After careful review of eight pieces of literature identified under the Collaborative Sustainability side of the framework, Figure 1, three were selected that the researcher believes most appropriately address the external collaborative sustainability perspective. The three dimensions identified under the collaborative sustainability paradigm were; Managing the Value Chain, Outsourcing and Networking.

IMPACT, 1998 focuses on the concept of managing the value chain. Bauer & Koszegi, 2003 focuses on the concept of outsourcing and McConnell, 2000 focuses on networking. All three conceptualise VO from the perspective of collaborative sustainability. The researcher defines this perspective as the degree of readiness to become more collaboratively sustainable. Table 1 details the dimensions identified in the three pieces of literature and devises a means of extrapolating out commonalities to create a new set of dimensions and headings which form the foundation of a new instrument the Virtual Enterprise Readiness Instrument; VERI as depicted in Table 1, column 4. A simple numbering system was used to identify commonalities. The commonalities were then used to create thirty headings which were then defined as the questions used in the first three phases of the process.

Table 1 Devising the Instrument: the VERI

Managing the Value Chain (Impact, 1998)	Outsourcing (Bauer & Koszegi., 2003)	Networking (McConnell, 2000)	VERI
Dispersion 1. Number of physical locations 2. Number of personal workplaces 3. Technology facilitated mobility 4. Reach: ease of access to customers, suppliers 5. Economic / political support 6. Visibility to customer	**Technology** 29. ICT as enabler 30. Coordination of activities 31. Process value adding 32. Virtual corporation 33. Temporary 34. Loosely coupled network 35. Combining core competencies 36. Mutual trust 37. Coordination of modularized production	**Connectivity** 63. Communications access 64. Network access 65. Power supplies 66. Supply chains	**Enablement** 1. Communication access 9, 38, 63 2. Process value adding 12,52,68 3. Loosely coupled networks 3,33, 72 4. Combining core competencies 18, 35, 71 5. Coordination of modularised Production 16,37,85 **Collaboration** 6. Facilitated mobility 3, 55, 68 7. Reach: ease of access to customers & suppliers 4, 62, 64
Interdependence 7. Number of formal / informal relationships (Int & Ext) 8. Level of external influence 9. Staff / Line function 10. Parallel line functions 11. Product collaborations 12. Cross-functional / cross process teams 13. Internal / External Service Level Agreements	**Configuration** 38. Independent configuration of networked companies 39. Uniting collaborators 40. Exploiting specific opportunities 41. Historically motivated 42. Structural cultural assimilation, loose coupling 43. Stability – change enabled 44. Standing network pool	**E-Leadership** 67. VO promotion 68. Automation processes 69. Alliances / Partnerships Universal access **Human Capital** 70. Qualifications 71. Cadre of skilled partners 72. Knowledgeable network population 73. Educational systems	8. Independent configuration of networked companies 11, 32, 55, 78 9. Uniting collaborators 12,39, 74 10. Exploiting opportunities 17, 40, 84 **Influence** 11. Alliances and partnerships 11, 42, 69 12. Number of formal / informal Relationships 7, 47, 76 13. Level of external influence 8, 44, 72 14. Product collaborations 11, 46, 69 15. Cross functional teams 12, 52, 75 **Accountabilities** 16. Cadre of skilled partners 19, 42, 71 17. Knowledge: network population 28, 35, 54, 18. Intellectual capital 13, 20, 59, 81
Empowerment 14. Defined accountabilities 15. Decision levels 16. Complexity, magnitude and scope of decision making 17. Levels of repeat business 18. Acceptance of empowerment and risk 19. Workforce skills investment	**Integration** 45. Heterogeneity (hesitation) 46. Dynamical configuration of core competencies 47. Shared organisational goals 48. Trust / Cooperation / Coordination 49. Exchange relationships 50. High uncertainty 51. High interdependence 52. Shared output and process controls	74. Participation 75. Creativity & information sharing 76. Workforce skills & efficiencies 77. Intellectual capital 78. Agile & change approving 79. Understanding the knowledge economy	19. Acceptance of empowerment and risk 18, 36, 78, 27 20. Defined accountabilities 14, 40, 66 **Standards & Stability** 21. Standards & rules 13, 54, 81 22. Transparency & predictability of implementation 18, 26, 53, 85 23. Financial stability and soundness 19, 61, 86 24. Response time 25, 40, 75 25. Openness to change 26, 43, 78, 27
Restlessness 20. New products / services 21. New markets entered 22. New / changed processes 23. New / changed job profiles 24. New / interdependencies 25. Response time 26. Levels of stress 27. Openness to change 28. Change appraisal criteria	**Modularity and heterogeneity** 53. Satisfier modules 54. Specific requirements core competence 55. Flexible & dynamic combination 56. Unique value chains 57. Competitive advantage 58. Virtually increasing resources 59. Know how endowment 60. Increases in capacity 61. Quality, flexibility, timing 62. Synergistic cooperating partners	**E Business Climate** 80. Regulatory policies 81. Standards & Rules 82. Institutional arrangements 83. Premiums for risk 84. Effective competition 85. Transparency & predicability of implementation 86. Financial stability & soundness 87. Electronic transaction support	**Interdependence** 26. Shared organisational goals 16, 47, 74 27. High interdependence 4, 12, 51, 72 28. Unique value chains 9, 46 52, 57, 68 29. Increased capacity 16, 58, 60 30. Quality, Flexibility, Timing 25, 46, 55,

Phase 1

The first phase required divisional managers to circle the response which most closely reflected how important they felt each of the questions was to their group. Table 2 provides an example of one of the 6 dimensions surveyed in the pre-interview audit (Phase 1) of the VERI. The complete audit comprised six dimensions, five questions per dimension making a total of thirty questions. The first box in each table identifies the Phase, the acronym of the instrument and it full name. The second area denotes the question that was posed. In the case of Phase 1 of the pre-interview audit the question relates to importance. Below this the letters used for the survey are explained e.g. SA Strongly Agree, Agree etc. Next is the wording for the dimension. In the case of Table 2 the example given is Enablement. There are 30 questions for each audit; the questions under Enablement are numbers one to five.

Table 2 Pre-Interview Audit; VERI

PHASE 1: VERI: VIRTUAL ENTERPRISE READINESS INSTRUMENT PRE-INTERVIEW AUDIT

If the division under my control were to work effectively with <u>other Health divisions</u> using Information Communication Technologies it would be important that:

KEY (Circle the response below which is closest to your opinion)

SA = Strongly Agree   **A** = Agree   **D** = Disagree **SD** = Strongly Disagree   **DK** = Don't Know

Enablement

1. Access levels to suppliers and partners are adequate.	SA	A	D	SD	DK
2. Group has strategies to add value to collaborative relationships.	SA	A	D	SD	DK
3. Group has the authority to facilitate collaborative relationships.	SA	A	D	SD	DK
4. My group supports the development of core competencies.	SA	A	D	SD	DK
5. My group has the resources it needs to collaborate effectively.	SA	A	D	SD	DK

A simple method, Table 3 was devised to identify the priority from most important to least important and the subsequent gap. A scale of five being strongly agree down to 1 was used. There were 5 respondents, consequently the highest score achievable was 25 (5 x 5) and the lowest 5 (5 x 1); the higher the score the more the importance.

Table 3 Likert Scale

Grade	Code	Value	X 5
Strongly Agree	SA	5	25
Agree	A	4	20
Disagree	D	3	15
Strongly Disagree	SD	2	10
Don't Know	DK	1	5

Figure 2 provides the results obtained from the 5 respondents to the 30 questions posed for the VERI and reflect Phase 1 data analysis.
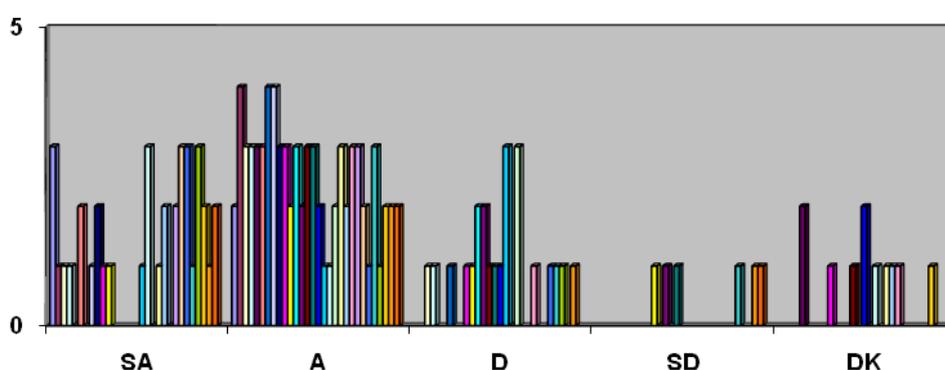

Figure 2   VERI Pre-Interview Audit Results (Importance)

The chart clearly illustrates that the vast majority of the respondents, out of the 5 surveyed Strongly Agreed or agreed that the dimensions and the questions posed were important. This is a significant initial outcome. The electronic version of these charts provides a colour coding for each of the thirty questions asked. These results are significant because they validate the instrument in terms of whether or not the organisation felt that overall, the dimensions and the questions posed were important. As you can see the results are heavily weighted to the strongly agree and agree, indicating that the majority felt that the questions being considered were important to their organisation.

PHASE 2

The second phase of the process involved one-on-one interviews with each of the respondents. An excerpt of the questionnaire is set out in Table 4. The questionnaire was designed to allow respondents to provide feedback about the pre-interview audit process. The overarching question remains the same as for the pre-interview audit in asking would it be important. But asks the subject to comment on whether he or she felt that the statement made sense; if not why not, then follows the dimension heading. The subject was then asked to comment on the five questions under the dimension regarding whether it made sense or not, what was missing or the subject would have liked to have

seen added. Finally the subject was asked if he or she had any other comments to make about the dimension.

Table 4 Questionnaire: the VERI

Questionnaire - VERI

If the division under my control were to work effectively with <u>other Health Divisions </u>using Information Communication Technologies it would be important that:

Did the statement make sense? If not/why not?
_____

Enablement
Perception across those surveyed is that "Enablement" is as important as other areas.
_____
_____

1.	Access levels to suppliers and partners are adequate	SA	A	D	SD	DK
2.	My group has strategies in place to add value to collaborative processes	SA	A	D	SD	DK
3.	Closely linked networks are essential to collaborative success	SA	A	D	SD	DK
4.	My group is efficient in combining collaborative core competencies	SA	A	D	SD	DK
5.	My group is able to modularize collaborative production effectively	SA	A	D	SD	DK

What was good/made sense about the checklist for this heading?

What didn't make sense?
_____
_____

What would you have liked to have seen covered/or added, or felt was missing?

Any other comments you would like to make about enablement?

The next step was to collate all the input from the interviews and develop a consensus across the respondents of their reactions to the dimensions and the questions posed.

PHASE 3

Phase 3 consisted of the distribution of the revised document; the Post-Interview Survey to the 5 divisional managers, as depicted in Table 5. Again the respondents were required to circle their responses to the 6 dimensions and thirty questions. The critical difference in phase 3 was that the overarching question that applied to all dimensions, changed to whether the respondents felt that they were actually **doing the things** they previously agreed were important.

Table 5 Post-Interview Survey: VERI

PHASE 3: VERI -VIRTUAL ENTERPRISE READINESS INSTRUMENT POST-INTERVIEW SURVEY

How effectively does your division work with <u>other health divisions </u>using Information Communication Technologies under the following headings?
KEY *(Circle the response below which is closest to your opinion)*

SA = Strongly Agree **A** = Agree **D** = Disagree **SD** = Strongly Disagree **DK** = Don't Know

Enablement – Allow, Facilitate, Permit

1.	Access levels to suppliers and partners are adequate	SA	A	D	SD	DK
2.	Group has strategies in place to add value to collaborative relationships	SA	A	D	SD	DK
3.	My group has the authority to facilitate collaborative relationships	SA	A	D	SD	DK
4.	My group supports the development of core competencies	SA	A	D	SD	DK
5.	My group has the resources it needs to collaborate effectively	SA	A	D	SD	DK

The true power of the instrument is reflected in Phase 3 results shown here in Figure 3, which provided a very different picture of the organisation. In the vast majority of the cases across the 30 questions, group managers were less confident that the organisation was actually doing the things it thought were important
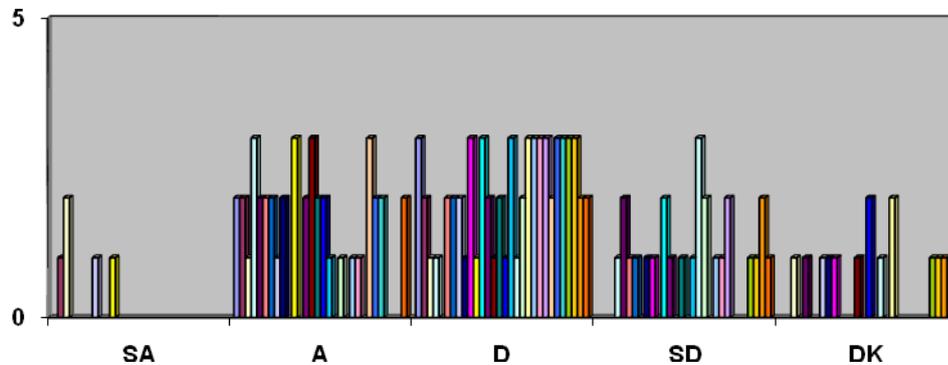

Figure 3   VERI Post-Interview Survey Results (Doing)

The results moved from a heavy concentration in the Strongly Agree and Agree columns to Agree, Disagree and in some cases even Strongly Disagree. It is this mixed response which was of most interest to the researcher and raised an interesting question; could the gap between Importance and Doing be used to set priorities for the organisation to focus on in terms collaborative sustainability? Table 6 converts the charts provided as Figures 2 and 3 into the top three priorities for the case study organisation. The table also recommends solutions for the top three priorities identified.

The VERI Doing chart for Health illustrates a number of concerns. Firstly, from the perspective of how the organisation collaborates with its suppliers and partners, the chart Figure 3, indicates that a majority feel that they are not doing a number of the things they identified as important. Health had a strong concentration in the Strongly Disagree column, indicating that there are a number of critical issues that need to be addressed, especially in terms of their external collaborative sustainability. Of the top three priorities identified, the highest priority was Influence with a majority expressing concerns about the influence that external partners exert on their organisation. This may well reflect the current crisis in health care and needs further investigation. With the other two priorities falling in the Collaboration and Standards and Stability dimensions, it is reasonable to assume that there are concerns about entities health collaborates with and whether the standards and stability of these relationships is suspect. Table 6 depicts the top three priorities and Table 7 identifies issues and suggests some ICT related solutions.

Table 6   Health: Top Three Priorities: VERI

Priority	Heading		Question	Gap	Issues
1	Influence	13	Collaborative partners exert a high level of influence on my group.	7	Other groups within Health, Suppliers and alliance partners exert different influences Different hospitals in Health manage information differently to others and to the way suppliers manage information Information that influences decision making is not timely and is poorly communication from Hospital to Hospital and between Health and its suppliers Other organisations exert influence collaboratively on Health e.g. Health Funds, Government Agencies etc
2	Collaboration	8	I understand the configuration of my group's existing collaborative networks.	6	Different forms, software systems, machinery and system configurations Suppliers have to deal with the needs of different hospitals in the group without a 'bulk purchase' strategy Data to aid collaborative decision making is poorly managed from a collaborative perspective Two forms of collaboration Hospital to Hospital within Health and Health and its suppliers and alliance partners
3	Standards & Stability	21	My group understands the standards/rules that apply to collaborations.	5	Patient care does not flow seamlessly end to end from one group to another in Health. Terminology is not standard group to group in Health which causes problems for suppliers and partner organisations collaborating or reliant on Health e.g. vacancy means different things to other groups in Health than it does to suppliers and collaborators Physically disparate groups within Health and suppliers all with own systems and procedures

Table 7   Health: Comments of subjects and suggested solutions

Issues Identified

Decision making is spread across the company with many physically disparate divisions. These divisions have developed their own systems and procedures. The shortcomings of not having standard business processes across the organization include: duplication of effort in developing processes and continuous improvement, not being able to take advantage of economies of scale in purchasing, business processes that do not run smoothly from end to end, inadequate management reporting and B2B endeavours being hampered. Standardized procedures will aid in business to business interaction, because both parties are more likely to understand the requirements of the other. World's best practice may aid efficiency within the organization but it will also make the organization more attractive to external parties as a collaboration partner. It is important to the company that certain external organizations are stable and that their software systems are stable. Groups within Health nationally do not collaborate effectively. Businesses who sell goods and services to SJGHC have to deal with multiple divisions and not an organization as a whole. The lack of standards and the lack of stability in working with other Health groups and with suppliers and alliance partners using ITC was identified as an issue.

Solutions Recommended

Solutions in regards to supplier and collaborative partner influences include undertaking projects focussing on applications such as Geographical Information Systems, Inventory Management, Forecasting software, Information Systems e.g. SAP, PeopleSoft, Axapta Collaborative solutions include centralised data bases integrated with purchases, integrated with patient information, integrated with the Internet. Other solutions to help Health improve its collaborative sustainability include data consolidation and display applications, data mining, data warehousing, data profiling, data visualization and analysis packages. Addressing issues and providing solutions to standardization and stability include continuing the current push to rid the organization of divisional and system silos by implementing ERP, so that common business processes can be applied in the same way in each group, such that business processes can operate smoothly across group and supplier boundaries. There are a range of web analytical technologies that can assist Health in implementing standardised stable processes and procedures.

PHASE 4

All the relevant information pertaining to issues identified; comments of subjects and solutions recommended were communicated to the Health sponsor via a report. The report included results and findings of conducting the Health Case Study using the VERI. A follow-up meeting with the sponsor was then organised so that the final phase, empirical analysis could be completed. Table 8 denotes the questions asked and Table 9 details the Health sponsors answers.

Table 8   Questions Posed

1.	Did your organisation think that the process had value?
2.	Were the priorities identified relevant to your organisation?
3.	Was the time devoted to the process considered time well spent?
4.	Do you think your organisation gained anything from undertaking the process?
5.	Were positive results achieved?
6.	Were there elements missing from the process?
7.	Did the changes made to the process reflect your organisations needs?
8.	Should anything else have been added to the process?
9.	Does you organisation intend to do additional due diligence on the priorities identified?
10.	Does the process provide you with an effective means of identifying organisational priorities?

Table 9   **Sponsors Answers**

No	A	General Consensus, Observations and Feedback
1	Y	The sponsor's initial reaction was that what had been discovered was common sense and would have been identified over time. However the sponsor did acknowledge that the information regarding priorities was useful, because it enabled him to understand concerns that were important to his most critical divisions and also whether or not the divisions shared his belief that issues were being addressed to the organisations satisfaction.
2	Y	The sponsor grudgingly admitted that some of these issues were important, but clarified this by stating that the results were not unexpected given the diverse nature of their national organisation.
3	Y	The sponsor conceded that although he felt the process had been time consuming the priorities identified were important.
4	Y	The sponsor felt that he gained an understanding of priorities that concerned five of his divisional managers. However he felt that thought should be given to expanding the number of subjects, to include some of the eastern states hospitals to get a more comprehensive result.
5	Y	As far as the sponsor was concerned on the surface the results were positive but he again was concerned that only five divisional managers had participated.
6	Y	The sponsor felt that the in terms of elements that were missing the solutions identified did not go far enough. He felt that a lot of the solutions recommended were already an extension of current plans. But he did agree that perhaps those plans had not been communicated very effectively throughout the organisation.
7	Y	Yes, the changes made were significant in recognising the unique nature of the organisation. What concerned the sponsor was the apparent lack of systems integration, nationally.
8	N	The sponsor was of the opinion that the VOPI and the VERI covered most of the issues facing his organisation but commented that it not enough was being done to ensure the stability of collaborative partners. He recognised the potential opportunities that effective collaborations provide especially in extending the existing focus and scope of the business.
9	Y	The sponsor indicated that based on the information contained in the report he would be following up with the group managers on the priorities they had identified.
10	Y	The sponsor indicated that the process had been a good first step; however he did comment that extension of the process to include more subjects nationally should be examined. Although he did not go as far as to invite the researcher back to repeat the process, he did suggest that he would support initiatives designed to undertake a broader implementation of the process.

Limitations

The first limitation obviously is that only one albeit highly collaboratively connected organisation in the Heath Industry has been tested. Second, the size of the sample makes it difficult to determine whether there is validity in the consensus. Third, the organisation is nationally collaborative not globally.

Conclusions

Although the limitations are relevant the empirical analysis confirms that the instrument did identify some significant priorities that Health acknowledged required further investigation. The organisation was diverse enough to be considered a reasonable initial pilot to test the validity of the instrument. Findings signalled that further refinement, testing and retesting will be necessary. Future research directions should include the identification and testing of globally collaborative ICT enabled environments. In terms of the paradox between the disconnected world and open, loosely coupled collaborative networks of organisations the case study has validated the need for frameworks and new instruments that will enable organisations to exploit global opportunities. The VERI is just starting point in exploring the fundamental issue. Findings would suggest that the answer to the question posed at the beginning of this paper; can an instrument be devised that enables collaborative networks to maximise the return on their ICT assets? The answer would appear to be yes.

References

Bauer, R., & Koszegi., T. (2003). Measuring the degree of virtualisation. eJOV 5 (2003) 2. from www.virtual-organization.net

Benbya, H., & McKelvey, B. (2006). Using coevolutionary and complexity theories to improve IS alignment: a multi-level approach. *Journal of Information Technology, 21*, pp 284-298.

Brodie, M (2007). *The End of the Computing Era: Hepaestus meets the Olympians*. Keynote Speaker, IEEE International Conference on Digital Ecosystems and Technologies, Phitsanulok, Thailand.

Chang, E., & West, M, (2006). Digital Ecosystems and comparison to existing collaboration environment, in WSEAS, *Transactions on Environment & Development*, 2 (11): 1396 – 1404.

IMPACT. (1998). Exploiting the Wired-Up World: Best Practice in Managing Virtual Organizations (No. Working Group 4): Project ACHIEVE.

Katzy, B. R., Loeh, H., & Sung, G. (2006). The CeTIM Virtual Enterprise Lab - A Living Distributed, Collaboration Lab. Working Paper Series No 3305.

Leliaert, P., Candries, W., & Tilmans, R. (2003). Identifying and managing IC: A new classification. *Journal of Intellectual Capital. Bradford, 4*(2), 202.

McConnell, (2000). *Risk E Business: Seizing the opportunity of Global E-Readiness*: in collaboration with www.witsa.org.

Rheingold, H. (1993). Visionaries and Convergences: The Accidental History of the Net. In *The Virtual Community, Homesteading on the electronic frontier*: Harper Perennial USA.

Rowley, J. (2002). Synergy and strategy in e-business. *Marketing and Planning, 20*(4), 215-222.

Warner, M., & Witzel, M. (2004). *Managing in Virtual Organizations*. London: Thomson Learning.

Zigurs, I., Evaristo, R., & Katzy, B. (2006). *Collaborative Technologies for Virtual Management.* Paper presented at the CeTim, Germany.