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**Coalition Transformation: An Evolution of People, Processes
and Technology to
Enhance Interoperability**

TITLE OF PAPER:

Lessons Learned from Commercial Transformations to Network Centric Operations

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This paper is the 6th in a set of 13 presented to the 9th ICCRTS by staff of the Defence Scientific and Technical Laboratory (Dstl) and QinetiQ plc, relating to 'command in the network enabled era'. The papers are based on research undertaken for the United Kingdom Ministry of Defence's 'Network Enabled Capability' programme and, unless otherwise stated, are covered in whole or in part by Crown Copyright.

Lessons Learned from Commercial Transformations to Network Centric Operations

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Abstract

As we move from the industrial age to the information age, organisational effectiveness will require the development of different capabilities. Information age technologies may allow us to develop new methods of working together that will enable agile groups to respond rapidly to changing circumstances. By examining the experiences of commercial organisations' transformation to network centric operating, valuable lessons can be learned to inform the military transition to Network-enabled Capability (NEC). Research involving 93 commercial organisations enabled the identification of the critical factors that have an impact on an organisation's ability to be flexible and adaptable. This in turn influences organisational effectiveness in network-enabled environments (Phillips and Louvieris, 2003). Seven factors were identified:

- Alliance/Joint decision management and intelligence

- Enterprise wide change management
- Organisational learning
- Process oriented agility
- Network centric information management
- Leadership of transformation
- Knowledge exchange meetings

It is critical that organisations are able to respond to environmental challenges effectively, which emphasises the importance of change as an organisational capability for the military. As being able to capitalise on knowledge is key to effectiveness in the network-enabled environment, organisational learning is perhaps the most important organisational process for military Headquarters (HQ) to develop further.

Background

As we move from the industrial age where organisations focused inwardly (on local issues), to the information age where organisations focus outwardly (on global issues), organisational effectiveness means developing different capabilities. Organisations need to change from information hoarding to information sharing. Vertical integration becomes less important and virtual integration more so, as relationships become more important to organisational success. Organisational success is no longer about mass – using scale and scope. Within this dynamic context, success is about information access and exploitation, and being agile¹. An organisation's effectiveness is determined by its ability to adapt/reconfigure its processes and structures in synchrony (at least, if not quicker) with the dynamics of its environment (Gartska, 2003; Phillips and Louvieris, 2002).

Network information and communication technologies (ICT) are a method of enabling process flexibility since they allow new ways of organising and communicating that simply weren't possible (or weren't practical) before. For example, ICT allow geographically distributed operations to function more effectively. Virtual organisations and alliances can be created, automated logistic and supply processes can be implemented, and automatic data collection and filtering processes can be employed, all of which support organisations in creating new or more efficient internal and external processes. The final key to effectiveness in the information age is to exploit the information collected by developing it into knowledge that can be acted on and exploit the new processes available by developing new capabilities from them in order to provide competitive advantage. This is the broad aim of the UK MoD's Network-enabled Capability (NEC) initiative. The Future Command Headquarters (FCHQ) project (funded by the UK MoD's Applied Research Programme) has examined how commercial organisations use ICT to support process change and enhance capability. Additionally it has identified lessons that could be learned from their experiences to apply to military HQ to improve command and Control (C2) capability.

¹ Agility is the capacity to adapt and respond in light of changing circumstances (Christie, Macklin, Roddy, Phipps, Fricker, Blendell, and Stewart, 2003).

Introduction

Digital technologies allow the potentially unlimited storage of information and its transmission throughout a network. This in turn enables information infrastructures and networked communication systems to be developed. It is increasingly accepted in the literature that the process of converting information to knowledge, exploiting it, and acting on it optimally has the potential to provide competitive advantage and sustain success in the information age environment (Kirk, 1999; Leedon, 2001; Phillips and Louvieris 2002; Phillips, Louvieris, Purvis, Kyriakidou and Gore, 2003). For example, two well known IT organisations interviewed have been able to leverage IT and information to develop competitive advantage, and now dominate their competitive domains (Phillips and Louvieris, 2003). The goal of Knowledge Management² is not to have a greater level of knowledge *per se*, but to exploit the knowledge optimally by enabling a superior decision-making process, enabling increased tempo, creating an advantage over an opponent, or creating a desired Effect (Almen, Anderson, Lagerlof and Pallin, 2000).

Whilst technology has a role to play in *supporting* these processes, the focus must still be on the human aspects (e.g. creating a knowledge sharing culture by using technology to create communities of practice³) (Phillips and Louvieris, 2002; Phillips and Louvieris, 2003). Case studies have shown that technology centred knowledge-management practices are not effective. A well-known technology organisation that experienced a near death experience in the 1990s attempted to turn itself around using a technology-centred organisational learning strategy. The initiative failed because it didn't consider people, tacit knowledge, skills and experience. The system did not connect people to allow knowledge sharing and was not process oriented to allow knowledge reuse in tasks and processes. Instead, the organisational learning strategy was redesigned to focus on people and support processes. The strategy worked and the organisation is very successful today (Phillips and Louvieris, 2003).

Contrary to popular belief, technology does not enhance capability *per se*. Introducing new technology to an organisation will not cause the organisation to be more effective, unless it allows processes to be improved, costs to be cut, or the organisation to be organised more efficiently. Results from commercial surveys indicate that only 22% report achieving the originally anticipated benefits (which were cost savings in 42% of cases) of introducing new technologies into their organisations (The Economist and KPMG, 2001). Technology is an enabler of capability in that it allows processes to be conducted better/faster/differently/more efficiently/in parallel or completely new processes to be implemented. It also enables new organisational forms and processes. (Although of course technology will be necessary to allow certain organisational forms to function effectively – for example

² Knowledge Management: The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organising, diffusion, use and [most importantly] exploitation. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout an organisation and appropriately applied (Skryme, 1997).

³ Communities of practise: A body of professionals with a common area of interest that seek to collate, share, reflect upon, debate and capitalise on experiences, knowledge and views to learn, develop and promote expertise and best practise in their working domain (QinetiQ, FCHQ working definition).

distributed forms of organisation such as Agile Mission Groups (AMGs) will need to use communication technologies.) Desired organisational forms may not be achievable in practice without the use of these technologies to support them, but the organisation and its processes do not rely solely on them. The organisation should not be designed around the technological system. Structuring an organisation around its technology would tie it to a certain way of functioning and a certain set of equipment, and have a serious negative impact on the organisation's ability to be flexible and adaptable (Phillips and Louvieris, 2002; Phillips and Louvieris, 2003; Symon, 2000a, Symon 2000b, Phillips et al 2003).

However, it is necessary for the organisation to adapt its existing processes to accommodate optimally the new processes made possible by the technology. Obtaining a measurable improvement in human performance from a new system relies on ensuring that organisational change is implemented to unlock the full potential benefits of technological change, rather than trying to slot new systems into sometimes inappropriate organisational processes (Nathan, Carpenter, Roberts, Ferguson and Knox, 2003). A recent survey of the impact of technology on organisational performance in commercial and government sector organisations concluded that when wider human factors issues are neglected, apparently disappointing payback for investment in technology projects is the result (Nathan, Carpenter, Roberts, Ferguson and Knox, 2003). However, as with any organisational change, the intended organisational change must be linked to the strategic goals of the organisation (The Economist, 2001; Phillips and Louvieris, 2002; Phillips et al, 2003). It is important, therefore, to identify what capabilities the organisation needs to develop for effectiveness, and change accordingly.

Research shows that in the information age environment flexibility and responsiveness are the core capabilities for network-enabled organisations (Phillips, Louvieris, Purvis, Kyriakidou and Gore, 2003). However, while flexibility is needed to meet operational and environmental requirements, reliability is necessary to maintain performance (Marsh and Burke, 2002). No one perfect organisational design can achieve the desired flexibility or meet all the challenges from a diverse environment (Nadler and Tushman, 1997). One way to achieve this is to develop relatively stable core capabilities with additional bolt on capabilities as required. This approach is also used in successful commercial organisations (e.g. a core capability is maintained but strategic business units are developed *ad hoc* and flexibly to meet arising environmental requirements) (Phillips and Louvieris, 2002; Nadler and Tushman, 1997). This allows organisations the flexibility to respond effectively to turbulent environments yet to achieve the reliability associated with so-called High Reliability Organisations (HROs).⁴

It is not only organisational research that recognises the need for a modular concept to facilitate effective responses; military thinking also identifies a need for agile organisations (JDCC, 2003). Current trends suggest that while UK forces should

⁴ HROs operate in demanding environments (e.g. petrochemical, aviation, nuclear) but with outstanding safety records. In these complex, technical, and dynamic environments the costs of poor performance or failure are either severe or simply unacceptable. Achieving reliability in itself requires an ability to respond appropriately to unexpected events and problems (Weick and Sutcliffe, 2001; Grabowski and Roberts, 2003).

maintain the capability to operate independently, the majority of future operations will require interoperability (both technical and interpersonal/organisational) with some, or all, components of other nations' armed forces in both *ad hoc* coalitions and formal alliances. Furthermore, the types of operations UK Forces are likely to contribute to may vary in intensity and include a variety of operations such as disaster relief, peace support and regional or inter-state warfighting. All of these may require different organisational processes and a variety of operational skills to be prosecuted successfully. Modern military operations are complex and uncertain; occurring in a dynamic and multidimensional battlespace that is under increasing scrutiny from international organisations and the media. 'Opponents' are not always clearly identifiable along the lines of traditional wars where clearly defined adversaries are separated by observable boundaries. Modern opponents may operate covertly, or even virtually. Therefore future command organisations will be required to be even more adaptable, and capable of a rapid and flexible response appropriate to the complexity of the environment (JDCC, 2001).

The FCHQ project developed the modular structures concept to achieve this balance between flexibility and reliability without significantly disrupting the organisation's core competencies (Christie and Fidock, 2002). The concept proposes a modular HQ organisational structure with a stable core composed of some of the features comprising HROs. Additional capabilities are provided by modular expansions. This concept itself must be flexible, as it will need to be adapted over time due to environmental changes and as a result of lessons learned. A one-off dramatic change followed by a period of stagnation will not be sufficient - constant evolution will be necessary to keep abreast of technological development. Modularity allows the ever-changing military environment to be addressed effectively (Christie, Macklin and Fidock, 2003). However it is recognised that to achieve all the desired aims some trade off may be necessary since modularity itself, while meeting some organisational goals, is not without its costs. For a full discussion of the organisational aspects affected by modularity see Christie, Macklin, Roddy, Phipps, Fricker, Blendell, and Stewart (2003) and Christie and Stewart (2004 – this symposium).

The military is not the only organisation facing new challenges from its operational environment. Commercial organisations face similar problems in an increasingly unpredictable and complex business environment. Product life cycles are shorter; there is increased uncertainty about the future and planning horizons are shorter (Phillips and Louvieris, 2003). Competitiveness is more of an issue, particularly as information-age technologies become more available and accessible to competitors. Commercial organisations are forced to diversify into new markets and operate in multiple sectors due to increased competition and threats. This involves the creation of alliances with suppliers/competitors with all the consequent problems of system interoperability, process interoperability, and conflicting organisational and sometimes national cultures. Global commercial organisations face threats from smaller, more agile organisations that are now also network-enabled (enabling an 'instant infrastructure'). For example global organisations such as British Airways face increasing threat from the 'new' smaller, more agile and network-enabled organisations such as Easy Jet. Many 'new' organisations also engage in outsourcing. This is often to third world countries with fewer restrictions on pay and conditions and less legislation, allowing cheaper production costs. This in turn increases their threat to larger organisations. This has obvious relevance to the type of asymmetric

adversaries increasingly faced by the military. Commercial organisations also face increased public and media scrutiny and tighter legislation from government and consumer groups. Therefore it is highly appropriate for MoD to learn from the experiences of commercial organisations, by examining best practice in commercial organisations and apply commercial lessons learned to inform the military's own journey towards a fully network-enabled capability (Phillips and Louvieris, 2002; Phillips et al, 2003, Bracken, 2002).

Method

This research aimed to identify the critical factors of a wide variety of successful commercial organisations in network-enabled environments. Consultation of the organisational behaviour and management science literature (e.g. Huczynski and Buchanan, 1991; Bell, 2002; Cook, Adams and Angus, 2002) or existing frameworks for organisational analysis (e.g. MIT90s) will lead to the ability to identify a set of basic attributes of organisations which are useful as investigative/analytical tools (Fidock, 2002; Cook, Kasser and Burke, 2000; Phillips and Louvieris, 2002). Most of these frameworks are broadly similar and include (or can be classified under the headings of) people/roles, organisational processes, organisation/organisational structure, technology, strategy/goals and the environment. Some models also include knowledge/information and culture as key factors affecting organisational behaviour (Phillips and Louvieris, 2002; Fidock, 2002). Preliminary research, including a literature review and interviews with best practice organisations, confirmed the applicability of the following headings as a framework for use in research into organisations in network-enabled environments (Phillips and Louvieris, 2002; Phillips, 2003):

- Structure
- Leadership
- People and culture
- Coherence
- Knowledge
- Alliances
- Agility and decision making

Using this as a basis, a questionnaire was developed that asked respondents first to rate the *importance* of 32 organisational variables (see Appendix A) within the framework for successful performance in network-enabled environments, and then to rate the *achievement* of their own organisation on this variable.

The questionnaires were sent first to a sample taken from the FTSE 350 organisations and then to increase the potential sample size to contacts from the 2400 Hoover list. All organisations were contacted first to assess their willingness to complete the questionnaire and identify appropriate respondents. Questionnaires were completed by senior management or those with responsibility for e-business initiatives. Ninety-three usable replies were received in total. The sample was drawn from best practice organisations in a range of industry sectors to obtain data from top organisations in the commercial sector operating in network-enabled organisations. This allowed identification of generic lessons learned and understanding of factors that enable organisations, operating in rapidly changing and uncertain environments to be responsive to the requirements of management. Specific examples include two well-known 'High Street' banks, technology sector firms, television and communications

companies, an engine/car manufacturer, supermarkets and organisations in the leisure industry. To supplement this, and obtain more detailed case study information, semi-structured interviews were conducted with senior managers in 9 organisations, all of whom had network technology/e-business responsibilities.

Summary of findings

As a preliminary analysis, the mean *importance* ratings for each questionnaire variable were put into rank order. The upper quartile range shows the eight variables rated by respondents as being most important for network enablement (means >3.96). Importance was rated 1 – 5, with 5 being most important.

Questionnaire variable	Mean importance rating for variable
Transformation champion	(M = 4.29, SD = 1.04, N = 93)
Involvement and commitment	(M = 4.27, SD = 0.97, N = 93)
Learning and renewal	(M = 4.17, SD = 1.10, N = 92)
Respect and trust	(M = 4.11, SD = 1.07, N = 93)
Alliance performance expectations	(M = 4.11, SD = 1.16, N = 93)
Knowledge sharing	(M = 4.02, SD = 1.15, N = 93)
Leadership accountability	(M = 3.98, SD = 1.32, N = 93)
Alliance respect and trust	(M = 3.98, SD = 1.10, N = 93)

Table 1: The eight questionnaire variables rated as most important

Further analysis compared the *importance* ratings with the *achievement* ratings for each questionnaire variable using paired sample t-test analysis. The aim was to examine the difference between ratings, a significant difference between *importance* and *achievement*, indicating areas that organisations were not successfully addressing. Overall, it was found that the *achievement* ratings were significantly lower ($p < 0.01$) than the *importance* ratings on 31 of the 32 questionnaire variables. (The only variable on which *achievement* ratings were not significantly lower than *importance* ratings was Knowledge exchange meetings ($t = 1.79$, $df = 93$, $p = 0.076$)). Assessment of the means of the paired differences in the upper quartile range (means >0.915) allowed identification of 8 areas that are the *least successfully addressed* by commercial organisations:

Questionnaire variable	Mean of paired differences	Paired t-test results
Transformation champion	M = 1.06, SD = 1.16	$t = 8.88$, $df = 93$, $p < 0.01$
Involvement and commitment	M = 1.00, SD = 1.02	$t = 9.54$, $df = 93$, $p < 0.01$
Learning and renewal	M = 1.02, SD = 1.09	$t = 9.01$, $df = 92$, $p < 0.01$
Respect and trust	M = 0.92, SD = 1.10	$t = 8.04$, $df = 93$, $p < 0.01$
Alliance performance expectations	M = 1.02, SD = 1.05	$t = 9.46$, $df = 93$, $p < 0.01$
Knowledge sharing	M = 1.00, SD = 1.11	$t = 8.66$, $df = 92$, $p < 0.01$
Standardisation and interoperability	M = 1.02, SD = 1.11	$t = 8.95$, $df = 93$, $p < 0.01$
Agility and decision edge	M = 0.97, SD = 0.99	$t = 9.49$, $df = 93$, $p < 0.01$

Table 2: The eight questionnaire variables with the greatest significant difference between importance and achievement

A data reduction technique was used to identify a set of factors that would explain the information in the 32 variables (See Appendix A) in terms of their common underlying dimensions. Principle components factor analysis with varimax rotation was conducted on the *importance* data using Statistical Package for the Social Sciences (SPSS). Seven orthogonal factors, accounting for 68.5% of the cumulative variance were extracted. At 5% significance level in a sample of 93 cases, only variables with factor loadings in excess of 0.55 were considered for factor interpretation. The seven factors are shown below⁵. The rotated component matrix can be seen at Appendix B.

- Factor 1: Alliance/Joint decision management and intelligence
- Factor 2: Enterprise-wide change management
- Factor 3: Organisational learning
- Factor 4: Process oriented agility
- Factor 5: Network centric information management
- Factor 6: Leadership of transformation
- Factor 7: Knowledge exchange meetings

These seven factors were used as the basis for developing ‘digitization indices’ to determine an estimate of organisational effectiveness in network-enabled environments. The target best practice digitization index was developed by using summated scales constructed from the *importance* data. The factor structure determines the variables included in the summated scales, such that composite scores are determined by averaging all the scores from variables with a high loading on to that factor to get Average Mean Importance Ratings (AMIR) for each of the seven factors. Table 3 shows the relative importance of the factors that organisations need to address to be effective in network-enabled environments, as perceived by the sample. The mean *importance* ratings for the individual variables can be seen at Appendix C.

Factor	Name	AMIR
6	Leadership of transformation	4.06
2	Enterprise-wide change management	3.82
3	Organisational learning	3.78
5	Network centric information management	3.65
1	Alliance/Joint decision management and intelligence	3.60
4	Process oriented agility	3.32
7	Knowledge exchange meetings	2.90

Table 3: Average Mean Importance Ratings (AMIR) for *importance* data by factor (average of the summated scale means)

In the same way, composite measures can be used to compute individual organisations’ Average Mean Achievement Ratings (AMAR) from the *achievement* data. The mean *achievement* ratings for the individual variables can be seen at Appendix D. Table 4 shows the relative position of the factors that the best practice organisations in the sample have addressed to date.

⁵ Although Factor 7 Knowledge exchange meetings shows a small amount of variance it is statistically significant at the 5% level.

Factor	Name	AMAR
6	Leadership of transformation	3.14
2	Enterprise-wide change management	3.06
3	Organisational learning	2.88
1	Alliance/Joint decision management and intelligence	2.84
5	Network centric information management	2.82
4	Process oriented agility	2.74
7	Knowledge exchange meetings	2.70

Table 4: Average Mean Achievement Ratings (AMAR) for achievement data by factor (average of the summated scale means)

Finally, these figures can be used to estimate effectiveness for individual organisations using multivariate summated scales to compile a digitization index. The Summated Scales based Digitization Index (SSDI) is achieved by summing AMARs weighted relative to the sum of the AMIRs and calculating a percentage ratio⁶:

$$Effectiveness = \frac{\sum_{i=1}^{n=7} AAR_i^B}{\sum_{j=1}^{m=7} AMIR_j^A} \times 100\%$$

Equation 1: Calculation of the SSDI

Discussion of findings

The individual variables rated as most important (Table 1) to success in network-enabled environments were all connected with human factors issues (people, culture, leadership and alliances). People and human factors, it seems, are key to achieving successful organisational transformations to network centric operations.

The significant difference between achievement ratings and importance ratings across the aggregate sample on all except one of the individual variables, indicates that even best practice commercial organisations have some way to go to achieve ideal performance in network-enabled environments. Achievement is only equal to aspirations in regard to the Knowledge exchange meetings factor.

Comparing the eight areas that are the *least successfully addressed* (Table 2) to those identified as most important (Table 1), shows that six of the eight areas identified as *most important* to be addressed by network technologies are also the areas that commercial organisations are having the most problems addressing.

The factor analysis allowed identification of seven factors that describe an organisation's ability to be effective in network-enabled environments. A model was

⁶ Factor scores were also determined to confirm convergent validity of the summated scales and Cronbach's Alpha (with a lower limit of 0.7) was calculated to assess the reliabilities of all the scales.

proposed informed by information from the literature review, demonstrating the impact of these factors on organisational ability to be flexible and adaptable, which in turn influences organisational effectiveness in network-enabled environments as illustrated in Figure 1 (Phillips and Louvieris, 2002 Phillips and Louvieris, 2003).

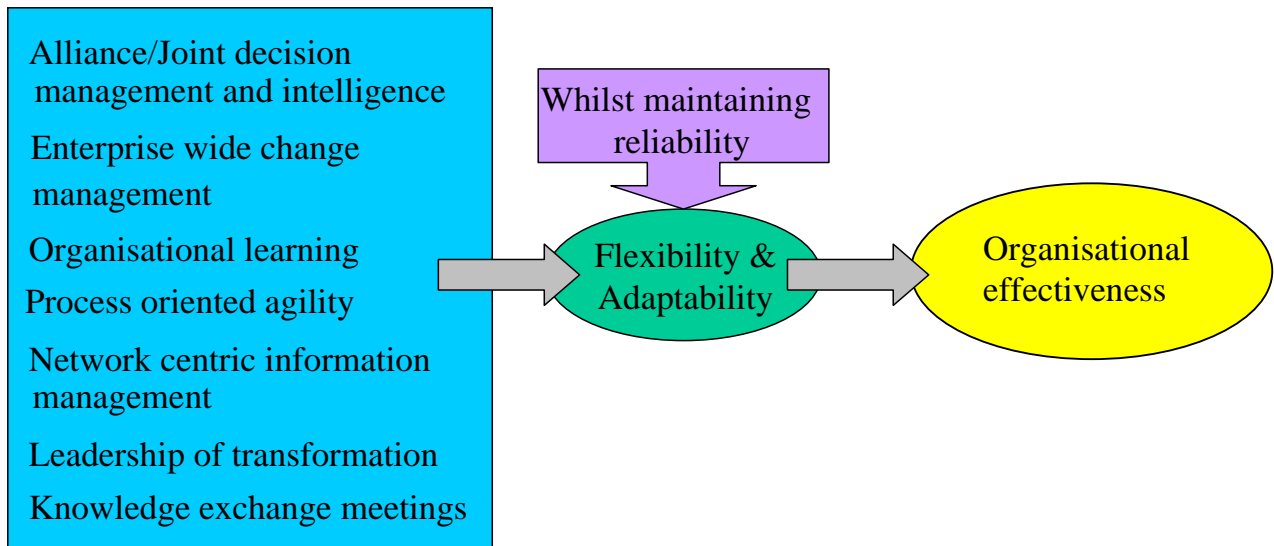


Figure 1: Organisational effectiveness in network-enabled environments

The seven factors and the main lessons learned associated with them are listed below:

Alliance/Joint decision management and intelligence

This concerns the way in which information is exploited, how consequent organisational decisions based on it are made and managed throughout the organisation and across its alliances. Alliances increase organisational complexity, so it is therefore important to manage the risk caused by alliances in complex digitised, collaborative organisational structures. There are two key recommendations here. Ensure that roles and responsibilities are clear in alliance contracts and outline performance expectations. Develop respect and trust to establish an information sharing culture, which in turn underpins project-based learning and joint decision making effectiveness. IT was found to enable faster decisions, but does not cause them *per se*. Human decision-making processes were found to be the factor that limits the ability of organisations to keep pace with the market place.

Enterprise wide change management

This factor concerns the management of organisational change by ensuring rapid and successful implementation of good change management practices. The ability to institute change effectively is a critical capability for an organisation in the network-enabled environment. To migrate successfully into a network-enabled organisation, firms need to bring together, people, process, and technology to address all aspects of change management successfully. In particular, people and culture as it is people that

cause change by developing new processes and capabilities, not new pieces of 'kit'. Technology in itself changes nothing, unless the people operating it change the way they do things. All case organisations interviewed stated that "it is essential in [network-enabled] environments to take into account the people, their relationships, and the organisational arrangements" (Phillips and Louvieris, 2002, pp 41). Digitization objectives should be viewed as an enabling project for the overall goals of the organisational strategy, not as a technology project.

Organisational learning

Knowledge (and the ability to capitalise on it) affects an organisation's ability to respond effectively to its environment. People throughout the organisation (at all levels) must be motivated and encouraged to develop, share and exploit knowledge to enable a true culture of learning to be established and for the organisation to learn from its experiences. It is not just management who should capitalise on knowledge for organisational success. The learning must be focussed on people and processes because case studies indicate that technology-centred organisational learning initiatives are prone to failure (Phillips and Louvieris, 2003). Therefore people-centred initiatives such as Communities of Practice where people can actively and informally share knowledge are important, particularly for tacit knowledge, which is often difficult to capture and share *via* technology centred initiatives. This type of knowledge sharing is particularly important in the military where knowledge residing only in individuals' heads can be lost as a result of the 2-year posting cycle.

Process-oriented agility

Process is more important than structure in the network-enabled environment. Successful organisations identify critical processes within the organisation and gather knowledge about them as a basis for improvement. Investment decisions should be based on developing organisational processes that help achieve strategic aims. Then IT systems can be put in place to support and facilitate these processes, and the organisation can structure in a manner that optimally supports the effective conduct of processes. Organisational structure (the formalised division of labour and reporting relationships) should be decided after the desired processes have been identified and designed (i.e. the tasks that people do and the way they are done). It is the processes that add value. The organisation must have a variety of actual and potential procedures and processes that it can implement rapidly in response to environmental challenges. In particular, organisations should develop better supply chains, develop better information flows and develop metrics for processes that include flexibility and adaptability.

Network-centric information management

Addresses the technology and infrastructure aspects that support organisational learning, knowledge sharing and exploitation in the network-enabled environment (issues such as interoperability of knowledge management systems and their integration into the wider organisation). Interoperability reduces uncertainty, risk and costs. Apart from usability, interoperability is the most important technical factor in making large distributed information projects work. Best practice organisations implement a framework to assess the effectiveness of network-centric information management and monitor interoperability. It should be noted that interoperability has both technical and non-technical aspects (i.e. the interoperability of processes, doctrine and culture). The FCHQ project has examined the aspects of non-technical

interoperability that influence effectiveness in Multi-National Forces and developed metrics for monitoring non-technical interoperability.

Leadership of transformation

The leadership of organisational change in the network-enabled environment may involve releasing control and empowering staff to make changes. Organisational change that is limited to higher levels of the organisation will not be effective. Successful organisations appoint strong leaders to champion organisational change and encourage staff to 'buy in' to the process. Case studies indicate that this is an important factor in the ability to achieve effective change (Phillips and Louvieris, 2003). Network technologies make information more accessible such that operations become more transparent, resulting in leadership decisions themselves becoming more transparent.

Knowledge exchange meetings

Using network communication technologies to support the process of organisational learning and supporting formal and informal communication across the organisation. This is critical to supporting the key activity of organisational learning (and knowledge dissemination) within the organisation and facilitating agile responses to business needs/environmental demands.

Assessing organisational performance

The mean *importance* ratings (Appendix E) from the summated scale means across the sample for each identified factor became a target for effective organisational performance in the network-enabled environment. Similarly the mean *achievement* ratings (Appendix E) from the summated scale means across the sample allow an aggregate to be determined for the organisations in the sample and plotted against the target. Figure 2 shows the aggregate achievement for the whole sample on organisational effectiveness (80%) plotted against the target for the sample (100%). Knowledge exchange meetings is the only factor where the sample organisations have achieved their target for network-enabled capability, reflecting the earlier results discussed in relation to the individual questionnaire variables.

This information can also be used as a tool to assess individual organisations. For example, if an individual organisation's achievement rating on the scale for that factor matches or exceeds the target rating for it, then the organisation is effective on that factor. Thus any organisation can be plotted against the target for effective performance to see on which factors it is successful/unsuccessful and therefore where process change or investment is needed. Alternatively, the achievement ratings of two organisations can be plotted against each other to highlight areas where they may be weaker/stronger. Some individual organisations have met or exceeded the aggregate for the sample on some or all of the factors and their behaviours in regard to these factors are obviously of particular interest for identifying learning opportunities.

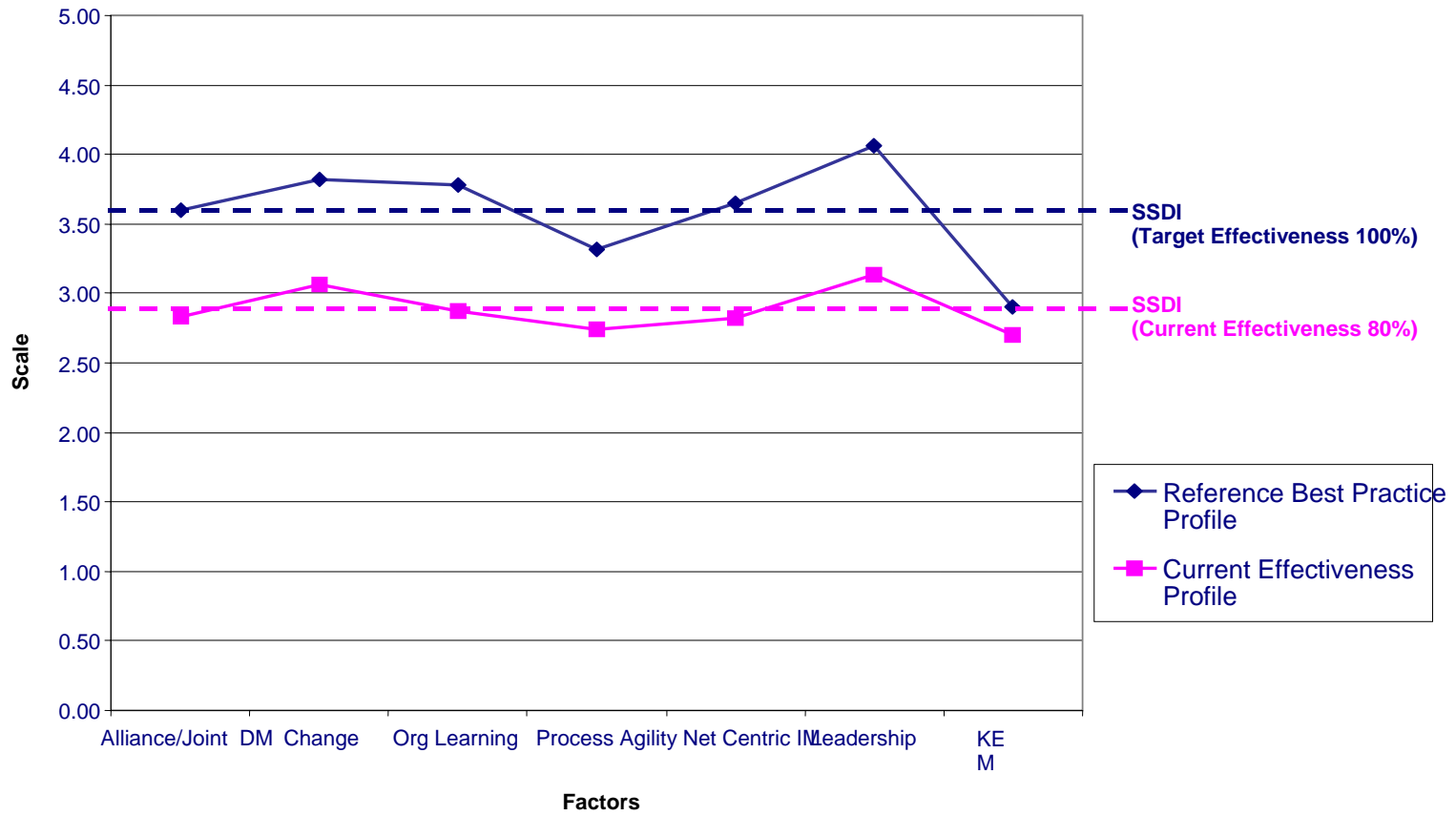


Figure 2: Aggregated sample's current and target effectiveness profile

The data were examined for differences in organisations on the seven factors. Five 'levels' of network-enabled capability were described and identified, although it is proposed that there are probably more beyond this. Behavioural markers for each level of network-enabled capability in terms of each of the critical factors were established using qualitative data from the analysis of case study and interview data. This could potentially be used as a tool for individual organisations to:

- Decide what level of network-enabled capability they are aiming for. (Depending on the nature of the industry and the threat from competitors, it may not be necessary to aim for Level V standard in every factor. It may just be enough to be better than your main competitors.)
- Use the behavioural examples given for each factor to identify where their organisation is on its journey to a fully network-enabled capability for each factor.

This is shown in Figure 3 on the next page.

Factors	Level I	Level II	Level III	Level IV	Level V
1. Alliance/Joint decision management and intelligence	Affiliates are used to generate additional website traffic.	Outsourcing is used to generate business benefits.	Major international collaborative projects, which can be with competitors.	Product swapping is used to speed up the time to market.	Form complex alliances to offer new product and service offerings.
2. Enterprise-wide change management	Make significant investment in digitization programme	Organisations realise that investment in people should keep pace with investment in technology.	Need to incorporate appropriate rewards systems	Respect and trust are key drivers of the change management programme.	Staff appreciate the value of learning and renewal throughout change management programme.
3. Organisational Learning	Intranet and E-mail used to distribute knowledge.	Stimulate two-way flow of knowledge.	Corporate portal used to develop “communities of practice.”	Formative stages knowledge sharing and renewal.	Creating a culture for knowledge sharing and renewal.
4. Process oriented agility	Recognise that in a digitised environment that profitability is a function of supply and demand.	Recognise that profitability can be enhanced if supply can be quickly adapted to changes in demand.	Develop better supply chains and information flows and the ability to aggregate scale.	Develop supply chain metrics that include flexibility and adaptability.	Develop innovative philosophy that seeks to ensure a favourable balance among organisation, quality and customer service.
5. Network centric information management	Tends to follow a differentiation policy with regards to technology.	Realise that interoperability can reduce uncertainty, risk and cost.	Realise that apart from usability, interoperability is probably the single most important topic in the glue that makes large distributed information projects work.	Attempts to implement a framework to monitor interoperability.	Balanced framework used to evaluate the effectiveness of network centric information management.
6. Leadership of transformation	Little change in leadership style	Attempt to lead staff on the digitization journey.	Leadership realise that digitization undermines traditional command and control management style.	Leadership seeks to fully integrate people, process, and technology toward achieving corporate goals and creating a sustainable competitive advantage.	Leadership allows individuals and organisations to thrive at the edge of complex environments, inspiring the innovation and creativity needed to develop new products and technologies.
7. Knowledge exchange meetings	Do not possess digitization infrastructure to support knowledge exchange.	Seeks to develop digitization infrastructure to support knowledge exchange.	Formulates and implements digitization infrastructure to support knowledge exchange.	Looks for digitization infrastructure commonality.	Seeks to keep abreast of industry standard for knowledge exchange.

Figure 3: Level of Network-enabled Capability and associated illustrative behavioural markers

Lessons learned

A number of issues associated with human factors, people and culture, were identified from the research as being the most important to address. Organisational and military research clearly shows that technology tends to be adopted by users for their own purposes and exactly how it is used is heavily influenced by the extant organisational culture (Proud, 1999; Symon, 2000a; Storr, 2002; Bradley, Strickland, Walker, and Wooddisse, 2002; McNally, 2000). Therefore it is important to understand and identify aspects of military organisational culture; in particular those parts that will need to change in tandem with the adoption of network technologies. Increasingly there is much evidence (some of which is of an anecdotal nature) to suggest a tendency for network technologies to be used in a manner that supports a centralised command concept (Christie, Blendell, Macklin, Phipps, and Shaw, 2004; Bradley *et al.*, 2002). This is not consistent with much of the current organisational or military research, which proposes the use of network technologies to support more decentralised and flexible modes of operation. To achieve effective organisational change it will be important to get genuine 'buy in' from the people involved in, and affected by, the change process; both the end-users of the new technology, and key organisational figures who lead on the necessary changes. They must understand what the changes mean and why they are necessary.

It is important that new technologies introduced into organisations are well-designed and that they actually support the users in conducting their day-to-day tasks more effectively, thereby genuinely contributing towards organisational goals. To achieve this attention to strategic goals, organisational processes and human factors approaches (e.g. user centred design) to system and technology design and implementation are necessary. End-users should be involved throughout the development of technology, its specification, design and testing. Expectation management is important; people's attitude to technology, their use of it and involvement in its implementation pays dividends in terms of willingness to use it effectively. Match investment in technology with investment in people. Successful technology implementations rely on more than getting the human-system interaction at the interface design level right. They include wider issues such as design of the task and overall work environment; ensuring that the appropriate training is given (and the correct staff are selected); and ensuring that appropriate organisational changes are put in place to optimise on the potential benefits offered by technological change (Wickens et al, 1998; Landauer, 1999). Training is important, because only when people really understand the technology, will they be able to get the maximum benefit from it, allowing the value of the investment to be realised. Organisations should not attempt to generate a set of rules for using the technology in a certain way as this might limit the potential novel uses of the technology, or development of new competencies that could potentially emerge from experimental use of the new technologies (Symon, 2000a). In a military environment, allowing war gaming and simulation with new technologies where this is the main aim of the exercise in a blame-free environment has the potential to stimulate this sort of creative use of new technologies. More attention is required to the people side of the process than the technological side of the process, otherwise new IT systems will fail (Phillips, Louvieris, Purvis, Kyriakidou and Gore, 2003).

Identify where the organisation is now and where the aim is for it to be in the future on each of the critical factors. Develop (or improve existing) capabilities in each of

the factors. In doing this, processes should be addressed as a key issue - variety and flexibility of processes. This will allow the organisation to address effectively the predicted variety of challenges thrown up by the environment, the requirements of particular operations, or the activities of adversaries. In particular, develop the ability to share and exploit knowledge, establishing a culture of organisational learning - including strong leadership of this change. This will involve identifying the processes by which knowledge is captured, shared, stored, disseminated and re-used in the organisation in day-to-day task context, improving them and where appropriate facilitating them with technological support. Get all staff genuinely involved and committed to this course of action.

Develop the capability to implement and manage change successfully as, in the information age, constant evolution is necessary to keep up with the fast pace of change (change in the environment, developments in technology and changes in the capabilities of adversaries). Leadership of organisational change is important - leaders need to take responsibility in six areas (Phillips and Louvieris, 2003):

Strategy:

- Develop a screening process to decide which processes should receive expenditure on support by network technologies
- Define the strategic role that network technologies play in the organisation and then determine the levels of funding needed to achieve these objectives
- Determine which network-enabled capabilities should be managed centrally and which should be managed at group/individual level

Strategy execution:

- Decide which features are crucial - is enhanced reliability or enhanced responsiveness more critical? Compare them on their costs and benefits
- The trade off between speed and risk must be incorporated into decision-making, decide what speed and what risks are acceptable. This depends on the context (in some situations risk is all-important, in some speed is more critical).
- Assign someone with responsibility for the organisation-wide initiative. More sophisticated organisations (e.g. Level V capability organisations) use metrics to monitor success of network technology initiatives/success of strategy implementation.

Conclusions

In the information age environment, the effective exploitation of knowledge can provide competitive advantage and sustain success. The findings of this research have important implications for the development of an appropriate learning infrastructure capability to support organisational effectiveness. Organisation-wide learning should be centred on *people* to allow knowledge to be disseminated and shared. This facilitates the development of new processes and capabilities throughout the organisation to help address the increasingly diverse challenges from the network-enabled environment. The introduction of network technologies, *in synchronisation with the appropriate organisational changes* will enable wider process changes whereby knowledge can be exploited to enhance organisational capability. Organisational change is an important capability for organisations in the network-enabled environment to allow them to adapt to new challenges, but organisational change of any type should be driven by strategic aims. Network technologies are an *enabler* of capability – supporting the organisational forms desired to meet specific

strategic aims. Organisational structures that exploit the relationship between knowledge and technology by enabling organisations to use knowledge to survive in dynamic competitive environments need to be flexible, adaptable ones yet with in-built reliability. This proposed solution to the organisation-environment interface addresses the strategic organisational goals of the military (providing broad operational spectrum capability through modularity and flexibility). Modular structures based around an elemental core will provide the adaptability and flexibility necessary for command and control in any specific situation.

Network information and communication technologies have allowed major changes to commercial organisations. The transformation experiences of a sample of best practice commercial organisations have been identified and applied to the military context to inform the MoD transformation to network-enabled operations. This work recommends that the focus of transformation to network-enabled operations should not be on technology *per se*, but on how it can optimally support the execution of organisational strategy, activities and processes. Research shows that the most important areas for network enablement are perceived as those connected with people, culture and processes, many of which are also currently the most poorly addressed by commercial organisations. Investment in people must match investment in technology for change to work. The way in which new technologies will actually be used will be heavily influenced by the existing command culture, both explicit and implicit. If the overall aim is to use network technologies to support a decentralised command concept, then organisation, culture and process change on a large scale is necessary to capitalise on the benefits offered by the technologies and result in the desired capability enhancement.

A number of lessons have been identified by reducing the data to critical factors of network-enabled organisations and examining the behaviours of successful organisations in these 7 areas. The proposed model demonstrates how the factors identified might influence organisational performance in a network-enabled environment. The work has also identified key areas for improvement and investment that organisations should address to maximise perceived organisational effectiveness in the network-enabled environment. The following recommendations were made:

- Organisations should focus on process before dealing with structures in the network-enabled environment.
- People-centred organisational learning and exploitation of knowledge are key to effectiveness in the network environment.
- Technologies have little impact on how decisions are actually made.
- Humans and processes are the limiting factor to decision tempo.
- Organisational change is a key capability in the network-enabled environment and needs transformational leaders to be effective.

The ability to adapt work processes and practices continually as a result of experiences and changes in the operational environment, is a key capability for success in the network-enabled environment. Change itself should be whole system change (co-evolution of culture, processes and technology) to cause change in processes and practices that will result in overall capability improvements in network centric operations.

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Appendix A – Hypothesised organisational variables (grouped under aspects of organisational framework)

Hypothesised organisational variables derived from literature review and interviews with best practice organisations	Example⁷
Structure	
Demand-based flexibility	Digital networks can enable organisational structures to be configured differently allowing increased flexibility to meet the demands placed upon them.
Strategic architecture	Network technologies have increased the use of outsourcing and complementary partnering/co-operation. This allows organisations to harness both new and existing capabilities in the creation of new sources of competitive advantage.
Process orientation	Network technologies provide an integrated information infrastructure that allows processes to be reorganised independent of organisational structures.
Managing relationships	A common, or compatible, network-enabled platform helps in the management of both external and internal relationships.
Leadership	
Leadership empowerment and idea synthesis	Network technologies can empower networks of leaders and facilitate the generation, and particularly the synthesis of, innovative ideas.
Leadership accountability	Leadership empowerment requires that all leaders are fully accountable taking responsibility for their actions.
Leadership advocacy	The best leaders are enthusiastic advocates of the business benefits that come from digitization and should be competent at convincing others of this.
Transformation champion	As with any culture change, senior management must be seen to be championing organisational transformation in network enabled environments.
People and culture	
Involvement and commitment	Successful planning and implementation of process and network redesign projects in network-enabled environments requires significant end-user involvement and commitment.
Respect and trust	Mutual respect and trust between stakeholders are essential to establishing an information sharing culture that underpins team-based learning and decision making effectiveness.
Learning and renewal	A culture of learning and renewal is necessary to the development of people's competencies in rapidly changing eBusiness environments.

⁷ As organisational variables were originally theorised at the start of the project.

Rapid customer responsiveness	Digitization can enhance a culture of rapid responsiveness to customers, which is key to organisational survival and growth.
Reward	Reward-based motivation is a key factor in stimulating sustainable achievement.
Coherence	
Common centralised services	Network-enabled centralisation through shared service units (SSUs) provides common, standardised, services across the organisation, e.g. product support.
Decentralised, differentiated services	Network-enabled process decentralisation allows the provision of differentiated services to geographically distributed markets, e.g. localised sales and customer service support
Standardisation and interoperability	Standardisation, by employing common digital communication and data tagging standards, is at the heart of establishing seamless (technical) interoperability and operational coherency.
Integrated information infrastructure	A common integrated information infrastructure is a critical aspect of coherent enterprise management.
Balanced Score Card measurement and performance evaluation	Digitization enables the synthesis of process data that act as input to a balanced scorecard system. This is the basis for coherent enterprise-wide measurement and performance evaluation.
Knowledge	
Knowledge sharing	Organisation-wide knowledge sharing is enhanced through digitization and must be seen to be shared.
Knowledge accessibility	A knowledge directory based upon a common business language is an important factor in making digital knowledge repositories accessible and navigable.
Knowledge exchange meetings	Network technologies are enabling the increasing use of electronically mediated meetings instead of face-to-face meetings for effective knowledge exchange across the organisation (providing increased opportunities for networking on a spontaneous and efficient basis).
Knowledge focus	Organisations need to focus their knowledge-sharing capabilities to achieve their business aims and objectives.
Knowledge development applications	Internet-based groupware tools are a key aspect of collaborative knowledge development and sharing.
Alliances	
Complexity and risk	E-Business alliances are increasing organisational complexity. It is therefore imperative to manage alliance risk in digitized complex collaborative organisational structures.
Alliance performance expectations	The roles and responsibilities of each partner, including performance expectations need to be clearly defined in the alliance contract.
Alliance respect and trust	Mutual respect and trust between alliance partners is essential to establishing an information sharing culture that underpins project team-based learning and joint decision making effectiveness in virtual environments.

Agility and Decision making	
Agility and decision edge	Agile decision making is required to respond to business need quickly in high velocity hyper-competitive eBusiness environments. Digitization enables the development of a decision edge based upon fast access communications
Market space awareness	Digitization enables the identification of new markets and facilitates quicker decision making to capitalise on the opportunities first.
Project management	Implementing eBusiness requires good project management to support decision-making. Digitization has an essential role in facilitating project control and ongoing evaluation.
Tempo/reliability trade off	Managing the trade off between operational tempo and decision reliability is an important aspect of successful eBusiness.
Matching speed and risk	Matching management decision making speed with business operational tempo and reducing risk is achieved by utilising intelligent decision support applications.
Intent realisation	Increased reliability in the communication, realisation and confirmation of (explicit) strategic intent is enhanced through digitization.

Appendix B - Rotated Principal Components Factor Analysis

	Component						
	1	2	3	4	5	6	7
S62a: ALLIANCE PERFORMANCE EXPECTATIONS	0.854						
S74a: TEMPO/RELIABILITY TRADE OFF	0.808						
S73a: PROJECT MANAGEMENT	0.796						
S63a: ALLIANCE RESPECT & TRUST	0.782						
S72a: MARKET SPACE AWARENESS:	0.746						
S71a: AGILITY & DECISION EDGE	0.746						
S75a: MATCHING ANALOGUE/DIGITAL SPEED & RISK	0.699						
S61a: COMPLEXITY & RISK	0.677						
S55a: KNOWLEDGE DEVELOPMENT APPLICATIONS	0.556						
S33a: LEARNING & RENEWAL		0.760					
S32a: RESPECT & TRUST		0.744					
S35a: REWARD		0.652					
S31a: INVOLVEMENT & COMMITMENT		0.602					
S41a: COMMON CENTRALISED SERVICES		0.571					
S42a: DECENTRALISED DIFFERENTIATED SERVICES		0.567					
S54a: KNOWLEDGE FOCUS			0.731				
S51a: KNOWLEDGE SHARING			0.723				
S52a: KNOWLEDGE ACCESSIBILITY			0.679				
S11a: DEMAND BASED FLEXIBILITY				0.750			
S14a: MANAGING RELATIONSHIPS				0.715			
S13a: PROCESS ORIENTATION				0.683			
S12a: STRATEGIC ARCHITECTURE				0.636			
S21a: DISTRIBUTED LEADERSHIP & INNOVATION				0.619			
S43a: STANDARDISATION & INTEROPERABILITY					0.740		
S45a: BSC MEASUREMENT AND PERFORMANCE EVALUATION					0.714		
S44a: INTEGRATED INFORMATION INFRASTRUCTURE					0.626		
S23a: LEADERSHIP ADVOCACY						0.667	
S24a: TRANSFORMATION CHAMPION						0.594	
S76a: INTENT REALISATION						-0.517	
S53a: KNOWLEDGE EXCHANGE MEETINGS							0.624

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 7 iterations.

Eigenvalues	6.15	3.89	3.11	2.86	2.44	2.04	1.40
% of Variance	19.22	12.17	9.72	8.95	7.63	6.39	4.39
Cumulative %	19.22	31.39	41.11	50.06	57.69	64.08	68.47
Overall Alpha Score	0.93						
Individual Factor Alpha Score	0.92	0.84	0.84	0.85	0.77	0.79	

KEY:
 Component 1: Alliance/Joint Decision Management & Intelligence
 Component 2: Enterprise-Wide Change Management
 Component 3: Organisational Learning
 Component 4: Process Oriented Agility
 Component 5: Network Centric Information Management
 Component 6: Leadership of Transformation
 Component 7: Knowledge Exchange Meetings

Appendix C - Means data and standard deviations for *importance* ratings

Variable	Mean	N	Std. Deviation	Std. Error Mean
S11a: DEMAND BASED FLEXIBILITY	3.65	92	1.06	0.11
S12a: STRATEGIC ARCHITECTURE	3.04	93	1.12	0.12
S13a: PROCESS ORIENTATION	3.26	93	1.11	0.11
S14a: MANAGING RELATIONSHIPS	3.65	93	1.10	0.11
S21a: LEADERSHIP EMPOWERMENT & IDEA SYNTHESIS	3.01	93	1.03	0.11
S22a: LEADERSHIP ACCOUNTABILITY	4.02	93	1.15	0.12
S23a: LEADERSHIP ADVOCACY	3.83	93	1.23	0.13
S24a: TRANSFORMATION CHAMPION	4.29	93	1.04	0.11
S31a: INVOLVEMENT & COMMITMENT	4.27	93	0.97	0.10
S32a: RESPECT & TRUST	4.11	93	1.07	0.11
S33a: LEARNING & RENEWAL	4.17	92	1.10	0.11
S34a: RAPID CUSTOMER RESPONSIVENESS	3.91	93	1.24	0.13
S35a: REWARD	3.46	93	1.28	0.13
S41a: COMMON CENTRALISED SERVICES	3.63	93	1.33	0.14
S42a: DECENTRALISED DIFFERENTIATED SERVICES	3.30	93	1.33	0.14
S43a: STANDARDISATION & INTEROPERABILITY	3.86	93	1.40	0.14
S44a: INTEGRATED INFORMATION INFRASTRUCTURE	3.96	93	1.19	0.12
S45a: BSC MEASUREMENT AND PERFORMANCE EVALUATION	3.12	93	1.54	0.16
S51a: KNOWLEDGE SHARING	3.98	92	1.10	0.11
S52a: KNOWLEDGE ACCESSIBILITY	3.56	93	1.18	0.12
S53a: KNOWLEDGE EXCHANGE MEETINGS	2.90	93	1.29	0.13
S54a: KNOWLEDGE FOCUS	3.80	93	1.04	0.11
S55a: KNOWLEDGE DEVELOPMENT APPLICATIONS	3.38	93	1.43	0.15
S61a: COMPLEXITY & RISK	3.51	93	1.51	0.16
S62a: ALLIANCE PERFORMANCE EXPECTATIONS	4.11	93	1.16	0.12
S63a: ALLIANCE RESPECT & TRUST	3.98	93	1.32	0.14
S71a: AGILITY & DECISION EDGE	3.76	93	1.23	0.13
S72a: MARKET SPACE AWARENESS:	3.14	93	1.47	0.15
S73a: PROJECT MANAGEMENT	3.77	93	1.20	0.12
S74a: TEMPO/RELIABILITY TRADE OFF	3.57	93	1.20	0.12
S75a: MATCHING AND SPEED & RISK	3.21	93	1.31	0.14
S76a: INTENT REALISATION	3.38	93	1.33	0.14

Appendix D - Means data and standard deviations for *achievement* ratings

Variable	Mean	N	Std. Deviation	Std. Error Mean
S11b: DEMAND BASED FLEXIBILITY	2.98	92	1.02	0.11
S12b: STRATEGIC ARCHITECTURE	2.65	93	1.08	0.11
S13b: PROCESS ORIENTATION	2.67	93	1.03	0.11
S14b: MANAGING RELATIONSHIPS	2.83	93	1.00	0.10
S21b: LEADERSHIP EMPOWERMENT & IDEA SYNTHESIS	2.59	93	1.01	0.10
S22b: LEADERSHIP ACCOUNTABILITY	3.27	93	1.15	0.12
S23b: LEADERSHIP ADVOCACY	3.05	93	1.29	0.13
S24b: TRANSFORMATION CHAMPION	3.22	93	1.12	0.12
S31b: INVOLVEMENT & COMMITMENT	3.27	93	1.15	0.12
S32b: RESPECT & TRUST	3.19	93	1.10	0.11
S33b: LEARNING & RENEWAL	3.15	92	1.10	0.11
S34b: RAPID CUSTOMER RESPONSIVENESS	3.11	93	1.20	0.12
S35b: REWARD	3.00	93	1.18	0.12
S41b: COMMON CENTRALISED SERVICES	2.99	93	1.34	0.14
S42b: DECENTRALISED DIFFERENTIATED SERVICES	2.78	93	1.38	0.14
S43b: STANDARDISATION & INTEROPERABILITY	2.84	93	1.53	0.16
S44b: INTEGRATED INFORMATION INFRASTRUCTURE	3.12	93	1.26	0.13
S45b: BSC MEASUREMENT AND PERFORMANCE EVALUATION	2.50	93	1.61	0.17
S51b: KNOWLEDGE SHARING	2.98	92	1.16	0.12
S52b: KNOWLEDGE ACCESSIBILITY	2.70	93	1.16	0.12
S53b: KNOWLEDGE EXCHANGE MEETINGS	2.70	93	1.32	0.14
S54b: KNOWLEDGE FOCUS	2.95	93	1.09	0.11
S55b: KNOWLEDGE DEVELOPMENT APPLICATIONS	2.78	93	1.53	0.16
S61b: COMPLEXITY & RISK	2.80	93	1.63	0.17
S62b: ALLIANCE PERFORMANCE EXPECTATIONS	3.09	93	1.40	0.14
S63b: ALLIANCE RESPECT & TRUST	3.00	93	1.48	0.15
S71b: AGILITY & DECISION EDGE	2.79	93	1.33	0.14
S72b: MARKET SPACE AWARENESS:	2.51	93	1.54	0.16
S73b: PROJECT MANAGEMENT	3.06	93	1.28	0.13
S74b: TEMPO/RELIABILITY TRADE OFF	2.91	93	1.29	0.13
S75b: MATCHING AND SPEED & RISK	2.59	93	1.36	0.14
S76b: INTENT REALISATION	2.79	93	1.32	0.14

Appendix E - Summated scale means for *importance* ratings across the sample for each identified factor

Mean <i>importance</i> ratings (summated scale means)							
MIR1	MIR2	MIR3	MIR4	MIR5	MIR6	MIR7	SSDI
32.43	22.93	11.34	16.60	10.94	8.12	2.90	100%

Averaged mean <i>importance</i> ratings (Average of summated scale means)							
AMIR1	AMIR2	AMIR3	AMIR4	AMIR5	AMIR6	AMIR7	SSDI
3.60	3.82	3.78	3.32	3.65	4.06	2.90	100%

Summated scale means for *achievement* ratings across the sample for each identified factor

Mean <i>achievement</i> ratings (summated scale means)							
MAR1	MAR2	MAR3	MAR4	MAR5	MAR6	MAR7	SSDI
25.52	18.37	8.63	13.71	8.46	6.28	2.70	80%

Averaged mean <i>achievement</i> ratings (Average of summated scale means)							
AMAR1	AMAR2	AMAR3	AMAR4	AMAR5	AMAR6	AMAR7	SSDI
2.84	3.06	2.88	2.74	2.82	3.14	2.70	80%