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THE RELATIONSHIP BETWEEN IS STRATEGIC PLANNING AND ENTERPRISE ARCHITECTURAL PRACTICE: CASE STUDIES IN NEW ZEALAND ENTERPRISES

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Abstract

Modern businesses face increased levels of competitive pressure, and the IT sector is going through a period of rapid change. The past two decades have seen a steady evolution of approaches to planning and managing IT services. Two approaches that have emerged in different eras are IS Strategic Planning (ISSP) and Enterprise Architectural Practice (EAP). Despite the apparent similarities between these two approaches, neither IS researchers, nor practitioners, have explored the relationship in any depth.

This paper investigates the relationship between ISSP and EAP, utilising results from case studies conducted in New Zealand (NZ) enterprises. It concludes that there is a significant overlap between these two activities, and suggests a framework for combining them. The paper also investigates some collateral findings relating to the low incidence of IS strategic planning in small/medium enterprises (SMEs).

Keywords: IS strategy, enterprise architecture

1   INTRODUCTION

Modern businesses face increased levels of competitive pressure, and the following factors will influence the nature and duration of current and future strategic planning (Wagner 2004):

- Shorter planning and implementation cycles.

- Frequent and rapid environmental changes, possibly with discontinuities.

- Organization units that extend beyond a single company, such as supply chains or virtual organizations.

In addition, the IT sector is going through a period of rapid change, and the rate of change is expected to at least remain steady, if not accelerate. Many commentators regard rate of change as a key issue in the sector (e.g. CCTA 1999 11). These pressures have resulted in a need for new approaches to planning and managing IT services.

Within the corporate world and, to a certain extent, government organisations, ISSP was pre-eminent during the 1980s and 1990s. In the latter half of the 1990s, EAP became prominent in the US Department of Defense; a trend which has flowed on to the government and commercial sectors. Some similarities between ISSP and EAP are apparent.

This research project examines the relationship between ISSP and EAP. An empirical comparison, based on a survey of NZ organisations, was conducted during 2005-2006 (Wilton 2007). This

demonstrated that there are strong similarities between the two activities, and that there are, indeed, opportunities to rationalise the two activities: to eliminate duplication of effort and to develop an improved IT planning methodology based on "best-of-breed" methods from both.

The case studies phase of the project was an attempt to triangulate the results of, and further investigate some unexpected results arising from, the survey phase.

2 THEORETICAL UNDERPINNINGS

2.1 ISSP

In discussing IT strategic planning, it is important to distinguish between *strategic information systems planning* (SISP) and strategic planning for *all* information systems (ISSP), terms often used interchangeably in the literature. The latter term, referring to the strategic planning of an enterprise's entire IT resources, is the term used in this paper. This is consistent with the terminology used by Fitzgerald (1993) and Cerpa and Verner (1998).

The Central Computer and Telecommunications Agency (CCTA[1]) of the UK Treasury denotes the following concerns of ISSP: (CCTA 1988)

- Understanding the aims and objectives of the business,

- Establishing the information requirements of the business,

- Outlining the systems to provide the information, and determining the role of technology in supporting the information systems,

- Agreeing policies and plans to develop and implement the information systems,

- Determining the role and use of resources to achieve the information systems required, and

- Managing, reviewing and evolving the strategy.

There are numerous techniques, or *methods* that have been used for ISSP, including Critical Success Factors (CSF) (Rockart 1979), Business Systems Planning (BSP) (Wiseman 1988), Porter's Competitive Forces Model (Porter 1980), Porter's Value Chain (Porter 1985), and Scenarios (Schwartz 1991). Methods can be grouped together to constitute a *methodology*. Methodologies used for ISSP include those of the CCTA (1988, 1999) and Boar (2001).

Many IT vendors and consultancy organizations use proprietary methods and/or methodologies, some of which are adaptations of open source approaches. Examples are Arthur Andersen's *Method/1* and Coopers and Lybrand's *Summit* (Lederer and Sethi 1988, Min et al. 1999). It is also well known that organizations often develop their own in-house methodologies, often based on open or proprietary methods or approaches (Earl 1993, Lederer and Sethi 1988).

One open source methodology that has been successfully used for IT strategic planning in the government sectors of Australia, UK and NZ is that of the UK government CCTA (1988, 1999). The basic mechanism is a sequence of actions, grouped into the common-sense phases of:

- Where are we now?

- Where do we want to be?

- How do we get there?

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[1] The CCTA is responsible for formulating IT policy, procedures and methodologies for all UK government departments. More recently known as the UK Office of Government Commerce OGC).

The steps include a detailed inventory and cost model of existing systems, a study of business goals and objectives, and a scan of the environment in which the business will operate. Senior management define a vision of where they envisage the organisation will be at the end of the time "window[2]" of the study, both from a business and IT perspective. Options for the provision of systems and services are defined, which are evaluated by a high level steering committee, who decide on the (or a small number of) option(s) to be costed and developed in detail into a strategic plan. The options could include outsourcing, or other innovative approaches to service provision.

The only concrete deliverables defined by CCTA (1988) are a strategy statement and associated management and technical policies (p. 26).. There are normally no detailed migration plans produced as part of the strategy. These are produced as "tactical plans", after the strategy is approved by senior management. CCTA (1999 Annexes A-E) provides more detail; a more comprehensive list of sample deliverables, examples of brief and detailed business cases for programs resulting from the strategy, and an example of the structure of a strategy statement.

In summary, the main strength of the CCTA (or similar) strategic planning methodology is that it gives a methodical, business-driven approach to selecting, funding, operating and managing IT systems. The production of a comprehensive, top-down IT strategic plan represents a low risk approach to any organisation's requirement to manage its IT infrastructure. The existence of a comprehensive strategic plan will allow the organisation to make informed "what if" decisions, such as evaluating the benefits of outsourcing all or part of its IT infrastructure.

2.2   Enterprise Architectural Practice (EAP)

Many approaches to ISSP include *IS/IT architecture* as a deliverable of the process (e.g. O'Brien 2004, CCTA 1999). However, the scope of "architecture" envisaged in EAP is somewhat more significant – it actually subsumes many of the steps inherent in ISSP.

EAP first became prominent in US government circles. Frameworks include those developed by the US Department of the Treasury (2000) and US Department of Defense (DoD) (1997, 2003). The US Army has developed an extension of the DoD framework, that is described in a separate document (U.S. Army 1998). Non-government approaches to EAP also exist; e.g. those developed by Zachman (1987), and The Open Group (2003).

The underlying purpose of EAP is as follows:

> "Architectures are developed to portray the evolution of an IT environment over various points in time, beginning with the baseline, or current situation. … The architecture envisioned to meet all operational and business requirements is the objective architecture. Migration documents show the progression of architectures from baseline to objective …" (U.S. DoD 1997 1-2)

A complementary view of the purpose of EAP is as follows:

> "Enterprise architecture is a far-reaching concept that comprises the vision, principles and standards that govern the acquisition and deployment of technology. As such, it provides the foundation for detailed data, application and network architectures. An enterprise IT architecture is a key component of a mature IS organisation that enables alignment of business goals, consistent processes and best practice in software reuse." (Cecere 1998)

The US DoD framework describes the process of defining an EA in terms of the deliverables; that is, the steps to be undertaken to produce the various elements of the operational, systems and technical architectures. It does not describe in any detail the underlying rationale, or analysis that should be undertaken to produce the various deliverables:

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[2] Due to the volatility of both the business and IT environments, a window of 3-5 years is fairly typical in a commercial organisation

> "The situation is further complicated because the framework does not provide a process for generating the products. Thus, an organization developing an architecture that is compliant with the C4ISR Framework could be faced with an unbounded amount of effort." (Barbacci and Wood 1999)

The opening paragraph of the C4ISR AF (U.S. DoD 1997) states that: "the application of the Framework will enable architectures to contribute most effectively to building … cost effective military systems" (p. 1-1). However, there is no elaboration of this statement into the development of a business case, or costed options, as is integral to CCTA. There is also no indication in C4ISR AF of any specific time window on which the objective architecture should be based. With rapid advances in technology, it may not be possible to specify a firm objective architecture more than 3-5 years ahead.

2.3   Theoretical Comparison of ISSP and EAP

A theoretical comparison of ISSP and EAP was conducted as part of a literature review, and the results reported by Wilton (2007). The high-level intent of the two approaches is very nearly identical, and the general scope and factors considered during the respective processes are very similar. However, the major difference is that ISSP tends to be process-oriented, with relatively little specification of the deliverables, whereas EAP is rather the opposite. US DoD EA practice (as espoused in U.S. DoD 1997, U.S. DoD 2003) does not attempt to define any business processes or models which could be used to derive cost-effective objective architectures. The use of ISSP methods could remedy this shortfall.

The similarities between ISSP and EAP are reinforced by Beveridge and Perks (2003 12-13) who state:

> "In many ways there is synergy between the Enterprise IT architecture and the concepts that embodies … ISSP. Both provide a medium- to long-term vision and framework within which the IT environment is implemented, including people, structure and technologies. Both the ISSP and enterprise architecture provide guidelines for systems to be implemented, technologies to be considered, and information to be gained."

3   EMPIRICAL COMPARISON OF ISSP AND EAP

During 2005-6, a survey was conducted of NZ organisations, based on a research model that is included at Annex A. This shows the variables, and anticipated relationships between them – most of these are considered to be self-explanatory and will not be further elaborated on. The main results and conclusions were as follows (Wilton 2007).

3.1   Key Results

All large organisations who responded have an ISSP or one under development, whereas only 87% of large organisations either have an EA (or one under development). A minority (20%) of small or medium organisations have an ISSP (or one under development) and only 17% have an EA (or one under development). The low proportion of SMEs (20%) that have either an ISSP or EA, and the fact that around 97% of NZ enterprises are SMEs is noteworthy (N.Z. Ministry of Economic Development 2005).

One of the major goals of this research was to determine the relationship between ISSP and EAP. One of the key indicators of this was a hypothesis that there is overlap between topics covered in IS strategic plans and enterprise architectures.

The results of a Spearman bivariate correlation test produced a correlation coefficient of 0.447, indicating significant correlation at the 0.05 level (two-tailed). Therefore, the hypothesis is demonstrated to be correct.

Another indicator of the close relationship between ISSP and EA is a comparison of the ranked lists of objectives for both activities. These are as follows.

Key objectives - ISSP	Key objectives - EA
1. Align IT with business needs.	1. Align IT with business needs.
2. Forecast IT requirements.	2. Establish technology path and policies.
3. Gain senior management commitment.	3. Forecast IT requirements.
4. Establish technology path and policies.	4. Gain senior management commitment.
5. Seek competitive advantage from IT.	5. Seek competitive advantage from IT.
6. Revamp the IT function.	6. Revamp the IT function.
7. Other reasons	7. Other reasons

Table 1. Key objectives for ISSP and EA (in priority order)

The primary objective is identical for both activities, but there is some variation in the 2nd, 3rd and 4th objectives (in particular, *establish technology path and policies* is ranked 2nd in EA, but 4th in ISSP). Apart from this variation, the lists are identical.

The considerable overlap between the objectives and contents of ISSP and EA suggests that there may be confusion about the role and scope of both activities, and this could lead to a risk of duplication of effort and resources. One possible solution is to combine them into a (conceptually) single activity. This would not preclude an approach where different deliverables are produced in successive phases.

3.2 Key Conclusions

Theoretical and empirical comparisons of ISSP and EAP indicate a strong correlation between these two activities. Organisations that undertake both, as separate activities, incur a risk of overlap, duplication of resources and possible difficulty in obtaining management commitment for both. There is the potential for development of a comprehensive methodology which combines best-of-breed methods from both disciplines. The research conducted in this area to date, has also produced some other significant results, such as the very low incidence of IS strategic plans and/or enterprise architectures in SMEs in NZ. In view of the fact that approximately 97% of NZ enterprises are SMEs, this may indicate that a significant number of organisations may not be realising the potential advantages that modern IT offers.

4 CASE STUDY PHASE

Mingers (2001 244) outlines the following benefits of *multi-method* approaches:

- Triangulation – helping to validate data and results by combining a range of data sources and observers,

- Creativity – discovering fresh or paradoxical factors that stimulate further work (or create fresh views of previous work) and

- Expansion – widening the scope of the study to take in wider aspects of the real-world situation.

The case study phase was undertaken to triangulate results obtained from the survey phase, and to explore unexpected findings and expansion opportunities that arose from the survey. This constitutes a multi-method approach to IS research, in terms of Mingers' criteria outlined in the preceding paragraph.

4.1 Research Design

The issues on which further information was required were grouped as subsets of the main research questions, as follows:

1. From both theoretical and empirical views, what is the relationship between ISSP and EAP? (e.g. unrelated, partially overlapping, synonymous).

    a. All large enterprises had an IS strategic plan and most had enterprise architectures (or had these under development). Theoretical and empirical comparisons reveal a large degree of overlap between these documents. What is the rationale for having both, and is there scope for combining these activities?

    b. For SMEs, what factors impact on the very low incidence of IS strategic plans and even lower incidence of enterprise architectures? For example: how critical is IT perceived to be to business success, the presence or absence of IT-trained staff, owner/manager IT awareness and knowledge, the complexity of the systems deployed.

2. To what extent are different ISSP and EAP methods used in NZ, how successful are they, and how have the methods used and success levels varied over time?

    a. For those organisations that had an IS strategic plan and/or enterprise architecture, a wide variety of methods were reported, including proprietary and in-house (a significant finding was that 67% of those organisations with an enterprise architecture used in-house frameworks). What criteria were used in selecting a methodology and/or framework?

3. Are the methods used and success obtained related to organisational factors? (e.g. organisation type, size, level of IT maturity, level of management commitment, allocation of adequate resources).

    There were no issues arising from the survey that impact on this research question, and it will not be addressed any further during the case study phase.

4. Could ISSP and EAP methods be combined to produce an improved IS planning methodology?

    a. What would be the essential and desirable characteristics of a methodology that embraced both ISSP and EA? (It is postulated that these are likely to be significantly different for SMEs and large organisations.)

    b. What is the feasibility of a "DIY" methodology for SMEs? (i.e. one that could be carried out by owners or business staff without in-depth IT knowledge).

According to Pare (2004 241): "when adopting a multiple-case design, a question many researchers encounter is related to the number of cases deemed necessary or sufficient for their study. … Ideally, researchers would stop adding cases when theoretical saturation is reached. … in its simplest form, a multiple-case design would consider two or more cases that are believed to be literal replications …"

Therefore, the study sampling strategy was to select as small a number of organisations as possible, while still allowing for comparison and differentiation. The study sample was selected as follows:

- One large government department with an IS strategic plan and EA,

- One large commercial firm with an IS strategic plan and EA,

- One SME with an IS strategic plan,

- One SME without an IS strategic plan.

Case study interviews were conducted during the first half of 2007, results transcribed and analysed using the qualitative research application Nvivo for Windows version 7. Findings are outlined below.

4.2 Case Study Findings

4.2.1 The Relationship between ISSP and EA

In the case studies phase, this issue was addressed by a question relating to whether organizations saw any overlap, and the potential for combining these activities. In both large organizations, which had an ISSP and EA (or one under development) the respondents acknowledged the overlap and the potential for combining the two activities.

The large enterprise (government department) response included:

> *Yes I would tend to agree that there is overlap between the two activities. … I can see some advantages of combining them.*

The other large enterprise has already moved towards combination:

> Large Enterprise – financial sector:

> *Q: So your organisation regards these two activities* [ISSP and EA] *largely as combined; at least conceptually? Any additional comments?*

> *A: Yes, conceptually combined, and orchestrated by a central team to ensure both align.*

Results from the survey tended to indicate that IS strategic planning is still regarded as a more critical activity than EA development. There was no indication, from the survey results, that any organisation regards EA development as a fundamental IT planning activity that supersedes ISSP. However, the LE - finsec case tends to indicate that that organization regards EA as a more fundamental process, as both ISSP and EA are "… orchestrated from the central EA team."

The case study findings include a list of required characteristics of a methodology that combines ISSP and EA:

- Must have adequate functionality; i.e. cover all required planning steps and functions and be well proven to work in practice.

- The process and the outputs easily understandable, by both business and technical staff.

- Flexible; that is, able to be tailored to the requirements of different organisations.

- Quick, and simple to use.

- Incorporate senior management guidance and steerage throughout the process. This assists with gaining senior management "buy-in" to the strategy eventually produced.

- Does not require a large amount of resources; particularly in terms of funding and people's time.

These are consistent with the characteristics of the business environment espoused by Wagner (2004) as outlined in Section 1 above - in particular the need for flexibility and agility.

In summary, the case studies support the survey findings, that there is significant overlap between the ISSP and EA processes and outputs. The case studies have also found that large organisations would support combining them, and provided a list of required characteristics of a combined approach.

4.2.2   ISSP and EA in SMEs

The survey results indicate that a low proportion of NZ SMEs (of the order of 20%) have either an ISSP or EA, and noted the fact that around 97% of NZ enterprises are SMEs. The reasons for this, as determined by the survey, were at a high level of abstraction, and were as follows (in priority order):

1.   Lack of awareness of the need.

2.   Low benefit/cost ratio.

3.   Insufficient management commitment.

The survey results tended to suggest there may be a relationship between the existence of an ISSP and the presence of in-house IT staff. *In-house staff* could even be an intermediate variable between *organisational size* and *ISSP* and *EA*. The case studies afforded an opportunity to explore the reasons for the low incidence of ISSP and EA in SMEs in greater depth. Several alternative explanations were explored, and the findings were as follows:

• Criticality of IT to business success.

• Presence or absence of IT-trained staff.

• Owner/manager IT awareness and knowledge.

• Complexity of the systems deployed.

(None of the above was found to be a significant factor.)

• Business motivation (i.e. the owner's motivation to expand the business). This factor was not originally considered as an alternative, but emerged as a possibility during one of the interviews. From evidence presented, this could well be a reason why some SMEs have no IS strategy.

The owner of one SME alluded to the reason he isn't concerned with trying to expand the business by using IT (or any other business driver) – he does not have the motivation to do so. This individual had spent a substantial portion of his career as a business consultant, and had observed a similar lack of motivation in other SMEs. Supporting comments were as follows:

> SME - executive travel:
>
> *Most of them* [SME owners] *are going to work on a wage basis – they make good money but this is just a good wage. Few actually take a strategic view and say "OK, I am going to compete on this basis and this is where I am going to be different from my opposition".*
>
> *At the end of the day it comes down to they will be asking themselves two fundamental questions:*
>
> *1.   Will this* [an IT strategy] *make me more money?*
>
> *2.   What is the price to me personally in terms of my life style … Unfortunately increased activity means increased people and with increased people you increase your problems and whereas you can get good information and valuable information from an IS perspective, people have actually got to be prepared to take on the people problem first.*

The above statement suggests that an SME owner's business motivation may influence whether or not they pursue IT (or any other source of potential competitive advantage) to expand their business. They may not actually want increased management overheads and possible lifestyle detractors (such as stress) arising from expansion. This is likely to influence whether they have an ISSP or EA.

By themselves, neither the survey nor the case studies provided explicit, in-depth reasons why the incidence of ISSP and EA is so low in NZ organisations. However, combining the findings from the survey and case studies suggest that the reasons can be categorised as follows:

Reason for low incidence of ISSP and/or EA in SMEs:	Indicators:
Lack of awareness of the need (or desirability)	Survey: "Lack of awareness of the need" - rated #1
Lack of business motivation	Survey: "Low benefit/cost ratio" and "Insufficient management commitment." - rated # 2 and #3 Case study: "…making the business grow is not conducive to leading it. Growth means taking on more staff with all the attendant management problems"

Table 2 Reasons for low incidence of ISSP and/or EA in SMEs

As most of the literature in this area emanates from countries where an "SME" equates to a large enterprise in NZ, it is difficult to compare the NZ situation with others. For example, the European Commission definition of "micro" (0-9 employees) encompasses the NZ "small" range (0-4) and nearly half the "medium" range (5-19). Levy et all (1999) report findings of ISSP research conducted in SMEs in the UK, and the smallest firm in the pilot study had 24 employees – considered "large" in the NZ context. According to Levy et al (1999 64): "…few SMEs plan their IS … the limited planning that is undertaken tends to focus on operational systems to improve efficiency and effectiveness, and there is little concern with competitiveness." The findings of these case studies, in the NZ SME context, support this contention, but go further in that they provide insight into the reason(s) why, and suggest possible remedies.

As a result of the survey, it was postulated that the development of a simple, short-duration IS planning methodology that the owners or managers could conduct themselves (a "DIY" approach) could improve the incidence of ISSP or EA in SMEs. This would alleviate the need for costly consultancy services to develop an IS strategy. The case studies canvassed this idea, and found support - one SME and one large enterprise thought it was a good idea; the other SME expressed support in principle, but had reservations about whether most SMEs had sufficient business motivation.

A list of required characteristics for a DIY IT planning approach for SMEs was elicited, and is as follows:

- Be proven to work in practice.

- Able to be performed by a person (or a small number of people) with limited or no IT knowledge.

- Be able to be performed quickly (e.g. over a weekend).

- Include the ability to plan the application of resources in an effective, but efficient, manner.

5   CONCLUSIONS

The findings of the case study phase support the conclusions from the survey, and also address other opportunities and issues that became apparent. These include an analysis of the possible reasons for the low incidence of ISSP and/or EA in SMEs. Key conclusions support those arising from the survey, which were:

- There is considerable overlap between the activities inherent in ISSP and EAP, and there is strong potential for development of a methodology that combines both processes.

- Within the NZ context, SMEs have a low incidence of IS strategic planning and/or enterprise architectures, and there is potential for development of a "DIY" methodology which fills this gap.

Sets of critical requirements for both types of methodology (for large enterprises and SMEs) were also determined.

6   FUTURE WORK

It is considered that the development and testing of a methodology that combines ISSP and EAP, suitable for large enterprises, is outside the scope of this particular project. This is because a considerable amount of time and effort has already been spent on addressing the feasibility, and it is known that a comprehensive IS strategy study and plan can take of the order of six months in a large enterprise (Wilton 2001). The next phase of the project will therefore focus on the development and testing of a "DIY" IS strategic planning methodology for SMEs. Development of an improved methodology for large enterprises will be undertaken as future work.

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Annex A (adapted from Turban and Aronson 1998)

Influence Diagram – ISSP and EAP

(Adapted from Turban and Aronson, 1998)

Year V1

(Galliers, 1993,
Gupta, 2004)

Organisation
Size (small,
medium,
large) V2

(Levy et al 1999,
Premkumar and
King, 1994)

Organisation
Type V3

(Newkirk et al, 2003,
Kearns and Lederer, 2004,
Premkumar and King, 1994)

IS Maturity
V4

(Nolan and Gibson, 1974,
Galliers, 1991,
Cerpa and Verner, 1998)

ISSP Methods and
Methodologies V5

Success?
V7

(Lederer and Sethi,
1992, Earl 1993, Premkumar
and King, 1994)

Resources V13

(Fitzgerald, 1993,
Segars and Grover, 1998,
Doherty et al, 1999,
Newkirk et al, 2003
Wang and Tai, 2003)

IS Strategic Plan V9

Enterprise
Architecture V10

Realised
Enterprise Info
Management
Infrastructure
V15

(Chan et al,
1997b)

Management
Commitment
V14

(Lederer and Sethi,
1992, Earl, 1993)

Enterprise
Architecture
Framework(s) V6

Key:

☐ Decision variable	◯ Fixed variable

⬭ Intermediate or final
outcome variable

⬚ Random (risk) variable

→ Certainty

⇢ Uncertainty