
Making sense of enterprise systems implementation

By Dennis Viehland and Maha Shakir

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Enterprise systems implementation choices are some of the most critical IT decisions an organisation encounters. In New Zealand organisations, is this an anarchical or political process, as sometimes portrayed in the media?



Damien Kurth, Umbrella, 2004, oil on canvas. Elam School of Fine Arts

Enterprise system (ES)¹ implementations are big bikkies. According to a recent survey, New Zealand organisations spent almost \$800 million dollars on ES expenditures in 2002.² However, this is just the tip of the iceberg. Failure in ES implementation leads to both short-term losses in money and effort and long-term losses in cost savings and missed business opportunities. With this much at stake, businesses and government agencies implementing enterprise systems, principally enterprise resource planning (ERP) applications, want to be sure the process is done right and with successful outcomes.

Despite the big costs and potential for even bigger benefits, internationally there has been relatively little research that examines ES implementation at the strategic decision-making process level, and none in New Zealand. When we began our research in 2000 we were determined to get beyond the theoretical frameworks and generally prescriptive decision-making models to discover what actually happens “at the coalface” of ES implementation. In this article, we report our findings back to the New Zealand business community.

ES background

The first generation of ES applications were in inventory control software (1950s), material requirement planning (1960s), manufacturing resource planning (1970s) and computer integrated manufacturing (1980s). As their names imply, these earlier software applications focused on improving manufacturing

operations. Second generation ERP applications applied this emphasis on resource tracking and efficient operations to other functional areas, principally finance, marketing, sales and human resources.³

First-mover advantage in the early 1990s belonged to SAP, but soon other “first tier” competitors emerged, such as J.D. Edwards, Baan, PeopleSoft and Oracle. In the late 1990s, with ES implementations in most large corporations already complete, ES vendors moved into “interorganisational ES”, introduced customisable modules to appeal to small and medium-sized enterprises (SME) and expanded modules and functionality into customer relationship management, supply chain management and data warehousing.⁴

Another recent development is Microsoft’s entry into the market with its takeover of Great Plains in 2001.⁵ Microsoft’s suite of ES business solutions now includes Great Plains, Navision, Axapta and Solomon. Additionally, in response to increasing SME demand for ES benefits, second and third tier ES vendors emerged, including New Zealand-based ES companies such as Exonet and Accredo. In the last two years, there has been a shake out of the first tier with PeopleSoft purchasing J.D. Edwards and then Oracle purchasing PeopleSoft.

Throughout this evolution, enterprise systems have served a variety of purposes — to connect disparate information systems after mergers and acquisitions, to upgrade inadequate IT infrastructure and, in the late 1990s, to solve the Y2K problem. Today the drivers behind ES implementation are most likely to focus on maximising strategic flexibility⁶ and improving business operations by reducing operational costs, enabling business integration, supporting customer responsiveness, improving data visibility and making better business decisions.⁷ For these reasons, enterprise systems remain a vital part of the New Zealand business scene.

ES implementation

ES implementation is a complex and dynamic process, one that involves a mix of technological and organisational interactions.

First, ES implementation should never be something that is left to be done by the IT department. “Because ERP systems are designed for the enterprise, an ERP implementation requires many enterprise decisions.”⁸ Thus representatives from finance, manufacturing, marketing, and human resources must be included, as well as extensive senior management involvement and decision making.

Second, because of the dynamic nature of ES implementation, decisions cannot be structured and need to be revised and reformulated with the progress of implementation. Furthermore, once enacted, strategic ES decisions tend to be irreversible and inter-dependent. In this respect “both ERP and concrete are easy to mould when first put in, but nearly impossible to change.”⁹

Third, ES implementation is never an intra-organisational exercise. Hardware and software vendors will certainly be involved, and one or more evaluation and/or implementation partners may act as consultants for application selection, package implementation, or business process reengineering. The mix of individuals and groups from inside as well as outside the organisation adds to the complexity of ES implementation.

Case study #1: J.D. Edwards implementation at DistCo

DistCo (Distribution Company) is a medium-sized (300 employees) business that distributes products from suppliers to thousands of retail stores throughout New Zealand (i.e., an intermediary business model).

DistCo’s profit is largely determined by its effectiveness in allocations – the degree to which it can increase sales while minimising returns (the product has a limited shelf life). Logistics management – efficiently collecting products from suppliers and getting them to retail shelves – is another key business process.

DistCo’s implementation was a new implementation. Prior to the implementation of the ERP, financial software from the 1980s was in place, with three full-time programmers to make continual enhancements. J.D. Edwards was selected as the ERP vendor and distribution and financial modules were selected for implementation. The cost was approximately \$3 million (\$700,000 in hardware, \$500,000 in software, and \$1,800,000 in implementation costs). The process began in 1998 and the ERP system went live in July 2002.

The implementation process experienced numerous delays for a variety of reasons – the sale of DistCo-Australia in 1999, an organisational restructure in 2000 and a change in senior management in 2001 (the Managing Director left the company and the ES Project Manager was appointed MD). The process was also characterised by almost continual business redesign process, especially in response to an initial cost estimate that was double the expected cost. This was largely attributed to the expectation that the ERP software could be implemented as is without changing DistCo’s business processes (i.e., a “vanilla implementation”). In reality, a great deal of software customisation or alteration of DistCo’s processes was required.

A process model for ES implementation

Previous research into ES implementation has largely been limited to investigating parts of the implementation process: vendor selection, evaluation process, business process reengineering, implementation failure or success, etc. However, by dividing the process into segments, we lose an understanding of the whole, which is greater than the sum of its parts.¹⁰ Therefore, one of the assumptions of our study is that ES implementation is a complex process that needs to be understood using a holistic approach.

We also assumed a process approach to ES implementation. Why? Because organisational decision-making can best be viewed as a process, and not as an event that takes place at one point in time.¹¹ Academics appreciate the process approach because it is useful in answering the “how” and “why” research

Case study #2: Oracle implementation at GovtAg

GovtAg (Government Agency) is a large (8,500 employees) national government agency that provides government-sponsored services in one of New Zealand's largest metropolitan areas.

GovtAg's ES implementation was driven by government requirements for increased standardisation, consolidation and integration of service provision, and the need for greater control over finances. Another compelling reason was the decision by the current ERP vendor (Oracle) to not support the existing version of the software.

This was not a new implementation and GovtAg decided from the beginning to stay with its current vendor. However, the new software version (Oracle 11i) and the expansion of ERP coverage (upgrade the financials module and new implementation of fixed assets and procurement modules) made this process resemble a new implementation, not an upgrade. The cost was approximately \$2.3 million (\$1.7 million for hardware, software, consultancy and internal costs and \$650,000 for operational costs). GovtAg was assisted in this implementation by one of the big-five consultancy firms. The ERP implementation process began in January 2000 and the various modules were phased in during December 2000 and January 2001.

The fast-track implementation process was delayed due to problems with the new software (the new Web-based version had considerable bugs) and by failure of the initial hardware to meet performance specifications discovered a few weeks before it was to go live. A contingency clause in the hardware vendor's contract allowed GovtAg to cancel the original contract and sign a new contract with an alternative vendor.

questions, as well as generating new process theories.¹² Practitioners value the findings of process research too because they tend to be easier to understand and highly relevant.¹³

Based on previous research¹⁴ and the results of our case studies (see case study boxes) we have defined an ES implementation process model to be composed of four phases:

- **Preparation:** Beginning with a decision that an ES will be beneficial to the organisation, the preparation phase typically includes the request for information (RFI), request for proposal (RFP) and contract negotiations with the selected vendor. Internally, the enterprise organises the implementation teams and chooses the appropriate technology platform.
- **Design:** The main activities of the design phase are defining system specifications, reengineering of business processes, training users and, perhaps, developing a prototype of the new system.
- **Implementation:** In this phase, the design blueprint is configured, software is installed, and user training begins.
- **Realisation:** The realisation phase begins when the

system goes live and the initial focus is on stabilising the new system to run smoothly. In the long term, this phase includes assessment of the realisation of the benefits that were identified in pre-implementation phases.

We will return to this process model when we describe some of our findings.

Strategic ES implementation decisions

The preparation-design-implementation-realisation process offers a macro view of the ES implementation process. This process makes sense to practitioners and academics, but it doesn't represent a major advance on previous research because process models are well known.

Micro-views of the ES strategic decision-making process are far rarer and represent a more substantial outcome of this research. Based on more than 30 articles in professional publications and the academic literature, the ES implementation process was conceptualised as a series of strategic decisions.

These are strategic decisions because they (1) commit a large amount of organisational resources, (2) have a long-term impact on shaping the ES and/or the organisation processes that support the ES, and (3) are complex because of the intertwining organisational and technological challenges that have to be taken into account. These decisions are also strategic, not tactical or operational, because they are made before tactical (e.g., how much will this cost?) and operational (e.g., how will this be resourced?) decisions are addressed.

These are decisions about strategy implementation, not strategy initiation or formulation. In strategic management, determining what should be done is the purview of the initiation and, especially, the strategy formulation stages. In the strategy implementation stage the emphasis shifts to how to do it, and that is the focus here.

This long list of strategic implementation decisions was refined and validated through three exploratory case studies and a survey of 14 executives involved in 14 different ES-related practices in New Zealand.¹⁵ The result is, as far as we know, the first list of strategic ES decisions that focus on a holistic and process-oriented implementation of enterprise systems. These fifteen decisions are:

1. Decide on the evaluation team
2. Decide on the evaluation partner(s)
3. Decide on the vendor(s)
4. Decide on key business processes
5. Decide on functionalities or modules
6. Decide on bolt-on applications
7. Decide on IT infrastructure
8. Decide on the implementation team

9. Decide on the implementation partner(s)
10. Decide on implementation strategy (BPR and software customisation)
11. Decide on go-live strategy (phased, plunge, or parallel)
12. Decide on ES variation strategy (similar or different versions of the same ES)
13. Decide on personnel training strategy
14. Decide on reporting needs
15. Decide on maintenance strategy

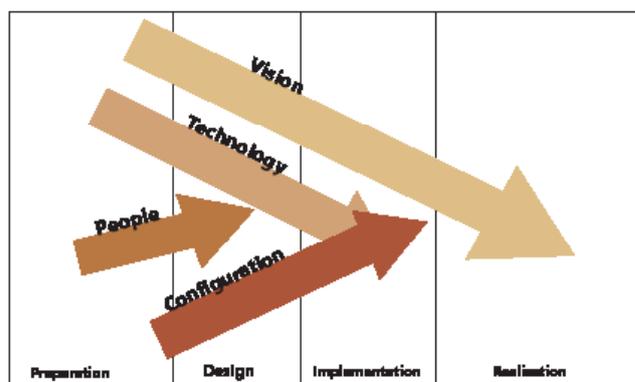
Decisions in the ES implementation process model

With the macro-level process model and the micro-level list of 15 strategic decisions in place, we turned our attention to mapping the 15 ES strategic decisions across the process model. Obviously there is a chronological order to the 15 decisions, even if decisions overlap and repeat. Of greater interest is a framework that categorises the decisions by focus area to reveal something about the strategic decision-making process in these two organisations (see case studies).

Table 1: ES Strategic Decisions by Topical Area

VISION	TECHNOLOGY
key business processes implementation strategy implementation team maintenance strategy	vendor(s) bolt-on applications IT infrastructure go-live strategy ES variation strategy
PEOPLE & PARTNERSHIP	CONFIGURATION
evaluation team evaluation partner(s) implementation team implementation partner(s) personnel training strategy	functionalities or modules reporting needs

Figure 1: ES Implementation Focus Across Four Phases: DistCo



The framework we developed is shown in Table 1. Through a process of straight, inductive reasoning, each decision was placed into one of four groups: vision, people and partnership, technology and configuration.

The analysis of the ES decision stories from the two case studies put each decision into one or more phases of the process model. When the framework in Table 1 was applied to each of the two case studies, the results for DistCo and GovtAg are shown in Figures 1 and 2 respectively.

These process maps indicate the unique character of each ES implementation. For example, DistCo had originally planned a “vanilla” implementation, that is, one with minimal customisation. The reality of the situation was that their business processes were fairly unique and extensive customisation of the software and their business processes was required. So the vision of what they expected from the ES kept changing. Other factors, such as the sale of the Australian division near the start of the implementation process and key personnel changes near the end of the process, also kept implementation strategy to the fore, contributing to the vision decisions being a factor in all four phases.

In contrast, GovtAg had what could be called a more typical

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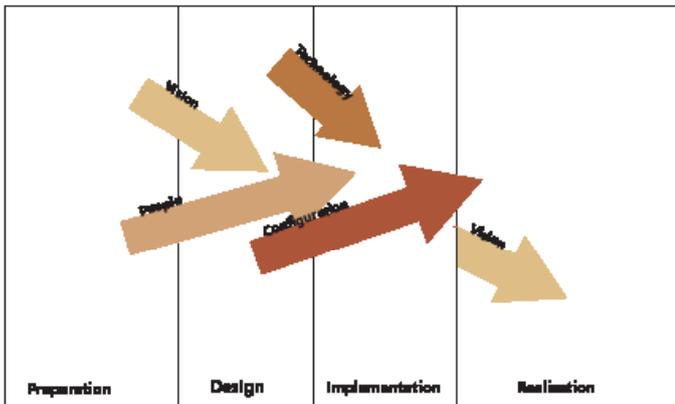
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Figure 2: ES Implementation Focus Across Four Phases: GovtAg



implementation process from a vision perspective. GovtAg decided early on that the ERP application would be used to “flush out bad habits” that had developed over time. In the words of the GovtAg Project Manager, a decision was made almost at the beginning to “discipline the processes with minimal configuration, and say, ‘that’s the system and that’s how you would use it. I’m sorry if that makes you unhappy, but no more argument.’” So vision about key business processes, implementation strategy and maintenance strategy was set at an early phase. As with other results, we see a rational process that makes sense for effective ES implementation. These maps not only provide a graphic depiction of the ES implementation process, but we suspect that they are nearly unique, almost fingerprints of the process. If similar decision-making process maps were drawn for any ES implementation, a different figure or map would emerge for each.

Five conceptual models of the decision-making process

Another significant outcome of our research was answering

the question of how ES implementation decisions are made. In other words, here we begin the process of making sense of the ES implementation process.

The approach we selected to do this was to examine how each of the 15 strategic decisions was addressed in the two New Zealand organisations (i.e., a multiple case study approach as described in the methodology box at the conclusion of this article) that had recently implemented an ERP application (see case studies). The framework we selected for this examination is five conceptual models that describe almost any strategic decision-making process. The five models are shown in Table 2 with assumptions and alternative or related models found in the strategic management literature.

Eureka! ES implementation makes sense

So, what were the results? We considered the five decision models—rational, muddling through, mixed scanning, garbage can, and political—as conceptual lenses through which the decision-making process could be viewed. From the two case studies each of the fifteen strategic decisions were evaluated to identify the model with the closest fit. In the end we had to expand our list of five to include two mixed models: rational-mixed scanning and rational-political. The results are shown in Table 3.

The first and largest impression is that the ES implementation process in these two organisations is a rational one in which decisions are made in a reasonable manner to maximise project goal achievements and in line with realising organisational benefits. Of the 30 decisions (15 in each organisation), one third (11 decisions) fall within the rational model and another six decisions show aspects of the rational model. Furthermore, if one considers the muddling through and mixed scanning models to express certain characteristics of rationality—what we call “incremental

Table 2: Five Conceptual Models of the Decision-Making Process

Model	Assumptions	Also known as...
Rational ¹⁶	Theoretically, decision makers seek the best alternative to maximise goal achievements. In practice, however, decision makers only look at alternatives that meet minimum standards.	Comprehensive, Computational, Root Method, Method, Planning, Appraisal, Instrumental.
Muddling through ¹⁷	Decision makers make small incremental changes through successive and limited comparisons starting from the present situation, and with no set of clear objectives.	Adaptive, Dynamic Design, Disjoint, Incremental, Machine Bureaucracy, Sporadic, Systemic Bureaucracy.
Mixed scanning ¹⁸	Decision makers pursue incremental decisions that are made within a framework for an existing mission and policy.	Adaptive, Assertive, Compromise, Iterative, Logical Incremental, Modified Search, Provincial, Seeking First.
Garbage can ¹⁹	Decision makers scan for matches among solutions, problems and participants.	Anarchies, Behavioural, Doing-First, Fluid, Inspirational, Organisational Process, Professional Bureaucracy, Uncontrolled Divergence.
Political ²⁰	Decision makers use their power to influence the decision process.	Bargaining, Controlled Collegiality, Entrepreneurial, Interaction, Judgmental.

rationality”—then almost all decisions exhibit some form of incremental and pragmatic decision making. The other models show little (political) or no (garbage can) occurrence in the decision-making process for these two organisations.

We find that ES implementation in New Zealand can be described as rational, planned, appraisal, adaptive, systemic, assertive, or logically incremental, as suggested in Table 2, rather than being characterised more by political, anarchical, or uncontrolled processes.

These findings are not unexpected and also make sense to other academics and practitioners with whom we have shared these results. Despite the horror stories that one reads and hears in the media about IT implementations, anecdotal evidence and these results show that management usually acts in a rational manner and for the benefit of the enterprise.

Other lessons from practice

Although the focus of our research was on the development of the ES strategic decisions and their application in the five decision-making models and process model, there is much more that we learned from our case studies that is of value to IT and business managers involved in ES implementation.

The four lessons and their implications for managers are:

1. Contingency planning

Contingency planning and risk mitigation procedures are critical for when things go wrong. The GovtAg implementation was largely saved and implemented on time because GovtAg had insisted on a contract cancellation clause with the IT platform vendor if the hardware and/or software failed to perform up to specifications. When data processing performance proved well below contract specifications approximately two months out from the go-live event, GovtAg was able to exercise this contract provision and replace the hardware and operating system.

2. Professional advice

Independent professional advice during the early phases of the ES project is useful to provide realistic expectations. Especially, ES vendors tend to overestimate the implementation benefits and implementation consulting partners tend to understate the difficulties. In our case studies, DistCo learned this by going into the process with an expectation of a vanilla implementation, only to be confronted by the reality of the situation, and huge unexpected costs, mid-way into the

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Table 3: Decision Making in ES Implementation at DistCo and GovtAg

Model	DistCo	GovtAg
Rational	evaluation team bolt-on applications implementation team ES variation strategy personnel training	evaluation team vendor functionalities and modules bolt-on applications implementation strategy ES variation strategy
Rational-Mixed scanning	(none)	go-live strategy
Rational-Political	(none)	evaluation partners IT infrastructure implementation team implementation partners maintenance strategy
Muddling through	evaluation partners functionalities and modules IT infrastructure implementation strategy reporting needs maintenance strategy	(none)
Mixed scanning	vendor key business processes implementation strategy	key business processes personnel training reporting needs
Garbage can	(none)	(none)
Political	go-live strategy	(none)

and time-consuming redesign is necessary.

Of course, these points make good sense and have been said before elsewhere. However, it never hurts to remind ourselves that occasionally the pressures of time, expense or unfamiliarity cause individuals to ignore what, in hindsight, seems like common sense.

Conclusion

In summary, this research shows that the technological and organisational decision processes for ES implementation are mostly effective, rational and adaptive, at least in the two ES implementation case studies reported here. Furthermore, the decision processes adapted well to changing conditions such as the inadequate performance of the IT platform (GovtAg) or the unpredictability of costs and go-live expectations for implementation (DistCo). Rationality in ES implementation decision processes is good news worth sharing with the New

Zealand business community.

implementation process. IT and management practitioners should ask colleagues about their experiences, consider a range of ES vendors and implementation partners, and be firm about asking for and consulting references from similarly-sized businesses on their experiences.

3. User training

User training should begin in the design phase, not be put off until the end. Training staff early in the implementation helps to clarify what the new ES can deliver and whether that meshes with organisational objectives. Waiting until near the go-live event to involve staff can be inefficient because a lot of early design decisions have already been made and may be irreversible.

4. Testing

Although the involvement of prospective users during testing and re-testing is critical, companies also need to involve professionally trained consultants. Sign off for screen design, performance testing and report generation should be a joint responsibility of organisational user-representatives and professionals. If only one or the other takes responsibility, then we should not be surprised to find that expensive

Zealand business community.

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Methodology: Multiple Case Studies

Our research into ES implementation in New Zealand used the multiple case study methodology. The case study methodology is useful for seeking answers to questions about a set of events over which the researcher has little or no control.²¹ Case study is also a useful methodology to capture the knowledge of practitioners and to develop theories from this knowledge.²²

The two organisations were chosen on the basis of the review of the ES literature, feedback from pilot case studies, suitable timing (both organisations had recently completed ES implementations) and, of course, the willingness of the two organisations to participate.

Semi-structured interviews of an hour or more were conducted with the key participants in the implementation, including the business sponsor of the ES project, a member of the steering committee, the ES internal project manager, the ES external project manager, one manager of an ES specific module, representatives from the ES vendor, the ES evaluation partner and the ES implementation partner.

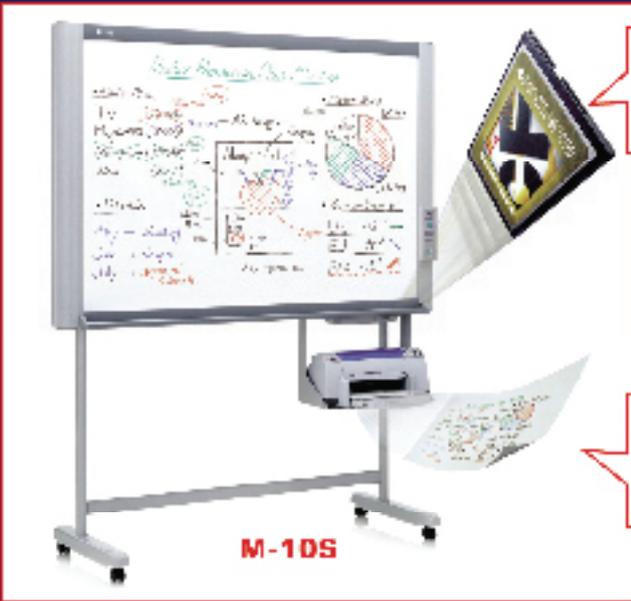
Interviews were recorded and transcribed and then complemented with the researcher's observations and reflections from notes taken during the interview. The transcribed interview data were analysed by QSR NVivo, software that is designed to support qualitative data analysis. Annual reports, project reports and other relevant documents were also key data sources.

In-depth case studies were written that included descriptions of the company, its information systems and the ES project, including a detailed chronology of events for each implementation phase. Then each of the informants was introduced and, most significantly, a detailed account of each of the 15 strategic decisions that are the focus of this study was compiled from the data.

Validity of the results was insured by asking participants to review their interview transcripts, conducting follow-up interviews to clarify and triangulate key points and requesting the key contact person in each organisation to review a final draft of the case study to correct any misunderstanding or inconsistency in the results.

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