The Critical Factors for Information Technology Investment Success

Information Technology in Strategic and Competitive Management

James Robertson

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ISBN 0-620-31633-0 (Softcover)

ISBN 0-620-31648-9 (Hardcover)

Also available electronically

First revision March 2004
First printing February 2004

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DEDICATION

This book is dedicated to the memory of my father, Angus Struan Robertson who provided me with the inspiration to live life the way I have, who provided me with the education which provided the foundation for this work and who supported me morally and financially at various times as I walked the path of my life to acquire the information on which this book is based.

Thank you dad!

It is further dedicated to my mother, Thelma and my wife Ingrid and to Yah, the Almighty Creator who is the source and reason for our existence.

ABOUT THE COVER

The graphic on the front cover is based on the strategy - tactics matrix of Professor Malcolm McDonald of Cranfield School of Management who can be contacted at m.mcdonald@Cranfield.ac.uk

This matrix uses McDonald's definition of strategy as "doing the right things" and tactics as "doing things right".

Consideration of these definitions indicates that an organization that does the right things well will thrive. An organization that does the right things but does not do them well will survive.

An organization that does the wrong things will die, it is simply a matter of how quickly. If it does the wrong things well it will die quickly and if it does the wrong things badly it will die slowly.

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CONTENTS

FORWARD

I've seen and worked on many software projects over the past twenty years, and rarely have results equalled expectations. These projects were at some of the largest corporations in the United States, and ranged across such industries as banking, mutual funds, insurance, entertainment, healthcare, as well as government. While some were massive in scale, truly "enterprise-wide" undertakings, others were more modest, focussed on improving workflow in a single department. But what they all had in common was a significant gap between what was promised and what was delivered. In the research field there is a concept known as "gap analysis," but rarely has this concept been applied to information technology, specifically software engineering for business. This book performs gap analysis on the subject of why most information technology systems fail.

I've known James Robertson since 1999, when he contacted my company to submit a proposal to a healthcare organization he was helping at the time. We did submit, and got as far as making a presentation to the Board, but alas, the organization was acquired by a large insurance company shortly thereafter and the project was stillborn. But having gone through the gauntlet of his evaluation process, I can attest to his investigative thoroughness. More than that, I experienced firsthand his relentless (and good humoured) probing to understand the structural underpinnings of our system. His perspective was unique, able to be systematic in the strict engineering sense and also analytical about the system's ability to fulfill the needs and capabilities of the business it was supposed to serve. Many engineers don't have a good grasp of business; James is one of the few who not only has a good grasp of business, he understands business.

Information technology professionals sometime forget that the reason that IT systems are designed and built is because they help people and businesses accomplish things. In other words, without the "users" that many in IT have a condescending attitude towards, they would be out of a job. This book begins by pointing out that the vast majority of new systems are considered failures by the companies which had them built, something which should be very humbling to the software developers. But rather than romanticize about human usability design, James patiently explains proven techniques and lays out detailed sequences of tasks commonly found in other engineering fields, to software engineering.

This is perhaps the first book on the subject of software engineering to discuss how to avoid building a system that fails. James takes many classic engineering techniques, such as having a laboratory and performing extensive testing, that goes far beyond the typical QA team found in most software organizations. Another is his belief in the preparation of extremely detailed written specifications, so that, as he puts it, "Software construction is then a matter of advanced 'cabinet making' working exactly to the 'drawings'." In other words, just as any building is constructed from a set of blue prints, so should software.

The book also makes many critical points either overlooked or not well understood by software developers, such as the necessity of designing the data structures before the process logic. As someone who has designed and built software, I can attest to the wisdom of this point. Computer programmers can't wait to start "screen painting," and often the data structures are an afterthought. The result is that their works of art can't reach all of the data needed to fill them completely, so they have to go back to the drawing board.

This last point goes to something deeper, namely that software must be designed based on a solid understanding of the business that it addresses. Somehow this understanding must be embodied in the data structures. Only then can the sizzle-the screens and plethora of features and functions-truly make life easier for the people who must get their work done every day with the system that we built.

Throughout the book the architecture / engineering / construction model is mapped onto the software development life cycle. The strength of this book is how completely it maps the ways in which engineering projects must be organized and managed-no one wants to have a bridge collapse-to software construction. While many software

companies and IT departments in corporations do implement some of these concepts, usually they are applied in a fragmentary way.

Although many in the software industry use some of the same terms, very few actually have studied their origins and understand their full meaning. The great service of this book is that now a knowledgeable and experienced engineer is educating his software engineering colleagues and business executives about the tried-and-true principles and specific steps to construct systems - in this case information - that succeed.

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PREFACE

Seventy percent of all business information technology investments fail totally. A further twenty percent fail to meet the business requirement. It is reported that ninety five percent (nineteen out of twenty) of all enterprise resource planning investments do not deliver what is promised. Ninety percent of strategic plans fail. Seventy percent of business process re-engineering projects fail.

The business solutions industry, as mature as it seems, is surely an industry characterised by failure.

There is clearly a need for a robust approach to designing failure out of what is undertaken whether strategic plans, business optimization programmes or information technology investments.

I have been involved in the strategic application of computer systems in business for over twenty years and in the development of effective business strategies for over ten years.

In the early years of my experience I undertook a number of projects which were notable successes and which created real competitive advantage for the organizations for which the information systems concerned were developed.

Subsequently, I started to consult in the field of effective application of computer systems in business. As time progressed I experienced some successes but also failures. My training is in Civil Engineering and I have BSc and PhD degrees in that field as well as practical experience. In addition, I have been designing and building things since childhood. Most of them have worked and worked well.

My first experiences of sub-optimal information system projects were challenging and traumatic, I was not accustomed to failure. In fact, my whole engineering training had trained me to expect success by designing against failure. The whole discipline of engineering is about designing failure out of solutions.

Without really consciously deciding to do so, the moment that I experienced failure in information technology projects I started to examine the projects in detail in order to understand what had caused failure so that I could design failure out of subsequent projects.

This investigation took me into a diversity of fields. Early on it became apparent that there was a vital requirement for the alignment of business information systems with strategy and consequently I started to explore the field of strategy development. I rapidly found that there was an absence of rigorous comprehensive methods for strategy development and implementation and started to undertake research and development in this field.

I also soon came to discover the widely reported ninety percent failure rate for business strategic plans.

As I continued to gain experience and continued to experience a mixture of success and failure, I came also to recognize the enormous impact of so-called soft issues or people issues on implementation failure. In gaining understanding of this I came to understand the close correlation between information system implementation and organizational redesign. If the system is effective it will have an impact on the structure of the organization.

Progressively I came to understand that the three fields, business strategy, organizational design and business information system development, procurement and implementation were all different facets of the same field of organizational improvement and could not be considered in isolation. They are all interlinked and interact in a complex manner.

As this journey of discovery continued I found increasing evidence that the factors giving rise to strategy failure were the same factors giving rise to information technology investment failure and were the same factors giving rise to business optimization failure.

As this understanding and experience increased I developed an ever increasing catalogue of factors giving rise to failure. I also found myself speaking at conferences in various locations around the world on these subjects.

Subsequently, I received international recognition through Who's Who in the World, Who's Who in Science and Engineering and a number of other accolades.

I continued to undertake projects and continued to find that sometimes things went well and sometimes things did not go so well. As this happened, the catalogue of factors contributing to failure grew and, at the same time, the experience of the things that worked to prevent failure also grew.

Because the experience evolved in what one might term an "organic" fashion the body of knowledge was initially relatively unstructured.

More recently I started to analyse the data that I had acquired. This was done using the critical issues strategic analysis process which is discussed in chapter 33, to analyse this body of data and bring greater structure to it. At the same time I gained even greater insight into what was required to design failure out of strategic solution programmes, be they information technology, business strategy or business optimization.

In doing this I became absolutely convinced that the only way to avoid failure was to regard all three of these aspects as different components of a total solution and to design solutions that incorporate all these facets.

This book represents the culmination of these years of experience and on-the-job practical research, learning and development.

It sets out to make visible the factors that give rise to failure. It outlines the factors that are necessary for success and it offers an overall approach to design failure out of strategic business solutions.

The book is written with particular emphasis on major corporate strategic information technology investments since these represent one of the greatest untapped opportunities and greatest challenges of the years ahead. In presenting the thesis around this dimension the book also addresses the full inter-relationship with strategy and business optimization.

In fact, I would go so far as to suggest that it is very difficult today for any organization to take radical new measures to create sustainable competitive advantage. To create sustainable competitive advantage requires a holistic plan of action that includes information systems and business optimization in support of business strategy in the manner presented in this book.

I hope you will find this book challenging and useful.

Dr James A Robertson PrEng (james@jar-a.com)

About the Author

Dr James Robertson has BSc and PhD degrees in Civil Engineering.

Dr Robertson has been exposed to the use of computers since the days of the card punch and typewriter terminal. He was also actively involved in the practical application of the first desk top personal computers. He has been actively involved in the practical application of computers in business for over twenty three years.

His experience includes a five year postgraduate materials science research project. During this project he used computers to analyse the stability and forces in large dams and to process over seven thousand pages of laboratory data. This included the development of graphics software for plotting complex graphs of the research results. In the process he researched information cataloguing techniques and developed a complex information cataloguing scheme. He received a major national award for the resulting doctoral thesis and travelled internationally as part of the award.

He then joined a firm of international investment consultants. He computerized this business and developed first principles computerised economic models of major corporations listed on the stock exchange. He also developed a database and flexible reporting application to allow rapid production of presentation quality reports for clients. In the first year these developments allowed the firm to increase its client base and double its turnover. During the four years that he was with this firm he also studied the global economy and commodity markets and gained a solid grounding in economics.

While with this firm he was also involved in consulting to clients in terms of the application of the results produced by the computerised analysis. This resulted in him travelling internationally and meeting with clients which included the senior vice presidents of major international banks. He continued to service this organization as a client for a further seven years.

This was followed by four years with an international civil engineering and mining engineering consulting firm. Experience included the use of computers for ore body modelling, mine design, slope stability analysis and processing of laboratory data.

At the same time, Dr Robertson architected and lead a project to migrate the organization from a large mini-computer installation to one of the earliest personal computer networks. This project included the specification, development and implementation of a fully integrated enterprise resource planning system for the firm. This system is still in use over sixteen years later. He also initiated a programme to place a computer on every engineer's desk with incentives to encourage high levels of literacy, including touch typing skills. He also managed a team of technical programmers.

After this Dr Robertson entered private practice consulting on the effective application of computers in business. Early assignments included the evolution and implementation of the enterprise resource planning system developed for his previous employers for other clients. Other projects included strategic marketing planning, systems audits and specifications and the development of a risk management system.

Concurrently with the above activities, for a period of over twelve years Dr Robertson was involved in the part time military with a military engineering regiment. For about six years he served as administrative officer with full responsibility for administration and human resources management, learning much about these fields in the process. Responsibilities included the supervision of the operation of a computerised records system and much was learned about the challenges of maintaining computerized records for large organizations.

Subsequently, he was appointed as officer commanding with the rank of Lieutenant Colonel and served in this capacity for four years. During this period he attended all the necessary training courses which gave an excellent grounding in results orientated, high efficiency tactical and strategic planning up to the Brigade level (approximately 7,000 men plus machines). He gained much useful experience in the leadership and management of large numbers of personnel during this time.

After four years consulting on his own, Dr Robertson merged his firm with two others, a specialist software development firm and a decision support systems firm with a view to establishing a one stop solution shop. Dr Robertson served as chief executive. A diversity of projects in all three fields were undertaken and Dr Robertson spoke widely at international conferences during this period. Projects included a highly sophisticated loss information management system, an information technology strategic plan for a major corporation and a wide diversity of other projects.

After four years Dr Robertson returned to consulting full time for his own account and has been doing this for seven years at the time of writing. Projects have included development of strategic plans for a diversity of clients, implementation of a national crime prevention strategy, architecting and managing the acquisition of a comprehensive enterprise resource planning solution for a large primary healthcare provider network and a wide diversity of other projects.

As a consequence of this diverse experience over so many years, Dr Robertson brings substantial knowledge and experience to the writing of this book. During this period he has systematically sought to bring the disciplines of the engineering industry to the development of effective strategic solutions in business. The great diversity of experience outlined above ensures that this book draws on diverse fields in order to propose solutions that are distinctly out of the box of conventional thinking about information technology and strategy and which offer the potential for solutions that really work.

Dr Robertson has spoken at over fifty conferences internationally and authored many white papers on subjects relating to the subject of this book. This professional background of diverse experience and practical thinking in and around the fields of effective strategic business solution development and effective information technology project development and implementation all underpin the work on which this book is based.

Dr Robertson has been listed in Who's Who in Science and Engineering, Who's Who in the World (four years running), Great Minds of the Twenty First Century, Two Thousand Outstanding Intellectuals of the Twenty First Century and the Contemporary Who's Who.

This book represents a summation of the thinking that has lead to these accolades.

About the Book

This book offers a sobering, challenging and stimulating look at the practical issues of effective strategic business solution investment against the backdrop of the professional achievements of the author.

One of the vital characteristics of engineering is summed up by the statement *"engineers do not design bridges to stand up, they design bridges not to fall down"*. This translates to something the author calls *"design for success by engineering against failure"*.

This principle is one of the threads that runs through this book -- what causes strategic business solution investments to fail and how to design failure out of the solution.

The book includes a comprehensive review of the factors that give rise to failure of strategic business solution and information technology investments.

It addresses subjects such as information technology mythology and lack of executive custody as two factors that contribute substantially to the failure of projects.

Lack of strategic alignment is also identified as a major factor giving rise to investment failure and is discussed at length together with some principles for identifying what strategic alignment is and how it is achieved.

An engineering approach to projects of this nature is presented and forms a thread that runs through the entire book.

Part 3 of the book provides a comprehensive introduction to the principles that the author advocates for developing projects and programmes that are designed not to fail and therefore to succeed.

The book ties together a diversity of established knowledge together with innovative, practical suggestions as to how successful projects and programmes can be achieved drawing on the construction industry metaphor.

A diversity of physical world examples are used to bring practical context to many of the issues facing organizations investing in strategic programmes, strategic information technology or managing existing investments. One of the lessons that is derived from these parallels is that if the parallels were effectively applied a large proportion of projects which fail would never be undertaken since there is frequently no real business case and the real cost of a successful investment far exceeds the expected benefits.

It is hoped that this book will contribute to a swing away from failure and contribute to a situation where the situation will be reversed. A situation where registered professional business solution engineers will deliver outcomes where more than ninety five percent of all strategic business solutions and strategic information system investments meet or exceed the specified requirement. The opposite of the present situation.

Acknowledgements

I would like to acknowledge all the people who through their knowledge and wisdom have played a role in bringing me to the point where I could write this book. I would particularly like to acknowledge:

-- Professor Milton Harr for teaching me to apply lessons in one industry, profession or speciality to solve problems in another.

– Professor Malcolm McDonald for his definitions of strategy and marketing that have profoundly influenced my outlook on these subjects.

– Ettienne du Preez for his friendship and technical excellence that proved that my concepts and ideas could be successfully applied in custom developed business software.

I would also like to acknowledge my numerous clients with whom and through whom I have gained the experience on which this book is based. Also my many business associates and friends who through the years have provided their input, comments and wisdom in diverse ways that have contributed understanding and insight which have made this book possible.

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CONTEXT SETTING

This book has been written with primary focus being the provision of business information system capabilities for organizations.

The focus is on those systems which impact the full diversity of the operation of the business.

This book is not about operating systems, networking systems, hardware of any sort, basic office automation technology, etc.

It is about the engine room of business information management in support of effective business decision-making.

Much that is written in this book is relevant to the full diversity of information technology investment in businesses, however this wider spectrum is not what I was thinking about as I wrote.

The Critical Factors In Information Technology Investment Success

PART 1

SETTING THE SCENE: AN INDUSTRY CHARACTERISED BY FAILURE AND WHAT IT SHOULD DELIVER

CHAPTER

1

THE CONTEXT OF INFORMATION TECHNOLOGY BUSINESS SOLUTIONS: AN INDUSTRY CHARACTERISED BY FAILURE

For nearly a decade I have been aware of statistics which indicate that seventy percent of all business information technology investments fail to deliver anything whatsoever.

These statistics first came to my attention when I was lecturing a master of business administration programme and undertook a poll of the students. These students represented middle to senior management of major corporations and were therefore considered to be a useful indicator of overall performance. The result of the poll indicated that the management of seventy percent of the corporations represented on that course were dissatisfied with their information technology investments and considered that they were not meeting their requirements.

I subsequently encountered a report which indicated that out of an estimated three trillion United States dollars invested in information technology worldwide by 1995, two trillion had failed to produce anything that worked.

As time progressed, I encountered other reports and quoted the statistics in a number of presentations to conferences internationally relating to the theme of this book.

Consistently I found that the figure of seventy percent total failure was supported. The only real surprises came from people who challenged the numbers as being too low and stated that the failure rate was much higher than seventy percent.

Recently I encountered an article which made the statement *"it is estimated that as many as 19 out of 20 enterprise resource planning system implementations do not deliver what is promised"* (McLeod 2003). Given that enterprise resource planning (E.R.P.) systems are supposedly the flagships of corporate information technology today, this statistic is a damning confirmation of the severity of the problem.

Parallel with these findings I encountered statistics that indicated that seventy percent of all business process re-engineering (B.P.R.) projects fail totally and that ninety percent of all strategic plans fail. Progressively I came to realise that the factors contributing to the failure of these projects were the same as for information technology projects and that, in fact, all three types of projects were simply facets of one family of organizational improvement projects.

While I was acquiring this data I was undertaking my own projects as a consultant and experiencing great success in some cases and disconcerting failure in others.

I also undertook the development of an information technology strategy for a major government agency. This was undertaken using a market focussed approach in terms of which the middle, senior and executive management of the organization were surveyed in a series of workshops.

It was found that the information technology shop of this agency could justly claim to have world class technology and methodology in terms of the equipment in use and the systems development life cycle being employed. However, they only achieved a rating of 42% in terms of what management of that organization considered to be really important with regard to the use of information technology in support of the business of the organization.

As I gained this experience I found myself constantly analysing the causes of failure, developing a catalogue of factors to watch out for. I also developed my own approaches to overcoming the causes of failure. Sometimes I made use of established methodologies from other disciplines but frequently I found that there were no formal methodologies to overcome these factors.

In the process of acquiring information about failure I started to develop an approach to projects which was designed to eliminate failure. Of necessity this meant that I spent a considerable amount of my time investigating causes of failure and potential causes of failure. In doing this, I found that people as a whole were not receptive to this focus on failure - seemingly a positive outlook was a vital requirement for a successful project and looking for causes of failure was not well received.

Initially I wrestled with the approach I was adopting versus the criticism I was receiving. In doing this I reviewed my experience as an engineer, both as an undergraduate and as a practising professional engineer in the field of engineering geotechnics with particular emphasis on mine design and hazard management.

I soon realized that my whole training as an engineer was focussed on understanding the factors that could give rise to failure so that failure could be designed out of the solution.

Engineers are trained from the beginning of their undergraduate careers to design failure out of their solutions. They work with factors of safety against failure and, as they become more advanced, may work with probability of failure. All the time they are seeking to systematically analyse every part of the design against failure in order to make sure that failure does not happen within acceptable parameters.

For example, in the case of a bridge, earthquake forces are investigated and the bridge is designed against design levels of earthquake. Wind forces are investigated and the bridge is designed against design levels of wind force. Boreholes are drilled in the abutments and geologists meticulously examine the rock in the abutments for potential failure planes and zones of weakness, the abutments may well be reinforced as a result.

Engineers investigate overload conditions and design against overload. During construction, actions to prevent failure are ongoing, for example, concrete cylinders or cubes for strength testing and quality control are taken from every batch of concrete, carefully cured and tested. All this is done in conjunction with national and international standards, policy statements, etc which have developed over the years as engineers have experienced failure and sought to prevent recurrence.

In practice, the only way that engineers can cost-effectively design any structure not to fall down, is by designing similar types of structure repetitively. They thus attain a level of knowledge and experience which enables them to design and build whatever structures they specialize in, quickly, efficiently and cost-effectively.

I progressively recognized the extent to which my professional training had prepared me to instinctively seek to understand the causes of failure of information technology projects in order to prevent a recurrence of failure. I also came to understand that the information technology industry as a whole does not think this way. It seems that there are those who are firmly convinced that just because they can describe a system in loose and unstructured business language they can build what they specify and it will work and deliver specified business benefit. In practice many systems only work because one or two individuals who seemingly have an intuitive feel for what is really required work long hours, often on a trial and error basis, to deliver solutions that work. As indicated above, the majority of such systems never deliver.

1.1 The Business Context of Information Technology

The business context of information technology is frequently hands-off. Information technology professionals are not well regarded and frequently business executives do not take information technology seriously or else regard it as a necessary evil. Failures are almost taken for granted and frequently written off casually.

Correspondingly, information technology investment decisions frequently seem to be taken on a basis that does not soundly reflect a business case and decisions are often reversed at short notice if the slightest adversity is experienced.

Many business executives use "*I'm not computer literate*" as a sort of apology with which they prefix any discussion of information technology and then abdicate responsibility to others who are supposedly "literate" and are therefore in some manner better equipped to take decisions. This despite the fact that these other "better equipped" individuals do not have any knowledge of the corporate strategic view and therefore are handicapped in formulating solutions that have serious potential to work effectively.

In considering the overall business context of information technology in recent decades, it is important to recognize that twenty years ago and even ten years ago the technology was evolving fairly rapidly. Increasingly business was faced with technology options that a few years previously had not be available at all or had not been cost-effectively available.

Today that has changed. All the technology components necessary for effective and efficient solutions for the average business are readily available at costs that put them within the range of most corporations which have a real business case for them. The technology is not cheap and, as you will see later in this book, the real cost of the technology is very substantial relative to the visible costs of direct technical components.

However, there is a legacy mind set to the effect that information technology is changing so rapidly that it is not possible to keep up. This is fed by an information technology industry marketing machine that has generated great wealth out of generating fear of being left behind.

However, as evidenced by the year 2000 (Y2K) situation, the ethics of this marketing machine and the industry that it serves leave much to be desired.

Another aspect of the current business context of information technology is the tendency to seek quick fixes. Most businesses are largely focussed on their quarterly results and investments are made with a short-term focus. This is giving rise to other ailments in the business environment which have nothing to do with information technology.

The reality is that a long-term strategic focus is an essential component of long-term business profitability and this long-term focus is perhaps more necessary in the field of information technology than in any other aspect of business endeavour. The fact is that really effective business information system investments take a long time to develop and implement and even longer to deliver a real payback, IF they deliver any payback at all.

Professor Michael Porter, speaking on the subject of global competitive strategy made the statement that the world is *"coming through an era where* (there has been) *a lot of confusion"*. He went on to say that *"many ideas may prove not to be robust"* and that *"the more we learn of the last 5 to 10 years* – (they were) *not nearly as good as it seems"* (Porter 2003).

Porter goes on to refer to *"the myth of rapid change". He* states that the *"perception is that things are changing so fast"* but that the *"reality is that key measures persist for decades"*. He states that *"profitability profiles of major players in the semi-conductor and airline industries have been stable over a decade"*. (Porter 2003).

1.2 The Challenge for Information Technology Today

As I gained understanding of these issues, it became increasingly apparent that the challenge for information technology was to get the right information, to the right people, at the right time and in the right place in order to make the right decision. The last piece, in order to make the right decision, is profoundly important.

Frequently information systems are designed to deliver the available information, not the information that will result in effective strategic decision-making. This is an essential distinction and one that is lost in most information technology projects.

This should be seen in terms of current economic trends which in turn should be assessed relative to historical differentiators.

In the 1960's the big challenge for business in the boom years was whether they could produce enough to satisfy demand.

In the 1970's the challenge became whether they could sell all that they could produce.

In the 1980's issues of finance and costing became critical. Principles like activity based costing, just in time, etc were in favour.

By the 1990's and 2000's business was confronted with excess supply and business conditions which meant that no single division could solve the business challenges. It was essential that the production, sales and financial challenges of prior decades were fully catered for and this remains the case today.

It should be taken as a given that in designing and implementing any major integrated business information system today that it must provide efficient and effective facilities for managing production, sales, costs and all related operational aspects. It should not be necessary to specify this, it should be taken as a given. Yet, frequently, system implementations are sub-optimal in some or all of these aspects and really effective support and functionality relating to some or all of these factors is lacking or absent.

Real support for activity based costing is, in its own right, a challenge. Very few major system implementations apply technology to effectively manage activity based costing as a routine component of the design and implementation of the financial components of the systems deployed.

In considering these aspects it is important to recognize that a boom similar to that of the 1960's and 1970's is highly unlikely. From this it can be concluded that strategic issues are vital. Further consideration indicates that this requires effective application of information technology and implies a holistic, integrated business approach including effective information technology

Information technology is not an end in itself. It is part of a holistic, integrated view of business which is strategically focussed and ensures that the business organization is effectively optimized and supported by effective information technology in support of strategic and operational objectives.

Further examination of the key differentiators in today indicates that market focussed strategy, effective utilization of the human resource and effective management decision-making are key differentiators in the decades ahead. All of these aspects require the effective application of information technology to fully support the business in achieving its full potential in terms of differentiation in these areas.

The application of information technology in these areas is not necessarily textbook application of the technology, it is the application of the technology in a strategic manner which makes use of not just hard information but also soft information. Something that very few organizations really address.

This integrated, holistic view of information technology in support of the right business strategies and tactics requires information to make the right decisions at a diversity of levels in the business. This strategic and tactical deployment of information technology to address every facet of business in a holistic, integrated manner represents one of the biggest opportunities facing business today and is addressed in more detail in the chapters that follow.

Porter states *"the essence of strategy is integration - the ability to see in a complex holistic way"* (Porter 2003)

A comprehensively integrated business information solution is a necessary requirement for a holistic, integrated globally competitive business in other words a world class solution.

The next chapter explains what I consider to be the attributes of a world class solution.

CHAPTER

2

WORLD CLASS BUSINESS INFORMATION SOLUTION DEFINED

As a counterpoint to the failure statistics presented in the previous chapter, this chapter sets out to define what the ideal end state should be in line with the points raised in the latter part of the last chapter.

What are the characteristics of an organization that is truly utilizing information technology in support of creating sustainable competitive advantage?

My analysis indicates that the following seven attributes describe a world class business information system solution:

1. Comprehensive data engineering
2. Appropriate fully integrated systems at data level
3. High system operational efficiency and precision
4. Strategic alignment of all operational systems
5. Integrated, holistic business operations
6. Comprehensive management information with full drill-down
7. Comprehensive strategic analysis and decision support capability

These seven factors describe not just a level of technology but a level of organizational capability and effectiveness relating to general business operation supported by technology. It is important to stress that the technology on its own does not deliver world class capability, it is what the organization achieves supported by technology.

These seven factors are discussed in more detail below:

2.1 Comprehensive Data Engineering

The term data engineering is used repeatedly throughout this book to describe a highly structured and systematic approach to the design of data content for validation tables and other tables within an information system. Data engineering ties in with established practices such as data modelling but it extends much further than this.

The term data engineering is described in detail in chapter 10.

The following represents a headline definition of the concept:

a) A comprehensive data model with standard data definitions for the entire corporation such that every possible entity of information is defined, specified and applied in a consistent manner.

b) Comprehensive strategic, hierarchical, top down, structured design of validation data and codes for every aspect of the business designed to maximize information yield, ease of data entry, etc.

c) There is coded validation of all possible entities thereby maximizing accuracy and speed of data acquisition.

This is a very short indication of what is meant by the term data engineering. What is vital to understand is that this has very little to do with technology and a lot to do with the content of the data that is entered into standard validation tables in a very systematic, structured fashion.

This requires considerable medium to high level cognitive, intellectual and business input facilitated by information classification specialists who have a solid understanding of fundamental cataloguing principles.

Data engineering provides a robust manner in terms of which the business and its competitive environment are rendered to the computer system in an intelligent manner that is supportive of advanced analysis. Experience indicates that the use of effective data engineering while delivering substantial improvements in management information (Barry and Robertson 1993, Speer and Robertson 1995) also gives rise to substantial organizational efficiency gains (Paton and Robertson 1994).

Effective data engineering provides an essential intellectual foundation for world class information system capabilities.

2.2 Appropriate Fully Integrated Systems At Data Level

A world class solution can comprise many forms of technology. This point includes:

a) A comprehensive suite of software and technology to meet all requirements of the corporation including all relevant modules of the enterprise resource planning system and all add-on systems.

b) Systems use technology appropriate to the specific requirement, ranging from green screen terminals to state of the art graphical interfaces and related hardware and other technology according to business need and business case.

c) Integration is at the data level, there can be widely divergent types of front end technology.

A point that is frequently missed is that information systems exist for the data not the technology with which the systems are created. From a practical business point of view it matters little whether every module has been developed in a different programming language or development tool, what matters is that the correct data is accurately captured at the correct location and is available for decision-making as required.

There are numerous pieces of technology available that will synchronize and port data between different databases and many products today are able to access multiple databases. All of this is of incidental interest provided the correct data is captured at the correct location by the correct operator, effectively processed and made available to the correct decision-maker. Technology is seldom the issue.

Clearly there are technical, aesthetic and operational benefits associated with having limited technology diversity, however this is not the basis for determining whether a system is world class. The acid test of a world class business information system is what the organization is able to do with its information.

Thus, this point stresses the requirement that there is software available for every application and that it is integrated at the data level. The rest is of secondary importance.

2.3 High System Operational Efficiency And Precision

This point comprises:

a) Operation of every system component within the business is optimized in terms of operator efficiency and precision thereby ensuring high quality data with minimum key strokes, no data entered more than once, no redundant data, no unnecessary fields, etc.

b) All data acquired at the point at which it is logical to acquire it. Automated electronic capture wherever possible.

c) Tight integration between operational software and factory, warehouse, etc processes.

d) On-line real-time capture of data wherever appropriate, automatic acquisition where appropriate, etc.

The use of automation technology is vital. It is not efficient to have an operator capturing data which could be electronically acquired by installing appropriate transducers on tanks, valves, etc in order to track production, raw material usage, etc. There is a tendency to isolate the business systems from the production control systems. In some respects there are sound reasons for this, however there is a strong case to be made for production control systems to interface to the business systems and pass key production data to the business system.

This will allow fully fledged activity based costing and other techniques to be applied. However this requires a holistic, integrated design in order to become a reality.

In reverse, order processing data can be fed directly through to the production module where appropriate, thus permitting tight integration of production with sales in those organizations where this is relevant.

2.4 Strategic Alignment Of All Operational Systems

Strategic alignment of the solution is an essential requirement for a solution to meet the requirements to be regarded as world class. This includes:

a) All systems operate in alignment with the strategic driver of the corporation.

b) Full costing and profit measurement per customer, per product, etc as strategically appropriate. Measure in accordance with strategic driver and strategic parameters.

c) Comprehensive multi-dimensional data model of the business for costing, value add and other purposes.

d) Information systems and business strategy are interwoven.

The alignment of information systems with business strategy is an area which is frequently overlooked. Unless the strategic driver of the business is clearly understood system decisions that interfere with the strategy of the company are very easily taken.

For example, a distribution company had a policy that was an essential strategic differentiator - *"place your order before 15h00 and we will ensure it is delivered the next morning"*. This was the essence of this companies strategic position, senior management spoke about it regularly, yet when a major brand name enterprise resource planning system was introduced no effort was made before "go live" to make sure that the implementation was optimized to meet this requirement. Result? The implementation was a disaster on this point, major customers were seriously inconvenienced, some threatened to go elsewhere, some went elsewhere. Eventually the company reverted to the previous system.

This example may seem trivial but it is characteristic of the sort of basic strategic alignment that is often lacking in major system implementations.

2.5 Integrated, Holistic Business Operations

The way the business operates is an integral part of a world class solution, this includes:

a) The overall operation of the business is strategically optimized in terms of manual process optimization coupled to system optimization.

b) The organization is strategically focussed on its objectives within a framework of operational excellence.

c) Managers and staff at all levels in the organization have access to the information they require in order to execute their functions effectively.

d) Managers and supervisors have clearly defined ownership and accountability for discrete packages of information without overlap with others on the same level.

e) Overall management efficiency has been significantly improved, organizational structure is leaner and flatter with greatly improved management and supervisor effectiveness and efficiency from the most junior levels of supervisor upwards.

f) Information systems and organizational design and operation are interwoven.

It is important to understand that this component is built on the previous components. Without really effective data engineering factors (c), (d) and (e) above are not readily attainable and may not be attainable at all. It is vital that there is a solid recognition that the design and implementation of the information systems must closely parallel the design of the organization and that both should be optimized concurrently.

If this is not done, reports will contain data that applies to more than one person or category of person and effective management will be difficult or impossible. The use of an effective cubic business model in the data and in the data model as described in section 10.7 is essential to achieving these steps.

It is also important to notice that the essence of the factors listed under this heading relate to the way the people in the business operate. They are supported by the information technology. If the information technology is not appropriately and effectively designed and implemented the levels of efficiency envisaged here cannot be achieved.

This point is about the way the people in the business operate.

2.6 Comprehensive Management Information With Full Drill Down

This component comprises the following:

a) All operational data is automatically loaded into a comprehensive information warehouse and automatically summarized in terms of all routine summarizations required.

b) There is a full suite of standard reports and models for all routine management enquiry.

c) All transaction level data is accessible through direct drill-down "at the click of a mouse" from the reports and models at all levels of management from executive downward.

d) Monthly financial statements are available within a day or two of month end and year-end financial statements are routinely audited and signed off within weeks of year-end.

e) Audits are routine and audit fees have been reduced.

f) Management can obtain answers to any routine query almost instantly.

g) Executives and senior managers have access to a series of operational and strategic performance dashboards that enable them to keep their "finger on the pulse" of the business at all times.

This component relates to the roll-up of the data and the drill-down of management inquiry.

This requires appropriate hardware and software, which are not cheap to acquire, however, the real cost of not having this functionality is very much greater. The real cost of expensive executives not having access to the information they need, when they need it, is very difficult to quantify but is substantial.

The real cost of having people performing routine processes with spreadsheets and other tools because the data engineering or system implementation is faulty is also substantial. Quite frequently these people are mid-level managers and can quite frequently be registered chartered accountants.

Effective design and implementation will do away with the need for such expensive resources or allow them to be channelled into creative analytical roles. Computers are designed to automate repetitive tasks,. This is what this component is about,. Focussing on automating the provision of highly structured, highly summarized data to senior and executive management in particular. This must be done in a manner which permits them to quickly and easily examine the state of health of the organization and ask complex questions of the information.

Any information system investment that does not support this type of inquiry and analysis with a high level of efficiency and intuitive use cannot claim to be world class.

2.7 Comprehensive Strategic Analysis And Decision Support Capability
This component comprises:

a) There are a diversity of advanced analytical tools that have been acquired and / or developed in support of long-term strategic analysis, forecasting, scenario analysis, etc.

b) Management have the capability to understand the dynamics of their business and the market environment at a level that is far in excess of that available to competitors.

c) The organization is using this information to create sustainable competitive advantage on a continuous basis.

The essence of this point is that the flow of information in the organization, including strategic competitive measurement information is truly supporting effective corporate strategic decision-making.

It must be stressed that while there is an advanced technology component inherent in the full extent of what is envisaged here it is the corporate data repository and overall strategically effective corporate operation which really make the difference. At the same time it must be stressed that having really effective strategic management without access to all relevant strategic information is also not a viable option.

It is possible that this capability could also require the establishment of a strategic information management facility comprising a number of highly qualified information acquisition specialists with, for example, masters degrees in information management or people with in-depth knowledge of the business and its competitive environment.

2.8 Conclusion: World Class Capability
The benefits of this holistic, integrated system, strategy and operational organization are hard to quantify but are substantial.

The question is really one of how one ascribes value to the ability of an organization to measure its performance at all levels quickly, efficiently and cost-effectively and furthermore how one values the ability to assess this quickly and effectively against changes in market conditions, competitor performance, etc.

Very few organizations today come close to achieving what is envisaged here.

An example of the possible value added profile of the above world class capability is as follows. Figures in brackets represent the relative contribution that full compliance with each factor would contribute to the total potential shareholder value that the investment would unlock:

1. Comprehensive data engineering (4%)
2. Appropriate fully integrated systems at data level (1%)
3. High system operational efficiency and precision (2%)
4. Strategic alignment of all operational systems (5%)
5. Integrated, holistic business operations (3%)
6. Comprehensive management information with full drill-down (6%)
7. Comprehensive strategic analysis and decision support capability (79%)

These numbers are taken from an analysis for a specific client. Relative contributions will vary depending on the circumstances of each individual organization.

It is important to note that the seventh component, strategic capability, dwarfs the other components. This is not because the other components are necessarily small. Rather, the financial impact of being able to consistently grow market share and market penetration is far greater than the impact of the other components which are much more operational in impact. Such impact is achieved in response to excellent strategic information and strategic capability. Insofar as they support improved cost-effectiveness and improvements in the overall value chain all seven components offer a contribution to the seventh component.

The first six components are necessary for the seventh component to be realized in practice.

Simplistically the seven components are implemented from top to bottom. The final strategic benefit requires the investment in the preceding components in order to be realised.

True strategic advantage dwarfs the benefits of components one to six even though those components may deliver very substantial real returns in their own right -- they may even pay for the full real cost.

In practice today very few organizations are operating in the last few categories or even recognize they exist

The following list depicts the estimated cost distribution for each of the seven components for the same organization as that discussed above. The figures in brackets represent the estimated relative cost contribution of each component to the total cost of achieving world class capability for that organization.

1. Comprehensive data engineering (15%)
2. Appropriate fully integrated systems at data level (25%)
3. High system operational efficiency and precision (30%)
4. Strategic alignment of all operational systems (5%)
5. Integrated, holistic business operations (5%)
6. Comprehensive management information with full drill-down (15%)
7. Comprehensive strategic analysis and decision support capability (5%)

In this case the bulk of the cost contribution occurs with the first three components and then with the information warehouse in component 6. Relative contributions will vary depending on the circumstances of each individual organization. In this particular case the cost of component seven, support for strategic competitive advantage, is small, however it requires the previous six components in order to become a reality.

A world class solution is where major long-term strategic competitive advantage lies.

In all of this discussion the essence of the point is not about technology, it is about what is done with technology. Technology today may be more affordable and more accessible but none of this requires bleeding edge technology.

Overall, it is about how organizations utilize and develop intellectual capital and about how organizations utilize and develop people.

It is about organizations doing things differently and better than their competitors.

CHAPTER

3

BENEFITS OF A WORLD CLASS BUSINESS SYSTEMS SOLUTION IMPLEMENTATION

Consideration of the previous chapter raises the question "What are the benefits of a really effective world class solution really well implemented?"

My analysis indicates the following seven factors as benefits. The percentage figures in brackets at the end of each statement represent the relative importance of each of these factors viewed from a corporate perspective. The percentages were given to us by a director of a major executive search consultancy and are therefore considered to be a good estimate of what top executives of major corporations would be looking for:

3.1 Improved Corporate Competitiveness (40%)
This is essentially the same point as made in the conclusion to the previous chapter. Corporate competitiveness is the biggest single basis why an investment of this nature should be considered.

3.2 Improved Corporate Profitability, Bonuses, Stock Options, Share Value, Dividends, etc (30%)
Improved corporate profitability follows closely on the previous point. Clearly developed competitive advantage will result in improved profitability and the associated measures of performance.

3.3 Effective Corporate Operation, Sustainability, Better Decisions (20%)
Central to the discussion in the previous chapter is the development of a capability that gives rise to more effective decision-making and is coupled to more effective corporate operation.

These factors in themselves will give rise to improved corporate competitiveness.

It is important to note that the first three factors are considered to account for ninety percent of the total contribution.

3.4 Improved Personal and Corporate Relationships For Executives, Management And Team Members (4%)
Improved corporate performance can be expected to reduce stress on executives. Axiomatically, in achieving these results the components relating to corporate optimization require that the management team learn to work effectively as a team.

3.5 Improved Health, Quality Of Work Life and Family Life For Executives, Management, Team Members and Staff (3%)
In a sense this is a direct extension of the previous points. A more successful organization in which relationships are more effective and better will almost certainly be a healthier and more pleasant place to live.

Effective management reporting, drill-down, strategic and operational dashboards, etc should reduce the number of hours managers and executives have to work in order to produce the same or better results.

3.6 Recognition, Differentiation and Promotion For Executives, Management And Team Members (2%)
By extension the previous points will ripple through to improved career prospects for the executives, managers and team members who have made this world class capability a reality.

3.7 Empowerment, Improved Remuneration, Job Security and Life Style For Executives, Management and Team Members (1%)

As factor 3.6 this flows naturally from the previous points.

It is important to note that none of the above have anything to do with technology.

This is just one facet of a fundamental conclusion of this book, that effective strategic application of business information systems is not about technology, it is about people and how people use the technology effectively.

CHAPTER

4

SCENARIOS FOR A WORLD CLASS SOLUTION (Case Study)

Achieving a world class business information solution capability is one of a number of possible scenarios each with different long-term cost benefit profiles.

In developing a strategic business information systems plan to achieve world class capability for a particular client a series of strategic analyses were undertaken.

These included:

a) Critical concerns with regard to information technology.

b) Critical business areas requiring information technology support for competitive advantage.

c) Various other analyses.

The above analysis was undertaken using our STRATSNAP© strategic SnapShot methodology which provides for workshop delegates to develop a series of critical factors describing the focus question and then to weight these in terms of relative importance and score them in terms of historic, current, forecast and objective performance. This process is outlined in chapter 33.

The seven factors representing the critical business areas requiring information technology support for competitive advantage for this particular client were identified as:

1. Marketing including technical support.
2. Logistics and distribution.
3. Inventory, production and stock control, planning and purchasing.
4. Basic systems that should be "given's" including finance, payroll, ...
5. Communication.
6. Forecasting.
7. Management reporting.

The weighting and scoring of these factors took place on a secret ballot basis based on a three year planning time frame. Scores three years ago, currently and three year forecast showed a straight line improvement to a level of about 5.5 out of 10 in three years. The desired objective in three years was estimated at about 8.0.

These ratings are based on a scale of:

0 = Could not be worse anywhere in the world
1 = Extremely weak
2 = Very weak
3 = Weak
4 = Mediocre

5 = Average - could be better / could be worse
6 = Acceptable
7 = Strong
8 = Very strong
9 = Extremely strong
10 = Exceptional, could not be better anywhere in the world

This is summarized as:

0.00	- 3.33	Cause for serious concern
3.34	- 6.66	Average -- fairly typical
6.67	- 10.0	World class

This is a standard scale used in all our strategic workshops as part of the STRATSNAP© process.

Following this workshop a detailed assessment of the systems currently in place was undertaken. Amongst many things, it was found that the existing data engineering, that is the data classification and coding schemes in the base enterprise resource planning system and surrounding systems, was very poorly structured. The data engineering was of such a standard that it would never fully support the world class system operation discussed in chapter 2.

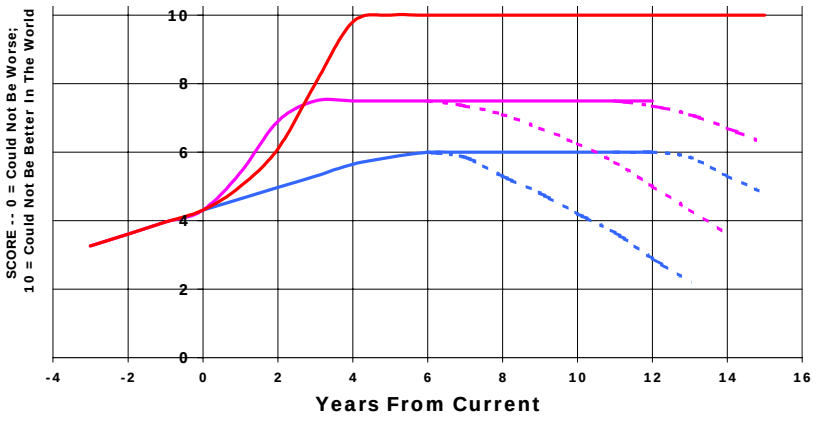

Figure 4-1: Scenarios for Competitive Advantage

After further analysis it was concluded that if the present trend of improvement were simply maintained without a major new systems investment it would probably peak out at about 6.0 on the above scale after about five years. This is shown by the lower curve in figure 4-1.

Given the variability of the competitive environment and the weaknesses, particularly in the data engineering, it would prove impossible to maintain this level in the long-term. It was postulated that at some time between six and twelve years the level of capability of the systems would degrade as shown by the dashed lines in the figure.

If a major project was undertaken without rectifying the core data engineering, the improvement would probably top out at about 7.7 as shown by the middle line on the graph. Such a project would upgrade the software, remediate a diversity of operational and organizational issues and basically do everything that was possible to remediate the situation excluding the data engineering.

As with the lower curve somewhere between six and twelve years changes in the competitive environment would result in deterioration as shown by the dashed lines.

The reason for excluding the data engineering in this option was that it was central to the implementation of the core enterprise resource planning (E.R.P.) and other systems and extended through to the configuration of the general ledger chart of accounts and its sub-structure. Accordingly, the only way this could be rectified was by what I term a "clean slate re-implementation" of the enterprise resource planning system and probably most of the other systems.

By clean slate is meant start a new instance of the software, with all necessary upgrades on a new instance of the database with new validation data and master files and start operation anew leaving an old instance of the applications and data available for historical inquiry.

This is the only way that the level of dysfunctionality relating to data coding in most organizations can be rectified.

By its nature a clean slate re-implementation is best undertaken over a financial year-end. This reduces the pain of changing instances and it also avoids the pain of two charts of accounts in one financial year.

It was concluded that a comprehensive, strategically, that is long-term, focussed clean slate re-implementation of the enterprise resource planning system with extremely well designed data codes, validation capability built in on all possible fields and many other enhancements would deliver world class capability. This was important as it meant that it was not necessary to replace the core enterprise resource planning software. In reaching this position a commitment was obtained from the vendors to supply the source code and provide the client with support services to customize the software to fit their strategic driver.

The issue of the strategic driver was important as the strategic driver was not characteristic for the type of business which was high volume, low value material manufacture. This is an industry in which the client organization had been highly successful in differentiating itself.

There was a discussion about replacing the enterprise resource planning system but it was concluded that given the strategic driver it was unlikely that any other enterprise resource planning product would fit better and customization was the way to go. Furthermore, the enterprise resource planning software was a sunk cost and there was a very substantial investment in people in the company learning how to use the software, even if sub-optimally. There was also a significant information technology support capability.

Customization and re-implementation within a clear context of achieving world class capability, as set out in the previous chapter, was proposed. It was concluded that provided this occurred, it could be expected that the implementation would reach a level of 10 at about four to five years and remain 10 indefinitely.

The long-term retention of the 10 standing was based on the assumption that it was possible to design data engineering and customization within the context of the strategic driver which would remain valid for the long haul. This would be the case even if every five to ten years a refurbishment of the data engineering proved necessary. The investment in software, learning, training, experience, policies and procedures, etc could be retained for decades.

It is important to note that the horizontal line at the value of 10 on the figure is a simplification. In practice the competitive environment will shift and change and the 10 line will shift and change with it. However, with the world class design set out in chapter 2 the organization and its supporting systems will be able to adjust and change in order to accommodate competitive pressures.

Furthermore, provided executive management take the new implementation all the way to component seven in chapter 2, “comprehensive strategic analysis and decision support capability”, they will be in a position to anticipate changes in competitive position and move ahead of the rest of the market.

An interesting observation about these scenarios was that the cost of the second option would probably be between eighty percent and ninety percent of the third option. In other words, a long-term sustainable world class capability with really excellent data engineering would deliver very substantial additional benefits with a relatively small increase in overall costs. This is the benefit of thinking strategically and moving away from short-term planning and thinking.

However, more than seventy percent of information technology projects fail totally and a further twenty percent of major projects fail to meet requirements so how relevant is world class?

How does one avoid failure?

The next section examines causes of failure.

PART 2

CAUSES OF INFORMATION TECHNOLOGY INVESTMENT FAILURE: CRITICAL MEASURES GENERALLY NEGLECTED

CHAPTER

5

FACTORS GIVING RISE TO INFORMATION TECHNOLOGY INVESTMENT FAILURE AND UNDER PERFORMANCE

In an earlier chapter it was stated that a fundamental principle of engineering is that engineers design against failure. This chapter presents some initial thoughts on information technology failure, in order to develop a clear view of the critical factors for success.

It is hoped that by the time that you have completed reading this section you will realize that the vast majority of so-called information technology problems are people related and can be resolved by taking the right decisions at the top and executing those decisions effectively. The same applies to business optimization projects and strategic plans.

In considering this discussion a critical question is "what is the desired end state?" Based on the previous chapters it is suggested that the desired end state is "*a holistically integrated world class business solution that underpins the effective operation of the organization*".

As mentioned previously, more than seventy percent of information technology projects fail totally and a further twenty percent of major projects fail to meet requirements. Furthermore ninety five percent (19/20) of enterprise resource planning system implementations fail to meet expectations.

In examining why this is so I have built up a catalogue of factors contributing to failure. This catalogue is based on my own experience with my own projects, observations of implementations that I have been called in to review and audit, discussions with others, reading, etc.

I have found that most of these factors are also responsible for the seventy percent failure rate of business process re-engineering projects and the ninety percent failure rate of strategic plans. It is hoped that by the time you have finished this book you will see strategic planning, business optimization and information technology as three closely inter-related components of business optimization or business improvement.

More recently this data was classified to arrive at the following major categories of factors giving rise to failure. The percentages in brackets represent the relative importance of each of these factors in contributing to the failures that I have encountered during my career.

1. Information technology mythology (30%)
2. Lack of executive custody and inappropriate policies (20%)
3. Lack of strategic alignment (15%)
4. Lack of an engineering approach (12%)
5. Poor data engineering (10%)
6. People / soft issues (8%)
7. Technology issues (5%)

The first three factors, in my experience, contribute 65% of the factors giving rise to failure.

These seven factors are discussed in more detail in the chapters that follow. In presenting these chapters the emphasis is on the positive of what should be present as far as possible so that readers can draw whatever comparisons are appropriate to their organization.

In general, while reference will be made to the negative aspect of each item, an effort has been made to present the findings in the sense of positive action required to avoid these factors becoming issues in your projects. Similar principles apply to effective business optimization projects and effective strategic plan design and implementation.

CHAPTER

6

INFORMATION TECHNOLOGY MYTHOLOGY

There is an enormous amount of folklore and conventional wisdom surrounding the application of information technology in business. People make statements about information technology which do not pass the tests of practicality and reasonableness viewed in the context of other aspects of the physical business world.

People say and do things with regard to information technology which, if they were to say or do comparable things with regard to any other area of the business would result in their immediate dismissal. Yet with regard to information technology profound commitment to such statements can result in promotion.

It is essential that business people at all levels and particularly executives and senior managers take a reality check on what they believe about information technology and about what they are prepared to consider and give effect to.

In analysing the factors that fall under the category of information technology mythology I was seriously challenged not to present a litany of negative statements. The following seven factors were finally determined:

1. Information technology can destroy a business
2. Abstractness and complexity
3. Critical lessons
4. Information technology is not about technology
5. Long-term investments
6. Professional standards
7. User friendly is not about technology

These factors are discussed in more detail below:

6.1 Information Technology Can Destroy A Business

Badly designed, badly built, badly implemented, badly selected, badly ... information technology can prejudice or destroy a business.

Short cuts, low cost solutions, etc are not worth taking chances on - well designed, well implemented information technology solutions that deliver real business benefit cost much more and take much longer than most people realise or want to believe.

Information technology that damages customer relationships can be extremely expensive in real terms.

Two examples of business failure or partial failure relating to information technology failure or under performance bear mention.

6.1.1 Temporary Staffing Company

The management of this organization decided to replace their existing Unix character-based application because the existing vendor had ceased trading. This decision was taken even though the programmer of the application was still available to maintain the software on a contract basis indefinitely.

Management were adamant that the software should be "Windows based". "Windows is more user friendly" was a key motivator. This was despite the fact that at that time Windows based business applications were still in their infancy. They selected a big name accounting package.

The software ran live without the rigorous approach set out in this book. It could not handle the volumes (25,000 debtors) and within months the billing cycle was weeks behind and no management reports were available.

This escalated in such a way that a debtor's book that had been on average less than a month climbed to several months.

In response, the organization initiated the software feature to charge interest on overdue accounts. This was done without testing. There was a serious error in the interest rate calculation. A substantial number of customers went elsewhere and a growth rate of about twenty five percent per annum compound was suddenly dramatically halted. Subsequently both the managing director and financial director resigned and several other key personnel left.

To the best of the writers knowledge that organization has never fully regained the market position it held previously.

6.1.2 Major Medical Insurance Administrator

A major medical insurance administration company purchased a large conglomerate which included a managed health care component. The conglomerate was unbundled and many divisions sold off with the managed care component retained.

Within the managed care component was a large medical insurance administrator which was well advanced in the implementation of a very substantial information technology investment. The new owner sent a high profile information technology consultancy in to evaluate the implementation.

On the recommendation of the consultants the existing consultants were replaced with the new consultancy. Some months later the new consultants reported that the new system, which was then running live, would never work fully.

The customers of the newly acquired medical insurer were moved onto the systems of the owner. However, the business model of the new acquisition was not entirely congruent with the existing system and the existing systems were unable to handle the hasty transition.

Medical insurance service levels deteriorated dramatically, payment of member claims ran out to over nine months and corporate customers started to move their business to other medical insurance schemes.

Within two years the medical insurance administration company had sold off all its assets and ceased trading and the insurance company that owned the administrator was sold off and ceased trading.

6.1.3 Conclusion - Information Technology Failure That Impacts Customers Can Destroy An Organization

The lesson from these two examples is that hastily or badly implemented information systems that negatively impact customers can seriously damage or even destroy highly successful, highly profitable corporations.

If a new information technology system is to be introduced, it should only be introduced if there is a solid business case and if there is a rigorous design, development and testing process and rigorous and well designed and well executed implementation process.

If there is not the budget to do things well, it is better to remain with the existing systems and do what can be justified on a carefully managed and controlled basis to improve the operation of the existing systems.

The approach advocated in this book is designed to meet these requirements.

In the context of the mythology of information technology, the impression is often given that failure does not occur. Information technology "professionals" glibly undertake new projects and make recommendations as though failure was not an everyday occurrence in information technology. Frequently they avoid taking responsibility for failure by finding a way to blame the client. As will be seen from consideration of the points raised in this book, blaming the client is a simple thing to do.

Until the information technology industry starts to regard itself as a profession that is accountable for its failures and to discuss failure and formulate approaches to overcome failure as a routine it is likely that failure will continue to be an every day occurrence.

6.2 Abstractness and Complexity

Information Technology is extremely abstract and complex. It takes a considerable amount of professional time and associated cost to understand and implement any major package or custom development.

6.2.1 The Construction Industry Metaphor

In order to grasp the point of this section, think about any large building that you know of. The professional time required to design and construct such a large building is very substantial. The professional team which includes architects, engineers, construction specialists, etc comprises hundreds of specialist disciplines. These are individuals who have undergone training for periods ranging from about six months to advanced specialists with postgraduate degrees taking many years to qualify.

These people spend their entire time on the project focussed on their narrow area of specialization. Because they have been so rigorously trained and because they spend all their time performing tasks in the one area of specialization repetitively, they work quickly, efficiently and accurately and their cost contribution is readily predicted.

The total cost of the professional time required to develop and implement or simply to implement a major new information system truly effectively is generally comparable in dollar terms to the professional and technical time required to design and construct a large building.

However, with a building there are meticulous drawings and models. These will frequently include a cardboard model produced by architectural draughtsman from the architect's drawings. Other drawings include engineering drawings that include structural steel, concrete, airconditioning, electrical wiring, etc through to finishes and furnishings.

A large building can be accompanied by hundreds and even thousands of large format drawings covering all these aspects in order to ensure that the building is built to specification and will not fall down.

In the structural design process meticulous analysis takes place with regard to earthquake and wind forces concentrating on extreme events with a one in fifty year probability of occurrence or even longer time frames. Analysis also takes place with regard to adverse loading patterns, overloading, etc based on the usage class of the building. All this is supported by national and international standards of good practice with regard to analysis and design, earthquake loading, etc. If necessary, tests are undertaken in fully equipped research laboratories.

These standards and good practices are, in turn, supported by comprehensive analysis of failures. Whenever a structure or building fails there is a comprehensive analysis of the cause of failure. If it is found that there is a flaw in current standards or thinking this is documented and the standards and practice notes are updated. If negligence or carelessness is encountered the professionals responsible are subject to disciplinary review by their professional institutions or statutory body. This may result in temporary or permanent withdrawal of their licence to practice.

In considering the above it will be apparent that nothing like this level of rigour is encountered in the business software development and implementation industry.

It will also be apparent that this level of rigour will result in a total information technology project cost which is likely to be orders of magnitude greater than is currently considered acceptable. This is the cost of avoiding failure and is justified when one considers the real cost of failure as indicated by the examples in section 6.1 above.

It is apparent from consideration of the construction industry metaphor that the information technology industry is faced with major challenges.

One of these challenges is that in the case of a building or factory the design is represented from an early stage first by sketches and then by meticulously prepared drawings. These drawings represent a physical reality that it is possible for any executive or manager to relate to. The use of physical scale models in many cases further assists the client to see what the building will look like. It is therefore a simple matter to assess what is being paid for.

Furthermore, as design and construction proceeds, the client can at any time look at the drawings and with relatively little explanation see how things are progressing. This applies whether the client is reviewing the engineer's drawings relative to the architect's drawings or is reviewing the construction site relative to the architect's and engineer's drawings. At each stage there is a close physical correlation between the drawings and the building or factory.

This is generally not the case with information technology.

On a typical information technology project the programmers or analyst programmers or implementers can sit at a computer workstation for days, weeks or months and the client is faced with very little physical that they can relate to.

Even once an information technology project is complete, there is very little to see, the client is dependent on individual computer screen views of which there may be hundreds or even thousands in a comprehensive integrated business solution, together with diverse printed reports. In order to assess whether the solution is, in fact, according to specification, it is necessary for the client to engage in an abstract cognitive evaluation process that very few people have the knowledge and experience to engage in successfully.

The net result is that the client either is forced to guess at whether they have what they paid for or they abdicate in the name of delegation. In the first case, this guessing is frequently based on a few screens and reports that they think they recognize, often associated with corridor gossip. In the second case the client may end up basing their opinion on the opinion of a third party who is frequently not familiar with their business and therefore not able to form a relevant opinion.

It is perhaps a bit like trying to inspect a very large building with a paper bag with a pinhole in it over one's head as the only source of sight.

In order to overcome this it is necessary that information technology systems are specified down to a level of detail at least comparable to the level of detail of the construction project. This implies detailed, to-scale, screen layouts with copious documentation of every data field and every function at a level of detail and in language that a business user can fully understand.

This should be accompanied by meticulous project plans at a high level of detail that explain exactly the sequence of events required to undertake the entire project, again in such a manner that the busy business executive can rapidly form a picture of what the project looks like.

6.2.2 Implications of Abstractness and Complexity

In the context of information technology mythology, abstractness has a large role to play.

Because of abstractness executives and senior managers frequently abdicate their responsibility to junior staff who are supposedly computer literate. This is done without recognizing the irony of relegating key strategic capability to a person who is quite possibly more accomplished at playing computer games than at applying computers in ways which are strategically significant in support of overall corporate effectiveness and competitiveness.

I cannot count the number of times in interviews with senior executives and managers that they have started out the interview by apologizing for the fact that they are not computer literate. This is not an acceptable state of affairs, it is time that executives insist on achieving a level of understanding that enables them to hold informed decisions.

This cuts two ways. Firstly executives must be willing to devote more time than at present seeking to gain effective understanding of information technology projects. Secondly they must be willing to pay the price in hard currency for suitably qualified professionals and rigorous methods, such as those advocated in this book.

As long as executives are unwilling to do both of the above, failure will be a commonplace occurrence.

In this context executives should consider the question "why should strategically critical world class capability cost less than the professional service cost component of the major productive assets of the corporation?"

Other ramifications of abstractness and complexity include:

Support for old systems. I frequently encounter executives who indicate that it is necessary to replace systems because the technology (development language) is outdated and the knowledge and experience of programmers is becoming outdated. If the system is well designed in the first place and is serving the business well, there is no reason for this to be an issue. It is common practice in the maintenance of buildings and factories that technicians who maintain machines and buildings require training on the maintenance of assets which are five, ten, twenty or more years old.

If large manufacturing concerns ripped the guts out of their factories every five to ten years because the machines were becoming a bit old and the technicians were no longer up to speed on the latest technology, the cost of manufactured goods and the efficiency of those organizations would decline drastically. As I write this I am thinking of factories like paper mills, petrochemical plants and the like where the core plant can run for decades with regular programmed maintenance. In such cases, flattening the plant and building a new one from scratch is not a common occurrence.

The complexity of a fully integrated, comprehensive business solution is similar to complex factories. Accordingly, the question must be asked, why should business treat its core information factory any differently to a physical world factory?

I am firmly convinced that well developed, well implemented, well maintained systems, with ongoing refinement and customization by a dedicated team of highly paid professionals can run for decades in virtually any business today. This would be accompanied by the acquisition and integration of more advanced technology components where there is a clear strategic business case.

Similar issues of abstractness apply to myths such as statements that an application must be replaced because it is written to run as a character-based application or runs under MS DOS. This again reflects ignorance of the fact that to a greater or lesser extent Windows is still running on MS DOS and MS DOS applications run quite comfortably in a DOS window under Windows. However the information technology industry's marketeers are not great on pointing this out.

The same applies to comments about replacing character-based applications with graphical user interface (Windows) applications. The application that an operator will be most comfortable with is the application they are most familiar with and work with every day. Moving experienced operators from a character-based environment to a graphical environment will simply set them back.

Equally, the use of a mouse is frequently inefficient in the context of applications with a high level of keyboard input. So much so that one of the key requirements for well designed Windows business information software is that the software can be easily run from the keyboard without using a mouse.

There are numerous other myths that surround the information technology environment that to a greater or lesser extend result from the abstractness of the technology and the solutions. All of these myths can be laid to rest by commonsense application of the construction industry metaphor and relating what is being proposed to real world physical examples.

Ultimately, if an executive does not understand he or she should insist on asking questions until they do understand.

If this fails they should seek out a specialist consultant with the knowledge and experience to assist them to understand and to advise appropriately.

If management are not prepared to invest the time and finances required to understand and make informed decisions then they must accept the consequences.

6.3 Critical Lessons

There are critical lessons to be learned from the experience of information technology in the years to date. In particular, consider Y2K and the Internet bubble:

6.3.1 The Information Technology Industry And Y2K - A Major Credibility Problem

In August 1998, over a year before the event, I undertook a technical analysis of why the impact of the year 2000 (Y2K) on information systems could not possibly be of the magnitude that was being presented in the media. This analysis indicated that there was little technical basis for the hype that surrounded Y2K and particularly the manner in which corporations were panicked into replacing established systems hastily with so-called Y2K "compliant" systems.

This analysis was borne out by the events of January 2000. The problem was nowhere near as serious as it was made out to be.

The reality is that there is very little basis to conclude that Y2K was of really major significance at all and that the level of hype in the information technology industry was either occasioned by gross ignorance and incompetence or greed or both.

In the case of Y2K, it does also seem that because of the abstractness of the technology the media hyped the situation out of proportion and few people in the information technology industry were confident enough to state categorically that it was not a problem. The wave of what approached hysteria was difficult to resist and was compounded by various cautionaries regarding investments, banks requiring guarantees from organizations with large debts, etc. The talk of aircraft falling out of the sky, collapse of the world banking system, etc also created a psychosis which was difficult to resist. It was hard to understand so that it seemed that there must be something that people did not understand.

Accordingly, in evaluating any decision with regard to investments in information technology, it is vital to ensure that the track record of the industry and the reporting on the industry by the media is taken into account. If an investment is to be undertaken it must be based on principles that are founded in an environment other than the information technology industry.

The writer identified these short comings of the information technology industry over twenty years ago and has for the past fourteen years been actively seeking to develop a body of knowledge around the application of sound engineering principles to the effective strategic application of information technology in business.

Accordingly it is suggested that the approach set out in this book is substantially more viable and offers a substantially better probability of a successful outcome than the approaches currently applied by the majority of those in the information technology industry.

In considering the lessons of Y2K, it is important to recognize that what the media report about what "the information technology industry says" is unlikely to be a sound indication of what constitutes viable best practice at present. This applies particularly to comments relating to replacement or upgrading of enterprise resource planning or office automation systems every few years.

Note that in contemplating a major upgrade to an existing enterprise resource planning system package executives should clearly evaluate the basis on which they consider the new upgrade will provide a better fit for their business. This should include serious consideration of the basis on which the vendor would go to great lengths to develop a better fit for their specific business when their business is no longer a contender for a new procurement.

In practice, the ongoing development of any major business information product is unlikely to result in improved fit. It is almost certainly the case that the organization would be far better advised to ensure that they acquire the source code and put in place an in-house capability to maintain and extend the software. That is generally what would be done in a physical factory situation.

6.3.2 The Internet Bubble That Burst

Another example of how the media hype around the information technology industry has resulted in outcomes that have been seriously sub-optimal, relates to the Internet.

Very substantial investments were made in Internet companies, many of which eventually collapsed with serious impact on stock markets around the world. This situation was a combination of media hype based on ignorance and information technology company marketing, which seems to have fed this hype without conscience.

The Internet bubble burst, at least in part, because it did not take account of the way people are.

The hype imputed human like characteristics to the Internet and computers generally that do not exist and are unlikely to ever exist in the way that people sometimes speak about them. Drastic changes in human behaviour for intangible and often unattainable benefits were assumed and have seldom materialized.

The Internet does have diverse and powerful applications and has transformed the nature of certain businesses and opened the door to new businesses that could not have existed otherwise.

However, the Internet's impact on the internal business of most large corporations is unlikely to ever be dramatic. It will require that there are specific Internet applications developed to provide customers and others with access to very specific, probably very limited, areas of the corporation’s business such as on-line order entry.

Such applications will require the careful design and development of specific Internet applications to run against the existing back-end databases. These should be designed with specific functionality to allow third parties to perform clearly specified tasks with clearly specified quality control, security, etc.

None of this requires the whole of the enterprise resource planning system to be Internet enabled or Windows based. It is probable that only a very small proportion of the total number of screens in any enterprise resource planning system will ever require to be mirrored with Internet screens. Since the application of those screens will be different to in-house use they will almost certainly co-exist with the existing enterprise resource planning system screens.

Similar remarks apply to screens that might be developed for use by sales representatives for remote order entry.

In terms of reporting, most high-end query and reporting tools to run against information warehouses offer the capability to deliver reports over the Internet so that management can access reports when out of the office.

The lesson of the Internet is again to be wary of media hype and to do only that which is practically necessary to exploit the strengths of the Internet in support of the strategic and operational objectives of the business.

6.3.3 The 19 Out of 20 Enterprise Resource Planning System Failure Rate

The report that indicates that 19 out of 20 Enterprise Resource Planning (E.R.P.) system investments "*do not deliver what is promised*" has been referred to previously (McLeod 2003).

In the context of the statistics presented in chapter 1 to the effect that seventy percent of information technology investments fail totally and only ten percent succeed, these statistics, indicating that only five percent of enterprise resource planning investments fully succeed are shocking.

Bearing in mind that since most corporations today have systems which are functioning to some degree, any decision to replace them, rather than refine and optimize them, requires careful consideration.

The key point to note with regard to the article referred to in chapter 1 relating to enterprise resource planning system failure is that the information technology industry has been actively and profitably involved in all these failures or sub-optimal outcomes. The challenge for those involved is to learn from their mistakes and apply techniques which avoid repetition of these failures. The approach advocated in this book is intended to offer such an approach.

The Y2K situation also has a bearing on this point. In taking a decision to proceed with any information technology investment, organizations would be well advised to seek an approach that is materially different to the approach that they have adopted in the past. They should also adopt an approach that is materially different from that applied by organizations which have participated in the ninety five percent failure rate reported above.

This applies unless such organizations have actively recognized the mistakes of the past and explicitly adopted a new approach which clearly addresses the factors giving rise to failure. These points apply particularly to any major investment. They are also relevant to even relatively minor information technology investments

Clearly this represents a challenge.

It is suggested that the only criteria that are valid are those that apply to engineering projects in any other discipline. That means rigorous, systematic analysis down to the last "nut and bolt", comprehensive documentation, check, check and check again, clear professional accountability, strong multi-disciplinary teams with strong, systematic, hierarchical leadership, direction and governance and rigorous discipline and commitment to quality.

Inherent in this approach is a level of discipline that recognizes that the professional engineer is subject to statutory professional sanction in the event of non-performance.

It is suggested that most of these requirements are lacking in the way that much of the information technology industry recommends that projects of fundamental importance to organizational survival and prosperity should be undertaken.

There are moves in this direction taking place in the industry and there are organizations that are succeeding in the effective application of information technology that appear to be applying some or all of the principles advocated in this book. However there are currently a relatively small number.

On the other hand, these disciplines are regularly applied in all forms of engineering project which are led by registered professional engineers in accordance with internationally recognized norms and standards. Accordingly it is suggested that any proposal for meeting the requirements of a new corporate information technology investment should comply with the standards and practices of the engineering industry, adapted as appropriate to the requirements of business information systems.

It is suggested that the approach offered in this book meets this requirement to a level that offers an acceptably low probability of failure and commensurately high probability of success provided the recommendations are fully adopted and applied in practice.

These observations support the view that the development of robust, repeatable techniques for ensuring the success of information technology investments is almost certainly the next information technology wave.

6.3.4 Conclusion: Critical Lessons

The overall lesson of this section is simply that there is an enormous level of failure in the information technology industry and an enormous lack of acknowledgement of the issues as well as lack of apparent concern.

It seems that many in the industry consider it acceptable to be involved with things like Y2K, make substantial profits and then, having found that the problem was nowhere near as severe as they made it out to be, carry on as though nothing has happened.

Regrettably, it appears that much of the information technology industry today is driven by its marketing and sales machines rather than by any commitment to professional standards and accountability.

6.4 Information Technology is Not About Technology

From consideration of the previous sections I hope it will be increasingly clear that information technology success is not about technology. It is about what the business and people do with the technology that creates benefit, efficiency and competitive advantage.

Mature business managers need to grasp that young enthusiasts do not know more about business and how to apply technology in their businesses.

Information technology is just a tool and it is quite possible for a mature business executive to gain the necessary practical insight to manage it like any other tool or asset.

Information technology does not fix anything, it is what the business does with information technology that makes a difference.

Only the business can deliver return on investment, the technology cannot.

Technology does not have a personality, no matter how much people speak about it as if it does.

Process is not the essence of the solution, the data and the business is.

Windows is not the solution for all ills.

The Internet is simply an additional communication channel.

One package will never fit every business or organization.

Each organization is unique and differentiated, that is why it exists successfully, why should an off-the-shelf package be an excellent fit?

6.5 Long-Term Investments

Information technology investments can have lives of five, ten, fifteen, twenty or thirty years. Information technology today is a mature technology. It is how the technology is applied in the organization that is the challenge.

Information technology is advancing much slower than industry marketing hype makes out.

It is not necessary to pursue every upgrade.

Customization of packages to fit each organization and accommodate growth and change is probably desirable in key strategic areas.

Maintain and evolve, rather than slash and burn. Slash and burn is not frequently warranted.

The next "wave" of technology will not make existing investments obsolete with very few and very specific exceptions.

Five year plus amortization periods are increasingly achievable and justified.

6.6 Professional Standards

Professional registration, professional liability and litigation have proved essential balances to malpractice, negligence and incompetence in other areas of business such as engineering, accounting, medicine, etc. The time is ripe for this to happen in information technology

It is vital that the owners of systems that fail are willing to litigate against the service providers and product suppliers who often charge fees amounting to millions in hard currency and then walk away when the investment underperforms or fails or demand more money to rectify it.

At the same time, owners must clean up their own act in terms of being willing to pay what it costs to do the job thoroughly and effectively using methods such as those advocated in this book.

In conjunction with this there is a real need for the representative information technology associations and bodies to start taking measures to require formal registration and a code of conduct with high levels of ethical performance.

In practice the necessary professional standards may well only become a reality when governments of countries like the United States of America, Britain, etc legislate for professional registration and accountability.

This will be a long process but is a process that it would be wise to put in train as soon as possible.

6.7 User Friendly Is Not About Technology

User friendly is NOT a brand or product, it is a set of standards and good design.

User friendly is also what users are accustomed to.

Apparently simple solutions are internally complex and costly to develop and implement.

The most widely known brand very seldom offers the most effective software solution to any requirement.

An enormous amount of information technology mythology hides behind the subject of "user friendliness". Yet, in the physical world, manufacturers produce machines with non-standard controls and operators learn how to use them effectively.

6.8 Conclusion: Information Technology Mythology

There are some things about information technology marketing that give cause for concern.

There are some fundamental assumptions about the way the information technology industry does certain things that do not make sense.

Surely there is a better way?

Hence the "engineering approach" that is advocated in this book.

It is important to recognize that there is an enormous amount that is good about the information technology industry. There are excellent products and excellent, dedicated, loyal people.

The problem is with how the technology is effectively employed in support of business strategy and business effectiveness and efficiency.

It is recommended that the solution lies in tying the technology together with the proven approach of the rest of the engineering industry adapted to this specific situation.

At the same time it is necessary to evaluate every statement that has the potential to fall into the category of mythology against physical world realities and carefully assess impact. If this is done it will be found that items of mythology will be relatively easily identified and eliminated.

CHAPTER

7

EXECUTIVE CUSTODY AND POLICIES

On analysing the data that has been acquired relating to lack of executive custody and inappropriate polices, the following major headings were determined:

1. Role of executives in strategic leadership
2. Systems support decision-making and do not make decisions
3. The issue is support for competitive advantage not productivity
4. The cost experience curve, utilize resources effectively and efficiently, recognize true cost, where errors originate
5. The fundamental components of information technology
6. Cost versus quality versus speed
7. Inappropriate policies

These are discussed below:

7.1 Role of Executives in Strategic Leadership
The role of executives in leadership of organizations should be primarily strategic and not operational. A well designed and well implemented corporate strategy will ensure that the operational side of the business is running effectively so that executive management can focus their attention on creating and sustaining competitive advantage.

Porter (2003) states *"The greatest barriers to strategy are often self imposed and many are internal. Strong leadership by the chief executive officer is almost a necessity if strategy is to be created and implemented."*

Porter goes on to say:

> *"The only way to have strategy work is to have clear leadership that remains focussed on strategy, trade offs, etc*
> *"The essence of strategy is how the things the firm makes integrate into a holistic whole*

The need for executive management to provide leadership and think about all the issues is absolutely vital in the context of business information systems. Only executive management can have the full strategic picture of the organization. Accordingly, only they can ensure that information technology is strategically deployed in support of the business in order to deliver the benefits outlined in chapters 2 and 3.

In auditing existing situations it is frequently found that the absence of real executive custody of the business information systems by executives is a major issue. By custody I refer to a parental sense of ownership not some distant hands-off or arms-length relationship. Executive management who are seeking to use information technology as a competitive tool must have an intimate relationship with the tool and the data it contains. This requires effort to acquire.

If executives are not willing to make such an investment they should let go of the pretence that they regard information technology as strategic or that they want world class information technology capability.

Abdication on the basis of "I'm not computer literate" and other mythology is widespread and must be overcome.

What is required is a different type of literacy to the ability to play computer games, do simple or even complex manipulations in spreadsheets, etc. It is a form of literacy that is able to see a wide vista of information opportunity for the business and to communicate and manage that vision to becoming a reality. It requires a hard pragmatic

view of the world that sees the use of information technology as a strategic resource. With such an outlook the executive management of the organization can achieve major break throughs.

Executives should treat information technology the way they would any other major capital investment. Typically this will involve the appointment of competent professionals and understanding enough to make sure they get what their business requires.

7.2 Systems Support Decision Making and Do Not Make Decisions
I make use of something that I refer to as the "measurement action generator".

This states simply that information technology:
1. Collects
2. Collates
3. Summarises
4. Synthesizes
5. Presents
information

While people:
a. Interpret Results
b. Take Decisions
c. Implement Decisions

People can also perform 1 to 5 and frequently do. Insofar as 1 to 5 are repetitive and reproducible a computer can be programmed to perform the same task.

In the context of process automation and similar applications computers can also perform a, b and c.

However, when it comes to new decisions that have never been taken previously, as applies in the general day to day context of strategic management, computers cannot perform a, b and c. Human beings are required to perform this function today and I do not see this changing in the future. For as long as business leaders take new decisions to respond to new situations it will not be possible for computers to automate the entire decision process.

In considering the above points it is vital to note that when organizations introduce systems such as those outlined in chapter 2, job content is likely to change. People who are performing 1 to 5 above will at best have their jobs radically transformed to undertake analysis of the data available to them or will in the worst case be without a job.

Appropriate human resource measures to deal with this situation are therefore an essential component of any significant information systems implementation plan. This is catered for in terms of the subject of business optimization in part 3.

In considering what might be termed the "informed decision process" it is important to recognize that in most strategic business decisions only a limited amount of the information on which the decision is based comes from a computer system.

At the same time, frequently the key data that could be in the computer is not there because it is not considered when systems are designed. The active role of executive management in identifying soft strategic data that is not typically captured in a computer system is essential. This should include numeric measures of customer satisfaction and staff satisfaction but can include many other aspects as well.

Use is frequently made in the information technology industry of triangles or pyramids to reflect flows or otherwise depict logic or structure. These can be very effective.

An example would be the flow of data from operational systems through integration and consolidation to presentation and analysis tools.

The key aspect of this pyramid is decision-making supported by the presentation and analysis tools. This requires involvement at the management, senior management and executive levels. This is frequently not taken into account in specifying systems or deciding on procurement.

Another pyramid reflects the data in an information warehouse / repository being reported on using server based reporting, batch reporting and graphical reporting tools with more sophisticated analysis being undertaken using executive information systems (E.I.S.) and on-line analytical processing (O.L.A.P.) modelling tools. Again the most essential component of this pyramid is the decision-making which determines whether the investment is world class or not or in fact serves any useful purpose.

In considering this aspect it is also important to recognize that there is no single "silver bullet" when it comes to purchasing packaged software. Rather choose the right tool for the job. For example for analysis and reporting the organization can have a collection of tools, some of which perform some tasks better than others.

The effective business data analyst does not have to have one all purpose machine in their tool-box, they can have multiple products for different purposes. What really matters is the extent to which they deliver effective management decision support.

Effective decision support relates particularly to incorporation of fundamental first principles analysis of business information, activity based costing and other analysis. Support for strategic analysis includes comprehensive disaggregation and support for current and future information needs.

Throughout this book use is made of the word “system”, it is important to recognize that generally most so-called "computer systems” begin and end with people. In other words people are part of "the system".

In fact, in your organization, you are part of "the system".

So, that from an executive perspective the real issue today is the ability to comprehend the full potential of the technology and exploit these capabilities for long-term competitive advantage.

This is the essence of what executive managers should take custody of.

7.3 The Issue is Support for Competitive Advantage Not Productivity

There is a strong tendency amongst executives to seek to build the business case for information technology investments based on productivity.

Productivity was a factor in the gains from information technology investments in the seventies and eighties but this is not the case today. In general, while there may be inefficiencies in the overall operation of the business which may be considerably improved by the implementation of a well designed and well implemented integrated information system these savings will not cover the true cost of undertaking the information technology investment.

Thus, while productivity may be a component in building the business case, other factors must also be taken into account.

As indicated in chapter 2, the big advantages will come from support to create and sustain competitive advantage.

Executive management must take custody of this objective if it is to become a reality.

7.4 The Cost Experience Curve, Utilize Resources Effectively and Efficiently, Recognize True Cost, Where Errors Originate

The relationship between cost and experience follows an exponential curve.

The design, construct and implement component of a system investment is characterised for the average organization by high cost and little benefit. It is non-recurrent and therefore can be at least partially outsourced to organizations who provide those professional services on an ongoing basis, provided that they have methods that work.

Recognize that the organization is, in a real way, its own prime contractor since the changes that the new system implementation brings are to the business itself. Accordingly there are limitations on what can be outsourced and the final accountability for the outcome of the project must rest with the business.

This is a challenge as it provides an almost guaranteed escape hatch for unscrupulous or ill-informed service providers to avoid delivering what they contract to do. Accordingly, an overall approach such as set out in part 3 is an essential requirement.

On the other side of the cost experience curve, the operation of the system overall costs are low and, if the system has been well designed and implemented, the benefit is high and accordingly there is no basis to outsource this component.

This analysis highlights one of the anomalies of the information technology industry today. Major corporations go to great lengths to develop and implement new systems and they then outsource the operation of those systems to third parties. In doing this they potentially sacrifice a significant component of their capability to create competitive advantage using the systems they have outsourced, particularly if the outsource contractor is also contracted to major competitors.

In considering this point it is important to recognize that the real cost of computers to the organization is very much greater than the cost of hardware, software, training, communications, etc.

Statistics indicate that the corporate cost of information technology support can be in the vicinity of forty percent, that is the cost of support staff, information technology management and administration, time taken in formal meetings relating to information technology, etc.

The cost of informal support can run to about twenty five percent. This includes time spent by staff assisting other staff, staff dealing with problems of their own making, etc.

These two percentages are illustrative only, they can vary over a wide range. What is important to note is that ineffective systems, ineffective support, etc can lead to the informal cost rising dramatically. In extreme cases this can result in this component costing far more than the other components together. However, few corporations appear to seriously take this component into account when reckoning information technology budgets, planning new projects, etc. It is almost taken for granted that a portion of the information technology operating costs will be hidden in organizational inefficiency.

With appropriate standards and policies, upgrading of office automation software at appropriately long intervals (say every five years) and other measures these informal costs can be drastically reduced. This can also be assisted by designing and implementing enterprise resource planning and other systems to fit the business like a glove and avoiding any inefficiency that gives rise to reduced operator productivity.

The ratios of direct hardware and software cost to formal and informal support cost change significantly depending on whether one is referring to a transaction processing system or the transaction processing component of the enterprise resource planning system or whether one is referring to the strategic decision support component.

The operators at the transaction processing level tend to be low cost and therefore the labour component of this side of operations tends to be low.

The users and operators at the strategic decision support level however tend to be middle to senior managers whose time cost can be substantial. Accordingly, inefficiencies at this level are very expensive.

Unfortunately, as discussed in the next section, inefficiencies in transaction processing systems in terms of data quality and related issues frequently only really manifest at the decision support level. It is therefore vital to ensure that the solution is well designed and well engineered at all levels.

Another dimension of cost versus experience is to consider where errors originate in typical system development projects. Indications are that fifty five percent of errors originate during analysis, thirty percent in design and only fifteen percent in construction and implementation. It is necessary to reduce errors in all these components.

Note that to the extent that organizations cut corners in analysis and design they will reap the harvest in implementation and operation. Regrettably, owing to a lack of understanding of these principles many organizations cause themselves considerable loss through cutting corners in analysis and design relative to the calibre of person they employ or contract to do this work. This is particularly the case in the context of strategic understanding of the business during the analysis and design stages.

As with the previous factors, real executive understanding and custody is an essential requirement.

7.5 The Fundamental Components of Information Technology

Taking a slightly different perspective on the environment there are two fundamental components of information technology These are:

1. Input and transaction processing which relates to the operational database and constitutes of the order of ninety percent or more of all information technology experience to date.

2. Executive level high-end inquiry and analysis built on an information warehouse which accounts for perhaps 5% of all information technology experience to date.

The second point is where the real strategic and competitive advantage is unlocked provided that the potential for this to happen has been built into the data at the outset.

This is where the concept of data engineering becomes vitally important. It is only by incorporating executive level strategic understanding of the business into the data classification schemes, data table design, etc that this information will be available to be unlocked at the decision support end of the system environment.

If only clerks are involved in the design of the data structures, data classification, etc then the resulting management information capability will turn out to be a clerical information capability instead.

This aspect may be the single biggest weakness of the vast majority of information system implementations in the vast majority of small, medium and large organizations. It is behind the inability of most organizations to provide executives with really meaningful decision support capability. As a consequence this represents one of the greatest opportunities for organizations to invest effectively in creating sustainable competitive advantage through the effective harnessing of information technology, as set out in chapter 2.

This use of data structures and code schemes designed top down with an integrated, holistic, strategic view of the business is a vital component of overcoming what are frequently referred to as islands of information. Islands of information are the islands that result when an organization has a diversity of different computer software products which cannot share data. The result is that data is entered more than once and that consolidated and meaningful strategic analysis is not possible.

The traditional information technology approach to this sort of problem is to scrap the system and start again, frequently replacing a variety of custom developed systems with a massive, “one size fits all”, enterprise resource planning system.

Referring again to the physical world analogy, demolition is the act of last resort. Typically if there are a number of buildings or factories on one site the real world engineering approach would be to construct bridges, tunnels, etc to link the buildings and factories together to the extent necessary to get the job done. Only if the buildings were so derelict and decrepit that the cost of integrating them was not justified would the buildings be demolished.

In the information technology field there are diverse technologies available today to handle replication (duplication) of data between databases and if this is not practical all data can be loaded into an information warehouse and restructured as necessary to provide support for required analysis.

Problems will occur if the data specifications for the same data are materially different in different software applications, if there are logical non-conformities between the systems and if there are differences in validation data code structure and content. These can all be overcome by making changes to the software and, where necessary, re-implementing the systems with clean, well designed structured codes as set out in chapter 10.

With a mature engineering approach to systems remediation, scrapping of systems can be considerably reduced and existing systems can frequently be given a new lease of life.

As with all these points, it is vital for business executives firstly to understand that these issues exist and are real and then to take custody of the decisions that result from this understanding. In doing this they would be well advised to be assisted by a competent professional. I use the term "strategic solution architect" to refer to a person who is able to assist management to sift through the available information and reach a quality decision.

7.6 Cost Versus Quality Versus Speed

Real world economics dictates that in any type of investment there are three parameters any two of which at extreme value are mutually exclusive of the third. These parameters are cheap and fast and good.

It is possible to develop a system that is good and fast but it will not be cheap, or it can be fast and cheap but it will not be good or good and cheap but it will not be fast. In the real world most project and procurement decisions require compromises with regard to all three of these factors.

However, in information technology there are a large number of executives who seem to be convinced that it is possible to attain all three, that is a good system, that is cheap and fast. I have yet to find a solution that conforms to all three of these parameters.

As with other references to practical real world examples, this example requires management to be practical and pragmatic relative to what can be attained and make the necessary compromises to achieve a balanced outcome.

7.7 Inappropriate Policies

Policies are management decisions that have been adopted as non-negotiable guidelines for the operation of the organization.

Many of the above points, because they are not understood by executive management, give rise to inappropriate policies.

Examples of inappropriate policies include management decisions such as:

- Must be Windows based

- No customization
- Upgrade with each new release
- etc

Frequently these are positions taken by management without clear understanding and analysis of implications, yet they end up dictating numerous aspects of business operation. Often they are based on information technology industry mythology or marketing hype.

Other policies give rise to what might be termed technology obsession. This includes policies such as:

- Upgrade at any cost
  The very latest
  Even if it is not tried and tested

- Lack of Standardization
  Each user a different version
  No attempt to optimize user effectiveness
  and efficiency

- Information Technology is seen as an "End in Itself"
  It is not
  It is simply a tool

In fact, technology only matters when it does not work!

The setting of policies should not be the result of throw-away lines gained by executives from colleagues no better informed than themselves. Policies should be the result of careful and informed investigation and consultation and systematic impact assessment and risk assessment before they are tabled for decision-making.

Executive managers who take information technology policy decisions without considering all aspects are not serving the organization well.

7.8 Conclusion: Executive Custody and Policies

It is hopefully apparent from the above that the ambit of executive responsibility with regard to information technology is considerably greater than the executives of most large organizations would like to consider acceptable.

This includes a responsibility to assess the physical world realities of statements that have the potential to fall into the category of mythology and, if appropriate, take the necessary measures to remove that vocabulary and belief from the culture of the organization.

My ongoing experience indicates that until executive management take the subject of executive custody and policy seriously and confront and act on it effectively, the future of information technology in business will continue to be mediocre to disastrous.

CHAPTER

8

STRATEGIC ALIGNMENT

The focus of this book is the strategic application of information technology in support of competitive advantage.

Accordingly, the definition of strategy and therefore the determination of the requirements for strategic alignment are an essential component of this book.

My own thinking on strategy was significantly influenced by my career as a part time soldier and finally military commander during which time I rose to the rank of Lieutenant Colonel in command of an engineer regiment. In the process I successfully completed the relevant courses.

Some years later, while writing a white paper on the importance of strategic alignment of information technology I thought myself well qualified to define strategy. It came as something of a shock to discover that after several pages of military metaphor that I was unable to define strategy concisely and in a way that I thought others would be able to identify with.

Shortly after this I encountered the work of Profession Malcolm McDonald of Cranfield School of Management on strategic marketing planning and found that I strongly identified with his definitions and approach. In the years that followed I have based certain key principles of my work on McDonald's Exmar methodology and undertaken considerable research and development to extend these concepts. My thinking on this subject is presented in part in chapter 33.

Subsequently I encountered the work of Michel Robert (Robert 1993) on strategic driving force and this further enhanced my understanding of a concise definition of strategy in business.

Professor Michael Porter offers further insight that is important.

In light of this experience and many discussions with clients during the years, I am increasingly convinced that many organizations do not themselves have a clear understanding of what they mean by strategy and do not have a clear strategy. This is one of the key reasons why many organizations fail to develop an effective approach to the strategic application of information technology.

Accordingly, in the next few sections a short summation of the positions, as I understand them, of the people mentioned above is offered together with a few thoughts of my own.

8.1 Professor Malcolm McDonald

McDonald defines strategy simply and elegantly as “doing the right things” (McDonald 1989). He defines tactics as “doing things right”.

McDonald expresses the relationship between strategy and tactics as a matrix as illustrated in figure 8-1.

In this figure, the Strategy (horizontal) axis moves from very bad strategy on the left to excellent strategy on the right.

The Tactics (vertical) axis goes from very bad tactics at the bottom to excellent tactics at the top.

The four quadrants of the matrix, which is represented in our corporate logo and on the cover of this book, reflect:

1. Die Slowly

   Bad strategy and bad tactics in the bottom left corner which gives rise to a corporate condition which McDonald refers to as "Die Slowly" - the organization is doing the wrong things very badly so the wrong things only have limited adverse impact.

2. Die Fast

   The top left quadrant represents bad strategy and good tactics and gives rise to a corporate condition which McDonald refers to as "Die Fast" - the organization is doing the wrong things very well.

3. Survive

   Good strategy and bad tactics are represented by the bottom right quadrant and gives rise to a condition which McDonald refers to as "Survive" - the organization is doing the right things but doing them badly so they derive limited benefit.

4. Thrive

   Finally, the top right quadrant represents good strategy and good tactics and gives rise to a corporate condition which McDonald refers to as "Thrive" - the organization is doing the right things well.

Expressing the relationship between strategy and tactics in other terms, there is no point in a pilot executing a perfect landing on an aircraft carrier that is about to hit an ice berg.

McDonald goes on to assert that Strategy is not forecasting and Strategy is not goal setting. In determining strategy an organization must have an objective but the objective is not the strategy.

A strategic plan maps the trajectory of change from the forecast future state to the desired future state taking account of the practical constraints to change. An effective strategic plan should follow an exponential trajectory of change as illustrated in figure 8-2.

This trajectory of change can be regarded as the path to competitive advantage.

Figure 8-1: McDonald's Strategy - Tactics Matrix

From consideration of this diagram it is apparent that information technology utilization must be strategically (future) focussed.

In other words, design your systems for the future, not the past. Effective information technology is vital to delivering information for effective decision support and strategy implementation.

One of the pitfalls that many organizations fall into in designing or specifying new business information systems is that they engage in design sessions with users who are currently living with highly sub-optimal systems. Without effective strategic facilitation by a skilled and experienced senior solution architect these people will specify the system they wish they had several years previously. In contrast they should actually be looking at the system that they hope to have when the organization reaches its strategic objectives in several years time.

The result is frequently that, by the time the system has been developed and deployed, it is now the system they wish they had years previously. It will therefore be automatically outdated when it first runs live.

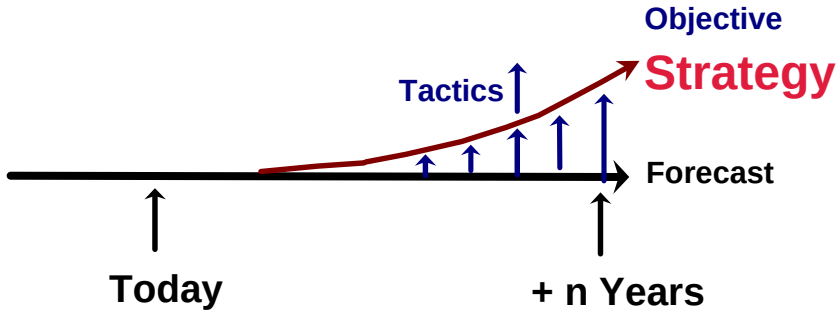

Figure 8-2: Strategic Plan --> Trajectory of Change

This is a major challenge with any significant information technology investment. Ensure that the design is based on where executive management consider the business is going in the next few years. Again this requires a high level of executive input. Not necessarily large amounts of time but high quality focussed input that ensures that vision for the future and management's view of the information they will require at the time they get there are accurately captured and accurately encapsulated in the solution design and implementation.

An experienced strategic solution architect leading the design process is vital.

Figure 8-2 also indicates that tactics are the forces or projects that one applies to bring about the required strategic change in direction. It is therefore apparent that in order to achieve a really significant strategic change in the organization a considerable number of projects and activities are required. Some of these projects may be information technology projects but in the broader scheme of things it is not necessary for any information technology projects to form part of this.

8.2 Michel Robert

Robert defines ten types of strategic driving force and asserts that for an organization to be truly strategically effective it must major on only one of these. The ten areas of strategic driving force together with the nineteen possible areas of excellence as defined by Robert and their associated strategic talent or expertise, are set out below (Coopman 2003).

Strategic Talent Required to Support Areas of Excellence

Driving Force	*Area of Excellence*	*Strategic Talent or Expertise*
1. Product	*. Product development* *. Service / Sales*	*. Product design expertise, e.g. best car designers* *. Product service / sales expertise, e.g. excellent after sales service*
2. User	*. User research* *. User loyalty*	*. Marketing expertise* *. Expertise in user satisfaction optimization*
3. Market	*. Market research* *. Customer loyalty*	*. Market knowledge expertise* *. Expertise in customer satisfaction, e.g., best CRM expertise*
4. Technology / Know-How	*. Research* *. Application marketing*	*. Scientist / engineer expertise, e.g. nanotechnology expertise* *. Application engineer expertise*
5. Production Capacity or Production Capability	*. Manufacturing / Plant efficiency* *. Substitute marketing* *. Distinctive production integration capabilities*	*. Manufacturing efficiency expertise* *. Marketing expertise* *. Manufacturing process design*
6. Sales / Marketing Method	*. Sales recruitment* *. Selling efficiency*	*. Sales training efficiency* *. Sales process design expertise*
7. Distribution	*. Logistic effectiveness*	*. Logistics process design expertise*

	. System organization	*. Continuous distribution process optimization expertise*
8. Natural Resources	*. Exploration*	*. Proprietary exploration expertise e.g. deep water oil drilling*
	. Conversion	*. expertise e.g. Metal alloys expertise*
9. Size / Growth	*. Portfolio management*	*. Financial asset management expertise*
10.Profit	*. Information systems*	*. Financial asset monitoring expertise*

It is important to note that most, if not all, of the areas of strategic driving force are relevant and even important for most organizations. However, this is not the point. Robert's point, as I understand it, is that only one of these points should be the primary (strategic) focus of operations of the organization. All the rest are operational factors in support of the core strategy.

Note also that driving force 10 "Profit" has as area of excellence "information systems". In other words, precise activity based measurement of costs linked to revenue are an essential area of excellence in any organization that is geared primarily to generating profit. Accordingly, it seems reasonable to conclude that in any corporation where profit is important, the effective use of information technology is also vital.

Loosely applied I have found the concept to be exceptionally useful in rapidly isolating the essential strategic driver of client organizations and, from this, determining the basis of strategic alignment.

8.3 Professor Michael Porter

Porter asserts that those with a clear strategy are very consistent. He cites BMW, South West Airlines and Dell to support this assertion. He indicates that Dell have followed the same core strategy for over twenty years and that South West Airlines have followed theirs for even longer.

> *STRATEGY AND CHANGE*
> *Once in a while will be changes that require a change in strategy ... good strategies have a value proposition that is robust, group of customers that is enduring*
>
> *There ARE technologies that are disruptive but they ARE rare*
> *Do your OWN work in terms of value impact. Migration, can I embrace?*
> *IF it invalidates a lot of my value chain THEN change*
>
> *WHAT IS NOT STRATEGY?*
> *The Internet or any technology*
>
> (Porter 2003)

This again is a vital point. Technology is not strategy. Information technology can be used in support of a business strategy, as set out in chapter 2 and elsewhere but the technology itself is not the strategy.

8.4 Summing Up: Definitions of Strategy

Strategy is a unique value proposition and a distinctive value chain as defined by Porter. It is the right things as defined by McDonald. It is the strategic driving force as defined by Robert.

A true strategy conforms to all of these definitions and provides a solid and robust way of the organization doing business.

It is important that, in formulating strategy one approaches the subject with one's eyes wide open and that one recognizes that it is difficult to think about all the issues.

Effective strategic analysis and design requires that the activities of the business are examined together with the segmentation of markets, products and purchase opportunities. Trade off's will be required with regard to the overall value proposition and value chain. Activities should be examined in terms of seeking true uniqueness, new activity combinations and choices.

A strategically effective organization will be consistent in its strategy and the application and implementation of its strategy. There will be continuity over a long period of time, not constant unstructured change. Strategically focussed organizations will develop skills that are truly unique and will constantly tune and polish these skills. They will always be looking for ways to more effectively deliver on their strategy.

When an organization has a very clearly defined and understood strategy they will find it much easier to respond to change.

In practice, while many speak of technologies being disruptive, it is seldom the case that a new technology will really disrupt the market, particularly at the strategic level. In general, the Internet was not disruptive, most of the existing players made better use of the Internet in the long term. Particularly those with clearly defined strategies.

The ultimate measure of an effective business strategy is determined economically. If one examines the fundamental drivers of economics it can be argued that these drivers seldom if ever change.

In discussing strategy, it is important to keep in mind the distinction between strategy and tactics offered by McDonald. A similar distinction applies to operational effectiveness which is, in effect, a dimension of strategy.

Operational effectiveness involves taking on board best practice, achieving those standards and extending the standards. Effectively, it is about running the existing race better and faster. Strategy on the other hand, is about positioning the organization to create a competitive position which is differentiated and which can be sustained. It is about redefining the race or choosing to run in a different race.

Amongst other things, a true strategy will have a distinct value chain and a highly differentiated value proposition which will create a unique, sustainable, differentiated market position.. This includes identifying trade-off's and deciding on activities that will be excluded from the strategic profile.

There are frequently internal barriers to strategy. Introduction of off-the-shelf information technology solutions in fields such as enterprise resource planning, customer relationship management, supply chain management, etc results in the introduction of standard processes and approaches which may cut directly across the fundamental strategic driver of the business.

I have encountered a number of instances where the introduction of a standard package has actively compromised a critical business differentiator. Sometimes this has resulted in the loss of customers.

Customization of a standard enterprise resource planning system or retention of a long serving custom developed system are both potentially highly strategically valid options.

If neither of these is possible, custom development round a core base financial system should not be ruled out provided it is undertaken using the approaches set out in part 3.

Effective strategic alignment requires that the information systems are closely aligned with this strategy and support it fully. They should never cut across, oppose or undermine the strategy.

Thus, if the strategy is excellence in customer service the information systems must be aligned in every possible way without compromise to support the business in delivering this excellence. The moment the information system requires compromise in this area it has become the enemy of the long-term competitive advantage of the organization.

As indicated above, the introduction of off-the-shelf systems frequently has this effect.

Strategic alignment is therefore something that is required at every stage of the requirement definition and procurement processes and should also inform decisions with regard to customization, etc.

If the most cost-effective solution is an off-the-shelf product, then ensure that during negotiations the source code is secured together with the necessary ongoing support. Alternatively ensure that customization at market related rates to customer specification will be a long-term option. This should be coupled with release of source code in the event that service levels are not up to standard.

8.5 The Technology Life Cycle as Represented by McDonald

Figure 8-3 reflects the traditional technology life cycle as represented by McDonald.

The table behind the curve indicates the product characteristics, price attributes and management style associated with each of the four phases of the product life cycle.

From consideration of this graphic it is apparent that when the use of technology itself is visionary then it is necessary to use leading edge or even bleeding edge technology. However, when the information technology itself is not central to the organization's strategy, technology in the service differentiation or commodity stages is perfectly adequate.

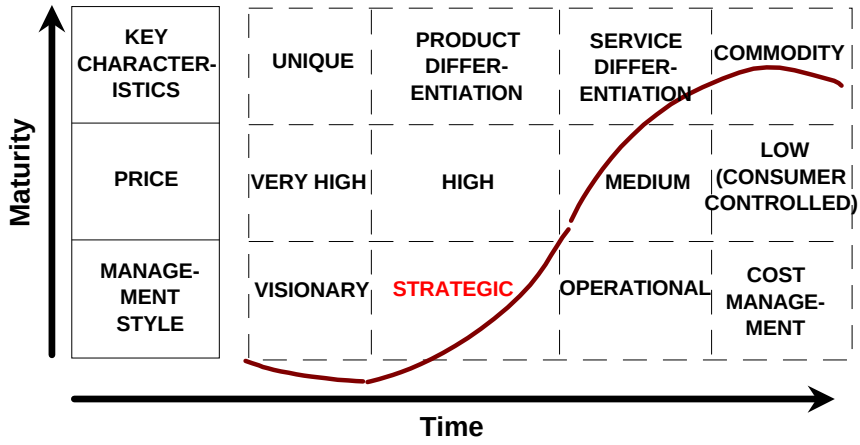

Figure 8-3: Technology Life Cycle, after McDonald

It is important to recognize that by the time a particular technology product has reached the commodity stage there are large numbers of users and technicians available, the rough edges and bugs and have been ironed out and, overall, the product is far more reliable. It may not be attractive from the perspective of the people trying to sell the product but it should be very attractive to the business executives who are buying.

However, much of the marketing in the information technology industry is geared to creating the impression that the technology is so fast moving and advancing so rapidly that it is constantly in the unique or product differentiation stages and never reaches the later two stages.

This same approach is used in marketing other commodity products like motor cars.

However, careful examination of the functionality that is actually required to service any particular business will generally reveal that technology that is several years old is entirely suitable for the business application.

Careful consideration of the office automation product market will reveal that the level of sophistication at which the products are being employed is such that whether users were using the latest version or software that is five years or more old would almost certainly be immaterial.

I currently use a twelve year old character-based word processing package to originate my documents, including this book, loading the document into a five year old package for final formatting and addition of graphics. I also use ten year old presentation graphics software in preparing presentations for conferences, seminars and training. I make the point that not one of the delegates can tell me what software is being used just from looking at the slides.

My reason for doing this is firstly because I consider the older technology to be more elegant and more reliable. I do it also to make the point that it is quite possible for the average organization to only upgrade its office automation suite about every five years. In the years to come it will be possible to limit upgrades to perhaps once every ten years. In the intervening period there is nothing to stop the organization purchasing licences as it requires them, of whatever version is current, but installing the same old version on all new computers. It is likely that, provided the organization purchases the correct number of licenses, software vendors will accept the situation.

A similar approach is frequently possible for the Windows operating system. In fact Dell, on their web site, continue to offer several out-of-date versions of Windows as standard options.

The reason for adopting this approach is simply to reduce the learning curve and support problems as well as the business disruption associated with maintaining multiple versions of the same automation software.

Where there are compatibility problems with external users who are using features in the latest software one or two super users in the information technology department can be equipped with the latest version so that they can do conversions for users when required. It is not necessary to upgrade all users.

Please note the difference in approach advocated here between the forward looking design of new systems versus retaining relatively old software where there is no reason to change. Recognize also that there are some organizations where it may be necessary to stay with the latest versions. However, given that latest versions today are more about fashion than functionality it is likely that this is a relatively limited number of organizations.

8.6 Strategy: Some Other Considerations

Figure 8-4 represents the cost benefit profile of strategy implementation. This also happens to be the cost benefit profile for any significant information technology investment.

The costs are incurred first and if the strategy or system is appropriate, well designed and well implemented the benefits are derived later.

Of necessity this requires that any significant investment of this nature is capitalized.

If it is to be capitalized then it is vital to ensure that the initial costing is accurate, that the business case is solid and gives a clear return on investment and that the entire project method is robust and will ensure a reliable dependable outcome.

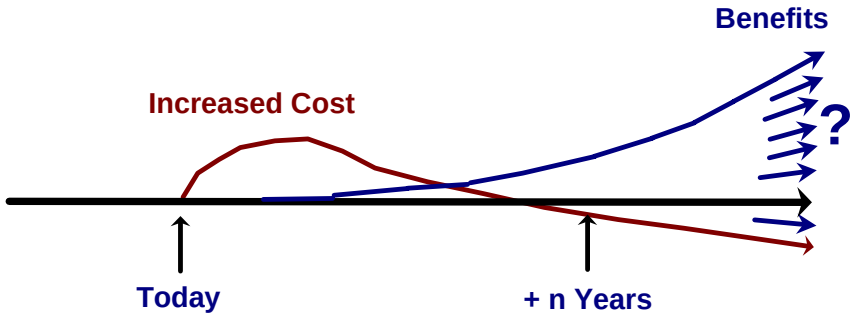

Figure 8-4: The Cost Benefit Profile of Strategy and Information Technology

Over and above this it is vital to ensure that the solution is clearly strategically aligned. If it is not then there will be a serious price to pay in terms of investment under performance in a few years time.

The 80:20 or Pareto approach is useful as a supporting technique in determining the right things and therefore in determining strategy.

The critical issues approach set out in chapter 33, is also extremely useful in sifting through the mass of requirements. This makes it possible to identify the critical requirements which, in terms of the definition that strategy is the right things, turn out to be the strategic things to do.

If strategy is the big picture, there must be a means to determine the big picture. Too often people focus all their energy on the large number of low impact issues and fail to identify and act on the small number of high impact issues. The critical issues or Pareto approaches are necessary tools in this regard. The approach of brainstorming all possible issues relating to a particular focus question, whether strategic or operational, followed by synthesizing the seven critical issues is extremely valuable. Refer chapter 33 for more details.

It can also be stated that strategy is determined by looking to the future with vision. The trouble with vision is that much of it is soft and woolly and hard to touch and quantify. But competitive advantage lies with the "soft and woolly" part.

It is vital that if a solution is to be strategic that it also provide tools to measure the soft information required to support the business strategy. If customer satisfaction is important, which should be the case with most organizations, then provide a means to measure customer satisfaction. If employee satisfaction is important, then measure it. The same applies to other soft measures. Refer to section 17.3 for more information.

8.7 Strategic Alignment

Strategic alignment is simply the process of ensuring that every aspect of the programme of work relating to the procurement or development of a new business information system or the upgrading of an existing business information system is closely aligned with and informed by the business strategy.

On an 80:20 basis it is likely that in eighty percent of the applications the software will have little or no impact on the strategy. In these cases there is absolutely no reason why off-the-shelf software cannot be used and the businesses way of working adapted to suit the software.

However, in the twenty percent of applications which have a direct impact on the strategy it is vital that the software is designed to fit the strategy. If necessary this will require customization of off-the-shelf software or else custom development of one or more modules.

This is a necessary pre-requisite if the strategically significant world class capability of chapter 2 is to be attained.

8.8 An Example of Strategic Alignment

The following example is drawn from experience with a particular client.

The organization is in the business of manufacturing and distributing high volume, low value chemicals to a wide diversity of users.

The strategy of the organization is to provide tailored recipes of its various products to meet the unique requirements of each of its customers. As a consequence it has a large team of technical specialists in the field who also comprise its sales staff.

These technicians undertake chemical analysis for each component of the customer's application and specify recipes to meet the exact requirements of that specific customer.

This impacts on manufacturing since, unlike its major competitors, this organization cannot simply mass produce the same recipe for days or weeks at a time. Individual orders need to be scheduled for manufacture.

The organization also offers high service levels in terms of delivery times of a few days from date of order.

Customers are also supplied on credit. Because of the different recipes it is vital that credit approval is granted before the order is manufactured otherwise the company could be left sitting with tons of specialised product that it is unable to sell.

This unusual strategy for an organization in this type of business demands very specific functionality from the order entry software, the production scheduling software, the manufacturing shop floor control software, etc.

Implementation of a major name brand enterprise resource planning system in this organization failed to fully recognise this requirement and was coupled with a policy decision to the effect that the enterprise resource planning software was not to be customized in order that the company could obtain future upgrades.

The result was that the company ended up developing a large custom "front end" for order entry and scheduling, developing a variety of other in-house developed "fixes" for the resultant problems and ended up with a cumbersome solution that did not provide effective decision support. In addition this poorly fitting solution required a large amount of manual effort and was prejudicial to the organization fully exploiting its strategic driver and business strategy to maximum advantage.

After in-depth analysis it was concluded that a clean slate re-implementation together with significant enterprise resource planning software modifications would be required to achieve world class capability as outlined in chapter 2.

8.9 Conclusion: Strategic Alignment

In the above example, failure to clearly identify the strategic driver and business strategy and to ensure that all aspects of the system procurement and implementation were aligned with the strategic driver resulted in a seriously sub-optimal outcome. This outcome was prejudicial to the business and gave rise to an estimate for a considerable sum in order to remediate the situation and achieve the desired levels of performance.

The lack of strategic alignment in any significant information technology implementation is likely to carry with it similar or much worse penalties. Accordingly, it is vital that any significant information technology investment programme should include a comprehensive strategic alignment programme as outlined in part 4.

CHAPTER

9

AN ENGINEERING APPROACH DEFINED

Over the years, drawing on my experience as a professional engineer, I have resorted to drawing lessons from my engineering experience to assist me to formulate solutions to the factors giving rise to failure that have been encountered.

I am firmly persuaded that the absence of what is termed in this book "an engineering approach" is a fundamental contributor to the shocking failure statistics reported in chapter 1.

This chapter sets out to explain and define "an engineering approach" in a manner which is intended to assist readers to adopt this approach as an effective approach to undertaking major information technology and strategy projects.

The engineering approach can be summarized by the statement, *"engineers do not design bridges to stand up, they design bridges not to fall down"*. To better understand this point, think of any large bridge that you know of, consider the Golden Gate bridge in San Francisco as an example.

There is a substantial factor of additional effort involved in designing a bridge not to fall down as opposed to designing a bridge. The additional effort required to research earthquake conditions, wind conditions, investigate bridge abutments, test alternative aerodynamics, etc to ensure that a bridge will not fall down could be about ten times the effort required to simply produce a set of drawings for a bridge without undertaking the analysis and design necessary to ensure that it will not fall down under all reasonable operating conditions.

In the case of aircraft the ratio is considerably higher.

The engineering approach to information technology investment can be expressed as *"the systematic, comprehensive analysis of the requirement and design of the solution in such a way that all factors that could give rise to failure or sub-optimal performance* (the seventy percent plus twenty percent) *are designed out in order to ensure a high probability of a successful outcome"*. This is discussed in more detail below.

From my analysis I have concluded that there are two dimensions that describe an engineering approach. The first dimension relates to the physical components of the activities. The second dimension relates more to an attitude or state of mind that in my experience characterises the way engineers approach their work. These two dimensions are listed below:

1. Executive custody, governance and strategic alignment
2. Programme design
3. Design against failure
4. Solution analysis and design
5. Laboratory testing
6. Data engineering
7. Management of change

The second dimension applies to all the first dimension activities as the second dimension of a governance matrix. Refer figure 9-1.

A. Meticulous design detail
B. Meticulous planning detail and costing
C. Multi-disciplinary teams and specialists

D. High professional standards and legal accountability
E. Cross checking and double checking of all important details
F. Physical world metaphor and impact analysis
G. Engineers know the limitations of their expertise and when to call in specialists

These individual items are explained in more detail in the sections that follow:

9.1 Executive Custody, Governance and Strategic Alignment
Effective executive custody, comprehensive programme governance and effective strategic alignment are vital.

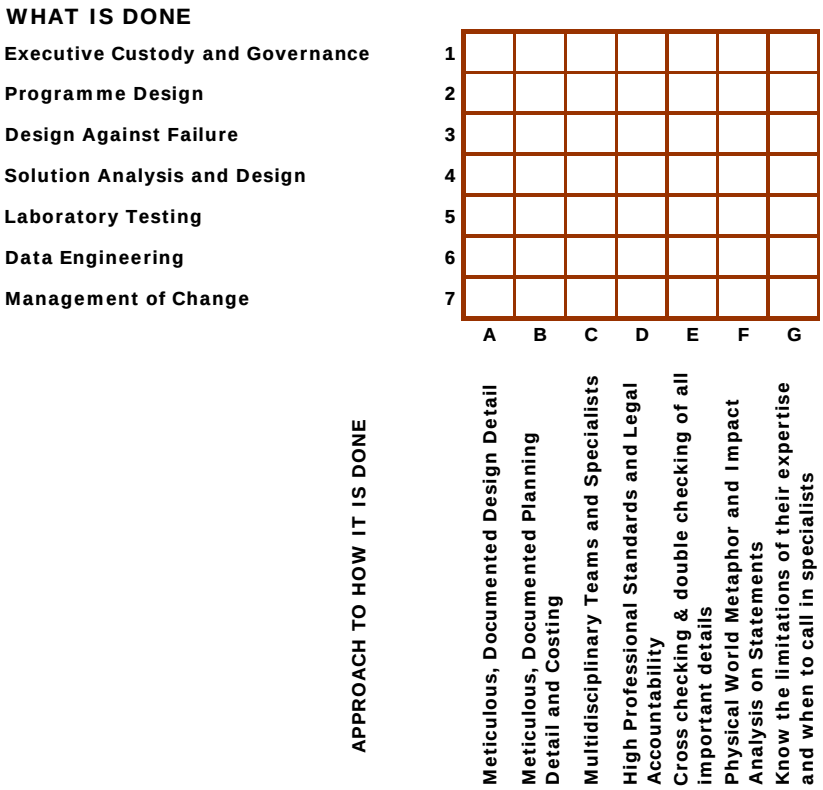

Figure 9-1: Governance Matrix for An Engineering Approach

This should include a programme management executive team comprising a business systems executive, a strategic solutions architect and a technical team leader with effective and appropriate contracting and professional accountability including client organization as the main contractor.

The business systems executive and strategic solution architect should report directly to the chief executive officer. Refer chapter 20 for further details.

9.2 Programme Design
Comprehensive, systematic, detailed programme design taking account of all factors identified as requirements for a successful outcome in this book. Refer to part 4 for a detailed discussion of overall programme design.

9.3 Design Against Failure
Comprehensive, systematic analysis of possible causes of failure and design against all possible causes of failure. Refer to chapter 14 for more details.

9.4 Solution Analysis And Design
Comprehensive, systematic, detailed analysis and design of each and every solution component. Refer to the second dimension of the engineering approach for more details about how the professional team should conduct themselves in this context.

9.5 Laboratory Testing
Comprehensive, systematic, detailed testing of every component prior to go live and during design.

The testing laboratory should contain enough workstations to simulate the full spectrum of users on a given module.

Run the software through all possible scenarios of operation with real data.

Audit transactions through the system.

Ensure everything is working defect free before release.

In some cases use the laboratory to systematically create a body of test data to use in establishing the information warehouse. Develop information warehouse load processes, etc against this data. Develop information warehouse query, reporting and modelling applications against this data.

Use the laboratory to develop comprehensive training material (computer based training) together with a comprehensive communication plan, comprehensive plan for management of change and comprehensive implementation plan with additional manpower as required. This may include hiring temporary clerical staff. The objective is to ensure that users are up and running quickly and with minimum disruption.

The laboratory can also be used to optimize all business processes (production and operational). Use the laboratory to identify optimum workflow for specific operation on a corporate basis. Where the business process of a particular unit deviates from that embedded in the standard software verify if there is a sound (strategic) business case for deviation. If the particular situation satisfies the strategic driver then optimize the process in the software. If there is not a clear business case to maintain the existing business process then adopt the process that is standard for the software.

9.6 Data Engineering
Comprehensive, systematic data engineering building on solid fundamental first principles analysis of the data domain and operational and strategic business decision support requirements. Refer chapter 10 for more details.

Comprehensive data engineering includes comprehensive data models, entity relationship diagrams, etc all of which are prepared and verified before screen design, etc is begun. Develop data field specification for all applications to meet all uses of each data item. Analysis should include data fields that may not be required initially, plan for future expansion, even if the data fields do not appear on operational screens.

Maximum use of validated fields. Validate everything that can be validated. As many validation fields as are required to fully describe the entity. Excellence in data engineering provides the foundation for excellence in management decision support and excellence in support for competitive advantage.

Parameterization of everything that may change during the design life of the system.

Data based design versus process based design. The data describes the real world entities that represent the reason for the existence of the business. The processes exist to execute computerized processes necessary to produce required outcomes. Data attributes are far more predictable than processes.

9.7 Management Of Change
Effective management of the process of change including all aspects of effective management of change, training, communication, management of "soft issues", etc as discussed in chapters 11 and 23.

The Second Dimension of An Engineering Approach
The second dimension of the engineering approach is about an attitude towards the work to be performed:

9.A. Meticulous, Documented Design Detail
Top down strategically focussed design from corporate strategic level. Start with a series of executive level strategic workshops to define the overall strategic context. Derive decision-making parameters from these and priorities from these. Everything is directed at supporting the long-term strategic and operational goals of the business.

This requires an iterative design process. First develop the concept at a level of detail that permits reasonable estimating. In parallel develop the business case -- where does the value of the investment lie and what is required to deliver that value to the business? Each component is a discrete business decision.

Detailed workshops with end users representing the entire spectrum of users of a particular module or system. Possibly different screens for different categories of end user with different requirements on the same database. Identify and address every exception and every requirement. Strategic parameters provide the basis to determine whether to tailor the software or change the business operation.

Meticulous analysis down to:

- Every single screen
- Every single field
- Every single attribute of every field

The resulting design should be fully documented in a manner that business users can read and understand and where nothing is left undocumented. There should be no assumptions required to fully understand the specification.

Such a specification should comprise a to-scale representation of the exact layout of the screen including fonts, colours, etc together with a comprehensive template which describes all the attributes of every field. This should include colour and other attributes, field entry and field exit processes, etc.

The detailed specification should result in a bound document which can be read through by business users as though they were using the software. The level of detail and presentation should be such that by the time the user has read the document they have complete certainty of what the completed software will look like and how it will operate. In my experience, once users are presented with a specification at this level of detail they will readily identify logic and other errors and these can be debated, evaluated and rectified without the need to make any changes to source code.

Software construction is then a matter of advanced "cabinet making" working exactly to the “drawings”.

Measurement of delivery is "does it do what the specification says it will do" - if it does the software developer has delivered - if it does not work it is the architect and engineers problem.

Compliance testing is straightforward - all the thinking should have taken place in producing the specification.

It must be noted that a programming language is a bit like an automated brick laying system. It builds binary code for the computer to process. The language that is used is largely a matter of convenience and preference. Once a language has been chosen for a particular application, project or programme then stick with it and make it work.

Appoint contractors who are experts with that particular language.

Recognize the anomaly of the concept of an "analyst programmer", a person who undertakes the analysis and design while building. It is comparable to an "architect bricklayer". Anyone who has seen a house built by a bricklayer who designed as they went along will recognize the problems inherent with software produced by an analyst programmer. I have considerable development experience and have proved to my own satisfaction repeatedly that if I take the time to produce a comprehensive specification the final result will be much more robust and consistent and take less time to build than if I simply build "on the fly".

9.B. Meticulous, Documented Planning Detail and Costing
Comprehensive programme and project schedule and budget management every step of the way. Projects planned down to the level of three iterations for document generation, etc. Refer chapter 24 for more details.

All planning down to task and activity level. Standard work packages for which the schedule manager builds up estimating versus actual experience to improve estimates as the programme advances.

Activities are of a few days to at most two weeks duration

Clearly defined completion criteria. Either not started, started or complete. Re-plan immediately unexpected complexity is encountered such as when a document is not accepted on the third iteration for legitimate design complexity reasons. Make use of critical chain planning, work to tight deadlines with slack at end under management of executive programme management.

Take account of real costs including all hidden costs and adverse business impact - loss of customers can destroy a business.

9.C. Multi-disciplinary Teams and Specialists
Multi-disciplinary professional team. Structure of team based on Critical Factors presented in part 4. Build core team to meet overall requirement and then approach design of each project from a top down, integrated, holistic, strategic perspective.

9.D. High Professional Standards and Legal Accountability
This is standard in the engineering environment. How to achieve it in the current information technology environment is seriously challenging.

To the best of my knowledge there are no professional information technology organizations that carry professional indemnity insurance or even which offer a really effective guarantee that if they mess up they will rectify at their cost.

At this stage the best that can be hoped for is to put together carefully pre-qualified professional teams with really well qualified professional team leadership and manage every step of the process with extreme diligence.

The need for robust executive custody on the part of the client organization is a vital component in achieving a successful outcome.

The professional team structure that is proposed in part 4 is designed to manage this aspect.

Note that in the construction industry the architect, consulting engineer and construction engineer are represented by three distinct legal entities each of which manage their performance risk in very specific ways. In reality there may be dozens or hundreds of individual legal entities contracted to perform different aspects of the work required to design and build a large building or factory.

Each of these entities will be robustly contracted and robustly supervised by different specialist professionals making up other elements of the overall team.

In seeking to put together a professional team to undertake a large information systems development or procurement it is recommended that constant reference is made to the construction industry model. Every effort should be made to isolate accountability for different aspects of the programme uniquely to clearly identifiable people or legal entities.

The level of maturity of the information technology industry today is such that fully fledged legal accountability may be difficult or impossible to contract. Accordingly, it is suggested that client organizations should consider the use of retention where a percentage of the fees is withheld pending a successful outcome. Alternatively use can be made of performance bonuses where a significant premium is paid if the system is delivered on time and on budget and meets specification.

I have yet to find a model that really works in practice and continue to see this aspect as one of the greatest challenges to ensuring a successful outcome.

9.E. Cross Checking And Double Checking Of All Important Details

This is an essential engineering discipline. Engineers will always double check and recheck their work and many times another engineer or senior engineer will review the work and test it for reasonableness. This represents significant additional cost but can and should be budgeted into a programme if the business is serious about avoiding failure.

9.F. Physical World Metaphor and Impact Analysis

Use of the construction industry metaphor throughout the programme is strongly recommended. Learn from the physical world.

Look for and apply practical examples in terms of replacement of systems, maintenance, etc.

Test statements like those outlined in chapter 6 against the physical world for relevance and validity and avoid doing things in the information technology arena that you would not dream of doing with a physical building or factory.

9.G. Engineers Know The Limitations Of Their Expertise And When To Call In Specialists

Engineers know the limitations of their expertise and know when to call in specialists. This should happen frequently unless there is a really large professional team.

Do not contract any person to fulfil any role unless they can demonstrate proven knowledge and experience in that role. Buying some new tool and then getting someone with no knowledge of the tool to learn on-the-job is not advisable practice. If a new tool is to be purchased insure that resources with expertise in how to use it are available and then budget realistically for training of own personnel or contracting of these specialist resources. Expect to pay a premium for such resources.

Note that it takes months or years of goal directed experience to really get to know any information technology product really well. In my experience, there are generally very few people who know how to make any particular product really perform up to its design capabilities, notwithstanding what the vendors may say.

Really outstanding information technology solutions require really outstanding use of the tool. This requires visionary design and dedicated highly cognitive, highly capable use of the tools. Years rather than months of experience are to be desired. Do not accept the "technology is moving so fast" argument. You certainly would not accept that as an excuse for shoddy work on your new high priced motor car, why accept it for your high priced business information system?

The net effect of this point is that it will cost much more than the salesman would like you to believe to use any computer based tool to anywhere near its full potential.

9.H. Conclusion: An Engineering Approach

It will be apparent that the net effect of all the above points is that it will cost orders of magnitude more to undertake an information technology project designed not to fail than it will to undertake a similar project without using this approach.

The real issue is whether you are willing to risk a ninety percent or ninety fiver percent probability of failure or whether you would consider a much lower figure to be more acceptable.

I am increasingly of the view that if an organization cannot clearly see the value in undertaking a project in a way that is designed to minimize the possibility of failure there is probably not a business case for the proposed investment and it should accordingly not be undertaken.

I am firmly persuaded that the absence of the engineering approach and the associated principles outlined in this chapter is a significant factor in the high failure rate of information technology investments.

CHAPTER

10

DATA ENGINEERING: WHAT IS REQUIRED TO TURN DATA INTO MEANINGFUL DECISION SUPPORT INFORMATION

10.1 Introduction

Data engineering is the systematic analysis and design of all data entities on a fundamental first principles basis. It includes the use of validated data to describe as many items as possible and the associated design of robust, structured, hierarchical codes.

In the sense that the term is used in this book it embodies a level of thoroughness of analysis and precision in code table content design and code design that is very seldom encountered.

In my experience, the absence of effective data engineering is one of the biggest reasons for sub-optimal information technology investment performance. It is the factor behind chief executive officer complaints that they cannot get the answers to questions even though they know with certainty that the data is in the system. Rectifying this dysfunction represents a major opportunity.

One of the difficulties that I experience in presenting this subject is that many people follow what is presented and dismiss it on the basis that superficially they think that their organization IS doing the things that are referred to.

However, I have yet to evaluate a system and find that it conforms to all the criteria that I have found to be necessary to achieve real excellence in what is defined here as data engineering.

In some respects this is easily assessed. If the chief executive can immediately and directly get consolidated answers to any question that he can think of asking within the confines of the entire locus of data contained in all his organizations systems then that organization has a robust data engineering solution such is envisaged here.

If not, then this chapter warrants serious consideration.

This chapter provides an overview of some key principles in understanding why so many corporations find themselves with massive databases and yet cannot obtain the management decision support answers that they require at the touch of a button (or click of a mouse) or on request or even on demand.

I would go so far as to suggest that data engineering in its full scale is one of the largest untapped opportunities in the information technology field.

10.2 Some Basic Principles

To better understand the concept of data engineering, consider that computers can only add 0's and 1's while people really only understand plain language (English in this case).

Somehow the information that is meaningful to human beings must be communicated to the computer so that meaningful analysis is possible and so that exactly the same result is obtained whether the computer or the human being analyses the data. This is data engineering.

Alpha numeric structured codes should be used to describe information for the computer and be linked to verbose, structured English descriptions for users. The basic concept is common place. However, it is the manner in which the content of the tables and the structure and the content of the codes is developed that differentiates a solution where manual effort is required to extract data versus a situation where computerized tools can quickly and easily extract the data.

In better understanding the principles involved it is important to take note that there is a considerable body of knowledge and experience relating to cataloguing in the fields of Librarianship, Botany, Zoology, etc. The solution proposed in this chapter builds on this knowledge and experience.

10.3 Personal Experience

My own experience in this field started with taxonomic experience in the field of Zoology while at school.

This was followed some years later by in-depth information cataloguing experience over a period of five years for my PhD research data which included a lengthy study of available literature on the design of library cataloguing schemes, manual punch card information retrieval schemes and other aspects of catalogue design. This resulted in a complex and elaborate coding method for the data generated during my research. This was highly successful.

Some years later this was followed by successful practical application of this thinking over a period of eighteen years to the time of writing. This experience includes over a thousand hours of research and development over a period of three years about a decade ago into the cubic business model and data code design with particular reference to the general ledger chart of accounts.

Subsequent experience has been gained in a diversity of fields as discussed in more detail below.

The rest of this chapter addresses some important principles and gives some examples.

The subject is complex and not documented anywhere to my knowledge. The approach used and the principles applied are self-developed and proprietary and not readily communicated in a single chapter of a book which has other primary objectives. However, I will endeavour to provide a concise overview in the rest of this chapter.

10.4 The Two Fundamental Components of Information Technology

The two fundamental components of information technology were discussed in section 7.5.

In summary, the vast majority of experience with information systems to date relates to getting data onto disc and processing transactions. A very small percentage of the experience relates to getting data off disc in a really effective way to support decision-making. Furthermore, most of this experience has not been particularly satisfactory.

The important conclusion is that unless one designs the code structures of validated data from a strategic executive management perspective it will be extremely difficult to extract strategic executive management level data out of the resulting databases. This is why most executives find that they cannot get the answers that they want with any level of convenience.

This results in any number of middle to senior managers and administrators who spend a substantial amount of their time extracting, summarizing, synthesizing and presenting information while this is something that computers can theoretically do instantly.

10.5 Basic Concepts

In considering the subject there are some basic concepts relating to presentation skills that have a bearing. Figure 10-1 indicates that the optimum number of slices in a pie chart for effective presentation is between five and ten slices. If there are more than ten slices the pie is cluttered and difficult to interpret as in the pie on the right. If there are less than five slices there is a very limited amount of information and it takes additional effort to build a comprehensive picture of the situation as in the pie in the centre.

Theory regarding abstract thinking and chains of command indicates that the average person can manage seven plus or minus two distinct areas or concepts simultaneously. These principles represent a span of cognitive ability which imposes practical limitations on how code schemes should be structured.

In essence, based on these principles, a code table or look-up list or picklist should not have more than about seven items at any one level of the code hierarchy. Ideally, when the picklist is displayed there should only be between five and nine options available and on selection the user should then be able to drill-down to a greater level of detail.

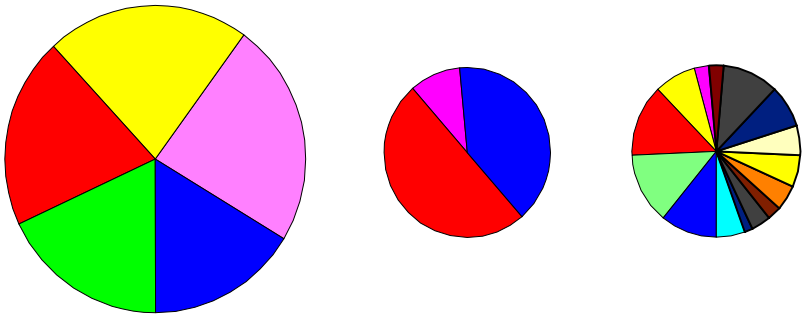

Figure 10-1: Optimum Number of Slices in a Pie Chart

This is an important principle which if correctly implemented in a data code hierarchy will result in speedy and ready drill-down on any set of data from an inquiry point of view as demonstrated graphically in figure 10-2.

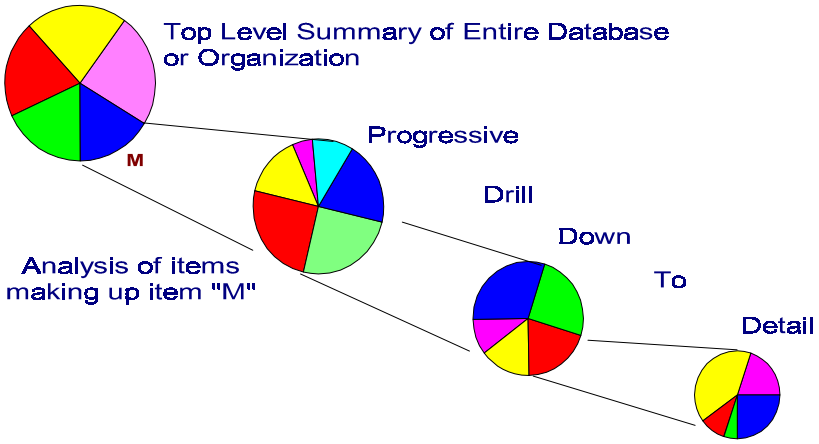

Figure 10-2: Hierarchical Data Inquiry Concept

10.6 Warehouse Analogy

By way of analogy, effective information classification is comparable to a warehouse containing well ordered, appropriately classified bins, versus one containing large, poorly classified bins.

The bins should be logically ordered and contain only one component. If adjacent bins are also ranked in a manner which is intuitively logical to someone who has basic knowledge of the contents of the bins, it will be very easy both to identify the correct bin to post an item to for storage and also which bin to access for retrieval.

This in simple terms is essentially what a database, assisted by appropriate classification data, is doing most of the time.

By way of example. If one wants to purchase wood screws for a hinge on a door from a store, one expects to find the screws arranged by some combination of length, diameter, head type, plating, etc. This should be done in such a way that once one has assessed the storage pattern one will quickly and conveniently locate the size and shape of screw that is required.

If on entering a store all the screws of all shapes, sizes, head types, etc were all stored in one large bin it is likely that one would rather visit an alternative store. This would result from an aversion to manually searching through the bin for the required number of screws of the required specification,

The storage of data on most information systems from a management inquiry point of view is very like the example of the large bin through which managers and executives are forced to scratch using spreadsheets and other tools in order to endeavour to make sense of the data.

This is time consuming and inaccurate as the physical example clearly indicates it will be. Data engineering, as proposed in this book, produces a result which is comparable to the systematically organized small containers of screws in the above example.

10.7 Cubic Business and Data Models

Effective data coding requires clearly defined structure and also requires that any structure inherent in the data is accurately captured and reflected in the coding schemes. Many types of data have a geographic or physical location axis and a functional axis. In other words there can be multiple validation lists with inter-related contents.

For example, the contents of a general ledger chart of accounts can be dependent on the physical location and business function that applies to a particular chart of accounts component.

This applies to the financial and other data at the general ledger level for all organizations of any size. It will also apply to the physical location of a medical condition and the type of medical condition in a clinical system. Similar matrixes can be uncovered in other data, such as in the classification of an “engineering approach” presented in the previous chapter.

This is show diagrammatically in figure 10-3.

Taking the example of financial data there are complex rules about what physical data can be represented by different components of the data model.

There are elements of the income statement and balance sheet that will apply to both a location and a function. There are components that will apply only to a function or only to a location. There are components that apply to the organization as a whole and do not have a location. Depending on the business and depending on its policies this will result in a variety of rules which will determine where accounts of a particular type can be allocated relative to function and location codes.

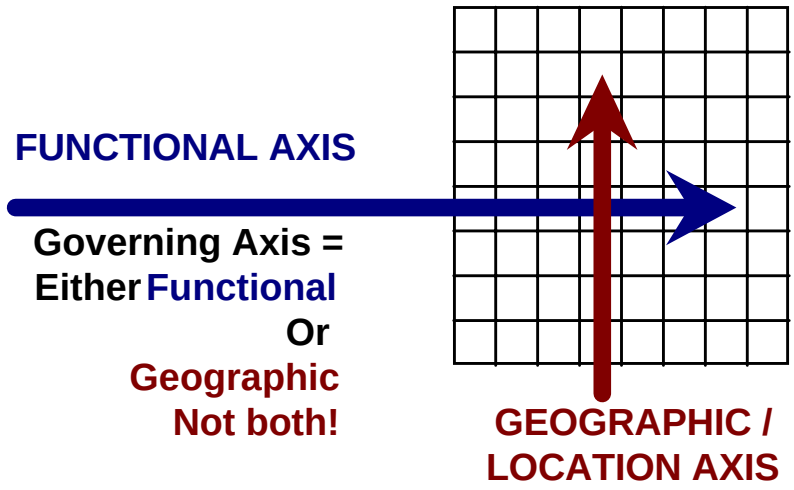

Figure 10-3: Fundamental Dimensions of Corporate Data

These rules are little understood and not widely recognized although most general ledgers pay lip service to their existence. However, provided these rules are identified from a rigorous fundamental first principles basis and used to generate the chart of accounts and associated look-up and allocation table codes, a wealth of corporate knowledge and governance potential is unlocked.

Once the fundamental matrix of the organization is defined and its supporting first principles and strategic rules identified, a wide variety of data including basic income and expenses, assets, human resources, etc can be coupled to the squares of intersection of the governance matrix illustrated in figure 10-3.

This results in the creation of a cubic model of the organization such as that illustrated in figure 10-4.

This model was formally described in 1990 (Robertson 1990).

This model allows the data to be sliced and diced and allows users to drill-down and zoom-in as required.

It is really important to recognize that what makes this fully possible is a really clear definition of the cell in the matrix on the front of the cube such that there is no overlap of data across the boundaries of a specific sub-frame of the matrix. This is illustrated in figure 10-5 from which it will be seen that clear definition of the boundaries of every cell in the matrix creates a data core into the body of the data.

This clean matrix sub-element is referred to as a "frame of contact". A clean frame of contact with functional and locational, or other axes, clearly linked to real world organizational design that is sound and efficient makes all sorts of data viable.

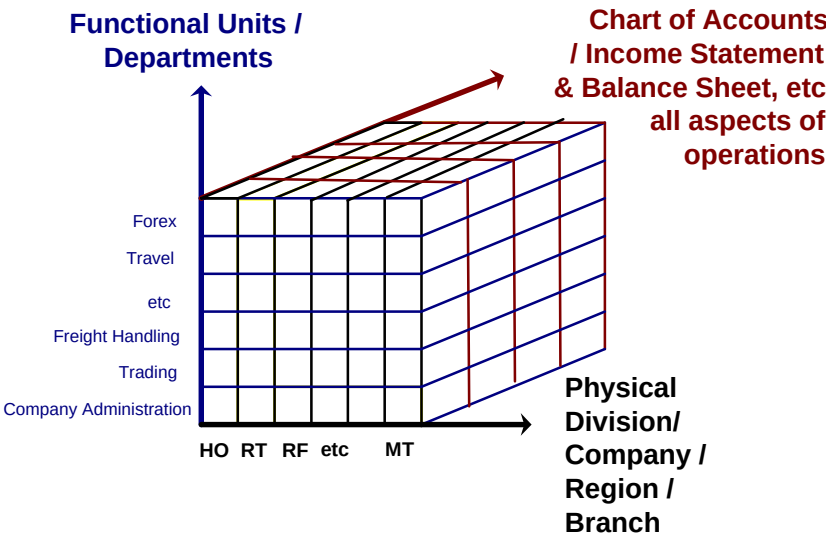

Figure 10-4: An Example of a Cubic Business or Data Model

If this is then cleanly linked back to corporate governance, such that there is only one manager who has responsibility for all the data that can occur in a specific frame of contact, remarkable impacts on management effectiveness result. This is illustrated in figure 10-6.

It is the existence of clearly demarcated frames of contact on a detail level, together with the corresponding data cores, that allows technical software to slice, dice, drill-down, zoom-in, etc. If this clear demarcation is not present the data that is extracted using the tools available will produce results which reflect this.

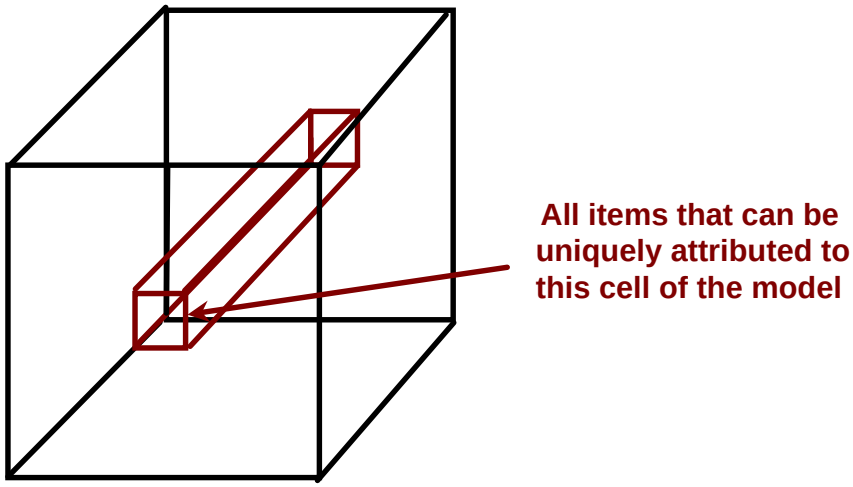

Figure 10-5: Illustration of a Frame of Contact and Corresponding Data Core

With this design in place it becomes possible to put in place really effective activity based measurement and management and to put in place incentive schemes that are linked to clearly measurable performance. This can be done in such a way that everyday reporting is always based on the same governance structure and accordingly there are no surprises when performance linked bonuses are calculated. Barry and Robertson (1993) describe the benefits of such an implementation.

Full accomplishment of this capability requires that the same governance frame of contact is echoed consistently in every system that has anything to do with the relevant data. It is further greatly assisted if the associated enterprise resource planning system strongly supports the automatic allocation of all types of income, expenditure, assets and liabilities to the general ledger.

Setting this up is a time consuming iterative process that requires considerable analysis. As mentioned above, I invested over a thousand hours of un-remunerated research and development into understanding this model some years ago.

The following section sets out to present more detail on what is meant by the term “data engineering”.

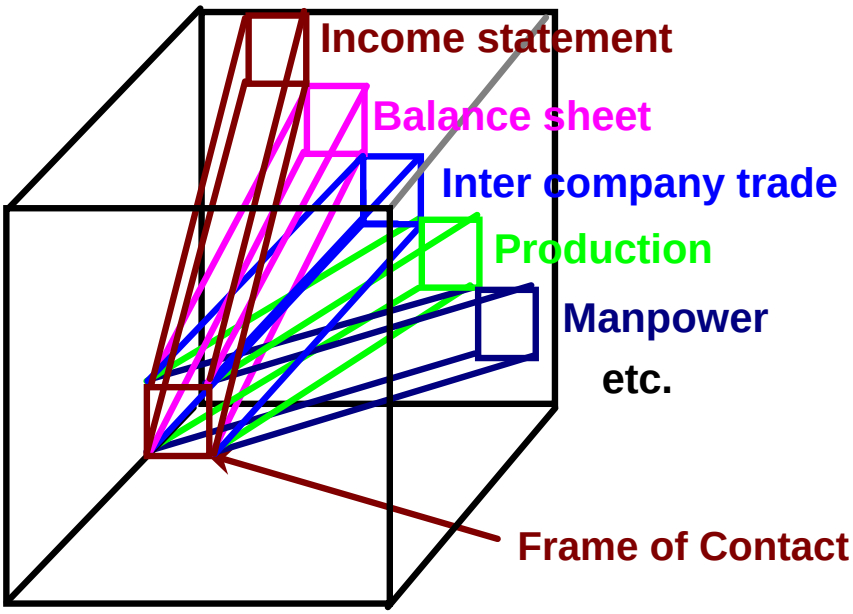

Figure 10-6: Multiple Data Cores Off A Single Frame Of Contact

10.8 Critical Components of Data Engineering

Data engineering comprises the following elements:

1. Data modelling and schemas
2. Maximum validation
3. Top down content analysis
4. List structure
5. Codes
6. Special techniques
7. Data cleansing

These are explained below:

10.8.1 Data Modelling And Schemas

Rigorous first principles data entity modelling including identification of cubes.

The use of entity relationship diagrams is a well established discipline in software design, this item refers to a systematic, rigorous, first principles, strategic application of this approach.

This should extend in a consistent manner through to the information warehouse schema design and the two data models should be designed at the same time in perfect synchronization.

10.8.2 Maximum Validation

Validation should be provided on all possible data fields. If an item of information that could be validated is not validated the information in that field becomes almost worthless, and from the point of view of management analysis, this can give rise to seriously spurious outcomes. Lack of validation can also result in data which appears to be lost as users can type in completely incorrect codes resulting in data sorting in areas for which there is an expectation that no data will occur.

Validation should be provided on every possible field and, where there are additional attributes which describe a data entity which could conceivably be of value from a management perspective, validation fields should be added.

10.8.3 Top Down Content Analysis

Strategically focussed top down analysis of validation file content including a long-term future focussed comprehensive view of content. All possible options should be catered for.

Strategic design should start from the top down working with executive management. The analysis should be based on the core strategic driver of the business. Take account of the fundamental parameters which define the business and the most important ways the information will require to be examined for strategic decision-making.

In undertaking this analysis real effort should be expended to identify all possible values of a validated field, not just the values that are currently common place. Consider all possible scenarios.

It is preferable to design a code structure that caters for all eventualities than to take a short-term approach which requires the regular addition of additional items and codes. It is much easier to develop a clean hierarchical structured code structure one-off with all possible data than to design a structure and then constantly add to it. In the case of constant addition it is time consuming to get into a comprehensive picture of the code structure before adding an item and accordingly new items can very easily be added in places which are not really logical considering the overall design.

Addition of new items can also result in the addition of new categories which, if present at the outset, might have given rise to a different structure.

Accordingly, it is important in developing the content of codes to reference all available data on a particular data item and also to involve a representative sample of business users who are able to brainstorm as complete a list of items as possible.

It will be apparent from the above that populating a look-up table or validation list is not as simple as it seems. This data represents the knowledge of the particular business as it is communicated to the computer system. Accordingly it is vital that all possible information is acquired during the design stage. This requires a much larger team of people and more input than would be the case if a high level of attention to detail in this area were not required.

Since most organizations do not comprehend the far reaching implications of really effective design it is almost unheard of for significant resources to be committed to this activity. The net outcome therefore tends to be a "clerical information system" instead of a management information system. That is a system designed by and for clerks rather than a system designed by and for managers.

10.8.4 List Structure

Highly structured hierarchical list structure is vital.

This involves defining between about five and nine headings at each level of code although in some cases fewer items may be appropriate. However, with careful analysis it will generally be found that there is a logical way of grouping the data so that there are about this number of headings.

The same principle will apply to the next level of headings and the next until the posting level is reached.

The following list is an extract from a list structure in a General Ledger Chart of Accounts:

```
DEPRECIATION
 DEPN GENERAL OFF MACHINES
  Gen Off M/C
  Airconditioners
  Photocopiers
  Binding Eq
  Printing Eq
  Photographic
  Telephone Eq
  Facsimile Eq
  Dicataphone Eq
 DEPN COMPUTER EQUIPMENT
  Comp Network
  Network Other
  Modem Eq
 DEPN COMPUTER PRINTERS
  Printer Eq
 DEPN COMPUTER SOFTWARE
  Major Comp S/W
 DEPN INSTRUMENTS & EQUIP
  Video Pres Eq
  Other Pres Eq
 DEPN FURN & FITTINGS
  Furniture
  Fittings
  Filing Systems
  Library F & F
  Office Sec Eq
 DEPN LIBRARY EQUIP
  Library Stock
 DEPN MOTOR VEHICLES
  Passenger Cars
```

```
    Light Del Veh
    Motor Cycles
  REPAIR & MAINTENANCE
   R & M GENERAL OFF MACHINES
    Gen Off M/C
    Airconditioners
    Photocopiers
    Binding Eq
    Printing Eq
```

Items in capital letters are headings, items in proper case are posting level accounts.

Each level of heading is indented and corresponds with a column in the code structure (not shown).

In the example above, which relates to depreciation of assets with the accounts at the end relating to repair and maintenance of assets, exactly the same list structure and content is used for all components of the general ledger that relate to assets. Thus this structure is used for the assets on the balance sheet, accumulated depreciation on the balance sheet, depreciation as an expense on the income statement, repair and maintenance, petrol oil and lubricants, operating costs, insurance, etc.

Note that in the case of petrol, oil and lubricants which will not apply to most of the assets the basic structure and coding is still retained and the components that do not apply are simply omitted.

10.8.5 Codes

Codes should preferably be logical and intuitive and, where possible, use should be made of alphanumeric codes. This is not always possible. In a General Ledger chart of accounts there is an overarching logic which makes alphanumeric codes impractical and numeric codes are appropriate.

In other cases there may be no particular logic dictating a particular sequence within a section and alphabetic sorting works well. In such a case use can be made of alphabetic or alphanumeric codes and with careful design it will frequently be found that mnemonic codes, that is codes where the letters have a direct correlation with the words they represent, can be used.

The following example is an extract from an anatomic site code for a clinical system:

```
CS....   CIRCULATORY SYSTEM
DS....   DIGESTIVE SYSTEM
EM....   EAR & MASTOID PROCESS
ES....   ENDOCRINE SYSTEM
EA....   EYE & ADNEXA
LS....   LYMPHATIC SYSTEM
MS....   MUSCULOSKELETAL SYSTEM
MSM...    MUSCULO SYSTEM
MSS...    SKELETAL SYSTEM
MSSL..     LOWER LIMB - APPENDICULAR
MSSN..     NON - APPENDICULAR
MSSU..     UPPER LIMB - APPENDICULAR
MSSUAL      Arm Lower
MSSUAU      Arm Upper
MSSUHA      Hand
MSSUWR      Wrist
NS....   NERVOUS SYSTEM
RO....   REPRODUCTIVE SYSTEM
RI....   RESPIRATORY SYSTEM
US....   URINARY SYSTEM
ZN....   NON-SITE SPECIFIC
```

The first two characters of the code relate to the first level heading in order to resolve the duplicate first letter usage between ear, endocrine system and eye and between reproductive and respiratory.

The third character relates to the second sub-heading and the fourth character relates to the third sub-heading.

The fifth and sixth characters relate to the posting level category which is in proper case and is again a two digit code to cater for duplicate first letters at this level, such as with arm upper and lower. Alternatively a single character might be used with a different convention.

Note that depending on requirement hand, upper and lower arm and wrist could be exploded to another level of detail. This could extend to further analysis according to bone, cartilage, etc.

In some cases posting against a heading may be valid.

Clearly these conventions have to be developed for the entire code table and not just for the segment that is exploded above.

Note the use of "z" in "ZN" to ensure that this general item sorts at the end of the list component where it appears.

Effective code design is time consuming and requires a high level of analytical skill, systematic thinking and clear understanding of underlying first principles of the business area being coded. A senior solution architect should be responsible for code design assisted by suitably qualified specialists.

Strategic executive input is the starting point with focus on decisions that are likely to be required in the future. In some cases such consideration may be trivial but in other cases they may require considerable business input.

Really well designed codes can take a significant amount of time to develop. They will often require multiple design iterations and comprehensive review with business specialists.

Quick and dirty data coding schemes will devalue the system investment and in the worst cases neutralize the entire investment. I have seen very substantial enterprise resource planning system investments totally crippled by poor data engineering.

Really well designed codes will greatly facilitate effective analysis and accuracy of posting and support use of simpler software.

10.8.6 Special Techniques

There are a diversity of visual and other aids and conventions that I have found really important in developing coding schemes.

Some of these are apparent in the examples already used and others are presented below:

1. Capitalization, Indents and Trailing Periods

I generally adopt a convention of capitalizing headings and writing posting level entries in proper case (first letters capitalized). This is evident in the examples already given.

Together with the capitalization I like to use indents in the text to offset each level of heading. This is evident in the examples already given. However, in some Windows based environments leading spaces do not appear. This can be overcome by using a leading period instead of the first space followed by spaces such as ". Wrist".

Where there is an alpha search on the text description the use of leading spaces or a period plus spaces will prevent the text search from working if it only works on the first characters of the field. In such cases one is faced with the choice of abandoning the leading spaces or alternatively custom developing a look-up table with search function which ignores the leading spaces or else do without the search function.

Development of a custom routine is my preferred course of action followed by ignoring or disabling the search function. With well designed and well structured codes the requirement for a search function is considerably decreased.

The combination of capitalization and indents makes it much easier for users to rapidly locate the correct posting description and therefore its corresponding code.

In practice the 80:20 principle also applies. Operators will find that the majority of posting is to a limited number of codes and if the codes are well designed mnemonics users will rapidly learn the codes for the most frequently posted data.

The use of trailing periods in the codes is also helpful.

This also serves to assist the user to scan down the code list and identify posting codes quickly. More importantly, consistent use of trailing periods in the codes provides an additional level of intelligence in the code for use in management reporting and analysis applications.

Provided the trailing periods are completely consistent, summarization and drill-down functions can be implemented based on the number of periods with summarization of totals between all codes with fewer periods. This allows relatively simple queries and reporting functions to unlock the full potential of the code structure very easily.

2. MULTISTAGE© Picklists

A difficulty that the above approach does not cater for is the length of the list to pick off that results from a comprehensive first principles analysis in some cases.

Thus, in the anatomic site code example above, if the entire code structure is displayed in the list instead of just the selected section in the example in section 10.8.5 it will take some time to browse down the list to the required item.

The use of capitalization, indents and trailing periods will collectively greatly simplify the task of rapidly moving to the correct item but the required scrolling is still somewhat tedious.

An approach to this, which I developed some years ago, is what was termed MULTISTAGE©. A MULTISTAGE© picklist only displays the headings for the first level of code when it is displayed. On selecting a specific heading the next level of the list for only that heading is displayed and so on until the posting level is displayed and the posting item can then be selected. This is done recursively in the same field using the trailing periods to drive the algorithm. A simpler option is to have a sequence of multiple picklists where the starting value of the next list is populated with the selected value from the previous list.

3. Not Applicable, No Information and No Code

Notwithstanding significant effort in ensuring that picklist content is fully comprehensive, there may be real world situations where the coded item does not apply or where the information to code the field is not available or where there is no code entry that the user can identify.

These real world situations should be catered for in the code design otherwise operators are forced to select something which makes nonsense of the data.

Conventions need to be developed for specific situations but examples that work well are:

Z00 No Code - to signify that the user cannot find the code required to accurately post that item.

ZNA Not Applicable - to signify that the validated list is not applicable in that situation.

ZNI No Information - to signify that the information required to select the appropriate code is not known.

The use of a leading "Z" is advocated in order to place these items at the end of the list so that users only see them as a last resort. If considered appropriate they could also be coded in such a way that they sort at the start of the list depending on the specific situations in the organization concerned.

If the code size is smaller than three characters the above can be shortened to Z0, ZA and ZI. If only one character is available X, Y and Z will work in the vast majority of cases except where X, Y or Z is mnemonic for some other content item. In such cases creative decisions will be required in order to arrive at a viable solution. Consistency across all tables is strongly recommended.

4. Standard Abbreviations in Trailing Descriptors

One of the important requirements in designing a look-up or validation list is that the descriptions are in meaningful English such that the user can easily identify where they are in the list and which item to pick. In the case of large lists, such as a general ledger chart of accounts, this can become challenging.

The most effective way to handle this is to use short abbreviations at the end of the description field which echo the key words of the headings. The following is an example:

```
16 81..    .  DEPRECIATION      -RBG-COHE    I  I
16 810     .   DEPN GENERAL OFF MACHINES     I  I
16 8100  12     Gen Off M/C     -Dpn-RbCo    B  A
16 8102  12     Airconditioners -Dpn-RbCo    B  A
16 8104  12     Photocopiers    -Dpn-RbCo    B  A
16 8106  12     Binding Eq      -Dpn-RbCo    B  A
16 8108  12     Printing Eq     -Dpn-RbCo    B  A
16 8110  12     Photographic    -Dpn-RbCo    B  A
16 8112  12     Telephone Eq    -Dpn-RbCo    B  A
16 8114  12     Facsimile Eq    -Dpn-RbCo    B  A
16 8118  12     Dicataphone Eq  -Dpn-RbCo    B  A
16 812     .   DEPN COMPUTER EQUIPMENT       B  I
16 8130  12     Comp Network    -Dpn-RbCo    B  A
16 8134  12     Network Other   -Dpn-RbCo    B  A
16 8136  12     Modem Eq        -Dpn-RbCo    B  A
16 814     .   DEPN COMPUTER PRINTERS        B  I
16 8142  12     Printer Eq      -Dpn-RbCo    B  A
16 815     .   DEPN COMPUTER SOFTWARE        B  I
16 8150  12     Major Comp S/W  -Dpn-RbCo    B  A
16 816     .   DEPN INSTRUMENTS & EQUIP      B  I
16 8160  12     Video Pres Eq   -Dpn-RbCo    B  A
16 8164  12     Other Pres Eq   -Dpn-RbCo    B  A
16 817     .   DEPN FURN & FITTINGS          B  I
```

```
16 8170  12     Furniture       -Dpn-RbCo    B  A
16 8172  12     Fittings        -Dpn-RbCo    B  A
16 8174  12     Filing Systems  -Dpn-RbCo    B  A
16 8176  12     Library F & F   -Dpn-RbCo    B  A
16 8178  12     Office Sec Equ  -Dpn-RbCo    B  A
16 818     .   DEPN LIBRARY EQUIP            B  I
16 8180  12     Library Stock   -Dpn-RbCo    B  A
16 819     .   DEPN MOTOR VEHICLES           B  I
16 8190  12     Passenger Cars  -Dpn-RbCo    B  A
16 8194  12     Light Del Veh   -Dpn-RbCo    B  A
16 8198  12     Motor Cycles    -Dpn-RbCo    B  A
16 82..    .  REPAIR & MAINTENANCE           I  I
16 820     .   R & M GENERAL OFF MACHINES    I  I
16 8200  12     Gen Off M/C     -R&M-RbCo    B  A
16 8202  12     Airconditioners -R&M-RbCo    B  A
16 8204  12     Photocopiers    -R&M-RbCo    B  A
16 8206  12     Binding Eq      -R&M-RbCo    B  A
16 8208  12     Printing Eq     -R&M-RbCo    B  A
```

This is the same example as in section 10.8.4 but with the code and trailing abbreviations added. Classification fields used in generating the list are also included in the two columns at the extreme right. These columns relate to switch settings for use by the software that was used to generate the comprehensive chart of accounts for the entire organization.

This was required because items like assets occurred in each of the office locations of the organization concerned, seventeen locations in one particular case. Accordingly, rather than manually creating the chart of accounts for all these locations a spreadsheet with macros was developed which would automatically generate the entire chart of accounts based on various master tables and switch settings. In doing this the full multi-dimensional cube of codes was generated so that the full cubic model was embodied in the general ledger.

This resulted in a chart of accounts of about 17,000 accounts associated with a high level of automation of posting from the enterprise resource planning system. This resulted in a high level of accuracy and efficiency, a reduction in bookkeeper head count and a massive improvement in management information (Barry and Robertson 1993).

Corresponding mapping was then undertaken in the associated enterprise resource planning system so that, where appropriate, items could be posted directly from the enterprise resource planning software. These postings related primarily to production and sales related information.

This data is for a general ledger chart of accounts which includes a cubic business model as outlined in section 10.7.

The cubic model is represented in the three-part code structure by the first and third code segments. The first code segment represents the locational code and the third code segment represents the functional code.

The central code segment is the posting code in the General Ledger. The sequence of the three code segments is a function of some peculiarities of the specific general ledger software that was being used.

The structure of the middle code segment could be improved. In this case the software in use limited the number of available characters to four and this introduced some significant constraints on overall code design.

The trailing abbreviations that form part of the account descriptions indicate a number of terms:

The "-RBG" after "DEPRECIATION" indicates an abbreviated location descriptor, in this case an abbreviation of the town name.

The "-COHE" after "DEPRECIATION" indicates the functional descriptor in an abbreviation that would make sense to the operators.

In the posting level entries that follow these two items are abbreviated into "-RbCo" which provides a mnemonic abbreviation of the location and function. This is required because the core detail on both the location and the function is exactly the same in some cases.

The "-Dpn" and lower down "-R&M" prior to the "-RbCo" are abbreviations of "DEPRECIATION" and "REPAIR AND MAINTENANCE" which are the higher level headings on these sections. This is required because the core detail on both depreciation and repair and maintenance is exactly the same.

5. Mnemonic Codes, Numeric Codes, Composite Codes and Delimiters
Mnemonic codes are demonstrated in the anatomic site example.

Where the scope of the validation list permits it, the use of mnemonic codes is always to be preferred. It is much easier for an operator to learn a mnemonic code with a clear correspondence to the plain English description than it is for the operator to learn a numeric code.

Applications where mnemonic codes do not work well are general ledger charts of accounts and project schedule work breakdown structures. In the case of the chart of accounts numeric codes are preferable because the list is so large and because the accounting logic behind the data requires a specific structure that is not amenable to alphanumeric coding. In the case of a project plan issues of size and underlying logic also indicate a numeric structure.

When numeric codes are used it is advisable to spread out the numbers used so that there is space to add in an additional item should it become necessary. It will be noticed in the chart of accounts example above that the posting codes are spaced out at intervals of two or four.

Where space permits composite codes comprising a numeric value for sort purposes followed by an alpha, mnemonic code for identification can be used. This is particularly applicable for overall corporate filing and directory structure schemes but tends to be unwieldy for typical validation code picklists.

Code delimiters can also be used. Most people find that a one, two or three character code segment is easier to read and remember than something that is longer. Where space permits the code can be separated into shorter segments using either periods ".", dashes "-", underscores "_" or spaces " " on a regular pattern.

6. Abbreviations
Where abbreviations are required in the description it is important to use consistent abbreviation conventions.

7. Other
There are other important principles and conventions that should be applied in data code design which are outside the scope of this book.

The effective analysis and design of strategically significant codes and code structures is a creative process that requires a solid understanding of the fundamentals of the business area being coded and a fundamental understanding of the principles of taxonomy, classification, etc. This is particularly important with regard to lengthy and complex code structures such as in charts of accounts and others code structures where there is a large amount of logical content.

A study of taxonomy and cataloguing principles from disciplines such as Zoology, Librarianship, etc is recommended.

In staffing a programme of work or a department it is recommended that a team member (part time if appropriate) with suitable cataloguing skills and possibly a masters degree in Information Management or related type of qualification should head up the data classification team.

One of the interesting things about data engineering is that when a really well designed set of codes is completed it is so intuitive that management cannot understand why it took so long to develop. The development of really well designed code schemes is a time consuming and challenging iterative intellectual process. If effectively completed this process will deliver very substantial benefit to the organization in terms of its ability to analyse its data.

Given that these code structures provide the only possible way of undertaking really meaningful analysis of the data it is vital that the necessary budget provision is made to do this effectively.

10.8.7 Data Cleansing and Data Quality

Data cleansing relates to removing duplicate names and addresses from databases of names, including customer master files and similar. There is specific software and associated databases and rules available for processing data files containing name and address information and using things like telephone number to identify duplicate occurrences.

Such software also requires calibration to the specific characteristics of the data to be processed. Thus typical misspellings of certain words, word equivalents in locations where people speak more than one language, etc are required.

The process of cleansing a large database of names and addresses involves:

- Drawing the data into a database for analysis,
- Calibrating and tuning the software,
- Running the analysis,
- Printing reports

- Editing the data in the operational database.
- Performing database merges to merge historical records for more than one instance of the same person to a single instance.

This work is not trivial. There are specialist firms that offer this service but it will require specialist database management skills relating to your specific database to bring about the merges, etc.

Similar duplication of entries can occur in other master files and will require appropriate measures to cleanse the data.

Where appropriate, once data validation tables have been cleaned up it is generally preferable to resort to a clean slate re-implementation as discussed in chapter 4. Such a re-implementation would include cleansed customer and other master files as appropriate on a case by case basis.

10.9 Case Histories

An example of a simple but effective practical data engineering implementation to create a substantial business benefit is reported by Paton and Robertson (1992)

This particular application software was designed in two days and built in ten days as a prototype with narrow scope and short design life. It took a further ten days to do a "quick and dirty" code design in which the author spent the entire ten days sitting with a director of the client company and bringing in other executives to consult on the content of the data codes.

The end result of this project was that four clerks did work that would previously have taken twelve clerks and captured orders of magnitude more information and the client obtained orders of magnitude more management information.

This particular piece of software related to the short-term insurance industry relating to claims for accidental damage and loss.

What was significant about this particular application was that in capturing the data off a two page claim form provision was made for thirty four data fields to be validated. This resulted in a situation where to capture almost all the data on the claim form apart from name and address information and a verbose description of the loss incident, everything else was captured as coded validated data. It turned out that in practice the vast majority of the claims fell into a very limited number of categories so the operators very quickly got to learn the most important mnemonic codes. This had the result that they did not even have to look up the codes, they simply typed them in.

It was this ease of data capture that resulted in four clerks capturing about eighty percent of the data on the form whereas it would previously have taken twelve clerks to capture about twenty percent of what was on the form.

This was a completely unexpected and very dramatic saving and was dramatically compounded by a wealth of management information as the structured codes permitted senior managers to analyse the data in every conceivable way possible and to examine trends and relationships which previously had been unattainable.

In another case, reported by Barry and Robertson (1993), an integrated enterprise resource planning system in the professional service environment with full general ledger integration at the data level was implemented. This implementation used the highly structured chart of accounts incorporating the cubic business model of which a very small component is listed in section 10.8.6 sub-section 4 above.

In this case year-end audit time was reduced from six months to six weeks for final sign off of the balance sheet by the auditors without qualification.

10.10 Parameterization

One of the problems that is experienced by many software implementations is that the business environment appears to change so rapidly that the software "cannot keep up".

I have found repeatedly over the years that robust first principles strategically focussed design results in a design that anticipates the vast majority of likely variations in the business environment in such a way that the software can adapt easily to change.

One of the things that I have found important is to parameterize everything that may change during the design life of the system.

Parameterization involves the use of validated fields which may have software switches and other parameters attached to them. This is a complex technical subject which is outside the scope of this book save to stress that it is possible to design software that will serve the client organization well in the long-term.

10.11 Data Based Design

Another subject that relates to data engineering is what I refer to as data based design.

Data based design, as distinct from database design (one word) relates to using the data as the primary focus for design rather than the processes that work with the data.

Many in the information technology field place considerable emphasis on process in designing software.

I have repeatedly found it more helpful to concentrate on the data and all the attributes of the data and then to evaluate the processes that will best integrate the software with the business and which are most profitable to automate.

In doing this I refer to the process engineering environment where information about the chemicals and other components to be processed is generally more important from a design perspective than the process itself. Processes in manufacturing tend to be rather generic whereas the products that are produced and the impact these have on the machines used in the process is considerable.

By way of example, the process of producing granular super phosphate fertilizer and granular calcium hypochloride swimming pool sterilizer is essentially the same. An acid is mixed with a naturally occurring material and a reaction takes place to produce a compound product. This is then fed through a granulator and fed into bags or other containers.

The process is simple and relatively standard. However the acids involved, the corrosive nature of the products and various other attributes are sufficiently different so that the machines that are required for the different components of the process will not all be the same. This demonstrates that focus on process alone is not sufficient to produce a solid engineered solution design.

10.12 Conclusion: Data Engineering

Well designed codes will leverage the investment in analysis tools by orders of magnitude and overall improvement in corporate health can be dramatic.

This is an area which is overlooked in virtually all system implementations in terms of the level that is envisaged in this book. Accordingly it represents a major opportunity.

Seriously dysfunctional data engineering is a major factor in the problems being experienced by many corporations. It also frequently represents the biggest single opportunity for many corporations.

However, it generally requires a "clean slate" re-implementation of the core enterprise resource planning system and other systems frequently with some software modification.

Well structured, systematic data cataloguing and associated code design should be a fundamental component of any information technology business solution. Redesign of data codes within existing applications can give rise to orders of magnitude improvements in data quality and information about the business.

Thus, on the one hand, dysfunctional data engineering is probably the biggest single cause of sub-optimal information technology investment performance and on the other hand it is probably the biggest single opportunity to create sustainable competitive advantage in the areas of operational and strategic decision support.

CHAPTER

11

PEOPLE / SOFT ISSUES

Organizations consist of people who come together into an organization to provide services to other people. This applies whether the organization is a profit orientated multi-billion dollar corporation, a government department, a non profit charitable organization or any other type of organization.

It is therefore remarkable the extent to which many information technology and strategy implementations fail to recognize the people related or soft issues pertaining to the implementation. After all, information technology exists only to assist and support the people to do their work effectively and efficiently.

This chapter highlights a number of people related aspects that are often overlooked but which should be taken into account in planning and executing any system implementation. These factors, if ignored, have the potential to cause the system implementation to fail. They also require investment that is significant if they are to be fully catered for.

11.1 Organizational Design Impact of Information Systems
The organizational design impact of information systems can be considerable.

Many people in organizations:
- Collect
- Collate
- Summarise
- Synthesize
- Present

Information

Sometimes they interpret and act as outlined in section 7.2.

Consequently the effective implementation of effective integrated information technology solutions which effectively automate the collate, summarize, synthesize and present component will give rise to business organization redesign. Certain job functions will become redundant and others will be drastically changed.

In one case an organisation made a substantial investment in new computerized systems to automate a particular clerical function. In an effort to retain some "human" component they left one aspect of the system open to human intervention. Once fully operational the software was expected to make three of a team of four clerks redundant.

Several months after running live the implementation was in serious trouble, there were now twenty temporary clerks in addition to the four permanent clerks who were trying to sort out problems with the software.

Eventually, an investigation revealed that the four original clerks had decided that since three of them were to lose their jobs they would make sure the software never worked. One of them was accordingly seeding the data with a false transaction and this false transaction was creating work for twenty four clerks trying to reconcile thousands of transactions.

It is also important to understand that where a new information system is going to automate a particular job function, it is frequently the case that the people who will be made redundant or have their jobs changed are vitally important team members during the implementation. After all, they know the function that is being automated better than anyone else. It is therefore essential to take appropriate human resource measures such as incentive bonuses or other provisions, to ensure that they are willing contributors to the success of the project.

In another case, a key staff member was never available when required for project meetings. Alternatively he came late and left early and never managed to "find the time" to do the things that were requested of him. These actions were vital to designing the system that was going to automate his function. Eventually it was realised that he had figured out that if the system ever worked he would be out of a job and accordingly he was quietly doing all that he could to prevent the system becoming a reality.

A discussion was then held with the individual's senior manager who had actually been planning to promote him to a more senior position once the project was complete but had not thought to communicate this to the staff member concerned. Immediately he was in possession of this information and could see a bright future for himself his attitude to the project changed totally.

It is important to recognize that when a system is introduced that will change or eliminate certain people's jobs, those people will almost always be the first to recognize this. Not necessarily at a fully conscious level but at a level that is sufficient for them to withdraw their cooperation and support unless effective human resource management actions are undertaken.

It is absolutely vital when planning an implementation to identify the people whose jobs will be threatened, and to take the necessary human resource management measures. This might comprise a well planned golden handshake and performance incentive, commitment to reskilling or some other measure which lets the staff member know that the organization is concerned about their welfare.

11.2 Personality Style / Psychometric Profile
People and organizations have distinctly different operating styles.

One well known method maps people onto a four quadrant grid in which the top left quadrant represents people who are primarily relationship orientated -- "Joe is a good friend and if Joe says so that is good enough for me".

The top right quadrant relates to people who are innovators -- "if it has been done before, lets find a new way of doing things".

The bottom right quadrant relates to people who are results orientated -- "I want it yesterday and I don't care who gets hurt in the process".

The bottom left quadrant relates to people who are administrators or bureaucrats -- "I like things just the way they are, don't change anything."

11.3 Response to Change
These different categories of people will respond very differently to the same changes in their work environment.

One of the consequences of this is something that might be referred to as the paradigm chasm. Champions of the new system are axiomatically in the innovator quadrant while the personnel affected by the implementation are effectively in the bureaucrat quadrant, they like it just the way it is. This results in a paradigm chasm that must be bridged.

Even people who say they want change, unless they are innovators, will resist change when it actually impacts them directly.

This will not necessarily manifest itself as outright obstruction and rebellion such as the example that resulted in hiring twenty temporary employees. In most cases it will result in lack of morale, lack of energy, lack of time to work on the new project, disinterest in the new project, half hearted contributions, not thinking things through resulting in wrong or partially wrong information, etc.

As things progress and implementation gets underway staff who have been with the organization for years may start complaining to management that the new system "will never work", is "cumbersome", etc. In light of the ninety percent failure statistics it is quite possible that many times these criticisms are valid. However, when the new system is well designed and will deliver major benefits this type of criticism can still occur.

This is generally not wilful, it is the result of an unidentified subconscious dis-ease with the system simply reflecting the person's discomfort with change. This is perfectly natural but it needs to be managed effectively with effective processes for the management of change or else it can cause a project to fail.

The most extreme case that I have encountered of this was a situation in which the chief bookkeeper was married to the chief executive. The chief executive officer did not invest the time he should have in the project and relied on his wife to keep him informed. When she started to get negative because the new fully integrated enterprise resource planning application was replacing her twenty four column cash book, the chief executive officer got

negative as well. It took a major effort on behalf of the executive responsible for the implementation to hold things on track.

In considering the process of change in the context of the personality matrix referred to above, it is important to be aware that different people will respond differently to change and will require different approaches to assisting them to accommodate change.

Thus people on the top left diagonal half of the matrix will require hand-holding to help them deal with change while those on the bottom right diagonal half of the matrix will want the team to "prove it works". Trying to prove things work to people who are relationship orientated will intimidate and alienate them and trying to hand-hold results orientated people will alienate them.

Management of change programmes need to recognize the realities of the different personalities involved and deal with this appropriately, if necessary categorize staff based on their psychometric profiles and then invite different groups to different project induction meetings designed for the different profiles.

11.4 Cognitive Ability

Within the dynamics set out above there will also be different levels of cognitive ability amongst staff. Some personnel may have considerable cognitive ability and thus be able to change their mind set from the present to the proposed new state in "one easy leap".

Many, in fact most, will require to be assisted to make the change "one small step at a time". This will require repetition and courses and training material that progresses them in gradual increments that are within the limitations of their cognitive ability or paradigm threshold, to change.

Again this will require that different categories of staff are progressed in different ways through the change process.

11.5 Competence

Competence issues can also be a source of major misunderstandings.

Competence is defined as the composite of a person’s knowledge and experience.

One model of competence uses a six-point scale in which a value of six equals considerable knowledge and experience and the ability to train others whereas a value of one equals no knowledge or experience whatsoever.

Competence is measured over a broad band of discrete aspects such that in reality every human being represents a composite of competence in hundreds of discrete areas.

The competence profile of one individual interacts that of others with whom they come into contact. If the gap in a specific competence area is greater than 1.2 then the one with the greater competence has forgotten what they did not know when they were on the level of the less knowledgeable person. The person who is lower on the scale does not know what they do not know.

Typically the people who are actively involved in the implementation of a new system will be close to six on the scale relative to their knowledge of the new system. However, particularly if they are outsiders, they can be close to one on the scale in terms of their knowledge of how the business currently does things. Conversely the staff know next to nothing about the new system but are experts on how things are at present.

The potential for these two positions to clash is considerable and highly destructive clashes are almost inevitable unless an effective change process including effective communication and effective education is introduced.

On the same scale, if the gap between a person in a superior position and a person in sub-ordinate position is less than about 0.7 then the sub-ordinate knows nearly as much as the superior and will resent being told what to do in that area. In the case of a young consultant, of the type who is typically employed in many system implementations, who has plenty of product specific knowledge but little real world experience yet is placed in a nominal position of authority, the potential for clashes and resentment with existing staff are enormous.

The effective management of competence issues requires the effective engagement of human resource professionals in order to manage this in a constructive manner. It also requires the effective use of appropriate training methods and sensitivity on the part of external team members when they are interacting with staff.

The use of really well designed interactive computer based training material (C.B.T.) can be an important way of dealing with many of the competence issues as well as other issues relating to the management of change.

Incidentally, I prefer to refer to "management of change" rather than the more customary "change management". This is as a consequence of a bad experience where a senior executive heard the phrase "change management" and

apparently became convinced that it was my intention to replace (change) the management of the company I was working with at the time.

The value of mature, experienced consultants with operational business experience in key roles cannot be over stressed.

Management of change introduces enormous communication, training and related requirements if the overall implementation is to be effective.

11.6 End User Support Issues

End user information technology support is another area where people related issues warrant serious attention. Typically there should be three levels of end user support in each and every technology and business system area. These are:

11.6.1 Front Line Support

People who are customer, that is user, focussed with good interpersonal skills and basic problem solving skills who are dedicated to a group of users. The ability to build relationships and to tell a user that if they turn on the power at the wall the computer will work, without treating the user like an idiot, are vital requirements.

11.6.2 Second Line Support

Technical specialists with good problem solving skills who know the specific business environment.

11.6.3 Third Line Support

The "boffins". Back-room personnel with very specific technical expertise who may frequently be from outside the company.

11.6.4 Problem Escalation

Problem escalation is from first line to third line. The escalation line reflects a movement away from detailed knowledge of the business and good people skills towards detailed knowledge of the technology and good technology skills.

11.6.5 Conclusion: Support

In general there is no reason for first line support to be outsourced. In fact, it is probably not in the best interests of the organization to outsource this.

In many organizations there will probably be a strong long-term business case to retain the second line support in-house as well.

Each category of support requires very distinct knowledge and experience sets and psychometric profiles.

Incorrect allocation of personnel can result in completely inappropriate support actions. In one case a person who was appropriately skilled to be third line support was employed in first line support. In response to a situation which required a simple explanation to an end user they instead took a technology view of the problem. This resulted in them re-installing network software which disrupted an entire department of over one hundred users for days.

In another case two highly skilled technical personnel spent half a day trying to find an apparent software bug when the real problem was that the user had spilled soft-drink on the keyboard. They were so focussed on looking for a complex technical problem that it did not occur to them to check the basics first.

11.7 Conclusion: People and Soft Issues

People and soft issues introduce very considerable communication, training and related requirements if the overall implementation is to be effective.

Close cooperation with corporate human resources management is vital.

It may also be necessary to engage specialists to assist in this area.

If not effectively dealt with and particularly if coupled with poor executive custody, people issues can wreck a technically sound project.

CHAPTER

12

TECHNOLOGY ISSUES

The failure of information technology has very little to do with technology and therefore the design of solutions which are designed not to fail has little to do with technology.

The overall information technology industry is really good at supplying most forms of technology. What it is not good at are all the things set out in the preceding six chapters, that is:

1. Information technology mythology (30%)
2. Lack of executive custody and inappropriate policies (20%)
3. Lack of strategic alignment (15%)
4. Lack of an engineering approach (12%)
5. Poor data engineering (10%)
6. People / soft issues (8%)

If the above six aspects are fully dealt with within the context of the principles, factors, etc set out in part 3 and within a programme context as set out in part 4, technology will seldom be an issue.

In this context it is important to recognize that in many cases where there are genuine technology problems the reality is that the technology problem is a consequence of failure to address one of the other issues. At the end of the day, technology that does not work is a consequence of bad analysis, design or construction. All of these relate to people.

Taking account of this, in this chapter I would like to set out some physical world parallels which are useful in understanding the different types of technology that typically form the full spectrum of the information technology solutions in any organization.

The sections that follow provide a discussion of physical world parallels for transaction processing, automation, decision support and integration within the context of an engineering approach to information technology using physical world parallels as discussed in section 9.7.

12.1 Transaction Processing Systems - Industrial Metaphor

Transaction processing systems, including large enterprise resource planning systems, are comparable to large factories or production lines and their associated processes.

Such factories comprise standard production units from various manufacturers assembled to convert specific raw materials to specific manufactured products with a limited number of operators for a large number of consumers ignorant of the process.

Factories tend to be dirty, smelly, dusty places and they keep on working year in and year out. Fashion and latest technology are factors which do not enter into consideration in the maintenance and operation of a factory. The objective is to get the maximum possible production out of the plant that is in the factory and only replace machines when they are totally worn out or when there is a quantum improvement in performance that will deliver real payback. Most major factories will have a design life of 20 to 50 years but clearly the frequency of renewal of individual components will vary greatly depending on the strategic profile of the business and various operating conditions.

Similarly, the frequency of replacement or renewal of individual information technology components should be based on strategic considerations.

There is no reason why major transaction processing systems in most organizations cannot be viewed in much the same way. In particular, I see no reason why a major enterprise resource planning system well implemented and well maintained should not run for ten, twenty or thirty years or even longer with modern technology well implemented. It is highly unlikely that real benefit will accrue from replacing such a system if the real cost of business disruption is taken into account.

On the other hand, a clean slate re-implementation, as set out in chapter 4, may well deliver substantial benefit. This may require modification and refurbishment of the system.

12.2 Automation Systems - Municipal Metaphor

Automation systems, including process automation and office automation, are best compared with municipal and utility services. They comprise standard units assembled to standard designs to provide utilitarian (functional) services to a wide number of users over a distributed area.

Examples include electricity reticulation, water, sewerage, roads, etc. They constitute infrastructure including large numbers of similar or identical components and provide utility services to large numbers of users with a design life of 20 to 50 years and a practical life which may well be longer.

While it may not be fashionable to suggest that business has reached a situation where the vast majority of users could use the same office automation products for five, ten or more years without any real hindrance to their work, this is probably the case today.

As mentioned previously, technology is already at a point where software that is ten or even fifteen years old written for the Intel and MS DOS / Windows platform will keep running without difficulty. This applies to most other major platforms as well. This being so, there is an even stronger basis to indicate that the current versions of office automation software will run perfectly well on Intel machines running Windows in ten or more years time.

If this approach is adopted it is quite conceivable that Intel based computers will run effectively for periods of eight to ten years or more without difficulty. It is only when one loads a new version of the Windows operating system or a new version of an office suite or other heavyweight software onto old machines that performance becomes a problem. If reliable brand name machines are purchased and properly maintained it is perfectly feasible to keep them running for longer than five years.

For some years now I have recommended a six year, three tier workstation procurement plan. Purchase new brand name machines at the top end of the specification range and give them to “super users”. After two years move them to intermediate level users and after another two years move them to users with low hardware performance requirements. Every two years give the power or super users the new machines. In practice an even longer overall machine life is increasingly practical.

Accordingly, within this context a clear strategic basis for automation system upgrades is indicated as the only basis to consider and then only in the context of the definitions of strategy presented in chapter 8.

Note that to the extent that certain users in an organization may genuinely have to exchange files with external users with later software versions it may be necessary to equip a support person somewhere in the organization with the latest software in order to convert files. Note, however, that in other aspects of business it would not be regarded as unreasonable to require suppliers to supply documents, etc in a format that conforms to the organizations standard.

Thus it would really only be communication with strategically important customers and partners that would require compatibility with latest versions of software and even then a polite request that documents are exported to an older version will generally not be problematic in at least some circumstances.

The big problem with this concept relates to the subject of information technology mythology dealt with in chapter 6 and issues of fashion amongst corporate executives.

Thus, in practice, it is unlikely that many organizations will adopt the approach recommended above at this time. However, if organizations do choose to upgrade more frequently then management should be realistic. In other words, they should acknowledge that the desire for the new version is a response to fashion and marketing pressure and not to real solid business need. Accordingly, in such cases there should not be an expectation of a return on investment and an alternative business case should be arrived at.

12.3 Decision Support Systems - Custom Building Metaphor
Decision support systems can perhaps best be compared to custom designed buildings. Of necessity these are strategic systems that are tailored to the unique requirements of each business.

Custom buildings are unique buildings designed to owner requirements by an architect / engineer team and built by building contractors for occupation by particular populations who are ignorant of the construction process. They may be prestige or utilitarian but are specific to the client. They too have a design life of 20 to 50 years or more.

These systems co-exist with the transaction processing and automation systems and rely on them for data feeds and various services.

Technology may not yet be at a point where really long design lives are attainable here since this is relatively new technology. However, the probability is that if a really well designed strategic decision support capability, including information warehouse and diverse analytical tools, were to be well implemented today it has the potential to last at least a decade.

12.4 Integrated Systems - Industrial and Office Park Metaphor
Integrated systems are analogous to a combined industrial and office park. The full diversity of factories, municipal services and custom office buildings integrated to create a functional environment in which business can operate effectively.

Integration between all the systems referred to in the preceding sections can be compared to this metaphor and appropriate lessons learned.

Creation of such an information technology office and industrial park indicates that diverse systems will be assembled as part of a comprehensive programme of action which produces something that is reliable and sustainable for decades.

There will be ongoing development, extension, modification, etc of systems. Individual components may become obsolete and be replaced or subject to major overhaul but the park is never flattened and replaced entirely.

It is suggested that the modern information technology environment for most corporations is technically capable of satisfying this metaphor. The question is whether executive management are willing to take the strategically important decision to put aside information technology mythology and fashion parade and concentrate on investing in long lasting systems that are simply tools for the conduct of the business. These tools may be added to and extended as the years pass and new technology components become available but the entire integrated assembly of dozens of systems from dozens of suppliers will never be scrapped and replaced in full.

Such a business system environment is the norm for every organization with any real investment in information technology today. In all cases, the resulting integrated system is unique!

Integrating business systems requires consideration of two major factors:

1. Mechanical / technical integration - can it be done?

2. Soft issue / business integration and optimization - do management have the resolve and the management determination and ability to make it happen?

The first point is generally trivial compared to the second. The obstacles to integration are summarized in the preceding six chapters and have little or nothing to do with technology.

12.5 Impact of Different Classes of System
The different classes of information technology require very different design, operation and maintenance approaches. They are designed and built by different professional teams. They are operated and maintained by different types of operator. They may all be used by the same users but with different objectives.

Do not treat them all the same!

12.6 Craftsmen Use Well Worn Tools
In considering another aspect of technology, consider that in most aspects of workmanship or craftsmanship, the people who make their living using tools, only purchase new tools when their existing tools are completely worn out or when a new tool becomes available that offers substantial productivity gain.

Such craftsmen also frequently possess a diversity of similar tools which have different nuances of functionality.

This is an important parallel to consider in the information technology context. Firstly, there is often no need for organizations to constantly upgrade their software or buy new software. Conversely, it may happen that advanced users may legitimately have cause to purchase a variety of different products which have different strong points in order to equip themselves to work at optimum efficiency and effectiveness.

There are other principles that can be drawn from this particular example.

12.7 Maturity of the Airline Industry

A useful example in considering the maturity of the information technology industry and its impact on procurement decisions is to consider the airline industry.

Up to the advent of the Boeing 747 approximately thirty years ago, every new passenger aircraft represented a noticeable advance on previous generations. For the last thirty years the Boeing 747 has been one of the most widely used aircraft in the world. While there have been ongoing technological advances in engines, control systems, winglets, etc the basic design of the aircraft has remained largely unchanged and the average person would have difficulty in quickly assessing whether a particular 747 was thirty years old or much newer apart from signs of wear and tear. Since most airlines undertake major refits of their aircraft periodically wear and tear would not necessarily be a reliable indicator of age.

In the last thirty years the major advances have been in the operation of airports, terminal design, air traffic control methodologies to cater for greatly increased traffic density, measures to accelerate turn-around and maximize aircraft utilization, etc.

The development of major business computer software, whether in the field of enterprise resource planning systems, office automation systems, decision support systems or any other form of technology is, today, probably at about the same point that the airline industry was thirty years ago. In other words, there are strong reasons to expect that from now on development of business computer software will be far more incremental than it has been. This will support much longer investment life cycles and amortization periods than applied in the past.

This point is reinforced by the experience with the Concorde supersonic airliner built by France and Britain. The market did not consider the added time saving warranted by the additional cost and people objected to the sonic boom. The result, non-technology issues prevented the Concorde from ever achieving market success and it is now no longer in service with no indication of any new supersonic passenger aircraft being built at this time.

In most, if not all cases, the current generation of information technology products are more than adequate for most, if not all, of the requirements of most, if not all, organizations. The issue is no longer the technology, it is the capability of business to effectively and efficiently apply the technology. This is central to the thesis of this book.

12.8 There IS Very Old Software Out There

In support of the previous points, it is important to note that there are organizations running what most people would consider to be “very old” computer software very successfully. For example, many banks are running systems which include components written in Cobol twenty or thirty years ago.

These components are front ended onto automatic-teller machines and other modern technology but the back-end processing is still essentially the same as it has been for decades. Accordingly, there is no value to be added by replacing these core systems. The value is added by developing or procuring new technology around the core systems. These old systems are obviously running on new computers with orders of magnitude faster performance and greater capacity than the computers on which the software was originally developed. However, it is the same software.

This highlights a very important attribute of computer software. It never wears out and as long as a compiler and processor are available that are capable of compiling and running the source code the software will generally keep pace with demand. Only if there are fundamental design flaws will the software eventually run out of capacity.

Extending this point, it is likely that in-depth examination of many of the major enterprise resource planning systems on the market will reveal that there are substantial pieces of source code that have undergone little or no modification in a decade or more with occasional exceptions where a product has undergone a total rewrite on a different platform. Even in such cases it is possible that closer inspection will reveal legacy components.

The essence of this point is that organizations should look very carefully at any proposal that requires that they scrap and replace any large or even moderately large information technology investment. Make absolutely certain that there is a solid business case for this course of action.

12.9 Conclusion: Causes of Failure

Failure to address some or all of the factors discussed in chapters 5 to 12 is a major inhibitor that stands in the way of producing an outstanding, cost-effective, high value adding, long life, low maintenance solution that will support corporate strategic objectives fully.

This discussion of problem areas provides the necessary background to the rest of the book. In the remainder of this book an approach to undertaking information technology projects and programmes which are designed not to fail is outlined.

PART 3
ACHIEVING SUCCESS

CHAPTER

13

THE CRITICAL REQUIREMENTS FOR A SUCCESSFUL SOLUTION

Having devoted the second part of this book to discussing the factors that give rise to information technology failure in a context of what needs to be done to undertake successful projects and programmes, let us now move on to consider the critical requirements for a successful information technology solution.

In other words, how does one go about developing a solution for an industry characterised by failure?

This requires a robust systematic approach. This approach should address all aspects of governance, programme (multi-project) design, design against failure, solution analysis and design, testing, data engineering and management of change.

This was defined in chapter 9 as "an engineering approach".

The objective was defined in chapter 2 as a "world class solution".

For a decade I have spoken at length on the "real issues" in information technology at conferences in various locations internationally and in client workshops along the lines of what is presented in part 2.

More recently it was decided to undertake an in-depth critical issues analysis of all the data that had been accumulated over the years in order to bring greater structure to our understanding of the issues and how to design solutions that REALLY work.

This resulted in a set of:

1. Critical Principles
2. Critical Stages
3. Critical Factors
4. Critical Technology Components
5. Critical Human Foundation

Being identified.

These form the basis of part 3.

This section seeks to provide an overarching context in which solutions that do not fail can be designed.

It examines some points that verge on the philosophical in the seven principles and addresses other issues which are very hard, although referred to as soft (the people issues). It also looks at a classification for different categories of technology which is intended to form an enduring classification that can be used in constituting programme teams and operational departments with regard to developing solutions that do not fail.

This provides the context to part 4 which discusses an overall programme management approach directed at undertaking programmes that are designed not to fail.

This should all be read in the context of part 2 which provides a very substantial amount of the background on which parts 3 and 4 are based.

CHAPTER

14

CRITICAL PRINCIPLES FOR SUCCESS

The Critical Principles are those foundational principles that I consider fundamental to the success of any significant information technology undertaking.

The principles constitute a filter against which every aspect of any programme of work or the day to day operation of the corporate information technology department should be evaluated. It is essentially a checklist.

They should be woven into the very fabric of programme, project and operational design:

1. Create competitive advantage (19%)
2. Engineer against failure (18%)
3. Improve decision-making (17%)
4. Measurement determines behaviour (16%)
5. People are part of the system (12%)
6. Computers are dumb and abstract (10%)
7. Payback takes time (8%)

Many of these points have been developed in part 2,the objective in part 3 is to provide concise headlines against which the overall approach to programme management can be developed.

The relative weights in brackets indicate the relative importance that each of these factors should carry in making information technology related business decisions. From this it will be seen that the first few points carry the highest weight and should therefore receive the greatest attention.

14.1 Create Competitive Advantage (19%)
This is an inherent principle in the concept of applying information technology strategically which is the point that is emphasized in defining the criteria for assessing a world class information technology investment in chapter 2 .

Competitive advantage can be numerically determined in terms of relative strength by determining the market critical success factors (C.S.F.) for different product for market components of a business and evaluating the performance of one's own organization against the performance of specific competitors.

This results in the equation:

$$\text{Relative Strength} = \frac{\text{C.S.F. Score (Self)}}{\text{C.S.F. Score (Competitor)}} = \text{Competitive Advantage}$$

Both as rated by the customer.

This equation and the methodology for defining it is defined by McDonald (1989).

Essentially it involves researching the critical factors that cause customers in a particular market to purchase a particular product or range of products versus competing products and then determining how those customers rate your business and that of your competitors.

This analysis can be undertaken for the entire portfolio of products that an organization produces and from this an overall portfolio analysis can be produced.

The above equation generates a numeric value of relative strength.

If the value is less than about 1.1 it is doubtful whether you have real competitive advantage. If the value above is less than one then your competitor has competitive advantage.

Considering the above in the context of the discussion of strategy and strategic alignment in chapter 8 it is apparent that any material information technology investment should be undertaken with an objective of creating competitive advantage. If it is simply a necessary project then it should not jeopardize or destroy competitive advantage.

If an information technology investment is not going to assist the organization in either creating or sustaining or defending its competitive advantage it should receive very careful consideration before it is undertaken. The energy and resources consumed and the negative business impact of a significant information technology project can easily compromise the competitive position.

14.2 Engineer Against Failure (18%)

The principle of *"design for success by engineering against failure"* has been developed in various locations in preceding chapters.

The essence of the principle is that an engineering approach seeks to design all components for an equal probability of failure. In other words to build a successful engineering system one designs against failure and thereby achieves success.

By concentrating on weaknesses one is not being critical or harping on what is wrong, one is simply identifying those aspects of the system which are failing or not meeting requirements at present or have excessive potential to fail so that one can design failure out! The absence of this approach is one of the most fundamental weaknesses in corporate information technology and strategy solution design.

In one sense this amounts to weakest link design. It requires that weak areas in the information technology environment that could jeopardize the business and particularly those that could jeopardize competitive advantage are identified and systematically remediated in a manner that is designed not to fail.

If there is a weak link in a chain there is absolutely no point in redesigning or replacing the chains on the left or the right of the weak link, it is the weak link that will fail. In other terms, a chain is only as strong as its weakest link.

Another engineering principle is that small mistakes destroy large structures and kill people. In my studies as an engineer with a life-long interest in engineering and the things that engineers design and build, I have always found that in reports of failures, the failure always results from a detail that was overlooked and not from some gross error. From this it is concluded that it is small errors in information technology investments that will result in the failure of such investments in many cases.

A physical world example that demonstrates this point relates to a hotel walkway failure that killed about 115 people about thirty years ago. In this example a simple bracket on the upper walkway failed because the weight of the bottom elevated walkway was carried through the bracket on the upper walkway instead of continuing the suspension rod through both levels.

This was a simple detail that was probably overlooked in final detailing or possibly was changed during construction for convenience. Whatever the reason, a large number of people died and enormous damage was done as a consequence of the failure of a bracket costing at most a few dollars.

Note that the detail itself was not fundamentally invalid, it was simply not designed for the way it was built. A stronger bracket, which would have cost at most a few dollars extra, would have prevented the failure from occurring.

In considering the principle of design for success by engineering against failure it is important to understand that in adopting this approach, it is taken as a given that all failure is more expensive than doing it right first time.

It is also taken as a given that it is possible to identify the right things to do and to do them right.

This is not to say that mistakes will not be made at times. They will, however with a rigorous engineering approach, as detailed in chapter 9, those mistakes can be caught and designed out of the final solution.

There is a saying *"quality is not free: it is just much cheaper than the alternative"*.

14.3 Improve Decision Making (17%)
In an earlier chapter it was stated that one of the critical objectives of an information system is to get the right information, to the right people, at the right time and in the right place in order to make the right decision.

It has also been shown that information technology is a decision support and transaction processing technology, it does not make decisions. Accordingly, the issue is people not technology and the benefits are determined by the people who use the system more than by the system. People are part of the system.

The failure to recognize the relationship between people and the system and the failure to design and implement information technology investments in such a way that they provide the support for users to make better decisions was discussed at some length in chapter 7.

It is vital in embarking on any information technology investment to assess how it is going to support better decision-making. If it is not going to support better decision-making there must be a clear understanding of the alternative value proposition that justifies the investment.

14.4 Measurement Determines Behaviour (16%)
There is a saying *"tell me how you will measure me and I will tell you how I will behave"*.

This is a fundamental attribute of people. The way in which they are measured will determine how they behave.

If an organization says that customer service is the most important measure of performance for a group of personnel but then they put in measures of financial performance it should come as no surprise that the behaviour of the staff will be dictated by the measures of financial performance.

If an organization truly considers customer satisfaction to be critical then it must put in place measures of customer satisfaction that are congruent with and aligned with the organizations assessment of what it is that represents a truly satisfied customer.

Such systems are quite possible to develop as is discussed in more detail in section 17.3.

Few organizations take the trouble to develop and implement systems to measure customer satisfaction on a consistent and well engineered basis. Most only implement financial management and administration systems and then complain that staff are not really customer focussed.

Alternatively there is not even a conscious consideration of this aspect and measures of hard data are implemented with no thought given to measures of customer satisfaction.

Similarly, few organizations measure worker or staff satisfaction, a measure which is also relatively easy to implement for large organizations.

Such soft measures are frequently highly strategic and without them it is very difficult for information systems to work effectively as strategic tools.

It is really important in planning any information technology investment to evaluate how the measurements that the system may be introducing will influence behaviour and then assess whether additional measures are required.

14.5 People Are Part of the System (12%)
This point has been made in different ways. It is inherent in the discussion of executive custody in chapter 7.

It is vital in planning any information technology investment to look at the entire system. The system begins with the people who originate or capture the data that is entered into the system and ends with the people who interpret and act on the information that comes out of the system.

This applies just as much to the order entry and fulfilment process as it applies to strategic decision support.

Ensure that in selecting the system that it fits the way the people in the organization work, particularly if this is determined by the strategic driver.

When implementing the system make sure that all the personnel who are involved with or impacted by the system have been fully trained, orientated, etc and are able to work effectively with the system.

In doing this ensure that realistic cost estimates for the entire process of orientating and training personnel and managing the process of change are taken into account.

If there is not a formal programme to manage change supported with comprehensive laboratory testing, training, etc there will be business disruption and resulting hidden costs.

If the full cost of an effective implementation that will really deliver the expected results is taken into account, then it is likely that in many cases it will be found that the cost of the new system will not warrant the expense and the new system is not justified. Alternatively, this analysis will require that the business case for the investment is analysed on a strategic basis with a longer term view in order to justify the investment.

This is a highly desirable outcome, short-term fixes with information technology frequently damage the business so a long-term view is clearly to be preferred.

It is absolutely essential to consider all information technology investments taking the people side of things into account.

14.6 Computers Are Dumb and Abstract (10%)

The fact is that computers are very elaborate adding machines. All they can do is add 0's and 1's. They are very good at automating repetitive tasks that humans do. They can do nothing else.

Language that imputes intelligence to computers does not make them intelligent and supports humans to abdicate their intellectual responsibility.

Information systems should be developed or procured because there is a clearly defined business function that will be enhanced, accelerated or otherwise improved by the introduction of computers.

However, the introduction of those systems is almost certainly going to give rise to a requirement for people to act differently and take decisions and act accordingly as outlined in chapters 7 and 11.

In considering applications of computers, any aspect of business in which human beings are doing repeated tasks which do not require a significant level of knowledge and experience to execute are ideal candidates for automation using computers.

Tasks which require a high level of abstract cognitive thinking by a human being are highly unlikely to be capable of effective computerization. It may be possible to computerize components in order to facilitate and accelerate the decision process and improve the quality of decision-making but there will still be a requirement for human beings to interpret the data, make the decisions and act on the decisions.

In considering any information technology investment the moment that language is used that implies that the computer will do something that experience teaches that only a human being can do, alarm bells should ring. Language that imputes human characteristics to computer systems is at best not helpful and at worst seriously misleading.

Executive management should have an aversion to even considering any proposal that falls into these traps. This is not a case of management being computer illiterate, it is a case of management applying physical world common sense to qualify and screen out proposals that are fundamentally unsound.

14.7 Payback Takes Time (8%)

Section 8.6 makes the point that the nature of any information technology or strategy investment is that it takes time to implement and even longer to deliver sufficient benefits to start really paying for itself.

Motivations for information technology investments which postulate payback periods which seem short relative to the payback period for a physical world investment should be carefully examined. The likelihood is that the business case will be flawed.

Barring the simplest and smallest information technology investments, the majority will take several years to implement and several years more to deliver a return that will fully compensate for the full cost of the investment.

In my experience it is virtually impossible to plan and execute even a relatively modest information technology investment project in less than eighteen months to two years.

This comment applies to business information systems rather than simple acquisition of pieces of hardware that will meet a very specific immediate need.

As stated at the beginning of the book the focus of this book and therefore the focus of these principles is on the overall business information system requirements of organizations. Much that is written in this book is relevant to the full diversity of information technology investment in all businesses, however this wider spectrum is not what I was thinking about when writing.

With this context, information technology investments should be comprehensively planned. They should be executed taking account of all that is contained in this book and using the overall programme and operational management design that is set out in part 4. This is comparable to the approach that would be adopted in designing and building a building or factory in the physical realm to serve the same corporation.

Accordingly, the costs will be substantially greater than the direct cost of the technology components and the entire cost should be capitalized and amortized over a time frame that is appropriate to the benefits that are expected to accrue. Thus amortization over a period of five years or longer should be quite acceptable.

This is only a valid approach if an engineering approach is adopted and thoroughly executed to design the solution against failure so that there is a realistic expectation that the capitalized costs will have a business return against which they can be offset.

14.8 Conclusion: Critical Principles

The critical principles have been summarized above.

They comprise a checklist that should be used in evaluating any information technology investment decision. They should be applied as appropriate throughout the duration of any information technology investment project or programme.

CHAPTER

15

CRITICAL STAGES FOR SUCCESS

The critical stages are those major programme or project milestones that are considered to be fundamental to the success of any significant information technology undertaking.

They represent the discrete time based intervals of specific activities that a project should follow in moving from inception to fully functional operation within the business.

Depending on the nature of the project the stages will be different. Stages for development and customization projects and for procurement projects are outlined below. There may be variations on this theme in certain cases.

In addition, when a corporation is undertaking a major programme of work comprising many projects all inter-related and integrated towards one strategic objective, such as achieving world class capability, as set out in chapters 2 and 4 the overall programme will follow its own stages.

Stages for all three of these situations are discussed below.

15.1 Stages For System Development or Customization

This section discusses the stages for a typical system development or customization project.

These stages will apply from the smallest development to the largest with the caveat that really large developments will be separated into a large number of discrete projects as part of a large programme of work as discussed in section 15.3.

15.1.1 Concept (19%)

A well developed concept is the third most important component. It is rated third after architectural analysis and design and data engineering only because thorough analysis in those two stages can compensate for a poor initial concept.

However, a clear, visionary view of what the future state of the organization can and should be once the new solution is implemented, is a vital component of a successful outcome.

The more clear the concept in terms of practical market competitive, strategic and decision support capabilities leading to enhanced competitive advantage for the organization, the more likely a solution which produces real competitive advantage and therefore the more likely a solution which is experienced as successful.

The concept should be developed by the strategic solution architect in close consultation with business executives and business representatives at all levels who have a view of the current and desired future state of the organization.

The concept should be developed by structured workshop procedures using, for example, the STRATSNAP© strategic snapshot approach to defining critical issues outlined in chapter 33.

Formal, detailed documentation of the concept is essential.

Concurrently with the strategic solution architect developing the concept specification the business should be developing the business case. Analysis of the concept will provide a first cut cost estimate and this should be compared with the business case developed by the business.

If the business cannot envisage a robust business case for the estimated costs it is likely that the project should be abandoned unless the business case can be extended by taking a long-term strategic view.

If a particular project can clearly be seen to add substantial value to the core strategic driver of the business but the benefits are considered to be somewhat abstract it is possible that the project might still be undertaken. However, my preference would be to use the strategic snapshot approach to identify the critical benefits and then estimate the value of these benefits.

15.1.2 Architectural (Business) Analysis and Design (28%)

The analysis and design of the business solution (the architectural stage) is by far the most important stage in delivering a solution that really adds value to the business.

This stage is time consuming but is the stage in which the die will be cast for the success or failure of the final outcome.

There are many things that can go wrong elsewhere to prevent a successful outcome but if the business architecture of the design is defective the final outcome will be defective.

A sound business architecture will take time to develop, will require in-depth consultation and workshopping with both visionary and practical staff members and, if well executed, will result in a solution that is so obviously right that people will not be able to understand why it took so long to develop.

The architectural design should result in comprehensive documentation which business users can read and understand. Applications should be specified in detail on a screen by screen, menu by menu basis with detailed scale drawings of the actual screen together with detailed specifications of every field, every button, every function, every attribute, etc of that screen and that which is initiated on that screen.

This level of detail should extend to the point where business users can read the documentation and understand exactly what the final result will look like and what it will do and not do.

They should be able to walk through the entire application.

My preferred form of deliverable for this stage includes a comprehensive mock-up of every screen in either a word processing programme or a spreadsheet application in such a way that every screen can be displayed in a way that mimic's closely the way the final application will look.

Business users can then assess accurately that the software will meet their needs once it is constructed.

In this process it has been my experience that obscure business rules, conventions and exceptions are highlighted that a less rigorous approach would only discover once the software was being tested.

15.1.3 Technical Analysis and Design (9%)

Provided the architectural analysis and design is really solid and there are comprehensive and meaningful specifications for every component of the technical work, the technical analysis and design should be relatively straightforward.

There are errors that can occur during this phase, particularly in terms of misunderstanding of the architectural business specification, sub-optimal algorithm specification and lack of constructive creativity in providing solutions to innovative architectural requirements.

However, provided the architectural design is solid and comprehensive the potential for critical defects in this stage is considerably less than in the higher rated stages.

Appropriate technical analysis and design should be at such a level of detail that construction is a straightforward systematic process based on the architectural and technical specifications.

Correctly executed technical design should give rise to a situation in which the construction of the solution is simply a form of advanced "bricklaying" or “cabinet making”.

Within the context of the definition of architectural design given above it should be noted that in the case of simple applications there may be limited technical design. In more complex solutions there may be complex database design and technology integration issues that will require in-depth analysis and design before they can be executed.

In every application there will be comprehensive data entity relationship modelling at a very early stage in conjunction with the architectural design. There may also be issues of information warehouse schema and load process design in association with the architectural design.

Quite frequently the detailed architectural design and associated workshops will highlight finer details and nuances of the database design and data model design that will require to be updated. Because of the abstract nature of information technology solutions the analysis and design of the solution will proceed through a number of iterations before the final solution is arrived at.

15.1.4 Construction - Front End, Database, Application (4%)

Construction is accorded the lowest weight since, provided the solution is well designed and well executed, this should be a relatively straightforward mechanical process with most of the analysis and design executed during the architectural and technical analysis and design stages.

Provided everything is systematically and comprehensively documented and provided the developers have been actively engaged in the entire analysis and design process there should not be much difficulty in construction.

Construction is largely time consuming grind in turning the detailed specifications into software that works and in testing, debugging, etc.

The big issue with construction is that every line of source code must be absolutely defect free, a single spelling or syntax error will prevent the software from operating correctly.

This is therefore a time consuming and tedious phase but, provided the design is well documented, it should be capable of being executed by relatively junior personnel provided there is top quality team leadership and supervision.

15.1.5 Data Engineering (23%)

Data engineering is the second most important stage by a significant margin.

Data engineering is discussed at length in chapter 10. The data engineering including structured logical codes designed in a consistent, hierarchical fashion determines what analysis of data is possible, particularly at the level of high level decision support, data mining, etc.

Really well designed codes can take a long time to design and develop. They require considerable high level input from subject matter experts and high level classification expertise.

The data design architect must have exceptional business conceptual understanding and the ability to lift out the true fundamental building blocks of the information in a way that results in fundamentally sound, universally applicable codes.

Readers are encouraged to read chapter 10 if they have not already done so in order to understand more of what is being referred to here.

As noted in that chapter, really well designed codes are so intuitive that business users find it difficult to understand why they take so long to develop.

It has also been my experience that since there are very few examples of really solid data engineering available people are perforce required to review what is written in this book on the subject through the knowledge and experience that they already have.

This frequently has the outcome that people grossly underestimate what is required and also grossly underestimate the true strategic benefit that can accrue through the application of the principles that are being advocated.

As indicated in chapters 2 and 4 really effective data engineering is essential to achieving world class strategic information system capability and without it any investment will seriously under perform.

Accordingly, readers are urged not to under estimate what is being proposed here. The average persons experiential profile of information technology does not provide a basis to fully comprehend the benefits of what is being discussed here nor does it equip them to comprehend the full magnitude of the effort that is required to accomplish what is being proposed.

15.1.6 Pilot Test and Commission; Implement (11%)

Effective pilot testing and commissioning and effective implementation are vital to a successful outcome.

If the previous stages have all been well executed and the critical factors have all been addressed in the project design and execution up to this point, success should be readily achievable.

This is not to underestimate the importance of pilot testing and implementation, badly executed this stage can cause an otherwise well designed solution to fail.

This is also the stage where the business starts to be impacted and where inadequate programs to manage change, communicate with the organization, etc can give rise to sudden and catastrophic project failure through arbitrary cancellation, etc.

This stage can also be jeopardized by corporate impatience, particularly when there has been time and / or budget slippage in previous stages.

An effective implementation is vital to ensuring the long-term success of the solution and in ensuring that the real benefits projected are realised.

It is very easy to cut corners in this stage and give rise to long-term organizational trauma through sub-optimal system operation and therefore sub-optimal data quality and therefore sub-optimal or no decision support capability.

At the end of the day, it is not finished until it is finished.

An essential component of this stage is a testing laboratory as outlined in section 9.5. A full spectrum of business users should be enroled into the laboratory with express instructions to break the software if at all possible and to find flaws in the vendors presentation. The concept of design for success by engineering against failure is vital here. It is not the salesmans nice promises that will deliver the business outcome it is the extent to which the software does not break in use or break the business and particularly the extent to which the software does not break the strategic driver.

It is also important to understand that there are some really important principles that apply to this stage.

The experience of users in the transition from one system to another can either be carefully planned with comprehensive training beforehand or it can take place the way it generally occurs - a bit like falling off a cliff.

Effective introduction of a new system will include:

1. A laboratory in which every aspect of the software is tested and documented and training material prepared.

2. Comprehensive computer based training material.

3. Temporary staff on the existing systems to free up permanent staff for testing and for thorough training on the new system.

4. Comprehensive help-desk and well trained and equipped support staff.

5. Comprehensive communication and management of change program.

Figure 15-1 depicts the transition from an existing system to a new system based on a number of possible scenarios.

Line (1), depicts the existing system in operation until at a point in time it is terminated. As suggested above the average user may experience this a bit like falling off a cliff. Everything they knew is suddenly jettisoned and replaced with a new system and all the knowledge and experience that has been gained over the years with the old system, whether a manual system or a computerized system, is suddenly of no value.

Users are then faced with the prospect of acquiring knowledge and experience with the new system.

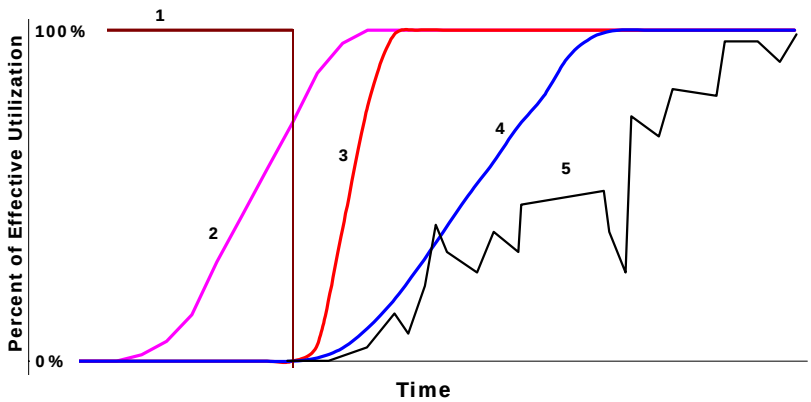

Figure 15-1: Alternative Scenarios For System Change Over

Depending on how the implementation is handled this experience could look like any of lines (2) to (5) on the diagram. In most cases it tends to look more like (5), an unstructured, rather random process of trial and error under pressure. This can result in sub-optimal use of the system indefinitely and can also result in very poor data quality, highly upset customers, loss of business, project failure, etc.

Most information technology people seem to expect the transition to take place more like line (3). A rapid, smooth acquisition of knowledge and experience which sees the business back on track within a short space of time. This will not happen except as the result of meticulous detailed planning and effective execution in line with what is presented in this book.

In practice, taking account of the issues of the paradigm chasm and related issues of cognitive ability, etc outlined in chapter 11 a well planned implementation is likely to follow a curve closer to line (4). This will see a period of several months before users are fully conversant with and optimally effective with the new system.

The period of business disruption is material.

The preferred course of action is that represented by line (2). Induction and training of permanent staff commences several months before live operation. They are provided with training using comprehensive computer based training programmes which include instruction not only in the use of the software but instruction in business rules and policies, guidance in handling exceptions, etc. They are also afforded time in the laboratory to process examples of real data from their day to day working environment in a manner that reproduces not only their own function but how this interacts with the functions of other staff.

Other staff are simultaneously trained in the laboratory so that during the training period the full permanent staff complement have had quality time on the prototype of the new system and have experienced all the possible interactions with other teams, departments, etc that can occur.

For this to happen will almost certainly require the employment of temporary staff. These should be trained up on the old system to keep that running smoothly. Meanwhile the permanent staff take time in training, using the computer based training programme, in management of change workshops and in the laboratory getting hands-on experience.

In some cases, where new data engineering is being implemented, this stage may include loading of data into a new information warehouse and the development of new reports.

The objective is that once the old system is terminated the permanent staff are able to easily and effortlessly move to the new system with a high level of confidence and high levels of accuracy. Disruption of the business is reduced to a "blip on the radar screen" that lasts at most a couple of weeks before users are up to full operational efficiency. In practice operations will hopefully be materially better than the old system.

Even in the case of a clean slate re-implementation it is considered appropriate to adopt an approach along the lines of that set out above. The clean slate re-implementation with comprehensive new data engineering will bring with it considerable changes which, if users are not fully prepared, will give rise to sub-optimal performance and business disruption and possible loss.

15.1.7 Utilize / Operate (6%)

Provided all the previous stages have been effectively executed and the solution has been well implemented the operational stage should proceed with relatively little difficulty.

Cutting corners in any of the previous stages will give rise to ongoing operational trauma and, in extreme cases, can result in the solution being discarded or never finally being commissioned.

This stage has been weighted slightly heavier than the construction phase simply because operation takes place in the day to day hurly burly of business operations and has greater potential to sabotage the expected outcome than the construction stage.

15.2 Stages For System Procurement

The stages for system procurement are largely similar to those for system development or customization. The main difference is the process of evaluating competing systems and reaching a buying decision.

The sections that follow are written with the procurement of a major system, such as an enterprise resource planning system, in mind. The procurement for smaller systems might not go to the same lengths in terms of travel, etc to evaluate options.

15.2.1 Concept

The development of the business concept will be similar to that of specifying a new system.

A strategic solution architect should undertake a thorough evaluation of the business and the business requirement, including running workshops at executive and operational level to classify the requirement.

On the ground evaluation of existing systems and visits to existing operational sites of the business are essential in gaining comprehensive understanding of the business requirement.

This should be formally documented.

Developing a clear understanding of the business strategic driver and the implications of this driver for the requirement is absolutely vital.

15.2.2 Architectural (Business) Analysis and Design

The concept stage may extend to some extent into a formal architectural design stage in terms of the most critical requirements.

Use a critical issues process to develop sets of weighted critical issues criteria for different components. Develop these criteria with representative teams of users from the business. These teams should be the same users who will participate in testing and evaluation of short list systems. They should also be the teams who will participate in customization workshops, in testing of customizations and in developing training material and providing assistance to other users during the implementation.

A comprehensive architectural design will not be undertaken.

15.2.3 Evaluate and Make Buying Decision

An initial evaluation may take place on the basis of brochures and other information that may be available.

If there are trade shows relating to the specific business it is worth attending these to find out what systems are available. In the case of specialized businesses this may necessitate travel to locations where such trade shows are taking place.

Undertake an evaluation process to identify those products that are most suitable.

Thereafter evaluate possible products at vendors sites and if they seem promising then arrange to evaluate them at operational sites of businesses that are similar to the business that is looking for the new system.

Be aware that if the strategic driver of the business is not conventional for its particular industry there may be a requirement to evaluate implementations at businesses with similar strategic drivers even if they are in different industries.

Evaluation of goodness of fit where a business has a strategic driver that is unconventional for its industry can be challenging.

Once on-site evaluation has been complete develop a short list of candidate systems. It is suggested that a short list of three is optimum.

Arrangements should then be made for each of the short list products to be brought to the client site and installed in the laboratory for evaluation. This may require the vendor to bring in a server with a demonstration installation installed. If the vendor's offices are close to the clients offices then the evaluation could be carried out at the vendors premises but it is important that a substantial team from the client organization is given the opportunity to evaluate every facet of the software.

Bring in teams of people representing every facet of the business and have the vendors of the software comprehensively demonstrate the software and answer questions. Make sure the people doing the demonstration are technical people and not sales people. What is wanted is a robust technical evaluation not a sales presentation.

The objective of the business users should be to break the software and the presentation, not in an ugly or aggressive way but in a systematic, thoughtful way. This should seek to find all the flaws in the system and the presentation. Remember the principle of engineering against failure. It is the weak points not the strong points that will determine whether the solution works for the business or breaks the business. Remember the examples of business damage in section 6.1.

Pay particular attention to the ability of the software to support the strategic driver.

Make comprehensive notes relating to goodness of fit, strong points and weak points during the evaluation process and print screen dumps and printouts of any examples that may be relevant for future reference.

Do not be satisfied with assurances that it can be made to work, ensure that all such assurances are recorded in detail and reduced to writing to form part of the contract. Make sure that the contract is very clear as to what features the vendor warrants will be available with the software and what features will have to be added.

In the case of features that have to be added document which features the vendor is committing to add within the purchase price and which will be for client account.

Ensure that the client evaluation team comprises sufficient technically competent and architecturally competent people to assess the software in all respects and to form a clear opinion on the validity of vendor claims. Remember the principle of engineering against failure. Rather have too many people involved than too few. Make sure that each person understands the particular aspects of emphasis that they should concentrate on.

Be aware that in the case of really large systems like enterprise resource planning (E.R.P.) systems these may be highly parameterized and it is possible that a diversity of functionality will require in-depth analysis and configuration to tune the software for your business. Form a clear opinion of the vendor's competence to do this fine tuning and ensure that people with many years of provable experience with this type of tuning are available and named as resources that will be available if you decide to purchase the software.

Make sure the names of resources are included in the contract.

This process may take several weeks to even a month or more in the case of an enterprise resource planning system and will have to be repeated for all three short list products.

On completion of this process a detailed evaluation of all the data will need to be undertaken by the strategic solution architect assisted by other team members before a recommendation can be made.

Revisit the critical criteria for each system with the same teams who developed them.

Be aware that in the context of enterprise resource planning type systems it is likely that several products will all appear to be a reasonable fit.

Also be aware that by the time a really focused team of business people have examined in-depth the weaknesses of the short list systems there is a distinct possibility that you will decide that NONE of the systems is an acceptable fit. This may result in a decision that it will be more advantageous for the business to undertake a comprehensive development of the strategic components of the requirement. This might be coupled with using one of the many standard general ledger and associated packages for the components that are not particularly strategic.

The vast majority of organizations will find that it will cost about the same to custom develop a tightly fitting highly optimized solution that meets their exact needs rather than to spend a large sum of money on a one size fits all off-the-shelf mega package with its associated high cost professional services.

This statement is made conditional on the requirement that both programmes are undertaken in accordance with the proposals in this book and there are no short cuts taken. In the case of custom development, evaluation of developers and contracting of developers will be a vital aspect. These service providers should have an outstanding track record in custom development and should have a large investment in utilities, standard libraries, etc geared to meeting the requirements of customers for large custom development projects.

The assembly of a professional team in accordance with the recommendations in this book will still be necessary.

Returning to the packaged enterprise resource planning solutions, if strategic advantage is to be retained and developed through such an investment there is a strong possibility that customization of the application in certain areas will be required. Ensure that the vendor is willing and able to customize and that rates for customization are market related.

Make sure that access to source code is negotiated prior to making a purchase decision. It should form part of the contract. If omitted the price for source code tends to increase dramatically at a later date.

The same basic approach to that applied above will apply to the full spectrum of smaller systems irrespective of what function they perform with the understanding that straight forward pieces of technology may not require anything like the effort set out above.

If the procurement is an end user tool keep in mind that it is possible that you may end up purchasing several tools to perform different functions rather than purchasing one tool that does everything. It may even prove desirable

to purchase several nominally comprehensive and competing products if they are strong in different areas. By way of example, many physical engineering workshops include multiple lathes and multiple drill presses with different attributes which better suit them for different functions.

15.2.4 Customization
As mentioned above, during the procurement process identify all required customization and undertake customization as required.

The customization process will follow all the same stages as a custom development project or programme.

If customization is relatively minor the process can continue with the stages that follow but if it is a major customization then begin the entire process over with the selected software starting at point 15.1.1 above.

15.2.5 Data Engineering
As for section 15.1.5 above.

15.2.6 Pilot Test and Commission; Implement
As for section 15.1.6 above.

15.2.7 Utilize / Operate
As for section 15.1.7 above.

15.3 Stages For Overall Programme With Additional Team
As indicated previously, the reality is that for most strategically significant system investments the work will involve a programme comprising many projects.

For the sake of example the discussion that follows is directed at the upper end of the scale, a major enterprise resource planning system implementation or re-implementation which requires considerably more resources than are available in the corporation. It is also assumed that one of the deliverables of the programme will be an information technology capability which has been restructured as a business systems capability which includes a business systems executive who has jurisdiction over strategic planning and implementation and organizational optimization as well as information systems.

For organizations embarking on more modest programmes and projects a more limited scale of work is axiomatically required.

The stages of such a programme are outlined below and would apply to a programme designed according to the critical factors for success which are outlined in chapter 16 below and discussed in more detail in part 4.

15.3.1 Concept
In the case of designing a full programme of work the concept stage will relate to formulating a comprehensive high level view of the entire scope of work.

This will constitute more of a scheduling and budgeting activity than a technical content activity.

This should result in a high level report and programme plan setting out the overall approach and presenting budget estimates.

The budgeting approach that I favour is a lower bound, upper bound, most likely basis.

This involves estimating for each activity the amount of time that I cannot envisage the activity taking less than and the amount of time that I cannot investigate the activity taking more than.

Statistically the most likely value, assuming a Gaussian (normal) distribution curve, as shown in figure 15-2, is then half way between the two values and has a fifty percent probability of occurrence.

Estimates should be at sufficient level of detail to give a reasonably accurate assessment of costs and duration and should be structured on the basis of the overall programme design outlined in part 4.

15.3.2 Design
Once the programme has been approved and the core professional team assembled, detailed design of the programme can commence.

This will include high level strategic workshops to define strategic parameters and priorities for the overall programme and initial review workshops to scope the full range of projects that are required to execute the complete programme.

In a reasonably large company it is possible for this to run to over a hundred projects.

Projects will include information technology projects directed at developing, procuring, customizing, implementing, etc information technology, both hardware and software.

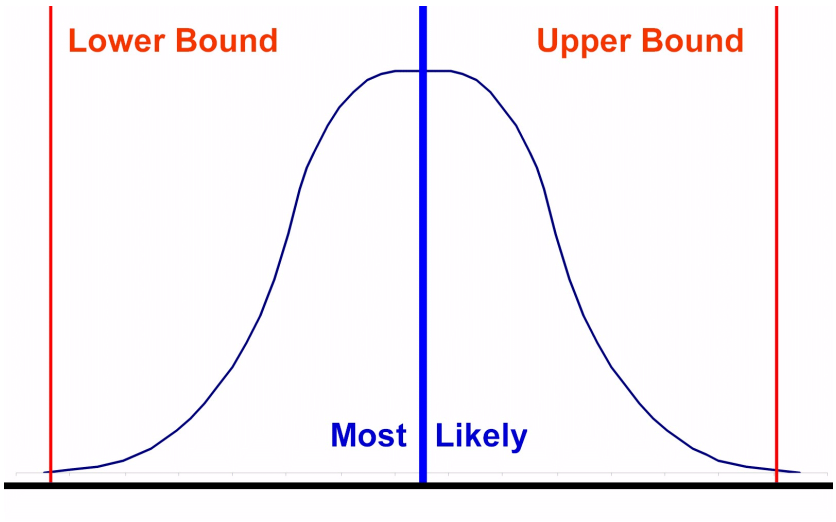

Figure 15-2: Lower Bound - Upper Bound Estimating Approach

There will also be strategic alignment and strategic change projects which are directed at ensuring that the organizations strategy over the next few years is optimized and implemented effectively. The objective will be for the new information systems and the business to arrive at the same place at the same time when all projects are completed.

There will also be organizational optimization projects which are directed at changing and optimizing the structure of the organization in line with the information technology projects. In other words, where the information technology is going to bring about changes in procedures and processes projects as necessary to bring about this change will be undertaken. If the overall information technology project will include the introduction of a cubic business model as outlined in section 10.7 there will also be business optimization activities required to align the organizational design and the cubic business model in order to ensure optimum business efficiency and accountability.

15.3.3 Establishment

Establishment will progress in parallel with the design stage and involves the recruitment and contracting of resources, establishment of a programme office and programme filing system, etc. It includes all other activities necessary to establish a fully functional programme team to execute the programme of work.

Recognizing that the work to be done directly involves the business, many of the people who will form part of the programme team will be representatives of the business on either a part time or full time secondment basis.

The exact roles and responsibilities will be determined during the programme design process.

The programme schedule, budget and resource management function discussed in chapter 24 will play a key role in the overall establishment of the programme team.

If the organization does not have a business systems executive it is recommended that this individual should be formally appointed at an early stage in the process.

15.3.4 Programme Operation (Numerous Projects)

Programme operation will be a typical large-scale programme of work.

There are considerable bodies of knowledge and expertise relating to the discipline that is typically called "project management". Organizations should contract team members who have long track records in this field.

15.3.5 Hand-over

It is assumed in the approach that is outlined here that the organization will be taking on a scope of work that is significantly greater than in-house resources can cope with.

This will not always be the case and, in such cases, the overall in-house capability should be structured on a long-term basis according to the proposals contained in part 4.

Assuming that the scale of programme is such that external resources are contracted as a short-term, two to five year, measure, there will be a handover stage during which the external resources withdraw and all aspects of operation continue with in-house resources organized and trained during the operational stage of the programme.

15.3.6 Wind Down External Team

The winding down of the external team may proceed after the formal hand-over is completed. The programme executive management team may become unnecessary while many of the more junior contracted resources are still required. Thus the hand over may entail the hand over of overall programme leadership and management to the business systems executive and may include hand over of a significant component of the external resources.

Wind down of these resources may then take place over a further interval, which may run to a year or more.

15.3.7 Operation

Operation is simply the steady state stage where all major programme related change has come to an end and day to day operations have stabilised into a routine.

It is important to note that if a major programme of work is undertaken in accordance with the approach outlined here it should be many years before the corporation needs to undertake another programme of similar magnitude.

CHAPTER

16

CRITICAL FACTORS FOR SUCCESS

These are the essential components of a successful solution from a programme design perspective.

1. Executive custody (25%)
2. Strategic solution architect (18%)
3. Clear strategic perspective and alignment (16%)
4. Business integration and optimization (14%)
5. Programme schedule, budget and resource management (12%)
6. Data engineering (10%)
7. Technology components (5%)

These items are discussed below:

16.1 Executive Custody (25%)
This component must respond to all the issues raised in terms of information technology mythology in chapter 6 and with respect to executive custody in chapter 7.

Essential requirements for this component are:

1. The chief executive officer recognizes his overarching responsibility for the success of the investment and takes full responsibility for this. This requires that he allocates sufficient time to keeping in touch with the process so that the chief executive officer is always well informed.

2. The executive committee recognizes their responsibility for the success of the programme and accept full responsibility for this. This requires that they allocate sufficient of their own time and sufficient of the time of their key resources to ensure that the business component of the programme is fully resourced.

3. The corporation appoints a business systems executive who is a full member of the executive team and, if all other executives are directors, is also a director. This individual should have considerable knowledge and experience of the business and should be well respected in the business. Their primary responsibility is to ensure the integration of the solution with the business. This includes not only the integration of the information technology components but also the strategic plan components and the business optimization components.

Once the programme is completed the business systems executive will have full custody of the entire information technology, strategy and business optimization service arm of the business.

16.2 Strategic Solution Architect (18%)
The strategic solution architect should be a professional specialist with considerable business and information technology knowledge and experience and an established track record in solution architecture.

This individual should have well developed strategic thinking and facilitation skills and should be tasked with leading the development of the programme strategic architecture and strategic concept, the organizational design concept and the information technology solution concept and architecture.

This should be a mature individual who is able to operate on a peer level with the chief executive and executives of the client corporation.

In contracting the appointment of this individual he should report directly to the chief executive officer and meet regularly with the chief executive officer on a one-on-one basis.

The strategic solution architect should NOT report to the business systems executive, they have parallel roles not hierarchical roles.

In managing the technical governance of the programme there should also be a technical team leader. I would personally prefer this individual to be a registered professional engineer with a significant number of years of practical engineering experience as well as a significant number of years experience in the field of information technology project and programme management. However, the availability today of such engineers is limited and therefore, in practice, this objective is probably unattainable. This person should have well developed knowledge of information technology but should also have good awareness of the other factors that are presented in this book.

The technical team leader should lead the full professional team while the business systems executive should lead the business team. The strategic solution architect should lead a small team of solution architects but apart from that should have no line responsibility. The line responsibility lies with the technical team leader for all technical resources, including both contracted and staff resources while the business systems executive has line responsibility for all business team resources both part time and full time.

Balanced management of these two operational legs is a vital requirement for a successful outcome.

Hierarchically the strategic solution architect will sit above the business systems executive and technical team leader insofar as the overall direction of the programme will rest with the architect and the architect will also resolve differences between the business systems executive and the technical team leader.

The solution architect will have the final say over the overall solution design and will report directly to the chief executive officer in terms of obtaining direction where required.

16.3 Clear Strategic Perspective and Alignment (16%)
The strategic solution architect will oversee the entire programme in terms of ensuring that there is full strategic alignment in every component of the programme in accordance with chapter 8.

16.4 Business Integration and Optimization (14%)
This component addresses all aspects of the integration of the solution with the business and the optimization of the business as part of the solution. It includes developing a holistic and integrated view of the business, business optimization and all aspects of the management of change. It must address all aspects of the soft issues addressed in chapter 11.

The business systems executive will be responsible for this function assisted as necessary by members of the professional team.

The approach and principles to be applied are discussed in more detail in chapter 23.

16.5 Programme Schedule, Budget and Resource Management (12%)
All aspects of schedule, budget and resource management and overall governance of the programme of work are accounted for here.

The technical team leader will have ultimate accountability for this function but will be assisted by a dedicated specialist on either a part time or full time basis.

More detail on these aspects is provided in chapter 24.

16.6 Data Engineering (10%)
All aspects of data engineering as outlined in chapter 10.

Includes cataloguing, data quality, warehouse table design, etc.

16.7 Technology Components (5%)
This is the component where traditionally all effort is focussed in information technology projects whereas it is really only effective if the previous six factors together with the principles, stages, etc are well executed and effectively implemented and applied.

Without the executive custody, strategic context, the business integration, etc no matter how well this component is executed the result will be sub-optimal or fail. This is because the component will not have the correct focus and it will not design out the factors that account for the vast majority of information technology investment failures as outlined in part 2.

The previous six factors create the overall framework for programme governance.

In addition to this the discrete system components comprise:

1. Operational and transaction processing systems
2. Automation systems including end user support systems, call centre systems, office automation, etc
3. Soft information acquisition systems
4. Decision support systems including information warehouses, data mining, simulations, EIS, OLAP, etc
5. Hardware, networks, operating systems and database systems
6. Systems integration components and allied services
7. Operators, users, customers and decision-making

These seven categories of technology, including people, represent the technical infrastructure from which the entire solution will be built.

The individual projects which make up the entire programme, which can run to over a hundred projects in a large programme to take a corporation to world class status, will be sorted under the above headings based on the basic form of technology.

Each of these components has distinct attributes and are likely to require different technical management.

The attributes of these components are discussed in more detail in chapter 17.

16.8 Conclusion: Critical Factors

The critical factors provide the logical framework for the entire operational management of an entire programme of work or, indeed, the day to day operational management of strategy, business optimization and information technology within the business.

This framework is discussed in more detail in part 4 where each component is discussed in more detail in the specific context of a major programme of work to take an organization to world class capability in accordance with what is outlined in chapter 2.

CHAPTER

17

CRITICAL TECHNOLOGY COMPONENTS FOR SUCCESS

The critical technology components for success were listed above as the technology components of the programme. They are identical. These components are discussed in more detail below:

In general it is likely that different technical teams will be responsible for most if not all of these distinct technology areas.

Different procurement approaches will also apply to these different components and will frequently involve different suppliers or developers who have particular expertise in particular areas.

The classifications below are also intended to make certain that in planning a comprehensive programme there is a clear balance between all aspects of the potential technology on the basis that a comprehensive solution can be expected to contain systems in all of these categories.

17.1 Operational and Transaction Processing Systems
A large component of the information systems in an organization will sort under this heading. This will include the core enterprise resource planning systems, financial systems, etc.

A diversity of other business systems are also likely to sort under this heading.

These are all the systems that process data in bulk on a day in day out basis.

In many cases this category represents the eighty percent of the systems that deliver twenty percent of the strategic benefit. They are necessary to provide the foundation for the other components. They also consume a very large proportion of the overall information technology budget.

17.2 Automation Systems Including End User Support Systems, Call Centre Systems, Office Automation, etc
This component includes office automation, call centre and similar systems.

They can also include factory process automation and related systems.

They may include other systems designed with specific objectives to automate specific functions of the business and, as such, there may be an overlap in terms of components that fit into this category and those that fit into the previous category.

It is important to draw this distinction as the requirements for designing software which automates processes and procedures is different to the requirements for designing routine transaction processing and data acquisition software.

17.3 Soft Information Acquisition Systems
This component refers specifically to soft data acquisition systems. These systems will frequently be strategic since the data that will really support a business strategy is generally not routine data that will be acquired by a transaction processing system.

At the very least the data acquired by the transaction processing systems will be supplemented by soft data in order to turn the high volume data into strategic data.

The following is an example of a soft data acquisition project:

The client was a primary healthcare provider organization with a large number of clinics. Problems were being experienced with customer retention.

A critical issues analysis was undertaken to determine the critical factors that were giving rise to patient walkout, that is, the market critical success factors. In other words the critical things that were so important that if they were not satisfied would cause patients to leave and conversely the factors that were so important to patients that if they were well satisfied patients would be extremely loyal.

These critical factors were tested with a sample of patients.

The critical statements were then fine tuned with the assistance of a market research specialist to ensure that the wording was exactly correct to measure the parameters that were important to us and that there would not be misinterpretation. This resulted in a number of detail adjustments.

Graphic designers were then appointed to design a really attractive public relations program including posters and postcard questionnaires on which the critical factors were printed together with a five point rating scale of happy to unhappy faces.

Postboxes were designed to be installed at key locations within clinics. The cards could also be faxed to a central fax server.

The post card response forms were designed to be printed with a unique serial number on every card. The operational reception software was specified with a user defined parameter such that after every "n" patients the receptionist would be prompted to give the patient then registering a card. The card serial number would be recorded on the computer.

It was accepted that only a small percentage of patients would take the trouble to complete the cards but every effort was made to ensure the cards were as attractive as possible and that it was easy for the patient to return the card.

The response cards were designed to be used with fax processing software so that the cards could be either manually captured or scanned and interpreted directly into a database.

This system provided a basis whereby an ongoing sample of patients could be sampled and the data captured into a database which could then be analysed.

Once the data was fed into the information warehouse it would then be possible to analyse the correlation with the patient data in terms of which doctors, which clinics, the time of day, which receptionist, the nature of the medical condition and much other data. This would also allow clinics to be bench marked against each other.

This is an example of the sort of simple system that can be implemented in order to obtain soft data such as patient satisfaction measures.

Similar techniques can be used to capture worker satisfaction.

The extent to which this type of technology can be applied to other soft data in support of greater strategic understanding is only limited by the ability of the business to imagine relevant and appropriate measures that can be determined using this broad approach.

There is substantial opportunity for creative business solutions using this type of approach and this is accordingly catered for as a separate category of technology.

17.4 Decision Support Systems Including Information Warehouses, Data Mining, Simulations, EIS, OLAP, etc

There is a large body of technology relating to information warehouses, data mining, simulation, executive information systems, on-line analytical processing, etc.

It is these tools and resources that will provide the capability to summarize the operational data and provide a basis for analysis.

This is the management reporting and analysis environment that is a vital component of supporting the executive decision support and strategic decision support components. The last two components required to constitute a world class solution as outlined in chapter 2.

It is these systems that underpin the second domain or fundamental component of information technology referred to in section 10.4.

This is the technology that gets the data off the disc and summarizes it in such a way that management can have access to strategic and operational dashboards, can drill-down, slice and dice the information and perform any number of analytical functions on the data. All this is subject to effective data engineering as outlined in chapter 10.

For any programme to deliver world class capability to an organization it is essential that a substantial investment is made in this category of technology.

This component can range from advanced reporting tools to very sophisticated analytical models, both tools that are purchased off-the-shelf and tools that are developed using other tools.

17.5 Hardware, Networks, Operating Systems and Database Systems
This comprises all the utility technology both hardware and utility software that provides a necessary technical platform for all the rest to operate on.

This would include projects to establish and equip the software laboratory.

17.6 Systems Integration Components and Allied Services
This component relates specifically to technology that is designed to allow systems to integrate.

This includes software that can synchronize or pump data between databases so that there can be only one version of the truth even though there are multiple databases. This is required where individual software systems are not able to share the same database.

Depending on the specific technology environment this component may or may not be required.

17.7 Operators. Users, Customers and Decision Makers
As mentioned previously, people are part of the system.

This component is very deliberately included under technology in order to ensure that the people side of things receives due attention.

This component would include projects to use market research consultants to acquire market parameters and market research data and projects to consult with customers to ensure that the final customer service capability is exactly what customers require.

The projects to staff the business team and defining the functions of the business team, such as staffing the software laboratory will also fall under this section.

General strategic projects developed as part of the strategic alignment process using techniques such as outlined in chapters 33 and 34 would be grouped under the strategic alignment component of the programme.

Organizational optimization projects would be grouped under the organizational optimization / business integration component of the programme.

CHAPTER

18

CRITICAL HUMAN FOUNDATION FOR SUCCESS

The final information technology solution is founded on the people who make up the organization. It is their competencies, personalities, commitment, etc that determine whether the solution succeeds or fails, particularly in the arena of corporate competitive advantage.

The following seven categories that make up the human foundation for success have been identified:

1. Business competence (knowledge and experience)
2. Technology competence (knowledge and experience)
3. Personality profiles and related human traits
4. Solution knowledge
5. Solution experience
6. Communication
7. Other human factors

These are discussed in more detail below:

18.1 Business Competence (Knowledge and Experience)
It is vital that the programme team and every project team contain the people with the best possible knowledge and experience of the business.

It is only people who have been with the organization for years and are really familiar with every specific aspect of the business that is to be included in a new information system investment who can provide the business input to the project.

This is a major factor in the proposals with regard to the business systems executive. It is proposed that the business systems executive should have in-depth knowledge of the business and general knowledge of the technology. Knowledge of the business is however by far the most important attribute.

It is possible to hire or recruit people with technology knowledge and experience, the challenge is to find the right person with business knowledge and experience.

The business team must be exposed to effective facilitation by a strategic solution architect and other architects who are able to assist them to develop a vision for the future direction of the systems in the business.

Business users with detailed knowledge and experience on their own are very unlikely to formulate a clear vision for the solution since they lack the technology knowledge and experience.

18.2 Technology Competence (Knowledge and Experience)
Knowledge and experience of the technology is the other side of developing a solution that really works. This requires a technical team with solid and deep knowledge and experience of the technology. They do not have to have in-depth knowledge of the business. Each business is different so it is relatively difficult for a person to be really knowledgeable about both the technology and the business.

The technical team leader and other technical team members should have well proven competence with technology.

The strategic solution architect and other architects have a very specific requirement in this context. They should have sufficient knowledge and experience of business generally to be able to rapidly understand the strategic essence of the business and design solutions that work. At the same time, they should have sufficient knowledge and experience of technology to be able to design solutions that work.

From the discussion of this point and the preceding point it should be apparent why there are distinct roles for the strategic solution architect, the business systems executive and the technical team leader.

18.3 Personality Profiles and Related Human Traits
As discussed in chapter 11, different people have different personalities and psychometric profiles, different cognitive profiles and other characteristics.

As a consequence of these attributes different people will respond completely differently to exactly the same project and programme conditions.

This is of particular concern when it comes to designing the management of change component of the overall programme.

18.4 Solution Knowledge
Solution knowledge and solution experience are identified as two distinct components since, during the design and construction phase, both members of the technical team and members of the business team will be building up knowledge of the new solution.

This applies whether one is referring to the implementation of off-the-shelf software, customization of software or development of software.

Thus, there will be a period of time where the overall knowledge of the solution will be progressively increasing. However, it will not be accompanied by corresponding experience as the solution will not yet be in a condition that it can be practically applied in a manner that people can gain experience.

18.5 Solution Experience
In most projects and programmes people move directly to implementation the moment that development and basic testing is complete. As a consequence they have little or no experience with the system and its nuances and all sorts of unforseen problems are experienced during implementation.

This is referred to in section 15.1.6.

For this reason it is strongly recommended that there should be an in-depth laboratory or pilot operation stage during which all users can gain both knowledge and experience with the new system.

Note that knowledge can be gained through lectures and presentations and reading specifications and manuals but this is no substitute for experience. Computer based training material provides a basis to deliver a combination of knowledge and some degree of experience but only a fully fledged implementation or a fully configured laboratory and pilot test environment will provide users with the opportunity to gain really meaningful experience with the software.

18.6 Communication
Communication is a vital component of any systems programme.

As stated in section 6.2, information technology systems are very difficult to tangibilize and visualize. They are very abstract.

Part of the solution is to make use of highly detailed specifications and plans as outlined at various points in preceding chapters.

Another component is to have effective communication. This requires careful design of the overall communication plan and regular issue of carefully worded and carefully designed communications. These should be designed to catch people's attention and to inform them about the progress of the programme and individual projects.

This is not about fancy road shows and glitzy communication, it is about the regular communication of messages that inform people and seek to bring them along with the progress of the programme.

Such communication must also be realistic about the challenges associated with a successful implementation and keep the business informed about the numerous activities that are continuing behind the scenes.

One of the attributes of people referred to in chapter 11 is the extent to which different people will change at different rates depending on cognitive ability and other factors.

This results in something known as “the diffusion of innovation”. This is illustrated in figure 18-1. This indicates that in a sales context different people will "buy" at different levels of repetition of the sales message for something that they actually want and need. Some, innovators, will buy in response to hearing the message only a few times or even only once. Others, laggards, may never buy irrespective of how many times they hear the message.

This progression of acceptance applies just the same to situations of change within an organization.

Some people will “buy” the new ideas almost immediately, some will resist to the bitter end.

In such cases there will come a time when management will need to take a firm stand and tell such laggards to either adjust to the new dispensation or look elsewhere for employment. Given the complexities of labour law in many countries this will require careful planning in terms of human resource management procedures to ensure that the necessary measures have been taken to assist all staff to adjust to the new dispensation. In the case of a person being completely unwilling or unable to adapt then dismissal would take place as a last resort.

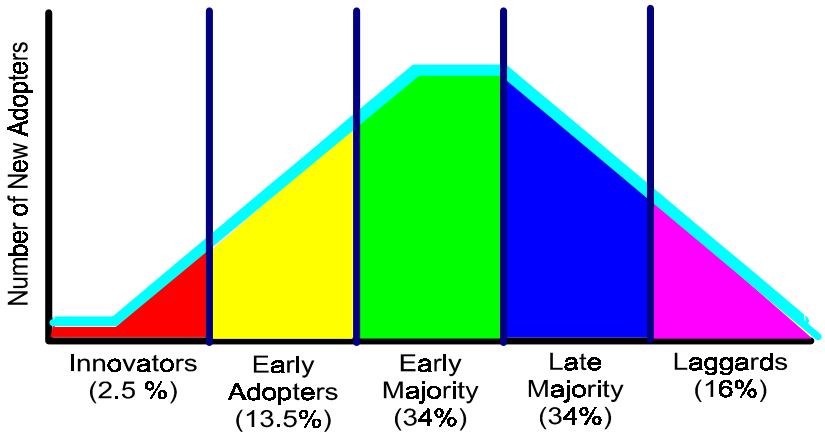

Figure 18-1: The Diffusion of Innovation

18.7 Other Human Factors

Human beings are complex and not widely understood.

The majority of people do not respond well to major change and this is something that is widely overlooked by the people who are leading change since such people generally thrive on change.

The management of the change process is therefore vitally important and should take account of all the aspects outlined in chapter 11 as well as all the factors outlined in this chapter.

The management of the change process requires human resource and other specialists to develop a comprehensive programme to assist personnel to change.

18.8 Conclusion: Critical Factors for Success

Provided organizations take account of the factors outlined in this part and apply the principles effectively they will achieve an outstanding, cost-effective, high value adding, long life, low maintenance solution that will support their strategic objectives fully.

The vast majority of so-called information technology problems are people related and can be resolved by taking the right decisions at the top and executing those decisions effectively.

PART 4

PROGRAMME DESIGN TO ACHIEVE SUCCESS (Based on Actual Example)

CHAPTER

19

CRITICAL PROGRAMME COMPONENTS FOR SUCCESS

The seven critical factors outlined in chapter 16 provide the framework for the design of the programme of many projects that is required to take an organization from its current status to the world class status outlined in chapter 2.

These seven factors are:

1. Executive custody
2. Strategic solution architect
3. Clear strategic perspective and alignment
4. Business integration and optimization
5. Programme schedule, budget and resource management
6. Data engineering
7. Technology components

Each of these components represent a critical component in a holistic, integrated business solution that takes full account of business strategy and seeks to ensure that strategy implementation informs the technology programme. It also ensures that full strategic alignment is attained by the end of the programme by ensuring that whatever projects of a strategic, non-technology nature, which are essential to achieving the long-term required business outcome are catered for.

They also form an integral part of optimizing the business to run with the strategy and the information systems in an effective holistic manner. The optimization of the business together with integration of all aspects of the solution with the business are vital components.

In putting this programme of work in place clear emphasis is placed on ensuring that the chief executive officer and the executive management of the business take full responsibility for the final outcome. They must therefore take full responsibility for ensuring that they are on board with the design of the programme every step of the way.

The strategic solution architect, a mature, visionary specialist with a broad base of experience of business and a broad base of experience with technology coupled with the ability to understand and interpret the strategic driver of the business is a key resource in developing a solution that will really deliver.

Effective management of the programme schedule, budget and resourcing is vital given the abstract nature of the programme and individual projects. Meticulous, detailed planning is a vital component of a complex programme to achieve world class status.

Effective data engineering, as outlined in chapter 10, is an essential pre-requisite for a successful outcome. Unless knowledge of the business and the business environment is effectively captured in the validated data in the software applications it will be impossible to unlock business intelligence from the data. The overall management of this component will be a key aspect of the responsibilities of the solution architect.

The bulk of the programme lies with the individual technology projects. These projects represent the primary reason for the existence of the programme. However, it is vital to clearly define the strategic and organizational context

for these projects in order to ensure that they integrate into a holistic solution that fits the business perfectly in terms of its strategic objectives.

Ultimately, for an investment in achieving world class capability to deliver, it is vital that it is exceptionally well designed, particularly from a strategic view point.

This part of the book is presented primarily in the context of a major programme of work to take a corporation to world class standing as outlined in chapter 2 with the benefits outlined in chapter 3.

Each of the chapters that follow contains a section relating to the initial establishment of a large programme. This information is based on the actual planning for a large programme for a medium sized corporation. While the details will vary from organization to organization it is considered that what is presented here serves as a sound guideline for any major programme of work directed at achieving world class capability.

The basic approach is based on the reality that today there are not existing organizations that have all the capabilities and structure that are required to plan and execute programmes of work in accordance with what is set out in this book. As outlined in chapter 31 it is expected that this will change. The approach set out in the following chapters is based on this reality as a way of establishing a suitably qualified professional team and managing it towards the desired outcome.

The same basic approach should be applied to more modest programmes or projects with more modest objectives.

CHAPTER

20

EXECUTIVE CUSTODY

This factor carries a weight of 25% as set out in chapter 16. This indicates that without effective executive custody a successful outcome is highly unlikely to be achieved.

20.1 Some Key Points On Executive Custody
In formulating the approach to executive custody, the following aspects are of particular importance:

1. The chief executive officer is the ultimate customer for the programme.

2. The strategic solution architect must be seen as a trusted advisor to the chief executive officer.

3. The chief executive officer is the owner of the scope, budget and deadline and must be kept informed on a regular basis of the overall status of the programme.

4. The chief executive officer has final responsibility for the governance of all business participants, the chief executive officer heads the business as the "contractor" for the work that is performed in and on the business.

5. The business systems executive reports directly to the chief executive officer and must have access to the chief executive officer at least comparable to the access granted all other executives.

6. The chief executive officer should ensure adherence to the principles set out in chapter 14, not in the sense of enforcing them but in the sense of testing that they are being applied, particularly in discussion around the board room table and in the corridors of the executive suite.

7. The business systems executive has a mandate which includes strategy, business optimization and information technology. This expressly includes the execution of the entire strategic information systems programme from the perspective of getting to the result within the business. In this process they are guided by the strategic solution architect who is responsible for the overall design of the solution. They are also assisted by the technical team who are responsible for the technical execution of the solution.

The role of the chief executive officer in any information technology investment of any substance and any real strategic significance cannot be understated. The chief executive officer is the only person in the organization with the holistic cross cutting view of the organization and the authority to ensure that all parts of the business pull together to achieve success. A negative, ill informed or disinterested chief executive officer, or one who is "too busy" has more capacity to sabotage a project or programme than any other person in the organization.

It is vital that the chief executive officer sits regularly with the strategic solution architect and business systems executive as trusted advisors and ensures that he is fully informed of progress, developments, etc.

It is also vital that the chief executive officer discusses areas of concern with these advisors immediately they arise and that he / she satisfies himself / herself that the concerns are being fully addressed.

Ill informed comment by the chief executive officer in a corporate public forum can destroy the confidence of the entire organization in the project. It is really important that the chief executive officer realizes this and avoids such action.

20.2 The Role of The Business Systems Executive

The business systems executive is responsible for the integration of the entire programme with the business and for detailed liaison with the executive team of the business.

The business systems executive is primarily responsible for ensuring that the solution is fully integrated in the business. In order to do this the business systems executive must have a good understanding of the business and credibility within the business.

The business systems executive should preferably be an internal appointment.

The business systems executive will work in partnership with the strategic solution architect and technical team leader.

20.3 Some Key Points On Programme Initiation

In the sections that follow an outline is presented as to how a medium sized corporation would go about embarking on a substantial programme of work to achieve the world class capability that is outlined in chapter 2.

This section and the corresponding section in each of the following chapters in part 4 are based on the actual programme design for a practical situation.

While it can be expected that certain details will change for different organizations and different specific situations, it is considered that what is presented here is fundamentally sound and will form the basis for such programmes for most corporations.

The team composition is likely to be much the same, what is likely to change is the extent to which individual team members will be full time or part time and the extent to which they will be permanent staff or contractors.

Each role is important and lumping multiple roles onto one individual will seldom, if ever, deliver an acceptable outcome. The knowledge and experience required to effectively perform each role is too different. The focus and emphasis is also too different.

The basic structure at the stage of planning that is presented here comprises:

1. Programme
2. Sub-programme
3. Master project
4. Project
5. Sub-project

The programme in this example is to establish an integrated business information system to world class standards for a medium size group of companies.

In preparing a cost estimate for a programme of this nature it is necessary to develop the programme in sufficient detail that all the major cost contributors are taken into account. In particular, the overall programme management and leadership and pool of technical resources can be provisionally estimated at a fairly early stage.

Detailed estimating of individual technical projects will require more detailed analysis of the components outlined in chapter 26.

Given that the scope is large and, in the early stages of such a programme there is great uncertainty, the most effective estimating approach is that outlined in section 15.3.1. Develop the programme design in sufficient detail that all the significant cost items are at least listed as headlines. Then, for each line item, estimate the cost based on the cost that it is highly unlikely that the item will cost less than (lower bound) and highly unlikely that it will cost more than (upper bound).

In general it is easier to do this by estimating the amount of time in man months and the rate in currency. Thus estimate lower bound and upper bound man months and lower bound and upper bound monthly rate. Apply the lower bound rate to the lower bound man months and the upper bound rate to the upper bound man months. This will give a conservative view of overall costs. The statistically most likely cost is midway between the lower bound and upper bound.

With careful management it should be possible to manage costs at lower than the mid-range value. Recognize, however, that this is being done in the context of a Gaussian (normal) probability distribution curve, as shown in figure 15-2 and that the more one seeks to achieve a value below the average the lower the probability of success and accordingly the tighter the level of management required.

The following are the major components that have been identified for the early stages of such a programme:

20.3.1 Establishment

Establishment refers to the initial staffing up of the programme with the key role players and other key activities that are necessary to get the programme of work underway.

Once the initial establishment stage of the programme is complete and the core professional team has been appointed they will then undertake more detailed analysis and design of the programme taking account of the specifics of the business situation and existing systems.

The items that follow are inter-related with the corresponding activities in the remaining chapters of part 4.

1. Define Relationship With Strategic Solution Architect

Following the appointment of the strategic solutions architect, refer chapter 21, define the relationship and operating guidelines between the group chief executive officer and the strategic solution architect and between operating company chief executive officer's and the strategic solution architect.

This activity will include discussion between the strategic solution architect and the chief executive officer and other interested executives, drafting of a document, review and revision of the document, finalise.

This is a function of the chief executive officer in conjunction with the strategic solution architect.

2. Appoint Business Systems Executive

Develop job description, appoint business systems executive as a permanent executive level appointment.

Activity includes discussion, draft job specification, consult with human resources executive, revise and finalise documents, interview candidates, make appointment and contract.

Permanent staff appointment from existing personnel. In a large group there may be business systems executives appointed in key operational companies as well.

There is considerably more information relating to the role and function of the business systems executive in subsequent chapters, particularly in chapter 23 and section 23.4.1.

3. Legal Documents

Identify required legal documents in terms of contracts with contract personnel and staff, particularly with regard to confidentiality of certain key aspects of the programme, data engineering content, etc. Includes intellectual property rights, etc.

Since the programme is designed to create the capability to support management in achieving strategic competitive advantage it is essential that appropriate confidentiality and other agreements are entered into. Since the programme will include development of comprehensive intellectual property in the form of validation tables, etc it is vital that those team members who will participate in developing this material acknowledge the confidential nature of the material and also cede all intellectual property rights to the corporation.

Discuss, draft requirement specification, appoint legal advisors, obtain draft from legal advisors, revise, finalise.

Professional services with regard to confidentiality clauses in contracts, intellectual property rights agreements, retention of contracted personnel and replacement to be applied in contracting with most external contractors and some staff.

Another aspect that requires attention in the drafting of contracts for temporary staff is to take whatever measures are possible to ensure that the team, once established, remains together for the duration of the programme. The same applies to permanent staff who will work on the programme in key roles. This is likely to be between three and five years. Measures should include human resource measures such as incentives and dispute resolution procedures to encourage personnel to stay with the programme to completion.

Where people are contracted there should be a clear stipulation of the duration of the contract and appropriate measures to secure the services of contractors for the full duration of the programme or for such period as can be realistically expected in particular cases.

There is a challenging balancing action required here. Ideally the corporation wants to be assured of the services of key team members for the full duration of the programme, whether on a part time or full time basis. It can be highly disruptive to have a key team member leave part way during a programme. Without appropriate contracting the information technology industry is prone to situations where contract personnel gain knowledge and experience

on a particular contract and therefore become eligible to secure higher rates from another client. This results in turnover of personnel that can be highly detrimental.

The challenge here is to structure contracts and incentives that minimize this turnover. The principal difficulty here is that in order to secure the services of these professionals for the entire programme period the corporation must be willing to give a corresponding guarantee of employment for the duration of the programme subject to due performance by the people involved.

Many corporations are not willing to give this sort of guarantee and therefore they cannot expect to secure a corresponding guarantee from staff and contractors.

This is an executive level issue that must be closely evaluated in terms of the strategic priorities of the corporation. It is my view that if a corporation is really committed to a long-term world class strategic outcome they will be willing to make commitments to ensure that key programme personnel are secured for the duration of the programme.

This activity involves the use of leading legal advisors to ensure the security of the strategic investment and the capability to meet deadlines. The only costs are during start up.

4. Negotiations With The Vendors of the Enterprise Resource Planning System
In this example it is assumed that the corporation has an existing enterprise resource planning system. Whether it is a custom developed assembly of diverse pieces of software or one of the name brands such as S.A.P., J.D. Edwards, Peoplesoft, Baan, B.P.C.S., etc will have an impact on this point.

If the existing system has been developed in-house there will be a relatively high level of in-house capability and some and possibly many of the roles set out in this chapter and the following chapters may already exist within the organization. Under such conditions, those additional resources that are required may also be taken onto staff. In such circumstances there may be little or no requirement for negotiations with vendors, the main requirement will be to put in place revised structures in the in-house capability to embark on a new programme that will go well beyond the existing capability.

If the existing system is an off-the-shelf system then this activity becomes more relevant.

If the organization is embarking on a programme to either purchase or develop a new system then the evaluation process should follow that set out in section 15.2. In such a case all negotiations should take place as part of the procurement process and there should not be a requirement for a separate negotiation activity.

Accordingly, this section will focus on the case of an existing system which is going to be re-implemented in order to achieve world class capability as set out in chapter 2. This programme will be based on the upper bound scenario outlined in chapter 4.

In such circumstances it may well be necessary to reach agreement with the software vendors regarding access to source code, escrow and other measures to safeguard the interests of the corporation in the long-term. Intellectual property rights of components developed under contract for the corporation, the basis of custom software development under contract, etc will all require negotiation.

This will require that representatives of the corporation meet with the vendor, discuss and negotiate requirements, draft agreement, legal review of the agreement, revise, finalise and sign.

A reasonable budget for legal costs will be required and in the upper bound cost scenario it may be necessary to budget for the strategic solution architect and business systems executive to visit the offices of the software vendor which may be in another country. Depending on the vendor's attitude to issues such as access to source code, long-term support, etc there may be other costs, such as increased license fees, etc that will need to be carried.

The important thing here is to arrive at an outcome which ensures that the corporation can remain on the current version of the software for a long period of time with full capability to maintain and customize the software as business conditions evolve.

Note that in many cases there is no reason for the corporation to require an upgrade path with the software.

5. Appoint Technical Team Leader
This will typically be a temporary contract position or could be an existing information technology manager provided they have the appropriate knowledge and experience.

Activities include develop job description, advertise position, short list candidates, make appointment and contract.

In drafting the job specification there will be a requirement for close consultation with the human resource executive and human resource staff.

In budgeting the cost of the technical team leader it is preferred that they should be a certified professional engineer with five to ten years practice in engineering and five to ten years experience in information technology. However, in practice, it is recognized that locating such individuals at present is problematic and that it will probably be necessary to appoint a suitably qualified information technology professional. This person will be contracted full time for three to five years. This is quite a difficult candidate to specify since the objective is to hire someone who can effectively bring the disciplines of engineering together with sound information technology experience to the programme.

Alternatively, a person with a strong information technology background who strongly identifies with the principles set out in this book should be recruited.

20.3.2 Develop Strategic Context for the Programme

Once the basic establishment of the strategic leadership of the programme team is in place, including the strategic solution architect which is dealt with in chapter 21, work can commence in earnest to develop the strategic context for the programme.

1. Workshop at Group Level

Work should commence with a group level executive workshop to determine the high level strategic context for the programme.

This workshop should include operating company executives to define the exact statement of the group strategic driver, to segment that driver into critical components, to define critical differentiators and refine overall prioritisation of strategic and operational outcomes including strategic prioritization of major system components and supplementary systems.

This workshop should use a structured strategic process such as that outlined in chapter 33.

At group level this would typically require at least a two day executive workshop.

This activity should follow the appointment of the business systems executive. It would be nice if the technical team leader could also be on-board but this can push the time line out.

Delegates would include group executive management and the group business systems executive. The workshop will be facilitated by the strategic solution architect.

These workshops will define or confirm the strategic driver, define the critical components of the strategic driver, define the critical strategic information systems required to create and sustain competitive advantage, assess strengths, weaknesses and threats that impact on the information systems, etc. The objective is to obtain a concise set of measures of the executive management view of the organization and its system requirements that will provide guidance for the rest of the programme.

Further workshops will be required subsequently to gather further information.

2. Operating Company Executive Workshops

These workshops are held in order to determine the high level strategic context for the programme. Workshops are held with executive and senior management of each operating company in turn to tailor the results of the group workshop to each operating company. This is done in order to develop the analysis to greater detail in support of operationalization of the strategic requirements into the entire programme for each company.

Two or three day workshop for each of the larger companies in a group and one or two days each for smaller companies. Further workshops may be required.

Workshops will involve executive management and the business systems executive and be facilitated by the strategic solution architect If a business systems executive is appointed for a specific subsidiary it is important that they are appointed before the workshop is held for their company.

These workshops will built on the data gathered during the group executive workshops and refined for each operating company. Further workshops will be required subsequently to gain more information.

20.3.3 Ongoing Executive Involvement

Regular one-on-one feedback meetings between the strategic solution architect and each chief executive officer in parallel with feedback from business systems executives. Other meetings and governance to be determined.

Say one hour one-on-one meeting twice a month of strategic solution architect with each chief executive officer for first six months and then one meeting a month thereafter, may require more time in first few months. Regular internal liaison between business systems executives and other executives and chief executive officer's. Monthly meeting of chief executive officer with strategic solution architect, business systems executives and technical team leader.

These meetings should be ongoing for at least the first three years in the case of major programmes with an overall duration of five years.

CHAPTER

21

STRATEGIC SOLUTION ARCHITECT

This factor carries a relative weight of 18% as set out in chapter 16. This is the second highest weight after executive custody. The appointment of a suitably qualified strategic solution architect and supporting architects is the second most important aspect of a successful programme.

In making this appointment it is vital that the senior architect must be on a peer level with executives. If the person responsible for the architecture of the solution is not on a peer level with executives the executives assume the right to sit in judgment rather than being part of the solution and working in partnership.

A few key considerations with regard to the strategic solution architect:

21.1 Trusted Professional Advisor to Chief Executive Officer
It is vital that in appointing the strategic solution architect that the chief executive officer has confidence in the individual who is appointed and is willing and able to regard that person as a trusted advisor.

If the chief executive officer is constantly doubting the advice of the strategic solution architect rather than treating them as a trusted advisor and working with them in partnership the potential for failure is greatly increased.

Accordingly, if the chief executive officer has doubts it is vital that these are resolved before an appointment is made.

21.2 Business Solution Architect
The responsibility for the architecture of the overall business solution rests with the strategic solution architect.

The strategic solution architect will shape the overall solution in much the same way that the principal architect in a building design programme shapes the overall form of the building in close consultation with the chief executive officer.

On a large programme there will be other solution architects who will do the detailed work but they will take their overall direction from the strategic solution architect.

The strategic solution architect will also be responsible for the overall architecture of all components of the solution as set out below and will therefore give overall direction to the technical team leader and business systems executive in terms of the actions that are necessary to achieve the desired outcome.

21.3 Strategic Architect
The strategic solution architect will have overall responsibility for the strategic alignment of the solution. In particular, they will facilitate all the initial high level strategic workshops and processes mentioned in section 20.3.2.

The strategic solution architect will maintain ongoing review of the entire programme in order to ensure that it is strategically aligned and strategically relevant. The business systems executive will also monitor the programme from this perspective.

At a high level it will be essential for the chief executive officer and operational executives also to monitor strategic alignment in the aspects of the programme that impact the aspects of the business that fall under their jurisdiction.

On a large programme the other solution architects may assist in this area. At the least they will be required to have a clear understanding of the strategic driver and the strategic parameters and to monitor these constantly in the work that they do. If at all uncertain they must escalate the issue to the strategic solution architect for a decision.

21.4 Programme Schedule and Budget Architect

The overall programme schedule and budget architecture will be defined by the strategic solution architect. The strategic solution architect may be assisted by another architect in terms of the detailed programme and project design.

The programme schedule and budget specialist will take final instruction from the strategic solution architect but will be responsible for the detailed design of the individual projects down to the activity level in close consultation with the other architects, technical team leader, business systems executive and other team members.

The detailed management of the programme schedule and budget will rest with the technical team leader.

21.5 Data Engineering Architect

In many organizations the data engineering represents the single biggest opportunity to use information technology in supporting the organization to achieve effective sustainable competitive advantage.

Accordingly, it many programmes, the strategic solution architect will devote a considerable proportion of their time to the architecture of the data engineering component and particularly the content.

As required, the strategic solution architect will be assisted by other architects in order to complete the work in full detail for every aspect of all the systems in use by the business.

As indicated in chapter 25 there will be a variety of other specialists who will be contracted to ensure that all aspects of the data engineering are fully executed.

21.6 Business Integration and Optimization Architect

An inevitable aspect of the business solution design is the business impact of the solution. The specification of systems and system components will axiomatically give rise to changes in business process, business optimization and other impacts that will require architectural attention as mentioned in chapter 11.

The strategic solution architect will provide high level architectural input with regard to this component while the business systems executive will have the operational responsibility to manage the processes that are geared to integrating the solution with the business.

21.7 Other Architect Functions

It will be apparent from the above that the ambit of responsibility of the strategic solution architect is very far ranging and pervasive.

It cannot be stressed enough that the appointment of the correct person is absolutely vital to the overall success of a programme of this nature.

Depending on the size of the programme, the strategic solution architect will typically be assisted by a number of solution architects who will concentrate on the technology solution architecture but may also assist with some of the aspects outlined above.

The strategic solution architect will have a limited level of input into the overall architecture of every single system or project although on a large programme this input may be extremely limited on projects that are not clearly strategic. On these projects the role of the other architects in ensuring that the standards and overall approach set by the strategic solution architect are maintained consistently will be vital. They will also be responsible for identifying situations where review or guidance by the strategic solution architect is called for.

21.8 Some Key Points On Programme Initiation

As with the previous chapter, this section contains some information on specifics with regard to the early stages of a major programme.

21.8.1 Establishment

As stated previously, the establishment of a programme of this nature will be basically similar for most corporations undertaking similar programmes to achieve a high level of world class capability as outlined in chapters 2 and 4.

The greatest variable will be the extent to which the corporation has its own existing in-house capability.

It is highly unlikely that a corporation embarking on a programme such as outlined in this part of the book would have a strategic solution architect in-house. If they did it would be reasonable to expect that a major programme was not required.

With the exception of really large corporations which are of sufficient size that a strategic solution architect could remain gainfully employed for decades, it is likely that most corporations will find it appropriate to contract a suitably qualified individual.

Having said this, such individuals are not necessarily easily found and the recruitment process could therefore be time consuming as it is really vital to retain the services of someone who is really well qualified and experienced to perform the function that is envisaged in this chapter.

The following are key establishment activities:

1. Appoint Strategic Solution Architect
As mentioned above, this would generally be a temporary contract position.

Identify, negotiate, appoint and contract strategic solutions architect.

It is recommended that this individual should have twenty plus years of experience in business, consulting and information technology. My own preference is that this should be a registered professional engineer but this may well be an unrealistic requirement in most situations.

The individual concerned should be established and have recognised expertise in areas relating to the approach advocated in this report.

It is likely that this person will come at a premium professional rate but if the organization is serious about achieving world class capability they will be willing to pay this rate.

Be aware that hiring an individual from a large firm is no guarantee that they can perform the function set out in this book.

In recruiting this individual be constantly aware of the fact that seventy percent of information technology projects fail totally and another twenty percent fail to meet the business requirement. Thus, while care must be taken in appointing this individual equal care must be taken in appointing the business systems executive and the technical team leader to ensure that all three of these key programme executives are the best possible candidates. Each must fully own their responsibilities for producing an excellent outcome, as indicated in chapter 27.

2. Appoint Engineering Process Advisor
This is an optional position although it is a role that I consider important. My own experience is in civil engineering, information technology and business. I consider the engineering metaphor, as I apply it to the design of large systems, to also have a strong component of mechanical or process engineering relevance. Accordingly, I personally choose to have a person with a strong mechanical engineering background as an advisor in this area if I am acting as strategic solution architect.

This person would have expertise in fields such as configuration management, critical chain scheduling, etc. They should have twenty plus years of experience in engineering, business, project management, project process, configuration management and related fields, information technology is not a requirement, preferably a professional engineer. The extent to which this role would be relevant would also depend on the qualifications of the technical team leader.

This would typically be a temporary contract part time position during the first year or two of the programme on a basis of a few days a month.

Develop job description, identify candidates, appoint and contract.

3. Appoint Solution Architects
These can be staff or contract positions.

Develop job description, advertise position, short list candidates, make appointment and contract solution architects. There may be specific appointments for specific companies. May be staff or contract positions. May be existing personnel.

Senior business analysts with a track record of ability to understand the business and to focus on business solutions and willingness to work closely with and take direction from the strategic solution architect. Likely to be full time

on the programme for at least the first two to three years and possibly for the full duration. It is likely that there will be several on a large programme and at least one of them will logically be a permanent staff position.

4. Appoint Technical Assistant to Strategic Solution Architect
The strategic solution architect has a very diverse field of responsibility.

Accordingly, it is necessary that the strategic solution architect has a technical assistant to assist to keep track of all activities, minute meetings, liaise, etc as required to maximize the overall efficiency of the strategic solution architect.

This would probably be a temporary contract position for the duration of the programme.

Develop job description, advertise position, short list candidates, make appointment and contract. This is a relatively junior position.

Junior consultant with at least five years experience. I would favour a professional engineer with strong information technology experience. This requirement is not easily satisfied. Alternatively a person with a commercial degree majoring in information systems.

21.8.2 Development of Programme and Solution Architecture

Once the basic team is established the design of the programme can be taken to greater levels of detail.

1. Second Iteration of Programme Design
Take the programme establishment outlined in this book and extend it to the next level of detail in terms of overall programme and project design based on the output from the executive workshops outlined in section 20.3.2.

Use the output from these workshops to develop greater programme design detail. This should take place once the core team is in place so that they can participate in gaining understanding of the programme and take ownership of it. This will also serve as an induction process for core team members.

2. Design and Recruitment of Further Technical Team
If required fill additional permanent or temporary positions.

Detailed design of the technical team.

Drafting of job descriptions for individuals to be hired onto staff or contracted. Recruitment and appointment of these individuals as required. Under the direction of the technical team leader advised by the strategic solution architect.

Once there is greater clarity on the requirement, start to identify other members of the technical team in addition to those identified in subsequent chapters.

Depending on the size of the organization and its existing in-house capability and the scope of the overall programme, it is possible that the core team plus specific personnel on specific projects will be sufficient. If not a few additional personnel may be required on the core team full time for the first few years.

21.8.3 Detailed Architectural Involvement

To be determined in detailed planning. The strategic solution architect will be responsible for maintaining an overview of all aspects of the programme right through to completion.

CHAPTER

22

CLEAR STRATEGIC PERSPECTIVE AND ALIGNMENT

This component amounts to 16% of the relative importance of the overall management of the solution as outlined in chapter 16. It is the third most important component of ensuring a successful outcome.

This chapter should be read in conjunction with the comments on strategic alignment presented in chapter 8.

The importance of strategic alignment is summed up by the statement *"If you do not know where you are going, any road will get you there."* It is vital that the information technology systems and the business both arrive at the same destination at the same time.

This requires action by both the business and the technical team to arrive at the strategically appropriate destination three to five years after commencement.

Clear strategic definition and clear strategic alignment are vital to ensuring that the required outcome is achieved.

Every aspect of the programme must be tested in terms of relevance and focus against the strategic driver and where a component is vital to assisting the organization to achieve its strategic objectives this component must receive priority attention.

This component will be directly managed by the strategic solution architect.

It is recommended that this component should be based on the STRATPROC© strategic planning process which is outlined in more detail in chapter 34. This will include:

22.1 Develop Strategic Context STRATSNAP©
Run strategic snapshot processes as outlined in chapter 33 to develop a comprehensive view of the strategic environment. This should include:

1. Critical concerns with regard to information technology that require attention.

2. Critical components of the business that require the support of information technology in support of creating sustainable competitive advantage.

3. Strategic strengths that require information technology support to maximize.

4. Strategic threats that require information technology support to counter.

5. Strategic opportunities that require information technology support to exploit.

6. Strategic weaknesses that require information technology support to overcome.

Other aspects as identified in chapter 33.

It is vital that right at the outset a comprehensive set of strategic parameters are defined against which all proposed projects, systems, etc can be evaluated.

The strategic importance of every significant proposed system and project should be determined on a relative importance basis so that there is a comprehensive analysis of the relative importance of every project from a corporate strategic view point. This should form the basis for prioritizing much of the programme. There may, however, be projects of low strategic priority that will be necessary to create the foundation for projects of high strategic priority.

Individual strategic snapshots should be scored in terms of how well individual factors or components are being executed historically, currently, forecast and objective using the ratings mentioned in chapter 4. This applies to components with no technology involvement just as much as to those components with technology involvement.

22.2 Gap Analysis STRATGAP©

Based on the ratings generated in the strategic snapshots a gap analysis should be undertaken to determine specific projects to close the gap between forecast and objective performance.

It is important in undertaking this work that attention is focussed on the business as a whole and not on the information technology component alone.

As previously mentioned, technology alone cannot deliver any benefit to the business, it is what the business does with the information technology that will make the difference.

Accordingly there will be a significant number of strategic projects which will not have any information technology content which will be essential to achieving the overall strategic objectives of the organization.

22.3 Framework and Strategic Design STRATFRAME© and STRATDESIGN©

In the process of analysing the business using strategic snapshots it is possible that one or more governance or other frameworks will be identified. These will be analysed and presented graphically as governance frameworks like the example in chapter 9 figure 9-1.

The overall list of projects generated from the gap analysis will be analysed and developed into a comprehensive strategic design, as explained in more detail in chapter 34. This, together with the full list of technology projects, will form the basis of a large proportion of the overall planning that is required to deliver the world class capability that is the objective of the programme.

The business integration discussed in chapter 23 and the business optimization discussed in chapter 28 will generate further projects which, together with those generated in the strategic alignment process, and technology systems will create the overall solution design.

22.4 Strategic Action Plan STRATACTION©

The strategic gap analysis, restructured and grouped in accordance with the strategic design will be developed into further detail to result in the strategic action plan as discussed in chapter 33.

22.5 Strategic Project Plan STRATPROJECT©

The strategic action plan will be developed into an overall strategic project plan. This is where the strategic design process will intersect with the overall programme design as set out in chapter 24.

22.6 Strategic Audit STRATAUDIT© -- Performance Measurement

The strategic audit process will be particularly important in the context of the "soft" strategic and organizational integration and optimization projects as distinct from the harder technology projects catered for in the first six categories of chapter 26.

22.7 Some Key Points On Programme Initiation

Management of strategic alignment will be primarily by the strategic solution architect in consultation with the business systems executive with reference to the chief executive officer where required. The chief executive officer must ensure that they have an overall view of the strategic alignment at all times.

The strategic solution architect will be assisted by the solution architects as required. The technical team leader will be responsible for ensuring that the strategic context is constantly held in view by the technical team. The business systems executive will be responsible for ensuring that the strategic context is constantly held in view by the business team.

This section describes some key aspects of the overall programme initiation.

22.7.1 Develop and Document Strategic Context for the Programme

Take the work that is outlined in this book, together with the outputs of the executive strategic workshops and develop a set of specific guidelines for prioritisation of projects, evaluation of strategic relevance of customisation and procurement requests, etc.

This will largely flow from the strategic snapshots outlined in section 22.1.

Development of a comprehensive set of standards, guidelines, protocols, etc to be applied by the business and technical teams. These documents must be reviewed and approved by the business systems executives, the business and the leadership of the technical team. First draft by strategic solution architect.

22.7.2 Detailed Management of Strategic Alignment

To be determined in detailed planning. Ongoing throughout all activities.

Strategic solution architect and other core team members.

CHAPTER

23

BUSINESS INTEGRATION AND OPTIMIZATION

As indicated in chapter 16 this component carries a relative weight of 14%. It is an important component of the overall solution. While the previous three components might be considered rather abstract and intangible, this component is dealing with very solid realities. When the technology programme impacts the organization the consequences can be substantial as discussed in chapter 11 and elsewhere.

This component relates to a holistic and integrated view of the business which includes business integration and the management of change and business optimization.

The technological component of the business solution (hardware and software) must be totally integrated into the business in a seamless manner. This requires that all business processes are harmonized and optimized according to the strategic driver of the organization and that all necessary measures relating to the management of change are taken.

The subject of business optimization is complex and is addressed in the context of the TWOCONE© organizational optimization model which is discussed in chapter 28.

The overall strategic management of this component will rest with the strategic solution architect, possibly assisted by a business integration and optimization architect. The practical implementation will be the responsibility of the business systems executive.

23.1 Organizational Optimization
The components of organizational optimization are discussed in more detail in chapter 28 but include:

1. Strategic Optimization
Ensuring that there is balance between all aspects of strategic management of the business relative to the overall business strategic driver, strategic direction and strategic objectives.

2. Strategic and Operational Alignment
Ensuring that the operational side of the business is closely aligned with the strategic direction of the business. This is in large measure catered for by the strategic alignment work outlined in chapter 22.

3. Operational Optimization
Ensuring that there is balance between all aspects of the operational management of the business relative to the overall operational effectiveness programmes of the business.

4. Strategic and Operational Focus
This is largely an organizational design issue. Ensuring there are the right people in the right place in order to run the business effectively and ensuring that the information systems are implemented in a manner that is closely aligned with this structure.

This will almost certainly require organizational design changes, reskilling of personnel and may possibly make certain personnel redundant once the new or revised information systems and accompanying business strategy are fully in place and operating effectively.

Any form of business improvement must be holistic integrated and iterative. Radically different thinking is required compared to typical information technology projects and programmes. The organizational optimization and organizational integration components of the programme are vital primary components, not add-ons that are considered after the programme has been designed.

23.2 Management of Change and Communication

The management of change and communication are essential components of the business integration and optimization component of the programme.

Even if there are no fundamental organizational structural changes there will still be significant change in the job content of a very large number of personnel if a comprehensive strategic programme to achieve world class capability, which is the subject of this book, is undertaken.

Issues relating to the psychology of change and the impact of change were addressed in chapter 11. The activities outlined below are intended to put in place comprehensive programme components based on the services of acknowledged specialists in order to address this.

The ability of people to adapt to change varies dramatically. The development and implementation of a comprehensive plan of action to manage the process of change is vital to the successful implementation of any information technology, business systems or strategic initiative

23.3 Support, Training and Other Integration Activities

The process of solution integration into the business should incorporate a comprehensive programme of computer based training in which the computer software and its associated business processes, standards, policies, protocols, etc are all integrated into one holistic interactive training programme. The content of these programmes should be carefully checked in terms of strategic alignment and necessary content relating to the strategy of the business, the strategic driver, etc should also be incorporated in the computer based training material.

Computer based training material should be self paced with learning performance measurement facilities to track how much time each user has spent, which components they have studied, how well they have done, etc. There should be comprehensive performance measurement linked back to the human resources executive and the business systems executive such that staff are monitored to ensure that they are progressing to required standards by the required date for the implementation of individual systems.

There will ultimately be many computer based training applications associated with the different major components of the systems that are being implemented. Note that for less frequently used components it will not necessarily be cost-effective to develop computer based training modules and hands-on training will be required.

In addition to the computer based training material there should be a fully equipped help-desk with comprehensive knowledge base on the business operation of the software staffed by business and technical support personnel who have been trained up in the laboratory to support users with operational difficulties.

The implementation and deployment team should also contain fully trained technical and business specialists who are fully conversant with the software and able to support others prior to the "go live" date.

23.4 Some Key Points On Programme Initiation

As in previous chapters, the following are key appointments and activities that should take place as part of the initiation of a major strategic information technology programme directed at delivering world class capability to the organization:

23.4.1 Establishment

As with the previous chapters this section relates to the establishment of the core team.

There are considerably more specialists that require appointment in this component than in the previous components.

1. Detailed Role Definition of Business Systems Executive

There are a wide range of points of importance that have a bearing on the business systems executive. Governance roles of the business systems executive, strategic solution architect and technical team leader are outlined in chapter 27. Other points include:

a. Clearly define and document the role and responsibilities of the business systems executive.

b. Ensure that there is full consultation with a fully representative sample of end users.

c. Identification of all in-house areas to be impacted by the programme.

d. Ensure that business requirement is fully identified and understood.

e. That testing meets full business requirement.

f. That business processes that require change are changed.

g. That appropriate people are seconded to the business team.

h. That all in-house reporting requirements are accurately defined and fed into the information warehouse team.

5. That information warehouse testing and report testing is comprehensive.

j. That test data is representative.

k. That training material is practical and effective for implementation in the business.

l. That staff are released for required training prior to go-live date.

m. That staff are fully supported during go-live.

n. That staff continue with training after go-live.

o. That management at all levels give 100% commitment to ensuring the success of the programme.

p. That the software is effectively used in the business.

q. That initial hiccoughs are brought to the attention of the technical team.

r. That required co-operation between business users and technical team occurs.

s. That management involvement in the use of the outputs is progressively escalated to the point where effective decision-making results.

t. That there is only one version of the truth.

u. That disciplinary action is taken in the event of non-cooperation by staff.

v. That key performance indicators are amended if necessary to incentivise staff to support the effective operation of the systems, etc.

5w. That day to day information system operations outside the programme run effectively.

Detailed role definition and empowerment of business systems executives is a vital component of ensuring that full business integration and optimization takes place.

Close consultation between the business systems executive, strategic solution architect, technical team leader and chief executive officer on an ongoing basis is essential. This constitutes the team that is responsible for success.

2. Appoint Management of Change Specialist
This is a temporary contract position. May be a specialist firm but ensure that designated senior individuals with proven track record are appointed by name. Probably a part time requirement.

Technical team leader advised by strategic solution architect and business systems executives draft specification, consult with human resources department, revise and finalise, advertise, short list, interview, make appointment, contract, commence assignment.

3. Appoint Communications Specialist
This is a temporary contract position. May be a specialist firm but ensure that designated senior individuals with proven track record are appointed by name. Probably a part time requirement.

There may be an existing in-house corporate communications capability or consultant.

Technical team leader advised by strategic solution architect and business systems executives draft specification, consult with human resources department, revise and finalise, advertise, short list, interview, make appointment, contract, commence assignment.

4. Appoint Computer Based Training Service Provider
Develop requirement specification, research and contract computer based training service provider.

Technical team leader advised by strategic solution architect and business systems executives draft specification, consult with human resources department, revise and finalise, advertise, short list, interview, make appointment, contract, commence assignment.

There will be computer based training components in the implementation of each major project under the technology components described in chapter 26.

In this component of the programme plan provide for overall consulting, standards, procurement of software, etc.

5. Appoint Organizational Optimisation Team
Agree composition of organizational optimisation team including business process and other optimisation. Overall solution direction by the strategic solution architect, implementation by the business systems executive. Determine whether there is a need to contract particular technical expertise on an as-required basis.

Technical team leader advised by strategic solution architect and business systems executive drafts requirement specification, research, review, make appointment, contract, commence assignment. Concurrent with second iteration of programme design.

6. Appoint Training Team
This team will comprise permanent staff on secondment or temporary contract positions or a mixture of both.

Agree composition of training team. Identify whether in-house resources are sufficient or should be increased or whether external contractors should be contracted when required. Training of trainers will be the responsibility of the technical team. Training of staff will be the responsibility of the human resources department with management support from the business systems executive.

Technical team leader advised by strategic solution architect and business systems executive draft requirement specification, research, review, make appointment, contract, commence assignment. Concurrent with second iteration of programme design.

7. Appoint Industrial Process Specialist
Temporary contract position. If required, contract industrial engineers to assist with modelling and optimisation of key business processes.

Technical team leader advised by strategic solution architect and business systems executive draft requirement specification, research, review, make appointment, contract, commence assignment. Concurrent with second iteration of programme design.

8. Appoint Implementation Team
Contract positions or second existing staff. Identify other requirements in terms of overall implementation capability.

Implementation teams will be assembled on a case by case base for implementation of the projects developed in terms of chapter 26.

Technical team leader advised by strategic solution architect and business systems executive draft requirement specification research, review, make appointment, contract, commence assignment.

Contract people for specific implementations, either part of core team or part of team working on a specific project or additional resources contracted on short-term basis. Make provision within individual projects.

9. Appoint Other
Temporary or permanent. Identify other resources required and procure as necessary -- both in-house and contract.

Technical team leader advised by strategic solution architect and business systems executive draft requirement specification, research, review, make appointment, contract, commence assignment. As required.

23.4.2 Design of Business Systems Department

Detailed design of long-term staffing requirements for business systems department to provide robust systems engineering and maintenance capability.

To be determined in detailed planning. May consult with specialist human resource consultants.

Business systems executive advised by human resources department, strategic solution architect, technical team leader and independent consultants (if required) draft requirement, revise and finalise, advertise, short list, interview, make appointments, contract, commence service on staff or contract basis.

In some cases the organization will require additional technical staff to man the upgraded in-house capability over and above the existing capability. Assume existing capability will be retained and new staff brought in to supplement.

In many cases it will be possible to take people on board for the programme in such a way that they will initially be full time on the programme but over time will take on operational responsibilities.

Recognize that the personality profile of people who are good at creating new realities are different to those of people who are good at maintaining an established reality. Accordingly it may be preferable to treat the staffing of the operational department as a distinct activity as the programme progresses.

23.4.3 Induct Technical and Business Teams

Full induction process for technical and business teams to enable each team to work together as a cohesive unit and both teams to work together respecting the sometimes conflicting objectives that they will have. This process will be facilitated by group human resources and the management of change specialists, possibly with other external specialists assisting.

Commences once establishment is complete.

In-house capability possibly with external assistance.

23.4.4 Establish Laboratory

Equip and establish testing laboratory.

This comprises a suitable room with seating, desks, chairs, telephones, etc. Includes a data projector, white board and other aids so that it can double as a training room.

Should be designed in such a way that there can be dividers in the form of demountable partitions between different parts of the room. This will permit the room to be set up with different workstations representing distinctly different parts of the business. This will enable the whole flow of processing each type of business transaction to be accommodated.

For example, for a particular simulation there might be one or more workstations for telephonic order entry. Other workstations representing different warehouse functions and despatch and other workstations representing inventory and stock control and others representing debtors. Transactions can then be simulated right through the entire process to ensure that the software runs smoothly, that there are no process delays, that any specific set-up or implementation issues are effectively prototyped, etc.

The venue must be conducive to practical simulation with a full team of people from all relevant components of the business for all possible forms of transaction processing. Simulation must run right through to month end processing, general ledger posting, banking transactions, etc.

23.4.5 Detailed Business Integration and Optimization

To be determined in detailed planning.

Strategic solution architect gives overall direction, technical team develops approach, business systems executive manages implementation in the business. Ongoing for duration of the programme.

CHAPTER

24

PROGRAMME SCHEDULE, BUDGET AND RESOURCE MANAGEMENT

This component carries a relative importance of 12%. Effective execution of this component is a vital aspect of making the overall solution design visible. This is the second of the more tangible components of the overall programme management. It is based on well established standards although the approach advocated here goes beyond the standards frequently applied.

The overall programme architecture will be initiated by the strategic solution architect based on the structure presented here using the seven factors listed in chapter 16 as the basis of the overall programme design. The work breakdown structure will be built around this.

Important aspects of this component include:

24.1 Programme Charter
The entire programme should be documented at an early stage with a formal programme charter. This document should document a wide variety of aspects including overall governance, methodology, etc.

There is a well established body of knowledge with regard to the creation of project and programme charters and, in appointing the programme schedule, budget and resource management specialist, the team should ensure that this person has an existing template that fits well with the approach outlined in this book.

24.2 Methodology
Overall, this is a technical function.

Planning and monitoring of plan performance relative to time, resource utilization and costs is traditionally referred to as "project management" but, as used here, represents a narrower definition.

In contrast, the overall approach to the management of programmes and projects, as set out in this book is much wider than traditional information technology "project management".

There is a large body of experience around the scheduling and budgeting of projects and programmes, particularly in the engineering field.

Not all of this body of experience subscribes to the very high level of detail of planning that is advocated here. Accordingly, in selecting the practitioner who will be contracted as the programme schedule, budget and resource management specialist, it is important to ensure that their thinking is closely aligned with what is advocated in this book.

24.3 Activity Segmentation and Coding
Planning and monitoring should take place in terms of the following levels of detail:

1. Programme (multiple projects)
2. Sub-Programme (groups of related projects)
3. Master Project
4. Projects (a specific package with clear deliverable)

5. Sub-Projects (sub-categorization of projects)
6. Sub-Sub-Project
7. Phases
8. Parts
9. Tasks (repeatable work packages)
10. Activities (the point at which all work is executed

The naming of the intermediate levels is not that important. What is important is that the entire programme of work is collated in terms of a rigorously defined organizational structure and hierarchy with clearly defined standards relating to specific components.

The combination of parts, tasks and activities, levels 8 to 10 above is really important.

All projects should be analysed down to the level of activities and all activities should be defined at a fine level of detail such that an activity is either not started, started or complete.

Activities should preferably have a duration of a few days and at most about two weeks so that at any reporting point there is no question as to the status of a particular work package.

All planning should take place at the activity level.

Every activity should have a clearly defined outcome which can be monitored and reported on when accomplished.

By way of example, if well planned, the creation and approval of a single document will comprise a significant number of activities each of a few days duration.

The package of activities which makes up the creation of a document, such as a specification, should be standard so that the specification of a particular project can quickly be accomplished by assembling packages of tasks and activities for items such as “produce a specification”, “undertake development”, “test software”, etc.

If this approach is rigorously applied it will be found that it is not time consuming to generate a detailed project plan for any package of work by pasting in standard definitions and refining them. It will also be found that management is relatively straight forward.

Failure to design the solution such that this level of detail is possible in scheduling, resource planning and budgeting is a major factor contributing to projects which take much longer than planned and cost much more than planned.

24.4 Fine Level of Granularity

This fine level of granularity is an essential component of ensuring that management and users can verify that the project design is comprehensive and valid and makes sense.

This is one way that the end customers for the programme can see what is designed and constantly monitor what is being produced against what was planned.

With this level of detail, the moment an activity starts to run out of control, for whatever reason, adjusted planning is possible. This requires significant discipline on the part of the technical team leader and the programme schedule, budget and resource management specialist.

Note that allocating a hundred page specification to one activity defeats the approach advocated here. Such a specification should be broken down into much smaller discrete packages.

There is a serious tendency in many organizations to budget and schedule information technology investments more on the basis of "wishful thinking" than on solid engineering analysis and design. Meticulous, detailed planning is the only answer

24.5 Governance

High level governance of the programme is referred to in a number of earlier chapters and is discussed in more detail in chapter 27.

Detailed governance of the programme downward from the programme executive of chief executive officer, strategic solution architect, business systems executive and technical team leader requires careful design in order to ensure that there is an effective balance between equipping, empowerment and accountability.

This should be worked out by the programme leadership at an early stage of the programme and documented as an extension of the programme charter by the programme schedule, budget and resource management specialist.

24.6 Some Key Points On Programme Initiation

As in the previous chapters this section outlines key establishment activities for a major programme in a medium sized corporation.

24.6.1 Establishment

1. Appoint Programme Schedule, Budget and Resource Management Specialist

Permanent or temporary position.

Technical team leader advised by strategic solution architect and business systems executive draft job specification, consult with human resources department, revise and finalise, advertise, short list, interview, make appointment, contract, commence assignment.

Ten years experience in general project management and particular formal qualifications in programme schedule and budget management. Able to supply well designed template for programme charter, documented standards for overall approach and clear knowledge of principles of programme governance. Must be willing to learn new approach based on what is presented in this book.

2. Appoint Programme Office Administrator

Temporary contract position.

Develop job description, advertise position, short list candidates, make appointment and contract programme office administrator. This is a senior personal assistant level of person with strong disciplines in project filing and administration to run the programme office.

Full time for duration of programme.

3. Establish Programme Office

Establish and equip programme office.

Business systems executive arrange for office to be made available and equipped in consultation with technical team leader and strategic solution architect.

Provide for office furniture, office rental, computer, filing cabinets, office operating expenses like telephone, etc. These costs may be carried as hidden office operating costs by the host corporation.

24.6.2 Initial Planning, Standards, etc

1. Programme Charter

Develop programme charter.

Programme schedule, budget and resource management specialist in consultation with strategic solution architect, engineering process advisor, technical team leader and business systems executive prepares programme charter. It is reviewed and signed off by all parties including chief executive officer and other business executives.

Programme schedule, budget and resource management specialist should have a template available as one of the requirements for appointment.

With some specialist firms there may be an intellectual property rights fee for use of the programme charter template.

2. Standards

Develop programme schedule and budget standards, filing catalogue standards and protocols including catalogue codes, etc.

Programme schedule, budget and resource management specialist in consultation with strategic solution architect, engineering process advisor, technical team leader, business systems executive prepares standards. They are reviewed and signed off by all parties.

Programme schedule, budget and resource management specialist should have a set of standards available as one of the requirements for appointment.

3. Initial Planning

Undertake initial outline planning of the programme building on the structure outlined in this part of this book to create a foundation for more detailed project plans as the technical analysis progresses.

Programme schedule, budget and resource management specialist in consultation with strategic solution architect, engineering process advisor, technical team leader, business systems executive commences initial planning based on work done to that date.

4. Programme Governance
Develop and document programme governance model and guidelines and implement in conjunction with the rest of the team.

Programme schedule, budget and resource management specialist in consultation with strategic solution architect, engineering process advisor, technical team leader and business systems executive prepares programme governance definition, policies, guidelines, etc. They are reviewed and signed off by all parties. Approach to be based on what is presented in this book together with strategic solution architect's definition.

24.6.3 Ongoing Planning, Schedule and Budget Management

Detailed planning as strategic analysis, business analysis, organizational analysis and technical analysis provides detail for planning purposes. Work closely with the solution architects, technical team leader and business systems executive.

Ongoing across all activities for duration of programme.

CHAPTER

25

DATA ENGINEERING

This component carries a relative weight of 10%. This reflects the requirement that the previous points must necessarily be dealt with in order to provide the appropriate context and environment for the data engineering. This does not detract from the fact that effective data engineering will frequently represent the single biggest opportunity to create substantial competitive and operational advantage.

Refer to chapter 10 for a detailed discussion of data engineering. This chapter defines the following components for data engineering:

1. Data modelling and schemas
2. Maximum validation
3. Top down content analysis
4. List structure
5. Codes
6. Special techniques
7. Data cleansing

25.1 Some Key Points On Programme Initiation
This section lists some key establishment and operational requirements which are particularly important for a large programme.

25.1.1 Establishment
1. Role of Strategic Solution Architect
A significant function of the strategic solution architect, assisted by the solution architects, is to develop the high level strategic data model and data engineering design.

The strategic solution architect will give overall guidance and final technical direction in this area. Ongoing for the duration of the programme.

2. Appoint Entity Relationship Modelling Specialist
This is a temporary contract position.

Develop job description, advertise position, short list candidates, make appointment and contract specialist in the analysis and development of comprehensive enterprise wide data entity relationship models. Depending on the scope of the programme the appointment is likely to be full time initially and part time subsequently.

Strategic solution architect makes final decision on this appointment. Concurrent with second iteration of programme design.

Ten years experience in data analysis and modelling, formal professional qualification (degree), rigorous discipline, strong analytical profile.

3. Appoint Information Warehouse Schema Design Specialist
This is a temporary contract position.

Develop job description, advertise position, short list candidates, make appointment and contract specialist in the analysis and development of comprehensive enterprise wide information warehouse schemas. Likely to be full time initially and then part time.

Strategic solution architect makes final decision on this appointment. Concurrent with second iteration of programme design.

Ten years experience in data analysis and modelling, five years experience in information warehouse design and implementation, formal professional qualification (degree), rigorous discipline, strong analytical profile.

If the organization undertakes a full first principles data engineering exercise coupled to a clean slate re-implementation it is likely that there will be considerably less work for this individual than in a case where the organization tries to carry on with existing dysfunctional data engineering.

In extreme cases it may be found to be almost impossible to develop a really effective information warehouse unless a full data engineering exercise with re-implementation is undertaken.

4. Appoint Information Management / Cataloguing Specialist
Temporary contract position. This person will probably be retained on a part time basis to manage the overall catalogue design and standards once the programme is complete. The maintenance of these standards as new information items and entities occur will be a vital component of maintaining high quality data engineering.

Develop job description, advertise position, short list candidates, make appointment and contract specialist in the development of information cataloguing schemes to work under direction of strategic solution architect and in close consultation with the entity relationship modelling specialist and warehouse schema specialist. Probably require someone with a masters degree in information management or similar qualification plus ten years experience. Rigorous discipline, strong analytical profile.

This is likely to be a difficult resource to locate.

Strategic solution architect makes final decision on this appointment.

5. Appoint Data Cleansing Service Provider
Contract an organisation on an as-required basis.

Develop requirement specification, research and contract data cleansing service provider.

Professional services and software for data cleansing of customer data as a minimum. May require several iterations and will need to be done on existing data in enterprise resource planning and other systems in the year leading up to re-implementation or as soon as possible if there is not going to be a re-implementation.

There may be other master data such as the product master data that will also require cleansing and possibly restructuring.

25.1.2 Ongoing Data Engineering

Detailed planning as strategic and business analysis provides detail for planning purposes. Work closely with the solution architects, technical team leader and business systems executives.

Data engineering team with overall direction by strategic solution architect.

Ongoing for the duration of the programme.

25.1.3 Create Fully Representative Selection of Test Data

Once the technical data design is complete commence systematically creating a representative sample of test data using simple prototype capture screens, spreadsheets, editing of existing data to replace codes, etc. Any acceptable technique to deliver test data of acceptable quality.

This will take place in the laboratory and will systematically involve end users representing the entire spectrum of the business.

Business team in conjunction with technical team and particularly the data engineering team start to build a representative sample of data from all parts of the business suitable for testing software and for use in building the information warehouse analysis and reporting applications. Particular effort must be expended to identify all possible exceptions and anomalies.

Commence work once the laboratory is established, business team has been appointed and initial data analysis is completed.

Business team comprises a team of business people with significant time commitment to the programme as well as representatives of every area of the business that has different requirements from the system.

Depending on the approach to programme costing, the time and overhead cost of the business team may be carried internally by the business or all costs may be made visible on a salary plus oncost basis in the programme planning.

25.1.4 Conclusion: Data Engineering

Effective data engineering has the potential to have an enormous impact on the final outcome. A significant investment in this component is therefore justified.

CHAPTER

26

TECHNOLOGY PROJECT COMPONENTS

This component carries a relative weight of five percent but represents a very substantial proportion of the total work to be undertaken. This is where the individual technology and other projects are located. However, for these projects to succeed the preceding six programme components are vital to create the context, provide the strategic and operational guidance, etc.

The organization-wide data engineering will provide an essential component of ensuring that data can be shared across all applications and that business intelligence is built into every aspect of the solution.

This chapter deals with the same seven categories of technology component or system described in chapter 17.

This is the component where traditionally all effort is focussed whereas it is really only effective if the previous six factors plus the principles, the stages, etc are well executed and effectively applied.

Without the strategic context, the business integration, etc no matter how well this component is executed the result will be sub-optimal or fail.

26.1 Some Key Points On Programme Initiation

As in the previous chapters the following sections are based on the design of a large programme to achieve world class capability for a medium size corporation.

Individual system requirements will be identified from the strategic analysis and the business analysis and workshops that will follow.

Technical and business team resources will be identified as required as part of the activities outlined in previous chapters.

Individual procurement projects will be undertaken once requirements have been established to evaluate the appropriateness of tailoring existing systems, purchasing and customising third party systems or developing from scratch. The outcome of these projects will determine further aspects of each project.

The technical team, with broad strategic direction given by the strategic solution architect and business input coordinated and managed by business systems executive. Specific service providers may be contracted for specific projects according to particular knowledge and experience required. Projects can include enhancement of existing systems, procurement and customisation of third party systems and development of custom systems.

This component is ongoing for the balance of the programme once establishment is complete. On completion of the second iteration of programme design.

This work can only commence in earnest once the full technical team and business team are on-board, inducted, standards set, roles and responsibilities defined and all activities necessary to deliver a high quality solution engineering environment are in place. This is likely to take between three to six months and is likely to take closer to six months. If not managed tightly this component can take longer.

Basic design, project leadership, etc will be performed by the core team. Project teams will be assembled for each of the items below comprising partly members of the core technical and business teams and partly people co-opted from the business for specific projects together with external technical specialists contracted specifically for each project.

The knowledge and experience requirement of the people contracted for specific projects will be determined according to whether the project involves tailoring a system already in use, the procurement and customisation of a commercially available system or the development of a new system. The sequencing of projects will be determined from the list generated at the first executive workshop and refined in the workshops identified in chapter 20.

26.1.1 Operational and Transaction Processing Systems

This is a major suite of projects and may well represent the biggest single package of work over the duration of the programme.

1. Identification of Enterprise Resource Planning System Projects

Based on the strategic evaluation list and prioritise all projects relating to the enterprise resource planning system. Business systems executive assisted by strategic solution architect evaluate business case for each project and present to management for approval.

A series of workshops will be held, run by the core team in conjunction with business specialists. Budget for travel and accommodation for business specialists from business components of the corporation outside the home city.

2. Enterprise Resource Planning System Projects as Required

Potentially a significant number of projects. Initial provisions will be gut feel. They cannot be refined without considerable analysis. Once projects have been identified, they will go through a standard process of developing concept specification, costing, development of business case, etc so that business decisions are taken on a project by project basis.

It may be necessary to budget for significant work to be undertaken by the enterprise resource planning system vendors paid in their home currency.

A full re-implementation will attract higher costs because there are upgrades that will not be justified in the absence of a clean slate re-implementation because of dysfunctional data engineering. Note that these costs are over and above the base line costs of the core technical and business teams which will do the high level architecture, etc of every project.

3. Other Operational and Transaction Processing Systems

Based on the strategic evaluation list and prioritise all other transaction processing system requirements.

Business systems executive assisted by strategic solution architect evaluates business case for each project and presents to management for approval.

Based on the analysis in the initial workshop and on the investigation, there are a significant number of satellite systems that will be developed around the core enterprise resource planning system and, in some cases, in place of certain enterprise resource planning system modules.

Estimating in detail at this stage is not possible. Initial numbers will be gut feel based on initial information.

It is likely that in the event of full re-implementation being avoided more will be done outside the enterprise resource planning system than in the event of clean slate re-implementation. It is likely that there are things that will be possible with re-implementation that will not be worth attempting in the absence of re-implementation.

Costs for this component are over and above the base line costs of the core technical and business teams which will do the high level architecture, etc of every project.

26.1.2 Automation Systems

1. Identification of Automation System Projects

Based on the strategic evaluation list and prioritise all automation projects. Business systems executive assisted by strategic solution architect evaluates business case for each project and presents to management for approval.

2. Comprehensive End User Support Capability

Upgrade existing support infrastructure or acquire new end user support infrastructure and develop content as required for effective long-term end user support in all aspects.

Includes requirement to staff the call centre and train call centre operators.

3. Automation Systems Projects As Identified
Other automation system projects as required.

At an early stage there may not be clarity on what these projects could look like. In such a case make a provision.

This component could include factory process automation systems as well as enhancements to office automation environments, etc including standards for office automation, standard templates, etc.

26.1.3 Soft Information Acquisition and Processing Systems
1. Identification of Soft Information Acquisition and Processing Systems
Base on the strategic evaluation list and prioritise all soft information acquisition and processing such as customer satisfaction ratings, etc. Business systems executive assisted by strategic solution architect evaluates business case for each project and presents to management for approval.

2. Soft Information Acquisition and Processing Systems As Identified
Soft information acquisition and processing systems as identified.

These may well form specific components of other developments but specific projects may result.

26.1.4 Decision Support Systems
1. Identification Of Decision Support System Requirements
Based on the strategic evaluation list and prioritise all projects relating to decision support, modelling, forecasting and other analytical requirements. Business systems executive assisted by strategic solution architect evaluates business case for each project and presents to management for approval.

2. Information Warehouse
Develop requirement specification, research and contract information warehouse service provider. Procure software and database, create loading routines, implement information warehouse, etc.

Specific project with specific specialist service provider.

Once data analysis and basic test data are complete for selected business areas and projects are identified.

Implementation, set up of database, creation of load processes, creation of aggregation processes, data quality checking, etc. Excludes hardware, includes information warehouse database and related software.

Costs for scenario with no enterprise resource management system re-implementation are likely to be materially greater if any real benefit is to be achieved. However there may be a case for not implementing an information warehouse if there is no re-implementation as dysfunctional data engineering may preclude any really meaningful capability. If meaningful capability is to be attained without re-implementation the costs will be higher than if there is clean slate re-implementation with excellent data engineering.

Information warehouse database and related software. Lump sum provision. May be ongoing license fee.

3. Basic Management Reporting To Replace Existing Facilities
With any significant programme, particularly with clean slate re-implementation or a new system, the existing management reporting capabilities, whether reports, models, etc will almost certainly cease to work. A full programme of action to develop new management reporting capability is vital before the new or re-implemented systems run live.

Develop basic management reporting on the information warehouse to replace all existing spreadsheets, etc subject to business case for major projects. Procure tools as necessary.

Specific projects with specific specialist service providers.

Once the basic information warehouse is established and populated with representative test data.

Development of reports based on existing spreadsheets and other reports. Lump sum provision.

This will take place largely before the go live of the re-implementation. Will be more complex if there is no clean slate re-implementation if this component is undertaken.

Will be much more power and functionality in the event of a clean slate re-implementation.

Work on this component can only start quite late in the first year of programme operation.

4. Intermediate Management Reporting and Analytical Applications
Develop intermediate management reporting and analytical applications. Procure tools as necessary.

Specific projects with specific specialist service providers, could be different service provider to the previous point.

Once basic reporting is well advanced.

Going beyond what currently exists.

Will only commence in second year of the programme. The corporation could opt not to invest at this level, however this is where real support to create effective decision-making will start to be delivered. This is the sixth component of world class capability as outlined in chapter 2.

It is unlikely that this will be an option in the absence of a clean slate re-implementation. If it is attempted without a re-implementation costs will be much higher than in the case of a full re-implementation with excellent data engineering and failure will be a possibility.

5. Advanced Management Reporting and Analytical Applications
Develop advanced management reporting and analytical applications. Procure tools as necessary.

Could be different service providers to the previous point.

Once intermediate analytical applications are well under way.

Going into really advanced strategic analytical capability. Will probably only commence in the third year of the programme. The corporation could opt not to invest at this level, however this is where real support to create competitive advantage will be delivered. This is the seventh component of world class capability outlined in chapter 2.

This is unlikely to be possible without a clean slate re-implementation.

26.1.5 Hardware, Networks, Operating Systems and Database Systems
1. Identification Of Hardware, Network, Operating System and Database System Requirements
Based on the strategic evaluation as well as specific projects identified above, list and prioritise all projects relating to acquisition or upgrading of hardware, networks, operating systems, database systems and other requirements.

Business systems executive assisted by strategic solution architect evaluate business case for each project and present to management for approval.

May be further requirements identified as other projects progress and technical requirements are more clearly defined.

Part of second iteration of programme design.

2. Information Warehouse Hardware
Specify and procure information warehouse hardware.

Specified in consultation with the information warehouse service provider.

Subsequent to appointment of information warehouse service provider and prior to information warehouse implementation. May be quite a lot of time slack in the time line for this activity as there is a very considerable amount of analysis required before work can begin on the information warehouse in earnest.

Specified by core team in consultation with information warehouse service provider.

3. Equip Software Laboratory
Equip a software laboratory for comprehensive workshopping of requirements for changes to existing systems and for testing of new systems. Will require a room, five to ten computers, server or servers or access to servers, data projector, etc. Refer section 23.4.4.

Business systems executive and corporate in-house resources advised by strategic solution architect and technical team.

Concurrent with second iteration of programme design.

Lower bound costs assume the corporation provides the facilities and the laboratory makes use of existing servers. Upper bound costs assume that all furniture, equipment costs, office rental, etc are carried by the programme.

4. Other Hardware, Network, Operating System and Database Systems As Required
Other components and systems as required.

Will be further requirements identified as other projects progress and technical requirements are more clearly defined.

Part of second iteration of programme design.

May not be any requirements but as additional systems are developed and greater utilisation occurs it is probable that there will be considerable additional requirements in this area. It is not practical to estimate at the concept stage of the programme.

Upper bound cost -- provide for a mirror server and full disaster recovery on existing hardware if this is not in existence already.

26.1.6 Systems Integration Components

1. Identification Of System Integration Components and Allied Services
System integration components and related services will be identified in part from the strategic analysis and largely from the detailed design of individual components.

As required. May not be any requirements. Will probably be incorporated in individual projects. Depending on technology in use there may be a requirement for third party replication technology and services.

26.1.7 Operators, Users, Customers and Decision Makers

1. Identification of Operators, Users, Customers and Decision Makers
The business systems executive in consultation with the business will identify the operators, users, customers and decision-makers who will be consulted with regard to various aspects of analysis and design, who will be involved in testing, who will be impacted by implementation, etc. This information will be fed into all aspects of the programme planning.

These role players will be identified by the business systems executive in consultation with the chief executive officer and the full spectrum of the business in order to ensure that there is full representation. Note that customers may not be required to provide input although in certain contexts this will be valuable.

Follows appointment of business systems executive.

2. Formation of Business Team
Permanent staff seconded to the programme.

The business team comprises those staff members who are selected as representing all the different aspects of business operations. These people will largely participate on a part time basis providing input to design workshops, reviewing drafts of specifications, participating in software evaluation and testing, supplying test data, etc.

It is probable that some business representatives will be required on the business team on a full time basis for some periods of time if a really robust solution is to be designed.

Mobilise business team members from across the organisation to participate in analysis and design workshops, generation of test data, testing of systems, etc.

Where personnel are seconded full time to the team it will be necessary to make arrangements to release these staff and support them with temporary staff or other arrangements.

This team will be managed directly by the business systems executive.

There will be separate teams for different subsidiary companies in a group setting.

The corporation may decide to carry this as an operational cost or may elect to include the costs in the programme.

3. Customer Relationship Management Team
In moving towards really effective strategic customer relationship management it may be desirable to undertake research and even involve key customers in certain consultative processes with regard to design of individual components.

Provide here for an overall research project.

There may be a requirement for market research consultants and other specialists. Costs may include travel and accommodation and other items relating to this category not catered for elsewhere.

4. Other Projects That Involve People and Not Technology
Those strategic and organizational optimization projects that do not sit logically elsewhere in the programme will all be allocated under this section.

26.2 Conclusion: Technology Components
This section lists the various components of technology that will make up the comprehensive world class solution outlined in chapter 2.

It is vital that every one of these components is carefully evaluated and required projects included in order to achieve the required world class capability.

Failure to include all required projects will result in unforseen difficulties later in the programme.

Comprehensive analysis of this component is therefore essential.

PART 5

BUSINESS AND STRATEGIC ISSUES

CHAPTER

27

PROGRAMME GOVERNANCE (Based on Actual Example)

Effective governance requires a balance between equipping, empowerment and accountability. Accurate, activity based measurement is a necessary requirement.

In a major programme there are a number of distinct governance flows including governance of the vision, governance of the schedule, financial governance, etc.

In the preceding chapters an overall programme governance leadership comprising a strategic solution architect, business systems executive and technical team leader has been outlined. These three individuals, under the overall leadership of the strategic solution architect and reporting overall to the chief executive officer of the client corporation provide the full executive management of the entire programme.

This governance structure is designed with a view to providing balance between the various aspects of required governance in a compact structure that can be effectively accountable to the chief executive officer.

This structure is complex but is the only way that I know to create the necessary management for any programme to deliver significant benefit.

In order to assist readers to better understand this programme governance the rest of this chapter is devoted to a discussion of the practical requirements for governance.

The following sections are taken directly from an actual governance specification for the leadership of a large programme. It is hoped that this will provide the most useful way for readers to grasp the full magnitude of what is required in practice.

The remainder of the chapter accordingly follows the structure of the document as it was created for the client in question.

The first section of the document was an overview of the client corporation and that is omitted in what follows. The extract accordingly commences with the second section of the document.

This document was drafted in my capacity as strategic solution architect.

Production of this document was preceded by:

1. A program of executive interviews.

2. An executive workshop to determine the ratings of the existing information technology capability and specific system requirements for competitive advantage and other factors.

3. A detailed high level evaluation of the existing systems with particular emphasis on cataloguing all aspects of the systems that were giving rise to sub-optimal performance.

4. The preparation of an extremely detailed report listing the findings of the investigation and outlining the overall programme design in line with the recommendations in part 4.

5. Various discussions and supplementary documents clarifying the overall scope of work, proposals, etc.

The document from which the following sections are derived was produced as the next step in moving towards the execution of the programme. The overall grammatical structure of the original document has been retained on the basis that this chapter will provide a useful template for readers whose organizations decide to embark on a similar programme. If you would like a copy of this template electronically, email me at james@jar-a.com.

27.1 Overview of Programme

The programme is directed at bringing the business information systems of the corporation and its subsidiaries to a world class level within five years.

The programme will address every aspect of information and business systems within the corporation in a systematic, strategically focussed manner over a five year period to bring about a comprehensive, holistic, integrated, strategic solution in support of the corporation's long-term strategic and operational objectives. In achieving these objectives the numerous short comings of the present systems and systems implementation will be remediated.

The core enterprise resource planning (E.R.P.) system in use at the corporation will remain the core of the new solution.

In order to achieve this objective a professional team is being assembled using an engineering approach.

The programme will include comprehensive strategic analysis of the overall business requirement, identification of current weaknesses, software customization projects, data engineering (data cataloguing, taxonomy, etc), software procurement, business optimization, strategic alignment and other activities directed at achieving the desired world class standing.

Once the full programme team is assembled, established and in full operation the programme will have three major stages:

1. Re-Implementation of Enterprise Resource Planning System

This stage will be undertaken with a professional team of significant size.

Members of the team will undertake a major project to analyse the entire data domain of the corporation and to develop comprehensive structured data coding designed to support strategic decision support. This will be coupled with the acquisition and implementation of an information warehouse and the development of a comprehensive suite of basic management reporting, query and analysis capability.

Various other projects will be undertaken to remediate a diversity of dysfunctional aspects of current system operations which are not fully supporting the business strategically and / or operationally.

Comprehensive testing of all modifications to existing systems, newly developed systems and newly procured systems will take place in a systems laboratory established specifically for the programme in order to ensure that the final design is fully functional and fits the business extremely well and is fully operational when deployed. Full training and implementation material will also be developed in the laboratory.

One of the key objectives of the overall solution design will be to design the solution in such a way that it is responsive to and can accommodate all changes in the strategic context and strategic environment of the business.

A comprehensive implementation programme for the re-implementation of the enterprise resource planning system will be developed which will include the use of computer based training and other training measures to ensure effective application of the re-implemented system from the moment it goes live. Comprehensive projects for the management of change, management of the new implementation, etc will be undertaken. In-house support capability will also be significantly upgraded.

The target date for this stage of the programme is eighteen months from commencement with the re-implemented enterprise resource planning system, information warehouse and related components all running live on this date. This is the financial year-end for the corporation. The objective is to achieve a highly efficient cut-over with minimum business disruption.

2. Progressive Improvement Leading to Hand Over to In-House Capability

Following on from the re-implementation of the enterprise resource planning system will be an approximately eighteen month programme during which a range of further projects will be undertaken. These will be directed at

progressively improving the strategic capability of the corporation and will include the procurement or development of a diversity of systems in support of the strategic objectives of the corporation.

Further development on the information warehouse is also envisaged.

One of the objectives of this next stage of the programme will be to hand over the entire management of business information systems to the in-house business systems executive who will be appointed at the outset of the programme. This business systems executive will be appointed from within the business and will focus particularly on the integration of the solutions with the business and the development of a robust world class strategic in-house business systems capability.

The objective is that the external programme leadership, specifically the strategic solution architect and the technical team leader, will hand over their functions to the business systems executive by no later than three years after commencement of the programme. Remaining external team members will remain on-board on an as-required contracted basis either part time or full time.

3. Further Improvement Translating into a Culture of Continuous Strategic Improvement and Adaptation
Following handover to the in-house business systems executive, the corporation will continue with the programme for a further two years progressively developing increased capability in support of long-term strategic and operational objectives.

The objective is that by the end of five years from commencement the corporation will have a comprehensive world class strategic business information systems capability in every facet and every aspect of the business both locally and internationally. This capability will be such that the corporation will be able to respond dynamically and proactively to every change in market conditions and will be generating substantial competitive advantage through access to and application of highly structured information of the highest quality as set out in chapter 2.

These systems will be fully scalable within the context of the existing core business areas of the corporation.

27.2 Overview of Team Leadership Requirement
The team leadership requirement which forms the basis for this specification comprises (percentages in brackets indicate the relative importance of each of the factors in the job function of the individual concerned):

1. Strategic Solution Architect
The strategic solution architect is primarily responsible for the overall solution architecture (26%), the strategic direction and alignment of the programme (25%) and the data engineering (24%).

The strategic solution architect provides the overall guidance to the entire programme while focussing personal attention primarily on the three aspects listed above.

The strategic solution architect will be an external specialist with at least 20 years relevant experience who will be contracted for the first three years of the programme. After completion of the first three years the strategic solution architect may be contracted on an as-required basis for a longer term if considered appropriate. In the third year of service the strategic solution architect will progressively hand over responsibility and function to the business systems executive and other in-house personnel.

2. Business Systems Executive
The business systems executive will be appointed from within the corporation. Additional business systems executives may be appointed within selected operational companies.

The business systems executive will be primarily responsible for executive liaison (24%) and business integration and optimization (23%) and will also devote particular attention to individual systems (14%). The business systems executive will play a liaison and monitoring role as well as manage business input to all facets of the programme. The principal responsibility of the business systems executive will be to ensure that all aspects of business requirements are fully identified and integrated into the solution and that the solution is fully integrated into the business.

The business systems executive will also be responsible for the day to day management of all aspects of business information and other system operations outside of the programme with support as necessary from the programme team.

Once appointed the business systems executive will play a key role in the detailed design of the programme. In doing this they will play an important role in ensuring that there is comprehensive consultation with the business and that all personnel who have differing knowledge and / or experience of the business are involved in scoping individual projects.

The business systems executive is expected to make themselves available to the corporation for at least a five year period.

3. Technical Team Leader
The technical team leader will be appointed as an outside contractor full time for a period of three years and in the last year of service will progressively hand over responsibility and function to the business systems executive and other in-house personnel.

The technical team leader will ideally be a registered professional engineer with at least five to ten years experience in engineering projects and five to ten years experience in information technology projects and with the capability to effectively lead the entire technical team. If a suitably qualified engineer cannot be located the technical team leader should be a person with a solid information technology background with a sound grasp of the engineering principles outlined in this book.

The technical team leader will place particular emphasis on the detailed leadership and management of all the technical projects (40%) and the management of programme schedule, budget and resources (30%).

27.3 Specific Considerations in Contracting the Programme Team Leadership Positions -- Critical Factors for Programme Leadership

The following specific factors have been identified in contracting all leadership positions on the programme team. Percentages in brackets indicate the relative weight that will be applied in evaluating suitability of candidates for a position.

1. Leadership and Management (21%)
Consultative approach with strong decisive leadership. Willing to accept leadership and give leadership. Effective manager. Constructive approach to dispute resolution. Bring out the best in team members.

2. Accountability (19%)
Acceptance of accountability and responsibility and willingness to be held accountable.

3. Allegiance to the Corporation (16%)
Put interests of the corporation first, no conflict of interest, any potentially conflicting interests declared, commitment for three / five year duration as applicable.

4. Accept Approach and Strategic Solution Architect Leadership (14%)
Accept and commit to overall programme approach specified by the strategic solution architect and set out in this book. Accept overall programme leadership by the strategic solution architect.

5. Practical Long-Term Outlook (12%)
Focus on practical use of appropriate technology appropriately applied to produce stable, durable solutions with long design lives.

6. Team Player (10%)
Willing and able to work as a member of a team, personality style appropriate to the role. Recognize that all people have weaknesses and strengths - team is about maximizing strengths and compensating for weaknesses.

7. Competence (8%)
Appropriate knowledge and experience, track record, professional registration a recommendation. Both business and technical competence.

The relative importance of the above factors is based on the principle that all factors are important with certain factors being more significant in making a final decision to appoint a candidate than others. Successful candidates will be required to take account of the above emphasis in all aspects of their involvement with the corporation for the duration of their appointment.

27.4 Function and Requirements for Programme Team Leadership

The overall functional requirements of the team leadership are based on the standard critical factors for information technology investment success defined in chapter 16.

The critical factors are those major programme design and operational components without which it is highly unlikely that any organization will achieve a long-term sustainable value adding strategic information technology investment

These same factors apply with minor modifications to organizational optimization programmes and to strategy implementation programmes reflecting the reality that these are all different facets of organizational improvement.

These factors form the overall basis of management and staffing of the programme and form the basis of the structure contained in part 4.

1. Executive Sponsorship (25%)
It is vital that the chief executive officer sits regularly with the strategic solution architect and business systems executive as trusted advisors and ensures that he is fully informed of progress, developments, etc.

It is also vital that the chief executive officer discusses areas of concern with the programme team leaders immediately they arise and that he satisfies himself that the concerns are being fully addressed.

The chief executive is the ultimate customer for the investment and is the only person with the cross cutting authority to ensure that the diversity of business components that are required to cooperate in making the investment work do cooperate.

The strategic solution architect should serve as a trusted advisor to the chief executive officer while the chief executive officer is the owner of scope, budget and deadline.

The chief executive officer is also ultimately responsible for the governance of business participants and heads the business as "the contractor". This reflects the reality that it is the employees of the corporation who determine the success or failure of the investment provided the other components have been fully satisfied. Much of this responsibility is delegated to the business systems executive.

2. Strategic Solution Architect (18%)
The strategic solution architect should be a trusted professional advisor to the chief executive officer and is responsible for facilitating the development of the overall strategic architecture of the solution in close consultation with executive management.

Other architect functions include the overall business solution, the overall programme schedule and budget, architecture of the data engineering, business integration and optimization architecture, etc.

3. Clear Strategic Perspective and Alignment (16%)
A clear definition of the strategic objectives of the organization and measures to ensure that the entire solution is aligned with these strategic objectives.

4. Business Integration and Optimization (14%)
All aspects of integration of the business systems with the people who form the business and optimization of the business.

5. Programme Schedule, Budget and Resource Management (12%)
All aspects of time, budget and resource management of the programme.

6. Data Engineering (10%)
The systematic structured analytically based coding of data in the software systems and all other aspects of data structure, modelling, etc.

7. Specification, Development, Procurement, Customization and Implementation of Individual Systems (5%)
The detailed development, procurement, customization, etc of specific systems required by the business. This has a low weight only because it requires the context created by the previous six points in order to succeed. All aspects of technology are catered for in the following seven sub-factors.

a. Operational and transaction processing systems.

b. Automation systems.

c. Soft information acquisition systems.

d. Decision support systems.

e. Hardware, networks, operating systems and database systems.

f. Systems integration components and allied services.

g. Operators, users, customers and decision-makers.

The weights applied to the seven primary factors represent the overall long-term relative importance that should be applied in any organization. The objective with the programme is to move the corporation's current business information systems management and operation to world class standing over the next five years.

In order to achieve this objective the initial emphasis of individual programme team leaders will be distributed in order to achieve the required level of emphasis in each aspect of the programme and business systems operation within the corporation. The distribution of relative importance of each of these factors between the three manpower components that make up the leadership of the programme are summarized below and discussed in more detail in the sections that follow.

The relative weight across the three categories is presented in table 27-1 and presented graphically in figure 27-1.

Table 27-1 Distribution of Governance Responsibility
Programme Leadership Team

	Programme Component	Strategic Solution Architect	Business Systems Executive	Technical Team Leader	Average
1	Executive liaison	14	24	5	14
2	Overall solution architecture	26	11	6	14
3	Strategic direction and alignment	25	10	7	14
4	Business integration	5	23	16	15
5	Schedule, budget and resource management	4	6	29	13
6	Data engineering	24	12	9	15
7	Individual systems and solutions	2	14	28	15
	TOTAL	100	100	100	100

The table indicates that the ratings have been approximately balanced across the three team leadership roles with a view to ensuring that each function receives approximately the same degree of focus overall.

Figure 27-1 illustrates the distribution of the weights for each of the three roles indicating that different team leaders have primary responsibility for each of the seven major categories. This distribution of focus is designed to ensure that each team leader understands their relative responsibility in terms of how they focus their efforts and the efforts of those who report to them.

In considering these figures it is important to recognize that all seven factors are important for all team leaders and team members. The relative weight simply indicates the relative importance of each of those factors in terms of emphasis, focus and responsibility of each of the team leaders. The team leader with the highest weight on each item has the primary responsibility for the management of that item.

Overall the final responsibility for the architecture of the entire technical and business solution rests with the strategic solution architect while the responsibility for the leadership and execution of each factor rests with the different team leaders as shown on the table and the graph.

27.5 Contractual Considerations for Programme Team Leadership

Each member of the programme team leadership and other contracted and staff members will be required to enter into a formal contract with the corporation for the duration of the programme.

Contracts will include the following:

1. Clear Definition of Roles and Responsibilities

This document sets out the basics of this component. More detail was contained in the report including the appendix and in the presentations that were tabled along with the document on which this chapter is based. The governance document, the report, appendix and presentations all constitute part of the contract. This book would also form part of the contract.

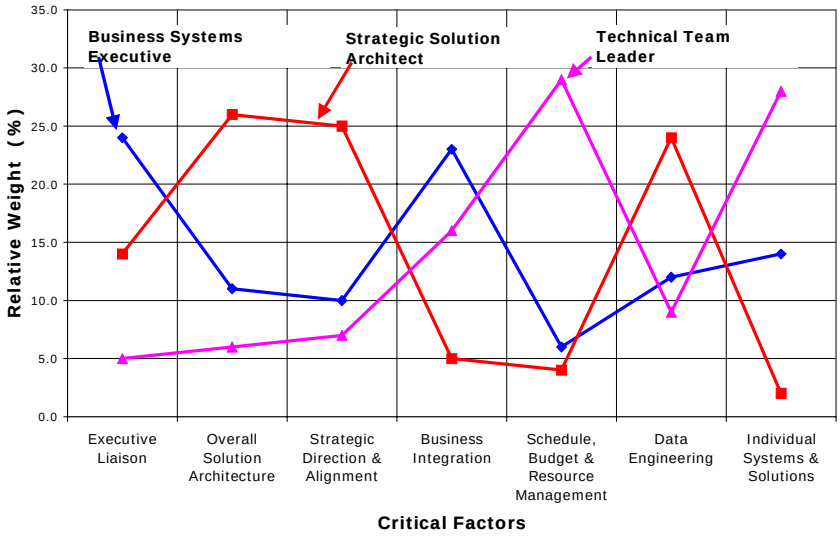

Figure 27-1: Governance Distribution Across Programme Leadership

2. Intellectual Property Rights and Trade Secrets
Certain aspects of the programme and particularly the data engineering seek to create a platform for the corporation to generate competitive advantage through effective application of information technology and information. These aspects should be protected by appropriate intellectual property rights and trade secrets agreements.

3. Remuneration and Incentives
The corporation might want to consider some form of incentive for a successful programme outcome to be paid to key team members at agreed milestones subject to specific performance.

4. Dispute Resolution and Sanctions for Non-Performance
A formal dispute escalation and resolution process that provides an effective way of dealing with non-performance and other disputes.

5. Leave, Term of Service, Notice, etc
Leave for the entire team at an agreed time.

Bind team members for a period of years. Requires reciprocity from the corporation.

6. Contract with Employer. Other Contractual Aspects
Where team members are contracted from specific service provider organizations provide suitable contractual terms which bind the employer and the employee or sub-contractor to the corporation for the required duration.

7. Knowledge, Experience, Personality, Team Player, etc
Relevant knowledge and experience relative to programme requirements as set out in this chapter and in the report.

Personality profiles to be determined in consultation with human resources department using a suitable psychometric instrument. I prefer the Predictive Index.

27.6 Functions of the Strategic Solution Architect
The strategic solution architect will perform the following functions (relative weight of focus in brackets).

The relative weights are presented graphically in figure 27-1.

1. Executive Liaison (14%)
The strategic solution architect is responsible for high level executive coordination with the corporation management. Executive liaison will also be the responsibility of the business systems executive and will be a primary focus of the business systems executive.

The whole programme and particularly the programme leadership requires the full support of the corporation management in order to operate effectively.

There will be regular meetings between the strategic solution architect and chief executive officer of the corporation as well as regular meetings of the programme leadership (strategic solution architect, business systems executive and technical team leader).

The primary responsibility for executive liaison on a day to day basis will rest with the business systems executive and they are responsible for communicating any concerns or issues directly to the strategic solution architect and for drawing the architect into any discussions as required.

2. Overall Solution Architecture (26%)
The strategic solution architect is responsible for the overall architecture of the entire solution. The strategic solution architect will determine the overall programme direction and provide guidance to technical and business teams.

The strategic solution architect is accountable for the overall outcome and has the final say in the appointment of programme personnel and in actions with regard to non-performance assisted by other programme team leaders and the human resources department.

The strategic solution architect also has the final say in all aspects of the solution architecture, both technical and business. The detailed designs will be developed by individual specialists and specialist teams and there will be detailed consultation with the business systems executive and technical team leader on all matters of importance. However, the final, casting "vote" will rest with the strategic solution architect.

3. Strategic Direction and Alignment (25%)
The strategic solution architect will develop the overall strategic understanding of the corporation's business, facilitate workshops as required and monitor and guide the strategic alignment in all components of the programme.

The strategic solution architect must have a clearly defined methodology that can be adapted to the corporation's requirements.

The development of the strategic direction of the entire programme and the work to ensure that the entire programme is strategically aligned with the long-term direction of the corporation and its subsidiary companies will be primarily the responsibility of the strategic solution architect with detailed input from the business.

The strategic solution architect will develop the overall strategic framework in which the entire programme will take shape and be carried out.

4. Business Integration and Optimization (5%)
The strategic solution architect will develop a holistic integrated view of the corporation and its subsidiaries and of the overall solution.

The strategic solution architect will give overall direction with regard to business optimization in support of the programme objectives and overall direction with regard to the management of change, communication and training.

The detailed management of all aspects of business integration and optimization, including ensuring that all relevant corporation personnel are consulted with regard to individual aspects of the programme and of specific solutions and projects will rest with the business systems executive.

5. Schedule, Budget and Resource Management (4%)
The strategic solution architect will give overall direction with regard to programme schedule, budget and resource management and programme governance.

Detailed management of this function will reside with the technical team leader.

6. Data Engineering (24%)
The strategic solution architect will give overall direction to the data engineering, cataloguing, data quality, warehouse table design, and other data related activities.

The strategic solution architect will have the primary responsibility for the detailed execution of these components of the programme.

7. Individual Systems and Solutions (2%)
The strategic solution architect will give overall direction to all technical projects including design, development, procurement, etc of individual systems and solutions taking account of the seven categories of systems identified in chapter 26.

The detailed management of this function will rest with the technical team leader with a clear monitoring and review function by the business systems executive.

27.7 Requirements for the Strategic Solution Architect

The strategic solution architect is required to have the following attributes:

1. Proven Strategic Ability at Executive Level (25%)
The ability of the strategic solution architect to facilitate strategic thinking and to provide thought leadership in terms of the strategic application of information technology and the development of strategic projects in support of the strategic objectives of the corporation is vital.

An operationally inclined strategic solution architect will produce an operationally orientated programme.

The strategic solution architect should have their own methodologies and track record with those methodologies.

2. Proven Leadership Ability, Strong, Decisive, Creative Leadership (20%)
The strategic solution architect should provide strong, creative leadership while at the same time being willing to work with a team.

3. Business Understanding at Executive Level (19%)
The strategic solution architect should have the capability to rapidly understand the business at the executive level and at the same time be able to rapidly grasp the operational principles of the business.

Experience in building a business would be helpful.

An engineering qualification is desirable but not essential.

4. Information Technology Experience (18%)
Diverse information technology experience from the level of programming up to the full spectrum of specification, supervision of development, testing, etc.

The strategic solution architect should have a solid pragmatic view of what information technology is and is not in line with what is presented in this book and particularly issues relating to information technology mythology as presented in chapter 6.

A clear understanding of, and acceptance of, the engineering approach set out in chapter 9 is also a requirement.

5. Personality Profile (8%)
Strong analytical profile, strong task orientation and assertiveness in terms of problem solving, does not give up until the problem is solved. Moderately fast work pace but time to find the right answer. Moderately high attention to detail, sufficient to ensure that the solution is well designed and will work in practice.

Must not bow to pressure which will result in unacceptable technical compromise.

Must also have well developed communication ability.

6. Accept Factors for Programme Leadership (6%)
Accept the approach to programme leadership set out in this chapter.

7. Willing to Mentor and Hand Over (4%)
Willing to mentor the business systems executive and hand over architectural supervision in due course.

27.8 Functions of the Business Systems Executive
The business systems executive will perform the following functions (relative weight of focus in brackets).

The relative weights are presented graphically in figure 27-1 from which it will be seen that the business systems executive has an intermediate to high input on all aspects of the programme.

It is stressed that the business systems executive is working towards a situation where at the end of three years they will have full responsibility for all aspects of the remainder of the programme and for all aspects of day to day operations of business systems including business information systems. The target end state at the end of three years is represented by the overall relative weights presented in chapter 16.

1. Executive Liaison (24%)
The business systems executive is responsible for executive liaison on a detailed day to day level, consultation with fellow executives, mobilization of the business in support of the programme, identification and mobilization of fully representative sample of business users, etc

2. Overall Solution Architecture (11%)
The business systems executive must liaise and coordinate with the strategic solution architect and must be familiar with the overall solution architecture with a view to assuming full responsibility for this by end of year three. Progressively increasing involvement over the three years.

3. Strategic Direction and Alignment (10%)
The business systems executive must liaise and coordinate with the strategic solution architect and must be familiar with the overall strategic alignment with a view to assuming full responsibility for this by end of year three. Progressively increasing involvement over the three years.

4. Business Integration and Optimization (23%)
Business integration will be a major area of focus of the business systems executive from the beginning of the programme. They must liaise closely with the strategic solution architect, the various technical specialists and particularly the business in order to ensure that the solution is an excellent fit to the business and that it integrates tightly with the business.

5. Schedule, Budget and Resource Management (6%)
The business systems executive must liaise and coordinate with the strategic solution architect and technical team leader and be familiar with overall schedule, budget and resource management with a view to assuming full responsibility for this by end of year three. Progressively increasing involvement over the three years.

6. Data Engineering (12%)
The business systems executive must liaise and coordinate with the strategic solution architect and be familiar with the whole data engineering solution with a view to assuming full responsibility for this by end of year three. Progressively increasing involvement over the three years.

7. Individual Systems and Solutions (14%)
The business systems executive will have considerable involvement in the business requirements aspect of the individual systems and solutions and primary responsibility for the provision of comprehensive business input into design, testing, etc and for ensuring integration and effective application of the systems and solutions in the business.

27.9 Requirements for the Business Systems Executive

The business systems executive is required to have the following attributes. Relative importance in brackets.

1. Autonomous Action (22%)
Must be able to operate autonomously within the business with a high level of delegated responsibility and authority from the chief executive officer.

2. Decisive (19%)
Must be willing to take decisions on behalf of the business but know when to escalate decisions to the chief executive officer / management team. Must be able to say "no" when required.

3. Business Understanding (17%)
Clear understanding of the core business objectives of the business and informed opinions of what the practical role of information technology is in the business.

4. Good Relations with Business (15%)
Have a good working relationship with the management and staff of the corporation and be able to motivate them to give quality time and quality input to the processes of the programme and to accommodate and adjust to process and other organizational change generated by the solution design.

5. Work Effectively with Strategic Solution Architect (11%)
Able to work cooperatively and effectively with the strategic solution architect at a high level of business and technical complexity and abstractness.

6. Basic Understanding of Information Technology (9%)
Grounding in the practical application of information technology in the business.

7. Committed (7%)
Diligent, systematic, hard worker, loyal, willing to commit to the corporation for the full five year duration of the programme and beyond.

27.10 Functions of the Technical Team Leader

The technical team leader will perform the following functions (relative weight of focus in brackets).

The relative weights are presented graphically in figure 27-1 from which it will be seen that the technical team leader has primary responsibility for the technical projects and for the overall management of programme schedule, budget and resources.

1. Executive Liaison (2%)
The technical team leader will undertake only limited executive liaison, this will be performed primarily through the business systems executive and strategic solution architect.

2. Overall Solution Architecture (6%)
Overall solution architecture will be designed by the strategic solution architect with further detail added by the solution architects and the business systems executive. The technical team leader will operate in and be guided by this context.

3. Strategic Direction and Alignment (4%)
Strategic direction and alignment will be designed and managed by the strategic solution architect with further detail added by the business systems executive and the solution architects. The technical team leader will operate in and be guided by this context.

4. Business Integration and Optimization (10%)
Business integration and optimization is primarily the responsibility of the business systems executive. The technical team will provide the technical resources and guidance. Overall management of the technical resources will be the responsibility of the technical team leader.

5. Schedule, Budget and Resource Management (30%)
The technical team will be responsible for overall management of process and compliance with regard to schedule, budget and resource management and governance. Overall direction given by the strategic solution architect. Overall management of the technical resources will be the responsibility of the technical team leader.

6. Data Engineering (8%)
The technical team will undertake the detailed data engineering with technical and strategic direction by the strategic solution architect and business input directed by the business systems executive. Overall management of the technical resources will be the responsibility of the technical team leader.

7. Individual Systems and Solutions (40%)
The technical team leader will devote considerable time to the detailed management of the technical projects.

27.11 Requirements for the Technical Team Leader
The technical team leader is required to have the following attributes:

1. Engineer or Equivalent (30%)
I would prefer an engineer with at least five to ten years relevant engineering experience out of at least fifteen years postgraduate experience. However, such individuals are in scarce supply. If such an individual cannot be located then an information technology professional with relevant and comparable experience and a clear commitment to the principles set out in this book should be appointed. A focus on engineering against failure is of absolutely cardinal importance.

2. Information Technology Experience (25%)
At least five to ten years relevant information technology experience out of at least fifteen years of postgraduate experience.

3. Lead Programme Schedule and Budget and Technical Projects (8%)
Willing and able to lead with regard to programme schedule and budget and detailed technical projects in support of strategic solution architect and business systems executive.

4. Personality Profile (12%)
Assertive, moderate extroversion (good with people), moderately fast work pace, moderate to high attention to detail, moderately analytical - exact specification to be determined in consultation with group human resources and external specialists.

5. Accept Factors for Programme Leadership (6%)
Fit in terms of overall factors for Programme Leadership.

6. Proven Leadership Ability (15%)
Track record in leading projects.

7. Willing to Mentor and Hand Over (4%)
Willing to work towards structured hand over of function to business systems executive in three years.

27.12 Additional Information
More information was contained in the report and other documents prepared for the particular client.

In contracting for a position successful candidates will be expected to contract on the basis that the full report plus the contents of presentations to management plus other documents will form the basis on which the assignment will be undertaken. In future, in projects that I undertake, this book will also form part of the contract.

Candidates for any of the programme roles should be willing to commit to tight programme objectives and have the necessary knowledge and experience to manage a programme of the magnitude estimated at the time that the team is appointed.

27.13 Conclusion: Governance

An overall framework for appointment of key programme team leaders has been presented.

This framework will form the basis of recruitment and contracting with each individual appointed to one of these roles.

Further work is required in order to refine the definition from a human resource management perspective and to produce formal legally valid contractual documentation taking account of the specific circumstances and legal jurisdiction applicable to readers. This will take place in consultation with the corporation’s human resources executive and with the corporation's legal advisors respectively.

Policy decisions with regard to financial structures and incentives are also required.

CHAPTER

28

BUSINESS OPTIMIZATION THE TWOCONE© MODEL

The optimization of business operations is referred to at various points in previous chapters.

There are effectively two levels at which this should occur. The first is simply optimization and integration of business processes with the information technology systems. This is catered for under the heading "Business Integration and Optimization" in chapter 23.

The second component is overall optimization of the business.

This is a complex subject and is not really within the scope of this book other than to outline a few principles that I consider to be important.

In order to do this I would like to outline a model that I have found useful in understanding the different components required to optimize a business. This is shown diagrammatically in figure 28-1.

The model considers the organization to be represented by two cones which are superimposed on one another point to point.

The TOPCONE©, at the top of the figure, represents the strategic dimension of the organization. This is the

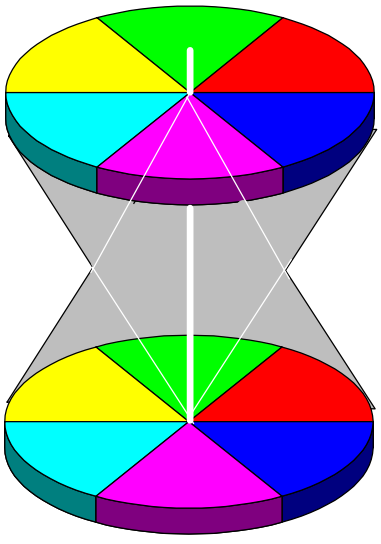

Figure 28-1: The TWOCONE© Business Optimization Model

component that looks to the future in the context of the overall strategic design of the business and which determines the direction of the organization.

The base of this cone is considered to comprise a number of segments which depend on the specific strategic driver of the organization in question. Typically these would include the overall strategy of the business, the human resources strategy, the financial strategy, the production strategy, etc.

The BottomCone©, shown at the bottom of the figure, represents the operational side of the business. This is what generates the production and therefore the cash flow and creates the force moving the organization into the future.

It will be apparent from considering the relationship between the two cones in the figure that for the organization to be optimized the two cones must be aligned axially with one another, both strategically and operationally. There is an optimum distance between the two cones determined by the point of focus of the one cone on the other. This metaphorically represents the depth of the organizational structure or chain of command of the organization.

Extending the metaphor, the resulting organizational design can be likened to a guided missile which in itself is very stable and is therefore able to respond nimbly to changes in the external environment.

One of the essential points of this metaphor is that in the physical world, for something to be able to respond very flexibly to change it must inherently be robust and strong. By extension, for an organization to be nimble in responding to changes in the competitive environment and market forces it should be internally optimally designed in terms of the TwoCone© model and should therefore be robust and, in a sense, solid.

This metaphor is also demonstrated by the rotor or flywheel of a gyroscope or gyro top. This is absolutely solid and spins at considerable speed. As a consequence of its rigidity it is able to accommodate rapid changes in direction and other changes in external conditions without in any way having its stability and particularly the direction and inclination of rotation altered in any way. This is why gyroscopes are used for navigation of aircraft and guided missiles.

This principle has an important bearing on the subject of this book. It will hopefully be apparent by now that it takes time to design and implement well designed computer based information systems that really integrate well with the business and serve the business really effectively. If the business is in a constant state of flux it is very difficult for the information systems to align with and serve the business well.

Accordingly, from consideration of the TwoCone© model, it can be concluded that a stable information systems environment is strategically appropriate for any major organization in the same way that a stable organizational design is also strategically appropriate. This statement is made with the caveat that in designing this stable organization it must be designed optimally to accommodate the inevitable changes of the strategic and competitive environment.

The remainder of this chapter sets out the TwoCone© model in more detail in order to suggest an overall approach to business optimization as a vital component of achieving the world class solution outlined in chapter 2.

In simple terms, the following are the steps in optimizing a business using the TwoCone© model as a basis to assist understanding and programme design:

28.1 Strategic Definition

The first stage of this process is to clearly define the strategic driver of the corporation.

In many cases this will already be defined, not necessarily with great precision but in enough detail to form the basis for analysis. If an organization really does not have any idea of what its strategic driver and essential strategy are then it will be necessary to undertake a formal strategic analysis process to define this.

For the sake of what follows it is assumed that the executive management of the corporation have a reasonably clear idea of the strategic driver and essential strategy. This defines the strategic direction of the corporation and provides the context for all further planning.

Strategic definition will then involve the definition of the critical attributes of the strategy. These would be determined using a critical issues process such as that outlined in chapter 33.

Thereafter, define the critical business components at an executive level necessary to support the strategy. This will define the segments of the pie that represents the base of the TopCone© in the TwoCone© metaphor.

28.2 Strategic (TOPCONE©) Optimization

The first stage in optimizing the business design involves evaluating the critical attributes of each of the critical strategic business components referred to above. This would again involve the use of a process like the STRATSNAP© critical issues process.

From this, critical measurements and other attributes can be determined in order to support the effective strategic management of the organization in support of the core strategy.

28.3 Strategic and Operational Alignment

Operational alignment involves evaluating the critical operational business components necessary to support the strategy. This will again require the use of the critical issues process to identify the critical operational components in support of the strategy.

These should be closely aligned with the critical strategic components and care taken to ensure that there is meaningful correlation between the two components.

Strategic and operational alignment in terms of the metaphor requires that the two cones are axially aligned so that the axis of the bottom cone and the axis of the top cone coincide.

In practical terms this requires that the definition of the operational and strategic measures of performance directly correlate and the strategic view of the organization feeds directly into the operational view.

This has implications in terms of reporting and therefore on the overall design of the information technology solution.

28.4 Operational (BOTTOMCONE©) Optimization

The next stage in optimizing the business design involves evaluating the critical attributes of each of the critical operational business components referred to above. This would again involve the use of a process like the STRATSNAP© critical issues process.

From this critical measurements and other attributes can be determined in order to support the effective operational management of the organization in support of the core strategy. This has a direct impact on the information technology solution.

28.5 Strategic and Operational Focus

The concept of focus between strategy and operations, as represented by the TWOCONE© metaphor, is represented as a physical distance such that the point of focus of the "lens" of the upper cone is on the centre of the bottom cone and vice versa.

In practical terms this translates to an optimum organizational management hierarchy or chain of command.

A hierarchy that has too many levels will result in overall organizational inefficiency while a hierarchy that has too few levels will result in a span of management which is too flat and therefore also inefficient.

This provides the basis for overall organizational optimization.

The considerations are:

1) The average person can manage seven plus or minus two direct reports effectively. In other words, the optimum management hierarchy will have between five and nine branches at each level. This is much more than is encountered in the average organization.

2) The competence gap between a superior and a sub-ordinate, as defined in section 11.5, should be between 0.8 and 1.2 so that there are ideally six competence levels including executive management and the lowest level operational employee.

3) The superior should have sufficient high level knowledge of the function of the subordinate to be able to effectively supervise and delegate to the subordinate.

Computerized tools are available that can be used to build a competence (knowledge and experience) profile in terms of the requirement for each job position in the organizational design as well as the profile for each incumbent.

A measure of fit can then be obtained, gap analysis between components of the hierarchy can be determined and overall organizational design can be modelled and optimized.

Although this type of software is quite widely available it is very seldom used effectively or as an effective analysis and planning tool.

Job analysis and competence evaluation software really well applied can be used to create a theoretical optimum model of the organization based on the principles outlined above and goodness of fit of personnel to each component can be evaluated. From this optimum design can be arrived at and training needs can be identified.

In extreme form this could result in a major programme of activity in order to arrive at an optimal organizational design. The detailed approach to this is outside the scope of this book.

The extent to which management are willing to incur this cost and organizational disruption should be evaluated at an early stage of the programme and appropriate decisions taken.

At the very least, as the different components of the information technology programme unfold requirements for changes in business process and optimization or change of organizational design will be brought to the fore and appropriate actions will be required. The steps set out in sections 28.1 to 28.5 should be a minimum in any major programme as an extension of the strategic alignment (chapter 22) and information systems requirements analysis.

What is important to understand is that in order for governance and other models to work effectively the information that is required for any particular frame of contact (section 10.7) or organizational hierarchical position must be clearly defined. Once reports have been produced for a particular organizational design, any change in design will disrupt the information technology environment.

This statement is based on the requirement that every manager should receive a report that contains all the information required to manage their function and which should not contain any information that is not relevant to their function. If a particular manager's job description changes then the key management reports for that individual will also change. Furthermore, each manager should have unique and absolute jurisdiction over the parameters which form the basis of their operational responsibility and performance measurement.

If care has not been taken in the overall establishment of the systems and particularly in the development of a fundamentally sound first principles business model then the disruption of the systems can be considerable.

The best approach to this is the development of a fundamental first principles based business model as described in section 10.7.

28.6 Conclusion: Organizational Optimization

A very brief outline of an approach to organizational optimization has been presented.

It is strongly recommended that this basic approach should be adopted in any major organizational improvement programme such as the information technology programme that is the focus of this book.

The extent to which an organization will embark on a comprehensive first principles optimization process will be a matter for an executive decision early on in the process. If it is decided not to embark on a comprehensive organizational optimization programme then it must be accepted that any inefficiencies that this will introduce must be accepted in the future and that future ad-hoc organizational change should be avoided.

The use of an effective first principles cubic business model in the core data provides a means whereby the organization can accommodate a reasonable degree of organizational fluidity.

CHAPTER

29

SOFTWARE COMPLEXITY CHECKLIST (SOFTXLIST©)

In embarking on a programme such as that envisaged in part 4 there will be a considerable amount of custom business software development. This is catered for in the different components provided in chapter 26.

The custom development of computer software is an extremely complex field that contains many complexities that the average businessperson is completely unaware of.

This results in situations where several service providers can quote for provision of the same software giving widely differing prices simply by virtue of unstated assumptions and service limitations.

Some years ago I owned a consulting and software development company. One of the challenges was how to make customers aware of the full diversity of services offered while at the same time not being excluded from consideration because of seemingly much cheaper quotes from software developers who did not have the same depth of experience in terms of solution complexity and functionality.

This resulted in something that was termed the "software complexity checklist" or SOFTXLIST©.

This chapter presents this checklist in its entirety with limited modifications to fit it to the overall context of this book. In particular, there are a diversity of professional services that are inherent in the overall approach set out in part 4, which are included in the list below. This has been done so that readers who are embarking on smaller projects have the full checklist.

In specifying software, the idea is that this checklist will be populated with a detailed description of the requirement under each of the headings. Where an item is not required the item will remain on the checklist with a statement to the effect that the item is not required. This will ensure a high level of certainty with regard to what is being requested and will provide a sound basis for quotations and for contracting.

More detail on the use of this approach is contained in chapter 30.

The principal objective of this checklist is to provide readers the opportunity to select those services and functionality that they require on a "menu" basis in order to permit them to tailor the solution purchased within their budgetary constraints.

The checklist is divided into a number of major components each of which can form sub-headings for overall budgeting and contracting.

29.1 Supplementary and Consulting Services

In addition to simply developing a piece of software in accordance with a detailed specification, there are a wide variety of additional services which are required in order to ensure that the application is appropriate to the business problem.

Statistics indicate that fifty five percent of all software application defects result from poor analysis, thirty percent from poor design and only fifteen percent from poor software construction.

A wide variety of professional consulting services are required in order to address these issues and these are outlined in previous chapters. Part 4, in particular, gives considerable detail on a variety of functions and other aspects are discussed in the context of "an engineering approach" as set out in chapter 9.

Part 3 and part 4 provide a comprehensive analysis of the distinct professional time activities that are required for a comprehensive custom software development programme. Depending on the nature of a particular individual software development some or all of these functions will be required.

The following is a list of activities for an average size one-off custom software development. Most of these activities will also apply to a procurement project:

1. Project initiation and planning.
2. Project management.
3. Concept development.
4. Business analysis and design.
5. Technical analysis and design.
6. Construction of front end, database and processes.
7. Business testing
8. Polishing.
9. Information classification.
10. Commissioning
11. Training
12. Implementation

Many software houses assume that the client will perform many of these functions. It is therefore important to explicitly define who will be responsible for each of these functions and agree budgets accordingly. Further comment on certain of these aspects is contained in subsequent sections.

Note that this full range of services requires a multi-disciplinary team as outlined in section 9.7. Clients should purchase the full portfolio of services or set up programme management as outlined in part 4. This comes back to the construction metaphor where the full professional team is required for a successful construction project.

29.2 General Functionality

This covers those components of an application which one might expect to be included but which have a significant influence on the cost of development. In some cases, this functionality can also be delivered at a very basic level or at a very complex level. It is therefore vital that the level of complexity is agreed at an early stage. The following elements of general functionality have been identified:

1. Security

In order to produce software at the lowest possible cost, it is not necessary to include any access control or other security. Theoretically it is possible to provide security through the operating system or database. In practice this is often not practical to maintain and does not offer the necessary level of sensitivity to requirements for individual groups of users.

It is frequently therefore necessary to provide some level of security on most software applications. Again, this can be delivered at various levels of sophistication with security at the module, menu item, individual screen or individual field level and associated with different groupings of users. Security can also be provided at a relatively simple level of technology or can use complex encryption and other algorithms to achieve the desired objective.

All of these factors have a material influence on the cost of a system and the level of complexity must be agreed before a final price can be arrived at.

Note also that implementation of a sophisticated security system requires considerable training and effort on the part of personnel within the client organization and / or consultants in order to define carefully thought out groupings and carefully define the access limitations of each groups. If not carefully done during implementation, this can give rise to an ongoing maintenance problem and ultimately failure of the security system to achieve the desired objectives.

Depending on the type of security required, it is not generally cost-effective to retrofit security to an application once it has been built.

Remember also that it is easy to specify complex security but it is not easy to implement and maintain it in practice. There are a number of simple practical issues which frequently result in sophisticated security systems being completely disregarded.

2. On-Line Help
On-line help as an alternative to manuals is increasing in popularity. It is, however, important to understand that different levels of help can be provided and that the mechanical provision of help screens which respond to the context of a particular activation does not constitute the provision of on-line help.

Help requires careful design in order to provide meaningful information to those who have technical questions about the basic working of the software. Help may also be required for those who require more detailed technical information about how the software works. Help may also be required for those who require business appropriate help in order to understand better how to effectively use the software.

These three classes of help each require careful analysis and design by specialists with an education and training background working closely with content specialists if they are to provide any meaningful benefit to the users. There is a substantial professional time cost associated with effective help.

The cost of providing the technical help capability (screens and functionality) and the cost of populating the help for each of the above levels of user should be budgeted separately.

3. Multi-user Enablement
In most environments today, software is required to run in a multi-user environment. Most software development environments will support multi-user natively. Most applications require multi-user enablement. Effective provision of application specific multi-user enablement is, in general, a design consideration which will increase the cost of development in many cases. As with many of the items on this checklist, the level of sophistication can vary and should be explicitly specified and budgeted.

4. Built In Back-up Capability
In most environments in which software is deployed today, there is effective network data and software backup. Accordingly, custom developed software does not require an internal backup facility unless specifically agreed as part of the specification.

29.3 Business Driven Application Sophistication
Application sophistication relates to those components of an application which may not be necessary to achieve the stated objective of a project but, which if absent, may greatly reduce the ease of use, accuracy or effectiveness of the application. Many of these features may have very little impact on the visible appearance of the application but they may have a substantial impact on the manner in which the application is used by the organization.

These facilities can have a substantial impact on the cost of the software as well as on the cost of implementation. The following aspects influence application sophistication:

1. Picklists
Many information fields in an application are capable of being validated with the potential to select a valid response from a list of pre-defined valid responses. This greatly improves accuracy and can reduce data capture effort considerably, refer chapter 10 on data engineering.

The provision of picklists requires not only additional application code but also has an impact on implementation. Badly defined picklist data can greatly compromise the effectiveness of an application. Accordingly, professional services with regard to the definition and classification of picklist data are generally a necessity.

Failing this, additional resources must be allocated by the client for this activity.

As indicated in chapter 25 and elsewhere in this book, I favour an approach which makes maximum use of picklists, however, specification of the number and sophistication of picklists must take place during the business design phase of the project. This has a cost implication in terms of complexity of specifications as well as in terms of construction cost. The biggest cost is typically in populating the picklists.

2. MULTISTAGE© Picklists
Effective information classification has considerable impact on accuracy of data input, effectiveness of management and decision support information and operator productivity. Accordingly, some years ago we developed a proprietary picklist technology called MULTISTAGE©. This used recursive selection of one code segment at a time within the same field in order to greatly improve the accuracy and effectiveness of software operation with large picklists.

This technology is not trivial to develop and it is unlikely that the average software house would offer a corresponding technology. However, in cases where large projects are being undertaken it might be worth contacting me on james@jar-a.com for information on how to specify this functionality.

3. Roll-ups
The rolling up or summarization of entered and computed values and flags to higher level entities requires careful specification and additional processing. This functionality gives rise to increased cost of specification and development.

4. Data Driven Menu's
Data driven menu technology is technology which provides greater flexibility in user access to different components of the software, it affords a "user definable" menu structure capability as well as the ability to jump between different, unrelated menu screens with ease. In addition, it provides an on-screen dynamic enquiry capability for use in making enquiries. Design and implementation of data driven menu technology represents an additional cost.

5. Overall Degree of Flexibility : Parameterization
Most software is designed with a view to solving a particular business problem and, in the design process, certain compromises are made. Typically, these compromises include a number of often implicit decisions to simplify the design owing to the difficulty of foreseeing all scenarios with regard to the application of the software.

It has been my observation that this is frequently a major contributor to situations in which maintenance of software becomes a continual problem. With careful and systematic analysis, it is often possible to define a solution in which the most likely changes in business environment and software application can be foreseen and, accordingly, catered for through parameters in design.

Suitable application of parameter driven design and construction techniques can then give rise to software that is very flexible and which seldom requires modification of source code in order to accommodate change. This approach does, however, require considerably more and higher levels of professional input during the design stage and during construction as well as requiring further information classification and additional input during the, testing, commissioning and implementation phases.

6. Undo Capability
The provision of an "undo" capability is sometimes taken for granted by people ordering custom software who are accustomed to this feature in office automation suites. However, the provision of an effective undo capability generally requires careful analysis and design. Design and implementation of undo capability represents an additional cost. This is because the undo function requires knowledge of business rules and other design factors.

7. Intelligent Delete Function / Restricted Delete
The provision of intelligent delete and restricted delete functions which take account of the "parent - child" relationship in the entity relationship diagram are natively supported by certain development platforms. However, intelligent delete and restricted delete functions require significant additional analysis, design and construction in many cases in order to work effectively and are, accordingly an extra cost item.

8. Data Maintenance Routines
In most operational environments, it is possible under certain environmental conditions, such as power failures, for a degree of data mismatching to occur, particularly where roll up of totals occurs, derived values are computed or data is captured to one record over a number of forms. In such cases, derived values and totals may be incorrect and maintenance routines will be required to rectify them.

This functionality should be explicitly specified if required.

9. Period End Processing Routines
Period end processing is required in certain applications where large volumes of data are being processed or where close off of periods or other controls or processes are required.

This functionality should be explicitly specified if required.

10. Reporting to Screen and Hard Copy
In general, when developing an application, there is a tendency to overlook the requirements to produce screen reports and hard copy reports of information contained in the application.

This functionality should be explicitly specified if required. Really useful reports can take considerable time to design, test and refine in order to really present the information in a manner that gives rise to effective interpretation and action.

In many cases, the development of comprehensive reports, executive information system and decision support system applications is a separate project in its own right.

11. Data Modification History / Date Effective
Under certain circumstances it is necessary to preserve previous versions of data once edited or to edit data to become valid at a future date (date effective). This represents a substantial increase in software complexity and must be clearly specified as a requirement if it is needed.

29.4 Technology Driven Application Sophistication
In addition to those facilities which are driven primarily from consideration of the desired level of business sophistication and business ease of use, there are other factors which drive system sophistication from a perspective of more sophisticated use of technology. These include:

1. Multiple Environment Support
While many development environments support the use of a variety of front and back-end technologies and even multiple spoken languages, it is generally necessary to develop standards for all likely environments before commencement of development. If this is not done, it may well be found that, while the technology is capable of addressing other environments, there are business and coding standards that have been adopted that preclude the use of this technology.

Other aspects may require explicit design considerations at an early stage.

2. Automated Or Intelligent Import / Export / Interface Facilities
Many applications require the import and export of data to and from other applications or databases or the establishment of particular interfaces. Many client's assume that because a particular data set exists, these linkages will be established and automated. Establishment of such linkages is not always trivial and full automation may require particular business rules to be incorporated. Such integration may have a significant hardware and commercial software cost impact.

3. Level of Sophistication of Client Server Technology Used
The term "client server" is widely used but, in many cases, is simply being applied to Windows based front ends running against server based databases with no material work load sharing between client and server and with high volumes of information flowing between server and client. This is technically the simplest solution to develop and is not truly "client server". It is, however, what is widely being offered as "client server". The required level of client server technology should therefore be clearly specified.

The development of genuinely well-balanced client server applications will entail an extra cost. Requirements for host based applications should also be explicit.

4. Hardware and Operating System Platforms Used
The hardware and operating system should be agreed at the outset of the project.

5. Minimum Target Hardware and Environment Requirements
Minimum target hardware and environment requirements must be clearly specified. It is very easy for a developer to produce software that runs well on the high performance workstation that most programmers tend to use only to find that performance is poor to intolerable on the average workstation in use by the customer. If these standards are not agreed up-front, then the customer is likely to end up meeting a heavy bill for hardware replacement.

If the proposed standards will result in compromises in the solution, these compromises should be documented and agreed to before work commences or the standards should be changed.

29.5 Performance and Usage Refinement
The cost of delivering a solution that meets the basic requirement to get a job of work done versus the cost of delivering an extremely elegant solution which is optimized in terms of ease of use and performance is considerable.

While certain of these aspects are largely addressed by careful and thorough analysis and design, other requirements can only be satisfied by technical and business concept refinement and optimization after a first generation system has been delivered. The costs associated with performance and ease of use refinement can be substantial.

1. Polishing of Screen Designs
It is relatively simple to produce a set of data entry or maintenance screens on a database, it is considerably more time consuming to ensure that those screen layouts work in practice and that the application flow is logical and convenient for the operator. Many low cost software developers work on the basis of delivering an application in accordance with what they consider to be acceptable and then raise extra charges for all "out of scope" changes.

The approach of detailed screen design down to the individual field details, as set out in section 9.7, will overcome this but represents a substantial additional cost relative to the approach adopted by low cost developers.

It may, nevertheless, be found that once the application goes into production problems are still experienced. Correction of these snags, which are often viewed by users as "bugs" but which, in the strict sense of the word are not, is often time consuming and expensive.

Appropriate budgeting for polishing of screen designs or a decision not to polish screens should be taken during the planning stage.

2. Optimization of Database Design
During the conceptual, business and technical design phases, considerable attention will be devoted to database design. This should result in a reasonably optimized design. Should additional optimization be required later this will represent an additional cost.

3. Optimization of Application Performance
The optimization of application and particularly process performance can be extremely time consuming. It is important to note that the greater the functionality, graphical detail, number of fields and other facilities requested on a screen or in an application, the worse will be the performance of the application in many cases.

Many low cost software developers fail to include any provision for performance optimization in their quotations. It is also not uncommon for them to load their applications with "nice to have" features which seriously impair performance. They then charge for improving performance or inform the client that hardware, database and operating system upgrades are necessary. In designing and building software applications reasonable care to ensure that the performance of the application meets generally accepted standards of performance should be contracted into the project.

Where clearly defined measures of performance are agreed during the specification phase, costing for performance optimization should be included in the contracted price.

4. General Polishing
Overall polishing of an application would typically be an additional cost which in many cases would not be considered.

29.6 Delivery and Post-delivery Services
In specifying and estimating an application, there are a variety of services, which are notionally optional with regard to the finalization of a project. In some cases, clients with a comprehensive in-house information technology function undertake certain of these functions themselves, in other cases the client may require all of these services.

1. Defining and Creation of Test Data
The definition and creation of representative, meaningful and comprehensive test data is time consuming and can be difficult for an external organization. Specific provision is made for this in the comprehensive programme design in part 4 but is easily overlooked on smaller projects.

2. Priming of Data
Priming of data involves the one-off feeding of data from existing sources into a new application which, thereafter, will maintain the data. Priming will generally occur several times during testing and may occur repetitively during a phased application start up. Budget provision should be made for manual or automatic priming.

3. Conversion of Existing Data
Conversion of existing data involves the one-off conversion of data from existing databases into a new application which, thereafter, will maintain the data. Conversion is not always necessary or practical and may require comprehensive analysis and definition of business rules. Conversion will generally occur several times during testing and may occur repetitively during a phased application start up.

Specific budget provision should be made.

Avoid converting poor quality data. This can result in the same sub-optimal performance that motivated the replacement of the existing system being transferred to the new system thereby defeating the objective of the investment. A clean-slate re-implementation is strongly recommended.

4. Populating and Coding of Picklists and Other Tables
The populating and coding of picklists and other tables can be an extremely time consuming task. This is an activity which requires a high level of understanding of the business as well as a very systematic approach to the collection, collation and classification of information.

This is provided for in the data engineering component in chapter 25 which allows for a high level of professional expertise. On smaller projects this is easily overlooked. Refer to chapter 10 for a more detailed discussion of this subject.

5. Installation
Not all development quotations include the installation of custom developed software. This should be explicitly agreed. Where there are multiple installations, such as at branch offices, the basis of charging should also be agreed.

6. Testing and Management of Testing
Most developers undertake some form of technical testing of software prior to delivery. Budget provision should be made for comprehensive technical testing.

Business testing is a separate activity which requires competent business specialists, generally from within the business. Laboratory and pilot testing, as provided for in sections 9.5, 15.1.6 and elsewhere, is an essential part of any software development. This is necessary to ensure that the software is not deployed until it is stable and until the business is fully conversant with the practical application of the software.

7. Level of Documentation and Manuals
Most software developers deliver little or no documentation and manuals. If documentation and manuals are required this should be specifically budgeted.

Recognize that the authoring of really effective manuals requires professional staff with particular expertise in that area. Technicians who write software can seldom produce effective manuals. Good manuals can represent a considerable cost.

8. Level of Training to Be Given
Really effective training requires training specialists and considerable time and effort to develop effective training programs. The level of training required should be carefully considered in developing the project budget.

9. Automatic Application and Data Upgrade Procedures
The provision of automatic features to upgrade databases and load application upgrades will generally represent an additional cost.

10. Hot-line Support and Help-Desk
Basic hot-line support should be available during the warranty period at no cost but would typically be limited to the original client representatives involved in the project. In all other cases such support is on a time and expense basis. More comprehensive hot-line support or help-desk services to new users can be arranged on an agreed basis.

11. Customer Sign-off Procedures and Specifications
The level of detail to be applied in the sign-off of a development must also be specified as this can also carry significant cost implications.

12. Support Contract
It is recommended that organizations should enter into some form of retainer type support and maintenance contract after delivery. If a support and maintenance contract is not in force, all support and maintenance that is not covered by the warranty will be on a time and expense basis.

29.7 Contractual Requirements
A variety of contractual aspects can have a significant impact on the cost of the project:

1. Retention
As a guarantee against final compliance and delivery it is sometimes useful to contract a performance retention into the initial contract.

The basis of this retention might be as follows:

a. A percentage, such as twenty percent, is deducted from all milestone payments before invoicing and only invoiced on substantive completion of the project.

b. In return for the retention all interim invoices are payable on presentation in accordance with the project plan.

c. The retention is a guarantee against substantive non-performance. This is defined as the failure of the developer to deliver a product which complies with the specification. In the event of this happening, the client is entitled to withhold the retention until such time as the project has been completed in accordance with specification.

Substantive delivery represents delivery of a completed software solution based on a plan and specification that has been approved at each milestone of the project. Final payment of retention would typically be payable on formal acceptance, or one month after formal delivery should formal acceptance be delayed by circumstances beyond the control of the developer.

This retention represents a guarantee against non-performance and is not intended to cover cosmetic aspects or non-fatal software defects, which are covered by the warranty.

If retention is required this will be subject to clear agreement at the outset as to what constitutes the final deliverable and substantive delivery thereof.

The retention provides a strong incentive for developers and service providers to remain focussed on deadline and deliverable right to the end of the project.

2. Warranty
Irrespective of whether a retention is adopted or not, there should also be a warranty. A three month or six month warranty on software is recommended. This warranty commences on the date of formal delivery of the substantively complete product and runs for the specified period.

The warranty is intended to cover all reproducible software defects and clearly defined deviations from the agreed specification. It is not intended to cover cosmetic enhancements which reflect personal aesthetic opinion or other subjective criteria. The design approach should be to seek to produce comprehensive documents for the concept, business and technical specifications which enable the client to clearly envisage the form and function of the final product.

3. Fixed Price and Framework for Change in Scope
This checklist is intended to form a basis for organizations to tailor the cost of the solution to their requirements while at the same time ensuring that all aspects that are omitted are omitted as a consequence of conscious business decisions.

I prefer to work on a fixed fee basis with clearly defined basis for determining changes in scope. However, much of the software industry is not geared to work on a fixed fee basis and consequently close management of the budget is likely to be required. In either case there should be a formal approach for agreeing changes in scope.

4. Internal Use Versus Commercial Exploitation
In general the expectation with custom development is that it is for a specified customer. In undertaking such work most software houses compromise on the recovery of research and development and standard utility investments and may discount certain costs against an expectation of future income.

If the client organization expects to commercially offer the software to its clients or otherwise exploit the software it should be understood that the standard software development contract will not make provision for this and therefore an appropriate exploitation agreement should be entered into.

This agreement should recognize both commercial and intellectual property rights and afford the software developer an equitable commercial opportunity to benefit from their technical prowess.

5. Terms of Copyright
In terms of most copyright law copyright in any source code developed vests in the developer. If the client wants copyright in any aspect of the development this should be contracted before the development commences and any royalty or other payments agreed.

If a licence to modify the software is required this should also be specifically contracted.

It is reasonable to expect that proprietary source code, utilities and other reusable components are licensed to the client on a limited basis exclusively as part of the solution provided to the client. The client can reasonably be restricted from copying these utilities into any other application or making them available to any third party.

6. Safeguarding of Source Code
Safeguarding of source code is frequently not addressed in software development contracts. The developer should undertake to safeguard the source code for the application until final delivery and thereafter if the source code is not going to be supplied to the client.

Recognize that if the source code is lost or corrupted, a small modification which might be all that is required to maintain long term use of the software will become impossible. This can easily result in substantial expenditure and business disruption as a consequence of negligence.

If the source code is to be delivered to the client then explicit provision for safeguarding of source code should be made. Note that magnetic media, particularly if not carefully looked after, do deteriorate and source code can easily be lost. Formal safeguards should be put in place. Generally it is desirable for the developer to be contracted to maintain a copy of the source code and development environment.

7. Insurance of Hardware and Commercial Software in Care of Contractor
Developers quite frequently take hardware and commercial software belonging to the client off the client site to the developer's offices. Generally the developer will not have insurance to cover these items. Provision should therefore be made if required.

8. Hardware and Commercial Product Procurement and Installation
If the developer is to handle the procurement of any hardware or commercial product as part of the project the terms of this agency should be clearly stipulated.

9. Project Management and Coordination of Third Parties
If the developer is to handle project management or coordination of project functions with third parties this should be clearly specified and fees agreed.

29.8 Conclusion

The above checklist can be used as a basis to specify custom software or even packaged software procurement as outlined in the next chapter.

Application of this checklist should take place against a clear definition of the strategic context of the project in order to establish which additional cost items are justified and which are not.

CHAPTER

30

EFFECTIVE SOFTWARE PROCUREMENT

The effective procurement of software, whether custom developed or off-the-shelf is an aspect that most organizations find extremely challenging.

This chapter provides some brief indications of important aspects to consider.

Chapter 15 provides further information on the stages of procurement.

30.1 Strategic Issues Are Vital

A clear strategic context of the "right things" for any procurement is vital.

This will provide a basis for assessing the extent to which the procurement can be accommodated with an off-the-shelf solution or whether custom development is required.

As a general rule of thumb for smaller systems, an off-the-shelf product will deliver much more functionality for the same cost compared to a custom development.

Accordingly, if there is a good fit in an off-the-shelf package this will frequently be the preferred solution.

However, if the application is truly strategic, it is the goodness of fit on the strategic aspects and not the overall goodness of fit that will determine the suitability of the solution.

In such cases, given that strategy and competitive advantage are about being different from competitors there is an increased probability that the factors that are really important may well not be accommodated adequately in a package and a custom development may then be required.

30.2 Track Record and Investment of Developer

In evaluating a potential developer it is important to establish that they have a track record in successfully developing similar systems to that which is required. This is not necessarily about them having a track record in your industry, it will more likely be about them having a track record in the specific type of system that you require them to develop.

They should also have considerable established experience with the development platform that will be used to develop your software.

Note that expertise with the business solution is more important than having expertise with a particular development platform that you may favour.

It is better to have a system developed by a software house that is really competent at the type of software that you require, even if they develop in a platform that is not necessarily your first choice.

One of the key requirements for selecting a developer should be that they have considerable experience with their development platform of choice and that they have a considerable existing investment in utilities, libraries, development aids, etc.

Beware of using a developer who has only recently acquired the development platform they will be using for your development. It is preferable for them to be using an older version but to have really top quality expertise in using that platform.

30.3 Defining Critical Requirements and Critical Success Factors

Use a critical issues process, such as the strategic snapshot process outlined in chapter 33, to define the critical success factors for the project and the critical requirements.

Determine the relative weights for each factor and critically examine the information that the weighting process yields about the requirement. The relative weights may well give a basis for deciding whether a custom development or off-the-shelf solution is required.

These factors can then also be scored for evaluating the relative suitability of alternative options.

Base the entire specification on these factors.

The following is an example of critical success factors for a particular project:

1. Accuracy, reliability, comprehensive, confidentiality, enhance image

2. Ease of maintenance, ease of use, flexibility

3. Commitment to maintain and use, one version of the truth

4. Integration with other systems and departments

5. Cost

6. Functionality

These factors were developed for a particular client and used to evaluate three separate systems one of which was clearly strategic. Based on the evaluation it was decided that the one requirement could be adequately satisfied by a low cost off-the-shelf package purchase while the other requirement could only be met by a substantial custom development at considerable cost.

The critical requirements will provide overall structure into which the detail requirements can be sorted.

In many cases organizations produce very substantial lists of required functionality with no attempt to classify and rank the requirement. The result is that a very considerable amount of effort is expended providing functionality which a critical issues analysis would indicate is not really important while critical functionality may be compromised. This alone can give rise to investment failure on some projects.

Effective high level analysis is therefore vital.

30.4 Software Complexity Checklist

The software complexity checklist presented in chapter 29 is a vital component of any software procurement, whether a development or an off-the-shelf package.

It is well worth working through the checklist in detail and writing up under each heading exactly what the requirements are. Even if the requirement is “not required”. This way there is a clear understanding of exactly what the solution should comprise.

Many of the items on the checklist will have a much greater impact on overall cost than a large amount of specific detail functionality. The creation of basic data entry screens is not where the cost lies, it is in all the added functionality, services, etc.

30.5 Contract Terms

Ensure that you are clear on the contract terms for the procurement and also that you are being realistic.

It is very easy to compile a wish list of contractual terms that have a very considerable negative impact on the costs. Focus on those things which are really essential to achieving the required objective.

30.6 Conclusion

The effective procurement of computer software, whether custom development or package requires a systematic strategically focussed approach.

The approach outlined here is a starting point to a much more sophisticated approach which is inherent in the proposals contained in part 4.

CHAPTER

31

ADVANCED BUSINESS SOLUTIONS IN TWENTY TO FIFTY YEARS TIME

One of the anomalies that is contained in the approach set out in part 4 relative to the engineering metaphor and the engineering approach contained in chapter 9 is that the construction industry operates on a clearly established basis of specialist architect, engineer, construction and other firms. However, the approach outlined in part 4 involves a substantial human resource recruitment exercise at considerable establishment cost.

This reflects the reality that currently the information technology industry and business improvement industry generally is not mature enough to execute work according to the engineering metaphor.

The information technology industry is still in large measure geared to selling products and services rather than to delivering solutions.

This is evidenced by the very high failure rates reported in chapter 1, the Y2K experience, etc.

There are not currently specialist firms that concentrate on solution architecture, specialist firms that concentrate on detailed technical design, specialist firms that concentrate on development, etc.

Certainly not in the manner that one encounters in the construction industry where there are high levels of accountability and a statutory environment where professional standards are regulated.

An engineer who designs a bridge that falls down will be subject to intense professional scrutiny with the distinct probability that they will be debarred from practising for at least a few years if not struck off the role permanently.

This robust environment does not currently exist in the information technology industry.

Notwithstanding the above, it is important to recognize that the information technology industry is a branch of the engineering industry, even though it is not currently regarded as such.

My prognosis of the next twenty to fifty years is that the world will increasingly see big ticket litigation against the vendors and service providers in the information technology industry as clients become increasingly frustrated with the poor outcomes of information technology projects.

This will probably give rise to a period of near paralysis as the industry seeks to redefine itself.

The probable long-term outcome will be that the industry itself will introduce a variety of professional certifications which will eventually receive statutory backing in many countries. It is likely that increasingly the information technology industry will find itself moving under the umbrella of the established engineering professional bodies, engineering faculties at universities, etc.

Together with this there will be a move to establish different professional service companies that will concentrate on different aspects of the solution in much the same way as exists in the construction industry.

The net outcome of this will be that in about fifty years time the failure rate of information technology projects will have dropped to at most a few percent and it will be a well regulated industry with a high record of consistent delivery.

It is hoped that the approach outlined in this book will play a significant role in assisting the industry to achieve this objective.

CHAPTER

32

CRITICAL DECISIONS WITH REGARD TO EXISTING SYSTEMS

In terms of practical application, part 4 devoted attention to major projects to remediate existing systems or procure or develop major new systems. Less has been said about how to go about reaching decisions with regard to existing systems.

Many organizations have existing systems, many of which have been in place for many years and have grown with the organization. Some are well designed and fit the organization well albeit often as the result of a trial and error process. Such systems may have been created with different development languages and databases and may be viewed by many as being aesthetically unattractive. This is quite frequently advanced as a basis to replace such systems.

Another argument frequently advanced for replacing such systems is that they are not the "latest technology" or that they are technologically out-of-date.

It will hopefully be apparent from the preceding chapters that the task of replacing such a system is arduous, time consuming, costly and disruptive to the business. It is not to be undertaken lightly.

Furthermore, because of the way the software has evolved, there is a strong possibility that there is a reasonably good fit to the strategic driver. While this may have happened more by trial and error than by deliberate, conscious design, this is an important factor to keep in mind. Insofar as the integration of the strategic driver may not have been conscious it is also possible that it will not be consciously integrated into a new system procurement and this can have extremely serious negative consequences.

Accordingly, prior to undertaking any new major procurement or development, I recommend that a formal evaluation, based on the principles contained in this book, should be undertaken. This evaluation should assess the goodness of strategic fit of the existing system, its potential to be maintained in the long-term and other factors relating to designing a new lease of life for the system.

Such an evaluation should also include evaluation of steps to upgrade the in-house information technology maintenance and development capability. Where applicable, negotiations should also be entered into with existing software houses that maintain the software in order to secure a long-term support contract.

Many organizations prejudice themselves by indicating to their software development supplier that they consider the software outdated and are considering replacing it. This forces the supplier to look to new income sources to safeguard their future. Frequently such action is prejudicial to the client organization.

Accordingly organizations should give careful thought to their position with regard to their existing systems, taking particular note of the points raised in chapter 17.

Prior to deciding to replace a system, the executive management of the organization should have detailed open cards negotiations with their suppliers. If an organization takes account of the full cost of replacing a system they will often find that their existing suppliers offer a very cost-effective solution.

With a realistic view of the real costs it is likely that the client organization will find that it is cost-effective to pay a reasonably considerable retainer to the supplier organization on a long-term contracted basis to ensure the ongoing support of the system. By long-term I am thinking in terms of five to ten years or more.

There are only two conditions under which an organization will find it truly cost-effective to replace their existing system:

1. When the existing system is truly technically badly designed and / or maintained and has reached a state where it has become technically unreliable with no reasonable prospect of cost-effectively bringing it to an acceptable standard of reliability and maintainability. This can quite easily happen where management have been particularly short sighted about the budgets they have provided although as a consequence of the level of dedication of many information technology professionals it happens less frequently than one would expect.

2. Executive management have thoughtfully and wholeheartedly embraced the concept of using their systems to support world class strategic capability in support of long-term competitive advantage as set out in chapter 2. In this case, the approach set out in this book is entirely appropriate. Even in this case, remediation will frequently be found to be a viable option.

Insofar as this represents a substantial opportunity for corporations to differentiate themselves in the years ahead, this represents a solid case for a major investment. However, it should only be undertaken with a long-term view of the benefits and the costs using the approach set out in this book. Quick and dirty low cost solutions will not support strategic competitive advantage in any meaningful way.

Sustainable competitive advantage is an increasingly scarce commodity, organizations should think carefully before adopting short-term solutions and seriously consider the long-term merits of the strategic option presented in this book.

Keep in mind that without competitive advantage there will be no profits.

CHAPTER

33

AN APPROACH TO STRATEGIC ANALYSIS AND AN OUTLINE OF AN INFORMATION TECHNOLOGY STRATEGY DEVELOPMENT APPROACH

The approach that I apply to strategic analysis is referred to as a strategic snapshot or STRATSNAP©.

The reference to a snapshot is a deliberate reference to a photographic metaphor in which one would move around the strategic environment of the organization taking snapshots. Some of these snapshots are inward looking and others are outward looking.

Snapshots are based on focus questions with an open-ended list of focus questions being possible.

The core snapshot makes use of a tool which you can purchase from us (email james@jar-a.com).

This tool is based on a critical issues approach. It is geared to synthesizing and evaluating the critical issues out of a large list of issues.

Based on McDonald's definition of strategy being the right things, as set out in chapter 8, With appropriate facilitation the critical issues tend to be the right things in most situations.

Thus the snapshot process involves listing the full spectrum of issues that pertain to the focus question and then distilling the critical issues against which further analysis takes place.

The snapshot process is briefly as follows:

33.1 Define Focus Question
As indicated above a very wide range of focus questions can be defined.

These include things like critical concerns and critical requirements and move on to critical strengths, critical weaknesses, critical opportunities and critical threats and then move on into other areas such as market attractiveness factors, market critical success factors, etc.

In the context of the major information technology programme outlined in this book, focus questions will be formulated for every aspect of the programme as the programme is developed.

Focus questions will include critical strategic requirements for the programme, critical attributes of the strategic driver, etc.

33.2 Brainstorm Focus Question
Based on the focus question all points, no matter how seemingly irrelevant, are brainstormed by the delegate group. In some cases this can run to a list of hundreds of points.

The objective is to get everything of relevance down in a list which can subsequently be classified and used for more detailed planning.

Brainstorming should take place without debate and without limitations on what is "practical", "reasonable", etc. There will be time for this analysis later.

33.3 Synthesize Critical Factors
The seven critical factors which represent the essence of the brainstorm list are then synthesized.

These can be seven discrete points or seven umbrella statements depending on the nature of the focus question.

In the case of programme requirements for example these would be seven factors which embrace the entire scope of the programme.

It will be noticed that throughout this book use has been made of seven headings to classify a wide diversity of subjects. These headings have been derived using the STRATSNAP© software and process in order to bring maximum structure to this book.

33.4 Determine Relative Importance of the Factors
The relative importance, totalling 100% for the seven factors, is then determined.

When working with a team these weights are developed on a secret ballot basis and individual weights are then captured. Individual team members then take time to explain their perspective and team members may choose to re-weight the factors based on this additional information.

The relative weight approach is very powerful in that it requires delegates to take a view on the relative importance within the context of limited resources (the weight of 100%).

It will be noticed that this approach has been used at various points in this book to give more information about my thinking on various subjects.

This approach is particularly important in this book with regard to the relative weights assigned to the seven critical factors which form the basis of the programme design which forms part 4.

33.5 Score Relative Performance
Where appropriate, the factors are scored in terms of historic, current, forecast and objective performance on a ten-point scale as mentioned in chapter 4.

This ten-point rating gives an indication of how well things are currently going, how well they are expected to be if the organization continues as at present, the long-term trend and also how well the organization would like to be doing.

This is vitally important in terms of assessing the detailed strategic parameters for design.

Analysis of these numbers for particular existing systems can give important indicators of whether a system should be upgraded and enhanced in order to close the gap or whether the current system performance is so poor that a new system is required.

These rating observations can then be verified by formal technical investigations.

33.6 Weighted Scores and Gaps
The weights are then applied to the scores to arrive at weighted scores and more importantly weighted gaps so that the relative strategic priorities can be evaluated.

33.7 Graphs
The STRATSNAP© tool contains a wide variety of graphs which allow users to quickly grasp the essence of the data that has been acquired and draw conclusions about trends, etc.

33.8 Relevance
The STRATSNAP© approach has high relevancy in rapidly cutting through the enormous volumes of information that apply to any organization and distilling the essence of what is important.

It is also very relevant in terms of obtaining a concise set of measures from busy executives in the shortest possible amount of time which can be used to form the basis of detailed design.

The tool and approach are equally relevant in the context of small projects.

33.9 Information Technology Strategy

In the context of developing an information technology strategy the following snapshots would typically be taken:

1. Critical concerns with regard to information technology in the organization.

2. Critical competitive strengths that require information technology / business systems support to realize.

3. Critical competitive weaknesses that require information technology / business systems support to overcome.

4. Critical competitive opportunities that require information technology / business systems support to realize.

5. Critical competitive threats that require information technology / business systems support to counter.

6. Critical business deliverables that require information technology / business systems support. These are the core deliverables of the business that require support.

7. Critical business systems / information technology systems.

8. Critical System Requirements for each of the critical business / information technology systems. Results in one snapshot for each of the seven critical business systems.

9. Critical factors for successful implementation. Standard factors and weights as presented in chapter 16 and which form the basis of the structure of part 4. Rate in terms of how well the organization is performing.

33.10 Further Analysis

The snapshots and process outlined in the preceding sections lay the foundation for a more in-depth strategic analysis as outlined in chapter 34.

CHAPTER

34

AN APPROACH TO DESIGNING A STRATEGIC PROGRAMME

The comprehensive STRATPROC© corporate strategic process is designed for application in organizations of all sizes including major global corporations. The process comprises a number of components. These are calibrated and adjusted for each specific strategic situation and most of them require only a small project team (STRATTEAM(c)) of between three to six middle to senior managers to develop. It comprises the following components:

34.1 STRATSNAP© Strategic SnapShot Analysis
High level strategic analysis using the strategic snapshot tool outlined in chapter 33.

Multiple snapshot processes are undertaken to analyse different aspects of the strategic environment and strategic context. These can include strength's, weaknesses, opportunities and threats, critical concerns, market (stakeholder) segmentation, market (stakeholder) attractiveness factors for different markets (stakeholder groups), market (stakeholder) critical success factors (critical buying factors) for different markets and diverse other factors specific to the strategic environment of the particular organization.

Processes can also be undertaken with specific stakeholder groups in order to obtain their inputs and improve the consultative process. Confidential interviews with stakeholder representatives can also be undertaken to better ensure appropriate corporate focus on stakeholder critical success factors, market weaknesses, etc.

The strategic snapshot process with various focus statements would be used to develop the analysis of the strategic driver, the balancing of strategy, the strategic alignment and the balancing of operations that are described as part of the TWOCONE© business optimization process described in chapter 28.

The snapshot process is also a vital component of much of the analysis and prioritization that is required in developing all aspects of the programme design set out in part 4.

34.2 STRATGAP© Strategic Gap Analysis
Systematic weighted gap analysis which builds on the strategic snapshot.

The gap analysis builds on the weights and ratings developed in the snapshot process together with relative allocations of resources, capital, operating expenses, manpower and other prioritization parameters.

Informed by these parameters the process determines the headline actions required to close the gaps taking account of impacts, return on effort and other measures. This ensures that those activities which will deliver the greatest impact are prioritized appropriately.

34.3 STRATFRAME© Strategic Framework
Detailed development of strategic frameworks and governance matrices relating strategic and operational factors and their interaction.

From these frameworks full corporate governance models are developed to ensure that the overall corporate governance and accountability is effectively aligned with the strategic objectives. Ratings provide a basis to

underpin corporate decision-making in support of strategic objectives. This provides input into the cubic business models described in section 10.7.

Rigorous specification of strategic and operational frames of contact provide the structure for resource allocation, financial reporting and performance measurement.

This highly structured technical representation of the organization, designed from a top down strategic perspective, ensures that all budgeting, financial and performance measurement takes place within a congruent framework. Fully executed this approach permits high levels of automation in analysis and reporting and underpins exceptional levels of management analysis in both soft and hard data.

34.4 STRATDESIGN© Strategic Design

Development of integrated hierarchical strategic design.

A broad-based high level conceptual statement of direction is, in itself, of little value. The high level strategic design must be systematically extended hierarchically in accordance with a strategically designed governance model such that there is unique ownership of every single component necessary to deliver the desired strategic outcome.

One critical activity omitted or left without ownership can jeopardize the entire strategic outcome.

STRATDESIGN© recognizes the immense multi-dimensionality and complexity of the global strategic market environment and of any competitive organization. By systematically structuring the detailed strategic design in a congruent and consistent manner that ensures that there are no structural non-conformities in the design many of the factors that typically give rise to failure are designed out of the corporate business system.

Strategic design involves examining each of the snapshots that have been taken, inside looking out, inside looking in, outside looking out and outside looking in and identifying which are fundamental drivers of strategy and which are filters which condition the strategic context in formulating the solution. This process is geared to building up a comprehensive, multi-faceted picture of the entire solution space.

34.5 STRATACTION© Strategic Action Plan

Development of systematic strategic action plans.

Converting strategic "visions", "missions", etc into actionable plans that work is a major source of weakness in the strategic planning of most corporations. At this level there is no substitute for the hard grind of systematically turning the high level gaps identified in the gap analysis process into detailed structured action plans directed at closing the gaps.

The STRATACTION© process systematically leads the core design team in breaking the required actions down to a level of detail where allocation of resources, measurement of performance, milestone reporting and other parameters is effective and reliable.

Strategic action planning involves systematically restructuring the multiplicity of projects and plan actions that result from the gap analysis and assembling them in packages which have similar functional or other criteria. This allows packages of activities to be assembled into groups that can effectively be managed by specific teams with specific knowledge and experience. Thus there might be a human resources plan, a communications plan, a financial plan, etc.

34.6 STRATPROJECT© Strategic Project Plan

Development of comprehensive strategic project plans which incorporate comprehensive strategic implementation components including impacts, dependencies, manpower and other resources and implementation time frames.

A strategic plan ultimately comprises two major components, structural organizational change and projects to bring about change and realize the plan objectives. An effective strategic plan is the most complex and most abstract planning exercise that most corporations will ever undertake.

The factors giving rise to failure of strategic projects are largely the same as those giving rise to information technology investment failure discussed in part 2.

To endure, any strategic plan must be effectively undertaken with comprehensive and fundamentally sound analysis of external and internal strategic factors. There must also be a clear mandate to produce a tactically and strategically robust and responsive organization. The end result of the process outlined here, if fully endorsed, supported and owned by management and properly funded is such an outcome.

To accomplish this outcome the detailed design process will result in a large number of strategic, tactical and operational projects. These projects will be directed at systematically bringing about progressive corporate

optimization over a period of years within the constraints of the capacity of the organization to tolerate change. Instantaneous change is easy to write about and talk about, in reality lasting effective change takes considerable time and meticulous planning and implementation.

The process outlined here progressively develops meticulous project plans capable of being effectively managed with auditable performance measurement. This is in accordance with what is outlined in chapter 24. These plans can then be handed over to professional project management teams in accordance with the programme design set out in part 4. It is only once strategic design has reached this level of in-depth project planning that meaningful strategic change and lasting competitive advantage truly become attainable.

34.7 StratAudit© Strategic Audit

Measurement (auditing) of performance during implementation and progressively as time passes.

Until a strategic plan has been reduced to a level of detail that enables progress and outcomes to be objectively measured using appropriate performance measures its value is an illusion. It is only once the plan is capable of being routinely measured in terms of progress and outcome that routine calibration and adjustment within the parameters of real life pragmatism becomes possible.

StratAudit© entails the full integration of all the resulting design components into existing corporate reporting systems and coding and other enhancements to existing reporting systems. This is undertaken in order to support the new dimensions of analysis required by the strategic plan. Where appropriate, enhancement or implementation of information warehouse facilities will be undertaken.

The end objective of the audit component is one page executive progress reporting at each level of management accountability. This is by no means a trivial exercise but, once achieved, it provides corporate management with a sustainable management tool that will provide the information to govern the transition.

More importantly, it will provide the tool-set necessary to govern the organization well into the future as a dynamically responsive, inherently stable entity that will outstrip its competitors in its ability to respond constructively to environmental change and market opportunity.

34.8 Conclusion

The above strategic planning process is a set of tools, concepts and methodologies that are designed to be integrated into any organization in consultation with its managers.

Strategic change is not something that can be imposed on an organization by large numbers of expensive consultants, it is a process of organic design and development by those who are intimately acquainted with the business and who must take ownership of the implementation and the outcome. It is impossible for an outside agency to bring about change in an organization, the organization must change itself.

A process such as the above is an integral component of the strategic alignment component of the detailed information technology programme set out in chapter 22.

This process will develop the full range of non-technology projects which will form the balance of the total solution in conjunction with the business optimization outlined in chapter 28.

CHAPTER

35

TIME AND COST

At various points in this book reference has been made to the elapsed time and cost for a programme of the scope outlined in part 4.

In moving to completion, it seems worthwhile to mention these points again.

If even a modest software procurement, development or remediation is to be undertaken with a strategic focus and designed to prevent failure, the minimum project duration is likely to be eighteen months to two years. With larger programmes of work a three to five year time frame is more likely.

The associated costs of such a programme of work for a medium to large corporation are almost certain to run into millions of dollars.

Accordingly, such initiatives should be undertaken circumspectly and only after in-depth and serious evaluation of the options. It is only by taking a long-term strategic view and having a clear perspective of how the system will deliver long-term sustainable competitive advantage, as outlined in chapter 2, that such an investment can be warranted.

It must be stressed that in evaluating the time and cost associated with undertaking a programme of the magnitude set out in part 4, an organization should have a clear strategic vision as to how the investment will create sustainable competitive advantage. The programme should be designed to make sure this is achieved.

Recognize that sustainable competitive advantage is likely to become an increasingly scarce commodity in the years ahead and therefore, any decision not to embark on a major strategic investment programme should only be taken after serious consideration.

CHAPTER

36

WRAPPING UP

In formulating an approach to effective strategic business solutions this book has looked at the shocking statistics that ninety percent of information technology projects under deliver and seventy percent fail totally. Ninety percent of strategic plans fail totally and seventy percent of business process re-engineering projects fail.

In other words, despite billions of dollars spent in each of these areas over the past few decades, failure is at epidemic proportions.

36.1 World Class Capability

Chapter 2 discussed at what a world class business information solution would look like and identified that an essential component of this solution was a world class strategic capability which enabled the corporation to achieve sustainable competitive advantage using information.

This began to establish the close correlation between information technology and strategy as two components of business effectiveness rather than as unrelated issues.

Chapter 3 discussed at the benefits of this approach and in chapter 4 examined the alternative scenarios that are available to most organizations with regard to the effective strategic application of information technology.

36.2 Causes of Failure

Part 2 examined in some detail the factors that give rise to the ninety percent information technology underperformance statistic and stressed that these factors were frequently the same factors that give rise to the failure of strategic plans and the failure of business optimization projects.

Issues of information technology mythology, lack of executive custody, policies, lack of strategic alignment, lack of an engineering approach, lack of data engineering, people and soft issues and technology issues are addressed.

Particular emphasis is placed on the need for an engineering approach. This is an approach that is geared to designing for success by engineering against failure. It recognizes that systematic, meticulous disciplines are the essence of the way in which engineering has reached the high standards of success that are taken for granted today.

The importance of a systematic, rigorous approach to data content, referred to as "data engineering" is also stressed and explained.

36.3 Achieving Success

Having established that engineers do not design bridges to stand up, but rather they design them not to fall down this book has presented a case for a robustly different approach to information technology, strategy and business optimization projects.

Part 3 outlines the requirements for such a radically different approach starting with a set of critical principles for success. This is followed by the definition of the critical stages for a project or programme for success, the critical factors for success, the critical technology components and the critical human foundation for success.

This last point, the human foundation, makes visible some of the key factors that give rise to failure and how they should be taken into account in designing for success. The net result of part 3 is a framework against which successful solutions can be designed.

36.4 Programme Design to Achieve Success

Part 4 provides detailed analysis of the components of a large successful strategic information technology programme.

Most of these components happen also to be what is required for a successful strategic programme or a successful business optimization programme. However, it is proposed that none of these in isolation represents a valid programme for any business in the real world.

Significant information technology investment cannot be undertaken without effective business strategic planning and business optimization. Business strategic planning cannot be undertaken without an undergirding of effective information technology and business optimization. Business optimization cannot be undertaken unless effectively undergirded by effective business strategy and strategic information technology.

Ultimately the business must end up in the place that is determined by the strategy, it must be organized and optimized to operate effectively in that future condition and it requires the right information at the right place at the right time in order to make the right business decisions. Effective information systems are an essential part of the solution.

Thus, in looking at effective strategic business solutions, one encounters a requirement for a comprehensive, holistic, integrated approach to developing and implementing solutions which is materially different from many of the approaches applied today.

Part 4 also outlines the basic staff complement required for a typical programme based on a design developed for a real world client.

36.5 Business and Strategic Issues

Part 5 wraps up with a range of specific chapters dealing with issues that require attention in order to complete the picture.

This part includes a detailed discussion of a governance model for managing large strategic business solution programmes such as those discussed in this book, it goes on to discuss a metaphor for systematically developing a business optimization programme.

There is then a diversion into the practical requirements for specifying software in such a way that there will be no surprises and the business will obtain the level of sophistication that is appropriate. The application of this concept is discussed in the following chapter and this is followed by a brief view of business solutions, including information technology, twenty to fifty years from now. It is suggested that the future will bring a situation in which the business improvement industry looks a lot more like the construction engineering industry than it does at present.

An approach to existing systems is outlined.

The book closes with a brief look at a systematic and effective means of strategic analysis and an overview of the overall approach to the development of large-scale strategic programmes in order to complete the picture of effective strategic business solutions which is an essential sub-theme of this book. This is followed by a brief assessment of realistic time and cost provisions.

Taken together, this book provides a framework for any organization that is truly seeking a more effective way of operating and of achieving real, effective strategic solutions involving information technology, to go about achieving the objective.

I hope that you have found this book challenging and enjoyable and that it has given you a new vista on how you can strategically benefit your organization.

If you think that I could be of assistance to you in achieving your objectives please contact me.

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ABOUT JAMES A ROBERTSON AND ASSOCIATES

James A Robertson and Associates is a specialist International Management Consultancy.

JAR&A offer executive level strategic consulting services with regard to effective strategy development and implementation and strategic application of information technology.

JAR&A also offer limited scope specialist training courses and Executive Briefings relating to the subject of this book and also with regard to effective strategic planning.

Our focus is primarily on short duration, high impact, high value, interventions.

More details can be obtained from our web site at:

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The Critical Factors for Information Technology Investment Success

The Critical Factors for Information Technology Investment Success recognises the extremely high level of Information Technology Investment failure, catalogues the causes of failure and presents a structured approach to avoid failure.

Compelling messages the book contains include:

Only ten percent of Information Technology investments meet or exceed the original business requirement and seventy percent of projects fail totally. Only ten percent of Strategic Plans succeed. Seventy percent of Business Process Re-engineering projects fail.

This book explains why.

Information Technology, Business Strategy and Business Process Re-engineering are all facets of one composite field of business improvement which require an integrated holistic approach to achieve results.

Information Technology is not about technology, it is about people.

A clear understanding of the strategic driver of the business is one of the most critical factors that determines Information Technology Investment success.

Highly structured validation data and codes in a comprehensive data model represents one of the biggest opportunities for businesses to secure real benefit using Information Technology.

This book confronts probably the single most challenging topic confronting business management today - how to apply Strategic Planning, Business Optimization and Information Technology to support business effectively, strategically and sustainably.