Conceptual design of an organisational capability

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CONCEPTUAL DESIGN OF AN ORGANISATIONAL CAPABILITY

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Summary

This study is intended as a guideline for enterprise designers in developing a conceptual design for an enterprise. It follows a system engineering approach and promotes top down design of enterprises viewed as systems.

Enterprises are examined as systems and their functioning analysed within their own boundaries, as well as within their operating and resource environments. The capability responsible for designing the enterprise is also considered.

The reader gets an overview of a generic development process to place conceptual design in context with the enterprise life cycle. Strategic design is shown to be the conceptual design of an enterprise.

The bulk of the dissertation addresses the process of establishing the conceptual design commencing with the charter for enterprise engineering i.e. the causes, expected results and impacts. Requirements for the enterprise are established from the enterprise leaders in terms of the strategic intent for the enterprise, which include the strategic drivers and its vision, mission and driving force.

The current enterprise is analysed to establish constraints arising from the existing enterprise. Various positioning options are discussed as sources of strategic alternatives.

Approaches to analyse market opportunities, organisational capabilities and constraints are given as input to establish the scenarios for which the enterprise design must cater.

The development of a single alternative high-level enterprise implementation is covered in terms of the value delivered, capabilities required in the enterprise and resource requirements. Alternative development approaches and the selection of one is discussed.

Finally, the design of a competency concept, the synthesis of design in a grand strategy, structural architecture, cultural architecture and plan to align resources with the design is discussed.

In conclusion some proposals for the extension and enhancement of this guide are made.

Keywords:

- *Enterprise engineering*
- *Conceptual enterprise design*
- *Organisational design*
- *Business engineering*
- *Strategic design*
- *Business potential*
- *Entrepreneuring*

Opsomming

Hierdie studie is bedoel as 'n riglyn vir ondernemings ontwerpers by die konseptuele ontwerp van 'n onderneming of element van 'n onderneming. Die studie gaan uit van die vertrekpunt dat 'n onderneming 'n stelsel of sisteem is wat op 'n bo-na-onder manier ontwerp moet word, maar altyd belyn met die verwagtinge van die oorhoofse sisteem en geïntegreerd met die oorhoofse stelsel waarin die sisteem moet funksioneer.

Daar word ook gelet op die rol van 'n besigheids ontwerp funksie en hoe dit die uitvoering van 'n konsep ontwerp sal funksioneer. Ondernemings word as begrensde sisteme ontleed wat in interaksie met 'n bedryf- en hulpbron omgewing funksioneer. 'n Funksionele benadering word gevolg in die interne ontleding van die onderneming om vereistes te kaskadeer en verdeel ten einde die ontwerp probleem hanteerbaar te maak.

'n Oorsig oor sisteem ingenieurswese, asook die plasing en rol van konsep ontwerp in die lewensiklus van die onderneming, verleen konteksuele verband. Die vereistes vir 'n besigheidsontwerp vermoë word aangespreek en daar word aanvaar dat die leser op voorgraadse vlak vertroud is met bedryfsingenieurswese. Die leser kry 'n oorsig oor 'n generiese ontwikkelingsproses wat die konseptuele ontwerp fase in konteks van die onderneming se lewensiklus plaas. Daar word aangetoon dat die konseptuele ontwerp van 'n onderneming in wese sy strategiese ontwerp behels.

Die onderneming word in 'n stelsel hiërargie geplaas wat beklemtoon dat die onderneming 'n substelsel in 'n groter sisteem is en weer op sy beurt uit substelsels bestaan.

Die hoof gedeelte van die studie handel oor die ontwikkeling van 'n konseptuele ontwerp vir 'n onderneming – beginnende by die mandaat van die ondernemingsontwerper waarin die motivering vir 'n ondernemingsontwerp projek asook die verwagte uitsette verwoord word.

Die vereistes vir 'n onderneming word deur die leiers en eienaars van die onderneming bepaal en in die strategiese bedoeling verwoord in terme van die strategie, drywers, visie, missie en dryfkrag. Die beperkinge waaraan die ontwerper onderhewig is word bepaal uit 'n

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CHAPTER 1

INTRODUCTION

INTRODUCTION

This study investigates a top down design process for enterprises as systems. It concentrates on the initial phase of design i.e. the conceptual design phase.

1.1 What the study is about

The study addresses enterprises as a special kind of system which need to be formally designed as opposed to being developed empirically, especially with intensifying global competition. The motivation for formal design is that it optimises the selection of elements and their interactions to achieve the objectives of the enterprise and thereby maximises the enterprise worth.

The conceptual design of a system whilst not resource intensive - has a major impact on the system's ultimate worth and has therefore been singled out as the focus of this study.

1.2 Reasons for conducting the study

The opportunity to utilise knowledge and skills

The author's experience in industry with systems engineering and the propagation of business re-engineering and other popular management tools and techniques, created the opportunity to develop a framework to integrate and systematise the process for engineering an enterprise.

To prevent damage from misdirected enterprise engineering efforts

A multitude of techniques and associated consulting services are confusing managers to the extent that they are jumping from the one bandwagon to the other, without ever realising their benefits. These actions keep companies in constant flux and are costing industries, employers and employees dear in lost and misdirected energy, stress, burn-out, devastated careers and lost profits [21]

The desire to make a contribution

The author intends to provide an improved approach to designing enterprises, which provides a framework within which to apply existing and new improvement techniques at appropriate phases.

1.3 The current solution environment

This study is conducted against the current management environment which is characterised by issues such as:

- Business managers do not realise and/or accept their dual role, to be both the designer/creator of a business capability and manager to operate and maintain/improve the capability for business benefits.
- Confusion reigns amongst business management about how to go about establishing or reinventing their enterprises to address new market opportunities or to cope with the changes confronting their businesses.
- There is uncertainty and indecision as to which of the multitude of new tools and techniques e.g. TQM, JIT, TOC, ERP, ABC, BPR, etc. being marketed by consultants as the solution to all ills [21] should be used.
- There is a high turnover of new tools and techniques coupled to a lack of understanding about how they work (even amongst their inventors) and what benefits they can deliver. E.g. . Dr Taichi Ohno, the inventor of the Toyota Production System and the Kanban approach, is quoted by Goldratt as saying that his system does not make sense at all, but that it works. [19]
- That enterprises are frequently designed empirically in a bottom up manner i.e. by reorganising the boxes on the organigram or partitioning the enterprise into profit centres.

1.4 Problems to be addressed by the study

The current role uncertainty, confusion and lack of knowledge and direction result in poor enterprise designs.

The reason why organisations are incapable of producing sound enterprise designs centre around lack of capability brought about by the failure to recognise that enterprises are complex systems that need to be designed and realisation that organisations need an enterprise engineering capability to perform these designs.

The lack of enterprise engineering capability manifests in:

- Lack of clarity on the dual role of business managers to be both the designer/creator of capability and manager to apply the capability for business benefits.
- A difficulty in defining the enterprise engineering problems adequately and in terms amenable to analysis.
- Lack of access to a systematic approach to define the solution requirements and a lack of an analytical capability to cascade and partition the problem to a level where it can be solved.
- Lack of understanding of the factors that contribute to synthesis of soundly structured implementations.
- Inadequate integration within modelling tools to support the analysis, synthesis and evaluation of enterprise designs.
- A lack of knowledge and understanding of business improvement techniques and how to apply them.

1.5 Specific objective

The objective of this study is to provide a development approach which will optimise the system worth for enterprise systems and to establish guidelines of how to execute the first phase (conceptual development) of development for an enterprise.

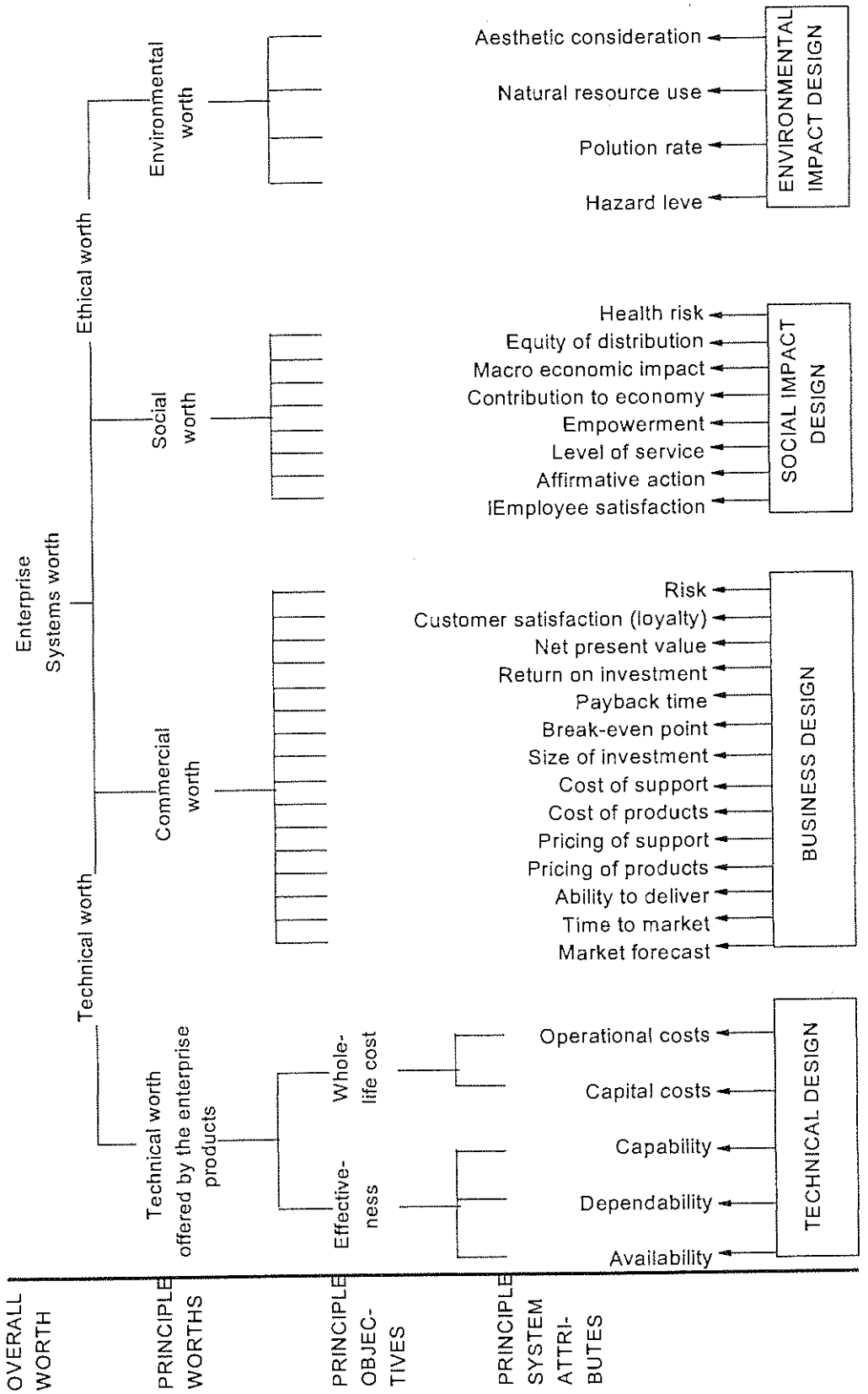
The extent of what this objective implies is demonstrated in ***Figure 1.1*** as expanded and interpreted from M'Pherson [23] in terms of the elements that need designing to ensure optimal enterprise worth.

Enterprise worth is a compound of:

- The **technical worth** of the enterprise i.e. its ability to, cost effectively, deliver its intended products and services. This element contributes to the business by enabling it to perform its basic function.
- The next element **commercial worth** reflect how well the business design aspects of the enterprise are handled to ensure that the financial structuring and the interaction with its resource markets, customer markets and competitive environment are optimised to achieve maximum business benefit.
- **Social worth** reflects how well the enterprise complies with the social expectations of its operating environment. This factor contributes to the business by influencing attitudes towards the enterprise, which affects the readiness of its environments to interact with the organisation. This factor may also impact the enterprise through social costs and levies charged for failure to comply with legislation e.g. training levy instituted by government.
- **Environmental worth** reflects how well the enterprise design copes and complies with expectations or legislation, which apply in its line of business. Environmental issues normally add cost to the enterprise in doing business but may also impact its image in the marketplace as a responsible company.

The reason for formal design is that all the requirements arise from the objectives of the business and its environments. To ensure that these conflicting needs are met by the implementations, which are removed by a number of levels and translations, structured analysis and synthesis is essential.

FIGURE 1.1: ELEMENTS CONTRIBUTING TO SYSTEMS WORTH



1.6 The contribution envisaged

This study envisages systemising a framework for the development of a conceptual design for enterprises. Insight will thus be provided to future enterprise designers into a logical, cascaded design process and guidelines applicable to enterprise design.

This approach will not necessarily overcome all problems in complex systems, especially those posed by human factors in the system, but will at least address the more explicit aspects requiring formal design.

1.7 The structure/approach of the study

This study evolved from earlier work by the author when systems engineering was researched from a product system context to provide a systems engineering guide in the defence industry, based on proprietary information of allies. The approach was laterally adapted to extend to the development of support systems for complex systems.

The support systems have increased human activity system content which then led naturally into enterprise engineering. Research on enterprise engineering started off with a review of the documentation of an enterprise engineering conference, held in Australia in 1997. Further research formed part of preparation for teaching manufacturing systems and a generalised system engineering course.

The concepts and approach were tested and refined during consulting projects in industry relating to systems and enterprise design at Iscor, Telkom and Sanlam. The initial work was documented in 1994 and has been revised and upgraded numerous times over the past 5 years. It is still a dynamic document, which is regularly updated as the guide for business engineering in Sanlam. The approach followed in this study centred on applying proven systems engineering principles and development approaches laterally to the design of enterprises.

Business engineering approaches, tools and techniques were researched from literature and positioned within the systems engineering framework.

The concepts were tested with a number of known figures in the systems engineering field e.g. Rod Belcher, Henk Sol, Hans Daelenbach and Michael Jackson.

Valuable guidance was provided by my promoters Prof. P S Kruger and P J Pretorius as well as colleagues in the department of Industrial and Systems engineering at the University of Pretoria

The document is set out in 4 parts i.e.:

- Overview of enterprises as systems which covers systems in isolation and context.
- Overview of design of enterprises which discusses the design process and its application for enterprises.
- Conceptual development of an enterprise addresses the specific approach and illustrates generically how the conceptual design of an enterprise may be achieved and includes guidelines.
- Concluding remarks than summarise the findings of this study and recommends further action.

The four parts are further split as follows:

- Overview of enterprises as systems
  - System hierarchy and generic system
  - The life cycle of systems
  - The greater systems context
  - The realisation of systems

- Overview of design of the enterprise
  - The scope of the design
  - The design process

- Conceptual development of an enterprise
  - Current assessment
  - Strategic requirements (pre-requisites)
  - Strategic concept
  - Analysis of requirements
  - Analysis of constraints from current organisation
  - Scenario development
  - Develop in strategic alternatives
  - Competency/capability concept design
  - Synthesising and formalising the design
  - Business transformation

- Conclusions

CHAPTER 2

SYSTEMS IN ISOLATION

We shall not cease from exploration
And at the end of all our exploring
We will arrive where we started
And know the place for the first time

T.S. Elliot, Four Quartets

SYSTEMS IN ISOLATION

This section defines a system, gives a perspective on levels in systems and examines a generic manifestation of a system in isolation to understand its functionality and structure.

2.1 Defining a system

This study is about enterprises as systems and it is therefore appropriate to define a system in terms suitable for self-sustaining systems. We take our definition from the IEE [36] i.e.:

"A system is a set of functional elements organized to satisfy user needs. These functional elements include hardware, software, people, facilities, data, techniques, materials and services. As used in this standard, a system includes the product design and facilities, equipment, special tooling, or processes for establishing the capabilities to manufacture, test, distribute, train, support, operate and dispose of the end product."

The IEE definition for a system was selected by the author from amongst nine still under consideration by the National Council of Systems Engineering, which is the governing body for systems engineering in the USA.

The choice was based on the comprehensiveness of the definition, which covers a wider range of systems than most of the other definitions, which only address product systems. In this definition "support" is seen in a narrow perspective as only including the specific items and services to restore/retain the system in a state of readiness. The other elements required to integrate the system into a capability e.g. training and distribution are identified separately.

The above definition does include support for the system, which is aimed at ensuring the continued survival of the system i.e. the system becomes self-sustaining.

2.2 Hierarchy of systems

Systems may manifest at multiple levels where a system, at a specific level, normally forms part of a higher level super system (the host system) and also consists of subsystems.

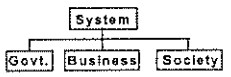
Such a hierarchy of systems assists the enterprise designer in establishing the system context i.e.:

- Identify the need for the system being designed to fit in with the higher level systems.
- Identify the subsystems, which form part of the system.
- Position the system in the levels of the hierarchy.

This hierarchy is illustrated in ***Figure 2.1***, from Barnard [26]. It was adapted from a military environment to fit into a commercial environment and expanded to include higher levels in the hierarchy and examples from a product sector, human system and service sector.

If we examine an organisational capability in terms of this hierarchy it can be placed at level 8 or 9. This level is determined by observing that organisational capability already includes human resources and can perform a technical function independently in a higher order system. A level 8 system is not yet completely self-sustaining i.e. it requires other organisational functions to support it, whereas a level 9 system is self-sufficient.

FIGURE 2.1: HIERARCHY OF SYSTEMS

SYSTEM LEVEL	PRODUCT SECTOR EXAMPLES	HUMAN REFERENCE	SERVICES/SECTOR EXAMPLES
12 Multi-national	Anglo American 	Human Race over the world	International conglomerate as part of world economy
11 Social system		National population	Conglomerate as part of SA economy
10 Group of companies	ISCOR group	Societal grouping	Enterprise as part of a national conglomerate
9 Self-sustaining system	Steel factory - offices with support, system workers	Trained human Human in family	Business division as part of an enterprise
8 User function operational capability (technical)	Steelmaking capability i.e. Melting, casting, milling with process workers.	Human	Operational division
7 System	Steelmaking/melting plant	Respitory system	Business systems
6 Sub-system	Equipment, materials, applications, controls	Ribcage	Information systems
5 Equipments	Motor, gearbox, instrument, refractory	Arm structure	Computers, programs, databases, workflows
4 Assemblies	Rotor	Bicep, femur, nerve	Sub-routines, procedures, functions, data structures
3 Components	Bearings, laminates, shaft, windings	Tissue, muscle, bone, skin	Entities e.g. work instructions, prototypes
2 Materials	Plastic Copper Steel	Cells	Paper, data items, magnetic media
1 Natural resources	Ores, chemical feedstocks	Water, chemicals	Trees, states of nature, time, magnetic and substrate materials

The requirements for such a (semi-) self-sustaining system may be better understood by examining a generic manifestation of a self-sustaining system illustrated in the next section.

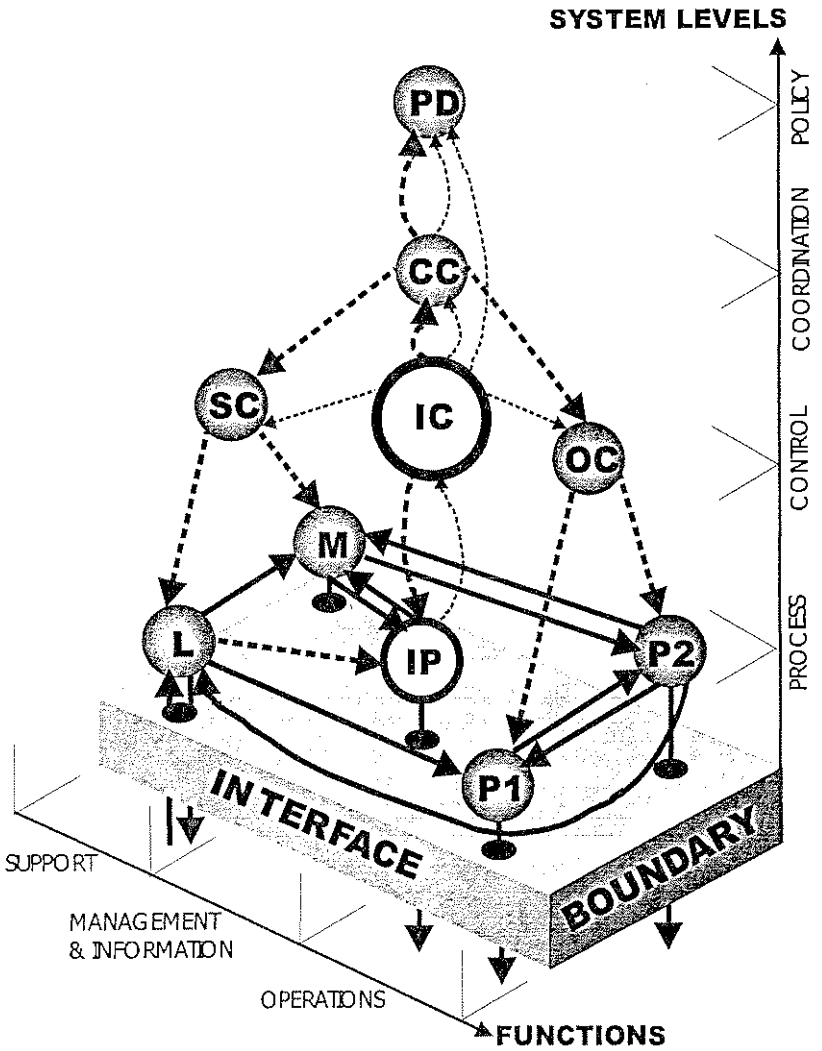
2.3 The generic self sustaining system

All organisational systems show some measure of self-sustainability. It is therefore useful to examine the properties of a generic self-sustaining system as a framework to understand the system, which we wish to conceptualise.

This section functionally defines a generic model for a self-sustaining system and serves to identify the types and levels of functions to be considered within the system to be developed The organisational system which we wish to develop is termed the System of Interest (SOI).

The System of Interest i.e. Enterprise system may be viewed in isolation as a generic self sustaining system using a model derived from M'Pherson [23] as described in ***Figure 2.2.***

FIGURE 2.2: THE GENERIC SELF-SUSTAINING SYSTEM



Legend

PD = Policy directives | CC = Co-ordinating control | SC = Support Control | OC = Operational Control | IC = Information Control | IP = Information Processes | P1, 2 = Operational Processes | L = Logistic Processes | M = Maintenance Processes

Figure 2.2 provides a functional perspective on systems and is useful to identify the generic types and levels of function of a system.

The salient features the generic self-sustaining system (SOI) are as follows:

2.3.1 *System boundary*

The system is enclosed by a boundary which defines the limits of the system. Everything outside the boundary comprises the environment. Specific elements of the environment may impact on the system- this is the relevant environment, which has to be provided for in the design. The system may in turn impact on the environment in a positive or negative manner, which may add additional constraints to the system.

The functions inside the boundary are included in the system and are within the designers discretion to design at will in conformance to the requirements. It is important to realize that implemented real systems may have boundaries, which are geographically dispersed i.e. the physical system and its boundaries may look vastly different from the functional system description.

2.3.2 *Interfaces*

The system interacts with its environments across its boundaries. These interactions of the SOI with its various environments, are defined as system interfaces.

Typical interactions and interfaces may include:

- Flow of inputs and resources to the system i.e. information, materials, services and physical, financial, human and information resources.
- Flow of outputs out of the system i.e. products, services and information.
- Flow of wastes to the environment e.g. effluents, pollution and scrap.
- Disturbances from the environment impacting on the system e.g. changes in legislation, market swings and resource impacts.
- Physical interfaces e.g. space, routings.
- Organizational interfaces e.g. functional fit within organizational architecture.

- Workflow interfaces where the flow of work has to fit in with a value stream.
- Time line interfaces in a greater process.
- Functional interfaces with e.g. data communications, utilities, etc.
- Legal and social expectations and constraints

Input streams, output streams, and waste streams impact on the performance design of a system which is the fundamental reason for the need for systems.

Resources required by the system impact on the efficiency of the design, whereas the likelihood of disturbances sets requirements for robustness or flexibility of the design.

Physical, organisational, social and legal impacts, workflow and time line interfaces normally constrain the design.

2.3.3 System functions

Functions of the system are divided into types and levels of functions. A process level, control level (operational management), co-ordination level (tactical management) and leadership/guidance level (strategic management) may be defined. Functions can be grouped by type into operational, support, informational and management functions (processes).

2.3.3.1 Operational functions

Operational functions comprise the functions that add worth as defined from a customer perspective to the inputs to the system and directly manage the execution of these functions. In figure 2.2 these functions are designated Process One (P1), Process Two (P2) and Operational Control (OC). In the SOI these functions could typically be to:

P1 - engage client

P2 - deliver service

OC - manage operations

2.3.3.2 Support functions

Support functions designated Maintenance (M), Logistics (L), and Support Control (SC) support either the workflow or the resources required to:

- Convert the input of the system into outputs.
- Directly manage the support functions.

The Logistic functions (L) handle the procurement, inbound logistics, internal flow of resources, inputs and intermediate products for both the operational and support processes as well as the distribution of the outputs to the system boundary, which might be the customers premises in a different geographic area.

The maintenance functions, designated (M) in Figure 2.2, are responsible for ensuring the continued availability of the operational capability. The maintenance function thus ensures the continued ability of the core value chain to produce its intended output in an efficient manner and enhances the resources to cope with variations in inputs, demand on output and changes in the environment. This broad maintenance function applies to all the functions of the system regardless of the type of resources by which they are implemented i.e. the human resources, business processes, intellectual property, physical resources, financial resources and throughput elements. Typical implementations of the maintenance function could be plant maintenance, training and certification of human resources, re-engineering of business

processes, insurance of assets and hedging of investments – including information.

2.3.3.3 Process information and management functions (IP, IC, CC, PD)

These functions provide information to and capture information from processes at the process level and control levels and integrate processes and disseminate information to facilitate and manage the operational and control level processes. At the Process Level (IP) these functions provide information required to execute the operational and support functions and capture the information upon which the management functions act. A typical example of this would be to provide customer details from a database as an input to process an order.

At the control level Integrative Control (IC) functions capture and provide information to synchronize the Operational Control (OC) and Support Control (SC) functions e.g. synchronise computer maintenance with the production schedules.

Co-ordinating Control (CC) provides an interactive planning and control function which ensures optimal timing and interfacing between operational, support, information and management functions with due regard for the effective achievement of the objectives of the system e.g. plan to adjust the balance of activity and scheduling of the operating and support functions to cope with variations in market demands within the design capability of the enterprise.

The (PD) Policy/direction function provides the visioning, strategizing and guidance to ensure that the system remains in step with demands of its environments and maintains a competitive edge.

The above paragraphs have clarified what the generic solutions for an enterprise capability might look like from a functional perspective.

This section has only addressed what a system functionally looks like when viewed in isolation.

From the definition of a system as including the capabilities to design, manufacture, operate, support and phase out the system, the view of a system in isolation needs to be expanded to cover its whole life cycle. This is covered in Chapter 3.

CHAPTER 3

SYSTEMS IN LIFE-CYCLE CONTEXT

SYSTEMS IN LIFE-CYCLE CONTEXT

As part of our exploration of the context in which systems operate we examine the life cycle of a system in this section.

The need to survey the whole life of a system arises from the fact that a system has to be designed and realised before it can be put into operation. Once a system goes into operation it needs to be supported and at the end of its life the system must be retired and phased out or renewed. These requirements force us to take a life cycle view of systems.

3.1 Life cycle view of an enterprise

An enterprise is developed like any other system but because of the enterprises' inherent ability to be self-sustaining, it's life cycle deviates in its later stages. This can be illustrated by way of comparison between Figures 3.1 and 3.2.

Figure 3.1 shows the conventional life cycle of products as adapted from Blanchard [32] to place more emphasis on the establishment of the delivery and support system and the roll out of products at the client. In this case there is an underlying assumption that a capability to realise products exist and that this capability creates many items of a variety of products which each move through the life cycle as shown in ***Figure 3.1***.

3.2 The conventional life cycle

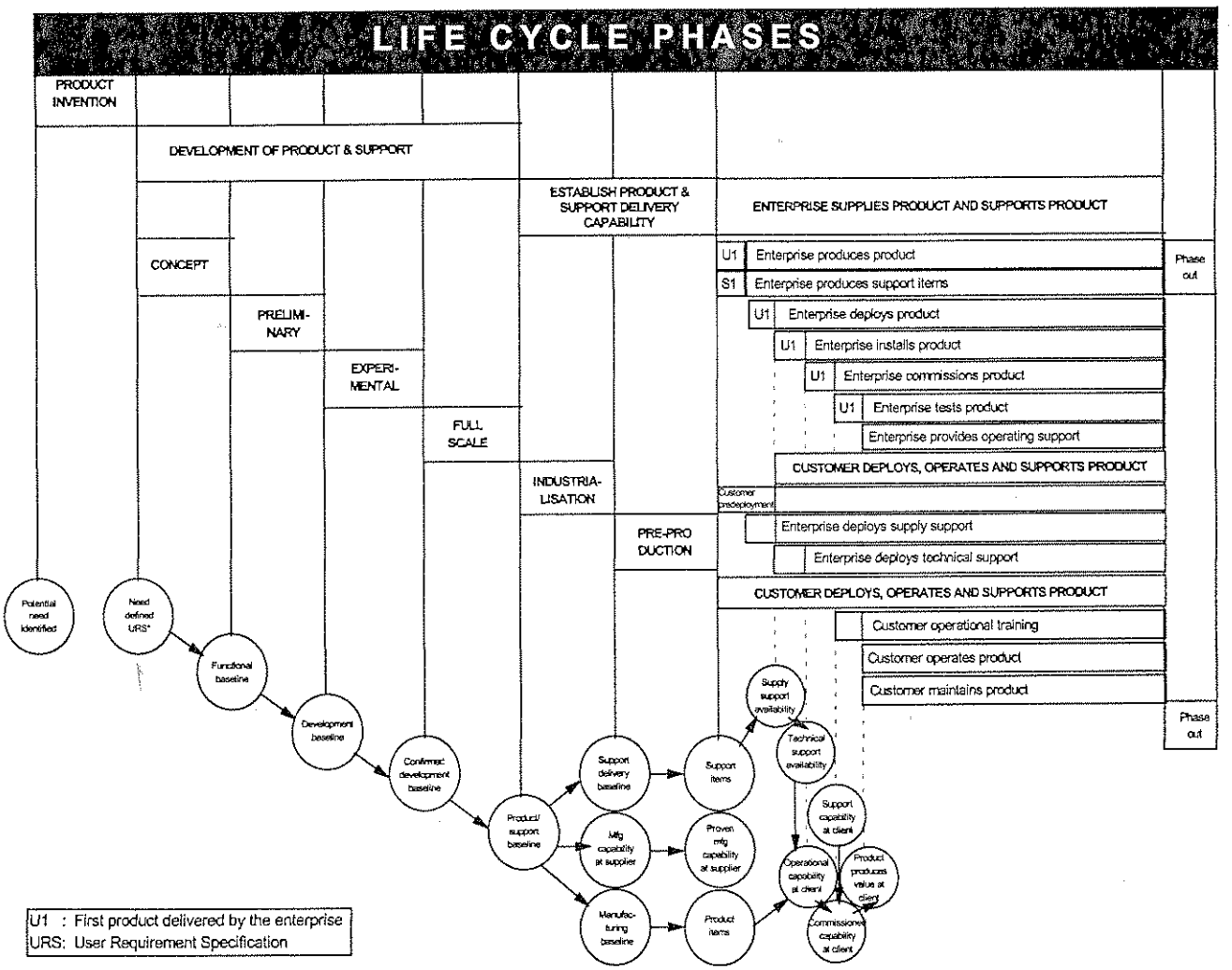
Figure 3.1 shows six major phases or processes in the life cycle of the products of an enterprise as well as the outputs generated in the phases.

The output of the various phases are shown in the circles and in most cases represent specifications of some kind which constitute a baseline or reference point. These baselines set the requirement for the following phase and the standards against which the output of the next phase are measured.

In order for an enterprise to deliver products, it has to be able to execute the processes in the value stream implied in this life cycle.

Some of the processes may be outsourced and phases may be combined but essentially the life cycle provides a framework within which the requirements for an enterprise can be investigated.

FIGURE 3.1: THE CONVENTIONAL LIFE CYCLE BREAKDOWN



From the life cycle the enterprise designer can thus conclude which capabilities must be designed into an enterprise. The capabilities are briefly reviewed below.

3.2.1 *Product invention*

Product inventions can be driven from two sources i.e. market needs or technological opportunities. This phase includes:

- analysis of: markets, market and technological opportunities, competitors and
- creative work to define needs and postulate characteristics of, or solutions for the needs.

3.2.2 *Development of products and support (in a phased manner)*

The development phase translates a need for a product into a proven design, which is capable, operable, affordable, manufacturable and supportable. Depending on the nature of products, this may require a very costly and time consuming investment in the future products of the enterprise. It is therefore often broken down and executed in a phased manner, which allows for management of risk and continuous review of the business case. The following phases are commonly recognised:

- conceptual design
- preliminary design
- experimental design
- full scale development

The conceptual phase confirms understanding of the needs in functional terms, the technical, operational, schedule and organisational feasibility of satisfying the need and establishes a baseline business case.

During preliminary design, the functionality of the system is cascaded, partitioned and allocated, after which design tasks are synthesised, which can be

contracted to detail design. The risks are established and the business case is confirmed based on a development baseline.

Experimental design is performed on high risk elements of the system where these are appropriately designed in detail, prototyped and tested to prove that the risks can be contained before embarking on full scale development of the whole system.

Full scale development designs the product in detail and proves its compliance to the requirements in terms of all-important parameters, which should include performance, availability, life cycle cost, safety and flexibility.

3.2.3 *Establish delivery and support capability*

For products unique and new to an enterprise, the cost of establishing the capability to deliver and support the product may exceed the cost of developing the product by an order of magnitude. This life cycle phase may therefore represent the major investment in a product.

The establishment of organisational capabilities to deliver products, is in fact exactly what this study is about. This phase emphasises to the enterprise designer that each enterprise that develops new products must have capabilities for enterprise engineering.

The establishment of the delivery capability may be broken down into an industrialisation component and preproduction component.

Industrialisation represents the design of the delivery capability, which may again comprise a multi-phased process to get from understanding the need to a detailed design of the capability just like the product design cycle.

Pre-production deploys, commissions, activates and tests the delivery capability to prove that it can deliver products and the support required for the products to specification at the places, times and volumes required in a way which

contributes to the organisational goals. I.e. pre-production is the transition from the designed capability to an implemented capability.

3.2.4 *Operations, Supply and support*

This phase is the culmination of all efforts towards providing a product. Operations, supply and support provides the returns for the enterprise on its investments and delivers the value and need satisfaction to the enterprise's clients.

There are three major groups of activities in this phase i.e.:

- the enterprise establishing a capability in a new market to deploy and support its products;
- the enterprise executing processes to deliver and support the product;
- the application or operation of the product of the enterprise by its customers to obtain need satisfaction.

The enterprise has to manufacture and deliver both the product and unique support items/services required for its support/maintenance. Additional to this the enterprise must, where appropriate, expand its supply and technical support abilities to cover new customers, train technical (support/maintenance) personnel and operational personnel of the customer and commission its products.

The customer needs to establish technical (support/maintenance) and operating capabilities, integrate the product in his customer's environment and operate and maintain the product to obtain need satisfaction for the customer from the product.

3.2.5 Phase out

At the end of their business life cycle, products get phased out of the product portfolio of the enterprise. Some elements/components of the product may be used in other products, which means that their design should be retained. The product population in the field may however survive long past the end of production and require the continued availability of spares and support. This means that phase out of the delivery and support capability may have to be delayed until the majority of products at customers can be converted or phased out.

The customer faces similar considerations when nearing the end of the economical life of the product. He may want to salvage some parts of the product, have to dispose safely of the rest and maintain a population of survivors.

The conventional life cycle provides the designer of the enterprise with a perspective of the type of life which the products delivered by the enterprise, will experience. Figure 3.1 also shows the need for and phasing of product design relative to the need for and phasing of development of capability to deliver the product i.e. industrialisation.

3.3 The enterprise life cycle

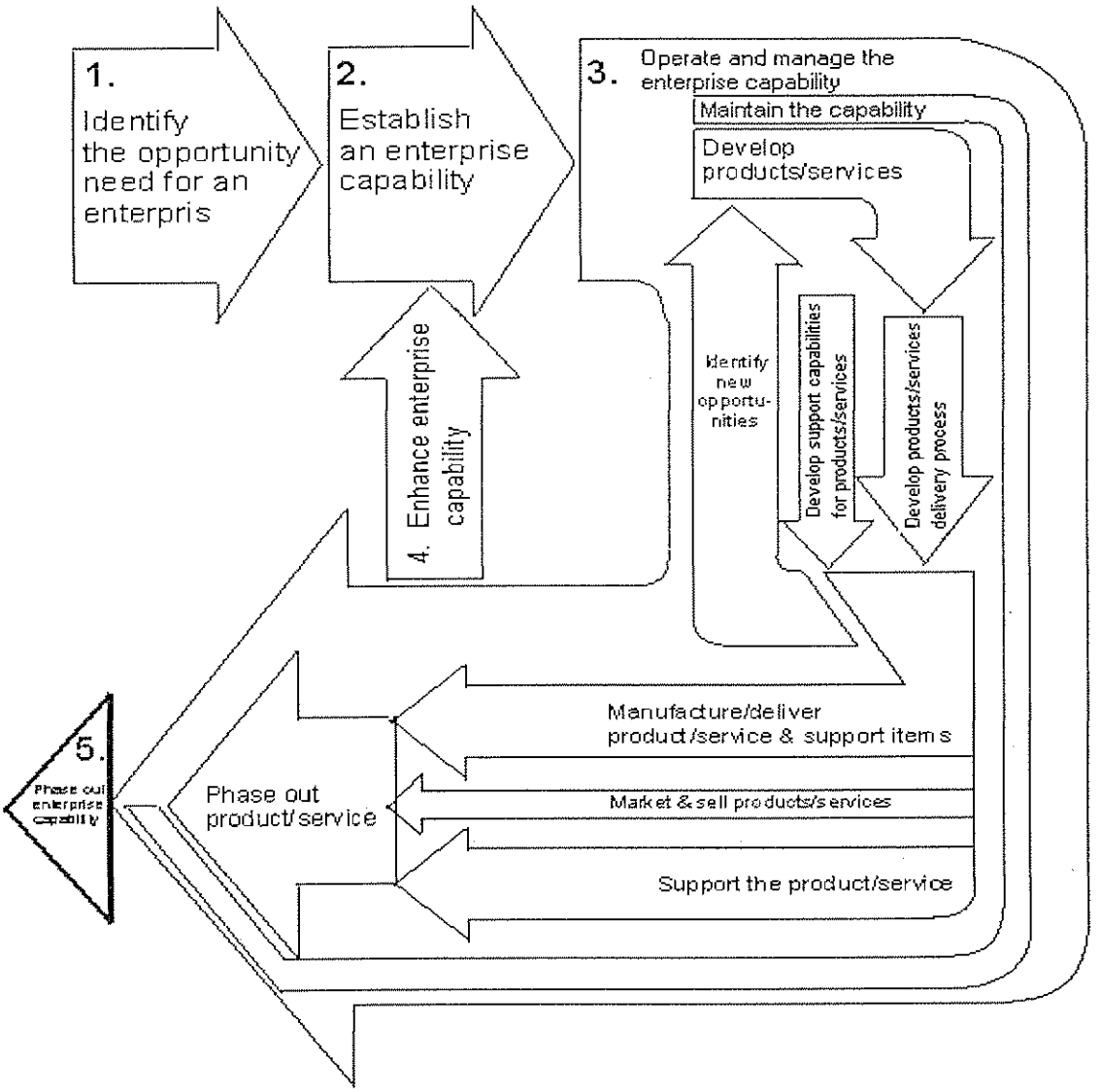
In contrast to the conventional life cycle discussed in paragraph 3.2, the life cycle of an enterprise may be viewed as a more evolutionary process as depicted in the model in ***Figure 3.2*** as described by Rottier [27].

In this model the whole conventional life cycle is contained in the operational phase of the enterprise in arrow 3 in the model. Note that this phase now also includes processes to maintain the capability of the enterprise and processes to market and sell the enterprise offerings.

Arrow 1, which identifies the need for an enterprise, is similar to product invention and often related to the invention of a new product or identification of new markets.

Phase out of an enterprise capability as shown in arrow 5 is similar to phase out of products, but much more traumatic in that it signifies an abrupt seizure of supply of product and support and also signifies disruption of employees and suppliers lives.

FIGURE 3.2: THE LIFE CYCLE OF AN ENTERPRISE



The evolutionary nature of the enterprise life cycle is apparent in the continuous need to review and upgrade its product portfolio as well as periodic redesign of the enterprise capabilities to adjust to new product requirements, changes in technology, in response to market demand or threats from the environment.

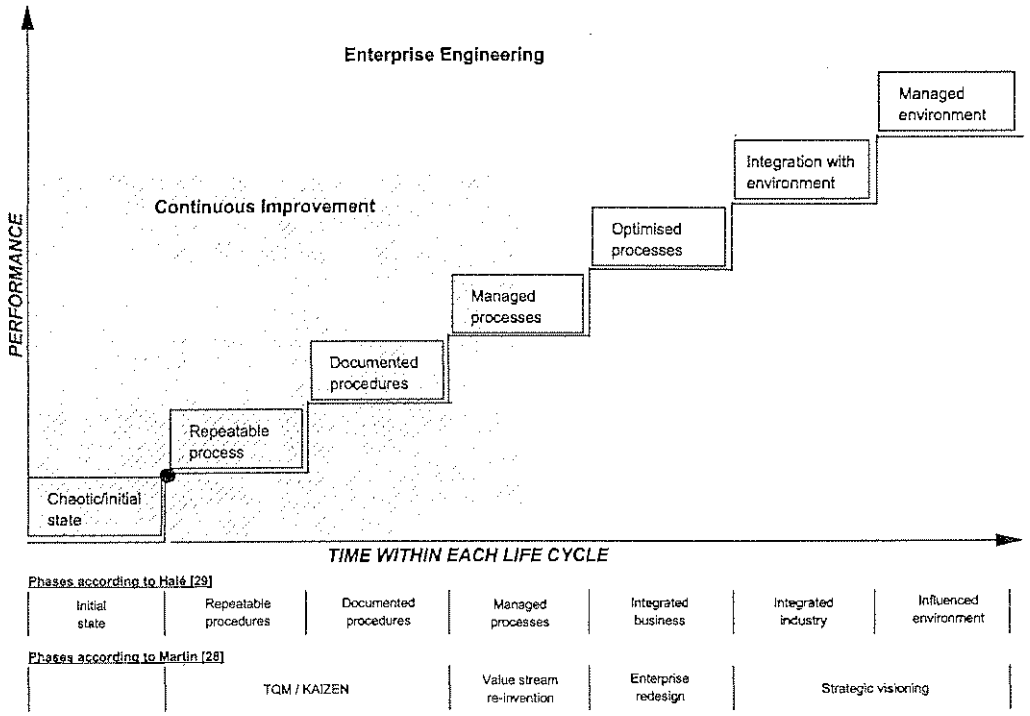
Strategic re-positioning triggers these evolutionary changes in the product portfolios or enterprise design. This implies that strategic design should drive enterprise engineering.

Arrow 2 and 4 addresses enterprise design and re-design and may be achieved in a variety of ways.

Renewal of enterprises may be achieved by a multitude of small incremental improvements as well as major business redesign endeavours for breakthrough improvements. The process of empirical design followed by continuous improvement is still the norm even in progressive enterprises.

According to to the process maturity model as proposed by Martin [28], typical growth in performance can be achieved as shown by the boxes in ***Figure 3.3*** under continuous improvement programs.

FIGURE 3.3: GROWTH IN PERFORMANCE WITHIN PHASES

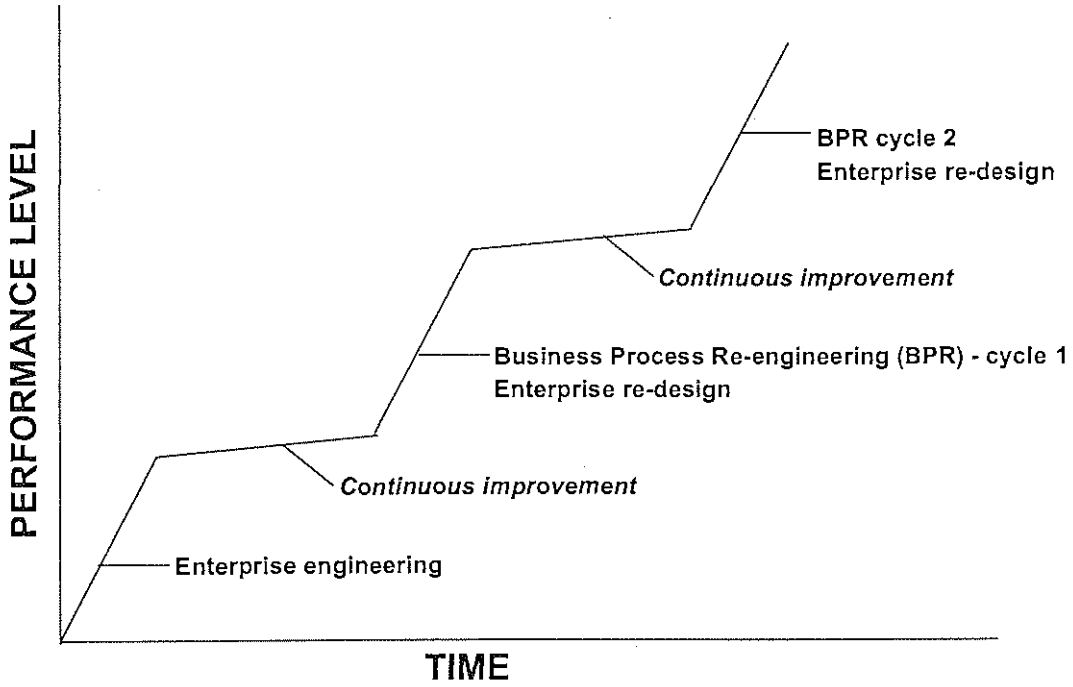


This growth pattern repeats in each evolution in the enterprise's life cycle e.g. every time the enterprise repositions itself with regards to products or capabilities, it starts off with a new empirical design which it incrementally improves to maturity (time allowing).

With a managed enterprise design, regular re-engineering proactively performs all steps in the whole process, including some of the optimisation normally performed in continuous improvement to maintain a higher aggregate level of performance. This leaves management with more time to (between redesigns) adapt, improve and optimise to stay current with incremental changes in the environment.

Such a renewal process, which uses both enterprise engineering and continuous improvement, applied over multiple phases in the enterprise life, may lead to growth in performance as illustrated in ***Figure 3.4*** as adapted from Halé [29].

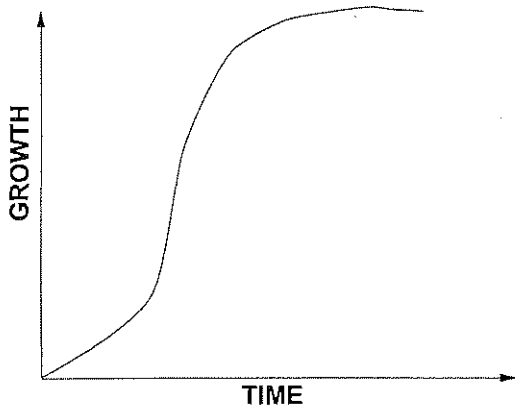
FIGURE 3.4: IMPROVEMENT AND RENEWAL OVER THE LIFE CYCLE



These two approaches to renewal should stimulate the enterprise designer to consider which aspects of the enterprise system are best designed explicitly and analytically and which aspects might be more effectively accomplished through iterative improvement. Obviously iterative improvement is only possible if the enterprise design is flexible enough to accommodate these changes Martin [28].

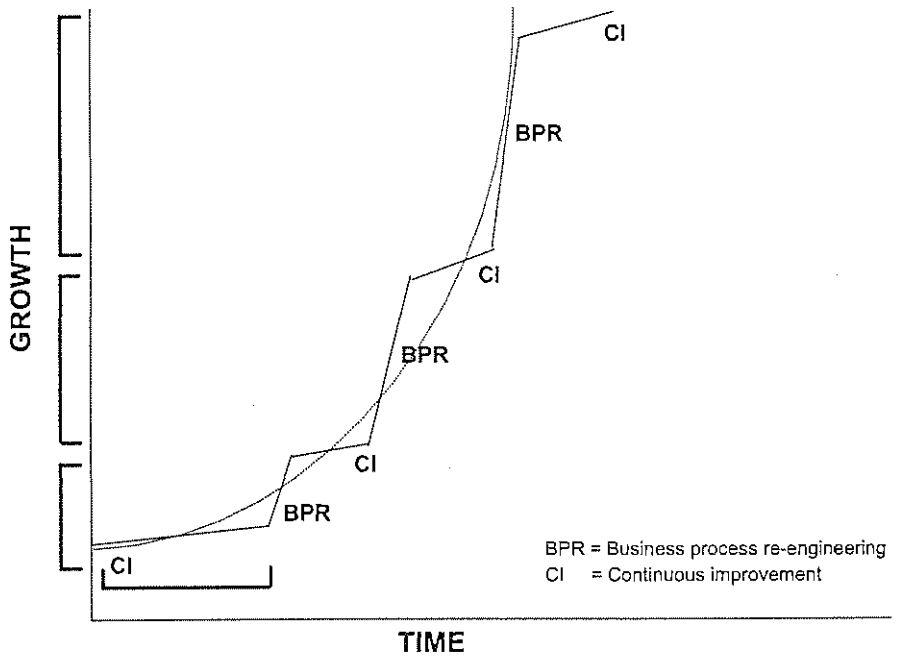
According to Moll [1 - p28] the growth and decline of organisations may be described by a sigmoid curve as illustrated in ***Figure 3.5*** and that the initial phases are normally driven by a reproductive mechanism or a mechanism driven by reproductive mechanisms the growth potential is exponential.

FIGURE 3.5: GROWTH AND DECLINE OF ORGANISATIONS



Whereas continuous improvement with an occasional breakthrough may be able to track the first stages of this curve more and bigger re-engineering efforts are required to sustainably track the potential as shown in Figure 3.6.

FIGURE 3.6: TRACKING GROWTH



From the life cycle context the enterprise designer thus becomes aware that:

- An enterprise needs to be designed from the strategic level down.
- The primary consideration in the enterprise design is what it needs to achieve (the enterprise's goal) in its operational phase.
- A capability to design enterprises is required.
- The feasibility of providing suitable resources and integrating them into a operating organisation is cardinal.
- In its operational phase an enterprise must be able to develop products and their support, develop delivery processes for products and support, produce and support products and market/sell products.
- Enterprises need a capability to maintain their resources and capability.
- The management of resources and value streams must be integral to the design.

From the fact that a system fits into a systems hierarchy, the boundaries of the system, and that it interfaces with an environment, imply that a wider view is required to design a system.

This wider view is provided by assessing a system as part of the host system in a whole system perspective addressed in Chapter 4.

CHAPTER 4

THE WHOLE (GREATER) SYSTEM CONTEXT

THE GREATER SYSTEM CONTEXT

The requirements for a system arise from the greater context of which it forms part. It is in this environment where it has to contribute to the super system it becomes part of and comply with the constraints imposed by the environments it is subjected to. The design of an enterprise is further constrained by the capabilities available in its environment for its design and implementation.

This section places the enterprise system in context with the greater system it forms part of, within the various environments which influence it and with which it interacts in the two major phases of its life cycle, which are of interest to this study namely:

- the development phase, and
- the operational phase.

This document is about the development phase of the enterprise, where we study how the enterprise is established. The design requirements for the enterprise are deducted from the second phase (the operation of the enterprise) which determines the performance requirements for the enterprise system once it is in operation.

The life cycle of an enterprise is unique in that:

- the enterprise to a certain extent creates itself and
- it has the inherent ability to enhance and sustain itself.

In this section we start of by reviewing how the system works which creates the enterprise. It then looks at the environments, which create the need and constraints for the enterprise system. It concludes by looking at how the enterprise operates in its operational phase, from which the functionality required within the enterprise, becomes clear.

4.1 Creating the system

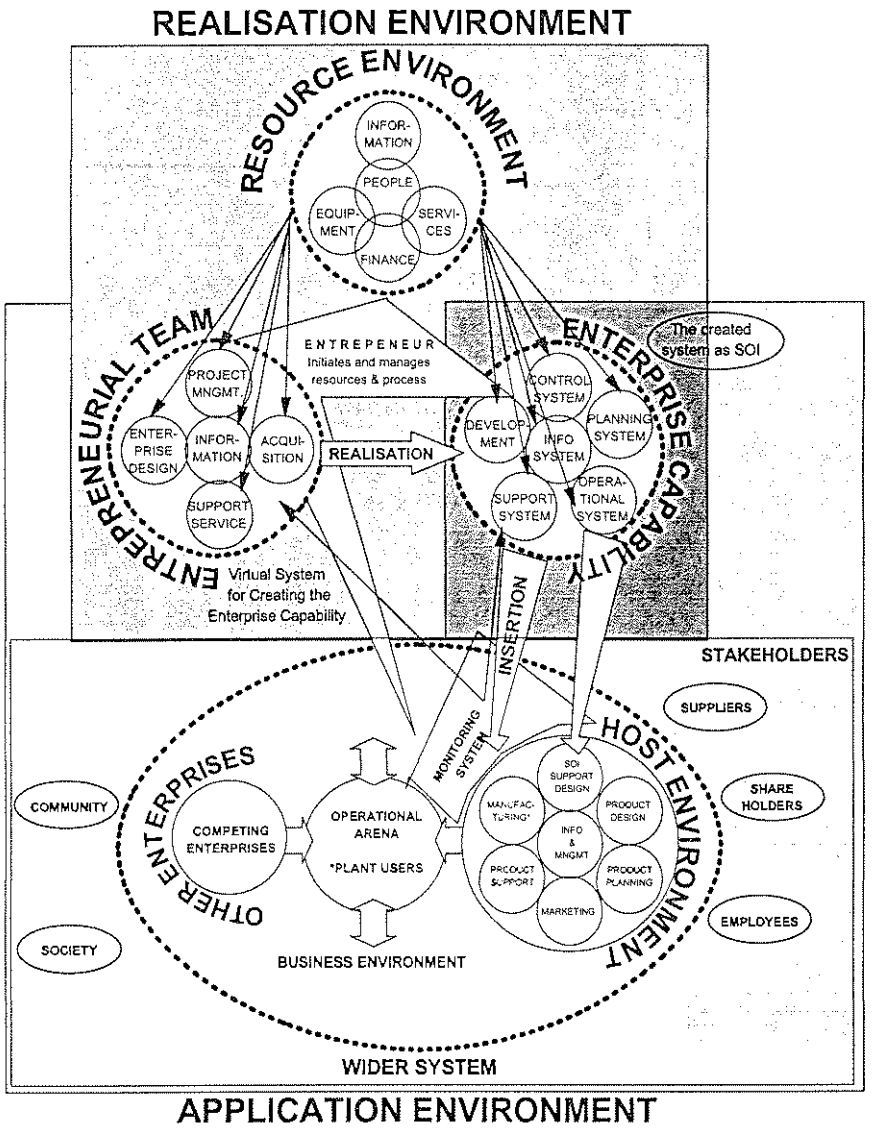
The initial process of creating an enterprise is also known as entrepreneuring. This process is depicted in ***Figure 4.1*** which was adapted from M'Pherson [23] by including the entrepreneur and entrepreneurial team as well as by clarifying and detailing the host and application environments.

The creating of an enterprise is subject to two major environments depicted in Figure 4.1, i.e. the realisation environment and the application environment. Both these environments have important impacts on the requirements for the design of the Enterprise.

The realisation environment is the environment in which the enterprise is created and the application environment is the environment into which the enterprise is implemented and where it will be used to produce its useful output.

Contrary to physical systems, significant overlap may exist between the realisation and application environments for enterprises.

FIGURE 4.1: CREATING THE ENTERPRISE CAPABILITY



4.1.1 The realisation environment

The realisation environment includes the entrepreneurial team who create the system, the resource environment which provides elements for the enterprise and the created enterprise.

The realisation environment has to create the enterprise elements and as such has a major impact on the type of enterprise elements that can be created.

4.1.1.1 The entrepreneurial team

The entrepreneurial team which needs to be constituted before the enterprise can be created, deserves special attention seeing that it may also evolve to become a part of the enterprise once it is established. The need for an entrepreneurial team may place an additional burden on the enterprise designer to first define and establish the capability to design an enterprise before the design of the enterprise can begin.

4.1.1.2 The resource environment

The extent to which resources/capability to perform the enterprise design and the elements by which the design must be implemented can be sourced, constrains the design.

The enterprise designer thus needs to thoroughly research this environment to ensure that the design optimally utilises the available resources, whilst not venturing into the bleeding edge.

4.1.1.3 The created enterprise

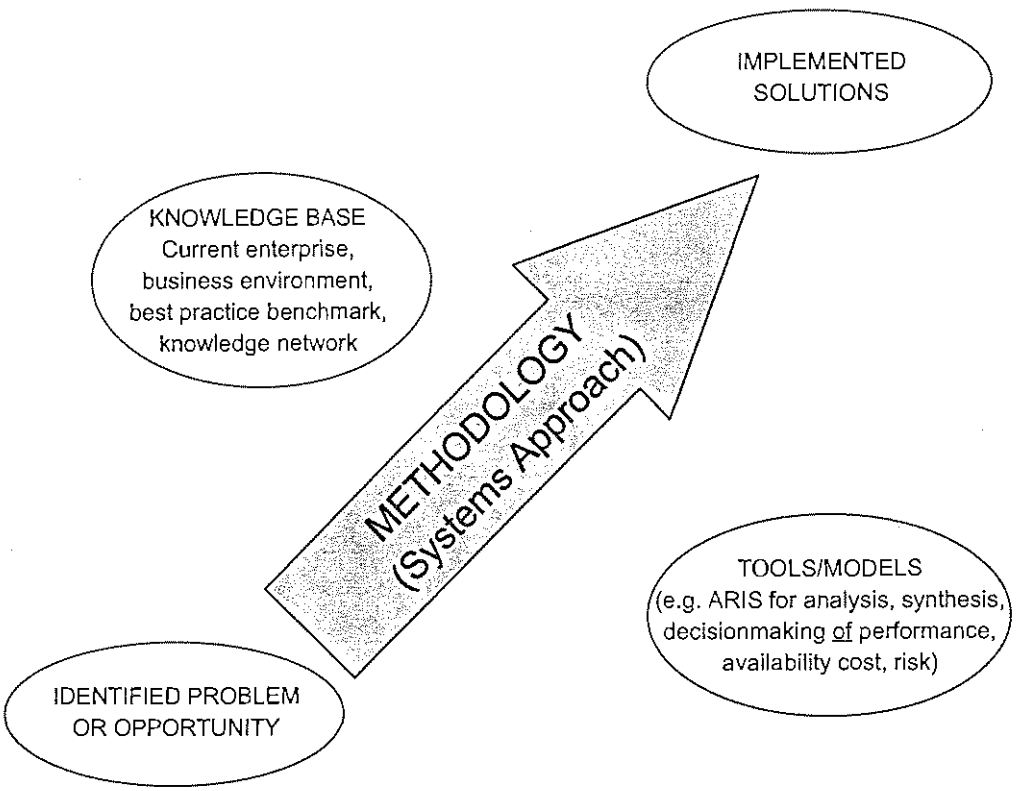
Capabilities within the realisation environment impact the to-be designed enterprise in terms of:

- It's ability to assess the sponsor's real requirements for the enterprise element.
- The quality of enterprise it can envision.
- Ability to translate the vision into a design requirement.
- The alternative implementations that it can create - (function of knowledge).

- How well it can select and specify a preferred system.
- Ability to validate and prove feasibility of the preferred system.
- Whether it is able to migrate the implementation of the enterprise elements.
- Capability to handle the scope of enterprise elements both in terms of size as well as complexity.
- Access to resources.
- Credibility with the client/sponsor.
- Availability and soundness of the methodology.

The aspects of the realisation environment, which the enterprise designer must consider, can be summarised by the generic elements of a development capability as described by Rottier [27] in ***Figure 4.2.***

FIGURE 4.2: A DEVELOPMENT CAPABILITY



4.1.2 The application environment

The application environment can be segmented into a number of elements that directly or indirectly impact on the requirements for the enterprise. These environments are:

4.1.2.1 The host environment

The host environment is the higher level system or environment into which the developed enterprise element is inserted. The host system generates the need for the capabilities provided by the enterprise or enterprise element. In enterprise engineering the organisation which needs a new enterprise capability becomes the host system. The Chief Decision-Maker defines the performance required of the enterprise in the host system. The Enterprise Designer needs to be acutely aware of the importance of this environment both as a source for the requirements for the enterprise as well as the judge of his performance in creating the system. The host environment provides two types of input to the requirements i.e.:

- Desired performance of the enterprise, and
- constraints within which the system must function/operate.

4.1.2.2 Operational arena

The operational arena is the market/business environment into which the enterprise contributes to the host system effectiveness. From this environment the enterprise designer may learn the measures against which the host system, and by implication the enterprise performances, are measured by the market which the host system serves. These requirements may be more stringent than those set by the host environment.

4.1.2.3 Competitors

In the operational arena other competing enterprises are found which also offer products and services and position themselves to fill specific market segments. These competitors constitute a benchmark against which the host enterprise's offerings, and specifically for this study, the enterprise-related aspects, must offer a competitive parity or advantage.

4.1.2.4 Business environment

All the activities of the host system and competing systems in the operational arena take place within the business environment in which they operate. The enterprise designer has to assess this environment in terms of the legal, economic, social, ecological, ethical, resource and other impacts and constraints it may impose on the design of the enterprise in terms of all the stakeholders involved.

The environments discussed above, may impact on both the Enterprise and the products realized by the Enterprise.

Over and above the requirements set for the products to be produced by the Enterprise the way in which these products are delivered to the clients, incorporated into their use and supported while in use also impact the requirements on the Enterprise. It is therefore also useful to review how the enterprise delivers and supports its products once it goes into operation.

4.2 The enterprise system in operation

The primary requirements for an enterprise design depend on its products delivered, markets served, distribution channels and value proposition as well as how effectively it can meet the value system of its customers wrt these criteria. The criteria normally are of the nature of quality(different dimensions), price, speed of delivery, predictability, flexibility and after sales service. These criteria are in turn determined by the needs of the enterprise's customers in terms of requirements for the products or services.

In Figure 4.3 the operation of an enterprise capability is depicted. It shows how the enterprise in its operational phase, delivers products with associated support (which comes with the product), as well as ancillary support (which is supplied separately and may be optional) for its products. These deliverables are inserted into another client's system that becomes the host of the enterprises' products and where the products have to contribute to the outputs of the client system in his environment. Notable is that the client may also have products from other providers in his portfolio.

The products produced by the enterprise may be supported by:

- support integrated in the product,
- ancillary support provided by the supplier, or
- support provided by third parties.

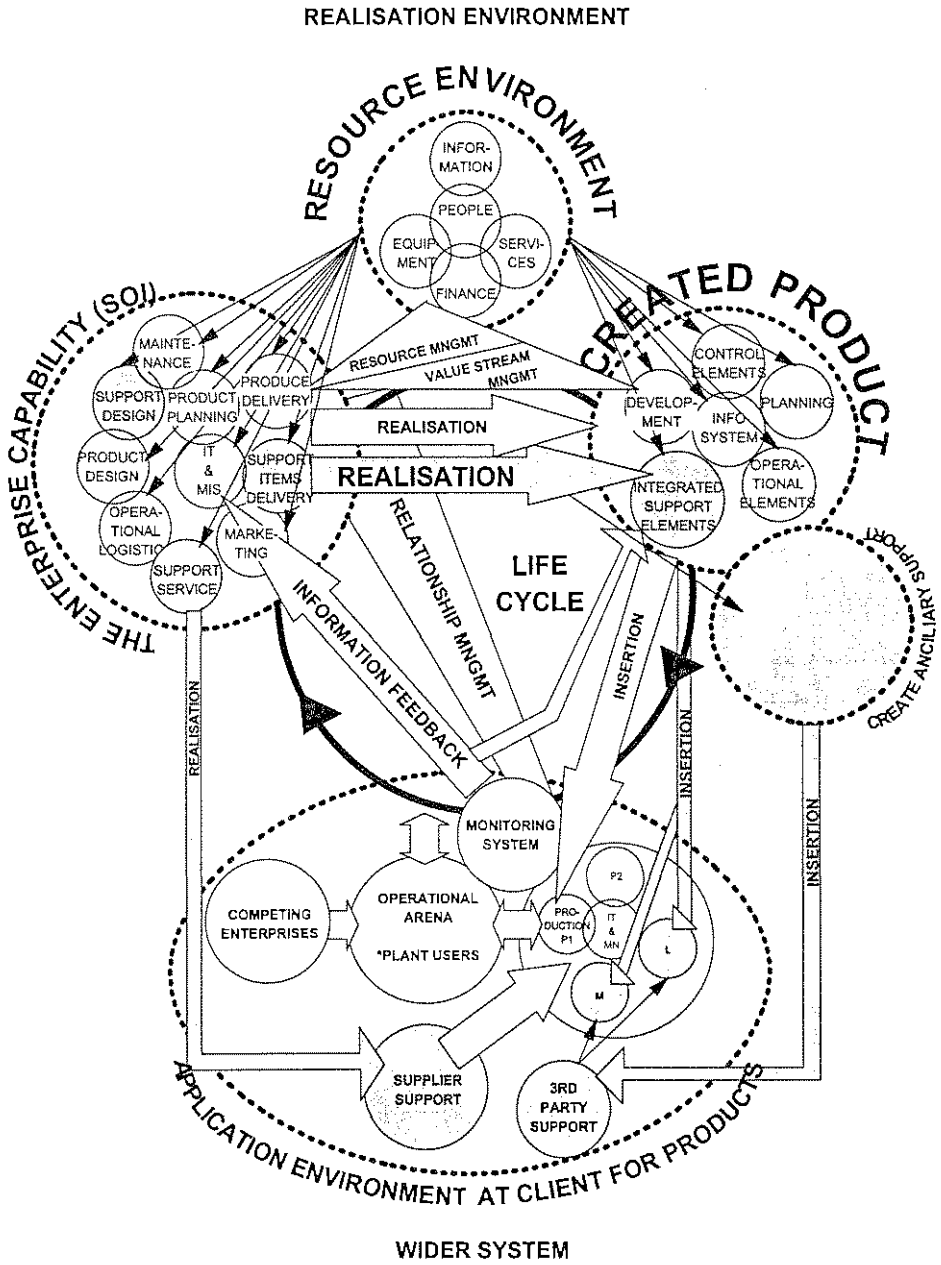
The importance of this is that both production and product support services are the clients of the product and support design.

The deployment of the enterprise's products and services in the client's environment, introduce requirements in terms of the distribution of products and services as well as the integration of the products with the client environment (such as training or integration support). These requirements cover aspects such as the logistic channels, geographic considerations, and packaging, transportation, security and handling concerns for items and as well as logistics requirements for the personnel that provide support services.

The enterprise system in operation has been illustrated for a single client environment in ***Figure 4.3.*** It must however be realized that normally there are many clients for each product. The requirements of clients for the product systems provided by the enterprise, may differ.
This raises the issue with the enterprise designer whether the enterprise should cater for designing a single support system, which all clients have to accept, or perhaps have a generic system, which can be tailored per client.

From the whole (greater) system context the enterprise design thus gleans information regarding the expectations from the enterprise in terms of its products and services and delivery capabilities, as well as constraints from the various environments that impact how the enterprise and its products may be designed.

FIGURE 4.3: OPERATING THE ENTERPRISE CAPABILITY



CHAPTER 5

SCOPE OF ENTERPRISE DESIGN

SCOPE OF ENTERPRISE DESIGN

5.1 Scope of the system of interest

The extent of the work required of the enterprise designer is determined by the scope of what enterprise design entails. This section focuses on what outputs the enterprise design should provide.

Scope may be defined in terms of the manifestations of the enterprise system design when viewed from various perspectives i.e.:

- user requirements
- functional requirements
- design requirements and design implementations
- design activities
- development approach
- business value/case
- contracting
- project management
- specifications
- plans
- analysis
- prototypes
- test results

In order to define the extent of enterprise design and constrain the study, this section:

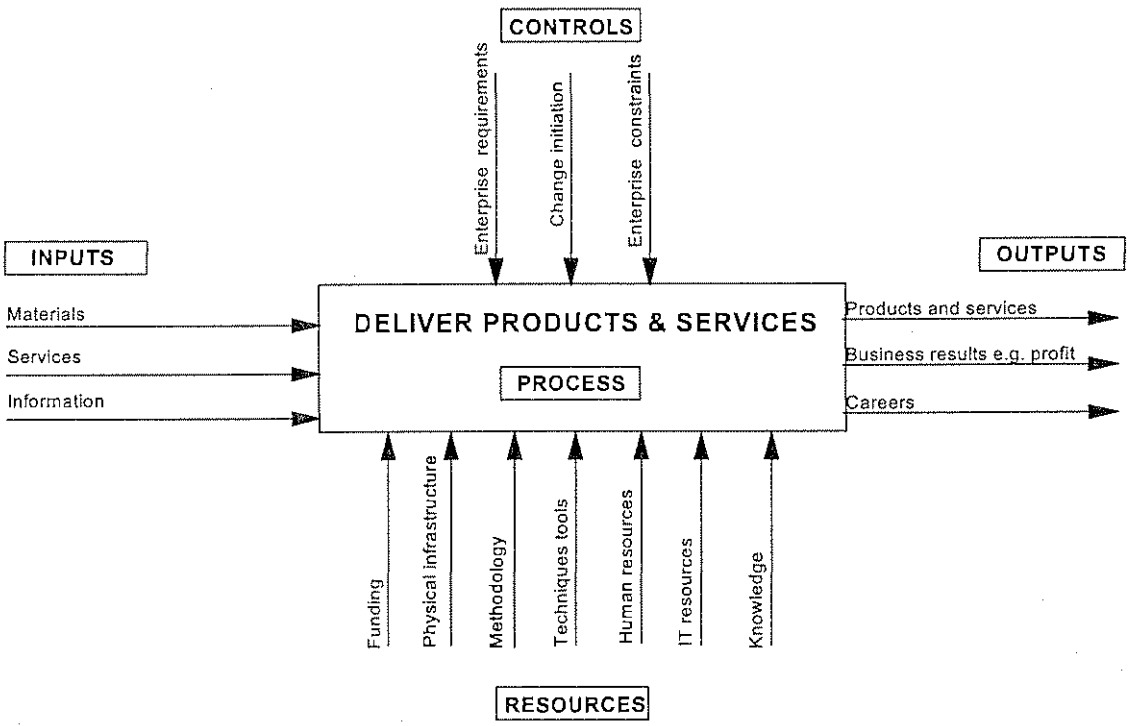
- reviews the functionality required of the enterprise,
- defines the outputs of the system,
- the purpose for which the outputs are produced,
- views the generic workflow procedures required for the enterprise, and

- identifies typical elements incorporated in benchmark implementations.

5.1.1 A top level process view of the SOI

The enterprise system may be defined by way of a macro view. The diagram in ***Figure 5.1*** takes a black box view of the enterprise system in its operational phase and defines it in IDEF (level 0) format. It describes the extent of: inputs, the processes which transform them, the outputs, the resources required to perform the processes and the controls required to regulate and manage the processes.

FIGURE 5.1: IDEF (LEVEL 0) DIAGRAM FOR THE ENTERPRISE



Based on the assumption that the enterprise system will be designed top down, in a goal-oriented manner, this implies that the desired outcomes of the system need to be examined to determine the system objectives and its performance. The next section examines the typical outputs of the system in more detail.

5.1.2 *Outputs of an enterprise*

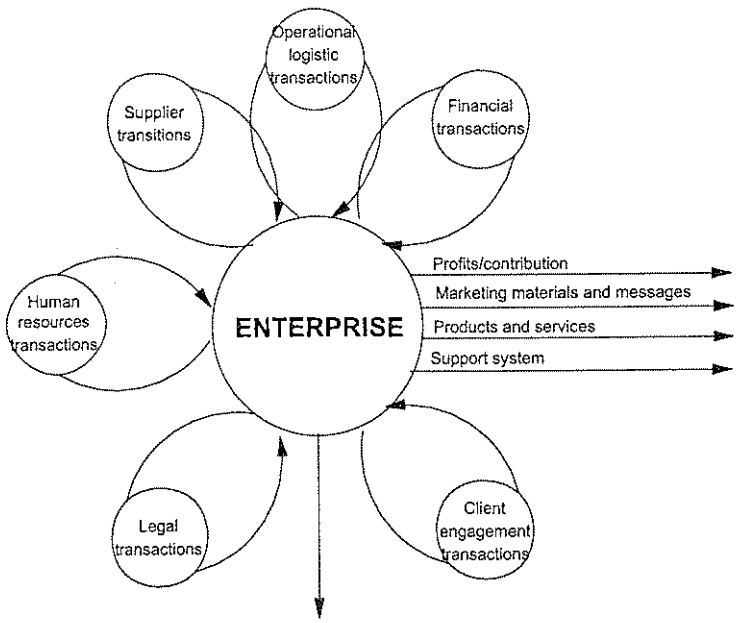
This paragraph generically defines the extent of the outputs, which the enterprise must be capable of delivering. The outputs of the (SOI) are:

- products and services and support for them to clients,
- business results for owners, and
- secure and rewarding careers for employees.

Intermediate outputs to the environment are also generated to facilitate the main outputs e.g. supplier transactions. To enable design the outputs have to be detailed to a level where they are specific enough to be supplied by a known process. Depending on whether a complete enterprise or only some enterprise elements need to be designed, the whole group of elements needs to be exploded.

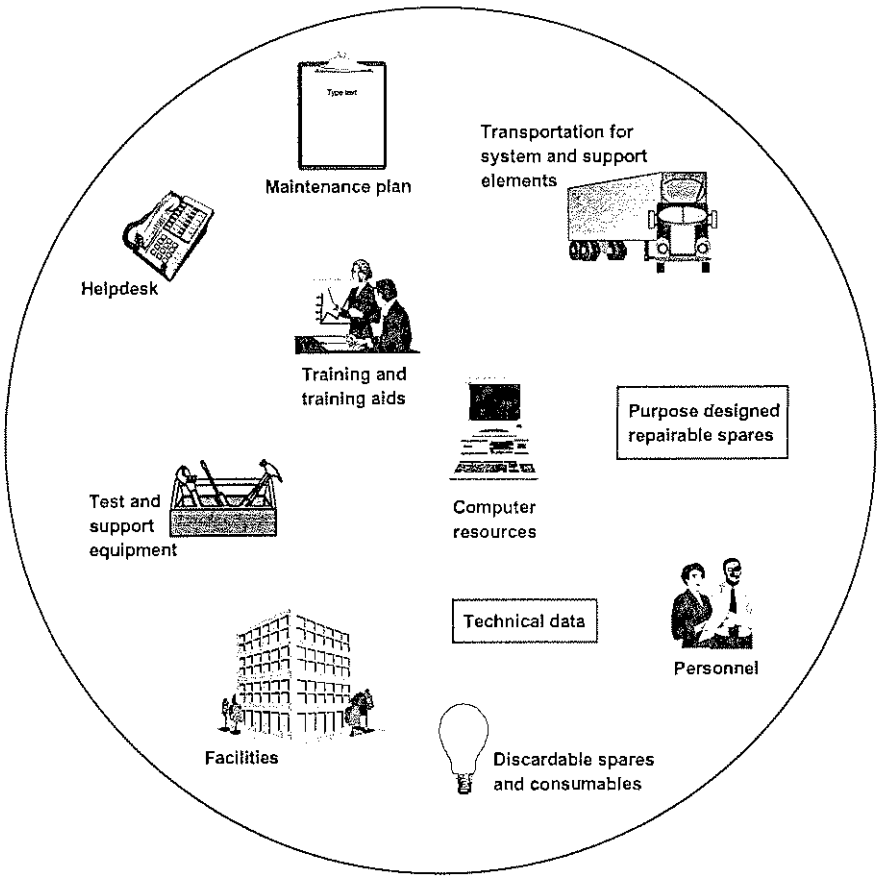
Such an explosion is sown in the example of the generic, final and intermediate outputs of an enterprise, illustrated in ***Figure 5.2.***

FIGURE 5.2: HIGH LEVEL GENERIC ENTERPRISE OUTPUTS



The output of the above enterprise may be exploded further in an area where detailed enterprise design is required such as support services. An example of how support services may be detailed through further levels of analysis is illustrated in ***Figure 5.3*** as expanded from Pretorius [30].

FIGURE 5.3: SUPPORT SYSTEM OUTPUT (SECOND LEVEL)



The enterprise designer can define the types of processes required by analysing the output required. Because of its generic nature a support system, as illustrated above, is analysed to a further level of detail, as example, to yield the following outputs:

- **Technical data**
  - Various levels of maintenance and repair instructions
  - Parts catalogue

- Operational manuals

- **Training and training aids**
  - Training manuals
  - Simulators
  - Computer aided training
  - Diagrams
  - Trainer manuals
  - Tests

- **Design for facilities layouts**

- **Test and support equipment**
  - Specification of standard equipment
  - Designs for special tooling, test and support equipment

- **Discardable and repairable spares**
  - Specifications for the preparation, preservation, packaging and marking of spares
  - Recommended spares list

- **Personnel**
  - People specifications for operational, maintenance and stores personnel

- **Maintenance plans and schedules**

- **Host and third party support services**
  - Specifications for support services to be provided by the host system
  - Specifications for support services to be provided by third parties.

- **Transportation and handling**
  - Specifications for standard transportation and handling equipment
  - Designs for special transportation and handling equipment

- Instructions for use of transportation including packing of support items
- Instructions for handling of support items

- **Integrated support management plan and system.** To ensure fit, synchronisation and effective application of all the above elements.

5.1.3 Performance objectives for an enterprise system

The performance objectives for the enterprise, in terms of its stakeholder interests, determine the criteria against which the enterprise design is measured. The key objective for enterprise elements are to realise the optimal contribution to business results through delivery of its products to markets and clients who in turn derive benefit out of the operating output and effects provided by the products.

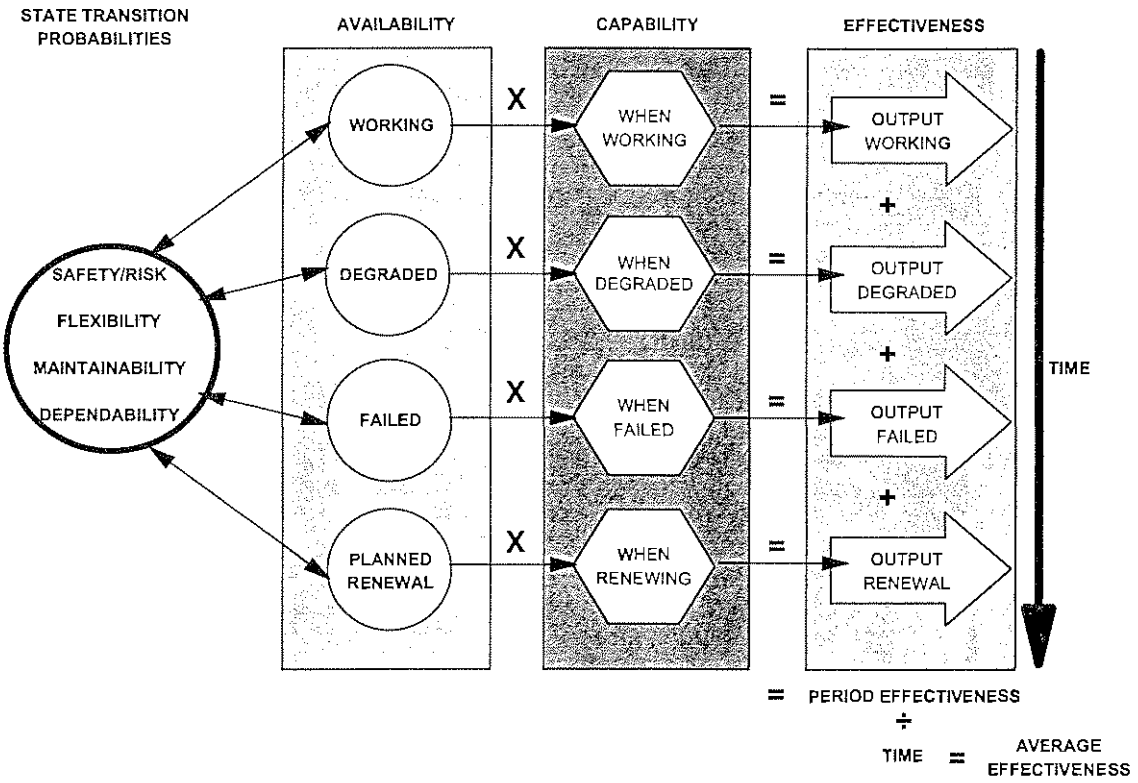
This means that the enterprise system element must:

- Optimise current and future profits, through
- primarily enable/contribute to/or facilitate the delivery and support of products and services and secondly,
- negate/cancel/prevent ageing and deterioration of the enterprise and thirdly,
- correct failures of the enterprise so that the system maintains a high availability and dependability while operating safely and at rated capacity, and lastly
- adapt to changes in the requirements.

In this way enterprise effectiveness is achieved as illustrated in ***Figure 5.4***.

Maximum contribution to the business worth of the system also requires that the establishment of the enterprise i.e. enterprise design and implementation must be done economically.

FIGURE 5.4: CONTRIBUTIONS TO SYSTEM EFFECTIVENESS



It must be noted that the degree to which the enterprise design provides for adaptability (Kaizen ready) as well as the enterprise engineering capability provided in the business substantially influences both the state transition probabilities and capability. The need for adaptability is influenced by the volatility in the enterprise environment.

The way in which the various aspects of the enterprise design contribute to system cost effectiveness is illustrated in ***Table 5.1***.

TABLE 5.1: RELATIONSHIP BETWEEN DESIGN AND PROFIT EFFECTIVENESS

Design	Profit Effectiveness											Risk					
	Effectiveness			Life-cycle costs								Through put flexibility				Adapt ability	
	Availability	Dependability	Capability	Capital	Operating	Risks	Maintenance	Logistics	Downtime	Modification	Phase-out	Capacity	Scope			Lead-time	Cost
													Product	Channels	Markets		
Performance design			X	X	X	X				X	X	X	X	X	X	X	X
Reliability design	X	X	X	X		X	X		X	X	X						
Maintenance/support design	X	X	X	X	X	X	X	X	X								
Logistic design (supply chain)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X

Table 5.1 emphasises that the enterprise design must ensure that, from a reliability point of view no untoward deterioration occurs in the quantity and quality of the capability of the system while it is working.

Further the support design for the enterprise should influence the reliability design to reduce failure rates and thereby contribute to dependability whilst itself providing an effective maintenance design to restore the system after crash downs.

The support design must also contribute to the availability of the system by ensuring the minimum down times for planned maintenance activities by:

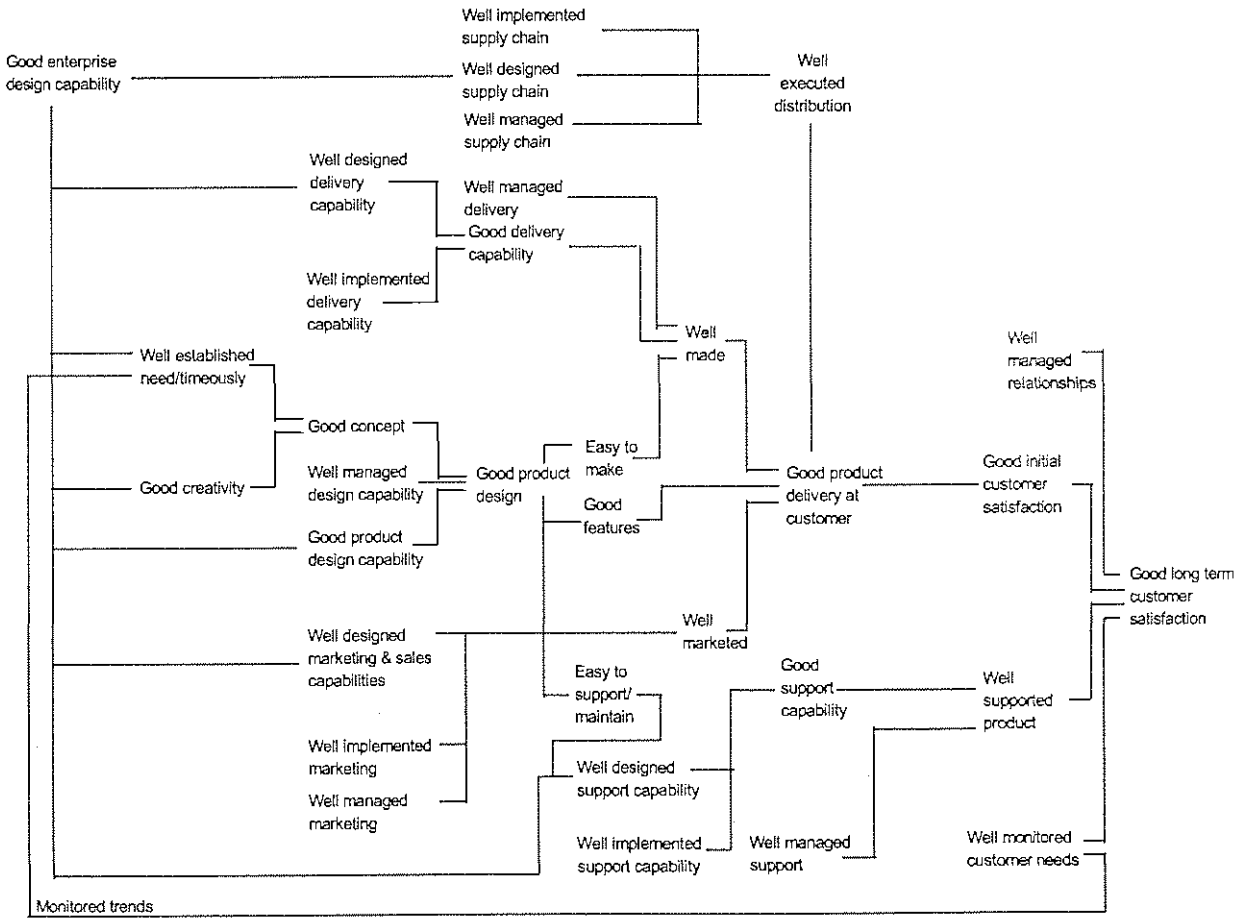
- Influencing the reliability design.
- Designing efficient maintenance processes for inevitable planned maintenance activities.

- Efficient and effective design of supply support to ensure high service levels.

The figure also indicates the efficiency measures in terms of life cycle cost to be employed in evaluating the designs.

An overview of the overall objectives for designing an enterprise and how this contributes to customer retention is summarised in ***Figure 5.5***.

FIGURE 5.5: HOW ENTERPRISE DESIGN CONTRIBUTES TO CUSTOMER BENEFIT



CHAPTER 6

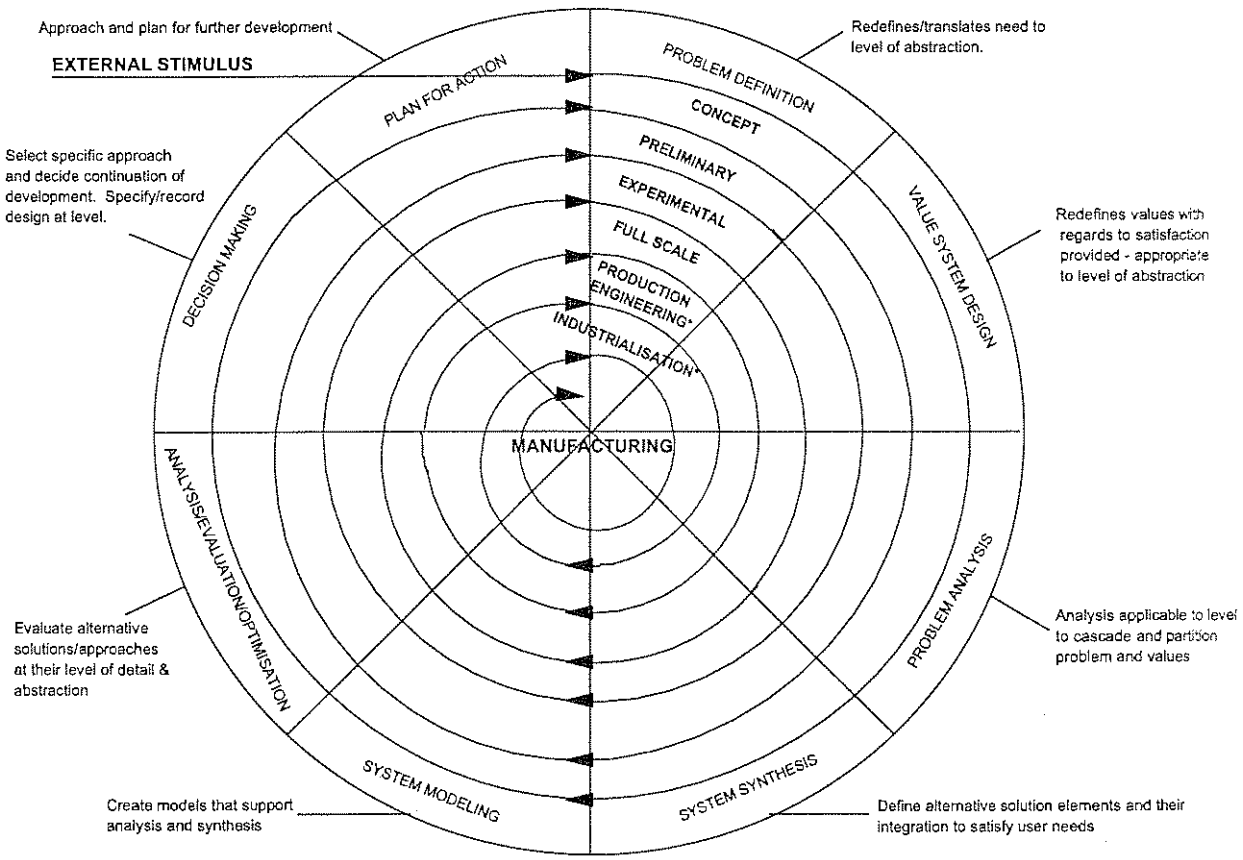
THE ENTERPRISE DESIGN PROCESS

ENTERPRISE DESIGN PROCESS

6.1 Development process overview

According to Hall [31] development is an iterative converging process of an evolutionary nature. This is illustrated in ***Figure 6.1*** based on Hall [31] and McPherson [23].

FIGURE 6.1: SYSTEM DEVELOPMENT PROCESS



* *Note that in this model the delivery system development phases are designated:*

- *Production engineering (which includes designing the delivery capability and changes to the product design for manufacturability), and*
- *Industrialisation (which includes the implementation of the delivery capability and pre-production to prove the capability)*

Figure 6.1 is based on a scenario where extensive costly development is required both in the design of the products of the enterprise and the design and realisation of the delivery capabilities. Each revolution of the iterative converging process represents a development cycle. The model indicates four cycles of development to achieve a qualified product design and two cycles of development before a stable delivery capability is established. Within each development phase there are eight steps which are repeated. The emphasis shifts from the earlier steps to the later steps as development progresses from phase to phase.

Despite the focus on steps within phases, attention is given to the critical constraints and key factors from following phases which appear in the non-focus steps. Concurrent engineering attempts to shorten development time by overlapping phases.

6.1.1 Development phases

The four product development phases are:

- Conceptual development
- Preliminary development
- Experimental development
- Full scale development

The two production development phases are:

- Production engineering
- Industrialisation

The difference between the phases lie in the level of abstraction and the amount of attention to detail in the phases, e.g. in conceptual development the focus is on defining the design problem and value system whereas full scale design emphasises detailed design, alternatives, trade-offs and specifications.

6.1.2 *Steps in the development phases*

Fundamentally the steps in the framework provide for:

- Re/definition of the requirements arising from the external environment or previous phase interpreted to the level of abstraction for the phase envisaged so that it is clear what this iteration of design has to achieve.
- Re/definition of the value system of the "client" translated and interpreted to the appropriate level of abstraction to guide and focus design effort and provide a basis for trade-offs.
- Requirements/problem analysis that partitions and cascades requirements to a level where adequate allocation of functionality to implementation can be established for the purposes of the applicable phase.
- System synthesis - which identifies one or multiple alternative "low level" implementations and identifies possible ways in which these may be integrated to a system level.
- Modelling - which selects and develops tools to cascade and partition requirements and assess the possible alternatives for sifting and synthesis to a system so those alternatives can be traded off and evaluated.
- Analysis, evaluation, optimisation where the alternative(s) proposed is evaluated in terms of appropriate measures for the phase.
- Decision-making and recording is where an alternative is selected, its value/worth predicted and agreement is reached on the case to proceed with development. Where further development is recommended, the specifications for the next phase are formalised. In all cases the business case is recorded.
- Planning further development - reviews the development approach, determines plans, budgets and milestones for the next phase of development, which then represents the incremental risk of proceeding with the development.

6.2 Product development objectives

The systems engineering approach focusses on the management of risk in each iteration of development for both the product and delivery system. In product development it is handled as follows:

6.2.1 Conceptual development

- The conceptual phase focuses on defining the clients' needs in an accurate and comprehensive way as well as thoroughly understanding his value system. The other steps in the framework are performed prefunctionally to establish:

  - The validity of the clients' needs
  - Technical feasibility of complying with the need (product concept)
  - Feasibility of support (support concept)
  - Ability of the existing/envisaged enterprise to design and deliver the product
  - An approach to develop further with optimal risk i.e. trade-off between managing development risk and urgency to get to market
  - Business feasibility (business potential)

6.2.2 Preliminary development

- In the preliminary development phase the focus is on selecting the correct system concept i.e. the translation of the functional requirements of the system from the conceptual phase to technical design requirements for subsystems - suitably partitioned to match the development organisation whether in-house or outsourced. This phase provides:

  - Development specifications per subsystem (including integration)
  - Associated development approach per subsystem (including integration)

- Firm sourcing decisions for both production and support
- Confirmation of technical feasibility including manufacturability and supportability
- Operational feasibility (operability)
- Revised development approach for product, production and support
- Plans and budgets for the next phase
- Revised and upgraded preliminary business case

6.2.3 *Experimental development*

- Experimental development is only required if a system segment poses a high risk in detail development. In such a case it is normally prudent to fully develop and qualify the segment of the design before it becomes a showstopper. The segment design is qualified by testing it whilst simulating the rest of the system. The process followed is similar to that used in full-scale development.

6.2.4 *Full scale development*

- Full-scale development focuses on realising the development specifications and achieving an integrated implementation for the system. It is thus about detail structures, flows, interfaces and optimal component selections. This phase produces:

  - Detail product designs
  - Detail support designs
  - Prototypes
  - Test reports which prove the system complies with its requirements
  - Revised plans for production engineering and industrialisation
  - Confirmed sourcing decisions
  - Plans and budgets for the next phase
  - Final business case to proceed to production

To summarise, this phase provides a design in the form of design documentation that has been proven to perform in such a way that it will satisfy the requirements of the clients.

6.3 Delivery process development objectives

The two phases in production support/delivery system development are handled as follows:

6.3.1 Production engineering

- Production engineering may also be broken up into phases i.e. conceptual and preliminary design and detail design where cost and risk justifies it.
- Preliminary production engineering establishes the conceptual design for the delivery system (either new or adaptations to the existing system). In this phase the delivery demands are reviewed and a delivery approach developed which includes:

    - Selecting the type(s) of delivery systems to cope with the expected product market life cycle
    - Taking of sourcing (where-buy) decisions with respect to product
    - Refining of product design to adapt to manufacturability and supportability requirements overlooked during earlier development (Changes at this late stage can be extremely disruptive and should be avoided by including and enforcing manufacturability and supportability requirements in the product design criteria.)
    - Taking make-buy decisions with respect to the delivery and support capability
    - Design of process flows and process type selection down to activity level
    - Allocation of tasks and processes to production/support resources

- Syntheses of equipment, infrastructure layouts, software architectures, database architecture, delivery manpower structures and knowledge architectures.

This phase serves to prove the feasibility of delivering and supporting the product over its envisaged life cycle.

Full scale production engineering provides the detail design for the delivery and support capability. The output of this phase includes:

- Detail designs or specifications for production and support delivery items i.e.:
  - Equipment
  - Facilities
  - Job/man specifications
  - Work instructions
  - IT systems and IT infrastructure

6.3.2 Industrialisation

Industrialisation procures and implements the delivery and support capability which enables the enterprise to satisfy its customers demands and proves through pre-production that the capability complies with the requirements.

The outputs of this phase includes:

- The operational system:
  - Computer programs and populated databases
  - IT infrastructure for operations and support
  - Buildings and facilities
  - Logistic equipment
  - Additional production equipment
  - Trained operational personnel

- Trained support personnel

- Management system for:
  - Operations
  - Inventory and distribution
  - Maintenance
  - Operational and support monitoring
  - Configuration management

- Distribution system
- Inventory and materials handling, preservation and packaging system

- Pre-production outputs:
  - Products and support items and services
  - Proof of capabilities to distribute to markets
  - Proof of actual costs confirming the business case
  - Capacity and service level test results

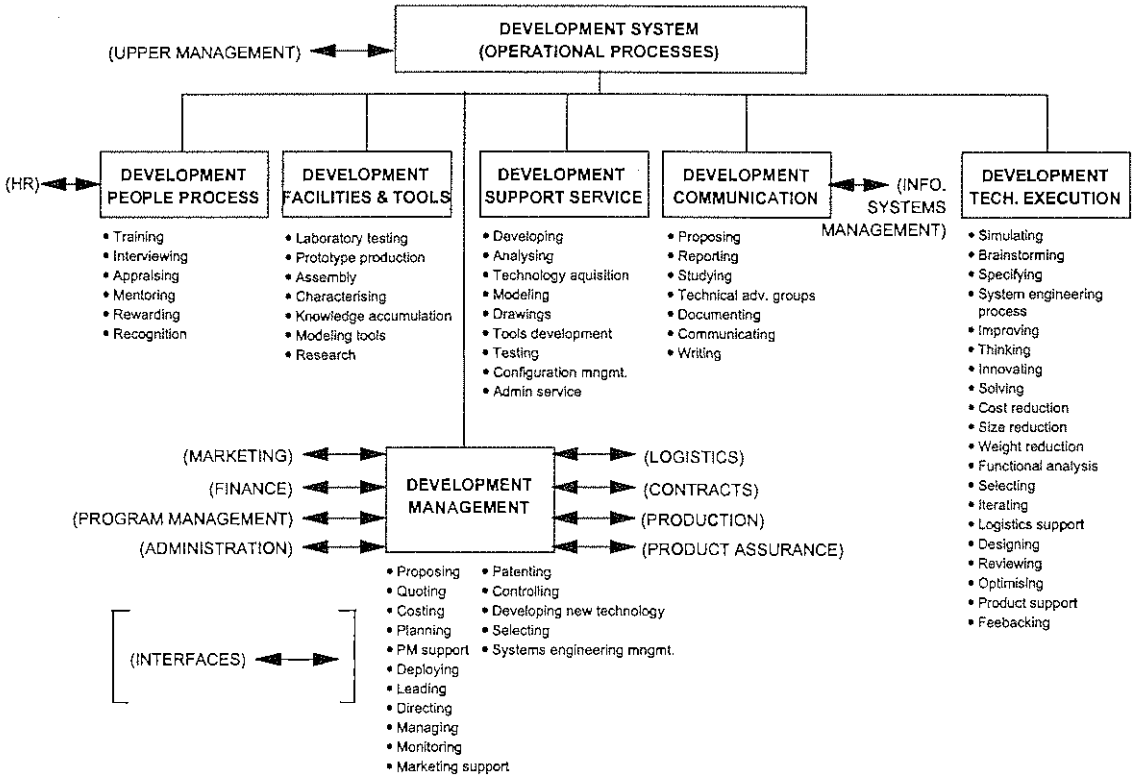
The iterative converging process for development described above provides insight for the enterprise designer into the generic process requirements in a development capability. This insight applies both for the capability to design enterprises as well as to determine what functions the development capability in the to-be-designed enterprises has to provide.

6.4 Development process implementation

Another perspective on what an enterprise design for a development capability entails is obtained by reviewing a possible functional implementation, illustrated by an example from Hunger [33] adapted for consistency with enterprise engineering terminology. This model depicts development management as a separate function/ process which illustrates the principle that the management/control function is cascaded and partitioned with the analysis from enterprise level to enterprise sub-functional level.

The example in ***Figure 6.2*** show the processes and facilities by which a development capability may be implemented and how they interact with the rest of an enterprise system.

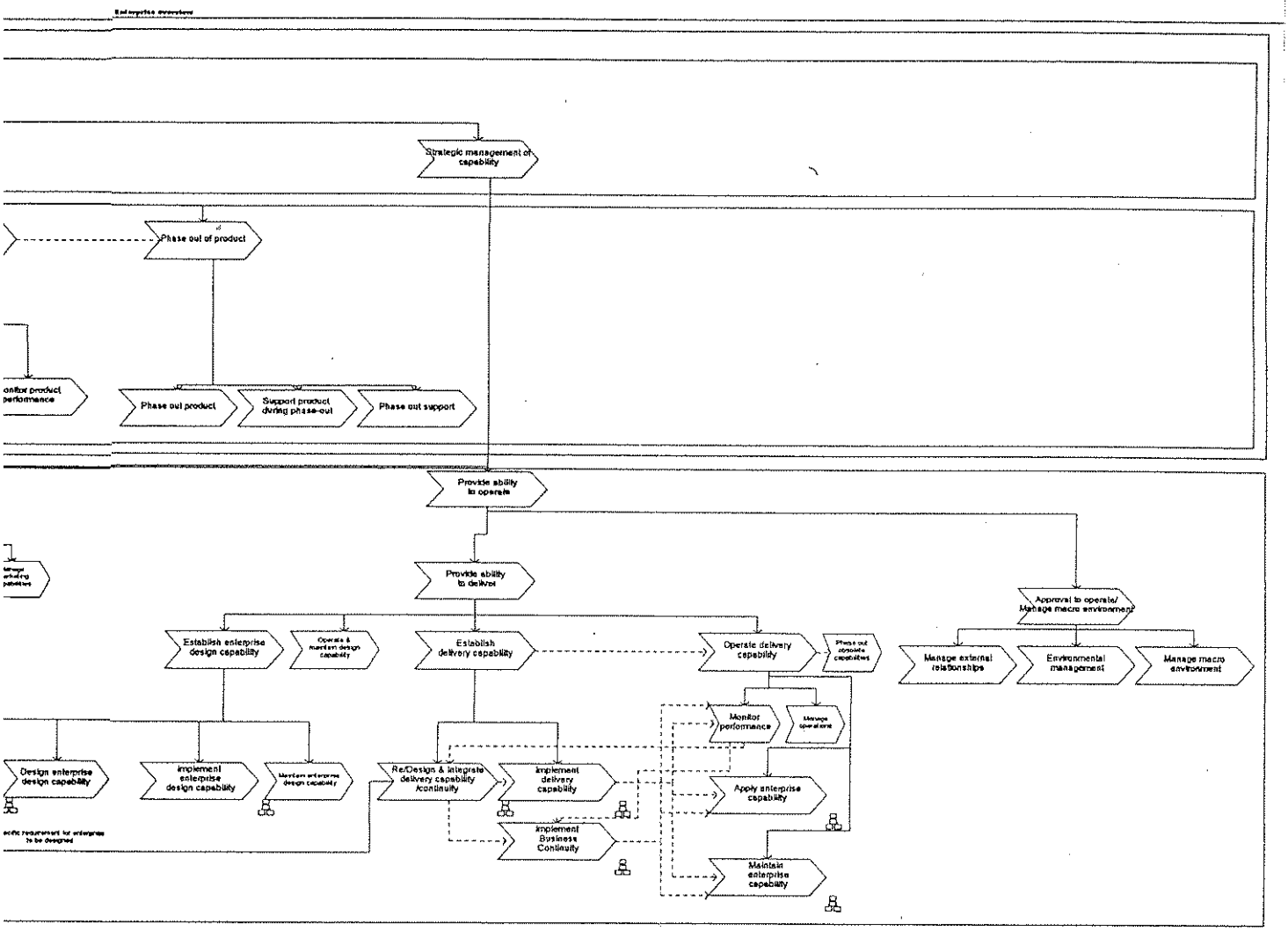
FIGURE 6.2: A FUNCTIONAL IMPLEMENTATION OF A DEVELOPMENT FUNCTION



This perspective provides the enterprise designer with ideas as to the type of low level functions required in a development capability for an enterprise.

6.5 Generic enterprise design (process view)

The foregoing discussion around a development capability as part of an enterprise may be extended to the whole enterprise. The extent of the task of an enterprise designer, is illustrated in the generic overview process flow diagram for an enterprise developed by the author and shown in ***Figure 6.3***.


Strategic management of capability
Phase out of product
Phase out product
Support product during phase-out
Phase out support
Provide ability to operate
Provide ability to deliver
Approval to operate/ Manage macro environment
Establish enterprise design capability
Establish delivery capability
Operate delivery capability
Manage external relationships
Environmental management
Manage macro environment
Monitor performance
Design enterprise design capability
Implement enterprise design capability
Re/Design & Integrate delivery capability /continuity
Implement delivery capability
Apply enterprise capability
Implement Business Continuity
Maintain enterprise capability

This diagram was modelled in the ARIS tool from Scheer Technologies. The model distinguishes between core value streams and supporting value streams – with the core value streams split between a strategic and tactical level. Within the levels the value streams are split according to the product life cycles. The enterprise design is essentially established in the strategic and supporting processes.

FIGURE 6.3: GENERIC OVERVIEW PROCESS FLOW DIAGRAM

6.6 Systems Engineering integrates development

This section defines System Engineering (SE), reviews its integrative nature and provides insight into the methodology. This methodology is employed in the process of designing the conceptual capability. The SE Methodology will also form the backbone of the design process, which is used in the Development Capability as part of the enterprise design.

6.6.1 Defining Systems Engineering

According to the DOD [37] Systems Engineering is:

"An interdisciplinary approach encompassing the entire effort to evolve and verify an integrated and life cycle balanced set of systems, people, product and process solutions that satisfy customer needs. Systems engineering encompass:

- the technical efforts related to the development, manufacturing, verification, deployment, operations, support, disposal of, and users training for system products and processes;
- the definition and management of the system configuration;
- the translation of the system definition into work breakdown structures;
- development of information for management decision-making."

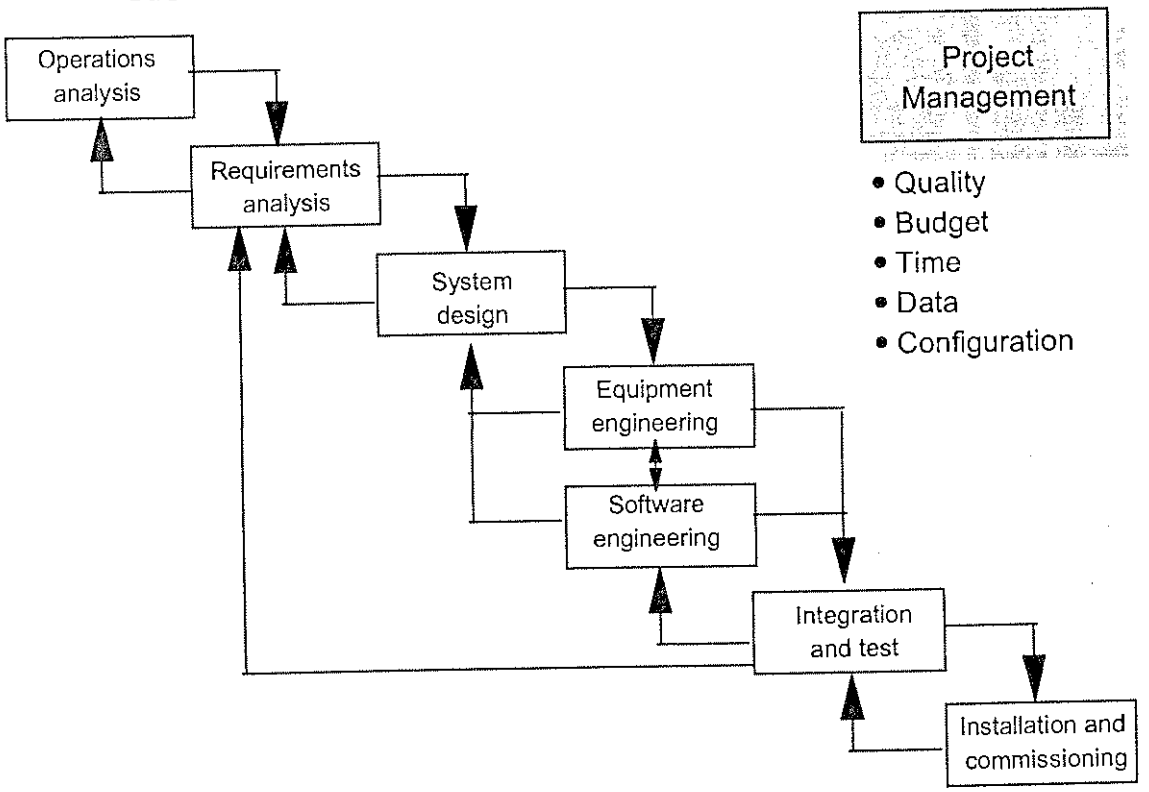
6.6.2 Properties of Systems Engineering

Systems engineering follows a development approach which in an iterative and evolutionary way cascades a problem through decreasing levels of abstraction to a solution. The process employed is logical and systematic working through analysis and allocation of requirements to alternative low level solutions and systematically synthesising these to system solutions. The whole process is goal seeking in that requirements and constraints are cascaded with functions and quantified right down to low level requirements.

Systems engineering takes cognisance of the whole system i.e. all aspects of the greater/higher level systems and their environments as well as the whole life of the system from conception to phase out.

The ultimate objective of Systems engineering is to facilitate and integrate the activities of the whole spectrum of engineering technologies toward the achievement of the system of interest. As such the systems engineering methodology is interpretative from market through functional to physical requirements by a phased approach as illustrated in ***Figure 6.4*** from Hitchens [43]. The approach continuously reviews the feasibility of achieving a system from a technologically, organisational and business perspective. Systems engineering provides for progressive risk reduction. Functional analysis also known as process analysis in enterprise engineering forms the core of the Systems engineering methodology.

FIGURE 6.4: A PHASED APPROACH TO DESIGN OF SYSTEMS



6.6.3 *Systems engineering methodology*

Since the Systems Engineer's methodology forms the backbone of the development model and since the author proposes that the Systems Engineering (SE) methodology can be directly applied in the engineering of enterprises, it is briefly reviewed here.

The SE methodology essentially comprises the systematic identification of system requirements, establishing their validity for development, specifying a system functionally and "proving" it through conceptualising a baseline solution. A baseline solution is a concept implementation for a system with an accompanying development strategy that is feasible from a technical, capability and business point of view.

Once the requirements are clear and verified the methodology provides an approach for handling the inherent complexities of system problems by cascading and partitioning the requirements functionally, to a level where implementation can be achieved in terms of:

- elements by which the required functionality can be achieved, and
- ability to allocate design tasks to development resources or capabilities.

The Systems Engineering methodology further provides a means for identifying alternatives at a detail system level, and sifting and trading off of these alternatives against requirements and each other. It also systematically allocates all requirements to low level elements. The low-level elements are grouped/synthesised into logical sub-systems by design discipline/group and in terms of standard design elements/units/modules.

Alternative sub-systems are again sifted against requirements at their level and traded off against each other. Preferred sub-systems alternatives are subsequently synthesised/integrated into higher levels until the system level is reached.

In this process the integration activities required between the system elements are defined so that they can be designed and managed by systems engineers. Integration is required amongst operational system elements, the operational and support system, and with the operational and support environments.

Extensive use is made of modelling and value systems both in the analysis and partitioning of functions and the allocation of requirements to the low level functions as well as in the synthesis of performance and other figures of merit to system level.

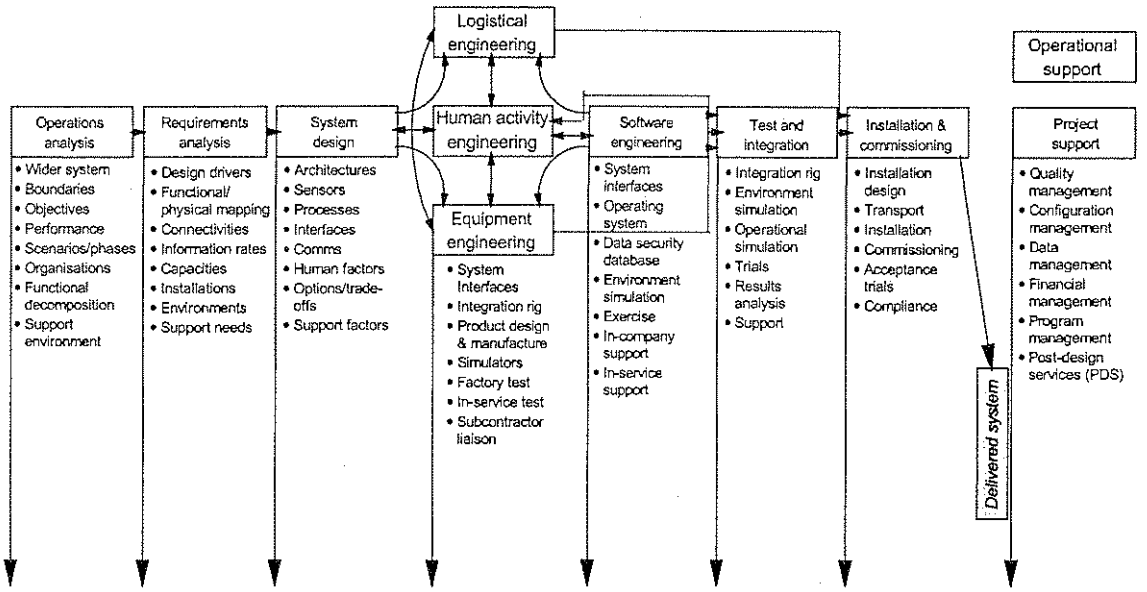
Valuation techniques are employed to assess the various worths of system alternatives (with due consideration for scenario influences) and through value systems combine the various worths to overall system worth.

Decision support theory is applied in the selection of alternatives at element, sub-system and system level to determine preferred alternatives for synthesis and ultimate implementation.

6.6.4 Systems Engineering Activities

In order to give a better feel for the scope of Systems engineering the typical activities for a physical type system are given in ***Figure 6.5***.

FIGURE 6.5: SYSTEMS ENGINEERING ACTIVITIES



The application envisaged obviously requires that the activities be tailored to the design problem at hand. For the design of an enterprise capability the analysis and system design activities are not seriously affected. At the end realisation level however major tailoring is required to accommodate a design, which utilises level 6 sub-system as its elements (refer to system hierarchy Figure 2.1).

6.6.5 Systems Engineering Tools and Techniques

A shadow-board displaying the generic systems engineering tools and techniques is shown in ***Figure 6.6***. This shadow-board defines the capability profile for an enterprise designer who wishes to system engineer an enterprise.

FIGURE 6.6: THE SYSTEMS' ENGINEERS TOOL-SHADOWBOARD

Operations Analysis	***Requirements Analysis***	***System Design***	***Project Engineering***	***Integration and Test***	***Installation and Commissioning***
Solution feasibility and performance	Requirements consistency and completeness	Design options, interfaces, trade-offs and specifications	Configuration, compatibility, interchange	Test environment	Customer acceptance

Scenario Models	System Models			Environment Simulation	
	Relationship Models				
System Boundary Models	Requirements Tools			Threat Simulation	Acceptance Models
	Human Engineering				
	Logistics Models (e.g. LSA)			Sub-system Simulation	
Risk Models		RAM/FMECA			
Functional Decomposition	Networks and Architectures		Configuration management tools		
	System Prototyping		Interface control tools		
	Functional/physical Mapping		Data management tools		
System design and engineering framework model					
Cost, planning and scheduling tools and models					

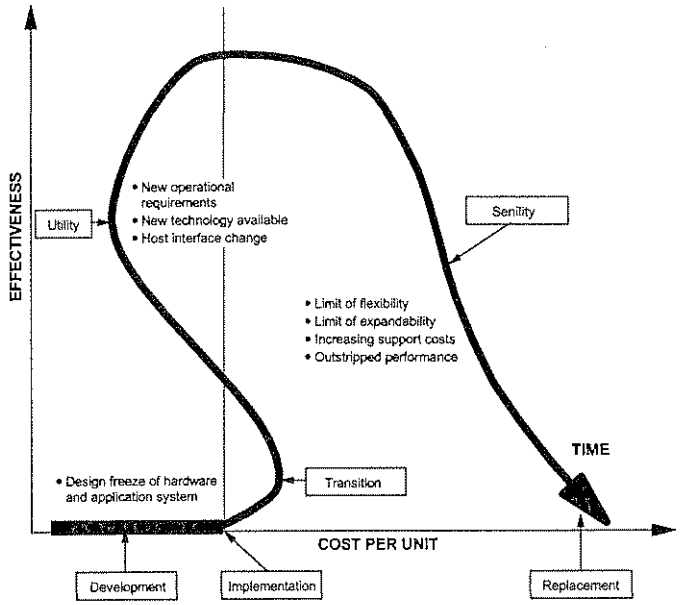
6.7 Providing for re-design

During the life cycle of an enterprise the product portfolio matures and ages, the environment changes, competition moves the goal posts, technology provides new opportunities and the productivity of the enterprise declines. All these factors substantially impact the adequacy of the performance of the enterprise, often to such an extent that re-design becomes imperative.

6.7.1 *Impact of product portfolio*

From literature [43] it is well known that products and enterprises start-up, grow, reach maturity and decline unless they can move into a second life. This phenomenon can be depicted from a technical performance perspective in a life cycle as shown in ***Figure 6.7***.

FIGURE 6.7: TECHNICAL PERFORMANCE PERSPECTIVE ON THE DEVELOPED SYSTEM'S LIFE CYCLE



This technical performance perspective sensitizes the enterprise designer to some major aspects in the operational life of the enterprise's products which need to be monitored for their potential to deteriorate the enterprise design.

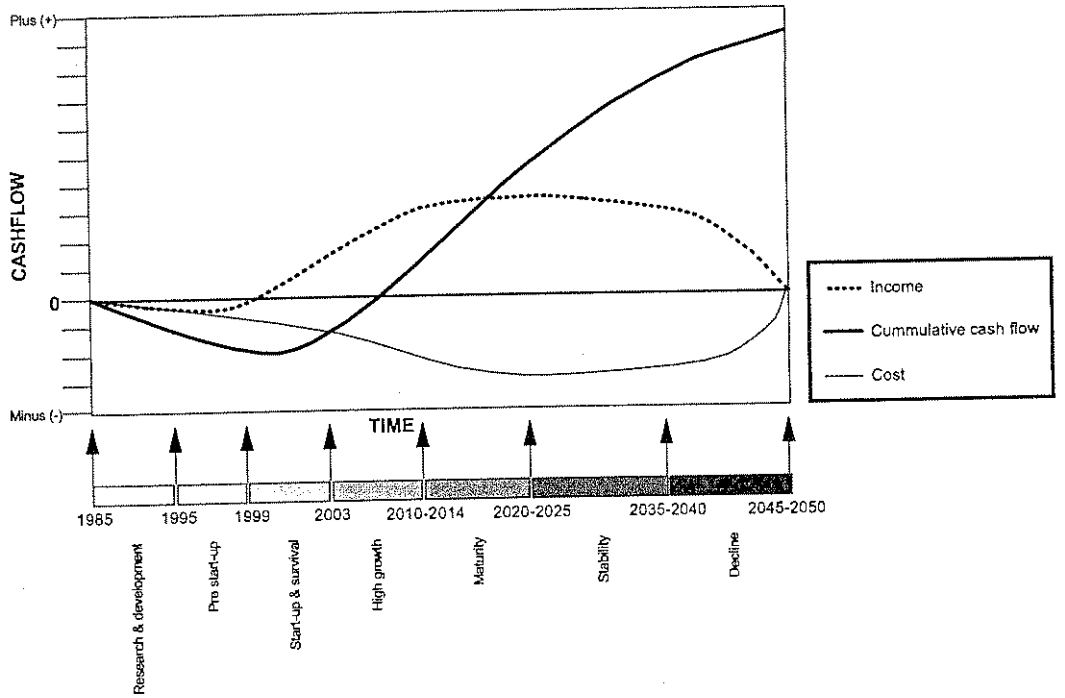
These include that:

- development costs only contribute to the cost per unit of production;
- the importance of throughput on effectiveness;
- changes in market needs and technology adversely affect efficiencies;
- the learning curve and sales growth have great impact in start-up.

6.7.2 Business impacts in life cycles

A business perspective on life cycles derived from an actual example of a capital-intensive process plant builder in a mature industry, for an invention-based enterprise is illustrated in ***Figure 6.8***.

FIGURE 6.8: BUSINESS PERSPECTIVE ON ENTERPRISE LIFE CYCLE



The magnitude of the cash flows, the total time horizon and the timing and duration of phases are dependent upon:

- Type of industry
- Entry barriers into the market
- Uniqueness of product
- Degree of relative benefit offered by product
- The length of the various cycles within the total life cycle e.g.
  - Lead times to establish capability
  - Length of product realisation cycle
- Interval between major technological breakthroughs
- Nature of the user industry or market

Enterprises are thus time consuming and costly to design and may have long payback periods. The applicability of the business life cycles to the enterprise design, lies in the fact that enterprises are complex systems and as such are subject to the same life cycle.

6.7.3 Growth impacts on re-design

A number of phases may be defined in the life cycle of an invention based enterprise for the purpose of addressing and grouping issues throughout the life cycle.

The phases are:

- Pre start-up
- Start-up and survival
- High growth
- Mature
- Stable
- Decline

The phases, risks and issues summarised from Timmens [48], are discussed in greater detail in ***Table 6.1***, but in essence show important transitions between phases that could substantially impact the enterprise design. The table was adapted to accommodate an invention-based enterprise with mega corporation potential.

From an enterprise design perspective it is important to focus on the major transitions that need to be made in growing the enterprise. At each transition substantial re-engineering will be required.

The major transitions are coupled to the span of management control and occur with each increase in levels of management. According to Timmens [48]:

- The first breakpoint falls at 20-25 employees where the leaders have to transit from doing to managing. This normally occurs in the start-up phase.

- The next transition at 75-100 employees normally occurs early in the high growth phase where the leadership will have to start managing managers to an additional transition which may be required to manage a multi-national consortium because of geographical distribution.

- If the business grows beyond 500 and 2500 employees, additional levels of management will be required or restructuring into different businesses or business units.

The risk associated with each phase is shown in terms of:

- entrepreneurship,
- business focus,
- resources.

The Table also indicates the typical focus and organisational forms that prevail in different phases. The enterprise designer may use these as a benchmark.

TABLE 6.1: GENERIC REQUIREMENTS AND RISKS ARISING DURING ENTERPRISE DEVELOPMENT

ISSUES	PRE-STARTUP PHASE	STARTUP AND SURVIVAL PHASE	HIGH GROWTH PHASE
Management transitions	Leaders change from doing to managing	Leaders start managing of managers	Leaders manage multi-national consortiums
Entrepreneurial risk	- Lack of entrepreneurial focus - Lack of management skills/capacity - Ability to sell business concept timeously - Failure to transit from doing to managing - Unresolved role issues between sponsors and project team	- Establishment of capable leadership - Resolution of objectives and workstyle issues - Transition to managing managers (empowering/delegating)	- Inability to successfully make international agreements and relent optimal control/benefit - Conversions to strategic management - Entrepreneur retires
Business focus/risks	- Product rather than marketing focus - Market estimates unsubstantiated - Unsubstantiated assumptions regarding product realisation, e.g. capabilities, costs, lead-times - Soundness of marketing strategy: product, price, distribution, promotion	- Failure of partnerships - Actual vs. anticipated product performance - Sustainability of product (complementary products) - Competitive technologies - Patent infringements/challenges	- Partners don't afford sound entry in to international market - Poor product/service perceptions - Loss of killer instinct on sales - Loss/dilution of vision - Competing technologies mature - Cost creep and client pressures on prices - Defaults on royalties - Inability to ring fence patents
Resource risks	- Requirement estimates (lacking/wrong w.r.t. quantity and type) - Ability to acquire funding - Quality/integration of business plans	- Inability to fund growth - Inability to grow capability - Inability to service market - Lack of business systems	- Business systems fail under explosive growth - Inability to fund growth - Liquidity threat - Inability to expand equity base - Failure of global networks.
Activities	- Developing technology i.e. process to commercially proven - Researching market and needs - Obtaining sponsors and funding - Planning and Marketing business concept - Visioning and establishing values - Creating capability to launch the business	- Positioning for growth - Establishing relationships with customers - Obtaining initial orders - Establish business systems and resolve problems - Expand core capabilities with additional capacity - Concluding and cementing relationships with partners and suppliers - Deliver products on increasing scale and market geography - Resolving initial operating problems of product - Protecting and enhancing initial technology base - Establish sound funding relationships	- Market breakthrough on all major markets - Frantic activity to grow capacity - Intense effort to bring new capacity up to speed - Intense negotiation for resources between projects - Crisis upgrades to systems - Chronic battle for funding growth - Severe management overload between growing the enterprise and managing its activities.
Organizational form	- Virtual organization i.t.o. entrepreneurial team provides initial funding and drive to create a core capability which can enter the market	- Functional organization with good integration mechanisms growing to programs type organization - Organizational provision for enterprise engineering	- More staffers and additional level(s) of management - Search for effective ways to split into more management able pieces - Possible split into multiple divisions/companies

ISSUES	MATURE PHASE	STABLE PHASE	DECLINE PHASE
Management transitions	Leaders retire or pursue other interests	Administrators and financial management emerges	Competent managers give up and depart
Entrepreneurial risk	- Lack of successors to first generation leaders - Entrepreneurial spirit dies out - No second cycle innovation	- Boredom, complacency - Risk aversion suppresses innovation - Product research becomes a "rain dance" for intellectual stimulation	- Emergency "innovativeness" - Only token support to real innovation - Only innovations that break even in year of investment are considered
Business focus/risks	- Transition to cost management - Managing in low/negative growth - Expiry of initial patents - Price declines due to high market penetration - Cost creep and client pressures on price - Loss of royalties after expiry of patent	- Short term thinking outsource indiscriminately - Understanding of business lost - Leaders lose belief in their industry/enterprise - Sales decline disproportional - Other's replacement technologies appear on market	- To survive another year nearer to pension - Customer dissatisfaction grows with decline in service levels - Overlooked new technologies capture markets
Resource risks	- Transition from growth to stable resource levels - Managing excess resources and cash	- Resources only on board for secure ride - Best resources seeks more exiting and rewarding employment elsewhere	- The last competent resources leave - Inexperienced personnel or consultants have to be hired to run the business
Activities	- Looking for further opportunities - Consolidation of markets - Getting on top of the management problems - Improving effectiveness all round - Restructuring and upgrading human resources - Finding replacements and re-allocating market products to various divisions or companies - Forward and backward integration in value chain	- Maintaining status quo - Working to budgets - Playing corporate politics - Focussing internally	- Continuous down sizing and productivity improvement programs - Trying quick fixes, new products and markets to beef up the turnover
Organizational form	- Multinational integrated group of enterprises	- Pruning of some division out of the group and within divisions	- Selling of or closing down major parts of divisions or whole division

CHAPTER 7

THE ENTERPRISE ENGINEERING CHARTER

ENTERPRISE ENGINEERING CHARTER

Before looking at the charter the structure of the next 12 chapters is briefly reviewed to establish context.

7.1 Section Overview

"Business Engineering, as an approach, is based on the application of fundamental engineering thought to business problems. It is therefore logical, systematic, manageable but tolerant for innovative culture" Moll [38].

This study covers the conceptual design of an Enterprise System therefore it is appropriate to review the Enterprise Engineering processes, methods and techniques applicable to conceptual design. This section (Chapters 7-12) review the analytical tasks and techniques aimed at defining the design requirements, which is the main focus in conceptual design. The next section (Chapters 13-17) address the applicable design tasks and techniques required to establish one possible solution, a design approach, and assessing the concept to confirm the potential of the solution and justify further development.

The techniques discussed in this section are analytical by nature and are useful to identify and define the problem or opportunity and to determine and define the constraints within which the opportunity may be exploited or within which the problem has to be solved.

Most businesses grow from humble beginnings and in the process incrementally develop their own design:

- more often than not in an empirical bottom up manner with forced learning of what does not work,
- or copy their design (through Benchmarking) from enterprises perceived as good role models.

In most cases Enterprise designers are therefore faced with an existing system, which has to be taken into consideration when an enterprise or enterprise segment is designed.

Enterprise Engineering therefore mostly focuses on the improvement of existing enterprises by way of Business Process Re-engineering (BPR).

7.2 The enterprise engineering charter

The enterprise designer's understanding and effectiveness in designing an enterprise, is greatly enhanced by his understanding of the external triggers which initiated the project, the expectations of where the design might lead to and perceptions about how the change to the new future may be achieved, as well as its impacts either on the existing enterprise or on the entrepreneurial team aspiring to create the enterprise. This understanding may be incorporated in an enterprise engineering charter.

Before starting with an enterprise engineering project the charter for the venture should be assessed.

7.3 External triggers/causes for enterprise engineering

Two situations give rise to a need to engineer an enterprise i.e.:

- when the entrepreneurial spirit drives go-getters to start a new business based on perceived market needs, or
- when existing enterprises perceive the need or opportunity which causes a strong enough desire to embark on a re-engineering exercise.

For an existing enterprise the issues to be addressed to adequately understand the motivation for embarking on an enterprise engineering exercise are:

- truths about the existing enterprise which identifies inadequacies or opportunities as drivers for redesign;
- the trigger for change which explains what events initiated the actions.

7.3.1 *Truths about the existing enterprise*

To understand the technical reasons, the enterprise designer attempts to determine what opportunities or what in the present performance of the enterprise, leads to or contributes to the need/ desire to establish or re-engineer an enterprise.

Issues that should be considered are:

- Levels of customer satisfaction i.e. the total performance with regard to need satisfaction is inadequate e.g. need may have changed.

- Performance of the current business processes i.e. the process may not be up to standard or the elements may have changed to an unacceptable technical performance level.

- Major breakdowns i.e. the availability of the system has become unacceptable.

- Current cost base i.e. the cost of operating the system has grown unacceptable or expectations with regards to cost have changed.

- Parity with the competition i.e. the enterprise has lost its ability to compete due to competition moving the goal posts.

- Not achieving its goal i.e. not profitable or not profitable enough.

Each of these situations will influence the emphasis of the enterprise designer in his enterprise engineering project.

7.3.2 The trigger for change

Even though there may be adequate technical cause for change, something normally triggers the change incentive. This may be found in:

- the business and behavioural drivers i.e. real business pressures in terms of results or general trends trigger the change;
- shortcomings in the existing strategy and operational model i.e. problems and difficulties in operating in the existing organisation internally and in its markets;
- readiness for change i.e. expectations exist with stakeholders that change should be investigated e.g. the new CEO broom has to do some sweeping;
- capacity to change in the organisation i.e. go-getters getting restless wanting to go bigger and better places.

7.4 Results expected of the enterprise engineering project

Here the enterprise designer needs to determine what the client's visions are regarding the to-be-established enterprise.

- Vision of how customers and competitors perceive the enterprise
- Vision of future performance
- Expectations of the future operating model
- Envisaged enterprise structure
- Whether the organisation will be able to muster the energy and resources for the change

7.5 Transformation expectations

The clients of enterprise design projects normally have expectations regarding how change will be implemented and how it will impact them. This may include aspects such as:

- Development approach
- Utilising short-term improvement opportunities (quick wins)
- Structure of the implementation
- Payback and cash flow plan
- Reskilling plan
- Cultural transformation

When adequate cause for an enterprise engineering project has been established, the point of departure needs to be established. This is done through assessing the enterprises current reality. If the enterprise already exist it must include the existing operational system, otherwise we can suffice by examining the current environments.

CHAPTER 8

CURRENT ASSESSMENT OF THE ENTERPRISE

CURRENT ASSESSMENT

When an enterprise designer has established sufficient need to embark on an enterprise design and follows the phased development approach, the first phase is conceptual design.

The first step in the conceptual enterprise design is to assess the current reality of the enterprise. Here various techniques are used to identify, define and analyse the existing enterprise system in its context. This step serves to define a baseline from which the designer can depart.

In many cases current assessment marks the first time that an enterprise formally analyses and records its system design. The existing system may be analysed in terms of its environments, stakeholders and implementation as reflected in its tangible manifestation but the intangible aspects such as enterprise culture are equally important.

This section defines the scope of current assessment, identifies tools and techniques for executing the assessment of the enterprise's internal workings and assessment of the enterprise's interaction with its business environment.

8.1 The scope of current assessment

Current assessment may be divided into an assessment of the enterprise, it's operating environment and macro environment. Both the tangible aspects of the enterprise and intangible aspects need to be assessed. In the knowledge based industries the latter is becoming the predominant driver of business success [24, 25].

The benefits from a current assessment to the enterprise design according to Athey [39] are that it:

- Defines the current system
- Provides a benchmark for new systems to be compared against
- Describes one alternative solution (i.e. maintain status quo)

- Improves understanding of the problems
- Exposes preferences and bias of stakeholders.

Before design of a system can commence, it is crucial to define the scope of the design and this requires identifying the system.

8.1.1 Identifying the enterprise system (element)

In order to be able to distinguish the system, it is necessary to determine which parts of the enterprise fall within the control of the enterprise designer and which do not. This is done by way of context diagramming in which the system, its boundaries and interfaces with what lies outside the boundaries, is defined. The context may be assessed in terms of the enterprise, its operating environment and its macro environment.

8.1.2 Identifying stakeholders

In order to ensure that all influences are taken into consideration, it is useful to identify all those who have an interest in and can impact or be impacted by the system, these stakeholders can be grouped by environment.

8.1.3 Defining the macro environment

The macro environment comprises all those environments which influence/impact the enterprise but over which it has no direct influence. The stakeholders to consider in this category include:

- Industry in which the enterprise operates
- Business environment
- Economic environment
- Legal environment
- Social environment
- Political environment

The macro environment imposes non-negotiable constraints on the enterprise design.

8.1.4 *Defining the operating environment*

The operating environment comprises all those stakeholder with whom the enterprise directly or indirectly interacts and includes:

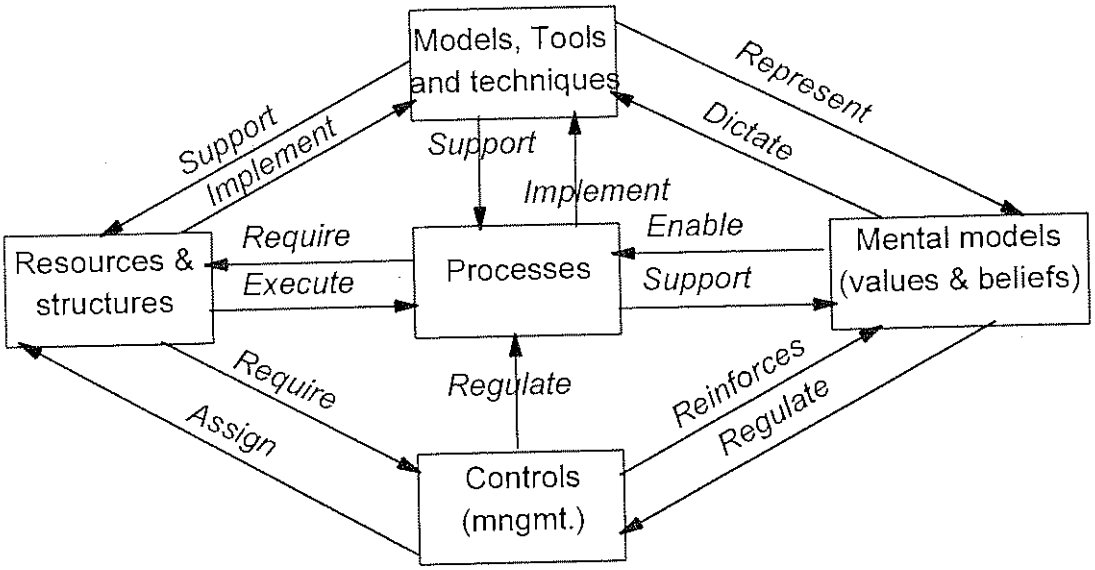
- alliances with clients and markets;
- the markets in which it operates;
- its competitors; and
- supplier corps and relationships.

The operating environment sets some negotiable constraints but also provides challenges and norms which the enterprise must meet.

8.1.5 *Defining the tangible enterprise system (structure, processes and resources)*

An enterprise may be represented in terms of its operating model as illustrated in ***Figure 8.1*** adapted from Computer Sciences Corporation [2]. The aspects included in this model range from tangible to intangible.

FIGURE 8.1: GENERIC ENTERPRISE OPERATING MODEL



Note that the degree of tangibility decreases from physical manifestation in resources and structures, through models (in tools and techniques), and processes to management controls - all of which are based on values and beliefs.

Factors to be considered in the assessment of the tangible aspects of an enterprise include:

- Ownership type of enterprise (e.g. closed corporation)
- Line(s) of business in which the enterprise is involved
- The product portfolio of the enterprise and product maturity status
- Asset base
- Current performance of business e.g. turnover, ROI, EPS, orderbook
- Management structure
- Financial structure
- Organizational structure, roles and responsibilities
- Business processes and value chains
- Internal capabilities
- Skills inventory/base
- Supplier corps

The enterprise system as defined through the above analysis provides the facts about the present which may be interpreted and assessed against:

- each other
- the requirements and constraints set by the owners and executive in the strategic intent for the business and
- outside references

to evaluate their contribution to the status of and prognosis for the enterprise.

In designing/upgrading an enterprise function this assessment provides a baseline from which to depart in designing changes as well as a knowledge base which may be utilized to create alternative solutions for a system.

8.1.6 Defining the intangible aspects of the enterprise system

In general intangible assets are assets which contribute significantly to the success of the enterprise but which do not appear on the balance sheet.

These assets can be categorised in assets that:

- Promote innovation and growth
- Facilitate access to markets
- Inherently enhance the business process of the enterprise

The actual nature of these assets are demonstrated by the following examples:

- **Innovation and growth assets**
  - Access to leading edge product or process technology
  - Product portfolio and maturity status
  - Successful R&D capability
  - Unique intellectual property, copyright and patents

- Ability to predict market and technology trends

- **Inherent capabilities of business processes**
  - Understanding of clients, markets and needs
  - Effective business processes e.g. methodology, tools and techniques and knowledge base for design as well as infrastructure, personnel, processes and supplier corps for manufacturing or service delivery
  - Flexibility to adjust to market trends (growth, change of direction, etc.)
  - Short lead times
  - Human resources with vision, leadership and drive to improve
  - Paradigms and paradigm flexibility of people leading the enterprise
  - Image as good employer
  - Image as a good company to invest in
  - Risk profile suited to growth
  - Core competencies in a strategic value chain
  - Effective management

- **Access to markets**
  - Market size and maturity (expanding and growing markets)
  - Competitive advantages in quality, capital intensity, efficiencies, complexity, controllability, flexibility, resource efficiency, environmental friendliness, legal and social acceptability, safety and guarantees
  - Limited number or no competitors
  - Coalitions and partnerships
  - Barriers to entry
  - Market image (market leader)
  - Track record
  - Locked in customer base

8.2 Techniques for assessing the enterprise internally

It must be realised that business outcomes derive from deliverables produced by processes and that redesigning a business requires changing its process and their interactions. This creates a central need to assess current processes and their interactions.

8.2.1 Techniques for identifying and defining the enterprise

These techniques are well know amongst systems and industrial engineers and include:

- context diagrams
- stakeholder analysis
- organisation charts
- network diagrams
- system layouts

and are therefore not discussed in more detail.

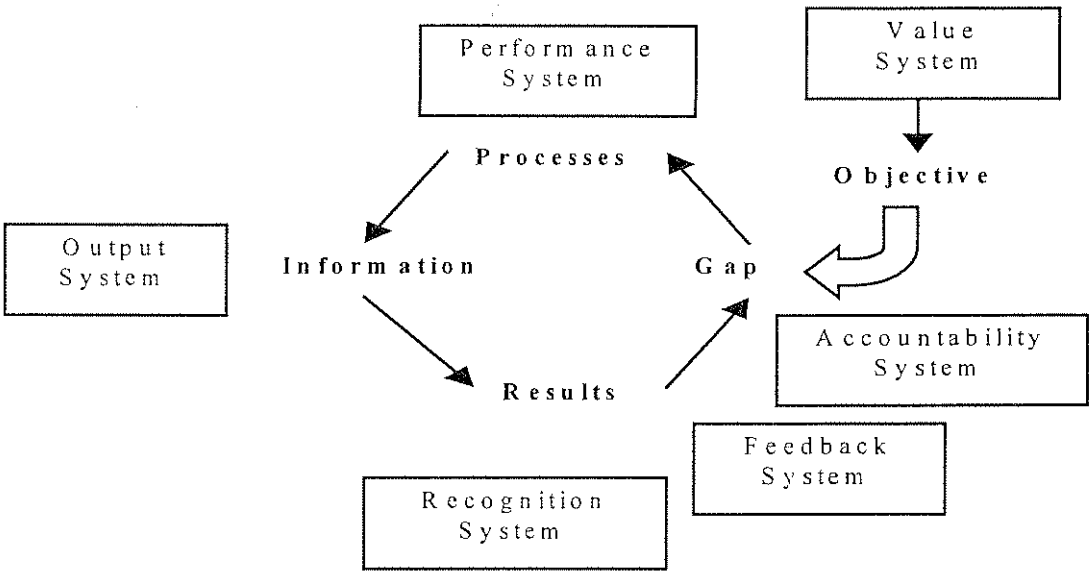
8.2.2 Techniques for identifying and defining processes

- Flowcharting
- eEPC (extended event process chart)
- Event lists
- Function diagrams/trees

8.2.3 Techniques for assessing processes

An enterprise engineering technique that may be used in this assessment is influence diagrams as derived from Senge [40]. A generic format for an influence diagram is represented in ***Figure 8.2***. [42].

FIGURE 8.2: A GENERIC ENTERPRISE INFLUENCE DIAGRAM



The model in Figure 8.2 shows how objectives are set out of the value system of the enterprise as performance criteria for the outputs of the system which are produced by the processes that are executed by the performance system.

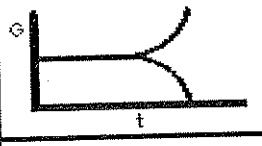
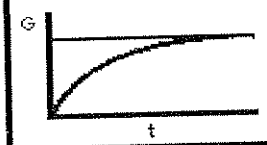
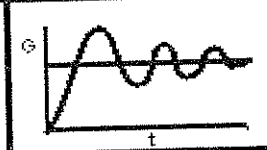
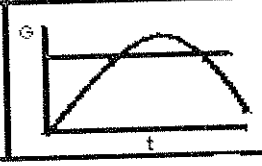
The output of the processes are delivered to the output system with ancillary information about the actual output produced flowing through and being interpreted as results in the recognition system and feedback system. The recognition system appropriately rewards the achieved performance thereby discouraging or reinforcing behaviour.

The feedback system compares the results to the objectives, identifies gaps and feeds this through to the accountability system. The accountability system adjusts the objectives or the system elements to address the gap.

Influence diagrams thus model the processes and can qualitatively predict the dynamic system behaviour in terms of performance if the nature of the interactions in the model is known. The nature of and interrelationships in a system, determine its basic behaviour in terms of performance.

Possible interactions and interrelationships between the elements of the system can be categorised as in *Table 8.1.* By studying the causal relationships of influences and feedback between elements of the system and identifying delays.

TABLE 8.1: THE RELATIONSHIP BETWEEN SYSTEM BEHAVIOR AND DRIVERS

Nature of Driver	Basic system behaviour	Graphical
Dominant possitive feedback (reinforcing)	Exponential growth or decay	
At least one strong negative feedback (balancing)	Goal seeking	
Negative feedback with delay	Ossilation and stabilisation	
Linked possitive and negative (feedback) loops (limits to growth)	Saturated S-curve (Sigmoid)	

The knowledge gleaned from influence diagrams may thus be applied to either predict the response of a system from its processes, or to determine the type of processes and/or their interaction from the system responses. Tests may be set up to characterise systems by using techniques from control theory.

Effectiveness in design requires that effort be focussed on developing or refining important, high yield, processes in the enterprise. This means that the enterprise designer needs to determine which processes and variables within the processes have significant impact on the achievement of enterprise objectives and focus design effort on their optimisation.

Models of a dynamic system and its working may reveal leverage points where a single or a few process drivers influence a number of loops. The enterprise designer can focus on these leverage points to achieve an optimal effect in the system.

Goldratt in his book "It's not luck" [5] applies an empirical version of these techniques in what he calls current reality trees to identify the "core problem" of a sick system.

Influence diagramming is a powerful technique to analyse the current reality of an enterprise in terms of both its structure and interactions. This technique takes tangible and intangible aspects into consideration. It provides the enterprise designer with insight into performance drivers and may therefore be used to focus an enterprise (re)engineering design process.

The importance of systematic analysis of systems and their interaction, is summarised by Jay Forrester's statement [38]:

" Whatever the problem, it is nearly always traceable to the way the company does things. Often, one small change will solve the problem. The high-leverage point is usually far removed in time and place from where the problem appears. When the high-leverage point is found, people mostly push the lever in the wrong direction."

This emphasises the need to identify remote relationships and the importance of correctly understanding the relationships.

Influence diagrams are used to determine the influences between tangible entities and derive suitable leverage points, these points are known as business engines or engines of growth.

Once the workings of the existing system (its processes) are understood and it is clear what drives its performance (how the processes affect the outcomes),

this knowledge/wisdom may be applied to the current reality (established through other techniques) to postulate theories concerning the role of intangibles in terms of the shortcomings and achievements in the current reality.

8.2.4 *Techniques for analysing intangibles*

Similar results may be obtained by the techniques developed by Goldratt [6]. His techniques develop and analyse current reality trees to find the fundamental conflict which inhibits system performance and then divine the underlying assumptions to derive powerful leverage points to resolve a conflict (disappearing cloud technique).

The Goldratt problem solving technique postulates the relationship between defunct/mental models and emerging problems by:

- Identifying the problems and concerns in the existing system in a business process orientated way
- Researching behaviour patterns over time related to the elements seen as drivers of the problems asking:
  - what causes this behaviour
  - what the effects of the behavior are
- Postulating mental models that explain the behavior
- Relating the mental models to the structure and behavior of the current reality in terms of how the mental models limit growth and constrain vision
- Building a theory that relates mental models to the results achieved and shortcomings of the current reality.

The mental models identified here are fundamental inhibitors and thus become leverage points in the cultural design that should receive priority, because of their ability to enable solutions.

The above understanding of mental models is used once a new future is visioned (based on scenario planning) and interventions are developed to shift mental models to make this future reality possible. This is done by:

- Developing business objectives and strategies to achieve them
- Identifying desired mental models that will support these incentives
- Developing interventions to shift the mental models

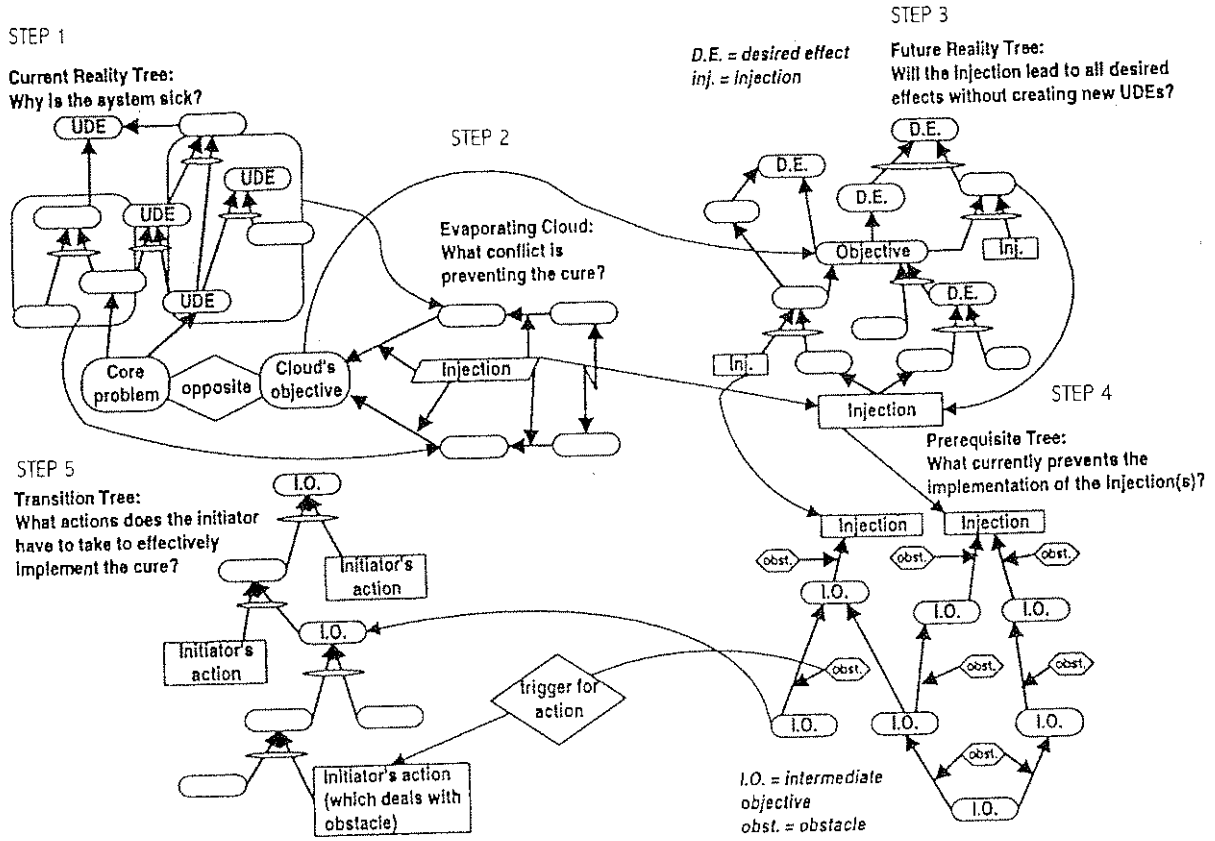
This may be modelled in a future reality tree. The realisation of the future reality is fleshed out by:

- Anticipating systemic reactions from the organisation through playing devils advocate and doing what if studies to derive obstacles which prevent interventions
- For each obstacle an intermediate objective is developed which will eliminate/negate the obstacle to establish the interventions. This may be modelled in a pre-requisite tree.
- Interventions are made and evaluated to determine whether they have the desired fundamental effects on the business reality. If not successful the process is iterated.

To enable the transition to the future reality the prerequisite intermediate objectives need to be actioned. The logic of this process in captured in a transition tree, which shows how the obstacles are solved to achieve the intermediary objectives, which ultimately lead to realisation of the injection that evaporates the cloud of conflict and resolves the core problem.

From the previous discourse as illustrated in ***Figure 8.3*** from Noreen, Smith & Mackey [6], it becomes clear that mental models (which are intangible assets) play an important role in the ability of an enterprise to flourish or achieve fundamental change.

FIGURE 8.3: OVERVIEW OF THE THINKING PROCESS



D.E. = Desired Effect Inj. = Injection UDE = Undesired Effect

I.O. = Intermediate objective Obst. = Obstacle

8.3 Techniques for assessing interactions with the current business environment

In order for an enterprise to be successful, it needs to enhance achievement of its business objectives now and in the future, by providing its offering to its markets. This means the business environment should be defined.

This analysis aims at providing an accurate, insightful view of the business aspects of an enterprise i.e. the facts about the companies' products and the situation in its markets so that the current state of the enterprise is known and opportunities and threats can become visible.

The assessment of the business environment includes:

- Market related issues
  - Market cycles
  - Growth in the customers markets/needs
  - Market trends
  - Financial position of customers
  - Forces impacting customers e.g.:
    - Resource availability
    - Cost pressure/tax
    - Ecological pressure
    - Legal
    - Unions

- Assessment of the enterprise's product
  - Age and current life cycle phase of existing products
  - Cost of raw materials/cost of living

Once the business is defined, its products should be analysed in portfolio context to determine relative contributions to business success, standing against competition, phase of maturity in its life cycle and coverage of market segments.

The above analysis is externally focussed and will highlight in areas where opportunities may exist or where the company may become threatened in terms of its current business portfolio.

We start of with the definition of the business.

8.3.1 Current business definition

In order to obtain useful information for an enterprise design exercise, the current business must first be defined and then characterised in terms that will allow valuation. The business worth stems from present and future sales income and the efficiency of delivery.

Sales may be broken down by product, market and channel as well as value proposition (i.e. what makes our product attractive to each market).

To determine the status and prognosis for these aspects of an enterprise thus requires definition of:

- current products
- current markets
- current channels
- current value proposition

and subsequent analysis of trends and contributions to business results.

8.3.1.1 Current product portfolio identification

The current product portfolio may be identified by product or product line. Where the enterprise is involved in multiple phases of the product life cycle, this should also be shown.

It is useful to represent this information both in terms of contribution to business/enterprise results, as well as the extent to which it employs/utilises the enterprise's capabilities.

According to Goldratt [5] it should be done in terms of profit effectiveness based on usage of constrained resources.

8.3.2 *Portfolio analysis*

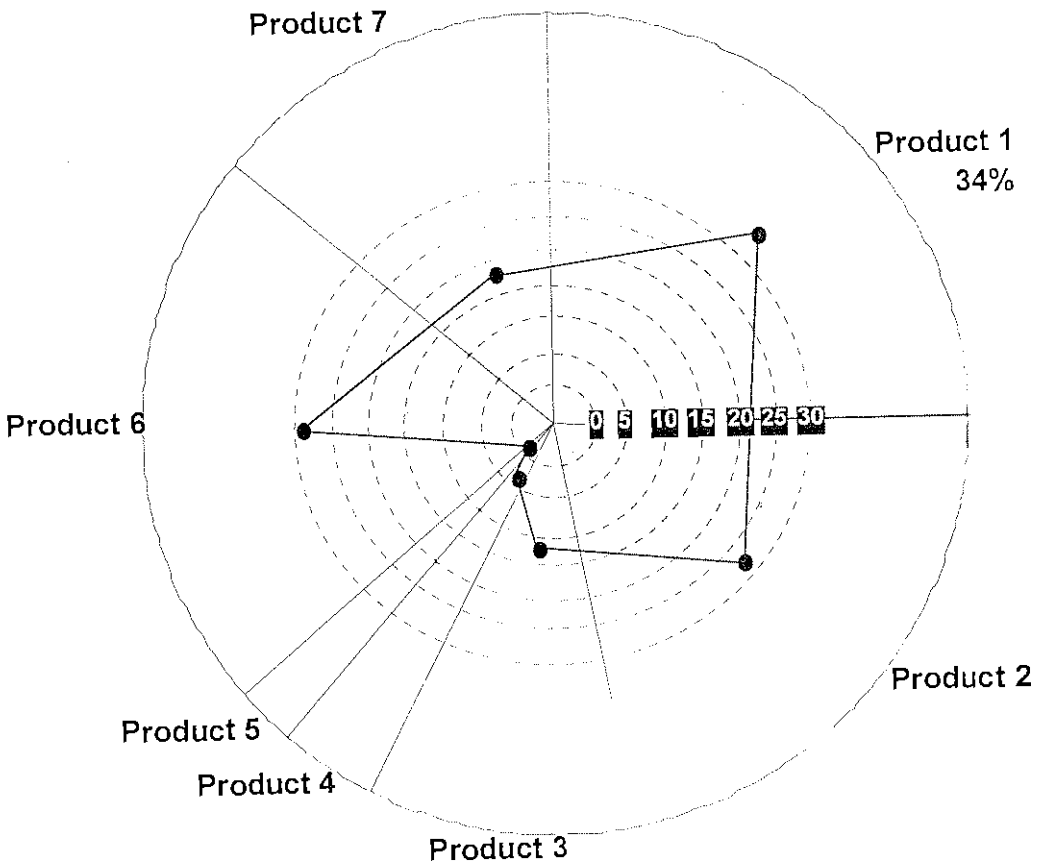
The portfolio may be analysed in terms of:

- Product contribution to portfolio turnover and profitability.
- Product portfolio status in phases of life cycle in terms of revenue earned or development investment.
- The maturity of products in terms of their life cycle (see Sigmoid curve in Figure 8.7).

8.3.2.1 Product contribution to turnover and profitability

This analysis gives the enterprise designer a snapshot of the relative importance of products in terms of their contribution to turnover and profit as shown in ***Figure 8.4***.

FIGURE 8.4: PRODUCT CONTRIBUTION TO TURNOVER AND PROFITABILITY



Note: The size of each segment of the pie is proportional to the contribution to turnover where as the dots on the target show profitability.

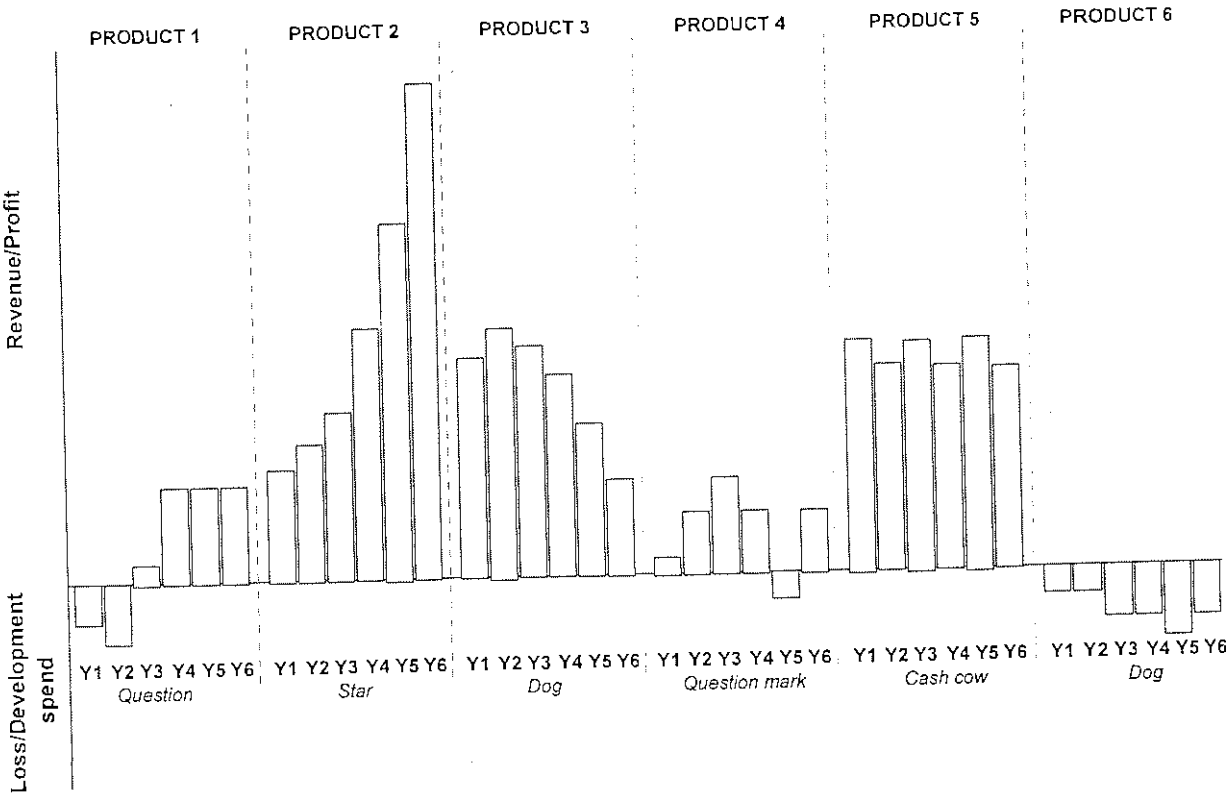
Different definitions of profitability may be used e.g.:

- Cost profitability, which is the traditional definition and which is used in the above graph.
- Marginal profitability, which gives an indication of the effect or potential impact of incremental changes in the product mix.
- Rate of profit generation based on the enterprise constraints, which is sensitive to the feasibility of impacting profits through adjusting product mix.

8.3.2.2 Product portfolio life cycle

By studying the relative contributions of the products to the company's performance over the past 5-10 years, a feel may be obtained for the trends in both turnover and profitability as shown in ***Figure 8.5***.

FIGURE 8.5: REVENUE/PROFIT PROFILES BY PRODUCT LINE

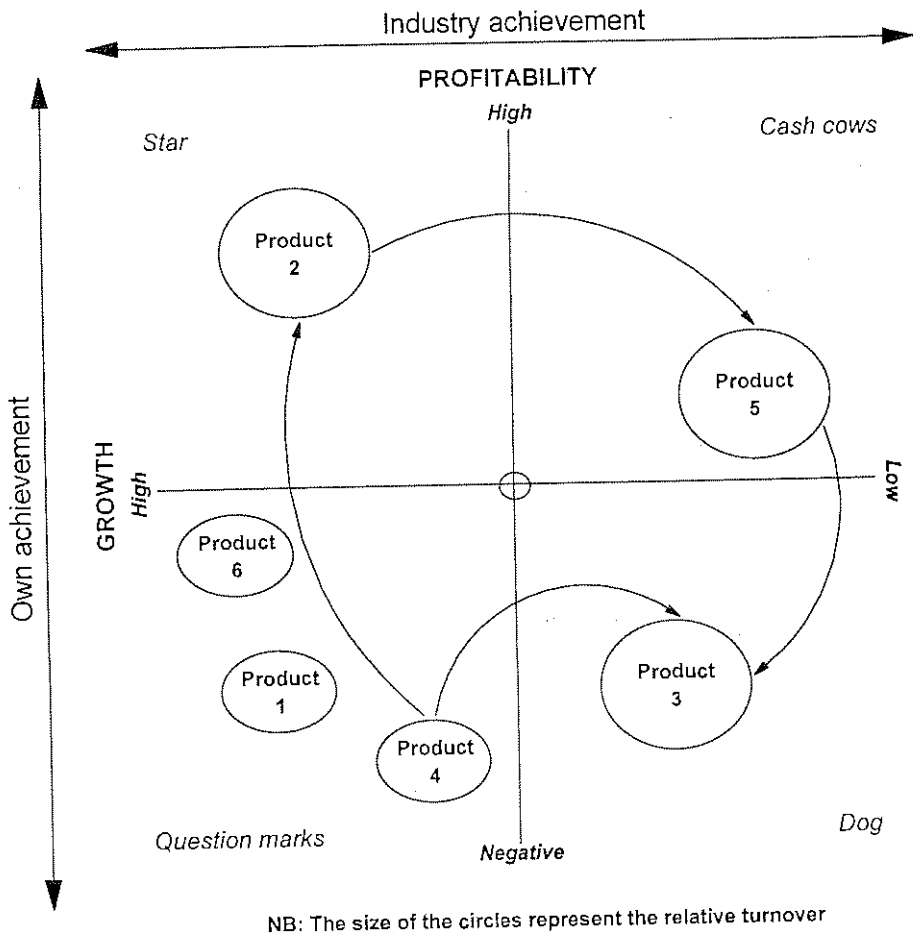


8.3.2.3 Portfolio classification

The information from the analysis may be presented in a model developed by the Boston Consulting Group as shown in ***Figure 8.6*** adapted from Kotler [3] and McDonald and Payne [4].

The products of which the revenue profiles are depicted in Figure 8.5, have been translated into the Boston Consulting Group classification in Figure 8.6.

FIGURE 8.6: BOSTON CONSULTING GROUP CLASSIFICATION



NB: The size of the circles represent the relative turnover

Figure 8.6 classifies products as:

- Stars which show high growth and high profitability and should be actively promoted.
- These stars can later become the cash cows with low growth and reasonable profits which provide the bulk of stable turnover and profits. Cash cows should be nurtured to maximise their life.
- Dogs are products that have a shrinking market and negative profits that should be discarded. There may be special reasons for retaining dogs such as to maintain a full line of products, provide a comprehensive market solution or as a loss leader. Where an organisation has spare capacity in its constraints, it is

sensible to retain products as long as their income exceeds marginal cost, contrary to what cost accounting might suggest.

- Question marks are products with negative growth or which make losses, but which may be turned around into stars when either growth or profitability are turned around. Otherwise they become dogs.

The Boston classification aids the enterprise designer in identification of the need to manage the various classes of products in the enterprise. It also provide prognosis for the size if the enterprise to be designed for, and identifies gaps in the life cycle phases e.g. no questions or stars, only cows may imply that there may not be much of a future for the enterprise.

8.3.2.4 Portfolio life cycle implications

The Sigmoid curve shown in Figure 8.7 provides a useful model to relate the Boston product classifications to enterprise requirements. The model profiles types of work required against the various phases in the life cycle and identifies the importance of specific capabilities required during the phases of the life cycle. The capability requirements apply equally to an enterprise and its products because of the commonality of processes.

The requirement for enterprise capabilities may thus be deducted from the aggregation of requirements over the product portfolio – and conversing the potential of the enterprise to manage/develop products through their life cycle may be deducted from the capability mix manifested by the enterprise.

In Figure 8.7 the capabilities are identified as:

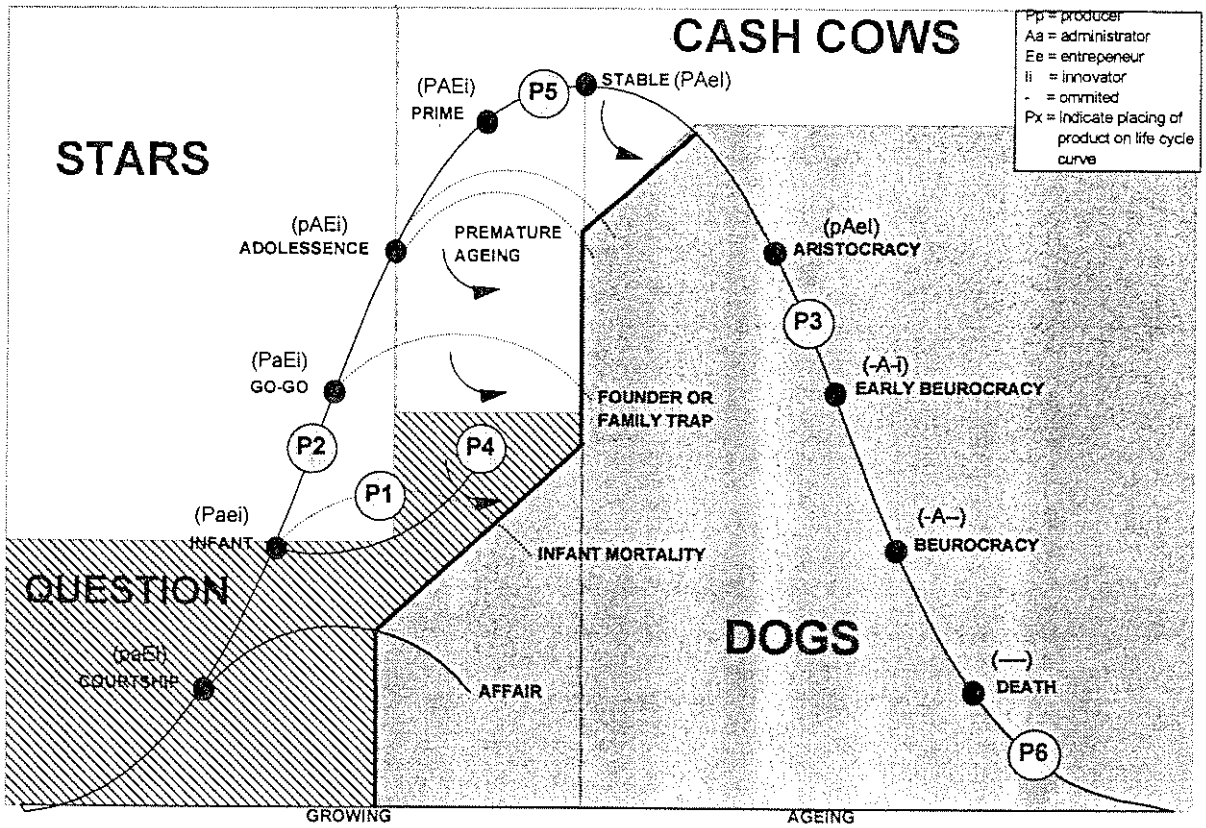
- Production (P)
- Administration (A)
- Entrepreneuring (E)
- Integration (I)

In each phase the combination of capabilities required is shown with the emphasis indicated by a capital letter i.e. (E) for important, or a lower case letter i.e. (e) for less important capabilities. In cases where it is not required, the letter is omitted i.e. (-).

The phases in the normal life are identified in ***Figure 8.7*** as: Courtship, Infant, Go-go, Adolescence, Prime, Stable, Aristocracy, Early decline, Late decline, Death.

Potential failures are also indicated as: Affair, Infant mortality, Founder trap and Premature ageing. The products shown in Figure 8.5 are plotted on the Sigmoid curve.

FIGURE 8.7: PORTFOLIO LIFE CYCLE ANALYSES



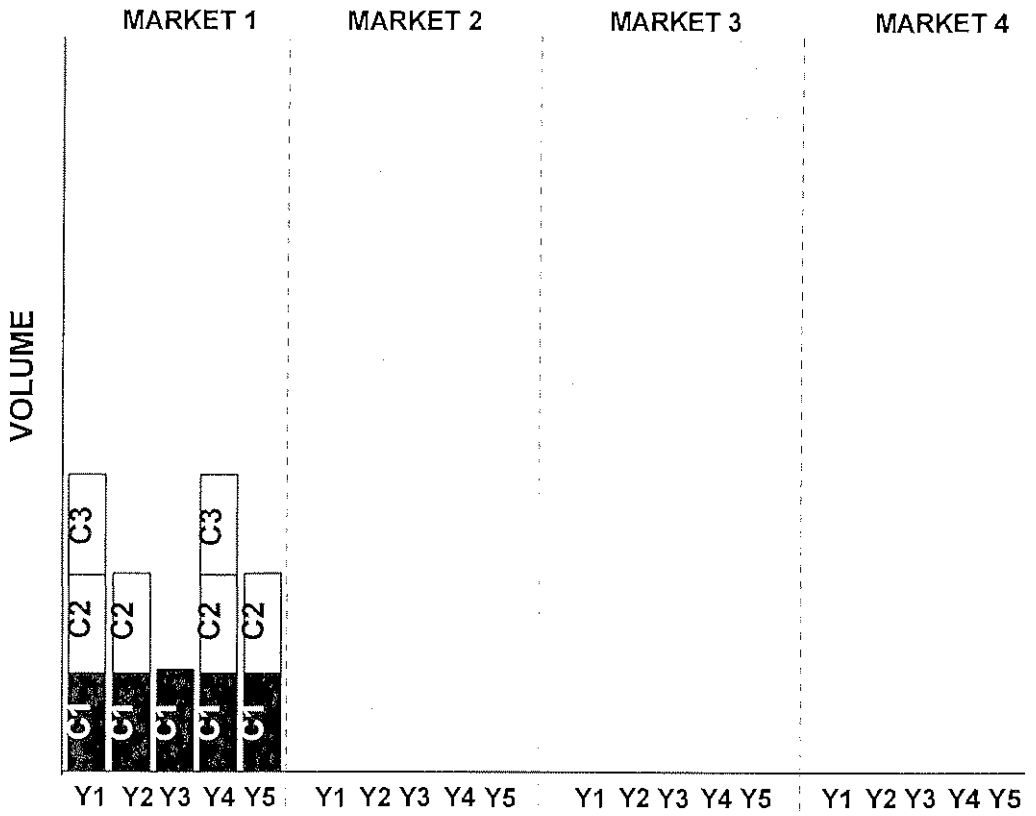
8.3.3 Current clients, markets and channels

In order to assess their relative importance and competitiveness in markets and channels, products should be evaluated in terms of performance both independently and in comparison to the competition. Markets may be split by geography, demography or other appropriate measures.

8.3.3.1 Product distribution by channel and market

In order to establish the need for designing marketing, sales and distribution capabilities, the enterprise designer must assess how products get to market and the trends in this regard. The analysis required is illustrated graphically in ***Figure8.8*** and is useful to determine/forecast the specific needs per market channel.

FIGURE 8.8: TRENDS IN SALES BY CHANNEL PER MARKET FOR ONE PRODUCT



C = Channel | Note: This study must be done for each product

8.3.3.2 Forecast by channel or market

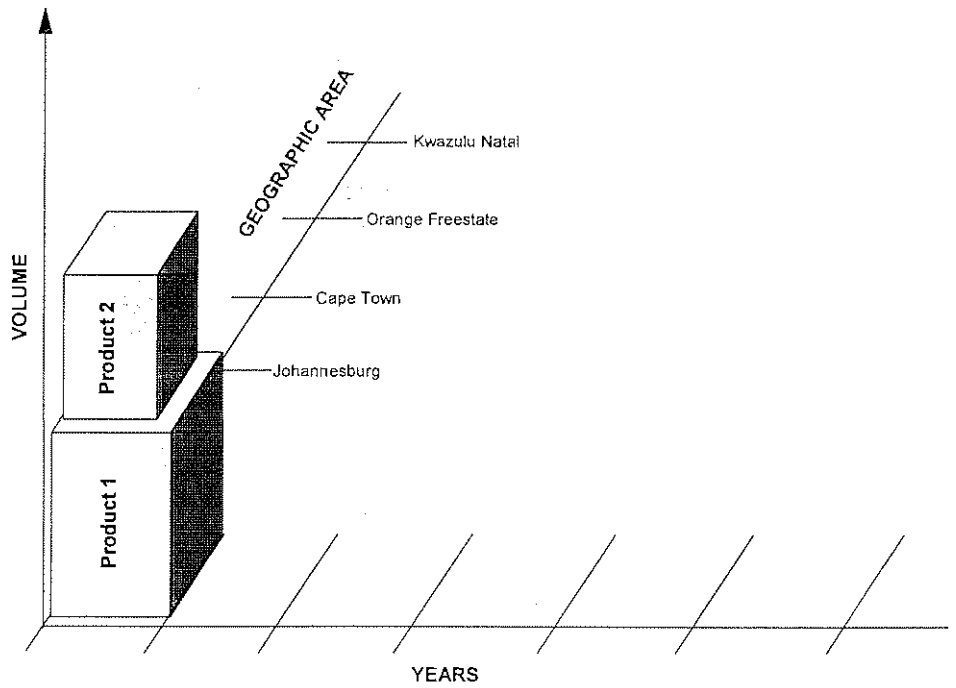
If the sales data is summarised over all products per channel, this gives the channel requirement whereas a summary over all markets provides the sales/marketing requirements.

8.3.3.3 Distribution requirements

The enterprise designer needs to forecast which volume of which products will be required by region to guide the design of the distribution channels i.e. warehousing, transportation, order channels, intermediaries. Even the derived needs such as preparation, packaging, preservation and marking may be dictated by these requirements.

The requirements may be represented graphically as in ***Figure 8.9***.

FIGURE 8.9: GEOGRAPHIC PARTITIONING OF MARKETS BY NEED



8.3.4 Current value proposition

To obtain insight into what motivates the markets in terms of the sort of value they are looking for in the products they are buying from the enterprise, the value proposition may be analysed by market and channel for each product.

This study is useful for highlighting, conflicting opinions or actual offerings, which need to be resolved before design proceeds. An example of such analysis is shown in ***Figure 8.10***.

FIGURE 8.10: VALUE PROPOSITION V/S PRODUCTS OFFERED

Value proposition	Market 1			Market 2		
	Channel 1	Channel 2	Channel 3	Channel 1	Channel 2	Channel 3
Product leadership	P1					P1
Cost leadership		P2			P2	
Customer intimacy			P3	P3		

Market
1 = individuals
2 = micro companies (< 5)
3 = small companies (5-20)
4 = medium companies (21-200)

Channel
1 = direct selling
2 = own sales force
3 = brokers

Product
1 = life cover
2 = disability cover
3 = savings

In the illustration a conflict (shaded) becomes apparent where cost leadership is required from a channel which, due to face-to-face contact and small policies in the individual market, bears a high overhead.

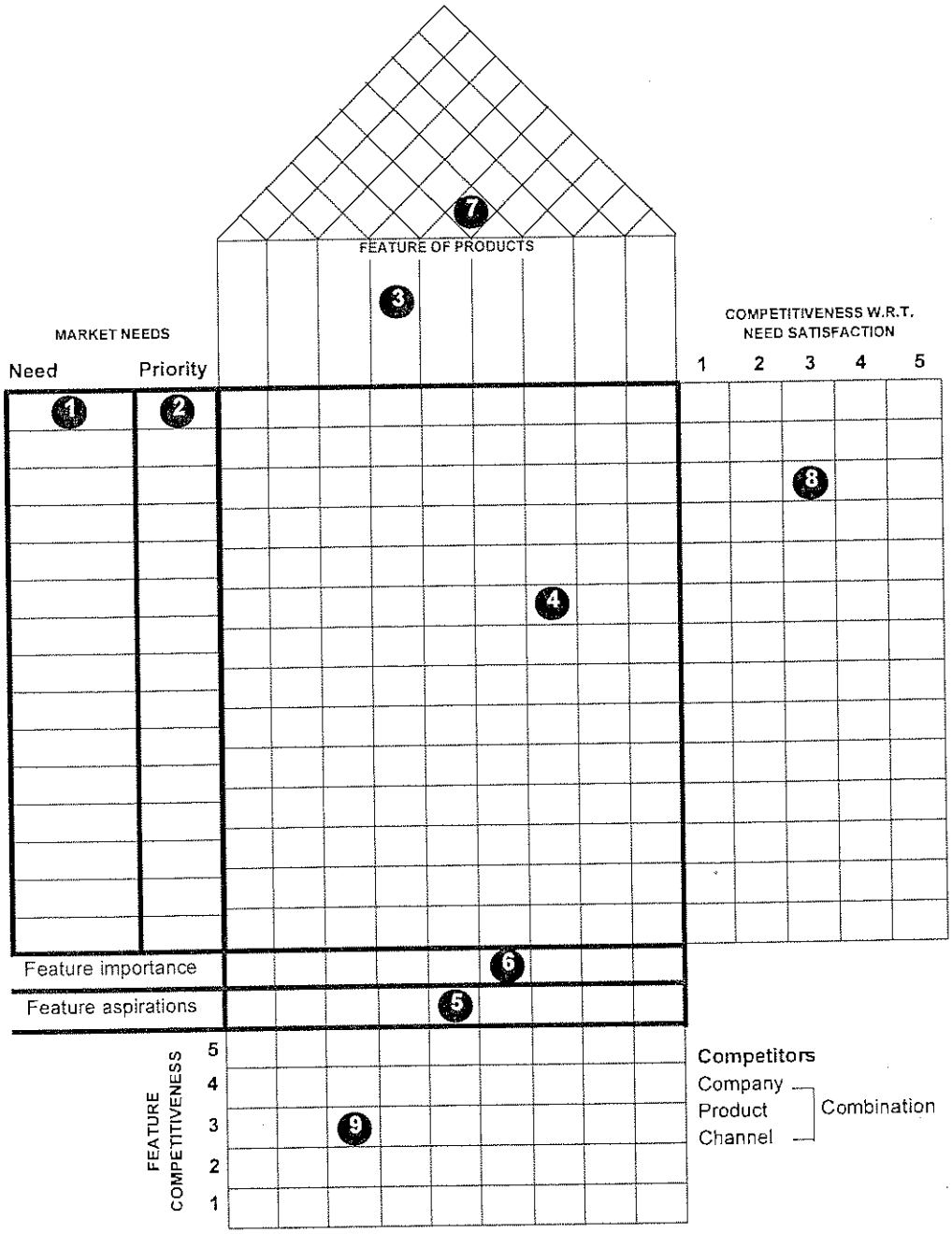
8.3.5 Current competitive analyses

Per product the existing competitiveness should be analysed to determine where the product stands with regards to its competitors in each market via each channel.

This may be done using the House of Quality (HOQ) approach as discussed by Oakland & Porter [7].

In this approach the features of the comprehensive product or service as offered via its channel, is evaluated considering the features offered. The HOQ model is illustrated in ***Figure 8.11***.

FIGURE 8.11: HOQ APPLIED TO COMPETITIVE ANALYSIS



In this model the market needs [1] are established by research techniques to identify the gratifications (e.g. financial security) customers want from the use of the product. The relative priority/worth of the gratification (5 very important – 1 not important), is determined to sharpen focus on important value adders [2]. Paired comparison tools may be used to compare and rank the market needs to determine a priority.

Product features [3], which are the means by which the needs are satisfied e.g. amount of cover, are defined and cross-referenced with gratifications in a matrix. The extent to which features contribute to gratifications is established by research/survey and coded in and scored [4] (typically on a 3-point scale i.e. minor rated (1), substantial rated (3) and crucial rated (9)). An existing or aspiration level of achievement is defined per feature [5] (e.g. R1m cover).

The matrix may then be used to calculate an importance per feature by the sum of the product of gratification importance and strength of contributions per feature [6].

A further use of the matrix is to establish and record how features [7] influence each other. This influence may range from strong negative to strong positive reinforcing. These correlations make the enterprise designer aware of trade-offs to be made where features conflict and synergies to be exploited in designing the enterprise strategies. Symbols are normally used to show strong synergy, some synergy, no interaction, some conflict and strong conflict.

The last two areas in this model are used to assess the competitive standing of the enterprise versus its competitors. Normally the enterprise and its competitors are assigned a symbol which is graphically placed in a position reflecting the role players strength (1 – weak to 5 – very strong) with respect to the relative image the product enjoys with customers [8] or how its features compare relative to the aspiration levels [9].

This provides insight into trade-offs, aspiration levels of performance, relative perceived customer benefits, relative value of features. This insight may be used to focus effort in designing a delivery capability to ensure the priority needs are best met.

CHAPTER 9

STRATEGIC REQUIREMENTS

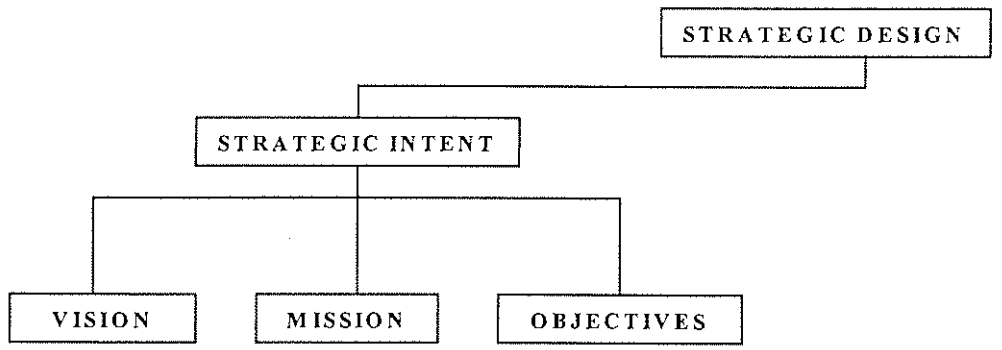
STRATEGIC REQUIREMENTS

The most important activity in developing any system is to correctly establish the requirements for the system from the client and users of the system as well as other stakeholders with an interest in or influence over the system. Compliance to these requirements determine the effectiveness of the design. In the case of an enterprise the requirements are established by the owners and interpreted and articulated by the executive and management (or alternatively the entrepreneurial team responsible for the establishment of the enterprise). The requirements at this level define what the enterprise is supposed to be and do and is incorporated in the strategic intent for the enterprise or its strategy.

9.1 Strategic intent in context

The strategic intent of an enterprise consists of the vision, mission and strategies of the enterprise and guides the enterprise to ensure consistent effective, goal-oriented actions supported by appropriate allocation of its resources over the long term. The relationship between the elements of the strategic intent and strategic design of the enterprise is shown in ***Figure 9.1***.

FIGURE 9.1: STRATEGIC INTENT



At the start of an enterprise development project the strategic requirements may not be defined even though they may implicitly be incorporated in the structures and operations of a running enterprise (i.e. the operating principles). The Enterprise Engineering process, tasks, tools and techniques applicable for identifying and defining

the strategic design requirements are discussed in this section. The process of determining the strategic design is also known as strategic planning.

Figure 9.2 provides a mind-map of the process of establishing the strategic design.

FIGURE 9.2: INFLUENCE DIAGRAM FOR STRATEGIC DESIGN

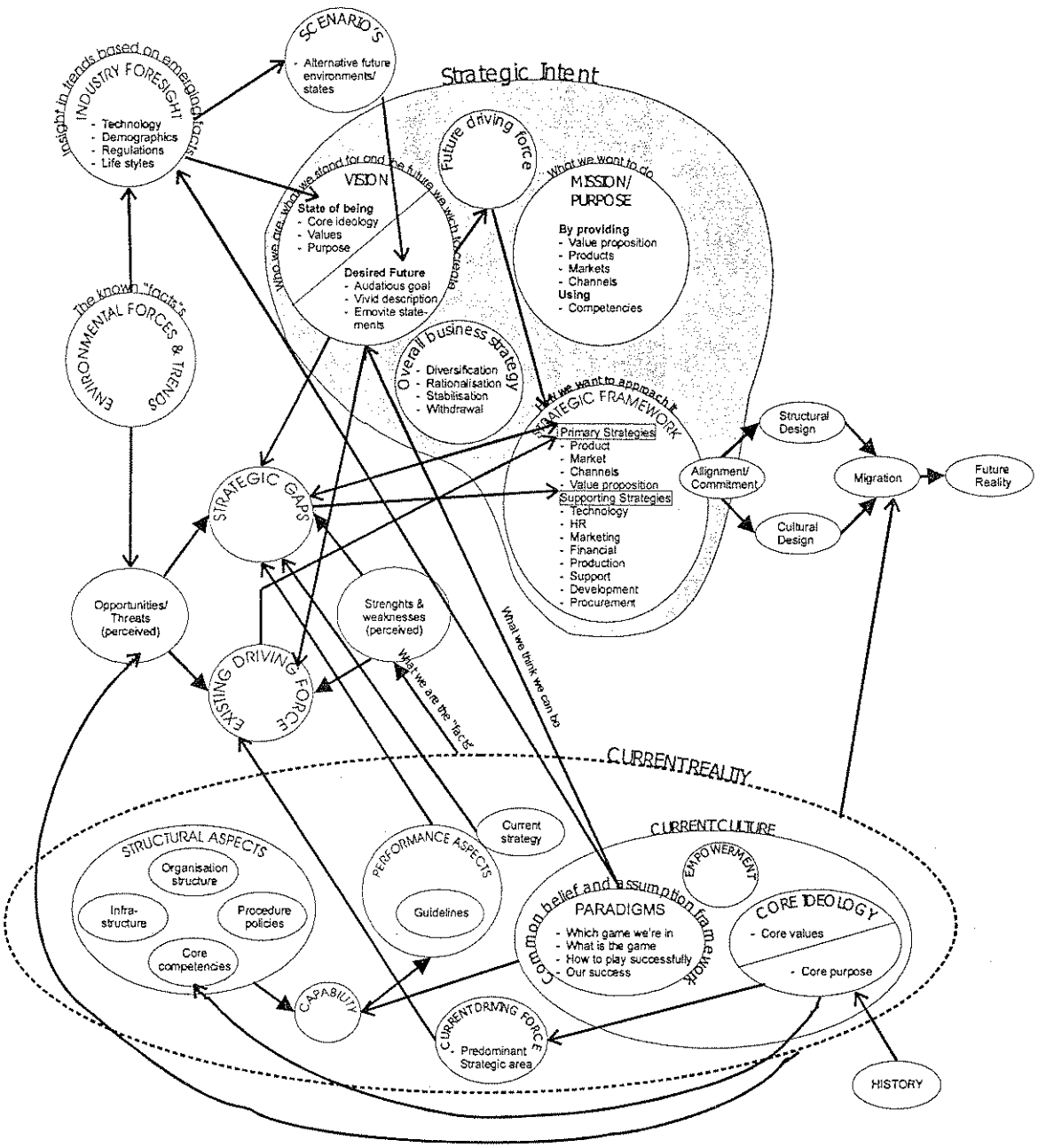


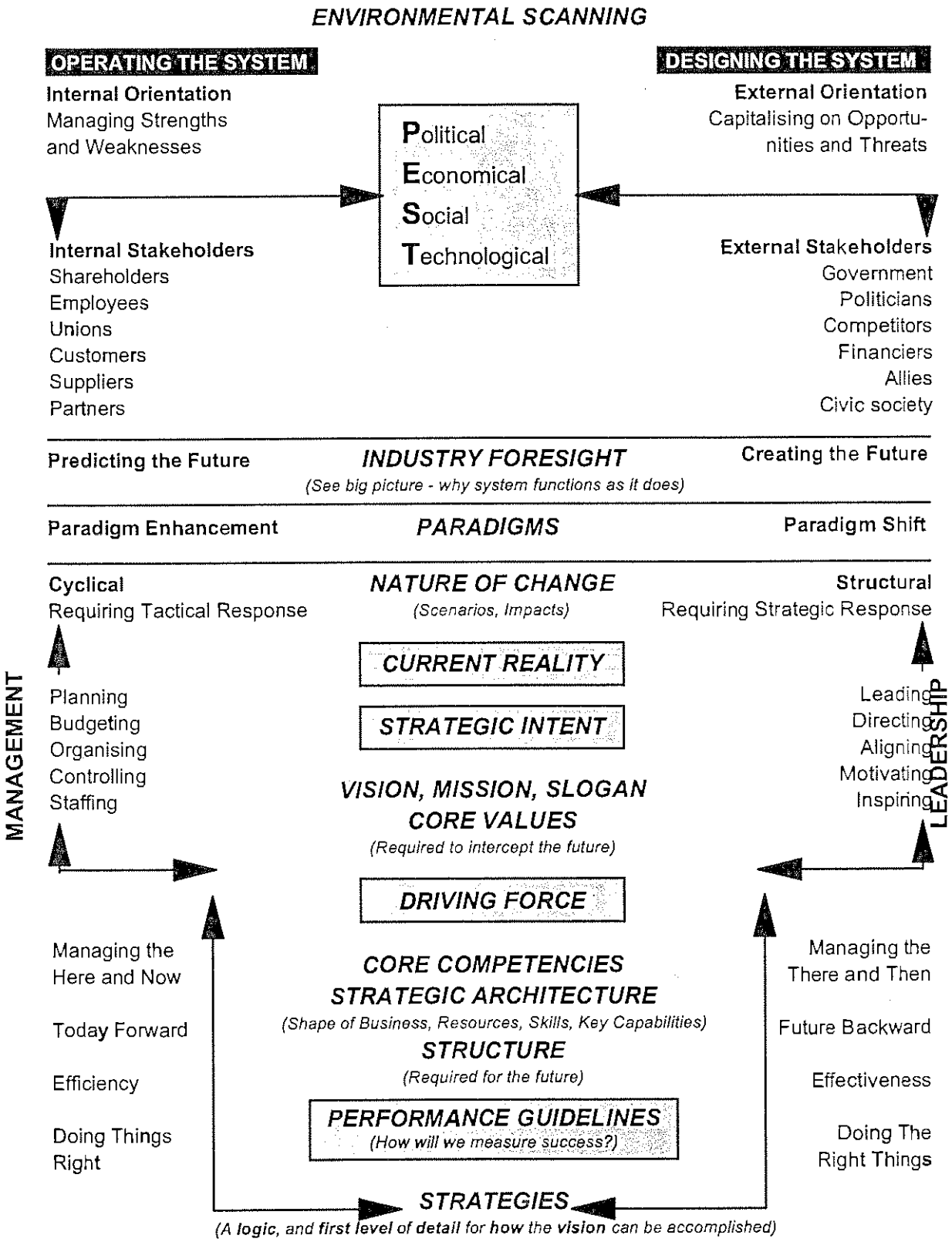
Figure 9.2 illustrates how the industry foresights, possible future scenarios and the paradigms of the owners and management of an enterprise influence the strategic intent.

The strategic intent compared to the current reality of the enterprise both in terms of its capabilities and performance identify the strategic gaps which lead to an updated strategic framework.

The strategic framework provides guidance with respect to the overall direction and direction for the main value streams and resource utilisation. This guidance is used to redesign the current enterprise structurally and culturally and migrate to the future reality.

Lewis [45] contrasts the development of a strategic design with the operation of the strategic design as shown in F***igure 9.3***. This figure provides an integrated view of the development, implementation and application of the strategic design.

FIGURE 9.3: CONTRASTING DEVELOPMENT AND OPERATION OF STRATEGIC DESIGN



9.2 Drivers of strategic intent

The strategic intent of an enterprise is influenced by the paradigms of those setting the strategy, the way they foresee the industry and how competition is perceived.

9.2.1 Paradigms

According to Covey [44] "paradigms are the beliefs and assumption held in common and taken for granted" i.e. abstractions of currently held wisdom and a way of viewing the world.

Paradigms are based on past experience and are mental models for a business of how the enterprise operates in its environment.

9.2.1.1 The impact of paradigms on strategy

According to Lewis [45] *"Strategy always proceeds from a given paradigm"*.

Paradigms are influenced by environmental forces and organisational capabilities and are often established subconsciously and subjectively. It is important to get these paradigms clearly identified, articulated and tested to establish their realism and create a more comprehensive, enlightened and objective framework against which to position the enterprise. Barker [46] stresses the importance of paradigm development and testing especially in turbulent environments.

Scenario planning provides a useful tool for proposing alternative futures in the changing environment.

It is further necessary to know the decision-makers' and the existing enterprise entities' paradigms in order to design solutions

that are acceptable within the existing paradigms or to identify the need for a paradigm shift. The degree of ripeness in an Enterprise to shift its paradigms is important for the design of change.

Management should always strive to achieve more comprehensive and enlightened paradigms by enhancing the existing paradigm but should also realise when a paradigm has become obsolete and should be shifted.

9.2.1.2 The nature of paradigms

The following should be considered in assessing paradigms:

- A business normally operates according to a set of beliefs held by its management and cascaded to its employees - these beliefs inter alia justify/explain the business' success.
- Business success reinforces these beliefs and makes it very difficult to motivate paradigm changes while things are going well.
- New paradigms often appear just before the peak of enterprises based on a previous paradigm and are therefore not sought, seldom noticed and if seen not wanted.
- New paradigms are most likely to be created outside the enterprise
- Existing paradigms make it difficult to see new paradigms
- New paradigms need entrepreneurs (paradigm pioneers) to champion them into an organisation.
- Paradigms invented by others can be used to shift an enterprise.

9.2.1.3 Identification of paradigms

Paradigms may be identified by examining the perceived failures and successes of the enterprise in its' recent past and finding the mental models which classify/interpret these as success or failure.

When the successes/failures are identified, the mental models, which motivated the actions causing the behaviour, which resulted in these failures and successes, are determined. Key success factors as perceived by the current organisation are also useful in defining these paradigms.

Paradigms may be divided into:

- Management paradigms i.e. mental models about the company, today
- Industry paradigms about the rules of the game today and
- Emergent paradigms which may lead to opportunities about how the rules of the game may be changed.

Once paradigms are identified they should be questioned to determine whether they inhibit breakthrough to higher growth or better performance.

9.2.1.4 Assessing and actioning paradigms

According to Lewis [45] the paradigms shift question i.e. "What is IMPOSSIBLE to do in our business (function, discipline), but if it could be done, would fundamentally change it?" is paramount. Paradigms can then be classified according to action required and the action documented in an action table as in ***Table 9.1*** to confirm the intent to do something about the enterprise paradigms.

TABLE 9.1 - PARADIGMS ACTION TABLE (Example)

PARADIGM	ACTION					
	Shift	Attend to	Note	Challenge	Take stand	Prepare strategy
Management has no confidence in new enterprise	✓					
EE Project needs management and discipline		✓				
Roll-out is as important as design			✓			
Product support is not really necessary				✓		
We don't know the size of the window of opportunity					✓	
We will need alliances to provide product support						✓
Much analysis provides good decisions				✓		

9.2.2 Industry foresight

Industry foresight is seen as a prerequisite to strategic design and is the ability to understand and predict the functioning of the Host- and Super System into which an enterprise fits.

"Industry foresight is more than a blinding flash of insight" according to Hamel and Prahalad [8] it is based on deep insights into trends in:

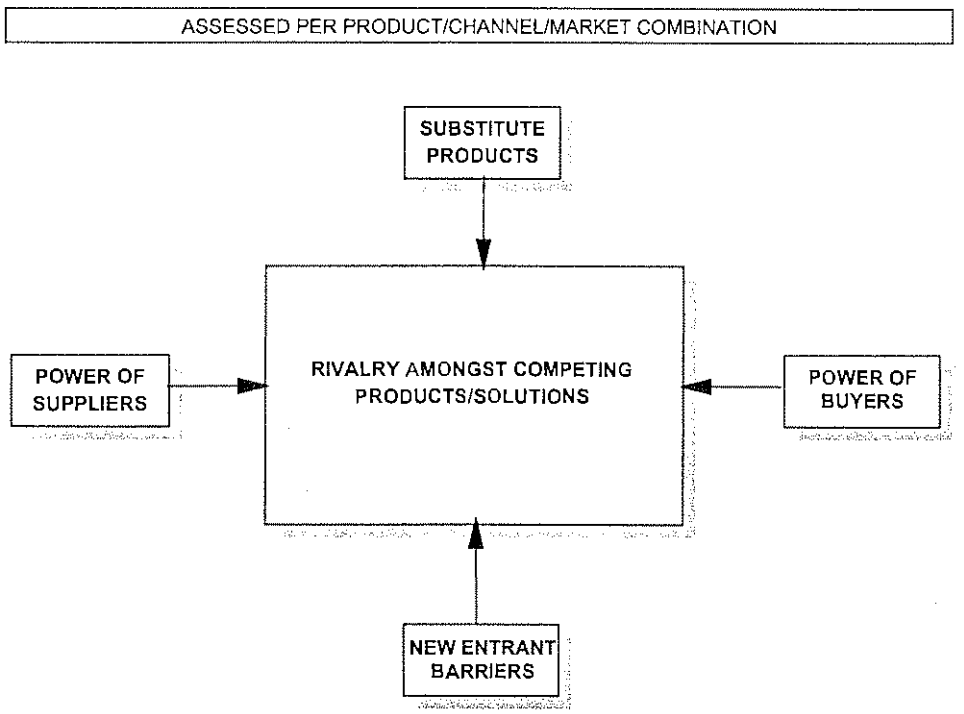
- technology
- demographics
- regulations
- life styles

which can be harnessed to rewrite industry rules and create new competitive space based on creatively managing a future based on emerging facts.

9.2.3 Competitive situation

One area that should be well understood is the structure of the market into which the enterprise operates. This may be done using Porter's 5 forces model [aa] as illustrated in ***Figure 9.4***.

FIGURE 9.4: PORTER'S FIVE FORCES MODEL



In the above model::

- rivalry amongst competing solutions forces the enterprise designer to identify the alternative solutions that he is competing against and assess his position relative to them
- substitutes, trigger awareness that the same need satisfaction may be supplied in a totally different way. E.g. financial security can be provided by insurance policies but may equally well be provided by savings products or unit trust investments.
- new entrants high light the fact that existing players could be confronted by new entrant and assesses to what extent the newcomers would be at a competitive (dis)advantage
- powers of buyers takes cognisance of the fact that the stature of buyers and the way in which they are organised and think may substantially impact the enterprise's product offerings and the way in which they can be offered to the market.
- powers of suppliers acknowledges that enterprises can become tied in or grow to be very dependent on their suppliers especially if core elements of products or core capabilities are sourced from them

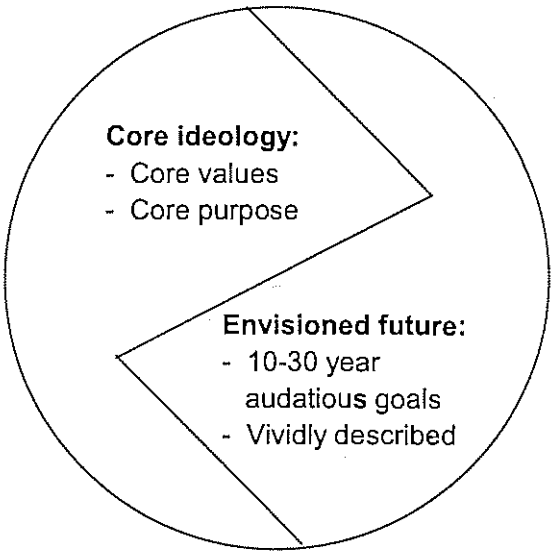
and provides the strategy designers with insights about which forces they have to focus on.

9.3 Defining vision

The vision of an organisation is a deep sense of purpose of what the organisation stands for and strives to create i.e. what the organisation is and where it is going (the future we want to create or future reality).

The vision consists of who we are and what we stand for - the core ideology and the envisioned future as illustrated in ***Figure 9.5***

FIGURE 9.5: AN ENTERPRISE VISION



The purpose of a vision is to provide the enterprise with a memorable meaningful goal and a measure to apply when allocating resources i.e. only expend resources that contribute to attaining the vision.

For the enterprise designer this means that the enterprise design should be totally focussed on attainment of the vision. I.e. processes, systems and structures must support and enable attainment of the vision.

A vision should be:

- Imaginable – something that can be pictured
- Desirable – appeal to the long term interests of employees, customers, stockholders and other stakeholders
- Challenging
- Focused clearly enough to guide decision making
- Flexible enough to allow alternative responses to cope with changing circumstances.

9.3.1 Core ideology

"It's more important to know who you are than to know where you are going" – George Merck of Merck

According to Collins and Porras [10] companies with enduring success have core values and a core purpose that remain fixed while their strategies and practices adapt to the changing world. These two elements form the core ideology of the company. It is therefore important to establish a "core ideology" which is considered genuinely sacred. This ideology is one of the cornerstones for developing a vision.

The core ideology defines what the enterprise stands for and why it exists – its enduring character. The role of the core ideology is to guide and inspire the enterprise. The extent to which it affects the enterprise depends on its authenticity and the discipline and consistency with which it is lived. The core ideology provides the glue that holds the organisation together throughout its life and all the changes accompanying it. Any effective vision must embody the core ideology of the organisation as contained in its core values and core purpose. The ideology only needs to be meaningful and inspirational to those inside the organisation. A clear, well-articulated ideology attracts people with compatible core values to the company.

The culture of an organisation is reflected in its implied or expressed values. Values express how the company wants to act. Values measure rightness of direction i.e. sets the norms according to which a company measures the consistency of its actions and its mission.

The core values of the organisation in fact determine the sort of purpose that may appeal to the enterprise therefore it should be determined before the core purpose is finalised. In cases where a change in the core purpose is anticipated the values of the enterprise will determine whether this change can be achieved. On the other hand the values also determine what is right in the way the enterprise goes about achieving its purpose.

9.3.1.1 Core values

Core values are the essential and enduring tenets of an organisation, a small set of timeless guiding principles, of intrinsic value, to those inside the company, requiring no external justification. To be meaningful it must reflect the values of the stakeholders. They define what the company stands for and would stick to even in adverse circumstances. Companies tend to have only three to five core values.

Values are the standards to measure the rightness of decisions whilst striving to achieve the vision.

Values actually have the nature of constraints within which the vision has to be attained. Values must be lived i.e. working examples must be highlighted and violations addressed and severely and progressively dealt with.

Typical examples of core values are given in ***Table 9.2***.

TABLE 9.2: EXAMPLES OF CORE VALUES

Core Values Are a Company's Essential Tenets

Company	Values
Merck	• Corporate social responsibility • Unequivocal excellence in all aspects of the company • Science-based innovation • Honesty and integrity • Profit, but profit from work that benefits humanity
Nordstrom	• Service to the customer above all else • Hard work and individual productivity • Never being satisfied • Excellence in reputation, being part of something special
Philip Morris	• The right to freedom of choice • Winning – beating others in a good fight • Encouraging individual initiative • Opportunity based on merit; no one is entitled to anything • Hard work and continuous self-improvement
Sony	• Elevation of the Japanese culture and national status • Being a pioneer – not following others, doing the impossible • Encouraging individual ability and creativity
Walt Disney	• No cynicism • Nurturing and promulgation of wholesome "American Values" • Creativity, dreams and imagination • Fanatical attention to consistency and detail • Preservation and control of the Disney magic

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Discovering the core values:

- **Assemble a "Mars Group"**

  A Mars group is a group of people one would assemble if you wanted to establish a settlement on Mars which should under the guidance of this group function like the current enterprise.

  To achieve this one would:

  - Assemble five to seven people with a gut-level understanding of your core values who have
    - Highest credibility with peers
    - Highest level of competency

- And are exemplars of the enterprise values "the genetic code"

- **Identify candidate values**

  - With relentless honesty
  - Starting from the values the individual brings to work, would teach his children and expect them to uphold regarding work
  - Select values that would still hold true for you in 100 years
  - Test that these values would remain valid for you even in adversity
  - These values would endure despite changes in: discipline, employer, line of work
  - Select those values around which individuals in the company can align themselves with respect to their work

- **Testing for core values**

  - Would you keep the values even if you were penalised for them?
  - Would you re-deploy the enterprise to adapt to these values?

9.3.1.2 Core purpose

The core purpose is the enterprise's reason for being (existence). It captures the soul of the organisation – the idealistic motivation for people to do the companies work – in general to do something which is of value. An example of the core purpose of a number of well-known companies is shown in *Table 9.3*.

TABLE 9.3: EXAMPLES OF CORE PURPOSES

Company	Core Purpose (reason for being)
3M	To solve unsolved problems innovatively
Cargill	To improve the standard of living around the world
Fannie Mae	To strengthen the social fabric by continually democratising home ownership
Hewlett-Packard	To make technical contributions for the advancement and welfare of humanity
Lost Arrow Corp.	To be a role model and a tool for social change
Pacific Theatres	To provide a place for people to flourish and to enhance the community
Mary Kay Cosmetics	To give unlimited opportunity to women
McKinsey & Co.	To help leading corporations and governments to be more successful
Merck	To preserve and improve human life
Nike	To experience the emotion of competing, winning and crushing competitors
Sony	To experience the joy of advancing and applying technology for the benefit of the public
Telecare Corp.	To help people with mental impairments realise their full potential
Wal-Mart	To give ordinary folks the chance to buy the same things as rich people
Walt Disney	To make people happy

H2 Haystack syndrome (Goldratt)

Discovering the core purpose:

The core purpose defines how the company wishes to contribute to establishing something of value. The criteria to consider in the search for the purpose include:

- Purpose is a guiding star never to be reached
- Able to inspire change
- Is the answer to the five why's starting from what the company does and asking why is that important five times
- The financial results of any enterprise's activities e.g. maximising shareholders' wealth is a consequence not a purpose (in a viable and flourishing enterprise)
- The purpose should relate to the way in which people in the organisation measure their achievement.
- The core purpose is the reason you would give for not selling the company to a "Random Corporate Serial Killer" if:
  - the company could be sold at a good price and,
  - employees would be guaranteed their pay and jobs regardless of job content and,
  - the buyer intended to shut down operations completely
- How to frame the purpose of the organisation so that people that do not need to work would want to dedicate their best energies to the company's effort.

In summary, the core ideology as expressed in the core values and core purpose above, defines what is fixed and what is up for change.

9.3.2 The envisioned future

The envisioned future is what an enterprise aspires to become, to achieve or create.

According to Collins & Porras the envisioned future consists of two parts i.e.

- Ten to thirty year audacious goal plus
- A vivid description of what it will be like to achieve the goal.

9.3.2.1 The audacious goal

Visionary companies often use "Big, Hairy, Audacious Goals" (BHAG's) [10] to provide a clear and compelling unifying focal point for effort, and to catalyse team spirit to achieve the clearly defined finishing line.

BHAG's stretch ten to thirty years into the future beyond current capabilities and the current environment and have only 50-70% success probability but must be believable to the company.

These BHAG's are normally:

- target oriented (e.g. be a R16 company)
- common enemy oriented (e.g. beat Mutual)
- role model oriented or (e.g. like Rolls-Royce)
- internal-transformation oriented

and expresses what the enterprise aims to be:

- in the world
- in technology
- in their industry
- to their clients

VERSUS

- their competition (e.g. be first, second or out of a market [Welch GB])
- in their product offerings
- in growth
- in diversification
- in innovation

The process of establishing the BHAG's needs to be initiated by the leader and adopted by the guiding coalition in the enterprise. Setting BHAGS must be a team effort, which address the head and heart. This is a time consuming exercise.

These goals provide guidance to a future that is desirable, feasible, focussed, flexible and conveyable.

9.3.2.2 The vivid image

Provides a vibrant, engaging and specific description what it will be (feel) like when achieving the BHAG - painting a picture with words. This may be illustrated by an example from Collins and Porras [10]:

"We will be respected and admired by our peers. The end-product divisions, who will achieve significant product "hits" in the marketplace largely because of our technical contribution, will actively seek our solutions. We will have pride in ourselves. The best up-and-coming people in the company will seek to work in our division. People will give unsolicited feedback that they love what they are doing. (Our own) people will walk on the balls of their feet. (They) will willingly work hard because they want to.

Both employees and customers will feel that our division has contributed to their life in a positive way."

These vivid descriptions should reflect passion emotion and conviction. According to Erikson [11] people at different stages in their development, have different development tasks to complete and different drivers. This range of drivers needs to be addressed in a successful, vivid image.

The visioned future reality goals BHAG's and the accompanying vivid image may then be combined into a vision statement.

According to Collins and Porras many companies attribute the achievement of sustained growth to investment in their capabilities. This means that capabilities should also feature in the vision.

The vision provides a meaningful memorable goal around which the enterprise's people can rally, and guides the allocation of resources.

9.4 Mission or Purpose

The mission or purpose of an enterprise addresses why the organisation exist, interpreted from the core purpose in terms of:

- **Core markets** – The type of need satisfaction (value proposition) provided by the enterprise in terms of benefits offered.
- **Customers** – To whom the need satisfiers are offered (in terms of market and segments), existing versus new, sector of economy and demography of market.
- **Products** – Level of integration/system provided, innovativeness, cost effectiveness, availability/reliability, range and ancillaries offered.
- **Channels** – Supply line integration, internal or external to the company and the geographic distribution.
- **Service** - The level of service that the enterprise aims at achieving.
- **Quality** - Level of quality envisaged in terms of both level of specification, level of conformance and level of availability.
- **Core competencies** – The competencies employed to achieve the enterprise's objectives.

9.5 The time horizon for the strategic design

The nature of the strategic framework is influenced by its time horizon. This time horizon depends on the flexibility of the factors that influence strategies. A realistic time frame may be derived by considering:

- The lead time for product development
- Rate of change in market trends
- Rate of change in customer needs and preferences
- Rate of technological change
- Capital intensity – degree of flexibility
- Rate of social, political and economic change
- Product life cycles
- The need for cultural shift

The time horizon for the strategic design thus also determines how far through the enterprise's life cycle the strategy will be due for upgrade/reinvention.

According to Porter [12] the costs and complexities of designing and transforming organisations to strategic positions implies that these designs have to be developed for at least a decade. This allows for implementing and improving (refining) the activities and their interactions and reinforcing the company's identity with its image.

9.6 Effectiveness requirements

All activities of a company contribute to its costs and thus reflect in its competitive advantage. An enterprise should therefore only engage in the minimum set of activities required to satisfy its chosen position and efficiency has to apply to all activities just to stay even with the continuous improvement of its peers.

Operational effectiveness is necessary but not sufficient to maintain a competitive advantage for two reasons, e.g.:

- Rapid diffusion of best practices through benchmarking which raises the bar for everyone
- Competitive convergence tools forge everybody till they look alike, have the same suppliers and engage in wars of attrition with takeovers as the only logical alternative to outlive the zero sum competition. This causes prolonged static or declining market prices and cost pressures which compromise companies' ability to invest and so further threatens their future.

Operational effectiveness thus becomes a minimum requirement or constraint for the strategic design.

In this section we have demonstrated how the mayor requirements for an enterprise design arise from the core values which determine/constrain possible core purposes for the enterprise.

From the core purpose and values a vision is determined which includes a vision statement and a vivid image of the desired future.

The vision is translated and defined in terms of the mission and strategic intent of the enterprise. This intent defines the primary drivers of strategy i.e.

- Markets served
- Channels utilised
- Products/services provided and
- The value delivered to the customer

and may be augmented by statements regarding the competencies to be employed in achieving the mission.

The time horizon needs to be defined to constrain the efforts in predicting trends.

Finally the constraint exists that the strategic design should as minimum achieve operational effectiveness to at least be in the running against competitors.

CHAPTER 10

POSITIONING AS STRATEGIC CONCEPT

POSITIONING AS STRATEGIC CONCEPT

Some companies equate the success of a company to its operational efficiency i.e. how to perform all activities with the lowest expenditure of resources. Strategic positioning in contrast with operational efficiency means performing different activities or similar activities in a different way than competitors.

According to Porter [12] companies should return to strategic positioning and should also ensure a good fit between the minimum set of activities from which emergent properties arise which enhance their competitive position – this requirement establishes a need to design a system of strategies for the enterprise i.e.

- overall strategy e.g. diversification,
- primary strategies relating to offering to markets
- secondary strategies in terms of business processes and resources.

Positioning augmented by fit implies that strategy should be designed as a top down greenfield exercise.

The previous section discussed how the strategic intent of an enterprise is defined in terms of:

A vision which defined

- what the enterprise is,
- where it wants to go in principle

Its mission that clarified which competencies it intended applying to

- deliver which products through
- which channels to
- which markets.

The current analysis determined the status quo of the enterprise and its environments.

SWOT analyses performed on the current reality indicated strengths and weaknesses, versus the internal capabilities of the enterprise, whereas evaluation against the external environment identifies opportunities and threats.

Designing a whole enterprise is a very demanding task and could become untenable if equal effort has to be expended on all aspects of the design. To focus the design effort it is necessary to define a driving force that sets the priority for choices which determine the nature and direction of an organisation i.e. markets, product and services, key capabilities, resource allocation, size/growth, profit/return. With the driving force established question then becomes how to approach the design.

10.1 Value system (driving force) for strategies

Most or all of the efforts in an enterprise are ultimately directed toward producing its products and serving its markets. This makes the decisions around the scope of a company's products and markets the most fundamental strategic decision in any enterprise.

The driving force concept (coined by Tragoe and Zimmerman) provides the key to decisions regarding the business, products and markets a company is in and is defined as "the prime determiner of future products and markets" [14].

The driving force thus determines the primary strategic decisions from which all other choices in the company's strategic profile follow as illustrated in ***Figure 10.1***.

FIGURE 10.1: THE FORCE DRIVING THE STRATEGIC FRAMEWORK

As example, a company in the financial services industry may exist for the purpose of providing financial security for a certain market segment. If it is product driven, the company will serve the market as long as it fits in with the company's product range.

This company would rather change its market to sell more products in order to make more money now and in the future than change its product range to more adequately serve the market.

10.1.1 Source of the driving force

According to research by Tragoe & Zimmerman the driving force may derive from any of the nine strategic areas which influence all companies. These nine areas are identified and grouped in ***Table 10.1***.

TABLE 10.1: STRATEGIC AREAS CATEGORIZED

CATEGORY	STRATEGIC AREA
Products/Markets	**Products offered** **Market needs served**
Capabilities	**Technology** **Production capability** **Method of sale** **Method of distribution** **Natural resources**
Results (Business)	**Size/growth** **Return/Profit**

10.1.2 Determining the driving force

Driving forces can either be understood explicitly or attempts can be made at applying them implicitly. When applying driving forces implicitly management tries to extrapolate strategic decisions by:

- abstracting the logic of earlier strategic decisions

- basing strategic decisions on operational criteria

This approach leads to arguments and confusion between the leadership because of variations in interpretation and experiences. For the smooth functioning of an enterprise, driving forces have to be thought about, be articulated and agreed upon amongst the leadership of the organisation.

Only one strategic area can be the driving force of the total company. Business units should also have a single driving force, which may differ from that of the whole enterprise. This driving force is the area most decisive in strategic decisions e.g. the company could be market driven but have product division which are product driven.

Driving forces may change over time. Determining a driving force is a tough, practical decision. This decision is based on:

- the organisations strengths and weaknesses,
- its competitive position,
- its basic beliefs (core ideology),
- the external environment and trends impacting the organisation, and
- the "gut feel" of the executive.

The selection of a driving force should aim at obtaining greatest advantage from the companies situation and capabilities. ***Table 10.2*** summarises the nature of driving forces and may be used as an aid to determine a driving force for a company. The current driving force should be continuously reviewed to ascertain that it remains appropriate in the dynamic environment.

In summary:

- An enterprise needs to take decisions about which markets it wants to serve with which products through which channels and on what basis it expects the markets to buy the products.
- These decisions require trade-offs that need a value system.

- The driving force helps to decide what is most important in terms of preference of how the enterprise wants to achieve its business objectives.

TABLE 10.2: DRIVING FORCES (their identification, manifestation and implications)

	TYPE OF DRIVING FORCE	DEFINED	IDENTIFICATION	ACTIONS / CONSEQUENCES
Output focussed	Product (product determines markets)	Thing offered to the market including its support grouped according to function, customer needs, size/form, durability.	Sticks to same or similar products and tries to stretch them – capabilities directed toward ability to supply that product/service.	Seek higher market share in existing markets or new geography and market/customer group. Marketing to sell product.
	Market needs (markets determine products)	Group current/potential buyers develop and acquire product/service segmented in some way by common need – formed or limited geographically.	Search alternative ways to fill current needs. All markets have similar needs.	Develop and acquire product range to serve market needs. Research emerging needs. Resources focussed to need analysis and market researeh. Timely new products.
Capability focussed	Technology (determines products and markets)	Reproducible learned knowledge and skills subject to update and extension.	Seek applications for technology – makes products from technology or sells technology outputs (design) to others.	Strives to be on leading edge – may buy in where others make breakthroughs.
	Production capability	The know how, processes, skills systems and equipment to make certain products or services and ability to improve the capability	Offers only products that can be made by its capabilities in two categories: 1. Efficient production of mass commodities where products may differ but mass production capability is common. 2. Jobbing capabilities where capability to techni-cally produce product takes priority.	1. Sells production capacity and efficiency rather than product. 2. Expands to broaden pro-duets base and flexibility.
	Method of sale (determines products, markets, geography)	Method of sale is the primary way in which the company convinees customers to buy supported by other marketing activities.	Capabilities and limitations of method of sale determine/ limit operations.	Seek compatible sales approaches. Distribution is developed to support method of sale. May sell others' products to gain maximum advantage.
	Method of distribution	A way in which products are brought to customers/users including en-route storage – with incidental know how system and equipment – excluding customer persuasion.	Determines customers, products, geography by what can be handled through established channels. Method of sale adapted to distribution.	Seek similar compatible distribution channels. May distribute others' products to gain maximum advantage.
	Natural resources	Actual and potential wealth created by nature (excludes artefacts).	Develops products and markets through use or conservation of natural resources.	Seeks increased control over resources to enhance value. May sell resources to others for exploitation.
Business results	Size/growth	Overall size/growth of company in appropriate measures.	Determines products, markets, and geography from desire to achieve a certain size. Time limited i.e. can only persist for limited time span.	Sets substantial change in size/growth as objectives. Normally serves only for limited time as transition to other driving forces.
	Return/profit	Financial result of company's effort in appropriate measures e.g. service level, achievement of budget, ROI, cost benefit ratio, profits growth.	Determines products, markets according to return/profit. Handles unrelated products.	Will change organisation from one product line to another more rewarding. Constrains expansion against profitability norm.

Benefits from defining the driving force include:

- improved visibility of viewpoints on future direction
- facilitating the fleshing out of an agreed viewpoint
- resolution of differences
- clearer communication of the vision

The driving force should therefore feature prominently in the vision statement of the enterprise. To a certain extent the driving force is a translation of the company values in terms of the relative priority of strategic areas.

10.2 Strategic positions

Some authors promote an approach that sees strategy solely as a means to enhance operational effectiveness. This approach is very restricting and indeed dangerous.

When the multitude of management tools for improving operational efficiencies and effectiveness (e.g. JIT, TQM, Benchmarking, TOC) are applied empirically they deteriorate the viability of companies in respect of maintaining a sustainable competitive position. Strategy must include, but also go beyond operational effectiveness. There is some uncertainty as to the capability of TOC as a philosophy to achieve breakthroughs by moving an enterprise to the white space of a redefined game in a new ballpark.

Following Porter's seminal article "What is Strategy", we advocate the return to positioning as the heart of strategy. This approach sets specific new requirements for the development of a strategic design and implies a top down focussed approach.

Accepting positioning as the core of strategic design, does not obviate the need to also attend to other appropriate requirements in the strategic design. These requirements should however be kept in perspective.

The parameters to be considered in positioning are:

- the value concept
- the capability concept
- width of focus

10.3 Value concept positioning

According to Treacy and Wiersema [15] the essence of serving markets better lies in focus. Different customers place greater value on different things like (order winning criteria):

- Price and convenience
- State of the art products, or
- Partners and solutions

even though they expect at least the minimum level of performance comparable to the competition on the other criteria i.e. the order qualifying criteria.

This offers the opportunity for market leaders who realise that they should not be everything to everybody to group their customers according to the above classes and focus on fulfilling specific prime customer groups' expectations i.e.

- Best cost
- Best product
- Best solution

The fulfilment is provided through three value disciplines i.e.:

- Operational excellence
- Product leadership
- Customer intimacy

For enterprise design this means choosing a value discipline matched to the capabilities of the enterprise and designing the enterprise to excel in the chosen discipline.

The enterprise should maintain parity in the other value disciplines and provide for continuous improvement to stay in the lead in the chosen discipline.

The above choice is judgmental and should take strong cognisance of the enterprise values. For an operationally excellent company, e.g. McDonalds, the focus in enterprise design must therefore fall on providing the best total cost through low priced, dependable products conveniently delivered to customers.

Product leadership requires an enterprise design that can produce the highest performing products. This means the enterprise must be geared to invent, develop products and exploit them in new markets.

The customer intimacy discipline requires an organisational design that can provide total customer specific solutions based on close relationships with clients. This means personalised service and advice are key in this design e.g. Roadway Logistics Systems.

The value disciplines set requirements and constraints for the enterprise design as shown in ***Table 10.3***.

TABLE 10.3: REQUIREMENTS AND CONSTRAINTS I.T.O. VALUE DISCIPLINES

	Value discipline		
Factor	**Operational excellence**	**Product leadership**	**Customer intimacy**
Cost of product/service	Lowest direct plus indirect cost of ownership over its life	Affordable	Affordable
Product variety	Standardised products	Continuous new products	Each product/service tailored to client
Delivery system	Procedural work	Flexible organisation team based, loose.	Empowered people work from understood customer needs
Transactions	Streamlined, flawless, quick, convenient	Focussed on integration informally	Specifically integrated with customer environment
Integration	Strong virtual integration in supply chain	Good from innovation through to market	Excellent integration by specific service per customer even into the customer organisation
Innovation	Not sought	Continual stream of new products and search for improved ones	Designed to customer requirements
Product performance	Acceptable	High performance – most effective provider of gratification	Customer tailored specific performance – not state of the art
People	Compliant	Imagination and ability to realise, team workers	Knowledgeable and caring
Type of work	Production	Development and production	Development, production and strong service

In choosing a value discipline, it is necessary to:

- Assess current reality in terms of
  - Value delivery capability
  - Customer base expectations
  - Reasons for not achieving excellence

- Evaluate opportunities to become a market leader
  - Synergism in value discipline performance and customer expectations
  - Benchmark against value leaders for closing gaps
  - Identify alternatives

- Evaluate alternatives

- Flesh out operational implications

- Assess impacts of proposed changes
  - Value of offering
  - Market for offering
  - Associated cost
  - Critical success factors

- Choose

10.4 Capability positioning concept

According to Porter "Competitive Strategy is about being different. It means deliberately choosing a different set of activities to deliver a unique mix of value".

Even though strategies are often described in terms of the customer of an enterprise, the essence is that performing a different set of activities or activities differently from rivals competing for the same customers' business must produce this value delivery to the customer.

This provides the enterprise design with another guideline to possible positions that could be congruent with the enterprise capabilities. Possible sources for strategic positions are one or a mix of:

- Producing a subset of an industries offerings (variety based positioning). This product based approach is applicable when a company can best produce his set of offerings with a distinctive set of activities (have a superior value chain) e.g. automotive lubrication services rather than car repair or full maintenance service.
- Servings all or most needs of a particular customer group (needs based positioning) which is applicable when there are groups with differing needs that can be served best by a uniquely tailored set of activities. E.g. IKEA meets all the furnishing needs of a group of young people who want style at low cost. Note that meaningful

positions only arise from needs when the needs require a different set of activities to best satisfy them.

- Serving customers based on their accessibility (i.e. access based positioning). Access may be based on geography, size or scale, or other factors, which require a unique specialised set of activities to serve the customers e.g. cinemas that serve towns with a certain population limit.

Capability positioning thus relates the offerings of the enterprise to its activities or processes and identifies which set of activities offer the uniqueness for the enterprise.

10.5 Positioning with regards to width of focus

Within the above sources of positions (variety, needs, access) each enterprise still has to determine its width of focus:

- Focused competitors thrive on customers that are overserved by other (overpriced) broadly focused rivals.
- Broadly focused competitors thrive on serving the common needs of a broad range of customers.

Decisions on focus should again reflect the need for different sets of activities to serve the customer group.

In order to attain a sustainable advantage the unique position adopted must be defendable against imitation. Imitation is likely to threaten the enterprise in two ways i.e.:

- Repositioning of a rival to exactly match your position
- Stradling where rivals seek to match the differentiating features of the enterprise while maintaining its existing position by grafting new features onto its existing activities.

From the definition of a strategic position as one requiring a unique set of activities follows that if this set is minimised and if the enterprise is really good at performing the set of activities imitators have to precisely clone the enterprise to follow its act. Any straddlers will have more than the required set of activities and therefore should be at a cost disadvantage.

10.6 Trade-offs in positioning

The above emphasizes the need for careful trade-offs to ensure exact focus of activities in satisfying a strategic position. From this again follows that we need a clear understanding of exactly what is required in terms of activities cascaded from the needs of the strategic position so that best alternative may emerge from a trade off against a value system. This means that the enterprise must cascade its requirements top down to activity level to ensure that it delivers exactly the essential activities and no more.

The values relevant to trade-offs are:

- Consistency in image and reputation in the market e.g. when a company starts delivering value inconsistent with its reputation customers get confused - secondly it is very expensive to create a new image i.e. the strategy must fit the companies strategic intentions with respect to its image which reflects its values. This means that the values have to be cascaded with the functions.
- Fit with capabilities. The more unique the position assumed by a company the less the likelihood that its capabilities will be matched by more general positions i.e. the right capabilities must be created.
- The level of capability. Value is destroyed when activities are over or under designed in that either the costs are excessive for the output needed or the capability is unable to provide the necessary performance i.e. the capabilities must provide the correct level of performance. This rules out designing systems that can do anything in any volume just in case.
- Limits of co-ordination and control. With decrease in focus i.e. trying to be all things to all people employees get confused in their execution of the work and in

the decisions they have to take. I.e. the position should be focused and require one set of guiding principles, policies, procedures within a specific design.

Whereas the quality of conformance is free the level of specification is not. The level of specification targeted in a strategic position should therefore be carefully designed. When performing near productivity frontiers "the trade off between differentiation and cost is very real indeed" [12]. This implies choosing what not to do.

10.7 Integration concept

Strategy is about combining activities i.e. selecting activities, structuring them and determining the interactions between these activities.

This means that a system of activities has to be designed in such a way that the emergent properties arising from the way activities fit together and reinforce each other lead to a competitive advantage.

"Fit locks out imitators by creating a chain as strong as its strongest link" [12]. This happens because the tight interaction emphasises weaknesses (similar to a JIT system) and allows them to be engineered out progressively.

Modern trends to focus only on "core competencies, critical resources and key success factors" destroys the focus on the interdependencies within the system which has to function as a whole. This emphasises that the enterprise designer has to ensure the enterprise is designed as a whole system with all the necessary functionality, but may implement the bulk of the capability by standard proven elements. This allows him to focus on the really important aspects of design i.e. the interactions between the elements and the elements which contribute significantly to the key performances of the system.

The levels of fit that may be discerned are:

- **First order:** Simple consistency between every activity and the overall strategy i.e. strategic requirements are cascaded down and partitioned to each function and

satisfied by the activities by which it is implemented. This ensures that competitive advantage accumulates.

- **Second order**: When activities reinforce each other i.e. the whole becomes more than the sum of the parts. This is achieved when the implementation of an activity over and above satisfying the function for which it is implemented also contributes to other functions e.g. Neutrogena markets its dermatological approved soaps to upmarket hotels retaining its own packaging because of its image - this in turn reinforces the image of the hotel as responsible and that of Neutrogena as the soap plus it entices customers to try the soap.

- **Third order:** Optimization of effort is about not only having activities support the strategy and each other but also finding the differentiated most effective way of executing the activities. Opportunities for optimization exist through coordination and incorporating information exchange in activities (the basis of many BPR successes) but also arise from designing the system from a whole system whole life perspective. Better fit between all the role players in all the phases in the products life and the strategy may further enhance the competitive position e.g. the product design fits the market and distribution channels perfectly, but is also easy to produce and support.

Benefits from strategic fit stretch beyond competitive advantage to sustainability.

Positions built on systems (interlocked arrays) of activities are much harder to match because:

- All activities have to be matched 100% to be equal. The serial probability of success for a number of imperfect matches soon reduces to an insignificant number i.e. $(0.9)^4 = 0{,}66$.
- New entrants even without the need for trade-offs faced by existing companies still are faced with the barrier of having to exactly clone the whole system to compete.
- Where second and third order fit forms the basis of competitive positions the system becomes very hard to untangle and discover the source of the emergent

properties. Even with the system defined the complexity of imitating the interactions of the system remains daunting

- Fit creates a pull to improve effectiveness in weaker links of the system and any improvement again reinforces the other links in the system
- Competitors who successfully match the whole system find themselves in a winner takes all position where the leader may still be more experienced than the imitator.

Positioning a company such that there is no compatibility with rivals' capabilities poses the most viable position a firm can aspire to.

The above further emphasises why the whole design of the enterprise i.e. processes, systems and organisation structure need to be designed in a strategic specific and integrated way.

We may conclude that even though the overall system should be well designed (at a strategic level), design should focus special effort on the important activities/processes of the enterprise which contribute most to the achievement of the strategic objectives and especially those activities which strongly reinforce each other. This is more optimal than trying to design all things equally well. The HOQ technique described in Figure 8.11 may be used to identify the important activities with good fit potential.

CHAPTER 11

ANALYSIS OF OPERATIONAL/MARKET REQUIREMENTS

ANALYSIS OF REQUIREMENTS

Requirements (and constraints) are determined by the host (existing enterprise), business and external environments of the proposed enterprise. Performance requirements and constraints arise from the external environment of the enterprise, thus it makes sense to analyse potential markets to determine where the enterprise would like to compete and how feasible this is.

The enterprise designer can focus the enterprise's strategic design by analysing potential markets in which it may be able to compete to determine their relative attractiveness and measure this against its ability to engage in each market. The enterprise must further assess itself against its competitors.

11.1 Factors influencing a market's potential

Market attractiveness is a function of the served market size, market growth potential, profit margin potential, capital intensity, potential price movements, stability of demand, special risks, customer and competitor structure and buyer concentration.

The enterprise's ability to serve a particular market depends on its degree of unique differentiation, financial strength, access to resources, buying expertise and power, locality and accessibility of distributors, relative market share (degree of dominance) and adaptability or flexibility.

The competitive situation depends on:

- Number and size of competitors
  - The enterprise's absolute market share
  - The enterprise's market share relative to the competition
- Cost advantage, independent of size
- Differentiation against competitors
  - Product i.e. different features or technology or implementation in terms of structure or appearance

- Value i.e. how needs of the customers are satisfied in terms of the amount of gratification received for their money
- Intimacy i.e. how well the customer perceives the enterprise to understand and tailor his offerings to their individual needs

- Innovation potential
- Entry barriers

11.2 Analysing the market requirements

The assessment of market attractiveness may be done by a survey of experienced and knowledgeable people with a deep insight into market dynamics and/or good understanding of the enterprise's abilities. The survey is based on rating of each specific market against the factors which influence the market attractiveness, ability to compete and competitive situation and the outcomes may be summarised as shown in the example in ***Table 11.1***.

Table 11.1 rates the **market attractiveness**, the **competitive situation** and the enterprise's **ability to compete** (on a five point scale where 1 is poor and 5 is excellent), by potential market segments in which the enterprise may consider competing. The normalised ratings are interpreted to a class as indicated in brackets.

Segment attractiveness scores high for a big lucrative market. Competitive situation scores high where there is little or weak competition in the market.

Ability to compete socres high on the enterprise having very suitable offerings for a market and the offering being superior to that of the competition.

TABLE 11.1: MARKET ATTRACTIVITY, COMPETITIVE SITUATION AND ABILITY TO COMPETE (example)

Potential product/market segment	Segment attractiveness*	Competitive situation*	Ability to compete*
1. Turnkey (design, construct, transfer)	4,07 (High)	3,29 (Average)	2,57 (Average)
2. Delivery technology	4,53 (Very High)	4,13 (High)	3,87 (High)
3. Product design	3,67 (High)	3,53 (High)	2,87 (Average)
4. Product delivery	2,93 (Average/Neutral)	3,07 (Average)	2,43 (Low)

A classification is used for translating point values to worths.

These results may be presented by way of a matrix as shown in the example in ***Figure 11.1a.*** It emphasises how well the enterprise is positioned relative to attractive markets and ***Figure 11.1b,*** which addresses how well the enterprise should be able to compete in the market segments with other players. The numbers in the matrix represent a specific market segment.

FIGURE 11.1a: ABILITY TO COMPETE VERSUS MARKET ATTRACTIVENESS

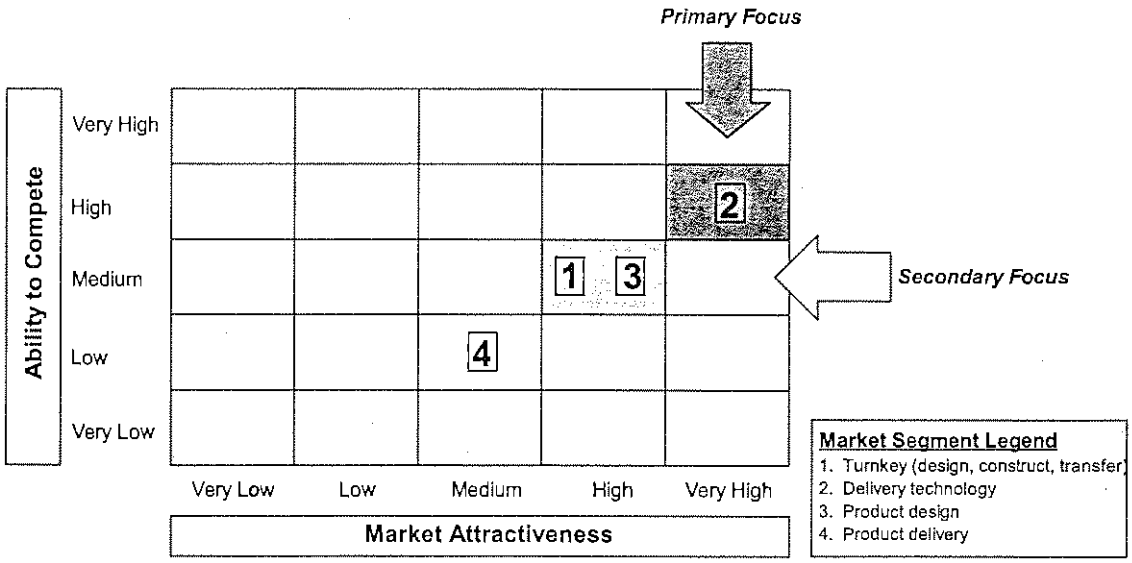
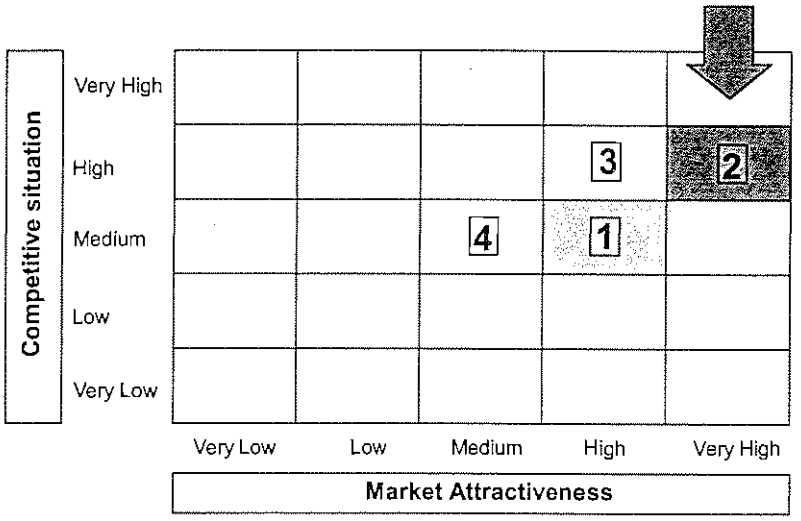


FIGURE 11.1b: MARKET ATTRACTIVENESS AND COMPETITIVE SITUATION



Between the two matrixes the preferred markets for the enterprise to compete in, may be identified based on current or projected scenarios. Arrows show the market segments chosen in the example.

11.3 Market profitability analysis

The **profitability** of a market is typically affected and determined by five forces, i.e. rivalry or competition, the threat from substitute products, the power of buyers, the power of suppliers and the threat of potential new entrants.

The enterprise designer needs to understand the structure of the market to determine which forces have the greatest impact on profitability in each market segment, so that design effort can be focussed on strategies affecting the primary forces.

The expected strength of the forces may be determined by questioning market experts to determine their valuations. The expected strength of the forces in the markets in which the enterprise currently operates and intends operating in, can be rated on a 5-point scale (where 1 – Very Low (VL); 2 – Low (L); 3 – Medium (M); 4 = High (H); 5 = Very High (VH)). If the strength of the force is scored high, it poses a great threat to the enterprise.

For this study the assumption is made that there is a generic need (market) for the enterprise offering and other players which already serve the need with similar or substitute products. This allows the assessment to be made.

Factors to be considered in assessing the five forces include:

Rivalry

- Credibility/image relative to rivals
- Comparative offer i.t.o. value, price, quality, service
- Product suitability for application, fit for use
- Quality of close, personal relationships with customers
- Understanding of needs
- Quality of market intelligence (ability to seek out business)
- Access to specifiers (ability to get product specified/prescribed)
- Alliances (with distributors, subcontractors, significant players/influencers)
- Protection of intellectual property (ability to obtain advantage from unique intellectual property)
- Productivity (lowest cost producer)
- Dynamic, continuous improvement
- Investment in R & D

Power of Buyers (i.e. the extent to which the buyers can organise and structure themselves, their way of buying and the environment to influence suppliers in a market)

- Their status/size/power
- Existing client relations/customer service/respect
- Their assessment of value for money
- Their influence on legislation
- Logic of purchase
- Emotion (comfort)
- Their value add

Power of the enterprise as supplier (i.e. how good its relationships and contracts are with its customers, its knowledge of the market, relations and image with the public at large)

- Long-term perspective/interests
- Customer relations/service vs all role players
- Predictability, reliability, trustworthiness, integrity
- Rules, policies
- Managed relationships
- Keep up barriers to entry (communication is important)
- Pricing (reasonable returns)
- Product development contributions
- ISO 9000/14000 contributions
- Strong marketing/intelligence
- Contracts

Power of suppliers (to enterprise) (i.e. the extent to which suppliers to the enterprise and its competitors can influence the ability of competitors to perform by their pricing, delivery performance, ability to become direct competitors, safe-guarding the enterprise's secrets, etc.)

- Reliability
- Integrity
- Managed strategic relations/alliances
- Contracts
- ISO 9000
- Growing industry together
- Secrecy/proprietary information
- International network
- Multinational
- Incentive scheme
- Intelligence in other countries

Entry barriers (i.e. the extent to which things exist in the market that make it difficult for new entrants to start operating in the market)

- Capital intensity
- Protected intellectual property
- Long lead times to develop product or delivery system
- Proprietary processes
- Legal protection

Substitutes (i.e. the extent to which other different satisfiers may be able to address the same want as the enterprise)

- Variety available
- Comparative benefits
  - Value
  - Ecological
  - Resource usage
  - Social acceptability

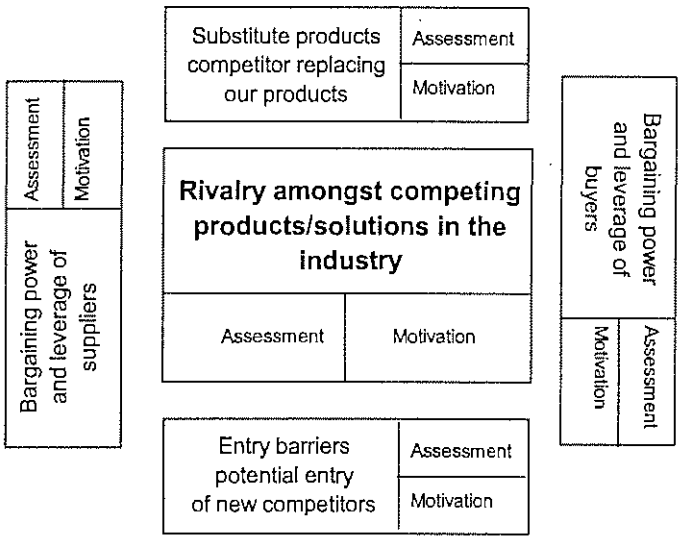
The outcome of such a survey may be averaged and represented and interpreted as shown in the example in ***Table 11.2***.

TABLE 11.2: MARKET STRUCTURE

Potential product/market segments	Porter's Five Forces				
	Rivalry	Substitute Products	Power of Buyers	Power of Suppliers	Entry Barriers
Turnkey	4,23 (VH)	3,00 (A)	3,31 (A)	2,85 (A)	4,08 (H)
Delivery technology	3,73 (H)	2,67 (A)	3,13 (A)	3,33 (A)	3,13 (A)
Product design	3,73 (H)	3,00 (A)	3,33 (A)	3,27 (A)	3,20 (A)
Product delivery	4,29 (VH)	3,92 (H)	3,85 (H)	3,54 (H)	3,15 (A)

For improved communication the market forces may be illustrated graphically as in ***Figure 11.2*** where the assessment of the strength of each force as well as the motivation for the assessment, is given.

FIGURE 11.2: ASSESSMENT OF COMPETITIVE FORCES PER SEGMENT



11.4 Selection of preferred markets

The preceding three models may be used to identify the high potential markets suitable for the enterprise and to determine the strongest competitive forces which determine profitability. The major forces influencing profitability are the most important in strategy formulation and may guide the process and resource related strategies of the enterprise.

The forces and their relative strength may be confirmed in greater detail through environmental scanning and market survey for the facts and interpreted by analysis or group techniques to find and scale the major forces for each potential market segment.

CHAPTER 12

ANALYSIS OF ORGANISATIONAL CONSTRAINTS

ANALYSIS OF ORGANISATIONAL CONSTRAINTS

Where an existing enterprise has to be re-engineered, the existing capabilities as well as the ability of the management and employees to transform themselves, severely constrain the enterprise design in terms of the extent to which a greenfield design can be pursued.

An organisation's cultural flexibility determines the extent to which it may be able to align around new strategic positions in the market and adjust its resource and process strategies to meet the challenges of the new position.

In overview this section covers:

- Paradigms
  - what led to success and failure in the past
  - how does what we are currently contemplating fit in this framework i.e. what are the probabilities that it will succeed/fail given the thinking framework.

- Ripeness of organisational climate to accommodate change and summarises the ability and motivation of the enterprise to change.

- Strategic leadership reflects the ability to lead and direct the change from strategic, marketing, technical and financial perspective.

- Suitability of enterprise's values profile compared to a benchmark, indicate the extent to which the values of the enterprise can support change.

- The enterprise's value proposition may be interpreted in terms of a thinking model where the strength of the values translate to an organisational model of which the suitability for various value propositions may be assessed for the enterprise.

- Capability to cope with change from a strategic, management, social and business environment perspective provide/allow classifying organisation type with implications for ability to change.

The cultural flexibility stems from the enterprise's thinking framework which is based on its paradigms.

12.1 Thinking Framework (paradigms)

The thinking framework of the enterprise determines the type of solutions that will appeal to the management and those solutions that will scare them off.

The paradigms may be discovered by brainstorming a selection of individuals with a profound understanding of the enterprise, its history, failures and successes and how people think about themselves and their performance.

The brainstorming group is used to first establish candidate factors driving success and failures from their past experience. The factors may be combined and pruned for duplication, and can then be ranked using any suitable technique e.g. paired comparison to find the factors with substantial support as responsible for the successes and failures of the past.

A sample of such a brainstorming session with the outcomes combined and rated, is shown in ***Table 12.1a*** and ***Table 12.1b***.

In this case participants were asked to vote for the most important factors on a list drawn up and consolidated from the brainstorm. The factors with the highest percentage response were selected in the exhibit.

TABLE 12.1a: FACTORS THAT HAVE BROUGHT ENTERPRISE X THE GREATEST SUCCESS OVER THE LAST THREE YEARS

	% Alignment
Enthusiasm, commitment and high motivation of team / The people involved and their vision / Dedication of individuals (loyal, hard working people)	46,7
Focus on simplicity / logical process	26,7
Selling from a successful pilot	20,0
Working from a process product concept and proven delivery concept	20,0

TABLE 12.1b: FACTORS THAT HAVE CAUSED ENTEPRISE X TO UNDER-ACHIEVE OVER THE LAST THREE YEARS

	% Alignment
Lack of capital and a proper development team / weak financial position of sponsor	26,7
Inadequate project management / total lack of organised management of the whole thing / initial management	20,0
Inexperienced project team / lack of experience and knowledge / not enough manpower	20,0

This indicates to the enterprise designer what the current enterprise could embrace or fear in any proposed enterprise development project. The % alignment demonstrates the extent to which a shared mental model exists and consequently the amount of effort that would be involved in establishing a shared mental model.

12.2 Organisational climate

The organisational climate like a natural climate determines which ideas will root and how successfully they will grow and is also subject to seasonality. The organisational climate may be assessed through a standardised questionnaire completed by selected people from the organisation. The persons should have a wide exposure to the enterprise and be sensitive to the climate.

In one approach, questions are ranked on a 7-point scale (which represents the limits of human capability for differentiating). The results may be presented as in the sample shown in ***Table 12.2*** and ***Figure 12.1***.

Only an abbreviated list of the most important factors for change is show in the example – a more comprehensive list may be obtained from literature.

TABLE 12.2: AVERAGE CLIMATE RATINGS FOR ENTERPRISE X

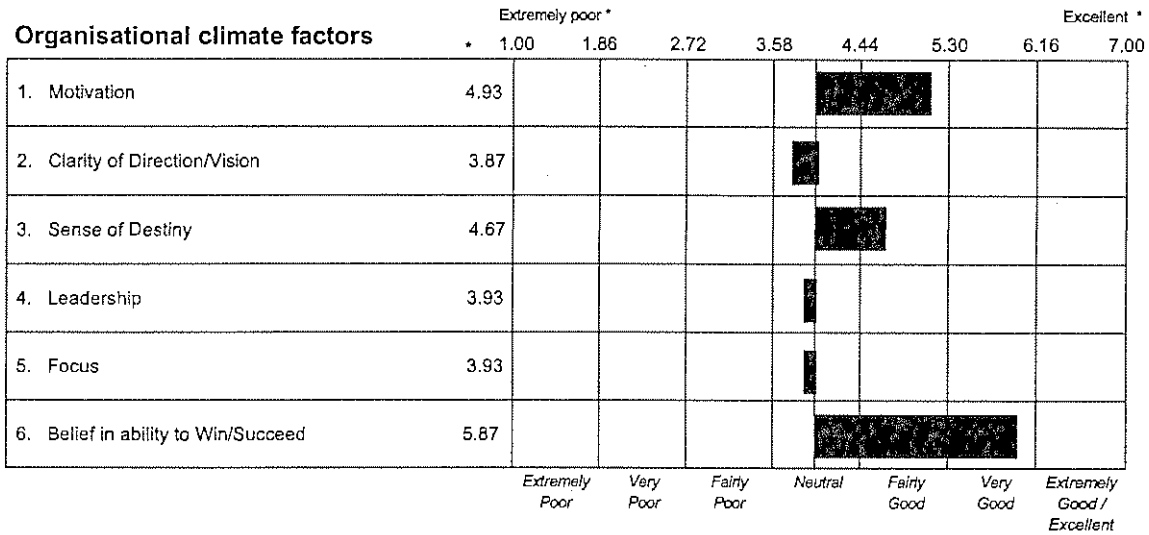
(Where 1 = totally inadequate/weak and 7 = totally adequate/extremely strong)

Organisational climate factors	Rating*	Interpretation
Motivation	4,93	Fairly strong
Clarity of direction/vision	3,87	Average
Sense of destiny	4,67	Fairly strong
Leadership	3,93	Average
Focus	3,93	Average
Belief in ability to win/succeed	5,87	Very strong

A scale is used to translate the ratings to worths with regards to the seven-point scale.

The ratings shown in Table 12.2 graphically represented help to obtain a better feel for the strengths and weaknesses in organisational climate.

FIGURE 12.1: ENTERPRISE X ORGANISATIONAL CLIMATE



The climate reflects the readiness of the enterprise to act to engage the future and provides the enterprise designer with insights as to the extent of change that may be feasible to implement and the scope of change management implied.

The chosen factors address whether the enterprise can:

- muster the energy to change,
- can concentrate and direct the change effort,
- believe that there is a worthwhile future to engage,
- has enough leadership and followers to guide the effort,
- can focus hard enough and long enough on its objective, and
- believe that it can succeed.

12.3 Assessment of leadership abilities

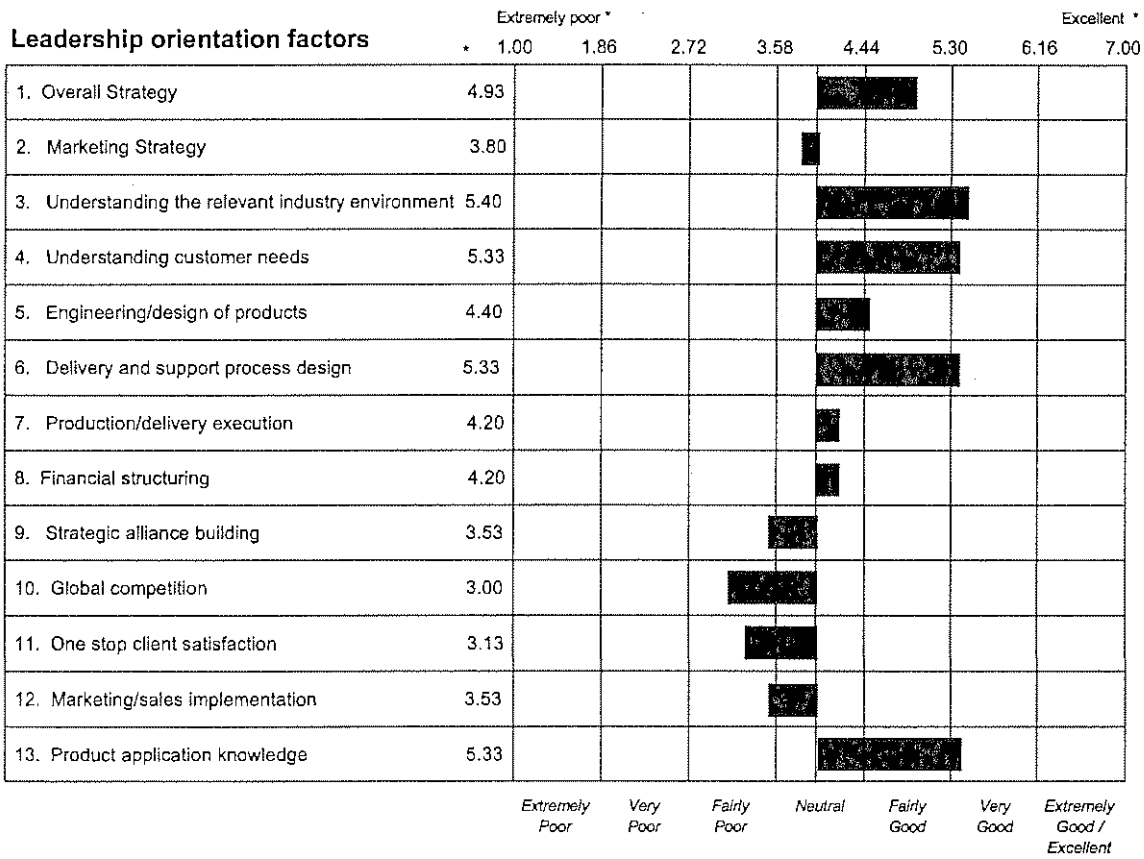
This analysis is based on another standardised questionnaire ranked on a 7-point scale. It should be assessed by people who are part of the enterprise leadership at all levels as well as employees able to assess the relevant areas.

The results of a sample analysis are shown in ***Table 12.3*** and ***Figure 12.2***.

TABLE 12.3: STRATEGIC LEADERSHIP ORIENTATION

Leadership factors	Rating	Interpretation
Overall strategy	4.87	Fairly well
Marketing strategy	3.80	Average
Understanding the relevant industry environment	5.40	Very well
Understanding customer needs	5.33	Very well
Engineering/design of products	4.40	Average
Delivery and support process design	5.33	Very well
Product/delivery execution	4.20	Average
Financial structuring	4.20	Average
Strategic alliance building	3.53	Fairly poor
Global competition	3.00	Fairly poor
One stop client satisfaction	3.13	Fairly poor
Marketing/sales implementation	3.53	Fairly poor
Product application knowledge	5.33	Very strong

FIGURE 12.2: ENTERPRISE X STRATEGIC LEADERSHIP ORIENTATION



This assessment guides the enterprise designer to utilise the strengths in strategic leadership in the design of strategies that can best utilise the strengths. Even though the assessment is based on opinions, a correct choice of respondents, good facilitation and inclusion of external monitors helps to obtain a fairly accurate picture.

12.4 Assessment of competing & organisational effectiveness values

Based on the work of Human and Horwitz 1992 a questionnaire as shown in ***Table 12.4*** rated on a 7-point scale by people with a feel for the current enterprise can access the enterprise's values from its operational model i.e. from how the enterprise works. This is demonstrated by values from a case study in which the author was involved.

In this study a team comprising of the EXCO and a project team working on a specific project completed the standardised questionnaire.

TABLE 12.4: COMPETING VALUES QUESTIONNAIRE

	Extremely Infrequently	Very Infrequently	Fairly Infrequently	Neutral / Average	Fairly Frequently	Very Frequently	Extremely Frequently
	1	2	3	4	5	6	7
Manifestations in the enterprise							
1. The work process is co-ordinated and under control							
2. Participative decision making is widely and appropriately employed							
3. Rules, procedures and formal methods guide work							
4. The goals are clearly understood by most members							
5. The work effort is usually intense							
6. There is a stable, predictable work environment							
7. Innovation is stressed							
8. There is a positive interpersonal climate							
9. Quantification and measurement are key parts of the work climate							
10. Consensual decision making is encouraged							
11. Outsiders perceive it as a vibrant, high potential organisation							
12. Creative insights, hunches and innovative ideas are encouraged							
13. It is easy to give an explanation of the overall objectives of the organisation							
14. There is a constant striving for greater accomplishment							
15. Employees feel as though they really belong to the organisation							
16. The organisation has the image of a growing, dynamic system							

The values were normalised and the outcome of the assessment is illustrated in ***Figure 12.3***. This reflects the values as demonstrated by their effect in terms of the behaviour of the enterprise.

FIGURE 12.3: VALUE OF ENTERPRISE X AS MANIFESTED IN OPERATIONAL MODEL

Operating principles/values	Extremely Poor	Very Poor	Fairly Poor	Neutral	Fairly Good	Very Good	Extremely Good / Excellent
1. Coordination and control							
2. Participative decision making							
3. Rules and procedures guide work							
4. Goals clearly understood							
5. Work effort is intense							
6. Stable, predictable work environment							
7. Innovation is stressed							
8. Positive interpersonal climate							
9. Quantification and measurement							
10. Consensus decision making							
11. Outsiders perceive as vibrant organisation							
12. Creative insights, hunches and innovation							
13. Easy to explain overall objectives							
14. Constant striving for increased accomplishment							
15. Employees feel they really belong							
16. Image of growing dynamic system							

To translate the competing values to organisational effectiveness, the 16 values are combined into 8 dimensions of effectiveness as shown in ***Table 12.5***. Effectiveness refers to the contribution that values make to facilitate change.

TABLE 12.5: TRANSLATION OF VALUE SCORES TO EFFECTIVENESS SCORES

Dimension of effectiveness	Factors combined	Average factor scores	Effectiveness interpretation
Participation/openness	2 and 10	4,8	Fairly effective
Innovation/adaptation	7 and 12	5,0	Fairly effective
Productivity/accomplishment	5 and 14	5,5	Very effective
Stability/control	1 and 6	3,8	Average effective
Commitment/morale	8 and 15	4,2	Average effective
External support/resource acquisition	11 and 16	4,5	Fairly effective
Direction/goal clarity	4 and 16	4,7	Fairly effective
Documentation/information management	3 and 9	4,0	Average effective

Human and Horwitz have established a South African benchmark (which is shaded in Figure 12.4) for the profile of enterprises that are successful in coping with change. The enterprise in our example has been plotted against the benchmark on the radar chart in ***Figure 12.4***. This shows how well the enterprise compares on various dimensions to enterprises that were successful in transformation.

FIGURE 12.4: EXAMPLE OF ENTERPRISE X COMPARED TO SA FIRMS COPING WITH CHANGE

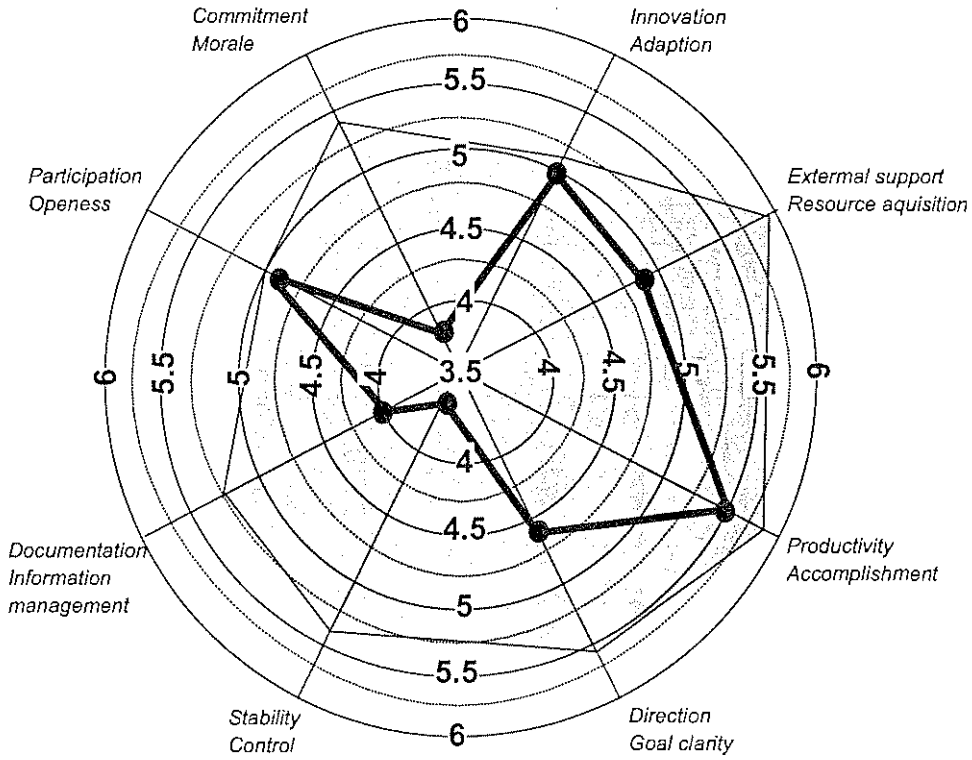


Figure 12.4 gives an indication of strengths and weaknesses in the values of the enterprise when compared to a norm for successful transformation.

When the operating principles profile, translated to values as shown in Figure 12.4 is known, the underlying mental model(s) may be discovered.

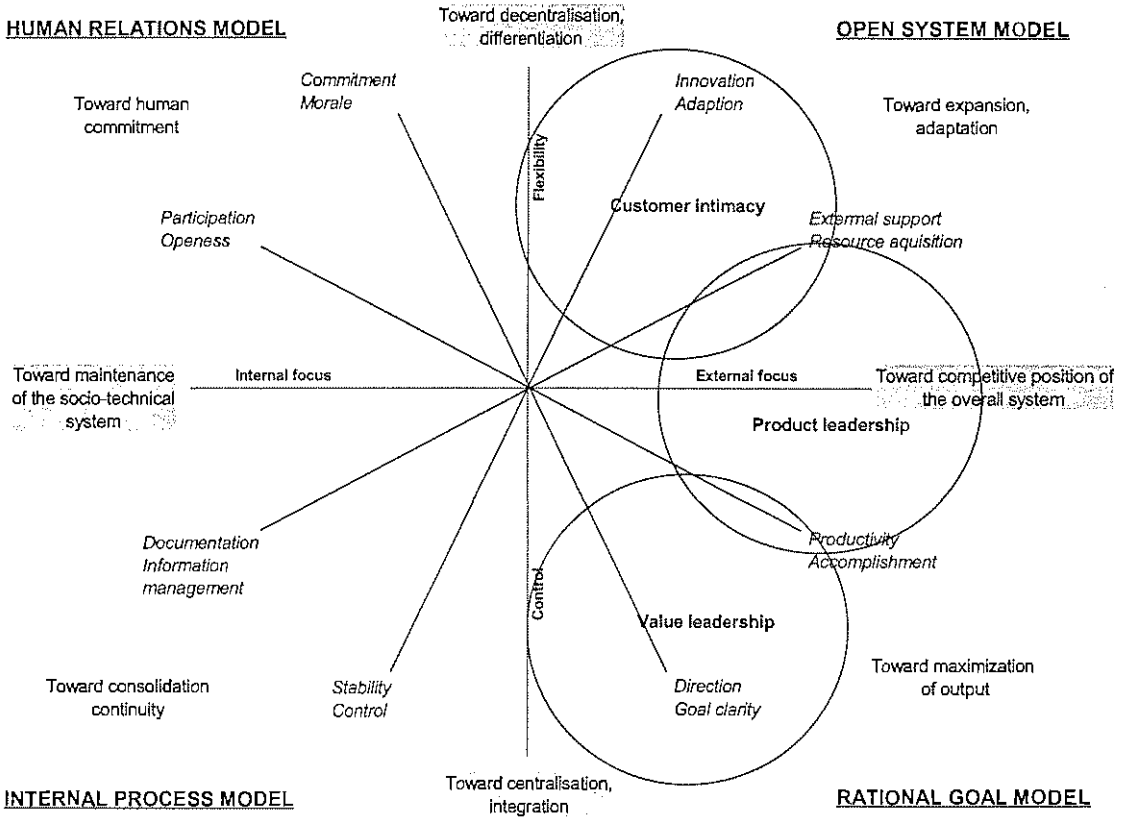
Human and Horwitz have established a relationship between the way people think about the enterprise and the values exhibited by the enterprise.

The way of thinking has been categorised into thinking models i.e.:

- open systems model
- rational goal model
- internal process model and
- human relations model

By super imposing the competing values model on the profile as shown in ***Figure 12.5*** the enterprise designer can discover how strongly each of these models influence the existing thinking.

FIGURE 12.5: ENTERPRISE'S DERIVED THINKING MODEL



In the thinking model the main axis in the vertical contrast flexibility and control and the horizontal axis contrasts internal with external focus. The eight shaded boxes show the trends which positions on the effectiveness model may support.

From the enterprises values profiles' shape and relative scores, consistency between values, and overall strength the suitability of the thinking model for the strategic intent can be determined.

This may guide the enterprise designer in terms of the feasibility of pursuing a specific strategic concept e.g. it would be inappropriate to pursue a product leadership strategy if the enterprise thinking and mental models reflect an internal process focus.

The author proposes that values should be consistent with the market value proposition. I.e. the enterprise design should require that the market value proposition complies to enterprise values, as shown by the clusters added to Figure 12.5 i.e. customer intimacy, product leadership and value leadership.

The enterprise designer should be alert to divergent focus in values i.e. the values that manifest strongly should support a single or at least overflow into adjacent compatible models. There could also be divergence in focus on values with regards to the enterprise and a specific product or project of the enterprise such divergence could spell trouble for the product or project in terms of sponsorship and support.

Both these instances would indicate the need for substantial attention to designing for a cultural transformation as part of the enterprise design – other triggers for cultural redesign would include significant relative weaknesses in the balance with other factors or weakness versus the benchmark profile.

12.5 Capability for coping with change

This analysis is once again initiated with a questionnaire to assess the capability of the enterprise to cope with change. The questionnaire consists of 32 questions that consider the organisation as a whole and on average. The responses are based on past events, as well as more recent events in comparison with other companies in the industry.

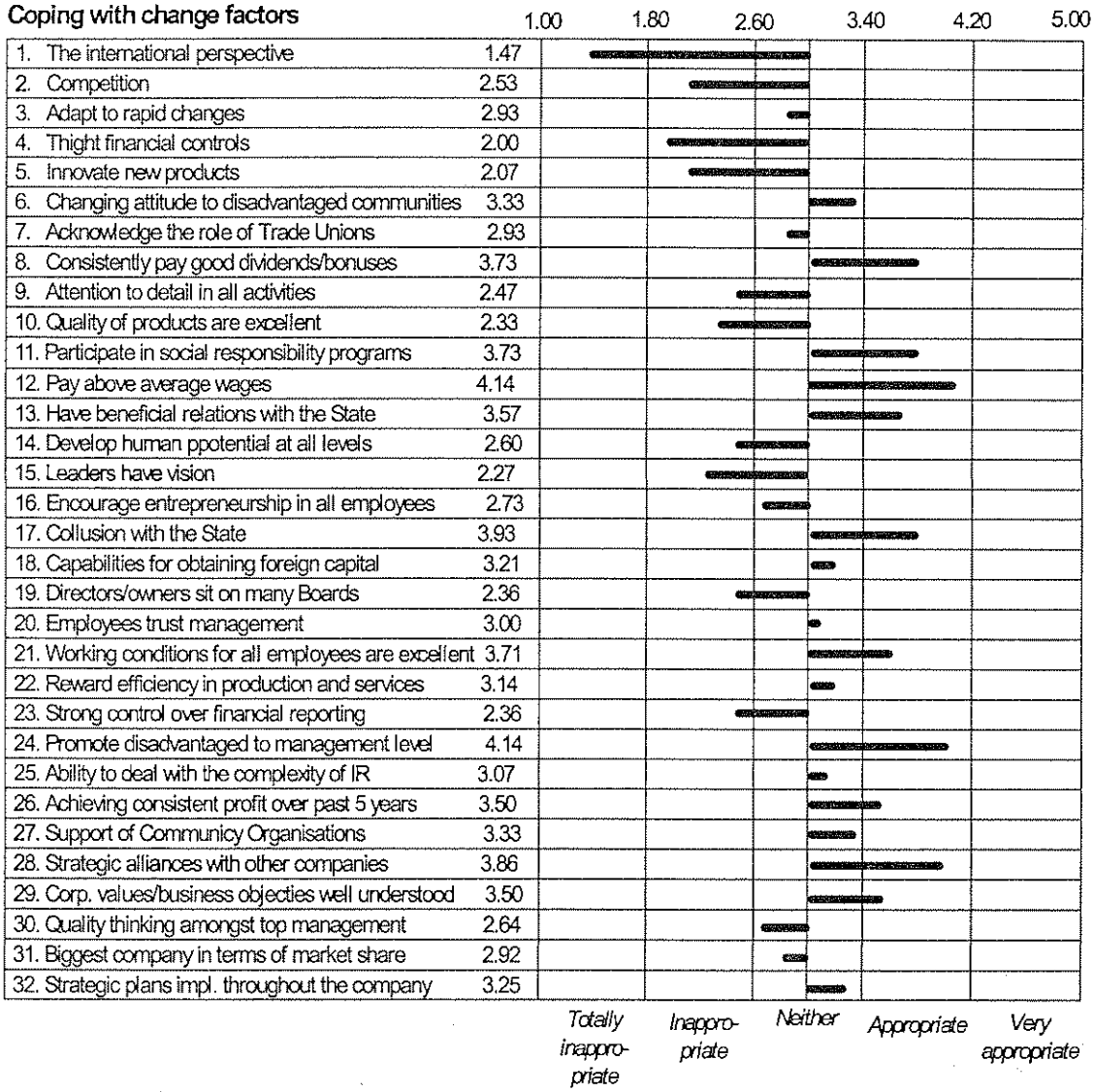
A group representative of the enterprise with profound knowledge of the enterprise is required. A sample questionnaire is included as ***Table 12.6***. Scoring is on a 5-point scale.

TABLE 12.6: CAPABILITY OF COPING WITH CHANGE QUESTIONNAIRE

	Very appropriate	Appropriate	Neither	Inappropriate	Totally inappropriate
	1	2	3	4	5
1. The international perspective is emphasised					
2. We experience a lot of competition					
3. We adapt swiftly to rapid changes					
4. We have tight financial controls					
5. We continually innovate new products					
6. We actively engage in changing attitudes to disadvantaged people (workshops, programs)					
7. We acknowledge the role of trade unions					
8. We consistently pay good dividends					
9. We give attention to detail in all our activities					
10. Our products are of excellent quality					
11. We are recognised as highly participative in social responsibility programs					
12. We pay above average wages					
13. We have beneficial relations with the State					
14. We develop human potential at all levels					
15. Our leaders have vision					
16. We encourage entrepreneurship in all our employees					
17. It is often said that we are in collusion with the State					
18. We have well developed capabilities for obtaining foreign capital					
19. Our directors are well connected (sit on many other boards)					
20. Employees trust management					
21. The working conditions for all employees are excellent					
22. Efficiency in production and services is continually emphasised and rewarded					
23. Strong control over financial reporting is exercised					
24. We have been successful in promoting disadvantaged people to management level					
25. We have developed a sound ability to deal with the complexities of IR					
26. We have achieved consistent profits over the past five years					
27. Our contribution to social welfare and support of community organisations is Significant					
28. We have many strategic alliances with other companies					
29. The links between corporate values and business objectives are well understood by all employees					
30. The quality of thinking amongst top management is outstanding					
31. We are the single biggest company in market share					
32. Our strategic plans are implemented throughout the company					

A possible result from this survey is shown in ***Figure 12.6*** - another sample from the authors consulting experience.

FIGURE 12.6: ENTERPRISE X CAPABILITY TO CHANGE



12.5.1 Management focus areas

The factors affecting the capability to change may be combined as shown in ***Table 12.7*** to facilitate interpretation in terms of the enterprise orientation.

TABLE 12.7: DEDUCTION OF ENTERPRISE ORIENTATION

Orientation	Factors combined	Average valuation
STRATEGIC ORIENTATION		
Dynamic culture	3 and 16	2,83
Strategic leadership	15 and 30	2,46
People orientation	14 and 20	2,80
Strategy implementation	29 and 32	3,38
Average		***2,87***
SOCIAL FOCUS		
Social responsibility	11 and 27	3,53
Black advancement	24 and 6	3,74
Industrial relations	25 and 7	3,00
Pay and working conditions	12 and 21	3,93
Average		***3,55***
CONTROL ORIENTATION		
Financial control	4 and 23	2,18
Hands-on management	22 and 9	2,81
Financial performance	8 and 26	3,62
Product quality and innovation	5 and 10	2,20
Average		***2,70***
INSTITUTIONAL FOCUS		
Relationship with the State	13 and 17	3,75
Internationalisation	1 and 18	2,34
Strategic alliances	19 and 28	3,11
Competitiveness	2 and 31	2,73
Average		***2,98***

The example above demonstrates a very neutral orientation with some trend towards control and aversion towards social focus.

12.5.2 Enterprise profile

By cross matching the above data as shown in ***Table 12.8***, the enterprise may be typified.

TABLE 12.8: CROSS MATCHING OF DATA

Orientation	Enterprise Typification
Institutional & strategic	Boardroom
Strategic & social	Missionary
Institutional & control	Technocracy
Control & social	Hardhat

The result of doing this is shown below for the worked example.

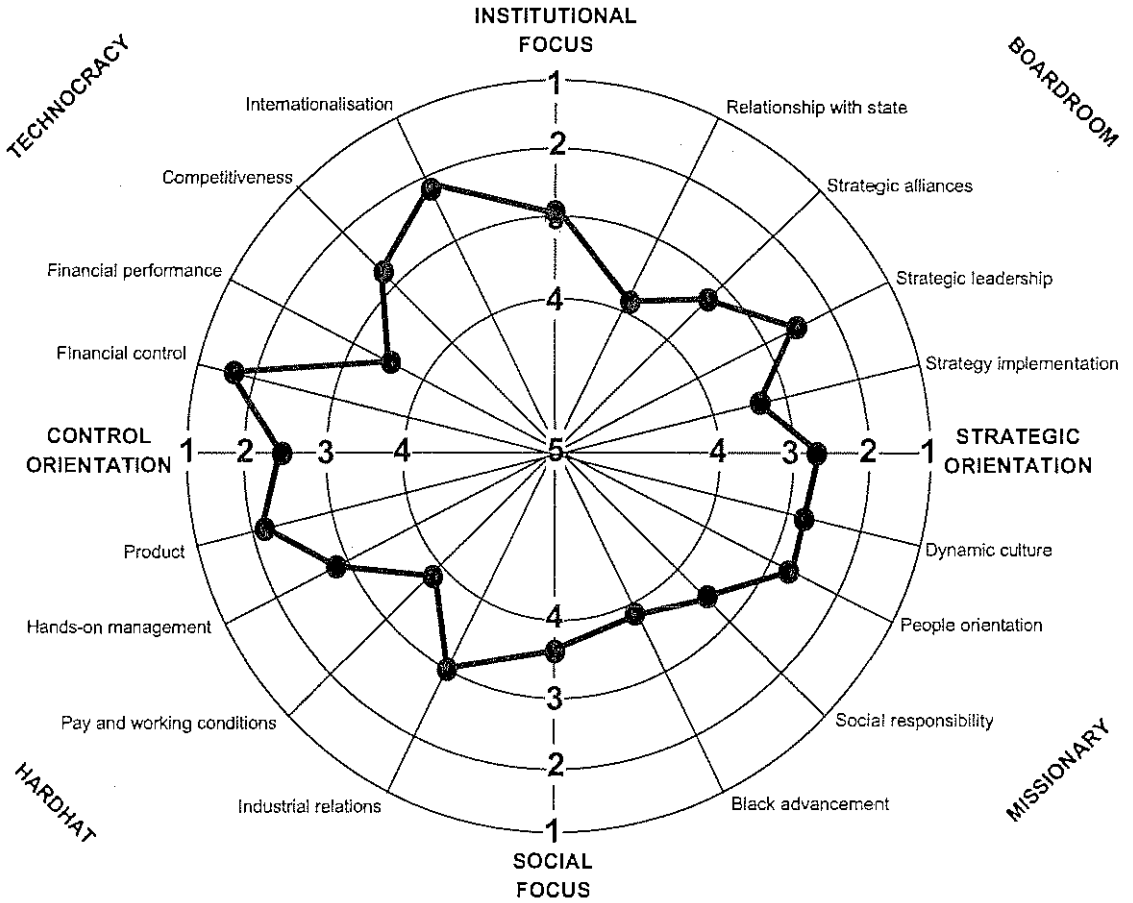
Cross match valuations

Social/Control	Control/Institutional	Institutional/Strategic	Strategic/Social
6,25	**5,68**	**5,85**	**6,42**
Hardhat	**Technocratic**	**Boardroom**	**Missionary**

The sample fails to show strong typification but tends towards a technocratic organisation.

The capability for coping with change may be graphically assessed using Human and Horwitz's radar chart which is shown in ***Figure 12.7***. In this chart the orientation criteria and values are profiled against a four-quadrant framework which helps to characterise the type of organisation that the enterprise is.

FIGURE 12.7: TYPIFYING THE ENTERPRISE ORGANISATION



This profile shows the sample enterprise to be a predominantly **technocratic** type of organisation, weak on the social side, operating according to the rational goal model. This profile also graphically illustrates where attention is required.

Strategy implementation certainly requires attention. The importance of strategic alliances is not sufficiently realised, as is the relationship with the State. Thus, overall strategic orientation is not highly rated. The relative weakness on the social and people side is also evident.

The enterprise designer may utilise this assessment to determine the type of organisation, match it with the strategic intent and pinpoint weaknesses that need attention.

12.6 Flexibility benchmark

In assessing the ability to cope with change, the following background needs to be kept in mind.

12.6.1 Operational effectiveness is not sufficient

In South Africa companies have survived the difficult years because they have somehow coped with the complexity of change by focusing on doing what they know best. However, with increasing globalisation, companies must indeed now become more strategically orientated to assist themselves, their industry and South Africa to transform from muddling along to the high road Singapore option.

12.6.2 The high road requires prominent and dynamic strategic leadership.

Strategic leadership is the capacity to create vision, to provide visible leadership, to have quality in management, which shapes the company's future, and to act as change agents. (Human & Horwitz: 1992)

These writers therefore suggest that "...in order to cope successfully with change, an organisation needs to understand its environment and in particular, its customer. To satisfy customer demand, the organisation needs management that can provide leadership and vision. Leadership and vision are necessary because the future is unknown and direction and certainty need to be created. This is done by **creating a positive attitude to the future**, i.e. saying that the future is a worthwhile place to get to.

Leadership is also necessary because organisations, by their nature, resist change; they tend to glorify the past and hang on to the comfortable and the certain. Organisations are inherently characterised by inertia rather than dynamism, snail-like behaviour, rather than the flexibility of the dolphin. Strategic leadership is a force acting **against** the natural tendency of increasing **organisational stability.**

12.6.3 The need for creative tension

Peter Senge (1990) refers to a creative tension between a vision of the future and the organisation's current reality. This is a **dynamic tension necessary for creativity, change and learning.**

12.6.4 Need for a vision

It is a peculiarity of man that he can only **live by looking to the future.** This is his salvation even in the most difficult moments of his existence. (Victor Frankl, 1984)

12.6.5 The need for a holistic approach

Perhaps the most important argument for strategic leadership is that organisational survival is highly dependent upon environmental resources. Supplies, labour, capital, knowledge, etc. have to be bought from the outside at lower prices than goods and services sold to the customer on the outside. **No organisation is an island,** although every organisation has a natural tendency towards an island mentality.

12.6.6 Leadership must become practical

Leadership alone, however, is not sufficient. The expectations of key stakeholders including customers, employees, suppliers and the initiator(s) of the vision and strategies of the organisation, have to be met. To create a vision is to create expectations of things to come. These 'things to come' are more often than not, tangible things. Hence, the **necessity** of producing quality and competitive products, **of implementing** and acting upon visions and therefore, the importance of 'hands-on' management."

CHAPTER 13

SCENARIO DEVELOPMENT

SCENARIO DEVELOPMENT

Scenarios perform two roles in enterprise development i.e.

- to sketch possible situations for which the enterprise design has to provide and
- when selecting alternative strategic solutions the enterprise designer has to provide the framework against which to evaluate them and for which alternative designs may be developed.

The actual state of the environments which influence the enterprise, are cardinally important in determining the effectiveness of the enterprise. The optimal strategic alternative for the enterprise will thus be the strategy that delivers the most acceptable outcomes under the probable mix of future scenarios.

Many issues and uncertainties affect the future of any enterprise. In order to cope with this complexity, it is necessary to identify the most strategic issues and key uncertainties or the industry in which the enterprise operates, as well as for the specific markets in which the enterprise competes. Future states of these factors may then be postulated and scenarios generated.

Identifying important issues and uncertainties and ranking them for the industry and markets with regards to both importance and urgency is used to establish these scenarios.

13.1 Industry assessment

For the industry in which the enterprise operates the issues and uncertainties may be identified and ranked as illustrated in ***Table 13.1*** with regards to importance and may similarly be ranked in a table with regards to urgency.

For this 7-point assessment people with profound knowledge and feel or the industry and market are required.

The example shown is not comprehensive. For each case the enterprise designer should review all of the following categories and establish which factors to include in the survey:

- Social
  - Current relevant status
  - Trends
- Technological
  - Number of competing technologies
  - Trend in technologies
  - Status of existing technologies
- Legal
  - Current legislation
  - Future trends
- Ecological
- Global
- Economical
- General business environment
- Political
  - Current situation in industry markets
  - Trends

TABLE 13.1: IMPORTANCE OF INDUSTRY STRATEGIC ISSUES

Strategic Issues/Key Uncertainties	Not Important						Extremely Important
1. Inflation rates							
2. Interest rates							
3. Real cost of money							
4. Financial market cycles							
5. Fluctuations in exchange rates							
6. Customer expenditure cycle							
7. Developments in markets							
8. Impact of economic blocks e.g. former USSR							
9. Developing world share of world economic activity							
10. Trends in industry ownership e.g. privatisation, demutualisation							
11. Information technology revolution							
12. Decline in traditional competitive capability							
13. Increase in current competitive capabilities							
14. Capacity utilisation in industry							
15. Transferability of technology							
16. Price of industry's products vs. competing products							
17. Growth of threatening delivery capability							
18. Scarcity of key resources							
19. Cost of key resources							
20. Legislation							
21. Substitute delivery capability							
22. International prices for resources							
23. Inadequate capacity to produce key inputs							
24. Ageing of existing product range							
25. Developments in individual consumer market							
26. Developments in intermediaries and bulk markets							

13.2 Market factor assessment

Once the issues influencing the whole industry are known, the enterprise designer can focus on the other issues and uncertainties that influence the specific markets in which the enterprise operates or plans to operate. These must again be identified from the experience of individuals with profound insight into the enterprise's markets and then evaluated with regards to importance and urgency to distill the critical few factors for incorporation into scenarios. A sample of such an exercise is shown in ***Table 13.2*** for the importance of issues in the enterprise's markets. A similar table may be used to evaluate the urgency of issues.

Strategic issues and Key Uncertainties are identified in the Scenarios for the enterprise markets. These factors are rated on a scale of 1-7 of importance/urgency.

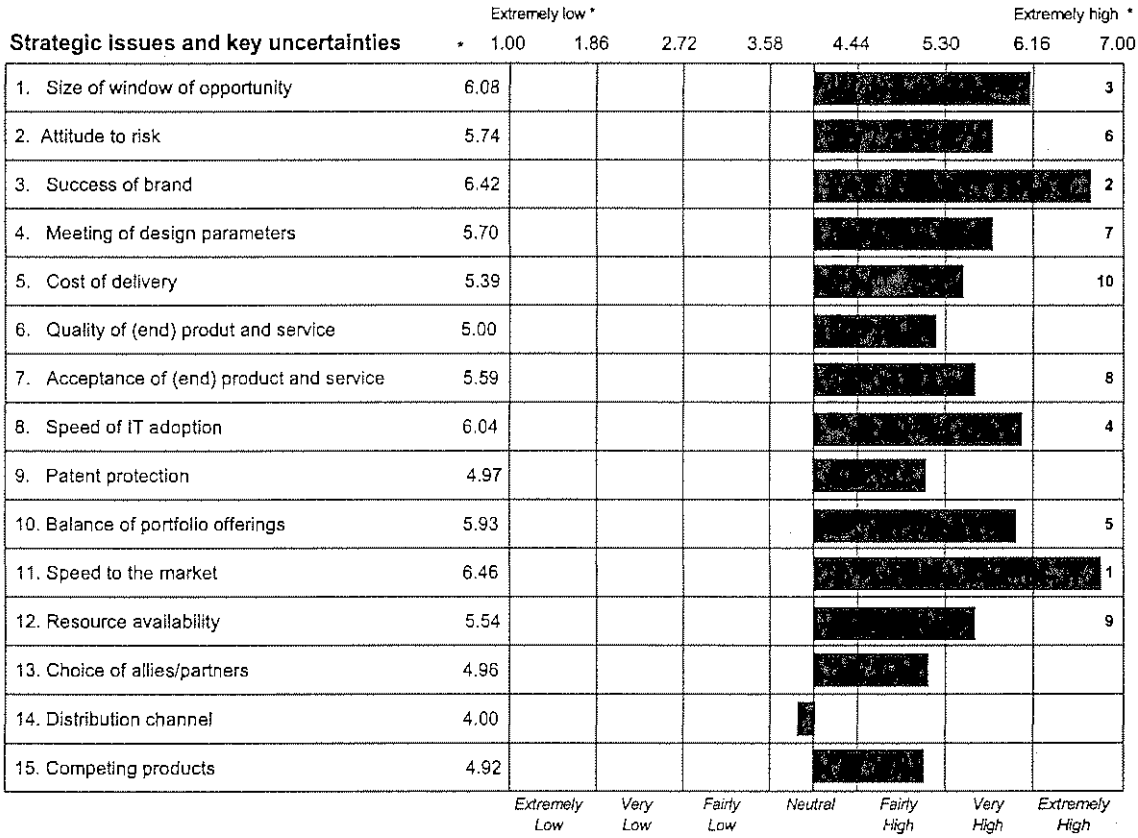
TABLE 13.2: IMPORTANCE OF ISSUES FOR ENTERPRISE X MARKETS

	Not Important						Extremely Important
Strategic Issues/Key Uncertainties							
1. Size of window of opportunity							
2. Attitude to risk							
3. Success of brand							
4. Meeting of design parameters							
5. Cost of delivery							
6. Quality of (end) product and service							
7. Acceptance of (end) product and service							
8. Speed of IT adoption							
9. Patent protection							
10. Balance of portfolio offerings							
11. Speed to the market							
12. Resource availability							
13. Choice of allies/partners							
14. Distribution channel							
15. Competing products							

13.3 Prioritising factors

The importance and urgency ratings may be normalised around the neutral rating i.e. divide the ratings by 4 and conflated i.e. multiply normalised importance with normalised urgency to give an overall weighed rating. This rating may again be transformed to a 7-point scale to give a total priority to each factor as presented in *Figure 13.1.*

FIGURE 13.1: ENTERPRISE X: TOTAL PRIORITY OF STRATEGIC ISSUES AND KEY UNCERTAINTIES IN THE MARKET



13.4 Developing scenarios

Once the most strategic issues and key uncertainties are distilled in both the industry and enterprise markets, the enterprise design can embark on developing three to five scenarios for which alternative strategies can be developed and against which strategies can be stress tested. Scenarios are developed by identifying the possible range of states

which may occur with regards to the key issues and combining various states in a morphological way with intelligent sifting. This creates possible futures.

These possible futures for the enterprise are investigated and their impacts studied. Probable futures are developed as an input to guide generation of alternatives and evaluate proposed solutions (stress test).

13.5 Scenario impacts enterprise worth

The role of scenarios becomes clear from the model in ***Figure 13.2***, which illustrates how the worth of a system depends on the scenario which realises. In the case of the enterprise scenarios could include aspects that influence the requirements as well as the constraints pertinent to the system. As far as requirements are concerned, such aspects as the number of different products and variants for which a delivery system has to be developed, the number of different clients per product and the different client environments that the enterprise must provide for, may form part of the scenario.

Constraint scenarios have to be constructed for each relevant environment that influences the enterprise significantly.

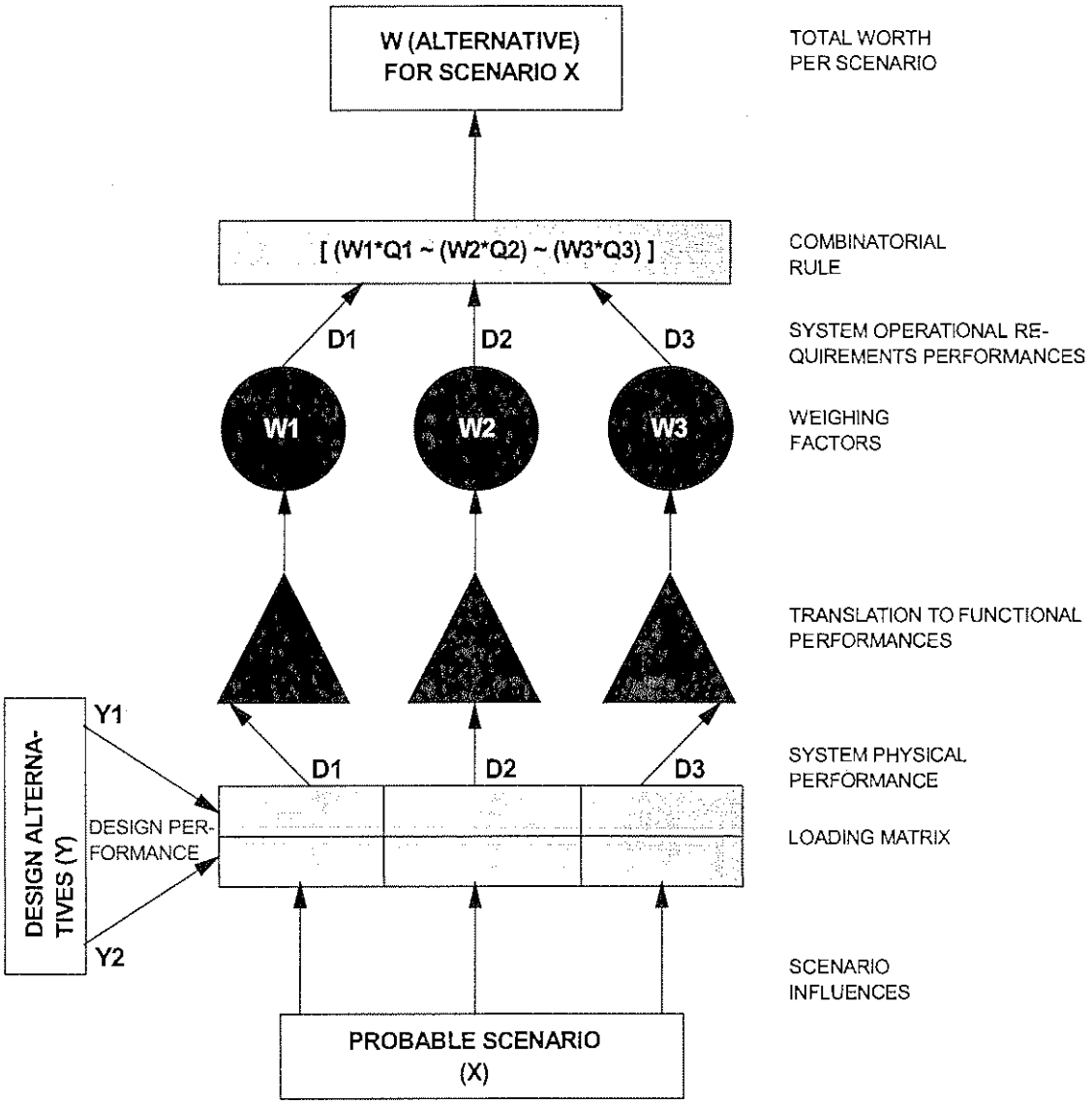
13.6 Summary

Three to five scenarios are thus constructed which take cognisance of important trends in the industry and the markets which the enterprise targets. The immediacy of the impacts of the trends is assessed in terms of an urgency to attend to the trends.

From the four dimensions of importance and urgency, a single set of key factors is abstracted. For these key factors possible states are derived and scenarios are constructed which reflect a probable sets of states for these factors.

These scenarios are applied to guide the design process and evaluate alternative enterprise designs.

FIGURE 13.2: SCENARIO'S INFLUENCES ON SYSTEM WORTH



CHAPTER 14

DEVELOPING STRATEGIC ALTERNATIVES

DEVELOPING STRATEGIC ALTERNATIVES

A design alternative comprises a possible technical solution to the design problem (i.e. design concept) plus an associated development approach which addresses how the solution will be designed, realised and implemented.

14.1 Overview

In strategic design we do exactly the same i.e. decide/propose what to change/ achieve in future rather than to detail the implementation of the enterprise. The strategy sets the requirements for functional performance of the enterprise analogous to the functional specifications for other systems.

This specification determines what the enterprise must be capable of in terms of producing products and services, delivering them to markets, serving market needs and which performance measures will apply. This is expressed in terms of the value produced by the enterprise e.g.:

- Scope of products or services
- Markets
- Distribution
- Value proposition

The strategic design thus determines the enterprise concept by prescribing the performances it must be capable of, but also provides guidelines or choices affecting its implimentation.

Specific requirements about the processes to be employed or avoided in the enterprise also form part of the client's prescription to the enterprise designer. These statements address how key supporting capabilities should be approached in the enterprise design e.g.:

- Development processes
- Production/delivery processes
- Product support processes
- Marketing processes
- Financial processes
- Management processes

Next there may be specific requirements regarding the utilisation of resources in terms of resource strategies e.g.:

- Human resources
- Financial resources
- Information
- Technology
- Materials

Some examples of this may be:

- The enterprise will be provider of service X in markets Y through channel Z and have lowest cost as its value proposition.
- The enterprise will outsource its product development in close alliance with two preferred suppliers C and D.
- The enterprise will minimise its use of human resources of type F.

Finally the level of performance required from the enterprise should be specified to establish the results it wants to achieve in terms of:

- Growth
- Return

14.2 Alternatives regarding development approach

This section discusses factors to be considered by the enterprise designer when deciding how to go about the engineering of his enterprise project. It covers trade-offs and positioning with respect to:

- The extent to which the current enterprise design constraints the development i.e. greenfields v/s incremental improvement.
- The trade-offs between urgency to implement and quality and cost of development i.e. concurrent v/s sequential engineering.
- To which extent prototyping will be used.
- The type of operational environment to be designed for i.e. in-house v/s outsourced operations.
- The type of development environment to be planned for i.e. outsourced v/s in-house development.
- How expertise will be accessed i.e. technology transfer v/s short time consulting.
- The level on innovation to be aspired to i.e. cutting edge v/s proven technology.

14.2.1 Greenfield development v/s incremental improvement

In developing alternatives, the choice has to be made between starting from a greenfield or doing incremental improvement, either based on previous strategic designs or just operationally focussed. Many degrees of incremental improvement techniques exist, varying from doing nothing through some thoughtless copying, creative copying to re-invention.

Strategic alternatives are developed from the requirements and constraints emanating from the analysis of the strategic intent, current reality and environment. The gaps identified between the current reality and the current environments as well as potential future from opportunities and strengths have to be addressed by these alternatives.

The basic challenges in selecting a development approach in order to successfully implement a business, are to:

- Reduce the business and technological risk of the concept
- Balance risk versus urgency to proceed
- Select the correct vehicle technologically (e.g. outsourcing versus partnership for commercialisation of the enterprise design)
- Select the correct development mix (e.g. design consultants, bought out design)
- Accessing appropriate knowledge base
- Balancing conservatism and entrepreneurial spirit

To clarify an approach it is necessary to review what needs to be designed in this phase of development i.e.:

- The functional requirements for the enterprise system.
- The performance measures for the enterprise.
- One possible technical solution to "prove" feasibility of proceeding with the design based on the selected strategic intent.
- A development approach to implement the enterprise to "prove" the execution of the design is feasible.
- The business case to show the potential of proceeding based on the proposed strategic design and deducted from implications of the implementation.

14.2.2 Concurrent v/s sequential engineering

Even though there is an underlying assumption that a systems engineering approach is the better technical approach, pressures of urgency may tempt the leadership of the enterprise to seek earlier implementation of a lesser solution. A choice has to be made explicitly whether a

- concurrent engineering or

- sequential engineering

approach will be followed. The enterprise designer has to advise the leadership regarding the additional cost and risk that a concurrent engineering approach entails i.e.:

- Each lower level of detail has to be designed and or constructed with much wider capabilities than would otherwise be required.
- Integration costs increase by orders of magnitude because every segment which is partitioned of for fast track development, creates an additional subsystem with its full set of technical and project interfaces.
- The design will be less well integrated and need higher overhead to manage.
- The technical quality of the solution will degrade.
- The operating cost will be higher
- The capital outlay will be larger.

14.2.3 Risk reduction approach

Another important aspect of a development approach addresses how the enterprise designer proposes to manage risk in the program. Approaches to reduce technical risk and commercial risk must be proposed e.g. fast prototyping.

- Fast prototyping is an approach where by building a system and operating it as an enterprise demonstrator, one can prove that the solution works.
- Benefits to be reaped from an enterprise demonstrators, include that it may be used as:
  - Marketing tool for both the products that it produces and the enterprise element that the client wants.
  - Proves engineering functions are capable of designing.
  - Proves the capability to realize the system and provides better cost information.

- Program management is evaluated by its ability to execute the program.
- If the prototype can be sold it also demonstrates marketing abilities.
- From the operation of the system, the process benefit can be shown in technical figures.
- The existence of an operating capability lends credibility to the system.

14.2.4 Operational sourcing i.e. commercialization/delivery approach

The enterprise designer also has to address how the delivery of the enterprise products should be sourced. Approaches to select the correct vehicle and partners to implement the enterprise commercially, can range from selling the rights (i.e. franchising) to developing and sourcing every activity in-house.

The choice of a commercialization approach should be based on:

- Identifying possible alternative approaches.
- Estimating their success probabilities in terms of the size of business that they will achieve.
- Estimating the profitability of the business.
- Calculating risk adjusted NPV per approach.

14.2.5 Development sourcing i.e. approach to development of the enterprise design

The options again range from outsourcing the complete design of the enterprise system to total in-house development. The following considerations are relevant:

- Life cycle cost of obtaining and maintaining the design.
- The time required for each approach.
- The probable level of success of the alternative design approaches.
- Bought out design requires ability to specify, evaluate alternatives and accept (quality of conformance) them.
- In-house design requires ability to define the needed capability,

establishment of design capabilities and lead-time.

14.2.6 Level of innovation i.e. approach to managing risk affinity

This is about managing paradigms and balancing conservatism and entrepreneurial spirit. The issue here is how much of a risk the leadership should take in allowing freedom of choice towards unproven territory in enterprise design.

Attitudes stem from paradigms and it is therefore necessary to interpret and manage values i.e.:

- from scarcity mentality to one of abundance
- from risk averseness to risk taking
- from internally focussed to externally focussed

to arrive at a selection regarding level of risk.

14.2.7 Approach to design and implementation expertise

In order for the enterprise designer to recommend the procurement of expertise, he needs to know:

- what expertise is required,
- what is available in the market and
- how able the enterprise is to access the expertise.

This is the single area that could have the greatest impact on success. A competent and loyal core team to manage the system integration supported by a technical team competent in key technology areas is a great recipe for success.

14.3 Selecting a development approach

A development approach clearly has to be a mixture of the alternatives discussed above. Some generic mixes may be defined from research/experience.

14.3.1 Generic approaches/nature of opportunity

The nature of the opportunity influences the choice. Three classes of generic approaches are proposed. These 3 approaches are:

- Visioning
- Analytical
- Organic

Each approach is based on a different balance between the effort expended in creating a vision for the enterprise v/s analysing and understanding the need for the enterprise and its offerings, as well as expending great effort in the design of the enterprise v/s focussing on implementation of the enterprise's solution after perfunctorily performing the other activities.

The enterprise strategy and situation must guide the enterprise designer in selecting an approach. Visioning is most appropriate where understanding the market needs is crucial e.g. when identifying and targeting niche markets. An analytical approach is best suited to ensure a well positioned and integrated enterprise where high levels of value delivery or product quality/innovativeness is required i.e. in very competitive market segments. Where the window of opportunity is limited and the market potential for the envisaged enterprise offerings is vast, an organic approach is the way to go.

14.3.2 Approach to planning and designing/need for guidance

The enterprise designer will very seldom be in a situation where the enterprise he has to design, will be the first or only company of that nature in the world (templates for resulting enterprise designs therefore exist). The enterprise designer must decide to what extent he will supplement his own experience or lack of it i.e. that he does not have a map by borrowing a number of maps. The creativity in the plan normally becomes how to get from the (low) road where the enterprise presently is, to the (high) road – for this the enterprise designer uses a compass.

14.3.3 Mixing development experience with understanding

In development the enterprise designer needs to guide the process of establishing a new design. He may opt either for understanding development generally and seek success through an effective process, or seek specific prior knowledge and experience of developing similar or identical enterprises. The enterprise designer's decision in this regard will distill from ability to:

- Manage intellectual capital (own as well as outsourced)
- Manage outside implementers (if experience has to be bought in)
- Manage fewer astronomical risks (where expert solutions are bought)

This impacts development sourcing.

14.3.4 Approach to learning v/s wisdom /knowledge base

Another decision criteria for selecting development sources is the extent to which the enterprise designer wants to keep and have wisdom in-house and achieve transfer of wisdom. Considerations are:

- There is wisdom in the world, effort/time to find the wisdom versus to grow it in-house is important.

- The willingness to have it not invented here or fear of unknown/ strangers or uncertainty of what to require of strangers may inhibit outsourcing of knowledge.
- In general it is good to start with best wisdom and learn from there.

14.3.5 Approach to paradigms

The enterprise designer has to carefully analyse the underlying paradigms in his decisions to confirm that these are sound. Examples of dangerous paradigms that may severely inhibit effective development include:

- We are good at exploiting opportunities
- We can do everything ourselves
- There is a scarcity of opportunities
- When you share you lose
- One does not take risks in business
- Many papers and lots of deliberation cause good decisions
- Careers are tied to not making mistakes you can't share around – it is better to wait
- In down swings you tighten the belt instead of investing adequately in developing a future slimmer enterprise

14.3.6 Approach to alliances

Alliances may contribute greatly to the fast and effective establishment of an enterprise. In this regard it is recommended as:

- Sound design principle – use proved sub-system at highest possible level whenever feasible.
- A quick way to establish capability without own investment.
- A way to learn from someone in an existing enterprise looking for improvement.
- To enhance focus of design and management effort on key capabilities.

- A way to access markets where the alliances partner already has entry.

14.4 Establishing one technical alternative

In the conceptual design phase only a single technical alternative is needed to prove the feasibility of establishing an enterprise as proposed.

The technical alternative should broadly identify the key technology envisaged, which key processes are required, the core competencies needed and give an indication how the design might be implemented in architectures. This should be in adequate detail to judge whether volumes of products can be delivered to the target markets through the selected channels with adequate service levels and to base a course grain life cycle cost estimate upon.

The classical principles of creativity according to Hitchens [43] that may be applied to derive an alternative are:

- To work from the highest level of abstraction (panoramic view of the situation)
- To prioritize breadth over depth (whole problem in each evolution/iteration before proceeding to the next level)
- To work on one level at a time
- Employ disciplined anarchy
- Decomposition precedes integration (i.e. top down)
- Functional before physical design
- Tight functional bindings i.e. keep implementation of a single function tightly integrated
- Loose functional coupling i.e. minimize coupling between different functions
- Functional migrates to physical

These principles have to be supported in the enterprise design process by tools and techniques.

The levels of design and desired outcomes are addressed in the following paragraphs.

14.4.1 Designing/defining the strategic position

The owner/executive are the client who states their requirements for what the enterprise has to achieve as its strategic intent. Operational analysis and environmental analysis defines the functionality and boundaries, whereas scenario analyses define possible future states of the environments of the system. The current reality is in fact one alternative solution for the system, but can also be the host environment into which the re-designed enterprise must be deployed.

Positioning determined the grand strategy for the enterprise through its:

- Strategic vision
- Strategic mission
- Strategic structure in terms of:
  - Primary strategies i.e. products, markets, channels and value proposition.
  - Secondary strategies regarding capabilities and resources.
  - Business strategies in terms of profitability and growth

The grand strategy is translated to an implementation by developing the scenarios and sizing the primary strategies to specific forecasts of what the enterprise should achieve over time in the market place and v/s its constraints as well as applying the business objectives to define the figures of merit for the design.

14.4.2 Designing the interfaces with the enterprise environments

As stated earlier, the enterprise achieves its performances through its value streams where processes performed by capabilities interact with the environment.

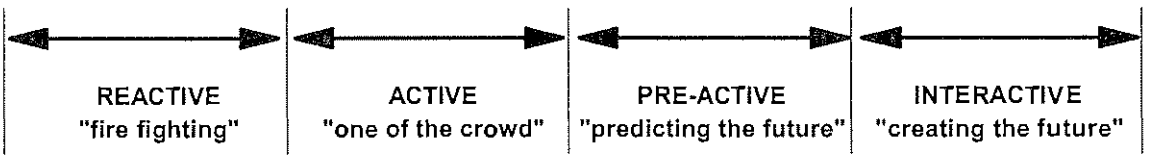
The starting point for designing value streams thus lie in defining the interactions with the environments. The environmental interfaces also stretch into the environment where the enterprise interacts with its resources.

How the enterprise positions itself with regards to these interfaces provides the enterprise designer with a source for the one alternative enterprise design now required.

14.4.2.1 Types of response environments

According to Ackoff [16] the relationship between the enterprise and environment constraints, can be managed in any of four ways as shown in ***Figure 14.1***.

FIGURE 14.1: MANAGEMENT OF THE INTERACTION BETWEEN THE ENTERPRISE AND THE ENVIRONMENT



14.4.2.2 Examples of alternative interactions

When these approaches are applied to the constraints, some typical positions or alternatives may arise from each environment as illustrate in ***Tables 14.1a, 14.1b*** and ***14.1c***. In these tables an example of a choice is included in the column labeled "Design Criteria".

TABLE 14.1a: ALTERNATIVE INTERACTIONS WITH EXTERNAL ENVIRONMENT

PARAMETER	REACTIVE	ACTIVE	PRE-ACTIVE	INTER-ACTIVE	DESIGN CRITERIA
NEEDS IN THE INDUSTRY	Wait for clients to come to you – no forecasting of needs	Pitch focus on demand as per forecast by industry organisations/ other institutes	Determine relationship between industry cycles and demand for products and services	Increase world demand for industry products through introduction of enterprise's products.	The enterprise must be designed according to e.g. the relationship between industry cycle and demand for products.

TABLE 14.1b: ALTERNATIVE RESPONSES TO THE BUSINESS ENVIRONMENT

PARAMETER	REACTIVE	ACTIVE	PRE-ACTIVE	INTER-ACTIVE	DESIGN CRITERIA
DEVELOP STRATEGIES	No formal strategy – Laissez Faire	Strategies – focussed on issues in existing markets.	Research potential customer requirements and design strategy	Strategy based on vision of demand	Strategy based on vision of demand
ASSESS MARKETS	Design size of business to visible orders and react when orders materialise	Respond/designed to published information on market sizes/timing	Respond/designed to primary information on market sizes/timing	Declare future market sizes/timing based on revolutionary approach	Two scenarios are to be investigated wrt market share: - visioning for enterprise concept - primary research for preliminary and full scale enterprise design identify leading indicators for each scenario
ADAPT PRODUCT TO MARKET	Deliver standard product according to order and client request	Tailored mix of standard products for client	Optimized for customers	Change the needs in the industry	Named, standard products packaged for clients
SELECT PARTNERS	Respond to approach from external partner	Recruit partners as required	Recruit partners according to forecast	Create partners to suit our needs	Recruit partners according to forecast
ASSESS COMPETITORS/ SUB-STITUTES	Take note when lose sales – someone tells us	Monitor published info on competitors/techn ology	Industrial "observation", symposia, publications on technology growth	Predict/create technology shifts	Monitoring the industry at first, moving towards predictions on technology growth
DEVELOP SUPPLIERS	Wait for supplier to contact (short term relationships)	Contact supplier when required (long term relationships)	Identify supplier according to demand forecast (JV partners)	Create new specified supplier base to suit our needs	Contact suppliers when required with a long term focus of identifying suppliers according to demand forecast (JV partners)

TABLE 14.1c: ALTERNATIVE INTERACTIONS WITH RESOURCE ENVIRONMENT

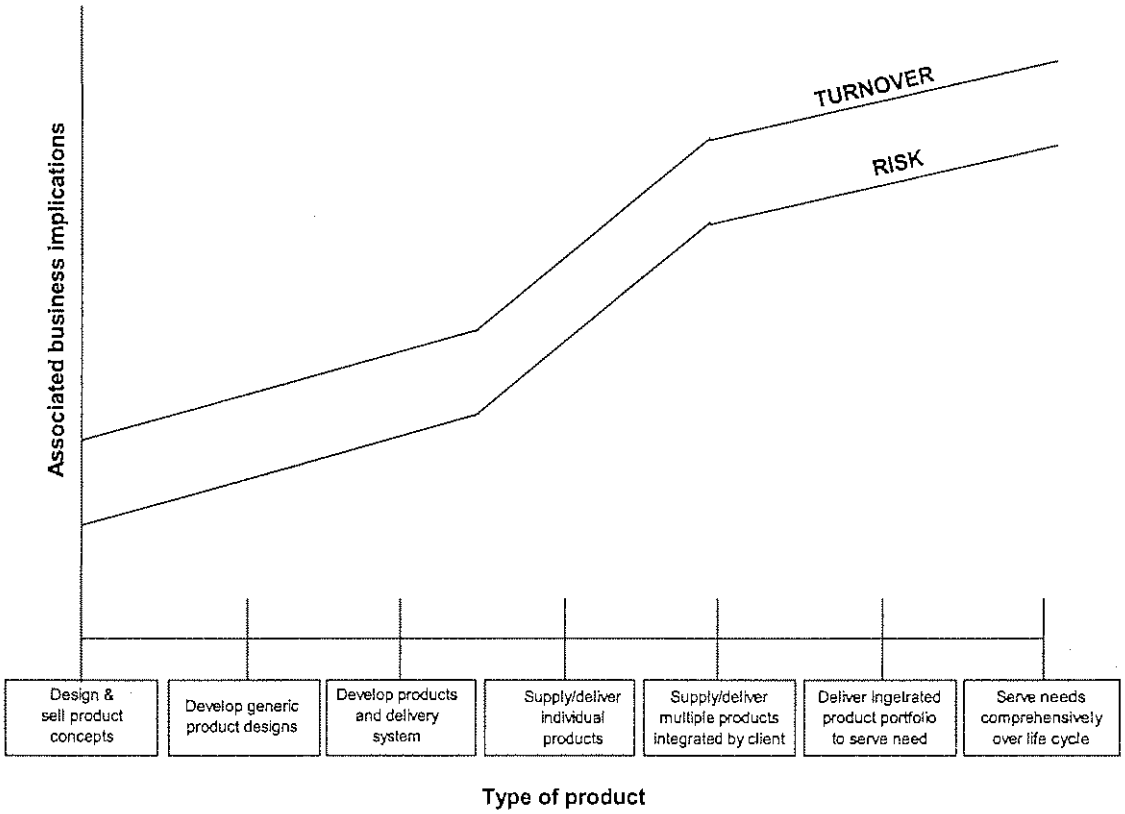
PARAMETER	REACTIVE	ACTIVE	PRE-ACTIVE	INTER-ACTIVE	DESIGN CRITERIA
MANANGE FINANCES/ FUNDING	Ad hoc funding; unknown budget	Relevant core business/criteria. Planned for project: - funding - tax - cash flow Operating budget.	Planned for business according to forecast: - funding - tax - cash flow Business budget.	New industry standards – deals and funding. Relevant core business e.g. Pick & Pay"	Alternatives for funding to be considered: - in-house - deals structure - JV's - Funding partner - Shares issue
MANAGE HUMAN RESOURCES	Ad hoc HR management	Manage HR according to existing policies and bureaucracy	Organizational planning, career path, individual career planning	Create a fundamentally new organisation aligned with policies	Focus during enterprise development phase: - Organizatio-nal planning - career path - individual career planning Create a new organisation during later stages
MANAGE INTELLEC-TUAL PROPERTY/ ASSETS	Expect that brand, copy right, trademarks and patent rights will protect asset – respond only to an incident	Brand, copyright and patents and security policy	Brand, copyright, patents, security policy and continuous development	Develop innovative and creative new organisation	The interactive person is already busy on a new technology. Pre-planned improvement of intellectual property and HR
MANAGE VALUE STREAMS	Fire fighting	One of the crowd	Predicting the future	Creating the future	Business should focus on creating the future
ESTABLISH CULTURE	Bureaucracy - low on people - low on achieving	Clan - high on people - low on achieving	Market - low on people - high on achieving	Adhocracy - high on people - high on achieving	Business should grow through all these phases up to the adhocracy
DEVELOP BUSINESS PROCESSES	Develop spontaneously	Benchmarking to existing process best practice	Processes to take forecasts into consideration i.e. emerging best practice	Uniquely designed processes	Business should grow through all these phases up to the stage where it will have its own uniquely designed processes

The nature of the interactions with the environment determine the type of processes needed to achieve these performances, but will also affect the success the enterprise will be able to achieve in its chosen markets.

14.4.3 Sizing the design

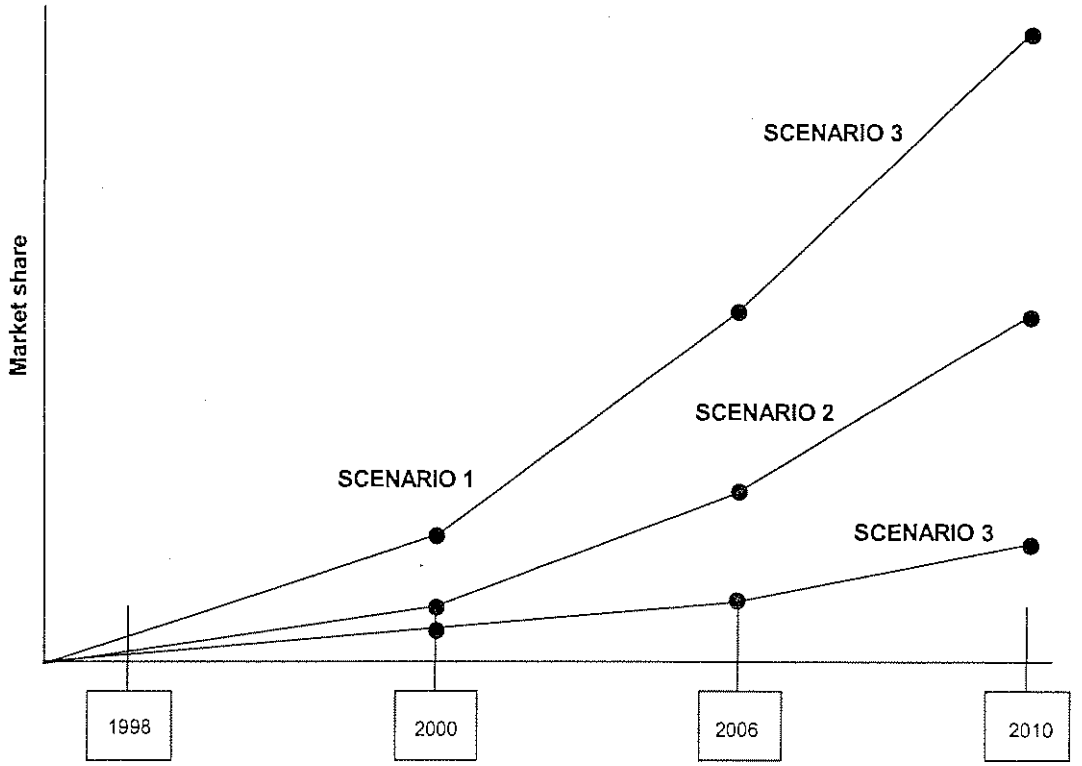
Once the design criteria are established i.e. where the enterprise will position primarily, the extent to which it works to be involved in the value streams and how it wants to interact with its environments, the design can be sized. This means that the implications in terms of the size of activity to design the enterprise for, has to be estimated. The graph in ***Figure 14.2*** showns how the choice of the level of product and involvement in the value chain may impact the relative turnover of and risk to the enterprise.

FIGURE 14.2: ALTERNATIVE POSITIONS WITH RESPECT TO PRIMARY STRATEGIES



Scenarios also impact sizing in that the external environment and how the business environment is managed, may require the different enterprise designs. This is shown in ***Figure 14.3***.

FIGURE 14.3: MARKET FORECAST FOR DIFFERENT SCENARIOS



14.5 Overview of deriving an enterprise implementation

Once the "technology" choices and design approach is selected and the design is sized, the conceptual design can proceed to define the processes starting from the interactions with the environments which become the main value streams. These value streams lead to the high level core processes which may be cascaded and partitioned to a level where they become activities which can be assigned to a single set of resources and design responsibility.

Once resources are assigned they may be synthesized into jobs, databases, application elements and infrastructure and facilities. The nature of the resources will dictate the nature of support and infrastructure required to integrate them and sustain and facilitate their workings. I.e. human resources require workplace, tools and food and hygiene services as infrastructure and management to regulate and integrate their work.

14.6 Focus points in conceptualizing an implementation

14.6.1 Finding leverage points

Based on the premise that it is more effective to focus on leverage points when improving or designing an enterprise, a SWOT analysis may be used to establish internal priorities in terms of strengths to be capitalized on and weaknesses to be eliminated or hedged as well as external opportunities to be utilised and threats to be neutralized. The internal facts are the basis of the enterprise's distinct competency from the "facts" profile i.e.:

- Strengths are resources or capabilities which can be used effectively to achieve the current stated objectives and address new opportunities, whereas
- Weaknesses are limitation, faults or defects in the organisation which constrain its ability to perform on its objectives.

The external facts assist in identifying the enterprise's most effective position in the market in terms of:

- Opportunities arising from favorable situations, needs, or trends in the organisation's environment that support demand for the organisation's products or services or will enhance the firm's position.
- Threats which create unfavorable situations in the environment and which are potentially hazardous to the organisation and its strategies.

The nature of the action to be taken in their priority areas, is guided by generic strategic responses to the SWOT analysis. The enterprise designer is thus guided by the SWOT analysis to the areas where alternative solutions are more urgently required.

This means that the enterprise designer may consider re-using the existing strategic design in the areas where it still suffices and only action the areas

where gaps in the current design are apparent.

As soon as the enterprise designer starts tampering with some aspects of the strategic design, it becomes imperative to revisit the next higher level of design to ensure that integration and synergy is retained.

14.6.2 Generic design guidelines to priority areas

From a SWOT analysis correlations may be found amongst the strengths, weaknesses, opportunities and threats which can be utilised to guide the type of response in terms of strategies and actions. A summary of these types of action is presented in ***Table 14.2***.

TABLE 14.2: STRATEGIC RESPONSES TO SWOT

SITUATION	RESPONSE
Strengths that exist to utilize opportunities	Offensive strategy (e.g. diversification)
Strengths available to counter treats	Defensive strategy (e.g. rationalization)
Weakness in an area of opportunity	Temptation to avoid (e.g. stabilization)
Weakness in an area of threat	Vulnerability (e.g. withdrawal)

The enterprise designer may use the suggested responses to guide his search for alternative solutions.

The above further emphasizes why the whole design of the enterprise i.e. processes, systems and organisation structure need to be designed in a strategic specific and integrated way.

14.7 Risk to strategic design

A number of threats inhibit effective strategizing and maintaining those strategies.

Threats from the environment to strategies include:

- Changes in technology
- The changing nature of competition

Threats from within a company may even be greater i.e.:

- The growth trap where executives come to see the trade-offs made and limitations imposed by their strategic positioning to constrain them to one group of customers placing a real or perceived limit on revenue growth. E.g. broadly targeted firms see opportunities lost to focused competitors and differentiated firms see losses of sales to price sensitive customers. Both these situations tempt managers to expand their competitive focus leading either to reductions in price or increase in cost or both, which they hope to offset by increases in volumes. This situation is further aggravated by the confusion caused amongst employees and loss of motivation resulting from lack of focus.
- It is possible to achieve growth without these sacrifices by deepening the strategic position i.e.:
  - Find extensions of offerings, which leverage existing activity systems through features or services that are impossible or costly to match on a stand-alone basis.
  - Building the perceived value with customers by making activities more distinctive, strengthening fit and communicating better.
  - Globalizing for growth consistent with strategies in a wider market.

14.8 Strategic leadership/sponsorship

Organisations fail through lack of leadership. Leadership needs to establish a clear intellectual framework to guide strategy which:

- Provide disciplined decisions about which industry changes and customer needs the firm will respond to.
- Sets limits in choosing what not to include in the company's strategic position.
- Teaches others in the organisation about strategy.
- Accepts core responsibility for strategy.
- Clearly communicates strategy to guide others in the organisation.

CHAPTER 15

CONCEPTUALIZING THE SOLUTION

CONCEPTUALIZING THE SOLUTION

The final steps in the conceptual design phase are to conceptualize a broad brush implementation for the strategic requirements. Only the more important aspects of the enterprise design need to be addressed in the concept. This typically means defining how the enterprise will go about producing its products and delivering them to the chosen market segments in the places, at the times and in the volumes predicted and at a profit to the enterprise.

The concept is thus about the capabilities of the enterprise especially those critical to achieve success. Here the enterprise designer has to focus on core competencies and the strategic value streams to utilise them to the best benefit in the enterprise design.

He must however bear in mind that the whole spread of core value streams and supporting value streams is required to achieve a sustainable enterprise.

Further it is necessary to have an estimate of al the resources required in the proposed enterprise before cost of development and operations can be estimated. This of course being a pre-requisite to enable the business potential to be established.

It is there fore recommended that the strategic priorities and crucial interaction be developed in a structured top down way starting with the top level value streams and cascading and partitioning the strategic streams using a process orientated approach. In this process the core competencies should be incorporated. At an activity level the transition is made to implementations. The implementations to which activities are allocated, can then be synthesised into structural architectures of resources.

15.1 Core competencies

A core competency according to Hamel and Prahalad [17] is a competency with a key technology or skill that can be used in many products. They state "The most powerful way to prevail in global competition is still invisible to many companies". The balanced

scorecard approach to evaluating companies goes some way towards rectifying the situation but is not widely used.

To be "core" to an enterprise the organisation the organisation must have mastered the competency to a level superior to its competitors and be in a position which cannot be emulated quickly.

Once a set of core competencies is mastered they should enable the enterprise to introduce diverse new products based on these competencies faster than its competitors. These core competencies should be a central building block in corporate strategy.

By their nature "core competencies" take long and may be costly to develop. It is therefore imperative to utilize these competencies as widely as possible in an enterprise (also known as knowledge management). This requires that core competencies be shared and distributed through "competency carriers" i.e. people knowledgeable in core competencies whose careers are centrally managed as a key corporate asset. Enterprises can enhance their position by planning their strategies around these competencies and systematically investing in building competencies themselves or assuring them through strategic relationships. Assured access to core technologies may often be obtained more cost effectively through buying and strategic partnerships.

This approach also offers flexibility to switch more easily between and add technologies much faster freeing the enterprise from the constraints imposed by deep vertical integration and vast investments in technologies which force them to sell what they can make rather than make what they can sell in a rapidly changing market. The reduced emotional attachment to core competencies sourced from others reduces the risk of retaining obsolete competencies.

From the above it becomes clear that the ability to recognise the required core competencies and successfully acquire them so that they may be integrated into product offerings is the key skill that enterprise designers have to master rather than the ability to develop the technologies in-house. This again points to a system approach to designing the enterprise after determining the guidelines from the matches between strengths (core competencies) and market opportunities to define a strategic position.

Additionally a systems approach provides visibility of the extent to which activities can be and are allocated to these superior competencies. If the skill in prevailing in global competition lies in sourcing integrating and applying core technologies rather than developing them the focus must shift to the way in which this integration is achieved. Nokia's spectacular success in the cellular phone market illustrated how the speed to market based on integrating bought out technology rather than developing the technology provided an edge.

This brings us to the concept of a strategic capability or value stream. It is essential to really abstract and understand the enabling characteristics of a core competency to realize its full potential e.g. Kao as manufacturer of skin care products whose core competency was understanding of surface science and lubricant technology who diversified to become the worlds largest producer of floppy disks based on the surface technology of floppy disk read heads.

15.2 Strategic value streams

Stalk, Evans and Shulman [18] argued that the ability of companies to perform better than their competitors are based on a end-to-end capability i.e. a strategic value stream.

This strategic capability is "a value stream critical to competing, performed at a level of excellence difficult for competing companies to copy" [28] which allows a company to perform faster or better than its rivals.

Strategic value streams should move fast with decisiveness and precision and should therefore be identified and singled out for appropriate attention. Strategic value streams are identified during the strategic visioning process.

These value streams should be designed by cross functional value stream teams and constantly reviewed to:

- accertain their continued ability to delight customers despite changing needs and wishes

- seek innovation in the processes of realising the products, bringing them to customers and supporting the successful use of the products by the customers.

The above argument again relates to determining requirements for an enterprise system derived from market needs which match enterprise capabilities or existing strengths, divining the market priorities and the enterprises relative strengths versus its rivals and focusing development effort on establishing strategic value streams i.e. business processes aimed at delighting its customers which have a competitive edge and then designing these integrated with all other processes to achieve the benefits of integration.

I.e. the higher the order of integration (fit) in a value stream the less observable it is and the more difficult to copy. This is especially true where we have human "Orgware" interfaces with software systems - a property that can be utilised in ED as a barrier to competitors.

Examples of key capabilities might be:

- A personalised banking service value stream based on strategic customer information.
- A strategic logistical value stream for a retail chain to get the right goods, to the right store locations at the right time with minimum cost.

Excellence in a strategic value stream provides an edge which may be used to enter new markets which require the same value stream or take over rivals and revive their companies by cloning the value stream.

The practical implication of developing strategic value streams and the core competencies that feature in them is that this requires an overall view of organisation and the focus of the whole as well as funding and support from the CEO to be successful. Cross functional teams may be used to pull all the elements and interactions comprising the strategic value stream together by providing ownership and a vehicle for continuous experimental learning. This value stream team should be led by an executive to ensure that the strategic value streams feature prominently in strategic

thinking. Mechanisms should be provided to scan journals and product catalogues for ideas and interacts with leading edge IT and communication innovators.

Strategic capabilities should be kept in-house to facilitate their continuous improvement and deny competitors access despite pressures to out source parts for cost reasons. Where elements have to be bought out very special relationships should be established with partners.

15.3 Integral monitoring and improvement requirement

Pre-occupation with operational effectiveness must be handled by clearly distinguishing and managing it separately from strategy as an all pervading effort to continuously improve all activities everywhere with separate provision for these activities in the enterprise design.

Such continuous improvements which impact the strategic choice of activities and their unique execution must however always be identified and evaluated from a system perspective, to ensure that the unique position and strategic fit are not compromised.
This means that the strategic design must be recorded and managed in such a way that it recognises imminent changes to the enterprise system and can discern those with a strategic impact. It must further be capable of assessing the impact and reacting in an appropriate manner.

15.4 Synthesising the structural architecture

The structural design is derived on a top down process driven analysis with cascading and partitioning of the high level value chain and objectives through business processes to activity level and seeking conceptual implementation. For the strategic value streams for the other value streams and supporting streams implementation may be benchmarked from other designs. The structural architecture provides

- sketch plan for desired business
- soundly designed concept for strategic objectives for elements of the strategic value chains e.g. core competencies
- identified business processes
- philosophy, strategy and practices activities for elements
- management processes
- resource requirements and structures
- infrastructure requirements e.g. accommodation, major plant and equipment

15.5 Synthesising a cultural architecture

This provides the behavioural framework for desired business and is derived in parallel with the structured design through cascading values and attitudes to activity level.

It addresses with regards to values crucial for business success:

- Current paradigms and trends
- Value system to be created
- Core competencies required
- Leadership

15.6 Approach for aligning resources

This step defines how the resources required and structuring of resources to implement business elements i.e.:

- human
- IT
- equipment
- facilities
- financial
- technology/knowledge

will be obtained or adjusted.

CHAPTER 16

ESTABLISHING THE BUSINESS POTENTIAL

ESTABLISHING THE BUSINESS POTENTIAL

Assessments of business potential are essentially about forecasting, life cycle costing and risk assessment, all of which is adequately covered in engineering economics texts. It is therefore only briefly addressed here.

In order to assess the business potential of an enterprises concept, the future sales of the enterprise have to be forecast for its various products in its various markets, anticipated pricing levels and movements applied and income streams calculated. (Some statistic modelling might be advisable.)

Based on the size of organisation, cost of materials and bought out services and cost and trends in resource prices, the operational cost can be modelled.

Further cognisance must be taken of the costs of supporting the enterprise throughout its life cycle. All of this traded off against the estimated development cost and costs for funding the start-up can be calculated to a figure of business merit e.g. ROI.

The outputs of such an analysis of the financial case for an enterprise should include the following:

- Primary assumptions used in calculations
- Primary factors to be used in setting the price of the product
- Enterprise value
  - Net present value
  - Internal rate of return
  - Payback period
- Income statement
- Cash flow
- Scenario modelling
- Risk assessment

Tools like B-plan (a computerised financial model) provide a useful template for the types of information required to evaluate the financial worth of a venture and also allows some what-if questions to be answered e.g. what if sales vary, what if resource costs vary, what if interest rates shift, etc.

The potential study above together with a requirements specification, (covering the areas analogous to Mil Std 499a) to prove that the requirement are well understood, the conceptual design and development approach to "prove" the technical and organisational feasibility are the output of this phase.

A formal recommendation (and plan for further development if recommended) round off the deliverables to the decision-makers.

This bring us to the end of the beginning…

CHAPTER 17

CONCLUSIONS

CONCLUSIONS

This document has attempted to provide a practical guide to the conceptual development of an enterprise based on research and experience gained in the industry. This model or approach has been applied to some extent in the military, product manufacturer and financial services industries and found useful.

Further work should be undertaken to stress test it in a controlled manner in a wider range of industries after a wider theoretical review.

This has only addressed the conceptual phase of development, which leaves ample room to expand it to cover the complete development cycle and especially the transformation for business design to information system and human activity design.

Generic modeling tools and templates should be developed to provide the enterprise designer with even better support.

Seen on the whole this has been a worthwhile journey to engage in and I thank our Heavenly Father for the opportunity and the abilities he has given to bring this to fruition.

My special thanks to Anneke Swiegers who helped me through the painful word smithing at the birth and infancy of the document and Madeleine Wallander for steadfast support with graphics and typing through the upbringing of this child.

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