Systems and Design Thinking

CREATING THE CORPORATE FUTURE
AN INTERACTIVE PLANNING PROCESS

The Ackoff Centre for Systems and Design Thinking @ Da Vinci
If you read the newspapers and are still satisfied with the state of the world, put this book down; it is not for you.

My objective is not to convert those who are satisfied -- even though I believe they need conversion -- but to give those who are dissatisfied, cause for hope and something to do about it.

[R. L. Ackoff, in Preface to /Redesigning the Future/]
Emergence of State Capitalism
Obama slips up
Japan's ailing electronics firms
The dark horse in Israel's election
Charles Darwin, still evolving
Where to get divorced

THE RETURN
OF ECONOMIC NATIONALISM
Systems & Design Thinking vs Conventional Wisdom

- “Business schools tend to focus on inductive thinking (based on directly observable facts) and deductive thinking (logic and analysis, typically based on past evidence), …”

- “Design schools emphasize abductive thinking—imagining what could be possible. This new thinking approach helps us challenge assumed constraints and add to ideas, versus discouraging them.”

- Procter & Gamble CEO A.G. Lafley

(From The Game-Changer: How You Can Drive Revenue and Profit Growth with Innovation, Business Week 28 July 2008)
Let’s today step out of the normal boundaries of analysis of our economic crisis and ask a radical question: **What if the crisis of 2008 represents something much more fundamental than a deep recession?** What if it’s telling us that the whole growth model we created over the last 50 years is simply unsustainable economically and ecologically and that 2008 was when we hit the wall – when Mother Nature and the market both said: ‘No more’?

Thomas L Friedman
- Production factors are diverted to activities that compensate for the loss of services that were previously provided by nature (e.g. sewerage treatment, air purification)
- Production factors are diverted from final goods production to exploitation of scarcer, more distant or deeper resources
- Technologies are invented to make use of lower-quality, smaller, less valuable resources (because higher-value ones have been exhausted)
- Capital depreciation exceeds investment, and maintenance is deferred, so that capital stock (esp. infrastructure) declines
- Growing demands by the military for production factors to gain access to, secure and defend resources that are increasingly concentrated in fewer, more remote or hostile regions

What Does A System Do That Is Under Stress?
What does a system do that is under stress?(continued)

- Investment in human resources (education, health care) is **postponed** in order to meet immediate consumption or security needs, or to pay debts
- Debt constitutes an **increasing proportion** of annual output
- Goals for **environmental health** are lowered
- Increasing number of **conflicts**, especially over resources
- Declining respect for governments as they are used by the elites to preserve or increase their share of a declining resource base
- **Growing chaos in natural systems**, with natural disasters becoming more frequent and more severe because of less resilience in the environmental system
Through our filters from the past we see only the problem that we want to see and therefore tend to react with known solutions, many of which are no more than quick fixes to treat symptoms.

The more we study the major problems of our time, the more we come to realise that they cannot be understood in isolation. They are systemic problems, which means that they are interconnected and interdependent, requiring a systems view.
We are products of the machine age

- **Renaissance man** – discoverer with a mechanistic view of the world
- **Analysis, reductionism, determinism**, - take apart, understand the parts separately, assemble the understanding of the parts to understand the whole
- **Industrial revolution** – lever, pulley, wheel axle, series of small stages/steps produce a defined outcome,
- **Applied machine logic to human effort** – intelligent machines driven by process defines the workplace
- **Assumes behaviour is deterministic, linear and repeatable** – the past is a reflection of the future
  - This forces conformance and “androidism” and assumes those at the top know which levers to pull to keep everyone safe and efficient
Does Systems & Design Thinking provide any answers?

Pace of Change, complexity and THE FAILURE OF CONVENTIONAL WISDOM
There is always and EASY solution to every problem – neat, plausible and WRONG – H L Mencken “The Divine Afflatus” 1917

"I have no interest in forecasting the future, only in creating it by acting appropriately in the present”.
Russ Ackoff
“We fail more often not because we fail to solve the problem we face but because we fail to face the right problem.” (Ackoff)

“Vision without systems thinking ends up painting lovely pictures of the future with no deep understanding of the forces that must be mastered to move from here to there” (Senge)
COMPLEXITY REIGNS

A DA VINCI PERSPECTIVE
“Some problems are so complex that you have to be highly intelligent and well informed just to be undecided about them.”

--Laurence J. Peter
Unintended Consequences

- Where did it all begin?
  - Working for water – Eucalyptus trees
  - Bread wrapper – biodegradable
  - Traffic Lights in Canada
  - The TOYOTA Catastrophe

- What really did take place?
  - Complacency?
  - Arrogance?
  - Complexity?
  - Western style of management?

FAILURE TO UNDERSTAND THE SYSTEM
THE REALTIES FACING THE MODERN WORLD

THE FAILURE OF CONVENTIONAL WISDOM
It is not clear which activities are relevant?

It is not certain how or to what extent these activities are interdependent.

The environment to a manager appears to be ill-structured, dynamic and uncertain.
• There is a subtle but pervasive kind of pain in our organisations.
• It is characterized by such frequently heard complaints as:
  • “How am I supposed to get my work done with all of these meetings?”
  and
  • “We always have time to do it over again, but never time to do it right.”
  • (Jeff Conklin).
The Reality of NOT Looking at the System as a Whole
Part of the pain is a misunderstanding of the nature of the problems at hand.

More precisely, the pain is caused by working on a special class of problems – **wicked problems** – with **thinking tools**, and methods that are useful only for simpler ("tame") problems.

Jeff Conklin, Ph.D.
Why with all the sophisticated forecasting and planning processes did the world not predict the global economic fall out?

We suggest that the reason for this lies in the planning processes which are based on FORECASTING, AND ANALYSIS.

THE REALITY IS THAT THE WORLD AS WE NOW UNDERSTAND IT IS AWASH WITH WICKED PROBLEMS AND CONVENTIONAL WISDOM IN MANY CASES EXACERBATES THE PROBLEM.
WICKED PROBLEMS

- Have No Stopping Rules
- No Definite Formulation
- Planner Has No Right to Be Wrong
- Solutions Are Not True-or-False, But Better Or Worse
- You Don’t Understand The Problem Until You Have Developed A Solution

Characteristics - Wicked Problems
Churchman describes wicked problems as, “a class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing.”
A wicked problem is a social or cultural problem that is difficult or impossible to solve for as many as four reasons:

1. Incomplete or contradictory knowledge,
2. The number of people and opinions involved,
3. The large economic burden, and
4. The interconnected nature of these problems with other problems.

https://www.wickedproblems.com/1_wicked_problems.php
Consider the following:

• The US Automotive Industry
• The Mining Industry in South Africa

Both are wicked problems which cannot be solved but can be dissolved

From a Systems viewpoint there are some interesting options
A black swan is a large-impact, hard-to-predict, and rare event beyond the realm of normal expectations. Taleb regards many scientific discoveries as black swans—"undirected" and unpredicted. He gives the rise of the Internet, the personal computer, the first world war, as well as the September 11 2011 attacks as examples of Black Swan events.

The term black swan comes from the ancient Western conception that 'All swans are white'. In that context, a black swan was a metaphor for something that could not exist.
The Black Swan

BELIEF THAT THE WORLD BEHAVES AS A BELL CURVE

unexpected can be predicted by extrapolating from variations in statistics
The bottom line is that you cannot solve wicked problems – you can only dissolve such problems.

Dissolution can only be achieved through re-designing the system.

Re-design can only be achieved through an understanding of SOCIAL SYSTEMS.
THE GREATEST CHALLENGE FACING ANY ORGANISATION RE-DESIGN IMPLIES

CHANGING MINDSETS
A Quote From Einstein

• Without Changing our pattern of thought, we will not be able to solve the problems we created with our current patterns of thought.
The Real Definition of Ego

Ego = \frac{1}{\text{Knowledge}}

“More the Knowledge, Lesser the Ego, Lesser the Knowledge, More the Ego...”

-Albert Einstein.
- The view that mindsets can differ and that they can have a powerful impact on corporate strategies is illustrated well by the case of Kenneth Olsen, founder and then CEO of digital equipment (DEC).

A Classic Example!
In the mid-1970s, DEC was the world's second-largest computer company and the market leader in the minicomputer segment.

In 1977, Olsen observed that "there is no reason for any individuals to have a computer in their home."

This was the same year in which Steve Jobs and Steve Wozniak incorporated Apple computer and launched the PC revolution."
A DA VINCI PERSPECTIVE
In the 1970s there were many head-on car crashes resulting in injuries and deaths on the George Washington Bridge (NY-NJ)
George Washington Bridge
Problem: Reduce Into Parts

Port Authority

Columbia-Presbyterian Medical Center

Police and EMS
Focused on the road markings so they regularly repainted the solid yellow lines. They measured their effectiveness by the degree of visibility of the lines by the drivers. But, there was little overall improvement.
Focused on driving behavior so they attentively issued fines to drivers who crossed the solid yellow lines or drove over the speed limit. They measured their effectiveness by the number of fines levied.

But, there was little overall improvement.
Focused on responding to emergencies so they kept themselves and their resources up to date. They measured their effectiveness by response time to the scene, quality of care, and response time to the medical center.

But, there was little overall improvement.
Focused on advanced medical care so they improved emergency facilities and treatment. They measured their effectiveness by quality of care feedback and survival rate. But, there was little overall improvement.
Until...A Different Model Was Applied

Frank and Ernest

OH WOW! PARADIGM SHIFT!

THAVES
Think Systemically
The performance of the whole is **NOT** the sum of the performances of its parts.
In a system problem the performance of the whole is derived from the interactions of the parts. A system problem cannot be solved by focusing on independent parts.
Parts Are Inter-connected

"I'm sure glad the hole isn't in our end..."
The parts do NOT always perform in ways that are expected.
In a social system the “parts” include

► people and groups
► who are purposeful, have their own interests, intentions, and generate their own goals
► a key characteristic of the players is that they exhibit choices!

Goals are not always shared
In a social system the “parts” are characterised by

- Parts of a social system are constantly interacting.
  - Because of the interdependency of the parts, changes cannot be made in isolation.
  - Moreover, feedback loops can create unintended consequences that do not follow a simple linear course and commonly include time delays.
Different methods are required to diagnose, describe, and understand a systemic problem.
When these methods were applied, a different question emerged:

On the George Washington Bridge, under what conditions would a head-on collision be impossible?
And THIS produced a Systemic Solution:

Replace the solid yellow painted lines with a solid concrete barrier
The A380 Challenge

Think about the realities:
• Airport facilities
• Passenger acceptance
• The rollout impact – who is controlling whom?

AND WHAT ABOUT BOEING?
• Impact on South Africa?
What Is A System?

- A system is a **construct** that the designer creates by assembling **interacting** parts of the world (either concrete or abstract) for the purpose of design. This assemblage must satisfy two conditions:

  - The assemblage must exhibit **emerging** properties that are not exhibited by any of its parts and will somehow be diminished if any of the parts is removed;

  - Each part must be **interacting** with at least one other part.
A Boundary: that defines the system as separate from its environment
An Environment: which influences the system and influenced by it
Subsystems: systems within the system
Has Purpose: either by design or by attribution
Demonstrates: emergence
A system is a group of interacting, interrelated, and interdependent components that form a complex and unified whole

- All parts must be present and functioning
- All parts must be connected in the proper way
- A critical element is the presence of a FEEDBACK LOOP
“Systems thinking is based on the fundamental shift of perception from the world as a machine to the world as a living system”  
(Fritjof Capra)

- Focuses on relationships and interrelationships rather than the parts
- Sees patterns not events
- Is about connectedness
- Gives a more accurate picture of the reality
- Forces awareness of ‘the unintended consequences’
Understanding the real system
<table>
<thead>
<tr>
<th></th>
<th>Holistic Thinking</th>
<th>Reductionist Thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method</strong></td>
<td>Systemic</td>
<td>Analytic</td>
</tr>
<tr>
<td><strong>Issue tackled by</strong></td>
<td>Investigating the problem’s environment</td>
<td>Reducing the problem into smaller &amp; smaller parts</td>
</tr>
<tr>
<td><strong>Approach characterised by</strong></td>
<td>An upward movement</td>
<td>A downward movement</td>
</tr>
<tr>
<td><strong>Simplifies by</strong></td>
<td>Taking multiple, partial views</td>
<td>Breaking problem down into simplest parts</td>
</tr>
</tbody>
</table>

It’s all about moving from the “either/or” to the “both/and”

**Differences between Holistic and Reductionist thinking (East & West)**
Reductionist – zoom in on the star shape in (b) and find it has elliptical components (a) with zig-zag subcomponents

Holistic – zoom out to observe context

Systemic – move freely between the views

Growing Wings on the Way – Rosalind Armson
DESIGN THINKING

Making sense of Wicked Problems
Design thinking is not new; it can be linked to the work of the likes of John Dewey and Edward De Bono.

Its ethos is human-centered, integrative, optimistic and collaborative, and warrants serious consideration as a possible creative response to wicked problems.

For businesses, it is a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.

If you read the newspapers and are still satisfied with the state of the world, put this book down; it is not for you.

My objective is not to convert those who are satisfied -- even though I believe they need conversion -- but to give those who are dissatisfied, cause for hope and something to do about it.

[R. L. Ackoff, in Preface to /Redesigning the Future/]
The 3 States Of A System

- The "As Is" State
- The "As It Will Be" State
- The "As It Should Be" State

Design

Early Warning System – the consequence of the system's current state of affairs

The DaVinci Way
Interactive Planning

- Interactive Planning
  - Mess Formulation
  - Idealised Design
Every organisation is faced with interacting threats and opportunities, a system of problems called a mess.

Why a ‘MESS’?
The purpose of exercise:

- Determine how the organisation would eventually destroy itself if it were to fail to adapt to a changing environment, even one that is perfectly predicted.

- Identification of the Achilles’ heel – the seeds of destruction – provides a focus for the planning that follows by identifying what must be avoided at all costs.
The Mess Formulation Process

1. **Stakeholder view of the Organisation:**
   - Identifying all the internal and external influencers

2. **Systems & Obstruction Analysis**
   - How does the system currently operate?

3. **Reference Projections**
   - An extrapolation of performance from past to future

4. **Reference Scenarios**
   - The possible future that the organisation will face

5. **Telling the Story**
   - Presenting the Mess in a compelling and factual manner
Stakeholder View of the Organisation

**Transaction Environment**
- Structure
- Culture
- Competencies
- Resources

**Contextual Environment**
- Unions
- Trade Associations
- Competitors
- Suppliers
- Customers
- Shareholders
- Creditors
- Regulators
- Environmental Forces
- Socio-cultural Forces
- Technology Forces
- International Forces
- Economic Forces
- Political Forces
- Communities

**Operating Environment:**
- Structure
- Culture
- Competencies
- Resources
Two assumptions are in place when making projections:

- No change in the organisation’s plans, policies, programmes, etc.
- The future environment will be what the organisation expects
Reference Projection: Group Performance
The current state of the organisation and the reference projections are now combined into a scenario of the possible future the organisation will face if it were to make no changes in policies and practices, and the environment changed only in expected ways.
A believable and compelling story that reveals the undesirable future implicit in the current state has to be developed.

Management is usually reluctant to share the mess with other stakeholders. This practice not only defeats the purpose for formulating the mess, but is also counter intuitive.

Remember - the world is not run by those who are right - it is run by those who can convince others that they are right!
In a shock announcement the shareholders of XYZ Pty Ltd have announced the closure of the company with immediate effect.

Reasons cited by the board include management’s failure to recognise the emergence of new technologies, obsessions with annual bonuses and a loss of key skills due to a neglect in developing retention strategies.
Reporting The Mess

Our guys + B

Fantastic. Terrific. NFW!

Winning Stage
2
EASY
Oh yeah!

Appian

PR SM

Let’s not worry Eleck!

daVinci
Research · Design · Education
Idealised Design

Begins with the premise that the system involved was destroyed last night but its environment remains as is
An Idealised Design

......is that design you would have right now if you could have whatever design you wanted
AN IDEALISED DESIGN IS SUBJECT TO THE FOLLOWING CONSTRAINTS

It must be

Technologically Feasible

and

Operationally Viable
IN ADDITION IT SHOULD BE READY, WILLING, AND ABLE TO CHANGE ITSELF, AND BE CHANGED

that is,

It Must Be Capable Of Learning and Adaptation
THEREFORE,
THE PRODUCT OF AN IDEALISED DESIGN IS NEITHER IDEAL NOR UTOPIAN

Because it is capable of being improved,

IT IS NEVER PERFECT
IDEALISED DESIGN

- BASIC PREMISE
  - The System Being Considered
  - WAS DESTROYED LAST NIGHT

- IDEALISED DESIGN
  - The Environment remains the same
  - It must be Technologically Feasible and Operationally Viable
  - It must be capable of Learning and Adaptation
  - Because it is capable of being improved
    - It is never PERFECT

- Is that Design you would want right now?
- If you could have whatever Design you wanted?
DA VINCI IDEALISED DESIGN PROCESS

D
DESIGN CRITERIA
(What Business Are You In?)

The New Reality
The Dream
Core values

A
ALTERNATIVE DESIGNS
Test Against Criteria
Select First Interaction

I
IMPLEMENTATION
(Migration Plan)

CRITICAL SUCCES FACTORS
(Costs, Benefits)

N
NEW MODEL
(Products, Processes, Structures)

V
VALUE CHAIN
Business Processes
Financial Model

I
IDENTIFY STAKEHOLDERS
(Test The Model?)

Idealised Design - Iteration
The Design Process

- **D = Design Criteria** - designing the new future state of the organisation/system – what business are you in?: including values
  - **A = Alternative designs** – assess impact
  - **V = value chain** – business process – operationalising the dream (partnering, change management, capacity building, subcontract, assemble, despatch, retail outlet)
  - **I = identifying stakeholders** – getting their views on the new vision
  - **N = new products/processes/structure**
  - **C = critical success factors/cost benefit analysis**
  - **I = implementation** – the migration plan
The Interactive Planning Process

MESS FORMULATION

IDEALISED DESIGN

GAP ANALYSIS

MEANS PLANNING (Remove Gaps)

RESOURCE PLANNING (Facilities, People, Finance etc.)

DESIGN OF IMPLEMENTATION (Who should do what?)

DESIGN OF CONTROLS (Monitor Implementation)
Major Commercial Electronics Company:(Mess Formulation)

- Has one major customer
- Spate of sporadic resignations
- Mess team finds out that the customer is building an expertise base from the Electronics Company
- The mess team also revealed that the reference projection for a recovery was not feasible.
Total Pre-tax Income

R million


What Management Promised

Reference Projection: Income

daVinci
Research · Design · Education
• Major Commercial Electronics Company: (Ideal Design)
  • Design team a number of young researchers and designers
  • Their dream was driven by a desire to take all their ideas as well as a cupboard full of abandoned projects and come out with a totally new integrated product
  • They are now launching the new product which bypasses their customer and will take on their existing customer’s customers
• Declining audiences
• Serious mismatch between the board and the management
• Very old school and dogmatic about following the rigid classical line
• Bleeding financially
• Too reliant on donor funding
Reporting The Mess
• Opera Company Ideal Design
  • A vocal company which can transcend several genres
  • Ability to provide a suite of services from entertainment to function design, to supply of specialist equipment
  • Taken the first steps –
    • Board resigned
    • Several singers could make the transition
    • New positioning in the market place
FROM BTE TO VO1SS
THANK YOU