## Sustainability

The concept of "sustainability" has increasingly become everyday corporate rhetoric throughout the business world, the specific concept of what "sustainability" really means within the business context remains an extremely elusive and ambiguous subject with which firms continue to grapple.

It need not be.

## Concept of Sustainability

"Our social organisation and our economic activity have grown to the point where we have reached and exploited just about every corner of the globe: so we are now the dominant planetary engineers. The one long term trend that is focussing minds at the present time is population growth, resource use and the possibility of global change. For the first time in human history we have the potential to make irreparable changes to the entire global fabric, including atmospheric chemistry, global nutrient cycles, climate, water distributions, land use and biodiversity. The constraints are now global as well as regional. There are the long term drivers on our present thinking about the human condition., which may lead to the predicted

singularity when technology and environmental change reach a new convergence point." Graham Harris.

**Current Technology**

If one looks at all current technology, its design, its embodied energy, its energy usage, its current eco-footprint, its emission etc and extrapolate to 9 billion people in 2050 its easy to buy the idea that our current technology is all unsustainable and that we can't take it with us.

**Crashing sustainability**

As the world population increases at an unprecedented rate over the next 4 decades and as we roll through the food crisis, the water crisis, the oil crisis, the climate change crisis, the resources crisis, this thing called sustainability will come crashing through the front gate.

**Cannot Incrementalise**

Anything and everything we make or use today cannot come on the journey with us to sustainability by 2050. We cannot incrementalise efficiency or resource use reduction into our current stuff and achieve sustainability with that existing technology paradigm. Even if

we maximise incrementalism of a particular technology it cannot become sustainable.

**Redesigned**

The technologies and all our current stuff has to be redesigned and path-changed into sustainable technology, hence the clothes washer vanishes and clothing technology "path-change" so the clothes never need washing.

**Population Increase**

Given that we know the population in 2050 will be half as much again as 2000 and therefore we know that we can't take our current stuff (systems and technology) with us on the sustainability journey just what are New Zealand manufacturing companies doing to ensure that as their dinosaur products and services expire they are assured of a continuing existence.

**Steaming towards us ready**

Sustainability is steaming towards us ready or not. It has to, as 9 billion people will be demanding resources from a dwindling planet. The numbers will kill us, you cannot have 9 billion people demanding a double drawer dishwasher that runs on power, uses water,

chemicals and discharges dirty water that requires treatment simply to clean plates.

**Mega cities**

We cannot have mega-cities or even meta-cities that demand huge quantities of water just to contaminate it and run it off to mega-effluent control systems. The same mega-cities cannot continue to shove food down their sinks and send them to the same effluent control centres.

**Brutal Sector changes**

As real sustainable design arrives the industry sector changes will be brutal and dramatic.

**Not be incremental**

These changes will not be incremental and slow in their non-heralded arrival. When the dishwasher is designed that does not use water, has no embodied energy, no chemical usage and no effluent discharge then the entire sector that currently produces such machinery dies on its feet.

**No warning**

There is no warning for such paradigm design shifts, its not an incrementally improved efficiency product that comes on gradually as someone

brings on a new efficient device. This is a brutal sector change, totally longitudinal.

**No more supermarkets**

As "digital ink" arrives the entire pulp and paper, photocopy, and printer business will vanish overnight. As lighting becomes "photon capture" based the entire worldwide lighting business sector will cease to exist. Supermarkets will cease to exist as sustainability arrives. The supermarket concept, even the hypermarket is an "unsustainable model" in 2050. (just think about it!). Supermarkets will vanish as quickly as they arrived.

**Brutal on Society**

These changes will be more brutal on our society more than at any time in the past.

**Long research periods**

The design changes incorporating sustainability are a result of long research periods which may last at least 30 years. New Zealand manufacturing companies are thus "standing into danger". This is because they are small and from a production point of view have little influence or impact on sustainability. But their weakness is also their strength. Because they are small they can move

fast, they are not tied to mega-production, they don't have vast wide and deep supply lines and many of our companies are very smart. But the time is short and it is imperative that they move now!

**Factor X**

The concept of "factor X" (used interchangeably with "eco efficiency' or "eco factor") which describes the range of efficiency with which the developed world currently makes use of the environment and of its resources.

**Factor 10 to 50**

In essence, the application of factor X enables us to demonstrate that if long term sustainability is to be adequately addressed - given the imminent future resource constraints facing the planet - the eco factors of current technologies produced by even today's most environmentally sound organisations require to be radically improved anywhere from a minimum of a factor of 10 to even factor 50 increases.

**2-3 times**

We can only expect a factor increase of 2-3 times for current technologies.

**What sustainability really means**

In light of the above, we can challenge the current idea of what sustainability really means within the business context and discuss the dangers and implications of current business as usual (BAU) practices of firms who falsely believe they are transitioning towards what they term as "sustainable".

**Over the Horizon**

In addition we can and attempt to draw attention to the concept of "Over the Horizon" strategic planning and product design and how it can be utilised by New Zealand manufacturing organisations in order to genuinely become sustainable - necessary for long term firm survival.

**Backcasting and All**

The three fundamental elements encompassed within "Over the Horizon Design" that are able to support strategic decisions about the future - vital in attaining this paradigm shift; those three elements are: Foresight, Back Casting and Scenario Planning establish that a drastic paradigm shift which embraces radical innovation and

eco-efficiency improvements is essential for long term firm survival.

**Manufacturing Strategy**

With New Zealand manufacturing in particular, questions that must be asked and explored include: what is the NZ manufacturing sector's current position on sustainability? What does this mean for the future of New Zealand's economy? What is guiding its strategy for the future in order to change its current position?

**OHD**

"Over the Horizon" strategic planning and product development is suggested as being possibly the only mechanism available to New Zealand manufacturers that is genuinely capable of addressing and attaining long term sustainability and Sustainable Technology Development (STD).

**Off Shore**

NZ Manufacturing companies can plan for and design the paradigm shifts and survive the brutal sector changes that are coming. We can send our "manufacturing" offshore and just not invest money into

production systems that will be lost when the sector changes come, let the off-shore organisations cope with that.

**Black rooms**

In the meantime we can establish the "black rooms" set aside people and money to design "over the horizon", to foresight what will be needed and required and importantly what will not be required.

**Scenario work**

Create the scenario work, develop options and backcast it all to the present to work out which research pathways to follow. To design a sustainability product paradigm shift will take two or three decades of diligent work but the payoffs will be great as the sector changes arrive.

**Summary**

- We can't take our stuff with us on the journey to sustainability
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- BAU sectors will be brutally eliminated across the entire business and industrial spectrum
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- Our Industrial sectors are smart and fast and loose
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- Our innovators need a mind set change
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- Time is of the essence
- Complexity will be the norm
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- Sustainability is coming ready or not.

## Complexity and Innovation : Matthew Haigh, Deloitte

**Decision**

As we move into the new norm with many uncertainties and unknowns then the processes of decision become into sharp focus. As sustainability becomes the fulcrum of the new norm and complexity is the environment then decision and high value decision makers become critical for companies that will innovate to sustainability.

In the last three decades the business world has turned upside down. The old rules appear not to apply any more. Stability became a liability, size an inconvenience, and command and control hierarchies an albatross.

Business as usual became business as unusual: unpredictable, unplannable, and above all, unmanageable. Old giants tottered and new players burst onto the market only to become roadkill for the next wave of upstarts. Current management theory was cut loose from its theoretical moorings and cast adrift in a chaotic sea of change.

Making decisions in an atmosphere of increasing time pressure, uncertainty, deep complexity and conflicting expert opinions creates challenges for any manager.

Making such leadership decisions in crisis situations is even more demanding.

Complexity hinking focuses on reframing issues so that the right problems are addressed, differentiating patterns from random events and identifying acceptable risks in alternative decision options.

## High value decision makers

High Value Decision Makers in advanced management decision-making based on differential analysis and integrative thinking, judgment, inductive reasoning and critical thinking.

As organisations become more CAS management oriented and intelligence and information is devolved to the lower levels the decision processes tend to be bottom up and drop down from the upper levels.

## Deep uncertainty

Making decisions in an atmosphere of increasing time pressure, uncertainty, deep complexity and conflicting expert opinions creates challenges for any manager. Making such leadership decisions in crisis situations is even more demanding.

The high- value decision maker will have to go beyond the pareto frontier to meet the sustainability design challenges of the new

normal. This will involve making extreme decisions about unknown unknowns, without historical data and strategies that cannot be written for unknown futures.

The technology designers (products and services) of the future will need to be able to motivate, coordinate, negotiate, and argue with experts with disparate disciplinary backgrounds and produce arguments patterned on the underlying logics and discourse ethics of different base sciences, each based not only on a different vocabulary and technical code drawn from mutually disjoint basic disciplines but also on a different set of standards of argumentation, reasoning and interaction and different modes of behaviour.

## Integrator and differentiator

The sustainability high value decision maker will need to be an integrator and a differentiator. High-value decision makers are integrators who can produce constructive reconciliations of tensions among different models, theories, beliefs and ways of knowing to the end of enabling in fast changing environments characterized by deep complexity.

Integration or integrative decision making involves the following:

The ability to face constructively the tension of opposing ideas and, instead of choosing one at the expense of the other, generate a creative resolution of the tension in the form of a new idea that contains elements of the opposing ideas but is superior to both.

Differential theory postulates not only that a decision process is a successful execution of one of several decision rules but also that decision maker must find or create an alternative that is sufficiently superior in comparison with its competitors.

EXAMPLES