TECHNOLOGY BUSINESS OPPORTUNITY CREATION

EXECUTIVE SUMMARY

Executive and enterprise leadership will have to be more innovative and creative and numerate if the enterprise is going to win in the future. We are entering the age of brain management over brawn management. Hence it is believed that businesses will quickly separate themselves into those that accept the challenge and those that don't. Successful enterprises will be more strategic and numerate and employ the latest technology and continuously create opportunities for their products and services. Those that don't will quickly dissolve in the competitive environment.

The living organisation, one that responds instantaneously to the environment and the changes of the consumer, is with us already.

Businesses must therefore must monitor a larger and more complex marketplace. Modern technology will enable business to respond to the challenges posed by the sudden removal of many commercial boundaries. Many of the problems, however, will not just be technical, they will be cultural since new disciplines must be learned by all. This means an increased amount of technological and cultural change, but change at a rapid rate.

This paper describes these changes and makes a range of recommendations for enterprises to accept the challenge and create the future.

1. INTRODUCTION

Globalisation and the speed of the microprocessor are accelerating the rate of change of business as never before. As the world suddenly expands from nation state to global village, the electron shatters trade and commercial barriers. The resulting revolution in data interchange and knowledge has increased the speed of supply chains to the customer and the flow of capital between the links. It has also, however, increased the complexity of decision making and magnified the risk of errors.

To combat this, business leadership will need to be more creative, more highly skilled and capitalise on mind capital. We are entering the age of brain over brawn.

Successful businesses of the future will quickly separate themselves from the rest as they accept the challenge of being more strategic and numerate and employ the latest technology quicker as they identify and create new market opportunities.

Businesses must therefore continuously monitor a larger and more complex marketplace and continuously update their technology. To do this their processes internally must be under tighter and more predictable control with cashflow administered in real time.

Success in the future will go to those businesses that are:

- Led by an innovative CEO with good strategic and numerate skills in charge of teams of advisers with data collected precisely and immediately.
- Using the latest technology and information and intelligence based systems which are continuously upgraded, both in hardware and software. Much of this information has to be available to a learning, focused workforce who also are continuously upgrading their skills.
- Mobile, using flexible operational teams and management groups continuously monitoring, not only their operational effectiveness but also shifts in the marketplace. These will be process focused not function focused.
- Teams operated by frontline staff with significant autonomy to improve service to the customer.
- Structured in a tightly controlled manner and hence they are able to move quickly to take advantage of cultural and perceptive swings in the marketplace.
- Focused on a reduced time to market for new products. This will quickly sort out the leaders from the followers.

- Recognise that there is a strong link between product development and innovation and process development and innovation.

Modern technology will enable business to respond to these challenges. The problems, however, will not just be technical, they will also be cultural, new disciplines need to be learned by all. This means an increasing amount of technological and cultural ***change -*** change at a rapid rate.

2. TECHNOLOGIES FOR THE 21ST CENTURY

(1) Information Technology

Currently microprocessors are now doubling in speed every 1.5 years. In fact their performance has improved by 25,000 times in less than 25 years. They have not only become faster, they have also become smaller and cheaper. Microprocessors are now three times faster than had been predicted in the early 1980's. This defies some of the normal laws of innovation prediction and forecasting. Part of the reason is a key technique called pipelining (integrated process steps).

Improvements in processing chips are ineffectual unless they are matched by similar gains in memory chips. The capacity of ***Random Access Memory (RAM)*** has increase fourfold every three years, but memory speed has not been able to keep up and in fact the gap between the top speed of processors and the top speed of memories is widening. One popular method of overcoming this problem is to place cache on the microprocess itself. This cache holds those segments of the program that are most regularly used and thereby allows the processor to avoid calling on external memory chips.

However computing methodology can be revised suddenly by some strategic chaotic input. It is believed that pipelining, superscalar processing and caches will continue to play an important part in the advancement of microprocessor technology. ***These microprocessors will be appearing in practically everything that is technological***. The range of applications will be mind boggling. They will involve voice recognition, virtual reality, light switches, even pieces of paper. In addition, it is possible in the future that microprocessor memories could merge in a technological blending operation.

Todays microprocessors are almost 100,000 times faster than those made in the 1950's and yet cost 1,000 less. The implications of such a breathtaking advance are purely limited by human imagination.

(2) Artificial Intelligence

The computer has shown already that many actions we think are difficult can be readily automated and speeded up. However, many of the tasks that are easy for people to do cannot be done successfully by computer presently. For example, computerised reasoning has some very narrow strengths and some wide weaknesses. As well, predictions of achievement of artificial intelligence have been overly optimistic. Some people now believe that artificial intelligence is on the brink of success, but given a very simple problem that is beyond the expertise of the programming, ridiculous answers can turn up.

The process of knowledge interchange between people cannot currently be automated. One can postulate that part of the problem with such artificial intelligence programs is the multiple meaning of words. The programs have to understand the natural languages and employ an existing knowledge base to comprehend a wide variety of texts which can be laden with ambiguity and metaphor and sarcasm. The processors can check grammar, spelling and to some extent content but what about intonation, double meanings and dishonesty. If this system is going to work it could be that we are on the verge of a more rational, universal language based on truth and a computer conversant only with intelligent software.

As palm top diaries, smart cards and interactive television proliferate the gap between users and non users will become even noticeable. More and more of us are spending more and more time in front of television sets and computer screens collecting, assimilating, visually assessing complex collections of software information. ***The digital world will start dictating our behaviour***.

Software ***agents*** (programs) have been born. These know the users interests and can act autonomously on their behalf. Such programs differ from regular software programs, by seeing themselves as separate entities. Agents will learn by experience to be flexible and adaptive and will respond to unforeseen circumstances as well as being multi tasked. People have been trying to build such knowledge based agents for over forty years, but now it appears that they could be on the verge of

success. In the future, as external demands for information alter, the software system itself will continually renew itself. The social impact of this will be enormous.

(3) Virtual Reality (VR)

Computers will become extensions of our bodies using virtual reality. This permits everyone to behave as if they were somewhere else. This place may be fiction, a recreated environment from another place or another time. VR transports perceptions by appealing to sight, hearing and touch all at the same time and by presenting images that respond immediately to ones movements. The current bulky, head mounted steroscopic displays used in VR will be replaced very soon by lightweight glasses that can superimpose images on the real world. ***It will be possible to simultaneously use a large number of perceptive skills to interpret information for the first time***. VR will make little distinction between body and mind. Where will this lead?

(4) Satellites

Satellites in the future will provide almost universal access to the information cyberspace. Satellite systems will soon bring communication to that half of the worlds' population that is currently hours travelling time from the nearest phone. Hence doctors and other specialists in these areas will have immediate access to the best information and the best people available in the world. What a revolution! Suddenly there will be an explosion of awareness!

A probable most important consequence of satellite communications may be that it will help to stem the large scale migration of people from the countryside to cities and densely populated urban areas. There will be a redistribution of population.

(5) Technology Blending

The blending of the basic digital technology of the computer with the television has already begun. This will mean that the differentiation between computer and television set will become increasingly blurred until they will merge into one.

3. ENVIRONMENT

The waste makers of society must be tackled right at the fundamentals of generation of industrial, agricultural and energy waste. This means more recycling and more reuse and smarter use of what is almost freely available – sea, wind and tide.

(1) Solar Power

The earths surface receives ten times as much energy from sunlight as is contained in all of the known reserves of uranium, oil, natural gas and coal. Since 1861 people have been trying to harness effectively solar power. The beneficial effect of the use of solar energy in reducing air pollution and global climatic change is well documented. It is highly unlikely that a single solar technology will predominate.

Electric power can be generated by:

- Building solar heat engines
- Photo voltaic cells
- Harnessing the power of rivers and dams
- Burning bio mass
- Erecting wind turbines
- Fuel such as ethanol and methanol (generated from bio mass).

Whilst only 0.25% of the sun's energy is converted into wind power, it is still significant in terms of energy consumption by people.

Solar energy itself is getting cheaper. In fact the total cost has fallen by over 70% in the past 12 years. It is hoped that solar technologies will enable the developing world to skip a generation of energy production infrastructure.

(2) Fusion

It has been one of man's most recent dreams to recreate nuclear fusion. Fusion uses atoms present in ordinary water as a fuel and therefore harnessing this process could ensure future generations of adequate electric power.

Fusion has so far failed to deliver. The problem is basically containment of the reaction. If this problem could be solved then our energy difficulties would be removed.

(3) Industrial waste

There is a significant shift already to not only recycling and reusing what was previously thought to be waste product, but strongly looking at its creation in the first place. The future will be about clean industries. Automobile recycling is one of the most successful examples of the reuse of manufactured product. The steel body can be remelted in a blast furnace, lead from batteries can be recovered, plastic bumper bars and components can be disassembled and recycled, sump oil can be recycled as can the coolant.

(4) The Future of Agriculture

The farmer has to go high tech. Technology has been the most reliable force in increasing farm productivity. Sustainable agriculture is defined as ***"farming that meets rising demands over the indefinite future at economic environmental and other social costs consistent with rises in incomes"*** (Pierre Crosson)**.**

In the future integrated pest management systems will be used to control harvest. This is a result of pooling and interpretation of a vast body of knowledge of insect biology and plant mites. As this knowledge increases, more and more clever inventions will be harnessed to increase productivity. New farm implements for agriculture will also be used to great effect.

4. MATERIALS, MANUFACTURING AND MACHINES

The future of machines, materials and manufacturing will involve:

- Increased use of robotics
- Microscopic machines
- The use of advanced composites and intelligent materials and self assembling materials (SAM)
- Custom manufacturing in higher temperature, superconductors.

Robots

Currently it is believed that the first robot went into production in 1961 in a die casting operation. Now there are over half a million robots operating worldwide. Some people forecast that homes of the future will involve automation systems that will outlive the occupants. Others envision that robots will serve and mix with humans for everlasting mutual benefit.

One of the most important lessons learned so far about robotics is that they can only be used in systems that are operating under ***tight control***. If the system they automate is poor then the product is still poor. The human skill in handling the development of robots may well determine the levels of human activity in the next century.

Microscopic Machines

New electronic fabrication processes can currently produce such things as data storage chips or even a chemical factory on a microchip. Researchers in microelectronics have already built motors that can be deployed to move atoms. The size of the mechanical elements are microns in size. Micro mechanical devices of the future will supply electronic systems with a window to the physical world which will enable us to use all of our senses. The advances in technology and technical peripherals will be enormous as we couple mechanical and electronic microsystems. A library of information will be written in area the size of a micro chip. Arrays of micro valves will release drug doses into bloodstreams at precisely timed intervals. Where is the limit?

Micro Electro Mechanical Systems (MEMS)

Micro Electro Mechanical Systems have already been born. Engineering of small machines and sensors will allow new uses for conventional ideas. MEMS will give micro electronics an opening to the world beyond simply processing and storing information. Imagine a chemical factory on a chip.

Such a calculator size device could reconstitute freeze dried drugs and perform DNA testing. The world will be very different!

Advanced Composites
Much of the promise of advanced composites is providing greater strength, lower weight and hence greater fuel efficiency for moving vehicles has not been realised, mainly because of their total complexity and understanding their properties and performance – but this can change.

The fracture of the Americas Cup yacht "One Australia" is evidence of how little is known about the real performance of some of these materials. Much is yet to be done, but where will it lead and will these problems be solved very soon?

Intelligent Materials
Scientists are now creating materials that can predict failure and repair themselves and materials that can adapt to the environment in which they are being used. Imagine buildings that reinforce themselves during an earthquake. Many researchers have already demonstrated the feasibility of such living materials. Steel "work hardens" but little use has so far been made of this.

The skilled engineer always designs with the worst case scenario in mind with the result the design contains very large margins of safety, redundant sub units, numerous reinforcements and back up systems and added weight. The intelligent material systems on the other hand will have great economies of scale and size. The name ***"actuator"*** has now been given to materials that allow structures such as ladders to adapt to their environment. The four most common actuator materials are:

- Peizoelectric ceramics
- Magnetostrictive materials
- Shape memory alloys (Nitinol)
- Electro rheological and magneto rheological fluids.

These materials such as the shape memory alloy (Nitinol) have outstanding characteristics but are only just being understood. Use of such materials will release a brand new way of engineering. Such materials will be able to sense their environment, store detailed information and experiment. The most lasting influence will be on the philosophy of design, they may eliminate forever catastrophic failures.

Self Assembling Materials
Complex machines of the future cannot be built with current methods. It will be necessary for them to almost make themselves. Self Assembled Monolayers, called a SAM, is a simple prototype that exemplifies the design principles that people are investigating with self assembling materials. The result of understanding how these work will enable such things as placement of the silicon and dopant atoms in the semi conductor crystal to be done by the materials themselves, not by individual human intervention.

Nature abounds with examples of self assembly. Consider a raindrop on a leaf, the rain drop assumes the shape required for an optical lens. Self assembling materials are about using nature in manufacture.

Superconductivity
Superconductivity may be regarded as the path of zero resistance. It is well known that the path of least resistance is the one that nature prefers, but such a path is not always readily revealed. When superconductivity was discovered in 1911 with liquid helium at 4° kelvins (4° above absolute zero) it was observed that mercury would suddenly transmit electricity without energy loss. Superconductivity has made little advances in recent times but is now poised to make a very significant impact on society. The reason for this is that as experimental work goes on, the temperature at which complex materials become superconductive has continuously increased up to 93° kelvins. This has been observed in ytrium, barium,copper oxide or YBCO. Already as a result of superconducting research, a superconducting quantum interference device called a SQID can serve as a highly sensitive detector of magnetic fields and as such can detect weak magnetic signals from the heart and brain. This opens up a brand new area of scientific investigation and previously unimagined medical benefits.

New superconducting materials could probably boost the speed of computation by another 50 times. Once superconductivity is better understood higher and higher transition temperatures may be reached.

5. BIOLOGY/MEDICINE

21ST Century will see innovative solutions to some of the worlds most important medical problems. This will involve greater use of artificial organs, gene therapy, improved methods of prediction of disease and medical history forecasts from blood samples. Gene therapy will allow doctors to treat many diseases by injecting needed genes directly into the blood stream. This is already being used for treating disease such as severe combined immuno deficiencies (SCID). Other disease to be treated in clinical trials on gene therapy are cancer, AIDS, arthritis, periphal vascular disease, haemophilea and cystic fibrosis.

Artificial Organs

Already medical science has moved beyond the practise of transplantation into the area of manufacture and fabrication. The idea is to make organs rather than simply to move them from donor to recipient. Artificial plastic tissues have already been created and genetic engineering may soon produce universal donor cells, cells that do not provoke rejection by the immune system. Whilst the transference of organs from animals may overcome the shortage of organs. The future will also involve using ultra pure biodegradable plastics or polymers as substrates for cell culture, implantation and generation of tissue. Using computer aided design scientists and engineers will be able to manufacture plastics into beds that mimic the structure of specific tissues and even organs and these scaffolds will be treated with compounds that help cells to adhere.

6. LOGISTICS AND TRANSPORTATION

Some of the immediate advances in this area will range from magnetically levitated high speed rail, huge single wing flying aircraft, driverless cars and tiny spacecraft. These are just some of the future technologies that are now in store for us.

The built in intelligence in automobiles will enable the drivers to tune themselves and cooperate through crowded traffic systems and so travel freely. Advances in materials and design will translate into cheaper and safer air travel. It is believed unlikely in the near future this will be very much faster than it is today. The emphasis will be on safety and size, but very fast rail traffic will become a very serious competitor to not only the motor car but the plane as well.

DISCUSSION

The ability of man to adapt to change has always been a problem. However the rate of technological change today is increasing continuously and this change has not really been matched by our ability to adapt to it. This exponential growth in technological change is a result of the scientific method and the inherent ability of scientific process to build on firm foundations. These arguments don't appear to apply to the same degree to social development, politics and in some cases human resource development.

The difference between change in the past and change now, is that now we have many of the tools to deal with it. Globalisation is firmly telling us that the status quo, particularly in Australia, is not good enough. In addition, as more and more of the 220 countries in the world become liberal democracies, the rules for business are starting to equilibrate. In fact the principles underlying the liberal democratic process will in future have more and more influence on the overall principles of business management. In addition, if we look at the commercialisation of innovation, the gap between invention and payback is narrowing distinctly. As shown in table 1, in 1666 it took the world 27 years to simply know that Isaac Newton had developed the theory of calculus. In 1880 the commercialisation of inventions was still taking 30 years, whilst in 1967 it had been reduced to 9 years in the year 2000 where will it be.

Table 1
Commercialisation of Innovation

Year	***Average time from discovery to commercialisation or use***
1666	27 years for Isaac Newton to publish theory of calculus
1880	30 years
1945	16 years
1967	9 years
1985	2 years
2000	?

In the future, the ability of business to grow will depend increasingly on its ability to innovate and create and drive the market. Companies are already using innovation and change management as a strategic weapon. The best illustration of this was the Honda Yamaha war in Tokyo in the mid 80's. Yamaha claimed that they were the foremost motorcycle manufacturer in the world and Honda responded by introducing a plethora of new models, demolishing the market for Yamaha and leaving massive stocks of unsold motorcycles in the Yamaha showrooms. Yamaha surrendered! The SPED teams used by Honda in this creative way were cross functional and linked sales and marketing, production, engineering and development and could move super quickly because of Honda's very strong Formula 1 experiences.

If the major elements of change in business today are analysed and prioritised it would be possible to get a list of the top 10 as shown in table 2.

Table 2
Major Elements of Change

1.	Globalisation
2.	Technological Explosion
3.	International Consumerism
4.	Brain not labour
5.	Systematic Networks
6.	Electronic Data Bases/Data Interchange
7	Shift to Asia
8.	Triumph of Fact over Fiction
9.	Supremacy of Knowledge Based Decision Making
10.	Team Creativity

This list can be expanded with lower priority items up to 250 elements.

For companies to be successful in the global marketplace they must be equipped to be able to respond quickly to changes in ***perceptions of the customer***. The change process in the company itself, must be able to respond to chaotic inputs, quality and therefore the internal business systems must be under tight control. If this is so, the company can be highly flexible and respond quickly to massive change inputs.

An example of the globalisation of business and the dissolution of the nation state is given in table 3. Here it is seen that for Pontiac Le Mans GM USA is outsourcing most of its components depending on the best and most successful supplier – is it an American car?.

Table 3.
Globalisation of Business
The Dissolution of the Nation State

$US	
10,000	For a Pontiac Le Mans – GM
3,000	South Korea for routine labour and assembly
1,750	Japan for Advanced Components
750	Germany for styling and design engineering
400	Taiwan, Singapore and Japan for small components
250	Britain for advertising and marketing
50	Ireland , Barbados for data processing

Rapid change in commercialisation and electronic data interchange puts greater emphasis on companies to be globally competitive. Table 4 gives the ranking of global competitiveness of Australia compared with other countries. Australia scored particularly poorly in "worker attitude". In fact three major areas of our infrastructure involving the wharves and transport are constraining Australia's ability to be the best.

Table 4
Global Competitiveness

	Rank			***Rank***
Singapore	1	1. Openness	Legal Frame	13
Hong Kong	2	2. Government	Productivity	22
New Zealand	3	3. Finance	Technical Skill	16
USA	4	4. Labour	Worker Attitude	33
Luxembourg	5	5. Infrastructure	LFEM	20
Australia	12	6. Technology		
		7. Management		
		8. Civil Institutions		
As measured by (1) GCR (Global Competitiveness Report) (2) BERI (Business Environment Risk Intelligence) (3) Singapore Productivity Board				

Some of the immediately observable rapid technological changes we see around us are given in table 5. The consumer is well aware of the increased utilisation of electronic data interchange for process control in the service industry in particular, eg point of sale technology. The technology is already available to us for electronically updating stock and control and placing orders direct on manufacturers. This reduces the number of steps in the supply chain, increase speed, decreases inventory and decreases waste. Such improvements in efficiency are even amplified on the worldwide web. In addition, the effect of human error is minimised by utilising such techniques as bar coding and point of sale technology.

Table 5
Immediately Observable Changes

1.	POS Technology – Real Time
2.	Supply Chain Integration
3.	Electronic Ordering/Supply
4.	International Consumerism
5.	Technology at Customer Interface
6.	www – on line
7.	On Line Databases
8.	Flatter Structures
9.	Team/Cross Functional Accountabilities

CHANGE

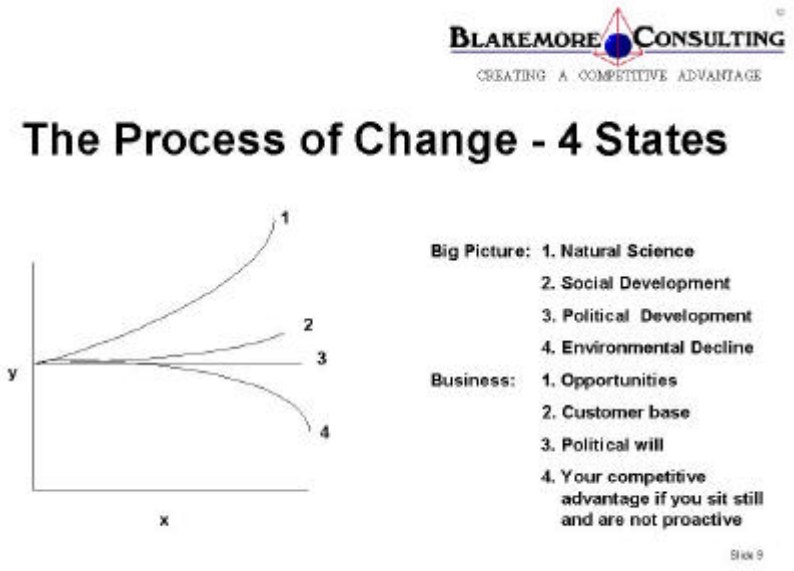
The process of change could possibly fit into four particular mathematical models as show in Figure 1. From this figure we believe that the are four types of different relationships when taking on the big picture of business.

1. ***Natural Science –*** The explosion of the exponential growth of knowledge.
2. ***Social Development –*** An exponential growth but not at the same rate as natural science
3. ***Political Development –*** This could be regarded as linear, zero gradient improvements are marginal.
4. ***Environmental Decline –*** negative exponential

If the same analogy is adopted for business the 4 trends are:

1. ***Opportunities*** - rapid and exponential growth
2. ***Customer Base*** - less rapid exponential growth
3. ***Political Will*** - linear zero gradient
4. ***Competitive Advantage*** - negative exponential if company believes its competitive advantage remains sustainable.

Figure 1.



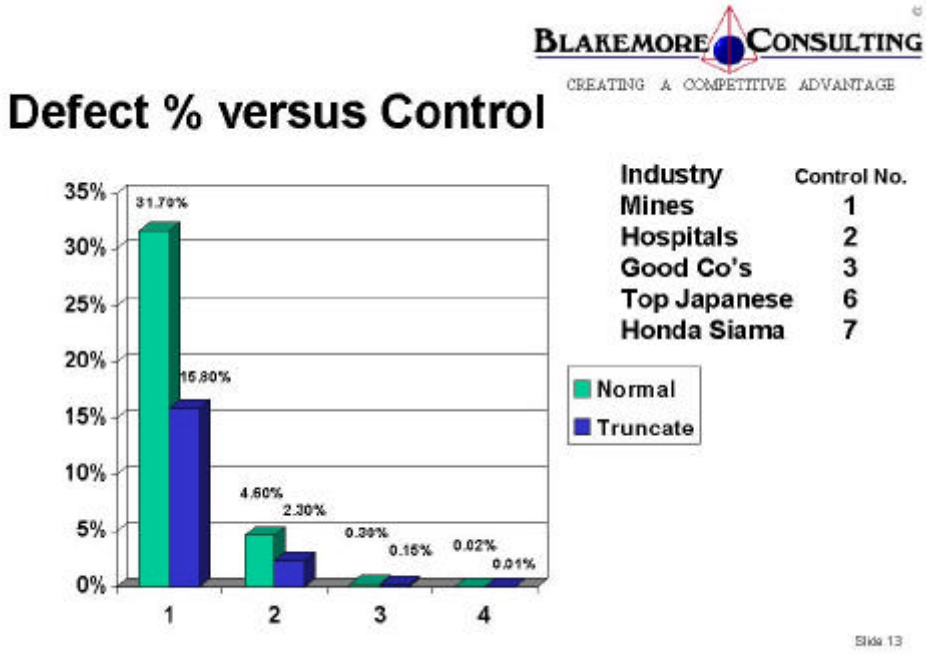
What this means is that we must take advantage of the latest technology, be extremely innovative and recognise opportunities or create them. It also means that any competitive advantage of business will not remain a competitive advantage for very long because of the nature and intensity of the competition and the rapid change of technology. Hence we believe we should no longer talk of competitive advantage but instead use the term ***"Strategic Advantage"*** and hence we define a ***Strategic Advantage for Winning".*** Already many of the well known global companies have seen the necessity to run tightly controlled systems, create their own opportunities or at least be aware of perceptive changes in the global market. The need to tap into worldwide process control expertise was quickly recognised by Porsche three years ago when they made a Billion $ loss. Today they are back in the black and striding forward with a plethora of new models all of them of much higher quality than ever before. How did they do it? They recognised that their major problem was one associated with quality, manufacturing techniques and innovation. They hired Japanese engineers to introduce Kaizen and as a result they have produced new models of much higher quality and reliability. Porsche is back.

ACTION

Business can win if it takes advantage of the new opportunities created daily by new technology and new ways to configure it. Therefore the business approach has to change. The board in the future, of most businesses, will have to be much more strategic in its thinking and to achieve this it means that the operational aspects of the business must be under tighter control and be reported in real time. In a nutshell, the board must become increasingly strategic and less operational. The processes in the company must be 7σ, ie zero defects, see figure 2.

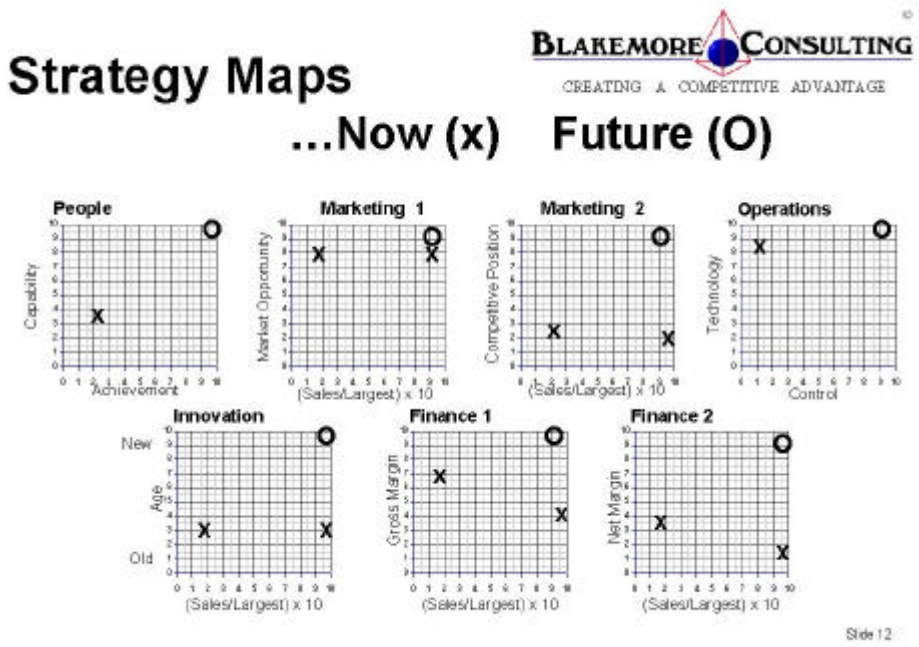
Strategic thinking is about recognising the opportunities, ensuring the correct tightly controlled processes are in place so that the board can concentrate on the bigger tactical and strategic decisions. Business must be able to change direction as quickly as a pitstop in Formula 1. Big opportunities are being created all around us as IT demolishes boundaries Today as never before. As all countries compete on a global basis, regardless of timezones, national boundaries become irrelevant. This will eventually lead to a global rationalisation of business and political principles.

Figure 2



Such new and strategic thinking means that simply analysing market opportunities and competitive advantage and setting new directions is no longer good enough. Business need not only monitor market opportunities and competitive advantage, but also align these with advanced technology, tight process control, and capability and achievement of people in the learning organisation, strongly matched to innovative and creative spirit and profitability. This means business needs a better strategic model such as that shown Figure 3.

Figure 3



This involves seven "Strategy Maps". These maps are defined as follows:

1. Marketing and Sales 1

This is a plot of market opportunity versus sales.

2. Market Opportunity and Sales 2

A plot of competitive position versus sales

3. People

A plot of capability versus achievement

4. Operations

A plot of technology versus control

5. Innovation

A measurement of age of product versus sales

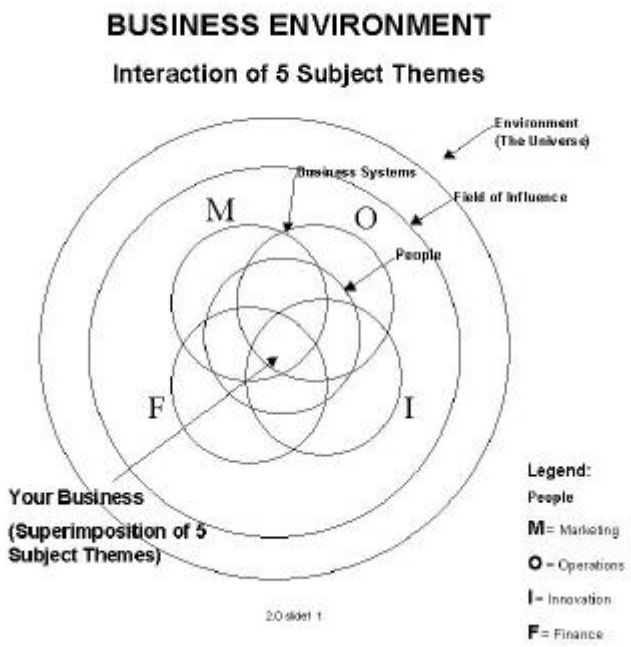
6. Finance 1

Gross margin or gross profit

7. Finance 2

Net margin (correct allocation of all overheads to product or process involved. Hence in the above model, 5 basic subject functions of business, all of which are regarded as cross functional and overlapping are shown in figure 4, and any one function contains all of the others or a part of them.

Figure 4



STRATEGY

Future Competitive Advantages

In the past, a competitive advantage was often related to the size or product differentiation, price or quality level. All of these can be copied reengineered or cloned and with modern technology and improved process control non of these remain in place for very long.

As can be seen all over the world, competitive advantages which are related to product features or characteristics can be readily copied since many of them, even technical innovations, can only be protected for a short time. The VTEC engine developed by Honda in Formula 1 has significant advantages in performance and economy but the patent could be circumvented by introducing computer variable timing systems to motor vehicles to yield similar performance characteristics without the use of twin cam valves with a mechanical switch. In the future, the strategic advantage will based on knowledge and human skills, control and technology, logistic capabilities, speed and strategic interpretation of data in real time.

Strategic Advantage for Winning

This will be the ability of the company to learn faster than the opposition. It will involve the use of tightly controlled and integrated processes and will lead to fast generation of opportunities and a recognition of these opportunities or creation of them. To become a winner, the latest technological advances in machines , vehicles and processes must be used. Therefore there must be a regular plan to upgrade microprocessor technology software and hardware. Depreciation laws need therefore to change to allow industry to invest and reap rewards sooner as the capital employed to labour cost ratio escalates.

In addition, operational aspects leading to organisational effectiveness must be taken out of the board's responsibility and the board should concentrate on strategic elements of the process. The role of the board, with regard to organisational effectiveness, is to ensure that the latest techniques are in place. Some immediate changes to improve the quality of management in Australia are given in table 6.

Table 6
Management

Plan	Strategic Thinking – at all levels, ***Key Performance Measures linked to the Strategic Plan***
Lead	Leadership based on facts, discipline with empathy, direction with numeracy, creativity with motivation, teamwork with good communication.
Organise	Synergy of accountability with cross-functional teamwork and flexibility
Control	Defects and error rates and rework reduced to that of 7σ companies based on prevention
Measure	Facts accuracy, statistical thinking, forecasting, proactivity
Habits	Teamwork, process orientation, factual evidence, creativity, innovation, proactivity, continuous learning

In the above table it must be emphasised that improved process control is a result of making that we measure the right things in the right way and can interpret them directly onto the Profit and Loss and Balance sheet.

Strategies for Success
There are a number of strategies which can assist in meeting the challenges posed by radical technological advances. These are given in table 7.

Table 7
Strategies for Success

1.	Improve process and system control to become a 7σ company
2.	Maximise use of technology, knowledge and computers
3.	Reward people in value added not hierarchal positions
4.	Use knowledge based interactive marketing
5.	Take advantage of new technology before competitors
6.	Become super professional by continuous learning
7.	Be agile and service flexible, drive the market, move at warp speed
8.	Develop a capability for supporting change
9.	Encourage creativity and innovation and create value
10.	Collect and analyse data in real time.

RECOMMENDATIONS

The following recommendations are made:

1. Business should continuously increase the utilisation of the latest technology in all processes in the supply chain. Instant availablity of the latest information using EDI enables enterprises to speed processes, reduce working capital and capitalise on the innovations and improvements demanded by the end users perceptions and needs. For example, consider the supply of fast moving consumer goods, (FMCG). EDI means instant feedback in demand from say, Coles or Woolworths and instant feedback on successful promotional strategies, better scheduling in the supply chain and more accurate ordering on the supplies of the raw materials, say chemicals to make up a household detergent.

2. The frequent upgrading of technological units will increasingly create new opportunities to modularise and miniaturise products. The only limitation here is our imagination.

3. The capital investment dollar to total labour cost dollar defined as a capital to labour ratio, should strategically increase continuously. This can be regarded as a critical ratio which will determine success and if this not seen as a driver then the company will lose its competitive edge.

4. Increasing the efficiency of the total supply chain and the elimination of some wasteful steps, such as warehousing, stacking, packaging and double handling will improve efficiency enormously. Bulk handling, just-in-time can be achieved. For example, using EDI, the finished goods stock at the manufacturing end could be minimised or eliminated or the raw material supply at the creation end could be minimised or eliminated. The use of EDI to the utmost from the final service delivery source, the end user, as far back in the supply chain as possible, will further increase efficiency. This will lead to integration of processes, the elimination of inventory, the speeding up of productivity and provide fast updates which can be used to minimise cash investment and enable the enterprise to respond more quickly to changing customer demands.

5. It is recommended that the companies continuously innovate and create new products and processes and services and do this faster than ever before, since now customer perceptions can be measured in real time. This will in turn put increasing demands on prototyping, modelling, using such methodologies as stereolithography and manufacturing. This places more emphasis on taking the correct measurements and ensuring these measurements are accurate.

6. It is recommended that the enterprise be extremely vigilant in the use and reuse and recycle of materials since this in itself creates not only cost improvements and price reductions and competitiveness improvements, but also a realisation of new opportunities for new products and processes.

7. It is recommended that the company use cross functional teams in areas of business to blend functions as needed to speed processes. This means that sales and marketing and finance must be part of the development team for new products and processes and services.

8. The blending of technologies creates opportunities like never before. Imagine blending customer smart cards with microchips embedded in say a watch to continuously measure the state of health of the wearer. Smart cards could contain all memory data, credit card data etc. while the continuous monitoring could be linked to a digital display like a watch. The possibilities are endless.

9. It is important to enhance the skills of all parties well beyond the core competency skills. Blending and the increase in skill band leads to productivity gains which can be very significant.

10. The enterprise must continuously monitor and measure the marketplace in real time and benchmark market trends, process efficiency and consumer and competitive movements.

TECHNOLOGY BUSINESS OPPORTUNITY CREATION

DR. JOHN S. BLAKEMORE
Level 67, MLC Centre,
Martin Place
SYDNEY. NSW. 2000

Phone: 61-2-9891 0056
Fax: 61-2-9699 4196
Email: masc@blakemore.com.au
Website: www.blakemore.com.au