# EPILOGUE

# CONCLUSION:
# HISTORY REPEATS ITSELF

*'And thus, the tale was preserved, and did not perish; and it may also preserve*
*us, if we will listen to its warnings; in which case we shall pass prosperously*
*across the river ... and during the journey of a thousand years*
*which we have described, we may never cease to prosper.'*

*Plato: 370*

# 1. INTRODUCTION

The world is experiencing profound changes. Closer inspection of political, environmental and social events (for example, the restructuring of Eastern Europe and South Africa, global warming and AIDS) suggests that stability is rare and promises to become even more so in the future. It is possible – no likely – that the only thing that will not change is change itself. The impact of the successive waves and the resultant eras, cause a ripple effect of discontinuity (possibly more so, from the Second to the Third Waves) and make these changes substantial in magnitude and force, and sustainable in that there is no possibility for returning to pre-equilibrium. Technology is dramatically and significantly altering the ways in which society is conducting its affairs and the way in which the world is preparing for the future. Consequently, changes bring about their own challenges and opportunities. Moreover, these new dimensions bring about dramatic business transformation – the object of this, being to control the challenges and take advantages of new opportunities.

Success in an increasingly competitive global environment is constantly being explored by leadership and their organisations. Traditional barriers such as national boundaries, currencies, regulation, a strong workforce and economies of scale that once sheltered businesses are crumbling and will, in all probability, disappear. This increases challenges and opportunities for businesses. Leaders making critical business decisions by applying traditional ('old') methods will not achieve the successes that they aspire to. Competition within this new paradigm

requires new rules, policies, structures, roles, leadership and organisation. It demands a radical transformation of business itself, of its processes, its leadership and its resources. The significance of business change is expanded and related to the evolution and growth in the fields of technology and, specifically, information technology. There is a significant need for businesses to align their business strategies and business processes with their (information) technology strategies as the latter (IT) is probably the most significant driving force behind change and, more importantly, the enabler of change.

# 2. FINDINGS FROM THE THESIS

This thesis addressed the issues pertaining to the *strategic use of information*, with regard to the organisation's IS and IT and how these could be used to effect change (or indeed to induce it). In the first **Module** the need for change was addressed by identifying the new incentives for change. Use was made of Toffler's waves and Imperato and Harari's epochs [1994a] thereby identifying the business world of today in terms of Handy's 'age of unreason' [1995a] in that the current status quo no longer serves the challenges of the new world.

Two concerns should be pointed out here, the first being that in an evolutionary world where technology is creating newer and more challenging opportunities, there is a notion of cyclicality (of repetition) – that, though the needs of society and the environment have shifted into a new paradigm (as a result of technology) these needs are in a way repetitive, with only the level of the solution to the specific problem and need, switching, similar to the K-waves in Module I. Moreover, these cycles occur at an accelerated pace (in accordance with society's needs and technology's ability to fulfil them) as can be seen from Toffler's waves (the first having lasted from about 8000BC to the mid-18th century, and the second from the 18th century to the late 20th century). There are really very few things new. The axioms on which most of what has been written in this thesis are based, have been postulated by Toffler [1970, 1980], Handy [1985, 1995a, 1995b and 1995c] and by Drucker [1970, 1983, 1990, 1991, 1994] to name but a few.

It is conceded that research in this field should be modern and contain modern references, but it is postulated that the repetitive nature of society (even one that will be largely dominated by technology, the content and usage of most of which cannot be forecast as its evolution is too fast) is such that there is relevance in the teachings of the grand masters of business.

With reference to the above, the question is whether it is then still possible to identify (or rather, predict) future patterns and trends and in any way identify possible changes in behaviour for businesses and leadership to lead them into the digital age. This becomes more pressing with the issues in **Module II** at hand, namely those of chaos and catastrophe. That there thus be some point (in time) at which organisations should jump the curve and radically redesign their thinking about their businesses, the processes, the resources and even leadership. An attempt was made to identify this (bifurcation) point – known in the literature on the subject, as the 'cusp'. Furthermore, a distinction was made between pro-active, pre-active and reactive behaviours in the identification of that moment of inertia.

The strange and exciting phenomenon of self-organisation is explored and largely became the focus of this thesis. The point was made that chaos theory stresses ultimately reaching some (new) point of equilibrium, this following on the self-organising ability of the chaotic system. Subsequently, the **Module** identifies the notion of the self-organisation as a form of organisational structure and continues to explore the characteristics of this organisational form – that of the chaordic enterprise - in **Module III**. Several (not all new) organisational forms are studied all of which are geared towards the new resources of organisations, namely knowledge (this author prefers the term business intelligence) and the so-called 'knowledge worker'. Around these new resources 'old' organisational structures and policies will fail and businesses find themselves in the situation where they should re-engineer the ways in which they have been conducting their businesses.

**Module IV** consists of research into the organisational leverage provided by knowledge and business intelligence. It explores the distinguishing line between 'business data', 'business information' and 'business intelligence' and justifies the choice of the term business intelligence over other, in many ways better known terms of reference within the field of knowledge management. The fine line between IT and IS, allows one to formulate strategic and operational issues (refer to Figures 11-14) pertaining to both and links the organisation's IS to its business processes through the re-engineering diamond. In this context, the **Module** defines IT, traces its evolution and discusses the problematic area of technological forecasting. It proposes moving IT from back-room to strategic tool in the businesses of tomorrow. In this, it discusses the Continuous Strategic Alignment Model as management tool to align the organisation's business strategy with the appropriate IT strategy. A classification of information technologies is proposed and discussed, the terms of reference being the ROIT, TCO and scope of these information delivery systems.

With the simultaneous (but not contradictory) diversification and convergence of technology, the IT-enabled business re-engineering proposed by Hammer and Champy [1990], has not delivered on all its promises and **Module V** sees the development of a Technology Change Model according to which the scope of change (radical/incremental) may be weighed against the IT investment (existing/new). With re-engineering reporting many (and costly failures) it is proper to finally suggest a case for 'de-engineering' the corporation (or cleaning up after re-engineering), perhaps more so when the re-engineering is intertwined with investing and implementing ERP systems. The importance of the self-organising phenomenon becomes more relevant insofar as de-engineering is proposed to counter the re-engineering failures and misconceptions. The uses of chaos and its role in the self-organisation principle become necessary and evident to enhance the performance of organisations. The principle of self-organisation directs organisations to become more focused on letting information take its own course rather than developing new models or frameworks or employing existing ones. The principle of self-organisation presupposes no organised starting point, it lets the organisation move into confusion after which the information or

organisation will, of its own accord, crystallise into new and exciting forms and ideas. Matthew Fox wrote that:

> '*Wisdom is about living harmoniously in the universe,*
> *which is itself a place of order and justice*
> *that triumphs over chaos and*
> *employs chance for its ultimate purpose.*'

In keeping within the scope of Tichy's model for change (Figure 1), which has been used as a road map for this thesis, the research finally turns to the most important issue of new and changing leadership in **Module VI.** Tichy himself has been actively involved in the field of transformational leadership [Tichy and Devannna, 1990], which focuses around change, innovation and entrepreneurship, the vehicle of all of these being technology. Organisational learning and the Competing Values Framework are studied within the framework of chaordic leadership.

# 3.   A REAL PARADIGM SHIFT

The value gained from information, the use of knowledge and the application of (business) intelligence has been debated throughout this thesis. That this will result in a paradigm shift is evident. When a paradigm does shift, it affects the way that people look at the world and the way they understand it, so that patterns and logic are totally new and the existing pattern and logic are no longer valid. The shift in paradigm (through the Quantum Era to the Third Wave) is not only due to the advent of new technology. It also follows from the emergence of new questions. For instance, Instead of '*What type of factory should we build*?', one would ask: '*What business should we be in*?'

This provides a new perspective, with totally new views of what the world is like and how and why things seem as they are, and also what work they do. Kenneth Clark provides an excellent example of this in his treatise on the development of
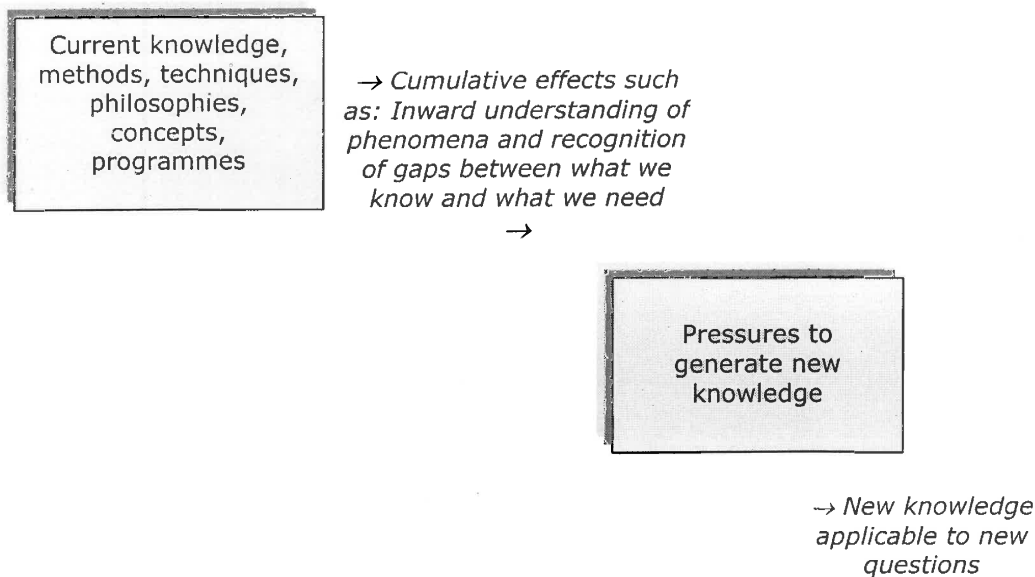
Western civilisation [1969]. He focused on the year 1100 when radical changes occurred in European culture, architecture, sculpture and the people themselves. Clark notes that these changes occurred within one lifetime - not as a result of some technological breakthrough, but rather through a fortuitous release of energy and a leap to a higher plane (or new (third) wave). Real shifts in scientific paradigms appear as the whirlwind activity of some great scientist/revolutionary (like Newton) who redesigns the world in his head and leads it in a new direction.

Thus, radical change in management occurs as a happenstance combination of a leap in technology and a (possibly subsequent) shift in management technology, outlook and perspective. Such changes may be due to environmental turbulence in a manner similar to the great discontinuities in biological evolution attributable to major changes in the earth's environment (like the end of the Ice Age). The merging of the technology leap with changes in management philosophy changes do not generally occur all at once. There is generally a gap between the occurrence of these two dimensions of the radical shift in management paradigm. Shifts in management paradigm are complex and lengthy and seldom attributable to a single innovator. They are incremental rather than sudden. On the other hand, the triggering dimensions of technology and change in management philosophy come from outside the organisation and its leadership. Management scientists digest potential changes and transmogrify them into a long-term indoctrination effort which results in shifts in paradigm. There are Gurus in management [like Deming, Champy and Hammer, Drucker and Toffler], there are no Newtons, Einsteins or Mandelbrots. Knowledge in management and organisations is still merely a fragile assortment of methodologies and findings borrowed from other disciplines like the sciences. The integrated framework is still in its infancy, made more complex by the array of questions that have arisen and management's inability to field or formulate simplistic yet encompassing models of how organisations exist. Moreover, at any given time, there is not only one, but several paradigms prevailing in the management and organisational discipline – some of which are completely divergent or paradoxical.

The notion of BPR and its links with technology were studied in this thesis. Geisler [1997] contends that BPR is not so much a paradigm shift as an obsolete

promise of a solution to a set of questions, that was sold to management as a manifesto for change [Hammer and Champy, 1990] – perhaps ahead of its time on the evolutionary scale of management knowledge, since it had few knowledge tools available to tackle these problems.   The figure below is an attempt to provide some clarification of the above notion of current knowledge and a future solution. The evolutionary development of management knowledge is not only incremental, but progresses in saturation stages. As in the evolution of science, contributions to the existing knowledge pool (state-of-the-art), have undergone some leveling-off  after which only radical movement can elevate this pool to a higher plane.   Real shifts in the management paradigm are rare occurrences, generally resulting from leaps on an evolutionary scale. This movement into a new paradigm and the driving forces behind it are depicted by the following scheme:

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┌─────────────────────┐
│ Current knowledge,  │   → Cumulative effects such
│ methods, techniques,│   as: Inward understanding of
│    philosophies,    │   phenomena and recognition
│     concepts,       │   of gaps between what we
│    programmes       │   know and what we need
└─────────────────────┘            →

              ┌─────────────────────┐
              │    Pressures to     │
              │   generate new      │
              │    knowledge        │
              └─────────────────────┘

                          → New knowledge
                          applicable to new
                          questions
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**Figure 43: Current knowledge and future solutions**
*After Geisler: 1997: 57*

It is doubtful whether research in this evolving field of radical change, information and technology, can ever be complete; whether a conclusive answer can ever be

reached. The answer is arguably no. However, this thesis cannot be complete without introducing a *macroperspective*. This will be dealt with below as the final conclusion of this thesis.

# 4.   CONCLUSIONS

In an attempt to be pro-active in business decision-making, the following guidelines are formulated here for organisations to compete in the new paradigms. These are all based on the premise that the re-engineered organisation will be knowledge-based, chaordic in structure and pro-active in strategies.

- ❑ Organisations can no longer operate under the existing paradigms and notions that have made them successful in the past. Leaders have to be innovative in reinventing the business processes or even the businesses they are serving.

- ❑ Inactivity (or the inability to change the business) will lead to doom and to failure, whereas reaction to environmental changes will result in a 'keeping up with the Jones's effect' and these organisations will always find themselves lagging behind.

- ❑ There is strategic advantage in appropriate IT/IS investments – provided that these are properly aligned with the business strategy and that the organisation follows the principles of self-organisation and chaordic leadership.

- ❑ Knowledge and business intelligence are the new competitive weapons and together with the knowledge worker, are the only meaningful resources for the business. How businesses may find ways and means to optimally use information is for them to decide.

- ❑ (Information) technology has opened up new avenues for business ventures. Business-to-business and business-to-customers using IT (for example, the

Internet) are two examples of the emerging digital commerce. Trading through this medium opens new markets to businesses, especially on a global level, and crosses all organisational, national and international boundaries. Moreover, strategic alliances and partnerships support businesses through transformations (via joint ventures, minority holdings, syndicates and intelligence exchanges). These arrangements may also make large organisations feel smaller and closer, enabling them to target and service custom markets. New partnerships are increasing, in part to support organisations moving into global markets. Globalisation of the organisation and its business, reflects the view that businesses will compete in a borderless environment. One consequence of this is that rivalry among businesses is accelerating as global boundaries are blurring.

❑ With the advent of new technologies, there are continuous threats posed by new entrants and substitutes (in terms of both products and services) and the bargaining power of suppliers and buyers is strengthening. Success in global markets requires more flexible and agile organisational structures.

❑ With a shift in the work force from blue collar to white collar, to knowledge workers, a highly skilled, customer-focused and self-directed workforce is emerging, performing highly specialised and complex tasks that capitalise on their intellectual abilities. They require increased learning support together with the ability to share information, knowledge and wisdom to get leverage out of their intellectual capital. This leverage includes creating and obtaining new knowledge, disseminating it, embodying it in the development of new products and services, and fostering collaborative team learning and systems thinking throughout the organisation.

❑ Leadership roles and skills are altering the traditional role of the manager from controller to coach who inspires, guides and develops employees. There is a movement away from Taylorism towards flexibility, empowerment and integration, with fewer managerial levels and the replacement of vertical hierarchies by horizontal networks.

❑ The new strategy transforms the Second Wave legacy of mass production into the new imperative of mass customisation. The latter supports the ability to rapidly redesign, produce, price and deliver tailor-made products and services to meet the changing customer needs at optimum price. Consequently, mass customisation forces flexibility and quick response rates from organisations. They generally use *evolutionary* process change to attain *revolutionary* change in products and services. This anomaly presupposes the need for de-engineering the business and its processes.

❑ Developments in technology are increasing exponentially and this results in a demand for state-of-the-art strategic use of technology, which leads to innovation. Moreover, the pace of technology will continue to increase and be magnified by the new network of communication opportunities. In this context, traditional financial approaches to evaluate the value of the IT investments (for example, forecasting costs, revenues, NPVs ROIs and break-even analysis) are no longer appropriate to handle the complexities of the internal and external environment of the modern business world – the reason being that customer satisfaction, quality, flexibility, cycle time reduction and employee morale can no longer be measured according to the old yardsticks. In this, IT's ability to measure capability for product variety, time to market reduction, error reduction rates, transaction volumes and the reporting thereof, are examples of business value that should be considered. It is suggested by this author that concerns regarding ROIT should be less important than the concern for the *value of the information* as an economic asset, and the competitive and strategic advantage gained from the leverage provided by information, business knowledge assets and business intelligence.

It has been shown how systems, technologies and knowledge move across the indefinable lines that divide organisations. Boundaries seem to disappear because technology removes them or makes them redundant. Sometimes boundaries appear where there have been none, because technology puts them there. Knowledge diffusion encourages the development of new and existing competition locally and globally. Increases in knowledge (particularly in the form

of technologies that embody new knowledge or uses for new knowledge) disrupt the stable patterns of investment, of employment and of organisation structures.

The new platform of knowledge for competitive advantage and the explosion of technology re-engineers modern-day organisations and their structures in ways that are unimaginable at first. Organisations as physical entities serving the community in which they are located, are fading. Organisations of the Information Wave are *virtual*, they compete in the new paradigm of service, and they do so using the most competitive weapon of all – that of knowledge and intellectual capital. The latter may be the only asset they own. Employees become *partners* and are specialists in their fields. They generally work from their own environment and do their business across the globe, using (and creating) new technologies. This is the age of *re-engineering* and *re-inventing* the ways in which the world is conducting its business.

This thesis to a large extent focused on re-engineering, re-architecting or revolution. It captured the core challenge of Act III of Tichy's model, and in this, it explored the notions of rule breaking and of boundarylessness in unfreezing from the current state (even wave) and refreezing into a new state (even wave).

The organisational boundaries may include:

(i)     *Vertical boundaries*: Delayering the hierarchies.

(ii)    *Horizontal boundaries*: Breaking down of walls, for instance using cross-functional teams, project teams and partnerships.

(iii)   *External boundaries*: Breaking down of the barriers between a business and its suppliers, customers, competitors and other external stakeholders, for example, creation of alliances, measuring customer satisfaction and relationship marketing.

The key to all of the above, lies in the social architecture – the people (who?), timing (when?), activities (what?) and space (where?). Thereafter, the issue becomes one of continuous revolution.

As the modern management structures rose out of the ashes of the Great Depression at the same time as the modern map of nations did, so shall this new order enterprise also see its analogy on a macrolevel.  Chaos has pervaded the realms of the twentieth-century nations.  Control over space, geographic borders and structures has slowly but surely declined.  Within this seemingly chaotic and terrifying system, global disintermediation is more and more predominant.  Supranational states like NAFTA or the European Union will increasingly have more power than will the countries themselves.  An overall erosion of the traditional state is taking place.

# 5.   A FIXED SOLUTION?

This situation poses new questions and few answers.  For instance, how can the idea of the nation state and its service role in the community and business environment be protected if the very foundations of its existence are in question as a result of the disappearance of boundaries?  Indeed, what new forms of international collaboration and state-like institutions will be required to serve the challenges and opportunities of the Information Wave?  Will the growth and reach of knowledge throughout the globe change the nations of the earth and take the world into the Fourth Wave?

Solutions, according to Wheatley [1994], are temporary events, specific to a context, developed through the relationship of people and circumstances.  Niels Bohr, in conjunction with Heisenberg, believe that [Wilbur, 1985: 20]:

' .. *great innovations, when they appear, seem muddled and strange.  They are only half understood by their discoverer and remain a mystery to everyone else. But, if an idea does not appear bizarre, there is no hope for it.'*

Finally, let us consider Ralph Waldo Emerson's [Eiseley, 1978: 214] image of society (one application of which is business) as an ongoing encounter with the unknown:

*'We wake and find ourselves on a stair; there are stairs below us which we seem to have ascended, there are stairs above us .. which go out of sight.'*

These will be the questions and discoveries to be found in the new millenium.  Did Plato envision this future?

*'What sudden onslaught, I replied, you have made upon my argument!*
*You have no compassion upon my uneasy loitering.  Perhaps you do not know*
*that after I have barely surmounted the first two waves, you are now bringing*
*down upon me the third breaker; which is the most mountainous and formidable*
*of the three;  but when you have seen or rather heard it,*
*you will think my conduct quite excusable, and you will allow*
*that I had good reasons for hesitating and trembling to broach a theory so*
*startling and to undertake the investigation of it.'*

*Plato: 185*

# SOURCES

## 1.  ARTICLES, BOOKS AND REPORTS

Aburdene, P and Naisbitt, J.  1993.  *Megatrends for Women.*  London: Century.

Ackoff, R. 1981.  *Creating the corporate future.*  New York: John Wiley.

Aczel, A.D.  1996.  Complete Business Statistics.  Third edition.  Chicago:  Irwin.

Adams, D. 1980. *The Restaurant at the end of the Universe.  The hitch hiker's guide to the universe II*, London: Pan Books.

Adler, P.  1990.  Managing High Tech Processes: The challenge of CAD/CAM. Oxford Press.

Aihara, K. and Katayama, R.  1995.  Chaos Engineering in Japan. *Communications of the ACM.*  38(11): 103-107.

Aislabie, C.  1992.  Sudden change in a model of small firm growth.  *Small business economics*, 4(4):307-314.

Albert, S. 1980.  *Dynamics and paradoxes of the ending process*. New York: Kennikat , April, 58.

Baba, M.L., Falkenburg, D.R. and Hill, D.H.  1996.  Technology management and American culture: Implications for Business Process Redesign. *Industrial Research Institute, Inc*  44-54.

Bancroft, N.H., Seip, H and Sprengel, A. 1998.  *Implementing SAP R/3*. 2nd Edition.Greenwich: Manning, 1998.

Bartholomew, D.  1998.  How to lead? *Industry week*. 19  Jan, 247(2): 27-30.

Bean, W.C. 1993. *Strategic Planning that makes things happen*. Massachusetts: HRD Press, Inc.

Block, P. 1987. *The empowered manager*. California: Jossey-Bass.

Bottoms, D. 1995. Facing change or changing face ? *IW : The management magazine*. 244: 17-18.

Boring, E.G. 1950. *A history of experimental Psychology*. Englewood: Prentice-Hall, 2nd Edition.

Bruce, R. 1993. Hail a new order. *Accountancy,* October: 48.

Burdett, J.O. 1994/1995. Managing in the age of discontinuity. *Management decision illustrative issue*.: 33-40.

Burgelman, R.A. and Maidique. M.A. 1988. *Strategic Management of Technology and Innovation.* Illinois: Irwin.

Burke, G. and Peppard, J. 1995. *Examining Business Process Re-engineering.* London: Kogan Page, 1995.

Carr, D. and Johansson, H. *Best practices in Re-engineering.* New York: McGraw-Hill Inc.

Cash, J.I., McFarlan, F.W., McKenney, J.L. and Vitale, M.R. 1988. Corporate *Information Systems Management.: Text and Cases*. 2nd edition. Homewood, Ill: Irwin.

Champy, J. and Nohria, N. 1996. *Fast Forward: The best ideas on managing business change.* [Boston, MA]: Harvard Business School Press.

Clark, K. 1969. *Civilisation: A Personal View*. New York: Harper and Row.

Cole, K.C. 1985. *Sympathetic vibrations as a way of life.* New York: Bantam Books.

Covey, S. R. 1993. Transforming the swamp. *Training and development*. 47 (5): 43-46.

Covey, S.R. 1993. *Principle-Centered Leadership.* Great Britain: Simon and Schuster.

Cowley, A. 1995. PC Week. 22 May, (20): E2(2).

Craig, J.C. and Grant, R.M. 1993. *Strategic Management*. London: Kogan Page.

CSC INDEX FOUNDATION. 1994. Re-engineering reviewed. Economist, 7 February, 332 (7870): p66.

CSC INDEX FOUNDATION. 1998. Information systems at work in business reengineering. *Information week*, 10/23/98, Issue 550, p69.

Davenport, T.H., and Drucker, P.F; 1997. A meeting of the minds. *CIO Magazine.* 15 September 1997.

Davenport, T.H. 1993. *Process Innovation: Reengineering work through Information Technology.* Boston Mass: Harvard Business School Press.

Davenport, T.H. 1995a. SAP Think Tank: Big change comes in big packages. *CIO Magazine.* 15 October, 9(2): 32-34.

Davenport, T.H. 1995b. The Fad that forgot people. *Fast Company.* November.

Davenport, T.H. 1997. Processing process information. *CIO Magazine.* 15 September, 1997.

Davenport, T.H. 1998. Serving up ERP value. *CIO Magazine,* February 1.

Davids, M.  1998.  The competition is outpacing me.  *Chief executive (Technology and the CEO: Nightmares, Daydreams, solutions Supplement):* 14-15.

Davies, J.L. and Vaughan, D.J.  1910.  *The Republic of Plato*.  London: MacMillan and Co.

Deming, W.E. 1991. *Out of the crisis*.  Cambridge, Mass: Massachusetts Institute of Technology.

Dessler, G.  1995. *Managing organisations in an era of change.* Orlando: Dryden Press.

DiRomualdo, A, and  Turton, P. 1995. Information Systems at work in Business Reengineering . *Information Week*, 23 October.

Drucker, P.F.  1970.  *Technology, Management and Society*.  London: Heineman.

Drucker, P.F. 1983.  *Managing in turbulent times*.  Great Britain : William Heineman.

Drucker, P.F. 1990. *The new realities*. Great Britain : William Heineman.

Drucker, P.F.  1991.  The new productivity Challenge.  Harvard Business Review, Nov – Dec: 69-79.

Drucker, P.F. 1994.  *Managing for the Future*.  London : Butterworth-Heineman Ltd.

Drucker, P.F. 1998a. Peter Drucker takes the Long View. *Fortune*.  September 28: 94-100.

Drucker, P.F. 1998b. Management's new paradigms.  *Forbes,* 5 October, 162(7): 152-177.

Dunsing, D. and Matejka, K. 1994. Overcoming the bohica effect. *Business horizons*. July - August, 37(4): 40 - 42.

Durrance, B., 1997. The evolutionary vision of D Hock from chaos to chaords. Training and development, April: 25-31.

Editorial. *Human Systems Management*. 14 (1995) 105-108.

Eiseley, L. 1978. *The star thrower*. San Diego: Harvest/HBJ.

Ellram, L.M. 1994. *Total cost modeling in Purchasing*. Tempe: CAPS.

Englebart, D. 1962. *Augmenting Human Intellect: A conceptual framework*. Stanford Research Institute.

Farnum, N.R. and Stanton, L.W. 1993. Quantitative Forecasting Methods. Boston: PWS-KENT Publishing Company.

Finlow-Bates, T. 1993. The swing of the pendulum. *Managing service quality.* January, 3(2):469-472.

Fitzgerald, L.A. and Van Eijenatten, F.M. 1998. Letting go for Control: The Art of managing the chaordic enterprise. *International Journal of Business Transformation*, 1(4), April: 261-270.

Frost, P. J., Moore, L.F., Louis, M.R., Lundberg, C.G. and Martin, J. 1985. *Organizational change.* California: Sage Publishing.

Geisler, E. 1997. *Managing in the aftermath of radical corporate change: Reengineering, restructuring and reinven*tion. Westport: Quorum Books.

Ginsburg, L. and Miller, N. 1992. Value-driven management. *Business Horizons*, 35(3): 23 -27.

Glaser, B.J. and Strauss, A. L. 1967. *The discovery of grounded theory*. Chicago, IL: Aldine.

Goodstein, L.D., Nolan, T.M.and Pfeiffer, J.W. 1992. *Applied Strategic Planning: a Comprehensive guide.* USA: McGraw-Hill, Inc..

Greene, B. 1999. *The elegant universe*. London: Jonathan Cape.

Gresov, C, Haveman, H.A. and Oliva, T.A. 1993. Organisational Design, inertia and the dynamics of competitive response. *Organization Science*, May, 4(2): 181-208.

Grover, V and Kettinger, W.J. 1995. *Business Process Change: Reengineering concepts, methods and technologies.* USA : Idea Group Publishing.

Haag, S, Cummings, M and Dawkins, J. 1998. *Management Information Systems for the Information Age*. Boston, Mass: Irwin McGraw-Hill.

Hamel, G. and Prahalad, C.K. 1994a. *Competing for the future : Breakthrough strategies for control of your industry and creating markets of tomorrow*. Boston Mass: Harvard Business School Press.

Hamel, G. and Prahalad, C.K. 1994b. Seeing the future first. *Fortune*. September 5, 64-68.

Hamermesh, R.G. 1986. *Making strategy work: How senior executives produce results.* New York: John Wiley and Sons.

Hammer, M. and Champy, J. 1990. *Reengineering the Corporation: A manifesto for Revolution.* London: Nicholas Brealey Publishing.

Hammer, M and Champy, J. 1993. *Reengineering the Corporation: A manifesto for business revolution.* London:Nicholas Brealy Publishing.

Hammer, M. 1990. Reengineering work: Don't Automate, Obliterate. *Harvard Business Review.* July-August 1990. P 104-112.

Hammer, M. 1995. *The Reengineering Revolution*: A handbook. New York: Harper Business.

Handy, C. 1995a. *The age of unreason*. London: Arrow books.

Handy, C. 1995b. The Empty raincoat. London: Arrow books.

Handy, C. 1995c. Trust and the Virtual organisation. Harvard Business Review, May – June, 73(3): 40-50.

Hannan, M and Freeman, J. 1989. *Organisational Ecology*. Cambridge, MA: Harvard University Press.

Harvey, D.F. and Brown, D.R. 1992. *An experiential approach to organizational development*. U.S.A.: Prentice-Hall.

Hawking, S. W. 1988. *A brief history of time: From the big bang to black holes.* Bantam Press.

Henderson, J.C. and Venkatraman, N. 1993. Strategic Alignment: Leveraging Information technology for transforming organisations. *IBM Systems Journal*, 32(1): 4-16.

Hendry, J. 1995. Process Reengineering and the Dynamic Balance of the Organisation. *European Management Journal*. March, 13(1): 52-57.

Hersey, P. and Blanchard, K.H. 1988. *Management of organizational behaviour*. Eaglewood Cliffs: Prentice-Hall.

Hinkley, D. 1987. *Inference about the change point in a sequence of random variables.* Biometrika, **57**: 85-93.

Hock, D. 1999. *Birth of the chaordic enterprise*:. Berrett-Koehler Publishers.

Hope, J and Hope, T. 1997. *Competing in the Third Wave.* Boston: Harvard Business School.

Imperato, N and Harari, O. 1994a. *Jumping the Curve*. San Francisco: Jossey-Bass Publishers.

Imperato, N and Harari, O. 1994b. When new worlds stir. *American Management Association.* October: 22–28.

Jordan, L.G. 1996. Strategic Control in reengineering the complex organisation. *Human Systems Management.* 15(4): 219-225.

Karathanos, P, Pettypool, M.D and Troutt, MD. 1994. Sudden lost meaning: A catastrophe?. *Management Decision*, 32(1): 15-19.

Kepner, C.H. and Iikubo, H. 1996. *Managing beyond the ordinary.* New York: Amacom.

Kimberly, J. R. and Quinn, R.E. 1984. *New Futures: The challenge of managing corporate transitions*. Illinois: Dow Jones-Irwin.

Klein, M.M. 1994. The most fatal reengineering mistakes. *Information Strategy: The executive's journal,* Summer, 10(4): 21-28.

Kline, P. and Saunders, B. 1993. *Ten Steps to the learning organization*. Virginia: Great Ocean Publishers.

Koch, C. 1996a. Flipping the switch. *CIO Magazine.* 15 June,, 9(17): 43-66.

Koch, C.  1996b.  Surprise, Surprise. *CIO Magazine.* 15 June 9(17): 23-29.

Kotter, J. P. 1995. Leading change : Why transformation efforts fail. *Harvard business review.*  March-April, 73(2): 59-67.

Laudon, K.C and Laudon, J.P.  1997.  *Essentials of Management Information Systems.*  Prentice Hall.  New Jersey.

Lawler, E.E. and Galbraith, J.R. 1994. Avoiding the dinosaur syndrome.  *American Management Association.*Vol.23, 4-17.

Levine, D.M., Berenson, M.L. and Stephan, D. 1998.  *Statistics for Managers using Excel.*  New Jersey: Prentice-Hall.

Lombard, F. 1989.  Some recent developments in the analysis of change point data. *South African Statistical Journal.*  23: 1-21.

Luftman, J.N., Lewis, P.R. and Oldach, S.H.  Transforming the Enterprise: The alignment of business and Information Technology Strategies.  *IBM Systems Journal,* 32(1): 198-221.

Macmillan, I.C.  1988.  Controlling competitive dynamics by taking strategic initiative.  *The academy of management EXECUTIVE*, Vol II, no 2 p 111-118.

Magretta, J. 1998. *The power of virtual integration: An interview with Dell Computer's Michael Dell.* Harvard Business Review, March-April, 76(2): 72-84.

Mallach, E G.  1994.  *Understanding Decision Support Systems and Expert Systems.* Burr Ridge, Ill: Irwin.

Mariott, F.A.C.  1990.  Dictionary of statistical terms. 5th edition.  New York: Wiley.

Marshall, R.  1992.  Business process re-engineering.  *CPA Journal*, Oct, 69(10): 30, 4p, 1c.

Martin, J. 1995. *The Great Transition*. New York: Amacom.

Masterton, W.L., Slowinski, E.J. and Stanitski, C.L. 1981. *Chemical Principles*. Fifth Edition. Philadelphia: Saunders College Publishing.

Mc Donald, P. and Gandz, J. 1992. Getting value from shared values. *Organizational dynamics,* Winter, 29(3): 64-77.

McGregor, D. 1960. *The human side of enterprise*. New York: McGraw-Hill.

Miller, P. 1999. The change decision: Before and after. *IESE. REVISTA DE ANTIGUOS ALUMNOS,* Septembre de 1997: 16-20.

Moser, H.W. 1996. Short takes. *Journal of Business strategy.* May/June.

Mullin, R. 1996. *Journal of Business Strategy*. Michael Hammer sees the processes of the Future. Journal of Business Strategy, Nov/Dec, 17(6): 11-13.

Murphy, P. 1996. Chaos Theory as a model for managing Issues and Crises. *Public Relations Review*, Summer, 22(2): 95–113.

Naisbitt, J. and Aburdene, P. 1985. *Re-inventing the corporation*. New York: Warner Books.

Nonaka, I. and Takeuchi, H. 1995. *The Knowledge-Creating Company*. New York: Oxford University Press.

Ohmae, K. 1982. *The mind of the strategist: The heart of Japanese Business*. McGraw-Hill, Inc.

Oliva, T.A., Desarbo, W.S., Day, D.L. and Jedid, K. 1987. GEMCAT: A general multivariate methodology for estimating catastrophe models. Organisational Science, Sept 4(3), 120-124.

Pascale, R. T. and Athos, A.G. 1983. *The art of Japanese management*. Great Britain: Penguin Books.

Pellissier, R and Kleynhans, A. 1999. *ERP or BPR – The Chicken or the egg?* The South African Industrial Engineer, November.

Pellissier, R and Pienaar, C.C. 1999. Y2K – Real problem or information technology's way to make money? *SBL Research Review*, Dec 2(2): 1-8.

Peters, T. 1987. *Thriving on chaos.* Great Britain: Pan Books Ltd.

Peters, T. 1992. *Liberation management*. London. Pan Books.

Peters, T. 1994. To forget is sublime. Forbes, April 11: 128-129.

Peters, T. J. and Waterman, R.H. 1984. *In search of excellence*. New York: Warner Books.

Porter, M. 1985. *Competitive Advantage*. New York: Free Press.

Quinn, J.B. 1992. *Intelligent Enterprise: A Knowledge and Service Based Paradigm for Industry*. New York: The Free Press.

Quinn, R.E. 1988. *Beyond rational management: Mastering the paradoxes and competing demands of high performance*. London: Jossey-Bass Publishers.

Quinn, R.E. et al. 1990. *Becoming a master manager: A competency framework*. USA: John Wiley and Sons.

Rapoport, C. 1994. Charles Handy sees the future first. *Time*, 130: 150-160.

Reich, R.B. 1991. The work of Nations. New York: Alfred A Knopf.

Revenaugh, D.L.  1994.  Business Process Reengineering: The unavoidable challenge.  Management decision, 32(7): 16-27.

Riel, P.  1998.  Justifying information technology projects. *Industrial Management*, Jul/Aug 40(4): 22-27.

Ross, G.  1994. *Toppling the Pyramids: Redefining the way companies are run* . New York: Time Books.

Rothshild, W.E. 1993. *Risktaker, Caretaker, Surgeon, Undertaker: The four faces of Strategic Leadership.* New York: John Wiley and Sons.

Russel, B.  1979. *History of the Western Philosophy*.  London: Unwin Paperbacks.

Russel, B.  1992. *The Basic writings of Bertrand Russel*.  London: Routledge.

Sanders, R.L. 1997.  If Marx had been a business process reengineer. *Records Management Quarterly,* 31(2): 58-65.

Saunders, M.  1994. *Strategic Purchasing and Supply Chain Management.* London: Pitman.

Schneider, B. and Bowen, D.E., 1995. *Winning the Service Game*. Boston: Harvard Business School Press.

Schultheis,R and Sumner, M.  1992 *Management Information Systems*: The manager's view.  Second Edition.  Homewood, Ill: Irwin Publishing.

Senge, P. M. 1990a. *The fifth discipline*.  New York: Doubleday/Currency.

Senge, P.M. 1990b. The leader's new work : Building learning organizations. *Sloan Management Review*. 7-23.

Solomon, R. C. 1985. *The new world of business*. Rowman and Little Publishers, Inc.

Spiker, B.K. and Lesser, E. 1995. We have met the enemy... *Journal of business strategy,* 16(2): 17-21.

Stewart, I. 1975. *The seven elementary catastrophes*. New Scientist, November, 68(20).

Sweat, J. 1998. The measuring of ROI is more art than science. *Computer Reseller News*, Aug 24 (804): 62.

Tapscott, D. 1996. *The Digital Economy.* New York: McGraw-Hill.

Tetenbaum, T.J. 1998. Shifting the Paradigms: From Newton to Chaos. *Organisational Dynamics,* Spring, 26(4): 21-32.

The Oxford Dictionary for the Business World. Oxford: Oxford University Press. 1993.

IMD. !998. *The World Competitiveness Yearbook*. Switzerland-IMD.

Thompson, A.A. and Strickland, A. J. 1989. *Strategy Formulation and Implementation*. USA: Richard D Irwin, Inc.

Thompson, A.A. and Strickland, A. J. 1993. *Strategic management: Concepts and cases*. Homewood, Ill: Irwin Publishing.

Thompson, J.L. 1993. *Strategic Management : Awareness and Change*. Second edition. Oxford: Chapman and Hall.

Tichy, N.M. and Devanna, M.A. 1990. *The Transformational leader*: The key to global competitiveness. New York: John Wiley and Sons.

Tichy, N.M. 1993. Revolutionize your company. *Fortune,* 13 December, 52 -54.

Toffler, A. 1970. *Future Shock*. London: Pan Books.

Toffler, A. 1980*. The Third Wave*. London: Pan Books.

Treacy, M and Wiersema, F. 1995. *The Discipline of Market Leaders*. Reading Massachusetts: Addison-Wesley Publishing Company.

Van de Vliet, A. 1994. Order from chaos. *Management today,* 7, 62-65.

Venkatraman, N, Henderson, J.C and Oldach, S. 1993. Continuous Strategic Alignment: Exploiting information technology capabilities for competitive success. *European Management Journal*, June, 11(2): 139-149.

Violino, B. 1998. ROI in the real world*. Information week*, April 27 (679) 60-72.

Waterman, R.H. 1994. *The frontiers of excellence. Learning from companies that put people first..* London: Nicholas Brealy Publishing Ltd.

Wen, H.J., Yen, D.C. and Lin, B.. 1998. Methods for measuring information technology payoff. *Human Systems Management,* 17(2): 145-153.

Wilbur, K. 1985. *The holographic paradigm and other paradoxes*. Colorado: Shambala Press.

Wheatley, M.J. 1994*. Leadership and the new science: Learning about organization from an orderly universe..* San Francisco Calif: Berrett-Koehler Publishers.

Wheatley, M.J. and Kellner-Rogers, M. 1996. The Irresistible Future Organisation. *Strategy and Leadership*, July/Aug, 24(4): 18-24.

Wright, D.J. 1993. Catastrophe theory in management and decision making. *Journal of the operational research society,* 34(10).

Yin, R.K. 1989. Case study research: Design and Methods. London: SAGE Publications.

Youngblood, M.D. 1997. Life at the edge of chaos: Creating the Quantum organization. Perceval Publishing.

Zeleny, M.1995. Editorial. Reengineering. *Human Systems Management,* 14: 105 –108.

Zwick, S. 1998. Riding the Waves. *Time,* November: 40.

## 2. DISCUSSIONS

Conversations and in-depth discussions with (IT) directors, managers and professionals in South African organisations – especially with respect to
- The implementation and use of the information delivery systems and their relative importance with respect to re-engineering mentioned in Modules IV and V.
- The technology Change Model presented in Module V and validated through discussions with change agents and consultants in various industries.

## 3. SOFTWARE

Venter, H. and Steele, S. 1995. Abrupt change point analysis. University of Potchefstroom.