The Leverage Effect of Holistic Engineering and Technology Management to Sustain a Developing Economy

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Abstract—High Technology Companies in Developing Countries are sometimes suspiciously viewed as “expensive endeavors” of doubtful benefit when these developing countries struggle with serious social problems such as poverty, unemployment and poor infrastructure. The argument being that the effort in high technology only benefits an elitist few and that the country has to put their resources to solving the social problems rather than dabble in high technology projects.

To let developing economies benefit sustainably from high technology organizations requires many factors being in place: an appropriate technology-base and related products that will continue to be sought-after in the local and global market in the future, a trustworthy political system, and an effective integration of systems & processes, leveraging the advantages to the problems of the community and the holistic, effective and efficient management of such organizations to mention but a few.

This paper will focus on the management aspects of large scale high technology and engineering efforts. The paper identifies and discusses the key success parameters for such a scenario and will focus on the benefits of managing an organization holistically so as to be globally competitive, which in turn results in sustainable contributions to the community and the national economy of developing countries.

The paper introduces a holistic management model which has been applied successfully in a country such as South Africa and also implemented in international companies in a number of developed countries. The suggested methodology/model lends itself to understand and judiciously manipulate the dynamics of the high tech global business environment for sustained competitive advantage in a framework of a sustainable economy. The management model recognizes and enables the manager to address the many issues confronting them daily by giving a new strategic perspective with the help of sub-models. These sub-models form the anchors of the Strategic Intent whereby the fluid and complex situation can be managed reasonably, effectively, sustainably and hopefully, wisely, too.

It is the contention of this paper that a mature, analytical and intuitive management approach which considers all stakeholders, based on the holistic management model introduced, and which is properly and consistently applied, will lead to a significant contribution to a sustainable economy. The research methodology employed is mainly exploratory in nature.

I. THE CHALLENGE

“The best way to make your dreams come true is to wake up.”

– French Poet/critic Paul Valery

Judicious and effective Engineering & Technology Management is a unifying discipline of soft and hard, of the past, the present and the future, of the natural and the synthetic, of people and matter with both global and local consequences. Virtually no aspect of physics, life-science, economy, or human/ social science can be left outside of consideration for an effective, comprehensive Engineering and Technology Management Model. A rather comprehensive as well as integrated model is called for.

Numerous concurrent challenges impinge on the post-modern organisation which have to satisfy the various stakeholders such as customers, employees, shareholders, government, unions, suppliers to name but a few.

Developing countries often struggle with additional serious social problems such as poverty, corruption, crime, unemployment and insufficient quality of infrastructure. This comes on top of omni-present global competitiveness, quantum-type technology shifts, value creation/management as well as growing the company in a sustainable fashion. All these factors result in excessive stress on the organisation and have to be managed judiciously and concurrently to avoid a “company burn-out” effect.

The achievement of this ideal within the constraints and consideration of a myriad of “soft and hard” factors requires an innovative approach that can unify many disciplines in a completely concurrent manner. Such a management paradigm has to consider and be appropriate to the contemporary situation, streams of information, the prevailing turbulence, uncertainty, paradox and such a management paradigm can successfully handle the resulting stress on business systems, processes and the diverse individuals working in such an organisation.

To thrive under such circumstances would imply an ongoing organisational transformation process that successfully adapts and changes flexibly to cope in its business environment. If the organisation cannot perform effectively the stress may result in loss of competitiveness. The situation is characterised by contradictory requirements, is not always logical, has to satisfy many diverse stakeholders, yet has to lead to ongoing organisational renewal and contribute to the company’s overall profitability. If such a transformation is to be sustainable and takes place in a globally competitive framework, the approach has to be holistic and it has to consider many additional factors which tend to be considered as soft in the analytical world of high tech.
II. THE PERSPECTIVE

Optimising business performance primarily depends on recognising perturbations in time and optimising processes fast and in line with the perturbations. This is analogous to surfing in the ocean when the target direction is the beach but the details of the actual ride are assessed and implemented from moment to moment in line with the behaviour of the wave.

The world experiences incredible fluctuation and unpredictability which affects everybody’s environment in a multitude of ways. One is simultaneously subject to and creators of a flow and evolutionary process which in its detail is completely unpredictable. This increases risk and the potential for failure; it also creates unprecedented opportunities and potential for wealth creation.

A pertinent comment by the German Futurist author Gerd Gerken makes the following observation, “Most managers and business leaders have not yet grasped that they manage evolution and not people and systems” [2].

The mechanistic world view of business and where the individual fits into this machine process is increasingly seen to be erroneous. The analogy of business processes to the business of life which is messy, yet meaningful, are reflected in the way spirituality and esoteric considerations have become a factor a greater impact and importance in the work place.

As a result of effective digital communication, ease of travel, globalisation and deregulation as well as accessibility by just about everybody to everybody via the internet, markets are quite transparent and yet have become relatively complex. Due to this complexity of the globally networked and interdependent markets, the fight for market-share is replaced by a better understanding of the continually changing dynamics. An organisation has to understand the change from the previous marketing-pattern of a few strong competitors in the past, to the pattern of multiple-surprises [3].

The greatest challenge here is increasing awareness of what is going on in the market – but on a much wider front than the specific market sector alone. This awareness has to encompass a multi-disciplinary range of aspects in which the business leader has to actively participate in the formation of the boundary conditions that created the market-pattern in the first place. Traditional market research will not suffice under such circumstances. Indeed, in most cases traditional market research will produce expensive and irrelevant historic information which no one will read, much less utilise productively.

III. THE SITUATION

The world is in a state of flux…as indeed it has always been. Change is inevitable. Change is the essence of life. The difference today lies in the observations made by James Gleick [1] in his book “Speed: The acceleration of just about Everything” that “since the days of the internet we are not just connected; there is not just more, it is different too. Time is subdivided into fractions of a nanosecond although we do not even grasp the meaning of a tenth of a second. The changes that happen at subatomic level in a millisecond from a physicists perspective are stupendous. In our daily lives we strive for the time precision but become increasingly disorientated when changes occur by the month week or hour. Chaos Theory understands that certain systems can undergo phase transitions such as water does when it turns coherently to ice or incoherently to steam”. It is the same in the business environment: The system can undergo spontaneous phase transitions and involved people must cope and survive on the event.

Adrian Woolfson, an author from the life sciences, makes an interesting comment in his book “Life without Genes” [4] which is believed to be as applicable to a modern business environment: “History only exists because the number of things that are possible greatly exceeds the resources of time and space available for their representation. Herein lies the tension that defines the essence of the process of life. Life is one huge resource allocation problem. But how is this tension resolved in the real world? Clearly a search and selection principle is needed. So life becomes synonymous with the process by which the mathematical space of all possible things is searched.”

Similarly, in an age of unbelievable options and choices, rapid changes and a flood of available information, a useful management model must enable us to look at the business space as an open system and by means of a sound search and selection principle discern in the business environment the valuable from the useless, the urgent and the important, the relevant and the inconsequential, the macro and the micro and then proceed to make judicious decisions.

Many try old fashioned and unproductive strategies when confronted by change. Some try to ignore change; others try to avoid it, still others try to resist or even sabotage it. Under those circumstances it is also important to recognise that no single individual has all the power to create and sustain a positive change effort alone. Individuals or groups develop a vision for the business but they have to effectively communicate that vision to others who then agree formally or informally to buy into that vision and proceed in the new direction. The management leaders and followers then bond to form effective teams that accomplish the changes required in a practical manner [5].

The diverse facets covered are by no means complete but serve only to paint a broad-brush picture of the complexity and contradictory nature of the contemporary business environment of high tech companies. Any leader – manager of such a company that wishes to achieve a sustainable competitive advantage whilst making a value contribution for all its stakeholders will be severely challenged.

The post-modern world has evolved from the modern era. The modern era in turn is reckoned to have lasted from about the fifteenth century through most of the twentieth century.
Modernism is associated in the West with the rational, scientific method. Most contemporary business leaders in high tech companies come out of the modern era and hold paradigms of those times.

The post-modern era which most younger and middle management leaders belong to, has a different mind-set. One of the characteristic features of post-modern culture is that opposite things can happen at the same time without being contradictory. Anyone who doesn’t feel pulled in conflicting directions doesn’t understand Heisenberg’s uncertainty principle, Pauli’s exclusion principle, and Schrödinger’s wave equation. [6] Where the modern age was predominantly either-or, the post-modern world is and/also. This is phrased memorably by Leonard Sweet [7], “the post-modernist always rings twice.”

In the Cluetrain Manifesto Levin et al argue “most businesses only know how to talk in the soothing humourless monotone of the mission statement, marketing brochure and your-call-is-important-to-us busy signal” [8] If today’s business does not recognise the networked, multi-disciplinary, multi-faceted global markets it will only crank out sterile messages which neither customer, employee or supplier will accept.

Such is the state of the world business finds itself in and it is equally clear that one of the major pre-conditions for successfully managed businesses will be the degree of personal mind-set management that the leaders and captains of industry are willing to engage in to get a handle on the increasingly chaotic, flowing, white-water situation.

To even just realise the incredible interconnectedness and the new nature of the challenges in post-modernism business, organisations will require new management approaches which in their basic form and structure –if such words are still applicable- will be partially unacceptable for modern mind-set managers unwilling to make the transition. The changing paradigms require of all managers and business leaders the need to become more aware and conscious of what really goes on in time and space with a scope much wider than their traditional thinking space [9].

A. System Health

Business only achieves its usefulness when the fundamental essentials are utilized in a harmonious dynamic manner responsive to the ever changing business environment. Analogous perhaps to proteins, enzymes and DNA, which are a necessary backbone in living organisms, it is their proper specialization, integration and collaborative functioning in a human body that makes the body come alive, productive and enabling it to survive in its environment [10].

B. Anchors

The basic methodology of the management model utilized in this paper (and proposed as well as assessed in the thesis of the first author[11]) orients itself on the following anchors: Time and space, a system framework, a process and an integrator. The expression anchor is used because some form of reference which provides a degree of stability in the midst of the storm of the daily operations of any business has to be found and articulated [11].

These chaos anchors –the eye of the storm, as it were- are briefly described as:

Time \(\rightarrow\) The moment of time and its contemporariness, Zeitgeist\(^1\), dynamics, kinematics, evolution, discontinuous business cycles, mind-sets, perspectives and values

Business Space \(\rightarrow\) a three-dimensional space in which the three spatial axes define the business environment in its entirety

A System Framework \(\rightarrow\) the broad challenges which every business has to address; three of which are strategic, three are operational in nature and one is spanning everything the organisation does

A Process \(\rightarrow\) the four-step process Imagine-Shape-Deliver-Support is based on the learning cycle and leans on very practical considerations

An Integrator \(\rightarrow\) Integrating all concepts and sub-models on a continuous basis in a framework of effectiveness and sustainability is the essential heart and capstone of the management model. Because of its all-inclusive integrative nature in a completely non-restrictive open system context it represents an extremely powerful methodology which is particularly valid for the fast-paced, turbulent digital age of unpredictability.

C. Take a compass rather than a map

The difference between good rational decision making and wise decision making is due to a large part to intuitive processes. Intuitive processes are truly holistic in nature and are based on expertise (logic), experience (intuition and logic) and inspiration (intuition). It is the latter that causes most problems for a completely holistic approach to problem solving in the technology area, in that inspiration is....well just that. Not rational, not logical. Not black, not white, but rather some grey in between. Yet note, that there exist many more shades of grey than the two boundary values of black and white.

Similarly, the road on which any business embarks daily is unmapped in its detail due to extreme turbulence and unpredictability, yet a modern business will persist utilizing a map or recipe approach to achieve its objectives. The modern business has a just-in-time mentality where everything is dealt with at the appropriate place and appropriate time.

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\(^1\) Zeitgeist – n. Spirit of the times, drift of thought and feeling in a period (Oxford Dictionary)
If one were to look for an accurate map, in the form of a well-defined, clear-cut process there would be disappointment. You can’t create a map of terra incognita. You can’t consult maps in a world where the terra is no longer firma. In the new world of the post-modern culture, with no familiar landmarks, you can only explore the new world for yourself. Post-modern culture is unmappable on flat surfaces. It cannot be reduced to two dimensions. Mapping is now non-linear. It’s more like “a spider spinning a web” [7].

The post-modern organization recognizes that a just-in-case mind-set has many advantages as it dispenses of the need of a map and orients itself instead by means of a compass. The compass points in the right direction, gives the organization its bearing and takes into account that obstacles can be circumvented. Everybody understands what the goal is and there is little chance of misinterpretation or confusion. The compass-equipped post-modern organization can handle change, turbulence, unknown territory and yet stays on course concerning business strategy and objectives. It just as flexibly changes tack even if stormy conditions prevail.

IV. THE MANAGEMENT MODEL

Some critical attributes the management model has to deal with are,

- Effective transformation
- The parts and the characteristics of the model anchors alluded to above:
  - The temporal relevance, i.e. time and Zeitgeist
  - the Business Space,
  - the Systems Framework,
  - the Process and
  - Integration.
- A framework with which it is possible to capture the above in a rational manner but with flexibility.

It is the contention that to achieve the daily transformation process in the organisation is analogous to that required for a living organism. A living organism consists of systems, processes and individual building blocks (cells) that are basically similar, yet specialised in functions. These are a) self-organised, b) networked and c) self-healing in a harmonious, optimised manner that is able to adjust flexibly to new circumstances and information. An organism that suffers less than good health in any of those aspects will display less vitality, less performance and possibly result in premature death.

The proposed management model lends itself to understand and judiciously manipulate the dynamics of the high tech global business environment for sustained competitive advantage. The model recognizes and enables the manager and leader to address the many issues confronting them daily by giving a new strategic perspective with the help of sub-models. These sub-models form the anchors whereby a complex situation can be managed reasonably, effectively and hopefully wisely too.

The suggested model is to a large degree independent of time and industry-space and is considered valid for a long time to come. Although aimed at providing a guideline at executive level of management in the high tech environment the suggested model is by no means limited to engineering nor is it limited to high tech companies. The framework and model anchors are equally valid in other complexity-prone industries as can be confirmed by the author’s wide international practical experience in a number of industries, from Banking, Service provides, Health Systems, e-commerce, Petro-Chemical and others as well as selected data from the first author’s thesis [11].

Mikhail Gorbachev observed, after he had been swept from power, “History punishes those who come late.” So it is with high tech companies that do not sense the moving of the tectonic plates of environment, time and trends. Shake-free business due to the moving plates in the business environment is inconceivable. In all high tech engineering companies will be subject to major quakes. According to futurist Sweet “The question is whether or not the high tech business prepares for the shakes that will come wherever and whenever one operates in the business space and on the time-line. It is of paramount importance to be aware of the directions the tectonic forces are moving”. [12]

For the sake of synthesis and understanding, the proposed management model consists of a number of separate models that have to be exercised concurrently on a highly integrated basis. As we know from the Introduction, the biggest problem is that there are no simple models for a complex world. If the model were a simple one, it could not handle the complexity and most of the really pertinent issues would be lost.

Furthermore, the processes of real life and business processes in particular do not take place in an orderly mathematically constructed world although its tools are getting more digital by the day. Hence the daily confrontation with fuzzy logic in the business environment and the analogue real world is non-digital and represents the grey area where the management model still has to be applied.

A. Integration

The seven challenges of the proposed management model have to be handled simultaneously and this is to be accomplished in a broad systems context, hence the term systems framework [11].

- Future Management

This challenge considers aspects of vision, trends and scenarios which affect strategic leadership for a dynamic, complex and open system organisation operating in an open system environment. It is concerned with how the future is perceived, the place of the business within that future and how to manage the course to that future.
Management of Change
Managing change is one side of this challenge. But to initiate change and to help shape the future by means of effective implementation is the concurrent second challenge with regards to change. Furthermore the change –anticipated or current – has to be managed in a systems thinking context. Understanding and developing the change agent as an issue, system or person and identifying the most ideal change characteritics are just some high level considerations. Simultaneously initiating change and managing the resultant stress in the different aspects of a modern organization is a highly complex task and just complicated.

Leadership, Vision and Strategy
The challenge of appropriate and effective leadership conveying a vision which is conducive to the formulation and implementation of a tangible competitive strategy usually falls on the top management person. Such a person must articulate and promote a holistic, global and contemporary management and leadership concept, where leadership is multi-focused, institutionalized and where paradoxically leadership conforms to the attributes of “servant-leadership”; this mix of leadership attributes encourages experimenting, learning and coaching within a company culture of sustained value creation where people can experience sense and meaning for their own lives.

Know-how Management
Intellectual and proprietary property have become highly significant in today’s competitive globalized world. This is especially true in the high tech engineering field. Know-how has to be cultivated, protected and yet disseminated in a manner that allows a sustainable competitive advantage. Know-how management concerns the transfer of tacit knowledge to explicit knowledge so as to increase value creation in the company. It also concerns the transfer of that knowledge into tangible benefits for the end customer.

Knowledge is based in people’s heads and not so much in hard-drives and reports. As such it becomes a people issue even when discussing systems, processes and relationships. Production, finances, human resources, quality management, customer relations, marketing aspects as well as experiential knowledge of the individual will all fall into this elusive challenge.

Innovation and Creativity
This includes understanding and leveraging processes of innovation, utilizing employees’ potential and appropriate knowldege application for the purpose of sustainable value creation. Innovation and creativity is closely related to the company culture and the attributes of leadership in a catalytic sense. Innovation and creativity are characteristics of every person, even if it be to different degrees, but the promotion, unfolding and practical utilization of such innovation is a great challenge.

Personal Competencies and Personal Mastery
Defining and developing appropriate functional and interpersonal competencies in terms of the so-called softer skills is a challenge for every individual. Mature self-management and self-knowledge are preconditions for a balanced approach to a large variety of diverse and sometimes contradicting stress factors: intellect and intelligence, emotion, intuition, leadership characteristics, sensitivity to task and people, effective and appropriate communication, mentoring and facilitation competencies.

These challenges have to be handled in a framework of finding personal meaning and balancing all aspects such as work, family, sport, cultural and spiritual activities.

Value-Based Management
Value-based Management ensures that every function and activity is evaluated in terms of the value-contribution it makes to some stakeholder of the organization. This periodic assessment is not done on the basis of some structured recipe-type process but is a self-assessment by the individuals with mentorship-support if and when required. It can be done through a formalized process which often consists of the financial parameters, but there are also many values which are not financial: customer delight, environmental issues, quality of life of the community, health, security and even media perception.

Only if all seven challenges of the management model are considered by virtually everybody in the organisation, in the sense of internalisation and personal commitment relevant to the level and position of the individual, and considered concurrently with an unbiased mix of rational and intuitive thinking, exceptional alertness and commitment, can the company be sustainably globally competitive in the long term.

This may appear to be idealistic, but it is achievable when there is a relentless commitment in living it out daily, especially by example through the top-management team. As international consultants the authors have observed that this is indeed the case in the truly successful companies but it is seldom based on a single person or a singular action. It is an ongoing challenge fraught with highlights and pitfalls, with failures and recoveries.

It certainly strives for an ideal which will still be seldom enough achieved because
• life is messy and not everything can be formally integrated and considered concurrently,
• an organisation consists of flesh and blood fallible people who will not operate like automatons and because totally unexpected twists and turns in the larger business environment will occur and upset the course of action,
not to say the unpredictable universe of events when seen on a global scale.

**B. Practical implementation**

Any management model must endeavor to transform the high tech engineering company in such a way that the company can adjust profitably to any changes in its environment or internal situation. Transformation is more than transaction of course and is fundamentally different.

Most companies’ management is involved in transactional activities such as administration, maintaining the status quo, planning, organizing and controlling.

Transformation implies change to a distinctive degree in terms of all the characteristics of a system or business. Transformation represents a determined effort to change the status quo, to inspire innovative approaches and to reflect on the future in terms what can be.

The required business transformation is in a sense radical: it resembles the metamorphosis of the caterpillar to the butterfly. Such transformation always implies the dissolution of the old structure and there is seldom anything in the new structure that resembles the old.

Many business leaders have not yet recognized the urgent need and the radical nature of the transformation because they tend to fight current trends as enemies of order, or perceive these trends as destructive chaos [11].

A less radical approach preferred by many is to keep the traditional order and structures, but at the same time making it more efficient. Unfortunately, in times of transformation the change is so dramatic that the refinement of the current approach does not necessarily improve its effectiveness. Consistency and continuity in terms of structure are the least likely attributes to be found effective during the transformation [13].

Paradoxically, at the same time other aspects demand continuity and consistency: sustainable value management, branding, global and cultural empathy, quality and customer delight etc must be ensured.

All those who want to be business leaders involved in successful transformation have to be willing to let go or at least critically re-assess concepts such as continuity and consistency, because it is rooted in traditional power-base thinking, rigid hierarchical structures and related manipulation and control. Which is not necessarily wrong, rather it may be inappropriate for the times [13].

Over the past couple of years there has been a growing realization that norms and standards, long-cherished ideals and power-structures are crumbling, but it is not recognized as a natural and exciting evolution which is a consequence of the increasing interdependence of diverse technologies such as biotech, gene technology, robotics, IT and the access to powerful computing technology.

The mind-set of many of those business leaders focuses on the power-structures, the hierarchical, the deterministic and validity of their traditional values. But the real business world is evolving in contradiction to such thinking.

In the high tech environment this is even more dominant because of the nature of the products and processes involved as well as the background and training of its individuals. Although engineers understand process very well, their highly developed analytical skills tend to search for order, rationality and predictability. That in turn promotes the illusion of control and corresponding behavior.

It is interesting to observe that the more powerful the organization in its particular industry in a traditional sense, the less likely that it will notice or take the transformation dynamics taking place all around them, seriously. Those that do not themselves undergo the transformation in their own mind-set will not necessarily perceive the transformation taking place in the external environment right in front of their eyes.

The transformation in the external business environment for any high tech company is already proceeding at a high speed. For a high tech company to adapt, it will have to undergo an internal transformation which can only be accomplished if the leadership itself has undergone the necessary transformation in their own mind-set. Then they will recognize that the shifts and drifts of the environment can be manipulated only when they themselves are immersed in these turbulent shifts.

As a consequence, leadership can and must act faster than they can plan. Traditional top management prefers to have detailed plans to exercise control over things and define outcomes nobody can directly control, least of all top-management, but the employee in the frontline has the best opportunity, insight and feel to make the better decisions.

In analogy, the exact progress of a surfer on a wave cannot be planned, but action and reaction has to be flexible, has to be quick, and is decidedly not directed from the beach. The environment and the wave must be felt so as to be able to make judicious decisions.

Of course, youthful enthusiasm, good intentions and a few additional management skills are insufficient to accomplish such a transformation but four aspects receive new impetus, meaning and relevance during the transformation process:

- **Evolutionary, Just-In-Case thinking** makes a more effective contribution than detail planning
- **Self-Organising and Self-Correcting** counter-acts the effect of accelerated pace and the disorientation due to frequent change events
- **Chaos can be constructive**
- **Multi-Perspective and paradox** provides a better picture of reality

The above indicates the importance of soft-factors and the emphasis to manage with innovative and imaginative flexibility in the transformation process. That innovative flexibility coupled to mature leadership will in turn cause better synchronization adapted to the vision of the company, better knowledge management and result in sustainable global competitiveness. In fact the quality of the leadership
at all levels in the company should determine the effectiveness of the organization in terms of value-contribution, sustainability and global competitiveness.

V. PASTforward

The proposed management model is itself complex due to a) the multitude of interdependent parameters that have to be considered concurrently and repeatedly, b) due to the many causalities involved and c) many of which are not always apparent, but rather concealed.

The management model consists of a loose framework of concurrently applied sub-models, but is not to be applied in a recipe mode at all. Rather, given the holistic picture of the vision in the high tech company, the proposed management model relies on the mental agility of leadership and the committed buy-in of all stakeholders and is re-shaped with every operational working day. The management model is closer in attributes to a mind-set, than to a procedure.

Paradoxically, the framework of sub-models of course also resembles a structural approach by its very definition, but in application it relies on dynamic relationship behaviour and continuous assessment between the various aspects under consideration rather than functional and sequential interactions.

The management model relies on the intimate, intense and dynamic relationship of the high tech company (personnel, systems and processes) with its larger environment (all stakeholders and shifting circumstances) embedded in a mental model given by the framework of sub-models, characterised by the wisdom, talent and skill of the leader or collective leadership of top-management. It also recognises the importance of the time frame and Zeitgeist in which the high technology company must function in a healthy, i.e. effective and efficient, manner.

Likewise, the seven core challenges provide the anchors for the business’ orientation. The seven core challenges incorporate all relevant aspects of strategic and operational importance for the company whilst providing an economic return.

The holistic business parameters as another sub-model point to those parameters that have been shown to form a value chain for a healthy organisation. By addressing each parameter in the seven challenges as a matrix approach with appropriate knowledge, insight and wisdom the business can grow, develop and prosper.

The repeated re-visiting of all identified aspects and parameters on a regular basis is mandated by the shifting trends in the business environment, including economics, technology and processes. The judicious application of the sub-model Imagine – Shape – Deliver – Support thus ensures a careful examination of assumptions and observations in real time.

Finally all these considerations, reflections and actions have to happen concurrently and, ideally, at the Sweet Spot of the leaderships’ perceived talent, competency and wisdom. Only then will the model provide a sustainable means to continuously transform high technology companies into globally competitive and healthy companies.

The management approach elucidated in this Paper has been applied in a number of industries both in South Africa and abroad by the authors, in what is perceived to be an effective and successful manner. This is generally supported qualitatively by some of the data based on questionnaires presented in Winzker [11] but the author is also still collecting more quantifiable data. The collation and evaluation of such research data is the subject of a further Paper in the near future.

With the considerations elucidated above, a nation’s industry can leverage business leadership and management to the benefit of a developing economy. There is no doubt that a sound management approach based on applying the lessons of the Past and focus on the future to move forward, will translate to a sustainable competitive advantage.

REFERENCES