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Development of an integrated business and career model for Cost Engineering which would build an effective Project Management / Cost Engineering relationship based on the High Performance Work Team concept.

VALUE BEYOND COST

PRESENTATION OF A PAPER AT THE ICEC 4th WORLD CONGRESS 2004

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Abstract

This unique model encompasses the following elements crucial to the success of the Cost Engineering business.

- It provides the clear strategic vision required to support the overall business.
- It provides the boundaries and groundrules necessary for disciplined work execution and behaviour
- It is supported and entrenched with a clear set of values
- The model clearly defines the roles and competencies required of different Cost Engineering team members in a HPWT environment particularly related to the execution of projects
- It also clearly defines the knowledge, skills, attitudes and leading performance indicators required for career advancement
- A performance ethos via performance contracting is clearly established to ensure the collective attainment of corporate goals
- Clearly defined job profiles ensure easy determination of gap analyses to direct competence development
- A comprehensive measurement system, utilizing the balanced scorecard philosophy, completes the cycle to determine corrective actions as early as possible.

Summary

Without clear goals, a sense of purpose, a defined canvas depicting the boundaries within which people operate, clearly defined roles and competencies, a culture of performance and the ability to monitor the progress towards these goals it is a tenuous management task to guide and direct effort towards the achievement of said goals. A leadership philosophy of **commitment** rather than **control** underpins the essence of the approach described below with **empowerment** featuring predominantly in most aspects of this philosophy.

Speaker Profile

Kevin Mattheys has been active in the Cost Engineering field for the past 15 years. His primary specialties include cost control and project planning and scheduling with a strong emphasis on developing systems to support the timely and accurate production of project management information to improve project decision making. Estimating of capital projects has also featured in his experience to date and he is currently the Manager : Cost Engineering, Sasol Technology.

He was also intimately involved in the development and implementation of this model and has been instrumental in ensuring its successful rollout and acceptance within the Cost Engineering group. This model is now being seen as a valuable tool within the other disciplines in Sasol Technology and a number of the novel ideas and processes within the model have been used elsewhere.

He started work at Eskom in 1980 in the R&D field focusing on designing, developing and implementing measurement and control applications with microprocessor based technology. In 1988 he moved into the Cost Engineering field at Eskom and subsequently joined AECI where he worked for 6 years before joining Sasol Technology. At AECI he was primarily responsible for all Cost Engineering aspects of projects and developed an integrated costing and financial system which was instrumental in supporting the Earned Value concept in use there.

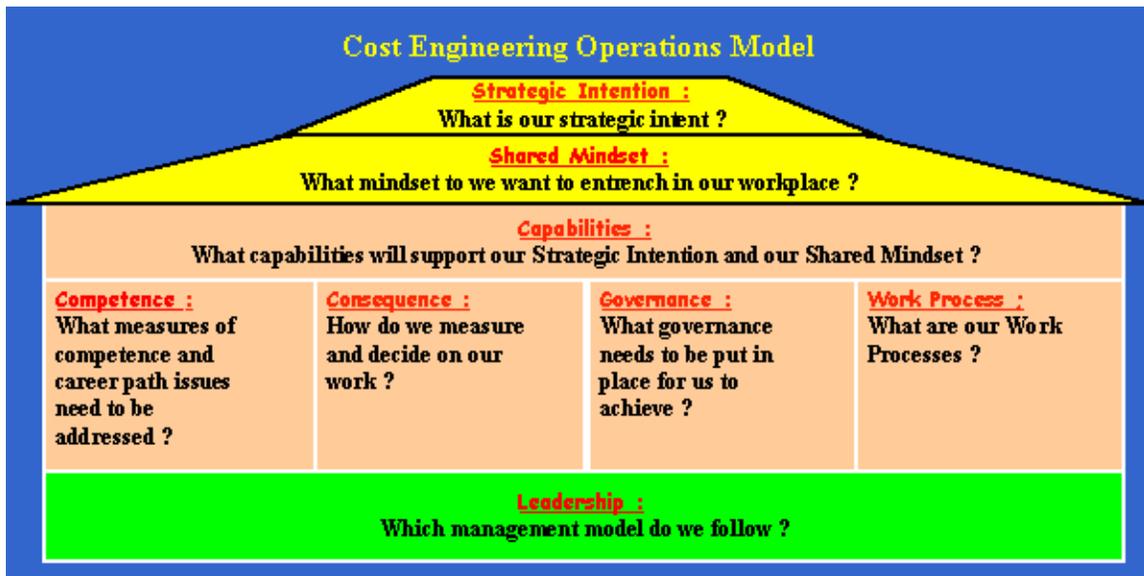
1. Introduction to the Model

In August of 1999 the function of Cost Engineering found itself in the invidious position of being largely directionless, relatively unaware of what its purpose was, having low morale among staff members, low levels of technical knowledge and competence (except for a few individuals who were overworked), a select few individuals blessed with leadership skills, no performance contracting and performance management methodologies in place, no idea of how to make a career out of Cost Engineering and the function was plodding along on a day to day basis doing what it is they thought they should be doing without being in a position to assess if goals and targets were being met.

At about this time the idea was mooted of beginning a radical transformation of Cost Engineering into something significantly better than what was in place. This was at approximately the same time as a company wide intervention, cutting across all the geographical boundaries of the company, had been implemented. The intention of this company wide intervention was to ensure that all functions became site independent implying that no matter where you were located if you were required to work in another location the systems, tools and procedures had to be totally transparent. This intervention also had the intention of improving the technical competence of the various functions by ensuring that each site function was integrated under one functional manager.

In order to effect this change it was firstly important that the Cost Engineering function define what its core business process consisted of. During a six month spell of intensive self analysis a business process was mapped for each sub-function within Cost Engineering. At the time these consisted of Cost Control, Planning & Scheduling, Cost Estimating and Business Economics. Once the process had been mapped a tied analysis was conducted which checked for overlaps in the various sub-function processes. Based on this tied analysis a functional business process was developed for Cost Engineering. With the business process mapped it set the stage for phase two of the transformation.

Phase two of the process was to develop the requisite architectural components for organisational capability best practices to align the people, systems and business process requirements. The author of the model used was a professor Dave Ulrich from the school of business at the University of Michigan. The model is used to diagnose organisational problems and was originally designed to be used as a guideline for the design of integrated business models. By combining the best of a number of processes, but still retaining the original framework, the House Model (shown below) was developed. Using the model as the basis for the Cost Engineering business definition, a period of six months was spent developing all the necessary components reflected in the house model and the result was an excellent operational model of the Cost Engineering business of Sasol Technology.



Once the work had been completed there was still a serious question hanging in the air. Where to from here ? The reason for this was that although the house model is an excellent tool for defining the operational side of the business, there were still elements missing for completion of the wholistic picture. After lengthy deliberations it was agreed that the elements missing from the above model were the **interpersonal competencies and attitudes** required in an individuals' daily working life which are a vital and complementary element of any career model.

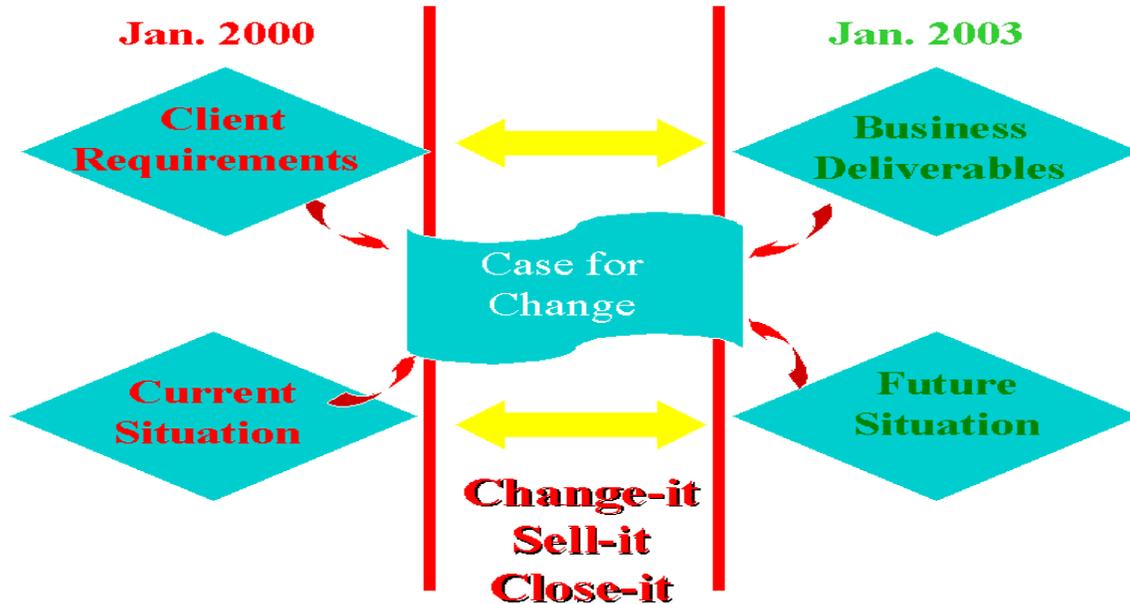
At about this time, and with the team grappling with the issue of which leadership model to follow to complete the picture, the team attended a three day training course on "Leadership In High Performance Work Teams" presented by Nickey Hanekom of High performance Work Systems (HPWS) based in Pretoria. His leadership training course, based on the work done by Kimball & Fischer, brought the leadership philosophy of High Performance Work Teams (aka Self directed Work Teams) as well as the interpersonal elements that the team had been searching for to the table. The problem now was to integrate the two models and come up with a single comprehensive model to address all the necessary requirements stated in the introduction above.

Using the Belgard, Fisher, Rayner six phase implementation model, which works on the fundamental principle that changing to a High Performance Work Team environment is best done by creating a natural "pull" for change, step one of the change process was to develop a proper case for change. This is an important part of the process as it forces one to take a hard introspective look at oneself and develop a desired future state for the function that can be worked towards in order to make the necessary changes required to meet the desired future state. It is also imperative that there is acceptance of the case for change by all parties within the function hence communication and buy-in and imperative to the success of this implementation.

2. Case for Change Process

In arriving at the case for change we had to take a long hard look at certain critical issues. We defined what our current state was and analysed our client requirements compiled after many hours of interviews and workshops. After the self analysis, debate centered on what our business deliverables were, as well as our desired future state, all the while keeping in mind that there were only three business options (routes) we could embark on. These three options were either to sell off Cost Engineering as we were not a value adding service to the business, to close it for

the same reason or to change it and make it a superior value adding function within the company. We decided to make a difference and followed the 'Change It' route and hence our case for change was born from the process depicted below.



Our first Case for Change statement :

Assist Sasol in maximizing ROI through providing all employees with opportunities, support and the skills needed to ensure technical excellence across all sites

At the start of 2000 an inward looking self analysis snapshot of the Cost Engineering function was undertaken. The state described below are the findings resulting from this survey and defined the point of departure for Cost Engineering on our quest to be world class.

- **Low technical knowledge**
- **Low level of competencies**
- **Low leadership skills**
- **No performance contracts**
- **No Service Level Agreements (SLA's)**
- **Low Co-operation between sites**
- **No Knowledge management being actively practiced**
- **No career model in place to assist in development and promotions**
- **Numerous systems & Work Processes**

After lengthy deliberations it was decided that if we could ensure that the following critical success factors were achieved within an agreed timeframe we would be well on our way to achieving that which we were striving for in terms of being world class.

- **Boundaryless organisation**
- **Functional excellence**
- **Defined career path & Personal Development Plan for every employee**
- **Technically competent people**

- **Performance management and measurement system**
- **High Performance Work Teams entrenched as a business culture**
- **Single, Integrated work system (eg SAP)**
- **Alignment of Work Processes**
- **Custodians of money**
- **Motivated work force**

With the above as the target towards which we needed to strive, it was confirmed that High Performance Work Teams (HPWTs) were the right course for us to take when the research findings below reiterated the reasons for us to further develop the HPWT philosophy within the function.

3. High Performance Work Teams (HPWTs)

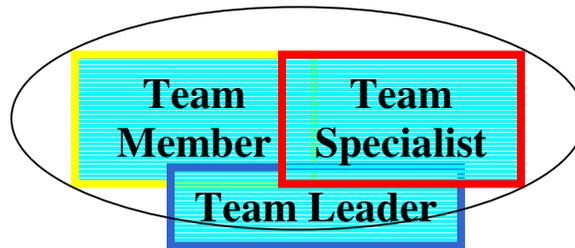
Open systems theory, first applied to organisations in the 1950s, demonstrated the irrefutable ties that organisations have with their surrounding environment. This theory, in its most simplistic form, suggested that organisations could only be viable to the extent that they were able to adapt to forces that were impinging on them externally. Sudden shifts in technology or customer expectations could send even the most successful of organisations on a downward spiral toward bankruptcy. The clear implication of this theory was that adaptation to change and variation should be a more central management concern than stabilisation, conformity and control.

The decision to introduce high involvement management practices should be tied to the demands that the external environment is impinging on the organisation. Put in simpler words, the change to high involvement should be tied to real business needs. If the introduction of the new system is seen as part of an effort to create a "make everybody happy work place" and divorced from the real concerns and issues currently facing the business, then the effort is unlikely to get the support it needs - managers are very good at rationalising away programs that are not seen as directly helping improve the viability of the business.

In many organisations, the decision to introduce high involvement work systems has been directly related to increased competitive pressures that require quicker adaptation to changes in customer demands as well as significant quality and productivity improvements. These "business realities" guided both the decision to change the Cost Engineering environment and helped determine the magnitude of the effort.

The Cost Engineering environment was, in our opinion, perceived as being no different to any other "business" with all its associated customer needs, interpersonal dynamics and business pressures and as such the management team undertook to make the transition to a High Performance work environment. Whilst all of the true characteristics of High Performance Work Teams were not strictly applicable in our work environment, there was more than sufficient belief on our part that the inherent good qualities embedded in this approach, necessitated us needing to follow this leadership model with gusto. Our view was that within 2 years we would have a transformed function producing high quality work, from extremely competent and capable employees, who were passionate about whatever they do.

The core essence and fundamental philosophy of a High Performance Work Team (depicted below) states that it consists of team members, team specialists and a team leader who operate within predefined boundaries in the execution of their work. It is their environment to control and manage (commitment paradigm) rather than for an external party to coerce (control paradigm).



Some primary reasons for the existence of HPWTs are that they :

- **Can react quickly to change**
- **Can deliver higher quality and better customer service**
- **Can constantly improve everything**
- **Improve motivation, satisfaction and production of workers**
- **Constantly learn, self-correct and respond to opportunities**

Some significant characteristics of HPWTs indicate that :

- **Members possess a variety of technical skills**
- **Members are accountable for their work, quality, costs and schedules**
- **Members have interpersonal skills that teamwork requires (communication, feedback, problem solving, decision making etc.)**
- **The Team is constantly encouraged to increase skills, improve the product or service and solve problems**
- **Members are empowered = f(Authority, Resources, Information, Accountability, SKILLS)**

Reasons for teams being successful are :

- **A shared goal / mission that everyone knows and agrees on and is committed to accomplishing**
- **A climate of trust and openness**
- **Open and honest communication**
- **A sense of belonging**
- **Diversity is valued as an asset**
- **Creativity and risk taking are encouraged**
- **Ability to self-correct**
- **Members who are interdependent**
- **Consensus decision making**
- **Participative leadership**
 - **Listening**
 - **Walk the talk**
 - **Motivating**
 - **Developing the team**
 - **Breaking down barriers etc.**

When HPWTs do not work it can essentially be brought back to one or more of the following reasons :

- **Lack of management commitment to the whole process**
- **Impatience or unwillingness to make the necessary personal changes**

- **Organisational unwillingness to provide the necessary budget and time for training to help team members and team leaders acquire new skills**
- **HPWTs should not be seen as a substitute for sound business basics**
- **Conformity tendency especially in large corporations**

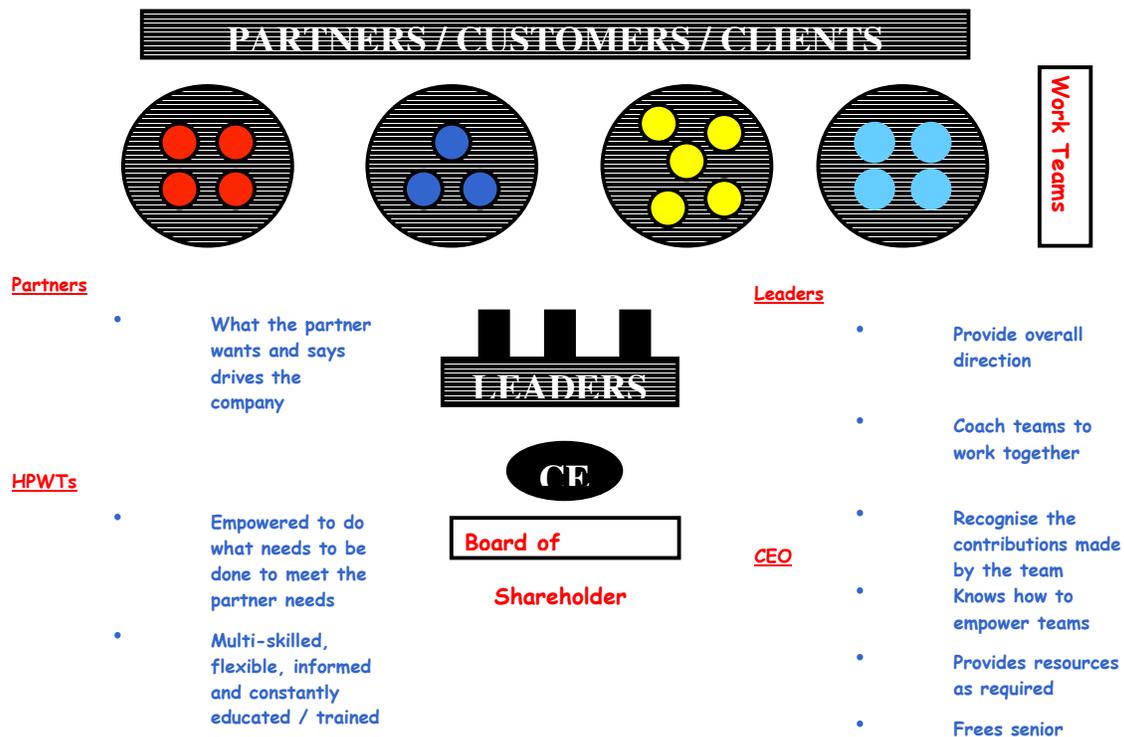
Research has also shown that the primary characteristics of team members, and hence successful teams, can be linked to one or more of the elements below.

- **Understand, support and feel ownership for team's goals**
- **Willing to put team goals ahead of own goals**
- **LISTEN to everyone on the Team**
- **"Task" and "Team" focused**
- **See conflict as useful and necessary**
- **Trust other members of the Team**
- **Communicate openly and honestly**
- **Respect differences and value diversity**
- **Work for consensus**
- **Utilise resources of others**

4. Organisational Structure

When looking at the traditional way of doing business it became very apparent that the preponderance for the usual top down matrix structure was particularly cumbersome with everything typically flowing via the manager or CEO. High Performance Work Teams seek to turn this structure on its head by ensuring that the team members are at the coal face and are accountable and ready to take the risks and decisions required in such an environment. Empowerment is a key element of this and thus it is the team leaders role to ensure that team members are skilled and competent to deal with these day to day decisions and issues. The structure employed in the Cost Engineering function is a combination of a functional matrix (to ensure functional excellence) with a clear and strong element of customer and business area project execution (coal face workings) present.

The model below shows the typical structure of a HPWT environment and also delineates some primary responsibilities for each party. As can be seen the structure is turned upside down compared to the traditional top-down organisational structure and empowerment, teamwork, recognition and the focus on the customer play a key role in the success of this model.

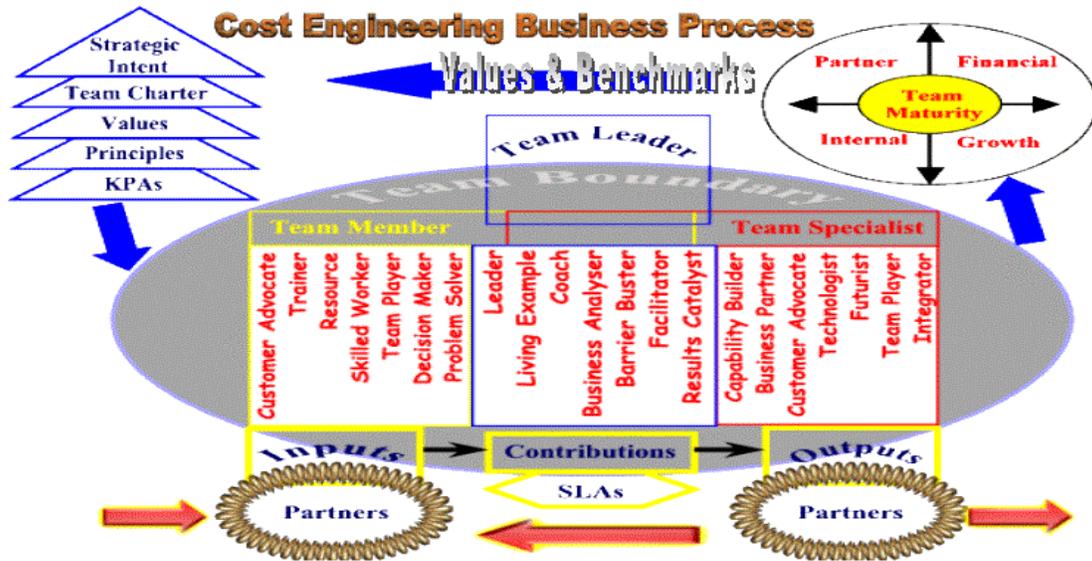


5. Value add business process

Believing in the old adage that one cannot go anywhere without a goal or a direction, and also that you will not know when you have arrived at your destination unless it is measured, a simple feedback loop business model was developed. It is simple from the point of view that it is not rocket science or something radically new. It is just the fact that the process has been packaged into something understandable by all and pictorially depicted as such. Beginning with the strategy (the direction) and the definition of the playing fields (boundaries, values and key performance areas) we see that the parameters and objectives for the team/s have been defined. With the team structure in place and all team members clear in their roles, the execution of the various tasks given to the team becomes perfunctory.

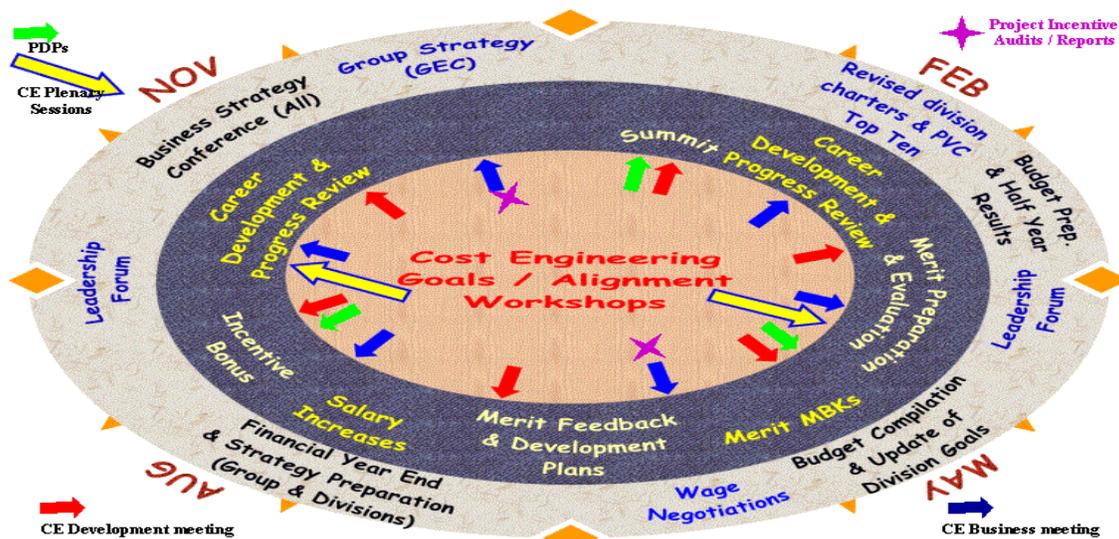
Supporting the team members in the execution of their tasks are the team leaders, and "behind the scenes" a career model guides them as to the requirements for advancement up the career ladder. This career model defines the specific competencies, performance criteria, knowledge, skills and attitudes required by the Cost Engineering teams and team members to execute their daily work. By having these criteria defined the model becomes an extremely useful tool for identifying individual competency gaps and as such, individuals know exactly where they need to focus their development to achieve advancement up the career ladder.

The execution of the work is measured by some particularly relevant key measures (especially Service Level Agreements) to ensure that we are doing what is required and not what is nice to do. The balanced scorecard approach is used here. In addition to the measures developed annually by the function we also benchmark ourselves against what other companies are doing in the industry to determine if we are indeed adding the value where we should and to the level of proficiency that other companies are.



6. Business cycle

As with any business there are predetermined activities which take place on an annual basis and the model below is used as a reminder and pictorial representation of these key activities to show the key business cycles in order to plan activities around them. Such a model is a vital and necessary communication tool to ensure all are aligned and understand what needs to happen, and by when.



8. Job Profiling

Due to the nature of the career model and the manner in which it was constructed it turned out to be a very simple exercise to define a set of job profiles for the various Cost Engineering disciplines. This set of generic job profiles shows the roles required of the member, the competencies required to deliver on the various roles and also the expected complexity of the competence required. A profile applicable to an individual is then used to assess the individual's promotability prospects and as such much of the subjectivity is taken away during the promotion cycles. As a consequence of the profiling exercise competence gaps are usually identified and these then serve as development areas for members to work on. This allows for more accurate development area identification and hence faster promotions as the areas of weakness are clearly identified and worked on a lot sooner. The 85% rule is applied which states that a person who demonstrates that they are operating at approximately 85% of the next highest profile will be considered for promotion. This leads to promotions being tabled for the right reasons and not merely for the sake of promoting people into their own areas of incompetence.

Job Profile Construction (Level 3)

Member Roles	Competencies (Incl. Knowledge & Skills)	Ranges & MOPs Required															
		4				3				2				1			
		4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1
Skilled Worker	Quality Management																
	Portfolio Database																
	Rolling Capital Plan																
Team Player	Team Process																
Decision Maker	Open communication																
	Team Leadership																
Problem Solver	Data synthesiser																
Trainer	Individuals development																
Resource	Change Champion																
	Business Orientation																
Customer Advocate	Customer focus																
Desired Personal Attitude	Creativity																
	Partnering / networking																
	Passion																
	Self Development																

Knowledge & Skills for each Competence

9. Performance Management

Inherent in all of the above is the fact that there needs to be a "delivery" methodology in place which will ensure that we deliver on our promises. This methodology utilises the concept of performance contracting using the "SMART" approach. SMART is the acronym for Specific, Measureable, Achievable, Realistic and Time based. Deliverables which are derived from the corporate and functional strategic drivers are assigned to individuals for completion within a certain contracted time period. In addition there is a team element which, in a similar vein, ensures that the team is working together to deliver on certain issues. Finally a 360 assessment,

focussing on the individuals attitude, is conducted. By modifying and driving certain performance areas it then becomes a relatively simple exercise to energise the whole function towards a common goal and to modify certain behaviours to direct the appropriate energies into achieving certain goals.

10. Strategic Measurement

Utilising the concept of the Balanced Scorecard as developed by Kaplan and Norton, with an additional component depicting team maturity, it is possible to develop a set of measuring instruments that will determine if the stated strategic drive is being met or timeously warn if things are going awry. Bearing in mind that the only resource we have is people, and that it is our competitive advantage, it immediately makes a lot of sense to employ this measuring instrument. By starting in the bottom left quadrant the focus is on ensuring that the correct tools, procedures and practices are in place. If those are in place then it is incumbent on the management team and the individual to develop themselves continuously to ensure they are at the level of competence required for the business and are also at the cutting edge at all times. Monitoring the fiscal discipline of the function and the fiscal impact on projects ensures that if we are prudent in this regard we will in all probability have partners who are satisfied with the product being delivered.



Kaplan & Norton Balanced Scorecard

11. Lessons learned

Vitally important to the success of the whole process are the following key success factors that should be remembered if one is to embark on an implementation exercise of this magnitude. There must be :

- a. **Consistent and transparent communication to all affected parties. After all the question that all people ask is “What is in it for me ?”**
- b. **Management commitment and support of the process**
- c. **Integrity and trust in the inherent contents of the model**
- d. **A commitment to the fact that this is a dynamic and not a static model**
- e. **An understanding that this is not a short term exercise but an on-going transformational process driven by the need to continuously improve in all areas of the business**
- f. **Complete understanding by all with no room for assumptions. Communicate to all, continuously.**

Conclusion and the way forward

In conclusion, we would like to say that that this has been a very rewarding and fulfilling journey. Being at the cutting edge of this development has given the team many frustrating, yet rewarding hours of debate and leadership competence. When one does not know what is expected, or where one needs to go, then gut feel takes over and it was primarily this instinct which drove us to what we have today. The excitement is certainly not going away as we have re-adjusted our targets and decided that world class is no longer good enough but that "BEST IN CLASS" is the only accolade we will accept now. This is uncharted territory but we believe we have the people, the competence and the will to get there with the support of a dedicated and committed team of professionals wanting to make a difference.

References

- 1) Leadership skills program by Nickey Hanekom of High Performance Work Systems, 1999
- 2) Leading Self directed Work Teams by Kimball Fischer, 1993
- 3) Assistance by Dirk Volschenk on the House model of Dave Ulrich
- 4) The Balanced Scorecard by Kaplan & Norton