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Value chain based strategy formulation for mining technical systems

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The management of the Anglo Platinum (AP) mining technical systems (MTS) embarked upon a process of defining the strategy for the MTS department. The newly established department forms part of the greater Group Information Technology (IT). The strategic process took place within an environment that had witnessed a dramatic proliferation of IT implementations across the group within the last three years.

The IT department has been structured in terms of the classical plan, build and run functions with the applications and integration streams running perpendicular across these three functions. The application stream is divided into commercial and mining technical systems with business systems integration the third stream. The mining technical systems department supports mine management to effectively gather, analyse and disseminate data relating to the ore reserve by integrating a number of strategically selected IT applications to ensure that the safety, legal and operational requirements are met. This service to business is rendered by management of a strategic outsource partner via tightly controlled service level agreements (SLAs).

The framework used for creating a mining technical systems department that is empowered to add value to business was formulated using the AP value chain as both the starting point and guiding process to ensure alignment to the greater internal strategy of the business.

Keywords: Platinum, Mine planning, Mining technical systems, Value chain.

Introduction

The value chain is based on the process view of organizations, the idea of seeing a organization as a system, made up of subsystems each with inputs, transformation processes and outputs. Inputs, transformation processes, and outputs involve the acquisition and consumption of various resources such as money, labour, materials, equipment, buildings, land, administration and management. How the value chain activities are ultimately carried out will determine the cost structure and have a material impact on the profits of the company.

Most organizations engage in hundreds, even thousands, of activities in the process of converting inputs to outputs. These activities can be classified generally as either primary or support activities that all businesses must undertake in one form or another.

According to Porter (1985), the primary activities are:

- *Inbound Logistics*—involve relationships with suppliers and include all the activities required to receive, store, and disseminate inputs.
- *Operations*—are all the activities required to transform inputs into outputs (products and services).
- *Outbound Logistics*—include all the activities required to collect, store, and distribute the output.
- *Marketing and Sales*—activities inform buyers about products and services, induce buyers to purchase them, and facilitate their purchase.
- *Service*—includes all the activities required to keep the product or service working effectively for the buyer after it is sold and delivered.

Secondary activities are:

- *Procurement*—is the acquisition of inputs, or resources, for the firm.
- *Human Resource management*—consists of all activities involved in recruiting, hiring, training, developing, compensating and (if necessary) dismissing or laying off personnel.
- *Technological development*—pertains to the equipment, hardware, software, procedures and technical knowledge brought to bear in the firm's transformation of inputs into outputs.
- *Infrastructure*—serves the company's needs and ties its various parts together, it consists of functions or departments such as accounting, legal, finance, planning, public affairs, government relations, quality assurance and general management.

This paper documents the methodology employed to systematically create the following components for the MTS department in order to support the core AP value chain:

- Vision
- Mission
- SWOT (Strengths, Weaknesses, Opportunities and Threats)
- Business needs analysis
- Project selection

Initially the team had to establish all the applications in use by the ten business units. This task was undertaken in a decentralized environment where many of the business units had selected their own software to suit their various needs as their business had progressed. The next step involved assessing user/business needs across the group and

determining what projects business saw as priority and was willing to pay for. Also as part of the process, MTS management actively engaged with the MTS strategic partners in order to maximize the probability of success and ensure alignment of outsource partner resources with future business IT needs.

Furthermore, a framework was established to communicate the strategy across the various functional disciplines using components of the MTS suite of products. The mindset of the organization had to change and be convinced that they needed to take ownership of the MTS strategy and related mining technical systems. This entailed creating a framework that is structured but does not hinder innovation and initiative, while keeping users empowered to shape their own IT future. Finally the overall process culminated in MTS management facilitating the formulation of an efficient budgeting process supported and driven by 'Business'.

By establishing the size of the user base, the licensing structure and the utilization levels of the various applications, AP had prepared a transparent platform from which to conduct future SLA negotiations with the various outsource parties. Effectively, the base for effective vendor/SLA management had been created during the 1990s, when AP first entered into its outsourced agreements. Subsequently a SQL database has been configured to manage a user base of over 1000 MTS users and 50 applications with a team of only two AP personnel. The database also assists with managing all projects in terms of project owners, NPV's, project description, vendor selection, project risk parameters etc.

By following this structured approach business actually formulated their own budget for MTS, facilitated by Group IT. Group IT had in fact, managed to construct a budget not perceived to be driven by 'IT mavericks' in isolation nor pushed by aggressive IT vendors.

The whole process was conducted with the AP value chain as the guiding reference tool. The initial format of the AP mining value chain was conceived in 1998 and that groundwork has served the MTS arena through the Y2K tribulations and on into today's focus on mining graphics and integrated information flows. The AP value chain was revised and reformulated as part of the Group IT strategy effort and now includes the support processes and functions across Anglo Platinum. The recent widespread use and scrutiny of this model has exposed a need for further review at a detailed level but it now constitutes possibly the most complete working business process model in mining.

Discussion

The mining technical systems department is tasked with providing all aspects of IT strategy, development, support and maintenance for the following functions within the organization:

- Planning
- Evaluation
- Geology
- Survey
- Metallurgy
- Safety, Health and Environmental.

In terms of aligning the MTS strategy with both the strategy of the business and the overall IT strategy, the domain of responsibility had to be defined and the value chain was again used as the tool for reference (Figure 1).

By drilling down into the underlying processes and sub-processes of the value chain, the task of mapping the IT systems became relatively simple. The first step is to

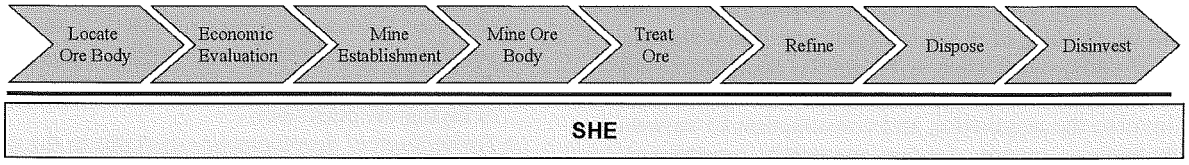

Figure 1. Schematic diagram of the functions supported by the mining technical systems department in terms of the AP value chain

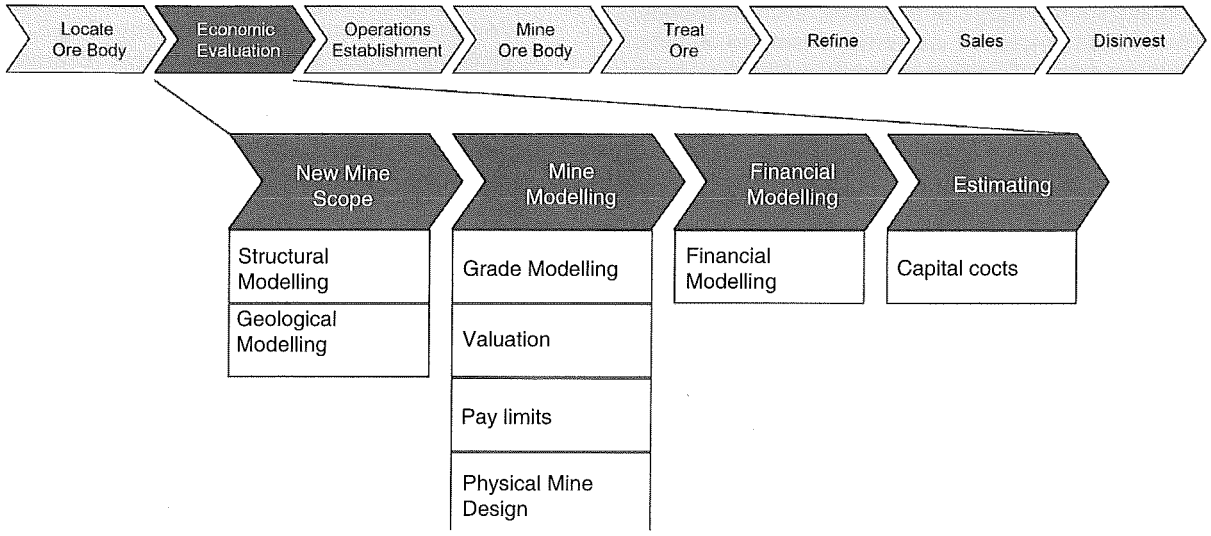

Figure 2. Schematic diagram of the sub-processes within the AP mining value chain

identify the underlying processes and sub-processes in a sequential manner as shown in Figure 2.

After work-shopping with 'Business' and obtaining consensus regarding the composition of the value chain, the next step is to map the applications to the components of the value chain and apply two simple tests, namely the functionality fit test and the system support test. The first test assesses whether the system supports the business functionality requirement and the support test establishes whether there is a SLA in place to adequately address the needs of the user base. A colour-coded system was used to prioritize areas in need of critical attention. This was presented to business for comments and feedback. By taking this systematic approach various areas and systems that had been previously neglected were highlighted and relevant projects identified, ranked and then prioritized accordingly.

Strategy formulation

Vision and mission statements

Before defining the vision and mission statements for the department, the overarching business strategy had to be analysed and understood in order to create alignment between the two. This is no mean feat as various strategies may or may not have existed within the business or departments. By aligning the MTS strategy to 'Business' and simultaneously involving our strategic MTS outsource partner, congruency was obtained within the organization while allowing the outsource partner to structure their service offering to meet our future needs. The vision statement is as follows:

'A stable, cost effective portfolio of mining technical services and technology based solutions enabling Business to maximise the exploitation of planning and control opportunities in the achievement of their objectives.'

The mission statement must encapsulate how the department will meet the needs of 'Business' and also define what the department will become. Also the statement must make it clear to 'Business' what the department is attempting to accomplish. The construction of the statement must be based on the fundamentals of what the department does. The classical framework of plan, build and run was used as a starting point resulting in the visualization of a mission statement as shown in Figure 3.

MTS management then tested their own understanding of the environment as expressed in the mission statement by approaching selected 'Business' customers to critique and comment.

SWOT analysis

The strengths and weakness address the internal managerial aspects of the department while the opportunities and threats deal with the environment external to the department. In preparation for the SWOT analysis the MTS department first defined exactly what is considered internal and what is considered external to their domain of responsibility. Failure to do this could result in misunderstandings with other departments and could potentially result in the incorrect allocation of managerial actions, resources or projects.

Once the SWOT was completed the resultant project proposals or management actions were prioritized then ranked and allocated to the relevant parties for further action. The opportunities and threats aspect of the exercise generally highlighted areas that needed a project management approach in order to resolve the issues.

Business needs analysis

Now that the departmental vision and mission statement had been formulated in conjunction with an intensive SWOT exercise, a questionnaire was designed to extract specific information from a sample of the customer base. The questions focused on a variety of areas that would ultimately determine what was running efficiently and what was not. Also, these one-on-one session's were used to assess both immediate priorities and future 'blue sky' initiatives as viewed by 'Business'.

Once all of the questionnaires had been completed the data was interpreted and analysed for common themes. By identifying common burning issues the MTS department could ultimately focus their efforts and that of the strategic outsource partner on these high priority areas.

After analysing the data the task was to present the

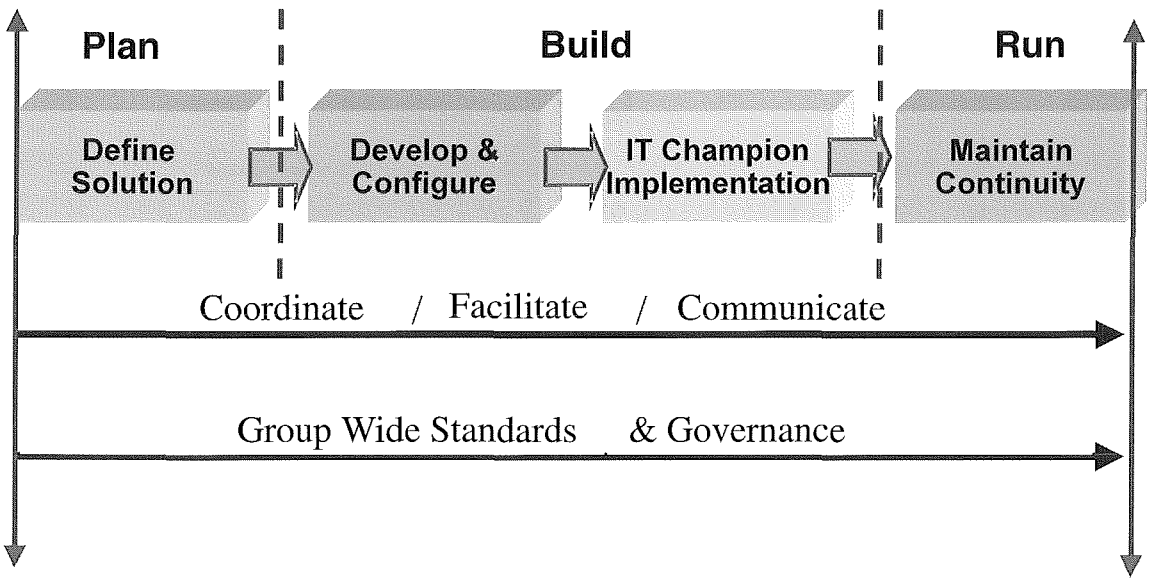

Figure 3. Framework used to derive the mission statement

summarized findings back to the relevant business decision-making forums and discuss various roles and responsibility in going forward as a team.

Project selection

In preparation for the capital expenditure budget (CAPEX), the operations in conjunction with the corporate office had to agree on which projects were to be chosen for the next financial year. Five individual sources had yielded a spectrum of projects namely:

- Mapping of systems to the value chain
- SWOT analysis
- Business needs analysis
- Previous MTS strategic initiatives
- Earlier IT audit documents.

The exercise had initially identified 36 projects that would potentially cost just under R100mil to implement. Obviously the budget could not accommodate this amount so the next task was to rank and prioritize this list of project sin order to meet the immediate needs of 'Business'. The mineral resource management teams at the individual sites were tasked with ranking the projects using the matrix shown in Figure 4.

In terms of the matrix a project is assessed by using two criteria, namely the return of the project versus the risk of the project. The return of the project can be measured in terms of increased revenue, cost savings or a combination of the two. Drivers of revenue were improved grade and reduced dilution, etc., while costs were measured in terms of improved efficiencies relating to personnel, equipment and materials. The internal rate of return was used as the discount rate for the Net Present Value (NPV) analysis. This is in turn plotted against the risk of the project, which can be qualitatively determined relating to its size, time period, clarity of business needs and the proposed technology platform. The grey tints represent a basic form of clustering that was used in an attempt to further classify the projects so they could be allocated to the various areas of expertise. Each business unit had to prioritize all of the 36 projects.

Once the various sites had completed the exercise, the prioritized projects from each site were entered into a simple spreadsheet to assess initially which 18 projects formed the basis for the new budget. After further iteration 14 projects were finally agreed upon. The projects generally focus on grade control, stope width control and safety.

Conclusions

Although this strategic exercise resulted in a MTS strategy that is aligned with business and conceived a budget that is ultimately owned by 'Business', many other positive aspects came from the effort. For example, the relationship with business was defined and cemented going forward. The knowledge gained from the exercise has been actively shared with the outsource partner in order to strengthen this relationship as well.

The Business benefits are that the proliferation of IT vendors within AP has been halted. This results in lower support costs per user as economies of scale prevail. A team comprising both business and IT personnel negotiates all IT contracts which improves the chances of a successful deal that represents fair value to both service receiver and service provider.

The projects selected were qualitatively tested by using simple cause and effect diagrams to establish whether they supported the overall AP strategy. The majority are aligned to the strategic intent of driving AP down the cost curve.

Many managerial actions were identified that may have not been acted upon in absence of the initiative. Roles and responsibilities within the MTS department have been clarified by working according to the value chain, while simultaneously many grey areas that affected the outsource partner have also been ironed out.

The whole process was made simpler by the fact that various user groups were already established and had reached a certain maturity level that encouraged participation and debate. These groups are the incubators for many of the value adding projects that AP are proceeding with presently. The contract with the outsource provider must also be structured in a manner that encourages both initiative and risk sharing.

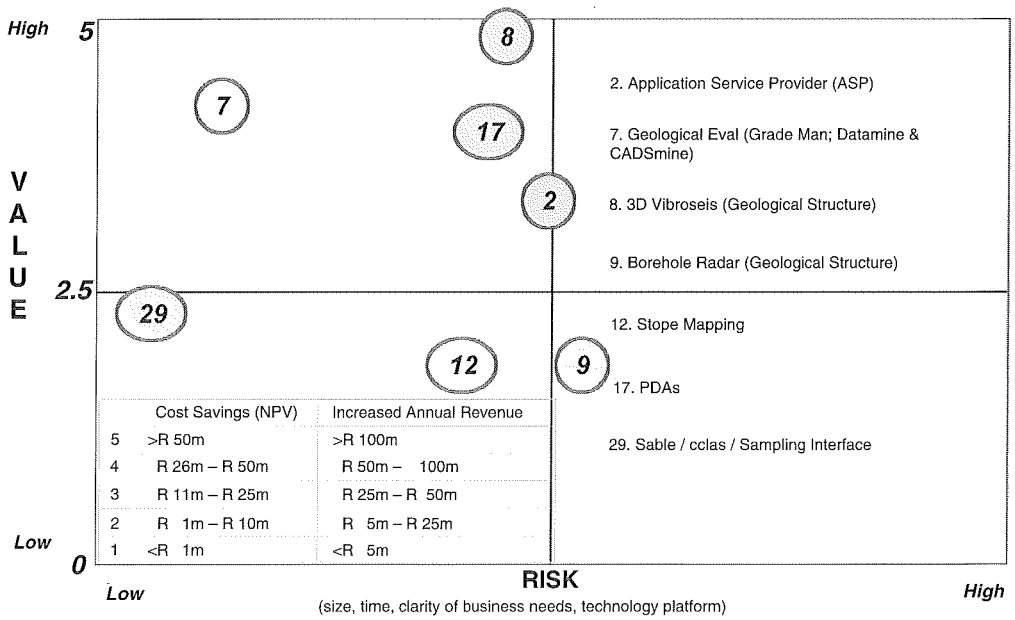

Figure 4. Matrix of Return vs. Risk used to derive mission statement

It is recommended that teams embarking upon this process should work according to the value chain, take a systematic approach and get the support of the executive management team before defining the strategy for the department.

Acknowledgements

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