

# The relationship between the owner's project team and the consultant's project team

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Sustained growth in demand for platinum group metals has resulted in an unfettered increase in new projects undertaken by the platinum producers. These projects are outsourced to various degrees.

The argument of this paper is that both the client's project manager and the consultant's project manager are essential elements in the successful execution of a project. Their roles are not only different but also complementary, and are defined in the paper.

Data gained from considerable experience in the South African corporate mining environment underpins the opinions expressed in the paper. Furthermore, an extensive literary search was undertaken to determine trends in related industries outside the South African context.

Throughout the argument it is emphasized that project philosophy emanates from a systems view and must be treated as an overarching whole. The elements of project management become meaningless unless they are connected to one another and integrated into a cohesive unit.

Advancing the knowledge field of project management is of critical importance to mining investors. There is no doubt that a key determinant of the sustainability of mining business is closely related to the efficiency of all-inclusive project management. From pre-investment and feasibility studies, implementation and execution, to ramping-up to full production, scientific project management has a critical role to play. Guidelines for the pursuance of this ideal are proposed.

The introduction contextualizes the subject matter in an overview of the evolution of mine management in South Africa and abroad. Then, brief insight is given into the philosophy of project management. This exposition is confined to the predispositions, presuppositions and defining characteristics of project management.

The core of the paper looks at the roles of the client's project manager in relation to the consultant's project manager. This section is underpinned by practical experience gained by the author on numerous mining projects. A view is taken of the future of project management in the mining industry.

The conclusion summarizes the argument and aligns project management trends in the mining industry.

## Introduction

Ever since Norwich-born John Taylor concluded that a mining concern should be managed and developed in a rational fashion with an eye on the long term,<sup>1</sup> mine management has been transformed. This process started, roughly, in the latter part of the nineteenth century, and has progressed steadily. Until that time, the prevailing attitude among shareholders was to grab the maximum annual profit with barely a thought for the next year.

Taylor established a model whereby a single team of professional managers could take on the directing of numerous mines, geographically dispersed. This model gave rise to the 'consulting engineer' and was widely adopted by the mining corporates until the latter part of the twentieth century. The head office consulting engineer's department was and still is the mainstay of centralized management that is so prevalent today.

What had also emerged was the trend towards functional specialization in the corporate management structures. So much so that, as functional departments grew bigger, their

boundaries became impervious and their focus myopic.

Self-service and self-indulgence were substituted for competitive advantage and client expectations.

To make matters worse, the era of management consultants dawned upon the mining corporate houses. During the last half of the twentieth century these consultants recommended, for various reasons, that senior managers should not hold a particular office for too long. Thus it became popular for senior managers to rotate offices every three to four years. While this system added to the experience and acuity of the managers, it also had a downside. As the tenure of office of senior managers gets shorter and shorter, it is only natural that managers increasingly look for short-term glory even though this may not be in the best interests of the organization.<sup>2</sup> In a great many projects senior managers have a vested interest in underestimating the capital and time required to bring a project to full-scale production. When the chickens come home to roost, some five to six years later, that particular manager has moved on to another position and can no longer be held accountable.

Today, investors will only consider ventures that are backed up by independent professional studies and proven to have long-term viability.

The mining industry cannot stay impervious to change. New and more effective management practices, based on the application of the scientific method to managerial decision-making, underlies the new way of working. These processes continue to improve and are extensively used in general management practice.

The traditional hierarchical structures are not conducive to efficient project management. Project management, with its strong emphasis on interaction and interdependence among its activities, requires a totally different approach to general management. Project management is a system that is greater than the sum of its parts. Like any other complex system, it becomes meaningless when reduced to its elementary parts. For instance, a human system is not the same as a pile of chemicals. Every element must interact with every other element to function as a whole. This concept is further developed under the sub-heading Project Management Philosophy.

Should project management be outsourced? This question is discussed in line with world trends.

We then turn to the tactical issues—the very tools of project management. What are the functions of the client's and consultant's project managers and how do they interact? A project execution method statement is then defined and developed.

Finally, we take a peek into the future. What areas of project management need further research, and further development to enhance its usage in new mining ventures creation?

### **Philosophy of project management**

In order to understand the underlying concepts of project management, one has to think about it—to think about what project management is, what it does, what it intends to achieve and what its absolute truths are, if any. In short, one has to apply reason, using a special strategy and technique—or philosophy—to get to its true meaning and to justify its thesis. We then have to ask: what are the cognitive processes through which project management evolved from general management?

In the first place, we have to be aware that project management is a separate discipline. It is an accepted science with a theoretical foundation that serves as the basis for research and analysis.

The management strategies and structures introduced in the nineteenth century were predicated upon efficiency and performance. This is an essential characteristic of a steady-state operation relying primarily on repetitive processes. Throughout the twentieth century these theories were developed and broadened as management science developed through the work of Taylor, Gantt, Fayol, *et al.* Although their theories were technically attractive, the results were not in keeping with the expectations.

The next dramatic effect on management thought came with the realization by Mayo that improvement in productivity was to a large extent dependent on social factors such as morale, satisfactory interrelationships and recognition. This gave rise to the behavioural sciences as applied to management.

The behavioural sciences promoted the notion that quality services, products and processes are only possible through quality people. Therefore, human capital or the human resource must be the focal point of any successful

management theory. This conclusion became more prominent as business decisions became more complex and the response time required from managers ever decreasing. It became obvious that the bureaucratic structures of general management could not respond rapidly enough to a changing environment.

This is particularly true of the highly centralized structures that are still evident in the organizations of some of our major platinum producers.

Project management emerged because a number of forces in our society required new methods of management<sup>3</sup>. Of the many forces involved, three are paramount: 1) the exponential expansion of human knowledge 2) the growing demand for a broad range of complex, sophisticated, customized goods and services; and 3) the evolution of worldwide competitive markets for the production of goods and services. All three forces combine to mandate the use of teams to solve problems that used to be solvable by individuals. A further and most important factor must be added to these three. This factor led to the rapid acceptance of project management theory: the highly volatile environment that exists around a project. Only project management, with its flat structures and integrated processes, can effectively deal with the rapid decision-making required in such a dynamic environment.

Project management is a systems-orientated approach to management because it considers the project as a system of interrelated tasks and work units operating in an influential environment<sup>4</sup>. It seeks to unify the planning and work efforts of numerous organizational units to efficiently and effectively accomplish, with minimal trade-offs, the multiple goals of a project.

Because any project is unique, has a finite time period and is also constrained by available resources, a special approach to the management of projects was indicated. This approach was developed by the Department of Defence in the United States of America. Its methods and techniques have been formalized into a Comprehensive Body of Knowledge (PMBOK) by the Project Management Institute of USA. The PMBOK is today globally applied and is the cornerstone of project management strategy.

The system's view looks at the world in terms of relationships and integration<sup>5</sup>. It is the opposite of analytical thinking in which things are broken into progressively smaller parts and more highly specialized disciplines. Systems are integrated wholes whose properties cannot be reduced to those of smaller units. Instead of concentrating on basic building blocks or basic substances, the systems approach emphasizes fundamental principles of organization. In other words, it tends to synthesize rather than analyse.

For this reason, project management must be seen as an integrated whole. Fragmented functional silos that are so characteristic of general management structures, impede the effectiveness of project management. The activity of systems involves a process known as transaction—the simultaneous and mutually interdependent interaction between components. Systematic properties are destroyed when a system is dissected either physically or theoretically into isolated elements. Although we can discern individual parts in any system, the nature of the whole is always different from the mere sum of its parts. Therefore, you fragment a project at your peril!

Another important aspect of systems is their intrinsically dynamic nature. Their forms are not rigid structures but flexible yet stable manifestations of underlying processes<sup>6</sup>.

The system's view questions the popular matrix organizations that are so prevalent in corporate project management structures. Koestenbaum<sup>7</sup> sees it this way: 'Matrix organizations, however, lead to systematic contradictions, to role confusion, to resistance to instructions, to a lessened sense of ownership and to accountability without authority.'

Project management therefore requires structures that are interdependent, autonomous and, above all, structures that are flat. Such structures encourage rapid information flow that leads to rapid decision-making. These ideas are contrary to the strong hierarchical decision-making processes of traditional command and control organizational structures. For this reason, and experience bears it out, only strongly project-driven structures that are complete and independent are recommended for long-term success.

The project management philosophy espoused here should serve to underpin the ideas in the remainder of the paper. It must be understood that philosophy by itself does not solve problems but instead trains the minds of those seeking explanations to solve the problems.

There is no doubt that project management is a specialized activity requiring a specialized approach for its successful execution. This leads naturally into the next section that asks the question whether project management should be outsourced by the corporate platinum producers or confined to the internal management structures.

### **The merits and demerits of outsourcing**

*You don't make sausages in an ice-cream factory ...*  
*Anonymous.*

Outsourcing, by its very nature, is a sensitive human relations issue because it can affect the career development of parties internal and external to the organization. The outsourcing question has only one relevance: will it or will it not improve the sustainable competitiveness of the organization? Specifically in this section we are inquiring into the desirability of outsourcing project management in the platinum producing corporates.

To a large extent, project management in one form or another, is commonly outsourced by the major platinum corporate mining houses. However, from time to time this activity comes under review and the debate starts afresh, resulting in some form of cherry-picking i.e. hiring key members into an in-house project team. This is a high-risk strategy in that it confuses accountability and fragments the project.

By way of benchmarking, let us take the view of leading management thinkers:

When interviewed by George Harris<sup>8</sup> on his book *Post-Capitalist Society*, Peter Drucker said: '...Increasingly you outsource where possible, it is predictable that ten years from now [June 1993] a company will outsource all work that does not have a career ladder up to senior management. To get productivity, you have to outsource activities that have their own senior management. Believe me, the trend towards outsourcing has very little to do with economising and a great deal to do with quality'. In the *Post-Capitalist Society*<sup>9</sup> he goes on to say '... This means a radical change in structure for the organization of tomorrow... It will be the one that has substantial revenues and substantial results, achieved in large part because it itself does only work that is focussed on its mission: work that is directly related to results; work that it recognizes, values and rewards appropriately. The rest it contracts out'.

James Brian Quinn<sup>8</sup> shows that core-competency-with-strategic-outsourcing strategies will allow greater concentration, leveraging, and flexibility than any other strategies presented to date.

Goold and Campbell<sup>11</sup> discuss outsourcing as a means of escaping from activities that are not regarded as sources of competitive advantage. As competition intensifies, firms must concentrate increasingly on activities they do best and offset areas of relative weakness.

These are but a few examples of advocates of the outsourcing idea. There is no doubt that outsourcing is a global strategy that has proved its worth.

Let us now look at the factors, issues and drivers of the outsourcing debate.

Corporates in the platinum industry, and indeed all major industries around the globe, are grappling with fundamental questions about how best to structure their organizations. Restructuring, merging, divesting, in fact any sort of alliancing, are the order of the day. The strategic logic is the quest to become world class, meaning being equal or better than the best in the world. Business processes are being redesigned to achieve dramatic improvements in critical contemporary measures of performance. Corporate agents are urged to sharpen their focus to concentrate on the defined business that they are in. This new drive has resulted in structures that are notably flatter, with many of the redundant middle managers being used in new, technical specialist roles that reflect the organization's changing circumstances<sup>12</sup>. In many of the corporates the middle managers have relocated to organizations whose core functions include the specialization of these individuals.

Senior management in corporates have to be ever vigilant to maintain focus on the rapidly changing environment they find themselves in. This leaves no time to nurture the specialist middle manager, especially if his specialization is not part of the root business.

Furthermore, it has become imperative that the root business be narrowly defined in terms of the ultimate product that the organization is obliged to deliver. Anything outside of this root business should be managed in a different way. Outsourcing is one obvious alternative.

In more colloquial terms 'you don't make sausages in an ice-cream factory'.

Haywood says:<sup>13</sup> 'it is distinctly possible for most client organizations, large and small, to gain great benefit from outsourcing at least some of their non-core functions. In order to do so they will need to work hard at understanding what is possible and it may be necessary for them to seek out or create the ideal providers.'

There is a caveat, however! Outsourcing must be managed just like any other business activity. There is no bigger recipe for disaster than leaving an outsource provider to his own devices. The outsource provider will be chosen for his specialist skills, project management, design, construction management, etc. The input, processes and outputs must be carefully agreed to and monitored throughout the life cycle of the contract.

In selecting the outsource provider, the corporate selection committee needs to be aware that the risks attached to their decision are directly related to uncertainty. They must therefore have a good understanding of the capabilities of the outsource provider.

For an EPCM contract of a value equivalent to a mega-project it is suggested that project maturity level<sup>14</sup> four is indicated. This means that projects are managed with

consideration as to how the project performed in the past and what is expected in the future. Management uses efficiency and effectiveness metrics to make decisions regarding the project and understands the impact on other projects. Project management processes, standards and supporting systems are integrated with other corporate processes and systems.

Another significant driver of the outsourcing initiative is the recent developments of project finance. Lenders increasingly demand an arm's length contractual arrangement with the engineering, procurement, construction and management (EPCM) company. A sponsor who is also an EPCM contractor has an obvious conflict of interest between the lending and the constructing role. The risk of inappropriate contractual arrangements, or a less than rigorous supervision of the EPCM contractor is evident and lenders therefore have to be satisfied that the EPCM relationship is on an arm's length basis<sup>15</sup>. Even if the sponsor has the experience to arrange the work under separate contracts and co-ordinate different responsibilities between parties, this is not usually acceptable to lenders in project finance who want there to be a 'one-stop' responsibility for completing the project satisfactorily since they do not want the sponsor to be caught in the middle of disputes as to who is responsible for failure to do the job correctly<sup>16</sup>.

This brings us to the main section of this paper: the relationship between the client's project manager and the consultant's (outsource provider's) project manager.

## **The relationship between the client and EPCM project teams**

The relationship between the client's project team (CPT) and the consultant's or the engineering, procurement, construction and management project team (EPCM) will be a determining factor in the success of the project. It is essential that a spirit of co-operation, support and respect be nurtured throughout the project life cycle. Should this aspect be neglected, relationships will soon spiral down to an adversarial and pejorative mode with dire consequences for the project as a whole. Therefore it is imperative that much work and effort be directed towards this goal.

More specifically, we can now look at some of the contractual obligations of the parties.

Whereas the EPCM project manager (PM) is accountable for the outcome of the project in terms of performance (P), cost (C), time (T) and scope (S) constraints, it is incumbent upon the PM to determine the project processes. The PM will execute the project with due care and diligence in accordance with the contractual definition of the deliverables.

The client's project team (CPT) will determine the product as specified by them and submitted to the PM before any work commences. To this end, the CPT will draw up a comprehensive user requirement statement (URS). Certain hold points will be indicated by the CPT for which approval must be sought by the PM before work can proceed on any activity. This process will be accurately defined and included in the schedule.

Any other activity such as reviews, audits and option studies will be arranged as parallel activities so as not to impact on the critical path.

It must always be remembered that the PM's professional indemnity insurance requires that the PM has full control over the activities that can attract a claim under this insurance.

To this end it is an absolute necessity that the PM's deliverables be defined in great detail.

This section presupposes that a comprehensive contract exists between the sponsor (client) and the project company (service provider) in the form of an Engineering, Procurement, Construction and Management type of arrangement. The contract allows for the design and engineering of a typical mining project, say a new mine, from inception and ramp-up to full production. The project management requirement includes all the component processes of the nine knowledge areas that define the framework of project management. The New Engineering Contract (NEC) as well as the Federation Internationale Des Ingenieurs-Conseils (FIDIC) contract have been used to good effect in this regard. We should be aware that many of the home-grown type contracts composed by well meaning agents have not the status and standing of international contract forms such as the NEC and FIDIC.

A further presumption is that the sponsor has selected the project company through a thorough pre-qualification process that demonstrates the project company's experience to build successfully the type of project required. This would include providing references for similar projects already built and, where appropriate, references for the technology being employed in the project.

It is unlikely that finance could be arranged for any project where lenders are not convinced that the EPCM has a good record in similar circumstances.

### **Principal tasks**

The client's project manager's principal tasks are to:

- Provide a clear and comprehensive user requirement statement
- Provide a co-ordinated aligned interface between the partners and stakeholders at the project and organizational level
- Position the organization in a strong global (macro) orientation by accelerating implementation of corporate strategies
- Manage extensive political pressure to deliver on unrealistic time frames and cost budgets
- Develop operational and performance standards to ensure quality, to control spending and to reduce time to market (metal)
- Provide structure and practical methods for planning complex and often emergent clients' needs
- Emphasize alignment of project management with corporate strategy and goals and distinct value statements.

The CPT must ensure that the client's corporate strategies, initiatives and goals are thoroughly imbedded into the PM's team. This will be achieved by proactive definition of deliverables, methodologies, specifications, standards and corporate culture.

Once these constraints have been agreed to, the CPT will set up a structure and quality assurance model to assure the efficacy of the processes.

Therefore, the CPT's strategies incorporate, to a large extent, the processes required at a level above the project level—the processes and organizations that provide a foundation for excellence on every project.

As valuable as project management techniques are, they are insufficient to manage the overall corporate business processes. Issues such as discerning what combination (trade-off) of cost, schedule and quality will make the project successful fall squarely into the portfolio of the

CPT. It is the responsibility of the CPT to manage the business case of the project.

In no way must the CPT be involved in the execution of the deliverables because such involvement will blunt the edge of their quality assurance role. Responsibilities will become blurred and the project processes chaotic.

The demands on the client's project manager's project management ability are therefore enormous. Not only must the CPM manage project managers, the incumbent is also required to operate in the area of corporate decision-making and external stakeholder management.

The incumbent to this position must be carefully selected from candidates who thoroughly understand the corporate culture, who understand both the people side of project management and the scientific processes involved. It is most desirable that this executive attained certification as a project management professional (PMP as issued by the Project Management Institute—USA).

Furthermore, without a demonstrable record of successfully managing similar projects, the CPM will have difficulty in commanding the proper authority. How often do we hear project managers complain that the CPM does not understand project management principles and will not allow them to do what they were trained to do? The CPM is a very important role and if the incumbent is ill chosen the project will be in for a rocky ride.

Communication between the two teams (CPT and PM) must be carefully planned so as not to impede the project processes and the consequent project progression. Interaction between these teams must be conducted on a formal and structured basis and confined to technical issues only. Overall project philosophy must only be communicated at the highest level i.e. project manager. We should, however, always be aware of the danger in formalized procedures. They can become orthodox, bureaucratic, and burdened with procedures so that the practitioner loses sight of the real aims.

In the final analysis, the CPM is a macro manager driven by key big picture ideas and uses.

### **Project specification**

The detailed project procedures are developed through a project specification or project execution method statement (PEMS) document. In the first place, this document must be designed to gain senior management support. If this is not accomplished, the project is doomed to failure because all the necessary support systems, down the line, will not be inclined to claim ownership of the project. In the project specification the definition of the project will be clarified. All nine knowledge areas of the project management body of knowledge will be covered. These nine areas include the management of integration, scope, time, cost, quality, human resources, communication, risk and procurement. In addition, elements specific to the type of work should also be covered. In the platinum industry none has a higher priority than human safety. Furthermore, issues such as design processes, environmental facets and even socio-economic factors are often included.

One very important element that should be described in great detail is the logical and orderly hand-over from the project team to the operating personnel. Very often not enough effort is put into this phase and a superficial hand-over consisting mainly of document transfer is thought to be expedient, but this is not conducive to successful project closure. Experience has taught us that such minimal transfer of intelligence and skill is counter productive. An EPCM

contract of appreciable size cannot be handed over in under four to six months after running at full capacity. This means that the total ramp-up phase should also be managed by the project team. After all, this is the most volatile period of the project and it is ironic that steady state management processes are often chosen when project management processes are specifically designed to cope with such conditions.

The important objective of the project specification is to ensure that all the objectives are fully and clearly explained so that the risk of misinterpretation is kept to a minimum.

### **Alignment**

A formal process of alignment between the relevant team members i.e. both the CPM's and PM's teams should take place at the earliest possible time. Mr Patrick Jonsson of Future Horizons has been used with great success on numerous projects to lead this process. He is an experienced facilitator who has a proven record of successfully aligning the various team members. The following notes have been compiled from private communication with Mr Jonsson.<sup>17</sup>

The first step is to review the objectives given to the PM by the CPM and to make sure that the PM understands them and what they imply. The most practical way to accurately obtain this information will be to arrange a presentation from the CPM in person. The presentation should include: objectives, expected results, time frames, constraints, enablers, resources and the environment within which the team will operate. Within this context, the internal team objectives and deliverables, leading the performance measures, will be clearly understood by all the members of the team. The team is now prepared to formulate the traditional purpose statements: charter, vision and mission.

This is just the beginning of the process. Roles and responsibilities will be defined, decision-making and dispute resolution protocols will be put in place and communications strategies determined.

Regular review and evaluation sessions will be planned and must be diligently executed throughout the project life cycle.

There is no doubt that a formal and structured alignment intervention led by an accomplished facilitator will facilitate a sustainable effective and harmonious relationship between the teams and their individual members.

Research has shown that the single most important factor causing project failure is project fragmentation. The project must be seen as an integrated whole where the PM's main function is to co-ordinate and integrate all the elements into a harmoniously working unit. For this integration to be carried out with any authority, all sub-consultants/contractors must be appointed through and by the PM.

A project charter must be established at the outset that will demonstrate client management support for the project and the project manager. This charter must clearly define the project manager's right to make decisions and lead the project.

### **One-stop responsibility**

There is an old adage that says: accountability is one managerial task that cannot be delegated. This is a simple truth that has been known by every good manager from time immemorial. But it is even more applicable in the dynamic world of project management. There must be one

person and only one person whose responsibility it is to make the project work. This may sound harsh when viewed against the multiple and layered structures of our mining industry in which it is not unknown to find 10 to 12 layers of management involved in any one project decision. This fact is common in many global corporates that practise central management. In the words of Norman R. Augustine, retired chairman and CEO of Lockheed Martin Corporation: 'If a sufficient number of management layers are superimposed on top of each other, it can be assured that disaster is not left to chance!'

This aphorism is even more applicable to the project environment. Only the project manager can be responsible for the outcome of a project—and that project manager has to be the hands-on project manager of the outsource provider.

These concepts sound so simple. Why then is there so much tension when projects are implemented in our industry? What does the future hold for project management in the platinum industry? The next section will overview some of the needs.

### The future of project management

*'The future is disorder. A door like this has been cracked open five or six times since we got up on our hind legs. It is the best possible time to be alive, when almost everything you thought you knew is wrong'*—TOM STOPPARD.

Stoppard is not the only eminent thinker who admits to an entropy view of reality. Entropy, derived from the first and second laws of thermodynamics, measures the unavailability of energy to do mechanical work in a closed system. As time progresses, randomness increases and so too disorder and hence the entropy in a closed system. This concept has also been used by many non-physicists to describe economic systems. Henderson, Forrester, Roszak and the pioneer of the process Georgescu-Roegen introduced the entropy concept into economic theory.<sup>18</sup> According to Georgescu-Roegen, the dissipation of energy, as described by the second law of thermodynamics, is not only relevant to the performance of steam engines but also to the functioning of an economy. As thermodynamic efficiency of engines is limited by friction and other forms of energy dissipation, so production processes in industrial societies will inevitably generate social frictions and dissipate some of the economy's energy and resources into unproductive activities.

Henderson has pointed out that the 'dissipation of energy has reached such proportions in many of today's advanced industrial societies that the costs of unproductive activities—maintaining complex technologies, managing large bureaucracies, mediating conflicts, controlling crime, protecting consumers and the environment, and so on—make up an ever-increasing portion of the GNP and thus drive inflation to ever increasing heights'.

What does it teach us? In the first place, there is an unstoppable march towards disorder. Secondly, the pace of this march is increasing at a steady rate. Thirdly, the effects of this change happen almost everywhere at once. Fourthly, our ability to understand this change is crucial to our economic survival.

But, how do we begin to contemplate the future? No one knows the future—only the great Creator of all things has insight into and control over the future. The best we can do is look at what is happening around us, be aware of the

changes and try to understand the fundamental drivers of change. We need to understand that no vision of the present, or the future for that matter, can be complete or final.

The way out of this dilemma is through asking questions and continuing to ask questions about every new situation we perceive in the environment we find ourselves in. Someone once said the right question is usually more important than the right answer to the wrong question.

Let us pose the first question. What is the most significant driver of change that we are aware of? The answer comes readily to mind—the microprocessor. The microprocessor has introduced an electronic awareness into every space known to humankind. Davis and Rees-Mogg<sup>19</sup> identify only three basic stages of human life that have been manifested from its earliest beginnings until now: 1) hunting-and-gathering societies; 2) agricultural societies; and 3) industrial societies. 'Now looming over the horizon, is something entirely new, the fourth stage of social organization; information societies'. A virtual community is beginning to establish itself, even against the understanding of the members of that community. New forms of social organization are being created in the process. These organizations, though competent enough to operate the process, are suffering increasingly from the effects of the psychological stresses induced by the impersonal human-machine interface. If we look around us we find widespread evidence of psychological breakdown.

To create a fulfilled emotional life and a sane psychosphere for the emerging civilization of tomorrow we must recognize three basic requirements of any individual: the need for community, structure and meaning<sup>20</sup>.

Therefore, we can anticipate that the project management environment of tomorrow will put much greater emphasis on the human behavioural sciences. The greatest gain in human productiveness will come in this area.

The human side of project management will be dominated by the individual more so than the current emphasis on the team. Technical and economic innovations will no longer be confined to small portions of the globe.<sup>21</sup> The information revolution will liberate individuals as never before. Those who can educate and motivate themselves will invent their own work and be tethered only by their computer links to clients in the corporate society. This means that bureaucracies as we know them will fade from the scene to be replaced by open non-racial, non-gender, non-sexist societies. In the cyber economy your individualism will come to the fore, putting more emphasis on innovation and creativity. As alluded to before, this situation will intensify psychological stress that could have potentially disastrous effects if not correctly managed.

The Project Management Institute's research programme has indicated that project management has the capability of taking a leading role in facilitating and enabling these changes.<sup>22</sup>

In the platinum industry, as mines become deeper, more complex and therefore more risky, it is obvious that planning and replanning will become critical. Deterministic planning models such as the critical path method (CPM) will no longer be relied upon to give acceptable results. Clients want to know the probability of a successful outcome of their projects. More emphasis will be put on statistical probabilistic methods such as the programme review and evaluation technique (PERT).

In the South African mining sector there has been an important shift in the stakeholder portfolio. The new mining

charter with its emphasis on black economic empowerment and socio-economic upliftment will inevitably have an affect on the practice of project management in the platinum industry. In this respect training and mentoring will become key aspects of the relevant project houses.

Ehyahu M. Goldratt, the doyen of the theory of constraints adds an important addition to the critical path constraint. He maintains that scarce resources needed by tasks not only on and off the critical path but by other projects, are often overlooked.<sup>23</sup>

The critical chain now becomes a combination of the critical path and the scarce resources that together constitute the constraints that need to be managed. To make the critical path run smoothly, he advises project managers to insert a time buffer whenever non-critical paths feed into the critical path, thereby ensuring that the tasks on the critical path will always have what they need to proceed. He further emphasizes the fallacy of controlling cost in favour of protecting throughput. Both these factors are absolutely necessary for project success.

These and many other techniques will have to be learnt and implemented in the new project management environment. Having knowledge and information will be quite sterile if they are not applied effectively. What is needed is knowledge manifested in skill. This is the only way true value will be added to project management in the new millennium.

### Conclusion

Project management philosophy is predicated upon an integrative approach and an ability to deal with the rapid decision-making required by the volatile project environment. Project management embraces a holistic system's approach to business, while at the same time it abhors fragmentation. Fragmentation of the project is the single biggest contributor to project failure. The more a project is fragmented into subprojects, the greater the number of interfaces to manage in order to maintain system integration and therefore the greater the probability of error.

As organizations become more focused on their product, the core business activity, and to add value for their shareholders, they will become more inclined to examine opportunities for outsourcing. Outsourcing provides access to specialist skills and thereby releases core internal company resources to accomplish what matters most: operational effectiveness.

But there is a caveat. Before you outsource your project management function, be absolutely clear of what you want to achieve. The scope and battery limits must be clearly defined and the relationship with the outsource provider be established on a professional basis. The ideal relationship is one of alliance partnering based on trust and goodwill. Be aware that the main benefit of outsourcing is enhanced quality of work rather than cost saving. An atmosphere of trust is absolutely necessary as too many restraints in the path of your consultant will negate exactly that which you intend to achieve—more effective projects. Capitalize on the outside advisor's expertise, knowledge and skills.

Appoint a skeleton project team to monitor the consultant's project team. The main function of this team is to ensure that the client's standards and specifications are achieved. The client's project manager manages above the project level, deflecting disruptive politics from the project team.

It is essential that at the outset and at intervals when it becomes necessary, team alignment sessions be held. At the start of each phase of the project framework, the role players must understand their duties and interactive relationships.

A project specification will culminate in an exact description of what is required from each role player. Furthermore it will delineate the workflow for each phase of the project.

The future of project management in our platinum industry will be driven more and more by global trends in project management. These trends, through the increasing power of the information revolution, will tend to individualize project team members. Information will be freely available to team members who will no longer be in geographical proximity with other team members. This lack of community, structure and meaning in one individual project member's life will introduce psychological stresses not anticipated before. Therefore, there will need to be a significant shift from managerial science to human behavioural science to deal with this new phenomenon.

On the technical front, the shift will be towards knowledge application, or simply a higher level of skill. More sophisticated techniques of analysis will be required but in the end project management will demand an all-embracing synthesizing approach.

Fragmentation, the result of over-analysis, is contrary to the philosophy of project management and therefore not sustainable. Project management, on the other hand, is about integration, putting things together, or synthesis.

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