The South African Institute for Computer Scientists and
Information Technologists

ANNUAL RESEARCH AND DEVELOPMENT SYMPOSIUM

23-24 NOVEMBER 1998
CAPE TOWN
Van Riebeeck hotel in Gordons Bay

Hosted by the University of Cape Town in association with the CSSA,
Potchefstroom University for CHE and
The University of Natal

PROCEEDINGS

EDITED BY
D. PETKOV AND L. VENTER

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SYMPOSIUM THEME:

Development of a quality academic CS/IS infrastraucture in South Africa

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FOREWORD

The South African Institute for Computer Scientists and Information Technologists (SAICSIT) promotes the cooperation of academics and industry in the area of research and development in Computer Science, Information Systems and Technology and Software Engineering. The culmination of its activities throughout the year is the annual research symposium. This book is a collection of papers presented at the 1998 such event taking place on the 23rd and 24th of November in Gordons Bay, Cape Town. The Conference is hosted by the Department of Information Systems, University of Cape Town in cooperation with the Department of Computer Science, Potchefstroom University for CHE and and Department of Computer Science and Information Systems of the University of Natal, Pietermaritzburg.

There are a total of 46 papers. The speakers represent practitioners and academics from all the major Universities and Technikons in the country. The number of industry based authors has increased compared to previous years.

We would like to express our gratitude to the referees and the paper contributors for their hard work on the papers included in this volume. The Organising and Programme Committees would like to thank the keynote speaker, Prof M.C.Jackson, Dean, University of Lincolshire and Humberside, United Kingdom, President of the International Federation for Systems Research as well as the Computer Society of South Africa and The University of Cape Town for the cooperation as well as the management and staff of the Potchefstroom University for CHE and the University of Natal for their support and for making this event a success.

Giel Hattingh, Paul Licker, Lucas Venter and Don Petkov

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ON PROBLEM STRUCTURING IN AN ELECTRONIC BRAINSTORMING (EBS) ENVIRONMENT

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Abstract

Research in the field of Group Decision Support Systems (GDSS) has focused on the following main issues: the Task (task complexity, clarity and rationality); the Individual (the profile of individual group members); the Process (process losses and gains); the Group (composition and size)and the Technology (hard ware, software and configuration settings). Much of the research has focused on group issues. A decision making group consists of two or more people jointly responsible for detecting a problem, elaborating on the nature of the problem, generating possible solutions and evaluating potential solutions. Research on idea generation in a group environment is relatively widespread but there are still areas like facilitator work and problem structuring that require further investigation. To the best knowledge of the authors, there is very little research on the structuring of problem questions in order to maximize idea generation.

In this paper are reported results on laboratory studies at the University of Natal which focus on the problem/question structuring as a means enhancing the quality and quantity of ideas generated during electronic brainstorming (EBS). The case problem area was Information Systems Analysis and Design. Traditionally a survey of major issues on Idea generation and Group Support Systems (GSS) reveals the pre-occupation with the productivity of GSS supported idea generating groups. These productivity issues are social loafing, evaluation apprehension, production blocking. Social loafing is when group members work less than they otherwise would, working by themselves; evaluation apprehension is where group members are concerned about how other members in the group are going to respond to their ideas; production blocking, where members cannot express their ideas as and when they (the ideas) occur to them: they must await their turn. In general, these productivity issues have been frequently researched within EBS environments, so that some definitive solutions have emerged: anonymity to conquer evaluation apprehension; and individual input devices allowing for the simultaneous entry of ideas by members, so that production blocking is virtually removed. In this study some of the issues are explored again within a new environment, **Team Expert Choice**'s Q&B, an EBS module for supporting brainstorming groups. Team EC allows groups to enter ideas anonymously and to enter these as they occur to them. In addition, the pool of ideas is stored on a common database where group members only have to "Refresh Items" in order to view the most recent pool of ideas. With respect to the application area one can note that the literature does not show significant indicators of previous cases of uses of such environments with problems from the area of Information Systems.

The focus of this research is on one of the least researched issues about brainstorming: task or problem structuring (and indeed time structuring) within the brainstorming process to further enhance group creativity and productivity. Two comparable groups were presented with exactly the same task, except in the first instance the problem was posed as a unified all-encompassing problem and in the second instance, the problem was broken down into sub-categories, and the problem serially presented in sub-categories. In addition, a fixed amount of time spent per sub-category was allocated. The total time spent on the entire problem by both groups is the same. It was postulated that the group handling the problem sequentially in sub-categories will generate more ideas and ideas of higher quality. It was also postulated that this group will perceive time constraints which will induce them to work faster and thus add to their productivity.

The results of the experiments show that the group solving the decomposed idea indeed generated more ideas of better quality. The group handling the all encompassing problem not only generated less ideas but focused on only one aspect of the problem. These results endorse that more research needs to be done in assessing the impact on group productivity and creativity of structuring the idea generation problem by breaking it down into problem sub-category . More research is needed to explore the role of task complexity and indeed who should structure or decompose the tasks, the group itself or the facilitator? Nonetheless, the results are conclusive and show the benefits to productivity of decomposing the brainstorming problem into sub-categories.

CHARACTERISTICS OF HIGH-PERFORMING INFORMATION SYSTEMS PROJECT MANAGERS AND PROJECT TEAMS

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Abstract

Projects, and their success, are vital if organisations are to produce new products and services. The key players in I.S. projects are the project manager and the project team. This paper discussed ongoing research of two projects – one that attempts to identify the key characteristics of the I.S. project manager and the other which researches the attributes of a high-performance project team. At this stage, the paper analyses the research literature. (The empirical component of the research projects will be reported at a later stage).

Introduction

The use of projects in organisations and society has increased significantly in recent times. The focus on projects in industry and academia is indicated by the many conferences, large research output, the move to professionalising the role of project manager and the focus on teams.

This research paper is based on on-going research in the areas of Information systems project managers and project teams. Two separate research projects are discussed - one relating to the competencies of project managers and the other relating to the effectiveness of project teams. As both projects are incomplete, this paper will focus on the literature findings only.

The paper first investigates the competencies of I.S. project managers and their managerial style. It then identifies the factors that influence the effectiveness of I.S. teams. It then ties the two areas together in a conclusion.

Definition of a Project

According to McLeod & Smith (1996), "a project is a co-ordinated effort, using a combination of human, technical, administrative and financial resources, in order to achieve a specific goal within a fixed time period." According to Dekom (1987) and PMI (1996), every project is unique because each one tries to achieve something that has not been done before. Young (1996) believes that the goal or objective of a project is "to achieve some specific results that satisfy the needs of an organisation as derived from the current business plans." A project can therefore be described as a "temporary endeavour" (PMI, 1996, p4), where every project has a commencement and a completion date. The duration of a project can range from a few months to several years, depending on its nature (AIPM, 1995; PMI, 1996).

The Nature of Project Management

Reiss (1992) argues that project management is the management of change.

AIPM (1995) defines project management as "the integration of project activity through the project life cycle to achieve the delivery of a defined product or service within prescribed constraints of time, scope and

quality." The process of project management involves the "application of knowledge, skills, tools, and techniques to project activities" (PMI, 1996).

Project management consists of a number of key elements and these can all be found in the guide to the Project Management Body of Knowledge (PMBOK).

The definition of project success depends on the perspective from which the project is examined (Lientz & Rea, 1995). A project can still fail, due to other factors, even if the objectives have been achieved (Lientz & Rea, 1995). A failed project could also be as a result of ineffective use of project management tools and techniques.

The PMI (1996) identify nine key areas of project management that need to be addressed in order to successfully implement a project. Similarly, the AIPM (1995) used a number of criteria with which to rate the competency of project managers based on these key areas. These areas provide the foundation for this paper's research, for reasons explained below.

The Crawford study (1998) identifies the "very reasonable and widely held assumption" that if project managers are *competent*, their projects will be more *effective*, which (as defined earlier) classifies them as *successful*.

There are nine key knowledge areas of project management as described by the Project Management Institute. In each knowledge area, there are a number of sub-processes that describe the issues facing project management today. It is intended to assist companies in dealing with the day-to-day issues concerning project management.

According to the PMI, the framework provides a basic structure for understanding project management. It describes a number of generally accepted management practices that bring about a certain amount of commonality and consensus to a relatively new and fragmented field.

The Nine Key Knowledge Areas of Project Management

Integration Management
This area describes the processes required to ensure that the various elements of the project are properly coordinated. It consists of project plan development, project plan execution, and overall change control.

Scope Management
Scope management describes the processes required to ensure that the project includes all the work required to complete the project successfully. It consists of initiation, scope planning, scope definition, scope verification, and scope change control.

Time Management
Time management describes the processes required to ensure timely completion of the project. It consists of activity definition, activity sequencing, activity duration estimating, schedule development, and schedule control.

Cost Management
Cost management describes the processes required to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting, and cost control.

Quality Management
Quality management describes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It consists of quality planning, quality assurance, and quality control.

Human Resource Management

Human resources management describes the processes required to make the most effective use of the people involved with the project. It consists of organisational planning, staff acquisition, and team development.

Communication Management

Communications management describes the processes required to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of the project information. It consists of communications planning, information distribution, performance reporting, and administrative closure.

Risk Management

Risk management describes the processes concerned with identifying, analysing, and responding to the project risk. It consists of risk identification, risk quantification, risk response development, and risk response control.

Procurement Management

Procurement management describes the processes required to acquire goods and services from outside the performing organisation. It consists of procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract close-out.

Competency Standards of I.S. Project Managers

The Australian Institute of Project Management (AIPM) Competency Standards are the internationally accepted competency standards for project management (PMI). They have been developed generically to apply across a range of industries and enterprises and they are therefore Common Standards with cross-industry application (AIPM, 1995). They are also closely related to the PMI framework, using the identical nine knowledge areas.

To be assessed at a level of competence or to achieve a competency based qualification, evidence of work skills must first be collected. This evidence is then assessed to determine whether the applicant is considered to be competent or not yet competent. Assessment takes place against the Standards. These specify not only what individual project managers and project team members can be expected to do in their working roles, but also what knowledge and understanding of their occupation is needed to underpin these roles at a specific level of competence (AIPM, 1995). Based on these evaluation criteria, project managers can achieve either a Level 4, 5 or 6 competency ranking.

The Crawford study used in the comparative research that follows assigned the following project management roles to each level:

Level 4 - Project team member or specialist
Level 5 - Project manager of a fairly well-defined project or sub-project
Level 6 - Project or programme director responsible for multiple projects

The AIPM (1995) give a variety of uses for the competency standards. They can be used for job evaluations, staff development, recruitment and selection, training and professional development, training needs analysis and planning, job descriptions, assessment and appraisal, course accreditation and qualifications and skills audits.

The benefits that can be derived from these standards take place on three different levels:

1. Individual
They provide a way for the individuals to calibrate their skills and to measure the contribution that the application of their skills makes to the production of project outcomes.
2. Corporate

They provide a way to establish the comprehensive skill patterns most suited to the project outcomes they seek to produce.

3. Industry

They provide a way to ensure continuous improvement as the better performance achievements of one industry or enterprise will translate to improvement in the standards and to the opportunity for reproduction of those achievements by others.

Managerial Styles of I.S. Project Managers

Several authors have suggested that project managers need to possess a number of skills in order to be successful. These can be broken down into two broad categories, namely: leadership/team management and negotiation/communication.

IS managers in the past have relied upon traditional project management practices to manage and control IS projects (Keil, 1995). The traditional approaches are important, but they are based on a rational approach to project management and thus tend to overlook some of the other dimensions and variables that seem to be associated with project failure (Keil, 1995). He therefore encourages project managers to take a broader, more holistic view of project management and consider alternative course of action. Cleland (1996) highlights a shift towards leadership and the ability to influence people rather than control them. He distinguishes the qualities of the "new managers" from traditional managers as listed in Table 1 below:

Table 1. Comparing qualities of 'traditional' managers with 'new' managers

Traditional Managers	New Managers
See themselves as managers-doing things right	See themselves as leaders-doing the right thing
Follow organisational hierarchy	Go wherever needed to work with "stakeholders"
Act within defined organisational structure	Carefully build and use networks
Believe they are "in charge" – "the boss"	Believe in value of teams
Make decisions alone	See themselves as sponsors, facilitators, coaches, co-ordinators
Hoard information	Consensus decision-making
Demand presence of people	Share all information
Meticulously follow policies/procedures	Evaluate people on accomplishments rather than presence
"Command & Control"	Believe policies/procedures are principally a guide to thinking
"Demand" results	Seek collaborative results
Welcome stability/status quo	Entrepreneurs
Communicate when necessary	Welcome/facilitate change
"Rigid"	"Flexible"
Found in appointed positions	Leadership found everywhere in "organisations"
Function-oriented	"Consensus & Consent"
	Process-oriented

Cleland (1996) suggests that the shift may have resulted from the consensus reached among researchers that IS project failure is generally caused by the neglect of behavioural and social factors (Thite & Simmons, 1997). 'New' managers (refer to Table 1) recognise the fact that the person who is performing the job generally has more knowledge about how the job should be done (Cleland, 1996). Furthermore, 'new' managers often have to work together with self-directed teams to plan, organise, monitor and control the

quality and productivity of the self-directed teams (Cleland, 1996). The 'new manager' needs to create an environment of trust where the team members are given more responsibility and control over the project being worked on.

Corresponding to Cleland's conclusion, Bolton (1997) suggests that the approach of coaching, mentoring and encouraging the team is more effective than old management styles of getting results through manipulation of your position. Project managers should manage the project team by empowering the people as opposed to controlling them and exercising project administration (Bolton, 1997).

Negotiation is often necessary to ensure that the stakeholders and the project team have the same perception of the project goals and objectives (Rosenau Jr. MD, 1981). Owens & Webster Jr (Cleland, 1998) suggest that when the expectations of the stakeholders and the project team are united, the project managers are more likely to be allocated the necessary resources to complete the project successfully.

Bolton (1997) maintains that developing trust-filled relationships with users and actively listening to their real issues are key actions of effective communication. Project managers need to be familiar with communication methods such as Joint Application Development (McLeod & Smith, 1996). Webster Jr & Owens (Cleland, 1998) suggest that following key factors of negotiation/communication must be considered by the project manager:

- Support of others in the project organisation – Project managers must be aware of supporters who will provide resources to encourage and assist the negotiator (project manager).
- Time pressures and deadlines – Project negotiation process often take as long as the time limits are given. Project managers could be required to self-impose time limits because deadlines can energise the parties involved in the negotiation process.
- Interdependence – It is essential that project managers are aware of the fact that they must work with and through others to succeed in negotiations.
- Personal attributes – Understanding the personality traits and negotiation style of another can affect the behaviour of the project manager and the results of the negotiation.
- Environmental factors – The project manager must bear in mind factors such as the location of the negotiations, the type of problems facing the parties, the parties past negotiation record, rules related to the agenda and different negotiation approaches of the negotiator.

Teams and Groups

A "team" is a group of people working together.   So is a "group".   Hackman [1990] seldom uses the term "team", but when he does, it is interchangeable with "group".   Cleland [1996] maintains that a team is distinctly different from a group:

- **Groups** emphasise individual efforts within a loosely co-ordinated substructure of the organisation.
- **Teams** rely on integrated efforts aimed at achieving the goals of the team.

Katzenbach and Smith [1993] concur with this distinction, as does Hayes [1997] when she points out that what is often referred to as a team in an organisation is actually nothing more than a working group; lacking the co-ordination, common objectives and sense of teamwork that make a team.

A team functions through **teamwork**, which Verma [1997] defines as a distinctive way of working that combines the skills, strengths and energy of team members, resulting in performance synergy.   Teamwork can be considered the set of norms under which team members operate within the team [Katzenbach and Smith, 1993].   Such norms are not exclusive to teams, and do not ensure team performance.

Verma [1997] takes the view that a team's effectiveness is how the team affects all constituents of the environment in which it operates, including the organisation, the project and the team members.

Furthermore, effectiveness determines the extent to which a team meets its goals, maintains the satisfaction of its members and survives.   Hackman [1990] suggests, from the point of view of defining effectiveness as meeting goals, that establishing effectiveness is difficult in an organisational context, where few tasks have a clear right or wrong answer.   He offers three dimensions of team effectiveness:

1. The extent to which the team's outputs **meet the standards** of those who receive, use or review them.
2. The extent to which the work process enhances the team members' **capability to work interdependently**.
3. The extent to which the experience of working in a team contributes to the **growth and well being of the team members**.

Most authors are of the opinion that a team goes through certain phases in its existence [Hayes, 1997; Robbins, 1996; Francis and Young, 1992; Verma, 1997; Lee, 1998].   General consensus suggests that a team experiences an initial phase of low productivity where team members become acquainted with each other and norms are established, followed by successively more productive stages as the team gells and works together.   A final phase of lower productivity occurs when the team disbands.

From a theoretical base, Katzenbach and Smith [1993] offer a useful model of different levels of team performance, the *team performance curve*, shown below.
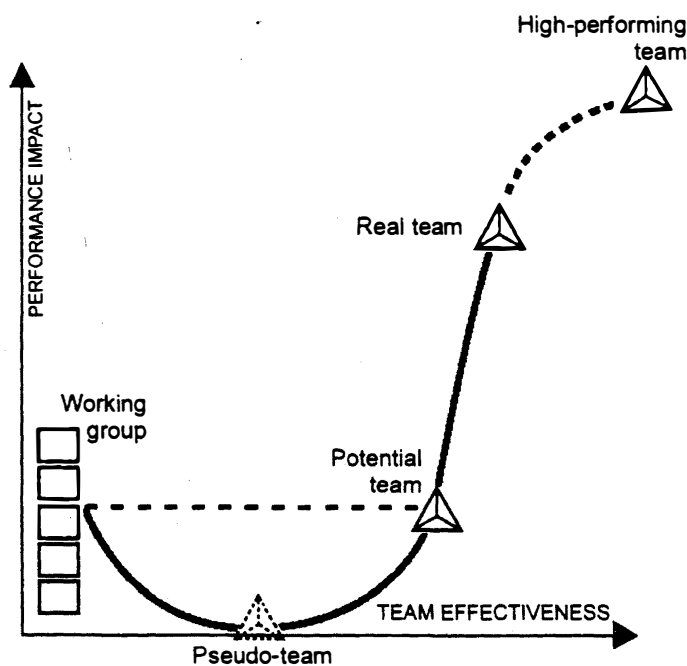
Figure 1. The Team Performance Curve

The team performance curve shows how the performance of a small group of people working together depends on the approach that they adopt.   The model suggests that in increasing order of team effectiveness, groups of people working together may be classified as *working groups, pseudo teams, potential teams, real teams* and *high-performing teams*.   Each of these categories has specific defining characteristics which are discussed below.

- A **working group** is a group of people that work towards common objectives, but do so in a very individual way, such that the group is essentially a sum of individual bests [Katzenbach and Smith, 1993]. A working group may produce good work products up to the sum of each individual's effort, but it never has the levels of interaction, cohesion and sense of mutual accountability that teams do. On the team performance curve, the set of five blocks represents the working group as a sum of individual efforts.

- A **pseudo team** is a group for which there could be a significant incremental performance result, but which does not achieve this due to a lack of focus and effort [Katzenbach and Smith, 1993]. The lowest performing type of team, the pseudo team has no interest in common purpose or performance goals – making the sum of the whole less than that of the individual parts [Katzenbach and Smith, 1993].

- A **potential team** has the need to achieve significant incremental performance, and is actually trying to achieve this. However, this type of team suffers from the lack of a clearly defined goal or purpose and often has not established a collective sense of accountability or identity [Katzenbach and Smith, 1993]. A working group may become a potential team with out the painful pseudo team stage – this is shown by the dashed line between working group and potential team on the model.

- A **real team** is a small number of people with different but complementary skills who are equally committed to a common goal, purpose and working approach [Katzenbach and Smith, 1993; Cleland, 1996; Francis and Young, 1992; Hayes, 1997; Verma, 1997; Hackman, 1990]. The team is task-oriented, has strong performance norms, strong interaction and communication dynamics and a sense of mutual accountability. Its work products are strongly co-ordinated, joint products of high quality.

- A **high performance team** has all the characteristics of a real team. Over and above these characteristics, the members of the team are deeply committed to each other's personal growth and success. This commitment usually transcends the team. A high performance team significantly out-performs all other like teams and also all reasonable expectations, given its membership [Katzenbach and Smith, 1993].

The key point to derive from the above descriptions is that groups of people working together do so in different ways, at different levels of effectiveness. It is clear that there is a range of factors that influence effectiveness (and thus performance). These are listed and examined in depth in the next section.

1. Goal

Larson and LaFasto [1989] observe that highly effective teams have clear understanding of their goals and a belief in the value of those goals. Bodwell [1996] states that goals are clear, simple and measurable units of performance. They exist at an organisational, team and individual level. Katzenbach and Smith [1993] offer six reasons for setting goals: they allow for focus on priorities, they facilitate better management, they result in improved productivity, they offer support for decisions as they are documentable, they assist in the resolution of problems, and they cater for better communication and relationships.

2. Communication

Kinlaw [1993] states that quality communication is appropriate (timely and relevant), concrete (accurate and specific), respectful and team-centred. Verma [1997] and Katzenbach and Smith [1993] both believe that communication with these attributes leads to a clear sense of roles and expectations, better team productivity, better collaboration and problem-solving, improved working relationships,

greater job satisfaction, fewer destructive conflicts and a sense of personal achievement. Essentially, then, good communication makes for a cohesive, effective team.

The key to effective communication, which in turn leads to better team effectiveness, is *open communication*, which facilitates real-time problem solving and initiative [Verma, 1997; Tagliere, 1992; Senge, 1990; Rees, 1991; Bass, 1982]. The members of a team that displays open communication feel that they can speak their minds to any member of the group.

3. Mutual Accountability/Trust

A team's group spirit must support the team. Essential to this is **trust**, which Cleland [1996] observes to be difficult to establish and easy to violate. Larson and LaFasto [1989] and Francis and Young [1992] state that trust and a constructive climate rely on honesty, high energy, respect, consistency and openness. Senge [1990] supports this when he suggests that openness is critical in forming a climate of common purpose where team members are not working cross-purposes. Trust is further essential for good feedback [Katzenbach and Smith, 1993].

Trust is closely related to a sense of mutual accountability [Katzenbach and Smith, 1993]. Mutual accountability is one of the core fundamental identifiers of a real team. It involves the team being responsible for the actions of the individual and vice-versa. This shows that the team is truly a real team and that the members are focused on their goal, the goal of the team [Katzenbach and Smith, 1993; Bodwell, 1996].

4. Identity

A highly effective team has a strong sense of team identity, where team members identify with each other through being part of the team [Verma, 1997]. Identity is created through norms and rules. Verma [1997] defines norms as the informal rules, expectations and patterns of behaviour that teams establish and that are also accepted by team members. Norms and rules are thus vital effectiveness factors as they govern the team interaction dynamic, which in turn impacts team effectiveness and performance [Katzenbach and Smith, 1993].

5. Feedback

An important aspect of teamwork is feedback. Verma [1997] states that feedback helps team members to monitor themselves and encourages in-depth understanding of problems. He goes on to say that there are two types of feedback, namely *feeling* and *factual*. Both of these have positive and negative aspects, but of primary importance is the avoidance of judgmental statements; all criticism should be constructive [Tagliere, 1992]. Cleland [1996] identifies giving good feedback as one of the responsibilities of a team leader. Hayes [1997] states that feedback from the organisation to the team is important (as well as feedback amongst team members).

6. Conflict Management

It is vital that teams are able to resolve conflicts that would otherwise result in reduced performance, resentment and lack of motivation [Rees, 1991]. The ability of a team to examine individual weaknesses and errors without personal attack is crucial to overcoming problems, and members' growth [Francis and Young, 1992]. To a large extent this boils down to good communication patterns based on trust. Rees [1991] states that conflict is a very natural process, but it must be addressed positively when it arises; furthermore, conflict can be a healthy process if constructively managed.

7. Resources

If a team is to fulfil its role in the organisation, it must be given the resources to do so. One of these resources is authority, which the team needs to legitimise the actions it undertakes in meeting its goals [Barker, 1998; Hackman, 1990; Katzenbach and Smith, 1993]. Hayes [1997] further suggests that

teams require six things from their organisation: clear targets, sufficient resources, information, training and education, feedback and technical or functional assistance.

8. Individuality

In a highly effective team, the individuals themselves define the team. Katzenbach and Smith [1993] explain that self-preservation and individual accountability, if recognised and addressed for what they are, become a source of collective strength. If not managed properly, individualism can preclude or destroy potential teams.

9. Work Approach

Rees [1991] explains that a successful group pays attention to not just the content of its work or task, but also to the processes used to do work. Often a team concentrates just on the end goal, not the means to that goal. This can result in hurt feelings, poor performance and impeded progress. Norms and rules are a way to build an effective work method – but are also key to the **identity** of a team. The norms and rules that affect work approaches are more task-oriented, work-driving codes than the broader defining norms and rules that define the team as a whole [Katzenbach and Smith, 1993] (see the description of **identity**). The correct use of standard methods of work, such as methodologies, also forms part of effective work approaches. Measurement helps to quantify the success or value of rules and work approaches [Bader et al, 1994].

10. Performance

A team requires performance challenges to thrive; a lack of performance challenges means there is nothing to nourish and justify the continued existence of the team [Katzenbach and Smith, 1993]. Highly effective teams achieve high performance targets.

11. Role

Research [Verma, 1997; Hayes, 1997; Francis and Young, 1992; Bodwell, 1996] suggests that the definition of roles within a team is an important factor when examining the effectiveness of the team. Francis and Young [1992] state that in order for the definition of roles within a team to be effective, team members must understand their roles, commit to and perform their roles completely, understand the roles of the other team members, build quality relationships with each other and adapt their roles to a changing environment.

12. Skill

Teams need an appropriate balance of skills and abilities, and one should select the people best equipped to achieve team goals [Larson and LaFasto, 1989]. This may seem like an obvious statement, but many managers make the mistake of including individuals in a team simply because they are interested, or because of some organisational relationship that they have with someone already on the team. However in addition to being technically and functionally skilled, members also require the interpersonal skills to collaborate and work together as a team [Larson and LaFasto, 1989].

Bass [1982] and Hayes [1991] stress a third skill required in a team, namely problem-solving ability, which enables the team to identify and overcome problems that would otherwise prevent them from attaining their goal.

13. Learning

Francis and Young [1992] suggest that in an effective team, the team members develop during the lifecycle of the team. One way to achieve this is through **training**, which Hayes [1997] believes increases skills, self-worth and the self-esteem of team members. But training cannot satisfy the need for learning entirely. Senge [1990] states that an individual should seek **personal mastery**, which prepares him or her for being part of a group and being receptive to others' learning, experience, questions and style of thought. The individual is then able to grow within the team by learning from

others. Furthermore, the team itself learns in a similar way to the way that organisations learn through knowledge exchange over time.

14. Fun

Effective teams have fun. DeMarco and Lister [1987] suggest that work tends towards order, which tends towards onerous boredom. As a solution they propose introducing small amounts of disorder into the team situation. This supports the unique social dimension of a real team by building trust and encouraging working together, as well as providing stress relief from pressures [Bass, 1982]. Katzenbach and Smith [1993] state that high performance teams seem to have a better developed sense of humour and have more fun together than teams displaying lower performance or effectiveness.

15. Commitment

Commitment is mental and physical energy directed at a goal [Larson and LaFasto, 1989]. Unless all members of the team are committed to achieving the team's goal, synergy and group spirit will not occur. If any member holds back, it will be to the detriment of the team [Rees, 1991].

Closely related to commitment is cohesion, which Bollen and Howle [1990, in Jones and Harrison, 1996] define as "an individual's sense of belonging to a particular group and his or her feelings of morale associated with membership in the group". Cohesion is derived from the human tendency for social identification [Hayes, 1997], and promotes a high motivation in members to stay with the team and make a contribution. It also makes members more sensitive to each other's needs which leads to better working relationships and trust, which are vital to effective communication. Other consequences are reduced destructive conflict and better social support of members in stressful situations [Verma, 1997].

16. Rewards

Bader, Bloom and Chang [1992] state that a team flourishes in an environment where there is a clear correlation between results and rewards. Verma [1997] stresses that rewards must be aimed at the team rather than at individuals – from his experience teams have failed when rewards have been directed at individual efforts. Rewards given based on individual performance are contrary to the concept of a team [Katzenbach and Smith, 1993], but team based rewards can lead to social loafing [Hayes, 1997].

17. Morale

Verma [1997] suggests that high morale is essential to good team performance. He believes that morale is driven by the job itself, the team, positive management practices and economic rewards and recognition. He goes on to say that morale is tied to motivation, which is key to the desire to achieve, the driving force that pushes teams to reach their goals. Verma [1997] states that motivation is driven by good interpersonal relations, expertise, clear role definition, agreement and distribution of work, a good learning climate, common goals, rewards and recognition, participation and mutual trust and respect. In essence, then, motivation is the sum of most of the factors that contribute to group effectiveness. A motivated group, hence, is likely to be effective.

Conclusion

Project management is important. The key to successful project management relates to how effective the process is. The process is based on key performers – the project manager and the project team. Both require certain competencies and characteristics to be effective. These have been highlighted in the two separate sections of this paper.

The project manager's ability is built on the nine knowledge areas defined by the PMI. These can be placed at three distinct levels of competencies defined by the AIPM. Along with these skills, the I.S. project manager must also have new management abilities defined by Cleland as the qualities of the "New Manager". These qualities take into account new requirements for coaching, mentoring and general encouragement.

The development of a team, and its level of performance, is characterised by the Team Performance Curve developed by Katzenbach & Smith (1993). The 17 factors that influence team effectiveness were identified and discussed.

The empirical research following these literature reviews will provide further insight and support for these findings in the context of I.S. project managers and their teams in South Africa.

Acknowledgements

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