CANDIDATE GUIDE

MANAGE COMPLEX ENGINEERING ACTIVITIES

OUTCOME 4

TABLE OF CONTENTS   PAGE NO.

CANDIDATE INFORMATION

Details	Please Complete details
Name of candidate	
Name of supervisor	
Work Unit	
Name of mentor	
Date started	
Date of completion & Assessment	

COMPETENCY STANDARD REQUIREMENTS

(Direct extract from SAIMechE's Standard of Professional Competency)

LEARNING OUTCOME 4

Manage part or all of one or more complex engineering activities.

Assessment Criteria:

The candidate is expected to display personal and work process management abilities:

1. Manage self
2. Work effectively in a team environment
3. Manage people, work priorities, work processes and resources
4. Establish and maintain professional and business relationships

Range Statement:

Management is demonstrated in the context of complex engineering activities. The team is in general multi-functional or multidisciplinary. Relationships may be primarily as a supplier or recipient of goods or services. Parties to relationship include engineers in same and other practice areas, other professionals, clients, customers.

KEYS TO ICONS

The following icons are used throughout the study guide to indicate specific functions:

	DON'T FORGET/NOTE **This icon indicates information of particular importance**
	CANDIDATE GUIDE **This refers to the learning material in this module which is aligned to the SAIMechE Competency Standard**
	EXERCISES **Practical activities to do, either individually or in syndicate groups during the training process**
	BOOKS AND WEBSITES **Additional resource information for further reading and reference**
	SELF TEST QUESTIONS **Self-evaluation for candidates to test understanding of the learning material**
	QUOTATIONS **Quotations which offer interesting points of view and statements of wisdom and insight**
	YOUR NOTE PAD **Provided for candidate to document notes during presentation of training**

GENERAL GUIDELINES

PURPOSE

This module provides an introduction to the basic concepts that you will need to understand relating the design or development of solutions to complex engineering problems. Easy-to-follow steps based on the assessment criteria of the competency standard will equip you with the skills to:

1. Know the definitions and major concepts relating to engineering
2. Understand the meaning of complex engineering problems
3. Introduce you to the process of managing complex engineering activities
4. Follow the assessment criteria steps when managing part or all of one or more complex engineering activities

This module introduces you to these management concepts and criteria. While it may be impossible and impractical to present in this module all the guidelines pertaining to engineering practice, certain issues of relevance will be highlighted and discussed. You, the candidate are expected to expand your awareness of this process through workplace projects and further reading and learning.

Candidates will have the opportunity to discuss and debate management during the workshop, and thereby understand and be better equipped to use these concepts and processes in the workplace.

LEARNING OUTCOME AND RANGE OF LEARNING

This programme uses the basic structure of SAIMechE's Competency Standard and specifically the assessment criteria to take you through the process of learning, as an understanding of the assessment criteria and the range of understanding required is fundamental to professional competence.

CANDIDATE SUPPORT

Resources	Candidate Guide	The Candidate Guide is a manual covering the theory on the comprehension and development of advanced knowledge and provides guidance on practical exercises to meet the requirements of the assessment criteria
	Candidate Portfolio of Evidence Guide	This is a separate document which provides guidelines for Candidates on how to compile their portfolio of evidence, and a template to structure their practical task evidence into a file format for assessment by the mentor/referee
	Books and websites	Refer to references at the end of the Candidate Guide
	Videos	Refers to any videos that are regarded as relevant to the subject
	Folder enclosures	This includes all handouts, checklists, etc. e.g. "The Engineer's Code of Conduct"
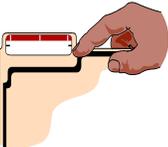
SECTION 1

MANAGE COMPLEX ENGINEERING ACTIVITIES

LEARNING OUTCOMES:

- Understand the concept of complex engineering activities
- Be aware of the concept of relationship and nature of work relationships
- Define and describe what is meant by the word, "manage"

1.0. MANAGE COMPLEX ENGINEERING ACTIVITIES

1.1. Engineering Activities

1.1.1. Activity:

The dictionary definition is "exertion of energy; the state or quality of being active". This has a wonderful engineering flavour as engineering is about energy, about getting something done or made. So here we are dealing with work, an activity requiring energy and therefore direction and focus. But we are not just talking about any activity: we are talking about engineering activities.

1.1.2. What are engineering activities?

Let us go back to Outcome 2 for the definition we used of engineering and then develop that towards engineering activities.

The American Engineers' Council for Professional Development has defined "engineering" as: "The creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behaviour under specific operating conditions; all as respects an intended function, economics of operation or safety to life and property."

So what activities can we identify that relate to the above definition? Here we turn once again to the Competency Standard, as all the activities identified in the Standard are *primary engineering activities.* These are:

- Define, investigate and analyse

- Design or develop solutions

- Comprehend and apply advanced knowledge

- Manage (the subject of this workshop)

- Communicate clearly

- Recognise social, cultural and environmental effects

- Meet all legal and regulatory requirements

- Act ethically

- Exercise sound judgement

- Be responsible

- Undertake professional development activities

The above activities will form the framework within which many sub-activities can be placed, and it is to these as well that we will refer when speaking of engineering activities. Activities include but are not limited to: design, planning, investigation and problem resolution (Outcome 2); improvement of materials, components, systems or processes; manufacturing or construction; maintenance; project management; and research and development. Further activities include computer-aided design, modelling for theoretical development, and machine shop fabrication. In relation to this specific Outcome activities may include recruitment, training, developing, coaching and leading.

Class question: What other activities can you think of? List these:

| |
| |
| |
| |
| |
| |
| |

Explore an interesting website: http://www.discoverengineering.org/

1.2. Complex activities (refer also to the definition in Outcome 1)

Complex Engineering Activities are characterized by several or all of the following:

1. *Activities* involve one or more of: design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; engineering operations; project management; research, development and commercialisation

2. *Boundaries* of practice area change over time, formulate new engineering principles, new procedures, standards or codes, or advancing engineering practice

3. *Context* is complex and varying, is multidisciplinary, requires teamwork, may be unpredictable and may need to be identified

4. Involve the use of diverse *resources* (including people, money, equipment, materials, technologies), high risk or resource intensive projects

5. Require resolution of significant problems arising from *interactions* between wide- ranging or conflicting technical, engineering or other issues

6. Are *constrained* by time, finance, infrastructure, resources, facilities, standards & codes, applicable laws

For more details visit: www.washingtonaccord.org/IEA-Grad-Attr-Prof-Competencies-v2.pdf

1.3. The concept of relationship

1.3.1. Managing people is about managing relationships

The concept of what a relationship is, is very important. Most, if not all, of an engineer's training is focused on the gathering of technical skills. When we go to University or College we are taught and acquire competence in mathematics, physical science and chemistry. We progress onto applied mathematics, thermodynamics, fluid mechanics and perhaps aeronautical engineering. Depending upon which discipline we may be involved in, this could extend to structural design, electronics or pump technology. There may be a course in Industrial Engineering, just for good measure.

Within these areas one will observe a relationship between different parameters such as that between force and distance, or resistance and current flow or stress and elongation. But absolutely nothing about the need for mature working relationships between people. Before any managing can take place there has to be a relationship between people, and the quality of this relationship is fundamental to the effectiveness of the management process. When speaking technically we are speaking of the relationship between things but when speaking of managing we are speaking of the relationship between people. There is a major fundamental difference of which we need to be acutely aware.

1.3.2. What is the definition of a relationship?

According to the Merriam Webster dictionary (http://www.merriam-webster.com/dictionary/relationship):

"The way in which two or more people, groups, countries, etc., talk to, behave toward, and deal with each other"
"The *relation* connecting or binding participants in a relationship"

Relationships are about the way in which people talk to and behave towards each other. Two fundamental words are present here that will lead us to greater depth on the topic. These are "talk" and "behave". Talk is the doorway to communication, fundamental to the concept of relationships, and behaviour defines the interaction between people. How we talk and behave defines the outwardly visible actions that we can observe and evaluate as people are relating. The quality of these actions determines whether the relationship is effective and it needs to be effective if meaningful activities are to take place. The quality of our relationships is the most important factor in determining the effectiveness of our managerial role and the effectiveness of our engineering activities.

1.4. What is managing?

In essence managing is getting things done through other people.

> **"Management** in all business and organizational activities is the act of coordinating the efforts of people to accomplish desired goals and objectives using available resources efficiently and effectively. Management comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal. Resourcing encompasses the deployment and manipulation of human resources, financial resources, technological resources, and natural resources.
>
> Since organizations can be viewed as systems, management can also be defined as human action, including design, to facilitate the production of useful outcomes from a system. This view opens the opportunity to 'manage' oneself, a prerequisite to attempting to manage others."
>
> https://en.wikipedia.org/wiki/Management

1.5. Managing oneself

Effective management starts with the effective management of oneself.

> "Quite simply, if you can't manage yourself, you will not be able to manage anyone else."
>
> *Phillip L. Hunsaker*, Professor of Management
> at the University of San Diego, California

As stated in the definition in 1.4., managing oneself is "…a prerequisite to attempting to manage others".

The management of oneself involves developing self-awareness, applying self-discipline and cultivating emotional intelligence. It is also very important to be sure of your values and how important they are to you. Insight into your personality type will also assist greatly in establishing your areas of strength and weakness. Use of a journal and the input from a trusted coach or colleague to give you feedback are useful techniques to employ during the development of your management skills.

Having a balanced lifestyle involving work, mental activity, physical activity and other aspects is as important a part of managing yourself, as being aware of your personal goals and the interaction between these and work-related goals.

1.6. Managing people

Four basic concepts stand at the base of effective management. These are goal setting, accountability, communication and the development of trust.

All these aspects need to be in place for engineering activities to be managed effectively and for the on-going relationship to be sustainable. Such matters as performance appraisals, recognition practices, reprimands and discipline all have a place in this process.

With these in place, following recruitment, training and development objectives can be achieved by work teams with a high level of efficiency and effectiveness.

1.7 Other resources

Management also involves the managing of other resources. The first of these, the most important, and the resource to which all others point, is the management of financial resources. Business is about making money and in our free market capitalist economic system, this cannot be forgotten.

Material resources such as machines, parts and equipment form part of a manager's responsibility; as does the management of time and natural resources.   Management therefore extends to the planning, organizing and controlling of these resources.

1.8 Part or all/ one or more

Managing is not about doing one thing only. A manager will have to be prepared to be able to structure his life and his time so as to be able to handle part or all of a particular activity and one or more than one activity. This is where the skill of being a manager is expressed as the ability to delegate, organize, control and lead subordinates in such a way as to ensure that all activities are goal-directed and effective.

http://www.slideshare.net/mutex07/peter-f-drucker-managing-oneself-synopsy

GROUP DISCUSSION

1. What are the fundamentals of management?

2. List as many skills as you can think of, that a manager must have in order to be effective.

3. If we define technical skills as those things that a person does directly, and management skills as those things that are done through other people, what ratio of technical to management work would be ideal for a manager?

INITIAL TEST

Complete the Initial Test in Appendix 1 (10 minutes are allocated for this).

SECTION 2

A PRACTICAL MANAGEMENT MODEL

LEARNING OUTCOMES:

- Understand the practical steps to be taken when managing
- Be competent in using the steps to manage
- Be prepared to apply this process in the workplace on a regular and routine basis

2.0. A PRACTICAL MANAGEMENT MODEL

2.1. Introduction

This section will take you through the assessment criteria which form the basis of a practical model which can be effectively used on an on-going basis when managing complex engineering activities.

2.2 Steps in managing

Step 1: Manage self

As stated in section 1:

> "Quite simply, if you can't manage yourself, you will not be able to manage anyone else."
>
> *Phillip L. Hunsaker*, Professor of Management at the University of San Diego, California

Before you can become an effective manager of others you need to be an effective manager of yourself. Managing self is about being aware of your thinking patterns, your emotions, values, and what motivates you.

Self-management also involves self-discipline and the awareness of your personal goals. A key word in all the above is awareness. A manager must be aware of a lot of things and not just operate on autopilot. So let us look at what we need to be aware of.

a. Thought patterns

How aware are you of what you think of during the day? How many of your thoughts are directed by you towards the goals you want to achieve and how many thoughts direct you? It is very important to become aware of what you are thinking at all times, to be mindful of what is going on when you are thinking. Our thinking and our imagination are powerful mechanisms that precede our actions and inform the direction of our activities. Take time each day to consciously focus on what is going on in your mind and observe if the thoughts you become aware of are constructive and directed towards what is the focus of your activities.

There are a number of useful practices that can be undertaken to help you become more mindful of your thought patterns and give you greater insight into what informs your behaviour and your responses. For example, take some time to be aware of what you are thinking throughout the day. This is simple, but not always that easy. Take a moment to simply stop what you are doing, take a few deep breaths and relax, and pay attention to what you are thinking. Become aware of the flow of your thoughts. Write them down, observe and evaluate them.

Another useful practice, which will take about 30 minutes each day, is to journal first thing in the morning. Write down your thoughts in an A4 notebook as they flow. Julia Cameron calls this "stream of consciousness". Note your thinking and resolve to change those recurring thoughts that are not helpful.

For further study go to:

"Mindfulness", by Professor Mark Williams and Dr Danny Penman.

www.franticworld.com

b. Emotional awareness

There was a time when it was believed that all a person needed was a reasonable IQ (Intelligence Quotient) to guarantee success. However, it has become clear that EQ (Emotional Intelligence) is also necessary to ensure that a person will be effective as a manager.

Daniel Goleman introduced the concept of emotional intelligence to direct us towards the importance of understanding the role that emotions play in our relationships. As positive relationships are vital in the workplace, emotional intelligence is of fundamental importance.

The way you react to an event or situation is the key component of emotional intelligence. Once again, ask yourself whether you are in control of your emotional responses or are they in control of you? Can you determine how you will respond to any given situation, or is your response just automatic? How you respond will determine how effective you are in any given managerial situation.

Try this quick checklist taken from Managing People, by Phillip and Johanna Hunsaker, to check your level of emotional maturity.

Am I aware of my feelings and do I act accordingly?	Y	N
Can I share my feelings in a straightforward, composed manner?	Y	N
Do I treat others with compassion, sensitivity and kindness?	Y	N
Am I open to the opinions and ideas of others?	Y	N
Can I decisively confront problem people?	Y	N
Do I maintain a balance between my personal life and work?	Y	N

Also do the "Growth Review Questionnaire" in Appendix 2 in your own time and check your emotional growth progress at 6 monthly intervals.

For further study go to:

http://psychology.about.com/od/personalitydevelopment/a/emotionalintell.htm

c. Are you aware of your values?

Values are enduring beliefs about what you think is important in life. They are the things that you see as worthwhile and they influence the way you behave and expect other people to behave.

For example, do you value punctuality? If you do, you will usually make sure you are on time for meetings and get stressed if some situation makes it difficult for you to get there on time. You would then try to organize your life to ensure, as far as possible, that you get to meetings timeously. You would probably expect other people to also value punctuality and find it difficult to work with people who are always late. As a manager, you would inform your subordinates up front that punctuality is an important value to you, and that you expect their behaviour to reflect this.

If you value a high level of quality in whatever work you are involved in you would find it very difficult to work for an organization that produces poor quality equipment and expects you to support it in the marketplace. Take time to become aware of your values and understand how they impact on your work relationships and thus your effectiveness as a manager.

For further study go to:
http://www.mindtools.com/pages/article/newTED_85.htm

d. What motivates you?

What gets you going? Why do you get up each day and get on with what you do? Is it fear of starving, or the excitement of gaining new knowledge or of having a new experience? Let's look at the definition of motivation taken from Wikipedia:

"Motivation is a psychological feature that arouses an organism to act towards a desired goal and elicits, controls, and sustains certain goal-directed behaviors. It can be considered a

driving force; a psychological one that compels or reinforces an action toward a desired goal. For example, hunger is a motivation that elicits a desire to eat. Motivation is the purpose or psychological cause of an action."

<div align="right">Schater, Daniel (2011). PSYCHOLOGY</div>

So what motivates you? Beyond the basic need to earn an income and provide for food, clothes, shelter and transport, what makes you excited? What are you passionate about? Understanding what motivates you will inform your behaviour as a manager, and help you direct your activities towards those things that you feel energetic about, and contribute towards your effectiveness.

For further study go to:

http://www.mindtools.com/pages/article/newLDR_57.htm

http://en.wikipedia.org/wiki/Motivation

e. The need for self-discipline in a manager

"Discipline is freedom. Now, you may not agree with this statement and you wouldn't be alone. For many of us discipline has become a "dirty" word associated with the absence of freedom. Yet the exact opposite is true."

These are the words of Tom Basson, Springbok gymnast. They reveal a fundamental requirement for a good manager. Discipline in a manager's life develops freedom from unnecessary surprises, and the freedom to observe what is going on in his life so as to make the best decisions and exercise good judgement.

Self-discipline is about having the courage to do what is necessary when it is necessary. If you have committed yourself to meet a client at a specific time to discuss progress on a project, then if you are self-disciplined you will make sure that you arrive at the designated time. This will demonstrate self-discipline and professionalism.

If you have committed yourself to doing a regular amount of exercise because you realize it will make you fitter and therefore more alert and energetic, then sticking to the programme indicates self-discipline and confirms your commitment to doing what is best for you and your career.

Self-discipline enables you to stick to the priorities you have set for yourself during your day which are part of your vision, goals and objectives. Exercising your will power and disciplining yourself to remain focussed will take you step-by-step towards the intended destination.

Time management forms a major component of self-discipline. We all need to manage our time effectively in order to achieve our goals and focus on what is important. To assist in this it is valuable to have a "To do list" which is prioritised and clearly indicates what is urgent and what is important. Work with the diagram below and deal with your activities in the fashion indicated.

High Importance

Do it now

Diarise and set
enough time
aside

High Urgency ─────────────────┼───────────────── Low Urgency

Do it, but do
it fast

Should not be on
your desk

Low Importance

For further study go to:
http://www.studygs.net/discipline.htm
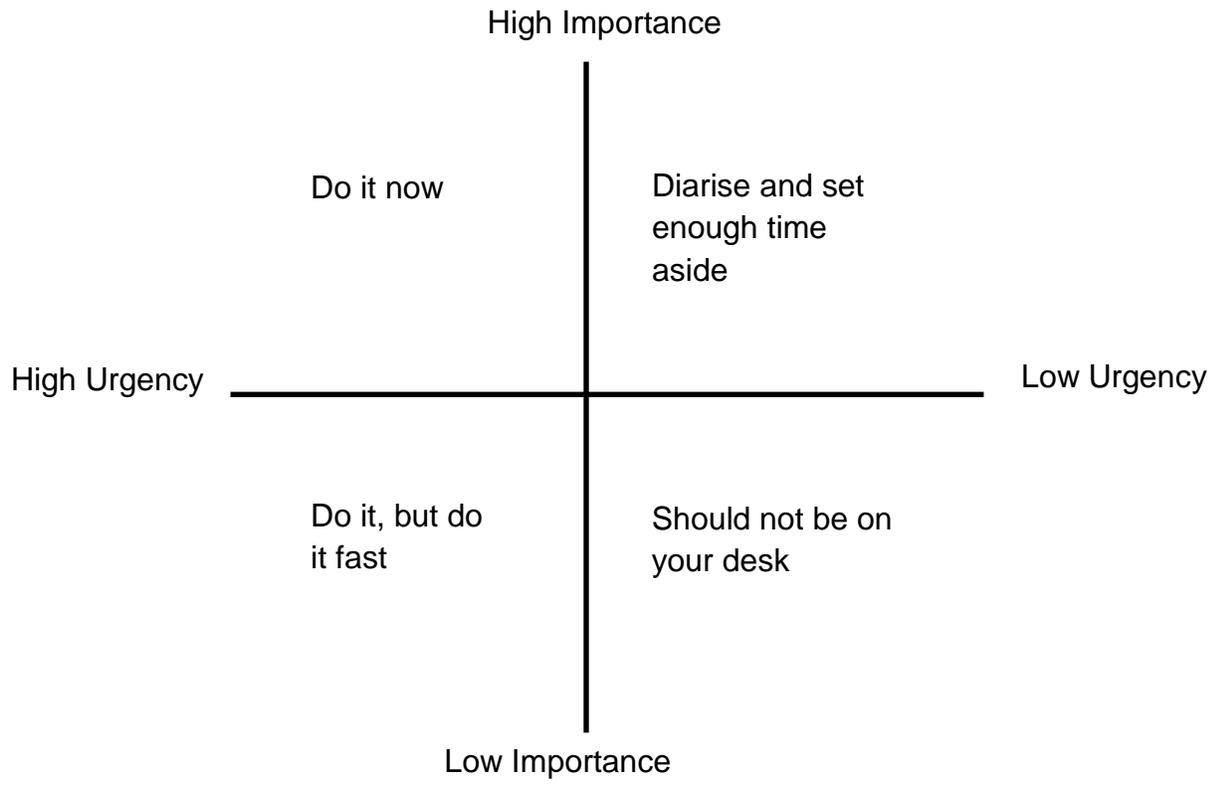
Step 2: Work effectively in a team environment

Lee Iacocca, former CEO of Chrysler Corporation, said: "All business operations can be reduced to three words: people, product and profit. People come first. Unless you've got a good team, you can't do much with the other two".

Because engineering is usually multi-disciplined, an engineer will usually work in a team environment. This means that there will more often than not be other people that you will have to relate to. This takes us back to the concept of relationship and the statement in section 1: "*Relationships are about the way in which people talk to and behave towards each other"*. Two fundamental words are present here that will lead us to greater depth on the topic. These are "talk" and "behave". The way people talk and behave towards each other has a fundamental effect on the strength of a team. You may work in a team as the manager of the team or as one of the members of the team. Whatever your position is, below are some of the important factors that will determine your relationship with your team members and therefore the impact you will have on the team.

a. Mutual respect

Each person in the team must be valued for their unique competencies and capabilities. There may be diversity in the team such as gender, race, age, values and culture. These differences must be respected and all prejudice eliminated and this must be reflected in what you say and do.

b. Effective communication

This is a very important aspect of being a contributing member of an engineering team. So much so that a complete outcome (Outcome 5) will be dedicated to looking at and understanding the importance of effective communication for the professional engineer. For

the time being, we need to highlight some of the fundamental aspects. These are listening, being open to other points of view, and sharing openly and willingly. Being a good listener opens the way to ensuring that what is being communicated is understood. This will ensure that the risk of there being any confusion is reduced to a minimum. Being open to other points of view introduces the concept of flexibility and reduces the danger of jumping to premature conclusions when there may be many different possible solutions to a given problem. Sharing openly and willingly also assist in ensuring that your ideas are made known and form part of the idea pool that will enrich the problem-solving output of the team.

c. Reliability and commitment

Everyone in a team must have confidence that other members of the team will be reliable and committed to the goals and objectives of the team. Team members must be able to trust that things will get done and deadlines met when a commitment has been made. This means that as a member of the team you must be reliable and committed. You must be self-disciplined in your focus on what has to be done so that the team can be sure that you will play your part in ensuring the success of the group. Showing up when you are required to, being punctual and aware of time are fundamental behaviours for the effective professional engineer.

d. Active participation

Being a member of a team implies that you will contribute actively and participate with enthusiasm and focus. When things need to get done, you will put your shoulder to the wheel and engage in the activities of the team, contributing as much as you can to the progress and success of the team. This will mean at times the team will take priority in your life and you may have to reschedule and re-arrange other activities to meet urgent and important deadlines while maintaining a balanced lifestyle so as to ensure your own well-being and your commitment to the team.

For further study go to:

http://www.dummies.com/how-to/content/ten-qualities-of-an-effective-team-player.html

GROUP ACTIVITY

A. Discuss the concept of "Managing Oneself" and list five reasons why it is important to do this.

B. Discuss the concept of "Team Work" and list five characteristics of an effective team player.

Step 3: Manage people, work priorities, work processes and resources

The context within which we manage people must be clear from the start. Within the business environment the context is crystal-clear: it is an environment for making money. Within our so called "Free Market" economy the reason for existence is that of turning a profit. Whatever products we make, we always have a common goal and that is to make more money than we spend. Even within the bigger picture of making a life rather than just a living as we go about our daily activities, we need always to hold as a guiding concept the fact that we have to make money otherwise our operations will cease to be viable.

a. Recruiting and Training

In order to have a team either to work in, or to manage, the first step would be to get some people to be part of the team. Let us have a look at some of the basic requirements in getting together a good team that will enable us to achieve our objectives.

A clear job specification is a fundamental requirement. If you do not know and clearly understand what your team member/s will be required to do, there is little chance that you will get the job done. The job specification would indicate the nature of the tasks the person would have to do, the characteristics of the person required to do the job, together with the level of qualification and competency required. Once this is known then the process of advertising, interviewing and assessing can begin. In most organisations there will be a Human Resources department that will handle much of the administration of this process. It is vitally important that the professional engineer plays an active role in the selection process of the team that will be the major tool that enables him to successfully reach his targets and achieve his goals.

There are many modern tools available to the professional engineer. Developed by clinical and industrial psychologists, they can effectively be used to match the characteristics of

people to the requirements of a job specification. This must be used to ensure a correct "fit" and give the team the best possible chance of being effective.

For further study go to:

http://www.hrfuture.net/recruitment/psychometric-assessments-as-screening-tool.php?Itemid=171

Once the correct people have been selected to be part of your team they need to be trained so that they clearly understand the requirements of the job at hand and can relate their skills and competencies to their new environment. The training must be done by a skilled trainer who is able to not only impart the required knowledge to the new team members, but to also assess them at the end of the process to ensure that they are capable and competent to perform the tasks for which they have been employed. Training must also take into account the different ways that people learn, and accommodate each person so that the training process takes place as quickly as possible, and has the result of creating capable and competent personnel.

b. Goal Setting

Before any work can start, the goals must be clear. Goal setting is a vital part of being a manager. We must know where we are going before we can get there. The time taken to meet with your team, whether it is one individual or a large number of members, will pay dividends as far as meeting deadlines and achieving the objectives required. There are a large number of goal setting techniques available and one can be chosen that works for any specific organisational culture.

One well tried and useful guide to effective goal setting is that of setting SMART goals:

S - Specific: Clear, not vague
M - Measurable: Quantitative progress and completion details
A - Attainable: Challenging, but possible to achieve

R - Relevant: Aligned to the greater objectives

T - Time Bound: Have deadlines and completion dates

For further study:

http://guides.wsj.com/management/strategy/how-to-set-goals/

A valuable goal setting tool is that developed by Ken Blanchard and called "One minute goal setting". He emphasises the importance of writing goals down and knowing what the good behaviour related to achieving that goal looks like.

For further study:

www.stickyminds.com/sitewide.asp?Function=edetail&ObjectType=COL&ObjectId=17181

At work, there will be the need to set goals within the context of the broad vision or mission statement of the organisation. These set the long term outlook. The specific goals assist the organisation to focus and achieve these objectives. Strategic planning may be required to develop plans, policies and procedures according to which everyone must operate, and this will be the context within which the goal setting is done. Specific action plans will ensure the materialisation of the goals and the fulfilment of the greater vision.

On-going routine goals within an organisation will be covered by such specific documents as job descriptions, standard operating procedures or standing instructions. These are valuable management tools that, if used correctly, can assist a manager to be efficient and effective.

For further study:

http://office.microsoft.com/en-us/word-help/write-effective-job-descriptions-HA001189474.aspx

c. Accountability

Goal setting will identify what, and how much, we have to get done. There is, however, another dimension to the requirement and that is the element of quality. To what standard must the task be done? This concept has already been raised when it was suggested that during goal setting a manager must establish what effective behaviour looks like. This introduces us to the idea of quality and performance management within the context of making money.

In reality, people need to be performance managed and the biggest mistake a young manager can make is to think that people will manage themselves and conform to the standards of effective behaviour without being measured and managed. People can be motivated to perform to the required standards through various techniques, including praise and recognition, and an effective manager will use all these to get the work done to the required standard. However, it is inevitable that the occasion will arise when a team member does not perform to the required standard and a reprimand will be required. Once a manager has set a standard for effective behaviour he must take action if the standard is not achieved, otherwise he will lose control and not achieve his objectives. Consistent and fair application of corrective measures will develop trust within the team.

A manager should attempt to reach and maintain the required standards through positive motivational methods like praise and rewards as far as possible, as it is a far more efficient use of time, but must not be afraid to reprimand team members if standards are not maintained. This should always be done in a respectful and consistent manner and dealt with immediately. Managers must be competent in handling matters of discipline and need to familiarise themselves with the requirements of an organisation's disciplinary procedures and the requirements of the various labour laws of the country.

Performance Appraisals are powerful tools for performance management if used properly and should be incorporated into the effective engineering manager's tool box.   As the development of trust is a major role of an effective manager, the correct use of performance appraisals on a

regular and controlled basis will go a long way in developing trust between a manager and his subordinates.

For further study:

http://www.forbes.com/sites/lisaquast/2013/01/21/how-to-make-performance-reviews-relevant/

d. Management of work priorities, work processes and resources

A professional engineer is also required to keep control of work priorities, work processes and other resources, such as time, finance and equipment. Everything that a manager gets done, gets done through other people. If all is in place to ensure the effective management of the team, then the management of work priorities, work processes and resources should present few problems. By delegating responsibility to various team members who are effectively managed, the control of the other resources will be ensured. It must, however, be remembered that even though a manager can delegate responsibility he will always be accountable for the performance of his team members to his superiors. And he will always be accountable for the resource that lies at the base of all team activities: finances. The management of priorities, processes and all other resources are all critical so as to ensure the attainment of financial success.

As project management is often a major activity in the life of a professional engineer, it would be wise to make use of the many computer-based options that are available. They give a manager access to powerful resource management tools that make it easier to keep track of priorities, processes and resources. Having said this, it is important to be aware that the tools used are only as effective as the correct and timeous input of information, and this must be obtained from people who communicate well, are committed, involved, reliable and motivated to ensure goals are met and success achieved.

For further study:

http://www.pmi.org/About-Us/About-Us-What-is-Project-Management.aspx

Step 4: Establish and maintain professional and business relationships

Business relationships are very important to a competent engineer. As business is about making money, and money is made through the work an engineer does for other businesses, it is obvious that the establishment, maintenance and development of good relationships is vital to the success of the business of a competent engineer.

Professional relationships are simply the extension of relationships beyond the team to people outside the organisation. If a manager has developed his skills and become effective within his team(s), he can extend these skills into the business environment with ease. Factors such as mutual respect, effective communication, reliability and commitment, listed in Section 2, will play a vital role in developing business relationships. The success of a business will depend on these relationships being maintained and developed.

There is another issue that must be kept in mind when building and maintaining business relationships: the matter of ethics. Even though all activities within the team environment must be ethical, this becomes highlighted when establishing relationships outside the organisation. To this end, a code of conduct has been developed to provide guidance to competent engineers when conducting business activities. This is also the subject of a complete outcome (Outcome 8) due to its critical role in ensuring a high standard in all the activities of the competent engineer.

ASSESSMENT TEST

Complete the Assessment Test in Appendix 1 (30 minutes are allocated for this).

SMALL GROUP ACTIVITY

Split into two groups and refer to the discipline-specific case study in Appendix 3.

CLASS DISCUSSION

Discuss Case Studies (Appendix 3) and Programme administration.

SECTION 3

GENERIC GUIDING PRINCIPLES

GENERIC GUIDING PRINCIPLES

1. Competency Standard

The SAIMechE Competency Standard is the fundamental document underpinning the journey to Professional Competence. It is the foundation document informing all aspects of the training programme that relates the requirements of competency to the working environment of the developing engineer. It is the standard of practice against which all activities of a competent and professional engineer are measured.

2. Outcomes

The eleven outcomes are the fundamental building blocks on the path to competency. A demonstration of understanding of these outcomes as they relate to the day-to-day working environment will indicate that a level of competency has been reached which will enable the candidate to function at a professional level within the commercial and business environment.

3. Assessment Criteria

The assessment criteria are the requirements against which the candidate is evaluated in order to determine understanding and competency. These are objective criteria which will ensure capability and transparency and set a standard that ensures a proficient level of competency and professionalism as required by industry and in the interests of public health and safety.

4. Range Statements

The range statements set the boundaries of the requirements of each outcome and determine the limits of competency as required for professional practice.

APPENDICES

APPENDIX 1

ASSESSMENTS/TESTS

INITIAL TEST (SECTION 1)

1. List eleven primary engineering activities of a competent engineer.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.

2. List ten other engineering activities.

1.
2.
3.

4.
5.
6.
7.
8.
9.
10.

3. What are complex engineering activities constrained by?

4. Complete the following sentences:

    a. Managing people is about managing _____.

    b. Relationships are about the way in which people _____.

5. What is the essence of managing?

6. Does effective management start with the managing of oneself?

Yes	No

7. Four basic concepts stand at the base of effective management. List them.

1.
2.
3.
4.

8. Of all the other resources that must be managed which is the most important?

9. A manager must be able to manage (you may circle more than one answer):

        a. Part of…

        b. Part or all of…

        c. One…

        d. One or more…

   …engineering activities?

ASSESSMENT TEST (SECTION 2)

1.   What are the four important aspects of managing?

2.1.   Indicate three of the five factors that are important for self-management.

2.2.   Comment in five lines about the important aspects of one of them.

2.3.   What are the two most important criteria used in time management?

3.1.   What are the characteristics of a good team member?

3.2.   Select the one you feel is most important and discuss below.

4.1.   List four important factors in managing people, work priorities, work processes and resources.

4.2.   Why is goal setting important?

5.   Why is it important to maintain professional and business relationships?

APPENDIX 2

GROWTH REVIEW QUESTIONNAIRE

(Adapted from the book *Why Smart People do Dumb Things* by Feinberg & Tarrant, by Stephanie Vermeulen in her book entitled *Emotional intelligence for everyone.*)

This is a checklist to give you an idea of your progress. Tick each item to which your answer is 'yes'. It doesn't matter how many ticks you have. What's important is to check your progress over time.

Complete it now and do so every six months to assess your progress. This will keep you focused on important aspects of your growth. It's like a personal appraisal; and when you see the progress you're making, you'll be rewarded with more satisfaction in your life.

	In the past year	In your personal life	In your career
Have you gained more control over your thoughts?			
Have you gained more control your emotions?			
Have you been on any personal growth workshops?			
Do you have fewer emotional outbursts?			
Have you been controlling your negativity?			
Have you increased your reading?			
Do you question more?			
Do you have more fun?			
Have your relationships become easier and do you enjoy them more?			
Has your stress level decreased?			
Have you increased your relaxation?			
Have you made any new decisions about yourself?			
Have you explored any new talents?			
Do you believe things you never did before?			
Have you thrown out some of your old beliefs?			

	In the past year	In your personal life	In your career
Have you changed your routine?			
Did you learn from your mistakes?			
Do you find it easier to deal with other people?			
Are you more focused in your activities?			
Do you feel more motivated or energetic?			
Did you learn any new skills?			
Have you developed any new friendships?			
Did you change some of your opinions about things?			
Do you like yourself more?			
Do you take pride in what you produce?			
Have you become more inquisitive?			
Have you become more flexible?			
Do you review your beliefs about yourself, life, spiritual existence?			
Have you become more sensitive to other people?			
Are you more excited about life?			
Did you achieve your goals?			
Are you more committed to success?			
Have you dealt with conflict appropriately?			
Do you feel better about your life?			
Have you given up any bad habits?			
Have you developed any new good habits?			
Have you stopped blaming other people?			
Have you learnt anything from other people?			
Has your health improved?			
Are you any happier?			
Are you more in control of your life?			

APPENDIX 3: CASE STUDIES

REFERENCES

Websites:

http://www.ipm.co.za/default.aspx?AspxAutoDetectCookieSupport=1

http://bouncebackhigher.com/articles/effective-leadership-10-timeless-principles-for-managing-people/

http://businesscasestudies.co.uk/cmi/the-importance-of-effective-management/leadership-and-management.html#axzz2aRc4rhOP

Books:

The Seven Habits of Highly Effective People, **Stephen R. Covey** (2004), Free Press

Managing People, **Phillip Hunsaker and Johanna Hunsaker** (2009), DK Essential Managers

The Speed of Trust, **Stephen M.R. Covey with Rebecca R. Merril** (2006), Simon and Schuster

RECORDING OF REPORTS

Formats for recording the portfolio of evidence

During the course of the candidate phase training, the Candidate will accumulate a portfolio of evidence comprising the reports supporting the various exercises covered in these guidelines for each Outcome.

Note that the PDP Administration will provide a web site document system that will allow the candidate to store all the PDP documents created as a back-up facility and will enable the candidate to allow access by the Mentor for any reviews that are required.

ASSESSMENT PROCESS

Guide to the Candidate

You will be assessed against Outcome 4.

In order to determine your level of competence you will be tested by:

- Tests done during the workshop and evaluated by fellow candidates and your mentor
- Written assignments (practical tasks given to demonstrate understanding of this Outcome through application in a work setting)
- Knowledge assessment and presentation (i.e. 10 minutes oral presentation using Power Point). Please Note: Oral presentations may need to be taped for moderation and re-assessment procedures.

You will need to prepare yourself in the following ways:

- Familiarise yourself with the contents of this guideline
- Familiarise yourself with the reporting formats required
- Familiarise yourself with the references listed
- Do the written assignments as required by this workshop
- For oral presentations of reports, a ten minute presentation is required to summarise the exercise performed

Note:

A detailed briefing on the exact requirements was given to you by the Mentor/Assessor at the Introductory Workshop in order for you to prepare for the assessment process.

The evidence you will be judged on includes:

- Your proven competence in all areas questioned in the presentation (Competent or Not Yet Competent)
- The practical tasks compiled in your Portfolio of Evidence

Good luck, and remember, the mentor/assessor is there to help you.