Create and manage an environment that promotes innovation

Learner Guide

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Training & Development

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UNIT STANDARD 252020

Title

Create and manage an environment that promotes innovation

NQF Level

5

Credits

6

Purpose Of The Unit Standard

This Unit Standard is intended for managers in all economic sectors. These managers would typically be second level managers such as heads of department, section heads or divisional heads, who may have more than one team reporting to them.

The qualifying learner is capable of:

- Analysing own unit in terms of opportunities for innovation.
- Demonstrating understanding of the techniques that promote creativity.
- Developing a plan for creating an environment conducive to innovation.
- Leading a team through a creative thinking process.

Learning Assumed To Be In Place And Recognition Of Prior Learning

It is assumed that learners are competent in:

- Communication at NQF Level 4.
- Mathematical Literacy at NQF Level 4.
- Computer Literacy at NQF Level 4.

Unit Standard Range

- The learner is required to apply the learning in respect of this/her own area of responsibility.
- Unit refers to the division, department or business unit in which the learner is responsible for managing and leading staff.
- Entity includes, but is not limited to, a company, business unit, public institution, small business, Non-Profit Organisation or Non-Governmental Organisation.

- Innovation is the bringing into being of something that did not exist before, i.e. a product, process or idea. Innovation happens when two or more ideas merge, that have never been merged before.
- Techniques for encouraging creativity include brainstorming, mind mapping, lateral thinking and problem solving techniques.
- Steps for solving problems include defining and analysing the problem, generating solutions, analysing solutions, selecting the best solution and developing an action plan.
- Stakeholders include team members, managers, customers, suppliers and interest groups.

Specific Outcomes and Assessment Criteria:

Specific Outcome 1

Analyse own unit in terms of opportunities for innovation.

Assessment Criteria

- Identify features of an environment that promotes innovation.
  - **RANGE** The features of an environment conducive to innovation include openness, creative thinking, questioning, encouragement of risk-taking, rewards for innovation, as well as a culture of enquiry, challenging the status quo and learning from mistakes.
- Analyse own unit in relation to the features of an environment conducive to innovation.
- The findings of the analysis are interpreted to determine whether the current environment promotes innovation.
- Areas for improvement are identified on the basis of the analysis conducted.

Specific Outcome 2

Demonstrate understanding of the techniques for promoting creativity.

Assessment Criteria

- Creativity and innovation techniques are identified in terms of generally accepted theory and practice.
- Three techniques for promoting creativity are explained with practical examples.

Specific Outcome 3

Develop a plan for creating an environment conducive to innovation.

Assessment Criteria

- The role of the unit manager in creating an environment conducive to innovation is described with reference to continuous improvement and innovation of the unit.
- The processes, actions and approaches necessary to create an environment conducive to innovation are recorded in the plan.
  - **RANGE** The plan could include the activities, techniques, approaches, processes, role players, reward systems, measurement, potential risks and benefits, and skills development of the unit manager and team members.

- The implementation of the plan is described with reference to the environment and availability of resources.
- The plan is promoted within the unit in order to encourage commitment.

Specific Outcome 4

Lead a team through a creative thinking process.

Assessment Criteria

- Techniques for promoting innovation and creativity are applied to generate ideas for a new or improved process, project or product.
- A number of alternative solutions are generated in relation to the process, project or product.
- The best alternative is selected from the solutions generated on the basis of evaluation criteria.
- A concept is developed for implementation in accordance with the entity's policies and procedures.
- The concept is recorded and communicated for implementation.

Unit Standard Accreditation And Moderation Options

- Anyone assessing a candidate against this Unit Standard must be registered as an assessor with the relevant ETQA or an ETQA that has a Memorandum of Understanding with the relevant ETQA.
- Any institution offering learning that will enable achievement of this Unit Standard must be accredited as a provider through the relevant ETQA or an ETQA that has a Memorandum of Understanding with the relevant ETQA.
- Moderation of assessment will be overseen by the relevant ETQA according to the moderation guidelines and the agreed ETQA procedures.

Unit Standard Essential Embedded Knowledge

- Features of an environment conducive to creativity and innovation.
- Features of a culture of enquiry and risk taking.
- Creative thinking techniques.
- Problem solving techniques.
- Management practices that inhibit creativity, risk taking and innovation.

Critical Cross-field Outcomes (CCFO):

Unit Standard CCFO Identifying

Identify and solve problems in order to generate innovative solutions.

Unit Standard CCFO Working

Work effectively with others when generating new ideas.

Unit Standard CCFO Organising

Organise and manage oneself and one's activities when participating in creative and innovative processes.

Unit Standard CCFO Collecting

Collect, evaluate, organise and critically evaluate information when generating ideas.

Unit Standard CCFO Communicating

Communicate effectively with stakeholders on innovative ideas generated.

Unit Standard CCFO Science

Use science and technology to assist with idea generation and to record ideas.

Unit Standard CCFO Demonstrating

Demonstrate an understanding of the world as a set of related systems and how innovations in one area could impact on another.

Unit Standard CCFO Contributing

In order to contribute to the full personal development of each learner and the social and economic development of society at large, it must be the intention underlying any programme of learning to make an individual aware of the importance of:

- Participating as responsible citizens in the life of local, national and global communities.
- Developing entrepreneurial opportunities.

SECTION 1: ANALYSE OPPORTUNITIES FOR INNOVATION

Specific Outcome 1

Analyse own unit in terms of opportunities for innovation.

Assessment Criteria

- Identify features of an environment that promotes innovation.
  - **RANGE** The features of an environment conducive to innovation include openness, creative thinking, questioning, encouragement of risk-taking, rewards for innovation, as well as a culture of enquiry, challenging the status quo and learning from mistakes.
- Analyse own unit in relation to the features of an environment conducive to innovation.
- The findings of the analysis are interpreted to determine whether the current environment promotes innovation.
- Areas for improvement are identified on the basis of the analysis conducted.

1.1 Analysing Opportunities for Innovation

Innovation is the introduction of new ideas, products, services, and practices which are intended to be useful (although a number of unsuccessful innovations can be found throughout history).

Let's explore innovations in well known business sectors.

Business Sector	Company/ Source	Innovation
Mining	Coal mines in Mpumalanga	Acid mine water treated and used for farming
Mining	Sasol	Oil from coal
Medical	EMI laboratories	Cat scan
Communications	Vodaphone	3G HSDPA
Communications	Telkom	ADSL
Financial services	Banks	Telephonic and on-line banking

Innovation leads to change which will impact your business sector as competitors strive to improve their product and service offering. It will also impact your business and department, as your customer needs and expectations change.

Change is achieved by realigning your people, processes and technology to develop a capability that supports the innovation and leads to the desired behaviours.

In order to maintain competitive advantage and market share, a business may need to adopt a new strategy as products and services are introduced to the business sector.

Consider the innovation rivalry in the local cell phone market. Maintaining market share is all about finding new and improved ways to attract and retain clients. MTN followed in the footsteps of Vodacom when the 3G card was introduced to the South African market. Vodacom's next step was the quick introduction of HSDPA.

The introduction of these new services by Vodacom raised expectations of the South African public.

Innovations can include:

- Products and services that meet customer needs (new opportunities)
- Products and services that address customer "pains"
- New processes that improve service delivery and accessibility
- Technology that improves service delivery and accessibility
- New ideas

Let's look at the potential impact of innovations in the Telecommunications business sectors:

Innovation	Positive Impact on the Business Sector	Negative Impact on the Business Sector
Cell phones	Introduction of new players into the telecommunications sector Alternatives to Telkom Communication flexibility and accessibility for the customer	Cost of initial infrastructure requirements

The introduction of cell phones has an impact on Telkom. Telkom had to explore the introduction of new services to try and maintain market value with landline users. Telkom's service offerings have expanded to include:

- Internet services
- Line services
- Call services
- Network solutions
- Phones and equipment
- International services
- On-line services

As with any business, innovations that impact the business sector and raise customer expectations, will impact your business and your department.

a. Innovation

Innovation is the bringing into being of something that did not exist before, i.e. a product, process or idea. Innovation happens when two or more ideas merge, that have never been merged before.

✓ *The Pros and Cons of Innovations*

Pros and Cons of an innovation should be investigated from various perspectives. At first glance one would immediately think of the pros and cons for your business and for your customer. However, the value chain needs to be taken into consideration. The value chain refers to "a sequenced set of primary and support activities that a business performs to turn inputs into value-added outputs for its external customers."

Consider all role players involved in the delivery of that service or product to the customer. Pros and cons must be considered for all the people involved as you are only as strong as your weakest link.

So the first step is to determine all the stakeholder perspectives you will need to consider. Include the pros and cons from an internal and external perspective. The internal focus refers to your business/department and external focus could refer to the customer, your suppliers, your distributors and your competitors.

Let's consider the following example. In the 1990's a Management Consulting firm introduces the concept of e-learning. This is a new training product, where a learner within a business accesses a course via the internet and studies at his own pace, and is tested by the system during the process.

A few examples are given to illustrate how this is completed.

Stakeholder	Pros	Cons
Management Consulting Firm	Pioneers the product Potential increase in market share Potential additional revenue	May experience technical problems with the first few attempts Market may not be disciplined enough at self-managed learning to be interested Start up costs
Training and Development Department	Can sell a combined solution of instructor led training and e-learning Develop new skills Expansion	Has to develop skills to support technology based product Start up costs
Customer (businesses)	Alternative to trainer based learning Managed within own time constraints Limits the effect on operations Creates a culture of learning Sliding scale used to	Learners may not have technical skills to support using this medium Learners may not be disciplined Companies may be hesitant to be the "first" International material may be costly due to

Stakeholder	Pros	Cons
	reduce costs with increased number of learners	import costs
Suppliers	Additional business Promotes brand name e.g. Harvard	Need delivery of international products within expected timeframes Limited supply to one distributor (if negotiated)
Competition (other firms who offer training and development solutions)	Have an opportunity to contact alternative suppliers Can learn from the "pioneers" mistakes	May not have capital to secure product May not have international supplier May not have technical expertise

b. Features of an Innovative Environment

We have seen that management need to come up with creative solutions to the challenges presented by globalisation and the advancement of technology.
You might say that that is easier said than done. In fact, you may be thinking, "I'm not one of those creative types who can invent great new gadgets or dream up new ideas in a split second." Remember, that often the only difference between creative and uncreative people is self-perception. Creative people see themselves as creative and give themselves the freedom to create. Uncreative people do not think about creativity and do not give themselves the opportunity to create anything new.

So, what is creativity?

Creativity is the bringing into being of something which did not exist before, either as a product, a process or a thought.

You would be demonstrating creativity if you:

- Invent something which has never existed before
- Invent something which exists elsewhere but you are not aware of
- Invent a new process for doing something
- Reapply an existing process or product into a new or different market
- Develop a new way of looking at something (bringing a new idea into existence)
- Change the way someone else looks at something

In fact, we are all creative every day because we are constantly changing the ideas which we hold about the world about us. Creativity does not have to be about developing something new to the world, it is more to do with developing something new to ourselves. The world changes with us when we change ourselves. Our actions affect the world, and we experience the world in a different way.
Creativity can be used to make products, processes and services better and it can be used to create them in the first place. By increasing your creativity, you, your organisation and your customers become happier through improvements in your quality and quantity of output.
Being creative may just be a matter of setting aside the time needed to take a step back to ask yourself if there is a better way of doing something. Edward de Bono calls this a 'Creative Pause'.

He suggests that this should be a short break of maybe only 30 seconds, but that this should be a habitual part of thinking. This needs self-discipline, as it is easy to forget.

Another important attitude-shift is to view problems as opportunities for improvement. While this is something of a cliché, it is true. Whenever you solve a problem, you have a better product or service to offer afterwards

✓ *Features of a Culture of Enquiry and Risk-Taking*

While one's innovative abilities are partially genetic, the expression of creative talent is dependent on several cultural aspects of the work environment that either stimulate or suppress innovative thinking.

Companies who wish to create an innovative work culture must not only hire creative individuals, but must also support and embrace an environment that is conducive to innovation.

Just as we may need to change our thinking about innovation and creativity, we need to encourage an attitude shift in our team members too. Multiple inputs stimulate thought and creativity. We all have different experiences, backgrounds, ideas and perceptions that can lead to greater innovations.

As a leader, you should create opportunities for innovation.

So how can we encourage our immediate team, the larger group and our stakeholders to participate in the innovation process?

A system should be put in place that allows key stakeholders to contribute to the innovation process.

Total Quality Management is a method by which management and employees can become involved in the continuous improvement of goods and services. Ford Motor Company, Phillips, Toyota and Motorola have all implemented TQM. The objective of TQM is to do the right things right, the first time, every time". The activities within TQM include:

- Buy-in and commitment from the senior management team
- Buy-in and commitment by all employees
- Meeting customer needs and expectations
- Just in time delivery of products and services
- Improvement teams
- Reducing product and service costs
- Systems that facilitate continuous improvement
- Ownership by line management
- Recognition and reward
- Challenging goals and benchmarks
- Improvement processes and plans
- Strategic planning

Total quality management cannot be achieved without the inclusion of innovative thinking from various stakeholders. Establishing improvement teams is the key step in taking innovation forward. The improvement teams will work on the feedback that is obtained from quality circle meetings and other methods for gathering feedback.

Getting the immediate team to participate in innovation

Set up channels that allow your immediate team to identify problems or opportunities and to share ideas on innovative actions to address/action these. Select a variety of channels so that input is encouraged. Channels could include:

- **The Idea Room -** Ideas are posted on a notice board in the room. Meetings are held in this room and innovative ideas are explored.
- **E-mail -** Problems or opportunities are e-mailed to the team and they are asked to think of ideas to address them prior to the next team meeting.
- **Innovation workshops -** Workshops are held with the team to brainstorm innovative ideas for the customer and the department.
- **Graffiti wall -** A graffiti wall is set up on a notice board for staff to post ideas.
- **Quality circle meetings -** Meetings are held with the team identify ways in which quality can be improved upon to meet and surpass customer expectations.
- **Innovation pro-forma -** An innovation pro-forma is a template that allows ideas and solution to be expressed and delivered directly to senior management. The importance of the process is to get feedback on the ideas returned to the employees within an agreed upon turn around time.

Refer to the template example of the pro-forma.

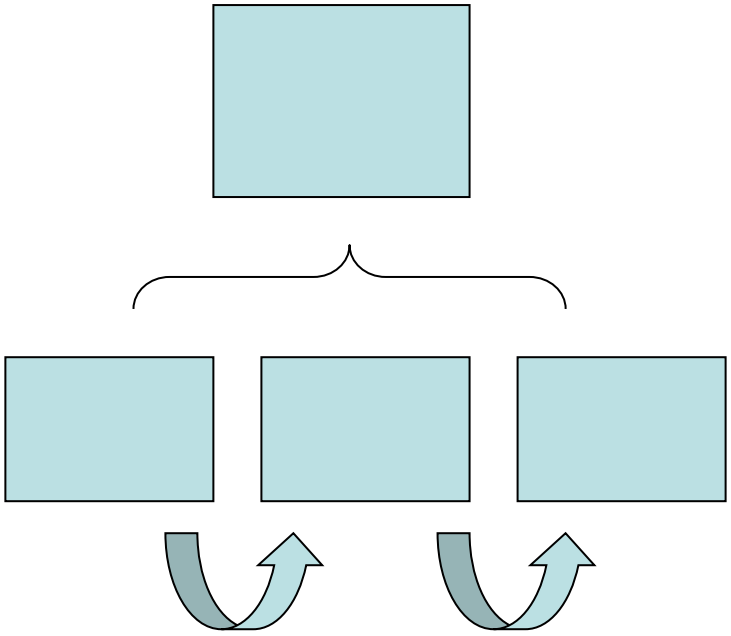
Innovation pro-forma

Current problems experienced:	**Recommended solutions to address problems:**
Ideas for improving the product and service offering:	**Recommended steps for improving these:**
Lateral thinking ideas:	**Recommendations for implementing ideas:**
Questions	**Answers to be provide within _____ number of days.**

Introduce elements of innovation in regular team meetings

Ensure that innovation is included in the regular team meetings. The innovation pro-forma and the other channels mentioned provide a framework for including innovation in team meetings.

First determine which channels you will use in your business to elicit innovative ideas. Collect all of the ideas and consolidate the feedback into a presentation or document.



During your meeting discuss:

- What needs to change (what are our business pains and opportunities?)
- Use this as your framework for innovation by facilitating:
- What should it change to (what will the desired state look like?)
- Actions for making the change happen (how can we get to the desired state?)

Use creative thinking tips and techniques for idea generation. (Tips and techniques for brainstorming and creative thinking follow in the next Module).

✓ *Creating the right conditions for innovation*

The nature of innovation is such that it cannot exist without risk taking. In a study on innovative organisations, managers invariably identified two critical elements for innovation:

- Support for risk taking and change
- Tolerance of mistakes.

Innovation means working in new ways and this may lead to errors. A key problem for managers is how to deal with honest errors - those efforts that, despite the best of intentions, fall short of expectations. Where performance falls short of expectations, this should be seen as an opportunity to learn. But this is a very difficult shift in environments where precision and time constraints are of extreme importance.

There is therefore a close relationship between innovation and risk taking. Indeed, the relationship is intimate to the extent that organisations cannot engage in innovation without taking at least a minimum of risk. The tolerance for risk taking is therefore a gauge for the innovativeness with which an organisation is likely to pursue its goals.

✓ *Impact of personal and organisational values on innovation and risk taking*

Personal and organisational values can have a profound effect in either promoting or constraining risk taking and innovation.

Individual values are the fundamental beliefs a person holds about an issue, a course of action, or the desirability of a future situation. Individual values are for the most part not consciously chosen. They tend to be the product of past influences and experiences, and they evolve gradually. For example, the values of religious devotees, environmental activists, or pedantic bureaucrats are rarely formed overnight. They are the result of living in a certain milieu for lengthy periods of time. Once formed, values are difficult to change. Many armed conflicts, as well as seemingly irrational behaviours, are the consequences of strongly held beliefs and values.

To a large extent, values drive individual and organisational behaviour.

"Improving service and performance in the Public Service is a function not only of systems and structures, but also of people and values. Values influence which tasks people will do with care, which they will do superficially, and which they will try to avoid. The role of values has received little attention. Managers tend to give more attention to systems and structures."[1]

The conventional view of organisations is that they are run by systems, structures and rules. This is the truth, of course, but it is not the whole truth. Organisations are also run by the values and beliefs of their members. It is for this reason that we see tensions between rules and values which often result in paralysis. If, for example, an organisation officially announces that there needs to be more risk-taking in order to foster innovation, and if the underlying values of the organisation and its members are risk-aversive, then more risk-taking is unlikely to occur. The case study below offers an illustration.

Public Service values

On the morning of May 22, 1986, Donald Trump, the New York real estate developer, called one of his executives, Anthony Gliedman, into his office. They discussed the inability of the City of New York, despite six years of effort and the expenditure of nearly $13 million, to rebuild the ice-skating rink in Central Park. On May 28 Trump offered to take over the rink reconstruction, promising to do the job in less than six months. A week later Mayor Edward Koch accepted the offer and shortly thereafter the city appropriated $3 million on the understanding that Trump would have to pay for any cost overruns out of his own pocket. On October 28, the renovation was complete, over a month ahead of schedule and about $750,000 under budget. Two weeks later, skaters were using it.

This example illustrates the tensions between innovation, risk taking and values, and the paralysis that can result when the tensions are not resolved. Public servants in the city administration needed to take into account the values of accountability, equity, responsiveness, efficiency and fiscal integrity. Yet they also needed to be innovative, which included some risk taking. And they couldn't reconcile these conflicting interests with the result that the job did not get done!

[1] Auditor General of Canada; http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/riskmanagement/rm-riv1-eng.asp#_Toc456673609

Formative Assessment 1: SO1 AC 1-4

Features of an Innovative Environment

Individually, complete the following formative activity:

List and describe the features of a work environment that promotes innovation
Analyse and compare your own unit (environment and people) in relation to the features of an environment conducive to innovation
Does the current environment promote innovation?
Identify areas for improvement on the basis of the analysis conducted above:

Place any extra evidence after this page, clearly marked for easy reference.

SECTION 2: UNDERSTAND TECHNIQUES FOR PROMOTING CREATIVITY

Specific Outcome 2

Demonstrate understanding of the techniques for promoting creativity.

Assessment Criteria

- Creativity and innovation techniques are identified in terms of generally accepted theory and practice.
- Three techniques for promoting creativity are explained with practical examples.

2.1 Understanding the Techniques for Promoting Creativity

A new way of thinking can only occur in an environment of possibility. It's essential to develop a cooperative, all-inclusive connection between employees and the company so that everyone is moving in the same direction — so that there is an overall "we." In a competitive environment of "us" and "them," people are too busy focusing on power struggles and politics. You might get spurts of creativity from some employees, but not from everyone. It takes constant practice to keep everyone in the company on track with innovative or possibility thinking.

This Module focuses on techniques to stimulate creative thinking and encourage a problem-solving mindset.

a. Identify Creativity and Innovation Techniques

Creative Thinking Techniques

The difference between logical and creative thinking

"…Thinking is a skill that can be learned, practised, and developed. But you have to want to develop that skill. You need to learn how to ride a bicycle or drive a car…"

Edward de Bono

Programmed, logical or convergent thinking recognises that our brains are pattern-recognition systems, and that they do not function like computers. It takes years of training before we learn to do simple arithmetic - something that computers do very easily. On the other hand, we can instantly recognise patterns such as faces, language and handwriting. The only computers that begin to be able to do these things do it by modelling the way that human brain cells work. Even then, computers will need to become more powerful before they approach our ability to handle patterns.

The benefit of good pattern recognition is that we can recognise objects and situations very quickly.

Imagine how much time would be wasted if you had to do a full analysis every time you came across a cylindrical canister of effervescent fluid. Most people would just open their can of cold drink. Without pattern recognition we would starve or be eaten. We could not cross the road safely.

Unfortunately, we get stuck in our patterns. We tend to think within them. Solutions we develop are based on previous solutions to similar problems. Normally it does not occur to us to use solutions belonging to other patterns.

When we are faced with a familiar problem, logical thinking enables us to tap into our personal experiences and find a suitable solution with the minimum of effort.

By assessing a situation against your relevant experience, you can choose the most appropriate path, and move towards a solution. This logical approach is very efficient.

However, it can become a barrier when you have little relevant experience; when there is more than one potential solution, or when you need a brand new solution.

A person who is able to work outside the boundaries of his / her experiences, will be more successful in the long run.

We use lateral, creative or divergent thinking techniques to break out of this patterned way of thinking.

Creative thinking is the process which we use when we come up with a new idea. It is the merging of ideas which have not been merged before. This creative thinking process can be accidental or deliberate.

Without using special techniques creative thinking does still occur, but usually in the accidental way; like a chance happening making you think about something in a different way and you then discovering a beneficial change. Other changes happen slowly through pure use of intelligence and logical progression. When using this accidental or logical progression process, it often takes a long time for products to develop and improve. In an accelerating and competitive world this is obviously disadvantageous.

Using special techniques, deliberate creative thinking can be used to develop new ideas. These techniques force the merging of a wide range of ideas to spark off new thoughts and processes.

Developments of products occur much more rapidly using these deliberate techniques than by accident. Many people known for being creative use these techniques, but are not aware they are doing so because they have not been formally trained in them. Lateral thinking techniques help us to come up with startling, brilliant and original solutions to problems and opportunities.

Each type of approach has its strength. Logical, disciplined thinking is enormously effective in making products and services better. It can, however, only go so far before all practical improvements have been carried out. Lateral thinking can generate completely new concepts and ideas, and brilliant improvements to existing systems. In the wrong place, however, it can be sterile or unnecessarily disruptive.

Divergent or creative thinking involves opening up your mind to find new solutions and new ways of doing things. Instead of taking your usual, logical approach to a problem, you can learn to suspend your judgment and look for different, more inventive solutions. Once you have generated as many ideas as possible in this way, use a logical thinking process to refine your ideas and identify the best solution to the problem.

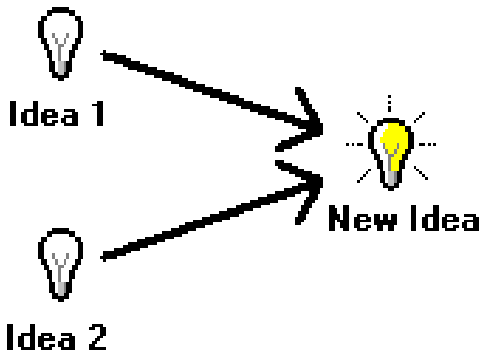
With practice, ongoing creative thinking (the continuous investigation, questioning and analysis that develops through education, training and self-awareness) occurs all the time. Ongoing creativity maximises both accidental and deliberate creative thinking. Ongoing creativity takes time and deliberate practice to become skilful, but it's surprising how quickly it becomes an attitude, not a technique.

The first step to take is to learn the creative thinking techniques so that you can deliberately use them to come up with new ideas. You should then practise the techniques to increase your

skill at ongoing creative thinking. (After a while you may even find it unnecessary to use specific techniques because you may be having too many ideas anyway.)

Creative thinking techniques work to stimulate original ideas. New ideas happen when two or more ideas are accidentally or deliberately merged when they have never been merged before. Creative thinking techniques provide the method for deliberately combining ideas in ways which you would not normally come across or think about. This combination generates a truly original idea for you.

The creative thinking process looks like this[2]:



Creative thinking is all about merging two previously unrelated or unmerged thoughts, products or processes.

In practice, of course, it can be very difficult to find the ideas to merge, and then to develop that new idea into a workable solution.

Processes for extracting ideas from a stimulus

Extract a concept or principle from the stimulus and reuse it

- How does it work?
- What does it achieve?
- How does it achieve it?
- What does the stimulus do?
- In what order does it work?
- Who is involved and why?

Extract a feature from the stimulus and reuse it

- What are its physical attributes?
- Why is it that shape?
- What process is involved and why?
- Who is crucial to its success?
- What is the timing of events?

Extract a positive attribute from the stimulus and try to replicate it

- What is good about the stimulus?
- Why is the stimulus good at what it does?
- How does it succeed?
- In what situations does it work best?

[2] Retrieved from **www.brainstorming.co.uk**

Extract the differences between the stimulus and the current solution

- How do the stimulus and the current solution achieve the same thing, but in a different way?
- Why does the stimulus do something one way and the current solution another?
- What is the difference in physical characteristics?
- What is the difference in process?
- In what way are they used differently?

Merge the stimulus and problem and then reapply the processes of extraction on the mixture. After you have exhausted extracting the initial ideas from the stimulus itself, you should merge the stimulus into the current situation and use the same idea extraction principles described above to the new mixed product. Remember, this involves using your imagination - which is a lot cheaper than physical experimentation - and that you're only using it to stimulate new ideas; it does not matter if the intermediate ideas don't work.

- Physically include the stimulus in the current situation and see what happens
- Force yourself to use the stimulus as a solution (and extract the ideas this creates).
- Mix the stimulus with the current object/method and extract the good ideas from it (and extract the ideas this creates ...)
- Imagine what would happen if you followed the process involved with the stimulus within your current process.
- Examine what happens on a frame-by-frame basis and examine the benefits at each frame. Is there a benefit at one time and not at another?
- Under what circumstances is the merged solution useful? (A different time, place, culture, market, ...)
- Physically include part of the stimulus in the current situation and see what happens

Take a part of the stimulus (e.g. a feature, a process, a physical section, a person involved) and place that into the current problem situation and examine what happens. Start extracting the principles and ideas as before. Look at the intermediate idea on a frame-by-frame basis and examine under what circumstances the idea would be useful and generally find some beneficial ideas you can reuse and reapply.

When the stimulus is a question, do the following:

- Answer the question directly without embarrassment or inhibition.
- Answer the question in as many different ways that you can. Most questions have many answers.
- Answer the question from a variety of different points of view. Give answers from radically opposing views.
- Answer the principles behind why the question was asked. See the question as asking many things.
- Answer the question both broadly and in great detail. Summarise and expand on your answers. Answer the larger question too.

By following the above guidelines with each thinking technique, you should be able to extract ideas from every stimulus you are given. You will never be stuck for a new idea if you apply the

above guidelines and use the creative thinking techniques we are going to study next to supply you with fresh and original stimuli.

We are going to look at a few of the most common creative thinking techniques:

Technique 1: Thought experiments

"We don't see things as they are; we see them as we are."

Thought experiments are highly-structured hypothetical questions that employ "What if?" scenarios

Thought experiments are designed to:

- Help us understand the way we think through reflection on the process
- Identify flaws in the way we have been educated
- Help us find the right question. For example, it does not matter what the bird on the roof is singing. The real and proper question is: Why is it beautiful?
- Show how all things are subject to interpretation
- Show how to look at the same thing as everyone else and see something different
- Encourage different ways of thinking
- Encourage flexibility in thought
- Challenge cognitive bias that limits a person to using an object only in the way is traditionally used
- Promote thinking beyond the boundaries of already established fact

Example: Matchstick problem

Correct the following equation by only moving one matchstick:

IV = III – I

Technique 2: Challenge facts

How many facts are really facts and how many are just the most reasonable, educated guess based upon the knowledge known at the time?

It is very rare that anything remains an undeniable fact for too long, especially when you consider people's views and differently acquired knowledge. We are in a constant state of change. We think differently as we gain knowledge and skills in thinking.

From one generation to the next we have different aims, ambitions and morals. What might be seen as a good thing by one generation could be seen as a bad thing by the next. Political parties change their views, as do their voters. Due to personal circumstances, individuals can change their whole philosophy of life within months.

Technology and other inventions now change the world faster than most people can keep up. What seemed impossible one week can become plausible the next, reality within months and an accepted way of life in a year or two. This is not really surprising when you consider the combined, diverse thought power of billions of people spread across the globe.

How do you know that what you considered to be a fact in the past has now become inappropriate due to changes which have happened since then? Might you now be able to improve your current product because of a change in human values or lifestyles?

The way to answer these questions is to challenge the facts. You are not saying that the facts are wrong but you are investigating what might happen if that fact were not true.

It is important not to see this technique as a way of proving someone wrong or inaccurate. Everyone does what they think to be right at the time and based upon the knowledge they have at that time.

If you now have more information or the world has changed in some way, this does not put any blame on the person who had the original idea or on someone who could not solve the problem.

Just as you must be considerate towards the people whose facts you are challenging, you should acknowledge that the world will probably develop a better way of doing what you are doing now. This does not reflect on your ability, it merely reflects the way in which the world develops.

At one time all the available evidence gave rise to the fact that the sun went round the world. If no one had challenged this fact, then we might still believe it.

Even Einstein's theory of relativity has been modified to take into account effects which were not possible for him to contemplate because technology at the time could not do what it does now.

The Challenge Facts technique asks you to consider what you think are facts and investigate what differences and advantages it would make if they were not facts.

You could try to imagine what would be the case if the fact were totally wrong. Or you could try to modify the fact and see whether that now fits into the current situation better than the original one. Or is the world likely to change so that the modified fact will fit in better in the future? If so, what new ideas does this future world suggest? If you find that your new consideration blatantly doesn't fit, then consider what advantages this hypothetical situation might have and how you might be able to incorporate them into your current solution.

You are using the challenge of a fact as a stimulus for new ideas, nothing else.

First list the facts, then write a statement which challenges that fact, then use that challenge to develop new ideas.

Example:

Fact: Companies pay employees for their time.

Challenge of the fact: Employees pay their company for the use of its facilities.

New idea based on challenging the fact:

Each employee receives a percentage of the profits based on his/her position within the company and the amount of time and contributions spent on its products or services. Out of this amount is taken the amount of money related to that employee's use of the facilities. In this way the employee is directly affected by the quality of the product or service and is more motivated to improve it. Also, the employees are directly affected by the amount of money they use in the course of their work. It could also mean that employees are free to live their own life and work the way they want to work.

Technique 3 Brainstorming

Brainstorming is a form of creative thinking: it works by merging someone else's ideas with your own to create a new one. You are using the ideas of others as a stimulus for your own.

Brainstorming is an excellent way of developing many creative solutions to a problem. It works by focusing on a problem, and then coming up with very many radical solutions to it. Ideas should deliberately be as broad and odd as possible, and should be developed as fast as possible. Brainstorming is a lateral thinking process. It is designed to help you break out of your thinking patterns into new ways of looking at things.

Rules of Brainstorming[3]

Rule 1: Postpone and withhold your judgment of ideas

Do not pass judgment on ideas until the completion of the brainstorming session. Do not suggest that an idea won't work or that it has negative side-effects. All ideas are potentially good so don't judge them until afterwards. At this stage, avoid discussing the ideas at all, as this will inevitably involve either criticising or complimenting them.

Ideas should be put forward both as solutions and also as a basis to spark off solutions. Even seemingly foolish ideas can spark off better ones. Therefore do not judge the ideas until after the brainstorming process. Note down all ideas. There is no such thing as a bad idea.

The evaluation of ideas takes up valuable brain power which should be devoted to the creation of ideas. Maximise your brainstorming session by only spending time generating new ideas.

Rule 2: Encourage wild and exaggerated ideas

The 'wilder' the idea is, the better. Shout out bizarre and unworkable ideas to see what they spark off. No idea is too ridiculous. State any outlandish ideas. Exaggerate ideas to the extreme.

Rule 3: Quantity counts at this stage, not quality

Go for quantity of ideas at this point; narrow down the list later. All activities should be geared towards extracting as many ideas as possible in a given period.

The more creative ideas a person or a group has to choose from, the better. If the number of ideas at the end of the session is very large, there is a greater chance of finding a really good idea.

Keep each idea short, do not describe it in detail - just capture its essence. Brief clarifications can be requested. Think fast, reflect later.

Rule 4: Build on the ideas put forward by others

Build and expand on the ideas of others. Try and add extra thoughts to each idea. Use other people's ideas as inspiration for your own. Creative people are also good listeners. Combine several of the suggested ideas to explore new possibilities.

It's just as valuable to be able to adapt and improve other people's ideas as it is to generate the initial idea that sets off new trains of thought.

Rule 5: Every person and every idea has equal worth

Every person has a valid viewpoint and a unique perspective on the situation and solution. In a brainstorming session you can always put forward ideas purely to spark off other people and not just as a final solution. Encourage participation from everyone.

Each idea presented belongs to the group, not to the person who said it. It is the group's responsibility and an indication of its ability to brainstorm if all participants feel able to contribute freely and confidently.

[3] These rules were created by http://www.brainstorming.co.uk/. Please visit http://www.brainstorming.co.uk/, internet and computer resources for creativity and brainstorming.

Principles behind brainstorming[4]

The fear of making mistakes

In nature, mistakes can mean dying, injury or being eaten by predators. In the human jungle, mistakes usually lead to mental pain rather than physical pain. Some people fear that their whole existence is at risk if they say the wrong words in front of their manager. The fear of making mistakes at work can be the greatest fear of all because it can lead to the destruction of an individual's vision of his/her future. Some people see the smallest of mistakes at work leading to lack of promotion, reduced salary, and even unemployment - and all of the social problems associated with this. They see their family and social life held together by the fact that they are working and earning money. And now you put these people in a room and tell them to put forward crazy ideas which may not work!

Everyone has thousands of good ideas within them just waiting to come out. Even if you don't know what yours are, you will have them and those ideas will help improve the world. The problem is creating an environment where those ideas can come out without feeling the fear of making mistakes. This environment is the brainstorming environment. This is a situation where the group has actively decided not to judge anyone by what they put forward. Here, making "mistakes" and putting forward ideas which don't work is not only acceptable but is actually encouraged. Your ideas are never criticised and never judged. Your ideas can never be a mistake because they can be used either as a solution or as a stimulus for others.

Brainstorming is designed to remove, or at least reduce, the fear of making mistakes. The professionalism and attitude of the participants is the key to how much inhibitions are reduced. This is why sticking strictly to the rules, coupled with good training and a good facilitator, are so important.

The fear of the manager

Now, imagine you are with your manager and your manager's manager in a room for a normal business meeting. They ask you for your ideas on how well your department is run and how they should change their management style. Some of us do actually have managers whom we can approach with confidence and who are actually pleased when we tell them. However, in most situations this is highly awkward and many of your true ideas will be kept to yourself, however valid and valuable they are.

This is because of the fear of making suggestions which challenge those people who can affect your personal future. There are many situations where valuable ideas are not put forward because of fear of "the manager", such as:

- Job interviews
- Sales presentations
- Press releases
- Government strategy meetings open to the public

We need to create a special situation where the participants do not feel that their actions will harm them when they put forward ideas which challenge the views and feelings of those in authority. Brainstorming sessions are ideal for this as good managers realise that they can get valuable feedback and suggestions which they would not normally get. If you really want to improve yourself as a manager and get good quality feedback, try a brainstorming session on company improvement, but be very careful not to criticise at any point and remember to thank anyone for their ideas which were frightening to say. Your staff will reduce their fear of you if you join in actively and purposefully help to start the session by putting forward ridiculous ideas, however challenging this is to you personally!

[4] Retrieved from: www.brainstorming.co.uk

Principles relating to Rule 1: Withholding judgment

- Ideas which initially seem like they won't work can sometimes have enormous benefits when modified.
- You will reduce the inhibitions in others.
- You will encourage others to give you the freedom to share your own ideas.
- Original ideas are more likely to surface.
- Ideas which stimulate good solutions are more likely to be shared.
- The generation of new ideas is maximised because no brain power is used on evaluation.

Principles relating to Rule 2: Encourage wild and exaggerated ideas

- It's easier to tame wild ideas into a valid solution than it is to boost normal ideas into an original solution.
- Ideas which stimulate good solutions are more likely to be shared.
- Wild ideas are better at stimulating new thought patterns.
- Original ideas are encouraged by such actions.
- A loss of inhibitions is more likely.

Principles relating to Rule 3: Quantity counts at this stage, not quality

- It's easier to pick out good ideas from a large list than a small list. Idea evaluation is often easier than idea generation, so give yourself lots of ideas to analyse later.
- It's easier to create a good idea from combining lots of little ideas.
- A fast output of ideas reduces the likelihood of evaluation and so helps a loss of inhibitions.
- People get more absorbed by the process and think more freely.
- Quantity, in this case, brings quality.
- The focus on each idea is minimal at this stage and so participants feel less pressure on each idea.

Principles relating to Rule 4: Build on the ideas put forward by others

- Every idea put forward has a principle or concept that will be useful.
- Wild ideas can be turned into valid solutions.
- You encourage others to put forward stimulating ideas by using those ideas.
- You build freedom for yourself when you put forward stimulating ideas.
- It's often easier to adapt someone else's idea than to generate a completely original one.

Principles relating to Rule 5: Every person and every idea has equal worth

- You will get solutions from a wider range of people.
- The breadth of ideas will cover different personality types.
- You will encourage others to listen to your own ideas.

- Every idea has equal worth as a stimulus.
- You will know that you have created a healthy brainstorming environment if everyone feels confident to contribute

While there are risks involved in the early stages of establishing brainstorming sessions, the overall benefits are enormous and with a little preparation and thought you can run brainstorming sessions which will improve your own and your organisation's prospects in both the short and long term.

Brainstorming is a well-established technique for generating new ideas and solutions. However, it still has some faults. Brainstorming is supposed to allow people to ignore their natural inhibitions; but, in reality, this is often difficult to do. It is also very hard for people naturally to think in new directions without assistance.

Brainstorming by yourself without the need for a group

You will be pleased to learn that you can brainstorm effectively by yourself without the need for a group. This means that you can hold a brainstorming session absolutely any time - and as many times as you want - with no money, time or difficulty spent organising a group of people.

In fact, many individuals find that they can be more creative on their own rather than as part of a traditional brainstorming group.

Times when you may want to brainstorm by yourself

- You work by yourself
- You work for yourself and are self-employed
- There is no one available for a group session
- The people around you do not like brainstorming sessions
- The people around you will not follow the brainstorming rules
- It is too time-consuming or expensive for you to hold a group brainstorming session
- You want to take credit for the ideas all by yourself
- The problem is too small to justify gathering a large group of people
- You work in an uncreative or very critical organisation

How to brainstorm by yourself

- Use **creative thinking** techniques to start off your approach from a different angle
- Spark off new ideas by getting stimuli from books, pictures, websites, etc. instead of relying on other people
- Challenge your current ways of thinking
- Think of all possibilities
- When you get stuck for an idea, instantly move on to a next stimulus

If you use a structured problem-solving approach to generate and analyse new ideas you will be at a great advantage over people who do not think that they can be creative by themselves. It is possible to be more creative by yourself using creative techniques than you might be in a group of people in a badly-run brainstorming session.

Possible problems with Brainstorming

- You don't have the time or resources for a group session

- People don't lose their inhibitions
- The session doesn't flow naturally and people feel uncomfortable
- People constantly struggle to think in new ways
- You need a group of people to do it and cannot do it by yourself
- There are too many awkward periods of silence and discomfort
- The sessions are dominated by one or two people
- Some people do not contribute
- The facilitator needs to give constant encouragement to the participants
- The same ideas are repeated again and again
- No successful outcome or solution is reached

Possible causes of the problems:

- Many people are uncomfortable in the brainstorming environment
- People do not believe they can be creative
- Authority is accidentally used which makes people feel scared of their actions
- No real objectives are set
- Participants do not know how to think creatively
- Participants do not use creative thinking techniques
- A poor mixture of participants is present
- Different personality types need different brainstorming styles
- None or not enough training has been given
- Not enough guidance and encouragement is given by the facilitator
- No warm-up exercise was used
- The brainstorming environment is hostile to creativity
- People are not using other people's ideas to stimulate their own

Technique 4: Mind maps

For the last few hundred years it has been popularly thought that man's mind worked in a *linear* or *list-like* manner, a falsehood based on speech and print. In speech we are restricted by the nature of time and space to communicating one word at a time.

Recent evidence shows the brain to be far more multi-dimensional and pattern making, suggesting that in the speech /print arguments there must be fundamental flaws.

How does the brain which is speaking, and the brain which is receiving the words deal with them *internally*? Although a single stream of words is being processed, a continuing and enormously complex process of *sorting* and *selecting* is taking place in your mind during a conversation, reading a book, or listening to a lecture.

A linear presentation is not necessary for understanding and in many cases is a disadvantage. Your mind is perfectly capable of taking in information which is non-linear.

Therefore, the human brain is very different from a computer. Whereas a computer works in a linear fashion, the brain works *associatively* as well as linearly - comparing, integrating and synthesising as it goes.

Association plays a dominant role in nearly every mental function, and words themselves are no exception. Every single word and idea has numerous links attaching them to other ideas and concepts.

Mind Maps™, developed by Tony Buzan, are an effective method of note-taking, as they help organise information, and are useful for the generation of ideas by association.

Because of the large amount of association involved, they can be very creative, tending to generate new ideas and associations that have not been thought of before. Every item in a map is in effect, a centre of another map.

The creative potential of a mind map is useful in brainstorming sessions. You only need to start with the basic problem as the centre, and generate associations and ideas from it in order to arrive at a large number of different possible approaches. By presenting your thoughts and perceptions in a spatial manner and by using colour and pictures, a better overview is gained and new connections can be made visible.

Mind maps are a way of representing associated thoughts with symbols rather than with extraneous words- something like organic chemistry. The mind forms associations almost instantaneously, and "mapping" allows you to write your ideas quicker than expressing them using only words or phrases.

Key features of mind maps are:

- Organisation
- Key Words
- Association
- Clustering
- Visual Memory
- Conscious involvement

Imagine your hobby is reading short stories, you read five a day, and you keep notes so that you will not forget any of them. On each of these cards you record key words and phrases. How would you choose the key words? Image words? Imaginative? Evocative?

Reviewing these notes five years later may be difficult, depending on how the words were chosen. A good key word or phrase is one which funnels into itself a wide range of special images, and which, when it is triggered, funnels back the same images. It will tend to be a strong *noun* or *verb*.

A creative word is one which is particularly evocative and image forming, but far more general than a directed key word. Words are 'multi-ordinate' meaning that each word is like a little centre on which there are many, many little hooks. Each hook can attach to other words.

Key words are essential for memory recall, forging new associations and recall of other experiences or sensations. Taking notes, thinking of new ideas and summarising information is best done using association of keywords, and not in a linear, written form.

To make a mind map, one starts in the centre of the page with the main idea, and works outward in all directions, producing a growing and organised structure composed of key words and key images.

If the brain is to relate to information most efficiently, the information must be structured in such a way as to "slot-in" as easily as possible. It follows that if the brain works primarily with *key concepts* in an interlinked and integrated manner, then so should our notes and word relations be structured in a similar manner.

Rather than starting from the top of a page and working down in sentences or lists, one should start from the *centre* with the main idea and branch out as dictated by the individual ideas and general form of the theme.

The disadvantages of standard notes:

- They obscure key words. This prevents the brain from making appropriate associations between the key concepts.
- They make it difficult to remember. Monotonous single colour notes are boring. Most notes look like lists.
- They waste time by encouraging or requiring unnecessary noting, reading and rereading unnecessary notes, and searching for key words.
- They fail to stimulate the brain creatively. Linear presentations prevent the brain from making associations, thus counteracting creativity and memory. Reading a list implies an `end' or `finish', whereas a mind map encourages the brain to build on existing thoughts and ideas.

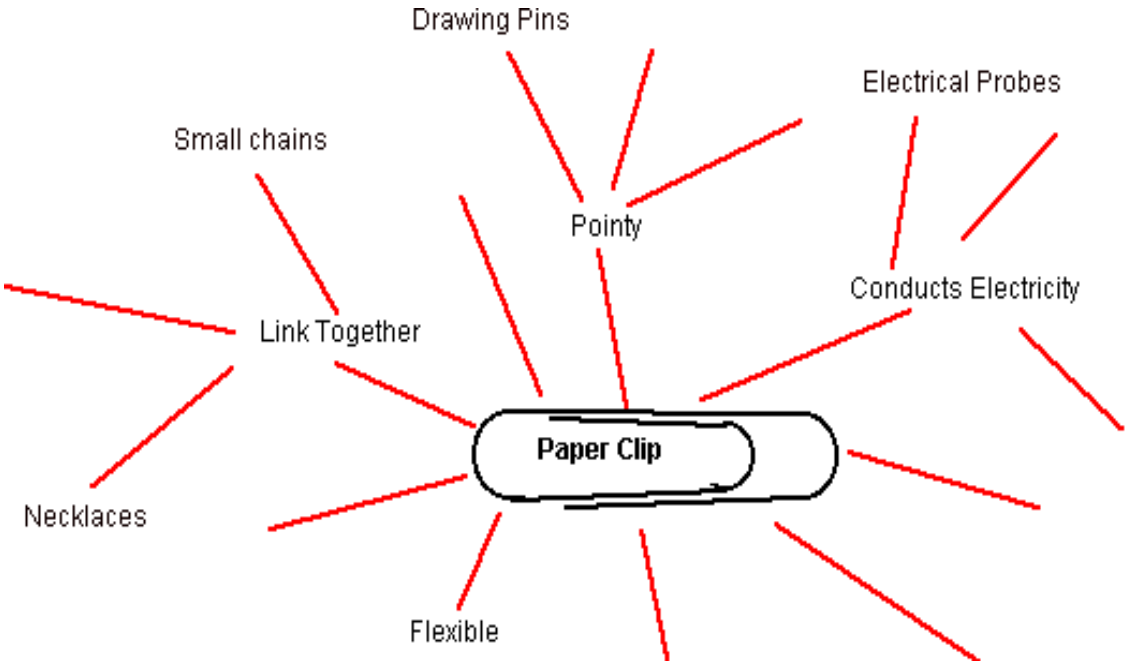
A mind map has a number of advantages over the linear form of note-taking:

- The centre with the main idea is more clearly defined
- The relative importance of each idea is clearly indicated. More important ideas will be nearer the centre.
- The links between key concepts will be immediately recognised.
- Recall and review will be more effective and more rapid
- Addition of new information is easy
- Each map will look different from other maps, aiding recall
- In the more creative areas of note making, the open-ended nature of the map will enable the brain to make new connections far more readily.

Example:

Consider the problem of "What are some alternative uses for a paper clip"

If you started to write a list, you would become bored and would probably slow down. Alternatively, a mind map allows building on previous ideas, attributes, or stepping stone ideas.



Mind maps use pictures:

The reason why pictures are `worth a thousand words' is that they make use of a massive range of cortical skills: colour, form, line, dimension, texture, visual rhythm and especially *imagi*nation - a word taken from the Latin *imaginari*, literally meaning `*to picture mentally*'.

Images are therefore often more evocative than words, more precise and potent in triggering a wide range of associations, thereby enhancing creative thinking and memory.

Mind maps harness the full range of your cortical skills:

Hierarchies and categories:

A classic study done in 1969 demonstrated the importance of hierarchies in an aid to memory. Generating ideas with a mind map is much easier than making lists, because key words or "Basic Ordering Ideas" can be used as triggers. Linear notes in the form of lists directly oppose the workings of the mind, in that they generate an idea and then deliberately cut it off from ideas the preceding and following it.

Wholeness/Gestalt:

Harnessing the brain's tendency to function in gestalts or wholes, allows the addition of blank lines to the key words on the Mind Map, enticing the brain to `fill in' the beckoning areas.

Once the brain realises it can associate anything with anything else, it will almost instantaneously find associations, *especially when given the trigger of an additional stimulus*.

The Mind Map is based on the *logic of association*, not the logic of time (as in a list)

The Basic Ordering Ideas in any Mind Map are those words or images which are the simplest and most obvious ordering devices. They are the key concepts, gathering the greatest number of associations to themselves. A good way to find these Basic Ordering Ideas is to ask:

- What knowledge is required?
- If this were a book, what would the chapter headings be?
- What are my specific objectives?
- What are the most important seven (7) categories in the area under consideration?
- What are the basic questions?
- Why? What? Where? Who? How? When? often serve remarkably well as major branches in a Mind Map.

Techniques for drawing Mind Maps:

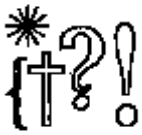
- Use emphasis
- Always use a central image
- Use images throughout your Mind Map
- Use three or more colours per central image
- Use dimension in images
- Use variations of size of printing, line and image
- Use organised spacing
- Use appropriate spacing
- Use Association
- Use arrows when you want to make connections within and across the branch pattern
- Use colours
- Use codes
- Be Clear
- Use only one key word per line
- Print all words
- Print key words on lines
- Make line length equal to word length
- Connect lines to other lines
- Make the central lines thicker
- Make your images as clear as possible
- Keep your paper placed horizontally in front of you
- Keep your printing as upright as possible

- Develop a personal style
- Pay attention to layout
- Use hierarchy
- Use numerical order

Examples:


Arrows

These can be used to show how concepts which appear on different parts of a pattern are connected. The arrow can be single or multi-headed and can show backward and forward directions.


Codes

Asterisks, exclamation marks, crosses and question marks as well as many other indicators can be used next to words to show connection or other 'dimensions'.


Geometrical shapes

Squares, oblongs, circles, ellipses, etc can be used to mark areas or words which are similar in nature - for example triangles might be used to show areas of possible solution in a problem-solving pattern.

Geometrical shapes can also be used to show order of importance. Some people, for example, prefer to use a square always for their main centre, oblongs for the ideas near the centre, triangles for ideas of next importance, and so on.


Artistic three dimension

Each of the geometrical shapes mentioned, and many others, can be given perspective, for example, making a square into a cube. The ideas printed in these shapes will thus 'stand off' the page.


Creativity images

Creativity can be combined with the use of dimension by making aspects of the pattern fit the topic. Someone, for example, when doing a pattern on atomic physics, used the nucleus of an atom and the electrons that surrounded it, as the centre for his pattern.

Colour

Colour is particularly useful as a memory and creative aid. It can be used, like arrows, to show how concepts which appear on different parts of the pattern are connected. It can also be used to mark off the boundaries between major areas of a pattern.

Creative Thinking Mind Maps

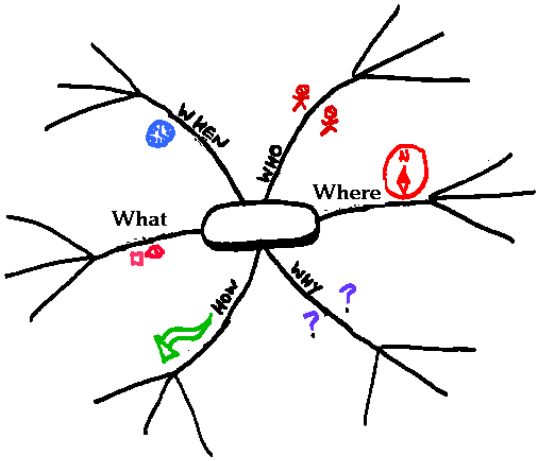
Objectives:

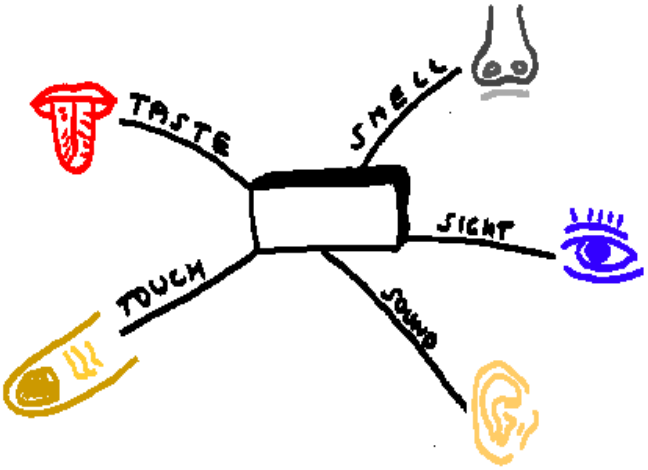
- To explore all the creative possibilities of a given subject
- To clear the mind of previous assumptions about the subject, thus providing space for new creative thought
- To generate ideas that result in specific action being taken, or physical reality being created or changed.
- To encourage more consistent creative thinking
- To create new conceptual frameworks within which previous ideas can be reorganised.
- To capture and develop 'flashes' of insight when they occur.
- To plan creatively (Mind Map diaries with a yearly plan, monthly plan and daily plan maps)

Computer Mind Mapping

At the moment computer Mind Mapping cannot compete with the infinite visual variety, portability and `minimum tool requirement' of traditional Mind Mapping techniques. However the areas where computers can offer a significant improvement to personal productivity are the areas of automatic Mind Map generation; Mind Map editing; data storage and retrieval, text input and organisation of data. The creation of many variations of the same Mind Map is also facilitated and accelerated.

Mind Maps are an external 'photograph' of the complex inter-relationships of your thoughts at any given time. They enable your brain to 'see itself' more clearly, and will greatly enhance the full range of your thinking skills: they will add increasing competence, enjoyment, elegance and fun to your life.





Problem Solving Techniques

Problem solving forms part of thinking. Considered the most complex of all intellectual functions, problem solving has been defined as higher-order cognitive process that requires the modulation and control of more routine or fundamental skills (McCarthy & Worthington, 1990). It occurs if an organism or an artificial intelligence system does not know how to proceed from a given state to a desired goal state. It is part of the larger problem process that includes problem finding and problem shaping[5].

Characteristics of difficult problems

As elucidated by Dietrich Dorner and later expanded upon by Joachim Funke, difficult problems have some typical characteristics. Recategorised and somewhat reformulated from these original works, these characteristics can be summarised as follows:

- Intransparency (lack of clarity of the situation)
- Complexity (large numbers of items, interrelations, and decisions)
- Dynamism (time considerations)

[5] Retrieved from : www.wikipedia.com

The resolution of difficult problems requires a direct attack on each of these characteristics that are encountered.

Problem-solving steps[6]

Problem solving is a tool, a skill and a process. It is a tool because it can help you solve an immediate problem or to achieve a goal. It is a skill because once you have learnt it you can use it repeatedly, like the ability to ride a bicycle, add numbers or speak a language. It is also a process because it involves taking a number of steps.

You can engage in problem solving if you want to reach a goal and experience obstacles on the way. It is very likely that in working towards your goals you will encounter some barriers.

At the point at which you come up against a barrier you can engage in a problem solving process to help you achieve your goal. Every time you use a problem solving process you are increasing your problem-solving skills.

Much of what managers do is solve problems and make decisions. New managers, in particular, often make decisions by reacting to problems. They are "under the gun", stressed and very short on time. Consequently, when they encounter a new problem or decision they must make, they react with a decision that seemed to work before. It's easy with this approach to get stuck in a circle of solving the same problem over and over again. Therefore, as a manager, get used to an organised approach to problem solving and decision making. Not all problems can be solved and decisions made by the following, rather rational approach.

However, the following basic guidelines will get you started. Don't be intimidated by the length of the list of guidelines. After you've practised them a few times, they'll become second nature to you- so that you can deepen and enrich them to suit your own needs and nature.

(It might be more advisable to view a "problem" as an "opportunity". Therefore, you might substitute "problem" for "opportunity" in the following guidelines.)

Step 1: Define the problem

This is often where people struggle. They react to what they think the problem is. Some problems are big and unmistakable, such as failure of an air-freight delivery service to get packages to customers on time. Other problems may be continuing annoyances, such as regularly running out of toner for an office copy machine.

The first step in reaching a solution is pinpointing the problem area. Seek to understand more about why you think there's a problem.

Ask yourself and others, the following questions:

- What can you *see* that causes you to think there's a problem?
- Where is it happening?
- How is it happening?
- When is it happening?
- With whom is it happening? (HINT: Don't jump to "Who is causing the problem?" When we're stressed, blaming is often one of our first reactions. To be an effective manager, you need to address issues more than people.)
- Why is it happening?
- Write down a five-sentence description of the problem in terms of "The following should be happening, but isn't ..." or "The following is happening and should be: ..."

[6] Retrieved from: http://www.managementhelp.org/prsn_prd/prb_bsc.htm

As much as possible, be specific in your description, including what is happening, where, how, with whom and why.

- **Defining complex problems:**

If the problem still seems overwhelming, break it down by repeating steps above until you have descriptions of several related problems.

- **Verifying your understanding of the problems:**

It helps a great deal to verify your problem analysis by conferring with a peer or someone else.

- **Prioritise the problems:**

If you discover that you are looking at several related problems, then prioritise which ones you should address first. Note the difference between "important" and "urgent" problems. Often, what we consider to be important problems to consider are really just urgent problems. Important problems deserve more attention. For example, if you're continually answering "urgent" phone calls, then you've probably got a more "important" problem and that's to design a system that screens and prioritises your phone calls.

- **Understand your role in the problem:**

Your role in the problem can greatly influence how you perceive the role of others. For example, if you're very stressed out, it'll probably look like others are, too, or, you may resort too quickly to blaming and reprimanding others. Or, if you are feeling very guilty about your role in the problem, you may ignore the accountabilities of others.

Step 2: Look at potential causes for the problem

Learn more about the problem situation. Look for possible causes and solutions. This step may mean checking files, calling suppliers, or brainstorming with fellow workers. For example, the air-freight delivery service referred to in Step 1 would investigate the tracking systems of the commercial airlines carrying its packages to determine what went wrong.

- In this phase, it's critical to get input from other people who notice the problem and who are affected by it.
- It's often useful to collect input from other individuals one at a time (at least at first). Otherwise, people tend to be inhibited about offering their impressions of the real causes of problems.
- Write down what your opinions are and what you've heard from others. If you think there might be performance problems associated with an employee, it's often useful to seek advice from a peer or your supervisor in order to verify your impression of the problem.
- Write down a description of the cause of the problem and in terms of what is happening, where, when, how, with whom and why.

Step 3: Identify alternatives for approaches to resolve the problem

At this point, it's useful to keep others involved (unless you're facing a personal and/or employee performance problem).

- Brainstorm for solutions to the problem. (We will learn about brainstorming in the next section)
- Distinguish between fact and opinion, for example, it is a fact that packages are missing; it is an opinion that they are merely lost and will turn up eventually.
- Draw conclusions from the gathered evidence and pose solutions.
- Finally, weigh the advantages and disadvantages of each alternative. What are the costs, benefits, and consequences? What are the obstacles, and how can they be handled? Most important, what solution best serves your goals and those of your organisation? Here's where your creativity is especially important.

Step 4: Select an approach to resolve the problem

When selecting the best approach, consider:

- Which approach is the most likely to solve the problem for the long term?
- Which approach is the most realistic to accomplish for now?
- Do you have the resources?
- Are they affordable?
- Do you have enough time to implement the approach?
- What is the extent of risk associated with each alternative?

In our example in Step 1, the freight company decided to give its unhappy customers free delivery service to make up for the lost packages and downtime.

Step 5: Plan the implementation of the best alternative (this is your action plan)

- Carefully consider "What will the situation look like when the problem is solved?"
- What steps should be taken to implement the best alternative to solving the problem?
- What systems or processes should be changed in your organisation, for example, a new policy or procedure? Don't resort to solutions where someone is "just going to try harder".
- How will you know if the steps are being followed or not? (these are your indicators of the success of your plan)
- What resources will you need in terms of people, money and facilities?
- How much time will you need to implement the solution? Write a schedule that includes the start and stop times, and when you expect to see certain indicators of success.
- Who will primarily be responsible for ensuring implementation of the plan?

Write down the answers to the above questions and consider this as your action plan. Communicate the plan to those who will involved in implementing it and, at least, to your

immediate supervisor. (An important aspect of this step in the problem-solving process is continual observation and feedback.)

Step 6: Monitor implementation of the plan

Monitor the indicators of success:

- Are you seeing what you would expect from the indicators?
- Will the plan be done according to schedule?
- If the plan is not being followed as expected, then consider: Was the plan realistic? Are there sufficient resources to accomplish the plan on schedule? Should more priority be placed on various aspects of the plan? Should the plan be changed?

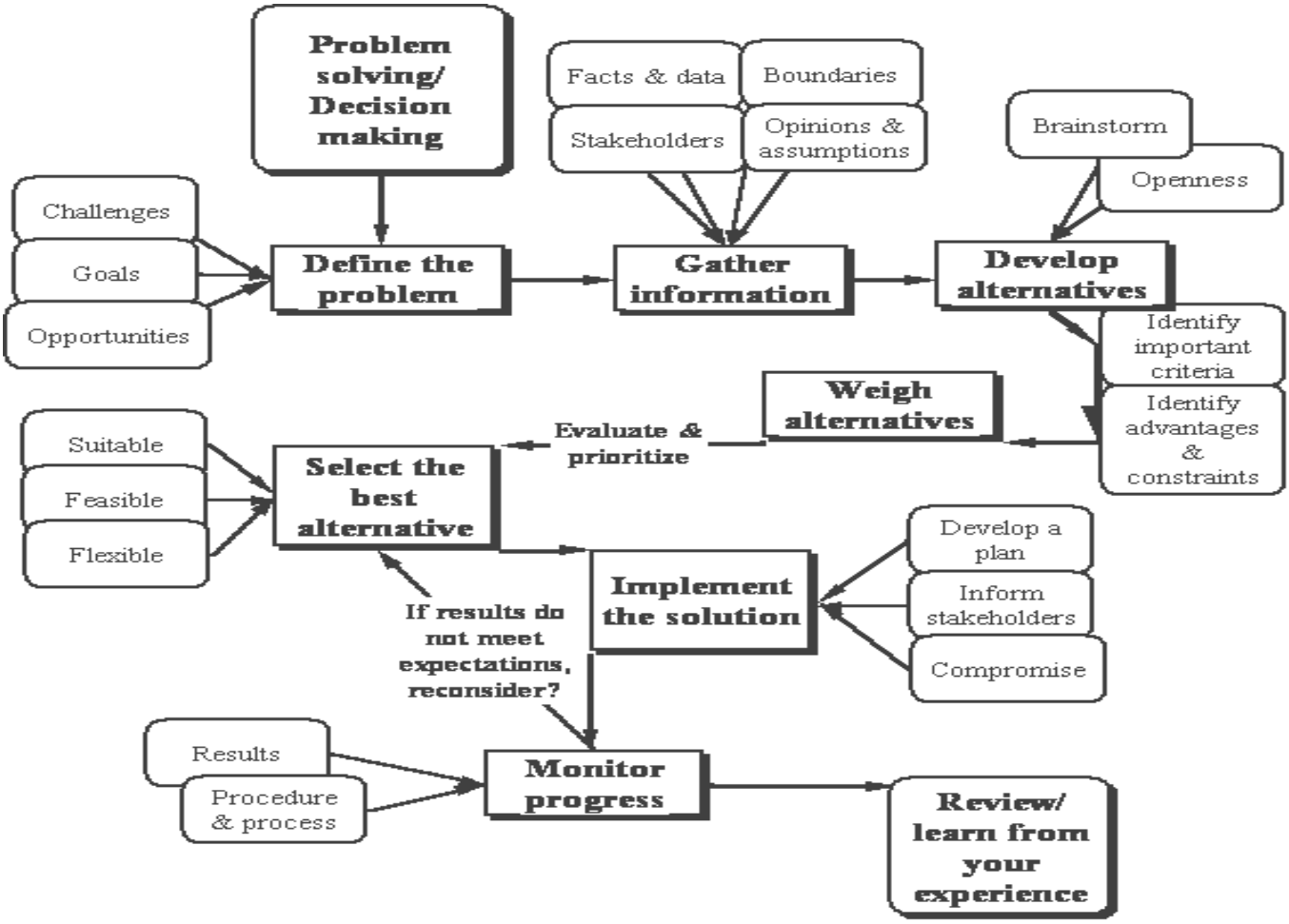
Step 7: Verify if the problem has been resolved

One of the best ways to verify if a problem has been solved is to resume normal operations in the organisation.

For future reference, consider the following:

- What changes should be made to avoid this type of problem in the future? Consider changes to policies and procedures, training, etc.
- Lastly, consider "What did you learn from this problem solving?" Consider new knowledge, understanding and/or skills.
- Consider writing a brief memo that highlights the success of the problem solving effort, and what you learned as a result. Share it with your supervisor, peers and subordinates.

Overview of Process[7]



Examples of problem-solving techniques:

Technique 1: Problem Definition

(including problem analysis, redefinition, and all aspects associated with defining the problem clearly)

- **Paraphrasing Key Words**

  This technique requires you to alter the meanings of key words in the problem statement (or any sentence that contains key words) to reveal assumptions and generate alternative perceptions.

[7] Retrieved from : http://www.studygs.net/problem/problemsolvingo.htm

- **Replacing Key words with Synonyms**

This method, devised by Edward de Bono (1970), requires you to identify key words in the sentence, substitute them one at a time with other words that have the equivalent general meaning, and create different emphases and a different rhetoric.

It can be achieved in a simple and informal way from general knowledge, or at a deeper level with imaginative use of a thesaurus. Look at the example below, which an average word-processor thesaurus gave the direct and indirect synonyms for the 3 key words in the problem statement:

We have	**Overused**	**Reprographic**	**Resources**
We have	**Wasted**	**Copying**	**Property**
We have	**Squandered**	**Remaking**	**Machines and people**
We have	**Derelict**	**Transcribing**	**Mechanisms**
We have	**Superfluous**	**Facsimile**	**Holdings**
We have	**Excessive**	**Mimicking**	**Agency**
We have	**Bountiful**	**Mirroring**	**Investment**
We have	**Generous**	**Reproducing**	**Means**
We have	**Redundant**	**Mimeographing**	**Belongings**
We have	**Ignored**	**Cloning**	**Facility**

Altering just one word at a time produces very distinct shifts in the meaning and boundary assumptions such as:

- We have over-capitalised reprographic resources
- We have underused cloning resources
- We have underused reprographic belongings

Obviously the amount of potential paraphrasing is very large, just using the synonyms in the table above, this simple problem statement may well be reworded in at least 1000 (10 x 10 x 10) ways, many of which correspond to very different meanings. Paraphrasing as such can be used either to alter the problem statement itself, or to trigger different streams of ideas about possible solutions.

- **Use Synonym Pairs to Trigger Ideas**

A variation of the method above devised by Olson (1980) takes just 2 key words from the problem statement (ideally a grammatically linked pair such as noun-verb, verb-noun, verb-adverb, adjective-noun), generates lists of synonyms for each word (as above), and then uses word pairs generated from the 2 synonym lists to stimulate ideas. For example:

- **Select grammatical keyword pair:** I choose: Reprographic resources (adjective-noun pair).
- **Generate synonyms**: e.g. the two right hand columns of synonyms in the table above.
- **Select some interesting word pairs:** e.g.: mimicking agency; transcribing investment; cloning capital; mimeographing belongings etc.
- **Use these to trigger ideas:** e.g. from mimicking agency: Develop an agency to make copies of photos; develop a service for transcribing hand-written records; start a service to print cheque-books or pay-in books or toy money for children, etc.

Technique 2: Assumption Busting

- **List assumptions**

List all the assumptions you have about the "problem", especially the obvious ones that you would not consider challenging...

- **Challenge assumptions**

Test each assumption. Ask under what conditions it would not be true.
You will start to make assumptions as you challenge some assumptions, simply add these to the list, and challenge them later.

- **Find several ways in which you can force the assumption to be true**

This is the opposite way of challenging the assumption from 2.

Technique 3: Idea Generation

Talking Pictures[8] is from the book *Instant Creativity* by Brian Clegg and Paul Birch.

When you need a little extra boost for a group that have got a little stale during the Idea Generation phase, split up into teams, giving each a digital camera and access to a printer (you could use a Polaroid, or provide a set of bizarre photographs you have, but it's best to get the teams to capture them).

Get the teams to spend about 5 minutes outside of the immediate area, taking pictures of either unusual objects, or objects from unusual angles. The more bizarre the better.

Bring the groups back together and distribute their pictures to the other groups.

Each group should now use the pictures provided to create associations that occur to them and then use these associations for idea generation. At the end of the session you can either collect all of the ideas together by writing them onto flipcharts or you can ask the groups to have listed their own and have these displayed for general perusal.

This techniques uses random stimuli with the advantage of a challenge / competition thrown in. The humour generated from the unusual objects / angles also raises the energy levels of the group, along with the fact that they have been up and moving about.

Technique 4: Consensus Mapping[9]

The consensus mapping technique helps a facilitator and group reach consensus about how best to arrange a network of up to maybe 20 – 30 activities that have to be sequenced over time into a useable plan of action (e.g. outlining a 10-year network of sequentially linked activities to deal with a complex environmental pollution issue). These will usually be activities that could be done in a range of orders – i.e. the order has to be approved – it is not given by the internal logic of the activities themselves.

[8] Retrieved from "http://www.mycoted.com/Talking_Pictures"

[9] Retrieved from "http://www.mycoted.com/Consensus_Mapping"

The technique has parallels to many of the usual project planning methods (and could if necessary feed into them) but operates at a purely qualitative, outline, level.

Here is the suggested procedure:

1. **Present the ideas**: Devise a master list, via any suitable means, detailing all the ideas to be used in the single coherent action plan required, e.g. brainstorm the activities needed to implement some idea or project. Everyone copies the master list onto Post-its, or equivalent, one idea per slip.
2. **Form groups**: The facilitator forms 2 – 4 task groups, each of 5 – 9 individuals in each.
3. **Private clustering:** Individuals in groups makes their own private attempt to group the ideas into related clusters or categories.
4. **Sharing in triads:** Join together in pairs or triads within each task group to describe one another's clusters.
5. **Group clustering:** Individual task groups combine to try merging their private clustering into a shared clustering they can all accept.
6. **Group review:** following group clustering, clarification of the original ideas, and re-evaluation of them takes place.
7. **Facilitators create and present an integrated map:** each task group delivers their group clusters to the facilitator. They then take a break. During the break, staff members consolidate the group cluster maps into a single overall cluster map, containing all the ideas, categories, and relationships generated by the groups. This integrated map is presented to the group as a whole when they come back together.
8. **Map reconfiguration:** The whole group splits itself again into the respective task groups, and each one uses the integrated map for motivation and stimuli for developing its own map in which cluster of activities are linked sequentially. Links made of ribbon or yarns are better than pen lines at this stage, because they can be changed.
9. **Plenary presentation:** Each task group exhibits its map of sequentially linked clusters to the others.
10. **Map consolidation:** Representatives from each task group meet to construct a single final map that combines the features of all the maps.

The complete procedure works best with a trained group, but the mapping element could easily be adapted to informal solo use.

Technique 5: Synectics[10]

Synectics is based on a simple concept for problem solving and creative thinking - you need to generate ideas, and you need to evaluate ideas. Whilst this may be stating the obvious, the methods used to perform these two tasks are extremely powerful.

- **Preliminary planning**

  In advance, hold a preliminary planning meeting with the problem owner(s). This checks that there are genuine problem owners, wanting new options that they themselves can implement, within their authority; helps you to understand the problem-owners' perceptions of the problem area; gives a feel for the number and quality of solutions needed; helps to ensure realistic expectations about results; and allows you to agree team membership.

[10] Retrieved from "http://www.mycoted.com/Synectics"

Procedure during the session:

- **Problem owner provides headline and wish**: They describe the issue, how it is experienced, the background, what has been tried, and the possible scope of action. It is then expressed in one or more 'big wish' statements of the form: 'I wish (IW)...' or 'How to (H2) ...'. Note that this is not a 'problem definition' but a wish reflecting the way the issue is experienced. The group listen imaginatively, rather than analytically.
- **Group generates large numbers of 'springboards':** The mood here should be expansive and unconstrained. The springboards use the same formats as the 'big wish' (IW, H2, etc.). They are not ideas for solutions, but articulate further wishes to open up space for invention: 'It would be nice if we could do X but we don't yet know how to.'
- **Select an interesting springboard:** The mood now switches to a more focused approach than in Steps 1-2. Problem owner and group members choose their favourite springboards (more on the basis of interest or appeal than on the basis of logical relevance). They share their choices, but final choice rests with the problem-owner. However, the process can always be repeated, so the choice is not critical. The assumption is that within any springboard will be creative possibilities that can usefully be explored.
- **Ideas to help achieve the selected springboard are generated** (see creative-thinking techniques). The problem-owner selects some that seem interesting.
- **Check understanding of these by paraphrasing** them and checking with their authors until the paraphrase is correct. An idea is selected for the Itemised Response.
- **Itemised response.** Every conceivable positive feature of the selected idea is listed. Then (and only then), a single concern / problem / issue is expressed as a problem for solution (e.g. 'How to ...'). Solutions for these are expressed by all in terms of 'What you do is (WYDI)...'.
- **Recycle or end:** Back to ideas generation until sufficient ideas for this springboard have been explored and the problem-solver has a solution s/he is happy to run with, or until time runs out.

Technique 6: **Appreciation**
(Extracting Maximum Information From Facts)

Appreciation is a very simple but powerful technique for extracting the maximum amount of information from a simple fact.

Starting with a fact, ask the question 'So what?' - i.e. what are the implications of that fact? Keep on asking that question until you have drawn all possible inferences.

Example:
Appreciation is a technique used by military planners, so we will take a military example:

Fact: It rained heavily last night

So What?
- The ground will be wet

So What?
- It will turn into mud quickly

So What?
- If many troops and vehicles pass over the same ground, movement will be progressively slower and more difficult as the ground gets muddier and more difficult.

So What?
- Where possible, stick to paved roads. Otherwise expect movement to be much slower than normal.

While it would be possible to reach this conclusion without the use of a formal technique, Appreciation provides a framework within which you can extract information quickly, effectively and reliably.

Asking 'so what?' repeatedly helps you to extract all important information implied by a fact.

Technique 7: Drill Down

(Breaking Problems Down Into Manageable Parts)

Drill Down is a simple technique for breaking complex problems down into progressively smaller parts.

To use the technique:

- Start by writing the problem down on the left-hand side of a large sheet of paper.
- Next, write down the points that make up the next level of detail on the problem a little to the right of this. These may be factors contributing to the problem, information relating to it, or questions raised by it. This process of breaking the problem down into its component part is called 'drilling down'.

For each of these points, repeat the process. Keep on drilling down into points until you fully understand the factors contributing to the problem.

If you cannot break them down using the knowledge you have, then carry out whatever research is necessary to understand the point.

Drilling into a question helps you to get a much deeper understanding of it. The process helps you to recognise and understand the factors that contribute to it.

Drill Down prompts you to link in information that you had not initially associated with a problem. It also shows exactly where you need further information.

Example:

The owner of a windsurfing club is having complaints from its members about the unpleasant quality of the water close to the clubhouse.

This seems like a huge problem.

She carries out the analysis on the next page:

Figure 1: Drill Down Into Problem of Improving Quality of Sea Water

This gives her a starting point in which to begin thinking about the problem. It highlights where she does not fully understand the problem, and shows where she needs to carry out further research.

'Drill Down' helps you to break a large and complex problem down into its component parts, so that you can develop plans to deal with these parts. It also shows you which points you need to research in more detail.

Technique 8: Cause and Effect diagrams

(Identify the Likely Causes of Problems. Also called Fish or Fishbone Diagrams, and Ishikawa Diagrams)

- **Identify the problem:**

  Write down the exact problem you face in detail. Where appropriate identify who is involved, what the problem is, and when and where it occurs. Write the problem in a box on the left hand side of a large sheet of paper. Draw a line across the paper horizontally from the box. This gives you space to develop ideas.

- **Work out the major factors involved:**

Next identify the factors that may contribute to the problem. Draw lines off the spine for each factor, and label it. These may be people involved with the problem, systems, equipment, materials, external forces, etc. Try to draw out as many possible factors as possible. If you are trying to solve the problem as part of a group, then this may be a good time for some brainstorming (see later). Using the 'Fish bone' analogy, the factors you find can be thought of as the bones of the fish.

- **Identify possible causes:**

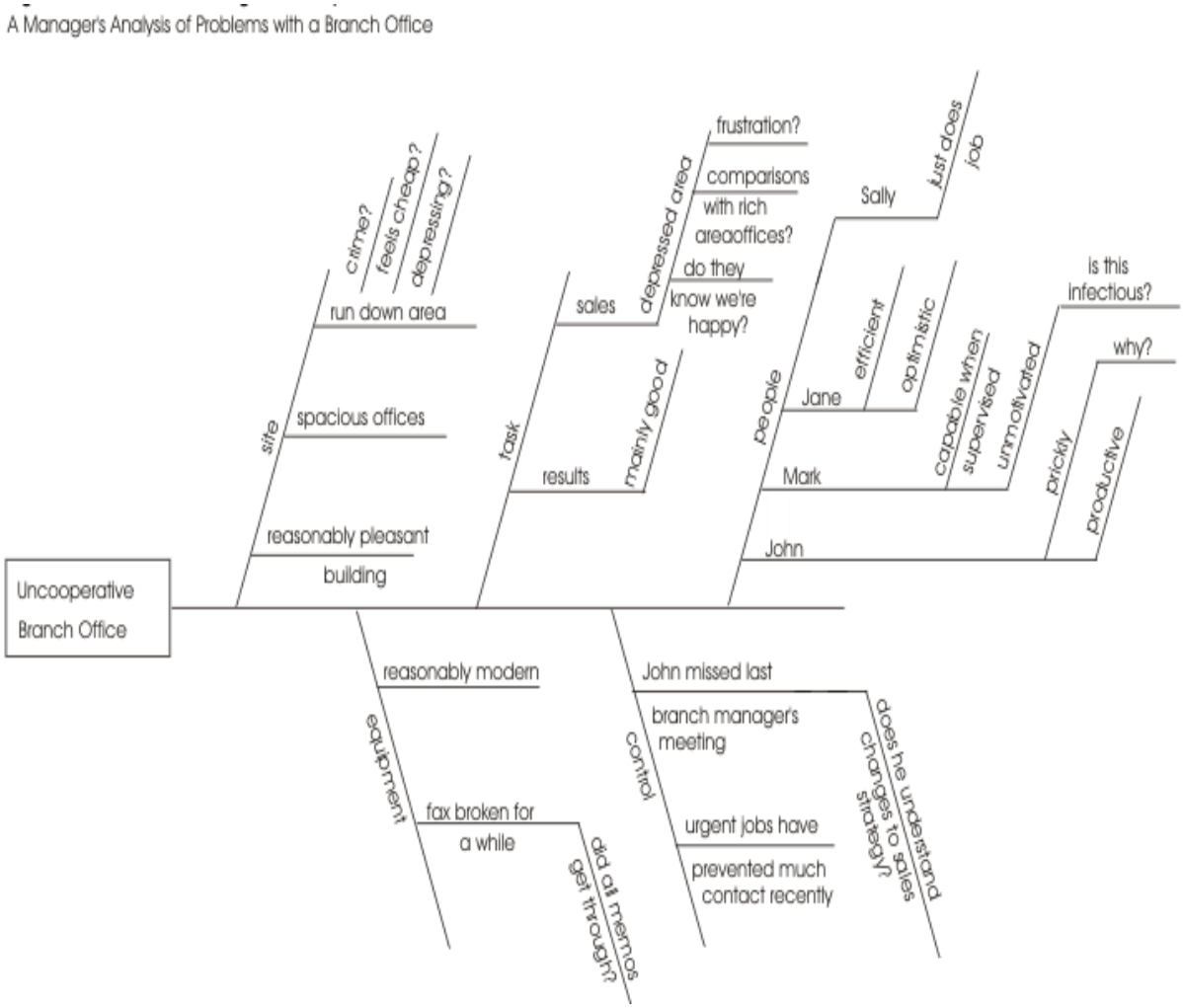
For each of the factors, brainstorm possible causes of the problem that may be related to the factor. Show these as smaller lines coming off the 'bones' of the fish. Where a cause is large or complex, then it may be best to break it down into sub-causes. Show these as lines coming off each cause line.

- **Analyse your diagram:**

By this stage you should have a diagram showing all the possible causes of your problem. Depending on the complexity and importance of the problem, you can now investigate the most likely causes further. This may involve setting up investigations, carrying out surveys, etc. These will be designed to test whether your assessments are correct.

Example:

The example below shows a Cause & Effect diagram drawn by a manager who is having trouble getting cooperation from a branch office:



If the manager had not thought the problem through, he might have dealt with the problem by assuming that people were being difficult. Instead he might think that the best approach is to arrange a meeting with the Branch Manager. This would allow him to brief the manger fully, and talk through any problems that he may be facing.

Cause & Effect analysis (or fishbone analysis) provide a structured way to help you think through all possible causes of a problem. This helps you to carry out a thorough analysis of a situation.

Technique 9: SWOT

(Discover new opportunities. Manage and eliminate threats.)

To carry out a SWOT Analysis, write down answers to the following questions:

Strengths:

- What advantages does your company have?
- What do you do better than anyone else?
- What unique or lowest-cost resources do you have access to?
- What do people in your market see as your strengths?

Consider this from an internal perspective, and from the point of view of your customers and people in your market. And be realistic: It's far too easy to fall prey to "not invented here syndrome". Also, if you are having any difficulty with this, try writing down a list of your characteristics. Some of these will hopefully be strengths!

In looking at your strengths, think about them in relation to your competitors - for example, if all your competitors provide high quality products, then a high quality production process is not a strength in the market, it is a necessity.

Weaknesses:

- What could you improve?
- What should you avoid?
- What are people in your market likely to see as weaknesses?

Again, consider this from an internal and external basis: Do other people seem to perceive weaknesses that you do not see? Are your competitors doing any better than you? It is best to be realistic now, and face any unpleasant truths as soon as possible.

Opportunities:

- Where are the good opportunities facing you?
- What are the interesting trends you are aware of?

Useful opportunities can come from such things as:

- Changes in technology and markets on both a broad and narrow scale
- Changes in government policy related to your field
- Changes in social patterns, population profiles, lifestyle changes, etc.
- Local Events

A useful approach to looking at opportunities is to look at your strengths and ask yourself whether these open up any opportunities.

Alternatively, look at your weaknesses and ask yourself whether you could open up opportunities by eliminating them.

Threats:

- What obstacles do you face?
- What is your competition doing?
- Are the required specifications for your job, products or services changing?
- Is changing technology threatening your position?
- Do you have bad debt or cash-flow problems?
- Could any of your weaknesses seriously threaten your business?

Carrying out this analysis will often be illuminating - both in terms of pointing out what needs to be done, and in putting problems into perspective.

Strengths and **weaknesses** are often internal to your organisation. **Opportunities** and **threats** often relate to external factors. For this reason the SWOT Analysis is sometimes called Internal-External Analysis and the SWOT Matrix is sometimes called an IE Matrix Analysis Tool.

You can also apply SWOT Analysis to your competitors. As you do this, you'll start to see how and where you should compete against them.

Example:

A start-up small consultancy business might draw up the following SWOT matrix:

Strengths:

- We are able to respond very quickly as we have no red tape, no need for higher management approval, etc.
- We are able to give really good customer care, as the current small amount of work means we have plenty of time to devote to customers
- Our lead consultant has strong reputation within the market
- We can change direction quickly if we find that our marketing is not working
- We have little overhead, so can offer good value to customers

Weaknesses:

- Our company has no market presence or reputation
- We have a small staff with a shallow skills base in many areas
- We are vulnerable to vital staff being sick, leaving, etc.
- Our cash flow will be unreliable in the early stages

Opportunities:

- Our business sector is expanding, with many future opportunities for success
- Our local council wants to encourage local businesses with work where possible
- Our competitors may be slow to adopt new technologies

Threats:

- Will developments in technology change this market beyond our ability to adapt?

- A small change in focus of a large competitor might wipe out any market position we achieve

The consultancy may therefore decide to specialise in rapid response, good value services to local businesses. Marketing would be in selected local publications, to get the greatest possible market presence for a set advertising budget. The consultancy should keep up-to-date with changes in technology where possible.

Key points:

SWOT Analysis is a simple but powerful framework for analysing your company's Strengths and Weaknesses, and the Opportunities and Threats you face. This helps you to focus on your strengths, minimise threats, and take the greatest possible advantage of opportunities available to you.

Technique 10: Risk analysis

Risk is 'the perceived extent of possible loss'. Different people will have different views of the impact of a particular risk - what may be a small risk for one person may destroy the livelihood of someone else.

Almost everything we do in today's business world involves a risk of some kind: customer habits change, new competitors appear, factors outside your control could delay your project. But formal risk analysis and risk management can help you to assess these risks and decide what actions to take to minimise disruptions to your plans. They will also help you to decide whether the strategies you could use to control risk are cost-effective.

One way of putting figures to risk is to calculate a value for it as:

Risk = probability of event x cost of event

Doing this allows you to compare risks objectively.

To carry out a risk analysis, follow these steps:

Identify Threats

The first stage of a risk analysis is to identify threats facing you. Threats may be:

- **Human** - from individuals or organisations, illness, death, etc.
- **Operational** - from disruption to supplies and operations, loss of access to essential assets, failures in distribution, etc.
- **Reputational** - from loss of business partner or employee confidence, or damage to reputation in the market.
- **Procedural** - from failures of accountability, internal systems and controls, organisation, fraud, etc.
- **Project** - risks of cost over-runs, jobs taking too long, of insufficient product or service quality, etc.
- **Financial** - from business failure, stock market, interest rates, unemployment, etc.

- **Technical** - from advances in technology, technical failure, etc.
- **Natural** - threats from weather, natural disaster, accident, disease, etc.
- **Political** - from changes in tax regimes, public opinion, government policy, foreign influence, etc.

This analysis of threat is important because it is so easy to overlook important threats. One way of trying to capture them all is to use a number of different approaches:

- Firstly, run through a list such as the one above, to see if any apply
- Secondly, think through the systems, organisations or structures you operate, and analyse risks to any part of those
- See if you can see any vulnerabilities within these systems or structures
- Ask other people, who might have different perspectives.

Estimate Risk:

Once you have identified the threats you face, the next step is to work out the likelihood of the threat being realised and to assess its impact.

One approach to this is to make your best estimate of the probability of the event occurring, and to multiply this by the amount it will cost you to set things right if it happens. This gives you a value for the risk.

Manage Risk:

Once you have worked out the value of risks you face, you can start to look at ways of managing them. When you are doing this, it is important to choose cost effective approaches - in most cases, there is no point in spending more to eliminating a risk than the cost of the event if it occurs. Often, it may be better to accept the risk than to use excessive resources to eliminate it.

Risk may be managed in a number of ways:

- **By using existing assets:** Here existing resources can be used to counter risk. This may involve improvements to existing methods and systems, changes in responsibilities, improvements to accountability and internal controls, etc.
- **By contingency planning:** You may decide to accept a risk, but choose to develop a plan to minimise its effects if it happens. A good contingency plan will allow you to take action immediately, with the minimum of project control if you find yourself in a crisis management situation.
- **By investing in new resources:** Your risk analysis should give you the basis for deciding whether to bring in additional resources to counter the risk. This can also include insuring the risk: Here you pay someone else to carry part of the risk - this is particularly important where the risk is so great as to threaten your or your organisation's solvency.

Reviews:

Once you have carried out a risk analysis and management exercise, it may be worth carrying out regular reviews. These might involve formal reviews of the risk analysis, or may involve testing systems and plans appropriately.

Risk analysis allows you to examine the risks that you or your organisation faces. It is based on a structured approach to thinking through threats, followed by an evaluation of the probability and cost of events occurring.

Risk analysis forms the basis for risk management and crisis prevention. Here the emphasis is on cost effectiveness. Risk management involves adapting the use of existing resources, contingency planning and good use of new resources.

Technique 11: Five Forces

Porter's 5 Forces tool is a simple but powerful tool for understanding where power lies in a business situation. This tool was created by Harvard Business School professor, Michael Porter, to analyse the attractiveness and likely-profitability of an industry. Since publication, it has become one of the most important business strategy tools. The classic article which introduces it is "How Competitive Forces Shape Strategy" in Harvard Business Review 57, March – April 1979, pages 86-93.

With a clear understanding of where power lies, you can take fair advantage of a situation of strength, improve a situation of weakness, and avoid taking wrong steps. This makes it an important part of your planning toolkit.

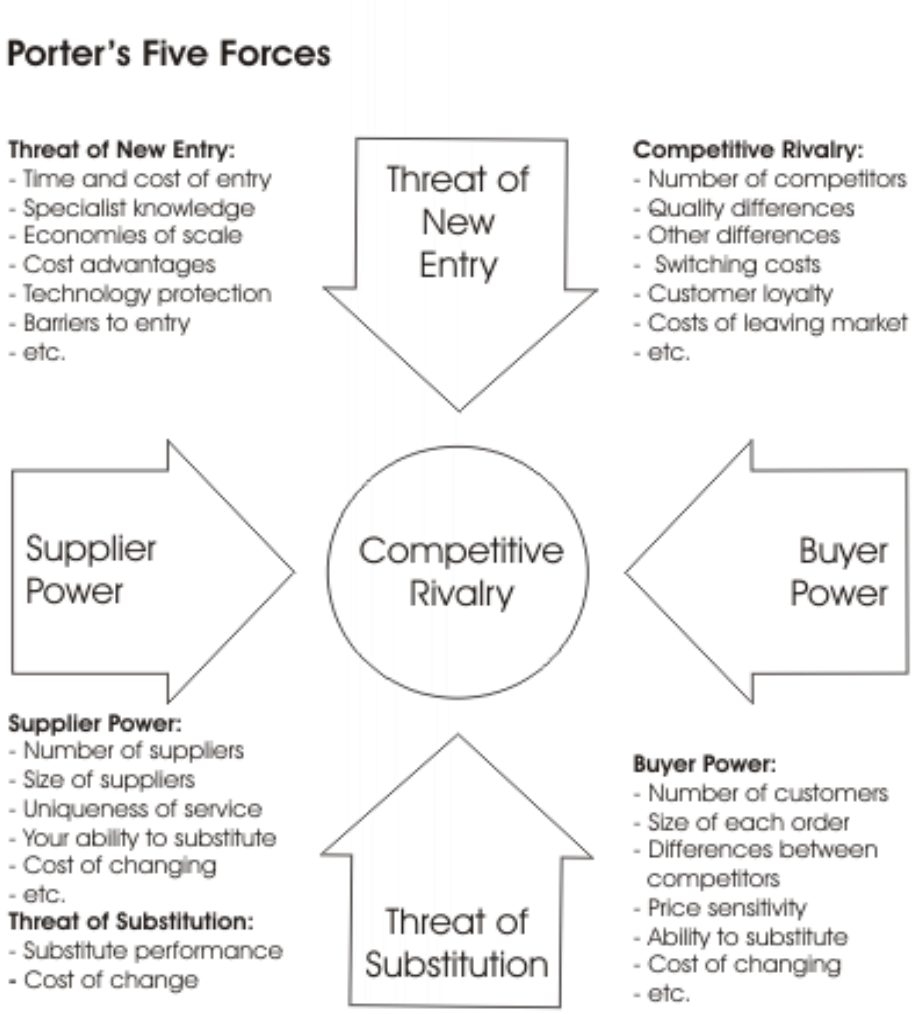
Conventionally, the tool is used to identify whether new products, services or businesses have the potential to be profitable. However it can be very illuminating when used to understand the balance of power in other situations.

Five Forces Analysis assumes that there are five important forces that determine competitive power in a situation. These are:

1. **Supplier Power:** Here you assess how easy it is for suppliers to drive up prices. This is driven by the number of suppliers of each key input, the uniqueness of their product or service, their strength and control over you, the cost of switching from one to another, and so on. The fewer the supplier choices you have, and the more you need suppliers' help, the more powerful your suppliers are.
2. **Buyer Power:** Here you ask yourself how easy it is for buyers to drive prices down. Again, this is driven by the number of buyers, the importance of each individual buyer to your business, the cost to them of switching from your products and services to those of someone else, and so on. If you deal with few, powerful buyers, they are often able to dictate terms to you.
3. **Competitive Rivalry:** What is important here is the number and capability of your competitors – if you have many competitors, and they offer equally attractive products and services, then you'll most likely have little power in the situation. If suppliers and buyers don't get a good deal from you, they'll go elsewhere. On the other hand, if no-one else can do what you do, then you can often have tremendous strength.
4. **Threat of Substitution:** This is affected by the ability of your customers to find a different way of doing what you do – for example, if you supply a unique software product that automates an important process, people may substitute by doing the process manually or by outsourcing it. If substitution is easy and substitution is viable, then this weakens your power.

5. **Threat of New Entry:** Power is also affected by the ability of people to enter your market. If it costs little in time or money to enter your market and compete effectively, if there are few economies of scale in place, or if you have little protection for your key technologies, then new competitors can quickly enter your market and weaken your position. If you have strong and durable barriers to entry, then you can preserve a favourable position and take fair advantage of it.

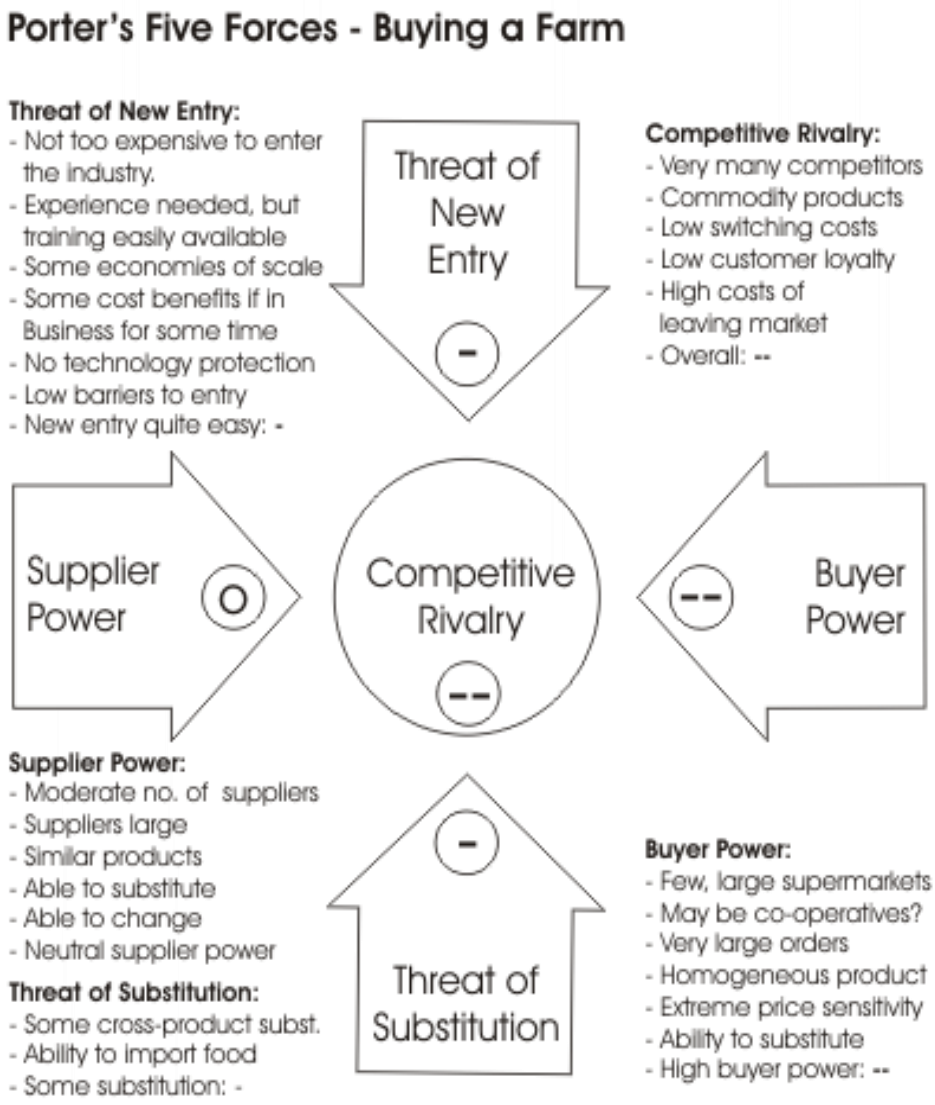
These forces can be neatly brought together in a diagram like the one below:



To use the tool to understand your situation, look at each of these forces one-by-one.

Brainstorm the relevant factors for your market or situation, and then check against the factors listed for the force in the diagram above.

Example:
Martin Johnson is deciding whether to switch career and become a farmer – he's always loved the countryside, and wants to switch to a career where he's his own boss. He creates the following Five Forces Analysis as he thinks the situation through:



This worries him:

- The **threat of new entry** is quite high: if anyone looks as if they're making a sustained profit, new competitors can come into the industry easily, reducing profits;
- **Competitive rivalry** is extremely high: if someone raises prices, they'll be quickly undercut. Intense competition puts strong downward pressure on prices;
- **Buyer Power** is strong, again implying strong downward pressure on prices; and
- There is some **threat of substitution**. Unless he is able to find some way of changing this situation, this looks like a very tough industry to survive in. Maybe he'll need to specialise in a sector of the market that's protected from some of these forces, or find a related business that's in a stronger position.

Porter's Five Forces Analysis is an important tool for assessing the potential for profitability in an industry. With a little adaptation, it is also useful as a way of assessing the balance of power in more general situations.

It works by looking at the strength of five important forces that affect competition:

- Supplier Power: The power of suppliers to drive up the prices of your inputs;
- Buyer Power: The power of your customers to drive down your prices;
- Competitive Rivalry: The strength of competition in the industry;
- The Threat of Substitution: The extent to which different products and services can be used in place of your own; and
- The Threat of New Entry: The ease with which new competitors can enter the market if they see that you are making good profits (and then drive your prices down).

By thinking through how each force affects you, and by identifying the strength and direction of each force, you can quickly assess the strength of the position and your ability to make a sustained profit in the industry.

You can then look at how you can affect each of the forces to move the balance of power more in your favour.

Technique 12: PEST analysis

PEST Analysis is a simple but important and widely-used tool that helps you understand the big picture of the **P**olitical, **E**conomic, **S**ocio-Cultural and **T**echnological environment you are operating in. PEST is used by business leaders worldwide to build their vision of the future.

It is important for the following main reasons:

- Firstly, by making effective use of PEST Analysis, you ensure that what you are doing is aligned positively with the powerful forces of change that are affecting our world. By taking advantage of change, you are much more likely to be successful than if your activities oppose it;
- Secondly, good use of PEST Analysis helps you avoid taking action that is doomed to failure for reasons beyond your control
- Thirdly, PEST is useful when you start operating in a new country or region. Use of PEST helps you break free of unconscious assumptions, and helps you quickly adapt to the realities of the new environment.

PEST is a simple mnemonic standing for Political, Economic, Socio-Cultural and Technological. Using the tool is a three stage process:

- Firstly, you brainstorm the relevant factors that apply to you;
- Secondly, you identify the information that applies to these factors
- Thirdly, you draw conclusions from this information.

Tip:
The important point is to move from the second step to the third step: it is sterile just to describe factors without thinking through what they mean. However, be careful not to assume that your analysis is perfect: use it as a starting point, and test your conclusions against the reality you experience.

The following factors may help as a starting point for brainstorming (but make sure you include others that may be appropriate to your situation):

Political:

- Government type and stability
- Freedom of press, rule of law and levels of bureaucracy and corruption
- Regulation and de-regulation trends
- Social and employment legislation
- Tax policy, and trade and tariff controls
- Environmental and consumer-protection legislation
- Likely changes in the political environment

Economic:

- Stage of business cycle
- Current and project economic growth, inflation and interest rates
- Unemployment and labour supply
- Labour costs
- Levels of disposable income and income distribution
- Impact of globalisation
- Likely impact of technological or other change on the economy
- Likely changes in the economic environment

Socio-Cultural:

- Population growth rate and age profile
- Population health, education and social mobility, and attitudes to these
- Population employment patterns, job market freedom and attitudes to work
- Press attitudes, public opinion, social attitudes and social taboos
- Lifestyle choices and attitudes to these
- Socio-Cultural changes

Technological Environment:

- Impact of emerging technologies
- Impact of Internet, reduction in communications costs and increased remote working
- Research & Development activity
- Impact of technology transfer

Things that make activity more difficult for people or organisations raise the cost of doing business: activity is either blocked altogether, or costs more in time/ money as difficulties are circumvented. The higher the cost of doing business in a region, the more project profitability is squeezed or eliminated.

And given that businesspeople normally have at least some level of intelligence, businesses and projects that could otherwise operate are never launched - meaning that less economic activity takes place. And the lower the amount of economic activity, the poorer and less capable societies tend to be.

Another broad principle is wherever there is rapid or major change in an area, there are likely to be new opportunities and threats that arise. Smart people and companies will take advantage of the opportunities and manage the threats.

Remember that few situations are perfect: it is up to us to make the most of the situation in which we find ourselves.

PEST Analysis is a useful tool for understanding the "big picture" of the environment in which you are operating, and the opportunities and threats that lie within it. By understanding your environment, you can take advantage of the opportunities and minimise the threats.

PEST is a mnemonic standing for Political, Economic, Social and Technological. These headings are used firstly to brainstorm the characteristics of a country or region and, from this, draw conclusions as to the significant forces of change operating within it. This provides the context within which more detailed planning can take place to take full advantage of the opportunities that present themselves.

Common pitfalls of problem-solving efforts

- **Identifying the wrong problem.** Sometimes what really needs to decided is very obvious, but other times the issue is harder to spot. For example, let's say your colleague cancelled a study session with you to hang out with other friends. Is the problem that you are hurt by your friend's actions or that you are worried about his study habits? Figuring out the focus of your **decision** can save you from big headaches later on.
- **Listening to only one source.** This will hurt your chances of coming up with a broad choice of alternatives and coming up with the best solution. Overestimating how helpful or reliable one person can be is also dangerous, because nobody can completely understand the particular dynamics of your situation.
- **Listening to too many sources.** It is important to collect as much information as possible to help you make your **decision**, but an overload of input may prevent you from following your gut instinct. Trusting your intuition is a key component of successful **decision-making**.
- **Overshooting on the outcome.** When considering your options, take care to also assess how probable the outcomes of each option truly are. A **decision** that looks attractive but is totally unfeasible will not help you solve the problem.
- **Bad timing.** Sometimes it's best to hold off on **making** a **decision**, but other times delaying a response can makes things a lot worse. Taking your time will probably result in a higher-quality **decision**, but expediting the process could also give you more time to fix things in the event of an undesirable outcome. Since each choice is often case-specific, consider how the pros and cons of timing will affect your **decision** and the ensuing outcome.

Formative Assessment 2: SO2 AC1

Creativity and Innovation Techniques

Individually, complete the following formative activity

Draw up a list of 10 common problems in the workplace (in random order as they come to mind):
Explain *why* **one** of the above is a problem in your workplace
Now write down a **description of the problem** in terms of "**The following should be happening, but isn't ...**" or "**The following is happening and shouldn't be: ...**"
From the list in 1, select the five problems that hamper the achievement of your team goals most, say whether they represent a surplus or a deficit and what the "ideal state" would be:
Study the following calendar showing team members' attendance for the month:

S	M	T	W	T	F	S
	Mr A Mr B Mr C	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	Mr B Mr C Mr D	
S	M	T	W	T	F	S
	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	Mr B Mr C Mr D	
S	M	T	W	T	F	S
	Mr A Mr B Mr C	Mr A Mr C Mr D	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	
S	M	T	W	T	F	S
	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D	(Pay day) Mr A Mr B Mr C Mr D	Mr A Mr B Mr C	Mr B Mr C Mr D	
S	M	T				
	Mr A Mr B Mr C Mr D	Mr A Mr B Mr C Mr D				

You say you are not happy with your team's attendance. **Define the problem** by asking relevant questions:

What

When

Who

Why

Where How
Describe the absenteeism problem in the following terms: "The following should be happening, but isn't ..." **and** "The following is happening and shouldn't be:
Based on your statement above, you can now say that your team goals are not being achieved because:
Select a problem in your workplace related to a **process**. State the fact and then get your mentor/supervisor to ask "So what?" until you are happy that you have extracted all the important information implied by the fact. **Signatures upon completion:** **Mentor/supervisor:** **Learner:**

Date:

Brainstorm possible solutions to the problem identified above. Write your notes below:

Address the problem identified above by answering the following questions about **each solution**:

	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5
Which approach is the **most likely to solve the problem** for the long term?					
Which approach is **the most realistic** to accomplish for now?					
Do you have the **resources**?					
Are they **affordable**?					
Do you have enough **time** to implement the approach?					
What is the extent of **risk** associated with each alternative?					

Most likely solution: _____

Draw up an action plan to implement the solution

Action Plan Form

Initiative:	**Date:**
Action step or change to be accomplished:	
What actions or changes will occur:	
Who will carry it out:	
By when (for how long):	
What resources are needed:	
Communication (who should know what):	

Place any extra evidence after this page, clearly marked for easy reference.

b. Explain the Techniques for Promoting Creativity

Many people believe that creativity is somehow dependent on "natural talent". Most researchers, however, indicate that the skills involved in creativity are something that can be taught and learned.

In *A Whack on the Side of the Head*, Roger von Oech (1983) describes the characteristics that promote the creative process:

- Generate as many answers as possible. Don't look for the one "right answer".
- Don't ask if something is "logical".
- Set aside all rules.
- Don't judge the quality of an idea by looking at its "practicality".
- Allow ambiguity.
- Don't worry about being wrong.
- Indulge yourself...let yourself play.
- Let yourself go into new areas.
- Be foolish and silly.
- Accept your own creativity.
- Make yourself receptive to new ideas.

Scott Witt adds that confidence, independence, and curiosity are the prime ingredients of ingenuity. Witt maintains that creative people have unbending confidence in their ability to come up with solutions to problems, and that they enjoy leaving the beaten path and exploring unusual possibilities.

Recent research by Terry Greene and Helga Noice states that the act of complimenting students on their clothing, hair and/or jewellery will improve their performance on creativity tests. Creativity is somehow related to the emotional state of the creator.

Michael Hutchison in *Megabrain* (1986) points out the importance of stimulating the brain with challenges, change, ambiguities, and novel experiences.

Formative Assessment 3: SO2 AC2

Techniques for Promoting Creativity

Individually, complete the following formative activity

Describe in detail 3 techniques that you can implement to **promote** creativity in your department and team:

SECTION 3: DEVELOP A PLAN FOR CREATING AN INNOVATIVE ENVIRONMENT

Specific Outcome 3

Develop a plan for creating an environment conducive to innovation.

Assessment Criteria

- The role of the unit manager in creating an environment conducive to innovation is described with reference to continuous improvement and innovation of the unit.
- The processes, actions and approaches necessary to create an environment conducive to innovation are recorded in the plan.
  - **RANGE** The plan could include the activities, techniques, approaches, processes, role players, reward systems, measurement, potential risks and benefits, and skills development of the unit manager and team members.
- The implementation of the plan is described with reference to the environment and availability of resources.
- The plan is promoted within the unit in order to encourage commitment.

3.1 Developing a Plan for Creative Innovation

In an environment where products, markets, operations, and business models are in permanent flux, clear values and goals provide alignment and cohesion, and create a culture where the team are comfortable with change and unpredictability.

What's required is for managers to become visionary challengers – people who question assumptions and suggest radical alternatives (even being brave enough to suggest alternatives that others might consider impractical). These will be charismatic change leaders who set direction, inspire, deliver against defined business outcomes, and move the organisation forward. In this environment, strong management (and especially change management) is a core competence at all levels and nurtured as a professional discipline, not an "art".

a. Describe the Role of the Manager in Innovation

It has been said that traditional management practice has little to contribute to processes of creation and innovation. Therefore, if innovation is to be fostered in an organisation, the role and practices of management require innovation as well.

But what kind of innovation in management are we thinking about?

First of all, organisations need a new kind of leadership. Innovation is directly proportional to the attitude of senior management. Without a corporate strategy to reach defined corporate goals, innovation will be misdirected and unguided. Actions of top managers should set the context: they must guide the process, clearly communicate the reasons for the innovation and protect their creative teams. Managers would also need to adjust their thinking to appreciate distinctiveness in people and their thinking; and welcome change.

Management would need courage, and the CEO needs to have the vision and fortitude to stand before the board and defend the opportunity to explore and fail.

Because innovation is most often carried out in teams, leadership's role is also to provide a work environment of openness built on trust where every member of the team feels free to express their views/opinions without fear of ridicule or reprisal.

In addition, management should consider facilitating calculated testing environments to evaluate and secure viability of new ideas.

Managers must provide staff the support and freedom that allows them to fulfil their potential, and to deliver the optimal creativity and innovation that elevates performance to world-class. To deal successfully with the cultural changes demanded by today's smarter working practices, a manager must demonstrate integrity, honesty, sensitivity, and humility. In equal measure, they must also inspire, motivate, and be willing to challenge habits and conventions. When distilled against this new work backdrop, the work of management is focused on two essential tasks;-

- **Amplifying human capability** (creating an environment that inspires, enables and empowers people to give the very best of themselves) and:
- **Aggregating human effort** (co-ordinating the activities of individuals in ways that allow them to achieve together what they could not otherwise achieve alone).

The case is clear – managers must adapt to survive and thrive – and so are the tough questions that must be asked:

- Are managers the visionary challengers required to create the freedom to effect meaningful change? Does your organisation manage change as a structured program and precisely measure the effectiveness of change?
- Does your organisation have robust processes in place to incubate new product, service and business model concepts – and redirect investment when required?
- Does your organisation have a healthy appetite for change? And how quickly can managers adapt?

Management Practices that Inhibit Creativity, Risk Taking and Innovation

Managers have much more power than they realise. They can crush creativity with subtle comments and gestures and responses to suggestions and ideas that are deciphered by staff as rejection.

The following are ways in which managers can inhibit risk-taking and innovation among their employees:

Criticism of all new ideas

Point out some of the weaknesses and flaws that will prevent an idea's success. The more experienced a leader, the easier it is for that leader to find fault with other people's ideas. Remember, though:

- Decca Records turned down the Beatles
- IBM rejected the photocopying idea that launched Xerox
- DEC turned down the spreadsheet
- Various major publishers turned down the first Harry Potter novel

New ideas tend to be partly-formed so it is easy to reject them as "bad." New ideas often diverge from the narrow focus previously established and are, thus, easily discarded. Every time a new idea is criticised, the person with the idea is disinclined to waste further time presenting more suggestions. Criticising sends a message that new ideas are not welcome and that anyone who volunteers them is risking criticism or ridicule.

Lack of staff involvement

The chief executive and senior team try to shoulder the responsibility for solving all the company's major problems as they believe strategic issues are too complicated and high-level for the "ordinary" staff and forget that employees can be challenged to develop solutions.

Focus on efficiency, not innovation

By concentrating on making the current system work better, time will not be wasted looking for different systems. The current business model is the one that is obviously the best one for the business. "If the makers of horse drawn carriages, after all, had improved quality they could have stopped automobiles taking their markets. The same principle applies to makers of slide rules, LP records, typewriters and gas lights".[11]

A culture of long hours and hard work

Managers insist on working harder at the old way of doing things believing that will eventually solve any issues. They do not deviate from set plans regardless of circumstances and market changes. If an idea was not part of the original plan, there is no budget for it and, thus, the idea would not be implemented.

Punish mistakes

If an employee tries an innovative idea that fails, blame and punishment follow. The existing way of doing things will be reinforced and dangerous experiments are discouraged.

Don't value training

Workshops, budgets and time allocated to creativity and innovation are often looked at as wasteful extravagances.

Formative Assessment 4: SO3 AC1

Management Practices that Inhibit Creativity, Risk Taking and Innovation

Individually, complete the following formative activity:

List and describe 8 management practices that inhibit creativity, risk taking and innovation:

[11] By Paul Sloane;Retrieved from: http://www.realinnovation.com/content/c071112a.asp

How do you rate yourself and your organisation on openness to innovation and creativity? Give reasons for your answer based on the 8 indicators listed above.
What needs to happen, in your opinion, to enhance innovation in your organisation?

Place any extra evidence after this page, clearly marked for easy reference.

b. Plan to create an innovative environment

You need to plan to create an innovative environment:

✓ *Recording and communicating new ideas*

Regular team meetings provide the opportunity to voice any new ideas that may emerge during the life cycle of the project. New ideas should be recorded in the meetings and the tips and techniques for creative thinking can be used to further develop the ideas and perhaps, to initiate new projects.

Using the innovation pro-forma

The innovation pro forma is an ideal tool that can be used to promote innovative thinking. The principle of the tool is that it gives everyone a chance to voice their opinions or ideas, but at the same time, holds them responsible for providing solutions to problems and ideas they may generate. It also prevents the filtering of information as feedback is aimed at the project manager (or senior management team where necessary).

It also provides the opportunity for all ideas to be recorded and communicated. The project administrator could be responsible for capturing all ideas into a consolidated documented that provides a historical view of the ideas that have been generated and in some cases, actioned, throughout the project.

Setting up the process for recording and communicating new ideas

During the team planning meeting introduce the concept of the innovation pro-forma. Ask the team to first agree on how the pro-forma will be accessed. This could be hard copies of the template or soft copies via e-mail or the intranet.

Then discuss how the forms will be returned and who they will be returned to for sorting and capturing of the data.

The next step is to determine the turn around times for giving feedback to the team on the recommendations and the forum that it will be completed in.

The last step is optional and could include rewards for the best ideas.

A motor manufacturing company in South Africa included the last step in their problem solving process, and told their employees that any innovative ideas that were recommended by staff would be reviewed against the ability to implement and the ability to save costs. The reward was 10% of the cost savings to the business. A worker on the assembly line came up with an idea that saved the company over R2,000,000. He was rewarded with a cheque for R200,000.

Let's look at an example of how the innovation pro-forma could be used.

Innovation pro-forma

This is an innovation pro-forma for the customer service department of an airline company.

Current problems experience:	**Recommended solutions to address problems:**
Too much paper being used on the project. Too many copies of reports being distributed and piles of paper are being wasted at the photocopier machine.	Send all reports on-line. No printing of reports for standard meetings. Source the route of the work that has been printed and left at the photocopier and address with each individual.
Ideas for improving the product and service offering:	Recommended steps for improving these:
Customers complain that Johannesburg and Durban have different policy on hand luggage. Jhb allows you to take laptop, handbag and carry-bag. Durban only allows 2 pieces of hand luggage. Define clear policy and educate staff.	Review existing policy Get inputs form Jhb and Dbn on what works best for the customer within safety regulations. Redefine policy. Line managers to communicate changes to staff. Managers to assess implementation.
Lateral thinking ideas:	Recommendations for implementing ideas:
Economy class customers can use the VIP lounges.	Have an open day to use the VIP lounges Vouchers to the lounge for frequent flyers
Questions	Answers to be provided within _____ number of days.
None	

✓ *Describe the Implementation of the Plan*

Now that you are enthused and ready to stimulate creativity in your team, you need to come up with a plan. Look at your environment and availability of resources- do you already have that sinking feeling that this is going to be a futile exercise?

We already know that organisational structure can inhibit or foster creativity and innovation. The problem with organisational structure though, is that it is resultant of many factors, including history, organic growth, strategy, operational design, product diversity, logistics, marketing, client base, supplier base and so forth. Therefore, what you need, are not recipes for complete structural change, but a plan to foster structures that can be adapted into the existing structure.

In its simplest form, your plan can aim for the following:

- Direct communication links to decision makers.
- Communication and information flow between departments and creative teams in other departments
- Tangible progression of ideas from problem to solution
- Fostering a culture of creativity in your team

Now that you have established your goals, you can draw up your action plan.

✓ *Promote the Plan*

Of course your plan will be dead in the water without buy-in and commitment from relevant stakeholders, such as team members, other managers, perhaps even customers, suppliers and other interest groups.

Depending on the prevailing culture in your company, you could find responses ranging from apathy to ridicule and you could have your work cut out for you when trying to change attitudes and gain commitment from the role players.

Formative Assessment 5: SO3 AC2-4

Implement and promote a plan to enhance innovation

Individually, complete the following formative activity:

Devise a plan to enhance innovation in your organisation
Explain how you see your role in implementing the plan

Describe the processes, actions and approaches necessary to create an environment conducive to innovation
Describe the implementation of the plan with reference to the environment and availability of resources
Explain how you will promote the plan within the unit in order to encourage commitment

Place any extra evidence after this page, clearly marked for easy reference.

SECTION 4: LEAD A TEAM THROUGH A CREATIVE THINKING PROCESS

Specific Outcome 4

Lead a team through a creative thinking process.

Assessment Criteria

- Techniques for promoting innovation and creativity are applied to generate ideas for a new or improved process, project or product.
- A number of alternative solutions are generated in relation to the process, project or product.
- The best alternative is selected from the solutions generated on the basis of evaluation criteria.
- A concept is developed for implementation in accordance with the entity's policies and procedures.
- The concept is recorded and communicated for implementation.

4.1 Leading a Team through a Creative Thinking Process

Initially you may find that you have to lead your team through the creative thinking process, but as they experience the freedom and rewards of innovation and acknowledgement, they will be able to run brainstorming sessions by themselves.

a. Apply Techniques for Promoting Innovation and Creativity

Innovation and creative thinking are often required to address problems, pains and barriers to performance. Innovation and new ideas are an important part of the problem solving process. Steps in the problem solving process include:

1. Identify the problem
2. Clearly define the problem
3. Define the options
4. Identify possible solutions
5. Implement and evaluate the results

Identify the Problem

The first step in the problem solving process is to identify or acknowledge that there is a problem. This may be a problem such as missing stock, poor turn around times in service delivery, continuous errors, not getting things right the first time, bad behaviour, problems with

technology etc. Once the problem has been identified, the next step is to clearly define the problem.

Clearly Define the Problem

In order to clearly define a problem you need to gather information and evidence. Ask questions to determine the true source of the problem. For example, if customers phones in to say that his calls are not being returned by a staff member, the immediate response is to attribute the problem to the staff member. However, upon investigation, you may establish that the call answer facilities on the PABX is faulty and does not save messages.

A technique that can be used to identify the root cause of a problem is to use the 5 Why's. When you use this technique you look at a situation, or at a person's behaviour and you ask why a situation or behaviour has occurred. You continue to ask the question why, until you get to the root cause of the problem.

For example:

Manager: Why are the customer's calls not being returned?

Employee: I have not received any messages?

Manager: Why have you not received any messages?

Employee: I have checked the messages on the phone and it says no messages

Manager: Why would the system say there are no messages when the customer says he has been leaving messages?

IT manager: The system does not appear to be recording messages on the call answer facility

Manager: Why is the system not recording messages?

IT Manager: It has not been programmed properly

Manager: Why hasn't it been programmed properly?

IT Manager: The suppliers were supposed to have done it a week ago

Evaluate all of the information that is given to you. Look at things such as internal bias and consider all stakeholders involved.

It is evident in this example that the root cause of the problem rests with the supplier and needs to be addressed by them to ensure that the problem is resolved. It has however created a knock on effect that has affected a relationship with a customer, and that is another problem that will need to be resolved.

Define the Options

Once you have gathered data, evaluated all of the information and identified the root cause of the problem, you are able to look at options for addressing the problems. Use creative thinking to generate options and innovative ideas.

Let's look at an example of customer's ordering the product telephonically, but the turn around time on orders is 4 days and the customer wants it in 2 days. You could use the reversal technique in this situation and reverse the statement "the product gets delivered to the customer" to "the product does not get delivered to the customer". If the product does not get delivered to the customer, what are the options?

- The customer collects the product
- The product is not assembled and parts get sent to the customer

Use the techniques for creative thinking that were discussed earlier to assist you in generating options and innovating new ideas.

b. Generate Alternative Solutions

Once you have generated alternatives, possibilities or choices, you are in a position to identify possible solutions.

1. Identify possible solutions

When identifying solutions, ensure that you consider all the stakeholders involved and that you predict the long term and short term consequences of the options.

When predicting the consequences, consider both the positive and the negative. This should give you enough information to make an informed decision.

- Example:
- 3Ms production of "Post It" note pads". Glue was made in production that did not meet the expected standards. So instead of disposing of it, the 3M team looked at what the glue could be used for. It could be used as a reusable adhesive on paper that sticks to surfaces. This then led to "Post Its" which are used all over the world for note taking and used as reminders.

You can explore attributes in the following categories:

- Physical e.g. colour, weight, materials, speed
- Psychological e.g. appearance, symbols, feelings it generates
- Functional e.g. its uses, applications
- People e.g. anyone who is involved
- Miscellaneous e.g. cost, reputation, origin

Run a brainstorming session

A brainstorming session should be used for generating lots of new ideas and solutions. It should not be used for analysis or for decision making. Of course you will need to analyse and judge the ideas but this is done afterwards and the analysis process does not involve brainstorming techniques.

A brainstorming session must be targeted to a specific topic or else you run the risk of downgrading any future sessions. You must define the problem area or the opportunity area you want to create ideas for. You must draw up a specific problem/ opportunity statement which describes what you are trying to achieve. This statement must not even suggest what a typical solution might be because this will hinder the idea generation.

It is perfectly acceptable to propose a brainstorming session to investigate a whole area of interest which you wish to explore. You will have no fixed perceptions about the area and can often discover new ideas and markets precisely because you didn't follow the normal training path. Creative thinkers often suggest that before you do research in a specific area, you should generate your own ideas because if you follow what everyone else has done, you will follow the normal line of thinking and come up with the same or similar answers.

Once you have an initial statement you should decide whether a brainstorming session is appropriate. The time and costs spent brainstorming can sometimes be saved by just implementing a currently known solution and spending your valuable time on more crucial opportunities. Some problems are best solved by computer simulation or mathematical calculations because they do not need a change in perception. You should not be planning a brainstorming session if you already have several solutions and all you want to do is to decide

which one to use (this is done by analysis). If you are only going to ignore what everyone else suggests then you shouldn't waste their time, or yours.

Decide how you will run the session and who will take part

Assume you now have a goal statement describing what you are trying to achieve or investigate. You have also decided that brainstorming is the most valid approach to your investigation.

Now you need to decide how you will run the session and who will take part. It is important to adjust the style and management of the session depending on the topic and the participants involved.

First you should decide who will lead the session, namely who is going to be the facilitator. This person needs to introduce the session, to keep an eye on the time and to make sure the rules are obeyed. This person will facilitate the session to make it run smoothly and ensure that the participants feel comfortable and join in the process. They will also be responsible for restarting the creative process if it slows down.

This central facilitator will normally be you. But you should be careful not to automatically select yourself in this role. If it is a sensitive issue and includes an evaluation of your position, maybe you shouldn't be there. Alternatively, you may be better at being a regular participant than as a facilitator. Or to remove all biases you could employ a facilitator from another department or from outside your company.

Next you should decide who will take part. The natural inclination and easiest option is to gather your own group of colleagues and friends from within your department, group or company. This is what normally happens, and normally works well. If you are more confident then you should invite people from other departments / groups / companies whom you don't normally work with. You may now be mixing many more different personalities into the creative flow and this can only result in a broader outlook in your ideas.

Group sizes often number between 4 and 30 people. More people mean more opportunities for diversity but can lead to nervousness or to frustration if each person is not given enough individual time to suggest ideas.

Prepare the room and materials

The choice of room will obviously depend on what is available:

A group of approximately 12 people:

Arrange people to be seated in a circle with no "head of the table". Ideally, a round-shaped table is best, though a set of tables in a circle is the usual solution. Otherwise a broad U shape layout is fine. This makes everybody feel equal and when people's ideas start to flow you will find that the person initiating the session becomes part of the group and can play an equal role without pushing any authority. You could have flipcharts just behind the members (approximately one per two people) and with lots of coloured pens. Each person should also have a notepad and pen so that they can write down their personal ideas at the same time as ideas shouted out by other people are being written down elsewhere. Make sure no ideas are lost at any stage. The cost of extra pads is small compared to the loss of a potential winning solution.

You may well need a projector if you intend to display the problem/ opportunity description and any background information or pictures.

A room which has space around the table in which to move about, but not one which makes the group feel small in comparison, is ideal. Comfortable chairs and tables coupled with refreshments on a nearby table are useful. Providing an object in the middle of the circle gives people something to fix on while thinking and removes the need to look into the face of someone else while suggesting an idea.

A dedicated scribe (or two) whose only job is to grab and write down the ideas is extremely useful. This releases some pressure on the facilitator who can spend more time guiding the process

- Smaller groups: Smaller groups are easier to control but there are fewer people to keep the process moving smoothly onward. A very small group is more like a quick-fire conversation and could be seated round a small table with a large pad of paper covering the whole table surface. Everyone can add their ideas at the same time. Try to move the group close together so they don't feel remote from each other.
- Larger groups: With large groups it's impossible to arrange people in a circle without them being too far away to feel part of the group. In this situation you will need to have a theatre-style seating pattern with the facilitator at the front.

If you need a microphone and speakers then it's likely that the group is too big for brainstorming because ideas will be lost while people wait for their turn to speak. If you want to brainstorm with such a large group then you need to have everyone write their ideas down on a notepad or on a computer, use some ideas as stimuli to help people with their personal brainstorming and then gather the pads in afterwards.

Prepare the participants and issue invitations

When you know who you will be inviting and where it is going to be held, you need to invite everyone. First find out when you can get the room you require and if you can have all of the equipment for those times. Try to find three different times when it is available (and reserve it for those three times if you can).

Send out invites by post or by e-mail telling people the time and the place and how long the session will last. Suggest just the most suitable time and location for you and specify a date by which they must have replied. Tell them you want a reply whether their answer is “yes” or “no”. Let them know the topic of the brainstorming session and let them know how much you appreciate their assistance.

You may need to remind people to reply just before the deadline. If the deadline arrives and you have too few people that can come, send out an invite for the next two times you have planned and ask them which ones they can attend. If they cannot attend those either then you should not ask them again and you should hold a smaller session. Remember to cancel any bookings you don't need.

Thank everyone for replying and tell them the final meeting place and time and invite those who say they cannot attend to turn up if they change their situation.

Running the session itself

First of all, you should arrive early, prepare the room and feel relaxed within it. Stick the **brainstorming rules** up in a prominent place. Mentally prepare yourself by running through what you will be doing during the session and remembering that you will be friendly and encouraging at all times.

As the participants arrive, welcome them individually and try to get them talking to each other socially. You are trying to relax everyone and make them feel comfortable with each other. It is very useful if you can introduce people who haven't met each other before. Turn on some peaceful music if you have some.

At the point when everyone has arrived (or most people have, depending on the time), gather everyone together and settle them down in their seats. Welcome them to the brainstorming session and outline the purpose of the session: to get as many ideas as possible on the subject of your choice. Allow people clarification of your intentions but be careful not to suggest specific solutions and try not to place any barriers to solutions at this stage. For now, they should pretend that anything is possible.

Run through the **brainstorming rules**. If anyone is new to brainstorming then it is useful if they have a printout of the rules.

Highlight the importance of the rules. Also explain that the ideas they shout out are both to serve as possible solutions AND to stimulate ideas in other people. You are expecting strange and impossible ideas which will spark off workable solutions. Let them know how much you value weird and bizarre ideas.

If people are new to brainstorming or do not brainstorm very often, it is important to hold a warm-up session to get people "in the mood" and to help them lose their initial inhibitions. One way to do this is to ask people to approach a non-related topic which will not influence anyone in the company. The purpose is to get minds thinking in a flexible and creative way. Typical examples are: "Generating new features for cars" or "Generating new features and gadgets for the kitchen" or "Generating new television programmes". Anything fun, stimulating and, most importantly, not job related.

After warming up for about 5 to 10 minutes, you should reintroduce your main topic for brainstorming.

Open the session by asking for as many ideas and suggestions as possible. Write every one of them down. Tell people to write them down on their own pads of paper if they think they will forget before it can be written down "officially".

Then start asking for radical ideas, ideas which will work in a strange way and any ideas which just spring to mind for no apparent reason. Write them all down on the flipcharts. As each piece of paper is filled, remove it from the pad and fasten it to the wall so that everyone can see it.

Remind people to use other people's ideas as a springboard for their own. Get them to read the current ideas and expand on them radically. Change, warp and exaggerate them and see what further ideas come up. What is the strangest way of solving the problem? Occasionally remind people that you want the ordinary ideas too. They should shout out all of their ideas, not only the interesting ones.

Keep telling them how well they are doing when they come up with new ideas, especially when the idea is very weird. Thank them for saying their ideas. Be encouraging. Lightly scold the group if they criticise or sound shocked at the ideas. Encourage and reward all suggestions, radical or not. Glance from person to person, catching their eye in a pleasant way and smile. Try to speed up the ideas so that there is less time for criticism or evaluation.

Do not call people by their names because this reduces the group bonding. Use "we" when you speak. Let them know that it is a group effort and that you are all responsible for making a helpful and creative environment.

Inevitably there will be awkward silent periods. Try not to highlight this as bad. People need time and space to think. Light conversation to the other participants will help them speak out again and will stop them feeling like they are breaking the silence. Move back to the ideas listed on the flipcharts, pick an interesting one and put that to the group asking them to expand, modify or remodel it. Keep going until the ideas dry up.

After a short period your group will have exhausted their ideas for a while and will need a break. The time this takes could be as little as ten minutes or as much as an hour. Depending on the time you have allocated to the session and depending on the number of ideas generated, you should ask them to take a break or, indeed, it may be time to end the session. Don't force people to stay for two hours just because the room is booked for that long. Stop when you have finished.

If you are taking a mid-session break, get people to move about, chat outside, meet other people and relax. Thank them for taking part and for their ideas so far. Allow people to talk about anything they want to. Encourage them to look through the flipcharts of ideas. When the

break is over ask people to sit in a different place, greet their new neighbours and then start again. Remind people of the rules and the purpose, then ask for suggestions.

You should try to change the process if you are having several sessions or if you find things drying up:

Get people to create small groups around different flipcharts and brainstorm around the ideas on it. Then they can move on to the next one.

Get people to write their ideas on a piece of paper and hand it to the next person to build on those. (Or you can redistribute them randomly so that people will be less embarrassed and inhibited.)

By this stage you should have a great brainstorming session running and will have hundreds if not thousands of ideas and potential solutions. At some point you will need to stop the session, either at a natural break or end point or, if necessary, due to lack of time.

Ending the session

When you decide to end the session, for whatever reason, catch everyone's attention and ask them to finish off their writing. Thank them very much for taking part, tell them how good the process was and how enjoyable you found it. Let them know that you will be collating the ideas in a large list and analysing them to find out which ones you will use. You can offer to send the list to them if appropriate.

Tell them that if they have any ideas later in the day, on the way home, in the bath or during the next week, that they should let you know because you are still interested in all their ideas. Tell them where and how to contact you - don't assume that they all know.

At the end of good session your participants will normally be mentally exhausted so give them a break or some refreshments and tell them to leave everything where it is. When they have gone, go round and gather every bit of paper with writing on it - notepads, flip chart paper, even scraps of paper (accidentally) put in the bin.

If you leave the room now, you can often forget what really happened and so it can sometimes be productive to just sit in the middle of the empty room with a pad of paper and think through the session and note down any extra ideas you now have. You can often think very clearly at this stage and have hundreds of suggestions swimming round in your head just waiting to join together and surprise you. You should also note down your ideas on how the brainstorming session went and how it could be improved next time.

Now take the set of papers to your office, and take a well-earned break. Congratulate yourself on a job well done.

Post-session work and idea analysis

You should now have a large number of ideas scattered about on lots of bits of paper (unless you used a computer program to store your ideas). It is recommended that you put all of the ideas into one list.

If you intend to do any amount of analysis on the ideas or you want to share the complete set with other people in your organisation (which is a very good way of encouraging people to contribute) then you will want to enter all of the ideas on to a computer. The simplest way of sorting and analysing them is using a spreadsheet package such as Microsoft Excel. With the ideas stored electronically you can easily restructure them and send them to other people by e-mail or by disk.

Technically, the brainstorming session is over at this point and the analysis process has begun. It is important to make this distinction. Brainstorming is only the generation of the ideas. When you start to analyse the ideas you are not brainstorming.

c. Select the Best Alternative Solution

The analysis of the ideas can be done by just you or it can be done in a group. The group can be the same group who did the brainstorming or it can be the dedicated group of people who will eventually be implementing the chosen ideas. Because it is best to have "external" people in the brainstorming session it is often the case that the group which analyses the ideas is a different group to that which produced them.

Even if you are using a group to analyse the ideas it is always helpful to do an initial sort-out to remove duplicates and remove ideas which are really are totally impractical. This removal should be based on valid physical criteria such as cost, time and physical laws. Try not to remove any remotely possible solutions at too early a stage.

Now that you have a long list of possible ideas, work through them and arrange them into three lists:

- **Excellent**. Definitely will work and can be implemented immediately.
- **Interesting**. Will possibly work or may require further analysis to decide if it will work. Needs more investigating. May work in the future.
- **Useless**. Will not work.

When you have the lists you should plan to implement the excellent ideas and to investigate the interesting ones. This is where your management and leadership skills are necessary.

Analyse the ideas and discover your solutions Once you have made your decision, you are in a position to implement your innovative idea.

d. Develop a Concept for Implementation

If it is a large scale initiative, use your action plan to detail the steps required, and allocate responsibilities. Make sure that your planned implementation is in accordance with the organisation's policies and procedures

e. Record the Concept and Communicate it for Implementation

Ensure that the concept is recorded in an agreed and approved format and that it is communicated properly to all the relevant stakeholders.

Formative Assessment 6: SO4 AC1-5

Lead a team through a creative thinking process

Individually, complete the following formative activity:

In the workplace complete the following task if possible, select a leader who will lead the team through the following process:

- Techniques for promoting innovation and creativity are applied to generate ideas for a **new or improved process, project or product**
- A number of alternative solutions are generated in relation to the process, project or product
- The best alternative is selected from the solutions generated on the basis of evaluation criteria
- A concept is developed for implementation in accordance with the entity's policies and procedures
- The concept is recorded and communicated for implementation

Write a paragraph of the feedback from this task

References and Further Reading

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