InnoSupport:

Supporting Innovation in SMEs

Leonardo da Vinci
Pilot projects

Overview

This innovation guide contains training and working components on the following subjects:

1. Introduction: Innovations in the working place
2. How to identify the innovation needs of a business problem
3. How to specify the innovation needs of a business problem
4. Tools for developing innovative solutions
5. Evaluation of innovative solutions
6. Innovative Production Strategies
7. How to protect innovations and intangible assets
8. Financing Innovation
9. Marketing of Innovation
10. Human resources management policies to support innovation
11. Innovation Networks
12. Other tools for business innovation support

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Further Information can be found at **www.innosupport.net**!

Preface

Dear Reader

This InnoSupport material represents a guide in the form of a series of components which has been designed and developed to support innovation in SMEs by a transnational partnership and partly funded by the European Programme Leonardo da Vinci.

Who is this guide for?

This guide is an introduction to basic tools to support innovation in SMEs. We do not address experienced R&D experts but staff in SMEs (managers, employees and trainees) who have to develop innovative products and services to suit their own circumstances and look for some tools that may assist them. We address people who do not have overall knowledge of the many-facetted innovation processes but who wish or indeed need to know more about it. Therefore, we also address students or continuing professional development trainees who might use it as “a pocket guide” for economic and innovation related subjects. Business consultants might wish to use it as an additional tool to support their clients or to give their clients a general understanding of innovative issues.

What is the scope of the guide?

Innovation can lead to success and the best way to achieve the expected results is when tried and tested processes are understood and applied. The components have been designed to support general understanding of innovation related issues and to support the learning of the processes in the workplace.
First, the material informs you of what a certain technique or process can be used for. The information on where and how to apply the tool aims to help you decide if a more intense application will be useful for you and the objectives you have in mind. Examples and case studies are meant to underpin the understanding and illustrate practical applications.
You can use the search function for moving within the system and the glossary for further information. You can also download the content in pdf-format.
The information on tools will enable you to apply and test the tools immediately, supported by checklists and links to relevant further information. This product is therefore a combined learning and working tool.
For other, more complex tools, expert assistance or further learning will be necessary. This can be best done in useful learning scenarios by way of workbased, project based, project integrated learning or similar.
After reading the content you will be in a better position to make a sound decision on the usefulness of a certain innovation tool for your purposes and your working environment.

This way, we hope to encourage the user of this guide to reflect on the question “what else can help me to become more competent, effective and innovative?” And we also hope that guide will prove to be of real value in the user’s strive for competitiveness and innovation in his or her company as this would be the best result for the INNOSUPPORT project team.

However, we know that there is always scope for further development and we would appreciate your comments and suggestions for future improvement by contacting one of the partners in your country.

The guide is available as a web-based system, a CD and a handbook.

We wish you success in working and learning with the INNOSUPPORT-guide!

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1. Introduction: Innovations in the working place

This component provides and overview as to why innovation is perceived to be important by government and business. There are references to many policies that have a direct impact on how business relates to and perceives innovation.

Gaining competitive advantage through innovation

"Innovation" is a term that is popular with governments but also businesses, education and research communities. It is meant to encapsulate in one way or another the recognition that in a global economy, with its societies increasingly dependent on knowledge and communication, progressing efficiency, effectiveness and appropriateness of our products, processes and systems at all levels and in all areas is key to sustaining competitiveness and meeting the challenges of the future. For example the British Minister for Science and Innovation emphasised that “the successful exploitation of new ideas from science, technology and emerging management practices has a crucial role in raising productivity. The most successful economies of the future will be those which excel at generating and disseminating knowledge and exploiting it commercially” (see “Innovation into Success”, UKSPA, Issue 1, 2003) or in their report the British Chamber of Commerce indicated that UK productivity is under threat because small and medium sized enterprises (SMEs) are failing to exploit the benefits of technology. (see Using IT: Small Firms and Technology, 2002).

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1.1. Government Policies

Government Policies

The European Commission and European governments have sought to develop a range of policies and initiative that support innovation in business and the economy.

Since the Green Paper on Innovation in 1995 the European Commission has been furthering the development of a European policy on innovation and in 2000 responding to the goals set by the Lisbon Council, the Commission defined a timetable for concrete progress towards five innovation-related objectives:

- coherence of innovation policies
- a regulatory framework conducive to innovation
- encourage creation and growth of innovative enterprises
- improve key interfaces in the innovation system
- a society open to innovation

The objectives are monitored and supported through a range of activities including The European Trend Chart on Innovation collects, analyses and disseminates information on innovation policies in all Member States. It includes three main strands: 1) Measurement of innovation performances under the European Innovation Scoreboard, 2) Analysis of national innovation policies through a network of country correspondents, and 3) Policy workshops to carry out peer reviews of policy schemes. The Innobarometer is an opinion poll conducted among enterprises to gather their appreciation of innovation challenges (see http://europa.eu.int/comm/enterprise/innovation/index.htm).

Although EU and national policies have identified innovation in SMEs as a cornerstone of future economic competitiveness and wealth creation, the European Commission and European governments are concerned about the uneven distribution of innovative firms and their sustainability.

Similarly EU member states have developed their specific policies on innovation, for example the White Paper *Excellence and Opportunity - a science and innovation policy for the 21st century* (see http://www.ost.gov.uk/enterprise/dtiwhite/foreword.html) from 2000 outlines the UK Government's proposals for:

- investing in the UK's world-class science base
- stimulating stronger university-based links so that our science and engineering excellence is turned into successful and innovative products and services; and
- fostering a confident relationship with science

1.2. Government Support

Government Support

Most of the Government policies on innovation relate to the European Innovation policies. Out of these a range of initiatives have been developed to directly support innovation in business.

The EU supports a network of over 70 Innovation Relay Centres across more than 30 EU and newly associated countries, which help companies and research organisations to transfer technologies to and from the rest of Europe (see http://irc.cordis.lu/) or the Gate2Growth initiative supports networks among players in innovation financing (e.g. venture capitalists, incubators), and amongst industrial liaison offices in public research organisations to strengthen public-private links. The network of Business Innovation Centres (BIC's) throughout Europe specifically supports SME's in the development of innovative technologies and processes (see http://www.ebn.be/).

Specific EU actions for innovation has been supported directly through the 6th Framework Programme for Research and Development (SP 1: 11,5 million Euro, SP 2: 348 million Euro for 2003-2006) and its predecessors. However the theme of innovation cuts across many EU actions, including for example employment, community and training related actions such as the European Social Fund and related programmes such as Equal and also Leonardo da Vinci.

Again support is also made available at national level, for example in the UK the government has established a Knowledge Transfer Partnership scheme which supports the transfer of technologies, innovation and knowledge via talented graduates from Universities to business, involving businesses and academics or researchers that work together on commercially and strategically important development projects that are vital to a company's future but beyond its existing capabilities (see http://www.ktponline.org.uk/). The Department for Trade and Industry (DTI) which is directly responsible for supporting innovation in business has developed a series of toolkits and guidance (see http://www.innovation.gov.uk/).

1.3. Characteristics and types of Innovations

All organisations need to improve their innovation process, as it is the lifeblood of future revenue streams. The reality however is that most organisations, particularly SME's find it difficult to understand how innovation can be effectively managed. Research & Development (where it exists!) is often seen as the only department directly responsible for innovation and other areas of the business do not contribute. However, companies need a framework for understanding and managing innovation in order to achieve individual, product, service and process innovation to significantly improve overall business performance.

One definition of innovation could be the one used by the UK government: "Innovation – the successful exploitation of new ideas – incorporating new technologies, design and best practice is the key business process…" (http://www.innovation.gov.uk/). Another one could be "Innovation refers to the entire process encompassing the use of creativity and research to generate new ideas, feasibility studies to evaluate their cost-effectiveness, risk analysis, design and development, new policies and procedures, market research and marketing, and implementation of the new product or service" (see www.acrologic.co.uk/i2/innovation.html#T1).

Businesses that seek to develop and exploit new ideas need strategies to engage in, drive and manage the innovation process. Key innovation performance drivers have been identified for example in the areas of (see www.innovationwave.com/index.html):

- Vision & Strategy
- Leadership
- Processes
- Culture
- Physical Work Environment

The recent report for the European Commission *Innovation Management and the Knowledge-Driven Economy* (2004) has identified Innovation Management Techniques (IMT's) defined as the range of tools, techniques and methodologies that support the process of innovation in firms and help them in a systematic way to meet new market challenges. The report identified ten IMT typologies:

1. Knowledge management techniques
2. Market intelligence techniques
3. Cooperative and networking techniques
4. Human resources management techniques
5. Interface management techniques
6. Creativity development techniques
7. Process improvement techniques
8. Innovation project management techniques
9. Design management techniques
10. Business creation techniques.

The report distinguishes between the traditional and more current approach to innovation: "The traditional idea that innovation is based upon research (technology-push theory) and interaction between firms and other actors is replaced by the current social network theory of innovation, where knowledge plays a crucial role in fostering innovation".

This present Guide deals less with some of these conceptual and policy related issues of innovation, but seeks to provide in the subsequent components, some of the innovation techniques, information and case studies that help businesses in a practical way to explore and engage in innovation processes in support of their competitiveness.

1.4. The Leonardo da Vinci programme

This Guide has been produced with the support of the Leonardo da Vinci programme, which is a programme funded by the European Commission to serve as a laboratory of innovation in the field of lifelong learning and seeking to address two challenges:

"First, there is a need to prepare European citizens better for entering the labour market, thereby reducing the number of unemployed. Second, companies need a skilled workforce to cope with rapid scientific and technological changes in an increasingly competitive world".

1.5. Resources

Innovation Management

Innovation management courses or programmes are delivered through universities or private institutions in the UK. A list of UK University websites can be accessed via the Higher Education Funding Council for England http://www.hefce.ac.uk/ . In South East England for example the Cranfield School of Management offers individual courses related to innovation and also post graduate programmes

(see www.som.cranfield.ac.uk/som/mscilp/faq.asp) or private organisations such as Make Innovation Happen http://www.mihcentre.co.uk/ , which offers tailor made courses and workshops.

There are also search engines that help to find courses, for example the Course Locator (there is a charge) http://www.thecourselocator.co.uk/.

Innovation Support Agencies and Programmes

Department for Trade and Industry: This website http://www.innovation.gov.uk/ supports business in managing and thinking about innovation. It provides links to other sites and practical support resources.

Department for Trade and Industry: This website http://www.ktponline.org.uk/ provides details for the Knowledge Transfer Partnership scheme, which supports businesses in accessing University expertise through academic staff and graduates with the aim to facilitate innovation.

South East Development Agency: This website http://www.seeda.co.uk/ supports high growth businesses in the South East England region, especially through their network of Enterprise Hubs and Enterprise Gateways.

Office for Science & Technology: This website www.ost.gov.uk/science_links.htm provides good links related to innovation.

Innovation Policies

The ***British Library*** holds an innovation policy bi-monthly newsletter http://www.innovation-policy.co.uk/ which states: “Innovation - scientific, technical, organisational and managerial - is the key to survival and success in the new knowledge economy. Whether you are an R&D professional, a business manager, an academic researcher, an educator or a policy maker, success depends on being well informed about the complex, interacting pattern of influences that make up the innovation environment. Joined-up thinking has never been more important, and *Innovation Policy Review* will help in that process by keeping you up to date with major trends and developments”.

The ***European Commission*** is a key driver of innovation policies and details can be found at http://europa.eu.int/comm/enterprise/innovation/ . It states “Up to now, DG Enterprise's actions for innovation policy have been financed from two of the specific programmes of the 6th Framework Programme for Research and Development (SP 1: 11,5 millions, SP 2: 348 millions for 2003-2006) and its predecessors. The aim is to encourage a more innovation-friendly environment throughout the EU, and to stimulate technological innovation and the setting up of innovative technology businesses. It is envisaged to also include new innovation actions into the successor of the present Multi annual Programme for Enterprises (starting in 2006)”.

For the ***UK*** details relate to the ***White Paper*** on innovation, which can be found at www.ost.gov.uk/enterprise/dtiwhite/ .

The *HM Treasury* website sets out the UK ten-year investment framework for science and innovation alongside the 2004 Spending Review. The framework sets out the Government’s ambition for UK science and innovation over the next decade, in particular their contribution to economic growth and public services, and the attributes and funding arrangements of a research system capable of delivering this.

Driving innovation policy regionally is the responsibility of the ***Regional Development Agencies*** and for the South East of England details are at http://www.seeda.co.uk/. SEEDA has priorities its Business Development Innovation Framework as follows (see Innovation Framework , SEEDA 2002):

RESEARCH AND TEACHING EXCELLENCE	SPIN OUT, START UP AND TECHNOLOGY TRANSFER	GROWING KNOWLEDGE BASED FIRMS	INFRASTRUCTURE AND QUALITY OF LIFE
RESEARCH EXCELLENCE RATINGS IN UNIVERSITIES (RAE)	INCUBATION SCIENCE AND TECHNOLOGY PARKS	ATTRACT/ NURTURE LARGER FIRMS, INWARD INVESTMENT	PLANNING SYSTEM SUPPORTIVE
INSTITUTES/ CENTRES OF EXCELLENCE	SEED CORN AND VENTURE CAPITAL	PRIVATE R&D	BROADBAND CONNECTIVITY
TEACHING QUALITY, GRADUATE TRAINING AND EMPLOYABILITY TEACHING ENTREPRENEURSHIP	LINKS TO PROMOTE TECHNOLOGY TRANSFER & DISSEMINATION FROM HEIs, NHS	CONTINUOUS IMPROVEMENT OF THE SKILLS BASE	HOUSING AND TRANSPORT EDUCATION AND HEALTH PROVISION
INTERNATIONAL PARTNERSHIPS AND LINKS	EXPLOITING SMART, FARADAY, LINK, TCS, FORESIGHT	NETWORKS, CLUSTERS AND SUPPLY CHAINS	CULTURE, LEISURE AND LIFESTYLE

Priority SEEDA contribution
Some SEEDA contribution
Limited/No SEEDA contribution

Also the ***Organisation for Economic Co-operation and Development (OECD)*** monitors and benchmarks Member country technology and innovation policies and assesses their impact on economic performance. It identifies good policy practices in areas such as support to R&D, public/private partnerships for innovation, and overall management of national innovation systems.

2 How to identify the innovation needs of a business problem

Introduction

Today, the products' life cycle becomes gradually smaller. Actually in some sectors such as the computer sector, technological devaluation of the products occurs within a few months. Therefore it is a great competitive advantage for the companies to be able to introduce new products to the market before their competitors, gaining in this way significant sale shares. Today the companies must be able to be constantly innovative in order to maintain or improve their position in the market. In order to achieve this, they must know how to identify the innovation needs of a business problem. The innovation management tools, which are utilized for doing this, are Technology Audit and SWOT method.

2.1. Audit tools (Technology Audit)

Introduction

Today the companies must be able to be constantly innovative in order to maintain or improve their position in the market. In order to achieve this, they must know how to identify the innovation needs of a business problem. A technology audit is a method of investigation aiming at the evaluation of the a) technology capacity, b) procedures, c) needs of an SME or an organisation. Furthermore, it is a process of analysis, a method of identifying the strong and weak points through the characterisation and general assessment of the firm's basic know how an assessment which is performed by using the SWOT analysis method.

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2.1.1. What is Technology Audit

The Technology Audit is a method for identifying the major company requirements, needs, weaknesses and strengths on both human resources and infrastructure. The Technology Audit is a technique, which identifies the management's view of how the company performs as well as strong indications of what the company really needs. The Technology Audit technique examines concurrently the External and Internal environment of the company and identifies the human resources relation to company's performance.

The objective of Technology Audit is to provide a clear identification of company's first priority needs as well as strengths and opportunities that should be taken under consideration. It also assists the company to identify the more significant actions that it should adopt.

2.1.2. Why Perform a Technology Audit?

An SME can perform an audit in order:

- To generate income (or more income) for the technology driven organisations (e.g. technology based enterprises, research centres, institutes) from their available technology
- To improve the productivity of the technological factors;
- To improve business competitiveness and public administration's performance
- Assess your current capabilities before making expensive changes
- Learn how to optimise the use of current technology
- Learn about your technology options
- An independent assessment can help convince your organisational partners of changes needed

Therefore those who ask for an audit are:

The management of an organisation:

- As a source of strategic management information
- To increase awareness and stimulate the staff

Whoever is interested in the organisation, in terms of contracting, funding, VC investment, or acquisition.

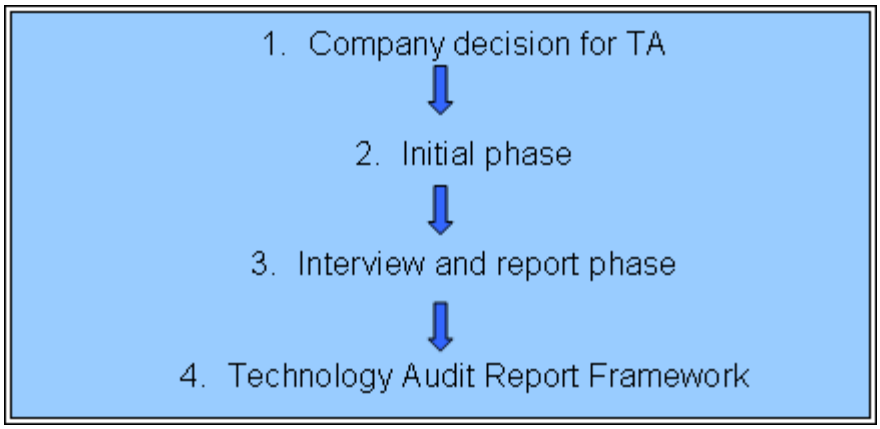
2.1.3. Where Technology Audit applies and how is it applied?

Where Technology Audit applies?

The technology audit is equally applicable to ***manufacturing and service firms***. The firms should wish to create new products, incorporate new processes, diversify their activities and be with growth potential. They should have capacity to survive and innovate and an aptitude for international cooperation.

How Technology Audit is applied?

Technology Audit Framework



The main steps of a technology audit process are:

Step 1: Company decision for Technology Audit

The starting point of the technology audit process is the desire or wish of a firm to carry out a technology audit.

Step 2: Initial phase
The initial phase is important to ensure that the audit proceeds smoothly and effectively. It includes discussion with the Head of Department to explain and agree the purpose of the audit, to modify the questionnaire and the framework for the report to suit the Department and to select those to be interviewed. Initial information about the Department (published and unpublished reports) is gathered at this stage. Analysis of questionnaires should be done prior to the interviews and might be done at an earlier stage, so that selection of those to be interviewed is partly based on questionnaires.

Step 3: Interview and report phase

The company is being interviewed with a questionnaire, normally with the General Manager aiming at:

- Collecting general company data
- Shaping company technology profile
- Performing SWOT analysis
- Identifying technological areas for further analysis

Technology Audit Tool consists of two parts, the questionnaires and the reports. The results derived from the questionnaires generate the reports that can be easily assessed by the General Manager of the company, but for a more accurate and less biased diagnosis, an external specialised consultant is proposed.

Example Questionnaire for Technology Audit (at the end of the article):
http://www.adi.pt/docs/innoregio_techn_audits.pdf

Step 4: Technology Audit Report Framework
The final report of the technology audit should include:

- Subjects analysed
- Methodology used
- Problem areas identified
- Solutions proposed by the problems
- Steps to be taken for implementing the solutions (action plan)

2.1.4. Case Study: Technology Audit

Background: A mid-sized school district (11,000 students) had used the bond process to aggressively acquire and deploy technology. Three bond issues since 1997 funded the installation or modernisation of their Wide Area Network, structured cabling, data network, video network and computers.

Problem: The district was seeking a “health check” of their technology systems for hardware, software and network infrastructure as well as IT policies, procedures and organisational structure. They wanted to verify that the stand-alone technology decisions over the last seven years functioned as a “system”, were in concert with their technology plan, and aided in the development and delivery of curriculum. They also wanted recommendations for economies or process improvement in technical support, help desk and staff development areas. Finally, the district wanted a forward-looking plan that provided solid goals and added focus and direction to future technology implementation. Layered on top of these goals was the reality that the district was facing a significant reduction in their State funding.

Therefore the district decided to perform a technology audit.

Audit: The Head of Department agreed for the purpose of the audit, modified the questionnaire and the framework for the report to suit the Department and selected those to be interviewed. After the fill-up of the questionnaires the district could have a wider view of its situation.

First, the Audit report uncovered a number of standards violations that had occurred during past implementation projects. Some of these problems threatened the integrity and survivability of the networks and some of the violations were fire stopping, fire suppression and physical security related. At this point, the participation of experts for recommendations and solutions was necessary. So the district used the help of Wright & Hunter Technology Review and Audit and all of their recommendations were implemented.

Second, the audit report uncovered a number of redundancies and organisational inefficiencies. Wright & Hunter recommended a streamlined organisational structure that eliminated the overlaps and improved communication.

Results Achieved: As Wright & Hunter was in the process of finalising the recommendations, the true extent of the State funding reduction became known. This district was able to follow a new organisational plan as the basis for restructuring their entire technology support and staff development departments. The new budget realities were met with the least amount of employee disruption and service level degradation as possible. The Wright & Hunter recommendations for improvements in the physical plant were implemented and the probability of disruptions in service, security breaches or fire damage was significantly reduced.

2.1.5. Expected Results/Benefits of Technology Audit

The expected results from a carefully conducted technology audit mainly concern:

- Complete and comprehensive analysis and evaluation of the requirements of the firm for its sustainable growth
- Thorough impartial SWOT analysis
- Opportunity spotting for new products / new services / new technologies / new markets
- Networking with technology suppliers, technological sources, other companies
- Possible assessment of technology portfolio, intellectual property rights

2.1.6. Resources

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Analytical information about technology audit

- http://www.access-ecom.info/article.cfm?id=63&xid=MN

Brief information about what technology audit is

- Madrimasd.org

Technology audit methodology and a case example

- http://www.oxin.co.uk/downloads/taudit.pdf

Useful address about strategic planning in general, where also technology audit is explained

- http://www.strategicinformation.com/audit.htm

At this address one can find tools that help for the development of innovative firms and also a questionnaire for technology audit

- http://www.newventuretools.net/technology_audit.html

2.2. SWOT Analysis

Introduction

In 2.1 The Technology audit has been presented as a useful tool for identifying the innovation needs of a business problem. SWOT analysis is another tool for auditing an organisation and its environment. It is the first stage of planning and helps markets to focus on key issues.

A scan of the internal and external environment is an important part of the strategic planning process. Environmental factors internal to the firm can usually be classified as strengths (S) or weaknesses (W), and those external to the firm can be classified as opportunities (O) and threats (T). Such an analysis of the strategic environment is referred as a SWOT analysis.

The SWOT analysis provides information that is helpful in matching the firm's resources and capabilities to the competitive environment in which it operates.

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2.2.1. What is SWOT Analysis?

SWOT analysis is a business tool by which, a firm wishing to implement a strategic analysis, analyses and recognises its corporate **S**trengths and **W**eaknesses as well as the existed or forthcoming **O**pportunities and **T**hreats from its external environment. Only when these four critical information elements are well elaborated and known, the enterprise is able to formulate and implement the strategy leading to its business aims.

The role of SWOT analysis is to take the information from the environmental analysis and separate it into internal issues (strengths and weaknesses) and external issues (opportunities and threats). Once this is completed, SWOT analysis determines if the information indicates something that will assist the firm in accomplishing its objectives (a strength or opportunity), or if it indicates an obstacle that must be overcome or minimised to achieve desired results (weakness or threat).

When doing SWOT analysis, remember that the S and W are INTERNAL and the O and T are external.

2.2.2. When and why to use it?

The SWOT analysis is an extremely useful tool for understanding and decision-making for all sorts of situations in business and organisations.

SWOT Analysis is a very effective way of identifying your Strengths and Weaknesses, and of examining the Opportunities and Threats you face. Carrying out an analysis using the SWOT framework helps you to focus your activities into areas where you are strong and where the greatest opportunities lie.

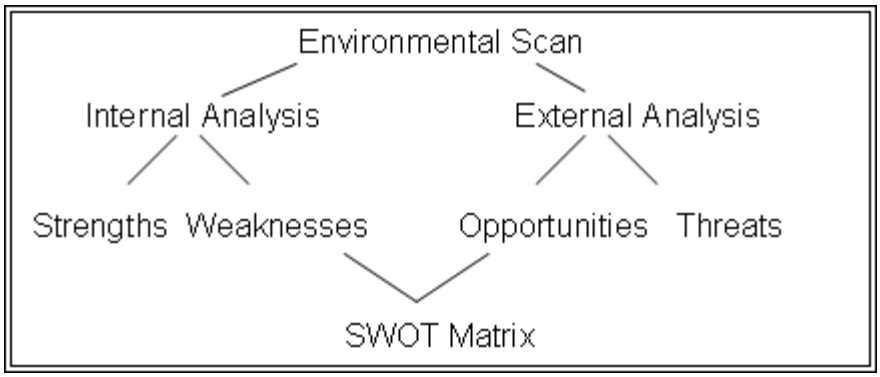
By creating a SWOT analysis, you can see all the important factors affecting your business together in one place. It's easy to create, easy to read, and easy to communicate.

A company can use the SWOT analysis:

- While developing a strategic plan or planning a solution to a problem.
- In order to develop a plan that takes into consideration many different internal and external factors, and maximises the potential of the strengths and opportunities while minimising the impact of the weaknesses and threats.

2.2.3. How SWOT Analysis is applied?

SWOT analysis Framework



Action checklist

1. Establish the objectives

The first key step in any project is to be clear about what you are doing and why. The purpose of conducting SWOT analysis may be wide or narrow, general or specific.

2. Allocate research and information-gathering tasks

Background preparation is a vital stage for the subsequent analysis to be effective, and should be divided among the SWOT participants. This preparation can be carried out in two stages:

- Exploratory, followed by data collection.
- Detailed, followed by a focused analysis.

Gathering information on Strengths and Weaknesses should focus on the internal factors of skills, resources and assets, or lack of them. Gathering information on Opportunities and Threats should focus on the external factors.

3. Create a workshop environment

If compiling and recording the SWOT lists takes place in meetings, then do exploit the benefits of workshop sessions. Encourage an atmosphere conducive to the free flow of information and to participants saying what they feel to be appropriate, free from blame. The leader/facilitator has a key role and should allow time for free flow of thought, but not too much. Half an hour is often enough to spend on Strengths, for example, before moving on. It is important to be specific, evaluative and analytical at the stage of compiling and recording the SWOT lists.

4. List Strengths, Weaknesses, Opportunities, Threats in the SWOT Matrix

5. Evaluate listed ideas against objectives

With the lists compiled, sort and group facts and ideas in relation to the objectives. It may be necessary for the SWOT participants to select their five most important items from the list in order to gain a wider view. Clarity of objectives is key to this process, as evaluation and elimination will be necessary to separate the wheat from the chaff.
The SWOT analysis template is normally presented as a grid, comprising four sections, one for each of the SWOT headings: Strengths, Weaknesses, Opportunities, and Threats. The SWOT template below includes sample questions, whose answers are inserted into the relevant section of the SWOT grid. The questions are examples, or discussion points, and obviously can be altered depending on the subject of the SWOT analysis.

Strengths	**Weaknesses**
• Advantages of proposition? • Capabilities? • Competitive advantages? • USP's (unique selling points)? • Resources, Assets, People? • Experience, knowledge, data? • Financial reserves, likely returns? • Marketing - reach, distribution, awareness? • Innovative aspects? • Location and geographical? • Price, value, quality? • Accreditations, qualifications, certifications? • Processes, systems, IT, communications? • Cultural, attitudinal, behavioural? • Management cover, succession?	• Disadvantages of proposition? • Gaps in capabilities? • Lack of competitive strength? • Reputation, presence and reach? • Financials? • Own known vulnerabilities? • Timescales deadlines and pressures? • Cash flow, start-up cash-drain? • Continuity, supply chain robustness? • Effects on core activities, distraction? • Reliability of data, plan predictability? • Moral, commitment, leadership? • Accreditations, etc? • Processes and systems, etc? • Management cover, succession?
Opportunities	**Threats**
• Market developments? • Competitors' vulnerabilities? • Industry or lifestyle trends? • Technology development and innovation? • Global influences? • New markets, vertical, horizontal? • Niche target markets? • Geographical, export, import? • New USP's? • Tactics - surprise, major contracts, etc? • Business and product development? • Information and research? • Partnerships, agencies, distribution? • Volumes, production, economies? • Seasonal, weather, fashion influences?	• Political effects? • Legislative effects? • Environmental effects? • IT developments? • Competitor intentions - various? • Market demand? • New technologies, services, ideas? • Vital contracts and partners? • Sustaining internal capabilities? • Obstacles faced? • Insurmountable weaknesses? • Loss of key staff? • Sustainable financial backing? • Economy - home, abroad? • Seasonality, weather effects?

2.2.4. Tips for successful SWOT analysis

	Top Tips	**But remember …**
1	Never copy an existing SWOT analysis; it will influence your thinking. Start with a fresh piece of paper every time	*You could use a standard template to help the ideas flow*
2	Set aside enough time to complete it	*You may need to come back to it several times before you are happy*
3	The SWOT analysis itself is NOT the result. It's only a tool to help you analyse your business	*Before you begin any analysis, you should know what you intend to do with the results*
4	A SWOT analysis is not a business school fad. It is a proven technique used throughout the business community	*You need to be comfortable working with it in **your** business*
5	Keep your SWOT analysis simple, readable, short and sharp	*It needs to make sense to outsiders (e.g. bank managers or investors) so don't use phrases or acronyms that only you understand*
6	Make sure you create an action plan based on your SWOT analysis	*You need to communicate this clearly to everyone involved*
7	A SWOT analysis only gives you insight at a single point in time	*You need to review it – probably quarterly – to see how the situation has changed*
8	Don't over-analyse. Try not to worry if it isn't perfect, just get the analysis done	*If you are going to act on the results, it needs to be accurate in all the important areas*

2.2.5. SWOT analysis example

Subject of SWOT analysis example: the achievement of a health centres mission.

The scenario is based on the SWOT analysis, which has been performed by a health centre in order to determine the forces that promoted or hindered the achievement of its mission.

Starting position of the health centre:

- The staff lack of motivation
- The building was really small
- The facility was old
- There was a lot of paper work and bureaucracy

Those characteristics resulted in this health centre facing up to a lot of problems with the accommodation of the patients. Moreover, the establishment of a new advanced hospital in the city made the situation even worse. Therefore, they decided to perform a SWOT analysis in order to perform the best decision-making for all the problems that they faced.

Step 1: Purpose of conducting SWOT analysis- the achievement of a health centres mission.

Step 2: The gathering of information on Strengths and Weaknesses focused on the internal factors of skills, resources and assets, or lack of them. The gathering information on Opportunities and Threats should focus on the external factors.

Step 3: The manager of the health centre encouraged all the members of staff to freely express their opinions about what they felt to be appropriate.

Step 4: SWOT matrix

Strengths: • Willingness of staff to change • Good location of the health centre • Perception of quality services	***Weaknesses:*** • Staff lack of motivation • Building was really small • Paper work and bureaucracy • Cultural differences with users
Opportunities: • Support of local government • High felt need of users • Internationally funded projects	***Threats:*** • Low income of users • Bad roads • Low salaries • Lack of budget • Paradigms of providers • High competition

Step 5: After completing the SWOT matrix the SWOT participants had a wider view of the situation at the centre so they were able to propose the alternatives that helped considerably in the operation of the health centre.

The alternatives where:

- training of the staff in interactive techniques of quality improvement
- coordination with other providers to cover all user needs
- remodelling of the facility with local government funds and international help
- cost recovery of drugs and lab supplies with user fees
- payment of incentives to staff based on performance
- review of procedures for decreasing costs and waiting times and increasing perceived quality.

This strategic analysis and planning of the health centre had the below results:

- 27% increase of patients
- reduction of waiting times to 15minutes
- 20% increase of staff performance
- remodelling of the facility

2.2.6. Resources

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- Akao, Yoji, Quality Function Deployment QFD: Integration Customer Requirements into Product Design, Productivity Press, Portland Oregon, 1988

Internet sites

General address of the University of Arizona with a useful file about SWOT analysis

- http://www.bpa.arizona.edu/~dmeader/MIS341/341files/341.SWOTAnalysis.pdf

Analytical address which explains the procedure of SWOT analysis

- http://www.planonline.org/planning/strategic/swot.htm

File, which explains the structured way to plan SWOT analysis

- http://www.amputee-coalition.org/communicator/vol2no4pg1.html

Panasia networking website contains an interesting site for SWOT analysis

- http://www.panasia.org.sg/iirr/ikmanual/swot.htm

A very analytical address for SWOT analysis

- http://cbae.nmsu.edu/~dboje/sbc/pages/page3.html

Quick MBA is an address for strategic management in general and therefore it contains the tool of SWOT analysis

- http://www.quickmba.com/strategy/swot/

In this address one can follow some lessons for successful SWOT analysis

- http://www.marketingteacher.com/Lessons/lesson_swot.htm

Analytical description of the method of SWOT analysis

- http://www.erc.msh.org/quality/ittools/itswot.cfm

SWOT analysis method and examples, with free SWOT template

- http://www.businessmajors.about.com/cs/casestudyhelp/a/SWOT.htm

3 How to specify the innovation needs of a business problem

3.1. Black Box Method

Introduction

Two of the most important tools, which can be used to define the innovation needs of a business problem, are the Black Box Method and the System and Process analysis.

A black box is a method of a process in which we have no knowledge of the inner workings of the process being tested. We might know what the input is and what the expected outcome is, but not how the results are achieved.

The method aims at:

- either a formal description of the **transformation rules** linking inputs and outputs
- or the construction of a model exhibiting a behavior that approximates what is observable from the outside of the "black box""

See below the definition of the Black Box method according to Principia Cybernetica:
http://pespmc1.vub.ac.be/ASC/Black_metho.html

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3.1.1. What is the Black Box Method?

In this report we will focus on the ***Black Box Method*** which can be described as the process of analysing a project or a problem. Starting from a position that we know, what sources are available to us, and what is our desired output, but we need to obtain and optimise the appropriate methodology which will lead us to our goal.

The Black Box Approach to Problem Solving is a simple but powerful and significant method of dealing with complex problems.

Its main advantage arises from the fact that it makes us differentiate clearly between:

- The preconditions for solutions/or success
- The inputs (or resources we need - and/or dispose over)
- The desired goals (for instance Design Goals) and
- The processes needed to bridge between the inputs and outputs

Having mastered this very simple technique we can:

Start to define new possibilities, potentials and systems, where we may have relatively little information on what is in the box or what could be there.

Using only plain logical thinking we can often**:**

See a logical bridge between inputs and outputs (or present state and goals) and thus realise new possibilities where some total simultaneous total consideration of the box would confuse us and make us focus too hard on not-as yet developed processes, which easily results (if overdone) in feelings of impossibility.

3.1.2. Why and where Black Box method is used?

Using the black box method we will realise logical possibilities that may or may not be realisable by existing processes – but we will become far more sensitive to new opportunities and potentials by doing this.

SO: The BB method is in sense a very effective eye-opener as regards innovation!

Even in fields where we do not understand the transformative processes completely. The only thing we have to understand is that there can be a logical connection between the inputs and the outputs.

The Black Box method is typically used by:

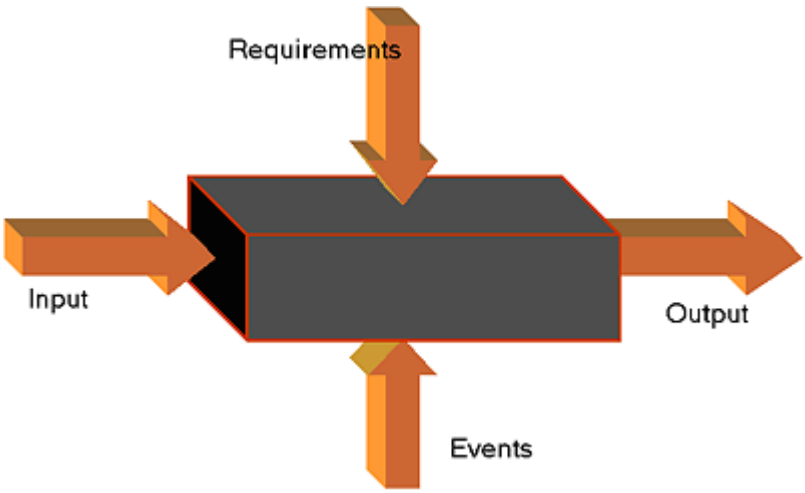
- Researchers/ statistics
- Project management
- Manufacturing
- Change management
- Engineering

3.1.3. How is the Black Box method applied?

In order to perform the black box method black box testing is used. The test cases in a black box test case design are deviated from the requirements or respectively the specifications. The object to be assessed is considered as a black box, i. e. the assessor is not interested in the internal structure and the behavior of the object to be assessed.

- **Black-Box Testing**

The functionality of each module is tested with regards to its specifications (requirements) and its context (events). Only the correct input/output relationship is scrutinised.



Other names for black-box testing include: *specifications* testing, *behavioural* testing, *data-driven* testing, *functional* testing, and *input/output-driven* testing.

In general, every combination of input and output would require an inordinate number of test cases. Consequently, exhaustive black-box testing is usually either impossible or unreasonable The art of testing is to design a small, manageable set of test cases so as to maximise the chances of detecting a fault whilst minimising the redundancy amongst the other cases.

3.1.3.1. Equivalence Testing and Boundary Value Analysis

Equivalence testing, combined with boundary value analysis, is a black-box technique of selecting test cases in such a way that new cases are chosen to detect previously undetected faults. An *equivalence class* is a set of test cases such that any one member of the class is representative of any other member of the class.

The principle of the generation of equivalence classes is to group all input data of a program into a finite number of equivalence classes so it can be assumed that with any representative of a class it is possible to detect the same errors as with any other representative of this class.

The definition of test cases via equivalence classes is realised by means of the following steps:

- Analysis of the input data requirements, the output data requirements, and the conditions according to the specifications
- Definition of the equivalence classes by setting up the ranges for input and output data
- Definition of the test cases by means of selecting values for each class

Example:

Suppose the specifications for a database product state that the product must be able to handle any number of records from 1 through to 16,383. If the product can handle 34 records and 14,870 records, then the chances are good that it will work fine for, say, 8534 records. If the product works correctly for any one test case in the range 1 to 16,383, then it will probably work for any other test case in the range. The range from 1 to 16,383 constitutes an *equivalence class*. For this product, there are three equivalence classes:

- Equivalence class 1: less then one record.
- Equivalence class 2: from 1 to 16,383 records.
- Equivalence class 3: more than 16,383 records.

Testing the database product then requires that one test class from each equivalence class be selected.

A successful test case is one that detects a previously undetected fault. In order to maximise the chances of finding a new fault, a high-payoff technique is *boundary-value analysis*. Experience has shown that when a test case on or just to one side of a boundary of an equivalence class is selected, the probability of detecting a fault increases. Thus, when testing the database product, the following cases should be selected:

Test case 1:	0 records	Member of equivalence class 1 and adjacent to boundary value
Test case 2	1 record	Boundary value
Test case 3	2 records	Adjacent to boundary value
Test case 4	723 records	Member of equivalence class 2
Test case 5	16,382 records	Adjacent to boundary value
Test case 6	16,383 records	Boundary value
Test case 7	16,384 records	Member of equivalence class 3 and adjacent to boundary value

3.1.3.2. Functional Testing

1. Objective and Purpose

An alternative form of black-box testing is to base the test data on the functionality of the module. It is the purpose of the *functional testing* to identify test cases that can be used to prove that the corresponding function is available and can be executed as well. In this connection the test case concentrates on the normal behaviour and the exceptional behaviour of the object to be assessed.

2. Operational Sequence

Based on the defined requirements, the functions to be tested must be identified. Then the test cases for the identified functions can be defined.

3. Recommendation

With the help of a test case matrix it is possible to check if functions are covered by several test cases. In order to improve the efficiency of the tests, redundant test cases ought to be deleted.

3.1.4. Resources

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- Barnett, H.G., *Innovation The basis of cultural Change*, McGraw-Hill Book Company Inc, New York, 1953
- Walkup, L., Individual Creativity in Research, Battelle Technical review, Battelle Memorial Institute, Columbus, Ohio, August 1958
- Zwicky, F., Discovery, Invention, Research, First American Edition, The Mac Millan Co, 1969, pp107

Internet sites

In this address you can find a Black Box program to use a genetic algorithm that helps optimise your problems

- http://fdtd.rice.edu/GA/

Elementary Method "Black Box Test Case Design" (BBTD)

- http://www.informatik.uni-bremen.de/uniform/gdpa_d/methods/m-bbtd.htm

Black box approach: an eye-opener in innovation work

- http://www.hi.is/~joner/eaps/y3_16047.htm

3.2. System and Process Analysis

Introduction

As mentioned in 3.1 system and process analysis are the other tools available to define the innovation needs of a business problem. System analysis is a method that helps the businesses pinpoint where changes need to be made in the system, so that limited resources can be focused on those areas. Process analysis determines what steps within a task are required to create a measurable output. Process analysis provides an opportunity to identify problem points in a workflow, understand the factors that affect performance, and question why certain actions are taken.

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3.2.1. What is system and process analysis?

The process analysis helps to trace the source of variation and is, therefore, a useful method to identify root causes of a problem. Process analysis is typically performed using an activity – level process flowchart and by asking a series of questions to explore or justify excessive cycle time, approvals, improper sequence, delays, and other process deficiencies.

System analysis is an explicit formal inquiry carried out to help the decision – makers identify a better course of action and make a better decision than they might otherwise have made.

The typical use of systems analysis is to guide decisions on issues such as national or corporate plans and programmes, resource use and protection policies, research and development in technology, regional and urban development, educational systems, and other social services. System analysis is performed using a system analysis diagram which is a tool that systematically illustrates the process flow from the supply side (or input of resources), to the transformation of throughput of product or services, to the output side for final quality verification and release to the customer. This diagram helps to identify interrelationships of major tasks, work phases, and opportunities for improvements through the use of feedback loops at the organisation and the customer levels.

3.2.2. Where and why system and process analysis are typically used?

Typical application of the process analysis technique

- To review, analyse, and improve an existing process
- To identify process improvement opportunities
- To fine-tune processes in an organisational change project

Typical application of the system analysis diagram

- To overview the sequential production or service processes, lines of communication, and quality feedback loops
- To reach a common understanding using the systems approach
- To clarify roles, task responsibilities, and system requirements

The system and process analysis are typically used by:

- Research/statistics
- Creativity/innovation
- Engineering
- Project management
- Manufacturing
- Marketing/sales
- Administration/documentation
- Servicing/support
- Customer quality metrics
- Change management

3.2.3. Problem solving phase

The problem solving phase encompasses the below steps:

1. Select and define problem or opportunity
2. Identify and analyse causes or potential change
3. Develop and plan possible solutions or change
4. Implement and evaluate solution or change
5. Measure and resolve solution or change results
6. Recognise and reward team efforts

3.2.4. Notes and key point for process and system analysis

Notes and key point for process analysis

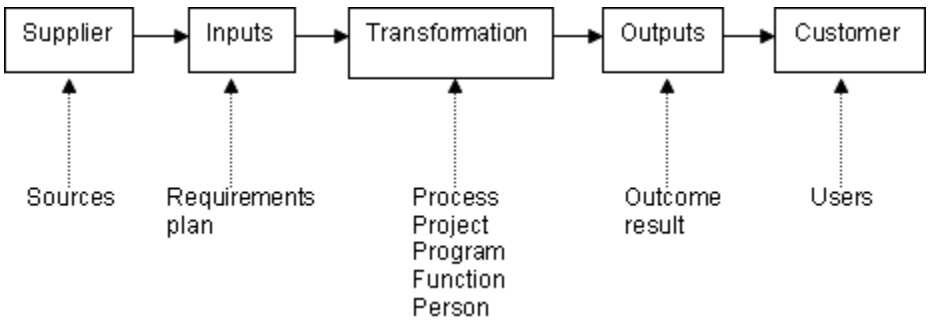
To construct a process flow, several tools are available:

- Process flowchart
- Symbolic flowchart
- Process mapping
- Cycle time flowchart
- Activity analysis

Using any one of these will allow a process improvement team to achieve established team goals. The given list of 10 process analysis questions (see in the example) is optional. The number and content of questions may change in accordance with the complexity of any given process.

Notes and key point for system analysis

Below, in the boxes, we are presenting the major steps of the diagram and outside them we give some other headings or designations that can be submitted for the generic system analysis diagram headings:



3.2.5. Step-by-step procedures of process and system analysis

Step-by-step procedure of the process analysis by using the tool of symbolic flowchart

1. As a prerequisite activity, a facilitated team develops a process flowchart at the activity-level for the process selected. In order to create a process flowchart the steps below need to be followed:

- The team facilitator assembles a team whose participants thoroughly understand all aspects of the process.
- The overall scope of the process flowchart is determined. A starting and stopping point is identified.
- Next, participants identify all major process steps and the sequence of completion. Symbols and connecting flow lines are used to show process activity and sequence.
- The facilitator uses a whiteboard to start drawing the flowchart. The participants assist the facilitator in drawing and connecting all process steps in the correct sequence.
- Finally, the symbolic flowchart is verified for accuracy and dated.

2. The facilitator displays a set of standard process analysis questions. The team reviews the questions, adds, deletes, or revises questions to fully cover the process to be analysed.

3. Using the finalised list of questions, the team discusses all activities in the process and provides responses to the questions.

4. Finally, the facilitator asks participants to recheck all responses, makes final revisions, and dates the list.

5. The information serves as an input to a variance process, a logical next step for the team.

Step-by-step procedure of the system analysis

1. The team develops a system analysis diagram consisting of five blocks, interconnected, and with internal and external feedback loops added.

2. The blocks are designated to contain processing or requirements information.

3. Using the completed System Analysis Diagram as a guide, the team explores potential problem areas and process improvement opportunities.

3.2.6. Example of process analysis application

In the example below we will present the method of process analysis in the facilitation of the process of a student's workshop that takes place in a university.

The first step was the assembly of a team that knew everything about the process of the workshop.

The second step was the construction of the symbolic flowchart that would portray the process. (See the flowchart below).

After the flowchart, the facilitators displayed a set of questions that fully covered the process of the workshop. In the table below you can see the questions and the responses to them.

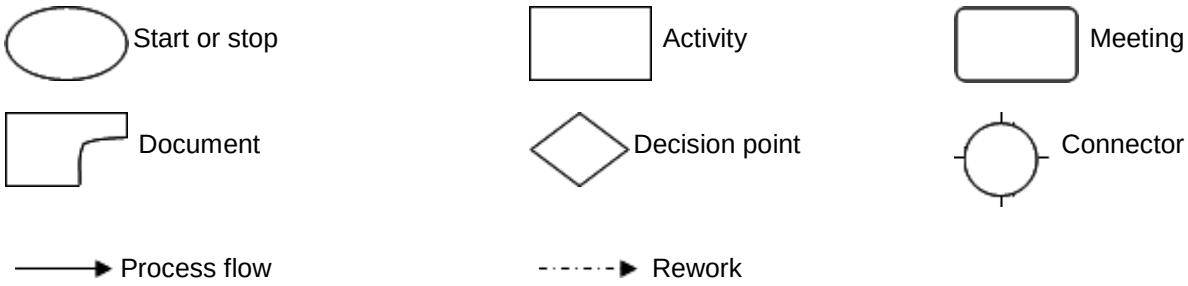
Typical Process Analysis Questions

1. Are the connected tasks performed in a logical sequence?
    - No, materials check should have been done earlier
2. Does the defined process show more than two loopbacks?
    - Yes
3. Do individual tasks have relatively long cycle times?
    - No

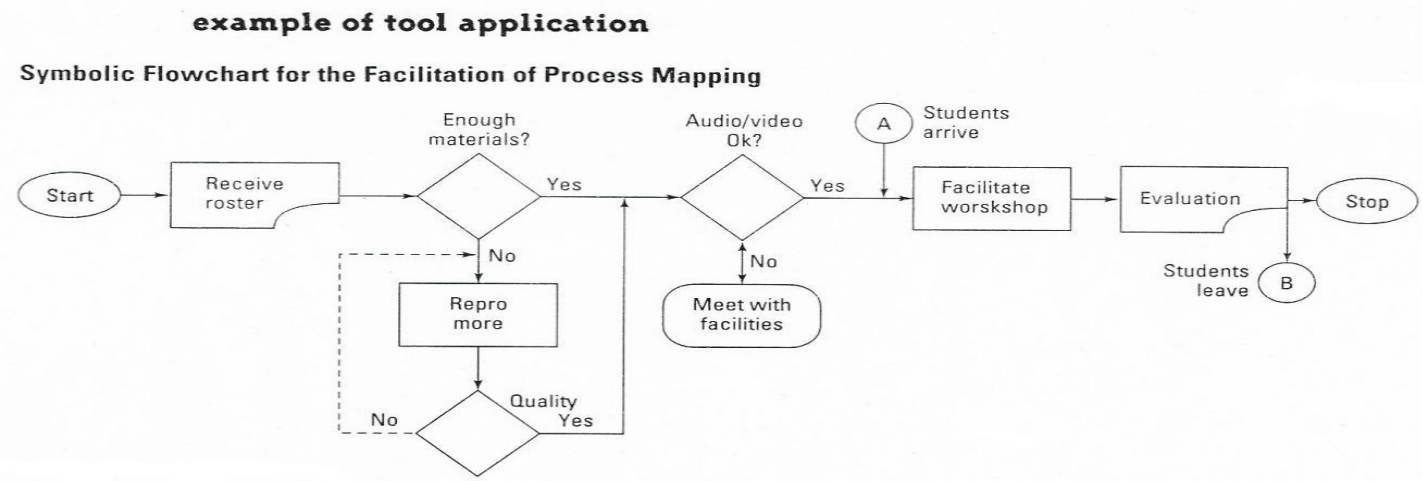
4. Does every task add value to the process?
    - No, audio-visual check does not add value to this process
5. Are there redundant tasks?
    - No
6. Does the process reflect excessive delays?
    - No
7. Does the process contain sources of key variance?
    - No
8. Are there more than two approval requirements?
    - No
9. Can the process flow be changed to reduce tasks?
    - Yes, remove A/V checks
10. Does this process have a high level of consistency?
    - Yes

From the above responses the facilitators decided that the materials check should be done earlier in order to avoid delays. They noticed that the rosters for the students were invariably sent very late, so there wasn't enough time to prepare the materials needed to be given to the students who attended the workshop. Moreover, they observed that they could change the process flow, by removing A/V checks in order to reduce the tasks.

Standard symbols:

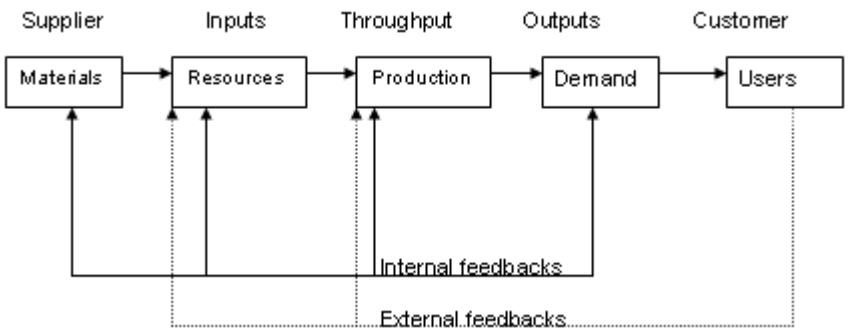


A flowchart is drawn from top to bottom and reflects left to right directionality. Avoid crossing flow lines within the chart; use connectors within and from page to page.



In the addresses below you can find examples of some other process flowcharts.

3.2.7. Example of system analysis application



The diagram above represents the production system of a factory. By constructing this system with its major five blocks, and by finding the feedbacks that affect its function, the factory team can explore potential problem areas, such as:

- Bad quality of resources have a negative impact on the demand
- A market analysis is very important to decide what resources should be used in order to provide the good quality products that the customers want
- Not taking into consideration the internal feedback of demand to production will result either in the production of more products than are demanded, by increasing the storage cost, or in the production of less products, by increasing the deficiency cost.

Resources

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Internet sites

This is the part of the general address Principia Cybernetica Web, which refer to the system analysis method:

- http://pespmc1.vub.ac.be/ASC/SYSTEM_ANALY.html

In this address of the TECHinsights one can find information about process analysis and process analysis services:

- http://www.semiconductor.com

4 Tools for developing innovative solutions

4.1. Foundations of generating ideas

"Culture usually deals with making certain ideas famous.
Education deals with communicating these famous ideas.
Both deal with perfecting these ideas, by updating them.
The only way to change ideas is conflict (...)"
(Edward de Bono)

Introduction

A defining feature of the present is the radical and continuous change. It is of utmost importance to make people think creatively so that the effort put during the changing process is justified.
Creativity is a complex field of study that is why this concept does not have a clear-cut definition. This is reflected in the great number of definitions for creativity. We will work on the definition that makes the distinction, that several management authors make, between creativity and innovation; therefore:

- creativity is the process of generating new ideas,
- innovation is a translation of the ideas into new products, services or production methods.

Our purpose is to show that the activity of an organization can increase its efficiency and effectiveness as long as it uses creative measures. The module content is:

- what are the reasons, why and when stimulating creative solutions in an organization are recommended;
- how are the foundations of generating ideas put together: adaptors/innovators, group creativity, factors that stimulate or block creativity, how is creativity influenced by the management style;
- case study.

4.1.1. The foundations of generating ideas - overview.....37

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4.1.1. The foundations of generating ideas - overview

Generating ideas depends on several factors:

Creative person (group)	**Creative product**	**Creative process**	**Creative environment**
- *adaptors*: prefer to do things better; try to improve the present situation without making radical changes, - *innovators*: prefer to do things differently; try to make radical changes;	Is something new, original but also true to reality; it is important to create new ideas and it is as important to implement them in the benefit of the organisations	Stages: *1. defining the problem* (documentation regarding the present problems of the organization); *2. further preparation* (focus on a problem, formulate the hypotheses without censorship); *3. incubation or gestation* (trying to find the solution); *4. illumination* (the emergence of the solution, sometimes it can emerge in the most unexpected situations); *5. checking* (it is done in order not to eliminate errors or gaps).	Must be democratic, relaxed, friendly, to encourage imagination and unusual solutions.

4.1.2. Why and when is the creation of innovative solutions recommended?

Why is the creation of innovative solutions in organisations recommended?

- it proved to be very productive (for example when the organization has difficulties in finding solutions to a certain problem, a brainstorming session can offer the solution);
- it increases the competitive spirit, self-confidence and initiative of the organisation's members (for example, the organisation can discover it is much more efficient to find solutions using its own employees than asking for consultancy elsewhere);
- it improves the mood and the relations between the employees of an organisation (for example, creating a relaxed open to communication atmosphere, employers can discover potential problems of the organisation – no matter the level of their occurrence – before the situation gets out of control).

When it is the creation of innovative solutions in organisations recommended

The generation of new ideas and their implementation are valued in an organisation in the following situations:

- When the rhythm imposed by the market is faster than that of the organization: the new employees as well as the regular people can be valuable sources of alternative ways of using the technologies of the providers or of the competition, of new ideas;
- When present problems in the system overwhelm us or in order to be at the normal parameters regarding the efficiency and effectiveness of the organisation;
- When there are substantial demographic changes and consequently industrial and marketing structure changes appear.

4.1.3. How to found generating ideas

The creative personality was the focus of researches in the field of creativity, at the beginning. Yet, since then, researches in this field expanded including topics like (see 2):

Creative person (group)	Creative product	Creative process	Creative environment
• adaptor; • innovator	can be a concrete one or a "psychological", ideal one	an extremely complex phenomenon out of which will result either a work of art or a technical innovation, a mechanism, a mathematical theorem etc.	where the creative process takes place, for example the climate or context

The following will be briefly presented:

- some of the adaptors/innovators characteristics;
- some of the advantages of group creativity;
- factors generating or blocking creativity (and some recommendation of how to surpass the barriers);
- how does the management style stimulate the creative environment

4.1.3.1. Adaptors/Innovators

As far as the *creative person* is concerned, researchers have studied the individual from a multitude of perspectives: so, two individuals can be creative but in different styles. *The style of creativity* measures the way in which creativity manifests itself ("How creative you are?" / "How does your creativity manifests itself?") whilst *the level of creativity* measures the capacity to create ("In which degree are you creative?"). (2) Kirton (1989) (apud 2) identifies two favourite creativity styles*: adaptation* and *innovation*.

Adaptors	Innovators
• prefer to do things *better;* • seek professions that encourage stability and order such as accountability and production; • formulate ideas without changing very much the initial data of the problem.	• prefer to do things *differently;* • are found in departments as marketing that demand interaction with changing environments (who deal with incertitude); • would rather produce ideas by introducing new elements in the context of a problem and also by changing the relationship between the elements of a problem.

We cannot say that one of the two styles is superior to the other. Organisations and groups are normally made up of innovators as well as adaptors, in various proportions. (2)

4.1.3.2. Group creativity

In recent years, one of the best ways to generate ideas was to make up teams using known methods (for example, brainstorming, brain writing, 6-3-5 method, analogical reasoning etc.) to offer solutions that make the best out of the human creative potential. Groups of different sizes have more chances to solve a problem than individuals do.

Group creativity presents a lot of advantages:

- efficiency in solving complex problems;
- unlimited communication and increased capacity in generating ideas;
- the risks are easily tolerated because the chance to find a solution is bigger;
- it is an inexhaustible source of stimulating the individual creative potential.

As the creative products are concerned, not every product of our activity is a new and/or original and creative. New original ideas and answers must have social value, be adjusted to reality and correspond to objective demands.

4.1.3.3. Factors generating creativity

There are more factors that contribute to the creative process (3, pp. 220 – 222) as can be seen in the table below:

Intellectual factors	**Personality factors**	**External factors**
• imagination (the combination of known elements); • intellectual fluidity (richness of ideas and images associations); • flexibility (the easiness of a person to change the point of view when approaching a problem); • originality of solutions (unusual character); • memory (new ideas appear (indirectly using our previous knowledge); • thinking (it continually guides and checks the process of creation), • the observation spirit.	• skills (the role of heredity and of the environment in forming them); • perseverance, will; • motivation (the passion of creation , desires, aspirations that make an individual want to discover something); • interest; • creative attitude.	• the influence of the **external environment**, especially of the social one (the role of social demands in stimulating creation in an epoch, the stage of the project: the society's attitude towards creation can stimulate or inhibit the creative process).

4.1.3.4. Creative environment

Creativity Barriers

A mind functions only when there is an opening. A new idea is the beginning and not the end of the creative process. A lot of barriers have to be surpassed before an idea is seen as a solution. The organisational climate plays an important role in producing or blocking ideas. (4)

Here are three types of creativity barriers presented briefly:

Of cultural nature	**Of perceptive nature**	**Individualist attitudes**
• conformism of ideas (old or new); • too much stress put on reason; • prejudges; • cultural differences; • non-integration of frustrations: run, aggressiveness, transfer, resignation, compensation, frustration integration.	• negative thinking: "I am not creative!"; • difficulty to make the difference between facts and problems; • premature presentation of pseudo-solutions to a problem; • difficulty in perceiving unusual relations between ideas and objects etc.	• fear of making mistakes, lack of self confidence; • Weak capacity to relax; • distrust in superiors, colleagues, collaborators; • excessive dependency on someone else's opinions etc.

To surpass these creativity barriers, the specialists invented (and are still doing it) numerous methods and proceedures to stimulate creativity, methods that stress the freeness of associations: syncetics (Gordon), brainstorming (Osborn), group of specialist training (Roco), or of students' training (A. Onofrei and M. Gîrboveanu) (6, pp. 183 - 190). For more details, examples of types of exercises and games for stimulating creativity, we recommend Mihaela Roco, "Creativity and emotional creativity" and Edward de Bono, "Lateral thinking".

Exercise – sentences that block creativity

1. We do *not* have time; this is not in our plan "it doesn't work";
2. We *cannot* do this without taking into account the regulations; we will discuss it some other time...;
3. Although the idea is good, I'm sure it will *not* work; it is absolutely absurd;
4. We will *not* be taken seriously; you say things that are not possible;
5. Let others try first and then we'll see if it worth the try;
6. I have never done this before, is this idea written anywhere?
7. Before speaking, think hard if you have anything serious to say!

Continue the list with other sentences that block creativity and think about it! It is important to discover the factors that block the creative potential.

Creative environment: Managing styles and creativity

The traditional classification of the managing styles is: authoritarian style, democratic style, permissive style (laissez - faire).

No matter the style, the manager seeks to obtain the colleagues' cooperation, their agreement for the activity that is about to happen. Here is a table that presents the main features of the three managing styles:

Authoritarian style	**Democratic style**	**Permissive style**
• he/she imposes his/her own ideas; • he/she critics, raises his/her voice; • he/she dominates, imposes fear; • he/she does not accept negotiations or changes in the plans made by him/her; • he/she praises or encourages people very rarely - almost never; • he/she imposes a strict discipline, he/she takes all the responsibility; • he/she punishes, humiliates, imposes.	• he/she seems open to a minimum collaboration with the subordinates: sets strict rules but he/she also encourages independence; • he/she is open to discussions, accepts controversies and critical discussions; • he/she uses praises and encourages people even when they make mistakes; • he/she creates a stimulation environment and cultivates employees' self respect; • he/she encourages the employees to seek solutions, to get involved, to take upon the consequences of their decisions; • he/she avoids critics and humiliations; • he/she creates an atmosphere of openness, of friendly communication.	• he/she accepts an almost total freedom that leads to anarchy and disorder; • with excessive permissiveness he/she creates frustration that leads to very few positive results; • he/she is efficient only if he/she has very talented and motivated employees.

We have to make an important statement: the managing styles do not exist in a pure state. As it can be easily seen in table above, in order to create a stimulating environment from the creativity's point of view, it is not recommended to use authoritarian domination.

Mini guide for creating a creative environment

- Ask for each employee's opinion in order to produce a large number of ideas. If they are shy persons tell them to write them down. Do not criticise the person that produced the idea but the idea in itself.
- Do not evaluate the ideas immediately. This is done much later.
- Do not force people to "think traditionally" but do not force creative thinking either! Learn how to relax. (Breaks can be creative as well.)
- Use external stimuli to "get into the mood": step out of the office and go to a park, museum, listen to music etc.
- Stimulate your thinking with questions of the type: What, where, when, why, how, for how long.
- Rigid managing structures inhibit communication, which impedes solving problems: be open to communication.

4.1.4. Case study

(http://www.bright-side.com/why/case1a.html)

The organisation: it is a public company founded in 1930 with over 28,000 employees worldwide.

Context: the company fights its capacity to serve its clients, to produce quality products and to maintain efficiency, effectiveness and especially the quality of the organisation.

The following problems have been identified:

- barriers connected to fear, resistance to change and repeating old inefficient work habits;
- this behavior limits individuasl, groups, and organisational performance having an impact on the company's business.
-

Measures: they contacted a firm specialising in solving these kinds of problems (Bright Side) who organise workshops focusing on stimulating creative thinking of the executive leadership of the company.

Phase I: Discovery, evaluation and integration

This stage started with the interviewing process - 2 hours with the leadership and one hour with other participants at the workshop. The following **barriers** have been identified that were preventing them from reaching the targets set by the company:

- low level of energy, involvement and passion towards the vision/target of the company;
- lack of dynamic thinking and a high degree of resistance that were limiting creativity in solving problems;
- fear to make decisions because of negative experiences in the past;
- barriers connected to the group that were creating territorial problems between three groups that had a low level of respect, cohesion and understanding;
- lack of openness, honest communication between the departments of the company;
- conflicts due to the rapid change rhythm and the quarrels between the groups;
- high level of stress and anxiety; attitude of the kind: "We cannot do this", low level of confidence;
- distance and lack of communication between the main three groups of the organisation (Inside Sales, Outside Sales and Product Marketing)

Phase II: Measures, design and development

After analysing the data together with the leadership, Bright Side has developed an individual development process and one for the leadership that best fits the needs of the company. The following targets and objectives have been set:

- increasing personal initiative and responsibility for the targets of the team/company;
- development of self-confidence and confidence in others;
- development of communication strategies to increase honesty, authenticity and cooperation;
- creating the desire to change by developing, communicating and alignment of the targets and individual, group and organisational tasks.

Phase III: Bright Side Workshop

The workshop lasted 4 days. There were 2 moderators and 12 participants (Sales Executive Vice-president, Marketing Executive Vice-president and their leading teams).

The first day: revision and analysis of the interviews results, presentation of the changing model proposed by Bright Side and experimental measures of genuine communication; the second day: participants 'understanding of the vision and objective of the change; the third day: involving participants in experimental situations of openness and resistance to learning and accomplishing the plans; the fourth day: involving participants in experimental situations of building and supporting the measurable behaviour changes and supporting the desired company goals.

The 4 days focused on:

- personal/individual learning and the capacity to apply these things to produce greater personal and team impact;
- transfer of the personal learning to group learning and then reaching the organisational goals and tasks.

Phase IV: Team reinforcement workshop

This lasted for 6 weeks (it refers to individual and leadership development process), the target aim to reach the company's objectives.

Phase V: Individual/Learning Partner Reinforcement & Coaching

Learning is done in pairs with the purpose of offering support and understanding and, in the end, the participants have identified obvious behaviour changes.

Phase VI: Change measurement

The results obtained have been analysed by specialists; after one year behaviour changes and measurable business results were recorded. The leadership has been interviewed every six months and one year by specialists.

Results: *at leadership level (6 months after): understanding, confidence and cooperation; energy and reinforcement; openness towards learning and change; **at business level (6 months after):** growth in sales and closing new deals; increase of quality production and efficiency (of the clients attending time); after 1 year: tremendous growths in sales.

In conclusion, an organisational environment that promotes personal initiative and responsibility for the team's/company's goals, development of self confidence and in others, communication and alignment of the individual, group and organisational tasks, reward for good performances proved to be very stimulating from the point of view of creativity. That is why these organisational systems that support the decision-based process and the experimental systems are extremely useful in interrogatively solving problems.

In conclusion, encouraging autonomous thinking, a certain degree of permissiveness, stimulating open communication, using methods to stimulate creativity (brainstorming, sinectics, GSS – Group Support System, 6-3-5 Method, Analogical Reasoning etc) create the conditions for feelings of psychological security, favourable for creative manifestations.

4.1.5. Resources

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4.2. Brainstorming

Introduction

People want to think together. People want to collaborate with others and to take decisions together, though be sure about the solution of a problem. The most powerful and efficient intuitive method in doing that is brainstorming. The power of brainstorming is generated by the multitude of ideas issued on a time unit and by the originality.
Today reality: new technologies, the great amount of information have determined new approaches to manage a business. A manager as a leader has to build a good team. People want to feel free so that they can express themselves.
The main key to success is communication. *Brainstorming* is a method that makes possible free communication between people. *Brainstorming* is a method that makes people think and be responsible for their decisions.

What is Brainstorming?

Brainstorming is a technique to generate ideas. Brainstorming is a process to create new ideas, when a person produces a wide range of ideas or a group of people meet and issue ideas about a specific area. For more definition click here.
The initiator of the brainstorming method is Alex Osborn. The method was presented in 1948 in the book called “Your creative power”.
According to Osborn: "Brainstorm means using the brain to storm a creative problem and to do so "in commando fashion, each stormer audaciously attacking the same objective."

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4.2.1. Why and how to use Brainstorming

The idea is when can we use brainstorming? Why can we think that a brainstorming session can help us?

There are two possibilities:

1. We can carry on the brainstorming sessions in a planned process: for example in a strategy to develop a firm we have already planned brainstorming sessions in regular meetings;
2. We can carry on brainstorming sessions spontaneously, in diverse situation, when we have to make a decision or we need make changes in our activities. For example in a firm, the number of orders is decreasing and the profitability is in danger. So we have to attract more customers, we have to increase the quality of the products and so on. So we need innovative ideas to make some changes, to offer new products, to be more attractive on the market. A brainstorming session will generate a set of creative ideas, the staff of the firm will work together, in a brainstorming session the communication will increase, the people will feel free to express any idea.

The main goal of this process is to stimulate the creative thinking. In a brainstorming session people issue as more ideas as possible, without criticism about them. The brainstorming isn't a method to solve a problem, but only a method to generate new ideas which could lead to a solution for a specific problem.

The Brainstorming is used in decision making. The decision isn't taken during a brainstorming session, but it is taken using the ideas generated in the brainstorming session.

4.2.2. Where is Brainstorming used?

Brainstorming can be used in every business-area and any situation you think about. Here you area some areas: Management of any type [of a company], Marketing, Advertising.

Requirements to run a Brainstorming session

1. a problem (situation) to solve;
2. a group which can be a team (maximum 10 persons).
3. a special place with a large board or paper that can be see by all participants.
4. an expert called facilitator, which can acts as a leader to maintain the order and the focus of the session.

4 basics rules to run a Brainstorming session (provided by Osborn)

Osborn provides four basic rules for brainstorming:

1. "Criticism is ruled out. Negative judgments of ideas must be withheld until later.
2. Free-wheeling is welcomed. The wilder the idea, the better it is easier to tame down than to think up.
3. Quantity is wanted. The greater the number of ideas, the more the likelihood of winners.
4. Combination and improvement are sought. In addition to contributing ideas of their own, participants should suggest how ideas of others can be turned into better ideas; or how two or more ideas can be joined into still another idea."

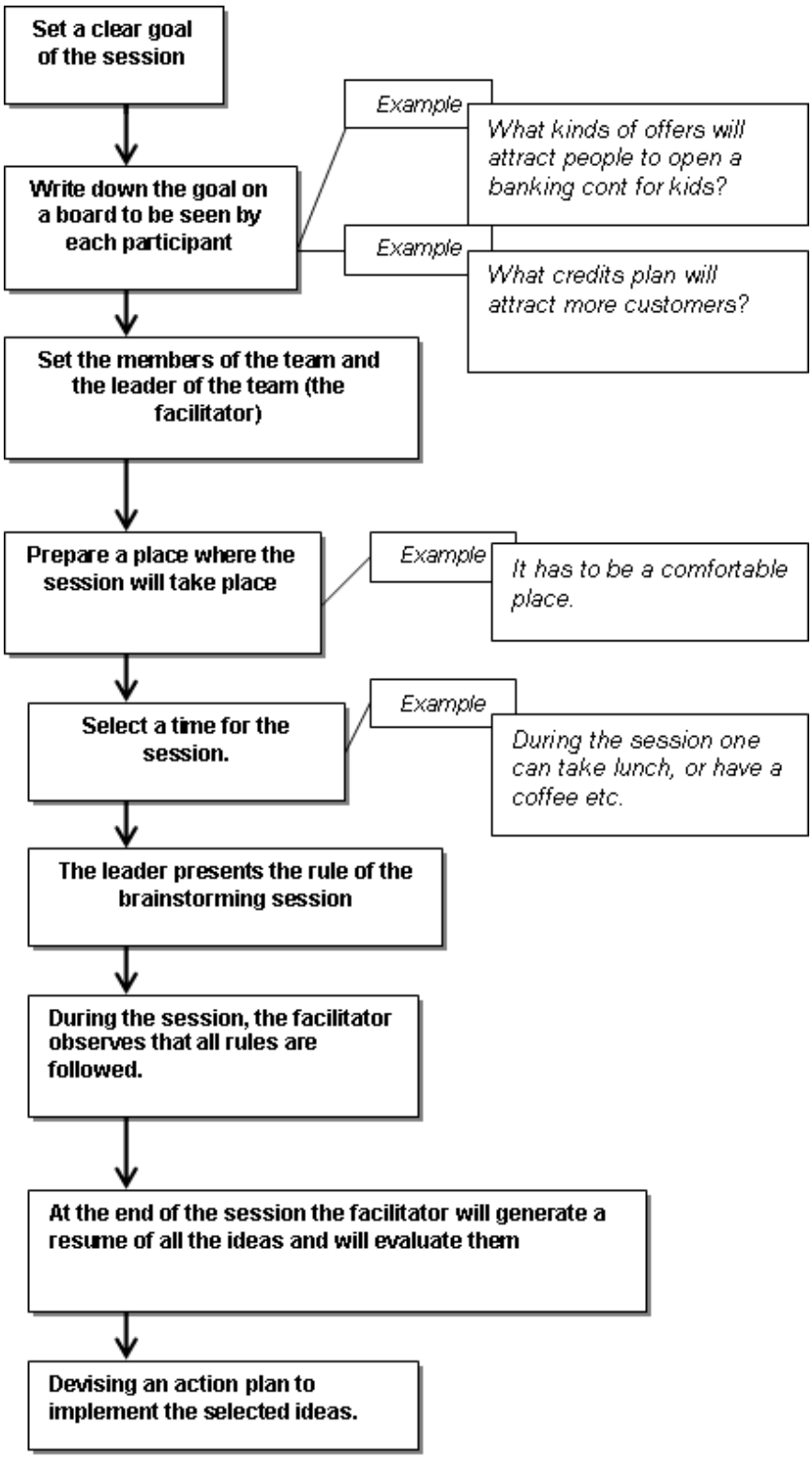
Tips and tricks - rules to run a session

There are simple rules to run a brainstorming session.

- Identify a clear topic that will be discussed;
- Encourage generating ideas;
- Write all ideas so the whole group can see them easily;
- Don’t judge ideas;
- Any person and any idea are equals in value;
- Limit the time;
- Don’t discuss on ideas. All discussions will take place after brainstorming is finished.
- Organise small group of persons (<=10);
- Encourage creativity. All ideas are welcomed.
- The brainstorming session need a leader, called facilitator;
- Build on others people’s ideas;
- No idea is wrong;
- Evaluate the ideas in 2 steps: one step is to define criteria to select the good ideas and the next step is to evaluate the ideas with the selected (defined) criteria and write down the results
- The sessions must end with a plan to implement (apply) the selected ideas generated in the brainstorming sessions.

4.2.3. Schema and procedure for a brainstorming session

General schema of a brainstorming session



Procedure for a brainstorming session

1. Select a leader and a recorder of the ideas. It could be the same person. This person is called facilitator and has the following role:
    - to pose the problem to the group, like a question: “What can we do about this problem?” or “What are your ideas?”;
    - to maintain the discussions of the group focused on the proper topic;
    - to encourage everyone to say what they think;
    - to protect the participants from the criticism;
    - to respect the rules of the brainstorming session;
    - to respect the limit of time;
    - to record all ideas;
    - to summarize the ideas;
2. Define the problem to be brainstormed. Make sure that every participant has understood the topic of the session. The solution of the problem is the objective of the session. The facilitator has to write down the problem on the board.
3. Set up the rules of the session and let every participant to know them.
4. Start the session. The facilitator leads the session.
5. Once the session has finished, the leader has to resume the ideas: eliminate the ideas that are similar or repeated, group the ideas and the concepts; eliminate the ideas that don’t fit to the analysed problem.
6. Evaluate the ideas:
    - write down some criteria (about five) to select which ideas are the best. The criteria should start with the word “should”, e.g. “it should be the minimum cost”;
    - mark each idea with a score for: each criteria.
    - the idea with the highest mark will be selected to solve the problem. Keep a record of all best ideas and their marks.
7. Inform the group about the remaining ideas and discuss with the group an action plan to implement the solution. If this is difficult do another brainstorming session to make a plan to implement the solution.

4.2.4. Tools and example

Tools used in a brainstorming session

Using conceptual maps for ideas generation

The conceptual map is a term which describes a visual language. The conceptual maps are represented through labelled nodes (rectangles, circles or ovals) and labelled arcs which interconnect nodes. From the point of view of brainstorming, conceptual maps are non-formal structures. Each person draws concepts and links between concepts.

Software tools to hold a brainstorming session.

ConceptDraw MINDMAP, Conceptual Map software.

Brainstorming forms

The forms of brainstorming are: classical brainstorming and advanced brainstorming

Classical Brainstorming is the brainstorming until now discussed. Advanced brainstorming is a better brainstorming session which follows the classical rules, but is improved upon by using specialized techniques and tools.

The modern tools and techniques used in advanced brainstorming are:

- Brainstorming software tools: brainstorming toolbox, software to generate conceptual maps;
- Creative thinking techniques: random word technique, random picture technique, False Rules technique, scamper method, analogies, role play, Alexander technique [more info].

Conclusions
Brainstorming is not the only method to generate ideas. However, brainstorming is the first and simplest of these methods. To see other methods click here.

Example
Problem: get new customers for a market.

Steps to be followed in organising a brainstorming session:

1. Selection of a facilitator (she/he has to have good communication skills, hold a certain level of authority in the group).
2. The facilitator raise the problem: How can you get new customers? He writes down on a board the problem.
3. Set up the rules of the session: limit time: 20 minutes, anyone can produce any idea about the problem, every participant has to respect the idea of his colleague.
4. The participants at the session start to issue ideas. The scriber draw a map (star form, with all ideas).
5. The facilitator summarises the ideas.
6. Set up the criteria to mark the ideas: 1- cost; 2- should be solved with the actual employers; 3- speed of implementation; 4- implementation difficulty.
7. Marking ideas:

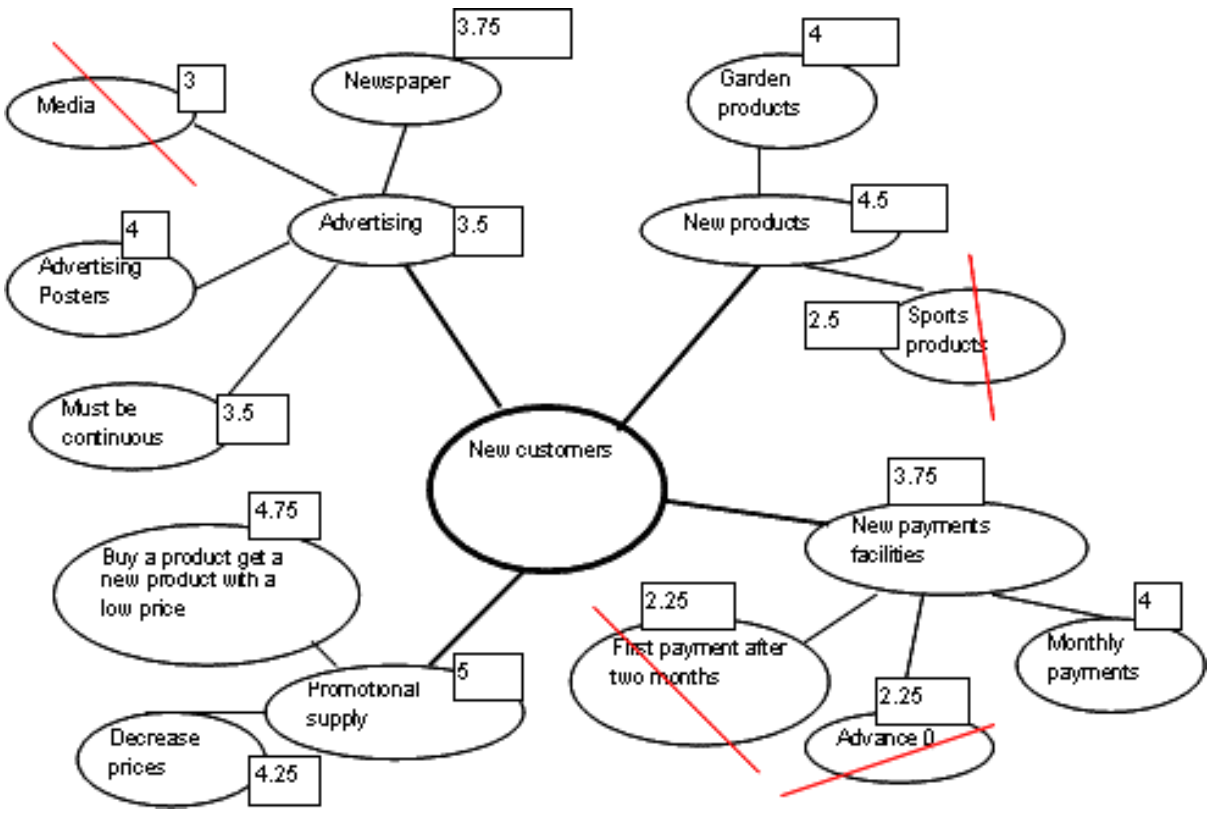
   The score for each criteria is from 1 to 5 .

	Criteria no, 1	Criteria no, 2	Criteria no, 3	Criteria no, 4	Average
Advertising	3	1	5	5	3,5
Advertising Posters	5	1	5	5	4
Must be continuous	3	1	5	5	3,5
Media	1	1	5	5	3
Newspaper	4	1	5	5	3,75
New products	4	5	5	4	4,5
Garden products	5	5	3	3	4

Sports products	3	1	3	3	2,5
New payments facili-ties	3	5	4	3	3,75
Monthly payments	4	5	4	3	4
Advance 0	1	5	1	2	2,25
First payment after two month	1	5	1	2	2,25
Promotional supply	5	5	5	5	5
Buy a product get a new product with low price	4	5	5	5	4,75
Decrease prices	3	5	4	5	4,25

8. Inform the group about the idea selected and make an implementation plan.

See the picture: the ideas that have been discarded are crossed with a red line.



4.2.5. Resources

Internet sites

- http://www.mindtools.com/brainstm.html
- http:/www.brainstorming.co.uk/tutorials/whatisbrainstorming.html
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4.3. 635-Method

Introduction

In 4.2 Brainstorming was presented as a useful tool for developing innovative solutions. Method 635 is a kind of brainstorming but it is carried out in a group and in written form.

New ideas can be discovered and developed in the way that ideas of the participants are adopted and further developed. This way, the creative potential of a group can be used. Like brainstorming, this will be especially useful if experts in different fields of knowledge and levels of qualification participate in the session.

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4.3.1. What is Method 635?

What is Method 635?

Brainstorming allows the collection of ideas which are presented by the participants orally, Method 635 principally does the same but the collection of ideas is carried out on paper, it's a sort of brainstorming on a sheet of paper, it's "brainwriting".

The name derives from the basic principle of the method:

- 6 participants note down
- 3 ideas in a period of time of
- 5 minutes 5 times

What can Method 635 be used for?

- Creative finding of ideas
- Finding solutions for a problem
- Also applicable for complex problems

4.3.2. How to use Method 635?

Prerequisites:

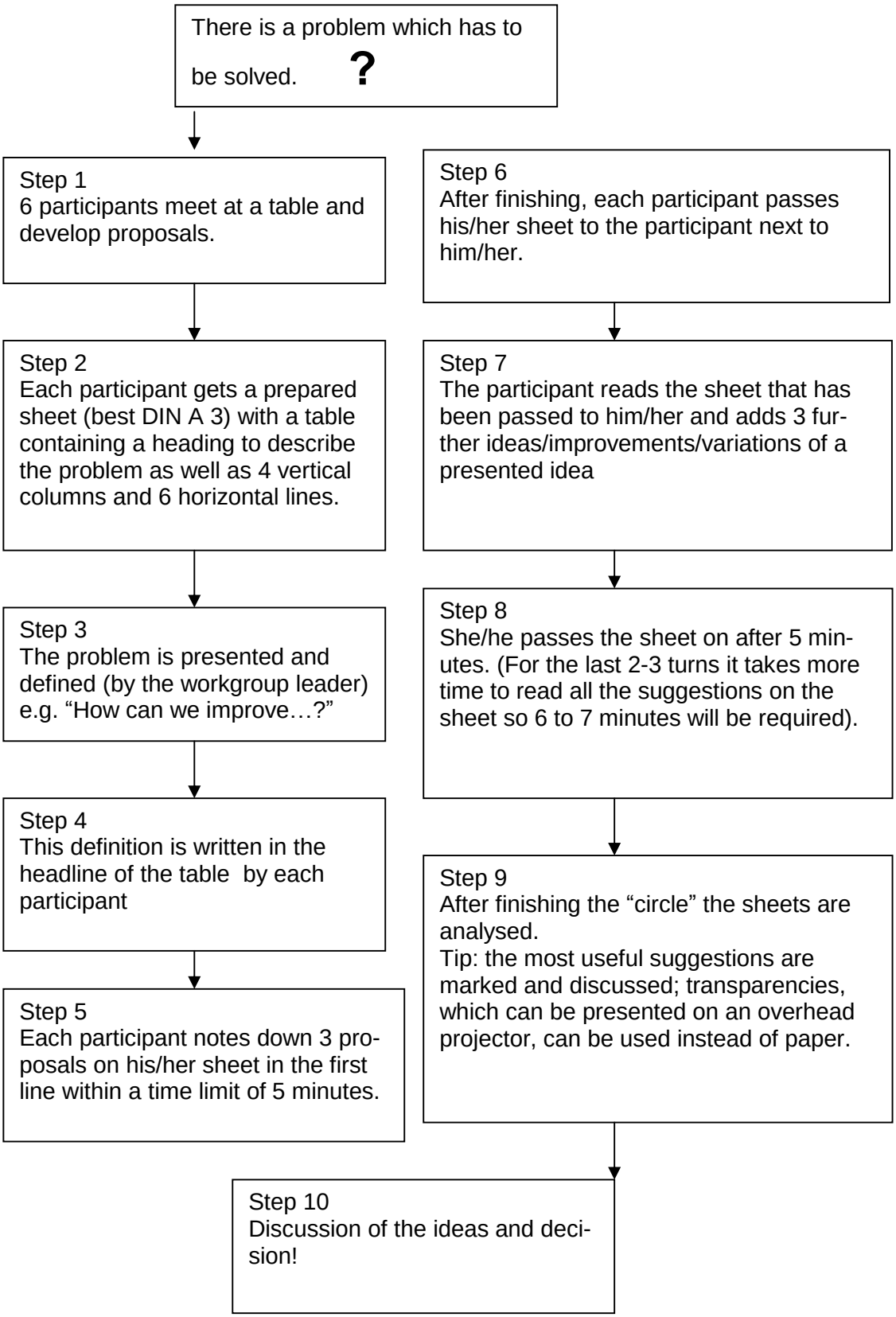
- 6 participants (in different fields of knowledge)
- Prepared forms (see 4.3.8)
- A room without any disturbances
- About 30-40 minutes with further time for discussion

Proceedings for using Method 635:

As pointed out before, this method is used for finding/collecting ideas.

6 participants meet in order to further develop 3 ideas 5 times.

Practically, this means following the 10 steps shown below:


There is a problem which has to be solved. ?
Step 1
6 participants meet at a table and develop proposals.
Step 2
Each participant gets a prepared sheet (best DIN A 3) with a table containing a heading to describe the problem as well as 4 vertical columns and 6 horizontal lines.
Step 3
The problem is presented and defined (by the workgroup leader) e.g. “How can we improve…?”
Step 4
This definition is written in the headline of the table by each participant
Step 5
Each participant notes down 3 proposals on his/her sheet in the first line within a time limit of 5 minutes.
Step 6
After finishing, each participant passes his/her sheet to the participant next to him/her.
Step 7
The participant reads the sheet that has been passed to him/her and adds 3 further ideas/improvements/variations of a presented idea
Step 8
She/he passes the sheet on after 5 minutes. (For the last 2-3 turns it takes more time to read all the suggestions on the sheet so 6 to 7 minutes will be required).
Step 9
After finishing the “circle” the sheets are analysed.
Tip: the most useful suggestions are marked and discussed; transparencies, which can be presented on an overhead projector, can be used instead of paper.
Step 10
Discussion of the ideas and decision!

4.3.3. Application Example

Problem: How can we improve the knowledge of English in the service department?			
A1 Evening classes	A2 Motivation for holiday abroad	A3 “English speaking day” each week in the department	A Nikos
B1 Evening classes paid by the company	B2 Motivation for summer university in England	B3 Project meetings in English	B Vlad
C1 Evening classes with 2 hours off to prepare for the evening classes	C2 Contribution by the company for summer university in GB	C3 Conversation circle once a month after work	C Annelie
D1 2 hours per week with a teacher in the company	D2 Higher remuneration for a certified qualification	D3 English version of professional literature	D Linda
E1 e-learning with a tutor and classes in the company	E2 English “library” at the company	E3 Conversation circle with foreign colleagues from the company	E Laila
F1 Intensive course twice a year on the weekend	F2 Going to the Irish pub as often as possible	F3 Intercultural evenings with foreign colleagues from the company	F Caron

4.3.4. Pros and Cons of the method 635

Possible advantages:

- The method is very easy to use.
- The method doesn't require a special qualification for moderation.
- The innovative potentials of a group can be used (experts in different fields of knowledge).
- All participants are active (not necessarily achieved by a brainstorming session).
- It is useful if there are conflicts in the group (conflicts in a group could have a negative effect when using the oral method of brainstorming).
- A useful idea is systematically developed further.
- The "author" of a creative idea can be identified.

Possible disadvantages:

- Some participants might have problems describing their ideas concisely so that the idea is not clear enough for the other participants (handwriting must also be clear!).
- As there is a fixed time limit of five minutes, participants might feel pressured and restricted in their thinking.

As there are obviously more pros than cons, it's worth a try!

4.3.5. Resources

Downloads:

- form for applying method 635 (PDF, 7kb)
- 10 steps for applying method 635 (PDF, 11kb)

Literature:

- Schlicksupp, Hans. Ideenfindung. Vogel-Verlag Würzburg, 1992

If you use a search machine like google and search under "methode 635", you will find that there are a lot of explanations given in GERMAN. Most websites present more or less the same information about the method, sometimes with slight modifications like:

- http://www.teachsam.de/arb/krea/krea_brainst_2e.htm

However, when entering the English word "method", no information about this creative method could be found, only some information about physical analyses. We therefore hope the description was clear enough. If you have any further questions you may contact the author of this component under info@pro-kompetenz.de

4.4. Analogical Reasoning

Introduction

Like the other methods referred to in this chapter, the method of analogical reasoning helps to **find ideas to solve a problem**. Analogy is a basic human reasoning process, based on a fundamental process of human thinking, to **remember similarities and to transfer them to a given problem or situation to find an adequate solution**.

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4.4.1. What is Analogical Reasoning?

Experiences we have had and knowledge we have acquired help us to orientate and to adapt our actions. We go back to information we have stored in our brain in a given situation to make a decision or to act in the most efficient way.

I remember that when I was a child I was very afraid of injections. One day, my mother took me to the hairdresser. As the hairdresser was dressed in a white coat, which was traditional at that time and the same as the doctor had worn when he gave me the injection, I turned around in the doorway and ran away as fast as I could…

We try to find parallels to situations/problems which are similarly structured.

Analogical Reasoning is a creative method and has nothing to do with thinking "we have always done this successfully in this way, so we will continue doing it this way", which often blocks new and innovative solutions.

4.4.2. Where can we use Analogical Reasoning?

This method can help us to **find ideas for solving a problem**. We all have stored a lot of information in our brains, personal experiences and information we have kept from other sources like TV programmes, movies, books etc.

When we get into a certain situation where we have to find a way to solve a problem, **it helps us to mobilize that information which had been used in a comparable situation**.

This is generally very useful, **especially if colleagues with a very different background of knowledge and experience come together to discuss a problem**.

4.4.3. General proceedings for using Analogical Reasoning

How to structure the search for analogies?

First, we have to **find a suitable analogy** for our problem.

Possible objects of producing analogies:

- System
  - Structure
    - Elements (form, colour, material, physical state)
    - Relation between such elements
  - Function
- Environment of the system

Where to search for analogies?

Suitable analogies can be found in different fields of work or disciplines which seem to be "distant" from each other. Therefore, for the composition of a work group, experts from different fields are useful (technicians, doctors, biologists etc.)

Useful branches to look for analogies may be:

Nature: we all know about surprising solutions by using examples from nature (the durability of a spider net, the orientation of bats), which have been transferred and used for technical solutions. There is a whole scientific discipline dealing with this topic - **BIONICS**.

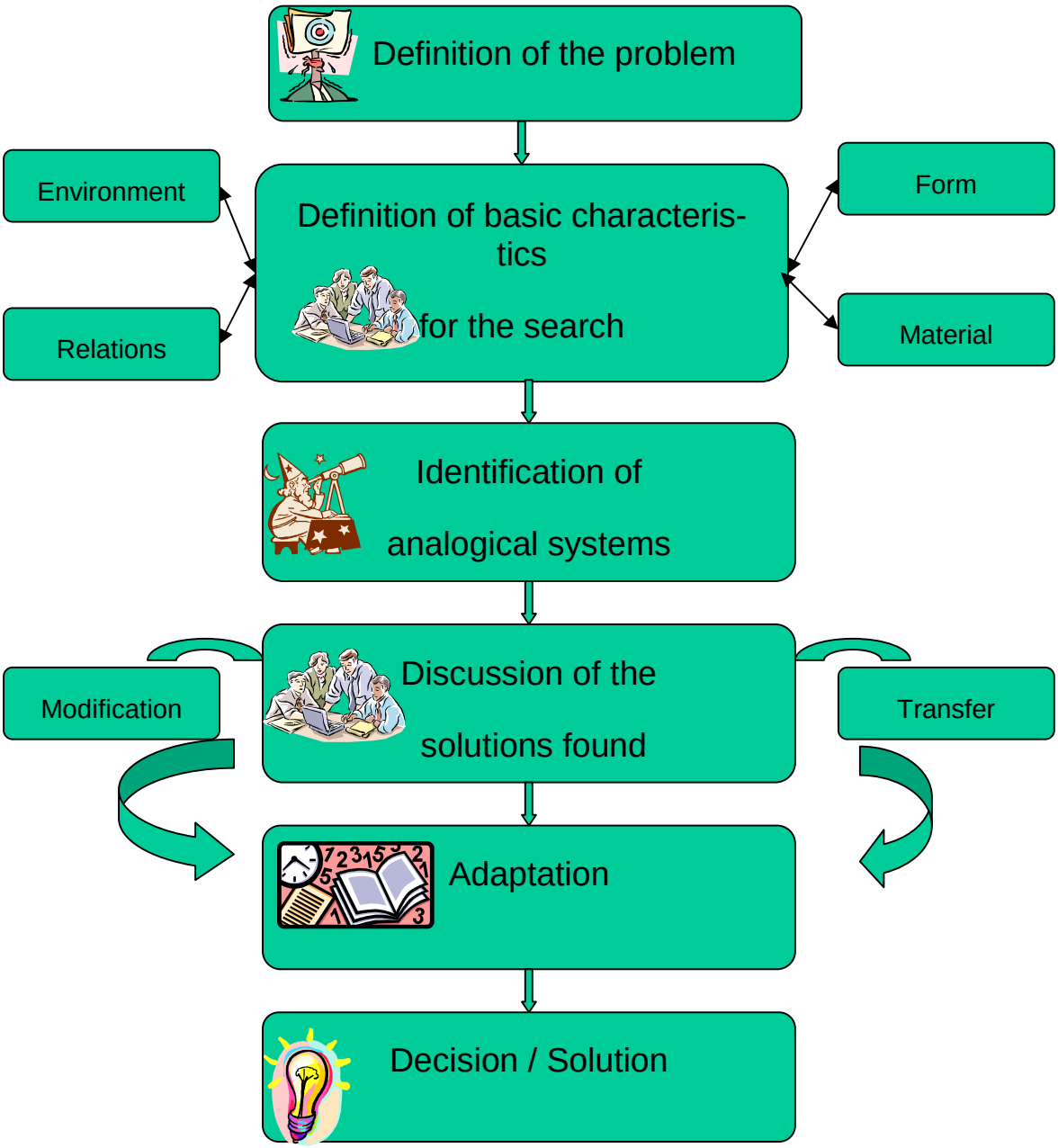
There are lots of problems we are trying to solve which animals and plants have already solved.

Other cultures, other technical disciplines, art, medicine, science, history are useful fields to search for analogies.

In looking for analogies from "**distant**" **fields of work**, solution concepts can be developed that are completely different from the original context of our problem. So they can **lead to innovative solutions.**

Prerequisites:

- Clear definition of the problem
- Available knowledge in different levels/expertise of different fields of knowledge (natural science, technical expertise, medicine…) – group work with experts from "distant" fields can be very useful
- Capability to "see" similar structures/functions in a different field of knowledge
- Abilities to transfer found similarities to the problem situation which has to be solved
- Knowledge about available sources of knowledge- **databases, experts**… - and abilities to use them



From the point of view of patent protection analogies should be found in fields which are “farther away” if this is possible!

4.4.4. Application examples

There are lots of examples of finding solutions from nature. Analogies found in other technical fields are quite common, too. In training for analogical reasoning, the question of how transfer from historical sources can be made and asking for illustration, often appears,. Therefore, we have chosen two examples from historical sources (see K. H. BUSCH).

The "Rat catcher of Hameln" is a story well known in Germany. People of the German town Hameln suffered millions of rats and mice. In 1284, as the story goes, a man wearing a strange looking vest appeared in the town and told the citizens that he would be able to free the town from the plague.

The citizens promised him a good reward. He took out off his pocket a small pipe and started to play. All the rats and mice came out of the houses and followed him. He went right away into the nearby river; the animals followed him and drowned…

- Attracting/driving away animals (rats, mice, moles, and midgets) by using acoustic means is very common nowadays.

For those who do not know the German story, we are going to tell it to the end.

The citizens were very happy but "forgot" to reward the man who had freed them from the plague. He went away very angrily but appeared again, early in the morning of the 26th June.

He started to play his pipe again but this time, many children appeared to follow him. They went out of the town to a hill where they disappeared forever …

Another example:

Perhaps you remember the story of HERAKLES who had to solve the problem of how to clean out the big stables of King Augias in one day. Three thousand cows had been living there for years so that there were mountains of dung. It seemed impossible to solve the task.

But HERAKLES didn't do what was expected. He dug a channel to the rivers nearby, let them flow through the area to take away all the dung, and solved the problem.

- This technique is used nowadays for cleaning big stables

A lot of examples of how analogical thinking is applied can be studied on the internet, especially from the field of BIONICS, the transfer of systems from nature to human needs and solutions, e.g. http://www.bionicdolphin.com/tom/source/tarcodesigns.html (a water scooter using dolphins as a model) or http://www.cnn.com/2003/HEALTH/09/25/bionic.arm/ (an artificial arm which is linked to the brain creating communication between the brain and the outside object that needs to be moved).

4.4.5. Resources

Literature:

Busch, Klaus Henning: Handbuch Innovationen erfolgreich realisieren. Erfinden lernen – lernend erfinden. Berlin: trafo verlag dr. wolfgang weist Berlin 2003

General sources in English which we identified concerning the topic were very philosophical and theoretical, not orientated on the practical use in innovation processes.

Dynamic Case Creation and Expansion for Analogical Reasoning

Thomas A. Mostek, Kenneth D. Forbus, and Cara Meverden

Qualitative Reasoning Group, Northwestern University

(Useful article about how to use databases for analogical reasoning: Special databases have been set up to support searching for useful analogies). download PDF

4.5. Attribute Listing

Introduction

Imagine that the General Manager of a big company has invited you to a business meeting at the Hilton Hotel. You are waiting at the entrance looking for a big Mercedes.
Suddenly, a cyclist riding a mountain bike with a rucksack on his shoulder appears. He gets off and says: “Good afternoon, I’m Thomas Edison, General Manager of….”

Our thinking is very often limited to standard expectations and characteristics, in our case “General Manger” is attributed to expensive suit and luxury car, leather briefcase from a shop selling top brand items etc.

For innovation, we have to call into question those “normal” characteristics. Very often, we consider prerequisites for solving a problem as “given” without reflection on whether they are appropriate in the situation. If we try to skip one or more of those prerequisites, or try to give them other characteristics, we can find surprising and creative solutions!

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4.5.1. What is attribute listing and where can this method be used?

From the introduction you might have an idea of what attribute listing is. It is a **creative method to find new ideas to solve problems and to find innovative products and services**. Therefore, this **method can be very usefully combined with a brainstorming session**.

The core idea is to “forget” everything we have learnt and retained when thinking about a possible solution.

- We will have to “break up” an existing product, service or system “into its elements”.
- We have to ask: “Is this element of an object or a structure necessary for its function?”
- The elements have certain characteristics/attributes (form, material etc.) Are there any other possibilities and ways to create this element?
- What happens when we put elements with changed attributes together?

For this purpose, the elements and possible attributes are listed in a table.

We might arrive at surprising “compositions” from the table, not all will work but some of them will lead to completely new products, services and structures.

4.5.2. How to proceed?

We can describe attribute listing by the following main steps:

Firstly, we have to

- Identify components of an object or a problem we have to deal with.
- The result will be a list of elements of a product or a service or a list of elements of an organizational strategy of the company.
- All these elements (e.g. material, colour, weight, use of the product, design) can be described with certain attributes

Secondly, we have to

- Draw a table
- Use the elements found as column headings.
- Find as many variations of attributes as possible within the columns under the heading.

Tip: You can do this alone or by using a **brainstorming** (*see 4.2*) conference in your team.

Thirdly, we have to

- Mix and discover interesting variations,
- Discuss their feasibility.

Note: When regarding prerequisites and elements of a product/system it's important to ask if they are a necessity. If yes, how they might be changed:

If it is necessary to leave a message you might think of a piece of paper first. Another "mechanical" way could be a black board, a small white board for the desk, or you might choose an electronic way, an answering machine, a voice recorder….Why not apply an installation within the loudspeaker system of the computer of the person for whom you would leave the message and which automatically starts when switching on the computer? By the way, why does she/he need a switch to switch the computer on (mechanically)? Couldn't it be an optical, acoustical, chemical or biological starter…?

Oh yes, a biological starter! My fingerprint to start the computer! So many passwords always changing which is often the problem …no problem anymore with log-in or stolen passwords with my unique and never changing fingerprint, only recorded once…

4.5.3. Example of attribute listing

Example of attribute listing

Let's assume we have got the order for the street lighting in the historical centre of our hometown. What does attribute listing in this case practically mean?

So let's start with the **first step:**

- examining prerequisites (necessary elements???) and
- identifying the components first.

We might find the following elements: energy supply, the style, the material, the size, light intensity, the kind of installation...

Now, as the **second step,**

- we draw a table
- we write the elements into the table as headings
- we organize a brainstorming session or try to find as many attributes as possible ourselves

Energy supply	Style	Material	Size	Light intensity	Kind of installation
power supply from the city net	modern	ceramics	large	high	fixed to the ground
solar	medieval	wood	medium	middle	Suspended across the street
water power	Art Nouveau	metal	low	low	Suspended between buildings
wind power	…	stone	slim	changing	Attached to buildings
gas		bamboo	…	…	mobile
petrol		glass			…
organic substances		plastic			
batteries		…			
Solid fuel					
…					

As the third step,

- we mix and discover interesting variations.
- finally, we discuss their feasibility (with staff and clients).

Good luck! If you would like to get to know more about this method and see more examples, please go to “resources”.

4.5.4. Resources

Literature:

Bergmann, Gustav: Kompakt-Training Innovation. Ludwigshafen: Friedrich Kiehl Verlag GmbH, 2000 (German)

Busch, Klaus Henning: Handbuch: Innovationen erfolgreich realisieren. Erfinden lernen – lernend erfinden. Berlin: trafo verlag dr. wolfgang weist: 2003 (German)

This handbook contains many illustrative examples, giving an excellent overview of important steps and techniques as part of the innovation process.

Links:

The website offers a well-structured overview on different creative techniques, illustrated with examples. Easy to read and useful to get further information about the subject from another perspective.

- http://kaufwas.com/bk/wissen/kreativ/42.htm (German)

Interesting website, "Robert Alan Black's creativity challenges". From 1960 to the present, Alan has had 47 jobs lasting from one day to over 20 years. From these many experiences and from being creative every day for both employers and clients, he has gained a rich resource of examples to help others expand and use their own creative thinking skills and abilities. The site also contains articles and creative thinking exercises.

- http://www.cre8ng.com/CC/cc1998/9804.shtml (English)

4.6. Knowledge Management

Introduction

In the beginning of the 21st century, we enter a new era where the traditional means of competitive advantages acquisition, like capital, ground, raw materials and technology do not represent the only determinants of success for an enterprise or an organization. On the contrary, in the **Knowledge Society**, the company's future and success are determined henceforth by their ability to turn to their advantage their most precious resource: the **Organisational Knowledge**.
Knowledge is a key resource in any organisation. The more you know, the better you perform. Knowledge Management is about systematically and routinely making use of the knowledge in the organisation and applying it to key activities.

What is Knowledge Management?

The term "Knowledge Management'' very often is inexplicitly used to describe a set of management practices aimed to improve the main KM process such as knowledge acquisition, creation, transfer, dissemination and use. In real business environments, the overall aim of a KM strategy is the business value creation. Many researchers disagree with the term «**management**» insisting that in order to manage knowledge, mainly existed in people (employees) minds, firstly you have to manage people specific behavior regarding knowledge.
Therefore, the role of a Knowledge Management System is not only to focus to some complementary HRM resources supporting the above KM activities but also to create the business environment, which will facilitate and support all the KM processes.

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4.6.1. Where Knowledge Management applies?

Knowledge Management can be used by most type of firms although it has more apparent results to firms with a relatively big size as well as to technology or knowledge based or firms. Knowledge Management can solve the following problems:

- When there is a need for implementing a special know-how or a knowledge skill and nobody from the existed personnel seems to have this knowledge.
- When a past experience of someone is definitely needed to solve a current firm problem and nobody knows where this past experience exists.
- When the job-person matching doesn't work efficiently, KM system could be used for better job requirements-person skills matching.
- When a firm decides to implement personnel training policies but the training needs, which reflect specific knowledge gaps are not known or not documented.
- When the knowledge capital of the firm, although existed, is not effectively used.

4.6.2. Why K.M is that important?

The value of Knowledge Management is delivered in three areas:

Better and faster decisions; by tapping into the experience of the organisation, you can avoid pitfalls, reapply proven solutions, and make the right decision first time.

Greater empowerment; by enabling people to access and use the knowledge of their peers, you empower them to take accountability for their own performance.

Faster learning; cutting the personal and organisational learning curve in everything new that you do.

In order the reader to realise how important K.M is and how many well-known business problems are addressed with K.M, some paradoxes associated with managing Organisational Knowledge are presented below:

We train our employees	… but	we don't let them use their knowledge
We learn mostly in projects	… but	we don't pass on our expertise
We have an expert for every question	… but	few people know how to locate him/her
We document everything thoroughly	… but	we cannot easily access our knowledge store
We recruit only the brightest	… but	after three years we lose them too our competitors
We know everything about our competitors	… but	not much about ourselves
We ask everyone to share their knowledge	… but	we keep our own secrets

Two Main types of Knowledge

Knowledge in business environments exists in two main forms, the tacit knowledge and the explicit knowledge.

- **Tacit knowledge**
  mainly refers to personal experience, built after many years of work, it is mainly personal knowledge and difficult to be expressed with text, formulas and handbooks.
- **Explicit knowledge** refers to more systematic knowledge, which is usually required for and is embedded into business process, systems, etc.

4.6.3. How Knowledge Management is applied?

As the knowledge requirements vary according to the firm size, the industrial sector, level of technology and many other characteristics, there isn't a unique system or KM suitable for each firm. However, there are some basic steps and prerequisites that any firm must follow to ensure the success of any KM policy decides to follow.

Prerequisites for Knowledge Management

Consistency with the organisation culture

In deciding where to anchor your KM approach, it is important to lead with a style that is consistent with the firm's culture. Some firms are strongly technology-based and hence it is reasonable for them to build knowledge management on top of technology initiatives and plans. Apart from that it is of critical importance to get the people feel sufficiently loyal and trustful to share their knowledge with the rest of their co-workers.

Ensure top Management Commitment

The top management must actively support every action aiming to change the way an organisation or a firm operates. Management board is responsible to create the appropriate culture where knowledge sharing is encouraged and the participation of each employee to the firm cognitive capital is also recognized.

KM alignment with the firm strategic aims

KM is not an end in itself. Only the systematic alignment of the firm business strategy with the KM aims can ensure the achievement of the firm strategic aims. For example, if the firm under consideration is a customer oriented firm, then all the knowledge and information relative to customers must be the start point for the content of the Knowledge Management System.

Use of appropriate technology

It is obvious that the role of new information and communication technologies plays a catalytic role in KM especially in process such as knowledge dissemination, sharing. This is because a major part of knowledge exists in the form of texts and electronic documents. New systems such as intranets, documents management systems, collaboration systems and databases constitute a vital factor, which facilitates KM.

4.6.4. Strategic steps to Implement K.M.

Step 1: Definition of the business strategic aims

As referred to earlier, Knowledge Management in order to have the maximum results for the firm must be in alignment with the most important strategic aims. The strategic aims of a firm are stated in the business plan or in case this is not feasible a SWOT analysis must be done in order these priorities to be defined. This is of outmost importance because in most cases the results of KM are not obvious in terms of cost or other quantitative characteristics and in order to ensure top management commitment, KM team must show the first results as fast as possible.

Step 2: Identify your knowledge gaps, the future knowledge requirements and the special knowledge characteristics of the firm: Auditing organisation's Knowledge.

Well-defined and analszed strategic aims provide a good framework for analysing the current knowledge gaps and the future knowledge needs of the firm. Knowledge gaps might arise from missing people (special know-how or experts) or missing technology or a combination of the two. Knowledge gaps must be filled in with several policies such us internal training, staffing with new personnel, know-how acquisition, new knowledge generation, etc.

Possible knowledge gaps could be recognised by past reported problems and by talking with the firm operational managers and all the personnel. This process is also possible

to recognise knowledge redundancy in some departments as well.

A well-described tool in the literature for implementing a K.M audit is the **Knowledge Management Audit tool.** The audit tool (extensive questionnaire and methodology) aims to provide the user with a detailed methodology of how to identify all the areas (recognition procedure), which should be investigated more and should be improved in order that all the barriers and organisation-specific characteristics dealing with Knowledge Management should be pointed out and removed.

Some of the key questions will be addressed in the knowledge audit:

- Do we know the wealth of knowledge that exists in the company both existing and potential?
- Do we know how knowledge flows through the company?
- Do we have knowledge maps? If not why not? If yes are they used effectively?
- Who to you go to when there is a problem?
- How do we manage the threat of the loss of key people and their know-how?
- Do people get the knowledge they need when they need?
- How do people get the information and knowledge they need?
- With whom do people collaborate and share information & knowledge?
- What are the barriers to knowledge sharing?
- Do we reward people for sharing knowledge? If yes, are the rewards appropriate?
- Do we know what we should know but don't in fact know?
- Do people feel empowered? Do people feel that their knowledge is valuated?
- ….and much more….

Step 3: Implement a culture change policy

In today's very competitive work environment many employees don't feel safe in their work position and usually ''hide'' knowledge, which, could use to improve their efficiency or are afraid to lose their

personal knowledge advantage in case they share knowledge with others. This is probably the major barrier for every knowledge management activity. People must feel free to exchange their ideas, make mistakes or ask other employees if they don't know something. People at work also shouldn't be afraid to have small conversations at work (water cooler discussions), read a book even while working to gain new business knowledge, etc. All these soft but very critical every day activities help a firm to build a KM culture.

Step 4: Implement a knowledge-mapping tool

Knowledge mapping is a process aiming to virtually associate knowledge description with the people who have or might have it. In most cases it is difficult to map the knowledge itself and it is easier and logical to create links between a brief knowledge description and knowledge owners.

However, knowledge in an organisation exists in many types and in different thematic areas (management, production, marketing, sales, technical, etc). Therefore, knowledge in order to be described and to be well understood from everyone must be transformed in a common and easy language (code) and the relative process is called **knowledge codification**. There are many types of codification and the most correct refers to the special firm's knowledge characteristics. For example, a simple codification for knowledge could be as follows: Tacit, explicit, teachable, non-teachable, documented, undocumented simple, composite, operational, non-operational, theoretical, practical, etc. A knowledge map does not necessarily reflect a firm's knowledge as presented in the organisational chart. Specific knowledge might exist in every employee due to his/her past experience, first degree, etc.

4.6.5. Case Study

Golden West Foods

Improved site management methods help meet growing demand

Brief

Golden West Foods operates the UK warehousing and delivery system for one of the largest chains of fast food restaurants in the world. Golden West is part of the RHM food manufacturing and distribution business. The popularity of the restaurants and their aggressive programme of expansion create intense pressure for Golden West. They must be able to fulfill orders accurately, on time and to extremely high standards of quality and food safety. This is particularly crucial for temperature-critical goods, which Golden West both stores and distributes. Within their Distribution Centres time scales are short, volumes are high and growing, pressure is intense and much of the work is routine and repetitive. In this environment, best practice working procedures are **business-critical-information**. They must be **clearly defined** and **accurately communicated** to employees.

Solution

To help the company maintain and improve the quality of their working methods, Information Transfer and Mitchell Management Training worked closely with Golden West Foods. I.T and MMT researched site management methods and transport services to identify best practice, which all staff should use. The 2 consulting companies then developed a comprehensive set of Work Instructions to communicate this information to groups of warehousemen, drivers and office staff.

The drivers' work instructions, for example, covered starting a run, delivery to the store, collecting goods from warehouses, changing trailers and ending a run. **Clear step-by-step procedures** included health and safety information, instructions on what to look out for, and actions to take when things go wrong. To help build staff knowledge, work instructions were accompanied by Training Modules and Assessments, used by the trainers to train staff and validate the training. These provided

trainers with the skills to train their colleagues, and the confidence to use the materials both to deliver standardised training and assess performance.

Results

The initiative was very effective, and highlighted some key issues within supply chain management. The experience of working with the groups of trainers in Golden West demonstrates how **relatively easy** it is for organisations to improve their effectiveness by harnessing the knowledge held by a work-force that is often doing **very routine work**.

4.6.6. Obstacles to develop Knowledge Management (The cultural challenge)

Obstacles to develop Knowledge Management (The cultural challenge)

Western culture does not treat knowledge sharing as a default activity. Since our school days, we are brought up with the assumption that we need to solve everything ourselves that re-using others' solutions is "cheating", and that asking for help is an admission of failure. There are many factors most of them cultural that inhibit knowledge transfer. Most of these factors slow or prevent transfer and are likely to erode some of the knowledge as it tries to move through the organization. The following are the most common factors and ways of overcoming them.

What are the main cultural barriers to Knowledge Management? How can they be addressed?

Obstacle	Possible Solution
Lack of trust	Build relationships and trust through face to face meetings
Different cultures, vocabularies, frames of reference	Create common ground through education, discussion, publications, teaming, job rotation
Lack of time and meeting places, narrow idea of productive work	Establish times and places fro knowledge transfers: talk rooms, conference reports
Status and rewards go to knowledge owners	Evaluate performance and provide incentives based on sharing
Lack of absorptive capacity in recipients	Educate employees for flexibility, provide time for learning, hire for openness to ideas
Belief that knowledge is prerogative of particular groups, not invented here syndrome	Encourage nonhierarchical approach to knowledge, quality of ideas more important than status of source
Building empires	Focus on building communities which cut across organisational divisions

Individual work bias	Promote and reward work in teams and communities, and show how this gives better results
No time to share	Capturing and sharing knowledge needs to be seen as part of the job, not an add-on
Not invented here	Redefine "here", so "here" could mean "this community" or "this organisation", not just "this team''.
Knowledge is power	Help people realise that sharing knowledge increases collective power, and that accessing the knowledge of others makes you more effective
Intolerance for mistakes or need for help	Accept and reward creative errors and collaboration, no loss of status from not knowing everything

4.6.7. Technology

You don't necessarily need new technology to start sharing your knowledge. You can begin knowledge sharing using meetings, conversations, paper and pen, filing cabinets etc. But if you want to exchange knowledge at a distance, and with other offices and other organisations, then technology will be very useful.

What technologies can help you manage your knowledge?

Email: Email is the simplest and one of the most effective technologies for sharing knowledge at a distance. Threaded discussions on in-house email systems or on the Internet are a great way for a community of practice to raise questions and exchange solutions.

Intranet: An Intranet can act as a universally accessible corporate filing system for the knowledge of the organisation. However it needs to be seen as a filing and sharing tool, not as a set of glossy pages designed to impress. Structure the Intranet around the key activities of the organisation, and make sure that publishing material is easy and quick.

Communication tools: There are many electronic communication tools, which can help build networks within your organisation. For example the chat room software "msn messenger" (free from Microsoft) can be very powerful in allowing people in remote sites to have online conversations.

Collaboration tools: Video-conferencing systems are a very powerful way of bringing remote sites together, but are expensive. Microsoft Net meeting - another free software application - is a simpler alternative.

Video: One of the best ways to transfer knowledge is through the use of stories. This is even more powerful if the people with the knowledge are allowed to tell the stories in their own words. A picture tells a thousand words, and a moving picture tells them movingly, so consider the use of video to capture and transfer knowledge.

Simple technology: Sometimes the simplest technologies are the best. Conference telephone calls are a great way for a community to stay in touch. Newsletters can be a good way to disseminate learnings, knowledge can be exchanged face-to-face in meetings and conferences.

4.6.8. Resources

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4. G. Mentzas, **«The Future of Organisations and Knowledge Management?»,** European Commission, Information Society Technologies Program, Consultations Meeting, **23-24 May 2000.**
5. J. Swan, S. Newell and M. Robertson, **«Knowledge Management: When will People Management Enter the Debate?», 2000**
6. Nick Milton of Knowledge Transformation® International. Nick runs occasional Knowledge Management workshops for BOND. For more information, visit http://www.ktransform.com/.

Internet Sites

- http://www.knowledgeboard.com/
  KnowledgeBoard, which is one of the leading European web site in K.M area, is an online community to create a global exchange of Knowledge Management expertise and interest.
- http://km.gwu.edu/km/index.cfm
  This web site represents the attempt of George Washington University to share their knowledge in the KM area. The University offers a Master's and Doctoral program, as well as a KM Graduate Certificate program.
- http://www.knowledgemedia.org/
  www.knowledgemedia.org is the scientific platform for research in the field of Knowledge Communication, offering you access to the most current scientific content in the Knowledge Management domain.
- http://www.cio.com/research/knowledge/
  CIO and CIO.com are published by CXO Media Inc. to meet the needs of CIOs (Chief Information Officers) and other information executives. Free newsletters are offered.
- http://www.kmpro.org/
  This portal provides member access to the **KMPro Knowledge Center (KC)**, where members have full access to content as well as a ***new and improved*** forum to communicate with members and other KM enthusiasts.
- http://www.kmnews.com/
  Knowledge Management News™ is a free information repository and occasional newsletter focused on Knowledge, Content, Information, and Identity Management.
- http://www.km-forum.org/
  The Knowledge Management Forum is a virtual community of practice focused on furthering the fundamental theories, methods, and practices supporting the Knowledge Professions.

4.7. Systemic Management of internal innovative proposals

Introduction

Always people working in a firm will have ideas, they will try to improve something, but they have to do that in an environment where rules have to be followed. Has any worker on the assembly line the authority to make changes that he thinks will improve *its efficiency*? Of course not. So are we going to throw away the idea? Again, of course not. Regardless of size, any firm that wants to have good results has to think of a systematic management of internal proposals: how to stimulate them, how to put them into practice, how to reward the initiators etc. Maybe that under the pressure of the daily work and stress, some firms will neglect this aspect. This is a mistake. A mistake will also be to expect early benefits of managing the ideas and suggestions for improvement. It could take many months, but if properly set up, the system will bring its benefits and these should have impact.
The module tries to help companies to organize such a systematic management of internal innovative proposals, by offering ideas and examples.

What is Systemic Management of internal innovative proposals?
Systemic Management of internal innovative proposals refers to a framework for promoting, conducting, using and stimulating any innovative proposal from within the organization. This requires a proper structure within the company.
Large or small firms have to understand that it is worthwhile the effort of implementing a proper structure for a systematic management of the internal innovative proposals. If they do so, it will gain two major advantages that will be reflected in their success:

- They will not waste the innovative potential of their employees (practically the most valuable asset of a company).
- They will create among employees the sentiment of participation, the sentiment that their ideas are taken into account. This will result in a strong bond between the company and the employees, which is in itself beneficial.

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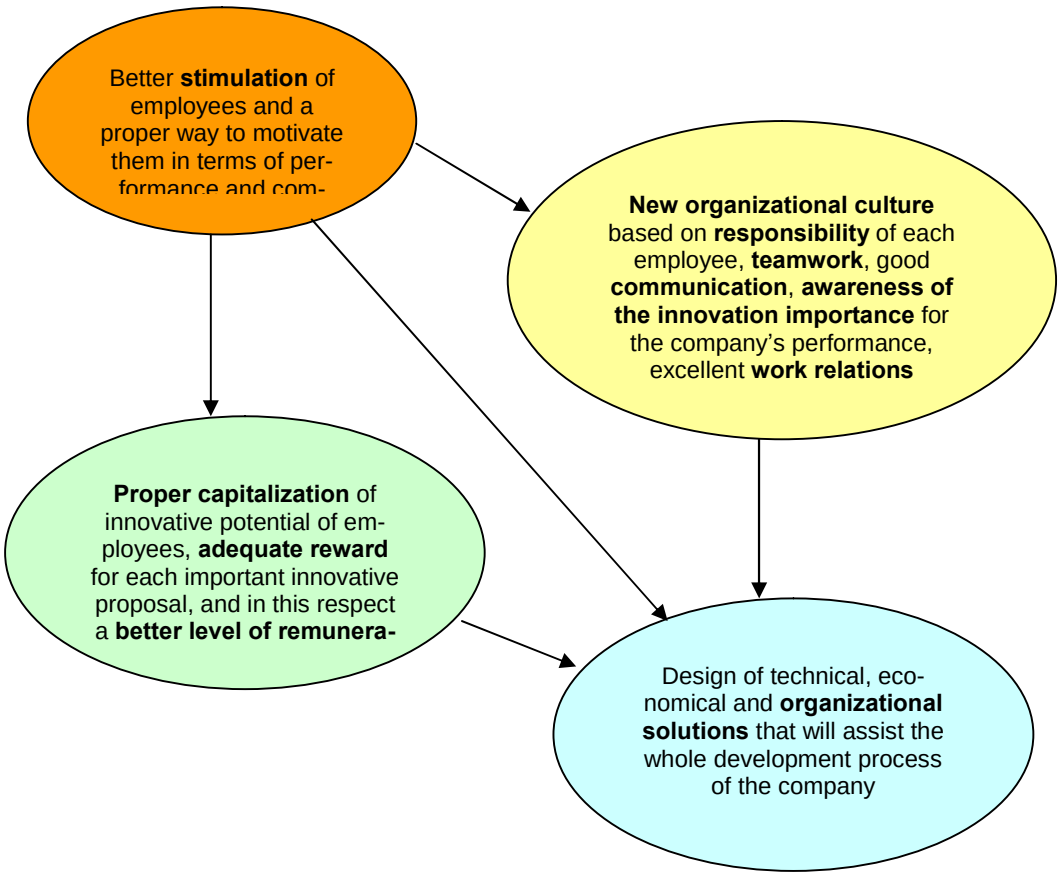
4.7.1. Why and where is it used?

Why and where Systemic Management of internal innovative proposals is typically used?

Companies have to be innovative to survive on the market. The globalization will "kill" companies that do not understand the importance of being innovative. The most important competitive advantages obtained by using a systemic management of internal innovative proposals are presented below:



On the other hand, it is necessary to identify **where** it is to be recommended to implement a procedure consisting in a Systemic Management of internal innovative proposals. Firms have to consider three fields that represent three important organisational functions:

- management of research and development;
- human resource management;
- production and operations management.

Also, a methodology for Systemic Management of internal innovative proposals is required in any organisation in order to use every innovative proposal in improving performance for the firms and create certain competitive advantages in comparison with the main competitors.

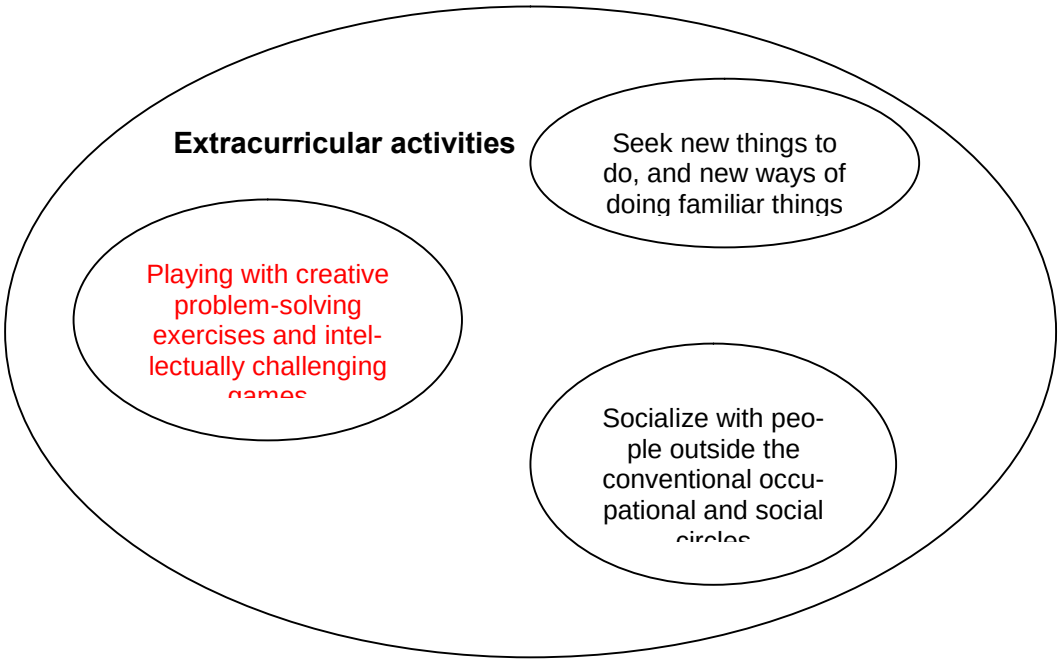
To exploit each element, the management have to design a standard procedure that makes possible to planning, organize and control the entire internal innovation process.

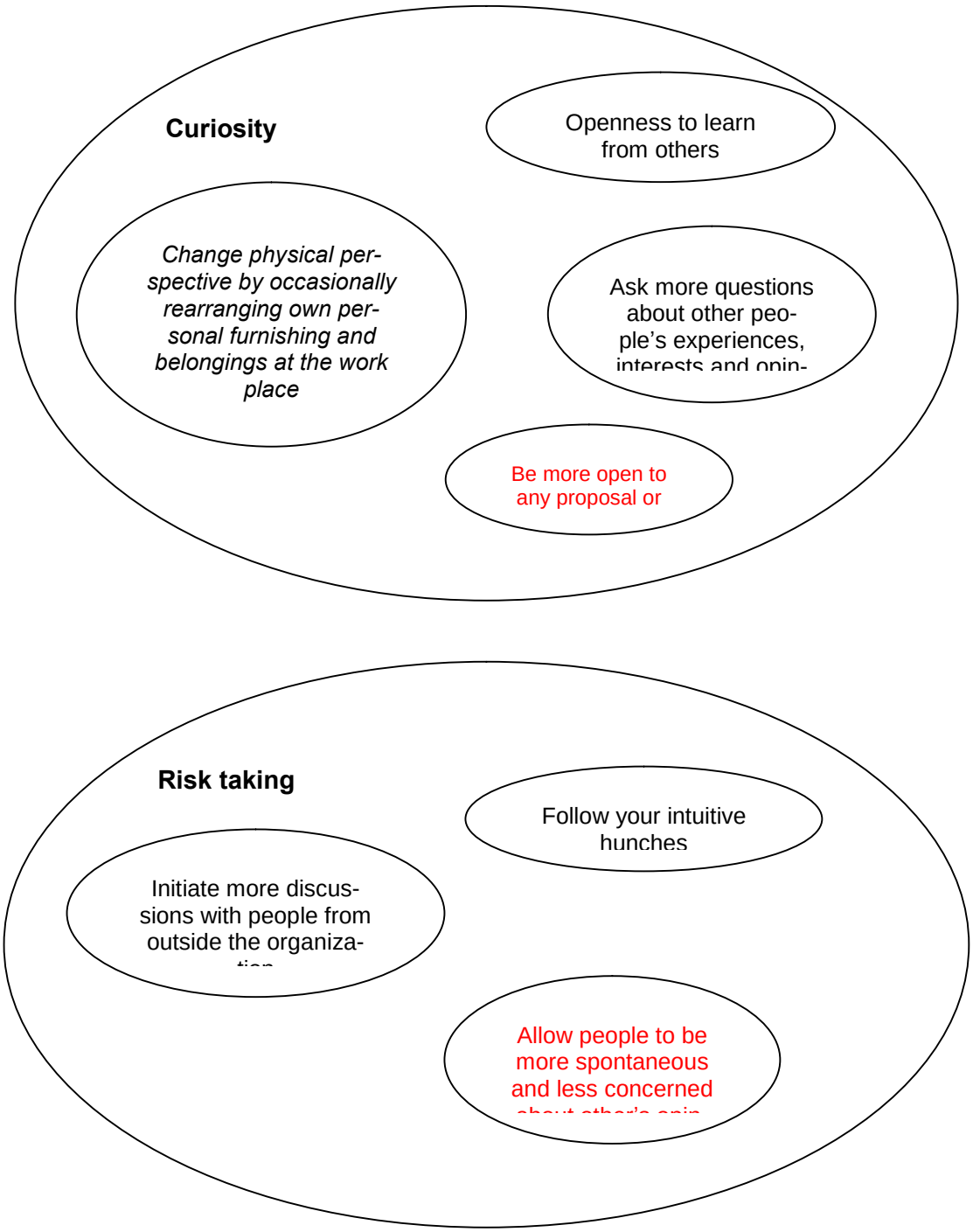
4.7.2. How to stimulate innovative proposals within companies

The process has two phases (components):

- Nurturing an environment that encourage the creativity of employees (blue sky thinking that use toys to stimulate creativity are to be considered - see links)
- Setting up organizational structures / mechanisms that support, reward, assess and implement innovation.

The first component has to focus on developing and supporting the key characteristics of creative thinkers. This can be achieved through:





The second component is more complicated because it implies a real commitment from the management. Basically it consists of devising organisational structures, using tools that will make the most of the creative potential of the employees. Details on that subject will be given later in the module.

4.7.3. Factors that influence innovation and Methodology of Systemic Management

Factors that influence innovation

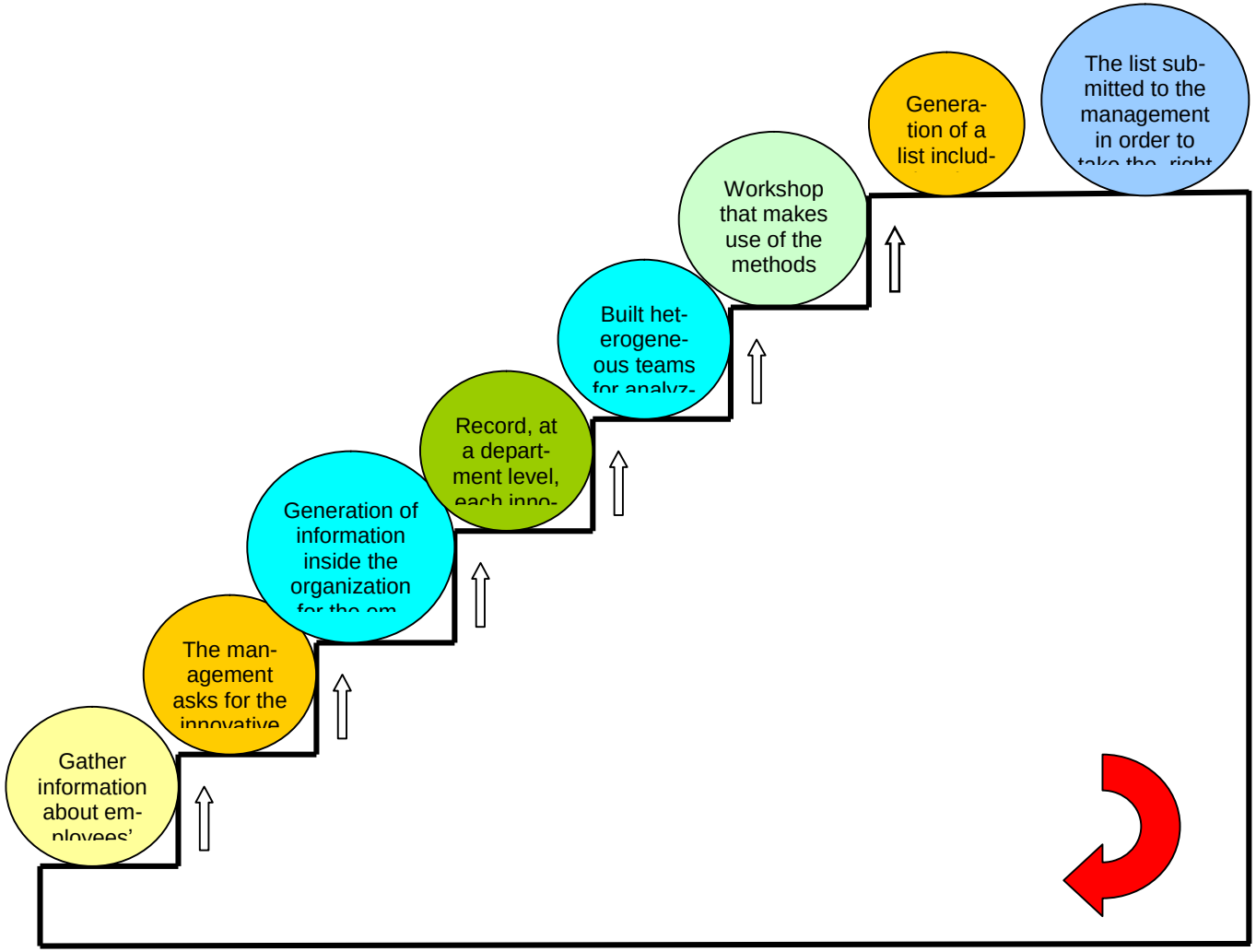
A study carried out by Euroconsult monitored a group of 400 managers, lead to the following results (the figures represent the number of persons that consider that factor as the most important):

Factors that support innovation

- Autonomy, freedom of action, responsibility (52)
- Involvement and motivation of personnel (48)
- Financial support (48)
- Explicit support by the management (36)
- Small team building, project oriented (27)
- A good mixture of competencies (27)
- A good management of the innovation process) (27)
- Good relations with clients (21)

Methodology of Systemic Management of internal innovative proposals

The methodology proposed is a step-by-step approach. Basically it implies a gradual process that aims at stimulate innovation and make sure that the results will be used properly in the firm, and will produce the expected results.


Gather information about em-
The man-agement asks for the
Generation of information inside the organization
Record, at a depart-ment level,
Built het-erogene-ous teams
Workshop that makes use of the methods
Genera-tion of a list includ-
The list sub-mitted to the management in order to

4.7.4. Tools to stimulate creative thinking and help innovative proposals

Brainstorming (see also component 4.2)
The classic creative thinking tool is brainstorming. Its key concept is the enforced separation of the generation of ideas from their subsequent evaluation. It can be used by either an individual or a group, but is usually used as a group process.

A very good example is the case of the Sony Corporation, that used the Brainstorming method in order to reconsider changes for the Walkman. A lot of questions were generated: “Smaller? Condensed? Miniature? Lower? Shorter? Lighter? Omit? Streamline? Split up? Understate?" These provocative questions led to Sony’s redesign of the classic tape recorder into a smaller — but groundbreaking — new product: the miniaturized, recordless, speakerless "Walkman".

Analogical Reasoning (see also component 4.4)
The most common creative process is analogical reasoning--the transfer of an idea from one context to a new one. Perhaps 80 percent of creative ideas are rooted in analogical reasoning, and examples abound in every field of human creativity.

We also see analogical reasoning in the mechanical realm. The irreplaceable fastener Velcro was inspired by the obnoxious cocklebur. Gutenberg's printing press was a combination of the stamper used for minting coins and a wine press.

Finally, virtually every architect and designer keeps stacks of books and magazines filled with ideas waiting to be adopted.

But you need not sit back and wait for analogous connections to appear by themselves. Analogical reasoning can be a conscious technique if you deliberately ask questions like these:

- "What else is like this?"
- "What have others done?"
- "Where can I find an idea?"
- "What ideas can I modify to fit my problem?"

Attribute Listing (see also component 4.5)
Attribute listing is a specific idea-finding technique (one that could even be used while brainstorming). You identify the key characteristics, or attributes, of the product or process in question. Then you think up ways to change, modify, or improve each attribute (in design engineering this is called the substitution method).

Almost anyone can "disassemble" a product into its attributes and then think of modifications for most of them. For example, a can of soda has these attributes: size, shape, color, color pattern, decorative theme, material, possible uses after modification, other audiences for the product if modified. Can you invent alterations for each of these attributes? Fran Stryker supplied himself with plots for Lone Ranger radio and television episodes for a couple of decades by modifying these characteristics: characters, goals, obstacles, and outcomes.

Morphological Synthesis (http://www.cc.gatech.edu/faculty/ashwin/papers/git-cc-94-01.pdf)
Morphological synthesis is a simple elaboration of attribute listing. After completing the list of attributes, list changes in one attribute (such as “products”) along the horizontal axis, and list changes in a second attribute (such as “markets”) along the vertical axis. Idea combinations, or syntheses, will appear in the intersections, or cells, of the table. Morphological synthesis will force you to look at many surprising combinations.

Idea Checklists (See ref: "Making hard decisions : an introduction to decision analysis", Robert T.

Clemen. Belmont, Calif. : Duxbury Press , c1996. Edition 2nd ed)

Have you ever consulted a telephone directory or a supplier's catalog as a "checklist" of resources or ideas for solving problems? You may not know that checklists have been written expressly to solve problems creatively. The best known is Osborn's "73 Idea Spurring Questions." Consider how you would invent a better mousetrap as you read these examples from his idea checklist:

- *Put to other uses*? New ways to use as is? Other uses if modified?
- *Modify*? New twist? Change meaning, color, motion, sound, form? Other changes?
- *Magnify*? What to add? Greater frequency? Longer? Extra value? Duplicate? Multiply? Exaggerate?
- *Minify*? What to subtract? Condensed? Miniature? Lighter? Split up? Understate?
- *Rearrange*? Interchange components? Other sequence? Change schedule?
- *Combine*? How about a blend, an assortment? Combine units? Combine purposes? Combine appeals?

Quality circles http://www.freequality.org

Quality circles were initially a method to improve quality, but they proved very useful also in stimulating innovation in firms. The first quality circles appeared in the 60s in Japan.

A quality circle is a group of persons that work in the same workshop or office, that meet once or twice a week in order to examine how to improve the quality of the products they deliver, the procedures they use, the environment they work in. Basically, the success of the quality circles is based on the feeling the employees get, that they are taken into account, that their opinion counts. When implementing quality circles, it is better to start with two-three pilot circles, that will be encouraged to function for at least one year.

Suggestion boxes http://www.its.qut.edu.au/cip/qmf/section1/1_2_4/

The method implies the creation of a number of boxes where the employees deposited ideas, suggestions, and innovative ideas. In order to assure the success, a number of issues have to be considered:

- All suggestions, propositions, ideas, have to receive an answer, preferably in a face-to-face meeting. Good ideas will be encouraged, while people with bad ideas will be encouraged to continue.
- The author(s) of ideas that have been implemented has/have to be rewarded.
- The method to not produce results immediately, one has to wait a couple of months, maybe a year.

Innovation engines http://www.accenture.com

Workshops may be a kind of innovation engine in a company. They are important because they help prevent a firm from running out of the initial enthusiasm and voluntary activity.

Well-functioning innovation engines have the following qualities:

- They are regular events
- Well-known fast channels,
- Market-like environments.

Good engines also allow broad enough perspectives to enter the innovation activity. Cross-functionality and/or cross-business-unit (or cross-geography) quality are critical.

Innovation routines http://www.melbourneinstitute.com/wp/wp2003n05.pdf

Innovation is first and foremost a behavioral issue. Hence, innovation routines seek to emphasize the kinds of changes in behavior, attitudes and daily routines that need to be accomplished in order for innovation to become a true capability and not just a slogan. These routines involve new voices and perspectives to be included in the search for innovation. For instance, Theragenics, a medical treatment company in the U.S., involves people from the plant floor in its innovation processes. Cemex, a Mexican cement company, regularly uses all its employees and its customers for ideas. These firms understand that corporations cannot have “out-of-the-box” thinking if the same people are always involved in the discussions. New ideas and fresh thinking are necessary. Other innovation routines may include mentoring of innovators by senior management, seeking advice and resources outside established channels, celebration of successes and learning from failures.

Checks and balances
Finally, checks and balances need to be in place. This is particularly critical in innovation environments that allow people to move forward with their ideas without too much management interference early on.

Such checks and balances certainly include metrics that accelerate or eliminate ideas, experiments and ventures from the innovation pipeline. They involve techniques to assess the value of a pipeline in terms of its growth potential for the company as a whole. And they involve ways to ensure transparency — management and employees may see, at a glance, for instance, what kind of innovations are under development in the pipeline. An important issue, as well, is the manifest passion and commitment to innovations in the pipeline. Finally, innovation incentives need to be carefully balanced. Out-of-proportion individual rewards may create a cut-throat environment for competition that over time is detrimental for cultivating the team spirit necessary to drive complex innovations in alignment with business unit goals. However, potential entrepreneurs may end up leaving the company if the incentive structures don’t recognize the extra efforts and personal risks taken to drive innovation in the organization.

4.7.5. Guidelines for installing a corporate innovation system

1. Always create the motivation first. Then build the basic necessities. Motivation may be about having the right to work on the ideas that one feels passionate about. Or it may be about establishing enough credibility for the corporate commitment to innovation so that it is worth bothering with. In addition, make the rules of the game explicit. Do I have a right to work on my idea for one month exclusively if I submit it to the pipeline? Do I have the right to join an innovation team part-time? What kinds of risks (implicit, career-wise) am I taking if I dedicate my time to innovation?

2. Ensure management commitment - ***concretely, consistently and explicitly.*** Avoid situations where there is a lot of talk but no action. That is a sure way to erode the credibility of the entire effort for years to come.

Open up the strategy dialogue about innovation so that general managers talk to each other, to their organizations, and to top management. Then create a platform that has commitments such as:

- I will invest 5% of my budget in the innovation pipeline.
- I will dedicate 10% of my time to mentoring innovators in my business.
- I will evaluate the success of innovative efforts according to the following targets: 50 ideas in the next 6 months, 5 experimental business concepts in 12 months, 2 ventures ready for commercial launch within 24 months, 10% of innovation projects in the pipeline receiving support from my organization in the form of labor, seed capital or use of other assets.

Also, ensure that you obtain the cooperation of middle managers.

3. Start the innovation engines. Innovation is hard work. Most managers make the mistake of assuming it will just happen. There may be a few ideas floating out there that are going to be easy to

harvest, but beyond such easy catch it is going to take time, energy and dedication. Create your innovation engines that will drive the effort over time. For example, at Kraft Foods, a small dedicated staff skilled in networking with the business divisions is driving innovation. R&D labs often function as an engine, but the challenge is to build the capability for turning technologies or scientific discoveries into business concepts.

4. Cultivate innovation routines, and name your innovation ambassadors. Study what makes innovation tick in the organization; catalogue what has worked and what hasn't. Identify people who can mentor others in these routines. Name your innovation ambassadors and let them spread the best practices. For example, computer-services company EDS has instituted a fellows program to recognize innovative individuals who can serve as mentors for aspiring innovators in the company. Appointment to fellow does not change an employee's work function or business unit. But, in exchange for the honour, fellows assume an ambassadorial role in the company. As ambassadors, they typically spend a fair amount of time presenting their ideas to clients, speaking at professional conferences, or representing EDS at industry consortia.

5. Put the checks and balances in place. Assess their effectiveness and purposefulness regularly. It is difficult to get the criteria, metrics and innovation incentives right the first time. Adjust them periodically based on your accumulating experience. Focus on quantity first to develop an innovation habit. Then slowly move to quality to make the most efficient use of resources. Over time, link the use of the best-practice innovation routines to the evaluation. And, finally, reward your executives as entrepreneurs - not simply as stewards of the corporate legacy.

4.7.6. Case studies

Case study 1

A firm's (working in house appliances) experience in organizing quality circles can be summarized as follows:

A first quality circle has been created in the assembly workshop. The circle comprised of 12 workers, under the supervision of a foreman. They met one hour every week. After one year, they achieved the following results:

- 25 improvements at the working places (posts)
- 17 product modifications
- 5 proposals for improving the safety
- 10 simplifications of administrative forms used in the workshop
- Improvement of a machine tool. The costs were approximately 100 euros, and the benefits of about 70000 euros.

The quality circle functioning was the following:

Propositions were made during the meetings, they were then discussed and taken to the engineers. At the beginning the proposals were not seriously considered. Then they imagined a form with three columns (like below). In 15 days the management has to return the form with the third column filled in. The form had been displayed in the workshop.

Problem	Solution	Measures to be taken for applying the solution
…..	…..	

In order to obtain better results, the members of the circle also followed courses on: team working, use of board platforms, methods to improve innovation (brainstorming, Ishikawa diagrams, Pareto diagrams, mind-mapping, statistical analysis etc).

In order to assure the success of quality circles, some ideas have to be considered:

- they have to be supported by the management
- they have to be supported by people with academic degrees
- they have to be accompanied by campaigns of dissemination and increased visibility
- they have to be helped by a support team (eventually outside bodies that can inform, train, organize)

Case study 2

Starting with March 2003, in the Romanian Bank for Development - RBD - (member of Groupe Société Générale), a program called “innovation” started. The aim of the initiative was to maintain a permanent flow of ideas and communication between the person/team that had the idea and an Innovation Committee in the RBD Central Headquarters. More, annually prizes are granted for the best and most innovative ideas.

The program functioning:

The program will evolve in stages:

- Initiation: all the departments and groups will designate a correspondent responsible with innovation (Innovation Correspondent – IC).
- Transmission: all the ideas/innovations will be centralized using an common e-mail address. The person responsible for the sending the idea is the IC. Here a person/group will centralize the ideas and a first selection will take place. Ideas can also be sent through regular mail.
- Selection: Ideas that passed the initial selection are further analyzed and one verifies if they respond to a read need/problem, if they are feasible. All the people that sent ideas will receive confirmation of receipt of the idea(s)/innovation(s).
- Assessment: Ideas will be scored (marked) in accordance with a predefined grid.

A central Innovation Committee will be created at a central level. This committee will meet every two months and its main role will be to evaluate the ideas/innovations. Also the committee will analyze the feasibility of the idea(s) and will approve the process of putting it into practice.

The first three ideas will receive important prizes: the first prize: a trip to Paris (3000 Euros), second prize 1600 Euros and the third prize 1000 Euros.

One has to mention that every employee has the right to participate to the program. The above case study involves a large organization, but a simplified version can be envisaged also for a SMS.

4.7.7. Resources

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Links

- Using toys to stimulate creativity
  http://www.thunderboltthinking.com/performance_improvement.htm
- Creating an Environment for Innovation
  http://www.strategyletter.com/CD0902/featured_article.html
- Risk and challenges in thinking about innovation
  http://www.innovation.cc/peer-reviewed/glor-ethics.pdf
- Managing Innovation in Organizations - A Framework for Creativity and Collaboration
  http://www.refresher.com/!pginnovation.html
- Repetition Leads To Innovation
  http://gbr.pepperdine.edu/011/recursive.html
- Techniques for creativity thinking
  http://www.winstonbrill.com
- The Art of Work
  http://www.accenture.com
- Innovation and SME Programme
  http://www.cordis.lu/innovation-smes/home.html
- Case studies
  http://www.nap.edu/books/030903891X/html/index.html
- Innovation at Work
  http://www.ideachampions.com/innovation_at_work.shtml
- Creative Thinking: Theory, Techniques, and Assessment
  http://www.indiana.edu/~bobweb/Handout/create.doc
- Morphological Synthesis
  http://www.cc.gatech.edu/faculty/ashwin/papers/git-cc-94-01.pdf
- Innovation routines
  http://www.melbourneinstitute.com/wp/wp2003n05.pdf
- Quality circles
  http://www.freequality.org
- Suggestion boxes
  http://www.its.qut.edu.au/cip/qmf/section1/1_2_4/
- Innovation engines
  http://www.accenture.com

5. Evaluation of innovative solutions

Introduction
In the context of Innovative Solutions, evaluation refers to a systematic examination in order to determine efficiency, impact or relevance. The evaluation can occur at various stages. Merely an idea or concept could be evaluated in order to decide whether it is worth implementing or further developing. A prototype could be evaluated in order to determine whether a product is being developed according to specification and will be fit for purpose.
Evaluation doesn't necessarily have to be of an idea, prototype or finished product. The actual development process could be evaluated, or the project management. In fact, any aspect of a project could be evaluated.
It is through evaluation that the overall progress, success and value of an endeavour is measured and it is by this method that potential for enhancement can be identified and measures for future improvements can be established.
Evaluation should be part of any Innovation related project. By definition, projects related to Innovation will have an element of originality, newness or improvement, which means that evaluation is especially important.
There are a number of ways in which evaluation can be included in the development of a project. Evaluation could take place at the end of the project, which has the disadvantage that possibly large parts of the project may have to be repeated to rectify unacceptable mistakes and also, the lessons learned may not actually feed back into the project but only benefit future projects. Evaluation could take place at important milestones of the project or there could be a continuous evaluation process present.
Often, the opportunity for taking a good idea and developing it further may be lost, or the most innovative elements may be excised, by a lack of efficient evaluation. Thus, at the idea stage, evaluation should fulfil the purpose of providing a method which will allow the acceptance/rejection of potential projects based on the assessment of the potential gain in balance with the risks involved. The evaluation at this stage should also be used to allocate the resources and determine the scope of the project. At later stages, the evaluation should provide feedback on progress or trigger the introduction of new approaches.
The various aspects of Evaluation that we will focus on are:

- The Decision Making Process
- The Point Rating System
- The Benchmarking Process

For further information on the different existing methods of evaluation, please refer to the "Links and Resources" section.

5.1. Decision Making Process

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5.1.0. Decision Making Process

Introduction
Making decisions is something that we are all faced with. We need to make decisions in our professional life, in our social life, in our normal daily actions. Whenever there is a choice and we are confronted with two or more alternatives, we need to make a decision.

Some decisions are fairly easy to make, such as whether I want an egg for breakfast or whether I should take my umbrella on leaving the house. But many others are harder and in fact, there are times when we feel that it is not within our power to make a decision.

What
Decision making can be perceived as a process and it is an important process involved in evaluation. We said in our Introduction that evaluation is a systematic examination in order to determine efficiency, impact or relevance. But knowing how to make use of the information gathered during evaluation is essential. To what extent will this information influence the future actions to be taken? Well, the decision making process can be applied to establish this in a systematic and structured manner.

"A good decision is never an accident"

Where
The Decision Making Process is a method which can be applied in any situation where a decision has to be made that bears importance to your organisation or project. For example, when your organisation is faced with a problem and has to decide on a solution or when your organisation is considering introducing a new service or developing a new product.

Why
The Decision Making Process will allow you to use a structured approach to making a decision and although it doesn't guarantee that the decision you make will be the best one, it sure increases your chances. This is due to the fact that it forces you to gather facts and evaluate these and not make a rushed or unsupported decision.

How
There are a number of steps which should be taken in the decision making process:

- Define the problem or goal
- Gather the required information
- Evaluate
- Make a choice
- Re-evaluate

The first step is to define the problem that you are trying to resolve or the goal that you are trying to achieve. By getting a clear definition of the nature of the problem or goal you will be able to make a more focused decision and be able to verify whether the decision taken actually solves the problem at hand or achieves the set goal.

As you have a well-established problem it is now possible for you to determine what information will be required or what information is in any way relevant to solve the problem or achieve the goal. It is also necessary to confirm what information is in fact available and then collect the information.

Once the information has been gathered, it is time to evaluate this information which is done by attributing weights to the extracted information. This is necessary since in order to evaluate, we need to

assign values to the gathered information so that direct comparisons can be made. This will be explained in more detail in the following section.

The evaluation phase also embraces the establishment of the set of possible decisions to be taken.

Next comes the moment of truth where a choice has to be made from the available decisions. In order to do so, the evaluation of all the relevant information has to be combined and weighed out.

In order to make the decision two things should be undertaken:

1. Predict the outcome of the decision
2. Verify whether the outcome fits the set goal or problem solution

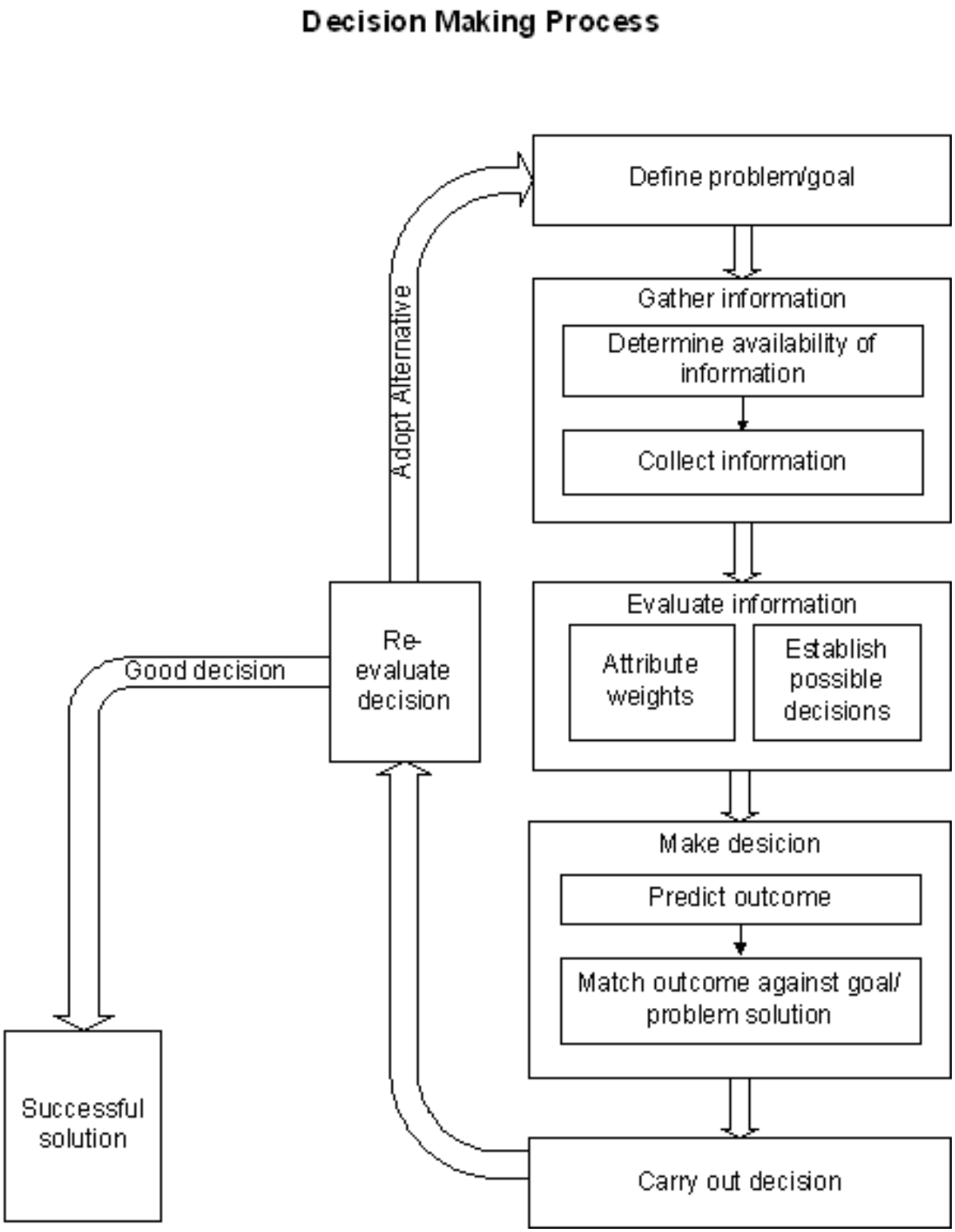
The last step is to re-evaluate the decision after it has been carried out, which will determine whether the decision was well-taken or not and what alternative should have been adopted if it did not achieve the desired aims.

There are a number of aspects that one should be aware of when faced with making a decision:

- Don’t be overconfident – unless inevitable, avoid guessing or just estimate without evaluating the existing information
- Each decision is unique – if a particular decision has proven itself good in the past, this doesn’t mean that it still applies now
- Beware of personal mood – the emotional or spiritual state at the time the decision is made could have an impact on the decision, which could later be regretted
- Important decisions shouldn’t be rushed – take the necessary time to properly evaluate the information and make a decision

Making decisions is often a repetitive process, where similar decisions will be taken again. It is important to use the information constructively by identifying strong and weak points in the decision making process and improving the process.

5.1.1. The Process visualized



5.1.2. Example of a Decision Making Process

Below is an example of a company which was operating a bookshop and was considering investing in a webpage, in order to promote its business. It applied the Decision Making Process in order to decide whether to go ahead with this idea or drop it.

Magic Books is a company which operates a bookshop in southeast London. Despite the high number of book shops in the area, Magic Books had quite a reputation and a stable customer base. However, a major bookshop chain was moving into the area and Magic Books was thinking of new ways of attracting customers and coping with the new competition.
One of the possibilities that was considered was to have a webpage developed, which would promote the shop online. However, a webpage wouldn't come for free, so in order to decide on whether this investment should be made, Magic Books decided to apply the Decision Making Process.

The problem was already defined: "Is it worth it to invest in a webpage?"

The next step was to gather information. Here Magic Books devised a number of methods:

1. Customer survey
2. Internet-based research
3. Approach web developers for quotes

The customer survey consisted of a small questionnaire which was given away with each purchase and made available on the counter in the shop. The questionnaire asked customers to answer a few questions regarding their use of the Internet and whether they would find it useful if Magic Books had a webpage.

The Internet-based research basically looked at web pages of bookshops of comparable size and nature, identifying the kind of services and information provided, etc.

Also, a number of web developers were approached and quotes were obtained. These quotes included a number of options, some with more functionality and more basic versions.

Having collected their information, Magic Books evaluated this information by identifying a number of important points and assigning different weights to these. These points included the cost, results from the customer survey (e.g. the number of customers with Internet access, the number of customers interested in a Magic Books website, etc.).

At this stage Magic Books also established a number of possible decisions. Based on the Internet-research and the quotes, a number of options were established. A very basic version with only one page providing information, one with a number of pages and an emailing facility, where enquiries could be emailed to Magic Books. A third option included a monthly newsletter and a possibility for visitors to the webpage to subscribe to the newsletter. Some multimedia content was also considered to make the page more attractive. The other possible decision, of course, was to drop this idea and not have any webpage.

The evaluated information was used to estimate the cost and increase in turnover brought by the website in the long term.

Based on this information, Magic Books decided that getting a webpage was an investment, which they were willing to risk. However, it was decided to have a webpage with information and a possibility to email Magic Books, but not with a newsletter. This could be added if the webpage proved to be a success.

5.2. Point Rating System

Introduction

Evaluation can only be achieved if there is a way of quantifying what is to be evaluated. We have to be able to measure in order to evaluate. But what are we measuring? In order to answer this question, we need to establish a set of criteria. By having this set of criteria, we can compare two or more elements and make choices accordingly. An element in this context is understood to mean something that we want to evaluate, for example a project, product, process, etc.

What

A Point Rating System evaluates something according to some defined evaluation criteria. The rating system may be used to give a general indication of the progress of a project, the development of a product, or to make a choice between a number of options.

Where and Why

A Point Rating System can be used when evaluation needs to be carried out, especially when a number of elements need to be compared. This is because the Point Rating System allows for a quantified comparison, where points are scored, which can then be easily compared by just looking at the points the different elements scored.

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5.2.1. How the rating system works

The rating system works by setting a scale and using it to assign points to categories. Each evaluation uses the assigned points in order to determine a score. The score has to be within a predetermined range, for example, between 0 and 1 or 1 and 10. A low score means poor, an average score means fair, a higher score than the average is good and the maximum score is excellent.

Evaluation may involve a number of steps, which are as follows:

- Establish criteria – we need to know what is being evaluated
- Establish weighting – sometimes it is important to show that different criteria may have different importance within the overall comparison, which can be reflected by introducing a weighting system
- Obtain information
- Carry out the comparisons – produce the evaluation results, which can now be used to make a decision

There are a number of evaluation methods which can be used in order to carry out the comparisons, each of which may be applicable in different situations. The different methods have different levels of complexity.

Advantage-Disadvantage Table

The advantage-disadvantage table is a very simple rating table in which advantages and disadvantages of a number of criteria can be compared. For each element to be included, the same criteria are identical, in order to allow a direct comparison. The criteria are listed in a column. Each element will be represented by two columns, one for the advantages and one for the disadvantages.

The scale in this case consists merely of a binary value, such as 1 and 0 or the presence and absence of a value (e.g. ‘x’).

The created table is filled according to the advantages and disadvantages of each element using the scale. At the end the score is obtained by adding the values in each column and it is now possible to verify how the elements compare by looking at the score of advantages and disadvantages.

This evaluation method is very simple, but it is also very limited as it perceives all criteria as carrying the equal weight.

Plus/Minus/Interesting Table

This method can be used to evaluate whether a particular action is favourable or not.

A table with three columns is created, namely, “Plus”, “Minus” and “Interesting”. Then all the positive aspects are entered in the “Plus” column, the negative ones under “Minus” and under “Interesting” one should enter extended implications of taking the action. These implications can be both, positive and negative.

Each entry in the table should now be considered and a number of points from a predetermined scale should be assigned. Positive points in the “Plus” column, negative ones in “Minus” and either could be used for entries in the “Interesting” column. It is now possible to obtain a score by adding the assigned points and determine whether the evaluation is favourable or not.

5.2.2. Example

We will look at and use an Advantage/Disadvantage Table in order to compare the two current flat panel television technologies. The advantages and disadvantages of each are added (the advantages using positive and the disadvantage negative numbers). It is now possible to compare the results of the two directly.

The first table shows a simple Advantage/Disadvantage Table and the second table shows the same comparisons, but this time using weighted criteria.

Criteria	***Plasma***		***LCD***	
	Advantage	***Disadvantage***	***Advantage***	***Disadvantage***
Contrast	v			v
Viewing Angle	v			v
Thickness		v	v	
Screen Refresh Rates	v		v	
Burn-in		v	v	
Longevity		v	v	
Voltage Requi-rements		v	v	
Colour Repro-duction	v			v
Total	4	-4	5	-3

Criteria	**Weight**	***Plasma***				***LCD***			
		Adv.	***Pts***	***Disadv.***	***Pts***	***Adv.***	***Pts***	***Disadv.***	***Pts***
Contrast	0.2	v	20					v	20
Viewing Angle	0.25	v	25					v	25
Thickness	0.05			v	5	v	5		
Screen Refresh Rates	0.1	v	10			v	10		
Burn-in	0.1			v	10	v	10		
Longevity	0.1			v	10	v	10		
Voltage Require-ments	0.05			v	5	v	5		
Colour Re-production	0.15	v	15					v	15
Total	1		70		-30		40		-60

It is interesting to notice that, even though the advantages and disadvantages of each technology are identical, the application of weights has an extremely high impact on the actual outcome of the comparison.

Using the plain Advantage/Disadvantage table, the LCD screen came out as being better. When weights were applied, though, the Plasma screen actually obtained a better score. When using weighting, the total sum of the weights applied has to amount to 1. This ensures that the distribution of the weights is applied correctly and consistently. Depending on the importance that we place on different elements, the score may vary greatly.

5.2.3. Resources

Links

Below are a few links which show examples of point rating systems being used.

- http://www.radioera.com/t-o_ratingsystem.htm - this page shows how to use a point rating system in order to describe the physical and electrical condition of a radio.
- http://www.mit.edu/~jcb/xmas-light-rating.html - this page shows how to assess Christmas light displays using a point rating system.
- http://www.sethkahan.com/Kahan_MarieStopes_PovertyGrading.pdf - this document presents a point rating system in order to grade poverty within the Marie Stopes Clinic Society.

5.3. Benchmarking process

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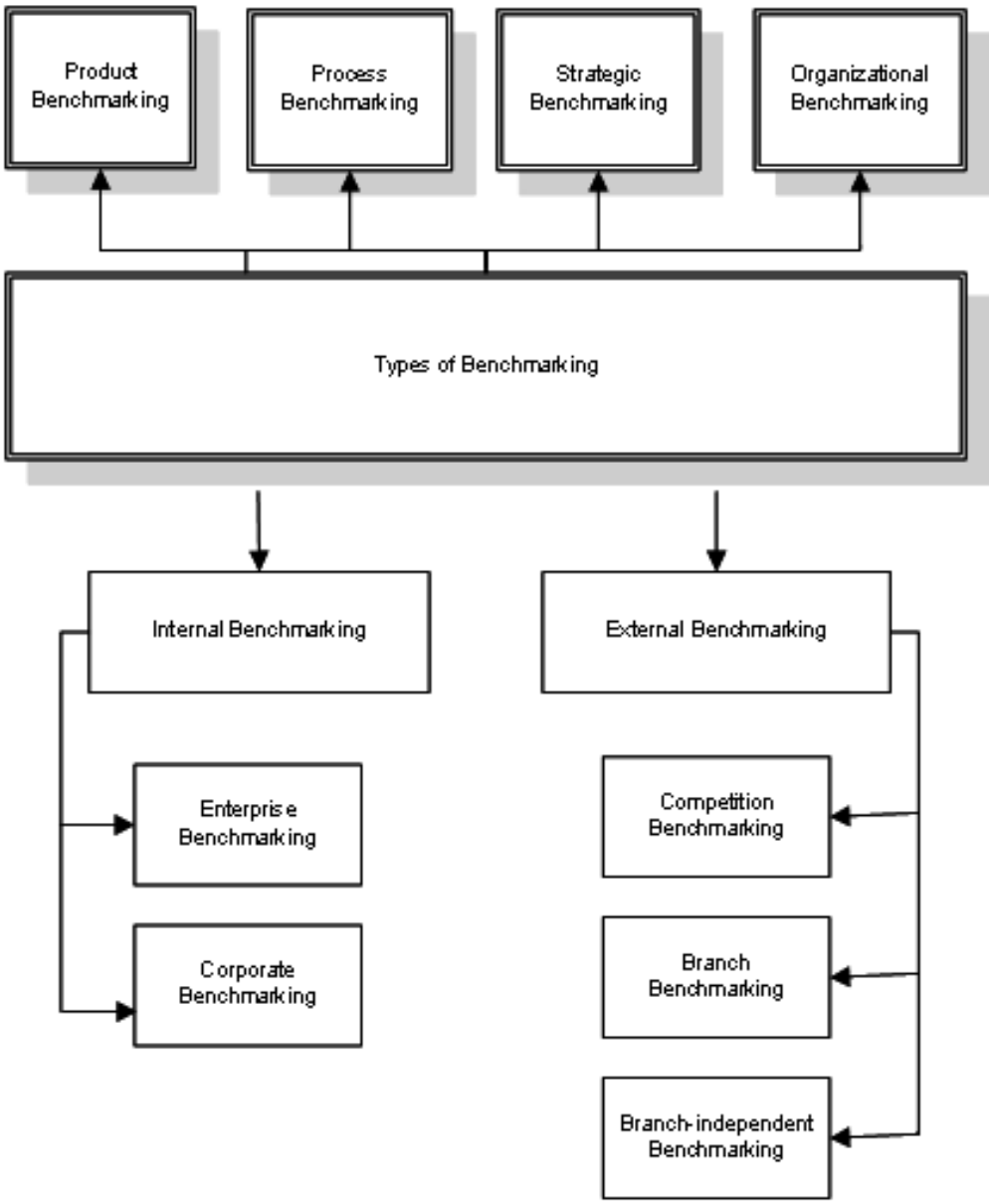
5.3.0 Introduction

Companies are generally operating in a competitive environment. Companies are often operating on a rather limited budget and have staff constraints, in terms of staff numbers, skills, qualifications, etc. Often companies are not in a position where new strategies can just be developed, implemented and tested. A trial like that could severely set back a company, not only in terms of time and production but also financially, should it fails. But companies can learn important strategies, working processes and methodologies from each other, by observing how other companies operate, thus learning valuable lessons.

What

Benchmarking is the continuous process of measuring subjects against competitors or market leaders. These subjects could be products, services, strategies, processes or operations.
Please see the graph below for a breakdown of the different types of benchmarking.



5.3.1. Where and Why

The aim of benchmarking is to improve process effectiveness, company strategies, product quality and service delivery, by comparing them to the approaches taken by the competitors or market leaders and determining which aspects are better achieved by these. It is then necessary to verify whether the approaches taken by the competition could be feasibly adopted. Benchmarking thus enables organisations to compare and improve themselves.

There are three levels at which benchmarking can be applied:

- **Functional** - at this level, aspects which cut across the entire business are analysed. This type of benchmarking would take place when an organisation benchmarks with partners from different business sectors or areas in order to discover ways in which to improve similar functions. A good example of functional benchmarking is L.L. Bean and Xerox. Xerox analysed the operations at L.L. Bean and improved their own operations according to what they learned, even though both companies are specialised in different fields, one produces clothing and the other office equipment.
- **Operational** - at this level, aspects of individual business units are analysed. An example of this kind of benchmarking is Shell, which runs an annual benchmarking process comparing refineries and gas sites. This process looks at different areas, such as health and safety, environmental performance, personnel, and others more.
- **Strategic** - at this level, aspects related to corporate strategies are analysed. Long-term strategies and general approaches, which have been successfully implemented in other companies are analysed. This type of benchmarking may include examining competencies, changing the product line or offering new services, etc. In this type of benchmarking the results often take considerable amount of time to implement.

5.3.2. Approaches to benchmarking

How

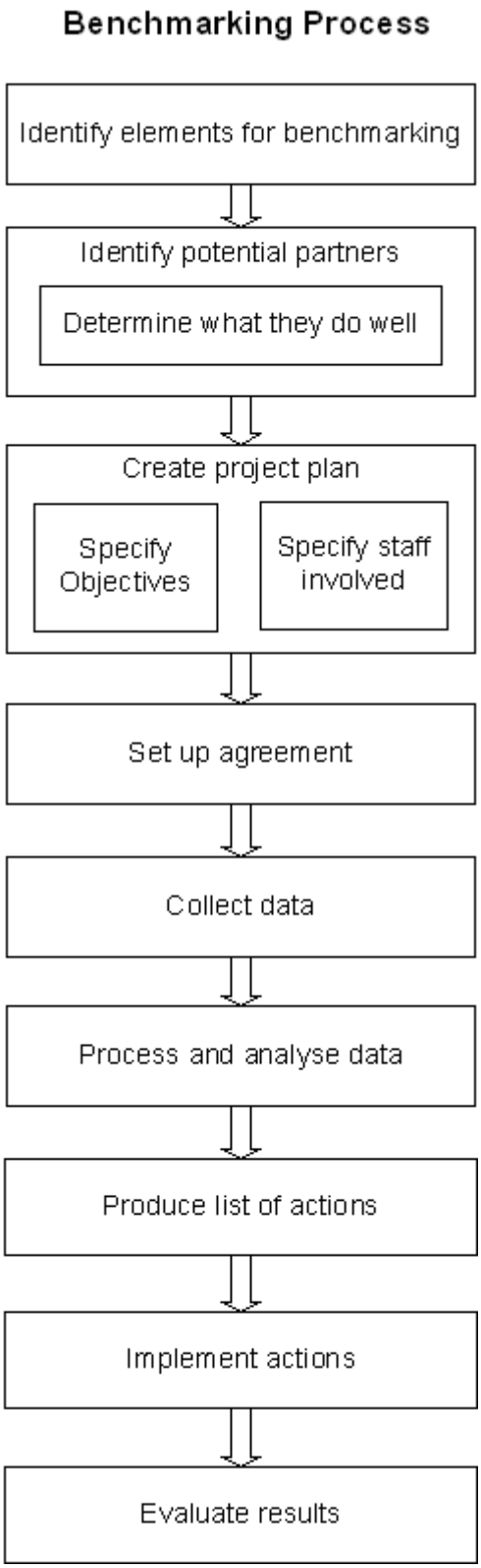
There exists many approaches to benchmarking and there are no exact rules for carrying out benchmarking. The approach will depend on aspects, such as the organisational goals, the relationship with the target organisation, etc. However there are a number of guidelines.

These are the steps generally involved in the benchmarking process:

- Initially, it is important to identify what you want to benchmark. The objectives of the benchmarking process will be important in order to determine the approach taken. Sometimes it might be useful to look at areas that require the most expenditure, or those which are gaining the company the greatest profits, as these would be areas that should be improved.
- Identify potential partners and look at what they do well. The selection of the partner(s) should be made bearing in mind the objective, thus it is very important that they be good at what you are looking for. The organisations do not necessarily have to be in the same sector. In fact, it may be advantageous if they are not as companies in the same sector may be prone to the same conventional ways of operating. If you belong to a trade union or other kind of association, then this may be a useful way of searching for benchmarking partners. It is also worth considering companies with whom you have had a good working relationship.
- The benchmarking process should be regarded as a project and should therefore be based on a project plan, specifying the objectives, potential partners and the members of staff involved in the project. It is important to have a person which is responsible for the benchmarking process. Someone who knows what is happening, who is involved and has a good overview of the benchmark process.

- Contact the selected partners and set up an agreement on the terms of the involvement. This should include the performance measures, a programme of visits, the method of data collection, etc. This should be done in a diplomatic way; you have to raise the interest of the other party, because if they don't see how the benchmarking will benefit them, they will say "Why should we participate?"
- Collect the necessary data, according to the agreement. The collection of data could be achieved through observation, conversations with people involved, gathering of documents, etc.
- The gathered information needs to be processed and analysed. The analysis of the information should stress the comparison between the two organisations.
- The importance lies in identifying aspects where the other organisation(s) perform better and try to recognize the causes. These findings should be used to produce a list of actions in order to introduce the improvements in your organisation. The environment in which your organisation operates may differ from the analysed organisation(s) and thus some of the improvements may in fact not be feasible in the conditions existing at your organisation.
- Implement the actions specified. These actions have to be possible in order to be implemented within your organisation and you have to ensure that the members of staff involved will be able to deal with the changes. Also, you need to consider any new equipment or material which may be required.
- If everything went according to plan, your organisation should have improved. Carry out an evaluation of the results of the new implementations and the overall performance of the organisation in order to determine whether the benchmarking process was successful.

5.3.3. Benchmarking Process



A benchmarking fact sheet, benchmarking case studies, benchmarking demonstrations and some general information on benchmarking is available at http://www.constructingexcellence.org.uk.

When involved in a benchmarking process bear in mind that the partner organisations may not always be compatible in all respects to your own organisation and that you may need to take into consideration environmental influences that may not exist at your company, and which may have an indirect impact on performance.

5.3.4. Example

Canus Management and Language Support (CMLS) is a small company which provides language and business management training to small local businesses. The training takes the form of classroom-based lectures and tutorials.

CMLS's general manager decided to broaden their area of expertise and offer a new business analysis and consultancy service.

Since CMLS was moving into this new area, they decided to find out the best practices and methods involved in business analysis and consultancy by looking at how other small companies in this area operate.

A list was compiled of small companies offering business analysis and consultancy services within the region. CMSL then chose the companies they perceived as having good working practices and contacted them with a benchmarking proposal and a draft plan.

Unfortunately, most of the contacted companies were not interested in a benchmarking cooperation, but two companies agreed to participate after having had a number of amendments to the benchmarking plan. Confidentiality was one of the main issues involved and it was agreed that any information relating directly to clients or financial matters would not be shared.

The benchmarking plan provided a list of benchmarks which were to be analysed in the benchmarking exercise. This list included aspects of productivity, communication with customers, marketing and some internal working processes.

Each company involved documented their approaches and provided relevant data over a period of time, at the end of which there was a meeting between the three companies. At this meeting the collected data was analysed, which was later used to produce a report, specifying the different approaches and methods applied in each company.

CMLS's directors had an internal meeting to discuss future actions in light of this report. The practices applied by their benchmarking partners were analysed in turn and evaluated as to their suitability and adaptability to their own working procedures and environment. A list of actions was prepared, together with a list of steps necessary in order to implement these actions in CMLS.

Some of the areas which were reported on was the way in which clients are approached, communication with clients, bookkeeping, the management of consultancy projects, among others.

The initial transitional phase was rather laborious as the staff had to be trained and adapted to the new working procedures, but the results shown so far have been very positive and a number of the implemented processes have brought a great increase in productivity by making working procedures more efficient and reducing time spent on a number of tasks.

5.3.5. Resources

Links

If you are looking for further information on the topic of evaluation of innovative solutions please refer to the following sources:

- http://www.instituteforstrategicclarity.org/dmp.htm - the Institute for Strategic Clarity provides information on the Decision Making Process
- http://www.benchmarking.gov.uk – the web site of the Public Sector Benchmarking Service promotes effective benchmarking and provides information, as well as a database of Good Practices
- the Office of Government Commerce provides information and a checklist on benchmarking
- http://www.benchnet.com/ - Benchnet is a benchmarking and best practices network, which provides information and self-assessment tools

Bibliography

- For a good book on Evaluation methods please refer to: Proctor T, Creative Problem Solving for Managers, Routledge, 1999, ISBN 0415196795

- s Clinic Society.

6. Innovative Production Strategies

6.1. New product development methods

Introduction
All organisations face the challenge of innovation. Their survival and growth depends upon their capacity to renew what they offer the world (product/service innovation) and the ways in which they create and deliver that offering (process innovation) [1]. New products are critical to successful growth and increased profitability for most SMEs. As European SMEs don't have a typical R&D department, SMEs who play and win the innovation game not only sustain themselves in their sector but also tend to distinguish themselves as market leaders.

Basic marketing theory suggests that all products have a life cycle consisting of introduction, growth, maturity, and decline. In the maturity or decline stage it is vital that an organisation consider (1) expanding the product line to extend the life cycle, (2) redesigning the product to maintain its competitive superiority, or (3) **developing a new product to maintain revenue and profitability**.

There are rewards for successful innovation and punishment for failing to innovate. But the **new product development process** must be managed properly so that the risks are minimised and profits are maximised. This text is designed to help SMEs managers to understand the NPD methods necessary to introduce successful new products.

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6.1.1. What are New Product Development methods?

To avoid development of a new product that will not be a success in a market and to minimise the costs of such a development a NPD Roadmap can be used. NPD methods are tools providing a roadmap that can help companies and organisations to successfully develop new products or upgrade existing ones through a series of logical steps, starting from the process of idea generation and ending at the launch of the product into a market.

This process contains a series of activities called "**Stages**" and control points, called "**Gates**". Each stage contains information and well-defined series of activities concerned with the particular stage of the development and each gate is a decision point where senior management can continue or stop funding the process. In more detail, a stage contains all the information and tools that are needed to successfully complete the particular stage and a gate contains the required questions, or specifications or mandates to which the results of the previous stage are compared to so that a go / kill or hold decision can be made.

6.1.2. Why NPD is important and where can it be applied?

Why NPD is important?

The rapid development of new technologies, the shift change in customer needs and attributes, and the gradual increase of the competition has forced all business to adopt New Product Development (NPD) as a **necessary and unavoidable business practice**. NPD is a complex and time-consuming process, which cannot be taken lightly, since it holds more perils than first meets the eye. According to David S. Hopkins and Earl L. Baily [5] research has shown that 40% of new consumer products, 20% of new industrial products and 18% of new services related products have **failed completely** as products.

- In most markets and especially those relating to **consumer products**, the number of new product introductions per annum has increased dramatically. For example, a study into the consumer packaged goods market showed that new product introductions had increased around **tenfold over an 18-year period** (1). Driven by consumer demand and fueled by advances in technology, SMEs have to bring more and more products to market in order to remain competitive. SMEs best able to execute NPD **will clearly have an advantage**. This is partly about **reducing time to market** but also about **making effective use of scarce internal resources**.
- Partly as a consequence of the increasing rate of new product introductions but also because of the drive of technology advances, **product life cycles are shortening**. As a result, companies and especially SMEs are increasingly dependent on revenues from new products to drive their top lines each year. A recent study by Deloitte showed that, for the companies' most dependent new products, the proportion of their revenue derived from these products will increase from around one third to nearly a half over the next three years (1). The implication is that companies good at NPD **will see the benefits sooner**, those who are less effective will feel the pain sooner. In the future companies will have fewer opportunities to live on past successes.

Where NDP could be applied?
NPD method could be applied by anyone involved in new-product development process including executive directors, marketing directors, business development, and R&D directors, manufacturing engineers, start-up directors, development engineers, quality managers, customers' service and support staff, and procurement managers.

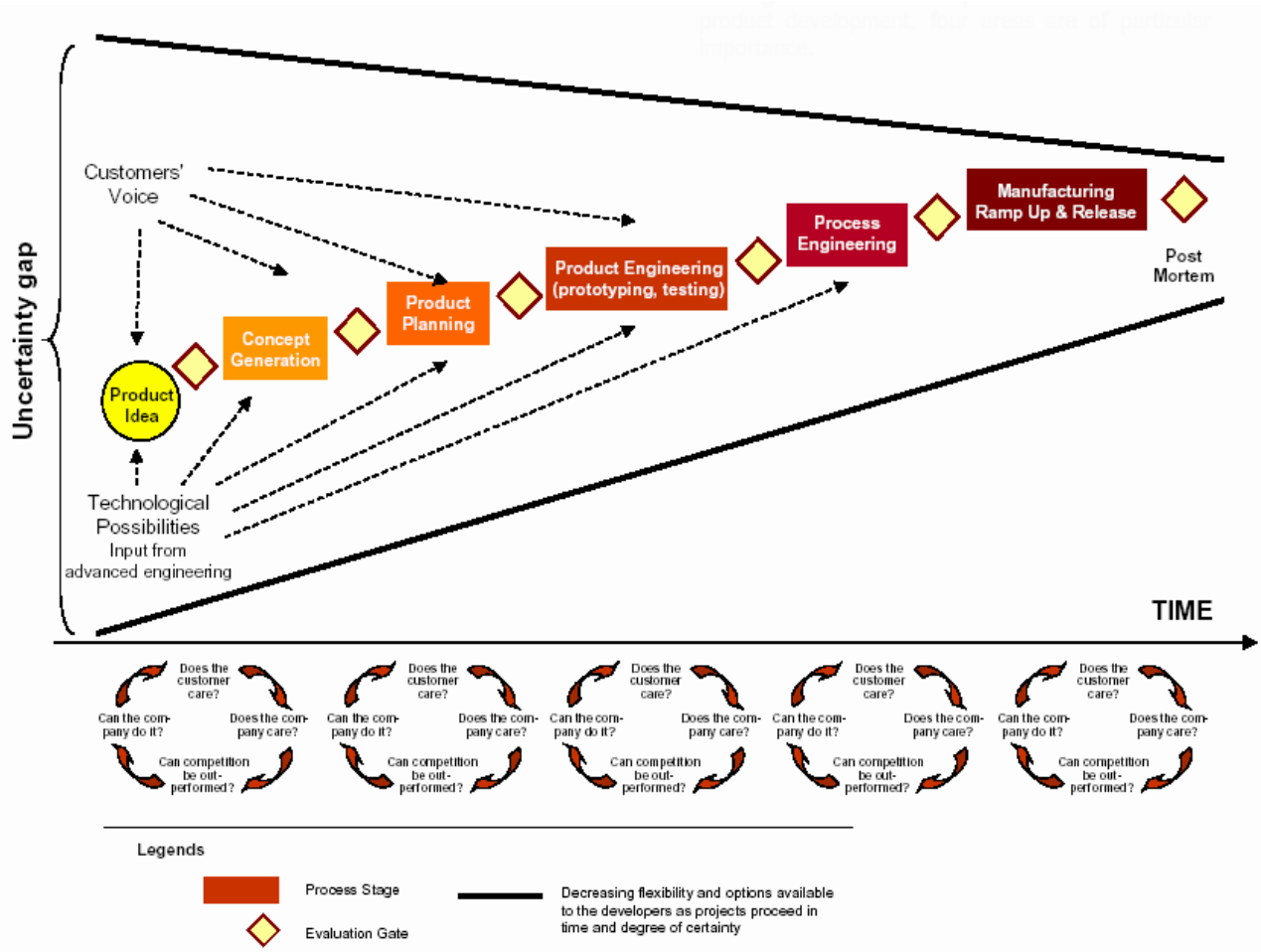
6.1.3. How NPD is applied?

One of the most widespread and well-accepted conceptual descriptions of the NPD process is that of Clark & Fujimoto (1991) who identify five successive but overlapping stages of the process:

- **Concept Generation** where designers and product planners define the character of a future product to become from a customer's perspective.
- **Product Planning** where the concept is translated into specifics for detailed design, including major specifications, technical choices and cost targets.
- **Product Engineering** where product plans are transformed into blueprints or CAD-drawings then into prototypes and ultimately into real parts and components.
- **Process Engineering** where the manufacturing tools that will realize the product are developed, and material flows, plant lay out, work organisation and tasks are defined.
- **Production Process** where final products are made and assembled for the end customer. The NPD process then ends with feedback into the product and process engineering steps from ramp-up production and pre-series.

The product development funnel (Iansiti & Kosnik, 1999) is another process framework closely corresponding to that of Clark & Fujimoto. The funnel concept illustrates how customer needs and technological possibilities influence concept generation and selection and how projects then evolve through the subsequent steps of product design, prototyping and testing, and pilot production to end up in manufacturing ramp-up and release, all taking place **under decreasing levels of uncertainty** - which simultaneously means **reduced flexibility** - as the development phases unfold over time.

Fig 1: The New product development (NPD) process



A third widely used model is the **stage-gate model** of new product development (Cooper et al, 2002). It identifies a series of development stages, similar to the ones described above, but complements these models by explicitly identifying a series of evaluation gates through which a new product project has to pass from idea to commercial launch. The stage-gate model creates discipline in the NPD process by requiring **periodic systemic review** of projects at multiple milestones in the development cycle.

Hughes & Chafin (1996) propose a final complementary dimension they call the value proposition process (VPP), consisting of keeping managers focused on four critical issues/questions: capturing market value (answering the question "does the customer care?"); developing business value (answering "do we care?"); delivering a winning solution (answering "can we beat the competition?"); and applying project and process planning (answering "can we do it?"). Keeping these questions on the top of the development agenda calls for continuous performance monitoring from customer satisfaction, financial and strategic management, and a process management perspective. Figure 1 illustrates the product development process integrating and building on the steps of Clark & Fujimoto, the product development funnel, the stage-gate model, and the value proposition process.

6.1.3.1. Stage-gate model explained

The stages[2]: Stages are where the action occurs. The members of the project team undertake key tasks to gather information needed to advance the project to the next gate or decision point. Stages are cross-functional: There is no R&D or marketing stage. Rather each stage consists of a set of parallel activities undertaken by people from different functional areas in the firm, working together as a team and led by a project team leader.

To manage risk via a stage0gate method, the parallel activities in a certain stage must be designed to gather vital information-technical, market, financial, operations in order to drive down the technical arid business risks. Each stage costs more than the preceding one, so that the game plan is based on incremental commitments. As uncertainties decrease, expenditures are allowed to mount and risk is managed.

The gates[2]: Preceding each stage is an entry gate or go/kill decision point, shown in the diagram. Effective gates are central to the success of a fast-paced, new product process:

- Gates serve as quality control checkpoints: Is this project being executed in a quality fashion?
- Gates also serve as Go/Kill and prioritisation decision points. Gates provide the funnels where mediocre projects are successively culled out.
- Finally, gates are where the path forward for the next stage is decided, along with resource commitments. Gate meanings are usually staffed by senior managers from different functions, who own the resources, the project leader and team required for the next stage. These decision-makers are called ‘’gatekeepers’’.

Gates have a common format:

- **Deliverables**: These are the inputs into the gate review-what the project leader and team deliver to the meeting. They are the results of the actions of the previous stage and are based on a standard menu of deliverables for each stage.
- **Criteria**: These are questions or metrics on which the project is judged in order to make the Go/Kill and prioritisation decision.
- **Outputs**: These are the results of the gate review-a decision (Go/Kill/Hold/Recycle). An action plan is approved and the date and deliverables for the next gate are agreed on.

The stage-gate reviews should have well-defined entry criteria, review objective and agenda for each review.

Example of Stage-Gate Review Definition

Meeting Title	Programme Approval Meeting	Design Approval Meeting	Pilot Approval Meeting
Timing	Prior to the Feasibility & Concept Stage	At the end of Feasibility & Concept Stage	At the end of the Prototype Stage
Stage Approved	The Programme and the Feasibility & Concept Stage	Design Stage	Pilot Stage
Entry Criteria or Pre-	Project Definition	Successful Concept	Successful Final De-

requisites		Design Review	sign Review/TD>
Meeting Required Before:	Resources can be applied to programme	Quote Delivered to the Customer and Design Stage can begin	Pilot Stage can begin and production tooling ordered
Agenda	Programme overview Basic customer requirements Key programme milestone dates Product and tooling cost targets Quality targets Programme risk issues Proposed NPD process deviations	System architecture Degree of new invention & technical development Manufacturing sourcing Concept Design Review issues & proposed resolution Cost targets vs. estimates Internal quality targets Programme budget & preliminary investment requirements Programme breakeven time Proposed customer quotation Updated programme schedule Programme staffing issues Programme risk issues NPD process deviations	Final Design Review issues and proposed resolution Customer satisfaction & issues Cost targets vs. estimates Programme budget Tooling & equipment investment and budget approval Programme breakeven time Updated programme schedule and status Programme risk issues NPD process deviations

6.1.3.2. Success Factors

Success Factors

In order for a product launch to be successful, 7 different factors (3) have to come together in just the right way. If one is wrong, it's likely the whole launch will fail.

Seven Actionable Critical Success Factors

1. Solid up-front homework – to define the product and justify the project.
2. Voice of the customer – a slave-like dedication to the market and customer inputs throughout the project.
3. Product advantage – differentiated, unique benefits, superior value for the customer.
4. Sharp, stable and early product definition – before Development begins.
5. A well-planned, adequately resourced and proficiently executed launch.
6. Tough go/kill decision points or gates – funnels not tunnels.
7. Accountable, dedicated, supported cross-functional teams with strong leaders.

The challenge of NPD is to make sure that all of these things are achieved all of the time.

NPD is difficult to manage

One of the often-heard comments is that the NPD process is difficult to manage and this is certainly true for two reasons:

- At the beginning of a project, the outcome and the work that will have to be undertaken are often uncertain.
- For many groups in the company, such as supply chain management and manufacturing, NPD is disruptive, causing them to interfere with processes that have been painstakingly optimized.

Following is a case study of how the **Stage Gate™** new product development process has helped an energy company become highly competitive in a newly deregulated energy market.

6.1.3.3. Case study

How Energex Implemented A New Product Development Process

The Company

ENERGEX is one of the Australias electricity, natural gas and LPG retailers. It is leveraging its experience and expertise to develop and deliver innovative energy solutions to a market place that is undergoing significant change. Energex's customer base consists of more than a million commercial and domestic consumers. The company is committed to offering a broad range of energy options and is positioning itself as an innovative multi-fuel retailer. This strategy has put significant focus on its product development capabilities. ENERGEX products today include domestic and commercial electricity, natural gas and LPG supply.

"Typical of the innovative, high value-added new products is EMP the company's energy monitoring programme," says Roman Meister, ENERGEX Retail Marketing Manager. "EMP packages hardware and software into one product which monitors all energy inputs and costs, providing instant access to information on energy usage, power quality, billing verification, on-charging and greenhouse gas emissions. Managers can have access to volumes of data but still lack quality information about one of their most critical operating costs – their energy consumption levels. EMP changes this situation".

ENERGEX responded to the challenge of deregulation by creating ENERGEX Retail, a fast-moving market-focused corporation that concentrates on developing and marketing energy-based products to commercial and residential customers. It recruited some of the best people in the industry so that it could act swiftly to meet the changing needs of the evolving energy market.

The Challenge

This team needed a product development process that would help them manage critical risk without slowing them down. According to a business consultant helped ENERGEX, "We were initially surprised by the call from ENERGEX - energy retailing is a long way from our usual customers in manufacturing". After initial discussions the product development environment at ENERGEX was reviewed. This involved structured interviews with both the users and "customers" of the current product development process. A review or "audit" of the existing environment is always a **critical starting point** for any product development process. Any issues can be brought to light and the existing process elements can be captured and related to the organisation's objectives.

According to business consultant the results of the ENERGEX Retail review were positive. "We found high-energy teams passionate about their industry, their business and the need to move at lightning speed in a fast-paced industry. We also found product development processes that had much in common with those of our traditional customers. While much of the existing process was very thorough, it had two significant characteristics. Firstly there was a mismatch with the fast-moving culture of ENERGEX, and secondly there were inefficient mechanisms for filtering and prioritising projects and allocating precious resources."

In addition, Product Managers and the Product Development Manager were dissatisfied with the quality of "pre-development homework" and wanted improvements in the quality of product definition and specification before committing to development of new products.

The Solution

With the guidance of the CEO, the ENERGEX team decided that a **Stage Gate** based product development process was right for their business. According to Ray Cao, Product Development Manager, "We scoured the world for practical product development advice and found that the world's best is in our own backyard. With the help of the business consultant we have **tailored the Stage Gate** product development system to suit our managerial needs".

ENERGEX chose business consultants to help them develop its new process and tackle the shortcomings identified. The first step was to establish the "**PIT crew**", a process improvement team comprising Product Managers, the Product Development Manager, and representatives from Finance, Customer Service and Technical Services. This team represented all functional groups in the product development environment. ENERGEX has seen that process development by an **empowered cross-functional team** is crucial to long-term project success. Such teams must have the authority to **make real decisions** as well as the personal backing of the senior management team. Good senior management support **speeds process acceptance** and early success.

"The initial plan was to involve the PIT crew in all aspects of process development, but after the initial training it was obvious that this would be hard to achieve with such a high-energy team," said Ray Cao. "So we chose instead to use a more manageable development team consisting of QMI, two of my Product Managers and myself, with the original PIT Crew's role being that of process reviewers, at least once every two weeks". Depending on company culture and the personalities of team members, such a "two-tier" approach can work well.

It does however place more emphasis on training, and the core process development team should not just represent one functional group otherwise process buy-in will be adversely affected.

Implementation

"Already our new products - such as EMP - are meeting the market's needs faster and more efficiently than our competitors'. As we get even better at executing the process we can only improve our competitive position", said Roman Meister, Retail Marketing Manager – ENERGEX.

During the development of the process, as much as 60% of the PIT team's time was spent refining the tools for product definition and the **first two critical gates**. Design of this pre-development activity and the associated gates should always take most of the time in a Stage Gate implementation project – 70% or more of project budget is not uncommon.

Conversely, most companies are very competent at actual technical product development, so effort can be minimised in those areas.

The modified approach was much more productive than the initial plan, and the draft of the new process was developed in just under ten weeks from project commencement. The new process follows the classic Stage Gate model closely and has been christened RAPID by the ENERGEX PIT crew.

When it came to gate design, ENERGEX was better prepared than most. ENERGEX Retail has just completed a major strategic planning exercise, the outcome of which had been clearly documented and communicated to all staff. It was a relatively easy process to express this strategy as a series of "**must meet" filtering questions** and "**should meet**" project prioritisation questions that would be well understood by all users of the RAPID process. Many companies struggle with the design of their early gates: simple questions like "is the product aligned to our strategy?" can engender hours of debate if a company doesn't have a clear, documented and communicated strategy.

ENERGEX handled the launch of the new process effectively. All process documents were published on the corporate network, a colour promotional brochure on RAPID was produced for internal circulation, and a launch function for the new idea process was held along with training for all users of the process.

Implementation of **Stage Gate™** is really about changing attitudes and behaviour in an organisation. It needs to be sold and sold well, to internal and external stakeholders. It's all about getting "buy-in". Depending on organisation size and complexity, the launch should consist of education and practical hands-on training for users and gatekeepers (senior management), accurate and concise process documentation, a process brochure for those who need to be aware of but not use the new process, and some appropriate form of launch event to let everyone in the organisation know that the process is now real and alive. New employees should also be trained in the process.

The Results

During the implementation of RAPID, existing projects were mapped to the process and a number of pilot projects were conducted. The mapping process effectively corralled some projects that were close to launch and still had significant commercial and legal risk issues to be managed. The senior management gatekeeping team has already welcomed the consistency of business cases produced

by the new process, and some tough and appropriate project “Kill” decisions have been made - freeing up valuable resources for the best projects.

“ENERGEX is already seeing that the lead-up to product launch is significantly smoother with less re-work during the hectic pre-launch stages. This is a direct result of better pre-development homework, better cross-functional teamwork and tighter project specifications.”

Ray Cao, Product Development Manager – ENERGEX

In any large, complex organisation, it can be difficult to create synergy across divisions; RAPID is already helping ENERGEX to do this. “Synchronisation of processes between ENERGEX Technical Services and ENERGEX Retail has already improved teamwork and we now have a product definition that the whole team supports,” said ENERGEX Technical Services Marketing Manager John Wedgewood.

Within ENERGEX Retail, Ray Cao’s team has now embarked on a formal product portfolio management programme, ably supported by the RAPID process. Portfolio Management is a strategic management tool designed to balance and focus resources to support the longer-term aims of the company. Whereas **Stage Gate™** is a day-to-day management tool, supportive of strategy, Portfolio Management provides both a rear vision mirror of past performance and a telescope on the future to ensure that a commercial resource balance is maintained.

6.1.4. Resources

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6.2.1. Rapid prototyping

Introduction

The term ***rapid prototyping*** (RP) refers to a class of technologies that can automatically construct physical models from Computer-Aided Design (CAD) data. These "three dimensional printers" allow designers to quickly create tangible prototypes of their designs, rather than just two-dimensional pictures. Such models have numerous uses. They make excellent visual aids for communicating ideas with co-workers or customers. In addition, prototypes can be used for design testing. For example, an aerospace engineer might mount a model airfoil in a wind tunnel to measure lift and drag forces. Designers have always utilized prototypes as RP allows them to be made faster and less expensively.

In addition to prototypes, RP techniques can also be used to make tooling (referred to as *rapid tooling*) and even production-quality parts (*rapid manufacturing*). For small production runs and complicated objects, rapid prototyping is often the best manufacturing process available. Of course, "rapid" is a relative term. Most prototypes require from three to seventy-two hours to build, depending on the size and complexity of the object. This may seem slow, but it is much faster than the weeks or months required to make a prototype by traditional means such as machining. These dramatic time savings allow manufacturers to bring products to market faster and more cheaply.

6.2.1.1. What is rapid prototyping and where could it be used?

What is rapid prototyping?

In general, rapid prototyping (RP) is defined as using a technological process to produce 3D objects in a short period of time usually days rather than weeks. Most RP machines create 3D geometries by growing them layer-by-layer, but high-speed CNC machining a deductive process also meets these criteria in certain applications.

Where rapid prototyping could be used?

RP can be used **in all types of product industries** – any type of company that designs and/or manufactures a physical product. However, most of the rapid prototyping services are sold to the following industries: design & engineering, R & D, consumer products, electronics, aerospace, automotive, robotics, appliances, telecommunications, orthopaedics, healthcare, dental, foundry, oil & gas, petrochemical, toys and plastics.

6.2.1.2. Why rapid prototyping is important?

The rapid development of models or prototypes may largely reduce the development cost and the product development cycle. In 1994, Pratt & Whitney achieved "an order of magnitude [cost] reduction [and] time savings of 70 to 90 percent" by incorporating rapid prototyping into their investment casting process.

In addition, they can be used in test markets prior to the entry of the product in the final production and commercialisation stage. Since it is based on technological changes or improvements, the development of such models or prototypes is usually conducted by technologists, who have no regard for the cost of such a development. (The cost of such a development is due to the cost of the material, additional personnel, training of that personnel and system changes). Therefore, any such development should be conducted upon an **initial assessment** of the models or prototypes from a combined team of technologists and

economists. Usually, the former submit a development proposal and the latter assess it based on the cost of the proposal and the future profit after its materialisation. The rapid development of models will be successful only if the following apply, and only then:

- Each prototype should provide answers to specific questions.
- The prototype should be as detailed and complex as necessary to provide the required information.
- If there are multiple ideas, then it is necessary that multiple prototypes be developed.
- Decisions should be made during the development of the prototype and one should not await its final form.
- The swifter the prototype development, the swifter the overall development of the new product.

6.2.1.3. How to use rapid prototyping?

At least **six different rapid prototyping techniques** are commercially available, each with unique strengths. Because RP technologies are being increasingly used in non-prototyping applications, the techniques are often collectively referred to as *solid free-form fabrication*, *computer automated manufacturing*, or *layered manufacturing*.

The latter term is particularly descriptive of the manufacturing process used by all commercial techniques. A software package "slices" the CAD model into a number of thin (~0.1 mm) layers, which are then built up one atop another. Rapid prototyping is an "additive" process, combining layers of paper, wax, or plastic to create a solid object. In contrast, most machining processes (milling, drilling, grinding, etc.) are "subtractive" processes that remove material from a solid block. RP's additive nature allows it to create objects with complicated internal features that cannot be manufactured by other means.

Of course, rapid prototyping is not perfect. Part volume is generally limited to 0.125 cubic meters or less, depending on the RP machine. Metal prototypes are difficult to make, though this should change in the near future. For metal parts, large production runs, or simple objects, conventional manufacturing techniques are usually more economical. These limitations aside, rapid prototyping is a remarkable technology that is revolutionizing the manufacturing process.

The Basic Process

Although several rapid prototyping techniques exist, all employ the same basic five-step process. The steps are:

1. Create a CAD model of the design
2. Convert the CAD model to STL format
3. Slice the STL file into thin cross-sectional layers
4. Construct the model one layer atop another
5. Clean and finish the model

CAD Model Creation: First, the object to be built is modeled using a Computer-Aided Design (CAD) software package. Solid modelers, such as Pro/ENGINEER, tend to represent 3-D objects more accurately than wire-frame modelers such as AutoCAD, and will therefore yield better results. The designer can use a pre-existing CAD file or may wish to create one expressly for prototyping purposes. This process is identical for all of the RP build techniques.

Conversion to STL Format: The various CAD packages use a number of different algorithms to represent solid objects. To establish consistency, the STL (stereolithography, the first RP technique) format has been adopted as the standard of the rapid prototyping industry. The second step, therefore, is to convert the CAD file into STL format. This format represents a three-dimensional surface as an

assembly of planar triangles, "like the facets of a cut jewel." [6] The file contains the coordinates of the vertices and the direction of the outward normal of each triangle. Because STL files use planar elements, they cannot represent curved surfaces exactly. Increasing the number of triangles improves the approximation, but at the cost of bigger file size. Large, complicated files require more time to pre-process and build, so the designer must balance accuracy with manageablility to produce a useful STL file. Since the .stl format is universal, this process is identical for all of the RP build techniques.

Slice the STL File: In the third step, a pre-processing programme prepares the STL file to be built. Several programmes are available, and most allow the user to adjust the size, location and orientation of the model. Build orientation is important for several reasons. First, properties of rapid prototypes vary from one coordinate direction to another. For example, prototypes are usually weaker and less accurate in the z (vertical) direction than in the x-y plane. In addition, part orientation partially determines the amount of time required to build the model. Placing the shortest dimension in the z direction reduces the number of layers, thereby shortening build time. The pre-processing software slices the STL model into a number of layers from 0.01 mm to 0.7 mm thick, depending on the build technique. The programme may also generate an auxiliary structure to support the model during the build. Supports are useful for delicate features such as overhangs, internal cavities, and thin-walled sections. Each PR machine manufacturer supplies their own proprietary pre-processing software.

Layer by Layer Construction: The fourth step is the actual construction of the part. Using one of several techniques (described in the next section) RP machines build one layer at a time from polymers, paper, or powdered metal. Most machines are fairly autonomous, needing little human intervention.

Clean and Finish: The final step is post-processing. This involves removing the prototype from the machine and detaching any supports. Some photosensitive materials need to be fully cured before use. Prototypes may also require minor cleaning and surface treatment. Sanding, sealing, and/or painting the model will improve its appearance and durability.

6.2.1.4. Case study

Rapid prototyping turns up the heat at Baxi

Rapid prototyping has delivered time and cost saving benefits for Baxi as it geared itself up for the launch earlier this year of its first home-grown combination boiler aimed at capturing a share of the lucrative home heating market.

The introduction of rapid prototyping at the firm has had a significant impact on the company's design strategy and the way it expects to tackle future new product development.

Preston-based Baxi is the UK market leader in gas fired domestic heating systems; designing, manufacturing and supplying a range of high quality, electronically controlled central heating boilers, fires and wall mounted heaters.

Back in early 1997, the company took a strategic decision to launch a completely new combination boiler, called the Bahama 100, designed and manufactured entirely in the UK at its Bamber Bridge facility. Moreover, Baxi had set itself a demanding 10 month timescale in which to design and develop a pre-production functional prototype of the boiler ahead of a full scale market launch in March 1998.

This was the fastest ever design-to-market time the company had set itself for a new product and to help ensure tight deadlines were achieved, Baxi's senior prototype engineer, Jim Astin-Kilgallon, turned to AMSYS, Europe's leading Selective Laser Sintering (SLS) rapid prototyping bureau.

As part of Baxi's technical section, operating under the aegis of the Design Department, Mr Astin-Kilgallon's key responsibilities involve sourcing rapid prototyping services, project managing new product models and liaising with design teams on the specification of prototypes.

Cost savings

A long time enthusiast of rapid prototyping solutions, he explained that he had been keen to get Baxi to examine the process as a beneficial alternative to traditional model making, which the firm had previously used. The benefits of rapid prototyping are well known to many companies within the manufacturing sector. The ability to quickly produce models of new products has an enormous impact on **'product-to-market' lifecycle** times and cost reductions, delivering competitive benefits to companies operating to tight margins in tough marketplaces.

Reviewing the Bahama 100 project Mr Astin-Kilgallon recalled that rapid prototyping played an important part within the overall design approach, and added: "The first product concepts of the internal components for the Bahama 100 and the control panel itself were quite complex and would inevitably call for design modifications as each new development stage progressed. "These considerations meant we couldn't use conventional model making methods as they were too expensive and time consuming. We therefore chose **SLS rapid prototyping** (*see glossary*) as an alternative solution, with impressive results."

Fully functional prototypes

The first components to be rapid prototyped by external RP expert, AMSYS were four Glass Filled Nylon (GFN) sintered hydraulic water connectors, which were fitted behind the control panel section.

"It was important to have fully functional prototypes which could withstand laboratory tests," explained Mr Astin-Kilgallon. "I was impressed by how well the prototypes performed and in particular how quickly AMSYS were able to produce them - **just three days**, as opposed to weeks if we had used a traditional model maker."

Of particular importance was the fact that the prototypes highlighted some design problems early on in the overall product design cycle. This enabled changes to be made, saving research and development costs in the long run.

Baxi sent its CAD files to the AMSYS Sunderland sintering facility by e-mail. Once these had been received, it took only a few days to produce the prototypes **(as opposed to three weeks using a traditional model maker).**

Without using rapid prototyping, said Mr Astin-Kilgallon, it would have been difficult for Baxi to have completed the Bahama 100 project on time. The fiscal benefits have also encouraged Baxi's Design Department to consider increased use of rapid prototyping in future new product developments.

Strategic integration

Baxi's existing design strategy is based around three new product development stages: concept, design and development and, finally, implementation.

"Up to now, rapid prototyping would have slotted into the second stage - design and development," explained Mr Astin-Kilgallon. "Now, with the success of the Bahama 100 project behind us, rapid pro-

totyping has pushed itself further up the agenda to figure at the product's concept stage, where we can take strategic advantage of the process."

"Our designers are also more aware of the benefits of rapid prototyping from bureaux like AMSYS. Rapid prototyping will be increasingly helpful to them as they'll no longer have to produce complex drawings of products. Instead designs will be downloaded from CAD and sent direct to the bureau, saving time and money in the process."

6.2.2. Product testing strategies

Introduction

Companies committed to rigorous product testing and continuous product improvement can, in most instances, achieve product superiority over their competitors. Product superiority, in turn, helps strengthen brand share, magnifies the positive effects of all marketing activities (advertising, promotion, selling, etc.), and often allows the superior product to command a premium price relative to competitors.

Most SMEs, unfortunately, do very little product testing. Few SMEs really understand the power of continuous product improvement and product testing. Even fewer companies know how to do product testing the right way. Fewer yet budget enough money to support a serious product-testing program. These shortcomings in the majority of companies create opportunities for the minority of companies who are dedicated to continuous product improvement. How can companies realize optimal value from product testing? The aim of this text is to provide readers with a practical framework for all the major product testing methods in order to be able to decide which of them they should use and for what purposes according their market, products and competitors.

What are the main types of product testing?

It is important to make a distinction between the different types of testing applied ***at different stages of the product development process***. This helps the development team to understand the purpose of each test and consider how data is to be captured. Different testing methods will have ***different objectives, approaches and types of modelling***. Four general types of testing are described in more detail:

- Exploratory tests
- Assessment tests
- Validation tests
- Comparison tests

6.2.2.1. Why is product testing important and where could it be used?

According to researchers product testing is the single most valuable marketing research that most companies ever do. The great value of product testing is, perhaps, best illustrated by some of its many uses. It can be used to:

- Achieve product superiority over competitive products.
- Continuously improve product performance and customer satisfaction (i.e., to maintain product superiority, especially as consumer tastes evolve over time).
- Monitor the potential threat levels posed by competitive products to understand competitive strengths and weaknesses.
- Cost-reduce product formulations and/or processing methods, while maintaining product superiority.

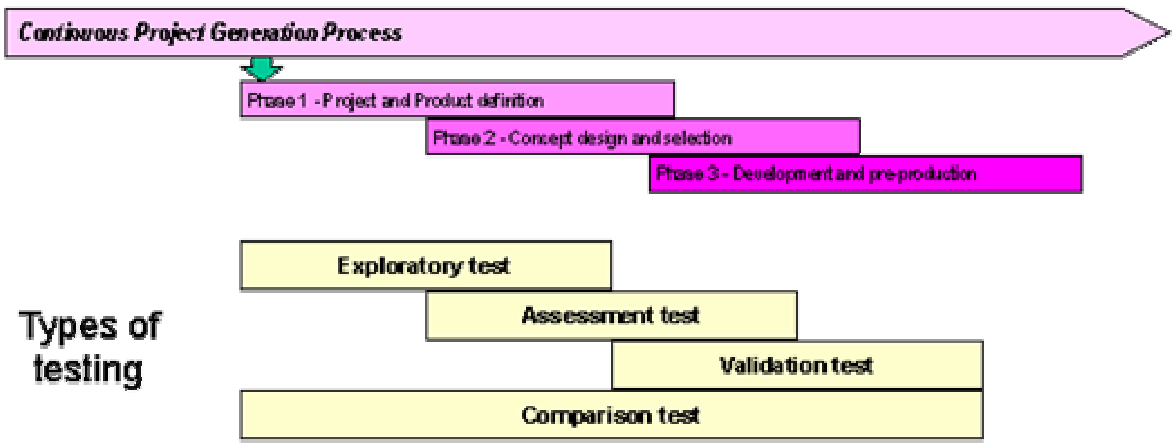
- Measure the effects of aging upon product quality (shelf-life studies).
- Implicitly measure the effects of price, brand name, or packaging upon perceived product performance/quality.
- Provide guidance to research and development in creating new products or upgrading existing products.
- Monitor product quality from different factories, through different channels of distribution, and from year to year.
- Predict consumer acceptance of new products.

While most product testing is conducted in the **food** and **beverage** industries, the concepts and methods of product testing are applicable to virtually all product categories, although the structure and mechanics of execution will vary greatly from product category to product category. For example, **computer software** can be tested, furniture can be tested, store environments can be tested, dog food can be tested, airline service can be tested, equipment prototypes can be tested, etc.

Competitive Advantage

The ultimate benefit of product testing is competitive advantage. **Product superiority** is the surest way to dominate a product category or an industry. Companies dedicated to product testing can achieve product superiority, and achieve a competitive advantage of great strategic significance. Companies that ignore product improvement and product testing, on the other hand, may wake up one morning to find themselves on the brink of extinction from a competitor who has built “a better mousetrap.”

6.2.2.2. How the main product testing methods are applied?



Exploratory tests

Carried out early in the development process during the fuzzy front end, when the problem is still being defined and potential solutions are being considered, preferably once the development team has a good understanding of the user profile and customer needs. The objective of the exploratory test is to examine and explore the potential of preliminary design concepts and answer some basic questions, including:

- What do the users think about using the concept?
- Does the basic functionality have value to the user?
- Is the user interface appropriate and operable?
- How does the user feel about the concept?

- Are our assumptions about customer requirements correct?
- Have we misunderstood any requirements?

This type of early analysis of concepts is potentially the most critical of all types of prototyping and evaluation, for if the development is based on faulty assumptions or misunderstanding about the needs of the users, then problems are almost inevitable later on. Data collection will tend to be qualitative based on observation, interview and discussion with the target audience. Ideally, the customer should be asked to use the product without training or prompting, to assess the intuitiveness of controls and instructions. Some quantitative measures may be appropriate, such as time to perform tasks, number of failures or errors.

Assessment tests

Whilst the exploratory test aims to explore the appropriateness of a number of potentially competing solutions, the assessment test digs into more detail with a preferred solution at a slightly later stage of development. The main aim of an assessment test is to ensure that assumptions remain relevant and that more detailed and specific design choices are appropriate. The assessment test will tend to focus on the usability or level of functionality offered and in some cases, may be appropriate for evaluating early levels of performance. Assuming that the right concept has been chosen, then the assessment test aims to ensure that it has been implemented effectively and answer more detailed questions, such as:

- Is the concept usable?
- Does the concept satisfy all user needs?
- How does the user use the product and could it be more effective?
- How will it be assembled and tested and could this be achieved in a better way?
- Can the user complete all tasks as intended?

Assessment testing typically requires more complex or detailed models than the exploratory test. A combination of analytical models, simulations and working mock ups (not necessarily with final appearance or full tooling) will be used.

The evaluation process is likely to be relatively informal, including both internal and external stakeholders. Data will typically be qualitative and based on observation, discussion and structured interview. The study should aim to understand why users respond in the way that they do to the concept.

Validation tests

The validation test is normally conducted late in the development process to ensure that all of the product design goals have been met. This may include usability, performance, reliability, maintainability, assembly methods and robustness. Validation tests normally aim to evaluate actual functionality and performance, as is expected in the production version and so activities should be performed in full and not simply walked through.

It is probable that the validation test is the first opportunity to evaluate all of the component elements of the product together, although elements may have been tested individually already. Thus, the product should be as near to representing the final item as possible, including packaging, documentation and production processes. Also included within validation tests will be any formal evaluation required for certification, safety or legislative purposes. Compared to an assessment test, there is a much greater emphasis on experimental rigour and consistency. It may be preferable for evaluation to be carried out independently from the design team, but with team input on developing standards and measurement criteria.

Data from a validation test is likely to be quantitative, based on measurement of performance. Normally, this is carried out against some benchmark of expected performance. Usability issues may be

scored in terms of speed, accuracy or rate of use, but should always be quantified. Issues such as desirability may be measured in terms of preference or user ranking. Data should also be formally recorded, with any failures to comply with expected performance logged and appropriate corrective action determined.

Comparison tests
A comparison test may be performed at any stage of the design process, to compare a concept, product or product element against some alternative. This alternative could be an existing solution, a competitive offering or an alternative design solution. Comparison testing could include the capturing of both performance and preference data for each solution. The comparison test is used to establish a preference, determine superiority or understand the advantages and disadvantages of different designs.

6.2.2.3. Case Study

A combination of validation and comparison tests from a Polish SME

Acoustic Testing of Automotive Exhaust Systems
ASMET was founded by Andrzej Szarski in 1989. Located in the Polish city of Czersk, some 250 km north-west of Warsaw, the company has grown rapidly from its origins as an automotive spare parts supplier to become a major European manufacturer of high quality **automotive exhaust systems**. ASMET has a production capacity of up to 250000 complete exhaust systems per year and remains privately owned. The **noise performance** of its exhaust systems has always been a focus area for ASMET. In 1999, the company purchased a complete Brüel & Kjær solution to measure and analyse the acoustic parameters of its products.

Fifteen Years of Growth. A Focus on Quality

With changes in its political structure, the late 1980s saw a boom in the importation of used cars into Poland. Spare parts from European manufacturers were expensive. To satisfy this growing demand, Andrzej Szarski founded ASMET in 1989. The company's vision was established at its birth. To design, develop and manufacture automotive spare parts with quality, durability and performance that are equal or superior to the OEM equipment from automotive manufacturers. After a short time, ASMET decided to concentrate its focus 100% on the production of exhaust systems, and its success over the last 15 years is a testament to Andrzej Szarski's decision.

The product range is wide with exhaust systems for over 600 different models in current production. These comprise more than 1000 different components. All design and development is in house, including the manufacture of production jigs. The flexible production lines enable both large and small batches of products to be easily and efficiently integrated together. About 250.000 complete exhaust systems are produced each year and there are facilities to manufacture up to 25.000 units per months at times of peak demand. ASMET employs nearly 90 people. The company is accredited to ISO 9001.

Miroslaw Bruski is ASMETs Managing Director. He has a Masters Degree in Engineering and joined the company in 2000. Miroslaw says, every month we add about **ten new models** to our product range, although there is still a demand for exhaust systems for older cars and we keep many in stock. Others can be produced on demand with short production runs from as few as 20 pieces. He continues, every year we receive a report from the SAMAR company that **monitors the automotive market in Poland**. The report provides us with information on which new cars are sold each year, and those that increase or reduce. From these figures, we analyse the market and decide for which models we should manufacture exhaust systems.

ASMET currently has about 20% of the market for replacement exhaust systems for cars and vans in Poland - more than any single competitor. Some 15% of the company's production is exported and ASMET is keen to expand this area of its business. For the last ten years, ASMET has exhibited at the automotive fair held annually in Poznan. In 2003, the company showed its products at Equip Auto in Paris and at Frankfurt in 2004. **New EU rules require that replacement exhaust systems sold in Europe must be tested**. Of ASMETs large production range, some 250 have been tested and a further 200 are in progress.

During its 15-year history, ASMET has acquired great expertise in manufacturing exhaust systems. Miroslaw says, our policy is to purchase original equipment exhaust systems and to then **thoroughly test and measure** them before starting the design and development of our replacement. The common opinion from our customers is that our exhaust systems have a very precise shape and fit easily, and this saves the repair workshops a huge amount of time and trouble.

Many vehicles now use catalysers to reduce emissions. We buy these components from a specialist manufacturer, add them to our complete exhaust systems, and sell the complete unit as a branded ASMET product. But it also works the opposite way and catalyser manufacturers often buy our components and then sell the complete unit as their own product.

To improve the durability, heat resistance, noise level and sound quality of its products, ASMET uses Owens Cornings Silentex. Muffler Filling System and glass fiber based Advantex® Muffler Roving, For some applications, polyethylene bags filled with continuous filament fibre glass wool are used.

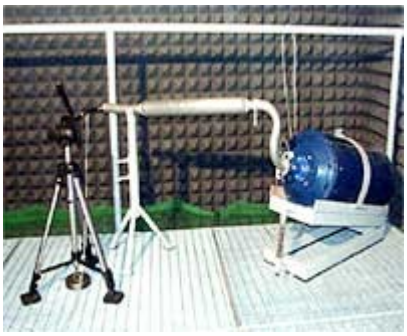
To design and develop an exhaust system, ASMET buys at least two complete units from the original equipment manufacturer. The units are carefully measured and CAD drawings produced. The aim is to achieve as close a shape to the original as possible. The next step is that acoustic measurements are made in the anechoic room. The unit with the best noise parameters is cut to reveal its construction and the interior dimensions are again measured and CAD drawings made.

Prototypes of the new design are made and these are thoroughly tested, both for their physical dimensions but also their acoustic properties. Subject to these being within the specified limits, the new model is released for production.

Miroslaw adds, But we can also develop our own designs based upon our years of experience. For instance, with one well-known and popular truck, we developed a new design of exhaust that gave a 6 dB reduction in cabin noise. To ensure consistent overall product quality and durability, the steel sheet and tube used by ASMET is imported. Manufacturers in Germany are the main sources.

Testing Acoustic Performance

Miroslaw says, we have always regarded the acoustic performance of our products as a critical factor. Our goal is to make our exhaust systems highly durable but also quieter than the original component, and this is reflected strongly in our marketing policy. The measured spectra of our products must be **equal or better** than those of the original part. Exhaust noise is becoming an ever-increasing issue in Poland and the **acoustic performance** of our exhaust systems is a **key market differentiator**. We always aim for the best possible noise performance. Every three months, each model of exhaust system is taken from the production line and batch tested for **dimensional accuracy and its acoustic parameters.** If high volumes of a particular model are ordered, batch testing is made at **more frequent** intervals. Miroslaw continues, Of course, many people, especially younger drivers, want their cars to sound right. So although we aim to manufacture exhaust systems with the lowest noise level, we also pay attention to the overall **quality of the sound**. We have a simple philosophy. Each and every customer must be 100% satisfied. We accept all complaints and offer a replacement exhaust without question. If the noise performance is the reason for a complaint, it is vitally important to fully investigate it, and **compare** the performance both to the OEM part and also other units taken from the production line.



6.2.3. Resources

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6.3. Production strategies

Introduction

The following text provides an SME production manager with the proper framework for better decision-making in the production context. There are a big number of different production methods and technologies available and each of them should be used and applied carefully by the manufacturing companies according to their special needs, type of product, production capacity, etc.
In addition when someone considers the complexity and scale of modern process manufacturing facilities, which can include massive process units outfitted with a variety of rotating and stationary equipment, plus large numbers of items requiring inventory, continuously changing demand models, etc it is easily concluded that decision-making in a production context **is basically a difficult problem of coping with large numbers** and with diversity of factors external or internal to the organisation. Therefore European SMEs should have a reference point on how to focus their managerial activity and their attention to implement better production strategies. It should be stated that most production strategies are supported by sophisticated software programmes such as MRP, MRPII, ERP, etc.

What is a production strategy?

The primary mission of production strategies is **planning the production schedule** within budgetary limitations and time constraints. They do this by analyzing the plant's personnel and capital resources to select the best way of meeting the production quota. Production strategies determine, often incorporating mathematical formulas, which machines will be used, whether new machines need to be purchased, whether overtime or extra shifts are necessary, and what the sequence of production will be. They monitor the production run to make sure that it stays on schedule and correct any problems that may arise.

Because the work of many departments is related, production managers work closely with heads of other departments such as **sales, procurement, and logistics** to plan and implement company goals, policies, and procedures. For example, the production manager works with the procurement department to ensure that plant inventories are maintained at their optimal level. This is vital to a firm's operation because maintaining the inventory of materials necessary for production ties up the firm's financial resources, yet insufficient quantities **cause delays in production**. Therefore a major component of a production strategy is **the inventory management and control.**

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6.3.1. Why are Production strategies important and where can they be applied?

Why Production strategies are important?

Some big manufacturing SMEs stock more than 500.000 distinct items in inventory. Retailers, such as department stores, carry about 100,000 goods for sale. A typical medium-sized manufacturing concern keeps in inventory approximately 10,000 types of raw materials, parts and finished goods.

Items produced and held in inventory can differ in many ways. They may differ in cost, weight, volume, colour or physical shape. Units may be stored in barrels, on pallets in cardboard boxes or loose on shelves. They may be perishable because of deterioration over time, perishable through theft and pilferage or subject to obsolescence because of style or technology.

Demand for items can also occur in many ways. Items may be withdrawn from inventory by the thousand, by the dozen or unit-by-unit. They may be substitutes for each other, so that, if one item is out of stock the user is manually willing to accept another. Items can also be a complement, that is, customers will not accept one item unless another is also available. Units could be picked up by a customer, or they may have to be delivered by company-owned vehicles or shipped by rail, boat, airplane or truck. Some customers are willing to wait for certain types of products while others expect immediate service on demand. Taking into account all the above considerations there is not a unified model for production strategy as there are many internal and external factors involved in a real production system and most of them uncontrollable.

Where Production Management could be applied?

Recent business success stories include many firms for whom production management is a strategic competitive weapon. Wal-Mart for example cut warehouse inventory to a minimum allowing (and sometimes forcing) suppliers to manage shelf inventory at the store level. It is no surprise that many competitors **have closed their doors**.

One lesson that arises from comparative research among several industries regarding production management importance is that top-managers of successful firms are directly involved with setting aggregate inventory and production planning policies. They **rightly consider** it an **integral part** of corporate strategy.

- Managers at a chemical firm somewhat set an inventory budget for each plant. Needles to say, every plant manager allowed inventories to grow to that level, **without considering** the benefits of inventory reduction.
- The owner of a mid-sized manufacturing firm directed his managers to reduce inventory by one-third, across the board. What he missed was the consequences for **customer service**. Investigation revealed that inventories could, in fact, be reduced without sacrificing service, but by significantly **less** that one third.

Clearly to properly recommend an inventory management or production planning and scheduling system, we need to know **more than the industry in which a firm operates**. We need to understand the attitude of top managers toward these issues and we need to be prepared to patiently work to establish the necessity of change and the magnitude of the benefits.

6.3.2. How should the management select a production process?

How management should select a production process and where should they focus according to the process selected?

Table 1 provides a framework for different production processes including a subset of **crucial characteristics** of these different processes. The important point is that **management's focus in different production process should differ**.

Table 1

Characteristics	Job-Shop	Line Flow/Batch	Assembly Line	Continuous Flow
Material Requirements	Difficult to predict	More predictable	Predictable	Very predictable
Control over suppliers	Low	Moderate	High	Very high
Vertical Integration	None	Very little	Some backward often forward	Backward & forward
Raw Materials	Small	Moderate	Varies, frequent deliveries	Large, continuous deliveries
Finished goods	None	Varies	High	Very high
Quality control responsibility	Direct Labour	Varies	QC specialists	Process control
Production information requirements	High	Varies	Moderate	Low
Scheduling	Uncertain, frequent changes	Frequent expending	Process design around schedule	Inflexible sequence dictated by technology
Operations challenges	Increasing labour and machine utilisation, fast response, breaking bottlenecks	Balancing stages, designing procedures, responding to diverse needs	Rebalancing line, productivity improvement, adjusting staffing levels	Avoiding down time, timing expansions, cost minimisation

Process flow	No pattern	A few dominant patterns	Rigid flow pattern	Clear & inflexible
Typical size	Usually small	Moderate	Often large	Large
Type of Equipment	General purpose	Combination of specialised & general purpose	Specialised, low or high tech	Specialised, high tech
Definition of Capacity	Fuzzy, often expresses in €	Varies	Clear in terms of output rates	Clear expressed in physical terms
Capacity addition	Incremental	Varies	Requires rebalancing	Requires synchronisation
Bottlenecks	Shifting frequently	Shifting often but predictable	Generally known and stationary	Known and stationary
Speed (unit/day)	Slow	Moderate	Fast	Very fast
Run length	Very short	Moderate	Long	Very long
Process changes required by new products	Incremental	Often incremental	Incremental or radical	Always radical
Number of customers	Many	Many but fewer	Less	Few
Number of products	Many	Fewer	Fewer still	Few
Typical factory size	Usually small	Moderate	Often large	Large
Level of automation	Low	Intermediate	Low or high	High
Speed (Units/day)	Slow	Moderate	Fast	Very fast
Nature of maintenance	As needed	As needed or preventive when idle	As needed	Shutdown

Process changes required by new products	Incremental	Often incremental	Incremental or radical	Always radical
Marketing characteristics	Features of the product	Quality and features	Quality & features or availability/price	Availability/price
By-products	Few	Few	Few	More
Need for traceability	Little	Intermediate	Little	High
Capital versus labour/material intensive	Labour	Labour & material	Material & labour	Capital

6.3.3. How decisions in a production context should be made?

In this section a unified framework for production decision-making is provided. The framework applies across a variety of processes, but managers should **emphasize different decisions**, depending on the process type under consideration. In continuous process a paramount issue should be the coordination of items at a single bottleneck operation, to achieve a high capacity utilisation as possible. In contrast in assembly processes the primary concern should be the appropriate coordination of raw materials, components, and so forth, across multiple stages of production. Batch flow operations may have a single bottleneck, and thus managers should focus on managing that resource. Alternatively, they may have a strong similarity to assembly process so that material coordination should be the key management focus. Job shops tend to have moving bottlenecks, and often have few components and materials, so that the important issue is short-term scheduling.

Anthony (1965) proposed that managerial activities in a production context fall into three broad categories., whose names have been somewhat modified over the years to become **strategic planning**, **tactical planning** and **operational planning**.

Strategic planning

Strategic (or long-range) decisions of relevance to the production area (but with important interactions with other functional areas) included which products to produce, on which of the dimensions of cost, quality, delivery and flexibility to compete; where to locate facilities; what production equipment to use; and long-range choices concerning raw materials, energy and labour skills.

Tactical planning

Tactical (medium-range) plans, with a planning horizon from six months to two years into the future, take the basic physical production capacity constraints and projected demand pattern, established by a long-range plan, and ration available resources to meet demand as effectively and as profitable as possible. Even though basic production capacity is essentially fixed by long-range considerations, production capacity can be increased or decreased within limits in the medium term. A decision can be made to vary one or more of

the following: the size of the work force, the amount of overtime worked, the number of shifts worked, the rate of production, the amount of inventory, the shipping modes and possibly the amount of sub-contracting utilised by the company. These plans, in turn, constrain but provide stability to what can be done at the operational level.

Operational planning

Operational (short-term) activities provide the day-today flexibility needed to meet customer requirements on a daily basis within the guidelines established by the more aggregate plans discussed above. Short-range operating schedules take the orders directly from customers, or as generated by the inventory system and plan in detail how the products should be processed through a plant. In most cases detailed schedules are drawn up for one week, then one day and finally one shift in advance. The schedules involve the assignment of products to machines, the sequencing and routing of orders through the plant, the determination of replenishment quantities for each stock keeping unit and so on.

Summary of Anthony's hierarchy applied to the production function

Category of activity	**Strategic**	**Tactical**	**Operational**
General types of decisions	Plans for acquisition of resources	Plans for utilisation of resources	Detailed execution of schedules
Managerial level	Top	Middle	Low
Time horizon	Long (2+ years)	6 to 24 months	Short range
Level of detail	Very aggregated	Aggregated	Very detailed
Degree of uncertainty	High	Medium	Low
Examples of variables under control of management	Products to sell, on which dimension to compete, sizes and location of facilities, nature of equipment (for example, general purpose versus specialised; long-term raw material and energy contracts; labour skills needed, nature of production planning and inventory management decision systems	Operation hours pf plants, work force sizes, inventory levels, subcontracting levels, output rates, transportation modes used	What to produce (procure), when, on what machine (from which vendor), in what quantity and in what order, order processing and follow up, material control

6.3.4. Case studies

Case study 1: Tyre Manufacturer Drives Improved Inventory Management System

Overview
A tyre manufacturer decided to update their green tyre inventory system to improve operations and production efficiency. The current system for inventory and scheduling tyre-building machines used a basic Excel spreadsheet that was in use for some time and was a conglomeration of personal theories, formulas, and ideas on how best to schedule tyres for machines. The spreadsheet was handfed data from manual tyre counts. The new system will automate data collection to allow better management of machines, shifts, and teams while allowing efficient reporting tools with real-time views of all production phases.

Solution

The tyre company with the help of external consultants built a solution to monitor and manage the current tyre inventory. The system takes cycle counts from tyre building and curing machines and uses these counts to modify the current green tyre inventory levels for all tyre codes. Operators, tyre codes, tyre types, tyre sizes, and build schedules are assigned from a system interface or an Oracle RDB database. The system also allows inventory levels to be adjusted after manual inventory level counts.

How The Customer Benefited

The customer now has a system that utilizes real-time data for accurate planning and reporting while allowing confident scheduling of machines, shifts, and teams in the plant. Productivity has increased, data collection is now automated and less costly, and the system is designed for future scalability.

Case study 2: Large Engine Manufacturer Revs Up Tracking System

Overview
A large engine manufacturer was forced to locate and recall a number of engines due to defective components. The recall was a difficult and costly process. In addition to the recall, the manufacturer had difficulty tracking the material back to the forger batch or production process that caused the defect. The manufacturer concluded it was necessary to track engine components to avoid similar issues in the future.

Solution

The engine manufacturer with the help of external consultants designed a solution with a multi-tiered software architecture that abstracts the functionality according to the business requirements. Each tier of the solution addresses a unique responsibility. The solution provided a lean custom manufacturing execution system that was able to serialise and track engine connecting rods by capturing information about the batch and die from the forger and relating this information with production process information thus enabling the manufacturer to see a complete genealogy for each part. Finally the solution related this information with information about the engine and cylinder number that each specific rod was assembled in. The solution included only the functionality that was explicitly essential for the rod and engine tracking.

Benefits to the customer

The manufacturer now has the ability to retrieve precise information about what rods are assembled in which engine, this can be done by a variety of different criteria, such as time, forger batch, operator, etc. Information about the processing of rods including various data collection is used by the opera-

tions management to coordinate and plan work. The engineering quality group is using information collected by the system to optimise and improve production processes. The system also enforces manufacturing processing rules, so that human error can be minimised and the quality improved. Finally the system provided automated scrap and rework tracking, which was previously done manually.

6.3.5. Resources

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6.4. Recycling Strategies

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6.4.0. Introduction

Recycling has become an increasingly important part of our more modern society. In this text recycling is not examined from the public but from a business perspective. Recycling in manufacturing sectors has opened new ways either for direct profit-making (recycling companies) or for indirect profit-making by providing companies with financial benefits in terms of lower production cost or cheaper raw materials from re-used items, etc.

To begin a recycling programme, a company must answer some basic questions, consider all the involved cost factors and analyze its waste stream. The aim of this text is to provide SMEs managers with a basic understanding of all crucial factors which should be considered, and steps that should be followed in order to get them prepared for implementing recycling.

What is recycling?

Recycling is a process where materials are collected, processed and remanufactured into new products or used or re-used as a raw material substitutes. A material is "used or reused" if it is used as an ingredient in an industrial process to make a product **or** if it is used as an effective substitute for a commercial product.

Why Recycling is important?

Western Europe currently produces over 150 million tonnes of solid material waste annually. At present over 80% of this is land filled. In the UK, the Landfill Directive has specified that this should be reduced to 35% by 2010. In addition to this, European Directives on packaging waste, automotive materials, and materials from electrical and electronic equipment are all driving the requirement for a rapid increase in the rates of recycling, into ever-more complex areas. It is estimated that the annual economic value of the recycling industry will soon reach over **£1 billion** in Western Europe. As the amount of economic activity related to recycling will grow immensely and as political and social push will increase for all, manufacturing industries will be responsible for the disposal of their products, and so the need for the employment of recycling strategies has become of great importance for many industrial sectors.

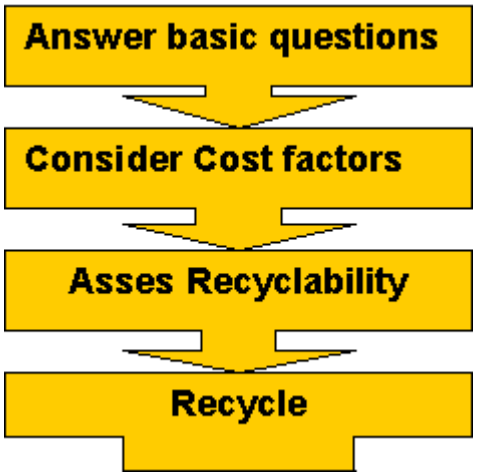
Where Recycling could be applied?

More and more of today's products are being manufactured with total or partial recycled content. Common household items that contain recycled materials include newspapers and paper towels; aluminium, plastic, and glass soft drink containers; steel cans; and plastic laundry detergent bottles. Recycled materials also are used in innovative applications such as **recovered glass in roadway asphalt** (glassphalt) or recovered plastic in carpeting, park benches, and pedestrian bridges. Manufactured using wood waste from the furniture and cabinetry industry and recycled plastic grocery bags or milk jugs, plastic lumber can be used to construct recreational furniture, decks, and even bridges.

6.4.1. How is a Recycling Strategy formed?

How a Recycling Strategy is formed?

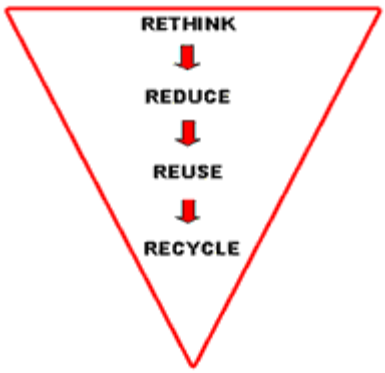
Recycling might be used for many products or by-products as well as from many different sectors. In addition there are many technologies available for recycling purposes as well as expert consultants in several recycling areas. According to the above context, the following paragraphs provide a **general framework** of actions and major issues for any company interested in recycling.



Basic questions

The following exploratory framework provides a good **starting point** before any business decision is made for recycling. The aim is to investigate the financial feasibility of recycling and to explore in this preliminary stage **if and how** the recycling team should continue:

Draw up a profile of the product's current end-of-life system



Who owns the product?

What kind of ownership is involved?

What is the price?

How big is the product?

What is the average life of the product?

What is the weight of the product?

Analyze the main reasons why users dispose of the product

Is the product disposed of because of technical failure?

Is the product sensitive to trends?

Are there new products on the market, which offer more features?

Determine what legislation and regulations affect the end-of-life system

To what extent is the manufacturer responsible for the end-of-life phase?

Does a take-back obligation already exist for discarded products?

How can the costs of returning an processing the product be financed?

What rules and prices apply with regard to product reuse, material recycling, incineration and dumpin of residual wastes?

Contact the suppliers

Due to specialised expertise, suppliers can usually achieve sub-assembly reuse, recycling more efficiently than the OEM (**O**riginal **E**quipment **M**anufacturer)

Establish how the product can be collected (possible ways)

Consumer return system via recycling center

Pick-up from last user

Return system via retailers

Determine who is going to recycle or process the product

Should the product be processed in house?

Should a third party process the product?

Select the most efficient end-of-life system

Use the answers to the preceding to establish an end-of-life scenario

Due to the uncertain nature, consider establishing several scenarios

Some trends to keep in mind:

Users will think twice before discarding products

Governments will develop more regulations

The processing industry will become more effective

Technological options will be expanded, especially in mechanical waste processing

Market for recycled materials will improve

Incineration and burial of waste will be subjected to more regulations and become more expensive

Basic Cost Factors in Recycling

The basic idea in recycling is that we want to make recycling profitable: Profit = Revenue – Cost

Revenues are obtained from:

- High value (high demand), undamaged recovered reusable components.
- Additional processing (cleaning, inspection, upgrading, reassembly, and redistribution) adds to costs.
- High value, uncontaminated scrap materials.
- Any contamination, which reduces material properties depreciates the material value.
- Energy recovered and sold from incineration or pyrolysis.
- Lowest revenue of all.

Common Cost Factors

- Buy back of product (€/product)
- Dependent on condition and value of product type.
- Transportation costs (€/km)
- May also be dependent on weight and damage tolerated.
- Tip/storage fees (€/product), also for land filled residue.
- Strongly influenced by location of facility and local legislation.
- Labour cost (€/hour)
- Dependent on level of skills required and location.
- Equipment investment cost (€)
- Influenced by need for special (expensive) equipment.
- Equipment operating cost (€/car, €/hr)
- Time necessary to recover parts and materials (hr/product). This cost factor is strongly **influenced by product design.**

6.4.2. Recyclability Assessment

To make a recyclability assessment, **a four-step approach** should be followed:

1) Data collection (identify the components, materials, and fastening mechanism in the assembly to be rated).

General: Most, if not all, of the information can be obtained from the **Bill of Materials** (BOM).

Materials: A proper identification of the materials used in a component is essential because these materials define its **recyclability**. Surface treatments (like paints, varnishes) and bonding agents (glues) must also be identified because of their potential to contaminate materials (especially plastics) to be recycled. In some cases, one percent contamination is enough to ruin a batch of high grade plastics for recycling.

Fasteners: A proper identification of fastening mechanisms is important because these largely define the separation process needed in case two components need to be separated for recycling. Permanent connections (like welds, heat stakes) almost always require some form of mechanical separation. Non-permanent mechanical connections (like bolted joints, screws) allow for manual as well as mechanical separation. The fastener material and coatings need to be evaluated as well, because it may need separation to avoid contamination.

2) Rate the components according to the rating scheme.

The calculation used to evaluate vehicle **recyclability** is based on two ratings for each component:

- A recyclability rating, and

- A material separation rating

Rating Scales:

A rating of 1 is the best.

A rating of 1, 2, or 3 for both recyclability and separability is considered acceptable for the European market and should be strived for.

Ratings of 4, 5, and 6 are considered poor.

In contrast, the United States Federal Trade Commission (FTC) rules are stricter. At the moment, the FTC only considers products/component with a recyclability rating of 2 to be called recyclable.

Material Recyclability and Part Remanufacture Categories

Category	Recyclability	Separability
1	Part is remanufacturable – Example: starter, transmission	Can be disassembled easily, manually. Approximate disassembly time is one minute or less. Example: "A" pillar trim cover
2	Recyclable – infrastructure and technology are clearly defined. Part is completely recyclable, infrastructure clearly defined and functioning. Example: Body sheet metal.	Can be disassembled with effort, manually. Component may contain compatible coatings or adhesives. Approximate disassembly time is one to three minutes. Example: fan shroud.
3	Technically Feasible, infrastructure not available. Collection network not defined or organized, technology for material recycling has been established. Example: Plastic interior trim.	Disassembled with effort, requires some mechanical separation or shredding to separate component materials and parts. Component may contain non-compatible coatings or adhesives. *The process has been fully proven.* Example: seat assembly, windshield glass
4	Technically feasible, but further process or material development is required. Technology has not been commercialized. Example: Backlite glass	Disassembled with effort, requires some mechanical separation or shredding to separate component materials and parts.

		Component may contain non-compatible coatings or adhesives
5	Organic material for energy recovery that cannot be recycled. Known technology/capacity to produce energy with economic value. Example: Tires, rubber in hoses.	Cannot be disassembled. No known technology for separation. Example: heated backlight glass
6	Inorganic material with no known technology for recycling. Recycling technology not known.	

Tip: Category 3 is a prediction of materials that are *technically feasible* to recycle

3) Calculate the percentage recyclability by weight.

The recyclability for an entire assembly is calculated on a “percent recyclability by weight” basis.

The weights of all components with a recyclability rating of 1-3 and a separation rating of 1-3 are summed. The resulting weight number is then divided by the total weight of all components in the assembly. The subsequent number represents the percentage (by weight) of the assembly that is technically feasible to recycle. The calculation provides a quantitative value, but the additional discussion of the good and bad points of the system and/or components is, in general, much more informative than this value.

4) Identify areas for improvement.

In general, any components with recyclability and/or separability ratings of 4 are immediate candidates for improvement, especially if a component’s recyclability rating is 3 but its separability rating is 4. Furthermore, components with a relatively large weight should be investigated first since they provide the (potential) highest increase in percent recyclability by weight.

6.4.3. Some Practical Recycling Strategies

Waste Stream Segregation

When waste streams are segregated or kept apart at the process level, they do not contaminate each other and create a single large problem. Plan managers can draw process waste diagrams and identify where large mixed waste streams are created, and consider the options for managing the waste streams separately.

Closed-Loop Recycling

Segregated waste streams can sometimes be recycled directly back into the process through a closed-loop system, thereby eliminating all waste from the process step.

Re-Use

Often, wastes can by re-used elsewhere in a factory, or even by nearby businesses, without treatment. Cooling waters and non-toxic cleaning waters can almost always find other uses. Company managers can identify ways to capture and store reusable wastes.

Recycle

Sometimes wastes must be re-processed to recycle them. For example, evaporators can recover almost all the water from some waste streams and the water can be reused. Simple technologies such as distillation and filtration should be explained.

Exchange

It may be possible for a business to give wastes to **others** who can use them. Managers from different companies can list their waste types and discuss other industrial uses for them.

Other strategies to convert or process wastes into profitable materials

By-Product Recovery

If waste streams contain potentially valuable materials, recovering the materials before final treatment may be cost-effective by offsetting the cost of treatment chemicals. Recovered materials can be re-used or sold. Recycling teams should consider the value of raw materials in the waste streams.

Waste Conversion

Additional processing can turn an existing waste stream into a brand new product. Many examples should be used here.

6.4.4. Benefits and Success Factors of Recycling

Benefits of Recycling

Empirical evidence suggests that by practising waste prevention, reusing products, recycling, businesses can cut costs and increase profits. Cost savings take the form of:

- Lower waste disposal costs and lower waste treatment costs;
- Lower energy costs;
- Savings on materials and supplies;
- A reduction in regulatory compliance costs;
- Lower storage costs and cost recovery through the sale of recyclable materials;

At the same time, recycling can improve: Production efficiency, Profits, Good neighbour image, Product quality and Environmental performance

Success Factors

1. Support and/or programme champion at **management level.**
2. Team with representatives from the **shop floor, engineering, office and management**.
3. Encourage all staff to participate in identifying opportunities and implementing changes in processes.
4. Benchmarking current use of resources through 'input > process > output' analysis.
5. Identify opportunities to 'reduce, reuse and recycle' resources.
6. Champion changes in processes to achieve identified opportunities.
7. Benchmark changes in resource use to identifying savings in resource purchasing (energy, water, materials), and reductions in 'waste disposal'.
8. Identify new opportunities to 'reduce, reuse and recycle' resources.
9. Involve the **Suppliers**: Suppliers need to be involved as well because of outsourcing in modern companies and one big issue is how to get **not only** the products from the supplier but also the **necessary information.**

6.4.5. Case Study

Case Study: Evergreen

Evergreen is a small, privately owned Bradford-based company that has developed a range of yarns, fabrics and finished products using a high proportion of **recycled wool fibre**. Although natural textile fibres such as wool are considered more environmentally friendly than their synthetic counterparts, the production and transportation of wool and its processing into a finished garment consume relatively large amounts of energy. However by using recycled fibre rather than new wool, a large proportion of this energy is saved as the recycled waste has already undergone several of the most energy-intensive processes and these **do not need to be repeated**. As well as the energy savings, other cost savings can be achieved because of the lower price paid for recycled fibre in comparison with new fibre.

The cost saving arising from the reduced amount of energy used in processing recycled fibre as opposed to new wool is **£0.20/Kg.** The cheaper price of purchasing recycled fibre and the fact that there are no dyeing costs (it is already dyed) means additional savings **of £2.75/Kg**. In 1992 total savings resulting from reduced energy use and the cheaper price of the recycled wool amounted to **£297,860.**

Using recycled wool has other significant environmental benefits. Fresh water consumption and effluent production are greatly reduced because processes such as raw wool scouring and dyeing do not need to take place. Old woolen garments are usually dumped in landfill sites where they decompose to produce methane, a gas that contributes to the climate change. Recycling wool means that this methane production is avoided.

6.4.6. Resources

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Links

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- http://www.ecorec.gr/ Ecological Recycling Society in Greece
- http://www.wrap.org.uk/ Waste & Recources Action Programme (training programme for recycling managers

7. How to protect innovations and intangible assets

Introduction

The following text will provide the reader with practical guidelines about all the available Intellectual property (IP) protection tools and how he/she could use it in order to have the best possible protection. Effective Intellectual Property management enables companies to use their intellectual property assets to improve their competitiveness and strategic advantage. Acquiring IP protection is a crucial initial step, but effective IP management means more than just protecting an enterprise's inventions, trademarks, designs, or copyright. It also involves a company's ability to commercialize such inventions, market its brands, license its know-how, conclude joint ventures and other contractual agreements involving IP, and effectively monitor and enforce its intellectual property rights. Indeed, a company's portfolio of IP must be viewed as a collection of key assets that add significant value to the enterprise.

Why innovations protection is important?

Many new products or services embody different types of intellectual property. Forward-looking enterprises face the challenge of extracting the latent value of their IP and using it effectively in their business strategy. Companies that dedicate time and resources to protecting their intellectual property assets can increase their competitiveness in a variety of ways. In addition, enterprises, which search systematically for conflicting IP rights of others prior to seeking IP protection, are able to avoid unnecessary litigation, thereby saving time and resources.

Where Innovation protection could be used?

For manufacturers protection of new ideas and innovations by way of patents, copyrights and trademarks (collectively, "intellectual property," or "IP") is critical for survival. Smaller companies, in particular, must protect their new ideas and innovations to increase their financial worth and, hopefully, compete with larger manufacturers.

SMEs can also benefit from the wealth of technological and commercial information available in patent and trademark databases to learn about recent technological breakthroughs, identify future partners, and find out about the innovative activities of competitors. Managing IP effectively and using it to devise business strategies is an increasingly critical task for entrepreneurs worldwide. Intellectual property protection helps in:

- preventing competitors from copying or closely imitating a company's products or services;
- avoiding wasteful investment in research and development (R&D) and marketing
- creating a corporate identity through a trademark and branding strategy
- negotiating licensing, franchising or other IP-based contractual agreements
- increasing the market value of the company
- acquiring venture capital and enhancing access to finance
- obtaining access to new markets

7.1. Intellectual Property Protection tools

Introduction

In the following paragraphs the main Intellectual Property tools are presented. The reader will be able to learn what each of these protection tools provide, how the are obtained, what is their period of protection and how they could be used to strengthen the innovation potential of an SME. As most of these tools are governed by national, European or in some times international laws, which are changing continuously, SMEs managers are advised to keep good contacts with the national I.P regulating offices in order to be informed about each change on time.

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7.1.1. What are the main IP protection tools?

PATENTS

Patents are concerned with inventions - **new** and improved products and processes containing a **new principle or idea** that are capable of **industrial application**. A patent is a monopoly granted by a state to the first inventor of a new invention, in return for a full disclosure of the invention.

TRADE MARKS

Trademarks are concerned with **brand identity** – they can be distinctive words, marks or other features the purpose of which is connect, in the mind of the customer, a link between the particular goods or service and the manufacturer/supplier. A trademark is a sign by which a business identifies its goods or services and distinguishes them from the products or services supplied by other businesses.

COPYRIGHT

Copyright is concerned with **new (original) literary, musical or artistic works**. The creators of such works **automatically** acquire rights, which mean that they can control their further use. Copyright has become particularly important because of the wide range of works that are now seen to be covered by it. These include computer software; any drawing, map, chart or plan; photographs and films; architectural works; sculptures; sound recordings; tv and radio broadcasts etc. Rights are related not just to the originators of the works themselves but apply also to people performing the works.

DESIGNS

Designs are concerned with the **appearance of a product** – features of e.g. shape, configuration, texture or materials not dictated by functional considerations. A design means the appearance of the whole or part of a product. It may consist therefore of three-dimensional features, such as the shape, texture or surface of an article, or of two-dimensional features, such as patterns, lines or colour. Traditionally it was seen as the quality that made an article appeal to the eye of a customer. However features having no particular eye appeal may be registrable.

7.1.2. Why each of the protection titles is important?

PATENTS

A patent owner has the right to decide who may - or may not - use the patented invention for the period in which the invention is protected. The patent owner **may give permission** to, or **license**, other parties to use the invention on mutually agreed terms. The owner may also **sell** the right to the invention to someone else, who will then become the new owner of the patent. Once a patent expires, the protection ends, and an invention enters the **public domain**, that is, the owner no longer holds exclusive rights to the invention, which becomes available to commercial exploitation by others.

Patents provide **incentives** to individuals by offering them **recognition** for their **creativity** and **material reward** for their marketable inventions. These incentives encourage **innovation,** which assures that the **quality of human life** is continuously enhanced.

TRADE MARKS

In a larger sense, trademarks promote initiative and enterprise worldwide by rewarding the owners of trademarks with recognition and financial profit. Trademark protection also hinders the efforts of unfair competitors, such as counterfeiters, to use similar distinctive signs to market inferior or different products or services. The system enables people with skill and enterprise to produce and market goods and services in the fairest possible conditions, thereby facilitating international trade.

COPYRIGHT

Copyright and its related rights are **essential to human creativity**, by giving creators incentives in the form of **recognition** and **fair economic rewards**. Under this system of rights, creators are assured that their works can be disseminated without fear of unauthorized copying or piracy. This in turn helps increase access to and **enhances the enjoyment of culture, knowledge, and entertainment** all over the world.

Copyright notice should be placed on all published works for the following reasons:

- It informs the public that the work is protected by copyright (and thereby helps to scare aware potential infringers);
- It prevents a party from claiming the status of "innocent infringer", which may allow a party to escape certain damages under the Copyright Act; and
- it identifies the copyright owner and the year of first publication (so that third parties will know who to contact to request a license to the work).

DESIGNS

Protecting industrial designs helps **economic development**, by encouraging creativity in the industrial and manufacturing sectors, as well as in traditional arts and crafts. They contribute to the expansion of commercial activities and the export of national products.

Industrial designs can be relatively **simple and inexpensive** to develop and protect. They are reasonably accessible to small and medium-sized enterprises as well as to individual artists and craftsmen, in both industrialized and developing countries.

7.1.3. Where each of the protection titles could be used?

PATENTS

Patented inventions have, in fact, **pervaded every aspect of human life**, from electric lighting (patents held by Edison and Swan) and plastic (patents held by Baekeland), to ballpoint pens (patents held by Biro) and microprocessors (patents held by Intel, for example).

All patent owners are obliged, in return for patent protection, to **publicly disclose information** on their invention in order to **enrich the total body of technical knowledge** in the world. Such an ever-increasing body of public knowledge promotes **further creativity** and **innovation** in others. In this way, patents provide not only protection for the owner but valuable **information** and **inspiration** for **future generations** of researchers and inventors.

TRADE MARKS

For most small and medium-sized enterprises (SMEs), marketing products or services is a major challenge. A marketing strategy should establish a clear link between your products or services and your SME, as the producer or provider of such products or services. That is to say, customers should be able to distinguish, at a glance, between your products or services and those of your competitors and associate them with certain desired qualities.

Intellectual property, when efficiently used, is an important tool in creating an image for your business in the minds of your current and potential customers and in positioning your business in the market. IP rights, combined with other marketing tools (such as advertisements and other sales promotion activities) are crucial for:

Differentiating your products and services and making them easily recognisable

- Promoting your products or services and creating a loyal clientele
- Diversifying your market strategy to various target groups
- Marketing your products or services in foreign countries

COPYRIGHT

Is your enterprise involved in the creation, recording, publication, dissemination, distribution or retailing of artistic, musical or literary works? Does your company have a website, a brochure, a corporate video, or does it advertise in newspapers or on TV? Is your SME using music, pictures, or software products owned by others in any of its publications, brochures, databases or websites? Does your company own the rights to any computer software? If you answered “yes” to any of the above, then you may wish to find out more about copyright issues.

Once you have a clearer picture on the basics of copyright protection you may wish to know what your SME should do to:

a. Legitimately use or exploit the works or creations of others with the authorisation of the author or right holder on fair and reasonable terms;
b. Protect your own works or creations and make sure you make best use of your right and get fair economic rewards from any use made of your creations

DESIGNS

Industrial designs are what make an article **attractive** and **appealing**; hence, they add to the **commercial value** of a product and **increase its marketability**. When an industrial design is protected, the **owner** - the person or entity that has registered the design - is assured an exclusive right against **unauthorised copying or imitation of the design** by third parties. This helps to ensure a fair return on investment. An effective system of protection also benefits **consumers and the public at large**, by promoting fair competition and honest trade practices, encouraging creativity, and promoting more aesthetically attractive products.

7.1.4. How to obtain a PATENT?

Patents are generally concerned with the functional and technical aspects of products and processes. To qualify for patent protection an invention must be **novel** and contain an **inventive step**.

Novelty implies that the details of how the invention works are secret. If such details have been publicly disseminated or the invention used in public where people could see how it works or if an identical product or process has already been invented then the application will fail.

An **inventive step** means that if a person with average knowledge of the technical field were presented with the problem the solution would not be obvious.

An invention must also be **industrially applicable**.

Not everything that is “new” can be patented however!

Most European countries laws follow the European Patent Convention (EPC)*)* in providing that a **patent cannot be obtained for:**

- Discoveries, scientific theories and mathematical methods,
- Artistic creations,
- Schemes, rules and methods for performing mental acts, playing games or doing business and programs for computers,
- Presentations of information,
- Methods for medical treatment of humans and animals (as opposed to medical products)
- Inventions which are contrary to public order and morality
- Plant or animal varieties or essentially biological processes for the production of plants or animals.

How does one obtain a patent?

In the first instance one applies to ones national Patent Office. Some countries offer different forms of patents depending on level of inventiveness. Here you can find a list of all the *European National Patent Offices*.

Disclosure

Take care not to disclose your invention publicly prior to applying for a patent. To get a patent your invention must be new and premature disclosure of the invention may mean that you will be unable to obtain a patent registration as this may prevent you from obtaining registration. Discussing your invention with your immediate fellow researchers, business partners and professional advisers would normally be regarded as implicitly confidential and would not prejudice a subsequent patent application. In cases of doubt however a written confidentiality agreement should be drawn up and signed.

Applying for a Patent

A patent application, made on the appropriate form and filed a National Patent Office or at one of the provincial delegate Offices, must be accompanied by the following:

In case of inventions

- A description including a short abstract, the specification, claims and any drawings;
- A certificate of payment of the State grant fees.

In case of utility models

- A description including the claims;
- The drawings, which may be replaced by photographic reproductions or by two-dimensional samples;
- A certificate of payment of the State grant fees.

7.1.5. How to obtain a TRADEMARK?

What can be registered as TRADEMARK?

Any sign capable of being represented graphically. Thus marks may be one or a combination of words (including slogans), letters, and numerals. They may consist of drawings, symbols, and three- dimensional signs such as the shape and packaging of goods, audible signs such as music or vocal sounds, fragrances, or colours.

What are the requirements for registering a trademark?

- A mark must be distinctive meaning that a customer seeing the mark can immediately link the goods or service to a particular manufacturer/supplier. Thus commonly used words are generally not acceptable except in a slogan.
- A mark must not be deceptive. It must not be too similar to an existing mark.
- A mark must not be descriptive. It cannot describe the product or service.
- Certain things are excluded e.g. photographs/drawings of or names of people or places unless they can be shown to be particularly distinctive.
- Trademarks legislation provides for various classes of goods and services. One may therefore seek registration only for a particular class and the requirements may therefore apply only in respect of other marks in that class.

Requirements for Trademark Registration

If one distinctive sign is to be registered as a trademark, it must satisfy the following requirements:

NOVELTY: i.e. the absence from the market of goods and services distinguished by an identical or similar sign. Novelty is not, however, lacking when the earlier mark expired over two years previously (three in the case of a collective mark) or lapsed because it was not used for over five years;

DISTINCTIVE CAPACITY: the capacity to distinguish a product or service from that of others;

PUBLIC ORDER: conformity with public order and morality.

Using Your Trade Mark

Registrations can be cancelled if the holder **is not using a mark**. It is important therefore to indicate on goods or services that the mark is a registered one. The letters RTM are normally used in association with the mark to show this.

Examples of well-known Trademarks are: **Guinness, Coca-Cola, Toyota and Shell**.

7.1.6. How to obtain COPYRIGHT?

Copyright is about the right to copy. Copyright legislation deals with the rights of creators of original works to control their subsequent versions.

What is covered by Copyright?

Definitions of what is covered can be very broad. For example literary works include software, and artistic works include any drawing, map, chart or plan. The only absolute requirement is that the work is new, i.e. not copied from somewhere else and has required original intellectual effort by the author.

How does one acquire copyright?

Basically the act of creating the work also creates the copyright, which then subsists in the physical expression of the work. There is no formal registration process in most countries. However if one goes to court to sue an alleged infringer one must be able to prove ownership. Works can therefore be dated, signed, witnessed and marked with the internationally recognised copyright symbol ©.

Ownership normally rests with the creator but there can be situations e.g. employment contracts etc. which affect this.

It is important also to recognise that copyright is not a monopoly. Two people could completely independently create identical items. Provided there is no copying, there is no infringement and both can hold copyright in their respective works.

Obtaining Protection – Copyright protection is **automatic** and there is **no registration system** - so there are no forms to fill in and no fees to pay. Once a work is created copyright subsists in it. It is important however that the originator be able to show subsequently when the work and the consequential copyright were created. One way of doing this **is deposit a copy of the work with a bank or**

solicitor in such a way as the date and time of the deposit are recorded. Alternatively one may send a **copy of the work to oneself by registered post** (which gives a clear date stamp on the envelope), leaving the envelope unopened on its return thus establishing that the work existed at this

Claiming Protection – It is essential that it is clear that copyright is claimed in a work. One should mark the work clearly to show who the copyright owner is and the date from which the copyright is claimed. The internationally recognised symbol © is normally used.

Transfer of Ownership – Remember a transfer of ownership may cover all or only some of the rights to which a copyright owner is entitled. First or subsequent copyright owners can choose to license others to use their works whilst retaining ownership themselves.

Using Material already covered by Copyright – Your work may be a development of the works of others. You may need to obtain permission therefore to use copyright material. This is normally done by approaching the copyright owner. However, there are a number of organisations that act collectively for groups of copyright owners in respect of particular rights and which may offer licences to users for a tariff. A performing rights society is a collective that deals with musical works, collecting royalties on behalf of composers, lyricists, songwriters and music publishers for the public performance or broadcasting of their music. Further information is available directly from these organisations.

Infringement of copyright.

Almost any form of unauthorised copying of a work will constitute infringement. The law does however allow copying to take place in a limited fashion in certain circumstances where the motivation is clearly not commercial and subject usually to certain procedures being followed. Only the owner of copyright is automatically allowed to reproduce the work in question or to permit anyone else to do so.

Related Rights.

A field of rights related to copyright has rapidly developed over the **last 50 years**. These related rights grew up around copyrighted works. They provide similar, although often more limited rights and of shorter duration. They cover a range of rights, which have been derived from copyright principles and are granted to e.g. performing artists, producers of sound recordings, broadcasting organisations in their radio and television programmes, and creators/owners of databases.

7.1.7. How to obtain a DESIGN?

What can be registered as design?

Essentially any feature which relates purely to the appearance of the article and is not dictated by the way the article is required to function or requirements that it fit into or match other components of a larger article.

What are the requirements for registering a design?

The design must be new. Details of it must not have been publicly disclosed prior to filing the application unless a grace period is permitted. The design must have individual character i.e. an informed observer would readily form the overall impression that it can be distinguished from earlier designs.

How does one register a design?

One applies to ones national office in the first instance. However if one requires wider protection and if ones country has adopted the Designs Directive (Directive 98/71/EC of the European Parliament and of the Council of 13 October 1998) one can apply to the Office for Harmonisation of the Internal Market (OHIM) for registered design protection in all EU Member States. The Directive has also been extended to the European Economic Area.

Case study: New Patented Fabric is Key to Enterprise Success – Grindi Srl.

The story of Grindi Srl. is closely related to the development of the Suberis® invention, an innovative fabric made of cork that is smooth as velvet, light as silk, washable, unscratchable, spotless, waterproof and fireproof. Few other products are said to have similar features of durability, softness and versatility as can be found in Suberis®. In other words, it is a unique product, covered by patent protection in a large number of countries, produced solely by Grindi Srl.

Suberis® fabric originates from the bark, which is extracted from the cork oak tree (*Quercus suber* L.*)*. This kind of tree has its ideal habitat in the Mediterranean area and one of the highest qualities of cork can be found in Sardinia. Through a long and demanding series of stages, after years of seasoning and sorting out the best kinds, the cork is treated and processed into thin sheets (a few tenths of a millimetre) to get a fabric and yarn branded with the Suberis® label.

This new fabric came to life out of the instinct, research and hard work of Mrs. Anna Grindi, founder of the company. In 1997, using only raw natural materials, she discovered the recipe for obtaining this silky and resistant fabric from cork.

After testing and codifying the treatment, in order to preserve this revolutionary item, in 1998 Mrs. Grindi filed an International Patent Application through the PCT. In 1999, the International Preliminary Examination Authority (or IPEA) issued a positive International Preliminary Examination Report for the "Process for Treating Linenized Cork Sheets."

The official presentation of the new product to the press and economic operators happened on March 29, 2000, at the prestigious venue of La Scala in Milan. Since then, both the national and international press busy themselves with Suberis®, with articles and reports appearing on national television broadcasts as well.

Suberis® receives attention daily from industrial and commercial sectors around the globe and from government institutions and Chambers of Commerce in Italy and abroad. The fabric is marketed exclusively by Grindi Srl., which has its legal headquarters in Tempio Pausania (SS). The product stirs up more and more growing interest from industry, designer, fashion and furniture operators, as well as from the motor-industry and air-navy sectors.

The Suberis® fabric is distributed all over the world by the firm that produces it, across specialized channels, in order to be used in car seats, boats, sofas, helicopters interiors, clothes and outfits, footwear, sportswear and so on.

7.2. International Regulations

Introduction

Sooner or later, many small and medium-sized enterprises (SMEs) operate in more than one market selling their products or services or licensing/franchising their intellectual property (IP) rights and know-how beyond their national borders. IP rights, however, are territorial, implying that they are usually only protected in the home country or region where protection has been applied for and obtained. Protecting IP in export markets is therefore crucial so as to enjoy the same benefits of protection abroad as are enjoyed on the domestic market. You should carefully consider applying for IP protection well within time in all countries to which you are likely to export or license your product or service in the foreseeable future

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7.2.1. What are the International Regulations for I.P protection?

International protection regulations significantly simplify the process for simultaneously seeking IP protection in a large number of countries. Rather than filing national applications in many languages, the systems of international protection enable you to file a single application, in one language, and to pay one application fee. These international filing systems not only facilitate the process but also, in the case of marks and industrial designs, considerably reduce your costs for obtaining international protection (in the case of patents, the PCT helps your SME in gaining time to assess the commercial value of your invention before national fees are to be paid in the national phase). International protection regulations include **three different mechanisms** of protection for specific industrial property rights:

- **International protection of inventions** is provided under the PCT system, the worldwide system for simplified multiple filing of patent applications. By filing one international patent application under the PCT, you actually apply for protection of an invention in each of a large number of member countries (now more than one hundred) throughout the world. (http://www.wipo.int/pct/en/)

- **International protection of trademarks** is provided under the "Madrid system." The Madrid system simplifies greatly the procedures for registering a trademark in multiple countries that are party to the Madrid system. An international registration under the Madrid system produces the same effects as an application for registration of the mark filed in each of the countries designated by the applicant and, unless rejected by the office of a designated country within a certain period, has the same effect in that country as a registration in the Trademark Registry of that country. (http://www.wipo.int/madrid/en/)

- **International protection of industrial designs** is provided by the Hague Agreement. This system gives the owner of an industrial design the possibility to have his design protected in several countries by simply filing one application with the International Bureau of WIPO, in one language, with one set of fees in one currency. (http://www.wipo.int/hague/en/)

7.2.2. Why International regulations are important and where to use?

As IP rights are 'territorial', i.e., are **only available** to you in the country or region in which they had been applied for and granted, to enjoy exclusive IP rights in foreign markets, you would have to seek and obtain protection abroad (except when it is available automatically without the need to comply with formalities, e.g., through an international treaty mechanism such as the Berne Convention for the Protection of Literary and Artistic Works.

The main reasons for protecting IP in export markets are outlined below:

- IP rights, especially patents, may open up new export opportunities.
- IP rights, especially trademarks and industrial designs, may help you to develop an advantageous market position in export markets.
- IP rights enhance the opportunity of winning loyal clientele for your products and services in export markets.

In addition, the advantages of using a European or International application for patent protection are:

Economy and efficiency

- A cost-effective and time-saving way of applying for patent protection in several different countries **Unitary effects in the contracting states**
- Term, scope of protection, binding text, grounds for revocation
  A 'strong' patent
- Every European & International patent has undergone substantive examination and can be obtained for countries which otherwise operate only a registration system

Regarding trademarks, the most attractive feature of Community Trademark (CTM) registration is that it offers trademark protection in all 25 countries of the EU at a cost that is **much lower** than that of filing separate applications in each Member State. Furthermore, use of the trademark is not required to secure registration or renewal. Also, bona fide use on a reasonable scale in a single Member State is sufficient to maintain the validity of the CTM registration throughout the EU, and prevent it from being vulnerable to cancellation through nonuse over a five-year period. Finally, a CTM application that is refused registration may be converted into national applications, maintaining the priority of the original CTM application

Where International regulations should be used?

As a general recommendation, your SME should make sure to obtain adequate protection in all relevant export markets as early as possible.

With regard to **patents** for inventions, most countries allow a **12-month priority** period from the date of filing of the first application for applying for patents in other countries. Once this period has elapsed you may no longer be able to obtain patent protection in other countries. This may signify an important loss of earnings from your export operations.

With regard to **trademarks** and **industrial designs**, most countries provide a **6-months priority** period from the date of filing of the first application for applying for trademarks and industrial designs in other countries.

7.2.3. How to use International regulations to obtain protection?

PATENTS

Foreign Patent Applications

If you think that you should obtain patent protection outside of your own country, you should consider filing an application for a **European Patent**, which gives the possibility of obtaining protection **in 24 European countries**. You could also consider filing an international **Patent Co-operation Treaty (PCT)** application, which allows you to defer the costs of obtaining patents overseas, while you decide which foreign markets should be protected.

Applying for an European Patent

European patent applications may be filed (notwithstanding the provisions on national security) at:

- European Patent Office, at its Munich, The Hague or Berlin branches;
- The National Patent Offices.

The grant procedure is based on a single application, drafted in one language (English, French or German). If the patent is granted, the applicant may initiate the national procedure in all the States designated or in only some of these States. If the language of the patent is not an official language of the designated State, the corresponding translation must be filed, failing which the patent will not be valid in that State.

Applying for an International Patent

Following the PCT (Patent Cooperation Treaty) procedure, a single international application makes easier to obtain protection. Applications may be submitted to the national Patent Office and, if there are no national security constraints, to WIPO (World Intellectual Property Organisation) in Geneva or to European Patent Office in either The Hague or Munich.

TRADEMARKS

Applications for the registration of a trademark should be made on the appropriate form and filed at the National Trademark Office or at one of the Provincial delegate Offices. The following should be attached:

- The protection declaration;
- A card containing the list of goods and services to be protected and an example of the trade mark;
- 8 copies of the trade mark;
- A receipt for payment of the State grant fees (for ten-years registration period).

If the application is for registration of a collective mark, a copy of the regulation concerning the use of this mark and the controls and sanctions relating thereto must also be attached. To renew a mark without any change, it is merely necessary to submit an application and pay the fees due.

Claiming Priority

It is possible to claim priority from an application made in the preceding six months in one of the States party to the Paris Convention.

Other Countries - Find out about trademark protection outside of your country in Europe and elsewhere. Costs and procedures involved in obtaining trade mark protection abroad are important factors in considering any potential export markets you may wish to target. Your national patent office can assist with information on the various procedures, which are in place to assist with the obtaining of trademark protection internationally. In addition, the web sites of the Community Trade Mark Office (OHIM) and the World Intellectual Property Organisation are useful sources of information *(link to websites)*

EU Mark Applications

You can apply for a national trademark registration, which may be appropriate if your business is focused on the domestic market. However, if you do business in Europe then you should consider applying to the Office for Harmonisation in the Internal Market (OHIM), for the registration of a **Community Trade Mark**. Community trademarks are legally enforceable and enjoy uniform protection throughout the territory of the European Union.

Other Foreign Applications - If you are the proprietor of a trade mark and wish to consider obtaining trade mark protection internationally, the **Madrid system** of international registration of marks gives you the possibility to have your mark protected in several countries by simply filing one application with a single Office, in one language, with one set of fees in one currency (Swiss francs). An international registration produces the same effects as an application for registration of the mark made in each of the countries designated by the applicant.

How to register a Community Trade Mark

Applications should be made on the form drawn up by OHIM (*Office for Harmonization in the Internal Market*). The single filing may be made at the OHIM, located in Alicante, Spain; by post, courier or fax, and can also be filed at the National Trademark Office. OHIM is responsible for examining the applications. Community trademarks are valid for ten years from their date of filing and may be renewed.

How to register an International Trade Mark

To apply for a registration of an international trademark is necessary to be proprietor or to have filed a request for an identical national trademark.

Applications for international registration should be filed at one of the Provincial delegate Offices and should include:

- The form drawn up by WIPO, duly filled in;
- The deed of proxy or power of attorney (where appropriate);
- A reproduction of the trade mark matching the national trademark of reference;
- A receipt for payment of the State grant fees;
- Payment of the international fees to WIPO.
- Registrations are valid for ten years and for renewal purposes, WIPO informs the proprietor, six months prior to expiry.

COPYRIGHT

With regard to **copyright**, if you are a national or resident of a country party to the Berne Convention for the Protection of Literary and Artistic Works or member of the World Trade Organization (WTO) bound by the provisions of the TRIPS Agreement, or if you have published your work for the first time or at least simultaneously in one of the above countries, your copyright will be automatically protected in all other countries that are party to the Berne Convention or are members of the WTO.

DESIGNS

International protection of industrial designs is provided by the Hague Agreement. This system gives the owner of an industrial design the possibility to have his design protected in several countries by simply filing one application with the International Bureau of WIPO, in one language, with one set of fees in one currency. (http://www.wipo.int/hague/en/)

7.2.4. Case Study

Case Study: Design Enforcement

A Scottish company obtained a design registration in the UK and corresponding design registrations in other countries including South Korea which is one of their major overseas markets, for a novel spirit decanter shaped like a golf bag. The product was extremely successful in the Far East. A South Korean company copied the design and began selling counterfeit decanters to other Far East countries including Japan. The Scottish company with the help of Marks & Clerk Scotland, IP experts initiated proceedings in South Korea for infringement of their South Korean design registration and **succeeded immediately** in stopping further manufacture and sales of the infringing product without having to resort to full litigation.

7.3. Non-Disclosure Agreements

Introduction

Many businesses often need to reveal some of their confidential information to new employees, independent contractors, venture capitalists or bankers. But they want to make sure the information stays relatively secret. The following paragraph explains how non-disclosure agreements allow confidential information to be revealed without fear.

What is a Non-Disclosure agreement?

A confidentiality agreement or non-disclosure agreement (NDA) is a legally binding contract that restricts the disclosure of confidential ideas, designs, plans, concepts or other trade secrets to a third party. Once signed, the non-disclosing party agrees that they will not disclose any information about your idea for competition purposes whether it be producing or selling unless otherwise stated in the contract.

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7.3.1. Why NDA is important?

Non-Disclosure Agreements are an important element of business in today's information age. From employees to potential partners, **every business** needs a Non-Disclosure Agreement to protect itself. Once you have your own Non-Disclosure Agreement at your disposal, your business will be able to protect ideas, designs, plans, concepts or other trade secrets.

Current and former employees are responsible for most breaches of confidentiality. Employees are under an **implied** duty not to use trade secrets in a manner that will harm your business. But it is best to get this in writing and to specify to the employee exactly what is confidential, and to make provisions for when the employee leaves your business.

They can be used to:

- share intellectual property
- share commercial or trading information
- formalise a relationship, eg between an employer and employee

7.3.2. What are the main types of NDAs and where they are used?

A **precedent** confidentiality agreement is used for mergers and acquisitions. If a company wants to buy your business, it will want to look at your books and assets. An NDA can provide an element of protection for your confidential information and trade secrets if the prospective buyer pulls out of the deal.

If you don't know exactly what information you will need to disclose during a **commercial relationship**, you can still use an NDA. It is a good idea to classify as confidential any information that will be disclosed later, so that the NDA still applies.

A **one-way** NDA is used when only one business is sharing information and the other agrees to keep it confidential. A **two-way** NDA is used when both businesses are sharing confidential information with each other, and want to be sure that neither will disclose their trade secret.

7.3.3. How to prepare a NDA?

Despite their differences, though, all NDAs contain certain basic provisions required to be effective.

1) First, you should list all the parties who will have contact with the confidential information, by category and, where possible, by name. This is not necessarily as simple as it sounds, since many companies, themselves, have subsidiaries or strategic alliances with which they share information. Also, your NDA should include appropriate language both restricting the types of people or entities with whom the other side can share the information and requiring the other side to obtain similar NDAs from employees, principals or agents of theirs who will come into contact with the information.

2) Second, there must be a recitation of confidential relationship between the disclosing party (the one allowing access to its confidential information) and the non-disclosing party (the one getting access to the confidential information).Additionally, there must be a recitation of the confidential materials themselves. In other words, the types of information that is expected to be kept confidential must be stated. You don't have to name every document, but it is wise to name the types of information by category or with even more specificity if the circumstances allow.

Parties to a good NDA usually articulate how confidential materials will be recognised. Sometimes, it is agreed that all confidential materials must be stamped "Confidential!" in bold letters. Other times, par-

ticularly for companies that haven't had a history of diligent trade secret classification stamping, the parties will simply say that any information disclosed concerning certain types of information will be deemed confidential.

To avoid disputes and potentially costly litigation, it's usually wise to figure out a way to earmark what will be considered confidential so as to minimise the possibility of accidental disclosure.

3) Third, as important as it is to define what materials will be confidential and how the other side will recognize them, it's just as important to include a straightforward statement of when it will be okay to disclose confidential information. The most common examples here concern being free to disclose information that somehow becomes public knowledge without wrongful disclosure, and freedom to release information when compelled by subpoena or other judicial or governmental process.

4) Fourth, NDAs are usually good only for a specified term or length of time, even though non-disclosure provisions may continue for some time after the end of the agreement. This simply recognises that many of today's trade secrets may lose their value over time and, also, that the purpose of the disclosure may come to an end at some point, say if a proposed deal doesn't go through.

5) Fifth, there should be an indemnification provision, protecting the disclosing party against impermissible disclosure by the receiving party.

Five main elements of a Non-Disclosure Agreement:

1. All parties who will be permitted access to the confidential information should be identified by category and if possible by name.
2. The relationship between the disclosing party and the non-disclosing parties involved must be orally stated. Furthermore, the confidential information itself must be orally stated and the key information to be held confidential must be clearly defined.
3. How the non-disclosing party can use the confidential information is vital to a Non-Disclosure Agreement. However, it is also important to set a time when the non-disclosing party can disclose the confidential information.
4. Non-Disclosure Agreements are normally valid for a pre-determined amount of time. However, some non-disclosure conditions may extend beyond the termination of the agreement.
5. To protect the disclosing party from unauthorised disclosure by the non-disclosing party, a remuneration provision should be included in the agreement.

7.3.4. Case Study

Recognition of the Importance of Intellectual property by a Start-up Business Manager - Enterprise S

Enterprise S. is a young start-up company from Luxembourg. Its activities are focused on the software and the Internet business. It develops, implements and distributes software management systems in the field of accounting, logistics, process tracking, communication, human resources and CRM. Enterprise S. also offers web solutions including application provider, web hosting, web and application development services.

The owner of Enterprises S. learnt about intellectual property issues by attending seminars and conferences for future company managers. There he became aware of the value of his intangible assets and of the importance of protecting them. So he began to seek information about how to best protect them, by consulting IP experts.

As some IP protection tools require financial resources that a start-up company may not necessarily have, the company owner finally adopted a 2-level strategy, which consists of using as much as pos-

sible of the free-of-charge protection tools such as copyright and secrecy and of making a cost benefit analysis in respect to his finance regarding trademark and patent protection. "Why not make use of the free-of-charge intellectual property rights as they give you a legal tool to defend your rights in case of infringement by third parties", is one of his principles.

So the company owner protects his know-how by concluding **non-disclosure agreements** with future employees, clients and partners before any information is exchanged. He also ensures that all the company's documents have a confidential notice. Furthermore a copyright notice is placed on all the documents, software and web pages produced by the company. Finally the registration of his products' trademarks remains on his list of things to do next.

Regarding intellectual property protection, the company manager has adopted a defensive strategy, because he does not think that his competitors are going to copy the company's products. Nevertheless he wants to be able to assert his rights in case a competitor copies him.

Intellectual property issues are managed by him alone. IP questions are dealt with as problems arise by seeking help from IP experts.

Planning to diversify his business activities, the company owner plans to develop a new innovative service based on a patented system. An exclusive license agreement has been signed between the company and the patent holders. During the negotiation of the contract it was agreed to extend patent protection to more territories, but they missed the deadline of 1 year, which is given to the patent holder to seek protection in other countries without failing the novelty criteria (the priority date). As a matter of fact the company now faces the problem that they can be freely copied and competed in some of their relevant markets.

The company owner considers intellectual property protection as a very important issue for small high-tech firms as it attracts investors and protects one's intangible assets from competitors.

7.4. Intellectual Property Management Strategy

Introduction

Each organisation has different goals and therefore strategies must be formulated in a way to facilitate the achievement of these goals. The importance of IP to the competitive advantage of an organisation depends on the sector of activity, its business strategy and interactions with the strategies of its competitors. Patents are essential as competitive advantage, particularly in areas where innovations are easy to copy. In some cases, other appropriation methods, particularly secrecy and lead-time advantages are also effective.

There is no “optimum” appropriation strategy. An IP strategy may vary from organisation to organisation. Large enterprises that have significant financial resources often pursue a strategy of procuring and maintaining a large quantity of patents. In contrast, for most start-up companies, developing and building a comprehensive patent portfolio can be prohibitively expensive.

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7.4.1. What is an I.P strategy?

Managing an enterprise's IP assets is more than just acquiring the formal IP rights through the national IP office. Patent or trademark rights are not worth much unless they are adequately exploited. Moreover, part of a company's valuable IP may not require formal registration but may call for other measures of protection (e.g. confidentiality agreements). Enterprises willing to extract full value from their know-how and creativity should take adequate steps to develop an IP strategy for their business and seek to integrate it within their overall business strategy. This implies including IP considerations when drafting business plans and marketing strategies. A basic IP strategy would include **at least the following policies**:

A Policy on IP Acquisition

A single product or service may be protected by various forms of IP rights covering different aspects of that product or service. SMEs must consider the best protection package and make sure that all the formal rights are acquired as early as possible.

A Policy on IP Exploitation

IP assets may be exploited in a variety of ways. These may include the commercialisation of IP-protected products and services; the entering into licensing or franchising agreements; the sale of IP assets to other firms; the creation of joint ventures; the use of IP to obtain access to other companies' technology through cross-licensing agreements; or the use of IP to obtain business finance. Enterprises should decide in each case how they may best exploit their IP assets both domestically and internationally.

A Policy on IP Monitoring

Consulting patent and trademark databases regularly is important in order to find out about recent technical developments and new technologies, identify new licensing partners or suppliers, new market opportunities, monitor activities of competitors, identify possible infringers, and avoid infringing competitors' rights.

A Policy on IP Enforcement

A clear policy on IP enforcement is crucial due to the losses that may be incurred by the existence of counterfeited goods in the market and the high costs involved in some IP disputes.

7.4.2. Why an I.P strategy is important?

Small and medium-sized enterprises (SMEs) represent over 90 % of enterprises in most countries, worldwide. They are the driving force behind a large number of innovations and contribute to the growth of the national economy through employment creation, investments and exports. Despite the importance of SMEs for the vitality of the economy and the potential offered by the IP system for enhancing SMEs competitiveness, SMEs often **under utilise the IP system**.

The linkage between an organisation's overall strategy and its IP strategy will be more significant in the **"new economy"** than it was before. In the new economy, one of the preconditions for being able to compete is that an organisation can **create, produce, protect and commercialise IP rights**. Linking the IP strategy tangible competencies and a strategy based in know-how may be able to create the basis upon which the management can allocate the organisation's resources.

Decisions concerning IP strategy will often have a **long timeframe** and **period** of effect. All other things being equal, these choices result in a high degree of irreversibility. This does not lie, for example, in heavy investments, which are connected with this concept, but simply in the choice itself. An IP strategy, which could be worth hundreds of millions, can be obtained for a relative modest amount of money. On the other hand, errors in this area can be **incredibly expensive**. IP rights can thus to a large extend, be thought of as a marketing related capacity. Since many areas of business are changing very quickly and since it is not possible for an organisation to pursue all paths, the strategic use of IP rights may be a possibility.

7.4.3. What are the main patent strategies and where they could be used?

A number of generic patent strategies are described in the literature. Examples of these strategies are the following:

“Ad hoc” patent strategy

This strategy is a result of *ad hoc* efforts and small resources. One or a few patents are used to protect an innovation in a special application. There are many possibilities to invent around and their costs are low.

‘’Sniper’’ strategy

Many patentees use the "**sniper**" strategy. They rely on a few patents to cover their core technology and do not concentrate on protecting possible modifications or improvements of that core technology. This is an inherently risky strategy, however, particularly if the core patents are found wholly or partially invalid, and there are no additional patents to cover improvements or modifications of the original technology. Another risk, which is undertaken without regular updating is that the original patents and the technology they protect may become obsolete.

‘’Blocking’’

This strategy is applied when an organisation does not intend to practice the patents, but it uses them as viable alternatives against its competitors.

‘’Shotgun’’ strategy

According to this strategy the patentee aims to obtain as many patents as possible in a particular area of technology. This approach is intended to give the impression that an area of technology is so littered with patents that it is next to impossible for a competitor to patent anything themselves or avoid infringement of one or more of the existing patents. Whilst providing optimum protection, however, this technique may be quite expensive and not an appropriate strategy for a SME, which, by their nature have lower R&D budgets. Therefore, it is of the highest importance for a SME to develop a cost-effective patent portfolio management for its IP, which satisfies a commercially realistic balance somewhere between the “all eggs in one basket” approach and “patent anything and everything”, approach.

“Blanketing” and “flooding”

In this case, efforts are made to turn an area into a jungle or a minefield of patents e.g. by bombing every step in a manufacturing process with patents, more or less systematically. This strategy may be used in emerging technologies when uncertainty is high, regarding which of R&D directions are fruitful or in situations with uncertainty about the economic importance of the scope of the patent.

“Picket Fence” Strategy

Some organisations file patents not only on their basic technologies, but also on incremental advancements, in an effort to erect a fence against their competitors. The Picket Fence Strategy generally involves the filing of numerous patent applications in view of a competitor's issued patents and products in an effort to patent improvements over the competitor's technology and "fence" in his future mobility.

"Surrounding"

This is the case when an important central patent, especially a strategic patent, can be fenced in or surrounded by other patents, which are individually less important but collectively block the effective commercial use of the central patent, even after its expiration.

"Prestige" Strategy

Some companies perceive that prestige and leadership, which accompany a patent, may help their business and provide the driving force for this strategy. Academic and research institutions are also known for filing patent applications to achieve recognition of their research work. A small company may also seek patent coverage to impress potential investors and to market the uniqueness of its technology.

"Scarecrow" Strategy

The patent owner may have no intention to enforce its rights, but instead view that competitors stay clear of the area he has protected. The patent acts merely as a "scarecrow" to keep competitors away from the owner's business. This strategy is more prevalent in industries unaccustomed to large-scale patent filings and frequent patent disputes. More sophisticated companies will seek ways to design around the patent, instead of less sophisticated companies which prefer to keep their distance rather than to invest in a costly design-around analysis.

7.4.4. What are the most usual types of licensing and where they could be used?

A number of generic licenses are described in the literature. Examples of these strategies are the following:

Non-Exclusive License

It is the most common type of license. A license is said to be non-exclusive if the rights granted to the licensee may also be granted to others. A typical example is the use of a commercial software product.

Exclusive License

A license is said to be exclusive when the licensee is the only entity that is granted the licensed rights. A typical example of this type is when the owner of a fast food franchise may be granted the exclusive right to use franchise trademarks within some specified geographical area.

Patent (or other IP) License

The owner of a patent (or other type of IP) is given the legal right to exclude the unauthorised use, manufacture, sale, offer for sale or import of products or services that include the protected subject matter.

Joint Development License

It is common for one technology-based company to enter a joint development agreement with another in order to collaborate in development of a product calling for the special resources of each company. When development of the new product is completed, the joint development license will grant each party whatever rights may be required to market the product.

Cross License

It is essentially two licenses combined into one agreement and it is used when each party to the agreement wants to obtain certain rights to the other's party property.

Conditional License

Contracting parties will sometime agree that if one party fails to do something, a license is created. For example if a software vendor fails to deliver sufficient quantities of its products to a distributor, the distributor may be granted a license to reproduce such products from master copies for the limited purpose of satisfying orders placed in accordance with the distribution agreement.

Sub-License

A sub-license provision grants the licensee the legal authority to license the IP to others. This would be common when the original licensee completes the R&D in a patent portfolio context, where others have contributed patents to the jointly managed portfolio.

Advantages of licensing include:

- Cost effective return on R&D investments by entering into new markets where the IP owner may not be able to access.
- Establishing new relationships, which will lead to R&D collaborations.
- Licensing provides a means of control and ongoing access to the development of the new technology.

7.4.5. Case study

Developing an IP Strategy in the ITC Sector - Eidon Ricerca Sviluppo Documentazione S.P.A.

Eidon Ricerca Sviluppo Documentazione S.p.A. is a private and independent Engineering and Contract Research Centre located in Udine and Trieste, in the north-eastern part of Italy. Acknowledged by the Italian Ministry of Education, University and Research as a highly qualified laboratory in the fields of information and electronic technologies, Eidon supports other companies providing innovation by R&D outsourcing.

Eidon is dedicated to innovation, accomplished through design, development, installation and servicing of software and systems for industrial processes as well as automation and IT integration in organisational processes (ISO9001 certified).

The company gives support to enterprises in activities such as project conception (including realisation of prototypes), overall project management, and presentation of applications for funding. The main

technological areas where Eidon has consolidated skills and know-how are: artificial vision systems, control and monitoring of industrial processes, internet/intranet software and technology and systems engineering.

The competitive environment of the applied research in ICT sectors is highly dynamic and subject to a rapid technological evolution. The number of problems proposed by customer SMEs is always higher than the number of technological solutions available. The company considers it crucial to monitor technological changes and advancements that could be critical for the company's competitiveness. In the last 4 years the company has established an informal *technology monitoring* activity with professional staff devoted to it.

The monitoring includes studies and informal surveys to identify competitors and is carried out using Internet with "human" filtering, consultation of specialised press, participation in conferences and workshops at national and international level, co-operation with Universities and other research centres, visits and market analysis, use of patent databases (seldom used) and the acquisition of reports from information providers (seldom used).

The company's R&D activities are always project-specific and are usually carried out either internally or in co-operation with Universities and other research centres and partners.

Since its foundation, in 1979, the company has used trademark protection to create a solid corporate identity and a strong external image. Trademark protection has been associated with the company's logo, a double arrow representing the idea of researching deeply into a subject and re-emerging out with a solution.

To date, the company has not used trademarks to protect personalised products or platforms when providing complex systems and original solutions developed *ad hoc* for its customers. However, the firm does not exclude the use of this intellectual property tool for future activities – in particular in relation to software programmes.

Eidon has been granted 15 patents, protecting original systems resulting from different R&D contracts carried out in co-operation with industrial partners in the following industrial sectors: brick industry, ceramics, chemical/petrochemical, food, pharmaceutics, marble processing, screen printing sector, tanning, textile, wine treatment, wood, metal industry, mechanics.

The company regards patent protection as being very important for innovative, high-technology solutions. However, in the case of incremental innovations, when time-to-market becomes more critical than technology issues, the company considers that obtaining a patent is not advantageous. Eidon believes that this can result in the early disclosure of strategic information which is easily accessible to third parties, who can opportunely improve the innovation, thus making the protection worthless. Therefore, when software intensive solutions are involved, Eidon relies on copyright protection.

Eidon's original software is protected by copyright. Access rights to software, based normally on an exclusive license model, do not usually include access to the source code, which may be granted only in exceptional cases and can be made subject to separate agreements.

Eidon's standard R&D contract is an interesting mix of different IP tools, which reflects the complexity of its contract research activities. Frequently the interests of customers and R&D centres do not converge when it comes to patentable knowledge created within a project. The customer wants the exclusive right of exploitation, while the R&D organisation wants to use their knowledge for further development. Acknowledging this dilemma, Eidon has adopted a compromise solution to safeguard the core interests of both sides which is based on the following three elements:

- confidentiality
- recognising Eidon's IP rights in the basic technology

- recognising that the customer may wish to secure IP rights in a specific application

Eidon's IP rights are protected mainly at national level, even though the company has applied for a few European patents. The application process is carried out with the advice of external legal experts, who are responsible for the correct implementation of the different IP protection tools chosen.

ble assets from competitors.

8. Financing Innovation

8.1. Financing Innovation in Europe

Introduction

In today's industry, Innovation is a key element and excellent ideas that could exploit new technologies or products are very important for the development of business. However, an idea in itself is often not enough. In order to put this idea into practice, an investment is required. This is a major hurdle to many SMEs which may have a very high potential and may be highly innovative, but lack the necessary economic strength to concretize it.

Developing an idea into a finished marketable product or technology is very time and money consuming. And finally, marketing the product successfully often takes amounts far from what was initially estimated.

Fortunately, there are many ways in which financing can be obtained for innovation.

This component will provide an overview of the different types of financing that are available when starting an innovation project. It is however important to note that the financing options available may vary from country to country, even within Europe. We tried to be as general as possible, but we cannot guarantee that the information available here is applicable to your country.

The main funding opportunities available, which will be included here, are:

- Grants
- Venture capital
- Banks
- Stock markets
- Business angels

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8.1.1. Determining the Right Financing for You

In order to seek the right type of financing, it is necessary to take into consideration a number of aspects, such as the specific nature of the innovation project or new technology business, the financial risks involved, the complexity of the project and the time needed for development.

The nature of a project is extremely important in determining the kind of financing that is sought.

If it is a research project, it is best to apply for a grant, as investors, be they venture capitalists, business angels or banks, will generally not be interested unless the outcomes of the project can be marketed and are expected to produce a profit.

Venture capitalists or informal investors (business angels) may be prepared to finance projects where the initial research has been completed and you are ready to start developing an initial product or prototype.

Banks are generally a better option when some form of commercial operation is already in existence and more capital is required. Banks will generally be reluctant to provide financing to a company or project, unless they have guarantees that they will be able to recover their investment in the case of success as well as failure.

Stock markets are only a feasible opportunity for companies which have been trading for some time and which have gained a considerable market value.

- http://www.cordis.lu/finance/home.html - Cordis (Community Research & Development Information Service) provides information on financing projects
- http://europa.eu.int/business/en/topics/finance/finance.html - This website provided by the European Commission gives information on how to access finance
- http://www.london-innovation.org.uk/innov_funding.htm - The London Innovation website contains information on funding Innovation projects
- http://www.businesslink4london.com/FinanceDiagnostic - Business Link provides links to two free Diagnostic Tools, an online tool and a questionnaire. However, this is only appropriate for SMEs in the UK
- http://www.businesslink4london.com/ – There are two case studies related to financing innovative projects

8.1.2. Grants

Grants are generally used to fund the early stages of a project. There are a large number of grants available which are offered by governments, local bodies, sector-specific schemes or even Europe-wide programmes.

The importance of SMEs involved in innovation within the European market has been recognised and important European entities, such as the European Commission, the European Investment Bank and the European Investment Fund, have generated schemes to support innovation within SMEs.

Advantages

- The main advantage of a grant is that it is generally non-reimbursable. This means that it is financial support which is given, but which will not in-debt the company from the start.

Disadvantages

- Due to the large amount of different grants available, it may be difficult to identify the most suitable ones to apply for
- There are large numbers of applicants for grants, so it is necessary to convince those responsible for approving the grant, that this project deserves the support more than the others
- It may take a long time from the time a grant is applied for to the point where it is approved
- Often, there are enormous amounts of paperwork involved at the application stage as well as during the period covered by the grant
- In most cases, grants don't cover the full amount required to finance a project. This means that the remaining amount would need to be provided by internal funding or from other sources of funding

The thing to bear in mind when applying for a particular grant is that grants are available according to certain criteria. These may be related to the industrial sector, the target group, particular development methods or processes, size of the project, etc. It is therefore important to analyse the suitability of your project, before applying for a grant.

- http://www.is4profit.com/busadvice/grants/index.htm - Free guide to grants for small businesses

8.1.3. Venture Capital

Venture capital is one of the most commonly used sources of financing start-up companies or innovative projects as venture capital often focuses on knowledge-based or innovative industry sectors.

Companies that receive venture capital are generally perceived to have a very good growth prospect, but lack access to the necessary funds to finance this growth.

Nevertheless, venture capital doesn't come for free. In exchange for the venture capital, the investor will expect some kind of compensation for the funds raised on the capital market. This may take the shape of a partial ownership of the company, seats on the board of directors, preferred shares, royalties or a combination of the above. The investment is not made with view to an immediate profit, but is made expecting the company to grow and thus increase the value of the investment.

The advantages of venture capital are that no security needs to be given, so if the investment doesn't bear fruit, the risk is with the investor as much as with the company and so is the loss. Also, an experienced investor will bring his knowledge to the company and will be aware of and possibly advise on best practices and approaches regarding development, marketing, etc. However, this involvement of a venture capitalist will also mean a loss of control.

Venture capitalists are sometimes specialised to particular industry sectors or will only invest in certain stages of a project or a company. It is therefore necessary to approach various venture capitalists and inquire as to whether this particular investor is suitable for your needs.

http://www.evca.com/ - The website of the European Private Equity & Venture Capital Association

8.1.4. Banks

Another option available for financing is to get a loan from a bank. This is therefore not really an investment on the part of the bank, but rather a loan as we know it from personal banking.

The problem with getting a bank loan in order to finance the growth of the company or an innovative project is that banks will demand a considerable amount of interest. This interest will have to be paid periodically and from the moment the loan is taken out, regardless of whether the endeavour is successful or not. Due to these factors, banks are generally not a very good option for long-term financing or relatively large amounts.

Bank loans should also be avoided if the company is not making a profit or doesn't have sufficient cash flow, since it will not be possible to maintain control over the debt. Bear in mind that there will not only be the repayment of the loan made available by the bank, but also the interest on this loan.

A further problem with bank loans is that the bank will require security in the event that something goes wrong in the business venture. The banks will want to ensure that they can recover their loan, even in the case of failure.

Since innovation is considered a high-risk business by most banks, it is sometimes difficult to find a bank willing to offer a loan.

When asking for a loan from a bank, a well-developed business plan is important as this may convince the bank to grant funding.

In order to find out about bank loans you should approach your local banks.

8.1.5. Stock Markets

The stock market may be a way for a company to raise considerable amounts of funding. This is achieved by selling company shares to outside investors by means of an initial public offering.

Unfortunately, the choice of making company shares available for public purchase is in most cases only feasible for high growth companies with enough existing profile to raise public interest. There are strict entry requirements imposed on companies wishing to go ahead with this process.

A way around the harsh entry requirements is the so-called "Stock Markets for High Growth, Innovation Companies". These are new stock markets which provide easier access for companies whose size may not be permissible at the traditional stock markets or which are relatively new companies.

Before attempting to enter the stock market, the following aspects have to be carefully analysed:

- Entry requirements such as minimum size, trading record, market value, etc.
- The possible costs involved (the actual listing, brokers, legal fees, etc.)
- Amount of share equities to be made available

Further, it is important to bear in mind that the more of the company's share equities are sold, the more control is passed to outside investors.

- http://www.kse.or.kr/webeng/work/ksem/st/wr_ksem_st_mn_df.jsp - This site provides an overview of the Stock Market

8.1.6. Business Angels

Business Angels are wealthy private individuals who invest in businesses by contributing funds and personal experience. Business angels are, by and large, interested in start-up businesses which they can help "shape" according to their interests and experience.

In many cases, business angels will be retired executives or people who have built successful businesses and then sold them. In either case, they would have an extensive knowledge of their market sector, the best practices, existing business contacts or other experience which may be otherwise difficult to acquire. Understandably, a business angel who has worked in a particular sector is attracted to investments related to his/her expertise. An added advantage is that there will not be a long application process, but the business angel should be fairly rapid in accepting or rejecting a proposed investment.

Business angels are unfortunately not merely pools of funding and experience, but will naturally wish for something in return. In most cases a business angel will ask for partial ownership of the company through equity shares or a seat on the board of directors and will generally wish to be involved in the running and decision-making of the business.

Even though business angels are wealthy individuals, the funding that they would be prepared to invest in a company is normally quite reduced in comparison to the funding that other sources, such as institutions or organisations, are willing to supply.

It may prove difficult to identify a business angel as they are often hard to discover. There is no section for "business angels" in the yellow pages. However there are a number of initiatives which aim to establish contact between business angels and interested companies. Examples of such initiatives are national "Business Angel Networks" or the "European Business Angel Network".

There are a number of national Business Angel Networks:

- http://www.business-angels.com/ - France
- http://www.business-angels.de/ - Germany
- http://www.nebib.nl/ - Netherlands
- http://www.bvca.co.uk/ - UK

8.2. Business Plan Development for Innovative products & services

Introduction

A Business Plan is an essential tool for anyone trying to obtain funding for an innovative project, regardless of the type of funding, be it a grant application, approaching a bank for a loan, getting in contact with a venture capitalist or a business angel.
The Business Plan should be well-developed and robust, as this will be your way of presenting the current state of your company and a detailed strategy of how you plan to carry out your project. The Business Plan will need to convey the strength of your idea and how it can be implemented successfully.

What

A Business Plan normally covers a considerable amount of time, between 3 to 5 years and should show the various stages of the project during this period of time, including milestones which will enable an effective evaluation of the project's progress.
There are a number of aspects which a Business Plan should address:

- Project outcomes
- Existing market
- Target group
- Competition
- Business management
- Financial management
- Marketing strategy
- Sales forecast

Why and Where
Wherever external funding is required for a business or a project, a Business Plan is an essential document. This document is what is presented to a potential source of funding and it will be based on this plan that the decision to fund or reject funding will be cast.

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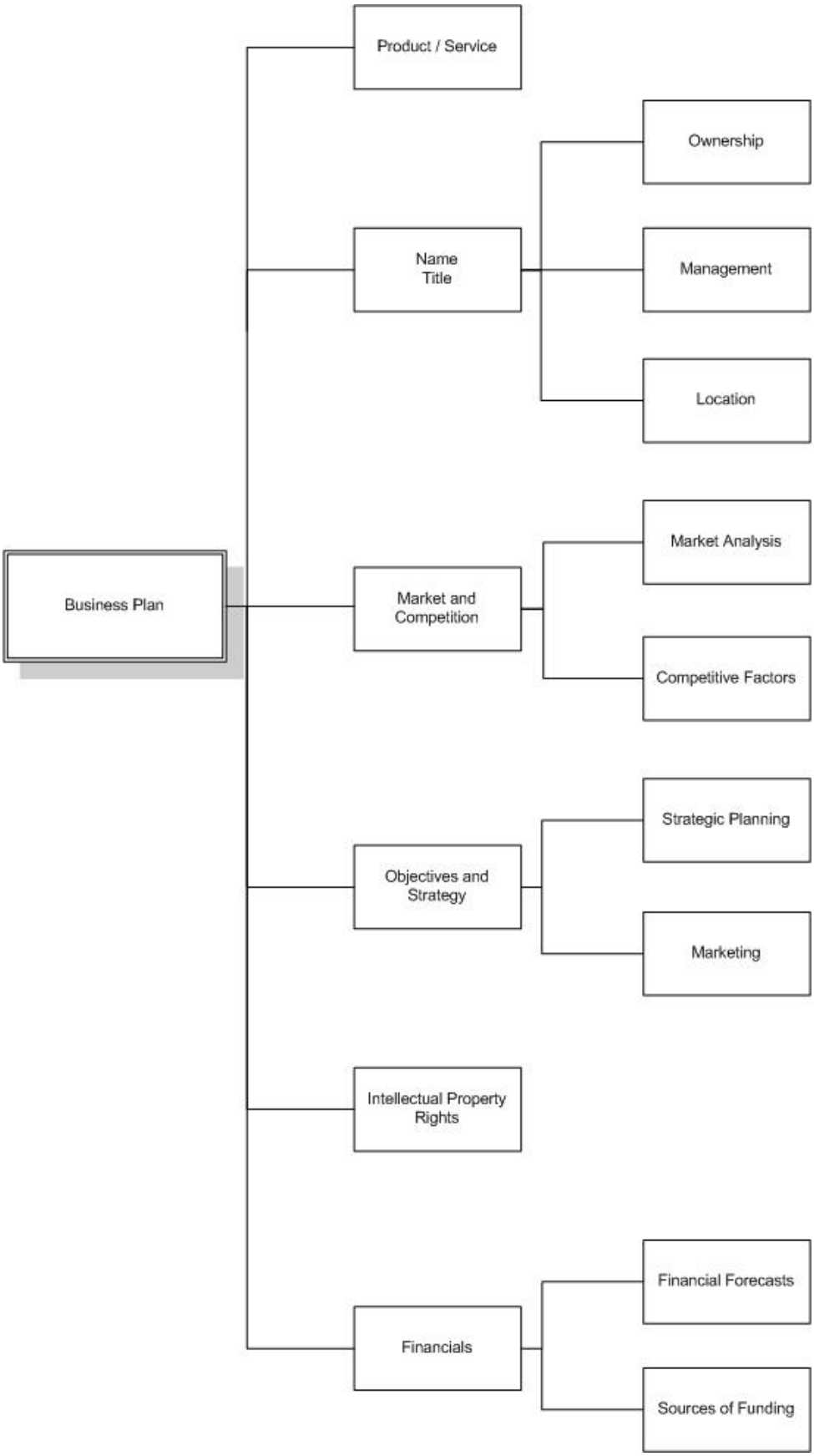
8.2.1. Structure of a Business Plan

Structure

The structure of a Business Plan is not something that would be consistent in any context. According to the purpose of the Business Plan different sections may be stressed or omitted. Nevertheless, there are certain guidelines with regard to the structure of a well-developed Business Plan. The figure above shows an example of the structure of a Business Plan, but the structure may vary according to the nature of the project.

If you wish to have a look at sample business plans from real businesses you can go to http://www.bplans.com/sp/businessplans.cfm.

This provides an extensive collection of 60 free sample business plans, including executive summaries, market analysis summaries, management summaries, financial plans, etc.


Business Plan
Product / Service
Name
Title
Ownership
Management
Location
Market and
Competition
Market Analysis
Competitive Factors
Objectives and
Strategy
Strategic Planning
Marketing
Intellectual Property
Rights
Financials
Financial Forecasts
Sources of Funding

8.2.2. The Elements explained

Elements that will be required in most Business Plans are listed below:

The product/service

If one is asking for funding in order to develop or market a particular product or service then it only makes sense that the product/service in question is presented and explained in enough detail to convey a comprehensive idea of the outcome to be produced.

This section should include a statement describing the innovative aspect of the product or service, or in other words, how does it differ from existing products/services and what are its advantages and disadvantages in relation to the existing ones.

The business and personnel

Here the business should be introduced. What type of organisation is it? What branch is it active in? What is its history? What is the size? Where is it based?

The investor will want to know who they are dealing with, so as well as presenting the business, the Business Plan should also introduce the main staff that will be involved in the project.

The information on the personnel should include the roles of each involved member of staff and the experience and key skills that each will bring into the project.

Further, it is important to introduce the management team and specify the distribution of responsibilities.

It is also important to consider the possible lack of a particular skill needed for the development of the project. If such areas have been identified, a recruitment and training plan should be provided.

Market and competition

First of all, the market should be defined, as well as the target group which the project is aiming at. Further, a market study should be carried out in order to demonstrate the commercial viability of the project by showing that there is a market gap or an existing market share that can be exploited.

All the existing competitors should be listed and a comparison should be made of their product/service compared to what your project is envisaging and, ideally, you would want to explain how your proposed product or service will be superior to what the competition is offering. What gives you the edge?

Intellectual property rights

Due to the creative aspect of innovative products or services, it is essential to establish proper protection of the idea.

This part is important as it will determine how well the concept is protected, which consequently will have an input in establishing its commercial exploitability.

There are a number of types of intellectual property protection, such as, Copyright, Trademarks or Design Rights. The project should be carefully analysed as to which types of intellectual property protection are applicable.

Strategic planning, marketing, financial information and sales forecasts

A detailed plan of the entire project should form part of the Business Plan. This plan should illustrate the project from its inception until at least the end of the period for which funding is being requested. This plan should lay out the various stages of the project, the involvement of the staff throughout the project's progress and important milestones.

The marketing of a product or service will in many cases determine the commercial success it will achieve. Even if a brilliant product is created, it will fail unless it finds a way into the public eye. This is why any investor will be very interested what approach will be taken to raise awareness and promote the product/service. The type of product or service and the target customer base are very important in determining the marketing approach, e.g. a software product or Internet service would best be advertised on the Internet on related websites, through email campaigns or dedicated computer literature or publications.

Last, but not least, the financial information and forecasts are crucial. This is the section that should justify the amount requested from the investor. The investor will certainly be interested about how his investment will be spent and also what return may be expected from the presented project.

All the sources for funding should be clearly stated (e.g. internal funding, the amount requested, funding provided by other sources and what these sources are).

The financial section should be as accurate as possible. No one will want to invest in a project where it appears that the invested funds will be ill spent or on the other hand, where it seems that a project is under-funded.

The information provided needs to be realistic. This also applies to the forecasts, which should also be backed by stating your assumptions regarding the market parameters which may influence the success of the project.

The most important thing about a Business Plan is that it is feasible, because it "sells" the company and no one will be willing to provide funding if the company appears not to be trustworthy or well managed.

8.2.3. Tips

Below are a number of useful tips which should be taken into consideration when composing any Business Plan:

- Use clear and simple language – the person that will read the Business Plan may not be an expert on the area of your project, so avoid the use of jargon or technical language
- Keep it precise and short – focus on the information that is important to the reader. You want to convey the scope of the project without boring the reader with superfluous or repetitive information.
- Be accurate and realistic – you want to transmit to the reader that you know what you are doing
- Present the Plan professionally – the Business Plan is an important document and this should be reflected in its appearance.
    - Include a cover
    - Use a professional and uniform layout
    - Include a contents page and an executive summary
    - Include an appendix with supporting information where required
    - Use page and section numbers
    - Spell-check and proof read the document
- Reference others – by referencing experts in the area of your project, studies/forecasts from market research companies or referring to existing similar products/services, you demonstrate that you have done your research and have knowledge of the current state of your market

Always remember, the quality and persuasiveness of the Business Plan will in most cases determine whether an application for funding is successful or not.

Resources

Links

- http://www.gate2growth.com/ – Gate2Growth is an initiative supported by the European Commission under its Innovation/SMEs programme and its main aim is to support innovative entrepreneurs in Europe. It provides a Business Planning Toolbox with tutorials, tools, case studies and guides on financing, Business Plan writing, budgeting and much more

9. Marketing of Innovation

9.1. Optimising and controlling the acceptance of an Innovative product/service

Introduction

For many companies, and especially for those trying to market new products or services, marketing of innovation is a very complex process involving a multitude of activities. One of them is optimizing and controlling the acceptance of innovative products/services.

What is optimizing and controlling the acceptance of an innovative product/service?
Optimizing and controlling the acceptance of an innovative product/service is a marketing activity that requires market research for innovative product/services in order them to be successfully accepted from the market and the so called method of “marketing mix”.
In order for your business to sell its products and services as successfully as possible, you need to look at what products you are selling in detail to ensure they will be attractive and needed; the price to ensure it is not too cheap or too expensive; where you are best distributing your product; and finally, how you can create interest and awareness for your products. All these elements need to be targeted at the right people at the right time.
In order for your business to tackle this correctly, you need to get the right type of mix (marketing mix), the mix should include four main elements: Product, Price, Place and Promotion, by examining each carefully and adapting them to your customer's needs, you will continue to produce needed products and services.

Why and where optimizing and controlling the acceptance of an innovative product/service can be used?
Optimizing and controlling the acceptance of an innovative product/service is of vital importance for a company because it is actually the marketing activities that can introduce an attractive product to the market. Many factors impact consumer purchase decisions and identifying what is most important to your consumers is always a challenge, made harder when your products are developed outside a market for which they are marketed eventually.
The optimization and control of acceptance of innovative products/services should be applied by all types of firms (manufacturing or service). This marketing activity takes part at the beginning of the planning of a new product/service in order to know what do the customers really need and avoid spending money for products with low demands. This is where the company starts to spend its marketing budget in order to collect all the data required and to make their analysis.

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9.1.1. How can we optimize the acceptance

Optimizing and controlling the acceptance typically involves:

- Defining your product/service
- Defining your needs
- Using published information
- Compiling questionnaires
- Making contact with companies

Defining your product/service

What does your product/service do?

You have worked to develop a product/service to meet a specific need. You know what it does and you believe you know who will use it. *But do you really know?*

Case Examples:

1. Teflon – this non-stick coating was originally developed to prevent debris sticking to space-craft. However, it main use has proved to be in cookware and domestic paints.
2. Stereo photography – a system originally developed for aerial survey in Earth Science is now used by the medical profession to track changes in body shape.

Prototype testing and early user testing often reveal unseen market features and new market niches.

What benefits do purchasers see?

Despite careful planning and market research, developers are often surprised to find that users identify benefits in products/services that they failed to spot. Likewise, users can also find undesirable features, which the developers failed to appreciate. Even when a product/service is just a concept, user feedback can point to benefits the users sees or to features that are potentially undesirable. This certainly helps to produce products/services that are useful in the marketplace.

The benefits analysis template can be used to track the market response to benefits at various stages of development.

Benefits Analysis Template

	Planned Benefits	Market Response	Proposed Changes
Concept			
Prototype			
Full product			

What business are you in?

This question is not always a straightforward as you might expect. The US railway companies suffered massive contraction between the 1950s and 1970s because they failed to recognize airlines as their competitors. They thought they were in the railway business, whereas they should have recognized that they were in the transport business.

Defining your needs

Having characterized the nature of the product/service offering, it is essential to be clear what you need to know and would like to know from the market research. It is also useful to consider what you will do with information once it has been collected. If it will make no difference to your marketing effort, don't waste time collecting the information.

Each market research exercise has different priorities, but typically they seek to determine information such as:

- How big is the market now or in the future?
- Will all customers want the same from your products?
- How are products distributed into the marketplace?
- What are the characteristics of competing products?

Case study: The Gallstone Treatment Market

A pharmaceuticals company developed a drug treatment for dissolving gallstones and wanted to assess its market prospects. These are some of the factors that it considered:

- The number of people suffering from gallstones
- The number of people who consult a doctor for gallstones
- The treatments the doctors currently prescribe
- The success of these treatments and reversion rates
- How acceptable treatments are to the medical profession
- How acceptable treatments are to patients

Using published information

For many, market research conjures up images of people with clipboards accosting the public in the High Street or a 20-page questionnaire arriving after a small purchase. In practice, this is only small part of market research, and great deal can be achieved before even confronting a customer. Desk research, as it is known, allows you to build up a comprehensive picture of your market and your potential customers from publicized data. Much of this information is free, or available at low cost, from sources such as:

- Libraries
- Directories (they provide details about the activities of your potential customers)
- Regular publications
- Market research reports
- Electronic Media (CD-ROMs, The Internet, Online services)
- Trade associations
- Others (data are National and Local Governments, Business links, Chambers of Commerce and the European Commission)

Compiling questionnaires

There are a variety of possible purposes to a questionnaire, including customer profiling, features analysis, competitor analysis, identification of customer needs and measuring the impact of communications.

Questionnaires can provide a useful mechanism to collect relevant market research provided they are designed and distributed correctly. The basic rules are:

- Keep the questionnaire as short as possible
- Ask questions that are easy to understand
- Ask questions that are clearly relevant
- Avoid leading questions
- Try to maintain a logical sense
- Provide an opportunity for comment

To obtain a good response from a questionnaire, it also helps to i) pre-test the questionnaire with an unbiased observer, and ii) provide a reply-paid response envelope.

Market research is a big investment, so it is a good idea to process the returns in a way that will allow reuse. The best approach may be *to create a database*.

Making contact with companies

Researching a market usually involves making contact with companies that are potential customers and this can become indistinguishable from personal product/process promotion. Attention focuses on the following aspects of contacting companies:

- Who to contact?

A typical list could comprise: customers, end users, distributors, agents, university specialists, trade journalists, research and technology organizations etc.

- Organizational buyer

Organizational buying is concerned with the purchasing by so-called “formal” organizations.

When approaching such organizations, it is essential to distinguish between the different roles as identified by Webster and Wind (1972).

- Users those using the product service

- Influencers those influencing key product attributes

- Deciders those in authority to select a product or supplier

- Gatekeepers those controlling information flows

- Buyers administration or purchasing personnel

- Initiating company contacts

Whenever you contact or visit a company as part of your market research effort, you will need to develop an approach that stops you being regarded as a time waster. There is no guaranteed formula for success; the following guidelines should improve your chances:

  - Try to obtain a referral to a named person
  - Explain who you are and what your company does
  - Outline why you are calling
  - Try to make your approach relevant to company needs
  - Seek advice about other contacts ant strategy

- Employing intermediaries
- Keeping records

9.1.2. Marketing mix

In order to achieve your marketing objectives you need to have a strategy that includes different elements - the various parts of the marketing mix. Calling it a mix reminds you to try and get the balance right between the different elements. It is easy to assume that one part of the mix is wrong, when in fact it is another.

For example, if take-up of a newly-priced service is poor, it could be that the answer is to change the service, or to deliver it in a way that is more convenient to the user, or to improve the quality of the promotion (rather than to cut the price).

The major marketing management decisions can be classified in the following categories:

- **Product** Defining the characteristics of your product or service to meet the customers' needs.
- **Price**: Deciding on a pricing strategy. Even if you decide not to charge for a service, it is useful to realize that this is still a pricing strategy. Identifying the total cost to the user (which is likely to be higher than the charge you make) is a part of the price element.
- **Promotion** This includes advertising, personal selling (eg attending exhibitions), sales promotions (e.g. special offers), and atmospherics (creating the right impression through the working environment). Public Relations is included within Promotion by many marketing people (though PR people tend to see it as a separate discipline).
- **Place** or distribution. Looking at location (eg of a library) and where a service is delivered (e.g. are search results delivered to the user's desktop, office, pigeonhole - or do they have to collect them).

THE MARKETING MIX

The goal is to make decisions that center the four P's on the customers in the target market in order to create perceived value and generate a positive response.

9.1.3. Resources

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Links

- http://www.oxtrust.org.uk/oi
  This is the Oxford Innovation website which provides information about innovation, technology and innovation management tools)
- http://www.netmba.com/marketing/mix/
  (In this address on can find analytical description of the marketing mix method)
- http://c2kschoolbox.granada-learning.com/pdf/keystage3and4/marketing_worksheet4.pdf
  (A useful address about the marketing mix)

- http://www.tpo.de/onli/
  (Analytical explanation about what marketing of innovation is)

9.2. Use of Media to support innovation

Introduction

Learning through instruction has always utilised some kind of media to illustrate and facilitate the learning content, be books, pictures or otherwise. Through the arrival of electronic media, initially analogue and then digital the use of media in learning has become an increasingly important feature. It has allowed the potential facilitation of learning content to a range of learning styles and learner needs. This component provides a brief overview and explains some of the issues involved. Enhancing the learning environment within the workplace is a key element in the facilitation and management of innovation.

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9.2.1. What is Media Based Training (MBT)?

The term media includes the whole range of modern communications vectors: television, the cinema, video, radio, photography, advertising, newspapers and magazines, recorded music, computer games and the internet. Media are films, images and web sites etc. that are carried by these different forms of communication. Media-based training basically utilises some of these media to enhance the learning process, address different learning styles and to broaden the range of learning resources and often making them more accessible, especially those that are digitally based via online learning.

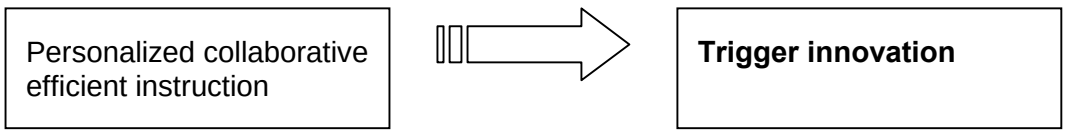
The use of media only enhances learning when the media matches the learning content. Media for the sake of media will not achieve the desired learning effect. There must be a clear link between the learning method employed and the media.

Electronic media can be distinguished between analogue and digitally based media. Analogue media is by now means dated if appropriate in the learning context. It can be cheap and easy to utilise. Digital media however can be more versatile, flexible in its application, especially when using the internet as a resource. Most of the following refers to digital media.

9.2.2. Where media applies?

Boring instruction is not an effective one. Minds wander, attention wanes, learners muddle through, maybe. When learners are through, they want to escape as quickly as possible. Little is retained. Needed behaviours have not been established. Rich associations do not exist for learners to remember key points. Learning trough media will provide choices in how to learn. *Media-based Training (MBT) is concerned with teaching and learning through the media.*

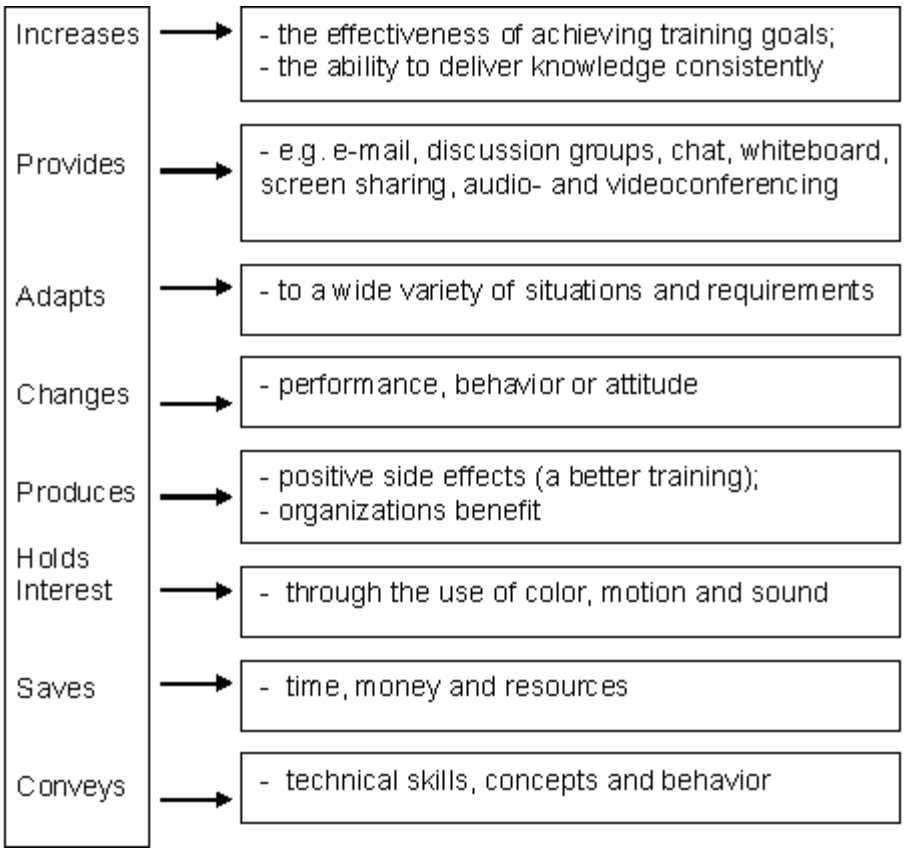
It is worthy to notice that there is a clear need of emotional intensity of [media simulated] experience for learning to last. Good MBT solutions are more than purely cognitive exercises – they evoke emotions. These solutions can train thousands of people all over the world simultaneously, if needed, but learner can use them also on request. Moreover, given the socially constructed nature of knowledge and the fact that meaning is created in relation with others, creation of meaning and efficient learning are inevitably a social process. MBT creates the conditions for deep learning through reflective dialogue with others. MBT can be applied in all types of firms. **In the new online evolving collaborative learning and working environment creative thinking may emerge**.



9.2.3. Why Media Based Training?

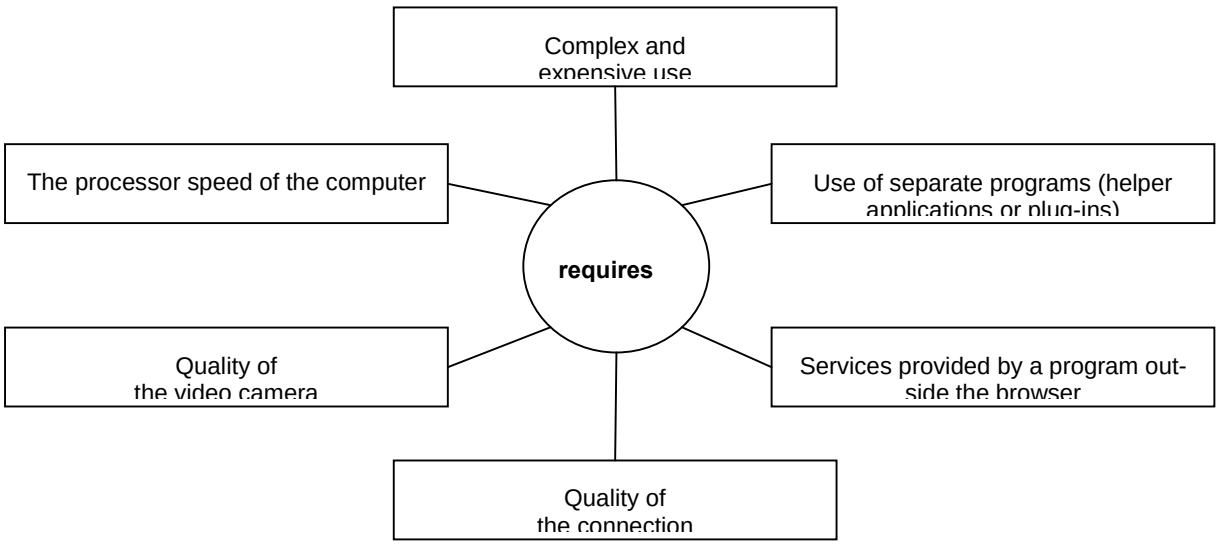
Each approach to learning has advantages and disadvantages. This is no different when using MBT. The illustrations below are aimed to list some of these.

Advantages

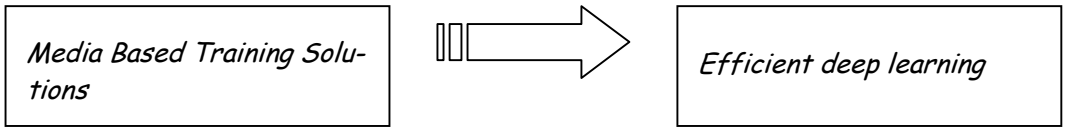


Although MBT has many advantages and demonstrates great potential versatility, the technology aspect can at times become the focal point rather than the learning as illustrated below.

Disadvantages



9.2.4. How Media Based Training is applied?



A lesson is a collection of activities and presentations that accomplish one of the sub-goals of the course. Each lesson is larger than an individual page and smaller than the whole course. Learners progress through a lesson along paths determined by the designer or choices by the learner. In many ways, a lesson is a miniature course requiring its own objectives, introductions, assessments and feedback. There are several *common lessons structures*.

- *Classic tutorials*: is used to teach basic knowledge and skills in a safe, reliable and sometimes boring way;
- *Activity-centred lessons*: is used to teach complex concepts, emotional subjects or subtle knowledge that requires rich interaction with the computer or other learners;
- *Learner-customized tutorials*: is used to let learners customize training to their individual needs; especially suits learners with widely varying needs, interests and levels of knowledge;
- *Knowledge-paced tutorials*: is used to let impatient learners skip over topics on which they are already knowledgeable;
- *Exploratory-tutorials*: is used to teach learners to learn on their own by developing their skills of navigating complex electronic information sources;
- *Generated-lessons*: is used to customize learning for those who have very specific needs and not much time or patience to complete topics they have already learned.

Metaphors and their support for innovation

A *metaphor* is a consistent design that models the structure and the appearance of the MBT solution on something familiar to learners. A metaphor can be an extended analogy, theme, motif, ongoing scenario or overall question. Metaphors are common in MBT. A good metaphor:

- lets people apply what they know about the real world environment to the task of navigating the MBT course;
- makes the learning environment more predictable;
- contains objects and actions corresponding to real-world;
- give the MBT solution a unified and consistent appearance and organization;
- can help people to learn and generate innovative ideas.

9.2.5. Where can we find online-training?

http://training.ugs.com/index.shtml

UGS Education Services offers a blend of training solutions for all lifecycle management products, including instructor led training classes and self-paced product training that enables each user to learn at their own pace.

Domains: Design, geometric modeling, 3D presentations.

http://www2.trainingvillage.gr/download/Cinfo/Cinfo398/C38K6EN.html

A learning centre is operating at the Melfi factory (near Potenza) of Fiat Auto. It is an innovative structure created to promote self-learning among employees of the car manufacturer. The first of its kind in Italy, it has thirty-five multimedia computers, two telematic workstations and a room for videoconferences. 100 electronic programmes, CD-ROMs, encyclopedias and web sites, specialist books and magazines, are also available.

This is a new model of training linked to the needs of the integrated factory. It equips people with the ability to analyze and manage problems and to play an active role in the production process. The learning centre will be open, outside working hours, to everyone working inside the factory premises. Shifts will be organized according to demand. There are 200 places available per day.

Domains: car manufacturer

http://www.bized.ac.uk/virtual/vla/index.htm

The Virtual Learning Arcade (VLA) is an exciting new section on Biz/ed that provides interactive online models and simulations for economics and business teachers, lecturers and students. The simulations also have support materials that have been written to enhance their educational value. These include explanations of relevant theories, interactive worksheets, definitions and guidelines on using the models.

Domains: Business Studies, Economics, Accounting etc.

http://www.engines4ed.org/hyperbook/nodes/NODE-130-pg.html

Dustin sets up situations that the student will encounter in real life and allows the student to demonstrate his competence. If the student succeeds at one task, he can skip ahead to the next lesson. If he has trouble, he can return to the beginning of the instruction. Because the student is in a simulated situation identical to the one in which he will have to function, he does not have to learn things that will be of no use to him. Dustin allows students to learn language in realistic situations. But it will probably not enhance a student's performance on achievement tests. A Dustin student cannot be graded in the conventional sense, but what we can see is if a student successfully completed various tasks.

Domains: Foreign language

http://www.engines4ed.org/hyperbook/nodes/NODE-302-pg.html

Modern training regimens often divorce instruction from practice, concentrating on either one or the other. GuSS (Guided Social Simulation) brings them together. GuSS applications are based on flexible social simulations. On top of this base, GuSS adds four different types of teachers. Each teacher monitors the student's on-going activity in the simulation and offers a particular type of intervention.

Domains: Selling to Simulated Customers

http://www.engines4ed.org/hyperbook/nodes/NODE-291-pg.html

Sickle Cell has proven to be a popular exhibit at the Museum of Science and Industry in Chicago.

Learning begins with a goal, even in a science museum. Rather than teach a set of decontextualised facts about genetics, Sickle Cell Counsellor gives people a compelling reason to explore the underlying knowledge. The context to the user, counselling, is used as a framework from which users can hang newly acquired concepts. This framework serves as a point of integration. All of the coaching and instruction the user is given is in service of the counselling task. Because users are eager to help their "clients," they want to learn what they can to give better advice. The users' goals serve to organize their experience.

Domains: Science

9.2.6. Preliminary conclusion

By using efficient MBT solutions we can get both the transition from dependence to independence in learning, which derives from the nature of reflective dialogue, and implies collaboration in learning and self [professional] development. These solutions take into account approaching the learners as whole persons, not only as intellects, the change with respect to knowledge in terms of approach, conception, attitudes and behaviour, and the achievement of transformation skills, self-evaluation and creation of learning communities. The use of the right metaphors in combination with the appropriate lesson structures can provide for a rich and ***effective learning environment that can be stimulating the generation of innovative ideas***.

Media-based training will continue to grow and advance. Soon most product sold will have MBT available – from the manufacturer or enterprising freelance training, MBT may even become the predominant way of delivering training. Along the way, MBT will transform from emerging technology to submerging technology. In a decade or two at most MBT could become such a normal customary way of delivering that we hardly notice it. By then anyone, anywhere will be able to learn anything at anytime. Related topics are web-based learning, computer-based learning and eLearning.

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- http://www.solt.info

9.3. Competencies of internet presentation and research

Introduction
All the innovation in the world will not help a SME if the company cannot establish a positive link between the innovation and the market. Using the internet can be a powerful tool to do this, but a basic understanding is required to take advantage.

What is the goal of this component?

- Show why the Internet presentation of SMEs is so important;
- Describe a classification of searchable databases.

Where? – In what ways this component offers help for the SMEs?

- It provides the main rules to be followed in order to produce an appropriate on-line presentation;
- Offers some e.g. of best/worst websites;
- Provides rules for an efficient search on the Web.

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9.3.1. Why to use and how to take advantage?

The SMEs have the opportunity to gain potentially huge advantage over their competitors. Over the next few years the Internet is going to completely change the way we do business. It is probably the most important development in business and communication in the history of the global economy. However, because the Internet is developing at such an amazing rate those companies who put off entering the world of online commerce may never be able to catch up with their more forward thinking competitors.

Why are so many companies going online? Because no other method can bring so many benefits and reach so many potential customers at such a low cost.

Advantages:

- intensify communication
- ease access to new information
- stretch the reach of marketing and sourcing
- reduce costs and as a result boost productivity and profits
- e-business should bring new customers
- grow the business from a local one to a international one

In a recent survey, 70% of companies questioned reported enhanced corporate image as a result of the Internet. 57% reported increased efficiency and 50% reported improved quality of service. From a marketing perspective, the web offers an unparalleled opportunity for SMEs.

How to take advantage?

Having a Web site is an excellent way of providing information on SMEs. The content of the Web site can be imaginative and rich in content, but time and effort does need to be spent on deciding how to design and produce a web site. Even at its most basic level, a Web site with a few links is interactive. It is this immediate feedback of user interaction on the Web site that makes it such a powerful communication method.

9.3.2. Presentation on the internet

Step 1: Set your goals!

You will not be able to make good decisions about your website or its development if you don't set measurable goals and targets for success from the beginning. If you haven't already set these kinds of targets in your offline business you'll need to start doing so, as this will help you to invest your resources, money and time more effectively.

Advice:

- Prepare a brief design detailing exactly what you want to achieve from your site.
- Prepare the copy or text for your site. This should be written using direct marketing copy-writing techniques either by your self or a professional.
- Select images for your site. These can be existing photos or chosen from an online photo library.

Step 2: Get onto the World Wide Web!

What do you need?

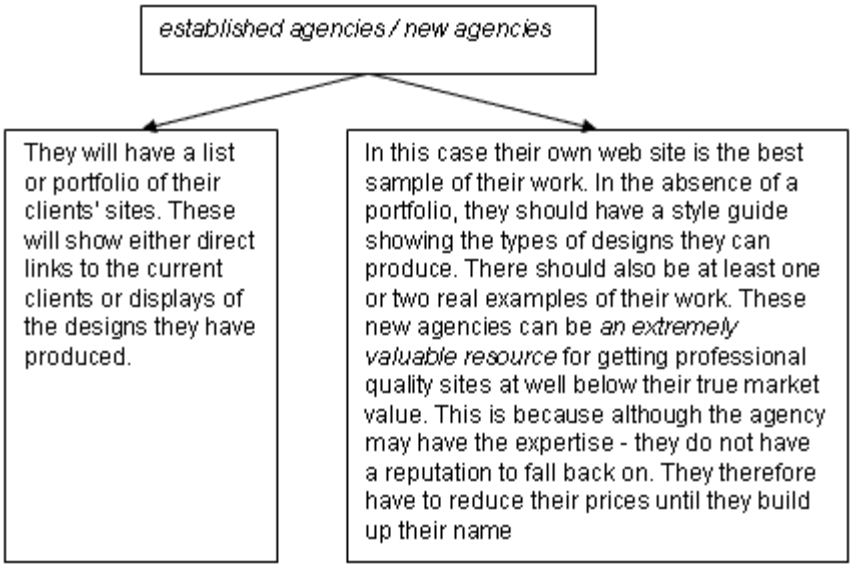
Web Space: Many service providers give you a certain amount of free web space with your connection. However, this usually has a limited capacity and is not really suitable for a professional site. You have to find a commercial web space that will enhance the experience of visitors to your site.

Web Site Developer: The first and most important step involved in setting up a web site, is choosing the right web developers. As the main purpose of a business web site in the SME sector is marketing. The overriding factor in deciding on an agency is whether they can develop your site as an effective promotional tool. Therefore out of all the abilities an agency should possess, by far the most important is direct marketing skills; because without applying effective marketing techniques to the site - a good design will be of little use for your business.

Choose a *direct marketing orientated web developer. Follow the rules below:*

- Use web marketing strategies to attract visitors to your site such as reciprocal links, direct email, newsgroup and list serve postings etc.
- Combine online marketing with conventional promotion such as direct mail, advertising and include your web site address on all business correspondence
- Include an online form for your prospect to respond to your offer, either to place an order or request more information
- Build up a database from enquiries. Offering a free report on the subject of your products or services that can be downloaded is a good way to build up a database of qualified prospects.
- Email your database regularly to keep them informed of new developments and offers. Alternatively produce an online newsletter for the same purpose.

How can you assess agencies' ability?



9.3.3. Web content layout

A good presentation of a SME on the Web must correctly address the people's ability on focusing on a certain topic/image/text:

- People are able to focus their attention on particular stimuli;
- People are able to attend to more than one stimulus at any one time;
- Attending to information requires mental effort;
- People are able to direct attention to groups of stimuli sharing sensory characteristics.

The consequences of these aspects on designing web interfaces are summarised below:

General guidelines:

- More than one piece of information may be displayed on the screen at any one time using static media (text or graphics) as long as the user is given control over the appearance and disappearance of the information
- Users are likely to have little difficulty in attending to a particular passage of speech, sound or music while other auditory information is also being presented
- Information about substantially different subjects or topic areas should be removed from the display (and from auditory channels) once a user begins to study a presentation about a new subject
- When more than one form of information is presented concurrently using dynamic media, the combination will tend to be more usable if:
    - the different pieces of information are presented using different sense modalities, or require different forms of cognitive processing;
    - the medium of presentation is familiar to the user;
    - the extraction of relevant information is easy;
- Users should be given the flexibility to "switch off" particular forms of output where they are not essential to the task in hand;
- Groups of information which users are intended to see as related should be given common perceptual features;

Some examples!

Amazon.com
is an online book retailer that is valued at $120 million. It is one of the most successful examples on the Internet. Within a few months of starting it became the largest book store in the world. They encourage participation by inviting shoppers to submit book reviews. The UK version of Amazon.Com is Book Pages. This company has a loyalty points scheme to encourage customers to come back and therefore create a community around their site.

Dell.com
Computer manufacturers Dell sells over two million dollars worth of equipment every day. Its success is due to using a built to order model. This allows customers to purchase a bespoke computer which has been built according to their specification.

Musicroom.com
Internet Music Shop is an online retailer of music CD's. The business which was launched in May 1996 has been valued at £2.2 million. They have succeeded in creating a strong online community around their site with 40% of their orders coming from existing customers. Their site attracts 1000 visitors a day, and from this number 5% place orders. This is way above the industry standard in mail order which is one to two per cent. This goes to show the power of the Internet as a sales channel - when things are done right.

Do you know the target audience?

Knowing your target audience is at the core in any type of marketing strategy. This is no different from utilising the web as a marketing tool.

Users Are Scanners	If you want a visitor to read your text, be sure to make your point in the very first sentence of the page. After that you should try to keep them occupied with short paragraphs and interesting new headers all the way down the page.
Less is more	Try to keep your pages as short as possible. Use a lot of space between your paragraphs and chapters. Pages overloaded with text will kill your audience.
Navigation	Try to create a navigation structure that is common for all the pages in your Web. Keep the use of hyperlinks inside your text paragraphs to a minimum. If you must use hyperlinks, add them to the bottom of a paragraph or to the navigation menus of your site.
Download Speed	Internet usability studies tell us that most visitors will leave a Web page that takes more than 7 seconds to download. If your pages take a long time to download, you might consider removing some of your graphic or multimedia content.
Let Your Audience Speak!	Feedback from your users is a very good thing. Your visitors are your customers. Very often they will give you some valuable wisdom, or advise you, completely free of charge, about what you could have done better. If you provide a simple way to reach you, you will get a lot of positive input from a lot of people with different skills and knowledge.

Use of core design principles:

Below are some examples of web sites considered good and less good, however the reader is encouraged to sample the websites listed and judge for themselves.

GOOD	NOT SO GOOD
2Entwine (www.2entwine.com) Super-simple, square, solid, blocky, soft colours, responsible use of Flash, clear text. Top marks. Apple (www.apple.com) Apple's whole design philosophy centres on rich, appealing content in a simple, effective structure. Excellent use of white space and	Findhotel (www.findhotel.co.uk) Not a very good site, devoid of any structured layout with a disparate collection of elements slung haphazardly into space. Way too much white space leaves the eye nothing to go by. Hicks and Company (www.hicks.co.uk) A one-page encyclopaedia of what not to do: distracting flashing ads (at periphery draw

imagery make this a great site to use. Appliance Studio (www.appliancestudio.com) A simple site with plenty of personality. This comes through neat writing and 'contentful' imagery. The design features plenty of white space, good contrast, and excellent layout. A pleasure to browse. Criticalmass (www.criticalmass.com) Very good site from a highly successful interaction design firm. Very clean site with clearly arranged information, leaves you with a feeling of trust. Needs to bring more information forward to home page, and focus the introductory message better. i-define living (www.i-define.co.uk) Dawn Winder is a Personal Branding Consultant (first of a new breed?). Her site is driven by high-value content, and the regular newsletter is an effective and flexible channel. The straightforward design has personality and gives a strong message, although should use a wider colour theme. I'd also place the logo over left.	the eye more); top navigation bar leads off-screen; no clear prioritisation; dreadful jumbled layout; click here for homepage etc. Interflora (www.interflora.co.uk) Basically decent concepts are let down by bad forms (for example the order form, takes 40 seconds to load, and is not a very user-friendly web form), lack of space between navigation elements, small text. Royal National Institute of the Blind (www.rnib.org.uk) Although this is a well-written site, it totally compromised by illogical layout and garish colour choices. The Trainline (www.thetrainline.com) A confusing layout, and dreadful behaviour severely compromise this train timetable and ticket purchasing site.

More traditional businesses are also finding success on the Internet. In the US which precedes the UK in business trends - many small businesses are finding that 40% - 50% of their business is now coming from the Internet.

However a surprising success story was that of a local butcher who started selling specialty meats through the Internet and the business took off to such a degree that he closed down his shop and now trades exclusively over the Internet.

9.3.4. Internet research

While doing research on the internet the searcher has to deal, besides the *large number of founded entries (1)*, with two other issues: *trustworthy information on the web (2)* and *deep web (3)*.

(1). The ability to reduce the *number of founded entries* and to find the needed information on the Internet is a function of how precise the queries are and how effectively one uses search services. *Poor queries return poor results; good queries return great results*. Contrary to the hype surrounding "intelligent agents" and "artificial intelligence", the fact remains that search results are only as good as the query we pose and how we search. There are very effective ways to "structure" a query and use special operators to target the results you seek. Absent these techniques, the searcher will spend endless hours looking at useless documents that do not contain the wanted information.

To illustrate some of the basic concepts and recommendations covered in a tutorial hosted by Bright Planet, let's say we have an interest in recent findings about new planets being discovered outside our

solar system. Using the information "contained" in this statement, we can see how an effective query can be built by following these guidelines.

- use nouns and objects as query keywords – actions (verbs), modifiers (adjectives, adverbs, predicate subjects), and conjunctions are either "thrown away" by the search engines or too variable to be useful (e.g. planet or planets);
- use 6 to 8 keywords in a query - more keywords, chosen at appropriate level, can reduce the universe of possible documents returned by 99% or more;
- truncate words to pick up singular and plural versions – use asterisk wildcard (e.g. planet*). The wildcard tells the search engine to match all characters after it, preserving keyword slots and increasing coverage by 50% or more;
- use synonyms via the OR operator - cover the likely different ways a concept can be described; generally avoid OR in other cases;
- combine keywords into phrases where possible - use quotes to denote phrases (“solar system”). Phrases restrict results to EXACT matches; if combining terms is a natural marriage, narrows and targets results by many times;
- combine 2 to 3 concepts in query - triangulating on multiple query concepts narrows and targets results, generally by more than 100-to-1 (*"solar system", "new planet*", discover* OR find*);
- distinguish concepts with parentheses - nest single query "concepts" with parentheses. Simple way to ensure the search engines evaluate your query in the way you want, from left to right – e.g. ("solar system") ("new planet*") (discover* OR find);
- order concepts with subject first - put main subject first. Engines tend to rank documents more highly that match first terms or phrases evaluated ("new planet*") (discover* OR find) ("solar system");
- link concepts with the AND operator - AND glues the query together. The resulting query is not overly complicated nor nested, and proper left-to-right evaluation order is ensured ("new planet*") AND (discover* OR find) AND ("solar system");
- issue query to full Boolean search engine or metasearcher - full-Boolean engines give you this control; metasearchers increase Web coverage by 3- to 4-fold ("new planet*") AND (discover* OR find) AND ("solar system").

(2) As for the *reliability issue*, there is the *checklist for research source evaluation*, which can be summarised as it is shown below:

- **Credibility**
- **Accuracy**
- **Reasonableness**
- **Support**

(3) Searching on the Internet today can be compared to dragging a net across the surface of the ocean. While a great deal may be caught in the net, there is still a wealth of information that is deep, and therefore, missed. The reason is simple: most of the Web's information is buried far down on dynamically generated sites, and standard search engines never find it. Traditional search engines create their indices by spidering or crawling surface Web pages. To be discovered, the page must be static and linked to other pages. Traditional search engines can not "see" or retrieve content in the *deep Web* - those pages do not exist until they are created dynamically as the result of a specific search. Because traditional search engine crawlers can not probe beneath the surface, the deep Web has heretofore been hidden.

- The deep Web is qualitatively different from the surface Web. Deep Web sources store their content in searchable databases that only produce results dynamically in response to a direct request. But a direct query is a "one at a time" laborious way to search. BrightPlanet's search technology automates the process of making dozens of direct queries simultaneously using

multiple-thread technology and thus is the only search technology, so far, that is capable of identifying, retrieving, qualifying, classifying, and organizing both "deep" and "surface" content.

- Public information on the deep Web is currently 400 to 550 times larger than the commonly defined World Wide Web. The deep Web contains 7,500 terabytes of information compared to nineteen terabytes of information in the surface Web. More than half of the deep Web content resides in topic-specific databases.
- A full ninety-five per cent of the deep Web is publicly accessible information -- not subject to fees or subscriptions. Total quality content of the deep Web is 1,000 to 2,000 times greater than that of the surface Web.
- Deep Web content is highly relevant to every information need, market, and domain. Deep Web sites tend to be narrower, with deeper content, than conventional surface sites. To put these findings in perspective one has to consider that the search engines with the largest number of Web pages indexed (such as Google) index no more than sixteen per cent of the surface Web. Since they are missing the deep web when they use such search engines, Internet searchers are therefore searching only 0.03% -- or one in 3,000 -- of the pages available to them today. Clearly, simultaneous searching of multiple surface and deep Web sources is necessary when comprehensive information retrieval is needed.
- The searchable databases on the web can be classified in twelve categories:

1. *Topic Databases* - subject-specific aggregations of information, such as SEC corporate filings, medical databases, patent records etc. (54% from the deep web is formed by these topic databases websites) e.g. http://www.10kwizard.com/, http://www.uspto.gov/
2. *Internal site* - searchable databases for the internal pages of large sites that are dynamically created, such as the knowledge base on the Microsoft site (13%) e.g. http://www.microsoft.com/
3. *Publications* - searchable databases for current and archived articles (11%) e.g. http://www.pubmedcentral.nih.gov/
4. *Shopping/Auction* (5%) e.g. http://www.flowerweb.nl/, http://www.locateaflowershop.com/
5. *Classifieds* (5%) e.g. www.canadaeast.com/
6. *Portals* - broader sites that included more than one of these other categories in searchable databases (3%) e.g. www.searchindia.com
7. *Library* - searchable internal holdings, mostly for university libraries (2%) e.g. www.lib.clemson.edu
8. *Yellow and White Pages* - people and business finders (2%) e.g. www.anywho.com
9. *Calculators* - while not strictly databases, many do include an internal data component for calculating results. Mortgage calculators, dictionary look-ups, and translators between languages are examples (2%) e.g. www.russiantranslation.ru
10. *Jobs* - job and resume postings (1%) e.g. http://www.medicsolve.com/
11. *Message or Chat* (1%) e.g. www.multidbexpress.com
12. *General Search* - searchable databases most often relevant to Internet search topics and information (1%) e.g. http://www.cyndislist.com/

Sixties deep sites that already exceed the web surface by forty times, from which two thirds are fee less (representing about 90% of the content available within this group of sixty), are available also at Bright Planet.

9.3.5. Resources

Links

- http://www.w3schools.com/site/site_tutorials.asp
- http://www.w3schools.com/site/site_glossary.asp
- http://www.killersites.com/
- http://www.vanderbilt.edu/create/tech/
- http://www.dreamink.com/beginners/b1.shtml

- ttp://www.brightplanet.com/technology/deepweb.asp
- http://www.brightplanet.com/deepcontent/tutorials/search/index.asp
- www.completeplanet.com
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- www.knobblycrab.co.uk/WebBrochure.pdf
- www.undp.org/info21/e-com/e5.html
- http://www.web100.com/listings/business.html
- http://www.webdesignfromscratch.com/best_and_worst.cfm

10. Human resources management policies to support innovation

10.1. Human resources competence requirements for innovations

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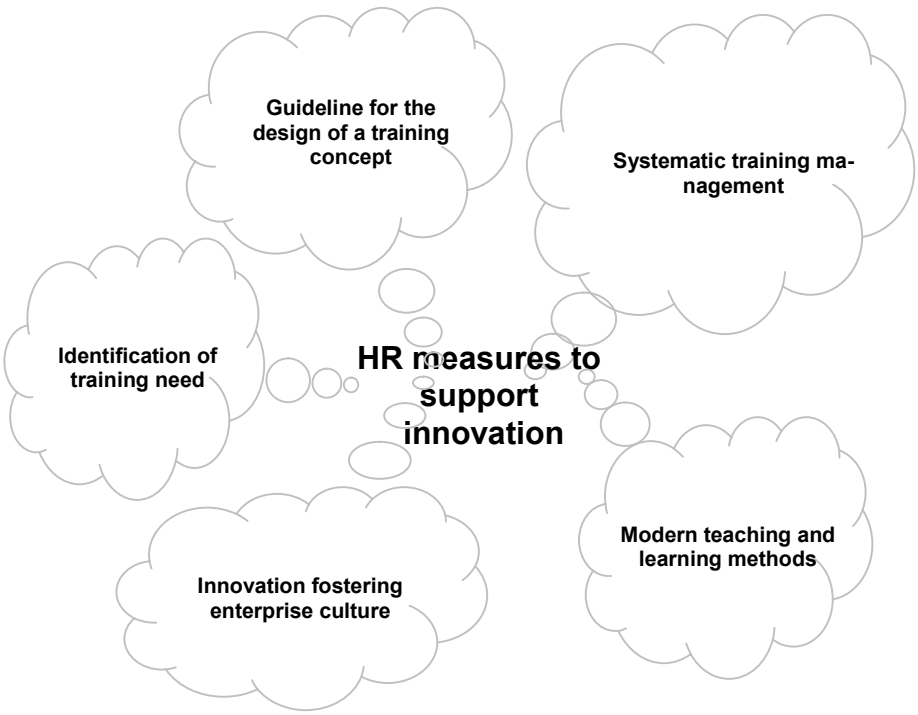
10.1.0. Introduction

The competence of enterprises to market new products and/or services, to keep their processes up to date technologically and organisationally etc. – in other words to be **innovative – depends to a high degree on their employees, their competence and knowledge.**

The great importance of training, further training, learning, human resource development etc. should not be neglected – nevertheless there are many SME enterprises that do not focus enough on these areas. Often they are lacking basic building blocks of Human Resources Management.

In this connection, the various sub-components of component 10 “Measures in the framework of Human Resources Management to support innovation” (see the graphics below) are designed to help the users to gain the basic principles needed for a professional Human Resources Management in their individual SMEs.



The component 10.1 treats the topics “Guidelines for creating a training concept“ and “Systematic training management“.

For information on the other topics see the sub-components 10.2, 10.3 und 10.4.

Links to further topics such as human resources management, human resources development etc. can be found in the link collection at the end of this component.

10.1.1. What: what constitutes the requirements for the qualification of the employees?

Changing market conditions such as:

- Increasing internationalisation and globalisation of the markets, high competition pressure,
- Decreasing product life cycles, increasing innovation speed,
- Growing market segmentation and customer orientation,
- Increasing demands on quality,
- Increasing complexity, dynamics and technology etc.

are great challenges for innovation strategies of the enterprises which in turn lead to complex qualification requirements of the employees.

- Faster decline of the knowledge and the need for lifelong learning
- High demands on the specific subject skills but also on the methodical and social competence of the employees
- communicative and language competence
- need for more responsibility and self-control etc.

Systemising the training work is a basic necessity in order to comply with these requirements.

10.1.2. Why: The role of human resources in the company's ability for innovation

The qualification of the employees are, on the one hand, a **pre-requisite for innovation**, because it is indispensable for the start and the permanent further development of innovation. On the other hand, **qualification is a result of innovation** as well, when technological, organisational and social innovation changes in the qualification profile are taking place among the employees.

Lacking qualification can turn out to be a **bottleneck in the innovation process in an enterprise** when enterprises design and carry out their innovation, mainly from the technological aspect, without preparing their human resources in a suitable way.

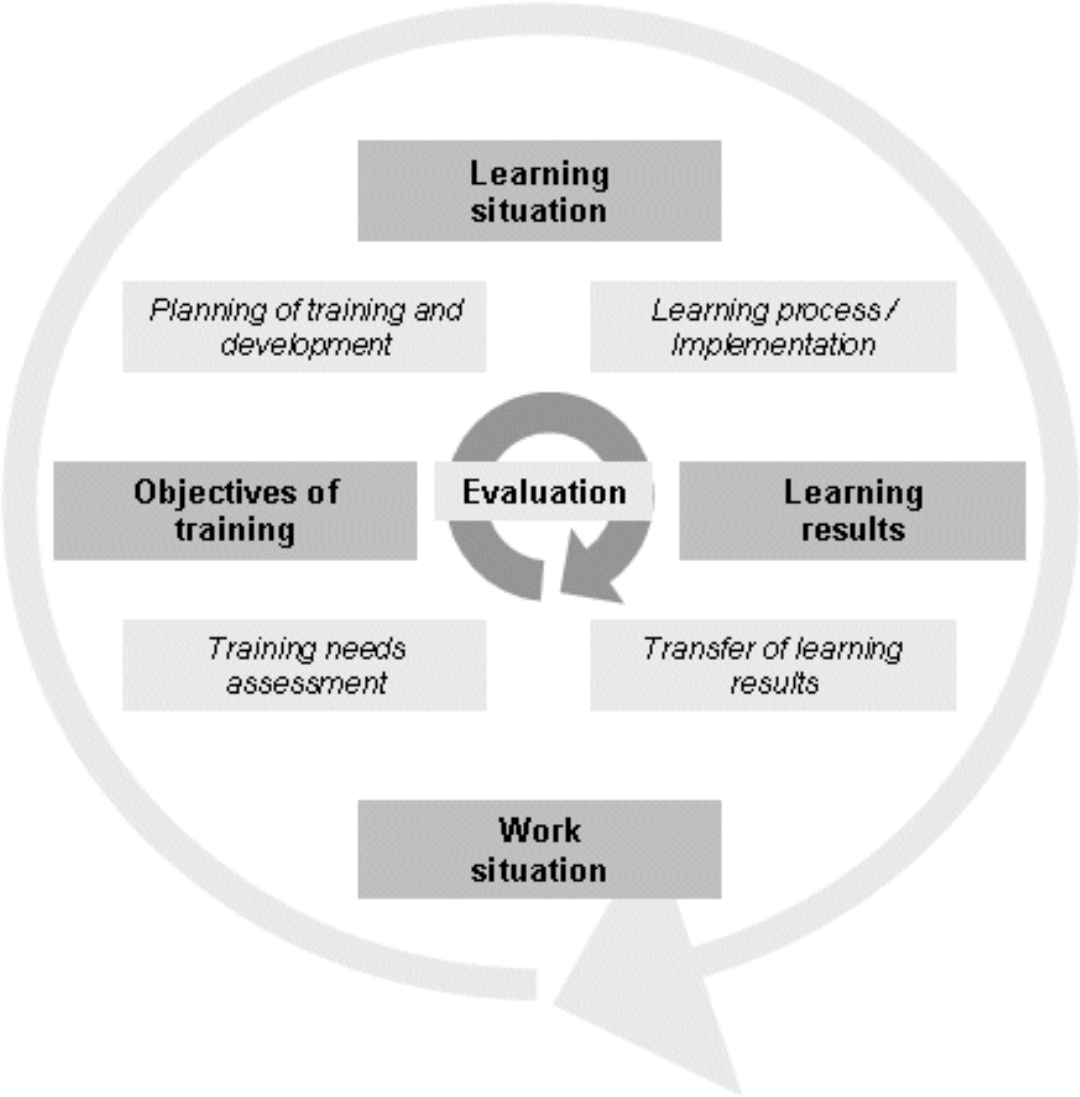
A **foresighted and systematic human resources development and qualification plan can set the prerequisite for an enterprise** to actively carry out its process of changes, and thus remain **at the top** of the competition.

The human resource becomes a decisive factor in the innovation ability of enterprises.

10.1.3. How: Systematic training management, training concept

With the help of the so called **training cycle** the following is **possible:**

- **questions of training can be thought through systematically**
- the **framework for necessary preconditions can be set and fostered, making training effective**
- **training processes can be looked** at from different angles **in order to detect strong, as well as weak points of training**



A **training needs assessment** (analysing the current work situation) usually **is** the **starting point** of any demand-oriented training management. By applying needs assessment, one turns away from supply-oriented training, at the same time making it possible to turn towards staff member orientation as well as allowing problem-solving-oriented training. By applying a training needs assessment, problems and requirements of the work situation are collected, making goal-oriented training measures possible.

On the **basis of needs assessment**, **training objectives are to be defined** (preferably together). In advance set training objectives show what should be achieved through appropriate training measures.

When formulating training objectives, the following should be considered:

- the observable changed behaviour of the training participant
- the object (training matter)
- the conditions under which participants have to present results (e.g. allowed resources)
- the evaluation criteria, showing if and to what extent the participant has reached the training goals

Based on the training objectives, the necessary programmes, contents and instruments are planned and developed. An essential goal of training planning and of the development of appropriate measures is to create training activities in such a way that the learning party can go through learning processes that lead to learning results which, in turn, correspond with the training objectives.

When planning and developing training measures, the following parts are to be included:

- planning of structure (structure of programme, sequence of contents, classification, textual coherence, schedule)
- planning of content and methods (didactics, forms of learning)
- target group planning
- evaluation planning ("how will we know that we reached our objectives and what will show us that we did?")

Within the **concrete learning situation** the participant is actually confronted with the teaching staff (as well as with the contents and activities). This step **leads to learning processes and finally to the results aimed at.**

When implementing training measures, the following aspects should be paid special attention:

- **increased application of on-the-job training and project-work**
- **intensification of internal know-how transfer**
- **use of new methods of teaching and learning, as well as the use of new learning technologies**

A **central position** within the training process holds the **transfer and the implementation of the acquired knowledge into the work situation**, the applicability of training results to the work place represents a main factor of successful training.

The described training cycle represents a process, causing evaluation measures along all components of the training cycle.

10.1.3.1. Checklist: Typical questions related to further training concepts

In the following table the main questions which should at least be answered to some extent when drawing up a concept of further training are listed.

- How does the company define further training (definitions for training, further training, human resources development, etc.)?
- What objectives does the company pursue with further training?
- Are these objectives written down?
- Is there a connection between further training objectives and company objectives?

- What role does the management play within the field of further training?
- How does the management support further training measures?
- Who is responsible for training issues?

- How are further training needs assessed?
- Is there an institutionalised system of need assessment?
- Who is responsible for the assessment?
- How is it checked whether there actually is a further training need or not?
- Is staff's point of view accounted for?

- How does the company get from the assessed training-needs to the further training offer?
- Who is responsible for the programme planning?

- Are costs of further training calculated?
- Is there a budget for further training measures?

- What range of further training measures (internal and external projects, on the job-training, coaching, quality circle, self-study material, trainee-pools and programmes, seminars, work-shops, etc.) is offered?

- Who carries out the further training measures?
- Which role do internal part-time trainers play?
- Which role do external providers play for the internal further training?
- Who selects external providers and which selection criteria are applied?

- What attempts are made to support the transfer of learning results onto the job?

- What attempts are made to determine the results of further training measures?
- How is it done? Who evaluates? Which instruments are applied?

- Which target groups are there for further training?
- Who is trained further and who is not?

- Does further training take place during spare time or working hours?
- Who makes sure that the further training concept is enhanced and revised?

10.1.4. Examples

By means of some examples from real life (SMEs only) we wish to show which measures enterprises use in practice to make a professional job of their training and the human resources development .

Example: prior and posterior debates, In-house training courses:

The CEO of Eloxal Heuberger (an anodising institution with 22 employees) has an interview with the staff member before this person is sent to an external further training course. Here the expectations of the enterprise and the employee from this training measure are made clear before the event.

After attending the seminar a follow-up interview takes place where the participants jointly find out how useful the seminar was for obtaining the goals planned, and which skills acquired can be applied directly, and which supporting measures the employees would need to apply them. In addition, a summarising report is written after each seminar and a short oral report is given in front of other employees. All training material is deposited in the company-owned library where it is readily accessible by all staff members. Furthermore, the CEO gives two-hour “in-house training sessions” weekly on current topics. Flipcharts are used for visualisation, the presentations are then photographed and are available for reference purposes whenever required.

Example “EDP: Tips and Tricks“

If required, the company Winkelbauer (engineering enterprise with 46 employees) organises events under the title “EDP: Tips und Tricks“in the seminar room of the company. Each staff member has the possibility to talk for two hours with an EDP expert about his EDP questions on the basis of a catalogue of questions prepared in advance and try to solve his questions on the spot. Minutes are written

after each meeting – issues and their solutions are recorded. These minutes then serve the employees as reference books for further questions.

Example Database "Market place of experience"

The Gosch Consulting company (Consulting enterprise with 30 employees) has compiled a database with the title "Market place of experience". It is accessible via intranet and serves as an active knowledge management. Here any problems and their solutions that crop up during the work are entered by the employees. If there is a problem during their daily work they then can access the "Market place of experience" and check whether a colleague came across the same or a similar problem in the past.

10.1.5. Resource

Bibliography

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  Karl-Franzens-Universität Graz, Institut für Organisations- und Personalmanagement – GRAZ, Graz 2003

Links

- http://www.evfh-nuernberg.de/data/dbfiles/entwickl.doc

  Employees are the basis of social organisations. For workers to comply with their tasks the company has to plan the volume of need for employees and their qualification level and competence. Furthermore, labour conditions have to be organised in such a way that the employees become motivated.

- http://www.hrtoday.ch/Artikel_Detail_de.cfm?MsgID=464

  Thanks to Employability fit for dynamic markets: A flexible human resources development, grants the employees labour market ability, and opens up new business fields for the enterprise.

- http://www.innovation-aktuell.de/kv0409.htm

  Systematic and continuous human resources development safeguards the innovation ability and the compatibility of the enterprise. However, whereas big companies have their own departments for preparing their employees for future requirements, professional human resources development is often vainly looked for in medium-sized and small enterprises. In this paper you will learn where cooperation makes sense for an SME, which advantages they may have, what an enterprise striving for a joint staff development unit has to do, and what the experience of six SMEs in the project Porregio was.

- http://www.diw.de/deutsch/produkte/publikationen/materialien/docs/papers/diw_rn02-01-12.pdf

  Human capital and innovative regional networks –theoretic background and empirical research findings:

- http://library.fes.de/fulltext/asfo/00853003.htm

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http://www.fhso.ch/pdf/human/snp20_innovativ.pdf

„Innovative employer": Catalogue of criteria and evaluation concept for the Swiss HR- catalogue 2002

- http://www.businessballs.com

  training development tools

10.2. Identifying training needs for Innovation in SMEs

Introduction

Innovation in a business is very much dependent on the appropriate skills of its staff. It is therefore important to establish what skills are available, what the gaps are and how assessing the training needs can develop required skills.

This section builds on the outcomes of another Leonardo project called Learn & Work that specifically addressed the issue of analysing training needs in business. The starting point being a review of how your business functions as an organisation, reflecting "about the strategy that you've designed to run your business and to identify its constraints and success opportunities".

What is a Training Needs Analysis?

Training Needs Analysis (TNA) should help you to collect and interpret data to enable the identification of both staff and organisational performance improvement. Key in an TNA is to gain comprehensive data on training needs, which amounts to answering the fundamental questions of: who, what, when and why as well as how.

You should involve key staff belonging to the different functional areas of your organisation. These are people working in the key processes of your business and for that reason have their own perspective about the **development needs** and **existing opportunities** leading to your company performance improvement.

The approach we are proposing starts with the identification of existing problems (constraints) that may stop, or opportunities that may allow to increase your company results.

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10.2.1. Where in business are TNAs undertaken

TNAs are potentially conducted in all areas of business that rely on the skills of its workforce, be it in the private or public sector. TNAs are more likely to occur in larger organisations than smaller ones normally due to the time and cost involved. However with some good preparation and lessons, and willingness to learn from those larger organisations a TNA can be effective in all sizes of business.

Below is an example of a TNA conducted by Rockwell Automation PLC

Part of Swedish processing giant Tetra Pak, Tetra Pak Processing UK is a leading OEM serving the dairy and other liquid food processing sectors. Tetra Pak Processing UK is based in High Wycombe and specialises in the design, installation and maintenance of large, complex liquid food processing and packaging systems at some of the largest plants around the country.

Tetra Pak Processing UK used the latest Rockwell Automation PLC's, networks and software resulting in a significant improvement of the performance of Tetra Pak Processing UK's food processing plant. To ensure maintenance engineers in its field service division keep ahead of the latest controls technology, the company commissioned Rockwell Automation to carry out a detailed Training Needs Analysis.

Field service manager is responsible for the maintenance of Tetra Pak Processing systems after they have been installed and commissioned. The service engineers' main role is attending breakdowns at customer sites, where their priority is to troubleshoot the problem and get the plant up and running as quickly as possible.

Rather than send the service engineers straight onto training courses, the field service manager commissioned Rockwell Automation to carry out a Training Needs Analysis (TNA). This is designed to identify skills gaps and enable training to be targeted precisely where it is needed to meet a company's operational requirements.

The field service manager commented:

"A TNA aims to establish knowledge, skill and experience levels in key areas and identify those areas where further training is required. Some companies waste a lot of money on training that is not required or is at either too high or low a level for the engineer concerned - a TNA avoids this."

"I will add my own views and knowledge of our service engineers to the TNA report, and this will enable us to target my training budget on the needs of the business"

10.2.2. Why undertake a Training Needs Analysis?

A TNA can provide

- a framework of training needs
- acknowledgement and better understanding of training needs
- a back-up policy if things get difficult
- direction for utilizing limited resources

A company's staff are its most important asset for the skills, knowledge and experience they bring to bear on business performance and achievement of business objectives. Skills for example are viewed as an important contributor to business success, which is evidenced in various reports. Being familiar with that asset, how to access and nurture it forms an important element of an innovative business. More often than not, staff performance is being challenged within an ever-changing market environment, keeping up-to-date with the latest technology advancements, customer demands, new product or process standards, management techniques, or indeed new government and EU financial and business regulations, health and safety rules etc. It is true to say that typically businesses will deal with these challenges by engaging support services such as consultants, lawyers, bank or government sponsored business advisors in order to tackle any perceived gaps.

Although seeking external assistance in closing any perceived gaps will often be an appropriate strategy. However, in the longer term a better understanding of the business in terms of a learning organisation with its base of skills, knowledge and experience ***and*** potential gaps will benefit the planning process for improved business performance and help to release innovative potentials, which is something that cannot easily be outsourced in smaller businesses in any case. Even larger firms are more careful now about the concept of downsizing and outsourcing, which was so dominant in the 80s and 90s, as they realise how difficult it is to replace a pool of knowledge. It is therefore important for a firm to periodically and systematically assess its skills base and needs not only to identify potential training requirements but also to inform the utilisation of innovation techniques described in this guide.

Some countries have developed standards to encourage good practice in nurturing skills assets in business from an organisation point of view. In the UK for example a new initiative was developed in the 90s to introduce such a standard for human resource development called Investor in People: "The Standard provides a national framework for improving business performance and competitiveness, through a planned approach to setting and communicating business objectives and developing people to meet these objectives"

10.2.3. How ? - Training Needs Analysis as a Project

The reader should note that an extensive TNA should be planned well, that it is treated like a project and should therefore be managed as such.

Typically this would include deciding on goals and parameters of the project, possibly select a project team, planning the project, preventing conflict with staff through communication and documenting the project. You will need to answer questions such as: Have I allowed a sufficient budget for the analysis to be carried out? What is the timeframe? When do I need results? Do I have people with the necessary skills to carry out such an exercise? Is there existing information that is relevant and readily available?

It will also be important that your plans for a TNA is communicated and explained to staff. You will need to think about staff briefings for example and how to keep staff informed during the process as a TNA may take several weeks to complete and analyse.

You will also need to think how the TNA project will be documented, for example justifying the solutions chosen to address skill gaps. Confidentiality may also be an issue to be aware of.

If you company does not have an HR department or an HR expert, you will most likely work with an external consultant or advisor.

So a good TNA ask appropriate questions around:

- ***Who***
- ***What***
- ***Where***
- ***When***
- ***Why***
- ***How***

Getting started: Identification of Problems/Opportunities

Training should be oriented to solve existing problems or to take advantage of new business opportunities. It must always be supported by the analysis of work processes and be oriented to the implementation of your company's business strategy. Remember a TNA is not the solution itself but only part of the solution.

10.2.3.1. List your company key-processes

A. On a sheet of paper, list your company key-processes

Business processes are a series of steps, which, through the use of resources, convert one or more inputs into one or more outputs that together, create value for the customer. Key processes of your business are all processes that your company needs to meet your customer's expectations. These processes are transversal to functional areas of your business and are the main focus of our analysis.

For example different business processes are:

PROCESS		EXPLANATION	COMPANY SPECIFIC DETAILS
CUSTOMER	►	Indicates the sub-processes or process steps that affect the customer (e.g.: start and end)	
MANAGEMENT	►	Indicates the sub-processes or process steps that refer to the management (e.g.: drawing up of the budget)	
PRIMARY	►	Indicates the sub-processes or process steps that generate a product or service (manufacture of electrodes)	
SUPPORT	►	Indicates the sub-processes or process steps that support the remaining processes (acceptance of the order, issue of invoices, training, recruitment, processing	

		of salaries).	
SUPPLIER	►	Indicates the sub-processes or process steps that affect or are affected by the suppliers' activity (e.g. supply of raw materials). In the processes map, identify the steps, sub-processes or connections where there can be breakdowns in performance.	
Other	►		

10.2.3.2. List your company's functional areas

B. On a sheet of paper, list your company's functional areas

After listing your company's key-processes, identify the existing functional areas. These are described in the typical hierarchical organisation chart, which in effect breaks down functions from the top manager of the enterprise through successive layers of management to the individual worker who touches the product or service, or who faces the customer. It is very important to identify these areas correctly because the employees of the different areas are the ones that will be involved in the training later on.

Example: Management, Marketing, Sales, Financial, Administrative Services, Human Resources, Production, Quality Assurance, Logistics, etc. In smaller businesses several of these functional areas may be carried out by the same person.

10.2.3.3. Identify the main problems and opportunities

C. Identify the main problems and opportunities of your company

Identify the main symptoms of existing problems. List the possible causes of the problem identifying the business process involved. Identify the functional areas affected or causing the problem. Do this by talking to the key staff responsible for these key areas.

Identify also the main opportunities foreseen for your business. Critical opportunities may cause training needs of your employees; we give you a few examples:

- Introducing new technologies;
- Entering a new market;
- Producing a new product;
- Hiring employees from specific target groups (e.g. immigrants);

or the mix of some of these factors.

Use the following table to identify the problems and critical opportunities and its implications in your business processes and functional areas.

Symptom of the Problem or Critical Opportunity	Problem Cause/ Opportunity	Business Processes Involved	Functional Areas
Problem: High rate of returned products from customers	Bad quality control Large delays in deliveries to customers	Production Quality Control Distribution	Production Quality Logistics
Problem: Cash-flow problems	Bad cash-flow management Delays in invoicing customers Bad negotiation process with suppliers about payments policy	Budgeting Invoicing Purchasing	Financial Financial Purchasing
Opportunity: Implementing an Enterprise Resource Planning Software System	Better stock management Better warehouse management Larger product rotation (First in, First Out)	Accounting Warehousing Sales	Financial Logistics Commercial

After filling this map, please discuss with your key staff if the results reflects the real situation of your company and whether there are any gaps.

Fine-tune the table if necessary or otherwise please move to the next stage.

10.2.3.4. Structuring your company 's Training Needs

D. Structuring your company 's Training Needs

You've just finished the structuring of your company's problems and opportunities. Please write in the table the way you pretend to solve or anticipate their existence, by filling in the following table. There may be multiple solutions like redesigning your company's business processes, restructuring of functional areas, or developing training sessions on-the-job or other.

This table is an example that can be filled with information related to your company that we have been using above. If necessary, ask for the support of an external expert to help you structure the measures to improve your organisation's performance.

				Training Needs			
Symptom	**Cause**	**Proces s**	**Functional Area**	**Desired Output**	**Employee**	**Proposed Solution**	**Solution Details**
High rate of returned products from customers	Bad quality control	Production Quality Control	Production Quality	**95% products with 0 defects**	Line managers Shift managers	Training in product quality control in the production line	1 hour training for 1 week for in production line managers and shift quality manager
	Large delays in deliveries to customers	Distribution	Logistics	**Delivery time rate 98%**	Packaging employees Delivery workers	Defining and monitoring of performance indicators for delivery control	Implementation of a packaging monitoring system in order to detect possible delays and take prompt corrective actions. 1 day training for packaging and delivery employees about this new system.
Cash-flow problems	Bad cash-flow management	Budgeting	Financial	**Existence of enough cash in order to meet supplier contracts**	Financial Director	Creation of a financial control map	Meeting with the Financial Director in order to create a cash-flow monitoring system
	Delays in invoicing	Invoicing	Financial	**Immediate invoicing**	Administrative Manager	Creation of an invoic-	Working session with the

	customers			**after product delivery**		ing control system	Financial Director and Administrative Manager in order to create an invoicing generation and control system.
	Bad negotiation process with suppliers about payments policy	Purchasing	Purchasing	**Negotiation of larger payment deadlines with suppliers (90 days) s**	Purchase workers	Negotiation and purchasing training for purchasers	Negotiation and purchasing training for purchasers. Working session with the Financial Director in order to establish standard contract and payment terms with suppliers.

10.2.4. Resources

Links

- **Business Link** provides some useful information on Training Needs Analysis and through local contacts further advice and guidance can be provided: www.businesslink.gov.uk/bdotg/action/detail?type=RESOURCES&itemId=1073793727
- **Businessballs.com** provides free templates, examples, samples, diagrams, tools and articles help the process of management and development of people, organisations, sales and business. www.businessballs.com/freeonlineresources.htm
- **Department for Environment Food and Rural Affairs** provides business advice for rural businesses, including a template for a TNA as well as a number of case studies: 217.205.66.230/VTS/form/first.asp 217.205.66.230/VTS/content/casestudies.asp
- **The Institute for Employment Studies (IES)** provides research in the employment market and publishes various reports on employment related issues. The report **Skills Pay -The Contribution of Skills to Business Success**, although not published by IES provides an analysis of how skills relate to business performance: www.employment-studies.co.uk/pubs/report.php?id=ssda0804
- The Investors in People Standard is a straightforward, proven framework for delivering business improvement through people and our website can provide you with all the information you need to get involved, keep up to date and put the Standard into practice: www.investorsinpeople.co.uk/IIP/Web/default.htm
- **Learn & Work** is a Leonardo project that specifically addressed the issue of analysing training needs in business. www.citeforma.pt/html/pub/lw/lw.htm
- **Rockwell Automation PLC** provides a case study of an TNA undertaken with Tetra Pak Processing UK: ww.rockwellautomation.co.uk/case_studies/casestudy_pack_tetrapak.htm

- **Sector Skills Development Agency (SSDA)** is responsible for supporting employers in the development of appropriate skills in the labour market disseminates skills related research findings. Research sponsored by the SSDA will be published in a dedicated research series and made available in both hard copy and electronically on the website below www.ssda.org.uk/ssda/default.aspx?page=41
- The **SME Sector Challenge project** was a three-year project aimed to enable the successful adoption, on a pilot basis, of Occupational Standards and NVQ/SVQs by Small and Medium sized Enterprises (SMEs). The project is working with four main audiences, across the built environment, focusing on Contractors, Specialist Sub-contractors, Consultants, and Local Authorities, where the departments work as SMEs. The site also provides some case studies: http://www.cicsc.org.uk/tvcbec.htm
- **training reference.co.uk** provides an overview of some of training providers that offer a TNA services relevant to business: www.trainingreference.co.uk/directory/training_needs_analysis.htm
- **trainingneedsanalysis.co.uk** is company specialising in training needs analysis. The link to the article on TNA provides a broad overview and further issues that should be considered when undertaking aTNA. www.trainingneedsanalysis.co.uk/tna_article1.htm
- Sirius Concepts Ltd provides diagnostic software for economic and business advisors, including TNAs for start-up businesses, rural businesses and social enterprises: www.sircon.co.uk/sirius-software/your_focus.asp
- **TrainingZONE** is one of the UK's most popular site for corporate training professionals with an online network of 50,000 members. The site should also be of interest to SMEs: www.trainingzone.co.uk
- **Trainers' Library** is an international online resource pool for trainers, HR managers and consultants, which gives members unlimited access to an ever growing number of training modules, exercises, toolkits and icebreakers: www.trainerslibrary.com

10.3. Creating a company culture for continuous innovation

Introduction

Customer and market needs are in constant state of change. You figure out what customers want on Monday, and on Friday they want something else. And in the week in between, a hungry pack of competitors have taken your idea and ran with it.
Yes, it is depressing. The good news? Everyone is on the same boat. And if you are quick on your feet, you can get to the next level of customer satisfaction before the rest of the pack.
Bottom line? If you are going to achieve and sustain a leadership position in a global marketplace that never sleeps, your company must be a hothouse of creative thinking, flexibility and agility-twenty four hours, seven days a week.
A culture of innovation can be a company's primary source of competitive advantage, and it can pay off steadily over the years. Any high performance culture is difficult to replicate, but innovation is in a class by itself. Once embraced by employees, innovation becomes a way of life. It ensures that all the human capital is in step and striving to produce outcomes of value for the organisation.

What creating a company culture for continuous innovation is?
What would a continuous innovative organisational culture look like? It would be one in which employees are motivated and confident enough to continually try new things out. To this end, employees would be equipped with the right types of knowledge, skills and abilities to both effectively generate and implement new ideas.
A company culture is the values and practices shared by the members of the group therefore, it is the shared values and practices of the company's employees.
This tool can help companies in creating a culture in which every employee has the opportunity to learn and grow in order to improve themselves and their business. This includes a work environment striving to meet the needs of all employees.

Why and where creating a company culture for continuous innovation is applied?
Today's leading organisations are knowledge creating companies that thrive on continuous innovation. It's a big competitive edge. New products and services can be "knocked off" or copied. But it's much harder for competitors to duplicate a management system and corporate culture that produces a continuous stream of successful product and service improvements, innovations, adaptations, and extensions.
Creating a company culture for continuous innovation can and should be applied in all types of firms, since it is well known that a company's staff is its most important asset for the skills, knowledge and experience they bring to bear on business performance and achievement of business objectives.

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10.3.1. So how do you create a culture of continuous innovation?

In order to create such a culture the companies should:

- Act with competitive urgency and decisive action
- Use knowledge of employees and data to make decisions in a timely manner
- Tolerate mistakes of employees in pursuit of continuous improvement
- Act with swift resolve to maintain the highest customer satisfaction
- Never rest with the customer's status
- Continuously seek ways to improve their business and themselves

Changes must be made in virtually all parts of an organisation, from management style to measurement systems. Obviously, such transformations don't happen overnight, but you must gradually bring about modified employee behavior, leading from the top. But once a company sets out on the innovation journey, the results can be dramatic.

Below are the five characteristics that help to create a company culture for continuous innovation:

1. **Make Everyone Accountable**
   Because a few individuals at the top cannot possibly plan all of a company's activities, give employees a set of rights, responsibilities and rewards that make them accountable for their own actions.
2. **Encourage Employee Innovations, and Reward Them Accordingly**
   Companies are often fast to turn to outside help, when in fact they already have the capabilities within their organisation to do the job.
3. **Replace Rigid Processes With Clear Business Objectives**
   Too often innovation is stifled because companies define business processes in great detail, then hand those designs to the line that is expected to execute them from memory.
4. **Challenge Employees to Compete**
   When challenged by external (or sometimes internal) organisations, groups are kept on their toes.
5. **Focus on Your Core Strengths…and Outsource**
   Another way of using innovation to stay nimble and competitive is by focusing on competitive differentiators, and relegating everything else to partners who have that expertise already.

10.3.2. Examples of successful companies

Examples of successful companies that have followed the above characteristics:

Example of characteristic 1:

Koch Industries, are an oil and gas company based in Wichita, Kansas, who wanted to achieve world-class safety. Rather than have a few safety engineers scour the company, Koch gave this responsibility to all employees, with rewards both for uncovering unsafe conditions, and for discovering new ways to conduct business more safely. This initiative resulted in as much as a 50 percent improvement each year in the number and severity of accidents across Koch Industries. Within one year the company had moved from the middle of the pack to having one of the best safety records in its industries.

Example of characteristic 2:

Koch's pipeline business in Minneapolis had budgeted $30 million to expand its pipeline with external support. A team of company employees decided that they could do the job themselves better and cheaper, and within a couple of months they had increased the pipeline's capacity by 15 percent while

spending only a little over $1 million. Koch immediately gave them all a cheque averaging 15 percent of their annual salary.

Example of characteristic 3:

Molnlycke Health Care, one of Europe's leading manufacturers and suppliers of single-use medical products, allowed production teams to decide how to meet their goals. With the responsibility for quality products moved to individuals on those teams, nearly 70 percent of the company's new products launch on time, compared with just 15 percent previously. As a result, the company will have quadrupled its shareholder value in only five years.

Example of characteristic 4:

For example, prior to being acquired by RWE AG in 2000, VEW Energie AG, a German based utility, created a new business entity responsible for service, maintenance and construction. But other VEW managers were allowed to do business with competitors offering the same services if the price was right. As a result, the new unit worked hard to remain competitive, and in return was able to offer services to outside companies as well.

Example of characteristic 5:

Imagine an insurance company established only two years ago that has already contacted 15,000 policies and is issuing 200 new policies every week. Now imagine that the company has only two employees. This is Universal Leven, a Netherlands-based subsidiary of Allianz, focused on large, professional broker organisations. The two employees are in charge of corporate strategy, network expansion and product development. Everything else, including product branding, product design, marketing and all back-office operations, are outsourced.

If someone has trouble understanding how individual innovators can work together to make a company itself work consider the elegant analogy below. An innovative culture is like a jazz band. There is a simple structure that must be adhered to, yet the heart of jazz exists in the individual players, improvisations: their solos. "Jazz music is all about the musician, the human factor".

An innovative business model requires no less than having good jazz scores (operating models and processes), played by good jazz musicians (employees), playing high quality instruments (technology) in the right way, so that the audience (customer) enjoys the performance. And central to all this is improvisation (innovation).

This is the form of perpetual innovation that companies need in order to evolve continuously to meet customer and market needs in this age of change.

Example of a useful tool to "Develop an innovative culture for Growth"

A useful tool that can help a company to assess its culture is called BAO SCAN and it is a questionnaire that the top team members and other key people SHOULD complete and from the derived results, they work together to identify innovative ways for growth.

You can see this analytically in the address below, the example of the questionnaire and the steps to create an action plan.

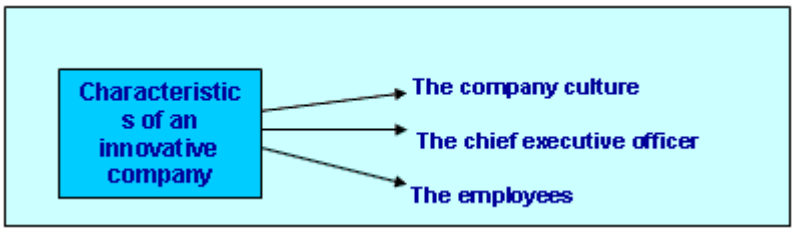
http://www.entreworld.com/ManagingGrowth/PDFs/SCANCh03.pdf

10.3.3. Characteristics of an innovative company

The most important issue in Innovation is the **culture that exists within the company.**

The innovative company:

- fosters an organisation and management culture that values and encourages creativity and idea generation throughout the company, and from all individuals, understands and closely monitors the changing needs of its markets.
- designs products, processes and services around customer needs and understands and closely monitors the changing needs of its markets
- successfully manages new ideas and innovation within the company through a structured approach to identifying, screening and implementing new ideas
- ensures that its business processes are aligned to satisfying the needs of its customers
- has a commitment to access finance from a range of sources to fund innovative activity
- ensures that individuals employed within the company have the appropriate knowledge and innovation skills
- networks with other companies and support organisations to learn from experience and pursue new business opportunities



10.3.3.1. Characteristics in detail

The company culture:

- is embodied in a clear mission statement, which encourages commitment and co-operation across functions
- encourages the acceptance of change and new ideas,
- remaining open to techniques developed elsewhere
- engenders a continuous striving for improvements and positively discourages complacency
- dictates that customer considerations pervade all activities
- ensures that targets are set through consultation with those responsible for their achievement
- links rewards to company performance and personal achievement
- generates enthusiasm and dedication

The chief executive officer:

- is a good communicator
- leads by personal example, is visible and accessible
- has very clear objectives and a clear vision compatible with those objectives
- is able to balance short-term needs and long-term objectives
- is enthusiastic about new products and processes and new ways of doing things
- is action oriented
- understands the essence of the business activity and the fundamental concepts of the technology
- is committed to the successful management of change

- is committed to quality and customer satisfaction
- is directly involved in the selection of key personnel

The employees:

- are competent and confident in their jobs
- are aware of their strengths and weaknesses
- are perceptive of the need for change and new ideas (whatever their source), promote them and participate fully
- are motivated both by job satisfaction and by financial reward
- have a shared vision that facilitates decision and action
- work well in teams but also recognise the need for specialists who may work independently of the team structure
- are well trained, with training seen as a continuing requirement for everyone

10.3.4. Resources

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Links

- http://www.ris-scotland.net/pages/innovationbenefits/modelinnnovativeco.shtml
  (The Regional Innovation Strategy is a European initiative promoting and supporting innovation within regions, helping companies to remain competitive in the world market.)
- http://www.innovation.gov.uk/
  (The challenge for companies is to bring to the market a stream of new and improved, added-value, products and services that enable the business to achieve higher margins and thus profits to re-invest in the business.)
- http://www.advantest.com/aac/Careers/culture.html
  (A useful address for company culture)
- http://www.24-7innovation.com/culturepressrelease.pdf
  (The article of Shapiro, “Creating a company Culture that fosters Innovation”)

11. Innovation networks

This component will give an overview of the theme “INNOVATION NETWORKS“. The component has the following structure:

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11.1. Introduction

Some characteristic **features such as insecurity, growing dependence on scientific progress, growing complexity of research and innovation, the importance of knowledge and learning etc. form the innovation process**. This background allows the coining of the following phrase:

"No firm can innovate or survive without a network"

Networks are a growing success and competition factor in industry and generally in society.

They are the **answer to a structural change** towards an information society. This change is accompanied by a worldwide globalisation of industry and puts special demands on **enterprises in competition**.

At present we watch an **increasing trend for cooperation in innovation** activities.

The cooperation opportunity **"Network" offers** some interesting solutions for the problems to be solved, **especially for small and medium enterprises.**

Thus successful innovation networks allow the individual network partner to gain access **to resources otherwise inaccessible**, i.e. **completely new sources for innovation, skills, markets and application possibilities, and they offer a sizeable cost reduction potential** to the participant.

In this connection, ability for innovation is an important property for the development of enterprises in competition. A **cooperation in the form of a network can contribute greatly to the ability for innovation of the network partners.**

"Cooperation in innovation networks maintains and increases the ability for innovation and causes competitive advantages."

11.2. What: What are innovation networks?

As is the usual case when defining terms, the term “innovation networks“ also has brought about differing definition approaches and so far there is no unity on what innovation networks really are.

In the frame of the component we will use the following definition frame:

Innovation networks…

- ...are all forms of organisations
- ...that serve the exchange of information, knowledge and resources
- …and by suitable learning among at least three partners
- …help to bring about innovation
- …are based on confidence and stable cooperation relations.

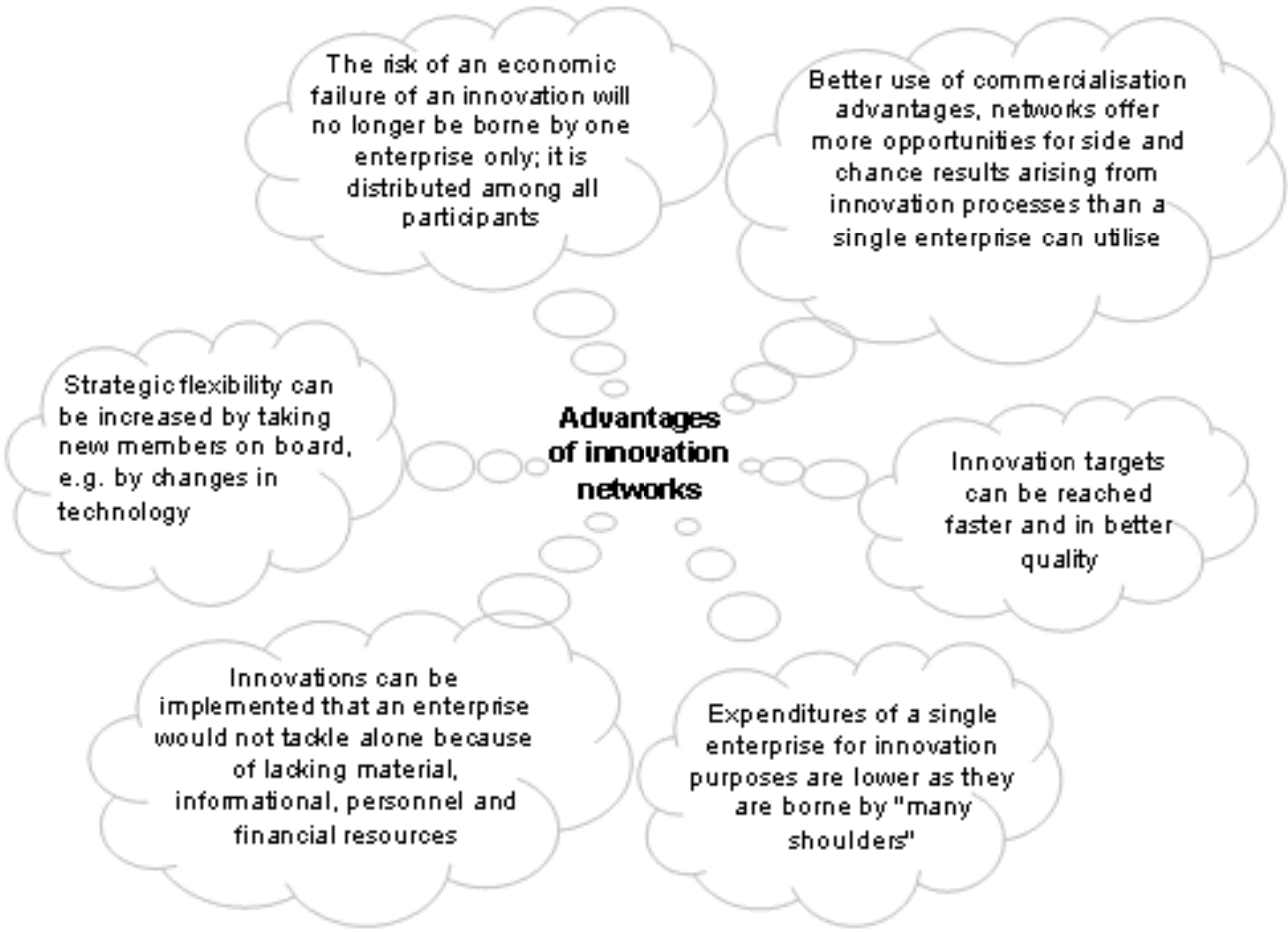
In innovation networks…

- ...innovation activities are coordinated
- …legally independent enterprises pool their business relations as far as their innovations potentials are concerned
- …stable relations are formed between enterprises and other players (training and research institutions, political players, etc, in order to gain competition advantages jointly and in a cooperative way
- …the joint efforts yield innovative products, processes and services

11.3. Why: Advantages vs. disadvantages of innovation networks

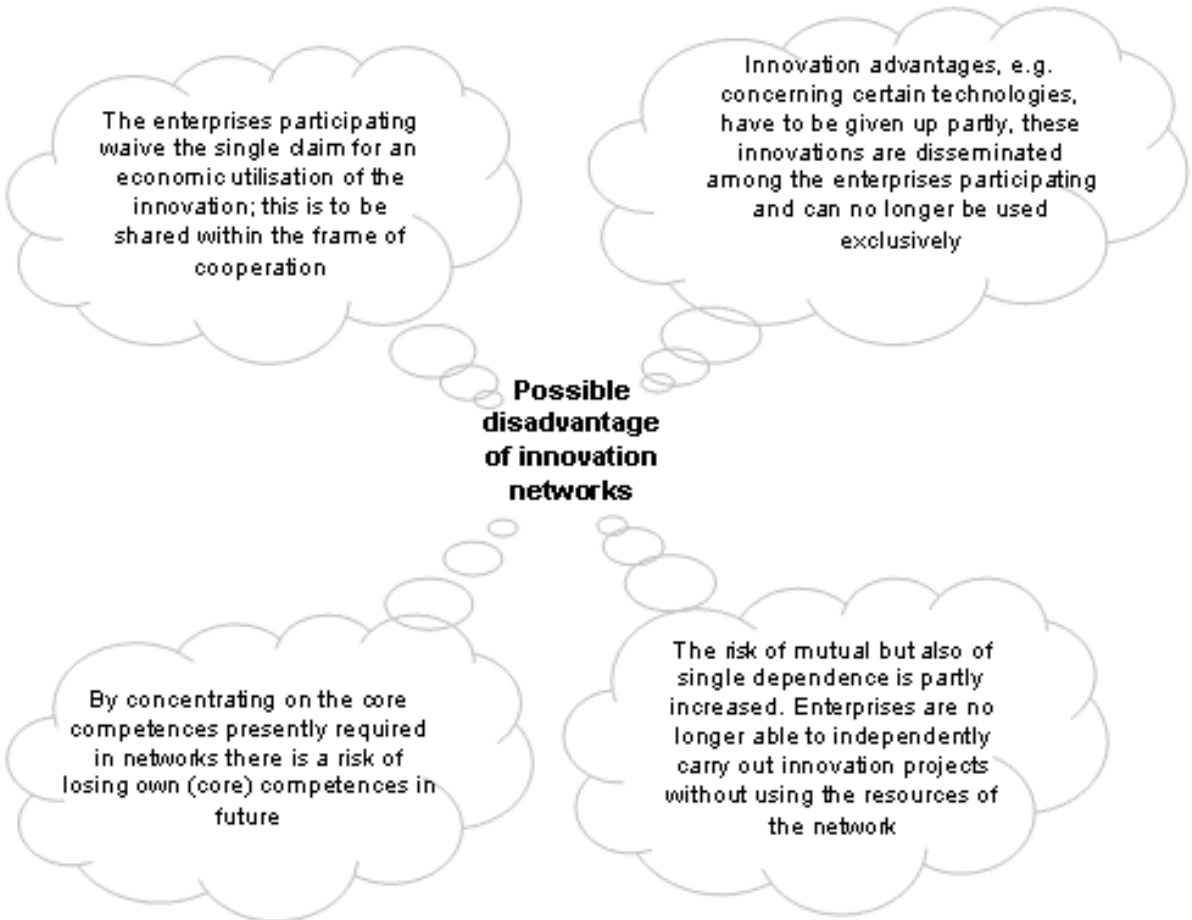
The central motivating factor for cooperation in innovation networks – above all for SMEs – is **the expectation** that entrepreneurs will reach their **goals easier and better by cooperation** than would have been possible when **fighting alone** and because of the hope of gaining **immediate advantages through this form of organisation**.

The following illustration gives an **overview of the advantages** to be expected (examples, no comprehensive list) from cooperation and **joint efforts in innovation networks:**



Despite all euphoria for innovation networks, **before starting a prospective cooperation in an innovation network it is advisable to take some possible disadvantages into consideration as well.**

The following **picture shows a few possible disadvantages** (example, no conclusive list). **Many of these disadvantages can be "intercepted or cushioned" in the preparation phase of establishing a network already** by relevant cooperation contracts **("rules" of cooperation).**



11.4. Where: Utilisation areas of innovation networks

Practical implementation results show that innovation networks can work especially well along the following concentration points and targets

- Research and development extension of application oriented F&D
- Strengthening of the innovation potential of branches or branch overriding systems respectively
- Strengthening of the innovation potential of whole region or forming a regional profile
- Technology transfer –effective and speedy dissemination and application of new technologies
- Support in internationalisation (for SMEs especially important)

11.5. How: Ideas of how to build up innovation networks

Central success factors for building up a network are, above all, the selection of the partners and the relations they form towards each other (promoting factors).

The implementation of the following points is a basic requirement for successful work in innovation networks. (You may use these factors as a check list when forming a network).

- Joint targets
- Ability of the cooperation partners to communicate and to learn
- Ability to take up and to disseminate information
- Ability to react to difficult situations of the partners, similar problem-solving approach and problem-solving competence
- Stable long-term business relations, interaction processes and links
- Independent profile of the network partners, complementing each other
- Openness and an atmosphere of understanding among network partners
- Avoiding hierarchies in the network
- Voluntary cooperation
- Linking of resources and exploitation of cooperation
- Spatial closeness of partners without separation from over-regional knowledge and information transfer
- Economic advantages from the cooperation for all partners involved
- Development of innovation relevant environmental links (inclusion of further players such as F&D institutions, universities, political players etc).

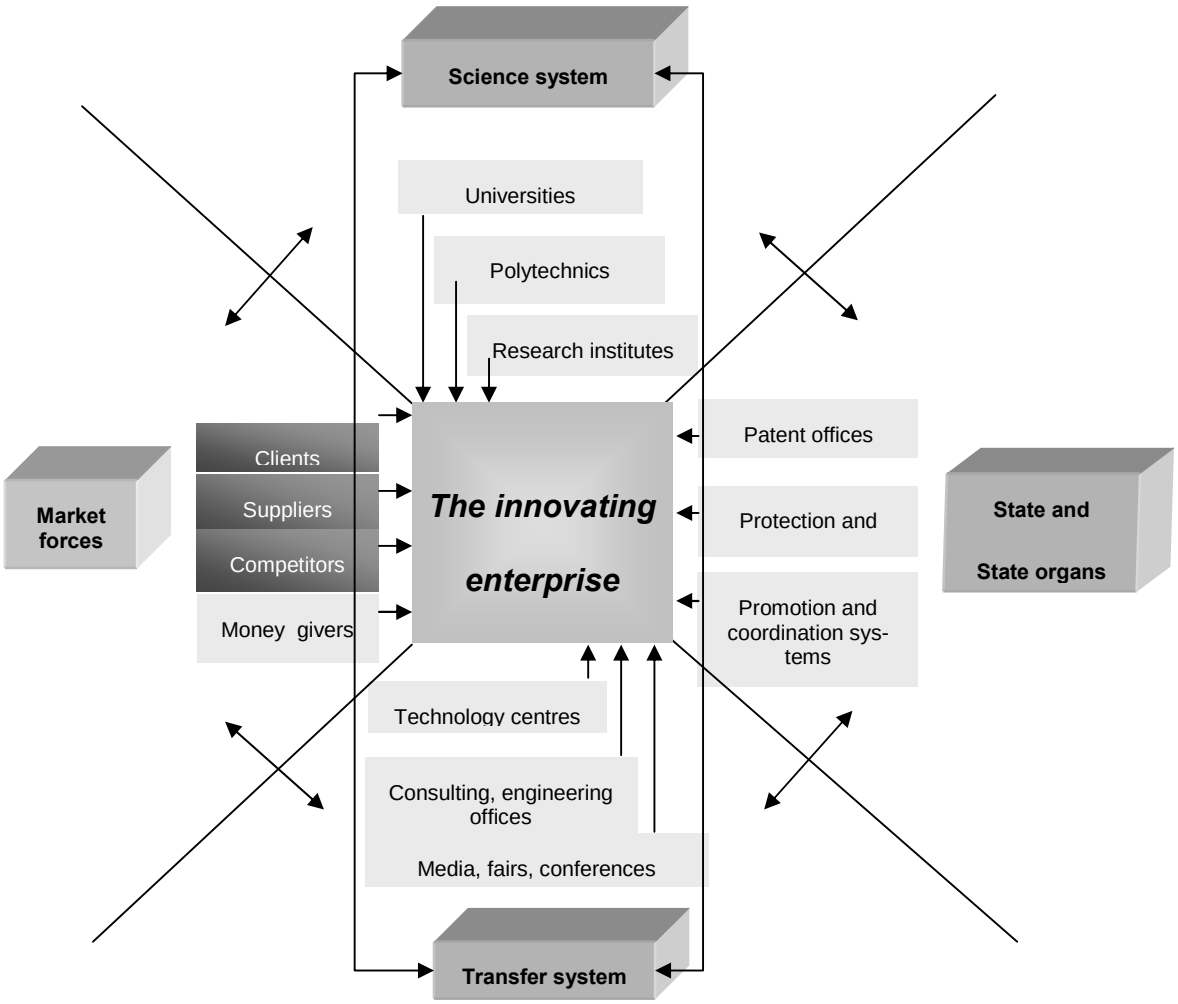
In contrast to the promoting factors described above, the following list will give you **possible reasons (hindering factors) that may contribute to the decline of an innovation network.**

Please consider these points when preparing the establishment of a network in order to prevent its failure as best you can.

- different aims and strategies
- missing identification with the aims and contents of cooperation relation on the personal level
- varying interest and power potential in a network that may lead to an unequal distribution of resources
- opportunist behaviour of individual network players
- too large a number of network participants making the network difficult to survey
- exaggerated need for harmony and a trend towards avoidance of conflicts, exclusion of competition among network participants counteract the original intention - they inhibit innovation rather than promote it

The following **illustration** shows an **overview** - from the point of view of an individual enterprise – and of the **partners** that should be considered when thinking of founding an **innovation network.**

In this case a **network basis as wide as possible** should be aimed at - partners from the most different systems offer a large number of opportunities for mutual knowledge and know-how exchange thus creating **frame conditions for a innovation promoting atmosphere.**



11.6. Examples and best case of Innovation Networks

Example of an innovation network in the field of plant construction

The first example shown is an **innovation network in the field of plant construction** (ICON – Industrial Construction Network). About 30 enterprises have united under the umbrella name of ICON (after several stages of analysis and pre-selection processes).

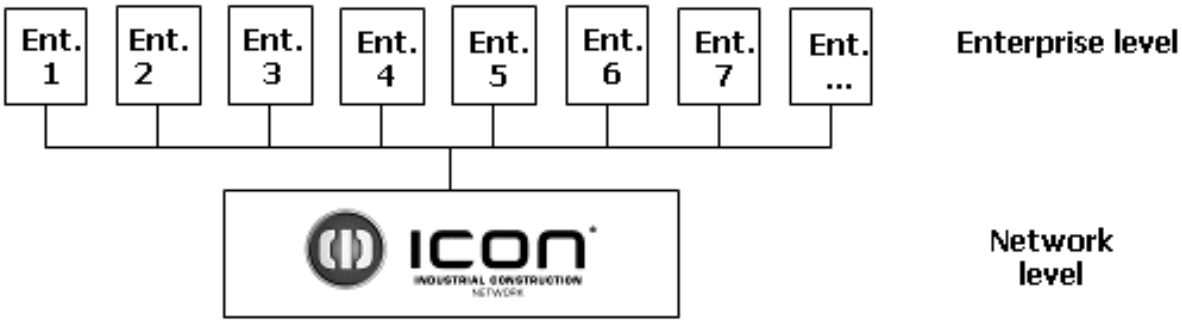
As a **joint goal and innovation field** they defined (after corresponding preparation activities) the area "**joint project marketing".**

The **following presentation** not only shows the individual steps and details of network formation and implementation but above all it gives an **impression of the central building blocks and essential steps from network formation to network implementation and further development.**

11.6.1. 1st Step: Network formation

1st Step: Network formation

Similarly, the network was formed on the basis of some fundamental prerequisites without which a network will not be successful. Enterprises from the field of plant production (focussing in SMEs) formed the ICON network.



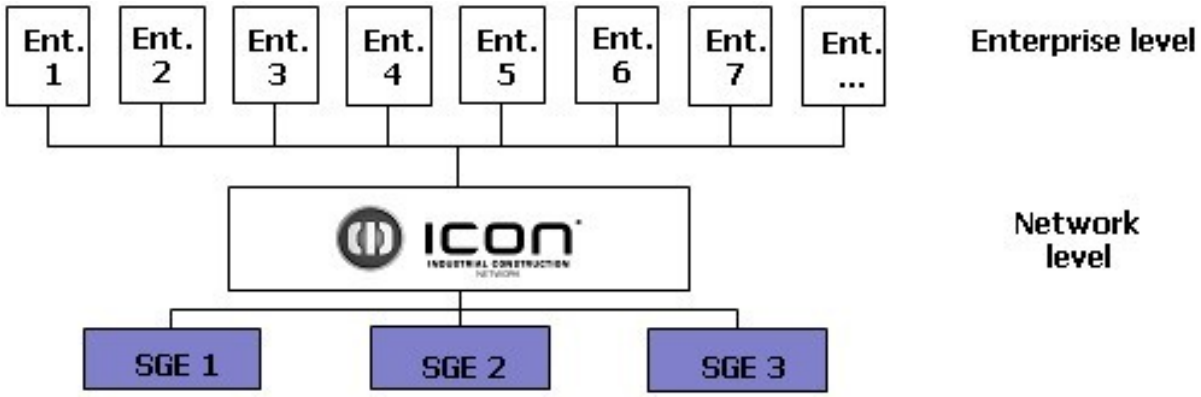
Step 1: Network formation by

- **Strategic prerequisites**
  There are strategic links possible between the enterprises
- **Cultural prerequisites**
  Enterprises accepts other enterprise cultures
- **Fundamental prerequisites**
  Enterprises want to reach joint goals

11.6.2. 2nd Step: Strategy development

2nd Step: Strategy development

An essential building block for a strategy development in a network is the know-how and the competences existing in the individual enterprises. Within the framework of a development of a network strategy it is worth while to define individual strategic business units as a basis for further enterprise planning.



Step 2: Strategy development by

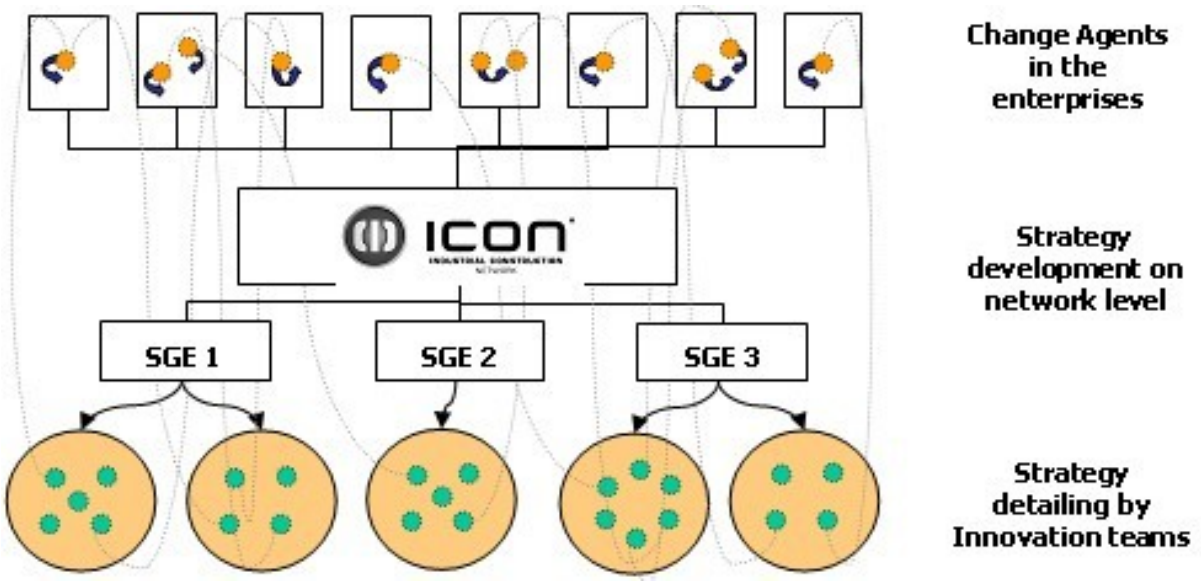
- Definition of strategic business units
- Strategic positioning of a network on the basis of the competences or the know how available in the enterprises

11.6.3. 3rd Step: Strategy detailing

3rd Step: Strategy detailing

Representatives of the individual enterprises so-called Change Agents - jointly work in inter-enterprise innovation teams on the concrete parts of the strategy of the network, and when doing so they also introduce changes in the individual enterprises.

The frame for innovative ideas is formed by the bundling up of the competences and the knowledge present in the enterprises supplemented by the cooperation with more enterprises, customers and external know-how carriers.



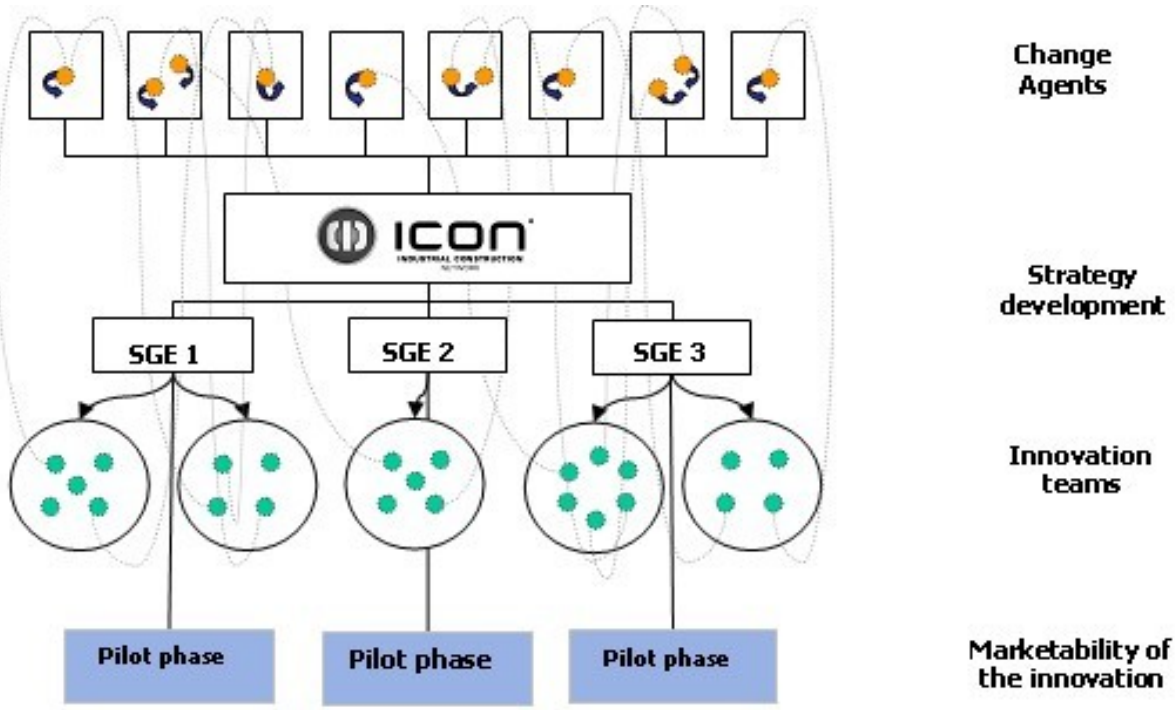
Step 3: Strategy detailing by

- Inter-enterprise innovation teams for product market finding
- Bundling of competences/ know how available in the enterprises
- Integration of further enterprises/customers/external know-how carriers
- Introduction of changes in the individual enterprises

11.6.4. 4th Step: Strategy implementation

4th Step: Strategy implementation

Innovative yields of the joint work of the innovation teams, such as pilot plants or innovative approaches to market positioning are tested in pilot phases as to their marketing capability.



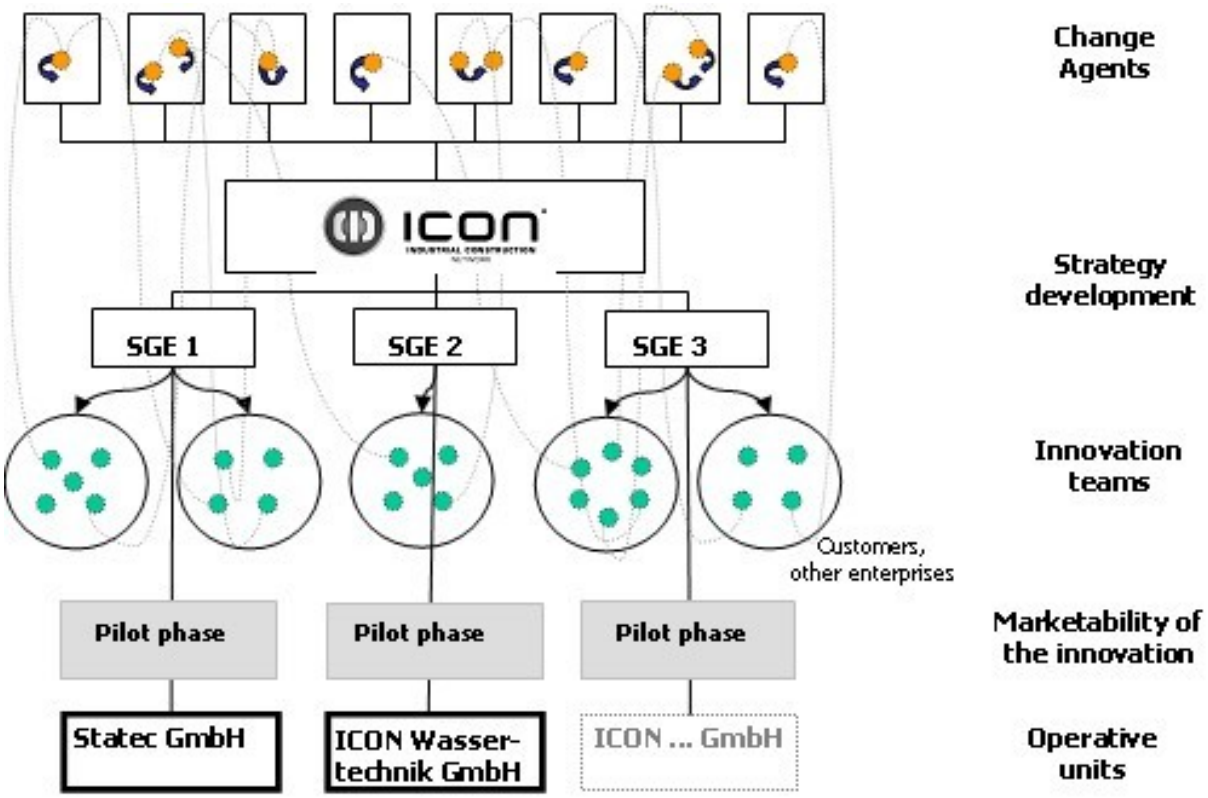
Step 4: Strategy implementation by

- Evaluation of the "Marketability" of the innovation in a pilot phase (e.g. pilot plant, market positioning, sales success...)

11.6.5. 5th Step: Market success

5th Step: Market success

Successful pilot projects are turned into independent operatively acting companies with simultaneous intensification of the idea of linking in the sense of inter-enterprise project management, a bundling of competence and know how in individual units and inter-organisational exchange of knowledge.



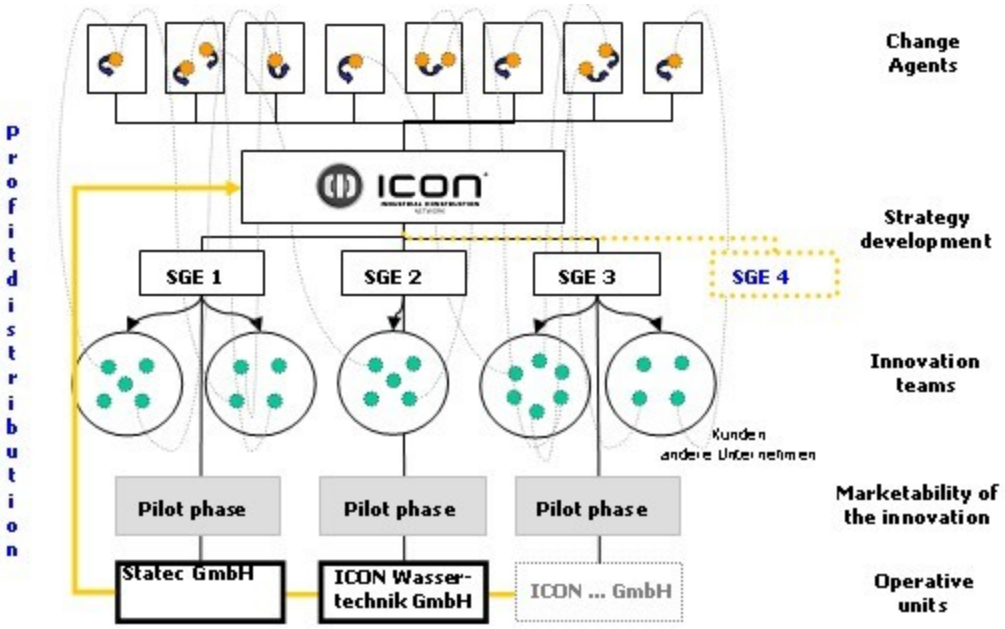
Step 5: Market success by

- Spin-off of operative units (companies) - competence/know how directed bundling, inter-enterprise project management, inter-organisational knowledge base.

11.6.6. 6th Step: Further development

6th Step: Further development

A continuous further development of the network is safeguarded by a re-financing strategy. Gains from newly-founded units (spin-offs) are re-invested into strategy development measures of the network and serve the construction further strategic business units. This also safeguards a progressive know-how build-up in the network and in the individual enterprises.



Step 6: Further development by

- Re-financing the innovation power

  Increase the know how/technology intensity of the network and the enterprises

11.6.7. Findings and conclusions

Findings and conclusions:

The ICON network can also serve as an example to show how cooperation in networks operates in practice. The following findings can be confirmed:

- Small and medium enterprises gain strategic spaces by
  - The improvement of their own innovation behaviour
  - The increase of know how and technology intensity
  - The improved ability to act via strategically positioned spin-offs
- Chances for knowledge transfer and development on individual, organisational and inter-organisational levels decisively improve the innovation behaviour
- Apart from business management effects there are manifold labour market political and political-economic effects

11.7. Example of a complete region acting as an innovation network

The following examples are presented in some **corner stones of the initiative "innoregio styria"**, which aims **at turning a whole region into an innovation network**.

For further information (however in German only) see:

www.innoregio.at

The example innoregio styria is intended to show that for the establishment of innovation networks and cooperation on an enterprise level the positioning of a country/region as a whole is of outstanding importance. Designing the frame conditions for innovation (promotion instruments, lobbying, environment processing, know-how transfer, etc.) can be positively influenced by bundling all regionally relevant players.

Basic principles of innoregio styria:

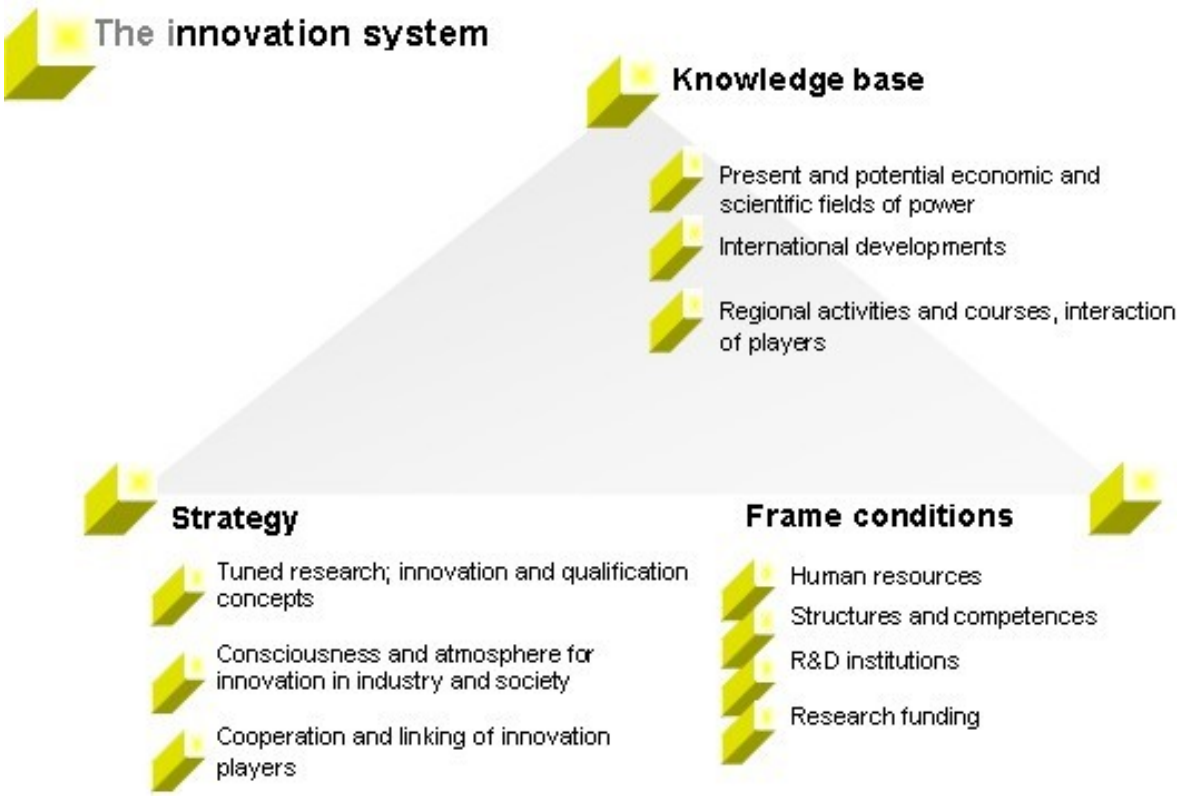
Innoregio styria is:

- An innovation network initiated by the industry of Styria and carried by enterprises, universities and research institutions other than universities as well as by central regional players
- An open platform with long-term orientation
- The strategy driver in the field of innovation policy

- The network node for bundling and setting goals, strategies and actions and therefore at the same time the lobbyist in issues of research and innovation
- The information node for companies, research and development institutions and regional players in innovation-political affairs

11.7.1. The network partners in innoregio styria

- Industriellenvereinigung Steiermark (Union of industries)
- Sparte Industrie der Wirtschaftskammer Steiermark (Chamber of Trade and Commerce)
- Joanneum Research Forschungsgesellschaft mbH
- olzcluster Steiermark GmbH
- Wirtschaftskammer Steiermark (Chamber of Trade and Commerce)
- Steirische Wirtschaftsförderungsgesellschaft mbH
- Österreichische Nationalbank – Zweigstelle Graz
- Karl-Franzens-Universität Graz (University of Graz)
- Technische Universität Graz (Technical University of Graz)
- Medizinische Universität Graz (Medical University of Graz)
- Montanuniversität Leoben (Mining University of Graz)
- FH Joanneum GmbH (Polytechnic)
- Campus 02 Fachhochschule – Studiengänge der Wirtschaft (Courses for Economy in Campus 02 Polytechnic)



Necessary requirements for a successful implementation:

- Clear competences and structures and a jointly agreed strategy for research, innovation, technology and qualification
- Public consciousness of the importance of innovation for wealth, employment and competitiveness for a highly innovative climate
- Marked sense of innovation in the enterprises
- Efficient research institutions of international format inside and outside universities
- Sufficient potential of highly qualified employees
- Attractive frame conditions for scientists and researchers from home and abroad
- Comprehensive readiness of the industry and the local governments for investing in and financing research and development, technology and qualification
- Intensive cooperation of industry and science and optimal transfer of research findings into marketable products and procedures
- Intermeshing of all relevant players from policy, education and research institutions, trade and industry, funding institutions and strategy bodies
- International orientation and border-crossing cooperation of the players

11.8. Resources

Bibliography

- **Weber, M. (2004).** *Innovationsnetzwerke – Typologie und Management*. Köln: Josef Eul Verlag.

  This book focuses on the issue of strategic musts – i.e. the most important strategic guiding lines – of innovation networks and networks in general and their possible implementation.

- **Scheff, J. (1999).** *Lernende Regionen – Regionale Netzwerke als Antwort auf globale Herausforderungen.* Wien: Linde Verlag

  This book outlines by means of the idea of a learning region a pro-active discussion of the processes of change. For the first time the idea of a learning region is comprehensively presented. Because of the look from a business management point of view, it gives impulses for a new understanding of the development of regions.

Links

- **http://www.vdi.de/vdi/vditz/kmu.pdf**

  This paper aims at suggestions for political measures that help SMEs to act in networks and thus react to changed requirements and to further employ their potential.

- **http://www.wi2.wiso.uni-goettingen.de/getfile?DateiID=519**

  Innovation networks as a source of competitions advantages: this paper shows the importance of innovation networks as a relevant form of organisation for the development but also the production and the sale of innovative products and procedures.

- **http://www.puscher-one.de/publikationen/Innovation_in_NetzwerkenKurzversion.pdf**

Innovation in networks: A study on the theoretic and ideally typical debate about the concept of innovative and regional networks.

- **http://www.fhv.at/res/ppe/forum/innovationsnetzwerke.pdf**

  Innovation networks as a model of organisations of the future at the example of kumulus – the network for product genesis

- **http://info.tuwien.ac.at/ai/tt_inet.htm**

  Here are links onto Austrian networks in which the Technical University of Vienna or the Außeninstitut of the TU of Vienna are members or partners as well as selected places at home and abroad that have a network for the transfer of cooperation or technologies.

- **http://www.innoregio.at/**

  Homepage of the Initiative innoregio styria

- **http://www.gate2growth.com/**

  Gate2Growth is an initiative supported by the European Commission under its Innovation/SMEs programme and its main aim is to support innovative entrepreneurs in Europe.

  Gate2Growth provides tools, infrastructure and support services directed to innovative entrepreneurs as well as to their supporters.

  For more information please have a look on the following homepage – under the point “partners” you can find more links to innovation-supporting organisations (e.g. International Network for SMEs http://www.insme.org)

- **http://www.forfas.ie/publications/forfas040624/webopt/forfas040624_innovation_networks_webopt.pdf**

  Study in 2003 to review Innovation Networks throughout Ireland and to contrast them with comparable international systems.

- **http://www.oecd.org/dataoecd/35/8/2100869.pdf**

  Paper about Innovation Networks and network policies

12. Other tools for business innovation support

12.1. Literature searches

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12.1.0 Introduction

In our days a vitally important and significant factor ensuring successful and productive development of an enterprise is its competitiveness. What factors are those that may guarantee the required competitiveness – is it just good luck?, experience?, or coincidence of circumstances? These may, of course, be important, but the basic prerequisite is KNOWLEDGE. Throughout the history of mankind, knowledge has been the main driving force enabling people to achieve targeted progress; it is a core factor promoting development and growth in every sphere of life, in particular in the sphere of business and entrepreneurship.

The aim of the component

The main aim is to give a brief description of several widely known and frequently used ways on how to obtain information and to supplement our knowledge, showing WHERE and HOW you can search the required information or reference material.

Why is this important?

Any company should have access to knowledge and information about novelties, development trends in its line of business, about demand, preferences of its customers – everything else and possibly even more – since it is important to be always at least one step ahead of others. As a matter of fact, the dynamic nature of the modern times may be characterised by using the well-known phrase:

W*e can stay where we are only if we run, and we should run very fast!*

The meaning of the phrase is the following: when we have already achieved something, when our enterprise is a success and things are running smoothly, we should not stop at this point. We have to follow our competitors and study the market; we have to identify all novelties and trends, not only on the local, but also on the global level, and therefore it is so important to be aware of the crucial role of knowledge and information in the operation of the company and to implement this role, thus contributing to successful development of the enterprise and expanding the staff's horizons and enriching their knowledge.

Practical application of the component

Increased KNOWLEDGE and AWARENESS will give the enterprise:

- Development
- Progress
- Competitiveness
- A stable market position
- Revenue.... etc.

The above factors could have a highly MOTIVATING effect in that they create striving for development and enlargement of knowledge, stimulate searches for information and data that would ensure successful operation of the company and its targeted development, and at this point the practical application of the component becomes evident – the basic ideas and a couple of practical examples are shown in the form of user-friendly tools that will help us to find the required information, data or reference material.

12.1.1. How to do literature and information searches?

Today information may be found in various ways, but it is important to find the most suitable tool of search on every concrete occasion, considering the specific nature of the information to be found. In cases when it is necessary to obtain some very specific technical information, most probably we will use a technical reference or will contact directly some expert in the field; nevertheless, the Internet could be used more often as the most comprehensive and operational means of finding information.

12.1.1.1. Internet

The rapid development of information and communications technologies (ICT) provides an opportunity to obtain large and varied amounts of information from all over the world in a couple of minutes or even seconds. The most frequently used and popular resource is the Internet, which nowadays combines several functions – it is a library with an unprecedented volume of literature, space for communication, which enables people to communicate and to exchange experiences with people from all countries of the world, and at the same time is the most powerful multi-purpose search tool itself.

The internet search tools are quite easy to use and operational: you start your search by entering in the window of the search tool the **key word** of the topic or phrase you are looking for.

For example, if you are interested in innovation management ► you have to type the words “innovation management” as a key word in the search window ► press the key “search” ► and in a couple of seconds you will be offered any information found according to your key word or phrase.

Example: Search tool http://www.alltheweb.com/

Usually a very large amount of information is found in this way, including perhaps some 300 or more links to the Internet information. However, it is quite easy to find your way through these offers, because you see the website, name and an excerpt from the text or comments, enabling the reader to make a judgement about the contents of the found homepage and to decide whether this is what you were looking for.

It is possible to limit or specify the range of the sought information as required. For example, if you are interested in references concerning exactly innovation management, you may write in the search window the phrase “innovation management”; if you are interested to find firms engaged in innovation management, you should write the phrase “innovation management firms”, etc.

It should be remembered that the phrase consisting of key words should not be too long or complicated but preferably should be as concrete as possible and directly formulated, otherwise the search engine may not be able to perceive the real key word.

Example - Links

The most widely used and well known search engines:

- http://www.google.com
- http://www.alltheweb.com
- http://www.msn.com
- http://www.yahoo.com

12.1.1.2. Databases

The use of databases is a way to obtain extensive and exhaustive data, as databases include various summaries of data, statistics, publications and other sources. Databases are available in various formats — in printed form (e.g., in library index cards and archived materials), in CDs (e.g., the annual statistical records), or in virtual form, i.e., on the Internet.

It should be noted that the Internet is the most comprehensive and complete storage place of databases, and an undoubted advantage is its range of search facilities, which should be characterised as global because it is possible to find information on any topic from any part of the world very quickly. Another advantage is that databases are user-friendly, because databases function exactly in the same way as the Internet search process (see the part **a) Internet**) – when you open a database, there is a window in which to write the key word of the information you are looking for, and a click on the search function will enable you to look at the information found according to your key word.

*You have to write the **Key word** > press **search** button > You will have the **result***

As numerous and very diverse databases are available, e.g., databases containing references, publications or other theoretical material, as well as databases aggregated by companies and statistical agencies, but in order to find the required information it is advisable as the first step to use the Internet search engine, then to select the most suitable databases and further to look into these databases for the necessary information by applying the principle described above.

Example - Links

International data base

http://www.census.gov/ipc/www/idbnew.html
Computerized data bank containing statistical tables of demographic and socio-economic data for 227 countries and areas of the world.

Geohive – Global Statistics

http://www.geohive.com/
Geopolitical data, statistics on the human population of regions, countries, provinces and cities, some statistics on economic factors and more.

12.1.1.3. Libraries and direct contact

Libraries could be divided into three categories:

- Conventional – where all the information is available in printed form and can be found by using index cards or with the help of librarians.
- Partially virtual – an electronic catalogue of the library can be found on the Internet, which helps to check whether the sought literature, publications or other information is available at the library. It is possible to reserve or order the material, however, the particular material will be available only in printed form. In this case you also can ask the help of librarians.
- Virtual – an electronic library where all information is fully available via the Internet — both the catalogues and the materials. The search process is similar to that generally used for the purpose of Internet searches (see part **a) Internet**) or by viewing the library website where there are detailed instructions about doing an Internet search.

Example - Links

Questia Online Library http://www.questia.com/

Internet Public Library http://www.ipl.org

The WWW Virtual Library http://vlib.org

Direct contact is not the most efficient way of getting information if compared to Internet searches, which only take a click on the search button; establishment of direct contact will take much more time.

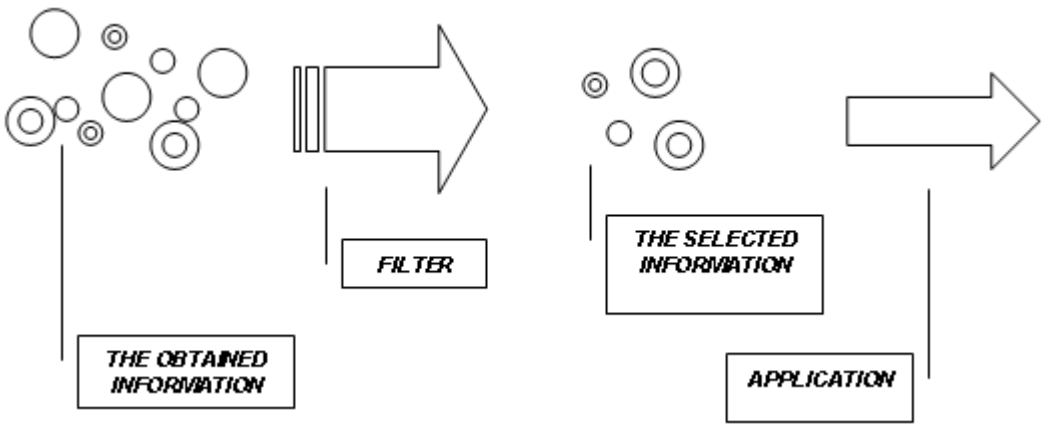
Nevertheless direct contact is a perfect way of establishing or maintaining contacts for communication purposes, by which we can additionally get **non-verbal information** and **feedback** . Due to direct contact, it is quite often possible to get some field-specific information and detailed comments provided by an expert in the field.

Depending on the type of the required information or specificity of data, it is possible to seek direct contacts in various countries, non-governmental organisations or private institutions, foundations, consultancies and other places.

12.1.2. Selection + summarizing of information and Conclusion

Selection and summarizing of information

To a large extent the selection and summarization of information will depend on the aim you are trying to achieve, the method by which information was obtained, its amount etc. On the basis of these factors, the most adequate information may be selected if you are guided by the following simple diagram:



The aim is to find information **X** ► by searching various resources, we find extensive amounts of information – **X, XX, Y, X, xY, yy, x, YY**....etc. ► selection is possible by using a *FILTER* consisting of a set of various criteria, depending directly on the initial aim (or aims) ► through the use of such a filter the *SELECTION* of the most adequate *INFORMATION* becomes possible **– X, XX, X, x** ► consequently, the obtained information is *APPLIED* according to the planned purpose and needs.

Conclusion

When starting a search:

First of all, set an **objective** ► state what you want to find, **what kind of information** or data, ► choose a suitable **resource for finding information** – the Internet, databases, direct contact or other means (evaluate the suitability of specific resources for your query) ► formulate the **key word** or phrase of the sought information (in case of a “search engine”) ► **select** from the offered/obtained information what suites best the set **objective**.

12.1.3. Resources

Bibliography

- Dimza, Vilnis. Inovācijas pasaulē, Eiropā, Latvijā – Rīga: LZA EI, 2003. – 206 lpp

Web links

The most widely used and well known search engines:

- http://www.google.com
- http://www.alltheweb.com
- http://www.msn.com
- http://www.yahoo.com

Databases

- http://www.census.gov/ipc/www/idbnew.html
  International data base - Computerized data bank containing statistical tables of demographic and socio-economic data for 227 countries and areas of the world.
- http://www.geohive.com/
  Geohive – Global Statistics - Geopolitical data, statistics on the human population of regions, countries, provinces and cities, some statistics on economic factors and more.

Libraries

- http://www.questia.com Questia Online Library
- http://www.ipl.org Internet Public Library
- http://vlib.org/ The WWW Virtual Library

- mpany Culture that fosters Innovation")

12.2. Foreign language competence

Introduction

The manager of big company wakes up in the middle of the night. In her dream she had presented her new, exciting product on a huge market square. A big crowd of people had been standing around her, friendly faces, open-minded, long beards and capes. She had praised the quality of the product, had explained the function but she noticed that the crowd got more and more nervous and angry and started to leave the place. Suddenly she understood that they didn't understand what she had been trying to tell them, they spoke a different language…Only a nightmare, far from reality?

Remember, innovation is the acceptance of a new product or service ON THE MARKET(PLACE). Communication is an indispensable element.

We might have the best offer, but when we are not able to communicate the characteristics of the innovative product or service to potential clients, how can we be successful?

Generations of companies could live and survive without foreign language knowledge. Nowadays, in a globalised economy, foreign language and intercultural competencies have become decisive factors.

Products, services and information are moving fast between continents and if we want to be more than a simple passive observer, we need to understand what happens, we have to infer, to gather information, to manage and therefore we need adequate communication tools, firstly, foreign language skills.

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12.2.1. What does it mean to be competent in another language?

To be competent in another language obviously also depends on what the purpose or use of the language is going to be: having small talk in a restaurant with a business partner and a detailed product presentation for a huge audience require different levels of foreign language competence.

But be careful! Foreign language skills should never be regarded separately from other social competencies. It might happen that it is not the German businessman who gets the order after a perfect product presentation with representatives from a Portuguese company but the pleasant Romanian partner, after the Romanian had appreciated the excellent wine of the host, the latest victory of Benfica Lisbon and the monuments of the city. The German had not been able to contribute very much to this kind of conversation during the last hour as he had "only" attended a course of technical English …

What does this mean? We need the skills to fulfil our task. A service technician, for example, will have to master the technical terms **but never forget the importance of everyday English for an informal conversation or to acquire some knowledge of and a real interest in the partner (country) – these might be more decisive factors than perfect business English.**

You may ask why the author of this component refers to English. Well, he would also like to see a wider range of languages in use in the international communication. When we regard demographic development, Arabic or Chinese perhaps will be dominating languages in future, forcing also the English to learn foreign languages …

Foreign language competence is also a political instrument. Surely, during negotiation the native speaker from the UK has advantages as the non-native speaker might sometimes be more occupied with finding the right words than with the subject of negotiation (therefore Esperanto was a good suggestion to establish a kind of equality among all partners in conversation). English is the so called "lingua franca" now, mostly used and understood by a lot of people, and this will be the situation for the near future. Besides starting (secretly) learning Arabic, **always be prepared to say some words in the national language of your business partner.** This will be considered as an expression of politeness and interest. There are tendencies in large companies not to negotiate in English but in the partner's language as this has been proved to be more successful.

The author hopes that the input so far has motivated the reader to get to know even more about the importance of foreign language competence in innovation. So let's read on to the next chapter …

12.2.2. Why and where does foreign language competence matter in innovation processes?

An international company had developed a new type of car and started to establish an export business with Spain to sell the new "Nova". Even people who do not speak Spanish know very well that "Nova" means "new" and marketing and sales had the idea to sell the product under this name as an innovative product conveying advanced technology and design. What they didn't know nor expected was that inventive Spanish customers very soon spelled the name in a different way: "no vá", which means "it doesn't work" …

 "NOVA" = new  = "no vá " = it doesn't work

There are a lot of similar examples and special efforts are often made to check if the proposed name for a product could provoke negative associations or how it could provoke positive ones with customers in the country of destination.

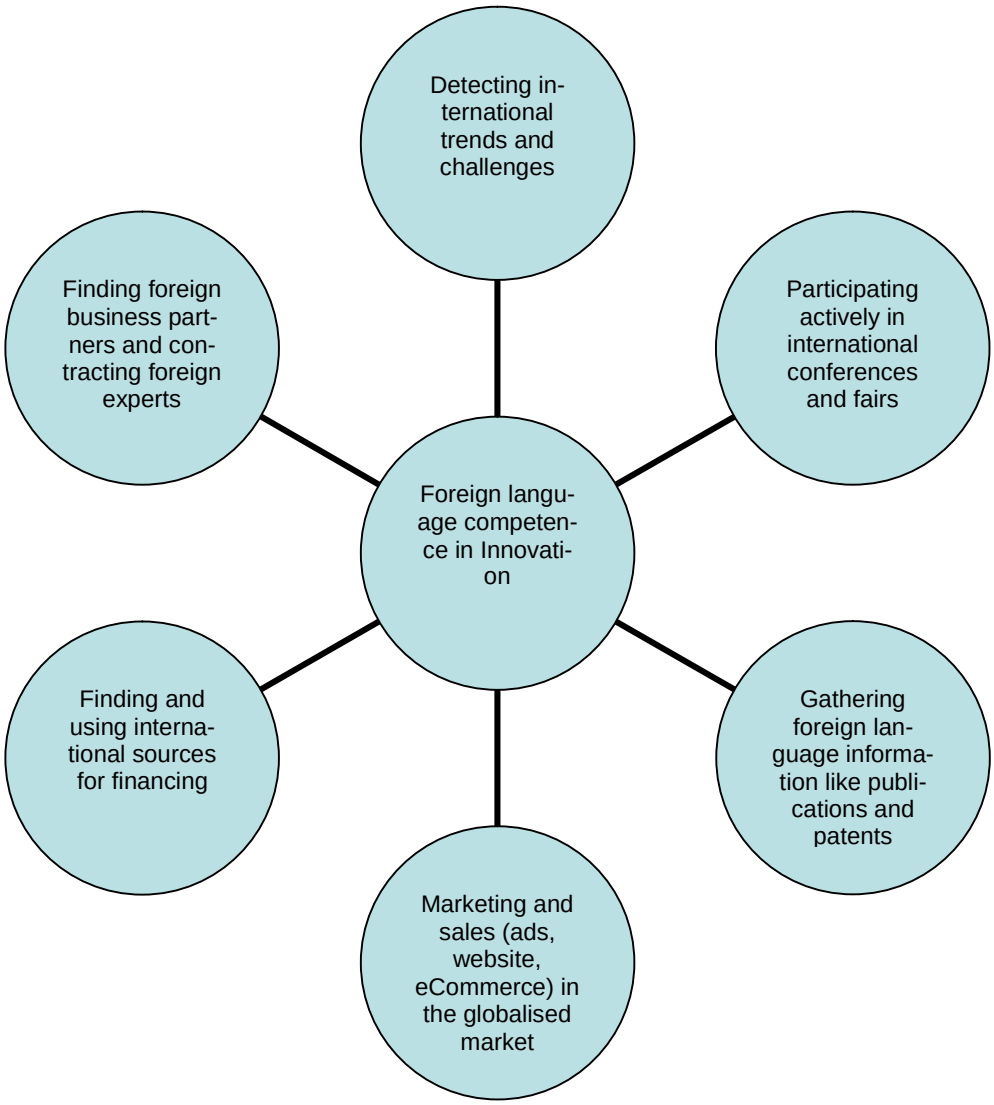
However, this is only one aspect to demonstrate the importance of correct language application in the market.

The website for "The Business of Language's Initiative" in North East England (http://www.thebusinessoflanguage.org.uk/) points to an interesting fact: Internet users are 3 times more likely to buy when addressed in their mother tongue.

Other reports present figures which show the importance of foreign languages for business. For example, in Limburg (Belgium) 35% of the companies interviewed admitted that they had missed business opportunities due to lack of foreign language competencies, while for the regions studied in the UK, Spain, Germany and Denmark the figures were respectively 31%, 18%, 15% and 14%. In Belgium 13% of companies have refused orders for the same reason.

[(European Commission, LINGUA, Language Audits and Needs Analyses, Saarbrücken 1994)

Foreign language competence is needed at all steps of innovation:



12.2.3. Seeking and comparing innovative solutions abroad

This sector seems to be of special relevance therefore we are going to look at it in a bit more detail. It has never been easier to access worldwide information particularly for small companies without R&D resources of their own who are searching for innovative products and solutions to acquire them.

“Know-how” can be acquired especially from countries where the workforce is significantly cheaper. This is not the place to describe what will have to be considered to make this transfer successful but obviously, language (and intercultural) competence is required to use those sources of information.

Highly educated people from abroad are living in your country, often as immigrants, waiting for a chance to demonstrate their qualifications and abilities to establish contact to persons and business in their countries of origin. Why don't we use their competencies, acquired in different cultures and their language competence?

As we stated before, to be successful it is necessary to give up the idea that our management concepts are the best ones. Business in Japan and the Far East follows very different concepts and is not less but often more successful. So we have to be open and eager to know what can be useful also for us. Management of multicultural teams requires language and intercultural competence, but these efforts will be made up by alternative methods and ways of thinking and can help us to find innovative ideas and solutions.

12.2.4. How to acquire foreign language competence for the company?

- *Principally there are two possibilities:*

1. Employing people who are professional experts and speak foreign languages e.g. because they come from or were trained abroad. A big advantage is that those people, besides speaking the language perfectly, have very useful cultural background knowledge and know how to establish useful contacts.

2. Getting the company's staff trained. The author of this component has taught and learnt foreign languages all his life so please note: the argument "I am too old to start" will not be accepted! Studies show that older people need more time to learn but they can compensate for this by concentrating more on the task. Young learners are able to use the potential of their brain power, although they cannot draw on as many experiences and reflection as older learners can. Above all, older people are very often more motivated than younger learners.

The main motive for (language) learning is the usefulness. An advantage of foreign language skills is that these skills are also useful in private life – for meeting interesting people, getting to know much more during a holiday abroad etc. Besides motivation, primarily the usefulness for private and professional life, there should be as many possibilities for application and training as possible. It doesn't make sense to learn for "storage".

There are so many ideas to be considered that it is not possible to cover them all. You may also find more advice when using the links at the end of this component. Let's try to deal with some of frequently ask questions (FAQ):

- *How can I find a good course?*

There are a lot of courses offered by private and public training providers. The number of students for intensive learning is best between 10 and 12. Ask what the adopted learning concept is. There are still learning concepts based on reading, translating and answering questions! Pair and group working and the use of audio-visual media should be standard, an increased progression in the application of the aquired knowledge should be guaranteed.

- *Is it better to look for a course with a native speaker as the tutor?*

It depends. For beginners, to learn the correct pronunciation with a native speaker will be useful. Generally, however, a qualified national teacher is sufficient for this purpose and you can (and should) also use audio sources (discs, TV-spots, internet and other programmes to learn the correct pronunciation). Very often, beginners learn better with teachers of their own nationality. Native speakers are needed for conversation at a later stage of learning.

- *Isn't computer-based training a good alternative to courses?*

I regard the learning with new types of media a useful learning instrument for exercises and testing but communication is a complex social activity: voice, face, body language, changes to the tone of speaking, listening and replying are elements which need face-to-face interaction. As part of the courses, therefore, these activities should be central but not so that the teacher speaks most of the time during the lesson!

- *We are thinking of organising an in-house language course. Can you give some recommendations?*

Learning in the workplace and in-house is very useful. In practice though, if a course is organised in the company, employees sometimes arrive late or leave during the course due to work commitments ("Mrs Y, there is a phone call for you …"). This is different when the training takes place outside the company.

Generally, for concentration, exercises and self-studies it is better to have 90 minutes twice a week instead of four hours once a week.

You should discuss the training needs with the training provider in detail and ask for the methods and experiences of the tutor. There are simple tests (see 12.2.4) which can be used by you and also by the teacher to get to know the real needs. You pay for the training with time and money and if you cannot see the relevance of the subjects to be worked through, you will have to ask for an explanation.

I also suggest combining the language training with another subject, e.g. intercultural training and presentation techniques, if appropriate. The best impression of perfect language skills will be ruined if the speaker is unable to handle the transparencies or the ppt-presentation.

12.2.5. Case Studies

A manufacturing company realised that they needed to develop the language skills of their employees. The company was based in the UK and did business there whilst 80% of their products were made for the international market. This meant supplying all the continents, dealing with clients and having to speak many different languages. Not being able to speak the native languages had proven to be an obstacle to conducting business in the different countries.

A local language centre was approached. The language centre provided a language trainer who was assigned to provide in-house training.

The language skills required were quite specific. They had to enable the sales teams to conduct their business abroad by identifying the needs of their clients and being able to advise them and supply products that would correctly meet their requirements.

A glossary was developed, containing entries related to their products and the associated industrial sectors, as well as general terms used in business. The glossary was translated into the languages most important for their business. This enabled the company to establish initial contact, by sending emails or faxes in the native language and introduce itself and its products.

Sending out the information in native languages significantly increased the response rate from the clients approached.

By contacting potential clients in their native languages, a lot of business is now generated, which was lost before. Thus, the investment that was necessary to implement the new linguistic skills has certainly paid off and has opened new sales opportunities on the international market.

Business related

AND

general foreign language competencies are required!

BASF (extract of a statement of Jochen Muskalla, Quality Management Services at the LINGUA Symposium, Saarbrücken, 1994):

"It is necessary to marry the aims of the company and those of the individual. One of the aims of the company is to enable their staff to feel at ease: If, during a dinner a staff member can only speak about business, he will not feel at ease. It is therefore necessary for staff to be proficient in general language as well as the specific purpose language relating to their job".

Language competency is not only required for the management board!

European Passenger Services (extract from a statement of Christine Mead, Language Training Manager at the LINGUA Symposium, Saarbrücken, 1994):

"In order to operate the trains using the Channel Tunnel, the company selected train drivers, most of whom knew no French. Most of them had left school at 15 or 16. The company asked for volunteers, who were selected … including a 3-week French course to ascertain their aptitude for learning the language. There were 600 hours of training altogether, involving firstly general knowledge of the language and secondly specialized language. Every situation the driver is going to be faced with was documented. The company cannot reach its aims without the drivers speaking French".

12.2.6. Self-Assessment foreign language competencies and needs

How competent am I and what do I need?

The following questionnaire helps you to assess existing language and presentation skills. It is based on results of a European Project* and a questionnaire developed by the author of this component. The employee can assess skill and needs him or herself. The results speak for themselves and help both the management and the employees.

Key:

Capabilities	**Needs**
1 Fully competent	1 Essential
2 Can get by	2 Useful
3 No knowledge	3 Irrelevant

The division into capabilities and needs is essential. For example, if you have marked 3 for your capabilities for negotiation but you never have to deal with negotiations in a foreign language, there will be no learning objective. Please bear this in mind when distinguishing between what you "would **like** to be able to do" and the "**real needs in your job"**.

We have also successfully used similar tables for the preparation of learning arrangements. Please give the tutor the filled-in questionnaire when discussing the contents. This will help her/him to prepare a tailored programme for you.

SPEAKING AND LISTENING	**Capabilities**			**Needs**		
	1	2	3	1	2	3
Using the telephone						
Travel arrangements						
Introducing yourself and the company/department						
Informal meetings						
Formal meetings						
Promoting products						
Following meetings						
Commercial information						
Negotiation						
Hosting foreign visitors						
Social conversation						
Exhibitions/trade fairs						
Specialist vocabulary						
READING						

Mail Fax, memos						
Business letters						
Business news						
Sales brochures						
Commercial & financial reports						
Technical reports						
Export documentation						
Product description						
Patent documentation						
Instructions for use						
WRITING						
eMails, fax, memo						
Business letters						
Commercial & financial reports						
Technical reports						
Product description						
Offers and orders						
PRESENTATION						

Presentation using transparencies						
Powerpoint presentation						
Design of documentation for the customer						
Rhetorical skills						
Negotiation skills						
Technical skills for searching for information / patents, regulations etc.						

*(0042/UK published in LINGUA, Language Audits and Needs Analyses, Documentation of the Symposium in Saarbrücken 1994; Zimmer, Gerd, unpublished material of the author, Rostock 2005)

12.2.7. Resources

Internet Sites

Online translation website: www.babelfish.altavista.com

There are various training programmes and possibilities within the Leonardo da Vinci and Sokrates Framework.

It's impossible to list all of them and there are also changes from time-to-time. You should contact the National Programme Agencies and ask for assistance to find what is most appropriate:

- http://www.inwent.org/ (for Germany)
- http://www.bibb.de/ (for Germany)
- http://www.englische-briefe.de/
  This is a German-English Dictionary which also offers support for writing English letters, eMails and faxes. Useful model sentences for Business English and eMail writing can be found here as well.
- http://www.jobware.de/ra/rt/tc/index.html
  Here you can test your skills free of charge.
- http://www.englishtown.com
  online English learning platform
- http://www.ego4u.de
  Learning English online: free exercises, explanation, preparation for tests, games and information about English language and culture.
- http://www.tu-chemnitz.de/phil/InternetGrammar/

- Self-learning tool for English grammar, run by the Technical University of Chemnitz. You have to register but the use is free of charge. It is very professionally done and open for learners from all countries.
- http://www.faz.com/IN/INtemplates/eFAZ/default.asp
  "Frankfurter Allgemeine Zeitung" offers online the English „FAZ Weekly". There is no registration, the service is free of charge.
- http://people.freenet.de/mvhs-english/
  This website contains many useful links for learning offers. Run by German Volkshochschule, more appropriate for German users but the links will be helpful also for learners from other countries.
- http://www.esl-lab.com/index.htm
  This one offers a great variety of listening exercises.
- http://www.bbc.co.uk/worldservice/learningenglish/index.shtml
  The BBC (British Broadcasting Corporation) offers very attractive and a large scale of learning subjects and exercises to improve your English skills.

12.3. Intercultural Competencies and the Innovation Process

Introduction

This component aims at providing a brief overview of what intercultural competencies mean and how they relate to the innovation process in a business context. The text and checklist and resources below should help the reader to engage with the subject matter and provide a platform for further exploration. It should also help the reader to engage in some reflective practice and contextualise the issue to his or her own situation.
In many countries intercultural competencies are in demand and arise out of historically grown cultural and political relationships. For example the historical Portuguese relationship with Africa (Portuguese speaking countries), Asia (Macao, India,...) and America (Brazil,…). The sharing of know-how, expertise and resources has been frequently perturbed due to the different cultural aspects. Even today projects between Portugal and such countries face the different visions and cultural aspects; important projects, like for example those on Education, medical assistance or researchers exchange between universities or companies, frequently experience difficulties of implementation due to different cultural visions and ways of understanding.

Understanding Intercultural Competency - What is it?

Your ability to work effectively with others who have a background that is culturally different to yours, for example in terms of language or religious belief. Your intercultural competence forms part of your overall social competence.
It may be useful for a company to be aware at what level of intercultural competency relevant staff are. At a basic level staff may be perceptive and open to other cultures and happy to learn form these experiences whilst not having any underpinning systematic approach in place. At anoher level staff have undergone more formal intercultural training and are able to deal with in unfamiliar situations in a more systematic and reflective manner. At a more proficient level staff can draw on experiences and apply these to new situations, understand some of the conceptual issues of intercultural communication and are receptible to cultural nuances, are confident but not offensive when communicating his or her point of view.
Identifying these competencies could help a company in identifying key staff that should for example be involved in drawing up a plan for engaging in intercultural communication, champion an intercultural working atmosphere, drawing up intercultural training plans or deciding who should support and help to prepare for oversea business trips
For further inforamtion on different intercultural compentencies see the Leonardo INCA project, which has developed useful descriptors: http://www.incaproject.org/

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12.3.1. Why are Intercultural Competencies important?

Intercultural competences can be important aspects in business innovation in terms of a) the (operative) ability to transfer and apply knowledge, concepts, processes and products within other cultural contexts and b) the (cognitive, attitudinal) ability to view situations from different and broader perspectives.

Economically and with the integration of the European Union large companies as well as small firms operating in a knowledge based economy have to rely increasingly on the interrogation of non-domestic sources of information and knowledge bases, and having to accommodate the particular cultural context of the region or country in order to access markets or gain or maintain a market advantage. Also, learning in the work place has increasingly to take into account the cultural diversity of its workforce, reflecting the multi-cultural social environments businesses are situated in.

Within a business environment, intercultural competencies are essential wherever two or more cultures co-exist, interact or where products or services produced or offered by a company or organisation are aimed at a multi-cultural audience.

Company employees: It is important to know the cultural characteristics of your employees, so if you have a workforce comprising members of different cultural backgrounds, then it is important that you know to what extend this will influence the way that they work, communicate, socialise.

Trading internationally: If a company is planning on expanding internationally, it is of utter importance that the intercultural differences are taken into consideration. This could often mean the difference between success or failure of the expansion.

Some aspects of **globalisation** affecting more or less EACH business are:

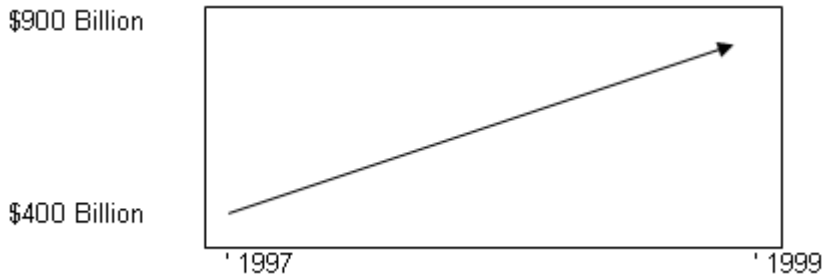
- Globalisation leads to a stronger competitive pressure on the markets
- Decisions on choice of location do not longer depend only from local or regional aspects
- Decisions on all business processes will have in mind a global market situation
- Technical progress is able to reach hidden corners of the globe within shortest time if added value is high enough
- Request for qualified workers increases, higher education becomes a decisive factor in competition
- Technical based professional skills lose against qualifications to adapt activities permanently to economic and technical changes; importance of “soft skills”, particularly social skills, is increasing

Therefore, intercultural competence to implement innovations has to be more than acquisition of knowledge about other cultures and how to behave in a meeting with foreign business partners.

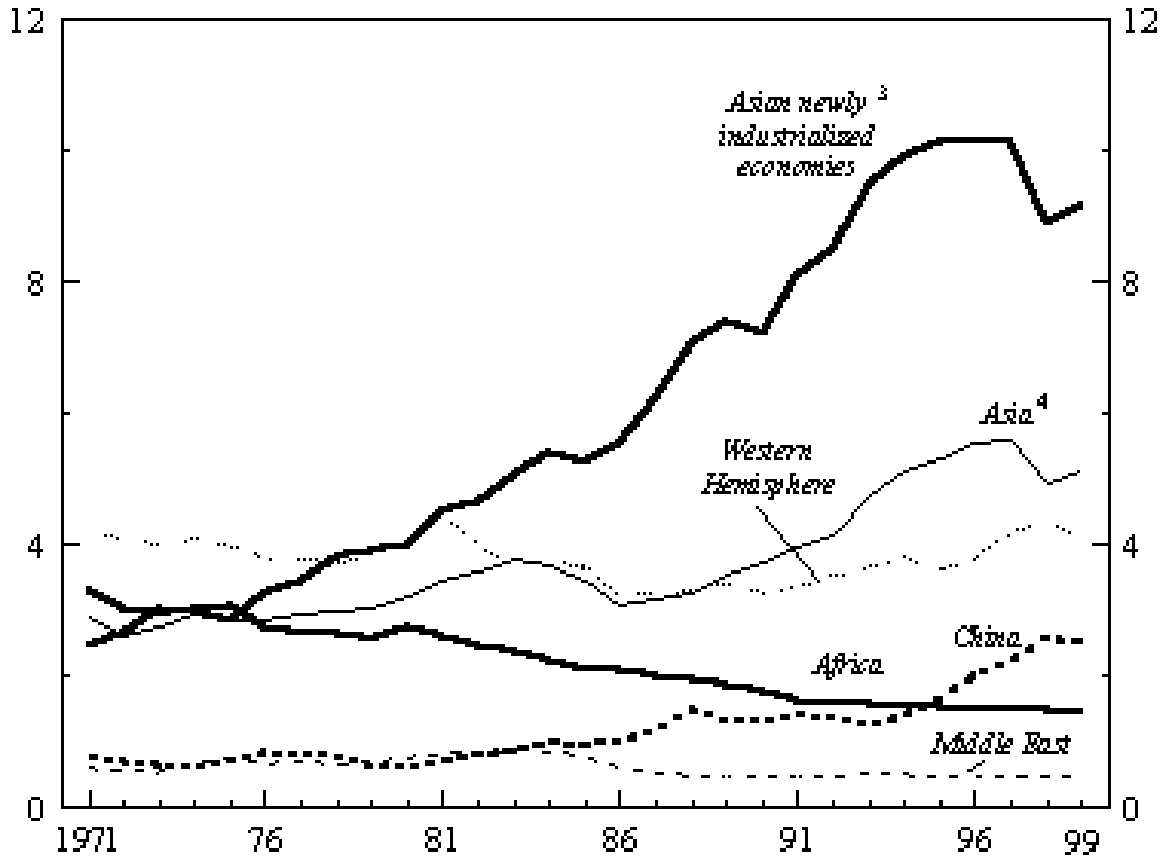
What the company needs – and not only the top management – is increasingly to have in mind global influences, effects and necessities – **Think global, trade local! Trade global, think local!**

The statistics are certainly convincing: since 1950, the volume of world trade has increased by 20 times. And from just 1997 to 1999, flows of foreign investment nearly doubled. The diversification of external trade is another example of globalisation.

Foreign Investment



External Trade (as percentage of World Trade)



Source: IMF, *World Economic Outlook* May 2000; Direction of Trade.
[1] Excludes oil exporting countries.
[2] Purchasing power parity terms.
[3] Hong Kong SAR, Korea, Singapore, Taiwan Province of China.
[4] Excludes China.

Some argue that today's era of globalisation is different from previous eras. One could argue that previous era of globalisation was built around falling transport costs, today's globalisation is built around falling telecommunications costs, which are able to weave the world together ever more.

12.3.2. Where are intercultural competencies applied in business?

Below are some examples to illustrate where we can find applications of intercultural competencies in different business related contexts.

An innovative idea …

"In a radio discussion on the on petrol prices an employer introduced the innovative idea to raise prices for petrol to avoid that shoes produced in Europe are brought to a third world countries only to thread the shoestrings and bring them back after. He suggested using the extra money from higher prices for the payment of employers' social contributions for the employees.

The answer which was given was that international competition in a globalized market makes the implementation of this idea impossible. At least all European countries would have to do the same.

That's why the check list for ideas and solutions for innovative products and structures will have to include the question for implementation of a market which nowadays is less and less a regional or national one".

A global business under pressure…

"Shell managers came under pressure had when customers internationally boycotted the company because of the company's conflict with Greenpeace. Public opinion becomes more and more critical, the idea of cheap, cheaper, cheapest still works but more and more customers are asking how products are produced, if production exploits resources and people in a not acceptable way. The internet and mass media are able to influence on costumers opinions during very short time".

Language skills needed…

"A manufacturing company realised that they needed to develop the language skills of their employees. The company was based in the UK and did business there, 80% of their produce was destined for the international market though, supplying all the continents and dealing with clients speaking many different languages. Not being able to speak the native languages had proven to be an obstacle to conducting business in the different countries.

A local language centre was approached, which provided a language trainer, who was assigned to provide in-house training.

The language skills required were quite specific. They had to enable the sales teams to conduct their business abroad by identifying the needs of their clients and being able to advise them and supply products that would correctly meet their requirements.

A glossary was developed, containing entries related to their products and the associated industrial sectors, as well as, general terms used in business. The glossary was translated into the languages most important for their business. This enabled the company to establish initial contact, by sending

emails or faxes in the native language and introduce itself and its products.

Since sending out information in native languages, the response rate from the approached clients has increased significantly.

By contacting potential clients in their native languages, a lot of business is now generated, which was lost before. Thus, the investment that was necessary to implement the new linguistic skills has certainly paid off and has opened new sales opportunities on the international market".

A further case study on "Teaching Intercultural Competence" is available at http://www.etweb.fju.edu.tw/culture/lesson/Gateway4.ppt.

There is also a very interesting academic publication called "Intercultural Communication in Business Ventures Illustrated by Two Case Studies" (http://www.tu-freiberg.de/~wwwfak6/paper/hinnertext.pdf). The two case studies, this paper is based on are describing how culture influences the marketing strategy and products in a foreign market. Even though the two German companies in question were not SMEs, but large companies, many of the concepts and strategic decisions taken are relevant to smaller businesses.

12.3.3. How to plan for intercultural competencies?

Below is a check list , which can help you and your company to plan for developing intercultural competencies. When reviewing the tasks ahead you may decide to employ professional help. The check list is followed by evaluative exercise to assess your or your staff's intercultural competencies.

A. Check List*

1. Establish with your staff an intercultural action plan and review on a regular basis	
2. Assess the intercultural competencies of you and your staff	
3. Assess your product, processes and services in relation to the cultural aspect of the markets	
4. Assess your marketing and communication strategy against intercultural requirements	
5. Identify intercultural training courses/workshops or language courses that address elements of intercultural competencies	
6. Establish discussion/learning circles in your company that discuss and brainstorm intercultural issues and use 'action learning sets' for example.	
7. Hold intercultural 'fun' days that include competitions that test your intercultural knowledge and skills, demonstrate different customs, food etc.	

8. Identify and encourage 'intercultural chanpions' in your company that will help to embed intercultural measures in your business processes.	

***** You may wish to employ some professional support to get started.

Intercultural competency entails how well you are able to deal with people that are culturally different from you. As an exercise evaluate your intercultural competencies by commenting on your perceived ability to demonstrate the competencies described in the table below (adapted from INCA project, see:www.incaproject.org.uk):

B. Self-evaluation

Competency	**Description**	**Your comment**
'tolerance of ambiguity'	an attitude of in situations which are not clear-cut and possibly a new experience and willingness to explore new solutions appropriate to a range of people	
'behavioural flexibility'	adapting to and appreciating the needs and customs of others	
'communicative awareness'	an ability of being "alert to the many ways in which misunderstanding might arise through differences in speech, gestures and body language" and always be ready to seek clarification and at times agreement as to "how they will use certain expressions or specialised terms"	
'Knowledge discovery'	an ability and willingness to engage in a, by way of finding out about and learning from the culture (e.g. customs, practices and values) of the customers, clients or business partners you will be working wth and adopting your practices accordingly	
'respect for otherness'	appreciating "other people's values, customs and practices as worthwhile in their own right and not merely as different from the norm. While you may not share these values, customs and practices, you feel strongly that others are entitled to them and should not lose respect on account of them. You may sometimes need to adopt a firm but diplomatic stance over points of principle on which you disagree"	
'empathy'	by trying to emotionally and cognitively under-	

	stand another person's situation or circumstance, 'putting yourself in their shoes' is a colloquial expression. "While this competence often draws on knowledge of how you would expect others to feel, it goes beyond awareness of facts. It often shows itself in a concern not to hurt others' feelings or infringe their system of values"	

12.3.4. Resources

Facts and Internet Sites

- **BBC:** www.bbc.co.uk/worldservice/programmes/globalisation/
- **National Centre for Languages (UK):** www.cilt.org.uk
- **Intercultural Competence Assessment (Leonardo da Vinci project):** www.incaproject.org
- **Regional Language Network (RLN) North West England**: www.rln-northwest.com
- **Globalisation Guide**: www.globalisationguide.org
- **The World Trade Organisation (WTO)** www.wto.org was established in 1995 to administer the rules of international trade agreed to by its 123 member countries. These rules have been ratified by the parliaments of all members.

  The WTO's rules make it hard for a country to favour their own industry over imports from other countries. Also, the WTO rules do not allow a country to favour the imports of one country over those from another.

  The WTO argues that the growth of trade between countries increases the wealth of everyone. Trade allows the production of goods and services by those who are most efficient, thus maximising their availability at the best price.
- **The International Monetary Fund (IMF)** www.imf.org was established in the wake of the World War II in 1946 to:
  - promote international cooperation on finance,
  - encourage stability in exchange rates and orderly systems for exchanging money between countries
  - providing temporary assistance for countries suffering balance of payments problems

  The IMF frequently seeks institutional reform in the countries to which it provides temporary financial assistance. The IMF has 182 member countries.

- **The World Bank** www.worldbank.org provides loans to poor countries for development projects. The bank provides loans for investment projects, such as water and sanitation, natural resource management education and health. It also lends for what it calls adjustment projects, which are to support governments undertaking policy reforms, such as improved public sector management.
- The **United Nations** www.un.org, established at the conclusion of the Second World War, has become a promoter of globalisation, arguing that individual states have a dual role with responsibilities to both their own citizens and to the world society as a whole. The United Nations says the broader global responsibility requires international institutions. It supports the case for reform of international institutions, including its own Security Council, to make them more representative. The UN has sponsored a Global Compact to establish and promote a shared set of core values in the areas of labour standards, human rights and environmental practices between the UN and the business community http://www.unglobalcompact.org/

- **The Organisation for Economic Cooperation and Development (OECD)** www.oecd.org/subject/growth/in_tr_gl.htm develops economic and social policy for its 29 members, which include the countries of North America, Western Europe (including Czech Republic, Hungary and Poland) and Japan, Korea, Australia and New Zealand. It provides economic arguments for globalisation, such as data demonstrating the positive contribution made by multinational corporations to economic development.
- **United Nations Conference on Trade and Development** (UNCTAD) www.unctad.org is a permanent intergovernmental body of the UN that aims to maximise the trade investment and development opportunities of developing economies and to assist their efforts to integrate into the world economy
- **The World Economic Forum (WEF)** www.weforum.org is a private not-for-profit foundation that operates conferences for business, political, intellectual and other society leaders. The WEF holds an annual conference in the Swiss town of Davos, where it is based, and also holds regional conferences around the world. It has no decision-making power, but many of the world's business and political leaders discuss issues of importance at WEF meetings.