



# The Art of Managing Innovation Problems and Opportunities

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**Management**



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## Accompanying the Book on its Way

Innovation has long been a central concept in all areas of life and spheres of the economy, from manufacturing to services, and from commerce to education. Despite the fact that there is much talk about innovation, many organisations in both the private and public sector would rather avoid innovation than accept it with open arms. One reason for this is undoubtedly inadequate knowledge and a lack of skill in the management of the innovation process and the changes it may engender. Like most other skills, those pertaining to the processes of innovation may also be learned by organisations. The right approach, supported by knowledge and insight, and, in particular, the will and support of management in effecting change, are essential in this.

This Book is intended both for those who wish to include elements of innovation in their academic work processes as well as practical person who would like to structure and improve their existing processes of innovation. It focuses primarily on the management of the initial phase of the innovation process, i.e. the identification of problems and innovation opportunities. It consists of four parts, each of which represents a chapter, that together represent a new approach to the introduction of innovative methodology. It is a “bottom to top” approach that works from the identification of an actual problem to the implementation of a solution. The Book brings together a selection of some well and lesser known methods, together with a number of newly deliberated approaches and techniques especially prepared for this purpose. It should be noted that some of the methods are original. The authors of each of these are marked accordingly.

The first part introduces the innovation process, especially its first part, pre-invention phase or so-called fuzzy front end of innovation. It is intended to familiarise the reader with the concept of the problem as a starting point in innovation and irrespective of the declared chaos of this phase demonstrates that there is nothing »crazy« if only we start in a systematic manner. The design of the Book and method of reading and practical application is also explained in this chapter.

The second part is the presentation of a set of 24 methods that are useful in the preparatory stages of the innovation process. Many of these methods are simple enough to be undertaken by those with less experience of such issues, but nonetheless have the potential to achieve tangible results. Due to the fact that the literature embracing methods for the creation and selection of ideas is both extensive and exhaustive, the primary focus here is on the somewhat less well known and less frequently used methods which are appropriate to the address of problems and the identification of opportunities. These methods may be applied as the basis for the innovation process study, while individuals or groups may use them for a better, more efficient and more orderly execution of the pre-innovation process. They contribute to creating a clearer picture of an organisation’s problems, as well as the identification of latent opportunities in relation to the address of the challenges faced, together with the provision of dynamic solutions.

Part three presents two new and slightly more complex methods for the integrated management of the initial stages of the processes of innovation which have been developed and successfully tested within the scope of the SharTec project. The first is PACIS, which focuses on the analysis of the problem, the creation of ideas and the selection of solutions through an appropriately comprehensive approach in the form of workshops within a closed group. The second method is eMIP, intended for the mass identification of problems through a mentored familiarisation with different methods and, with support in the virtual environment, their guided implementation within the organisation. This second section of the Book is principally focused on the concept of introducing or enhancing the culture of innovation among employees in the companies and organisations.

The fourth part of the Book is designed from a practical perspective. It comprises a set of worksheets and schedules in the form of a matrix or a typical structure, together with practical instructions for carrying out the methods to be implemented. It is designed for those who wish to carry out the selected method either as a trial or more broadly. The worksheets are ready for immediate use, but, if necessary, the user may also adjust them according to practicalities, which also facilitates the simpler and more efficient preparation and management of the pre-innovation phase.

Finally, to accompany the Book on its way: innovation is forever a process that has to be established and maintained in accordance with the nature of the organisation and all of its elements. Not only in the Slovenian area, but also in the wider international scientific community the pre-invention phase proves to be somewhat neglected. Accordingly, this Book should serve as a useful accompanying tool in the realisation of processes facilitated by curiosity, imagination and the desire to succeed.

**The Authors**

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# THE ART OF MANAGING INNOVATION PROBLEMS AND OPPORTUNITIES

## **Part 1:**

a few words on  
innovation and  
fuzzy front end  
pre-invention  
stage, which is  
not fuzzy at all

## Introduction

Companies in the global and competitive environment today no longer ask whether it is reasonable to innovate or not, yet they think about how many assets and other necessary resources they are ready to or need to invest in the invention-innovation-diffusion process (IIDP).

Innovate means to carry out the entire process from defining the problem to the successful implementation of innovations in practice by using it ourselves or sell it to others; innovation is a new proven benefit of users of new idea). As stated by Mulej (2015), IIDP includes the following basic steps:

1. practice and learning to make innovating a daily routine;
2. critical and creative thinking and experimentation;
3. ideas on changes;
4. selection of some promising ideas as inventions;
5. recording of a part of inventions as suggestions;
6. elaboration of a part of suggestions to create potential innovations;
7. making them accepted by users as sources of their benefits, i.e. innovations;
8. diffusion of innovations to maximize the number of users;
9. making innovations the usual practice;
10. permanent collection of new insights, ideas and experiences.

The whole process (IIDP) resumes after the tenth step.

The research results also suggest that investing in innovation results in economic results (Likar, Križaj and Fatur 2006, Likar 2002a, Antončič, Hisrich, Petrin and Vahčič, 2002). The latter proves true in the case of investing in the development of innovation itself and even more so in investing in the management of the innovation process. Hence, the innovation followers earn just over one euro from each euro invested in innovation, while the innovative earn as much as tenfold. However, in reality and in their daily battle for survival, the companies often fail to find additional time, resources and energy for much needed innovation. Investments in a systematic and organised innovation may often only be afforded by financially strong, predominantly large and medium-sized enterprises, which have a clear innovation strategy. However, there are very few such companies in smaller economies, such as Slovenian. Hence, a systematic and organised approach to innovation often remains just 'wishful thinking' for small and medium-sized enterprises. Companies often also fail to have specialists with expert knowledge and innovation management qualifications. The first phase, the so-called idea management is often formalised in enterprises, especially larger ones, yet rarely supported with appropriate and sustainable activities. In addition, innovation activities focus primarily on the creation of ideas and less on the perception of problems and opportunities. All of the aforementioned indicates that most companies run a risk of missing the global innovation train and weaker market competitiveness.

Said challenge may be translated into the question whether and how it is possible to bring the innovation process closer to small and medium-sized (and large) enterprises. At this stage, this Book has many advantages. It offers a carefully selected range of methods to manage pre-invention phase, which may be selected easily by way of using the "semaphore". The methods are comprehensively presented with a description of contents, implementation of process, the

potential and examples of good practice as well as templates and instructions for immediate implementation of methods in practice. The methods selected are operationally manageable, both time-wise and in terms of preparation and organisation. The reader is left with only one task: to select the appropriate method for a given situation in his/her organisation and to adjust to creativity.

## How to bring innovation closer to small and medium-sized enterprises?

Innovation and business process starts with an idea or a problem for which we find a new and effective solution. However, how can we come up with ideas for innovation? Firstly, we present some possibilities as to how ideas for new innovation-business challenges may be generated:

**Perception of market opportunities.** The example presents the Slovenian product Kosmodisk. It is a technologically simple product yet it entered into the market at a time when a lot was being reported on the disorders resulting from long hours of sitting and lack of exercise, and has in the mean time become a huge market success with approx. 2 million users.

**Detection of competition's weakness.** An example of this is the emergence of low-cost air carriers as a response to the market, which has for decades offered only relatively expensive services. By way of optimising the flight costs, airport fees, ticket sales and other items (new business model) the low-cost carriers have taken over a large part of the market share and rocked the entire aeronautical industry.

**Detection of technology opportunities.** Sustained and rapid progress of technology offers a range of 'compulsory' innovations (e.g. televisions, monitors based on the LED technology) and a range of innovative opportunities for products that are not in themselves evident. One of such examples is the capsule for the examination of the intestines, which the patient swallows, and which during its path through the digestive tract wirelessly sends a picture of the intestines and other data to the medical staff on the basis of a miniature camera. The Said capsule was created as a reflection of concealed stealth medical needs (painful examination with a probe, which travels through the intestines on a wire), which failed to be solved for a long period of time. The basic idea was born by pure coincidence, based on the development of air missiles. The idea was to transfer the so-called "missile eye" to the said capsule. It was not until the development of technology that this was actually possible.

**Spin-off.** Useful results often arise based on research and development activities performed at universities and institutes. If it is estimated that these results have market potential, a so-called spin-off company may be set up. Such an example are welding glasses that automatically dim when we start to weld. The basic technology was developed at an institute, while an internationally successful company, which used basic technology and developed a successful commercial product, was later founded.

**Building on our own hobbies, knowledge and skills.** Hobbies represent activities into which we are prepared to invest years of our free time, creativity and energy. Since we are motivated at work, we often achieve a high level of knowledge and skills. If we manage to connect this with a dash of creativity, this can be a great starting point for innovation and business work. An example is the company Pipistrel, where the hang-gliding hobby turned into an extremely innovative and internationally recognised company.

**Waste materials and energy as a source of opportunities.** The Ocean Orchids company from Prekmurje Region represents such an example. The specialty of the Ocean Orchids' tropical garden is the use of geothermal energy, which entails the use of "green" source of heating and enables the existence of a garden with tropical plants in an otherwise completely inappropriate environment place for their growth.

**Fashion trends as a source of ideas.** Manufacturers of mobile phones and accessories have come up with an idea to offer to the users colourful phone covers and matching parts of casing. Hence, the users were able to match the colour of their "cell phone" to the colour of their clothing, handbag or a certain event. In this case, the idea was not motivated by the known needs, but mainly from fashion trends and a vision of manufacturers, which has been well received among users.

**Problems as a source of ideas.** Very often the starting point is a problem which we or our customers or users face. Such a case is for example a mobile phone (and also the tablet). When they became larger and with a touch screen, a problem of drops to the ground emerged since a large display was significantly more sensitive to impacts. Hence, the protective covers emerged on the market en masse. We are talking about a new market opportunity resulting from a clear problem.

## Fuzzy front end pre-invention phase of innovation process

Why a problem? It is a well known fact that many of the greatest innovations of our time, as well as innovations in general, are a result of a brilliant idea, which appears at a the moment of extraordinary inspiration, while others are born based on the collection of ideas and proposals without previously ever talking about the problem. Therefore, it should be emphasised that the conceptual phase is by no means negligible and far from trivial. However, with merely focusing on an idea, a company or organisation may miss some key opportunities or may not detect problems that later may become unsolvable. This is not just a case with new market products, but also with the organisation, processes, strategy and other "soft" aspects of the operations. All of these are sources of problems and eventually innovation opportunities.

Contemporary literature also shows that the "fuzzy front end" or the pre-invention phase, sometimes also called the unclear or problem phase, is one of the key steps to a successful innovation. However, only rare authors or studies pay due attention to this stage despite its vital role in the innovation process. The aspect of problem with regard to the pre-invention phase is also rarely exposed in the literature. Usually, the thinking about the pre-invention phase commences with the element of idea (see e.g. Deppe et al. 2002; Hüsiger and Kohn 2003; Sperry and Jetter 2009; Breuer, Hewing, and Steinhoff 2009; Verworn, Herstatt, and Nagahira 2008). Also, Griffin et al. 2007, who in their study of interviews with serial innovators establish that in the process of innovation the said innovators primarily address the problem itself, yet they do not include this element in the definition of pre-invention phase. The sources which include an element of opportunity in the pre-invention phase may also be observed (see e.g. Paasi et al. 2007; Kim and Wilemon 2002), yet

only Paasi et al. 2007 explicitly talk about the problem in connection with the opportunity. In the aforementioned literature an opportunity relates primarily to pursuing of new technologies, discovering niche markets and potentials, identifying consumer needs, and rarely to a concrete problem in relation to an existing product, process, business activity, or as a concrete starting point for the creation of an entirely new product.

## How does Google Scholar see the “problem phase”?

To complement the existing literature, we strive to highlight and emphasise the importance of the problem phase as the key element in the pre-invention phase. The disregard of the problem aspect may be inferred from the scope of technical and scientific literature that addresses this topic. An overview of the number of ‘hits’ (links to sources) in the Google Scholar with selected search terms used gives one of the views of this topic. We were looking for hits by typing in the key phrase “front end of innovation + problem identification”. The second part of the phrase (after the + character sign) was appropriately changed so as to include all elements of the pre-invention phase (problem, opportunity, idea). The hits containing the words “problem identification, problem definition, problem analysis” were negligible in comparison with the results of search with the key terms “generating ideas, selection of ideas, identifying ideas”<sup>1</sup>. On the day of search there were a total of 73 hits (excluding references) on the element of the problem in the pre-invention phase and 984 on the element of idea. Even if the hits on the search of the term “opportunity”, which some authors use in a similar meaning (there were 477 of such), are added to the element of the problem results in a search term opportunity, is the element of idea almost twice as likely addressed in the sum of all hits. (Košmrlj, Likar and Širok 2014).

**Table 1:** Hits in the Google Scholar search engine for the selected search phrase

element of problem		element of opportunity		element of idea	
search phrase	hits	search phrase	hits	search phrase	hits
identification	38	identification	238	idea selection	193
detection	4	detection	1	idea detection	1
recognition	5	recognition	82	idea recognition	3
analysis	33	analysis	149	idea analysis	20
exploration	3	exploration	7	idea generation	702
				idea creation	65
<b>Total</b>	<b>73</b>	<b>Total</b>	<b>477</b>	<b>Total</b>	<b>984</b>
Note: Results as of 18 December 2014					

<sup>1</sup> The search was conducted in English, the search phrases may have appeared in the title or in the text, while the source had to contain the search phrase as a whole (e.g. *problem identification, problem definition, problem detection, idea generation, idea selection*) and phrase (*front end of innovation*). Patents and citations are excluded from the number of hits.

In a similar manner as the frequency of occurrence of a problem and idea in the pre-invention phase, we also checked the frequency of occurrence of certain methods in the professional literature<sup>2</sup>. Firstly, we selected 50 of the most common methods of innovation, especially those which are more commonly used and are suitable for use in the pre-invention phase. Based on their content and manner of implementation, we marked the methods as appropriate for working on a problem (problem identification, problem analysis) or as suitable for work on ideas (idea generation, idea analysis, idea selection). 598 sources were found on the methods for working with a problem, while 913 sources were found on the methods for work on an idea. An even more obvious difference appeared in the search with the key phrase “innovation” instead of “pre-invention phase” where there were a few thousand hits for problem methods and tens of thousands for idea methods.

## Obstacles in solving innovation-entrepreneurial problems

Since the Book focuses on opportunities arising from problems, some of the pitfalls, which are often encountered, should also be noted. The cornerstone of the innovative process is the correct understanding of a problem or a challenge. Sometimes problems are clearly visible, yet often having the general knowledge on a problem does not necessarily mean that its causes are really understood. To wit, a correct definition of a problem substantially facilitates its proper solution. The reasons for the failure to adequately solve the problem are multiple.

### Incorrect assessment of circumstances

The assessment of a manager, entrepreneur, executive head or other persons arises from the previously generated conception and experiences that lead to partial or incorrect assessment. This is the basis for further activities, which are consequently incorrect. In doing so, the causes of incorrect assessment may be two:

- an inadequate understanding of the problem,
- an incorrect specification of the problem.

We primarily talk about the perception in connection with the subjective assessments based on incorrect assumptions and old mindset, while we talk about the incorrect specification when we failed to obtain the necessary objective information.

*Example: On a long trip the bicycle's tyre is flat. Since the said tyre has had several puncture in the same season, we make a stop in a shop the store and buy bicycle puncture repair kit a tool for patching. When the tube is taken out of the tyre type, we discover that there is no hole and that there is actually a problem in the valve which is letting the air out. Since we failed to investigate the problem in more detail and we relied on the previous experience, we lost time and money. The example therefore points to two elements: an inappropriate perception and inadequate analysis and, consequently, the erroneous specification of the problem.*

<sup>2</sup> The search was conducted in English, the search phrases may have appeared in the title or in the text, while the source had to contain all the search phrases, i.e. the given phrase (e.g. *PACIS* or *PACIS method*) and phase (*front end of innovation*).

### Insufficient data, information and analyses

Intuition is one of the most common reasons for managers' incorrect decisions. In this respect there are a variety of forms. The first form is related to insufficient information, which leads to incorrect conclusions, since the crucial scenarios are designed without the necessary professional broadness. Another type of problems is a result of data, which are incorrectly processed or certain limitations of individual analytical methods, which are not properly considered. There may also be the case of the results of analyses, which are applicable for some other cases, yet not for ours. The third problem is linked to the "information era", where there is a wealth of information from which we fail to select those most relevant for a particular case.

*Example: A publishing company launches a new magazine onto the market. The company has carried out an analysis on the readership for the already existing magazine with similar content. Based on the said analysis, they established that they can expect 300,000 readers. However, the company failed to consider that each magazine is read by three readers on average, and hence, there are only 100,000 potential customers on the market.*

### The importance of focusing on the future

Modern innovation strategy must also ensure that the research and development work and innovation are not always subject to the pressure of today's business needs. Simply said, the great innovators do not allow that today's needs and pressures nullify their look into the future. Thus, the innovative leaders according to the AT Kearney study create separate "engines" for the management of today's business processes, and those, who look into the future and will be able to take advantage of the long-term benefits of the growth. Thus, for example IBM created three teams to manage the company's innovation programme, which focused specifically on innovation strategy, technological trends and operationalisation of innovation. So as to ensure the focus on the present and future priorities, IBM builds its business opportunities on three different time frames: short-term fundamental business opportunities, medium-term growth prospects and long-term upcoming opportunities. IBM has consciously decided to allocate a relatively large part of its funds (10 to 15 percent) for the development of long-term opportunities and they do not "sacrifice" those funds them for any immediate priorities or "fighting fires" in the company (AT Kearney 2014).

This is only one example where successful operations include addressing a problem. In fact, all organisations on a daily basis face problems that may be visible or concealed, known or yet unidentified, notwithstanding the relevance and the potential of idea in the innovation process. As the popular saying says, "recognition of the problem is already half-way to a solution". In our case, this means that a company or organisation that regularly detects and solves its problems and difficulties (at all levels) may potentially innovate and operate more successfully.

The aforementioned baselines which relate to different sources of innovation opportunities, importance of a problem phase and incorrect perception of problems, as well as focus on the future, served as the guidance in the preparation of methods, which are presented in this Book.

## How to choose the most appropriate method?

When there are a lot of tools or methods available for a particular task, the selection of the right tool is often more complex than the task itself. Similarly, when travelling, it is sometimes much easier to define the destination than to choose the path that will lead us to our destination. So as to facilitate the decision on selecting appropriate methods to the readers, potential innovators, each method has been labelled according to the six aspects that define its features and implementation.

1. **Scope** – the method is suitable to address a **problem** or an **opportunity**, which is already an intermediate phase on the way to the solution. When talking about the problem, we have in mind an issue or an inappropriate yet important situation, which need to be detected first and then clearly defined and analysed. On the other hand, an opportunity indicates either a challenge in the work process, a source of solutions for an already known problem or detection of the potential for an innovation, but it can also indicate an idea for a solution.
2. **Duration of implementation** – **swiftly** (may be implemented in no more than a few hours) or **slowly** (lengthy version). Most methods may be implemented in a very short time, swiftly, yet such a manner of implementation cannot provide optimal results. Therefore, the icon “swiftly” is only given to the methods which give visible results in a short time. Lengthy, slow implementation is very versatile: it can last several days or even weeks or months. This is further specified in the description of the method.
3. **Number of participants** – the method may be performed **individually** or may require work in a **group**. Most of the methods give the best results if they are performed in a group. Group dynamics may contribute to more associations, to divergent thinking and to greater creativity than the ability as well as practice of identifying and developing new deals. Moreover, a professional background of participants mostly represents useful basis for creative work. However, there are methods that may quite effectively be performed independently. These methods are marked in the text with the icon for independent execution, while the remnant methods are marked with the icon for the group. Nonetheless, the individual methods may be very effectively carried out also in the group. It is useful to include in a group also people who are not heavily involved in searched problems, since they often notice them more easily. Moreover, critical and pervasive individuals, even the “eternal grumblers” should also make part of a group.
4. **Profile of participants: expert** (a participation of an expert from a particular field or a moderator for the implementation of the method is required; as a rule, they are external personnel) or **generalist** (no special knowledge is required for implementing the method and more comprehensive view may be achieved). It is usually advantageous that an expert in the field under consideration is also involved in the implementation of the method. Whether it is enough that the said person is an experienced worker or is it sensible to invite an established expert depends on the complexity of the problem and situation as well as the company’s capacity. The methods where a cooperation of expert is indispensable are marked with the icon.
5. **Potential**: enables **incremental** or **breakthrough** innovations. Both are useful, as such. Breakthrough innovations are usually rare, yet essential for the development breakthroughs of organisations. We can expect many more incremental innovations from various fields. These innovations are necessary for sustainable innovation



and solving of everyday challenges. It should be noted that all methods allow the creation of incremental innovations, while the breakthrough category is marked for the methods, which enable also such innovations. However, two things should be stressed: we may not achieve the potential for a breakthrough idea despite the correct implementation of the method, and with only incremental innovations we can get an inspiration for a breakthrough innovation (the so-called Eureka moment).

**6. Orientation:** into the **present** (detection and solution of problems in the present) or the **future** (enables generation of significant, visionary ideas and is often based on the assumption of the state in the future). Our thinking is usually focused on the present. It is useful to promptly and regularly solve the existing problems and challenges so that they do not grow into large problems, or that they do not lose their potential. It is particularly due to the constant involvement in the present, that the methods which address the future are even more valuable. They enable us to envisage the development of the field, future challenges and even upcoming problems.

The methods are classified in a table pursuant to the first three aspects. Since certain aspects may overlap, e.g. some methods may address a problem and an opportunity, the method can be restated in several cells. This is particularly the case for individual methods, for the majority of which it is considered that they may also be performed in a group. By contrast, not all of the group methods are suitable for individual execution.

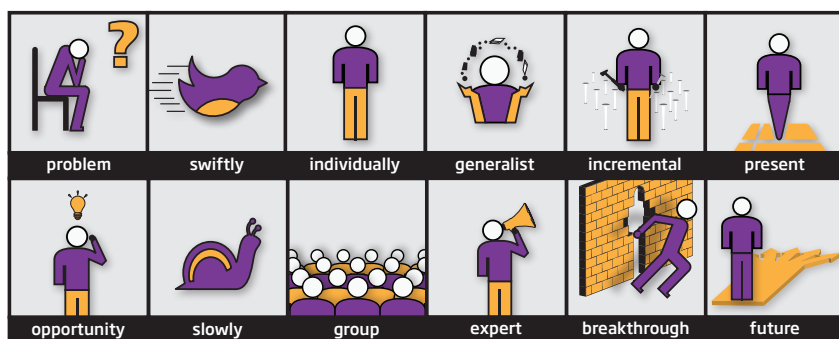
**Table 2:** Review of methods as per selected criteria – field, duration, participants

		ADDRESSING A PROBLEM		ADDRESSING AN OPPORTUNITY	
		SWIFT IMPLEMENTATION	SLOW IMPLEMENTATION	SWIFT IMPLEMENTATION	LENGTHY IMPLEMENTATION
INDIVIDUAL IMPLEMENTATION		Cause-Effect Diagram Ishikawa Diagram Mindmap Problem Mining QaDIM Problem Breakdown SWOT Analysis Forced Connections	Focus on the Goal Gemba Walk TRIZ	Mindmap Attribute Listing QaDIM SWOT Analysis Forced Connections	
		Innovation Cube Ishikawa Diagram Matrix Structure Design Problem Mining Progressive Abstraction QaDIM SWOT Analysis Forced Connections PACIS	Incremental Innovation - "From Sources to a Star" Focus on the Goal DELPHI Wild Cards eMIP PAPSA PDCA USOMID/SREDIM	Innovation Cube Attribute Listing QaDIM SWOT Analysis Forced Connections PACIS	Incremental Innovation - "From Sources to a Star" Five C's of Opportunity Identification DELPHI PAPSA PDCA USOMID/SREDIM



## A review Semaphore of methods

Final decision on the most appropriate methods should also consider a review of the Semaphore with the detailed descriptions of the methods in the second part of the Book. The Semaphore consists of six pairs of icons that represent the categories of previously presented aspects. Before a detailed description, we added the Semaphore with the categories that apply to the selected method. Some methods are “amphibians”, allowing both, addressing a problem as well as an opportunity; they can be performed individually or in a group, while other methods are very specific, intended e.g. only for group work. The Semaphore under each heading will thus be somewhat different for each method.



**Figure 1:** Innovation Semaphore – visual review of features

However, the said division represents the basic, mechanistic classification of the methods. For the purposes of a more serious introduction of innovation we recommend examining studying all the methods, which are presented in detail in second section of this Book. Each method is described with five elements:

- *description* provides general features of implementation and potential of the method;
- *purpose* is presented in terms of applicability and expected impact;
- *implementation process* presents various phases of the course of the method, the specifics of individual steps and instructions for actual implementation;
- *participants* indicates who and how many people are the most suitable for the implementation of the method; whether that is an individual or a group, whether it requires moderating, external participants, experts;
- *duration* is the section, where the envisaged duration of the implementation is presented in brief. Duration may vary from the anticipated, depending on the composition of the group, the nature of the subject object addressed, experience and motivation of participants.

A scheme or a matrix of implementation and a description of practical examples is also added to the majority of methods (where possible) so that the reader may better understand the application in practice as well as the manner of implementation. Worksheets with short instructions and a blank matrix are added in the fourth section of the Book for the methods where its implementation is possible based on the matrix or a scheme. Worksheets are ready for immediate use.

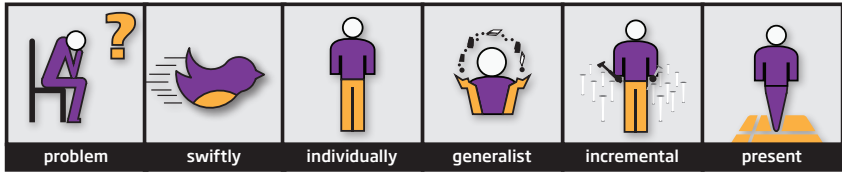
# THE ART OF MANAGING INNOVATION PROBLEMS AND OPPORTUNITIES

**Part 2:**  
presentation  
of methods  
selected to  
facilitate the  
introduction and  
implementation  
of innovation  
processes

# Simple methods for rapid implementation

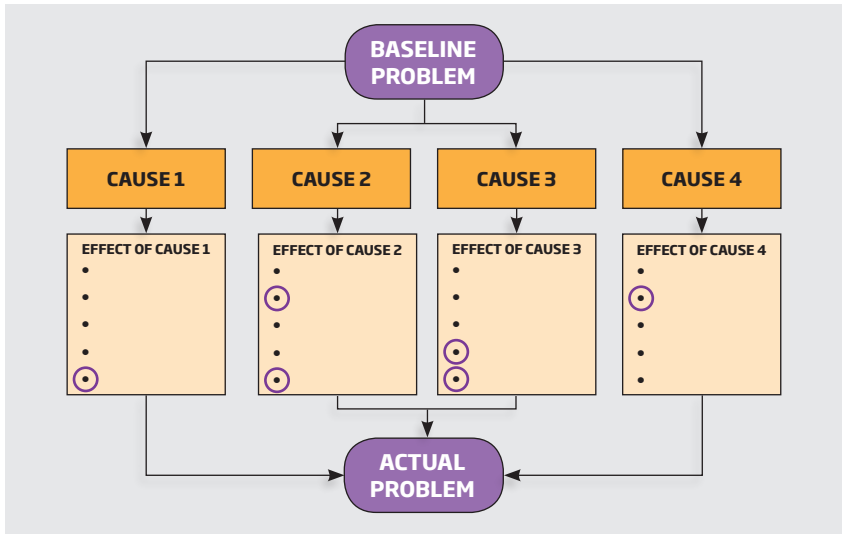
Presented below are a set of methods for addressing problems and identifying opportunities which have a common denominator, namely: overall simplicity and conciseness. These are methods that can be learned quickly and performed even more swiftly. They do not need a long period of preparation, and the results are immediate. Although in general these methods are simple, some are nevertheless a little more structured than others, and, as a consequence, it is a little more difficult to understand them; in any such case, it is recommended that the reader first studies the example, and then examines the technical aspects of the methodology.

# 1. Cause-Effect Diagram



*Description.* The cause-effect may be used independently in the innovation process, or as a support tool in the implementation of other methods. The diagram helps identify the actual problem through an analysis of causes and effects in a quick and easy way.

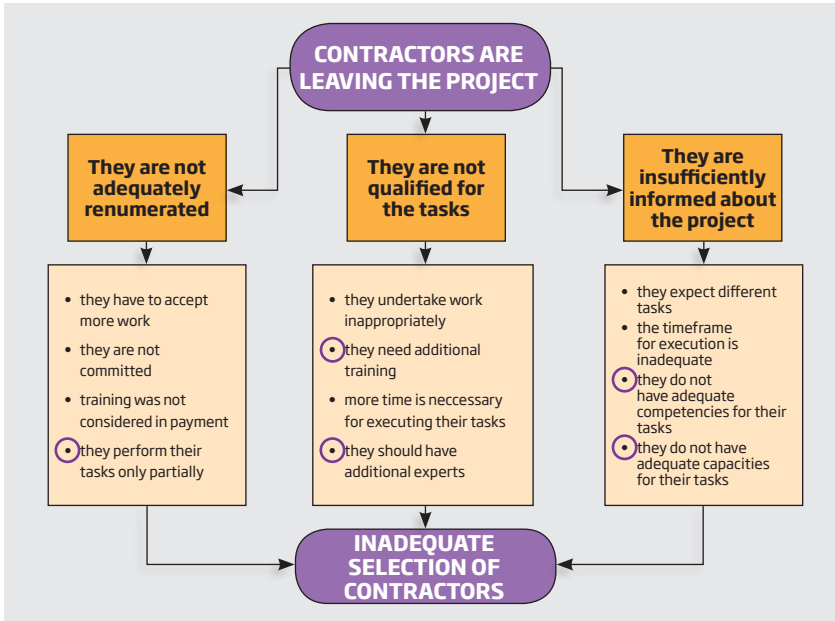
*Purpose and applicability.* This method is useful in analysing and defining more complex problems with many unknowns, or in cases where we fail to find appropriate solutions to an apparently simple problem.



**Figure 2:** Cause-Effect Diagram

*Implementation process.* We first write down the selected problem and then describe a couple of potential issues, which are believed to cause or underlie this problem. In the next step we try to ignore the baseline problem (we can also conceal it on the paper or wipe it from the board) and concentrate only on single suspected causes. Every such potential cause must be addressed separately and independently from the baseline problem. We then attribute effects to the cause, i.e. the effects that it has or might have (e.g. on the business operations, work process, etc.). This is then repeated for each of the suspected causes. An analysis of the effects follows in the next step. From the set of effects, we mark those which are actually perceived at work. Thus, by using the tools, those particular causes which actually engender the apparent consequences are identified, and on the basis of this result it is possible to redefine the problem and seek appropriate solutions.

*Example: A workplace safety company carries out its operations on a project basis and recruits personnel on a contractual basis. Projects have various different components: training, organisation of exercises, reviews of the adequacy of facilities, regimes and operations etc.. Recently, the company has been facing a drain of reliable project staff, and consequent contractual non-compliance, resulting in commercial losses. Meetings were convened in the search for solutions, but none were forthcoming; next it was decided to create a cause-effect diagram and thence analyse it in detail.*



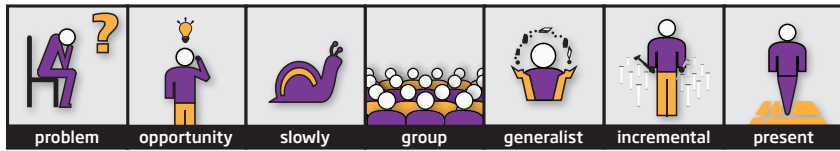
**Figure 3:** An example of a completed cause-effect diagram

Analysis of the effects (see Figure 3) reveals that the premature exit of staff from projects is merely a consequence, whereas the actual cause is the inadequate selection of contractors who, due to insufficient information about the project, fail to meet its demands or appropriately fulfil their tasks and obligations. On the basis of this, the company decided upon a different method of contractor selection, namely they first prepared a detailed inventory of tasks, the competencies needed to implement them, and only then did they look for suitable contractors.

*Participation:* Although the cause-effect diagram technique may be performed by individuals, it may be more effective if carried out in groups, in order that more opinions and a broader perspective of the issue may be gained.

*Duration.* The duration depends on the complexity of the problem together with knowledge as to the circumstances and processes; it may, however, also be accomplished very quickly, certainly in less than an hour.

## 2. Incremental Innovation - “From Sources to a Star”

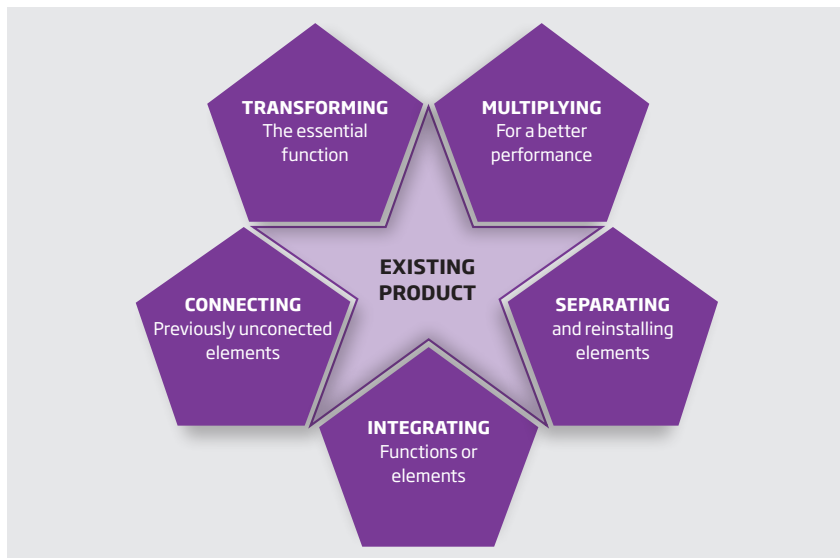


*Description.* It is the so-called systematic inventive thinking. In the case of innovation from resources we are dealing with existing products as opposed to customers and their needs.

*Purpose and applicability.* This method is useful for extending the lifecycle of a product upon the need for its upgrade or renewal, in order to maintain market appeal or remain abreast of the competition.

*Implementation process.* Searching for new opportunities for the re-design and upgrade etc. of products whose life cycle is coming to an end; these are relatively easy to accomplish and market, as they derive from existing sources. The method consists of the following phases:

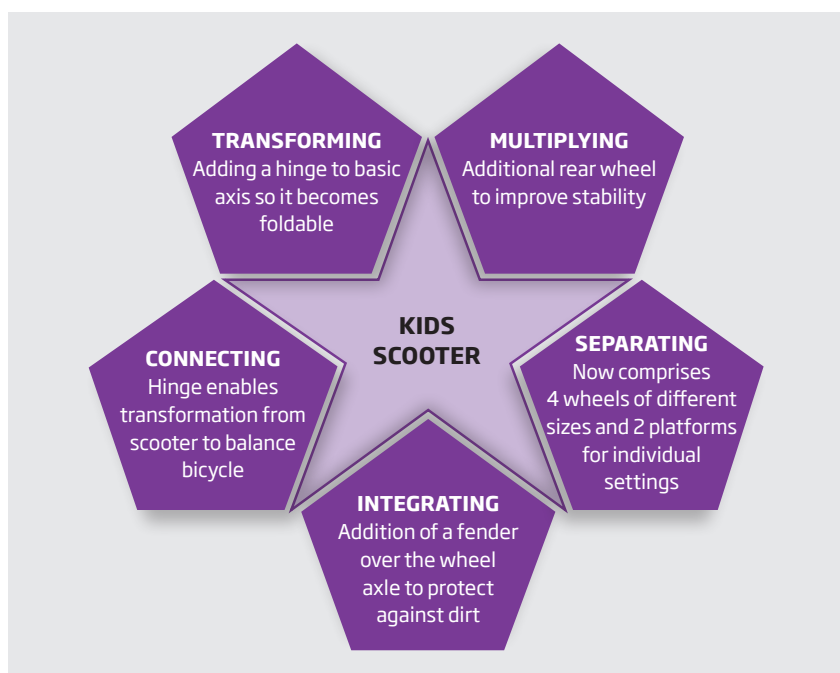
- *Transformation* (redesign through removal and replacement of the requisite or essential function, or upgrade/modernization of the existing function)
- *Multiplication* (the selected part is multiplied for better performance)
- *Separation* (some vital parts are split or subdivided to create a new composition of the product)
- *Integration* (functional elements of a product are assigned new tasks, else they are merged or integrated)
- *Connection* (creating new connections between elements that were previously unconnected, or reconfiguring the existing connections).



**Figure 4:** Innovating a product from existing sources

The scheme described in Figure 4: Innovating a product from existing sources can be used in implementing the various individual phases of the methodology. It is not necessary to follow the written order of the phases. Each step of the scheme may be carried out independently of the others, and also, depending on the product under consideration, it is not necessary to complete all the phases. It is, however, essential to focus on the existing situation and resources available when looking for opportunities. In essence, we should detect – based on the analysis of the product – which of its elements and/or functions hinder the continuation of its life (market) cycle. Thus, the identified problematic or obsolete elements of the product can be re-designed or renewed and updated to extend its lifecycle. The key feature of this method is that we innovate only by starting from the status quo and the already available resources. The Quick and Dirty Innovation Method (QaDIM), where a similar principle of innovation is implemented, is not limited by the resources, since we innovate on the basis of the potential of an existing product.

*Example: A manufacturer of baby toys has seen a drop in the sales of its push scooter; this is mainly due to cheaper, but lower quality, imports from eastern markets. Due to extant high production quality and commensurately high material costs, the price of the product could not be significantly lowered, thus it was decided to seek opportunities to maintain market position through improvements to the existing manufacture. Their target customers were young, active parents, and the company was thinking mainly in*



**Figure 5:** Example of innovation from existing resources



*the direction of addressing their specific needs and lifestyle. They gathered together a focus group, consisting of the push-scooter designers, young parents, marketers or retailers.*

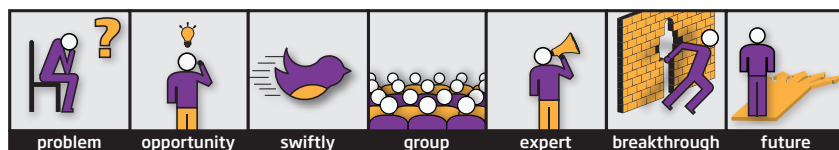
The company was looking for opportunities only by taking into account the existing elements of the product and the available resources, i.e. it did not want to develop a new product. In addition to the now added possibility of the simple transformation from a push scooter into a balance bicycle, potential for extending the lifespan of the product were found in the folding option for easy carrying when the child gets tired; adding wheels for greater stability; individualized configuration depending on the child's circumstances and the specifics of the terrain, as well as adding protection from dirt. The company's decision thence to manufacture the combination scooter - balance bicycle proved to be a good one, as it was most successful on the market.

*Participants.* The method is usually carried out in a group.

*Duration.* This method takes more time, at least 2 to 3 days, because it is necessary to carefully examine the various aspects of the existing product and options in order to perceive all the possibilities and opportunities.

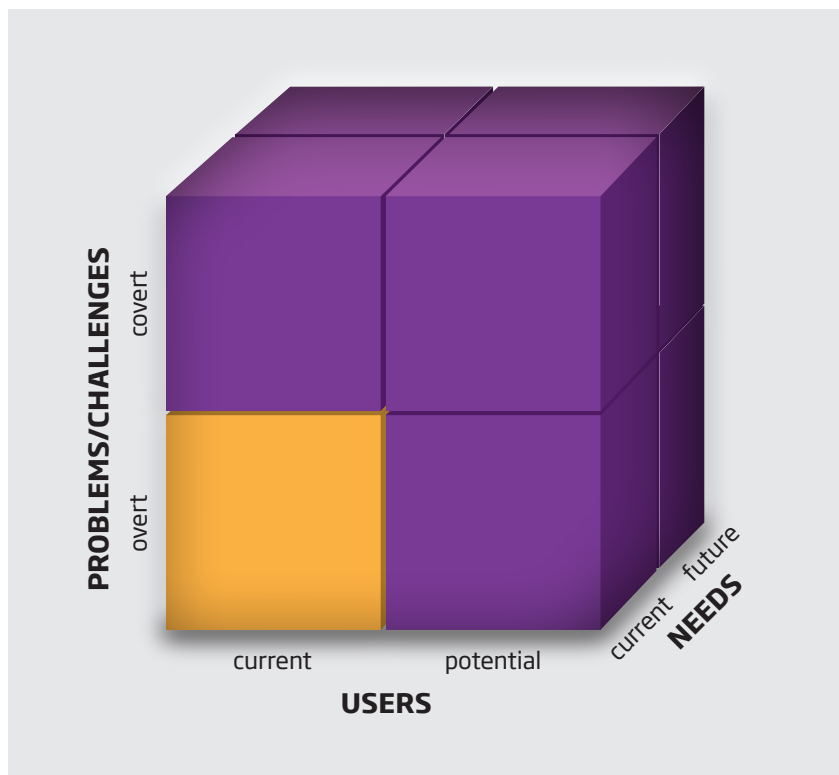
### 3. Innovation Cube

It is a method that has already been used in practice, yet it has been finally developed by the following authors: Borut Likar, Matjaž Marovt and Katarina Košmrlj.



*Description.* The innovation cube directs participants systematically towards a broader way of considering and addressing problems and needs, opportunities and ideas for novelties as well as towards finding new markets. This methodology guides our thinking towards incremental as well as breakthrough ideas, while its application also leads to consideration of future trends and needs.

*Purpose and applicability.* Primarily used for innovating products and services, this method is directed both towards the present and the future through the anticipation of completely new markets and products, as well as for minor innovations to existing ones.



**Figure 6:** Innovation Cube

*Implementation process.* The innovation cube also serves as a tool for creating visions and related objectives. In-depth knowledge across the broader area of the field of expertise, as well as creativity, is essential when using this method. Only a combination of both delivers maximum results. The method builds on three groups of challenges and/or dimensions of the cube:

1. existing and future needs and requirements of buyers/users
2. existing and potential users,
3. overt and covert – apparent and latent – problems.

The method may be applied in a simple or in-depth version.

In the implementation of the innovation cube methodology, we are talking about a combination of the “bottom-up” approach, where we start from the present and future – as well as the apparent and latent – needs of users, in conjunction with the “top-down” approach, because innovation is built on new technologies and emerging trends. Indeed, in this part we leave the so-called secure area of innovation, since it does not arise from the clear needs of users and only time will reveal which potential innovations the market shall actually adopt.

The process is systematically conducted using the following steps:

1. Analysis of the dimensions (needs, users, problems); we try to amass as much information as possible for each of the three dimensions of challenges.
2. “Filling the cubes” or merging dimensions of different fields, which is carried out in such a way that we find compatible information on convergent dimensions (e.g. the future needs of existing users in relation to their latent problems) and then complete the entire cube with this information.
3. Identification of problems and opportunities per the cubes (with regard to the common information with which the cubes were filled).
4. Searching for solutions that represent opportunities for innovation in existing products or the development of new ones. For this purpose we use one of the idea creation techniques.

Presented in more detail below is the process analysis of dimensions in specific areas of challenges.

Users’ needs are analysed in terms of current and future requirements.

- The needs of current users can be ascertained on the basis of surveys, interviews, critical observation of the direct use of the product, monitoring and analysis of the verbal and non-verbal expression of dissatisfied customers, with an analysis of comments and suchlike.
- Future needs are those that will arise after a certain time; they can, however, already be detected at present. Such needs are a reflection of the development of technology, materials, new concepts, business models, etc.. If we want to use this part of the cube well, then excellent knowledge of trends across various fields is necessary. Thus, for example, the manufacturers of motor homes need to be broadly familiar with that particular segment of the market, as well as pertaining design and materials. An important element of ideas for novelties is associated with the transfer of good practice from complementary and related

sectors, i.e. those whose products do not represent competition, but who are developing similar items (e.g. the transfer of best practice and innovation from the construction sector as well as information and communication technologies sector can be sought re their application in energy saving solutions in motor homes). Trends can also be monitored in relation to leading competitors, their current plans, and novelties in the preparation phase, as well as their presentations at trade fairs, etc..

*Users and/or buyers are analysed in terms of current and potential users.*

- Existing users are the key element, and most reliable part, of our market, as they are the ones who are already using our product, thus it is essential to keep them. So we need to meet their current needs and solve their expressed, overt problems; but we also have to anticipate their future needs as well as their latent, covert needs.
- Potential users are those who are (still) not using our product. This segment may be divided into two subgroups: firstly, those who have decided in favour of the competition, which has convinced them on the basis of their product, brand, price or otherwise; and secondly are the potential users who are satisfying those same needs with products from other segments and sectors. In determining new potential users, we need extensive knowledge, creativity and intuition. New potential users are not actually acquired from the “pool” of customers of our direct competition, but rather created from new groups drawn from other sectors. One example is the Cirque de Soleil. The audiences of traditional circuses have long been parents with children. Said circus, however, set as its target group all people who are looking for fun and entertainment. So, the protagonist created a business model which combines elements of classical circus (the erstwhile target audience), with stories and choreography (theatre goer target group), excellent music (music lover target group), costumes (fashion lover target group) and vigorous performance (athletic events target group). Based on the innovative concept, the circus gained a wide range of visitors and experienced a remarkable boom, unlike the traditional circus sector which has been in long-term decline.

*Problems or challenges are addressed as expressed/overt or concealed/covert.*

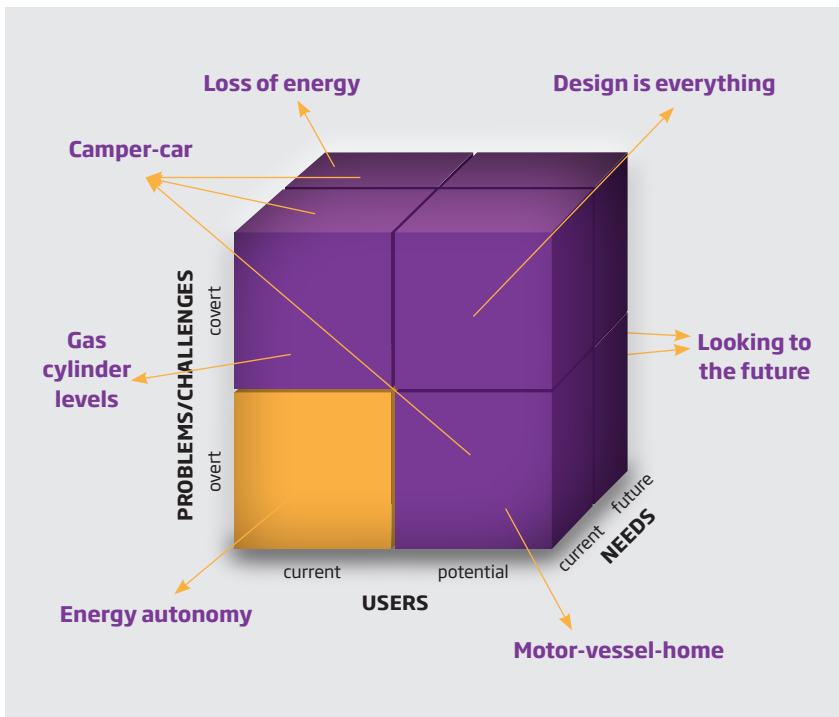
- If the expressed/overt problems are the ones that are clearly known to us as a producer or a user. However, we often fail to have a solution.
- For various reasons, we are often not aware of either the problems or the opportunities for improvement. We, or our users, can only be (partially) dissatisfied or say “that is how it is”, or maybe “it can’t be any different”, or “this has always been a problem” and suchlike. Such self-evident issues may not be unsolvable – as if they can be identified, appropriate solutions may also be sought.

Both in terms of expressed/overt as well concealed/covert problems, it proves reasonable to first break down the area under consideration into several smaller ones. For example: as regards the applicability of functionality, or simplicity, or materials, or maintenance, or transport, packaging, faults and cancellations, and suchlike, the division must be adapted to the specific product under consideration, yet we must not forget to connect the partial solutions into an appropriate comprehensive

solution. We can deal only with our product and likewise only address those challenges that come from the environment. Several additional guidelines for this endeavour may be found in relation to Problem-mining methodology, which should be similarly applied in this instance.

The method can be undertaken simply and rapidly, or in more depth. In the first instance, the systematically oriented thinking of experts per the aforementioned needs, users and problem fields (per the 3 x 2 innovation cube), is sufficient to achieve positive results, without further analysis. If we want to exploit the full potential of the method, however, then an in-depth assessment should be carried out. This requires additional preliminary activities that include in-depth analysis of existing users, competition analysis, together with analysis of development trends both in this particular and other industries. More participants should be included in the in-depth version.

*Example: Spending your leisure time and holidaying with a motor home is a special experience, and the owners and users of motor homes have become almost a subculture. Therefore, innovation is particularly important for their designers and manufacturers. One manufacturer addressed the development of its motor home models using the innovation cube, which was implemented across the following areas.*



**Figure 7:** Innovation cube

**Energy autonomy.** One of the key motor-home users' needs is seven-day autonomy without the need to turn on the engine. This is particularly difficult to achieve in winter conditions. The basic problem is associated with energy, and provision of massive reserve battery power is problematic. There are various system solutions available on the market, based on, for example, the use of gas, solar power, fuel cells.

*Expression as to the current needs and problems of existing users (lower front-left portion of the cube).*

**Motor-vessel-home.** There is a segment of potential customers who want the freedom provided by a motor home and the freedom enabled by navigation on water. One favours the vehicle, the other the vessel. An especially significant part of the content of both is the living area. This opens the opportunity to produce a motor-home-vessel according to the "two in one" principle. The vessel is an independent unit, its living area can also be used in instances where it is fixedly attached to an overland vehicle.

*Current needs expressed on the basis of an overt problem that may attract new potential users or customers are thus presented.*

**Looking to the future.** Today, there is almost no motor home user who would venture out without a smart-phone. This device can enable the remote control of lighting, air conditioning, alarm, and suchlike. It can also engender the application of "common sense" and provide an important step in the direction of prediction. Thus, for example, weather forecasts for the week ahead can be obtained via the web to better ensure and optimize energy consumption in the provision of 7-day autonomy. *This represents the future needs of existing users – which are already partially expressed overtly; however, for the majority of users this need or desire remains latent.*

**Camper-car.** Many users of motor homes are facing the problem of poor mobility (not permitted to enter inner city areas with motor homes, fixing the motor home for a temporary stay, as well as the vehicle's static awkwardness consequent to its size). There is actually a solution offered by the motor home itself: a small detachable vehicle which was an integral part of the camper and also contained a power unit or engine. Thus presented an interesting, clearly expressed challenge to attract new potential customers whose extant preference is to travel by car and either camp or stay in hotels. At the same time, it is a covert problem of existing users who take the aforementioned inflexibility of today's motor homes for granted. This example demonstrates the potential future needs and expectations of existing users.

*This example presents an expressed need of existing users, and at the same time also the overt problems of potential users.*

**Gas cylinder levels.** Mandatory in the operation of a motor home is the supply of (butane/propane) gas. Despite its extremely widespread use, even in households, the market still does not offer a simple and reliable meter that indicates the remaining amount of gas in the cylinder. As a consequence, we face the need to replace the gas cylinder only when we actually completely run out of gas. This challenge pertains, as a rule, to another sector/industry (production of metering devices), but it could also be encouraged by the designers and manufacturers of motor homes.

*The example illustrates a latent problem for existing users and reflects current needs.*

**Loss of energy.** Motor homes usually have a heater installed for use in cold weather. This heater is often located in an especially poorly insulated space, thus a large part of the heat energy it generates is lost externally. This creates a challenge to produce a better insulated heater, which is a covert challenge for the manufacturers. A balance that will ensure adequate ventilation and the avoidance of overheating has to be struck, and the failure to achieve this balance is reflected in an over-dimensioned heater in a poorly-insulated part of the vehicle. This scenario provides a further opportunity to reduce the power of the heater, which is associated with lower manufacturing costs, lower fuel consumption and fuel costs, as well as a consequent reduction in operational noise. In this context, the concept of innovation needs to be passed to the heater suppliers and manufacturers! There also exist additional possibilities arising from technology transfer associated with energy recuperation, the use of appropriate glazing and insulation materials and seals, etc., from the energy-saving and passive house construction sector, which in themselves engender additional opportunities for innovation.

*Considered here is a covert problem of existing users, which, however, largely reflects future needs.*

**Design is everything.** In the design and manufacture of motor homes, utility and functionality is generally at the forefront. Design is otherwise a desirable supplement, but not an essential guiding force in product development. At the same time it must be recognised that there is a segment of potential buyers who see design as the key feature; in this, however, they are unwilling to look at, let alone deploy and fasten the almost mandatory awnings, canopies and similar such accessories. For such users, the solution would be a design camper, with utility in terms of both the interior and exterior spaces, i.e. the exterior framework – replacing the traditional awning and canopies – could easily be opened to create a semi-enclosed fore-space.

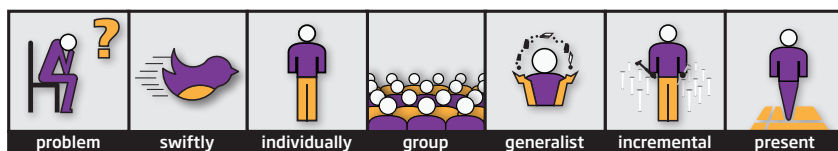
*This example reveals a covert problem of existing users, while at the same time indicates a future need and desire for both existing and potential users.*

Using the example of motor homes, we have illustrated further development opportunities identified in accordance with the structure of the innovation cube. Some of the innovation concepts could be developed in more detail by the motor home manufacturers and incorporated into their products. Other ideas for innovation, however, are of such nature and magnitude that they require major change, on which basis it may not make sense to consider them. Examples also reveal that a portion of the innovation proposals formulated on the basis of the “cube” are incremental, while others are breakthrough in nature.

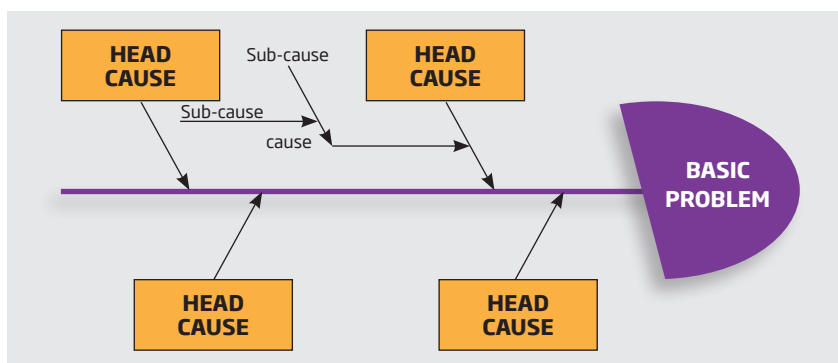
**Participants.** To implement this methodology, it is necessary to include various experts who accordingly have sufficient knowledge and experience in relation to customers, markets, technologies and requisites. By way of this, the solutions thus iterated will be both useful and applicable. This essentially means that the group implementation of this method is the most reasonable as well as the most effective.

**Duration.** Without previous preparation, the method may be carried out in a simple, swift version of 1 to 3 hours duration. In-depth implementation, which requires extensive preparations, may take much longer, depending on the size and complexity of the market, industry and product. Will and ambition are also, of course, an essential factor in this process!

## 4. Ishikawa (Fishbone) Diagram



*Description:* The fishbone diagram method is usually implemented in the context of a group, which is considering the possible causes of a problem, and the assessment is recorded in the form of a diagram presented as connected branches or “fishbone” in various levels of detail. The problem is usually addressed in terms of four or more business functions or elements of an organisation, which then represent the head causes, and these are further broken down into several levels of sub-causes. By way of this, we gradually extract and identify the underlying or root causes of the basic problem.



**Figure 8:** Basic matrix of the Ishikawa or fishbone diagram

*Purpose and applicability.* The Ishikawa - or fishbone - diagram provides a cursory visualisation of a cause and effect, which can be used to identify the key causes of problems. The diagram also fosters a more in-depth and objective presentation of the problem and ensures that all participants are aware of all the proposals and are on the right track. It discourages partial or premature solutions, and shows the relative importance of connections and interactions between different parts of the problem.

*Implementation process.* Analyses of the problem are undertaken with the aid of the diagram, which has the shape of a fishbone. On a broad sheet of paper we draw a long horizontal line in the middle, which is pointing to the right to a verbal description of the basic problem that needs to be addressed and examined. This line represents the fish spine, with the problem at its head. Into the spine, at an angle of 45 degrees, we draw a line (an arrowhead) for each probable cause that a group comes up with, and thence mark/identify it with the description of said probable cause. Then we add sub-arrowheads that represent the sub-causes. The level of detail growing outwards: the outer branches or bones are causal to the internal ones with which they are linked. Thus, the outermost branches/bones usually constitute the basic causes of the problem. All causes that occur more than once, are duly marked and recorded as they may well be relevant.



The group should then examine each cause and sub-cause, starting with the simplest - this for reasons of clarity, but also because complex explanations may be unnecessary due to the fact that the simple explanations already provided are good enough. Everything that could be a key cause is encircled, so it may be focussed on later. Experienced diagram users would add more branches and/or use different categories, all depending on the efficiency of the problem solution.

The method is usually carried out over several meetings, allowing the group to thoroughly address the problem. During breaks, new proposals on possible causes may be developed, and there is also an increased likelihood that participants forget who gave which idea, and therefore the subsequent discussions are less impeded.

Software tools - for example XMind and MS Visio - can be used for automated computer-assisted diagram presentation, and there are also many (free) templates available on the internet for the creation of diagrams in MS Word and Excel.

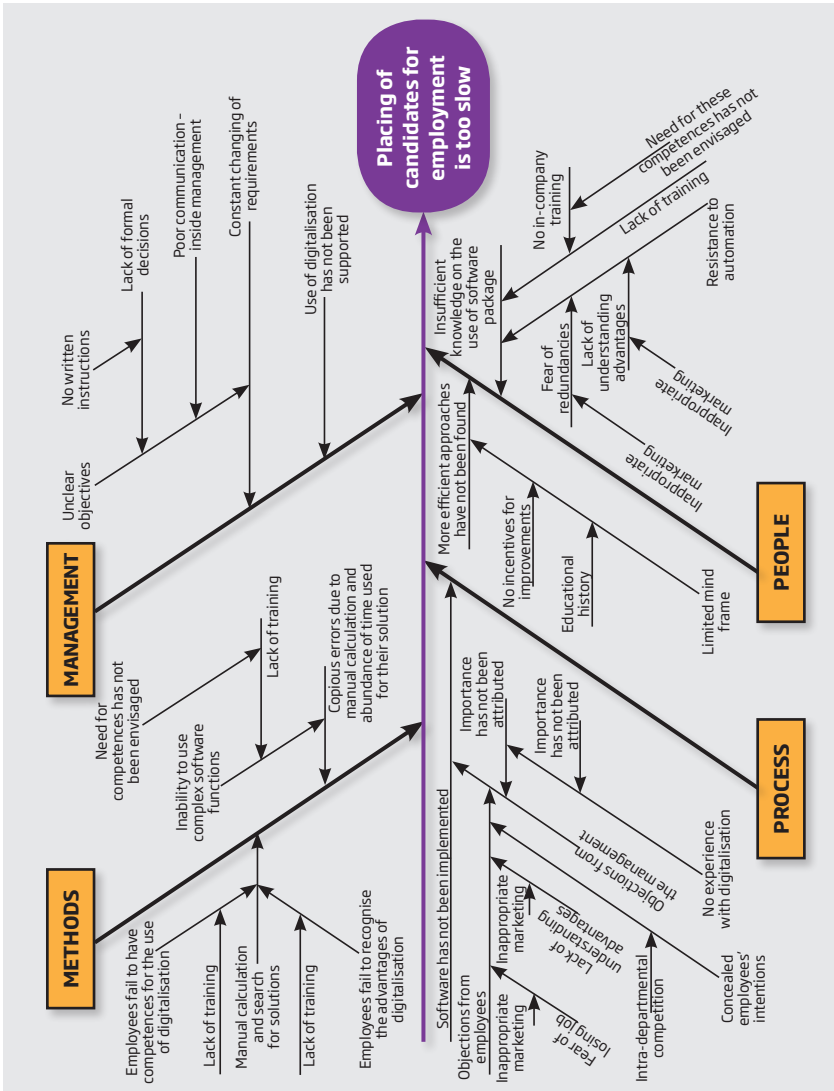
*Example: An employment agency involved in recruitment (outsourcing) for specific job requirements, specialises in linking specific competencies to job vacancies for which they charge a commission. Due to the high demand for specific competencies, their business rapidly expanded, but they were faced with a problem: they were not able to adapt their work to the increased volume of demand. Therefore, they recorded increasing delays and postponements in placing candidates, which annoyed customers. Due to the resistance of their staff, any attempts to introduce a computerized information system failed, so the person responsible for solving the problem decided to identify the key causes on the basis of which they could find the most appropriate solution.*

The person in charge wrote the problem down on a sheet of paper, and drew a line from it to represent the fish backbone. On this line she then added four key elements that influenced the development of the perceived problem. These were: the methods of placement, the management, the personnel and the process. For each of the identified key elements she wrote one or more pertaining causes, and thus continued to the point where it was no longer necessary to ask the question »why«. Each sub-cause of the diagram was entered with a new arrow that linked the cause with the sub-cause. The flow of the analysis was restated in the following bullet points:

- Why do the placement methods cause delays? Because the employees manually calculate the comparisons and statistical data, the data is not stored in the database is not always accurate and must be repeatedly reviewed.
  - Why don't employees use the computer to perform placements? They do not know how to use the complex software functions.
    - Why can't they use the software? They were not given the appropriate training.
    - Why didn't they receive training? It was not envisaged that employees required these competencies.

On the completed diagram, she was able to identify the causes and sub-causes that were repeated: the lack of training and the lack of internal communication (promoting computer automation). Based on the findings, the manager was able to propose measures to improve the situation and present these to the principal.

*Participants.* The method is usually implemented in a group. It is important that the group members are familiar with the issues as well as familiar with the environment or the situation in which the problem occurs. It is recom-

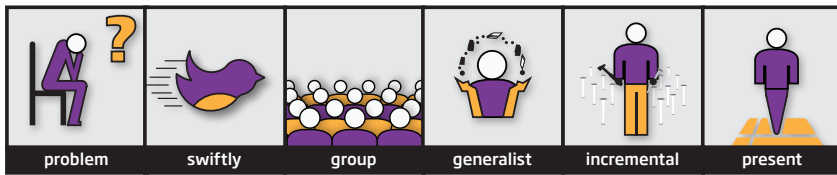


**Figure 9:** Example of the completed Fishbone Diagram

mended that at least some of the participants come from different profiles. The sources do not specify any specific number, but it is recommended that the number of participants should be from 6 to 8, but in the event of well functioning groups more than 10 people might be envisaged. It is important to ensure the diversity of views and at the same time make sure that the workload is manageable. With good knowledge of the issues, the method can also be accomplished by an individual working on their own.

*Duration.* The method is generally implemented in two stages: the first stage is to identify all the possible causes, and the second stage to identify the root causes of the problem. Depending on the complexity of the problem it can take an hour or two, or it can be held on two consecutive days.

## 5. Matrix Structure Design



*For a better understanding, we recommend that you first read the Example below.*

**Description.** This method of work organisation within the innovation process saves a lot of time in issuing and processing the feedback information in the course of dealing with more complex problems or ideas, where a larger number of processes and/or personnel need to be harmonized. These processes or personnel are arranged tabularly, so that we have a clear view of the sequence of activities as well as connections among the employees who are responsible for each activity. We can then consequently plan more rationally and without unnecessary complications.

**Purpose and applicability.** The method is particularly useful for organising the process of solving more complex problems when it is necessary to harmonize the various activities of individuals or a group, whereby the results of certain activities are important for the implementation of other activities. The method reveals the structure of activities and the interactions between them, thereby facilitating the planning and execution of the entire process as well as more active and rapid problem solving.

**Implementation.** This method allows us to arrange the elements and/or processes of complex problems in the context of a matrix - a table, in order that the structure can be seen clearly. A transparent display of processes that contribute to the problem, as well as personnel who are involved in these processes, reveals some potential conflict points where problems may occur (between processes, between personnel or between people and processes). Preparation of the scheme is carried out in several phases:

**Phase 1:** Accurate description of the problem, thence preparation of a list of all planned activities for the address of that problem.

**Phase 2:** Preparation of a table which contains, as its headings to the rows and columns, the various aspects of the problem or process activities. The activities in the columns and rows should be entered in the same order (see Figure 10). It makes sense that the order of entry of the activities follows (the estimated) order of their implementation.

Identified problem	A	B	C	D	E	F	G
A aspect of the problem or activity				X			X
B aspect of the problem or activity			X			X	
C aspect of the problem or activity		X					
D aspect of the problem or activity	X	X	X				
E aspect of the problem or activity			X	X		X	
F aspect of the problem or activity		X		X			
G aspect of the problem or activity	X			X	X	X	

**Figure 10:** Implementation of the matrix structure

Depending on the complexity of the problem and the size of the table, it can be decided whether to mark the elements or activities descriptively, with a label, or simply with a number, in which case a list of activities with the corresponding numbers should also be attached to the table.

**Phase 3:** Reviewing and entering the connections between the elements. In the table, we mark the intersections of various activities with a cross. If, for example, aspect A is related to aspect F, then this is marked with a cross in the cell of the table where the two aspects intersect. This process is repeated with all the elements in the rows. If the method is applied for the planning process, the matrix allows us to identify relationships between different aspects of the activities, and, the nodes, where the likelihood of problems increases, based on which it may be possible to organise the processes more sensibly. If the processes are already carried out and the method is used to analyse the problem, links between activities and critical points, which are hidden causes of the problem, are discovered. With such review (check) the unfavourable connections, overlaps and loops may (with the help of this matrix) potentially be avoided. In this case the matrix may serve as a foundation for the improvement of processes and activities.

**Phase 4:** Analysis of a problem or a process. In the table, draw a diagonal from the upper left to the lower right corner. This should be followed by an analysis of contact points - which are potentially critical points:

- Markings below the diagonal indicate the links that are sequenced in accordance with the envisaged course of implementation. At these intersections, problems may arise if, for the various activities which implementation overlaps, the same people are in charge. This can cause delays or faults in the process.
- Markings above the diagonal indicate improper overlapping of activities, these are our problems. As an example: let us imagine that when filling

the cans of pineapple chunks, the labels were applied before the can is closed. When moving (the unclosed) cans, liquid can pour out and damage or destroy the label. We may face similar problems in other areas, for example; in a music school, the teacher presents a tune in a minor key during instrument lessons, but the students have not yet learned the minor key scales in their theory classes, so cannot perform the piece properly. This is not a case of poorly prepared students, the problem lies in the concept underlying the teaching process. In such cases, it is necessary to modify or re-run the already started or even completed activities.

**Phase 5 (optional):** The method can also be carried out in a slightly more sophisticated, manner for the organisation of work and to yield even better results. After entering all the activities into the table, we continue with the entry of personnel or working groups who are dealing with problem under consideration. Similarly to how the list of the sequence of the activities was prepared, we now fill out the part that connects the employees or the executors with the individual tasks, so that all tasks each individual person performs or participates in are appropriately marked. The analysis of the table reveals which activities or persons may be over-burdened or interrupted due to an insufficient number of executors or a conflict between different assignments. On this basis, the more complex method will yield better results as regards the better organisation of work processes (Robbins in Coulter 2002).

	activity 1	activity 2	activity 3	activity 4	activity 5	activity 6							
activity 1		x			x		person 1	person 2	person 3	person 4			
activity 2			x	x									
activity 3	x			x									
activity 4						x							
activity 5				x									
activity 6													
person 1	x				x			x	x	x			
person 2		x											
person 3			x			x				x			
person 4				x					x				

**Figure 11:** Implementation of matrix structure design including activities per individual persons

*Example: A manufacturer of specialised mineral engine oils detects an abnormally high percentage of peeled-off labels per one of its products. This raises a number of complaints and delays in the process of order filling and, consequently, delays in the preparation of other orders. Since testing revealed that the packaging was flawless, they had to establish another cause for the emergence of the problem.*

The company implemented the matrix structure method. In the first column and row of the table they entered the possible causes of the problem, and then marked with a cross the causes that were linked. The analysis of the table revealed that the problem might have occurred due to the combination of several causes: poor fitting of the lid, due to the lack of employee hand cleanliness, lack of cleanliness of the filling conveyor, or excessive dampness in the filling plant.

Too high a proportion of D47 products with detached labelling	A	B	C	D	E	F	G	H
<b>A</b> Supply of inappropriate materials for the basic packaging			X					
<b>B</b> Basic packaging insufficiently clean			X					
<b>C</b> Poor fitting of the lid	X			X	X	X		
<b>D</b> Insufficient cleanliness of employees' hands		X	X		X			
<b>E</b> Insufficiently clean filling conveyor				X				
<b>F</b> Excessive dampness in the filling plant			X				X	
<b>G</b> Inadequate storage			X			X		
<b>H</b> Inadequate handling/ transportation					X	X	X	

**Figure 12:** Example of a completed matrix structure

A more detailed analysis of production revealed that the items in relation to suspected problems A) and B) were flawless, thus the materials used in packaging labelling were not at fault as they arrived at the filling plant in a completely adequate and clean condition. The causes underlying the poor fitting of the lid was therefore searched for in other areas. Given the possible lack of cleanliness, it was established that employees would be responsible for washing and cleaning the filling plant equipment themselves, including the gloves with which they handled the containers. In undertaking these prescribed tasks, workers had different habits, so not all the equipment was cleaned in the same way, although the employees properly ensured maintenance. As a consequence, the filler conveyor was contaminated by small

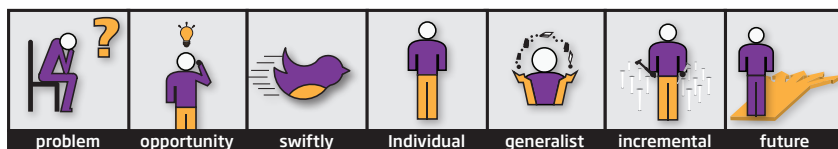
particles falling from the workers' equipment onto the packaging; as a result some of the lids had a poor fit. This error was then potentiated and exacerbated as a consequence of handling and storage methodology, which was not always optimal (too many loaded pallets stacked in one place, moving pallets to gain access to other products, a process in which the contents were shaken and spilled from the packaging, causing damage and the peeling-off of labels). Similar problems to the handling and storage phase also occurred during transport.

The company's management initially decided that they would hire external specialist industrial cleaners to take care of the cleaning of equipment. They also reorganised the packing and storage of engine oils; reduced the amount of containers per package, while the pallets of motor oil were placed on the lower floor of the warehouse facility, where they were easier to access.

*Participants.* A matrix may also be prepared by an individual who is dealing with a new task, but the process is significantly more effective if it is undertaken by a group; most of its efficacy comes to the fore in the work of different groups or departments in order to facilitate their integration, or merely focus on a number of key activities.

*Duration.* Preparation of the matrix depends on the complexity of the process and the number of activities, together with knowledge as to the process of implementation. There is also software that facilitates the preparation of a matrix for very complex problems and processes.

## 6. Mindmap



*Description.* The mind map is a graphical tool for the presentation and organisation of ideas or aspects of a problem, which help us gain a deeper understanding of a problem as well as mutual relations in the context of said problem.

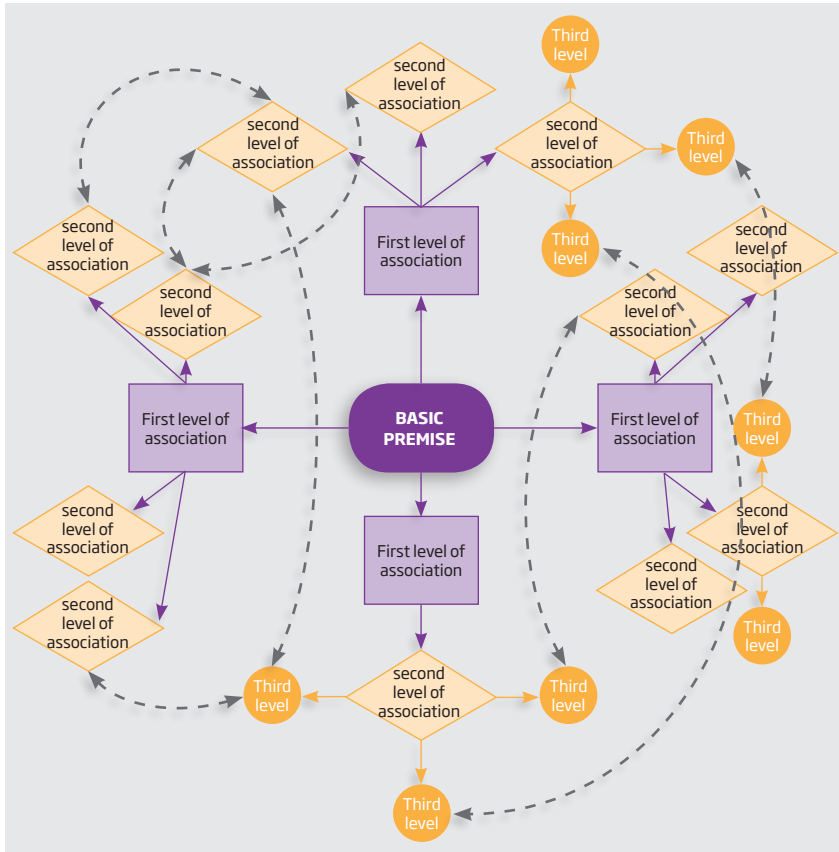
*Purpose and applicability.* The mind map is useful as a tool for individual analysis of the problem, as well as the creation and organisation of ideas and solutions. It enables the simple identification of links between the various aspects of the problem or idea in question, or, indeed, between different ideas. However, in the creation of mind maps one can soon fall into the established clichés. Continuously repeated codes are no longer the generator of associations, but merely the abbreviations and codes that reduce the time of writing. Therefore, for the sake of efficiency, care should be taken to maintain creativity with this technique.

*Implementation process.* Mind map is a distinctly individual method, therefore the actual implementation depends entirely on the individual. At this point, therefore, some general guidance shall be provided. Depending on the problem or the opportunity under consideration, and on the personal characteristics of the executer (visual type, logical type, organised, disorganised etc...) implementation is entirely adjustable. It is essential to achieve the goal of the method: the maximum number of associations in relation to the initial topic and the relationship between these associations.

1. **Preparation:** For the mind map we need an appropriate piece of paper as well as a pen or pens of different colours. We can also prepare several smaller papers or labels which can be affixed to the main paper (if not self-adhesive, adhesive tape shall also be necessary). For the more technical types, we also recommend a ruler (perhaps even with templates).
2. **Start:** The basic premise - the subject considered to be potentially problematic, an idea, or a product say - should be identified in the middle of the paper. This starting point should be written concisely, as a phrase or just as a keyword. It should be encircled, as preferred, and if necessary, furnished with further explanations.
3. **Associations:** Think about different aspects of the written record in the middle of the paper. Try to think openly and associatively. From the central element of the mind map, draw a line and write down an idea or association. Write down all the keywords, and from these draw new lines on which the new associations are also recorded in writing. It is not necessary that the thoughts are directly related to the initial topic. Normally, we encircle or highlight the individual words or records in the mind map for greater transparency, so that the dividing lines between them are clearly evident. One can also use different colours or different forms of external borders to differentiate the different levels. The mind map can be expanded until all its associations are exhausted. At the end a pattern is formed, which may be simple, with only one level of associations, or more complex and containing a number of levels.

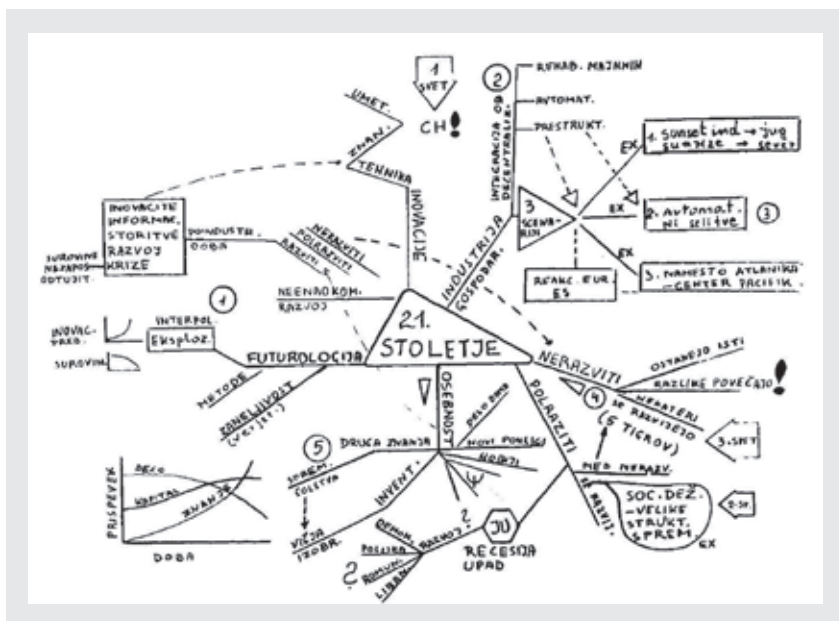


- 4. Connections:** Upon writing down all the associations, the mind map should be read and those elements - which are related or belong to the same (micro) context - should be connected with a line. Connecting follows the content, and not the levels of associations.
- 5. Analysis:** The connected elements provide information on key aspects of the initial topic. If it is a problem being addressed, it may be a case of important causes, key processes in which there are critical points, or even ideas for a solution ... If it is an opportunity or a challenge being addressed, analysis of the mind map may be used to discover potential opportunities, as well as ideas for the realization thereof.



**Figure 13:** Example of a mind map concept with connections

*Example. The pattern provided by Prof. Vid Pečjak on the topic of life and work in the 21st century (Pečjak 1989), is provided in Figure 14 below as an example of highlighting the main aspects, discrepancies and connections within the context of a mind map. Pečjak created this mind map in relation to several basic elements, and then added specific properties, which he in turn connected with different elements. In such way he obtained one aspect of a possible development. In this case, however, the mind map was not intended to solve a problem; nonetheless, the sketch is presented mainly due to its well-made graphic display of both content and links.*

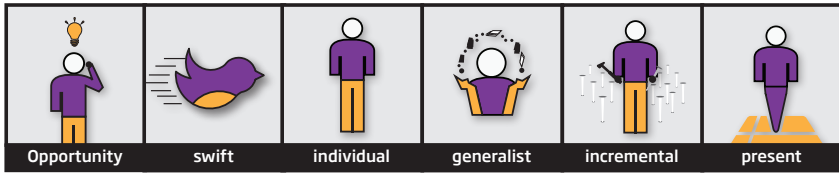


**Figure 14:** Prof. Vid Pečjak's mind map of anticipated development in the 21st century (Pečjak 1989).

*Participants.* A very individual technique, because it is often the case that others cannot read the mind maps of an individual, and consequently they fail to offer any information which can add value through their ability to relate to the minds or imaginations or others.

*Duration.* A swift method that can be implemented in less than half an hour.

## 7. Attribute Listing



For a better understanding, we recommend that you first read the Example below.

**Description.** Attribute listing is a technique for identifying opportunities from an existing product or a desired state. Said opportunities arise from otherwise incompatible attributes that are not established in the product/problem, but in its constituent elements. Likewise a brand new, original configuration of attributes, that would otherwise not be envisaged, may also be obtained.

**Purpose and applicability.** Attribute listing is a very useful technique for identifying unforeseen opportunities, either in the innovation of an existing product, the improvement of processes or in evaluating the potential of new ideas.

**Implementation process.** Implementation is very simple, and is conducted in five stages:

1. A product or a process, but also a strategy, can be divided or defined using a selection or all of the elements. These constituent parts may be useful properties, shapes, materials, etc...
2. A set of attributes that can be attributed to the individual identified elements (with each attribute being defined from different aspects) should be determined.
3. The findings should be recorded and organised in a tabular format. The elements should be entered into the columns (headings) and the attributes into the rows.
4. An attempt should be made to merge the findings, or attributes, in a new manner that better suits the objective being pursued and consequently leads towards solutions.
5. The resultant new solutions should be considered and evaluated, and thence combined in a renewed or new product, process or strategy.

Element 1	Element 2	Element 3	Element 4	Element 5
attribute to element 1	attribute to element 2	attribute to element 3	attribute to element 4	attribute to element 5
attribute to element 1	attribute to element 2		attribute to element 4	attribute to element 5
attribute to element 1	attribute to element 2		attribute to element 4	
attribute to element 1	attribute to element 2		attribute to element 4	
			attribute to element 4	

**Figure 15:** Example of a general matrix for attribute listing

*Example 1: A city wished to renew the lighting in its old town. The central district was essentially medieval; however, a few modern steel-and-glass buildings were also thoughtfully incorporated into the original architecture. The city council, faced with the problem of how to create a new image of lighting, prepared a call for tenders in which they wanted participants to focus on specific conceptual frameworks. They decided to conduct a meeting for generating ideas in a slightly different way, using the attribute listing method to arrive at truly diverse concepts. A spreadsheet table was prepared in which they recorded all the important elements of the lighting: the energy source, type and size of lamps, the intensity of lighting, the material used and the method of installation. Then they attributed the individual elements of lighting a list of potential attributes, regardless of the final product. The result is shown in Figure 16 below. When all the attributes had been listed, they made a few horizontal links. In the end, they decided upon medium-sized, medium-intensity solar-cell lighting of minimalist design with wooden brackets attached to the buildings.*

Source of energy	Type of lamps	Size of lamps	Intensity of lighting	Bracket material	Type of installation
electricity	modern	large	high	ceramic	fixed to the ground
solar	medieval	medium	medium	wood	hanging above the street
water	art nouveau	small	low	metal	hanging between buildings
wind	classical	narrow	variable	stone	fixed onto buildings
gas	minimalist		coloured	bamboo	mobile
oil			adaptable	glass	
organic fuels				plastic	
batteries				concrete	
solid fuels					
fuel cells					

**Figure 16:** Example of a completed matrix for attribute listing for a product

*Example 2. The Institute for the Development of Enterprise decided to create a business start-up support centre; however, they faced problems in the design of the centre as an organisation. As they were not able to develop an appropriate idea themselves, they attended a workshop aimed at identifying opportunities for business. This revealed various opportunities for the creation of the new centre using the attribute listing method. When the basic elements had been determined, they were entered under the appropriate column headers, then characteristics were attributed to each element.*

Activity	Premises	Hours	Manpower	Internet
counselling	office	a.m.	without	website portal
free of charge	open	p.m.	small group	social network
payable	mobile	split shift	contractual	forum
expert	virtual	flexible	occasional	none
support	homely	24/7	employees	bulletin
quick	external		according to expert field	transparent
individualized	rented		students	structured
group				multi-lingual
guided				

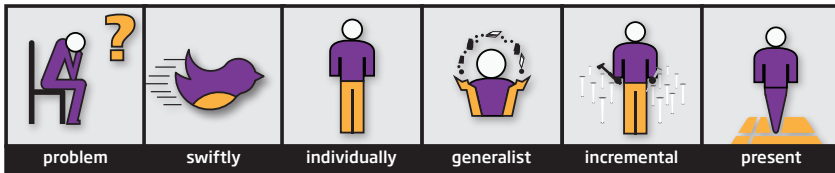
**Figure 17:** Example of attribute listing method for a service

By connecting the various attributes, it was discovered that they had many different options in the creation of a centre, and, in particular, that it would not require immense resources, as it would exist for the most part as a virtual portal on the Internet, but, if necessary, event venues could be hired for specific activities. Also, there was no immediate need to employ staff, as contracts with experts were concluded thus further increasing the added value of the services provided.

*Participants.* Implemented by an individual or a group.

*Duration.* This method can be implemented very quickly, in less than an hour, if the executors are familiar with the subject under consideration.

## 8. Problem Mining



*This is an original method, which was developed by Borut Likar and Klemen Širok.*

**Description.** Problem mining is a method which can be undertaken by an individual or implemented by a group; it is a means by which different areas of an organisation's operations can be systematically investigated. Thus, a multitude of problems and difficulties in different areas of the organisation, its processes, markets as well as its internal and external relations can be identified. Problem mining is about identifying clear, visible problems, as well as latent or hidden, potential sources of problems.

Let's focus on one business function, and, in the context of this, mine for various problems and challenges. An advantage of this method is that the search for problems is carried out in a systematic manner. At each step, the focus is on one business function, which is thence addressed from various angles (internal environment, external environment, employees, subcontractors; different types of resource problems, etc.). Only when we have exhausted one working process, do we move on to the next one. This provides a collage of various existing and potential problems and challenges, which together represent a more or less comprehensive picture of problem sources.

**Purpose and applicability.** The purpose underlying the problem mining method is to identify the greatest number of problems and difficulties, including latent and potential problems.

**Implementation process.** The problem mining method employs a matrix, the columns of which are headed with the organisation's variously identified operational elements and functions; the rows (headed left) provide aspect perspectives of problems (such as environment and type of problem). The matrix is completed gradually, so that a variety of problems and challenges are ascertained and entered into the matrix in relation to each column element or function. The content of the matrix is completed by groups in such a way that participants enter into the matrix all those problems which they regard as pressing or pertinent. Some guidelines re problem issues should be instigated for reflection, because after a certain while we fail to see the problem clearly enough, or get used to it and accept it as a matter of course. Some of these guidelines are provided below.

A mined problem can be addressed in several ways:

- By focusing solely on the guidelines provided in the first column (see Figure 18): internal challenges and external challenges. Participants should write down as many as possible of the problems that they regard as the most pressing.
- Further analyse the opportunities with respect to the first row (see Figure 18): work process, staff, equipment / technology, organisation, suppliers and partners. Comb the various problem areas systematically.

- We can get help with some guidelines (problem issues) for reflection (see Figure 18), because after a certain time we do not see the problem clearly enough or get used to it and accept it as a matter of course.

PROBLEM MINING	work process	personnel	equipment & technology	organisation	suppliers & partners
OUR COMPANY/ EMPLOYEES <ul style="list-style-type: none"> <li>▪ Already identified problems without a solution</li> <li>▪ Non-identified actual problems</li> <li>▪ Latent problems</li> </ul>					
PROBLEM MINING	problem/challenge				
EXTERNAL CHALLENGES <ul style="list-style-type: none"> <li>▪ market</li> <li>▪ users</li> <li>▪ trends</li> <li>▪ competition</li> </ul>					

**Figure 18:** Matrix of content addressed using the problem mining method

This is followed by an overall assessment of the identified problems and the selection of the most pressing ones, which serves as a spring-board for the subsequent search for solutions. The matrix can be filled in horizontally, starting with all areas from the perspective of the internal environment, and then in terms of the external environment. One can also start vertically by first ascertaining all the problems and opportunities in relation to a single identified operational element, before moving on to the next such element.

*Example: Operations were not running as planned in a company engaged in the production of high-tech plastic semi-manufactures. There were delays in delivery, product defects, and accumulations of certain stocks. Despite the numerous difficulties, nobody could say what was actually going wrong, because work was carried out according to the plan and in accordance with instructions. After talking with a consultant, they decided to implement problem mining methodology. A working group was formed, comprising the heads of two departments, an IT specialist, a production line foreman, a commercial clerk and a storekeeper. This diverse group of personnel was intended to enable the widest possible overview of the problems.*

*The method was undertaken in two stages. First, every individual filled in the matrix with all the problems and the proposed problem-issue guidelines (questions). Following this exercise, at a joint meeting was convened at*

which the various aspects identified by the individuals were compared and thence reviewed by the group; from this process new aspects were identified. The Identified problems, on which all the participants agreed, were entered in the common form (see Figure 18). Upon their analysis of all the identified problems, it was ascertained that the key and recurring aspect of all the problems was inadequate communication.

Communication was weak at the interpersonal level as well as the system level, because the technology and the software used did not facilitate return communication, but solely allowed the allocation of tasks and orders. There existed no personal communication channels between the departments and individual business functions, which were spatially separated, so a lot of essential information and feedback was lost. Despite the fact that all the employees may know each other and properly carry out their work, problems can occur due to a lack of communication. Based on these findings, the company undertook a detailed analysis of the specific problems with the system of communication, and accordingly began to formulate measures for its improvement.

*Participants.* Problem mining may be implemented in a group or individually.

*Duration.* The problem mining process can be carried out quite swiftly, in an hour or two. Normally, however, a longer period is necessary, since it requires full focus and consideration of a succession of selected areas.

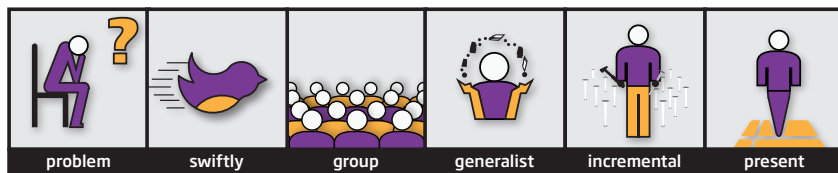
PROBLEM MINING	work process	personnel	equipment & technology	organisation	suppliers & partners
COMPANY / EMPLOYEES  <ul style="list-style-type: none"> <li>▪ <b>Already identified problems without a solution</b></li> </ul> guidelines for consideration <ul style="list-style-type: none"> <li>▪ Problems mentioned on several occasions in the past with no solution as yet</li> <li>▪ Problems that have been inadequately resolved</li> <li>▪ Seemingly insoluble problems</li> <li>▪ <b>Non-identified actual problems</b></li> </ul> guidelines for consideration <ul style="list-style-type: none"> <li>▪ What hasn't been changed for a long time?</li> <li>▪ Clear, but never exposed problems</li> <li>▪ Listening to people saying "I wish xyz, but we have problems..."</li> <li>▪ Focus on listening to dissatisfied colleagues</li> </ul>	Bottlenecks and delays in: <ul style="list-style-type: none"> <li>- the processing of changes</li> <li>- innovation proposals</li> <li>- execution of measurements and testing</li> <li>- prototyping</li> </ul> Frequently someone orders material that the company already has in stock, but everyone has forgotten about it. Increased administration (tenders, SAP...)	Perspective and operation of management is currently entirely vertical. A systemic approach is proving very difficult for more complex problems of a horizontal nature (at present it allows just reporting to superiors and proposals for rewards).	Information on the enrolment proposal.          Where is it better to register arrival at work - at the entrance or at the workplace?	Lack of information about important events within the company (e.g. what is the Works Council doing, who is the new director?...).   Completing and information (e.g. signing of contracts); problem with rapidity of information; we are not informed directly, but only through notifications and bulletin boards	



PROBLEM MINING	work process	personnel	equipment & technology	organisation	suppliers & contractors
<p>COMPANY / EMPLOYEES</p> <p><b>Latent problems</b></p> <p>guidelines for consideration</p> <ul style="list-style-type: none"> <li>• Why aren't people motivated?</li> <li>• What causes frequent terminations of employment relationships?</li> <li>• What are the causes of frequent sick leaves?</li> <li>• What represents routine work in the organisation?</li> <li>• Routine work, repeated operations</li> <li>• Problems and opportunities in the environment.</li> <li>• What at work has surprised me in a negative sense?</li> <li>• Where are the employees dissatisfied?</li> <li>• Where are the bottlenecks?</li> <li>• What is illogical?</li> <li>• What is duplicated?</li> <li>• How can we make use of unused materials?</li> <li>• Where do most faults occur?</li> <li>• Where are we losing time?</li> <li>• Where are the inefficiencies?</li> </ul>	<p>How to solve the problem of horizontal communication that would be in accord with the vertical authority?</p> <p>Request for omunication arriving externally, is not aligned vertically.</p> <p>The possibility of abuse?</p> <p>The possibility of blockage?</p> <p>How do people prepare to participate</p> <p>On-line data processing and monitoring of production quality</p>	<p>People do not want change. How to encourage them?</p> <p>It is stressful when a worker is in a workplace where other people are moving behind his back. How can we solve this?</p> <p>Lack of self-initiative for personal-professional growth (career planning).</p>		<p>Lack of space for work places and meeting rooms for meetings - planning for the anticipated future growth.</p>	<p>Lack of involvement of suppliers in ensuring competitive-ness.</p>
PROBLEM MINING	Problem				
<p>EXTERNAL CHALLENGES</p> <p>guidelines for consideration</p> <ul style="list-style-type: none"> <li>• What does the market need?</li> <li>• What are the problems/dissatisfactions of users?</li> <li>• Unrealised wishes of users - what do they want?</li> <li>• And what do the commercially available products services fail to provide?</li> <li>• The problems faced by users of the product</li> <li>• Why don't more people use our products?</li> <li>• What do the new trends (in industry, technology, materials, ICT, etc.) offer?</li> <li>• Where is the competition weakest?</li> <li>• Adoption of best practice - have I seen better solutions elsewhere?</li> </ul>	<p>Marketing - missing market analysis of products and their specifications, a lack of a systematic annual analysis of the competition.</p>				

**Figure 19:** Example of a completed form for problem mining.

## 9. Progressive Abstraction

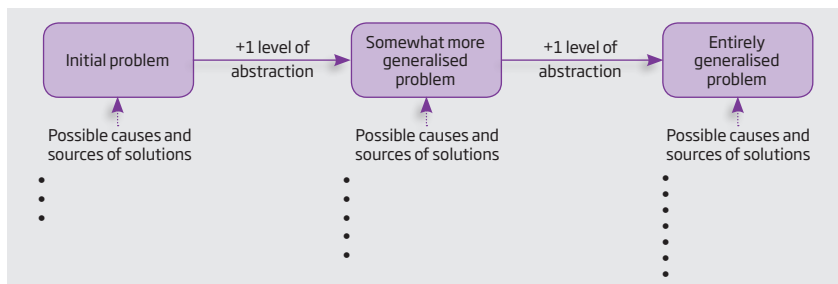


For a better understanding, we recommend that you first read the Example below.

**Description.** Progressive abstraction deals with the analysis and redefinition of the problem, so that the original problem gradually gets defined at a more abstract level: a specific element of this method is that the problem is analysed from the perspective of the specific thence to the general. The issue is a known problem (not concealed) and this tool is used to look for the underlying causes (i.e. decomposition of the problem, in the direction of generalization).

**Purpose and applicability.** Progressive abstraction is useful in the problem phase. The key advantage of this tool is the increased rate at which the problem can be restructured, allowing a more systematic analysis of the causes and the links between them. Unlike more conventional methods, the progressive abstraction allows us to generally generalise the problem.

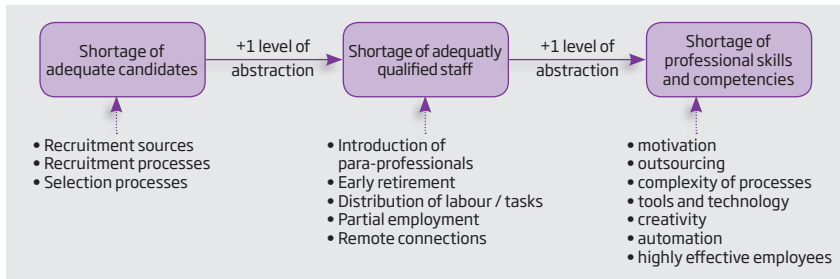
**Implementation.** The application of this tool is carried out in several stages. First a known problem is selected and defined very specifically, then various aspects and factors affecting it are discussed. These could be possible causes, sources of solutions, sources of deterioration or other impacts on the problem. The next phase follows only when consideration of the specifically defined problem has been exhausted. The problem is redefined on a more general level, so that its record is slightly more abstract than it was in the initial phase. Then, the group once again locates the factors affecting the problem. Now follows the third phase, with the additional generalization of the problem and finding yet more new factors which relate only to the general problem, these are then written down in an abstract manner, and not with its concrete manifestation. Thus, at each stage, the problem is defined somewhat more abstractly, and a new alternative enables the search for even more factors of influence. From the new and expanded set of factors, the true reasons for that particular problem - which could not be revealed from the previous narrow definition - can then be correctly identified.



**Figure 20:** Matrix for the implementation of the progressive abstraction method

*Example:* A company dealing with software development in the United States grew rapidly, making it necessary for a relatively quick preparation of a new

recruitment plan. Their long-term plan, which included hiring new graduates in the field of computer and information science, proved to be inadequate in the new circumstances where the number of graduates with the appropriate profile is decreasing. Consequently, there were far fewer suitable candidates who could be recruited. To solve the problem, they organised a working group. Since other methods of problem solving did not yield the intended requisite results, they also applied the progressive abstraction method. Initially, they defined the actual problem: a lack of qualified candidates for new posts. Then they searched for key factors pertaining to the problem, namely: there were no adequate sources of recruitment, the recruitment was not effective, thus the candidate selection process was inadequate.



**Figure 21:** Example of progressive abstraction  
(after Couger, Higgins and McIntyre 1993)

In the second phase, the original problem is defined somewhat more broadly, one level of greater abstraction: the lack of qualified staff. Factors affecting the problem, defined in such way, include: there are no mechanisms for the creation of para-professionals, too early retirement, no appropriate division of labour/tasks, part-time employment opportunities are not applied, the possibilities of remote connections are not used. In the second stage of abstraction, the set of factors increased from three to five.

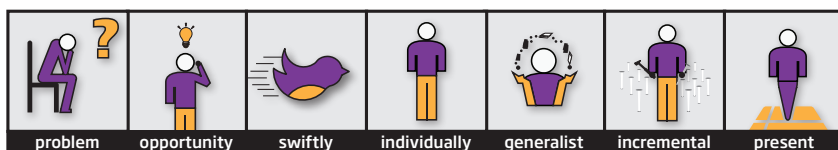
A third phase was also carried out, in which they increased the level of the generality of the problem by one more level: the lack of professional skills and competencies. In this definition, they cited the following factors: lack of motivation to learn and work, not exploiting the possibility of hiring external experts (outsourcing), the complexity of organisational processes, lack of appropriate tools / techniques for working, low level of creativity, poor process automation, as well as churn of successful / effective employees (high performers). In the third step, seven new factors were identified. In total the company identified 15 factors which affect the problem, from which they carried out a new definition of the problem and the opportunity to implement solutions.

A key finding was that the root of the problem was not the lack of staff, and that they didn't have to address the challenges of growth (exclusively) through the recruitment of new employees, but that it was also necessary to improve the organisation as well as the qualifications, competencies and skills of existing staff .

*Participants.* Implemented in small groups

*Duration.* Short

## 10. QaDIM (Quick and Dirty Method)



*Description.* “Quick and Dirty” method follows a matrix, where properties of a product or a service in question are systematically hypothetically changed on the basis of three or more pairs of operators. It sometimes may not be possible to use each operator for each product or service, however, it is generally possible to determine at least one incremental innovation in the matrix (Narashimalu 2010).

*Purpose and applicability.* The QaDIM method is primarily intended for the identification of opportunities for incremental innovations on the already existing product, but in the process of discovering problems and opportunities, an idea for a break-through innovation may also arise.

*Implementation process.* An individual or a group select a product (product or service), which is problematic or needs to be improved or redesigned. Redefining of this product is carried out in eight steps, or four pairs of activities, wherein each pair, as a rule, consists of two opposite actions (e.g. add a feature – remove a feature):

1. add a feature (we add a new feature to an existing product, e.g. we add an e-mail viewer to a mobile phone, which allows differentiation from the competition and thereby increases the price or market share);
2. remove an unnecessary or infrequently used feature or addition (to simplify a complex product, thereby increasing its attractiveness);
3. embed existing product into another product or service;
4. separate a product or service into two independent units;
5. combine with another product or service;
6. reduce size or volume of the service;
7. substitute certain components with lighter, cheaper, more sustainable ones;
8. develop a complementary product or service as a complement to the basic product or service.

Increase size (1, 1)	Add a feature (1, 2)	Embed existing product into another product (1, 3)
Combine two products into one (2, 1)	<b>Existing product (2, 2)</b>	Separate existing product into two (2, 3)
Embed another product into existing product (3, 1)	Remove a feature (3, 2)	Reduce size (3, 3)

**Figure 22:** Basic matrix of the Quick and dirty method.

Given the complexity of the product, we may add new dimensions to the matrix, but always in pairs, in order to maintain the square form of the matrix. After adding all the ideas and possibilities, we check which ones satisfy the following three conditions: the innovation does not face any adoption hurdles, the innovation is not easy to copy (such are inadequate), all the resources required to develop, deploy and distribute the innovation are easily available, and suchlike.

Below are two examples of the implementation of the Quick and Dirty method: for a product and for a service.

*Example 1. Product innovation: A company which manufactured mobile phones was thinking about the challenges of the industry in the future when mobile phones will no longer be just means of direct interpersonal communication, but will have to offer much more to the user. In one of the phases of the innovation process, they decided to complete the QaDIM matrix. They used eight operators.*

1. ADD the GIS navigation (map) option.
2. REMOVE the clumsy SIM card tray. Move it elsewhere.
3. EMBED a torch light into the phone.
4. REDUCE the length of the phone by opting for the clam shell design (flip phone)
5. SUBSTITUTE the metal casing with a lighter solid plastic casing.
6. COMBINE the phone with the MP3 player.
7. SEPARATE the phone's memory space from the phone; transfer it on the memory card.
8. COMPLEMENTARY PRODUCT - headset for hands-free calls.

REPLACE metal cutlery with plastic cutlery	ADD navigation map	EMBED torch light function
COMBINE with MP3 player	<b>MOBILE PHONE</b>	SEPARATE phone and memory card
REDUCE costs with low-cost flights	REMOVE clumsy SIM card tray	COMPLEMENTARY PRODUCT headset

**Figure 23:** Example of QaDIM Method for a product  
(adopted after Narashimalu 2010)

*Example 2: Service innovation. The following example illustrates the upgrading of an air carrier's services. The development team was thinking primarily about the fact that their service should not include only transportation by air from one place to another, but the whole process of the journey. By means of the Quick and Dirty method they found a few options of enhancing their services.*

REPLACE metal cutlery with plastic cutlery	ADD large screens for in-flight entertainment	EMBED tour package
COMBINE rental car	<b>AIRLINES</b>	SEPARATE airfare from food&beverage
REDUCE costs with low-cost flights	REMOVE smoking areas	COMPLEMENTARY SERVICE reasonable accommodation offers

**Figure 24:** Example of QaDIM Method for a product  
(adopted after Narashimalu 2010)

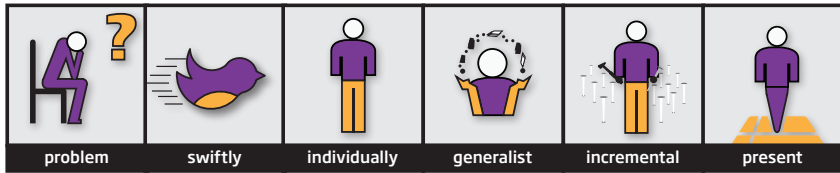
1. ADD large screens for in-flight entertainment.
2. REMOVE smoking areas on the planes.
3. EMBED air fare into the tour package (cooperation with travel agencies).
4. REDUCE costs by introducing low-cost flights.
5. REPLACE metal cutlery with plastic cutlery as a security measure against terrorism.
6. COMBINE purchase of flight ticket with rental car.
7. SEPARATE the purchase price for airline ticket from the price of in-flight food and beverages.
8. COMPLEMENTARY SERVICE- accommodation at reduced prices (cooperation with accommodation providers)

Most of these solutions are already widely implemented by mobile phones providers and air carriers.

*Participants.* The matrix may be completed by an individual or as group work. It is desirable that the participants are well familiarised with the existing product.

*Duration.* Duration of the performance depends on the size of the matrix, however, the method is fast and the matrix may be completed in less than an hour.

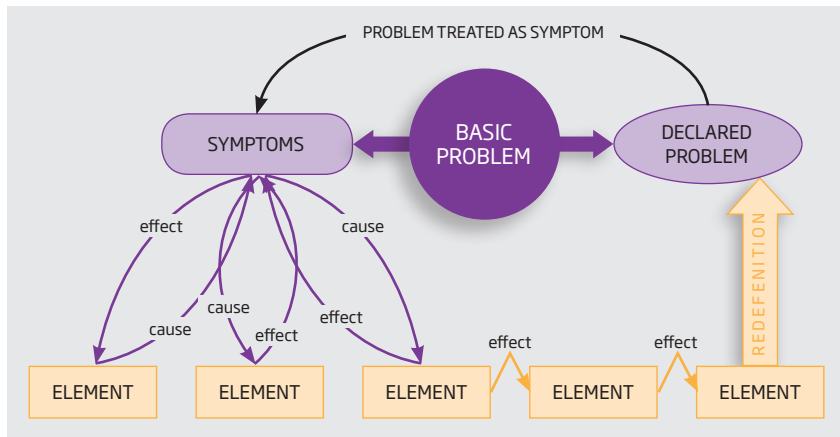
## 11. Problem Breakdown



Based on the example of the authors Sidky, Sud, Bhatia and Arthur (2002) the method was developed by Katarina Košmrlj.

*Description.* The problem breakdown method is based on the ability to distinguish between the perceived problems of the user and the actual problem that causes the user's dissatisfaction. The declared problem is seen as a symptom rather than a cause of the problem and then the actual problem is "diagnosed" through the analysis of the symptom.

*Purpose and applicability.* The method of problems' breakdown is suitable for situations where inadequate circumstances are detected, and the search for solutions first needs to define the problem or the cause thereof. The affected party often understands the problem very superficially, whereas their definition thereof is inconsistent with the identified symptoms. They consequently propose superficial solutions without fully knowing or understanding the problem and its causes. Often, however, the person who solves the problem, is not familiar with all the circumstances of the occurrence of problems. Thus, the method offers a systematic approach to objectivising the problem, i.e. less personal definition of the problem.

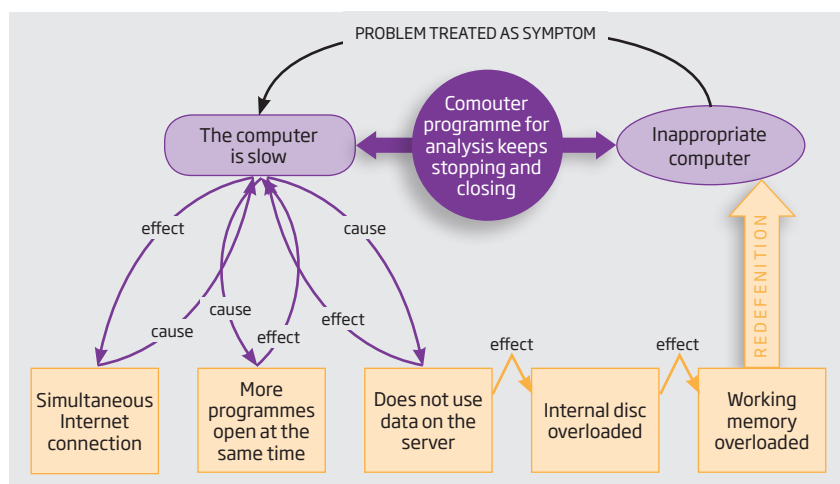


**Figure 25:** Matrix of the implementation of the Problem Breakdown method

*Implementation process.* In the event of an adverse situation or a complaint, this needs to be adequately defined as a problem or as a consequence of a problem. It should therefore be analysed in detail and broken down to various factors and concrete causes. All components of a problem need to be considered and analysed separately, and then the individual problems shall be defined (at a lower level), and these represent the basic elements of a problem at a higher

level. Finding a solution then takes place at the level of basic problems, which is easier, faster and more efficient. In doing so, we can make use of the cause-effect diagram of, mindmap and such like. It is advisable to draft a document that contains: description of the problem, all the stakeholders involved in the problem, the impact of the problem on the stakeholders as well as on business processes.

*Example: A company, which is responsible for ICT support in several companies, employs computer hardware and software specialists and provides the employees of their partner companies uninterrupted use of computers and other equipment. If the employees in partner companies experience any difficulties, they contact the call center where they are referred to the appropriate ICT expert or department, depending on the particular problem. An employee of the partner company, who deals with data analysis, repeatedly complained that his analysis software programme kept stopping and closing. He gave the obsolete hardware as the possible cause of his problems. Call center directed him to the hardware department, where it was established that the specifications of his computer were entirely in line with the requirements of the software programme. The problem was addressed together with the software experts who asked the said employee some additional questions on the manner of his work. It was established that during the performance of analysis, he also uses a number of other computer programmes and functions. The company's experts established that there was no actual problem related to the computer, but rather its inappropriate use. The computer was therefore not inappropriate, but merely overloaded. Thus, they advised the employee to, instead of buying a new computer, he should use the computer more rationally and thus effectively eliminated the perceived problem (adapted from Sidky, Sud, Bhatia and Arthur 2002).*



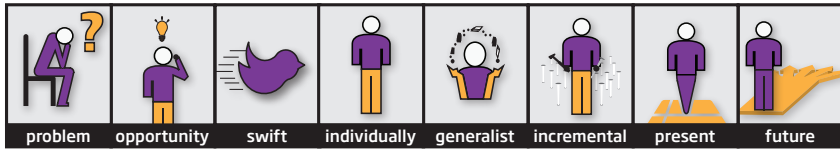
**Figure 26:** Example the matrix completed applying the Problem Breakdown method

**Participants.** This tool can be implemented entirely individually.

**Duration.** The implementation of this method is normally swift, however, in the case of a more complex problem, it would make sense to include more participants, thus also extending the duration.



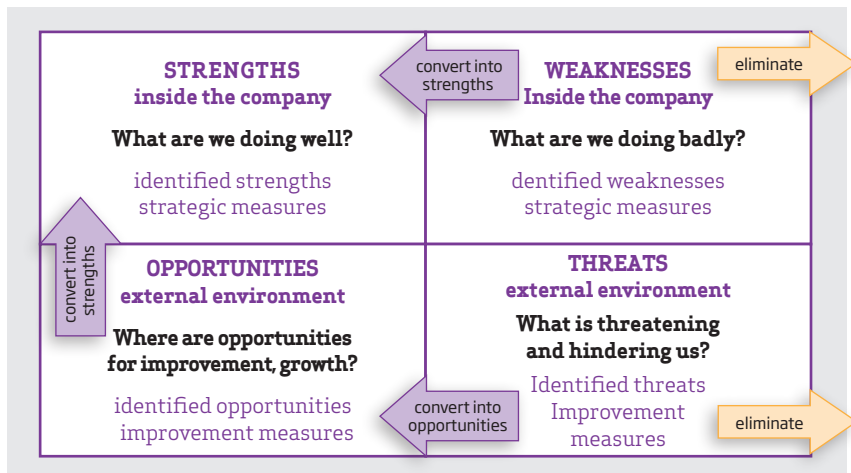
## 12. SWOT Analysis



*Description.* SWOT analysis is a tool, which is carried out by means of a simple 2 x 2 matrix. Each cell represents one aspect of a situation, problem or objective. A problem or a challenge is addressed from the point of view of its strengths, weaknesses, opportunities and threats. In carrying out this method, the objective distance towards the subject of the analysis is quite important, since otherwise the matrix does not reflect reality, but rather a personal view of it.

*Purpose and applicability.* The SWOT method is designed to identify problems and opportunities in order to achieve improvement. It is quick and easy to carry out as it is conducted in the form of completing a clear and simple matrix. It also helps to understand the business and the way to deal with the future. SWOT analysis can be applied to any field, and is therefore widely used.

*Implementation process.* Each cell represents one aspect of the subject in question: strengths, weaknesses, opportunities and threats. Strengths and weaknesses are considered internal issues, arising from the internal environment and operations of the organisation, while the opportunities and threats depend on external factors. The matrix may be completed gradually, each cell separately, or we simultaneously search for all four aspects for one individual element and then move on to the next element.



**Figure 27:** Example of SWOT analysis

Once all the advantages and disadvantages arising from the internal environment, and all the opportunities and threats risks arising from the external environment are written down, follows the analysis of the matrix. Among the identi-

fied disadvantages we search for those that can be turned into advantages. In doing so, we also check the available resources and the feasibility of these changes. For disadvantages which cannot be converted into advantages, we have to provide the possibility of eliminating them. In a similar manner follows the analysis of the possibility of converting the threats into opportunities. Although this is primarily a management tool, we can use the SWOT analysis to check the various aspects of individual complex problems, identify opportunities. The SWOT analysis also enables the analysis of ideas. It is important that the object of the analysis is assessed by all four above-mentioned aspects, taking into account the impact factors of the internal and external environment. We can also use the SWOT analysis to analyse our competition, although we may not have all the data required for a detailed analysis.

*Example. A swimming club has been organising various swimming events and competitions for many years. These events act partly as opportunities to popularise the sport, and partly also as a source for gaining some additional funds for the club. Due to the decrease in public funds intended for co-financing of their activities and due to declining inflows from sponsors, the club found it-*



**Figure 28:** Example of a completed SWOT analysis matrix

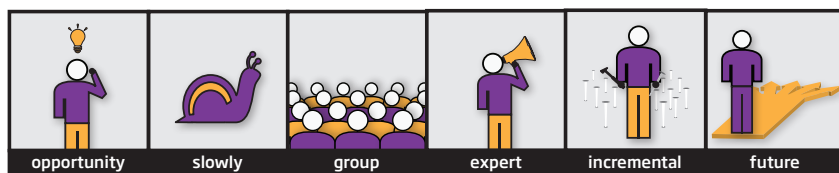
*self at a crossroads, whether to keep one of their events – the international swimming competition. The competition is important for the club because of the participation of the local swimmers and judges, however, on the other hand, this proved to be very exhausting from the organisational and financial point of view. The club addressed the problem of the “Development of financially sustainable competition” by finding their opportunities through the SWOT analysis.*

A SWOT analysis matrix has shown to the club management some opportunities, which could develop in the direction of enhancing the attractiveness for the athletes, coaches, and especially spectators. In such way they could potentially gain even more public and sponsorship funds. They made arrangements with the local tourist facilities providers which will enable the clubs to participate in the competition, and in addition also carry out training preparations as well as take part at the trips to the local attractions organised for the competitors. The largest weakness turned out to be volunteers who were poorly organised and therefore unmotivated for work. The management will therefore commence with the preparations for volunteers earlier and provide a better organisation of their work, whereby the most committed ones will be accordingly rewarded.

*Participants.* It can be carried out individually or in groups, it is also suitable for personal analysis.

*Duration.* The method is swift and simple.

## 13. Five C's of Opportunity Identification



For a better understanding, we recommend that you first read the Example below.

*Description.* The model (the 5 C's of opportunity identification) has been developed on the basis of Kotler's 4Ps marketing mix and focuses on thinking about the (covert) desires and motivations of the buyer/consumer (Creedy 2012, Scott 2012).

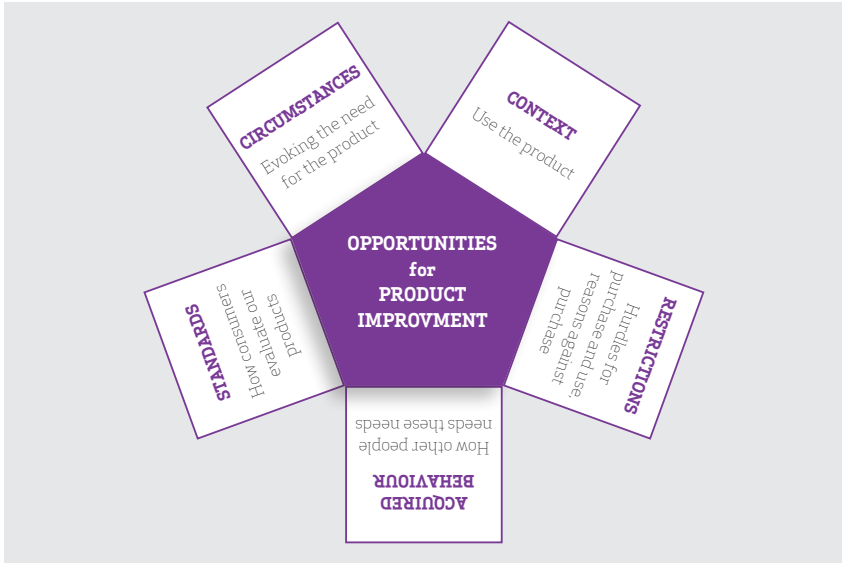
*Purpose and applicability.* The 5C tool is efficient for encouraging innovations since it provides clarity in identifying innovative opportunities. Its specificity is a marketing platform based on which we can define the areas of searching for opportunities. The method is suitable for different types of problems and enables the actual understanding of consumers' wishes and needs.

*Implementation process.* Also this tool may be implemented by using a matrix. There is a cell in the center to enter a product we wish to improve or a new market opportunity for an existing product. 5 sheets – frames derive from the basic cells. The said sheets represent individual elements of the mix. We begin to fill in the matrix in any chosen sheet and we then continue in a clockwise direction.

- Identification of circumstances. Normally, this is the first sheet we complete (circumstances - what triggers a buyer's need for a product). Circumstances represent the needs which the product meets and the sources of these needs.
- Context. This is the context within which the consumer uses the product. The focus should be on pre-shopping and shopping experience, the manner of using the product, experience and behaviour after using the product.
- Constraints. We check the constraints and try to understand why consumers do not buy or use a certain product, which includes factors that affect why consumers do not select our product or why target consumers do not use our product.
- Compensating behaviour. In this aspect we discover alternative ways to meet the needs that have been identified under the circumstances: how to treat customers who do not use the relevant product to meet the needs in question.
- Standards. We usually meet this aspect (criteria) last. We establish the standards and criteria by way of which consumers assess our product. Compliance with this framework may be quite challenging since it is necessary to assess our own ideas and concepts through the eyes of consumers taking into consideration both objective and emotional elements.

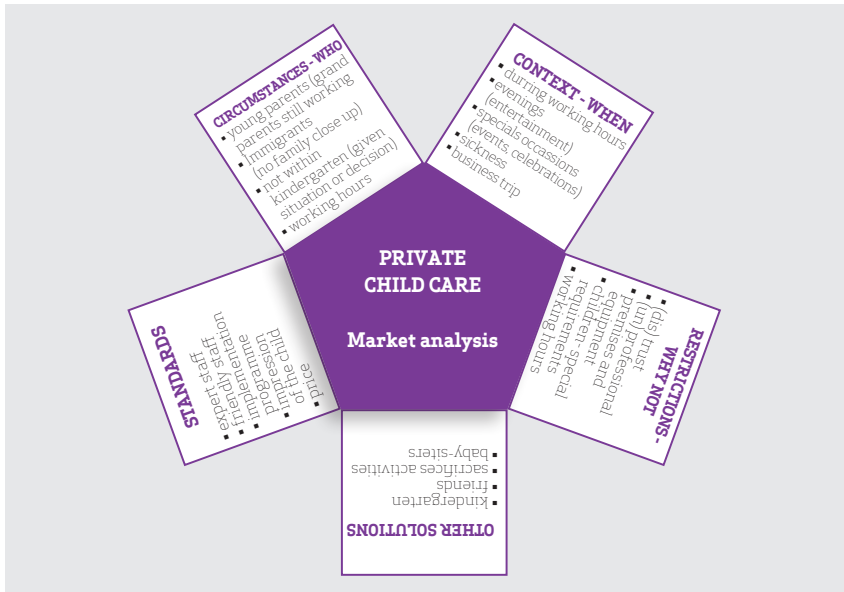
The completed matrix gives a fairly comprehensive view of a product and enables the identification of existing and potential problems and obstacles in relation with its use. The method may be implemented in two steps:

1. definition of target markets and specific needs of target markets,
2. Identification of opportunities with regard to the scheme and target markets.



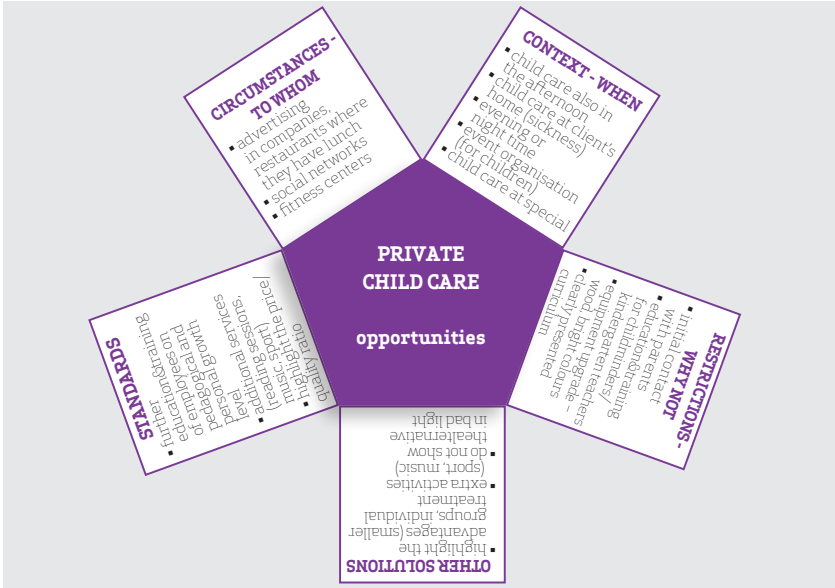
**Figure 29:** Matrix for the implementation of 5Cs method

*Example. Faced with the decreasing number of children and increasing enrolment in public kindergartens, two childminders, who were offering child care services at home, needed fresh ideas to transform and modernise their activities. They were aware of the fact that the success of their business depends primarily on meeting the specific needs of the market, so they decided to fill in the mix of opportunities. In the first step they identified their target market and specific needs.*



**Figure 30:** Example of market analysis by applying the 5Cs method

Deriving from the first mix they searched in the second step for opportunities to transform their business so as to respond to the perceived specific needs of the target market and simultaneously offer different solutions than public kindergartens.

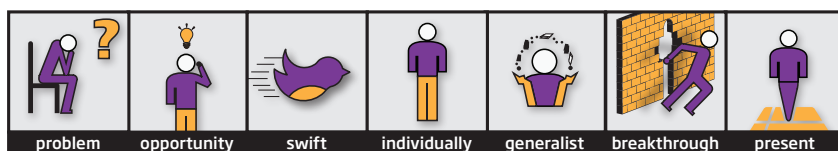


**Figure 31:** Example of searching opportunities by way applying 5Cs.

*Participants.* In a group.

*Duration.* Lengthy, taking into consideration the preparation. The method is somewhat demanding in terms of preparation since it requires precise knowledge of the market and competition (analyses).

## 14. Forced Connections



*For a better understanding, we recommend that you first read the Example below.*

*Description.* The method of directed connections forces the group to implement in an alternative, original way of thinking, in deviation from the established way of thinking. A leap in thinking which brings fresh perspectives on the problems addressed or opportunities and ideas is obtained through randomly selected words or objects that channel our thinking.

*Purpose and applicability.* This tool is intended to avoid the established ways of thinking and practice of searching for solutions in the context of the known. Primarily, it is intended for generating ideas, yet it is also useful for identifying problems (randomly random connection) and to find solutions (opportunities) for the already known problem. It is suitable for less demanding problems.

*Implementation process.* Forced and directed connections are created between randomly selected elements which are not necessarily related through the addressed topic. We search for connections between these elements. There are several ways of searching for forced elements. Depending on the problem, time and characteristics of participants, we create forced connections with a random selection of words from books, a collection of objects, selection of photographs, newspaper articles, etc..

The implementation of the method is carried out in several phases.

1. In the first phase, we select a problem, which we intend to address, or a product, which should be improved or its problems defined. The selected problem is written into the head of the scheme.
2. The second phase entails the selection of elements for the direction of forced connections. These can be selected in several ways, which are described below.
  - Reference words: we select some examples of reference literature (articles, Books, dictionaries, etc.). Words (should be nouns, adjectives or verbs) may be selected randomly or we select some words which are listed in the selected literature as keywords in the title or abstract. We select 5 to 6 words; if we work in a larger group, we may select more.
  - Non-reference words: we select a few examples of any written sources (the participants can, for example, bring their favourite book, magazine, album, etc.) and choose a random word from these sources. As a non-reference element can also be selected associations of the participants, but should not be considered related to the problem (in this case, write the compulsory elements, then the problem).
  - Phrases: instead of words we use sayings/proverbs or news headlines from daily newspapers. Proverbs and headlines may be selected at random from sources or the participants retrieve them by memory.
  - Factual elements: instead of words we select among from objects. These can be prepared by one of the participants, while others either

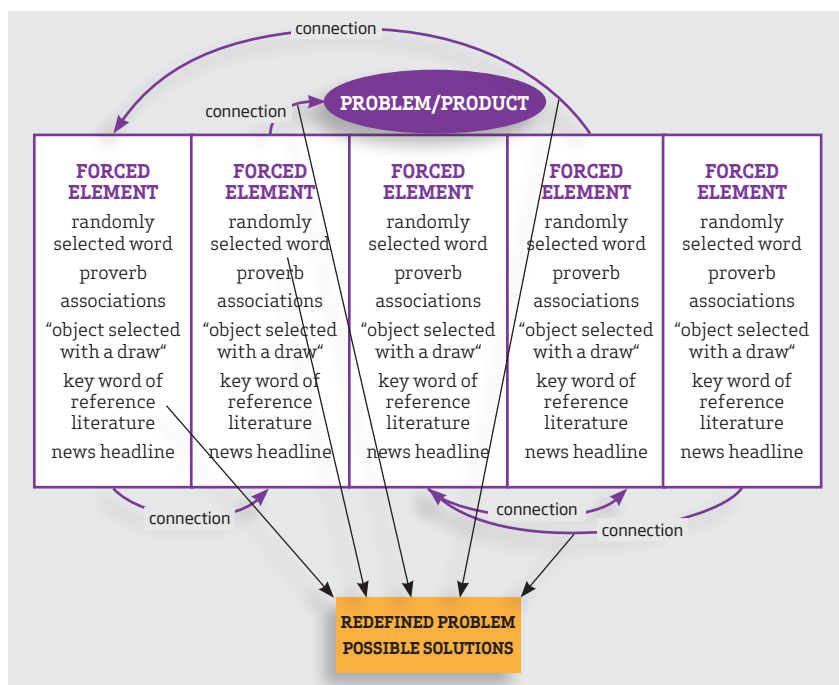
decide by a draw or each of the participants brings one object. These objects constitute »forced elements« for thinking.

The number of directing elements should not be too high, yet it proves reasonable to select at least five, so that these can be connected. Depending on how well we master the technique, on the group size and size of the problem, the number of forced elements may be increased appropriately.

In the second phase, we try to establish connections between different forced elements and between the elements and the problem. If we quickly exhaust the possibilities of connection, we select new forced elements or we replace some with new ones or we add new elements to the already selected ones.

An analysis of connections is carried out in the third phase. We try to identify which aspects of the problem appeared by connecting the forced elements. We write down various aspects of the problem and check whether we have identified solutions. Depending on the findings we redefine the problem or write it more clearly or determine the basis for solving the problem.

The diagram below may prove helpful during the implementation of this method.

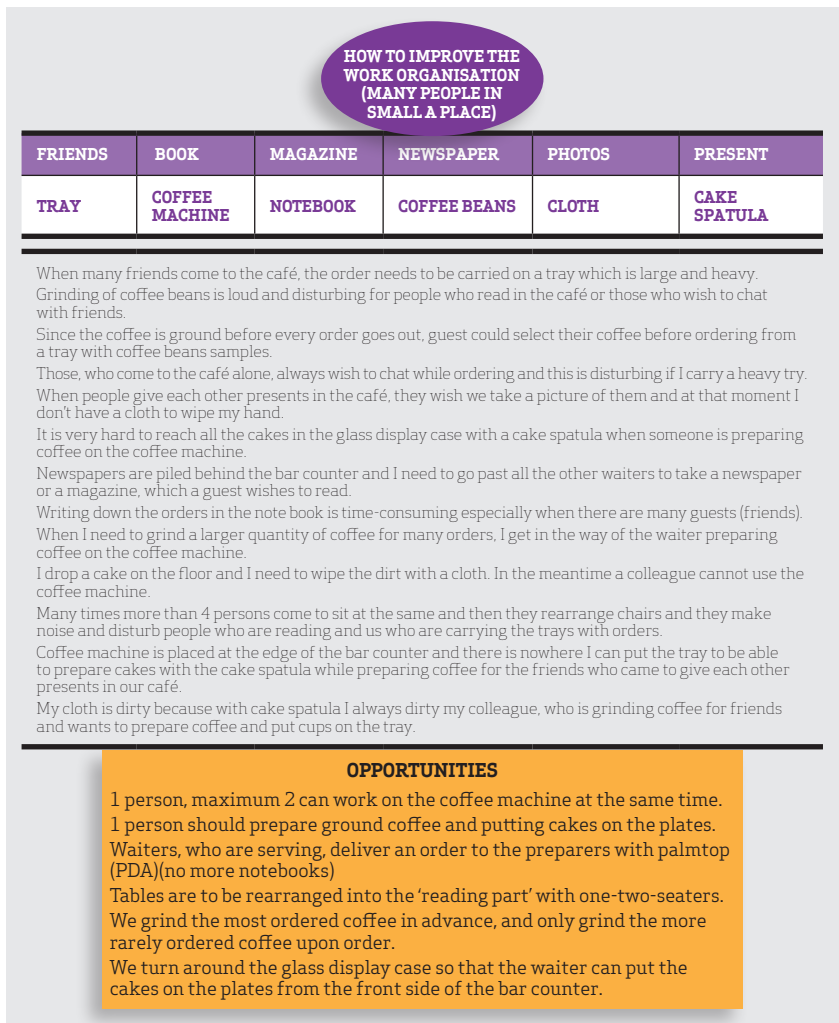


**Figure 32:** Implementation scheme of Forced Connections Method

*Example.* Due to the increased number of guests a café and patisserie employed new waiters. In the limited space for the preparation of beverages and desserts the employees repeatedly bumped into each other, there was a constant jam at the coffee machine and consequently, the guests were served untimely as well as



*inadequately. The owner was aware of the need to change something. A renovation of the café space was not an option due to high costs, so they knew they would need to do something regarding the organisation, but they have failed to come up with any adequate solutions. One of the consultants proposed to the owner to implement the method of “forced connections”. The owner instructed the waiters to bring to the meeting their most favourite item which they associate with a personal visit to a café or patisserie and something most nerve-wracking at the workplace. The range of objects was as follows: book, magazine, friend, scarf, newspaper, tablet and tray, cloth, notebook, coffee machine, cake spatula, coffee beans. They wrote down the items on the blackboard and the employees then revealed their associations in relation to the café. The associations are shown in Figure 32 (upper part of the Figure “How to improve ... to Opportunities”).*



**Figure 33:** Example of Forced Connection Method.

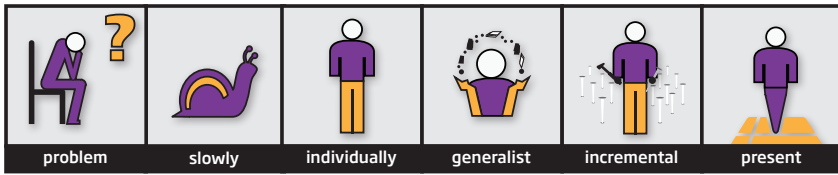
When association on given directing elements were exhausted, they read them and tried to extract from them the causes of the problem. It was decided that the problems would be addressed as opportunities to improve the organisation of work in the café, so they wrote the associations on the blackboard (Figure 32 the bottom part of the Figure – Opportunities). The range of opportunities has proved to be sufficiently wide to draw up measures for improvements.

By using the method of directed connections the owner organised the work in the café in such a way that two waiters were behind the bar preparing orders that they received through a palmtop (PDA). So as to ensure the quality they continued grinding coffee beans as necessary, while the reorganisation of tables helped the waiters to deliver orders more easily. In a simple and with almost no costs they reached a satisfactory solution for both employees and customers.

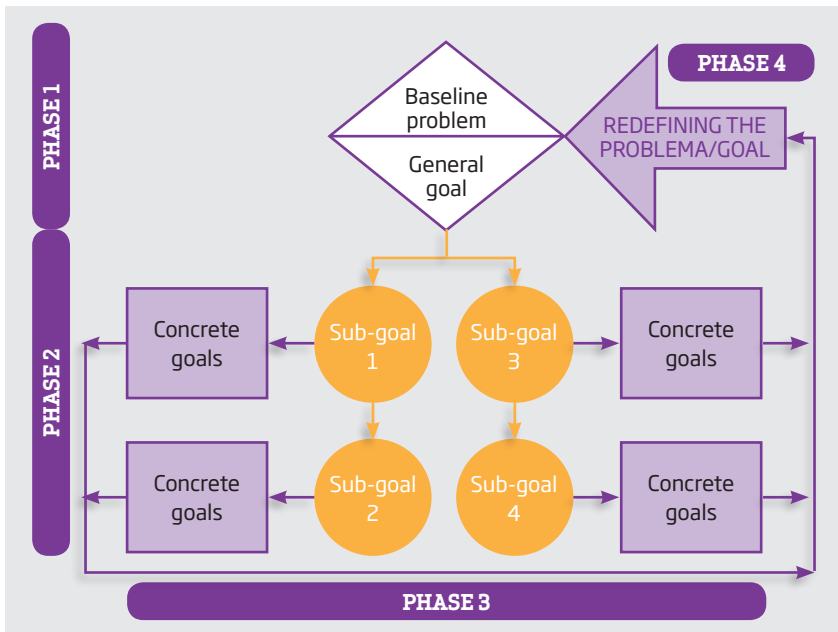
*Participants.* The method may be implemented both individually and in group. The group size does not present any particular limitation. It may also be carried out individually since the generator of ideas is not only a man, but a man in connection with a keyword. A rich vocabulary of persons implementing the method and adequate knowledge of the language is recommended.

*Duration.* The method may be carried out swiftly since it is relatively simple.

## 15. Focus on the Goal



Based on the example of Green (n.y.) the method was developed by Katarina Košmrlj. *Description.* When addressing a complex problem, its complexity may be a major obstacle since it prevents us from obtaining a clear view of the various components and aspects of the set goal or the perceived problem. The advantage of this method is that all the conditions to achieve the goal are identified. Hence, the relations between the conditions (certain conditions are for example contradictory and may contribute to exacerbate the problem) are revealed. Moreover, the functions and the person responsible for the execution of these conditions are also identified. At the same time the writing of goals, sub-goals and connections between them help to explain the structure of the system and the relations between performers of individual tasks.



**Figure 34:** Matrix for the implementation of the Focus on the Goal method

*Purpose and applicability.* This tool is useful when we are faced with a known yet complex problem (goal). The purpose of the method is to redefine or elaborate upon a perceived problem. The method is based on the determination of desired state, which should occur upon the solution of the problem. The method provides basis for predominantly incremental innovations.

*Implementation process.* Focusing on the goal is carried out in a few steps, which are presented in more detail below.

**Phase 1.** Recording of the detected problem. Perceived problem is usually complex; hence, it needs to be defined so that the final goal may be determined from the description. If the situation is not perceived as a problem, but for example, as an opportunity or a challenge, we determine the final goal directly from a perceived challenge. We do the same if we have a vision of a desired final outcome.

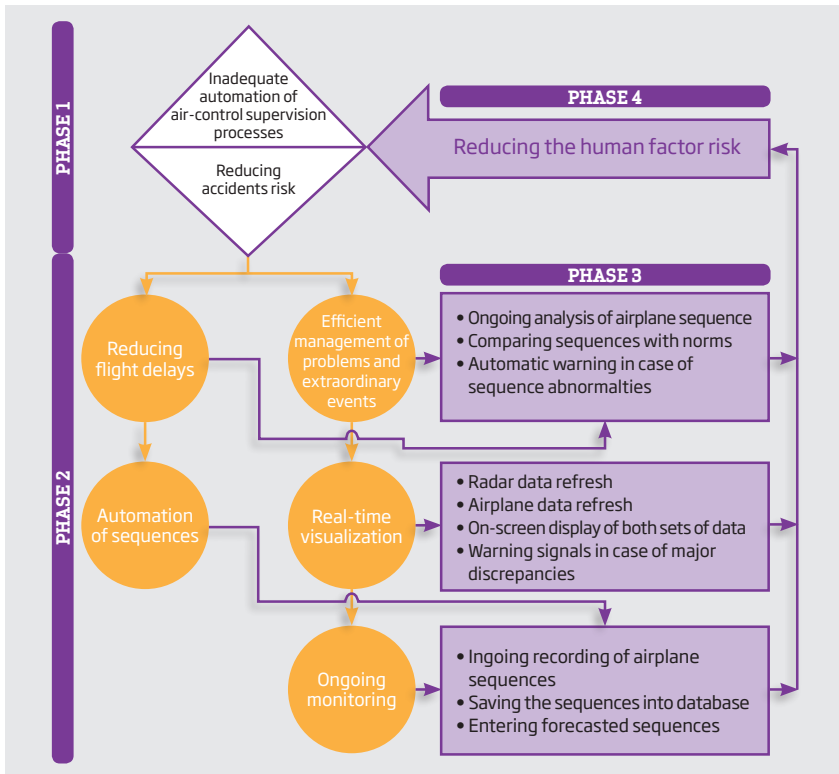
**Phase 2.** Decomposition of the overall goal. The final goal is broken down so that we “break” it into sub-goals. Sub-goals are intermediate achievements which in succession lead to the final goal. Each new sub-goal represents a new unit in the implementation of the method. Sub-goals are recorded in the form of a diagram of sequence until we establish the most basic conditions.

**Phase 3.** Consideration of feasibility. In the first and second step, we set up a set of sub-goals or intermediate stations in the achievement of the final goal. Their number depends on the complexity of the final goal. In the third step, we check the feasibility of the individual sub-goals. We establish also the relationship between them: we check whether any of the sub-goals are contradictory, how the fulfilment of one affect on the others, the extent to which each sub-goal may be achieved or whether we can omit them on our way to the general goal.

**Phase 4.** Redefinition of goal. Based on the analysis of sub-goals in the fourth step we (re)define the problem and/or final goal. We eliminate unrealistic and inappropriate solutions from a set of different options. If necessary, we redefine (more precisely) the definition of the problem, which then allows a repeated search for solutions.

**Phase 5.** Implementation feasibility study. Identification of the problem is followed by the identification and examination of the potential threats and pressures in achieving the goal. If necessary, we analyse in a similar manner the activities and functions, which can implement the sub-goals in the company. Based on the conclusions we draw a flowchart. At the end we write down possible solutions for each sub-goal in relation to the identified responsible functions within the company.

*Example: The example refers to a company which develops computer programmes for specific customers. When developing programmes, which are their key product, the company is often faced with intermediate defects in the operation or failure of functions. These defects are seen as unnecessary, yet they fail to find the causes of these defects. As they have failed to develop solutions with other approaches, they decided to use the “Focus on the goal” approach.*



**Figure 35:** Implementation of solutions based on the 'Focus on the Goal' method

The example shows collaboration with an air-traffic control company (adapted after Green - n.y. - no year indicated). The first step was the setting of the key goal. In developing the programmes, the objective is typically set as desired operation or functions of the programme or software system. In this very case the control processes were automated. However, in the analysis of operation they discovered that the latter is exactly what causes defects. Therefore, they derived goals for the client's company (higher level goals) and sub-goals from the key goal and from which they developed the specifics of the software.

In the second phase they created the programme's objectives on the basis of the client's objectives. Instead of the programme being focused on the automation of the control process, the programme designers focused on specific sub-goals and developed a programme so that the design met the individual sub-goals.

The final result was a software that was quite innovative as it focused on the needs of air traffic controllers and not directly on the goal of activity. Because of this, fewer errors or defects and fewer irregularities or inadequacies of operation were detected in the programmes, which contributed to meeting the higher level goals.

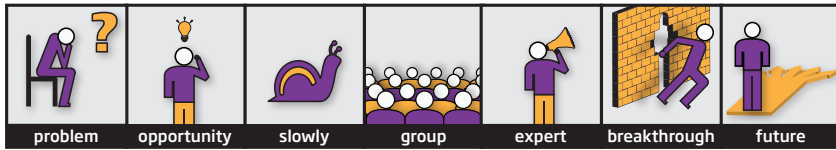
**Participants.** The tool is suitable for implementation in a group, as the search for solutions is comprehensive and includes all employees or departments that are associated with the implementation of processes for the design or delivery of the product.

**Duration.** The total duration of the implementation of the tool is several days.

# Methods that will take more time, yet it will be time well spent

In the next part we present a selection of methods, the implementation of which is somewhat more complex than of those presented in the previous part. These methods consist of multiple processes and address the innovation process more comprehensively. More time is needed so as to get to know and understand these methods; in some cases the assistance of external contractors or moderators is welcome. However, consistent with the increased time (and in some cases, organisational) input, more substantial and lasting effects may also be expected with the application of these methods. Above all, this is a lasting transformation of processes and organisational culture, which becomes more innovation-oriented. One could therefore say: more effort – more fun (in terms of achieving success).

## 16. DELPHI



*Description.* DELPHI is a lengthy and complex method, which attempts to predict future development in of the field under consideration (e.g. the future of photovoltaics). It is based on individual work of more individuals who are experts or connoisseurs in the field, and on a discussion among them, which is chaired by an experienced moderator.

*Purpose and applicability.* As is apparent from the description, the method is used to obtain answers to the in-depth or challenging scientific questions. The purpose thereof is to prepare a projection of the future or predict and explain very complex situations, which, although unlikely, have a great potential for innovation. Other constitutive element is a coordination of argued opinions of experts. Through their opinions we try to anticipate the developments in the field under consideration.

*Implementation process.* Each participant is familiarised with the problem and provides answers to some of the questions. Answers are analysed and then summaries which contain the most frequent statements are prepared accordingly. This is followed by a discussion, identification of discrepancies and then another repeated circle of discussion/correspondence, which is “kicked off” on the basis of the identified differences and of course the appertaining arguments. This process continues until a common ground or consensus is reached. In this context, the key role is that of a moderator, as he/she raises questions, oversees the dynamics and analyses and develops discussions. The method comprises the preparation and implementation phases.

### Preparation:

1. A moderator (or a group) first defines the problem. The problems are academic or practical, often deriving from the needs of a company.
2. Depending on the nature and extent of the problem, the team preparation or a study follows, which is carried out by an independent moderator. A researcher or a group needs to answer a number of questions before they can draw up a set of relevant questions.
3. The most important phase is the compilation of questions and questionnaires. The questions are open-ended, and therefore longer, reasoned answers are expected. The number of questions should be limited to fewer than 25, because lengthy questionnaires of this type prove to be tiring. Questions should be unambiguous so that they are understood by all the respondents in the same way.
4. The correct selection of the sample of respondents is of utmost extreme importance. The best experts in the field under research should form a

part of such a sample. Some experts do not like to answer the questions unless the publication of research, or at least a publication of personal information, is ensured.

5. A moderator or a group defines the envisaged number of rounds. Three rounds most often suffice, yet there may also be several more rounds. The moderator is responsible for the course of individual rounds so that a discussion develops, focusing on key questions and oriented towards achieving consensus. We can subsequently add a round.

*Implementation.* The classic version is lengthy, suitable for very different participants, or when the participants cannot gather in one location. It is carried out by correspondence and takes place in three rounds.

1. A description of the problem with the questionnaire is circulated to members of the group.
2. Responses are analysed and the participants familiarised with the “average or mean” answers and asked to reconsider the responses. Those, whose answers particularly stood out, are asked to explain their opinion.
3. Analysis of the responses from the second phase with the interpretation of extreme positions is resent to all the participants, who are asked to reconsider and, of course, to provide the answers. If the answers are still inconsistent, the phase is repeated (Likar 2002b).
4. Participants who have made salient responses are asked for further clarification. Participants are then familiarised with the analysis of the responses and provide reconsiderations about which another discussion again takes place.

The process is repeated until the participants unify or until multiple views are created, from which the creators do not withdraw despite possible counter-arguments.

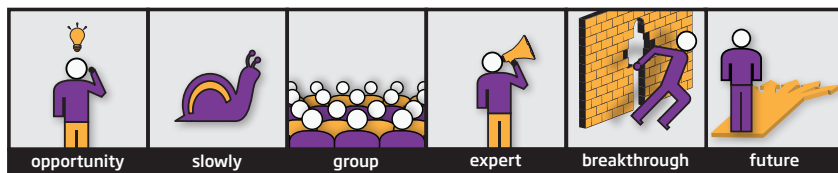
A swift implementation differs from the classical one in the fact that it is performed during a direct contact, for example at a seminar, symposium or a training-course, while the answers need to be processed very quickly. It is therefore necessary to shorten the questionnaire appropriately. Swift implementation takes place in the same rounds as the classic one, yet discussions are conducted with direct personal communication, and analyses are rapid and forwarded immediately.

*Participants.* A large number of highly qualified participants or experts are included in the method. It is quite characteristic for the classic version that some participants drop out of the discussion rounds in the progress. Especially the classic version is characterised some participants drop out from one round to the next.

*Duration.* Classic version requires a long period of time – many weeks or months, 45 days on average.



## 17. Wild cards



*Description.* The method of wild cards game is actually a game of search and creation of points or a future situation with a low probability yet with a potentially high impact. The method facilitates a reflection on the unusual, even impossible scenarios. These scenarios are created with the help of specially prepared cards of imaginary aspects of the future (hence the name of the method).

*Purpose and applicability.* Predicting the future, identifying trends... The method allows you to create unconventional ideas and solutions, moreover, it encourages divergent thinking.

*Implementation process.* The method is relatively difficult to prepare, and also to implement. Before the start of the method a group is chosen to prepare the cards. The cards contain hypothetical aspects, a projection of situations in the future, for example there is a description of future economic conditions, new (yet non-existent) technology, new consumer needs, new markets ... More cards mean potentially more unusual and interesting scenarios that can lead to more unconventional ideas. The group for the preparation of cards should consist of individuals who are able to think creatively and outside the established frameworks (Dewey in Carter 2003, Janoff in Wiesbord 2003).

The next step is the selection of participants for discussion who, as a rule, is composed of other participants. It is desirable that the group is heterogeneous, that participants are familiar with or even experts in various fields. One of the members of the group, which prepared the cards, should act as a discussion moderator. This moderator presents the purpose of the gathering to the group: creative thinking and generation of ideas on the basis of fictitious scenarios. The scenario is created from a combination of cards; each of the participants pulls out and lays down opens one card. The moderator explains the meaning of each card, and a consensus on the scenario is then adopted so that all the participants understand the scenario in a similar way.

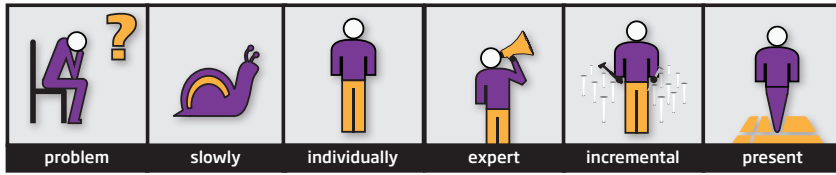
This is followed by a discussion on opportunities in hypothetical conditions, resulting in the creation of ideas. The moderator ensures that the discussion runs smoothly, that the ideas are not obstructed or criticised, although the discussion on ideas is allowed and welcomed. In addition, the moderator also records ideas and comments. When ideas on the chosen scenario are exhausted, the cards are pulled out again and new scenarios created. The already laid down cards may be returned to the deck, which is reshuffled, or it is "played" only with the remaining cards.

Participants may repeat the drawing of cards several times and create new scenarios. Depending on the intensity of the discussion, it seems sensible to make a brief pause between one scenario and the other.

*Participants.* The method is run in two smaller groups; one prepares the cards, while the other one plays the game and discusses. It is desirable that the participants of both groups have a lot of experience in various fields. It proves reasonable to moderate the discussion by adequately explaining the cards, while the ideas are appropriately recorded.

*Duration.* The method may take one or more days, depending on the number of scenarios.

## 18. Gemba walk



*Description.* Gemba walk actually means a walk through the reality; for the purpose of future innovation, we first physically look at the real situation, the full course of a product or a part that refers to the object of innovation, for example, a production line, offices, in-flight service, etc.. The method is complex, lengthy, and the executor should be well acquainted with the company and the field of innovation.

*Purpose and applicability.* The method is intended primarily for establishing and strengthening the innovation culture; however, each walk contributes to the perception of problems, detecting problems, as well as the identification of good practices and interesting ideas. The method is useful for introducing novelties in an indirect way or in this way new ideas are more easily and efficiently presented to the staff and encourage them to think and act innovatively. The approach is reasonable for incremental innovation, but it can also encourage breakthrough ideas.

*Implementation process.* The concept of Gemba walk is conditioned by three factors: observation, location and groupness. Observation of the processes must take place in person, on the site where the activity is carried out and in collaboration with people who perform primary activity (manufacture product or provide a service). It is important to recognise that it is not a matter of supervision but of establishing a contact both with the process and with the staff, which is followed by the establishment of a relationship, and finally the potential for detecting and reporting both problems and proposals for improvement.

The performer of the method, i.e. a critical walker, starts with the implementation of method by making regular visits to the production process in all phases and at all locations. In doing so, he/she tries to be visible but unobtrusive. The first cycle of the walk serves the familiarisation with the process and the people who carry it out. Walker can help him/herself by recording the impressions in a walk logbook. To ensure that the walk would not give the impression of supervision, it is better that walker writes his/her impressions in the logbook after the walk. The walker makes a note 'special attention' in the logbook next to the key aspects observed: for example, bottlenecks in the process, relations between operators, set up, etc. and he/she can also add his/her proposed measures for a certain change or improvement. The situation can also be photographed or recorded. Of course, he/she also pays attention to the examples of good practice, records ideas given and suchlike.

The observer can communicate the collected impressions to the staff (or just the management). This is done in a short informal meeting where in a non-binding manner he/she also communicates his/her proposals for changes,

recorded proposals given by employees or asks the participants to make their proposals for the detected problems. If he/she believes that the staff are not ready for immediate confrontation with the observations, that he/she may postpone the meeting to a later stage of the Gemba walk.

In the second cycle the walk is performed more actively. The walker tries to introduce innovative thinking during the observation of the process and conversation with employees. He/she encourages employees to actively monitor the process, maintain relationship with colleagues and to put forward proposals for changes and improvements. The walker writes down all proposals and communicates them to the management. When sufficient number of proposals is collected, a new informal meeting is convened, where all proposals are presented to employees and one or more proposal are chosen to be implemented. All proponents of changes are awarded in some way: praise, meal, a free hour (whichever is in line with the policy of the organisation) and they are further motivated to maintain creative thinking about their work.

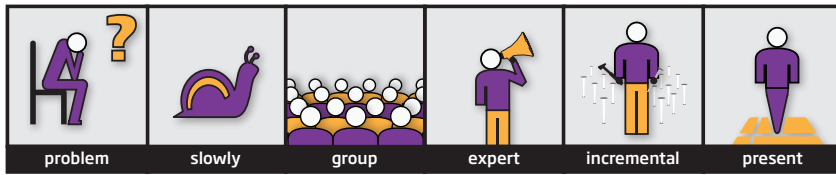
The third cycle of walk includes motivation for innovative thinking and its continuation. Employees are indirectly but continuously encouraged to detect problems and create solutions. This establishes a long-term innovation culture, which can mean a significant competitive advantage for the company.

*Participants.* The method is implemented by one or more employees, while the entire department or all the staff are included in the process.

*Duration.* Lengthy method.

## 19. eMIP

This is an original method, which is a result of the development of the following authors: Klemen Širok and Borut Likar.



*Description.* eMIP is a method for mass identification of problems and identification of opportunities for their solution, which is supported by e-learning. The method logically combines different methods of dealing with problems so that difficulties are addressed from very different angles. Partial implementation in a virtual environment allows great freedom of implementation and also the method is performed in an environment where problems arise.

*Purpose and applicability.* eMIP method is useful for identifying known, hidden and potential problems, their precise definition and analysis. Through the implementation of eMIP the awareness of the importance of (simultaneous) detection of problems is increasing on one hand whereas useful knowledge for the identification and analysis of problems on the other hand.

*Implementation process.* eMIP is implemented in the form of facilitated workshops. The first workshop takes place “live” so that the participants learn about the approach, working methods and simpler methods used. The second part takes place in a virtual environment of an eClassroom where moderators regularly monitor, encourage and guide the work of groups.

**Phase 1:** Workshop taking place live is designed to familiarise companies with eMIP, to meet the moderators and to motivate the participants. It is carried out for approximately 6 hours (with breaks). eMentors prepare a set of tools for addressing the problem. The tools are briefly presented to the participants. Participants learn about the way tools are implemented and their potential. Under guidance participants also implement some tools. At the end of the workshop participant learn about the work in the eClassroom.

**Phase 2:** eClassroom. This phase is lengthy and takes place mainly in a virtual environment. Participants from companies are divided into two or more groups (depending on the number of participants) so that they are better monitored by eMentors. In the eClassroom participants have various information sources in connection with the methods available as well as the material for implementation. eMentor sets timeframes for reporting on the results. Communication with eMentor is carried out through forums, interactive chat rooms, as well as via videoconference. If necessary, eMentors can meet with participants also live in the company’s premises, while they are generally guided and monitored only through the Classroom.

Work is carried out in three phases:

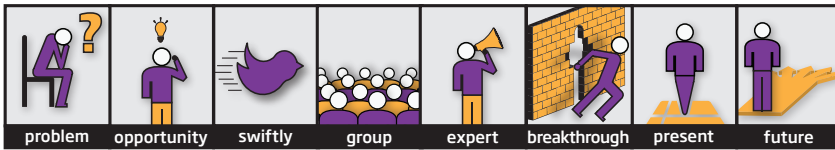
1. **Problem identification.** In this phase, participants perform simple methods with which they identify one or more problems or challenges in the company. Participants learn that it is possible, in a short time, to identify and define a number of issues that might otherwise remain hidden, or challenges that have great potential for innovations.
2. **Analysis and evaluation of problems.** The second part is dedicated to the evaluation of problems in terms of the nature of a problem (fundamental, baseline, more or less important ...).
3. **Problem potential.** The third phase is implemented by the moderators – eMentors, who present the implementation of methods for generating ideas and solutions. The participants can thus indirectly assess the potential of the identified problems in terms of benefits for their company.

*Participants.* eMIP is carried out in groups of at least 6 employees and is guided by qualified external moderators.

*Duration.* The introductory workshop lasts for about 6 hours, while work in the eClassroom lasts from a few weeks up to two months. The duration depends on the complexity of the problem as well as the number and especially the motivation of the participants.

## 20. PACIS

This is an original method, which is a result of the development of the following authors: Borut Likar, Janez Kopač, Peter Krajnik, Aleš Koder and many foreign authors, especially O. Bayard, M. Areskoug, C. M. Nicolescu, M. Saat, D. Nolan and H. Ahlin.



*Description.* PACIS stands for problem/ challenge analysis, creation of ideas and selection. It is a method for creative problem analysis and search for solutions, including even breakthrough solutions. The essence of the method is a comprehensive consideration of the pre-invention phase – from the identification and analysis of the problem to the generation and selection of ideas. It is carried out in the form of guided workshops and in a short time with intensive approach and allows immediate results.

*Purpose and applicability.* PACIS method is useful for different types and scopes of problems and allows their identification, analysis and solution. An integral part of understanding the problem is its visual presentation. This means that we carefully observe the environment. An important element of the method is the association with the upcoming trends and technologies, which can provide a major competitive advantage. The efficiency of PACIS method depends largely on the quality and creativity of the work of the entire group and consistency in following the steps of the method.

*Implementation process.* Implementation takes place in two phases; the first phase is dedicated to the preparation and the second one to the actual implementation. In both phases there are a total of 16 steps, which systematically regulate the implementation process of the method. Moderators – providers of workshops are included in the implementation.

**Phase 1:** Preparatory activities. During the preparation phase, providers of workshops familiarise themselves with the company, method of work and general problems. Usually, a visit to the company's main office, or even better to the location of production (service) process, where problems occur, is organised for this purpose. During the visit to the company a meeting with key people in the company is carried out and at which problem is determined. This problem will be a fundamental topic of the workshop. The preparatory phase is carried out in four steps:

**Step 1:** Presentation of the PACIS methodology

**Step 2:** Introduction to the basics of innovation and the situation in the region/sector

**Step 3:** Presentation of methods for identification of problems/challenges

**Step 4:** Arrangement of the workshop

**Phase 2:** Workshops – practical work in companies. The next steps of the method are carried out at the workshop. Employees who are directly related to the area from which the problem was selected, their superiors and one representative from the management should participate at the workshop. It also deems reasonable to include also creative person(s) from another department and that the workshop participants differ depending on the profile of work in the company.

The first three steps entail preparation of the company for the workshop:

**Step 1:** The company defines a minimum of three problems

**Step 2:** Selection of one problem per company for further work at the workshop

**Step 3:** Analysis of the upcoming trends

Other steps refer to the actual execution of the workshop:

**Step 4:** Presentation of the problem and examination of the situation in the company

**Step 5:** Questions of participants with the purpose of clarification

**Step 6:** Decomposition of the problem and selection (group work)

**Step 7:** Outline of the upcoming trends

**Step 8:** Preparation of group proposals in regard with solutions

**Step 9:** Presentation of proposals – analysis of the problem and solution

**Step 10:** Reflection – comments of the problem’s “owner”

**Step 11:** Teamwork - improvement of proposals/joint strategy

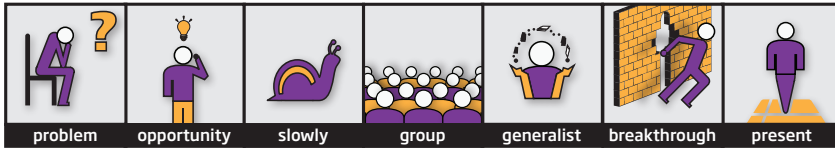
**Step 12:** Preparing the implementation plan (optional)

Based on the experience from the workshop, the company may enhance innovation with occasional or regular implementation of certain methods. The PACIS method is presented in more details in the third part of the Book.

*Participants.* PACIS is carried out in a group of 7 to 10 persons, who are specialists in the field of the perceived problem. At the same time they must also be sufficiently broadly educated so that they can contribute ideas outside the established framework. Participants may also come from outside of the company. The workshop is usually carried out by external moderators.

*Duration.* Execution of one workshop takes a few hours to one day, while we need an extra day or two for the preparation.

## 21. PAPSA



*Description.* PAPSA is an abbreviation standing for identifying the stages of the method: perception, analysis, production, selection and application. Each phase consists of a divergent and convergent part. Divergent part enables maximum production of ideas. Convergent part enables channelling of the energy that has been released in the previous part (divergent) in order to achieve one or more effective and feasible original solutions.

*Purpose and applicability.* The method allows the identification and definition of a problem and the search for appropriate solutions. It offers a multi-faceted view of a specific problem, a more varied range of views and effective problem solving.

*Implementation process.* To implement the PAPSA method we form a group that will for a longer period of time be intensively addressing the field of perceived difficulties. The method is carried out in five steps.

1. **PERCEPTION** of the entire problem. A problem is defined on the basis of the perceived difficulties. The group initially discusses various aspects of the problem, while it does not set any limitations. We look at the problem through the eyes of a child, without prejudice and from multiple angles; this is the divergent part. The convergent part involves a synthesis of various aspects of the problem into a single definition.
2. **ANALYSIS** and detection of the structure of the problem. In the divergent part, the problem is broken down and analysed from many angles in order to determine as many of its components as possible, also the unpredictable and the hidden ones. In the convergent part, the group identifies situations in which different aspects of the problem appear and thus further clarifies the problem.
3. **PRODUCTION:** in this phase in the divergent part, we quickly create a large number of original, unusual or realistic ideas for solving the problem. As in the first phase, we focus on creativity, non-criticism.
4. **SELECTION:** at this stage, we try to select one or more ideas that best meet the objectives pursued. The most original ideas are also taken into consideration. Ideas are rationally evaluated and critically assessed (good and bad points). We can also use a technique called “Angel’s Advocate”, which is carried out in three phases. The first phase – reformulation or redesign of the proposed ideas (verifying that the author agrees with the reformulation). Any misunderstandings are thus prevented. The second phase – “positivism” according to the formula: “I like your idea because ...”. The third phase – objective analysis of ideas by asking as many questions to others and oneself as possible. The objective is to verify the



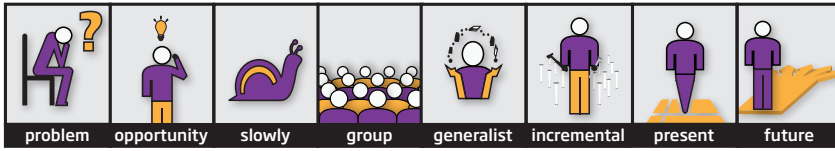
ideas from various angles. The Angel's Advocate technique has a trifold purpose: to develop active listening, to establish a flow of sympathy with the author of the idea and to focus the energy on positive things.

5. **APPLICATION:** in the last stage, the group seeks possibilities of application of an idea in a useful product or service, or for an upgrade of an existing product. The group first searches for possibilities in a very creative way, while after the completion of the divergent part, the possibilities of application are considered objectively, considering the available resources and external factors (legislation, market situation state of the market, the economic situation, competition ...).

*Participants.* The method is carried out in a group of participants with diverse experience and ability of creative as well as focused thinking.

*Duration.* Implementation is medium-long to long since each stage requires at least an hour or two of active work. It is recommended to make breaks between individual phases (e.g. one phase per day).

## 22. PDCA Deming cycle



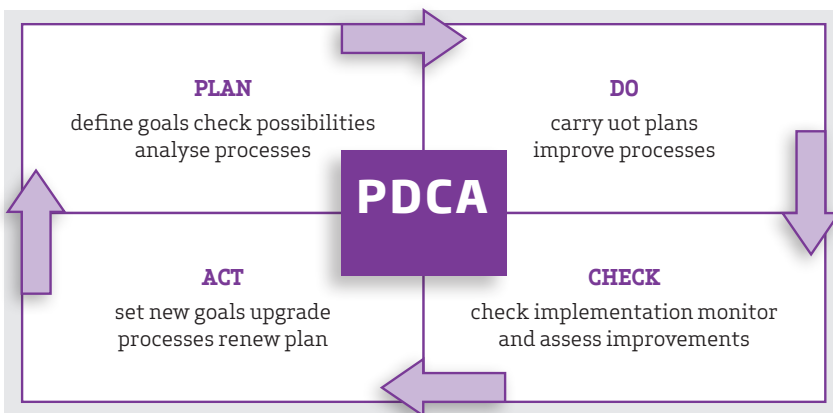
*Description.* PDCA or plan-do-check-act is a cyclic method intended for the improvement of processes, as well as also products. It is also known as the Deming cycle.

*Purpose and applicability.* PDCA method is used to improve organisational processes and to solve problems. It allows continuous search for more effective methods for the improvement of organisational processes.

*Implementation process.* The method is carried out in 4 phases, it is easy to understand and implement. Phases of the PDCA cycle are:

1. **PLAN.** We begin by identifying the existing state. Once we have defined the problem, we prepare a plan how to solve the problem and determine the goal we want to achieve.
2. **DO.** We begin to carry out activities in accordance with the plan.
3. **CHECK.** We monitor the processes. We then review them and evaluate the results of the changes. Has the change brought improvements? If it has, then we continue with this, if it has not, and we do not notice any improvements, we re-define the goal or improve it.
4. **ACT.** We think and act in accordance with new findings. We determine the appropriate measures, which will be taken to make corrections. Action is the most important aspect of the PDCA cycle (Sokovič in Pavletič 2007).

PDCA is a model that is never completed. When we reach the last phase and act, the cycle is repeated from the beginning. If necessary, we redefine the objectives and then we begin to seek new opportunities for problem solving and improvements.



**Figure 36:** Scheme of the principle of PDCA

The **8D** method has been developed in the automotive industry, and represents which is an extension of the Deming cycle. It consists of eight steps, hence its name. It can be used in all industries or sectors where the production process is highly structured and specialised.

The 8D method allows accurate definition of the problem and thereby elimination of actual causes of the problem, such as noncompliance of a product or noncompliance of the process operation of the process. It provides a comprehensive solution to the problem; hence the problem is less likely to reoccur.

The method is controlled in such way that we have a summary sheet – an 8D report. The data, which are the basis for planning the management of the activity implementation process, are entered into the report. It is easier to monitor the individual steps on the path towards achieving the objective if we use the summary sheet. The report also serves as a tool for the exchange of information (it is an evidence of the activities that have been conducted, of the effectiveness of activities).

The method is carried out in eight steps:

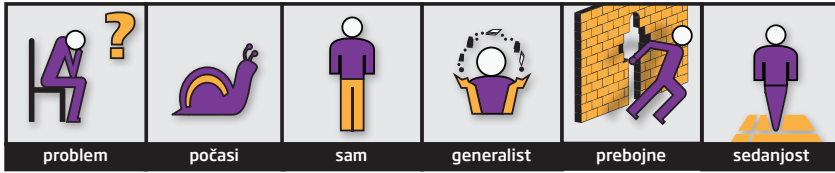
1. problem identification,
2. problem description,
3. immediate measures,
4. cause,
5. corrective measures,
6. evaluation of efficiency,
7. dissemination,
8. conclusion.

In every step we record the state, set activities and responsible persons, note measures and results or findings, and then continue with the next step.

*Participants.* In both the basic and in 8D version the method is performed in a group and may not be performed individually, since it is necessary to consider all aspects of the process or organisation.

*Duration.* The method is lengthy and entails a cycle which is in principle never interrupted. The duration of each phase is completely dependent on the complexity of the processes within the company, the goals set, as well as the conditions for achieving them.

## 23. TRIZ - Theory of Creative Problem Solving



*Description.* The method is relatively complex and demanding, and is carried out with the software, which includes a database of the patents and improvements. It is a systematic problem-solving method based on logic, data and research, rather than on intuition.

*Purpose and applicability.* TRIZ entails a systematic approach to reviewing patent databases. We approach to solving the problem by redefining it with regard to previous related problems, the solutions to which we can find in the patent database. The slogan of this tool is that “someone somewhere has already solved such (or very similar) problem”. The tool is particularly useful for problems where it comes to contradictory situations or if we cannot find a solution using other tools, whereas a special and relatively expensive software is needed for its implementation.

TRIZ is a methodology, a set of tools, database and model-based technology for generating ideas to solve problems. Contrary to the brainstorming, which is based on a random creation of ideas, TRIZ strives to create algorithmic approach to the creation of new or refining old systems.

TRIZ was developed by an expert on patents, Genrich S. Altshuller, who successfully reviewed more than 200,000 patents, namely in the search of inventive problems and ways how they were solved. Of these patents, only 40,000 had inventive solutions, while others were merely improvements. Altshuller classified these patents in a new way. He eliminated the content ‘subject’ so that he could reveal the very process of solving the problem. He established that the same problems were solved over and over again by using only one of the forty basic inventive principles. He then classified the solutions into five levels, as shown in Table 3.

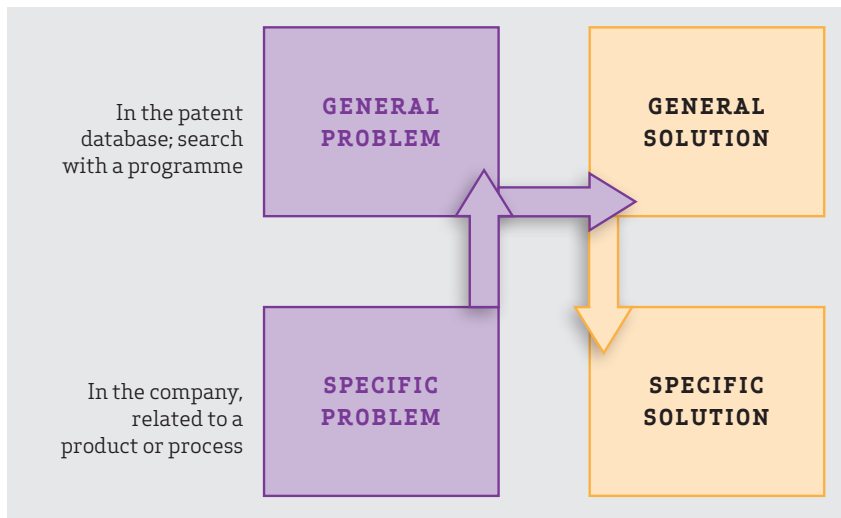
**Table 3:** Stages of solutions according to Altshuller

Level	Level of inventiveness	% solutions	Source of knowledge	Approx. no. of solutions which need to be taken into consideration
1	Apparent improvement	32%	Personal knowledge	10
2	Minor improvement	45%	Knowledge within a company	100
3	Great improvement	18%	Knowledge within the industry	1.000
4	New concept	4%	Knowledge outside the industry	100.000
5	Discovery	1%	Entire All knowledge	1.000.000

Source: Altshuller 1984

Altshuller discovered that more than 90 percent of the problems, which engineers were facing, had already been solved before. If engineers could follow the path to ideal solution, starting with the lowest level, personal knowledge and experience and continue on to higher levels, most solutions would derive from the knowledge that already exists within the company, industry or any other sectorial industry.

*Implementation process.* The tool is implemented by means of software, which with the selected algorithm searches the database for solutions to similar problems as those addressed. Most programmes are shareware and relatively expensive yet contain a fairly sophisticated databases and sets of solutions (e.g. IHS GoldFire, TrizSoft Trizy or WorkBench). There are also some free, publicly available programmes, which have limited databases (e.g. Oxford Creativity TRIZ Effects Database, TRIZ40.com, time-to-innovate.com). A specific problem is first defined with some general definitions, on the basis of which a programme finds general solutions. It is then necessary to use creativity and then derive from the general solutions specific solutions to an actual problem.



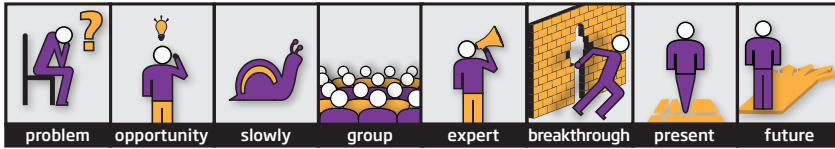
**Figure 37:** Scheme of TRIZ method (Source: Barry, Domb and Slocum 2001)

Figure 37 shows the basic concept of TRIZ: a specific problem, which we are addressing, needs to be given in a general form by the determined “variables” of the problem. If for example we have problems with fitting of two elements due to the insulating layer, we are dealing with variables “temperature”, “fit” and “insulation”. With the help of these variables we search in the patent database for the existing solutions to similar problems in other areas. We carefully review these solutions, seek opportunities for application in our specific problem, and then design an appropriate solution.

*Participants.* TRIZ is a tool that can be used by individuals or groups.

*Duration.* Search for one solution is relatively fast, while decision-making process and repetition of algorithm and especially the search for a specific solution may take longer until the solution is satisfactory.

## 24. USOMID/SREDIM



*Description.* USOMID/SREDIM is an applicative methodology that combines different methods for selecting a problem and creating ideas to solve it. It originates from the dialectical systems theory of Ddr. M. Mulej, Prof. Emeritus as a methodology for achieving integrity in creativity. It is based on the creative work of colleagues and focuses on work processes – more creative than routine.

*Purpose and applicability.* The method is applicable both to define the problem and to generate ideas and is suitable for all kinds of problems. The method is lengthy, yet has the potential for breakthrough innovations.

*Implementation process.* The group participates in six phases, from problem identification to the introduction of solution in practice, whereby in each phase the individuals first record individual proposals, then exchange the notes and complete them. They then discuss the proposals (e.g. by brainstorming) and align findings. It is important at each phase to focus on the work process. Usually, this is in large part a matter of routine; however, with USOMID/SREDIM method creative thinking is brought also into the routine elements of processes. The SREDIM steps facilitate an orderly work process, rather than cooperation. Hence, Mulej and colleagues (2004, 2008) added four steps within the method.

The process of work and cooperation pursuant to USOMID/SREDIM is shown in the Figure below.

		Steps in the process of cooperation			
		1. individual recording of ideas	2. exchange of notes for additional individual recording of ideas	3. discussion (brainstorming) to align findings	4. recording of group findings
Steps of work	S – selection of a problem				
	R – recording of data on the selected problem				
	E – evaluation				
	D – determination and development of the selected solution(s)				
	I – implementation of selected solution				
	M – maintaining the implemented solution				

**Figure 38:** Process of work and cooperation pursuant to SREDIM method

The USOMID/SREDIM method enables creative cooperation within each phase of the process, even if the individual does not master each phase. Selection and definition of individual phases of innovation is dependent on the topic, industry and the choice of the dialectical aspects of the system. The process is carried out using the composition of the letters SREDIM.

- S:** A set and selection of problem: we collect possible topics, select one, and prepare to work on it from the definition of starting points to progress towards objectives. (Select)
- R:** Recording data on the selected problem, we do not ask the question “Why?” for any piece of data. (Record)
- E:** Evaluation of the described features of the selected problem, search for the hidden essence. (Evaluate)
- D:** Determination and development of possible solution, which is considered the most realistic. (Determine)
- I:** Implementation of the selected solution, introduction of novelty. (Implement)
- M:** Maintaining the implemented solution, novelty becomes a useful practice, proposals for further improvements. (Maintain)

In accordance with the USOMID/SREDIM method the participating group determines also the problem (stage S) in 4 steps of cooperation. Thus, it is very unlikely that anyone considers the problem, which he/she helps to think about, as forced and therefore does not want to participate. Matjaž and Nastja Mulej (2007) introduced into the USOMID/SREDIM method also the use of De Bono’s six thinking hat’s (De Bono 2005).

*Participants.* The method is carried out in a group.

*Duration.* The implementation of the method is lengthy.

METHODS THAT WILL TAKE MORE TIME,  
YET IT WILL BE TIME WELL SPENT





# THE ART OF MANAGING INNOVATION PROBLEMS AND OPPORTUNITIES

## **Part 3:** PACIS and eMIP methodologies for systematic introduction of pre-invention phase in an organisation

## eMIP and PACIS: for whom and for what?

In the second part of this Book, we presented the selection of methods for addressing the problem in more detail. The said part was intended for a broad range of readers, in fact, all those who in some way wish to begin with the introduction of primarily invention methods in their organisations. The present part is intended for “more demanding users”, researchers who engage in innovation processes, as well as managers and heads of development departments or groups at the middle-management and senior-management level who want to comprehensively organise the first phases of the innovation process and to encourage innovation culture in their organisation. In order to achieve this, they need an appropriate systemised approach. In the next section of the Book two methods for comprehensive fostering of innovation and for introducing and strengthening of innovation culture in companies are presented. These are methodologies that have been developed and tested in the context of the international project SharTec and were positively accepted in its test version.

The first method, PACIS, is designed for work in a smaller group of staff of one company and for solving concrete and known problems (if the problems are concealed, we recommend the use of methods: Problem Focus, Innovation Cube or other appropriate methods). Understanding the fundamental causes of the problem is the first and necessary step towards finding appropriate solutions. PACIS stands for problem/challenge analysis, creation of ideas and selection. It is an approach to creative problem analysis and search for solutions, including even breakthrough solutions. It is suitable for demanding problems and allows their identification, analysis and solution. PACIS is carried out in a group of 5 to 10 people who are partly specialists in the field of detected problem and partly generalists. A part of the participants, also external experts, must have sufficiently broad knowledge from other fields and be familiar with the upcoming trends. The effectiveness of the PACIS approach depends largely on the quality and creativity of work of the entire group, consistency in following the steps of the process and the implementing emphasis on visualization. Implementation is carried out in several phases. The problem is determined during the preparation phase. The problem is precisely defined and analysed as well as decomposed on basic factors or source problems. This is followed by a search for or creation of solutions based on the identified source problems or causes of the problem. Through the cooperation of experts in various fields and creation of ideas, the approach builds on the consideration of upcoming trends and at the same time co-creates them – both at the level of technology and at the level of integration with other industries.

The second method, eMIP, is intended for a wider group of employees. With the use of eLearning, on the one hand the method opens concrete problems and provides solutions, while on the other hand empowers a greater number of employees to create the invention-innovation structures and strengthen the innovation culture within a company. eMIP is a method of mass identification of problems focused on the first phase of invention-innovation process and partly takes place in a virtual environment. A group of employees under the mentorship uses a variety of techniques to identify and analyse a large number of problems and/or challenges. These may be the starting point for both incremental and breakthrough solutions. The implementation of eMIP is carried out in two alternating forms, workshops and group work through eClassroom in which more participants from a company are included. Over a period of several weeks of continuous work under the guidance of an eMentor and with adequate approaches, the participants search for problems and opportunities as well as the appropriate ideas for solving them. In doing so, the participants solve concrete problems, while enhancing the innovation culture.

# PACIS Method for problem/ challenge identification and search for solutions

## Detailed description of PACIS methodology

*This is an original method, which is a result of the development of the following authors: Borut Likar, Janez Kopač, Peter Krajnik, Aleš Koder and many foreign authors, especially O. Bayard, M. Areskoug, C. M. Nicolescu, M. Saat, D. Nolan and H. Ahlin.*

## The methodology for problem/challenge identification and search for solutions (including also breakthrough solutions)

### OBJECTIVE

PACIS is a method of creative problem analysis and search for solutions, including the also breakthrough solutions. Problems can be large or small, simple or complex. However, given the relative complexity of the method it is particularly interesting for more complex challenges. Irrespective of the nature of a problem, PACIS provides ways to identify, analyse and solve. The focus is on the problem-solving process, which is carried out in the working environment of the group. The methodology is based on a method of Experience transfer model, a new concept for innovation power and may be used for different types of problems, for example technical, organisational, financial, operational problems... (Bayard et al. 2012).

The effectiveness of the PACIS methodology depends largely on the quality and creativity of the work of the entire group and consistency in following the steps of implementation. However, we wish to note that the proposed individual methods for addressing the problem and for selecting ideas are the most suitable for application in the PACIS methodology. However, depending on the nature of the company and the level of innovation culture an experienced person implementing the method may also choose any other comparable method, which is described in the second part of the Book.

The methodology consists of many phases. The first step is the preparation of a problem, which is performed before prior to the workshop. At the workshop, the problem is first presented to all participants. This is followed by the phase of visualisation and clarification of the problem. The aim is an in-depth and comprehensive understanding of the problem (e.g. in addition to an analysis of technical aspects of technological problems we also analyse other aspects, for example human resources, organisational aspects, etc.). The next phase is the phase of decomposition of the problem, where the whole problem is decomposed to underlying problems or causes thereof. Solutions are created based on the identified key problems. Since we want these solutions to be modern and future oriented, we use preliminarily conducted analysis of upcoming trends (Future Trends) when creating ideas.

### PARTICIPANTS

A group for a PACIS workshop consists of 5 to 10 people. If there are fewer participants, the discussion cannot properly develop, yet if there is are a

greater number of participants, the participants tend to hold back. It should consist partly of specialists – experts in the field of the considered problem, and partly of generalists with a sufficiently broad general education and the ability to integrate ideas of the group members into a joint conclusions. It is useful that people who are not employees of the company – both colleagues from other companies and from the academic environment – are also present. As a rule, the participants should be creative and tolerant. Depending on the culture that prevails in the parent company, it seems reasonable to consider the hierarchical levels in the company when composing a group. Otherwise, it may cause discomfort amongst both employees and management.

### IMPLEMENTATION

The whole process consists of two phases. The first phase is the phase of preparatory activities, while the second phase entails the implementation of workshops in the company. The content of initially presented steps is presented hereunder.

## Methodology phases/steps

### Phase 1 – Preparatory activities

The individual steps are carried out based on the previous cooperation and agreement with the company.

- |   |                |
|---|----------------|
| Step 1: Presentation of the PACIS methodology   | approx. 5 min  |
| Step 2: Presentation of the basics of innovation and the situation in the region/industry | approx. 10 min |
| Step 3: Presentation of methods for problem/challenge identification                      | approx. 15 min |
| Step 4: Agreement on the workshop   | approx. 15 min |

### Phase 2 – Workshops – practical work in companies

prior to the workshop (prepared by the company, coordination via telephone or e-mail)

- Step 1: Company defines a minimum of three problems
- Step 2: Selection of one problem per company for further work at the workshop
- Step 3: Analysis of the upcoming trends

workshop (as a rule held in the company)

- Step 4: Presentation of the problem and review of the situation in the company (15-60 min)
- Step 5: Questions of participants with the purpose of clarification (30 min)
- Step 6: Decomposition of the problem + selection (group work) (30-45 min)
- Step 7: Outline of upcoming trends (30-45 min)
- Step 8: Preparation of group proposals regarding solutions (30 min)
- Step 9: Presentation of proposals – analysis of the problem and solution (15 min)
- Step 10: Reflection – comments of the problem “owner” (15 min)
- Step 11: Teamwork - improvement of proposals / common strategy (30 min)
- Step 12: Preparation of a plan for implementation (optional) (45 min)

### MORE DETAILED PRESENTATION OF INDIVIDUAL PHASES:

#### Phase 1 – Preparatory activities

##### Step 1: Presentation of the PACIS methodology

The methodology is intended for identification of a problem/challenge and searching for solutions (also breakthrough solutions) in the selected company. A short presentation of the methodology with an emphasis on the presentation/management of the innovation process and especially its first phase. The presentation is carried out by an (external) moderator, trained and experienced in the PACIS methodology.

### **Step 2: Introduction of the basics of innovation and the situation in the country/region/sector (optional)**

Short presentation of the innovation work platform and overview of the situation in the EU, reference regions and sectors, depending on the client. Presentation is performed by a moderator or an employee who performed the analysis.

### **Step 3: Presentation of different methods to identify the problems/challenges**

A few simple methods are carried out within PACIS. Selected methods are presented in detail: objectives, the method itself, inputs, expected results as well as the plan of work and communication. The presentation is performed by a moderator.

### **Step 4: Agreement on concrete work in the company (participants, administrators)**

An agreement on:

- preparation of the problem(s)
- trend analysis
- execution of the workshop (schedule, participants, responsible person)

## **Phase 2 – Workshops – practical work in the companies**

*(before the workshop)*

### **Step 1: Definition of the company's problem**

Short presentation of a minimum of three problems and their aspects, the length of approximately one paragraph. Problems are prepared and presented by the designated administrators from the company.

Guidelines for the preparation of the problem:

- present the problem comprehensively, explain who is affected (individuals, companies, customers, and suchlike), how long has the problem existed, briefly describe the previous attempts of solving to solve the problem and suchlike.
- the problem should not be defined too narrowly, or one that involves exclusively technical details
- the problem should be clearly presented.

### **Step 2: Select one problem per company for further work at the workshop**

Pursuant to the guidelines, one problem for further work is selected at the meeting (live or in virtual environment) by moderators – persons implementing the methodology – and the company.

### **Step 3: Analysis of the upcoming trends**

Some of the participants, especially experts from the narrower field of the problem, are given a task to prepare some baselines points of future trends. They do this on the basis of the selected problem which the group will resolve (Phase: Selection of one problem per company).

(workshop)

**Step 4: Presentation of the problem and overview of the situation in the company** (15-60 min)

The company, which presents the problem, prepares a clear and comprehensive presentation of the problem to the person implementing the methodology. If necessary, it organises a visit to the company and locations of the “problem” with the aim of visualisation thereof. Such a visit is also attended by the participants of the PACIS workshop.

**Step 5: Questions by participants with the purpose of clarification** (30 min)

An in-depth analysis of work processes and the environment where the problem emerges. The aim of the analysis is to comprehensively address the problem and to clarify various aspects of the problem.

- Comments and explanations regarding the work process.
- Interviews and questions of the participants for better understanding of the problem.

Possible inhibitory factors which may be foreseen and taken into consideration in the implementation of the meeting:

- the owner of the problem does not want to talk about the problem;
- the owner of the problem does not see the problem;
- the problem is not structured;
- the most important aspects of the problem are not presented.

The concept of in-depth analysis is applied: creative thinking, adapted concept of brainstorming - no criticism, no stupid questions, we refer to the questions of other participants, we make the meeting fun, we think broadly, use provocative questions ...

**Step 6: Decomposition of the problem and selection of key causes (group work)** (30-45 min)

Fishbone diagram – definition of four aspects (there can also be others) where we look for causes of the problem: employees, methods, materials, technology.

Implementation process:

Phase 1 implementation of the fishbone diagram – decomposition

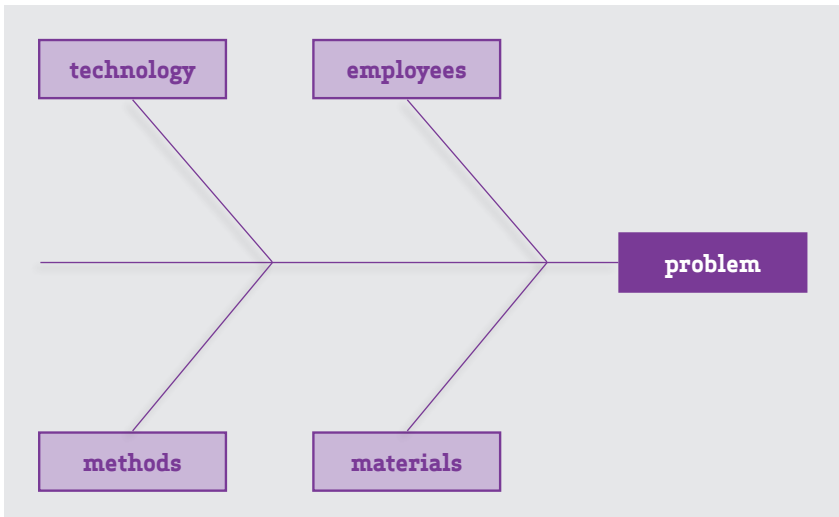
In the middle of the board or large sheet of paper we draw a long horizontal arrow pointing to the right. We write the problem on the arrow, which needs to be explained. The arrow represents the “fish’s spine”.

For each probable cause that a group comes up with we draw one line (fish rib) from the “spine” at an angle of 45 degrees and we mark it at the end. We then add sub-arrowheads, which represent sub-causes. We mark all causes that occur more than once – they might be relevant.

The group should then consider every cause or sub-cause, starting with the simplest, partly due to reasons of clarity, but also since complex explanations may be unnecessary because of good simple explanations. When decomposing the problem the leader of the group introduces as appropriately the presented concepts of problem identification.

It is best to re-draw the diagram so that the position along the “spine” indicates the relative importance of different parts of the problem – the most important part is drawn at the “fish head”.

We circle everything that could represent a key cause, so we can focus on such a cause later.



**Figure 39:** Basic framework of Ishikawa diagram

In terms of efficiency in solving the problem, the experienced users of the diagram add more branches and/or use different categories. The Figure 39 shows the basic framework of the Ishikawa’s diagram – described in more detail in the previous chapter.

Phase 2 of the implementation of the fishbone diagram – a selection of the most topical problems

Determination of the criteria for the selection: e.g. the topicality of the problem. When the fishbone is fully drawn or when the participants exhaust their ideas, we mark the most important problems.

**Step 7: Outline of upcoming trends (group work)** (30-45 min)

Based on the key issues, we carry out a round table on the topic of upcoming trends. This is a presentation of trends and knowledge which both specialists and generalists have; however, given the key elements of identified problems from Step 6, they are sought and presented in this phase. Work is led by a coordinator who ensures that as many different trends as possible are found. The discussion is limited to the minimum. To prepare conclusions coordinator may use the technique of mental map or time line. The result is more guidelines, partially structured, in respect of which we do not take sides but they only serve as data for the next step – creation of ideas. At the same time, one of the members of the core group (the organisers of the workshop) works on the visualisation of the identified trends – based on the results of the group’s work, he/she looks for photos, drawings, and suchlike so that the participants memorise, understand, are aware of the presented trends (the idea is in analogy with one of the techniques of idea creation – the technique of forced connections, which is upgraded with visual images of the upcoming trends and which further facilitates the creation of ideas). If necessary, some pictures are prepared in advance.

**Step 8: Preparation of group proposals regarding the solutions** (30 min)

Participants may be divided into smaller groups.

On the basis of Step 4 (Presentation of the problem), 5 (Participants' questions), 6 (Problem decomposition) and 7 (Outline of upcoming trends) the participants using the principle of the idea creation technique (i.e. first the creative part, and then the selection) prepare a set of the most significant problems and proposals for solutions. In doing so, the leader encourages them to try to generate ideas on the basis of knowing the future trends. The proposals are based on a preliminary analysis and on the basis of their own knowledge and experience. It is desirable that best practices from other related companies and other industries are integrated as well. It is therefore a method of "organic" integration of Future trends into the generated ideas.

Phase 1 – creative part: work in small groups with a few participants, for example with the techniques of brainstorming technique (brainstorming, Philips Buzz 66, idea writing).

Phase 2 – selection: determination of the criteria on the basis of which the ideas will be assessed, for example applicability, feasibility, price; a selection of up to three ideas for further work.

**Step 9: Presentation of proposals – problem and solution analysis** (15 min)

Each group presents its proposals.

**Step 10: Reflection – comments of the problem "owner"** (15 min)

Participants from the company comment on various important aspects: the quality of proposals, applicability (estimated costs, necessary resources, time-frame, ...), obstacles and limitations of the implementation and other comments.

**Step 11: Teamwork - improvement of proposals/joint strategy** (30 min)

Based on the Step 8 (preparation of group proposals) and 10 (Reflection), the team supplements the proposals and prepares a joint strategy to implement the solutions. If the following step, Step 12, is implemented, only the optimisation shall be performed.

**Step 12: Preparation of implementation plan (optional)** (45 min)

The group prepares an implementation plan for the selected proposals and solutions, while pursuing the following steps:

1. specify one or more main fundamental identified problems and briefly describe them;
2. indicate the expected measurable results for the most promising selected solutions;
3. describe the main steps or substantive milestones and deadlines and identify persons responsible for achieving the objectives;
4. define potential obstacles and ways of overcoming these obstacles.

It deems reasonable to identify the person responsible for implementing the plan. A well-prepared plan represents the basis for work, which should not come to a halt. By following the method of work in the PACIS methodology, i.e. continuous performance of tasks, motivation of all the involved participants and appropriate delegation of responsibilities we can effectively carry out the solution implementation plan.



# eMIP method for mass identification of problems supported by e-learning

*This is an original method, which is a result of the development of the following authors: Klemen Širok, Borut Likar.*

Methodology for mass identification of problems represents the manner of conveying and applying of the already discussed methods (see Part 2), which are focusing on the first phase of invention-innovation-diffusion process, specifically on the identification of problems or challenges, which are present in the company and its environment, yet not sufficiently clearly detected. In this way an excellent starting point for both incremental and breakthrough solutions and (additional) momentum of innovation processes in a company is set up. The approach also includes the creation of solutions as well as the selection of appropriate solutions to a selected problem. MIP, which is carried out through workshops, promotes horizontal integration by involving employees from different departments within a company. With a variety of activities, the method encourages the identification and understanding of different problems and different aspects of the same problem; not only in the field of technological development, yet also from other aspects of a company (services, business processes, organisational challenges, management, human resources challenges, customers, suppliers, work organisation, communication, subcontractors, etc.). As a result of one-day workshops, we may expect a greater number of detected innovation opportunities and creative solutions that are ready for implementation.

eMIP represents an upgrade of the presented methodology for mass identification of problems. eMIP is a system of support of external contractors to the idea management in the company and upgrades MIP with individualised work of more employees in the company and ongoing mentoring support to the introduction of idea management into the company. It is carried out mainly in the e-creative environment in which participating employees and mentors meet. It is a kind of “outsourcing” of the first phases of the innovation process with a creative participation of employees in the company. This form of work increases the flexibility and creative work and introduces elements of sustainable innovation in the company: development of invention-innovation structures and enhancement of innovation culture.

eMIP is therefore a method which allows companies to introduce innovative thinking and integrate different methods in everyday work processes regardless of the state and design of innovation strategy, policy or culture. We

could say that it facilitates understanding and introduction of a large number of diverse, already presented methods for addressing problems as well as ideas in a relatively swift and easy manner. Unlike the previously described PACIS methodology where external experts are required or at least welcome for the implementation of the methodology, the eMIP method may be – with some experience – carried out independently within the company yet it is certainly reasonable to include a group of experienced mentors – moderators of workshops and e-shops in the initial, introductory phase.

Below we present the structure and implementation of eMIP in more details. Similarly, as for the PACIS method, we wish to note that according to the authors the selected and presented methods are the most suitable ones for implementation in the context of eMIP, however, the person implementing the method may choose also other methods and techniques, which are collected in the second section of the Book, and adjust the selection according to the characteristics of the company and work processes as well as specific problems. At this point, we wish to add that the individual methods in the presentation of eMIP are only briefly presented, while detailed descriptions may be found in the second part of the Book.

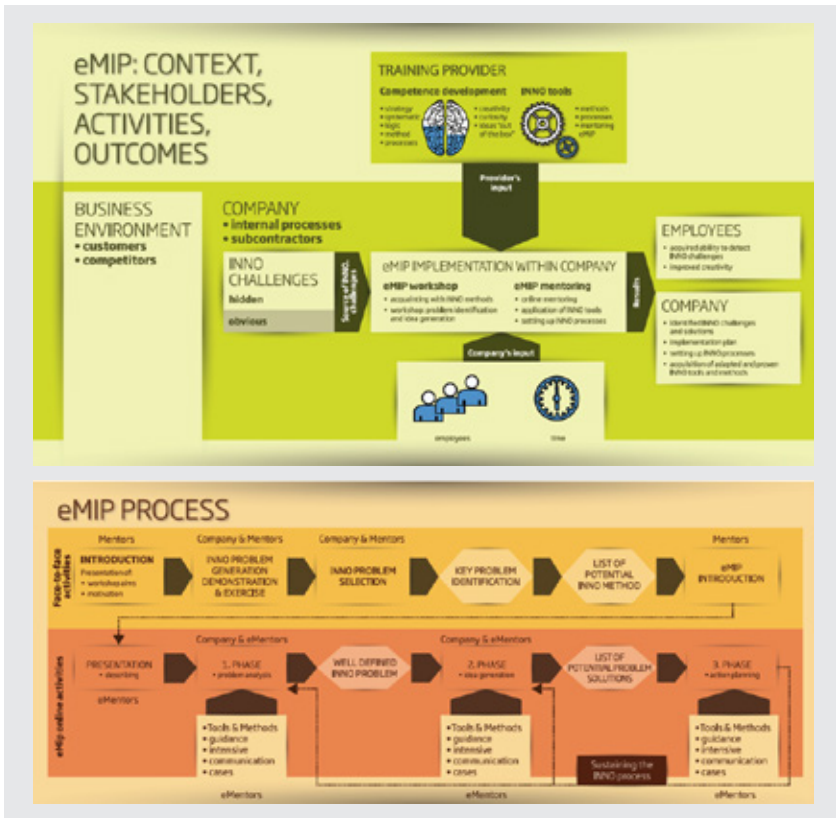


Figure 40: eMIP concept

## Implementation

Implementation of eMIP is based on three constitutive elements: workshops, eClassroom and activities which ensure sustainability of the introduced innovation activities within the company (Figure 40). eMIP applies and combines established innovative methods and tools presented in the second part of the Book and eLearning in a new manner. Pursuant to its basic structure the eMIP method is a clearly defined method yet extremely flexible with regard to its implementation and simpler methods applied and may be adapted to the many specifics of companies. From a wide range of innovative tools and methods, which are applied in the early phases of the invention-innovation process, eMentors may offer to participating companies those tools and methods which they see as appropriate as regards the company's activity and other specifics.

### Participants

The use of Moodle system to support learning (Learning Management Systems – LMS) provides flexibility in the implementation, both in terms of the pace of activity in the company and in terms of the number of participating companies. eMIP is carried out in the period from one to two months. The number of participating companies and the number of employees involved needs to be adapted to the limi-

tations set by the eLearning environment, and the number of available eMentors. Theoretically, a group of three eMentors may simultaneously provide support to ten companies. Optimal scope and quality of mentoring is achieved in five to eight participating companies. A company is represented by an innovation group, which consists of the head of the group and a minimum of two to three employees from different departments of the company. A lot of attention should be paid to an appropriate selection of participating employees in the innovation group. Characteristics of participants are often a determining factor in the creative processes. If feasible, eMentor selects a coordinator of the innovation team together with the company's management, whereas the desired personal characteristics are primarily openness, pro-activity, creativity and ability to lead the group.

### Methodology phases/steps

The eMIP implementation process represents a combination of practical workshops, work in the eClassroom (Moodle) and activities, which ensure sustainability of innovation activities introduced in the company. Individual steps are carried out based on previous cooperation and agreement with the company. It is only important that we first carry out the introductory workshop. After the completion of the workshop, the work continues in the eClassroom where different tasks are performed in an interval of five working days or up to two weeks. A concrete implementation plan is prepared by eMentors depending on the nature of the participants' work. If there is a need for additional personal meetings, these are organised in agreement with the company. Presented steps are described in more detail hereunder.

## Workshops

At the beginning eMIP envisages an event with face-to-face participation of mentors and participants from the companies. Introductory workshop serves for the familiarisation of companies with eMIP and ensuring an adequate level of motivation of the participants. It is carried out in the form of a short workshop, which lasts about 6 hours. Preparation of workshops and activities of e-mentoring is in the domain of mentors who are familiar with and qualified in the field of innovation management, idea management and distance learning.

The first workshop is intended also for meeting the participants, demonstration of the potential of innovative tools and agreement on further cooperation. The introductory part of the workshop is brief and devoted to delivering basic information on the state of innovation in the country and the industry and the importance of systematic innovation development. It also presents the guidelines of contemporary models of the innovation process (e.g. open innovation, 5th generation models), their advantages for the company and the role and purpose of eMIP within the innovation process. The workshop continues with a concise presentation of selected methods of mass identification of problems. In doing so, we introduce in a few sentences the basic principles and the practical value of each method, which we further substantiate using illustrations and examples.

The workshop continues with three groups of activities.

1. **PROBLEM IDENTIFICATION.** In the first set of activities the moderators ask the participants to identify a large number of problems and/or challenges within their company. Problem identification is carried out with the assistance of guided implementation of three to five methods of problem identification, where each of the offered methods follows a

different fundamental principle. Successive implementation of different methods confronts the participants with innovation in different areas of company's activities (production, marketing management, work organisation, etc.) and different ways of thinking, into which they are "forced" by various fundamental principles of the methods applied (e.g. problem mining, quick and dirty method, fishbone diagram).

The purpose of the first set of activities is to show that with appropriate mentoring and guidance it is possible to identify a number of real problems in a relatively short period of time. Quite a few problems with innovation potential may be extracted from a number of identified problems on the basis of an appropriate selection process. The manner of implementation of this set of activities is upgraded with the potential offered by the group dynamics. Appropriate moderating which encourages discussion (may) systematically contributes to the exchange of alternative views and thinking patterns of the participating companies or individuals.

2. **PROBLEM ANALYSIS AND EVALUATION.** In the second part of the practical activities the participants assess the problems they have identified in the previous exercise. For each of the identified problems they assess whether it is a case of a fundamental, basic problem, which is already suitable for searching for solutions, whether it is a problem that requires further decomposition, or a problem, which is inappropriate for examination and is therefore discarded.
3. **UNDERSTANDING PROBLEMS' POTENTIAL.** The third set of activities, which is carried out by the workshop moderators, is intended to show the potential of identified problems for innovation. By demonstrating the implementation of methods for generating ideas (e.g. brainstorming, idea writing, forced connection) the moderators search for as many ideas for solutions as possible for the already identified problems. This exercise serves showing that guided implementation of different methods may lead to concrete and useful results in a short time. The concrete implementation of methods is carried out via e-mentoring in the eClassroom.

The last part of the workshop is intended for the presentation of eClassroom with an emphasis on e-mentoring, which is further elaborated hereunder. By doing so, the workshop moderators, who are the future eMentors, provide companies with a realistic demonstration of the planned follow-up activities and necessary resources for the implementation of eMIP and expected results and benefits.

## eClassroom

The activities and methods which the participants have learned about at the workshop are repeated in the eClassroom. Members of the innovation group implement the methods based on real, current or hidden problems within the company. The implementation of methods takes place within the company, and is carried out by the employees themselves under the guidance and mentoring of eMentors. Materials for the implementation of methods, additional literature and interactive tools to communicate with eMentor (forum, chat room, mailbox for the exchange of documents) are available to the participants in the eClassroom. Members of innovation group participate in the in eClassroom as a study group. This allows the eMentor to adjust the quantity of assignments with respect to the current work dynamics of the company and encourages the innovation team at work.

**eMIP**

PRISOTNI ZA KURZ: Inovacija brez domnevalnega in v masa občinstva (novi)

EMIP → Moj profil → Nastavitve profila → eMIP

**NAVIGACIJA**

Domov

- Moj dom
- Strani spletnega mesta
- Moj profil
- Trenutni predmet
  - eMIP**
    - Sodelovalci
    - Bodnje
    - DOBRODOŠLIČA
    - NAVODILA ZA IZVEDBO 1. AKTIVNOSTI
    - KNJIŽNICA
    - POPOTNICA
  - Moj predmeti

**Zadnje novice**

Dodaj novo temo...

Klasni štiri 27. Jan, 12:34  
Povezava do video konferenca

Klasni štiri 4. Jan, 17:42  
Najdra 4. aktivnosti eMIP

di. Doris Likar 19. Nov, 08:29  
Nova gradiva v knjižnici

Klasni štiri 12. Nov, 12:57  
Trenutni za izvedbo inovacijske kurseve

Klasni štiri 30. Nov, 11:30  
Obdajanje poročil

Starejše teme ...

**Prisotni uporabniki**

(zdajh 5 ljudi)

Klasni štiri

**Nastavitve**

Spletno predmetno

Ocena

Zamenjaj vlogo v...

Vsi se v mojo spletno vlogo

Nastavitve svojega profila

**DOBRODOŠLIČA**

Po uspešnem začetnem spoznavanju Moodle okolja nadaljujemo z raziskovanjem njegovega potenciala in prvih komunikacij v njem.

Se naprej vam želimo uspešno delo.

Edija Fajduta za management

Splošne novice in najzve - jerna ogledna tabla

**NAVODILA ZA IZVEDBO 1. AKTIVNOSTI**

V nadaljevanju vas čaka nekaj aktivnosti. Vsaka aktivnost predstavlja vsebinsko celoto, za izvedbo katere je predviden 7 dnovi izvedbeni rok. In se nadijate je z naslednje zadolžitve. Pomembno prebrajte navodila zapletena pri vsaki nalogi, jih izvedite natančno in poskušajte izdelati pravo povezavo **ODGLAVNA RAZVOJNA POROČILA OZ. PREGLEDNOV**. Pregleda poročila oz. pregleda bomo pregledali in vam posredovali povratno informacijo z ustreznimi glade možnih izboljšav.

Če se vam pri delu pojavijo vprašanja, priporočamo, da pravnika upoštevate, ne obklevate in jih posredujete preko zavestnih oz. javnih komunikacijskih kanalov, ki jih najдете v spodnjem delu strani.

V prvi aktivnosti vas pozivamo pred izvirni identifikacija čim večjega števila relevantnih inovacijskih - inovacijskih problemov v Domolu. Iz dobijene množice bomo v nadaljevanju (naslednja dva) izbrali po en "horizontalni", en "vertikalni" in en "transverzalni" problem, katerega reševanje bomo nato simulirali v Moodleu.

A pojdimo po vrsti. Najprej boste za potrebo identifikacije problemov uporabili **PROBLEMSKO REŠEVANJE**.

- 1.) Vsaki član inovacijskega tima naj v spodnjem razdelku **ODGLAVNA POROČILA OZ. PREGLEDNOV** REŠEVANJE in si obravna ogleda.
- 2.) Član inovacijskega tima se nato virtualno poveže preko foruma **ODGLAVNA POROČILA OZ. PREGLEDNOV TIMOV**, ki je namenjen komunikaciji notranj tima. Servisa se tim lahko sestane tudi v "živu", vendar bi zaradi potrebe spoznavanja Moodlea poskušali vztrajati v virtualnem okolju.
- 3.) Po opravljeni razpravi in usklajevanju znotraj tima, naj vsak tim zbere probleme in jih (p)opisuje v eni obravni. Ta obravna pa nato odda mentorju na povezavo **ODGLAVNA POROČILA OZ. PREGLEDNOV**, nek na oddajo izboljšnega obrazca je ponedeljek 18.11. ob 12:00.
- 4.) mentor pregleda izdelke in ga "spovestnega" s sugestijami za izboljšanje vrne skupini.
- 5.) Ko bodo inovacijski problemi obravnavo popihani in zbrani, nadaljujemo z naslednje aktivnosti: izborom tistih problemov, katerih reševanje bomo kasneje simulirali v Moodleu.

**KNJIŽNICA**

Spodaj se nahaja nekaj povezav na spletno stran odzema dokumenta, kjer lahko najdete različne horizontalnega in znotraj inovacijskih oblikovanih. Ravno tako je priložen tudi nekaj člankov, ki se nanašajo na vse aktivnosti v eMIPu...

Priloge - uveljavljeno zagnanih za inovativnost podjetja

Priloge za obravnavo problemov in priložnosti v procesu inoviranja

Priloge za uporabo Moodlea

**POPOTNICA**

Priloge bodite pozorni in se izogibajte tistim, ki vas odražajo od doseganja namena naloge. Izogibajte se aritmetičnim, odzema slepega sledenja matricam oz. opovabljam. Naj se najprej zgodi razmišljanje in tako nato vrsta v opovabljam. Opomba je zgolj priporočila, ki ni nujno v celoti in vedno upraba. V kolikor si konkraten primer tega ne zahteva, vam ni potrebno izpolniti vseh kategorij obrazca.

Figure 41: Introductory page of eClassroom for eMIP (the names of participants are removed)

All activities in the eClassroom are aimed at concrete work on problems and solutions, while simultaneously allowing and encouraging the enhancement of innovation competencies and culture in the company. Innovation group has all the necessary tools, instructions and relevant additional information (examples, good practices, articles, etc.) available in the eClassroom. Participants follow the instructions for the implementation of selected method which was prepared for them by eMentors. After the implementation the participants report to eMentor. Reporting on implementation is structured in the form of reflection or structured discussion. The eMentor simultaneously and rapidly responds to any document published by the innovation group and sends feedback response, additional questions or suggestions. By doing so, the eMentor boosts the dynamics and quality of work and contributes to a more successful implementation. In such way eMentors at the same time also collect relevant data, which enable improvements to the offered tools and methods and working practices in the eClassroom. If the eMentor establishes that the proposed or applied method does not provide satisfactory results, the eMentor shall immediately offer an alternative method from the catalogue of methods. Some methods may be adapted for implementation in a group by way of using video-conferencing.

eMIP is concluded by channelled planning of implementation activities. Active involvement of middle management in communication in the eClassroom is envisaged in this phase. Middle management is first familiarised with the feedback or responses of provided by the eMentor. If necessary, the eMentor or the head of the innovation team directly contacts the (middle) management by requesting a feasibility study of the proposed solutions and implementation plan. The main phases of work are presented in somewhat more detail below.

### **Problem or challenge definition**

The key problem needs to be at least roughly defined prior to the commencement of work in the “eMIP” group. If we are not solving an actual problem with the eMIP technique, but it is the case of incremental, a regular innovation activity, the search for new problems or opportunities can be the first step of the group’s work.

### **Decomposition of problem**

If the problem is complex or the fundamental reasons are not entirely clear, we decompose (break down) or redefine the problem by using one of the methods.

### **Evaluation of problems**

If we have decomposed the problem and we are faced with a number of sub-problems, the problems should be evaluated and those which will be addressing selected. The criteria are mainly the problem’s topicality, potential effects of its resolution, and suchlike.

### **Finding potential solutions**

Using one of the techniques for generating ideas, the participants search for ideas to solve the problem(s). Integration of best practices from other related companies and other industries is desirable..

### **Preparation of proposals on the solution**

We carry out the selection of ideas based on pre-determined criteria pursuant to which ideas will be assessed, for example applicability, feasibility, price, etc. The result is one or more ideas which we wish to implement.

### Preparation of an implementation plan

The group prepares a plan for the implementation of the selected proposals and solutions.

When implementing the above illustrated steps, we may logically follow those, depicted in the PACIS method.

### Activities aimed at ensuring the sustainability of innovation activities

The third pillar of eMIP consists of activities aimed at ensuring the sustainability of innovation activities in the company. There are three activities serving this purpose: systematic collection and dissemination of good practices, appropriate means of communication by eMentors and monitoring of activities of the innovation process (these activities are carried out after the completion of the eMIP). Information collected in the eClassroom represent a rich source of examples of good and bad practices, which, with an appropriate dissemination, represent an important source of knowledge for both participants as well as for other companies – yet only with due protection of intellectual property, and if there are complementary interests among the companies. The eMentors' way of communication is primarily aimed at encouraging the effectiveness and efficiency of introducing innovation activities and processes within the company. Moreover, frequent and open communication represents a rich source of information that allows real-time monitoring of the scope and quality of innovation activities taking place in the company.

### Innovation methods implemented in the workshop

The list below provides a list of the methods used in the workshop. Descriptions and examples of the implementation of the methods used in eMIP are provided in the second part of the Book, whereas educational material for the implementation of the methods is provided in the appendices. In agreement with the company we apply in the eClassroom or eMIP the methods from the set specified in this text and also additional ones broadly, if thus required by the nature of the problem.

1. Methods of problem / challenge identification
  - a) Problem mining
  - b) Focus on the goal
  - c) Progressive abstraction
  - d) QaDIM - quick and dirty innovation method
  - e) Fishbone (also Ischikawa diagram)
2. Methods of problem evaluation
  - a) Form of problem evaluation taking into consideration innovation obstacles (Examination of adaption hurdles)
3. Methods for the idea generation and selection
  - a) brainstorming
  - b) method of inputs-benefits (performance ratio method)



# THE ART OF MANAGING INNOVATION PROBLEMS AND OPPORTUNITIES

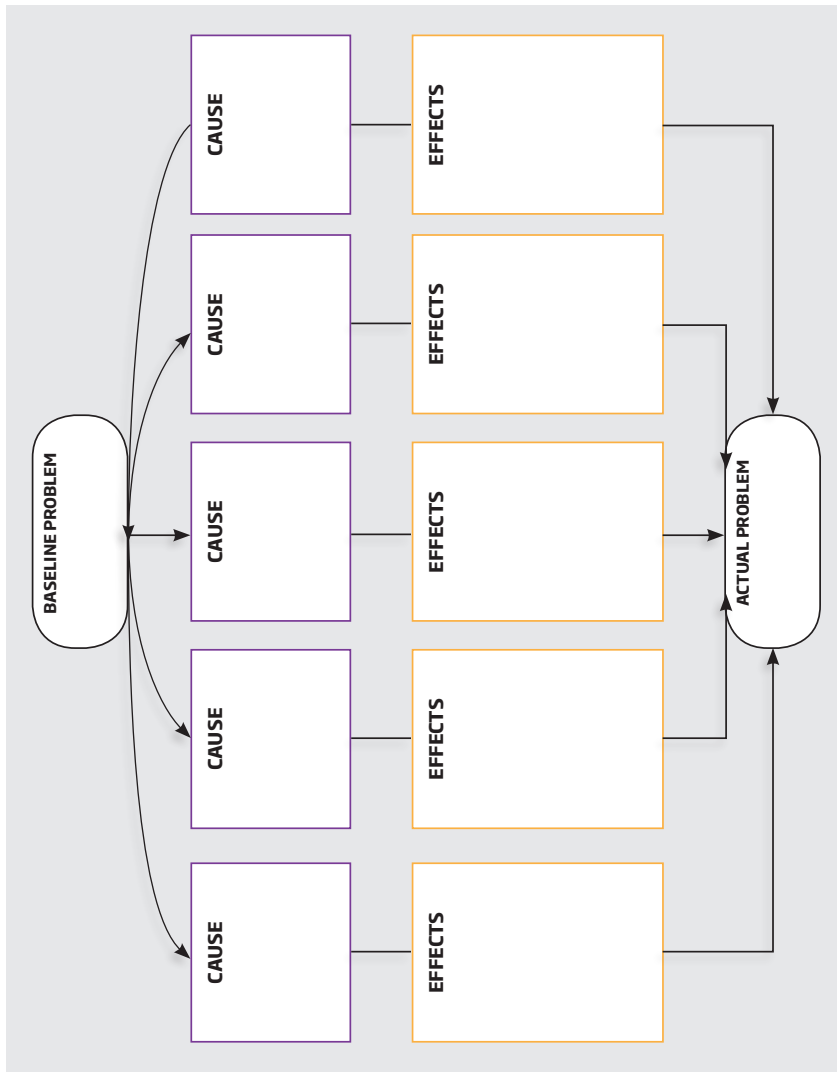
## **Part 4:** worksheets for direct implementation of methods

*Only points of reference for work are given for each method. Detailed instructions are provided in the description of each method.*

# Cause-Effect Diagram

## Guidelines for implementation

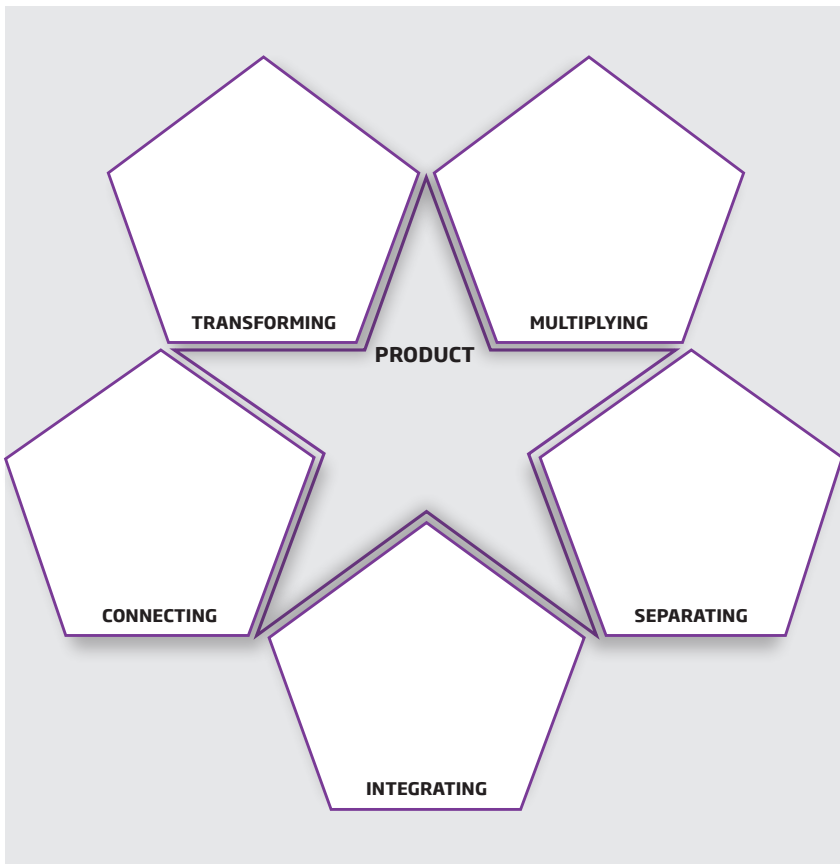
1. Write the baseline problem in the circle at the top.
2. Search for individual causes of the baseline problem and write them into rectangles. You can add any number of rectangles depending on the complexity of the problem.
3. Enter the effects each cause has. Address each cause separately and independently of the baseline problem.
4. Analyse the effects and highlight those that actually occur. Based on these, redefine the problem.



## Incremental Innovation - “From Sources to a Star”

### Guidelines for implementation

1. Select a product which lifecycle is expiring.
2. Write down the name of the product into a star.
3. For each step – aspect of the product identify the problem:
  - **TRANSFORMING:** What features are obsolete, do not work perfectly?
  - **MULTIPLYING:** Which parts of the product work well, are successful and would make sense to multiply them?
  - **SEPARATING:** Does the product have elements that could be excluded from the existing product and self-marketing?
  - **INTEGRATING:** Does the product lack a function and it would make sense to integrate such function?
  - **CONNECTING:** What elements of the product are unrelated?
4. Find fast and feasible solutions for the identified problems.



## Innovation Cube

### Guidelines for implementation

1. For each dimension of these three groups of challenges (needs, users, problems) find as much information as possible.
2. Filling the cubes: write down compatible information on convergent dimensions into appropriate cubes.
3. Looking at the common information, write down in the cubes at least one identified problem, challenge or opportunity.
4. Write down an idea for a solution, which represents potential for innovation.

### Simple implementation – 3x2

		PROBLEMS	
		overt	covert
NEEDS	future	challenges ideas for solution	challenges ideas for solution
	present	challenges ideas for solution	challenges ideas for solution
		challenges ideas for solution	challenges ideas for solution
		current	potential
		USERS	

# Advanced implementation - 4x2

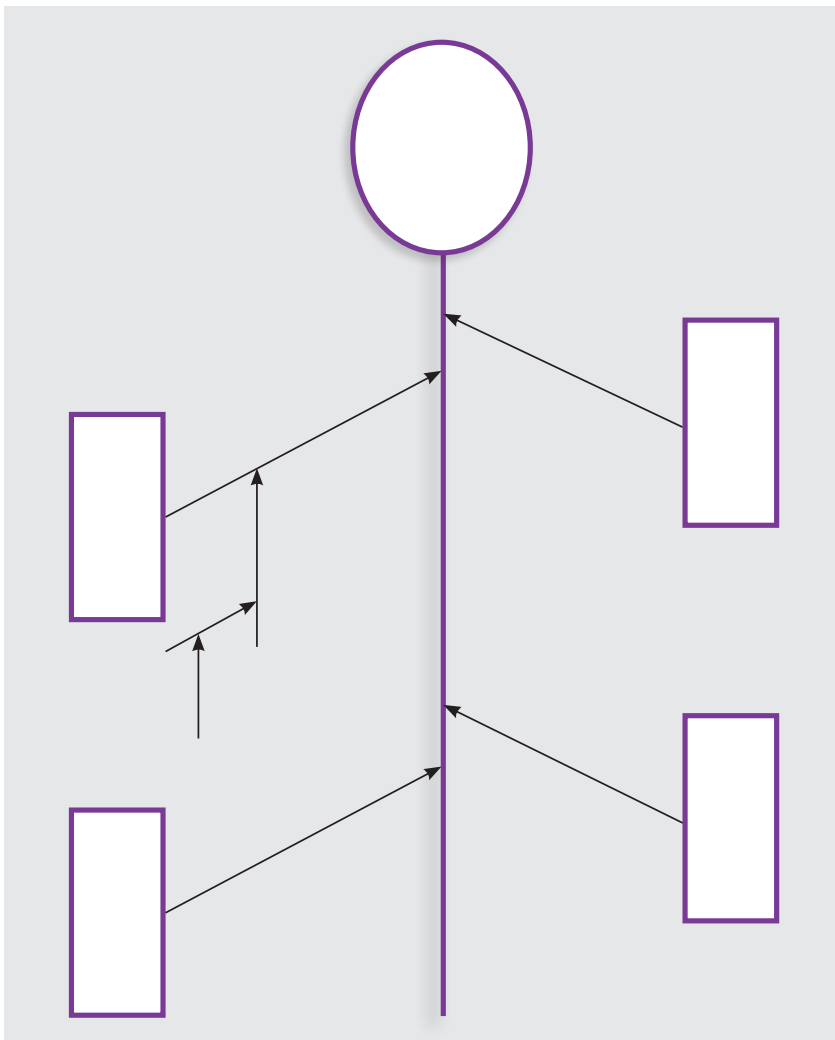
		NEEDS		PROBLEMS	
		present	future	overt	covert
USERS	current	challenges	challenges	challenges	challenges
	potential	ideas for solution	ideas for solution	ideas for solution	ideas for solution
		challenges	challenges	challenges	challenges
		ideas for solution	ideas for solution	ideas for solution	ideas for solution



## Ishikawa (Fishbone) Diagram

### Guidelines for implementation

1. Select and define the problem. In a clear format write it down into the head of the fish.
2. Select up to 4 aspects or functions within the organisation that are related to the problem and write them down into the frames on the main axes of fish bones.
3. For each function, find the causes of the problem as well as one or more levels of sub-causes for each cause. Connect each additional level with the connecting line to the axis (bone) of the previous level of the cause.
4. Mark the causes and sub-causes that reoccur in the scheme. Based on these, redefine the problem or seek solutions.



## Matrix Structure Design

### Guidelines for implementation

1. Prepare a list of all the elements of the addressed problematic process, or elements of the problem.
2. In the first column of the table (row headers), write down the elements of the process/problem in chronological order (add more rows and columns to the table, if necessary). Write down a number or a code of individual items In the first row of the table (column headers) in the same order as they are written down in the rows.
3. Mark the cell with a cross if the processes in a row and column are connected.
4. Analyse the matrix: crosses before the diagonal (left of it) show the sequence of processes, while crosses after the diagonal (right of it) show loops - at these points the process is not running straight and here problems may arise, or the cause of the identified problem lies at that point .

ELEMENT	E1	E2	E3	E4	E5	E6	E7	E8	E9
E1									
E2									
E3									
E4									
E5									
E6									
E7									
E8									
E9									

## Mindmap

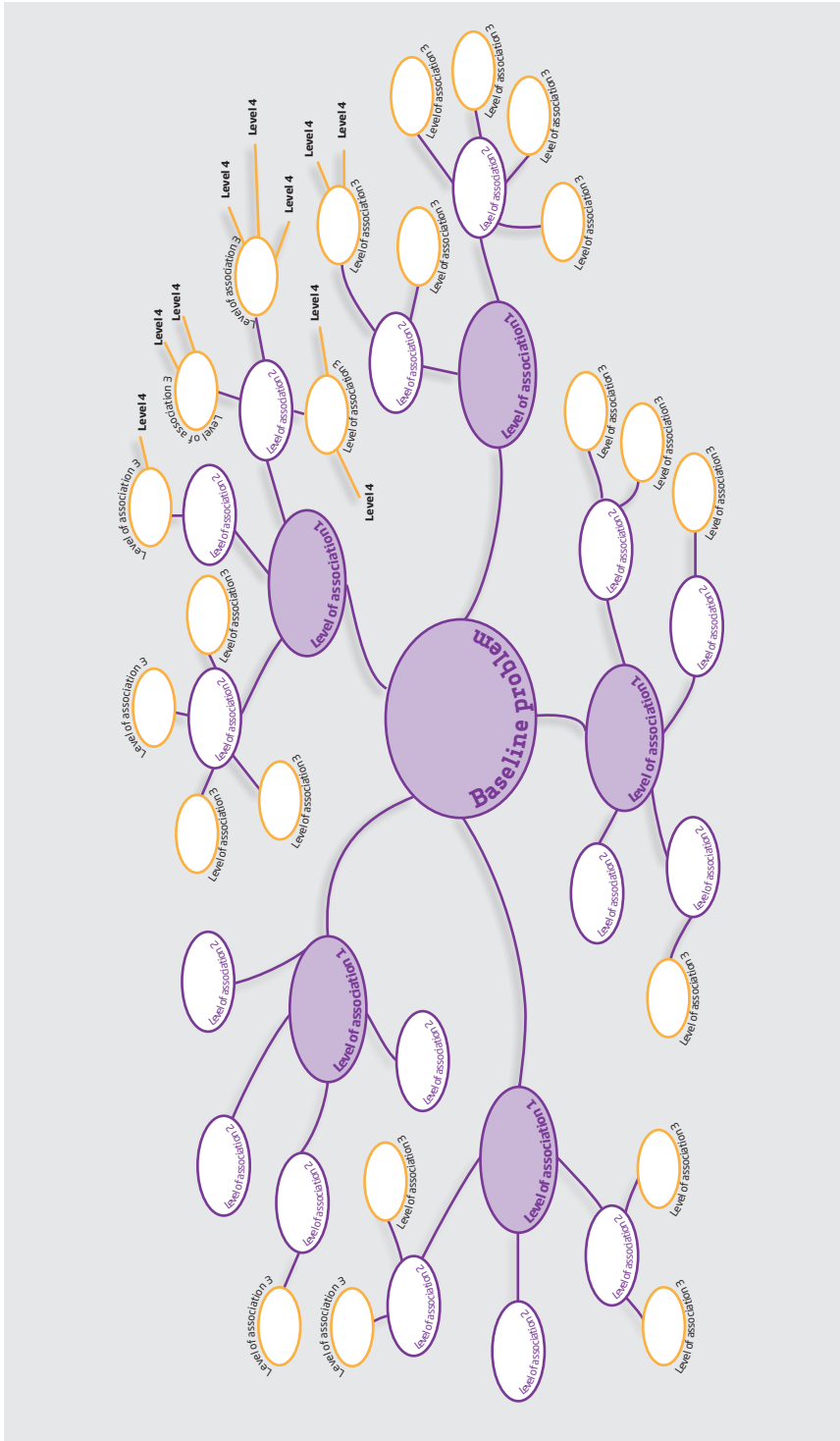
### Guidelines for implementation (one of the options presented)

1. Prepare a sheet of paper of adequate size (depending on the complexity of the problem), and different pens (can be of different colours).
2. Write down the problem/basic topic in the middle of the paper and circle it.
3. Draw a line from the center line and write down an association to the problem at the end of the line. For each association, directly related to the problem, draw a new line from the problem.
4. Focus on the individual association. Write down all the thoughts and ideas associated with it at the end of the lines, which you draw from this association. Continue until you exhaust your thoughts or reach a solution.

You will get more interconnected bubbles. You can start working level by level, or individual associations or jump from one level to another. It is important to maintain the dynamics of thinking that moves away from the baseline problem.

5. Analyse the mindmap. Select another pen, and mark with it the links between individual associations. This will allow you to define a new problem or find way to a solution.





## Attribute Listing

### Guidelines for implementation

1. Choose a problem or a product that will be discussed.
2. Identify 3 to 6 (max 8) key elements of the problem or the product and write them down in the column headers of the table.
3. Focus on the first element and write down its attributes in the write line, regardless of its connection with other elements. Repeat with the other elements.
4. Connect different attributes of the elements in the new layout of the product or as fundamental attributes of the problem.
5. Select the connection that best applies to the situation and vision of development.

ELEMENT 5								
ELEMENT 4								
ELEMENT 3								
ELEMENT 2								
ELEMENT 1								
	ATTRIBUTES							

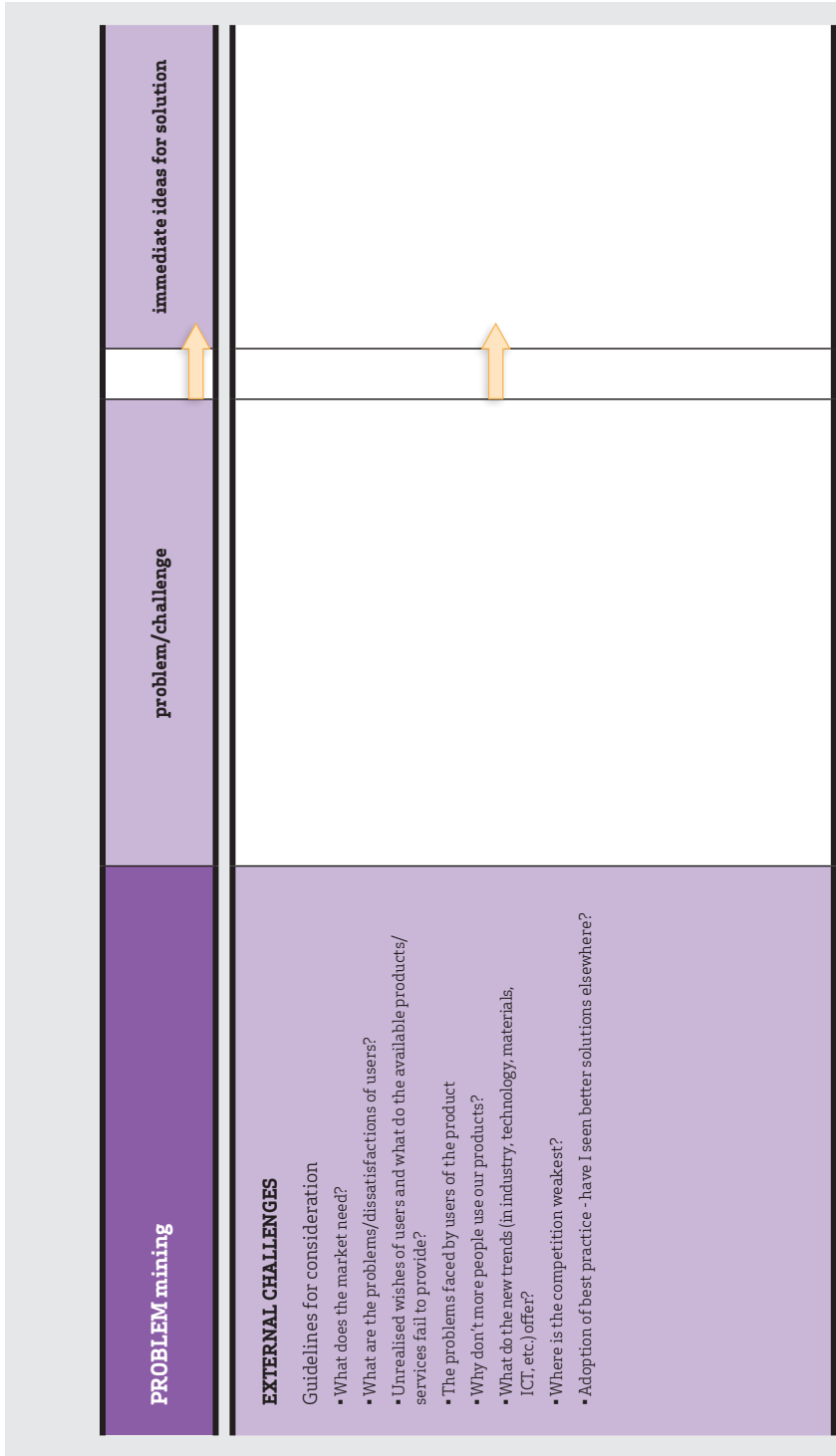
# Problem Mining

## Guidelines for implementation

1. Think about the key issues within your organisation and in connection with the external environment.
2. Write down the identified problems in the corresponding columns as to the organisational function to which they relate.
3. Check if any problem reoccurs in multiple columns. These are usually problems that require immediate attention.
4. Indicate any immediate ideas for solutions in the far right column.

PROBLEM FOCUS	work process	personnel	equipment & technology	organisation	suppliers & partners	immediate ideas for solution
<p><b>OUR COMPANY / EMPLOYEES</b></p> <ul style="list-style-type: none"> <li>• <b>Already identified problems without a solution</b></li> </ul> <p>Guidelines for consideration</p> <ul style="list-style-type: none"> <li>• Problems mentioned on several occasions in the past with no solution as yet (applying old approaches, technologies)</li> <li>• Problems that have been inadequately resolved (applying old approaches, technologies)</li> <li>• Seemingly insoluble problems</li> </ul> <ul style="list-style-type: none"> <li>• <b>Non-identified actual problems</b></li> </ul> <p>Guidelines for consideration</p> <ul style="list-style-type: none"> <li>• What hasn't been changed for a long time?</li> <li>• Clear, but never exposed problems</li> <li>• Listening to people saying "I wish xyz, but we have problems..."</li> <li>• Focus on listening to dissatisfied colleagues</li> </ul>						

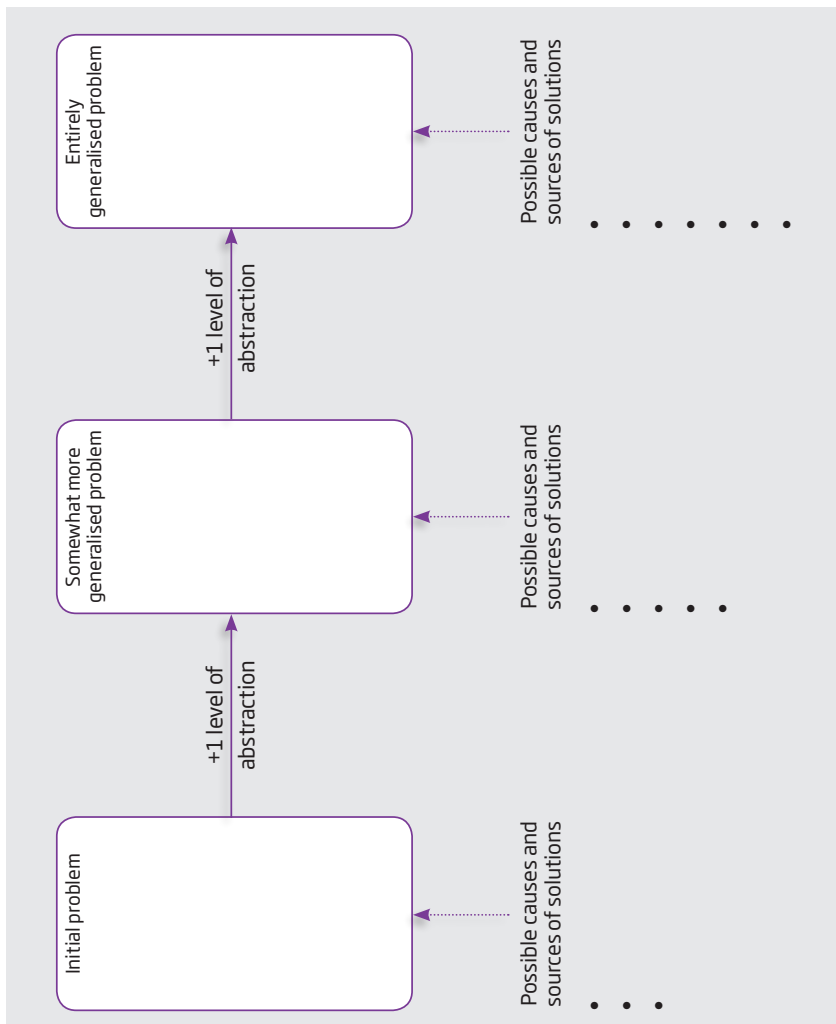
<b>PROBLEMING</b>	<b>work process</b>	<b>personnel</b>	<b>equipment &amp; technology</b>	<b>organisation</b>	<b>suppliers &amp; partners</b>	<b>immediate ideas for solution</b>
<p><b>COMPANY / EMPLOYEES</b></p> <ul style="list-style-type: none"> <li>▪ <b>Latent problems</b></li> </ul> <p>Guidelines for consideration</p> <ul style="list-style-type: none"> <li>▪ Why aren't people motivated?</li> <li>▪ What causes frequent terminations of employment relationships?</li> <li>▪ What are the causes of frequent sick leaves?</li> <li>▪ Routine work, repeated operations</li> <li>▪ Problems and opportunities in the environment.</li> <li>▪ What at work has surprised me in a negative sense?</li> <li>▪ Where are the employees dissatisfied?</li> <li>▪ Where are the bottlenecks?</li> <li>▪ What is illogical?</li> <li>▪ What is duplicated?</li> <li>▪ How can we make use of unused materials?</li> <li>▪ Where do most faults occur?</li> <li>▪ Where are we losing time?</li> <li>▪ Where are the inefficiencies?</li> </ul>						



# Progressive Abstraction

## Guidelines for implementation

1. Write the initial problem into the first frame. Think about the reasons why this problem occurs and write them down in bullet points under the frame.
2. Now define the initial problem in a more general way and write down this description in the second frame. Irrespective of the first part of the exercise work, write down all possible causes of this generalised problem under the second frame. Typically, there would be more causes in this frame than in the first one.
3. Re-generalise the problem and add the causes. Repeat the generalisation until the problem can be written in an entirely generalised way (3 to 5 stages).
4. Analyse causes in reverse order – from more general to less general. Actual causes recur. Do they explain the basic problem despite their general nature?



# QaDIM - Quick and Dirty Method

## Guidelines for implementation

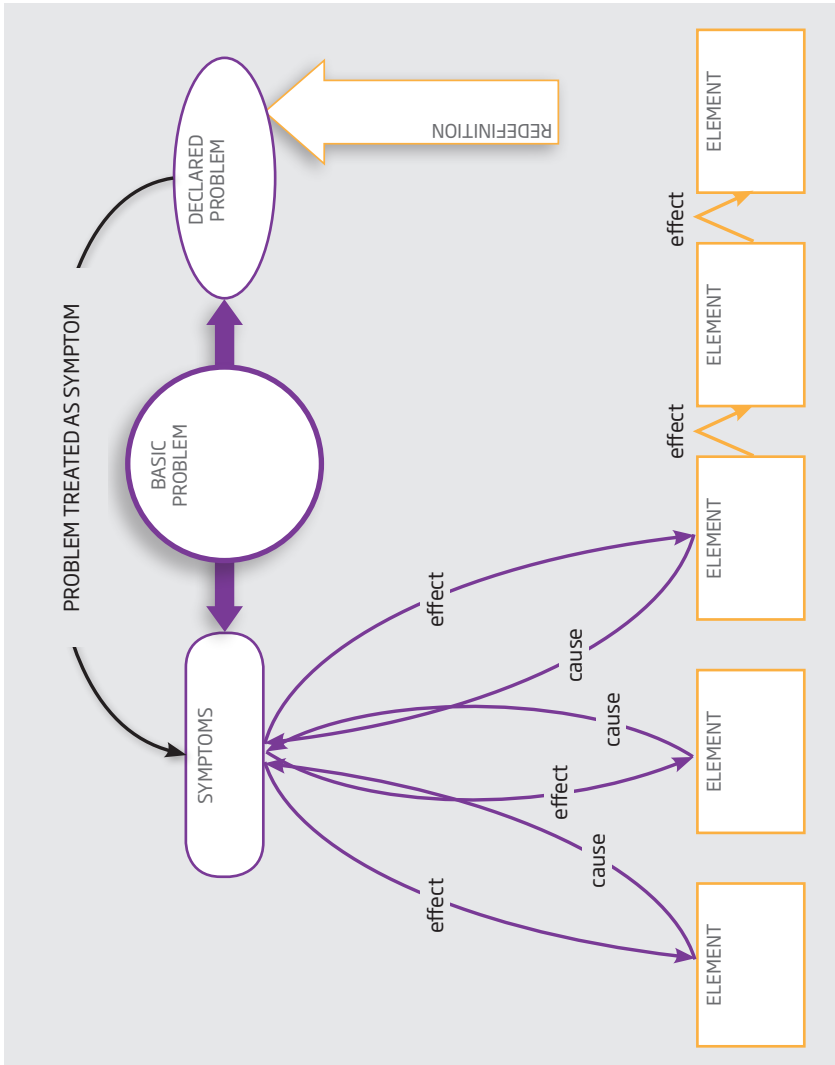
1. Write down, in the centre of the table, the existing product, which is marketed by the company or which the company wants to improve.
2. Fill in the pairs of cells (of the same shade) by entering the sources of problems or improvements to the product.
3. Any number of pairs of operators (cells) can be added to the matrix, or the existing pairs may be replaced with others in relation to the features of the product.

<p><b>REPLACE:</b> Is it possible to replace certain components with lighter, cheaper, more durable ones?</p>	<p><b>PRODUCT LACKS:</b> Can we add a function to the product?</p>	<p><b>EMBED:</b> Is it possible to embed the product with another product/service?</p>
<p><b>SEPARATE:</b> Is it possible to separate the product into two independent products?</p>	<p><b>PRODUCT</b></p>	<p><b>COMBINE:</b> Is it possible to combine the product with another product/service?</p>
<p><b>REDUCE:</b> Can the product be smaller?</p>	<p><b>REMOVE:</b> Is it possible to remove rarely used function or accessories from the product?</p>	<p><b>COMPLEMENTARY PRODUCT:</b> What product would be complementary to the original product?</p>

## Problem Breakdown

### Guidelines for implementation

1. Enter the identified problem into the circle.
2. Write down the declared cause of the problem on the right side of the chart, and then address the cause as a symptom on the left side. Try to identify reasonable causes and consequences of this symptom and enter them into the boxes. If appropriate, indicate more symptoms (add new boxes for the symptom and the elements).
3. Write down direct consequences of individual elements, regardless of the primary symptom and declared problem. Redefine the problem based on these elements.

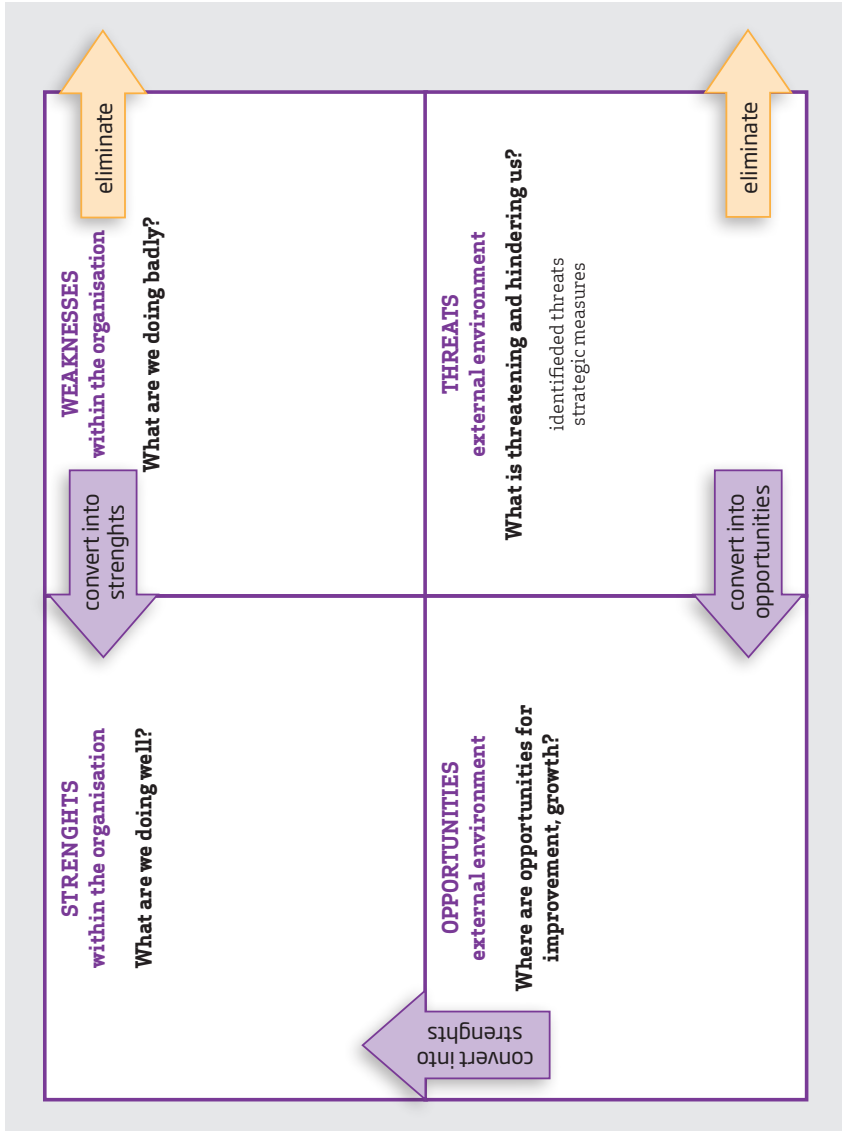




# SWOT Analysis

## Guidelines for implementation

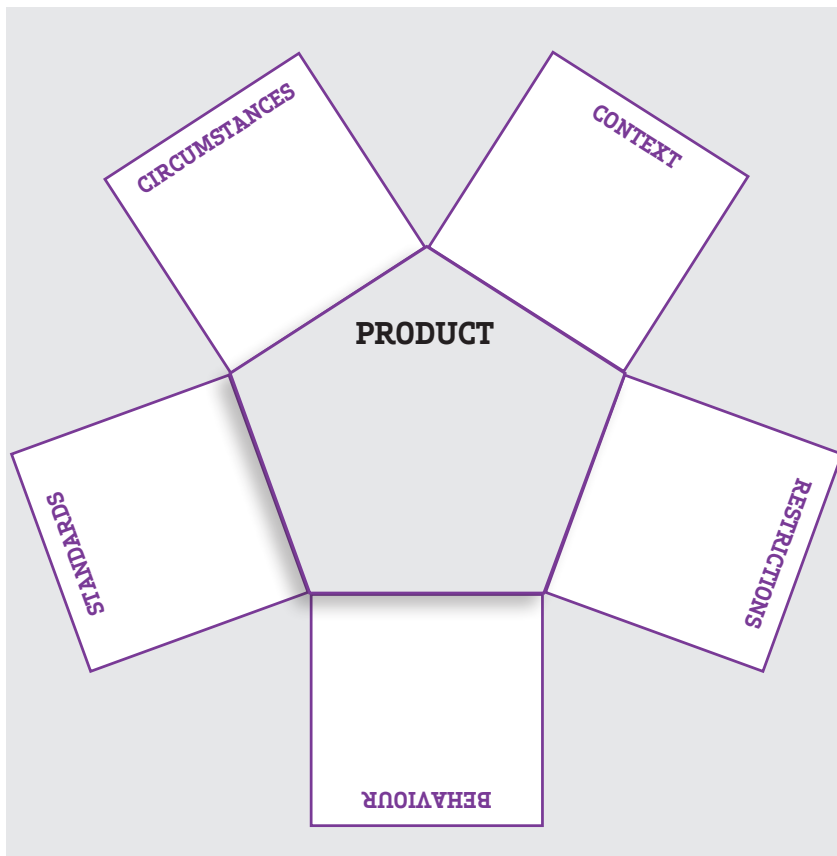
1. Write down key elements in each square of the matrix: strengths, weaknesses, threats and opportunities.
2. Highlight the weaknesses and opportunities that can be converted into advantages, and the threats that can be converted into opportunities!, and define the implementation plan.
3. Highlight the weaknesses and threats that you need to eliminate! and define the implementation plan.



## Five C's of Opportunity Identification

### Guidelines for implementation

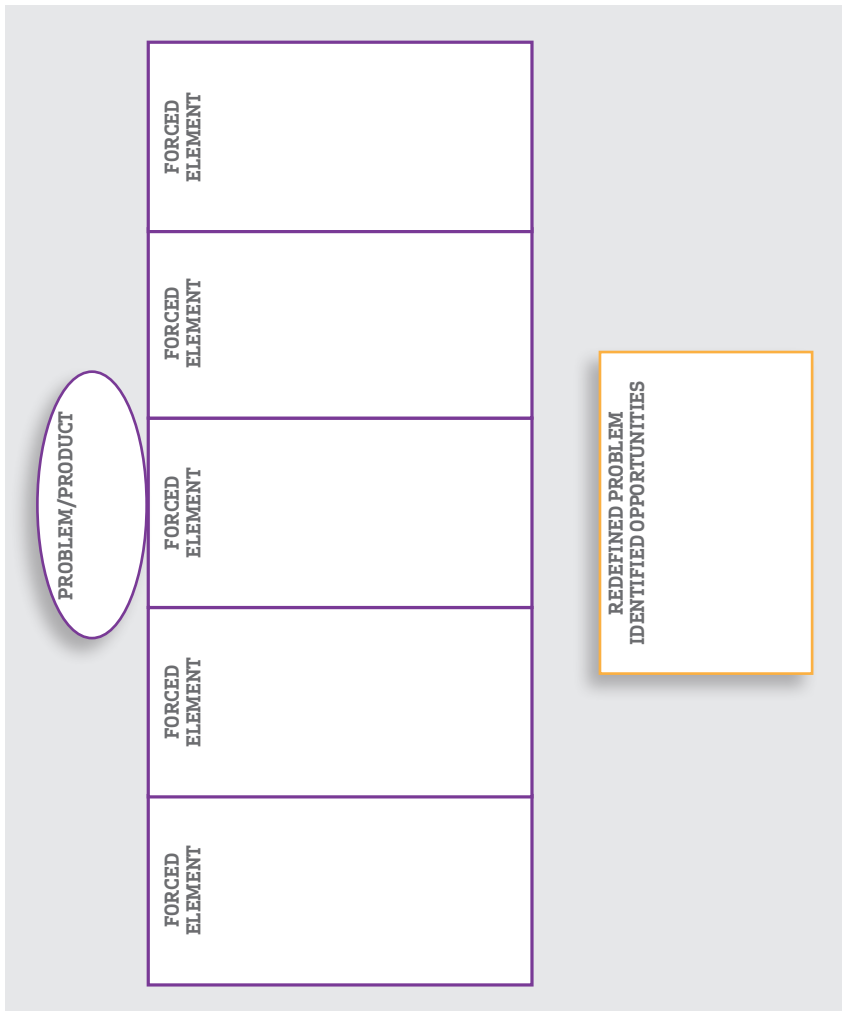
1. Select the product for which you wish to search for improvement opportunities.
2. Fill in the individual sides of a mesh:
  - CIRCUMSTANCES - what prompts the need for the product;
  - CONTEXT - use, consumer experience;
  - RESTRICTIONS - why don't they choose the product;
  - BEHAVIOUR - meeting the same needs in a different way;
  - STANDARDS - to assess the product.
3. Examine the completed mesh and define the key problems of the product, which you design into a challenge for improvement.



# Forced Connections

## Guidelines for implementation

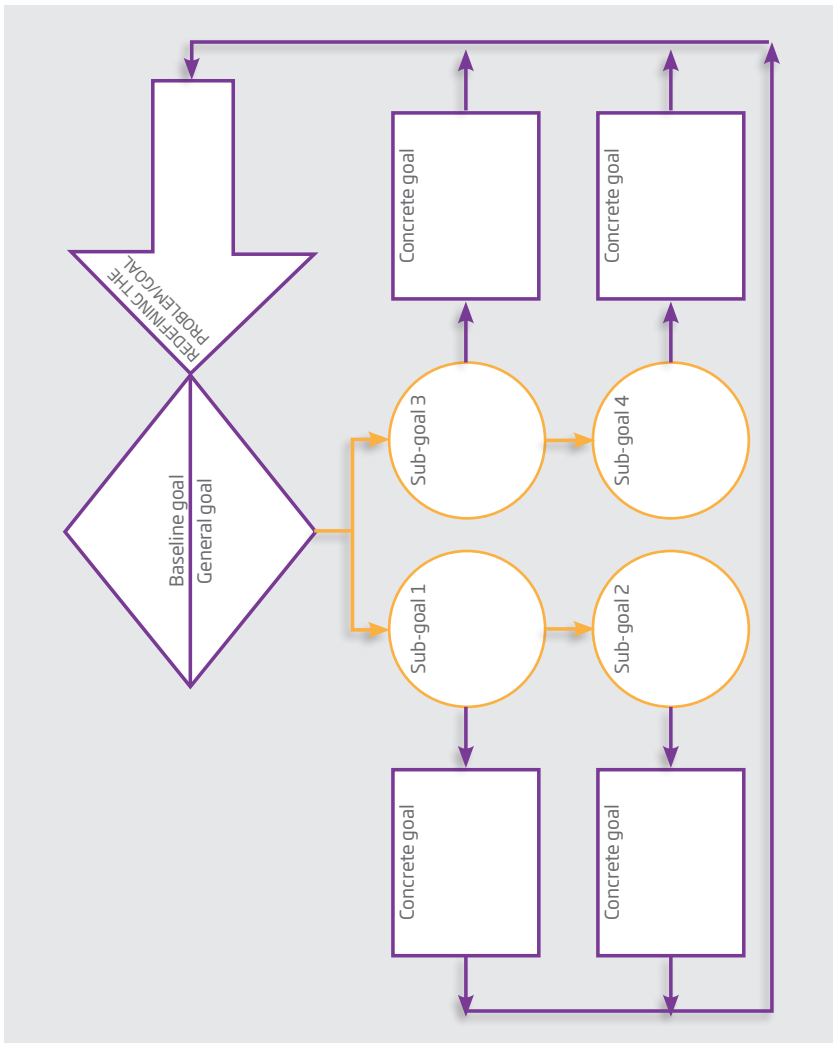
1. Select a problem or a product to be considered and write it down into the frame.
2. Select “forced” elements and fill in the fields below the basic frame. Select one of the following ways: randomly select 3 to 5 words or articles’ keywords from the literature; select 3 proverbs or sayings, or 3 headlines from daily news; prepare a box of various items and draw a certain number of these items; each of the participants should say the first word that comes to his/her mind (independently of the problem).
3. Search for connections among written elements and connections with the problem.
4. Analyse forced connections in terms of redefining the problem and potential solutions.



## Focus on the Goal

### Guidelines for implementation













1. Select the baseline problem and write down what is generally your final goal.
2. Deriving from the general goal, write down the sub-goals. Imagine that you are breaking down the general goal into several elements. Depending on the complexity of the problem or the set goal you can create one or more levels of sub-goals.
3. Write down specific goals for each sub-goal, i.e. individual points on the way to achieve sub-goal.
4. Analyse concrete goals in terms of the feasibility, costs, time, and viability. Select goals that you are actually interested in and redefine the baseline problem or rewrite the goal.



# Wild Cards

## Guidelines for implementation

1. Organise a group of 5 to 6 experts from various fields, and explain the purpose of the game.
2. Prepare a pile of cards. See some examples bellow. Add other options.
3. Arrange an appropriate room, deal the cards among the participants and keep track of their discussion.

<p><b>SOCIETY</b></p>  <p>A treaty with friendly civilisation of aliens has been signed.</p>	<p><b>SOURCES</b></p>  <p>All nuclear power plants are privately owned.</p>
<p><b>SOCIETY</b></p>  <p>Chinese and Indians account for 70 % of the world population.</p>	<p><b>CLIMATE</b></p>  <p>It rains between 1 and 2 o'clock PM every day all over the world. All other time, the weather is changeable.</p>
<p><b>SOURCES</b></p>  <p>All oil and gas deposits have been exhausted.</p>	<p><b>TECHNOLOGY</b></p>  <p>All machinery, the operation of which was connected with artificial intelligence, broke down.</p>
<p><b>TECHNOLOGY</b></p>  <p>There is a chip that enables handling with machines by remote control over long distances.</p>	<p><b>CLIMATE</b></p>  <p>The greenhouse effect has been neutralised and ozone layer completely restored.</p>
<p><b>CLIMATE</b></p>  <p>The world entered a new ice age. Only the very tropical zone has no snow.</p>	<p><b>SOURCES</b></p>  <p>A plant, which during grinding emits 4-times more energy than coal has been discovered.</p>
<p><b>SOCIETY</b></p>  <p>Twins or triplets are born each time due to gene mutation.</p>	<p><b>TECHNOLOGY</b></p>  <p>Material with time memory has been discovered (it records moments in time).</p>

## Gemba Walk

### Guidelines for implementation

1. Prepare a long-term plan of the walk: where will you start, what aspects you will focus on, what are your intermediate objectives and what is the final goal.
2. Prepare a logbook in which you record your work, achievements and progress of the organisation (example below).
3. Organise meetings at which the problems are discussed and solutions sought. In doing so, use other, simpler methods.

### PLAN OF THE WALK

I begin the walk in/at ....., I continue in/at

....., and finish in/at .....

Key aspects of observation are: .....

.....

Intermediate goals: .....

.....

Final goals: .....

.....

### WALK LOGBOOK as of:

OBSERVATIONS	Department 1	Department 2	Department 3
INTERPERSONAL RELATIONS BETWEEN PEOPLE			
EQUIPMENT HANDLING			
GENERAL ISSUES			
PROPOSALS, IDEAS			

FINDINGS and FURTHER ACTIVITIES

## PDCA - Deming Cycle

### Guidelines for implementation

1. Organise a working group for the strategic development of the organisation.
2. Prepare a basic matrix in a sufficiently large format.
3. Fill in the matrix:

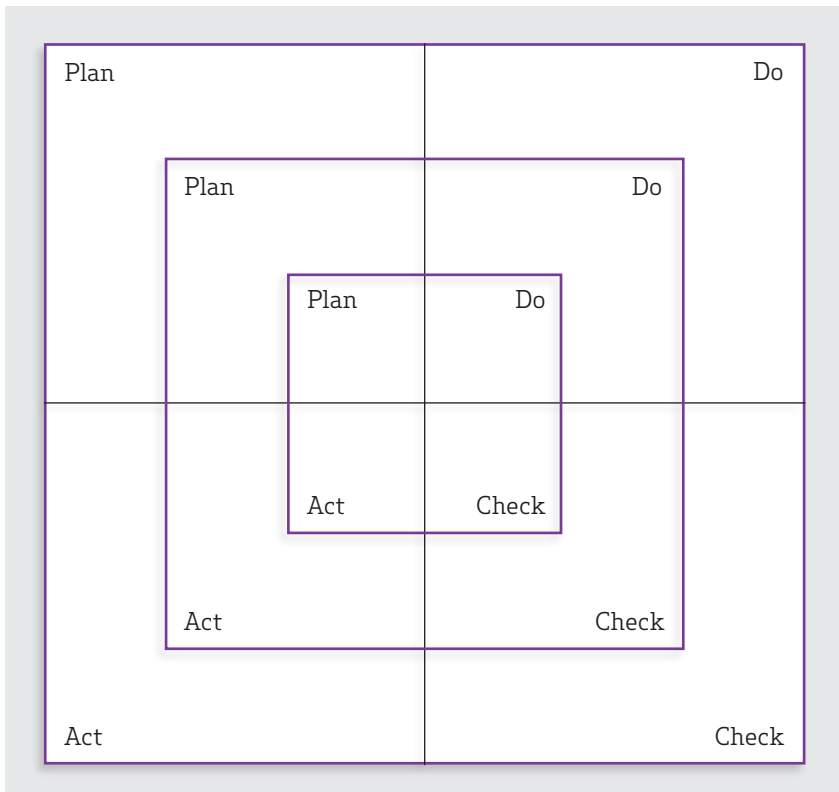
**PLAN:** Define goals and the time in which you wish to achieve goals. Develop a plan for achieving them. Write the plan into the first cell of the matrix (above left).

**DO:** Design processes that will enable the implementation of the plan. Write these processes into the second cell of the matrix (top right).

**CHECK:** Design methods for monitoring and verifying the implementation. Determine persons responsible for implementation. Write down key points into the third cell (bottom right).

**ACT:** Start with the implementation of the plan. According to the findings of ongoing monitoring, prepare measures for improvements and adjust the implementation. Write this into the last cell of the matrix (bottom left).

4. Depending on the adjustments of processes, redefine the goals and carry out a new round of PDCA cycle. Write the records of the new cycle in the outer part of the matrix. Repeat the cycle until the goals are achieved. The analysis of the entire cycle reveals weak points and enables learning to optimise the implementation of future projects.







# THE ART OF MANAGING INNOVATION PROBLEMS AND OPPORTUNITIES

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A list of books, papers and online resources that served as background material, a source of ideas and guidance in the preparation of this Book. We recommend reading these sources should you wish to gain in-depth knowledge of certain methods or innovation processes.

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Območna zbornica  
za Severno Primorsko,  
Nova Gorica



Università del Trieste,  
Facoltà di Management

*Prof. Dr. Borut Likar and his colleagues managed to do what every person, who in any way deals with the conception of an innovation culture, needs, i.e. to have available a review of innovation methods, which opens up in a clear and transparent manner and shows that no method is better or worse than the other. There are only suitable or unsuitable methods for a particular situation, a certain way of work and defined objective. The authors also highly appropriately draw the attention to the most important aspect of innovation, i.e. the importance of defining the problem, which is the motivation and inspiration to find innovative solutions.*

*I recommend the Book to all those who during their work face the need for innovation and who wish to independently find creative potential in themselves and their colleagues.*

**Tanja Mohorič**, Director of Innovation Culture and European Projects at Hidria Corporation Recipient of the 2012/2013 European Business Award for Innovation

*In an interesting and strictly non-technical way the Book introduces the methods that are useful in most of the early stages of invention-innovation-diffusion process, and which we fail to notice in the common literature on innovation management. The subsequent phases are, of course, similarly essential, yet without a success achieved in the early stages the subsequent stages may not emerge.*

Professor Emeritus DDr. **Matjaž Mulej**

*Brains are human being's key tool yet only a few percent of our brains are fully exploited, without realizing that by systematic thinking exercises or training of our brains and implementation of best solution we can effectively surpass the existing state. Is innovation therefore a skill? Yes, it definitely is. This is also demonstrated by the excellent present Book - "The Art of Managing Innovation Problems and Opportunities". It is a good asset for both teams in a company as well as individuals so as to create incremental or breakthrough innovations. It assists us to systematically apply the methods to identify a problem/challenge and to evaluate such a problem/challenge as well as to apply the methods for generating ideas and implement much needed selection of ideas. Simple methods for swift implementation as well as those that require more time, well worth taking, are available. I wish you high-quality training, since only excellent results can follow, yet - beware - the competition will still watch your every step.*

**Jana Petkovešek Štakuč**, Editor of the Gazela section in the Dnevnik daily newspaper

*The presented book is for everyone who in resolving the abundance of everyday problems does not have time for systematic invention phase of detecting their causes and problems in different areas of an organisation, products, services, processes and/or relations as well as market. That is exactly what this book offers. It provides its users with easier as well as more advanced methods, guides them through the process of identifying the problem and reveals the innovation process in a clear, explanatory and analytical manner, supported by examples and methods which are the result also of the Slovenian knowledge. The book thus helps reduce the companies' risk to miss the global innovation train and, consequently, increases market competitiveness of companies.*

prof.dr. **Ferdinand Trenc**

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REPUBLIKA SLOVENIJA  
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