

*Creativity techniques can be used during the D4S Redesign (Chapter 5) and D4S Benchmarking (Chapter 6) processes. Creativity is a continuous part of the product development process and creativity techniques are useful throughout. Initially, it can be used on a conceptual level and at the end it can be applied to solve technical problems. The challenges encountered during the product development process need different creativity approaches - there is no 'one single' best technique. This chapter presents several techniques that cover a range of situations. It is recommended not to stick to one technique but to learn to use different techniques and develop experience.*

## What are creativity techniques?

Creativity can be defined as 'all the ways of thinking that lead to something new and useful for the thinker'. A creativity technique should help generate new ideas. Creativity tools can:

- > Come up with new ideas;
- > Break through fixed ways of thinking;
- > 'Think out of the box' - thinking beyond current solutions;
- > Build upon each others ideas; and
- > Develop new inspiring and surprising ideas.

To understand how the techniques work and how they can contribute to the product development process it is necessary to put them into practice.

## Group versus individual creativity techniques

In general, brainstorming in a group generates more ideas, but sometimes the group culture may hinder revolutionary ideas. Group techniques use the ideas of others for inspiration. Group members can use each other's information as input for further stimulation.

Individual brainstorming can lead to original ideas but there is a danger that the outcomes are predetermined or limited to the idea originator's way of thinking. In individual brainstorming, free association initially yields seemingly irrational outputs that later can be refined into more recognizable concepts.

Given the potential and limitations of these approaches it is recommended to apply both individual and group brainstorming in the same project.

## Participants

Multidisciplinary teams are important to successful creativity sessions because it provides diversity in interactions and enables building novel associations. In group brainstorming, the free flow of ideas can be stimulated by including open-minded group members from different disciplines that are not afraid to ask 'stupid' questions. A group might, for example, select a range of different people: generalists and specialists, and creative people that are not experts in the field.

## Mind-set

In using creativity techniques, one should be as open-minded as possible and try to avoid criticism of the ideas that are generated because this can cut off potentially useful ideas. A positive attitude is the strong foundation of a successful creativity session. The following rules can facilitate the creativity process:

- > Group members should be able to express themselves freely and openly without censorship and should operate with appropriate respect towards others;
- > There should be no judging of people and;
- > It should be okay for members to 'lie'.

## Session facilitator

Brainstorming can be greatly enhanced by appointing a facilitator to guide the session. The facilitator should guide the session and not let his or her own opinions interfere with the expression of other peoples' opinions.



The facilitator should keep track of time and allow everyone who wishes to express an opinion at both the individual and group level. It is very helpful if the facilitator has a good general knowledge of the subject.

### The step-by-step process for a creativity session

Similar to the steps of product development process, each step of the creativity process has two main phases: a divergent phase and a convergent phase (see also Chapter 3). In other words, each phase starts with a 'problem' definition, followed by a divergent phase which includes the 'creation' or 'widening' of a field of possibilities which includes collecting and generating facts, problem statements, and ideas, without criticism. Then resultant solutions are clustered and categorized, followed by a convergent phase in which there is a narrowing of choices based on criteria of what is useful and relevant. (See Figure 64.):

- 1> Problem definition
- 2> Divergent phase
- 3> Clustering / categorizing
- 4> Convergent phase

The four stages of the creativity process each demand a different attitude from the participants.

### Problem definition

The formulation of the problem definition for the creativity session has a big impact on the outcomes of the creativity session. If the problem is not defined accurately, the created results might be irrelevant for the project. Guidelines for defining a problem include:

**A\_** Formulate the goal of the creativity session in one sentence.

Formulate from the project focus (the problem) in a concise and clear way. It forces the team to tackle the core of the problem. Often a problem consists of several sub-problems. It is recommended to tackle the sub-problems first, and then to bring the sub-solutions together.

**B\_** Keep a real and tangible focus.

If the problem defined is too abstract, the results will be general and will lead to sub-optimal solutions.

### EXAMPLE\_

"How can we generate a more positive attitude towards Photo Voltaic (PV)?" is a broad formulation. It becomes more specific if the statement focuses on children: "How can we inform children about PV so that they develop a more positive attitude towards it?" An example of an even more focused problem statement would be: "What can children play with that is made of PV?", or "How can we motivate children to play with outdoor play equipment made from PV?"

**C\_** Start with 'how' or 'invent'.

The pronouns 'who, what, where, when' and 'why' invite data collection. In order to stimulate solution generation, it is better to start with 'how' or 'invent'. The 'how' question focuses on the way or principle. The invent focus more on the end result.

### Divergent phase

During the divergent phase of the creativity process, a large number of alternatives are identified.

At this stage the most important rule is: 'quality is quantity' to generate as many solutions and new ideas as possible. Free association plays an important role during this stage. In addition, the rule of not judging ideas is essential. When confronted with new ideas or concepts it is important that participants take a constructive stance.

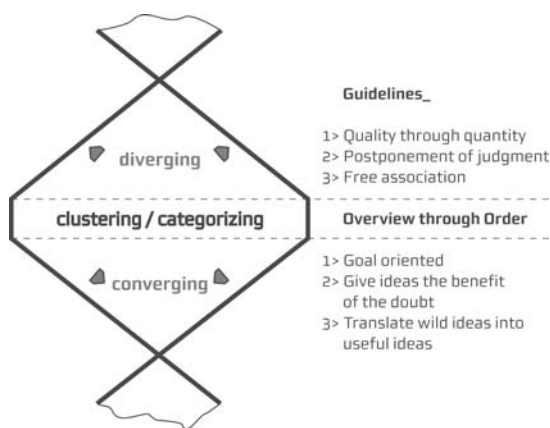


FIGURE 64 \_\_\_ THE CREATIVITY PROCESS.

## Clustering phase

Done properly, many ideas and solutions will have been generated and collected during the divergent phase. The sheer number of new options will make it hard to come to select the best ones. For that purpose, an additional stage of 'cleaning up' and acquiring an overview of the options generated (over 200 ideas is not unusual!) is useful before moving on to evaluation and selection. In this phase ideas are grouped together based on commonalities. At this stage some ideas may be clarified and/or elaborated upon for clarification.

## Converging phase

In the converging phase, all the ideas have the benefit of the doubt (the value of the idea may not be apparent at first), but one should also make decisions and work towards the stated objective. The alternatives chosen are then evaluated and selected.



## What kind of creativity techniques?

There are differences between textual and visual creativity techniques. General speaking, it is time (visual creativity techniques require more time than textual) and quantity (textual) versus detail (visual). Both kinds of techniques have advantages and disadvantages. Drawing may cover more of the original ideas because one does not have to reduce the idea into words but one has to be able to draw what one thinks. Textual is faster, but there can be problem with foreign languages and limitations because of the meaning of the words used. As a bottom line, creative techniques should be provocative and force thoughts out of the normal routine and into the open.

## EXAMPLES OF CREATIVITY TOOLS

### 1> Classical Brainstorming

The term Brainstorming has become a commonly used word in the English language as a generic term for creative thinking. The basis of Brainstorming is generating ideas in a group situation based on the principle of suspending judgment. The generation phase is separate from the judgment phase of thinking. Basic rules for Brainstorming are:

- > The facilitator writes down all the ideas on a large sheet of paper or board;
- > The participants call their spontaneous ideas as a reaction on the problem definition;
- > The participants associate on each others ideas;



FIGURE 65 \_\_\_ THE CREATIVITY PROCESS.



FIGURE 66 CLASSICAL BRAINSTORMING SESSION FOR IDENTIFYING NEW APPLICATIONS FOR RENEWABLE ENERGY TECHNOLOGIES.

- > The participants do not express their critics on each others ideas and;
- > The participants try to do this at a high speed.

## 2> BrainWriting

BrainWriting is a technique similar to brainstorming. There are many varieties, but the general process is that all ideas are recorded by the individual who thought of them. They are then passed on to the next person who uses them as a trigger for their own ideas. BrainWriting enables people who have ideas but are concerned about voicing them in a broader group to anonymously make them visible. They thus do not have to 'compete' with others to be heard. It also helps that all ideas are visible and can be easily scanned to trigger new ideas. It can

Problem statement: How to...			
	IDEA 1	IDEA 2	IDEA 3
1			
2			
3			
4			
5			
6			

FIGURE 67 6-3-5 BRAINWRITING WORKSHEET.

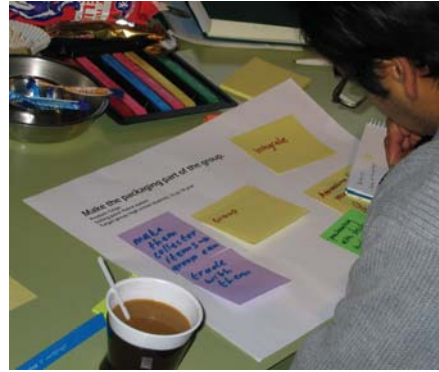


FIGURE 68 PARTICIPANTS IN A BRAINWRITING SESSION CREATING SOLUTIONS FOR PACKAGING WASTE ON THE STREET.

speed things up because everyone is offering ideas all of the time. Examples of this include:

*BrainWriting Pool*\_ Each person, using Post-it notes or small cards, writes down ideas, and places them in the centre of the table. Everyone is free to pull out one or more of these ideas for inspiration. Team members can create new ideas, variations or piggyback on existing ideas.  
*BrainWriting 6-3-5*\_ The name comes from the process of having 6 people write 3 ideas in 5 minutes. Each person has a blank 6-3-5 worksheet (see Figure 67).

Every participant writes the problem statement at the top of his or her worksheet (word for word from an agreed problem definition). They then write 3 ideas, on the top row of the worksheet in a complete and concise sentence (6-10 words). After five minutes, the worksheets are passed on to the next person upon which each participant writes down another 3 ideas. The process continues until the worksheet is completed resulting into a total of 108 ideas on the 6 worksheets.

### 3> Mind Mapping

Mind mapping, also called 'spider diagrams' represents ideas, notes, information etc. in far-reaching tree-diagrams.

To draw a mind map:

- > Lay-out a large sheet of paper in landscape format and write a concise heading for the overall theme in the center of the page.
- > For each major sub-topic or cluster of material, start a new major branch from the central theme, and label it.
- > Each sub-sub-topic or sub-cluster forms a subordinate branch to the appropriate main branch.
- > Carry on in this way for every finer sub-branches.

It may be appropriate to put an item in more than one place, cross-link it to several other items or show relationships between items on different branches. Coding with colour, character or size can do this. Alternatively, the use of drawings instead of writing may help bring the diagram to life.

Software packages, like Freemind (for free downloadable from <http://freemind.sourceforge.net/>) are available that support working with mind maps, thus making it easier to amend and reshuffle the map.

### 4> Five Ws and H

The 'Five Ws and H', are six universal question and are an influential, inspirational and imaginative checklist. The technique uses basic questions generating prompts:

Who?  
Why?  
What?  
Where?  
When?  
How?

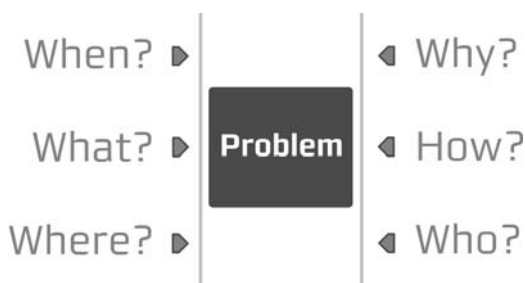


FIGURE 69 \_\_\_ START OF USING A MIND MAP FOR FIVE WS AND H.

The 'Five Ws and H' is a divergent creativity technique and can be used during the early stages of problem solving to gather information and to define more detailed the main (sub)problems to be solved. The checklist can be useful either as an informal or systematic way of generating lists of questions for which to find answers.

A Mind Map, with the 'Five Ws and H' as starting nodes can be used to facilitate the process (see Figure 69).

### 5> SCAMPER

The SCAMPER technique is a checklist that will assist in thinking of changes that can be made to an existing product to create a new one. These changes can be used either as direct suggestions of change or as starting points for lateral thinking. 'SCAMPER' stands for the following seven kinds of potential product changes:

- S – Substitute – components, materials, people;
- C – Combine – mix, combine with other assemblies or services, integrate;
- A – Adapt – alter, change function, use part of another element;
- M – Modify – increase or reduce in scale, change shape, modify attributes;
- P – Put to another use;
- E – Eliminate – remove elements, simplify, reduce to core functionality;
- R – Reverse – turn inside out or upside down.

Start by isolating the product or subject that will be the focus. Next ask for the seven SCAMPER topic questions about the product or subject. Continue asking "How can.....?", "What else.....?", "How else...?" for every idea.

### 6> Analogies

Analogies are used to estrange the participants themselves from the original problem statement and to come up with inspiration for new solutions and approaches. These analogies can take a number of forms, which are presented in Table 12.

For more information: see Tassoul, 2005 and <http://www.mycoted.com/creativity/techniques/index.php>  
[http://creatingminds.org/tools/tools\\_all.htm](http://creatingminds.org/tools/tools_all.htm)



ANALOGY	DESCRIPTION
<b>Direct analogy</b>	Starting from some aspect in the problem, one looks for comparable or analogous situations.
<b>Personal analogy</b>	What if you were an element in the problem?
<b>Nature analogy</b>	What kind of situations in nature does this remind me of?
<b>Fantastic analogy</b>	Can you place the problem in a fairy tale or other mythical situation and develop it from there?
<b>Paradoxical analogy</b>	Characterize the issue in two words which are each other's opposites.

TABLE 12 \_\_\_ TYPES OF ANALOGY.

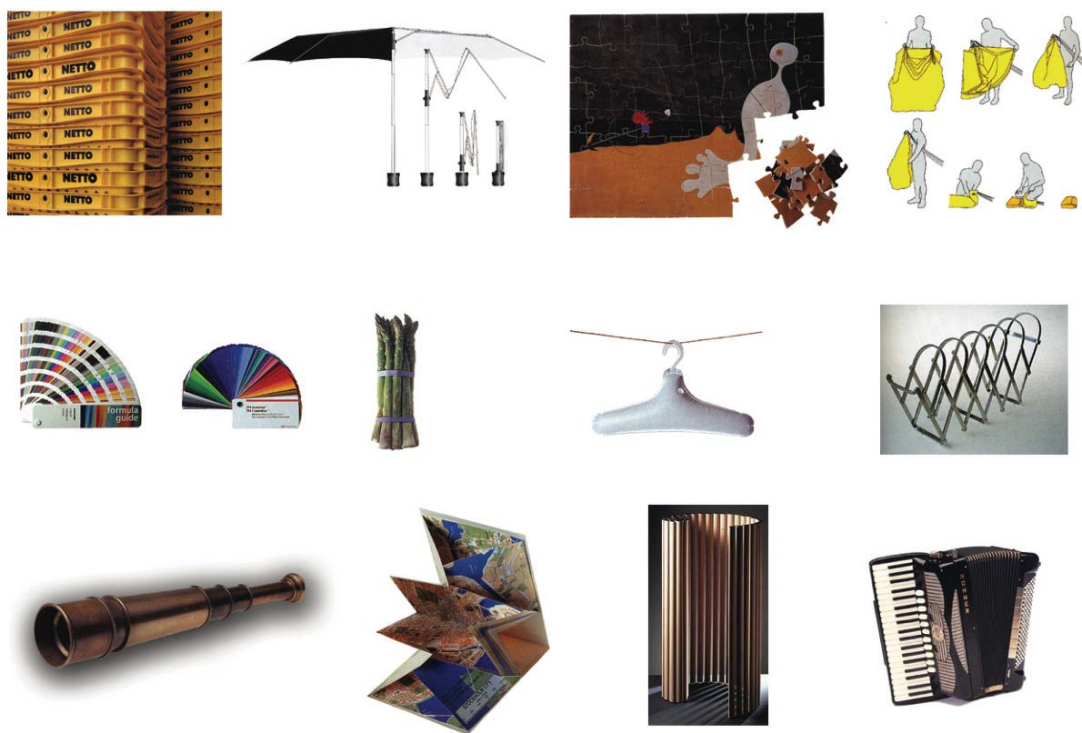


FIGURE 70 \_\_\_ ANALOGIES FOR CREATING A FOLDABLE COVER FOR A BICYCLIST.