

Creativity patterns – Expand your mind

CHRISTIAN KOHLS, TH Köln

Creative thinking is a key skill in almost every domain. Creativity is required to innovate, develop new ideas, get deeper insights, address challenges and resolve conflicts. This paper presents four patterns to expand your mind by externalizing concepts and ideas. The patterns are part of a larger pattern language for creative thinking and innovation. Each pattern is supported by specific examples of how one can externalize ideas and concepts.

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1. INTRODUCTION

Innovation has always been a driving force, both in society and business. There are many collections of creativity methods, techniques and tools: Lateral Thinking (De Bono, 1970), Thinkertoys (Michalko, 2006), How to get Ideas (Foster, 2007), or 101 Design Methods (Kumar, 2013), to name just a few. While these are all helpful collections many of the methods overlap. A pattern language can help to organize the various methods in a more coherent way. Moreover, patterns do not only describe the steps of a method but also capture the appropriate context of its application, the reasons for the general structure in terms of forces, and the consequences of choosing one way of doing things. Instead of just describing a method, patterns also explain why a method should be selected and why it works. As such, patterns can integrate research on how the creative mind works and link these principles to specific techniques.

The goal is a pattern language on innovating and finding new ideas. Each pattern will be very brief in order to provide a quick entry into the world of innovation. As the patterns are high level, there are certainly many more specific patterns that can be discussed in future papers. This paper adds to a body of patterns on creative thinking from the same author published on past *PLoPs, including:

- Patterns for Creative Thinking / PLoP 2012 (Kohls, 2012)
- Dream teams and the right place / EuroPLoP 2014 (Kohls, 2014)
- Patterns for Creative Thinking - Idea Generation / EuroPLoP 2015 (Kohls, 2015a)
- The Magic 5 of Innovation / PLoP 2015 (Kohls, 2015b)
- Creativity patterns – 5 Habits / VikingPLoP 2016
- The Magic 5 of innovation – Judgement Patterns / EuroPLoP 2016

This paper will cover four patterns for extending the mind with external tools:

BRAINSTORMING is about free association of ideas without judgement during the collection phase. **ATTRIBUTE LISTING** is about finding the attributes and properties of a concept, problem or solution. **MIND MAPS** help to externalize thought structures and map out the relation between concepts. **PARALLEL CONTRIBUTION** is about involving a group intensely, allowing parallel contributions.

All of these techniques help to externalize concepts from your mind. There are several ways to effectively bring the ideas from your mind to external storage. Brainstorming is the most common method, but it's not always the best. You can also collect categorized items, cluster ideas, or develop mind maps.

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2. BRAINSTORMING

2.1 Context

You are searching for potential solutions, features, requirements, goals etc. for a given situation. You want to collect many different ideas, views, thoughts, pre-existing knowledge, feelings, or suggestions without any constraints to the contributions. You want to collect whatever comes into your mind or into the minds of a team.

2.2 Problem

Many ideas are never expressed since they are not considered worthy or people fear that they are criticized for their thoughts.

2.3 Forces

When we are looking for new ideas it is not possible to judge in advance whether one thought is relevant or not. As we are looking for new ways of thinking, we may find that a fact that is irrelevant in the old conceptual thinking is quite relevant and beneficial within a new solution structure. There are two main problems with holding back any thoughts. First, good creative ideas are often unconventional. So filtering out strange ideas is dangerous since the strange ideas could be the good ones. The second problem is that filtering and evaluating ideas stops the flow of ideas. A flow of ideas means that new thoughts should be triggered rather than attacked. One thought often leads to another thought. So each captured idea will trigger more thoughts and associations. Even if an idea is not a good one it could trigger another thought that directly leads to the solution!

2.4 Solution

Therefore, allow a free storm of ideas. Capture each proposed idea without any comment, judgement, or critique. Quantity is more important than quality. The more ideas you get the more likely one of them is a good one. The judgment of ideas must be done after the free flow of spontaneous ideas. All ideas must be captured in order to spark new thoughts, allow combination of ideas and foster divergent thinking.

2.5 Solution details

State the topic or goal of the brainstorming. Everyone can contribute an idea at any time. Write down each idea and make it visible to all other participants. Do not filter any ideas! Even if they seem unrelated to your stated topic, write them down! They can spark new ideas. They can even be the best ideas because they are testament to a new way of thinking. You will evaluate the contributions after the brainstorming. Suspend judgment! Do not stop the brainstorming after the first wave of ideas has been uttered. Participants need time to find deeper and non-obvious ideas. They also need time to use the existing contributions as stimulus. Wait for a second wave of ideas because these ideas are often more elaborate. Encourage participants to combine ideas or find alternatives or specializations to the stated ideas. Set an idea quota you want to reach. After the second wave of ideas stop the brainstorming. You are not done yet. Because we did not judge any ideas during the brainstorming, it is very important to judge the ideas afterwards. You can prioritize ideas, rate ideas, vote on ideas etc.

Brainstorming might be the best known creativity technique and many people claim to run it very often. It was originally developed by Alex Osborn (1948). However, in many cases it is not executed properly. Once you allow judgement during the "storming" phase, it is no longer an open flow of ideas. If you want to discuss contributions right away, you might be better off with an

ATTRIBUTE LISTING. The idea of a “brainstorming”, however, is the free flow of ideas without any judgment! This also means you shouldn’t run a brainstorming session if you need a dialectic discourse to find a solution. Brainstorming works best if the general direction of thought is not yet set.

You can run a brainstorming alone or in groups. If a group gets too large there is a danger that not every participant gets the chance to contribute. Therefore, you can divide the large group into smaller groups, each running their own brainstorming session. A group size of 4-6 is adequate. The following sections discuss variations of this pattern. Each technique is its own pattern; but they all address the same problem. The particular contexts and consequences are discussed directly in the subsections.

2.6 Brainwriting

An alternative to brainstorming is “brainwriting”. In this variant participants write down their contributions and share them with other participants. A participant can write down an idea on paper and put it back on a stack (“brainwriting pool”). Other participants draw from the stack and get inspired from the ideas already written on the paper. The participant adds more ideas and puts the paper back on the stack. Another variant is the **6-3-5 method**: Six participants write down three ideas within five minutes. That means you need six papers with tables of six rows and three columns. Each participant adds ideas to the cells of the first row. Then, after five minutes, the papers are handed to the neighboring participant who reads the all the ideas on the sheet and adds three new ideas to the next row. Each sheet will have $6 \times 3 = 18$ cells for ideas. Since you use six sheets that rotate, you will have $6 \times 18 = 108$ ideas generated in a period of 30 minutes. You can alter the number of participants, the number of cells per row and the time each round takes.

2.7 ABC Brainstorming

Another variant of the classic brainstorming is an ABC brainstorming. The first contributions have to start with the letter A, the next contributions have to start with a letter B, and so on. It might be counterintuitive that constraining the words stimulates more creativity. But it is actually easier to think of words that start with “A” than thinking about words that start with any letter. In our brain, words are associated with starting letters as well. Hence, a starting letter sometimes triggers more words than free choice of words (Birkenbihl, 2002). Exercise: Write down 26 things that you can bring to the next birthday party. It’s easier to find them if each starts with another letter of the alphabet.

2.8 Set artificial constraints

You can add other constraints such as finding words with only 5 letters or words that rhyme. ABC works because it focusses on a smaller set of options (e.g. only words that start with A). Stronger constraints further reduce the options of traditional thoughts. It might be easy to come up with a theme for a dinner party (it’s likely you will remember some costume parties you attended yourself). But if you constraint the theme to words with 12 letters...Well, think about it! This technique is frequently applied by writers. You are forced to dig deeper and escape cliché and idioms. This also works when you are designing artefacts: if you have fewer materials available you may invent new ways of using the elements you have.

2.9 Flashing Light Rounds

If you run a brainstorming in a group and people are too shy to contribute, you can start with a flashing light round. Instead of allowing people to shout out their ideas at any time, you ask participants one by one to express their idea(s). A downside of brainstorming sessions is that writing down the contributions takes time. In a vivid group there might be many more ideas that can be captured. If you use STICKY NOTES each participant can write down their own ideas and stick them to a wall or on the table. This parallelism of work leads to EXTREME COLLABORATION. It is important that other participants can see the contributions if you want to use the ideas as stimulation for further ideas. However, in some groups the ideas might be too homogenous and convergent when people orient their own ideas towards already given thoughts (Stephen, Zubcsek & Goldenberg, 2015). You could also ask people to write down 3-5 ideas and then stick them to a wall. Let people read all ideas on the wall and add further ideas inspired by the existing contributions.

3. ATTRIBUTE LISTINGS

3.1 Context

In order to DIVIDE AND CONQUER you want to identify key elements of a concept. Once you have identified the key elements you can discuss each element, rearrange and re-combine the elements, and evaluate each single element.

3.2 Problem

There is a huge number of attributes that can be identified for each object or situation.

3.3 Forces

It is easy to focus on smaller parts than all the details. You can improve parts nearly independently. You can create new wholes by re-combining smaller wholes. You can replace single parts. You can improve single parts or focus on specific aspects. You need a list of parts that are relevant.

3.4 Solution

Therefore, take an existing object or situation and break it into parts by listing the core attributes about that object or situation. List only attributes that are important to that topic.

3.5 Solution details

Choose a topic and use it as a headline for the attribute list. The topic defines a specific category, a particular question, or a perspective. You can also define several categories at the same time. Create a table with several headlines (e.g. Pro | Contra, Suppliers | Customers | Internal Departments). All contributions must fit the given headline or topic. You are allowed to discuss whether something should be added to the list or not. This is different to BRAINSTORMING because contributions are evaluated right away. If you don't want to lose interesting thoughts that do not fit given categories, you can have an additional list for parked items. Try to make each list as complete as possible. Use identified attributes for systematic ideations, including COMBINATION, MODIFICATION, RANDOM IMPULSE, change of PERSPECTIVES, PROVOCATIONS, or replacement of attributes.

You can also use the identified attributes as headlines for new attribute lists. For example, you could first list all involved stakeholders. Then you use each stakeholder as the headline for a new attribute list in which you collect the interests and expectations of each stakeholder.

Finding all attributes for a specific question is somewhat similar to a categorized BRAINSTORMING. However, unlike a

brainstorming this approach does not allow a free storm of ideas. Rather you should focus on the given question and directly discuss which attributes are relevant, which partition is adequate etc. For example you could list all components of a car. You could also list all cost factors or all production steps. You could list all marketing options. You could list all sales area etc.

Very often so-called brainstorming sessions are rather attempts to find attribute lists. There is a big difference: a BRAINSTORMING (by definition) allows all kind of thoughts, and encourages including strange or seemingly unrelated ideas. Judgement is suspended and quantity is king. For an ATTRIBUTE LISTING the opposite is true. Only attributes that fit the questions should be added. Quality is more important than quantity. The list should be complete but not include speculations. You can create several attribute lists at the same time. For example, if you collect all positive and negative aspects of a design decision, you are creating effectively two attribute lists. In this context it makes perfect sense to directly discuss in a group whether one aspect is considered to be positive or negative.

Once an attribute list seems to have exhausted all attributes of a subject, one should further explore what these attributes mean. Thus, analyzing a whole and exploring its parts become intertwined. One can challenge each attribute (see CHALLENGE ASSUMPTIONS), change attributes (MODIFICATION of ideas), recombine attributes (COMBINATION of ideas), and evaluate each attribute.

Superficially the process of BRAINSTORMING and creating an ATTRIBUTE LIST are similar – you create a list of items. But the rules and mindset are quite different. Both approaches have their own context of use. BRAINSTORMINGS are explorative and divergent; the identified ideas are analyzed and categorized after the brainstorming. Attribute lists are analytical and focused; further meaning of the existing attributes are explored after setting up the list. In practice, an individual or a group can rapidly switch between both types of thinking.

4. MIND MAPPING

4.1 Context

You are working on a complex challenge and you need to organize your thoughts and ideas in a structured way.

4.2 Problem

It is hard to organize your thoughts if they are getting complex. It is even harder to communicate the thoughts to others.

4.3 Forces

Visual representation helps to capture a large number of thoughts. Many ideas are related to others –these relations are often hierarchical. There are associations between terms and ideas. These associations often exist in your brain but they are hard to state explicitly and to express them for yourself and to others. It is important that in a group of people all share the same picture. You want to reduce complex topics by naming the most important concepts and keywords. The relation between topics and concepts needs to be clear and should support the order, organization, and structure of complex areas. Visual representations can help to make relations easier to grasp. It enables us to mentally switch between overview and detail.

4.4 Solution

Therefore, develop mind maps or concept maps that represent logical structures of a topic. Both maps express our internal thought structures visually. They organize our thinking and make it easy to share our thoughts with others. A mind map is a hierarchical structure that starts with a central topic and adds branches to divide the concept into different parts, aspects or views.

Concept maps are non-hierarchical networks. That means each topic can relate to several other topics without implying any hierarchy.

4.5 Solution details

Write the central topic in the middle of a paper or whiteboard. Draw a circle around the core topic. Add important associative aspects to the central topics as branches. You can annotate the branch directly or write a subtopic at the end of the branch. You can add more branches to each branch. Hence, each thought can be added in an ordered way. Use only keywords instead of elaborate statements. The map provides only an overview. Details can be captured in separate documents.

In its original form a mind map is strictly hierarchical (Buzan, 1974). It is a tool to order and categorize your thoughts, starting with a central branch. Each branch is some sort of a headline and it triggers further thoughts (Buzan, 2006). For example, if the core concept is “car”, then new branches could be “advantages” and “disadvantages”. Each branch leads to several more sub branches that list all the advantages and disadvantages. But you could also have branches such as “components”, “models”, or “suppliers”.

Concept maps extend the idea of mind maps by allowing non-hierarchical networks (Novak, 1998). There is no specific central point and each node can relate to several other nodes. The branches can express many different kinds of relationships: Whole-part relations (contains, has-a, is-part-of), explanations (that means, for example, see also), specializations (is-a, belongs to, special case of), analogies (is similar to, equals), causal relations (causes, leads to, influences, increases, decreases), time (first, high priority, next, pre-requisite for), activities (works for, researches), tasks (controls, monitors, delivers) or different views (strength-weaknesses, pro-cons).

The spatial configuration of topics and branches has semantic implications – either intended or by accident. If you use a software to create mind or concept maps you should ensure that it is you, the user, who defines the spatial arrangement and not the software! Things that belong to each other should be placed close to each other. Direction of flow or priorities can be expressed in horizontal or vertical order. Important topics can be highlighted with thick lines.

Mind maps are a great tool to organize your own thoughts. However, it is often difficult for others to understand and agree to the structure of a map since it is a very individual product. If you want to use mind maps in a team it is important to create them collaboratively. In this case the group can discuss the meaning or the hierarchical structure and harmonize their thoughts.

5. PARALLEL CONTRIBUTION

5.1 Context

You are working in group and need to generate a lot of ideas rapidly. Each participant should have the same chance and responsibility to contribute.

5.2 Problem

Collecting contributions sequentially takes a lot of time and important contributions are not captured because participants get frustrated or forget ideas while others talk.

5.3 Forces

Working sequentially is less productive than working in parallel. If contributions are given in a sequence it is very likely that it takes too much time. Participants might get bored, forget their own ideas, or do not come up with new ideas unless they have voiced their current idea. If contributions are captured one by one, then some participants might be more dominant by uttering idea after idea. But people who are less extroverted have equally good ideas that are unheard if not stated. On the other hand if there are enough participants who say something, other participants might get lazy and let others do the work by sneaking under the radar of the moderator. Sometimes it is frustrating if two or more people have the same original idea but only the first person who names it gets the credit. Another source of frustration arises if some ideas are simply not captured because there is not enough time to write them down. More time is spent to collect the ideas rather than discussing and organizing them.

5.4 Solution

Therefore, foster extreme collaboration by enabling parallel contribution of ideas. Each participant has the same rights as others to contribute ideas at the same time. Participants write or visualize their thoughts individually in their private workspace (a sticky-note or their personal device) and share them on a public workspace (a magnet wall, whiteboard, or a large interactive screen).

5.5 Solution details

State the topic for expected contributions. Optionally you can set a minimum and/or maximum of contributions for each participant. Each participant draws or writes their ideas on cards or sticky notes. Participants work in parallel. Contributions are continuously added to a large shared work space. Similar ideas can be contributed several times if two or more participants have written down the same ideas. The large work space enables others to see which contributions have already been made (and use them as inspirations). Optionally, a facilitator can monitor the number of contributions and check that all participants have added some ideas. If all participants have added their contributions, you can start to discuss and organize the ideas.

Instead of using cards or STICKY NOTES you can use personal devices (e.g., smartphones) to create the contributions and send them to a large screen. There are several software packages that offer this feature. Make sure that participants can easily join without registration. Participants should have their personal workspace to create and edit new contributions without being observed by others. Once a contribution is sent it should be visible to others.

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