CREATIVITY SUPPORT TOOL – CONCEPT FAN WITH GOOGLE SERVICES

Vane Spasov[1], Dejan Ristevski[1], Dimitar Trajanov[2]

[1]*Lazarov Consulting Engineering, Skopje, Republic of Macedonia*

[2]*Faculty for Electrical Engineering and Information Technologies, Skopje, Republic of Macedonia*

Abstract – In this paper we present creativity support tool for generating ideas based on the lateral thinking techniques Concept Fan and the Random Input. Concept Fan technique is a way of finding different approaches to a problem when you have rejected all obvious solutions. Random Input is technique for linking another thinking pattern into the one we are using. The users of the tool could generate ideas by using the power of the Internet and the Google services. The users can collaborate to a given problem, also.

Keywords – creativity, mind tools, concept fan, random input, collaboration, Google Sets, Google Products,

1. INTRODUCTION

Creativity is a mental and social process involving the generation of new ideas or concepts, or new associations of the creative mind between existing ideas or concepts [1]. An alternative conception of creativeness is that it is simply the act of making something new.

From a scientific point of view, the products of creative thought, sometimes referred to as divergent thought, are usually considered to have both originality and appropriateness.

Although intuitively a simple phenomenon, it is in fact quite complex. It has been studied from the perspectives of behavioral psychology, social psychology, psychometrics, cognitive science, artificial intelligence, philosophy, history, economics, design research, business, and management, among others. The studies have covered everyday creativity, exceptional creativity and even artificial creativity. Unlike many phenomena in science, there is no single, authoritative perspective or definition of creativity. And unlike many phenomena in psychology, there is no standardized measurement technique.

Despite, or perhaps because of, the ambiguity and multi-dimensional nature of creativity, entire industries have been spawned from the pursuit of creative ideas and the development of creativity techniques.

Because scientific discoveries and engineering innovation produce broad benefits, improved tools that advance individual, group, and social creativity are becoming very important in our days [18].

There are several different tools for creativity [2] that can help us to become intensely creative. They will help us both solve problems and spot opportunities that might otherwise miss. Following techniques are known as creativity tools:

- Reversal and SCAMPER – which is used for improving a product or service
- Attribute Listing, Morphological Analysis and Matrix Analysis – used for creating new products, services and strategies
- Brainstorming – for generating many radical ideas
- Random Input – for making creative leaps
- Concept Fan – used for widening the search for solutions
- Reframing Matrix - Looking at problems from different perspectives and many others.

One of the mentioned creativity tools that are subject of our interest are Concept Fan and Random Input techniques [2]. They are an excellent way of developing many creative solutions to a problem. The Concept Fan is a way of finding different approaches to a problem when you have rejected all obvious solutions. It develops the principle of "taking one step back" to get a broader perspective. Random Input is a lateral thinking tool which is very useful when you need fresh ideas or new perspectives during problem solving.

There are two Google services that are very useful to be utilized in our work. First one is Google Products [17] which generates random words, noun of real existing object, and the idea here is that noun to be used as *random input* which will force you to think of new ideas that you wouldn't normally think of. The second one is Google Sets [13] service which is a tool that fleshes out "sets," or lists of things of the same kind [3].

This area is very interesting for many scientists and enthusiasts. They have spent time for developing useful creativity support software that uses similar concepts as those described before. For example ParaMind Brainstorming Software [4] generates idea combinations that are directly related to the idea that is typed on the user interface screen. It works on subjects from different areas such as writing, law, marketing and scientific inventions; Brainstorm and Affinity Diagram Tool [5] is used for brainstorming and combining ideas. This diagramming software tool combines two important creative processes in a split window and recording of creative ideas that answer a central question is allowed; The Solutions Genie [6] uses the Network Brainstorming aspect for generating ideas and can be used in organizations to help continuous quality and process improvement; The Brainstorming Toolbox [7] is a desktop application that incorporates several creativity tools such as: random word, random picture, challenge facts, false rules, SCAMPER. It is used for brainstorming, creative thinking, lateral thinking, creativity and problem solving. Other software tools that incorporate visual techniques for brainstorming called mind mapping helps the users to organize complex ideas or processes to increase understanding, plan more efficiently and turn ideas into action faster. These tools are IdeaFisher [8], SmartDraw [10], MatchWare[11].

In [9] the web tool for brainstorming and random input utilizing the Google Products and Google Sets as services for generating ideas is presented. In this paper the brainstorming technique is emphasized as a process designed to obtain the maximum number of ideas relating to a specific area of interest.

2. CONCEPT FAN AND RANDOM INPUT

If you want [12] to attach something to the ceiling in a room of normal height, then you look for a ladder. But if you can't find a ladder anywhere then what do you do? A ladder is only one way of "raising me off the ground." So the concept "raising me above the ground" becomes the fixed point. Alternative ways of satisfying this fixed point include standing on a table or having people lift me up.

But "raising me above the ground" is itself only one way of "reducing the distance between the object and the ceiling." This becomes the new fixed point and we look for alternatives. This time, however, the alternatives are themselves concepts. One concept is to "lengthen my arm." That concept can itself be carried out by "using a stick." Another concept alternative is to "have the object travel by itself." This can be carried out by attaching the object to a ball and throwing it up to the ceiling.

In this example we can see that there are two layers of alternatives as shown in Fig. 2.1. We go from an idea (the ladder) to a concept which becomes the fixed point for other ideas, but we also go from the concept itself to a "broader concept." which then becomes the fixed point for alternative concepts.

Each of these new alternative concepts becomes a fixed point for alternative ideas. So we use the two layers of concepts to cascade alternative ideas. This process is called a "concept fan."
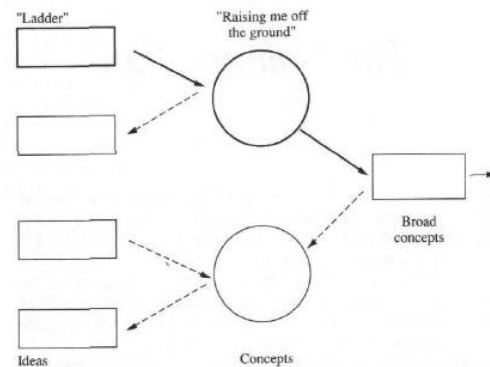

Fig. 2.1 - Two layers of alternatives

Moving backwards from the purpose of the thinking we then have the "broad concepts" approaches, or "directions" that would lead us to the objective. So if the objective was "coping with a water shortage" then the approaches or directions might be:
1. reduce consumption
2. increase supply
3. do without water

Each of these broad concepts or "directions" now becomes the fixed point for the finding of alternative "concepts." So we now move to the left and create the concept level. Each concept is a way of achieving either one of the "directions."

For "reduce consumption of water" we might have as concepts:
1. increased efficiency of use
2. less wastage
3. discourage use
4. education

For "increased supply of water" we might have:
1. new sources
2. recycling
3. less wastage from sources

For "do without water" we might have:
1. stop water-using processes
2. substitute other substances
3. avoid need to use water

At the end of this stage we have ten alternative "concepts" in the concept layer. Each of these concepts now becomes a fixed point for the next layer. For, each concept we now seek alternative ways of carrying through the concept. We seek alternative ideas.

For example, for the concept "discourage use" we might get as alternative ideas: meter the water; charge for water use; raise charge for waters; water only obtainable from public sources; water only at certain times; put a harmless bad smell into the water; restrict use for gardens, pools, and the like; publish names of heavy users; threaten to ration water.

The same process could be undertaken for each of the concepts in the concept level. The total process is illustrated on, Fig. 2.2.
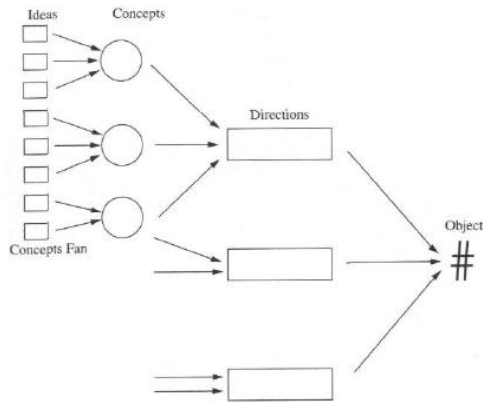

Fig. 2.2 - Total process

The three levels of the concept fan are:

1. *Directions* - These are very broad concepts or approaches. The broadest concept you can conceive becomes the direction.
2. *Concepts* - General methods or ways of doing something.
3. *Ideas* - Specific concrete ways of putting a concept to work. An idea must be specific. It must be possible to put an idea directly into practice.

We can use the analogy if you are driving north then this is the "direction." There are many roads, all of which are heading north. These roads are the ways of proceeding north and they become the "concepts." But you have to do something specific to travel along one of the roads (car, bus, and walk) and this specific action is the "idea".

Many people get worried about the difference between "concepts" and "directions". This is because the difference is relative. A "direction" is simply the broadest concept you can think of-If you think of an even broader concept, then that becomes the direction.

There is no magic in the three layers of the concept fan. In practice there are times when there may be many layers of concepts between the directions and the ideas. The direction is always the broadest concept and the idea is always the specific way of doing something. Everything in between becomes a "concept".

The Concept Fan [2], which was devised by Edward De Bono, is a way of finding different approaches to a problem when you have rejected all obvious solutions. It develops the principle of "taking one step back" to get a broader perspective.

Random Input [2], [9] is a technique for linking another thinking pattern into the one we are using. Along with this new pattern comes all the experience that thinker has connected to it.

To use Random Input, a random noun from either a dictionary or a pre-prepared word list is needed to be selected. It often helps if the noun is something that can be seen or touched (e.g. "helicopter", "dog") rather than a concept (e.g. "fairness"). If good word is chosen, then a range of new ideas and concepts will be added to the problem solving, while some will be useless. The Random Input is often used to initiate generation of new ideas, and because of that we have developed software tool that combines these two techniques.

3. GOOLE SETS SERVICE

Google Sets [13], [9] is a large-scale clustering algorithm that uses many millions of data instances extracted from web data. More specifically, it invites users to enter a few items that all fall into a certain category. It then tries to determine what the category is and generate a list of more items that belong in that category.

The Google Sets page contains blank lines for entering items and two options for getting result, "Long Set" and "Short Set (15 items or fewer)". "Long Set" option is for a list that is as comprehensive as possible but likely to include some items that are weakly related or seemingly unrelated to the others. "Short Set" option is for a list that is more focused and less likely to contain outliers, though not necessarily free of them.

4. USED TECHNOLOGY

The Concept Fan Tool (CFT) is designed and developed as web application that uses Silverlight 2.0 [14] and therefore it looks like desktop application. The application user interface is thankfully to the opportunities given and represented by the Silverlight which is Rich Internet Application standard.

The application has data model that is stored on SQL Server. This is used for storing all projects and all generated ideas for appropriate project. Also data is stored for all users that are using the application. The user management is made with the asp net membership provider from Microsoft. The communication between the client application and the data base is established with Windows Communication Foundation (WCF) service.

The objects that are displayed within the web page are designed with Blend Expression 2.0 [15], which is important and necessary helping tool for designing graphical objects for this architecture. All those graphical objects have declarative representation with XAML structure.

Anything that is created or implemented in XAML can be expressed using a more traditional .NET language, such as C# or Visual Basic.NET. However, a key aspect of the technology is the reduced complexity needed for tools to process XAML, because it is based on XML. As a result, a variety of products are emerging, particularly in the WPF - Windows Presentation Foundation space, which create XAML-based applications. As XAML is simply based on XML, developers and designers are able to share and edit content freely amongst them

without requiring compilation. The XAML based coding is strongly linked to the .NET Framework 3.5 [16] technologies.

The XAML code produces the look and representation of the graphic object that is used in the user interface of the NBT, presented on Fig. 4.1.

Fig. 4.1 - Object represented by XAML

Furthermore in the application is used WCF service that makes connection with Google services and the client application. This WCF service is the heart of the application because it is responsible for generating ideas.

5. SOFTWARE IMPLEMENTATION

Main purpose of this application is creating ideas for given problem. All ideas could be generated from only one user or from several users.

First of all every person who wants to use the application creates his/her own user account. After that the user can login to the system and can create new project for generating ideas or can accept invitation for participation in a project that is already created from another user. When the user is logged in to the system then empty canvas with menu is shown. The menu is on the upper right corner and has options for listing projects, creating new project, invitation to users, save project and clear the board.

'My Projects' window, which is shown on Fig. 5.1, contains the list of projects that are accessible by the user.
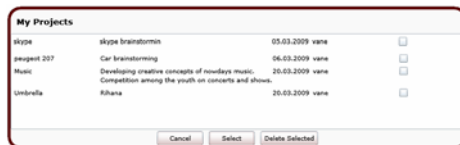

Fig. 5.1 - My Projects

If the user wants to generate ideas for the given problem, then the project is selected from the list. The project can be deleted by using the 'Delete Selected' button. The process of deletion means that if the user is owner of the project then it is deleted completely including all the ideas. But if the user is only a member of the project created by other user then deletion means leaving from selected projects.

For every project the user can invite other users in the ConceptFan process, Fig. 5.2.
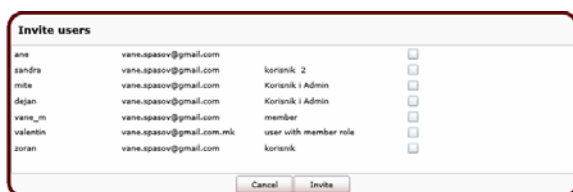

Fig. 5.2 - Invitation list

If the user wants to create new project then the button for new project needs to be clicked, and after that pop-up window is opened, Fig. 5.3. New project is defined with name and description. The name of the project is the root of the problem for which we want to generate ideas; description field contains short explanation for the project.
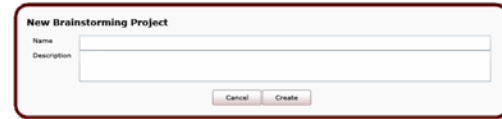

Fig. 5.3 - New project

These two fields define the root node which is starting point for generating ideas, Fig. 5.4. The process for creating ideas starts with this root node which is actually presented in the user interface drawing board when new project is created. This node has menu around itself and contains buttons for performing actions such as adding new idea node, generating ideas with Google services, show/hide child nodes etc, Fig. 5.5. Actions for moving the nodes network to all directions is done with mouse left click and mouse move. Actions for zoom in/out are done with the mouse scroll.

Fig. 5.4 - Root node

There are three types of creativity elements in the application, presented on Fig. 5.5. All of them have different meaning.
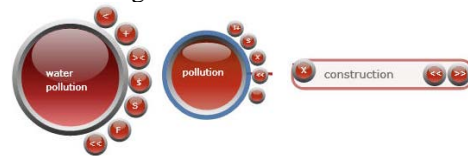

Fig. 5.5 - Starting node

The first one is the starting element for solving the problem. The second one is the concept element. These two elements can create two types of elements, concept and idea element. The third one is the idea element which has opportunity to be promoted to concept if the user wants that. All three has their own contextual menu with action buttons.

This creativity support tool has an interface for updating the node properties. The node has Name, Type, Content and Asset value properties. The name field is for writing word or word combination. This name is starting point of the ConceptFan process. The content field is for writing additional information for the node. The asset value field is for the idea node and represents field for giving value to the idea in the whole network of ideas. The updating interface is

shown for every selected node from the drawing board, presented on Fig. 5.6

Fig. 5.6 - Node properties updating

For the defined problem this tool enables adding new nodes manually or automatically.

The manual adding is creating new node that represents new idea or new concept and is defined from the user by populating the node properties such as name, content and asset value.

The automatically node adding is generating ideas which are associated with the problem represented by the selected node. We have developed two aspects of automatic generating ideas, getting random word from Google Products and getting similar category words from Google Sets. Generating of new ideas is with button clicking from the menu surrounding the node. The tool takes the word/words from the node name and sends it/them to the Google Sets service, then the service generates result set and the ideas are drawing as nodes on the drawing board, Fig. 5.7
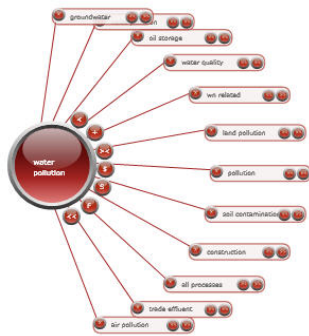

Fig. 5.7 - Starting with Creativity Support Tool

All these generated automatically or added manually nodes represent ideas for the problem that is solving. If some interesting idea nodes are generated then they can be promoted to concepts by clicking the promote button, Fig. 5.8
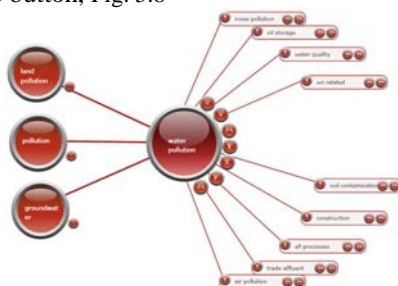

Fig. 5.8 - Creating concepts

If generated ideas are not interesting or valuable in the process of problem solution and the creativity process is somehow blocked then Random Input needs to be initiated by invoking random words from the Google Products. It contains nouns of physical products. These nouns are used as starting point for generating ideas for the defined problem on the central node. Google products or popularly known Froogle gives 25 random product names. Then randomly selecting two or three of them are given as input array to Google Sets which continues the list of the given ideas. Some of them are good or neither of them is good and they can be deleted.

Fig. 5.9 - Scenario

In the test scenario on Fig. 5.9, the problem of 'water pollution' is shown. This is starting element from which ideas are generated with Google Sets. From the generated ideas three of them are found to be interesting to be directions of problem solving because they are more general. The directions are 'pollution', 'land pollution' and 'ground water'. These nodes were generated as ideas but were promoted as general concepts or directions, by clicking the promote button from the idea node.

From this point the process of ConceptFan can be continued by making concepts or generating ideas. It is chosen ideas to be generated for the 'pollution' concept node, Fig. 5.10. The result is: 'recycling', 'natural resources', 'environmental science', 'climate change', 'conservation', 'energy' and 'environment'.
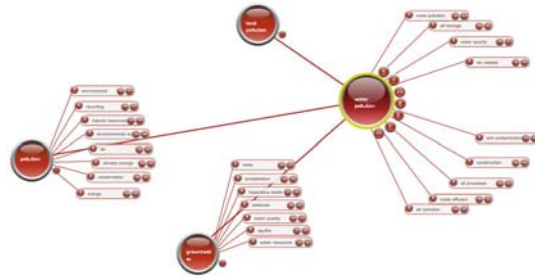

Fig. 5.10 - Concepts and ideas

It is found that 'environment' is interesting node and it is promoted to concept from which more new ideas can be generated, Fig. 5.11. The generated ideas are: 'science', 'world', 'safety', 'transport', 'agriculture', 'energy' and health.
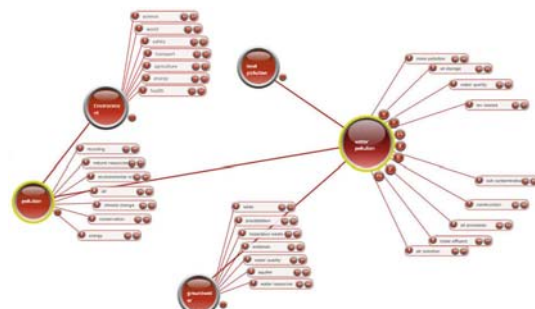

Fig. 5.11 - Generated ideas

5.1. Multi-user Collaboration

This application gives opportunity for users to collaborate on given problem. This means that several users can work on selected project and every user can work individually on several concept nodes separately from other users work. When the user works on some concept node then this node is locked and can not be edited (moved, renamed, add child nodes etc.) by other users. After completing his part of the process, the user saves his work and it comes visible to other users, also all locked nodes become editable for other users.

6. CONCLUSION

In this paper is presented creativity support tool that incorporates two creativity techniques, Concept Fan and Random Input. This tool utilizes the Google services, Google Products and Google Sets, for generating ideas. The Concept Fan technique is a way of finding different approaches to a problem when you have rejected all obvious solutions. It develops the principle of "taking one step back" to get a broader perspective. Random Input is technique for linking another thinking pattern into the one we are using. Along with this new pattern comes all the experience that thinker has connected to it. Google Products is used for generating random nouns that are used as starting point for generating ideas for the problem. Then randomly selecting two or three of them are given as input array to Google Sets which continues the list of the given ideas.

This application gives opportunity for users to collaborate on given problem. This means that several users can work on selected project and every user can work individually on several concept nodes separately from other users work

7. REFERENCES

[1] Creativity article on Wikipedia, http://en.wikipedia.org/wiki/Creativity , (accessed 15.01.2009)

[2] James Manktelow, Mind Tools Essential Skills For An Excellent Career, Mind Tools Ltd Signal House, Station Rd Burgess Hill, West Sussex, United Kingdom, 2003

[3] Jill Cirasella, Google Sets, Google Suggest, and Google Search History: Three More Tools for the Reference Librarian's Bag of Tricks, (accessed 15.01.2009)

[4] ParaMind Brainstorming Software -Idea Creation Technology http://www.paramind.net/ (accessed 10.01.2009)

[5] Brainstorm and Affinity Diagram Tool, http://www.skymark.com/pathmaker/tour/brain.asp?gclid=CIOd9NKeopgCFQpatAodzVV5mQ (accessed 10.01.2009)

[6] Solution Genie, http://www.brainstormingdss.com/site/bsnet.html(accessed 10.01.2009)

[7] Brainstorming Toolbox, http://www.infinn.com/toolbox.html (accessed 10.01.2009)

[8] Idea Fisher, http://www.thoughtoffice.com/?page_id=148(accessed 15.01.2009)

[9] Dejan Ristevski, Vane Spasov, Dimitar Trajanov, Milan Petkovski, *Web Tool For Brainstorming – Software Tool For Generating Ideas*, YUINFO 2009.

[10] SmartDraw, http://www.smartdraw.com/downloads/index.htm?WT.svl=link01 (accessed 10.01.2009)

[11] MatchWare, http://www.matchware.com/EN/products/openmind/default.htm (accessed 10.01.2009)

[12] Edward De Bono, *Serious Creativity*, USA, 1993

[13] Google Sets, http://labs.google.com/sets (accessed 15.01.2009)

[14] Silverlight 2.0, http://silverlight.net/ (accessed 15.01.2009)

[15] Microsoft Expression Blend, http://www.microsoft.com/downloads/details.aspx?FamilyId=5FF08106-B9F4-43CD-ABAD-4CC9D9C208D7&displaylang=en (accessed 15.01.2009)

[16] Microsoft .NET Framework, http://www.microsoft.com/downloads/details.aspx?FamilyId=333325FD-AE52-4E35-B531-508D977D32A6&displaylang=en (accessed 15.01.2009)

[17] Google Products, http://labs.google.com/products (accessed 15.01.2009)

[18] Ben Shneiderman, CREATIVITY SUPPORT TOOLS-Accelerating Discovery and Innovation, December 2007