SEARCH IDEAS FOR BUSINESS ALUMNI

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Abstract*: The article considers some methods and models for searching ideas for startups and business projects for the realization of the goals of the project TEMPUS544521Tempus-1-2013-1-De-Tempus-Shmes "EANET". An algorithm for the search of new technical graduates for a business organization is presented.*

Keywords*: Data Base (DB), BackUp Keeper, Archive, Restore, Full/Differential/TRN-Log backup, Emergency Management Australia (EMA), Garland of associations and metaphors*

Introduction

There are two trends that can characterize society development: first – continuous increase in human needs for new technologies, new services and products, tools, etc., and needs are doubled in less than seven years; second – a significant lag the pace of development of new technologies, products and services.

Today we need not any products and services, but only high-quality and competitive products and services, which have rates of 20-25% higher than existing products and services.

Scientific and engineering community is constantly in search mode of something new that can satisfy the particular needs of humanity. At present there is the need for new knowledge as they also grow old together with the corresponding already produced products and processes, and therefore obsolete and qualified specialists.

The pace of aging knowledge necessitates regular and systematic updating of knowledge, i.e. competence of professionals and workers. Assuming that the doubling of knowledge necessary for any profession occurs within 12 years, then people that started to work immediately after graduating from the university at 23 years will have only half of required knowledge at 35, 47 - a quarter, and 59 - one-eighth part of the knowledge. There is the need for regular, systematic training of specialists at all levels and in all branches of science and technology.

Relevant is the development of creative and innovative start from experts in particular business alumni (university graduates who can grow their business and to participate in market-society).

New ideas, products, technical solutions, services etc. for business alumni are encouraged to develop a modified method of garlands associations.

Main part

The task of forming a list of possible solutions to the problem in the decision-making process has traditionally solved by non-directional search (trial and error). Its solution in terms of lack of information, inability to use logic and the need to find new solutions to the original requires the creation and application of methods of activating the creative process or automation and modernization of methods previously considered non-algorithmic and formal; - methods of psychological thinking activation [2].

Despite the fact that in general the process of searching for new ideas for methods of psychological thinking activation difficult lack of ability to manage this search, support tools to find new ideas are widespread [4]. Among these tools can be called "matrix of ideas" by Lebedev Studio [3], «Ideas2.0», «Idea Generator» TDB Spesials Project [7], «Creativity Machine» of Steven Tyler [5], «IdeaFinder+» that is developed on the basis of linguistic processor of A. Baryshnikov and the others. To activate the creative process is also used audiovisual stimulation device (called Mind-machine), leading recipients in a state of deep relaxation, concentration, or an altered state of consciousness [6].

For methods garlands associations and focal objects conditional complexity of finding solutions to the increasing complexity of the problem to be solved is lower than for the method of trial and error, and methods of psychological activation as a whole, but higher than for the methods of directed search [4] (TRIZ [1], functional and physical method). In addition, methods for focal objects and garlands associations may be made of different control actions to increase the efficiency of the search for new solutions. In addition to automating the process of building a simple associative chains, implementation of algorithms of these methods will enhance the uniqueness found associations to solve inventive problems compared with the methods of random search.

To study the method of garlands associations to generate solutions to for solving inventive problems are encouraged to use a modified version of the method.

Methods for solving the problems of searching technical ideas for business alumni depend on psychodiagnostics in psychosomatics, the features of the subject area in which the task is being solved, and the requirements that the user sets for solving the search problem. The characteristics of the domain in terms of methods of solution can be characterized by the following parameters:

-the size that determines the amount of space in which the solution is to be sought;

-the changeability of the region, characterizes the degree of variability of the region in time and space (here we will allocate static and dynamic regions);

-the completeness of the model describing the region characterizes the adequacy of the model used to describe the given region. Usually, if the model is not complete, several models are used to describe the region, complementing each other by reflecting different properties of the domain;

The certainty of the data about the problem being solved characterizes the degree of accuracy (inaccuracy) and completeness (incompleteness) of the data. Accuracy (error) is an indicator that the subject area is described from the point of view of the tasks being solved by accurate or inaccurate data; Under the completeness (incompleteness) of data is meant the sufficiency (insufficiency) of input data for unambiguous solution of the problem.

The user's requirements for the result of the task solved by searching can be characterized by the number of decisions and the properties of the result and (or) the method of obtaining it. The parameter "number of decisions" can take the following basic values: one solution, several solutions, all solutions. The "properties" parameter specifies the restrictions that the received result or method of obtaining it must satisfy. So, for example, for a system issuing recommendations for the treatment of patients, the user can specify the requirement not to use some medicine (due to his absence or because it is contraindicated to this patient). The parameter "properties" can also determine such features as the decision time ("not more than", "time range", etc.), the amount of memory used to obtain the result, the indication of the mandatory (impossible) use of any knowledge (Data), and the like. Thus, the complexity of the problem, determined by the above set of parameters, varies from simple problems of small dimension with unchangeable definite data and the absence of constraints on the result and the method of obtaining it to complex large-dimensional problems with variable, erroneous and incomplete data and arbitrary limitations on the result and the method for obtaining it. From general considerations it is clear that no one method can solve all problems. Usually some methods surpass others only in some of the listed parameters.

The methods discussed below can work in static and dynamic problem environments. In order for them to work in dynamic conditions, it is necessary to take into account the lifetime of the values of the variables, the data source for the variables, and also to provide the possibility of storing the history of the values of the variables, modeling the external environment, and operating time categories in the rules.

The existing methods of solving problems used in expert systems can be classified as follows:

- methods of searching in one space - methods intended for use under the following conditions: small-dimensional areas, model completeness, accurate and complete data;
- search methods in hierarchical spaces - methods designed to work in areas of large dimension;
- search methods for inaccurate and incomplete data;

• search methods using several models designed to work with areas for which adequate description of one model is not enough.

It is assumed that the listed methods, if necessary, should be combined in order to allow solving problems whose complexity increases simultaneously by several parameters.

Currently, there are many methods for finding ideas. With a certain degree of conventionality, they can be divided into three groups:

1. Methods of psychological activation of thinking.

2. Methods of systematic search.

3. Methods of directed search.

Each of the methods is designed to facilitate the search for a solution to a creative problem in comparison with the so-called "trial and error" method, which is usually used by a person. The expediency of applying a method belonging to a particular group, in particular, depends on the complexity of the problem being solved.

To solve relatively simple problems, it is expedient to use methods relating to the first two groups. Directional search methods were specially created to solve complex problems and, in spite of the complexity of these methods, their application in this case is justified. The use of direct search methods for simple tasks may not be appropriate because the complexity of the methods themselves will be higher than the complexity of the problem being solved, or because these methods are not suitable for solving such problems.

Proposed solution

First of all, to find ideas it is recommended to build garlands of associations. The most acceptable form of representation of the generalized domain model of the solution can be given in the form of a triple

$$\langle A,P,G \rangle ,$$

where A – the final alphabet of the system; P – he final set of rules for which garlands of associations are drawn up; G – a finite set of associations' garlands.

At the first stage of building a garland of associations for the object chosen for analysis, a set of words characterizing its properties is determined (these can be, for example, adjectives and verbs). The second stage defines a set of random objects that form the knowledge base for building associations' garlands. For these objects, sets of characteristics characterizing them are also determined. The third stage is the compilation of a chain of associations. A property is selected for the analyzed object, and an object with the same property as the original object is selected from the list of random objects

according to a particular rule (the frequency of occurrence of the property, the uniform random distribution or another). After that, the following element is attached to the chain by the same rule. The stage ends when the specified length of the chain is reached, or it is impossible to add a new element to the garland. The fourth stage is the generation of new ideas. Elements of a garland of associations and their signs join the analyzed object. At the fifth stage, the most rational ideas are selected for further use.

So, the algorithm of the method of garlands of randomness and association has such stages of implementation:

1. Definition of synonyms for the object.
2. Select random objects.
3. Drawing up combinations of elements of a garland of synonyms for the object and

elements of a garland of random objects. Combinations are made up of two elements by attempting to merge each a synonym of the object under consideration with each random object.

4. Drawing up a list of signs of random objects. The signs of randomly selected objects with the greatest possible number of symptoms for a limited time (minutes). The success of the search into a large extent depends on the latitude of coverage of the characteristics of random objects, therefore it is advisable to list both basic and secondary signs. For convenience, a table of characteristics is drawn up, one column of which is indicated by random objects, and in the other (on the contrary) - the signs of these random objects.
5. Generating ideas by alternately joining the technical object and its synonyms for signs of randomly selected objects.
6. Generating garlands of associations.

Alternately, from the signs of random objects identified in the fourth step, generate garlands of free associations. For each of the individual characteristics they can be virtually unlimited length, so the generation should be limited in time or number of elements of the garland.

Note: If the generation of associations' garlands is collectively conducted, then each member of the collective is engaged in this independently.

7. Generating new ideas.

Elements of garlands of technical object synonyms are trying to attach elements of associations' garlands.

8. Choosing an alternative.

At this step, the question is solved - to continue generating garlands of associations or they are already enough to select useful ideas. Note: if, according to preliminary estimates, there are few such ideas, one can continue creation of garlands of associations, starting with some new element of garlands, created in the sixth step and acting in a similar way.

9. Evaluation and selection of rational ideas.

Among the many irrational, trivial and even ridiculous ideas, as a rule, always are original and rational. If for a short time you can find several dozens of solutions, it is quite satisfactory a situation in which at least several variants of variants seem useful.

10. Choose an option

Note: Often talk about "optimal" options, but forget to indicate, relative to whom or what they are optimal. Therefore, it is advisable to use the term "rational solution"

Mathematical model of the design object

Recognition when designing complex systems is a multi-level process. It is characterized by the successive stages provided by the procedural model, at each of which the projected system receives a description of the structure of the elements of the object and the parameters. In this connection, the description of the design object can be called stratified, which evolves from a "short" stage of the procedural model to "unfolded" in the lower levels.

To use a computer, the description of the design object should be the nature of mathematical models.

For any decision situation, they are a set of relationships that connect actions (replaceable, the value of which is selected by the person who makes the decision LPR) that is controlled, and the parameters of the given task with the original removable (changeable, dependent on the type of actions that control).

In a meaningful sense, the description of the design object in the form of a mathematical model should contain the following components and rules:

1. $\mathbb{Z}$ – purpose of functioning.
2. $\{\mathrm{Elem}\}$ – set of elements making up the system.
3. $\{\mathrm{T}(t_\tau)\}$ – set of time elements.
4. $\{\mathrm{P}(\mathrm{P_i})\}$ – a set of characteristics that characterize the system as a whole.
5. $\{\mathrm{P_{el}}\}$ – a set of characteristics that characterize the elements of the system.

6. $\{\mathrm{Sost}\}$ – set of states of elements in a given time interval.

7. $\mathrm{H}(\mathbb{Z})$ – rule for ordering the change of states in the course of achieving the goal.

8. $\{\mathrm{Q}\}$ – rule of relations between all elements of the system;

9. $\mathrm{F}=\{\mathrm{P_{el}},\mathrm{P}(\mathrm{P_i})\}$ – mathematical relations schemes that describe, features

Elements and featured systems.

10. $\{\mathrm{P_{sred}}\}$ – a set of characteristics that determine the interaction of the system with the environment.

The system will be defined if all of the above sets and rules 7 and 9 are defined.

A lot of goals, attributes and elements are best represented in the form of graphs.

A plurality of states includes a defined set of characteristic values of a system, subsystem, or elements at a time point $\mathrm{t_\tau}$.

Individual elements or the entire system for a given time $\mathrm{t_0},\ldots,\mathrm{t_\tau},\ldots,\mathrm{t_k}$ a certain number of times passes from one state to another. A single transition is an elementary operation:

$$\mathrm{Op_0} = \mathrm{Sost}^{\tau} \succ \mathrm{Sost}^{\tau+1},$$

where Sost^{τ} – position; $\mathrm{Op_0}$ – elementary operation; $\succ$ - order-of-charge sign.

It assumes that the operation is defined if the specified state, the final state, the order of state changes of the system, which can be described by the differential equations, finite automata, probability automata, Markov chains, Boolean functions, predicate functions, are defined for it.

The interaction of elements is determined by the relationships

The design process as a transition from one description to another can be expressed by a relationship:

$$\Pi_0 = \widetilde{\Pi}_1 \to \widetilde{\Pi}_2 \to \ldots \to \widetilde{\Pi}_\mathrm{i},$$

where Π_0 – means the design process, $\widetilde{\Pi}_1 \to \widetilde{\Pi}_2 \to \ldots \to \widetilde{\Pi}_\mathrm{i}$ – description of the design object at different stages of design at different stages of its development.

Description $\widetilde{\Pi}_1$, of the determinants achieved with its creation and use, is called the target: $\widetilde{\Pi}_1 = \mathbb{Z}_0$.

Description $\widetilde{\mathrm{O\Pi}_2}$, that gives an idea of the idea of its technical solution, is called conceptual: $\widetilde{\Pi}_2 = (\mathbb{Z}_0, \mathrm{P})$.

Description $\widetilde{\Pi}_3$ hat gives a representation in the function of an object, let's call it functional:

$$\widetilde{\Pi}_3 = \left(P_{sred}, H, Sost\right).$$

Mathematical models that relate to the structural description of a system include many elements that represent the system $\{Elem\}$; set of characteristics that characterize the elements $\{P_{el}\}$; set of connections between all elements of the system $\{Q\}$:

$$\widetilde{\Pi}_4 = \left(Elem, P_{el}, Q\right)$$

The dynamic description includes mathematical models based on a set of characteristics that determine the interactions of the system with the environment $\{P_{sred}\}$, at a multitude of times $\{T\}$ and mathematical schemes that describe the relationship between the characteristics of elements and the characteristics of the system: $\widetilde{\Pi}_5 = \left(P_{sred}, T, F\right)$.

A description that defines parameters for an object is called parametric. It includes many parameters: $\widetilde{\Pi}_6 = \left(P_1, P_2, \ldots, P_i\right)$.

In this section, we consider the general representation of the description and the mathematical model of the design object. In the future, it will be specified with respect to individual procedures and operations.

The method of garlands of associations and metaphors - is a heuristic method of technical creativity, which is the development of the method of focal objects.

The method of garlands of associations and metaphors includes the following procedures:

1. Definition of synonyms of the object, as a result of which a garland of synonyms is formed (for example desk-bureau-desk -...);

2. Choice of random nouns, with the help of which a garland of random nouns is generated (for example, pencil-chair -...);

3. Combining all the elements of a garland of synonyms with each element of a garland of random nouns. Some of the combinations represent ideas for solving a problem (for example, a table like a pencil-table in the form of a chair -...);

4. Compilation of a list of signs in the form of adjectives for each element of a garland of random nouns (clause 2). These lists are garlands of signs (for example, pencil: wooden-automatic -...; chair:..);

5. Combining elements of a garland of synonyms with elements of garlands of features, as a result of which ideas may appear to solve the problem (for example a table - wooden (in the form of a tree), automatic (automatic increase);

6. Generation of garlands of free associations.

The starting point is each element of a garland of signs. Number of garlands of free associations is equal to the number of all elements of garlands of signs. Garlands of free associations are formed by repeatedly stating the question "What does the word ...?" Resemble. The answer to the question obtained on the basis of the association is a new element of the garland, which is the starting point for re-stating the question (for example: "What does the word" green "refer to? -On the grass," What ... " Grass "? - About" field ";" About what ... "field"? - About "cold", etc.

A garland of associations contains: grass - field - cold ...);

7. Combining elements of a garland of synonyms with elements of garlands of free associations, resulting in new ideas for solving the problem;

8. Evaluation of the need to continue associations, based on an analysis of all received in paragraphs. 1-7 ideas and determining their sufficiency. In the latter case, the transition to paragraph 9 is carried out, otherwise with the initial beginning of the elements of free associations, secondary garlands are generated (through free associations), elements of which are combined with elements of a garland of synonyms, resulting in new ideas;

9. Evaluation and selection of rational ideas. It is recommended to conduct by classifying all ideas into irrational (unfit, bad), semi-rational (attractive), rational (good). Irrational ideas are discarded; Rational form the core for choosing the optimal variant, and the semi-rational (which are attractive but have obvious drawbacks) are analyzed again, and then included in the list of irrational or rational ideas;

10. Choosing the best option. A stage performed by some optimization method, for example, expert assessments.

The method of garlands of accidents and associations is the development of the MFO method. Its author is Henry Bush. Through associations, this method allows finding a large number of hints for the researcher. From the method of focal objects, it differs in that it gives a large number of combinations of a focal object with random ones. The expansion of combinations of concepts is achieved using the synonyms of the object.

Acknowledgement

The paper is published with financial support by the project ITHEA XXI of the Institute of Information Theories and Applications FOI ITHEA (www.ithea.org) and the Association of Developers and Users of Intelligent Systems ADUIS Ukraine (www.aduis.com.ua).

Bibliography

1. Altshuller G. S. Creativity as an Exact Science / G.S. Altshuller. — 2 edition – Petrozavodsk: publishing "Scandinavia", 2004 – 208 pages.
2. Dvoryankin A. M., Polovinkin A. I. Automation exploratory design: artificial intelligence in computer-aided design / A. M. Dvoryankin and others under redaction of A. I. Polovinkin. – Moscow: Radio and Communications, 1981 – 344 pages
3. Matrix of ideas [electronic resource], – [2009]. – Access mode: http://www.artlebedev.ru/tools/matrix/.
4. Search methods and ideas of innovation [electronic resource], - [2004], – Access mode: http://www.inventech.ru/pub/methods/.
5. Program Creativity Machine dreams up, invents and makes openings [electronic resource] – [2004]. – Access mode: http://www.membrana.ru/articles/inventions/2004/01/26/212000.html.
6. Light and sound stimulation [electronic resource], – [2008]. – Access mode: http://www.medsport.spb.ru/.
7. The Director Bureau Special Projects [electronic resource], – [2009]. – Access mode: http://www.tdbspecialprojects.com/.

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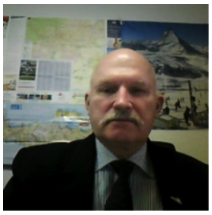

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