TRIZ Forum: Conference Report (22-G)

Personal Report of The Fifth TRIZ Symposium in Japan, 2009

Held by the Japan TRIZ Society, NPO, on Sept. 10-12, 2009, at National Women's Education Center (NWEC), Saitama, Japan

Part G. Patent Studies and Tools

Reviewed by Toru Nakagawa (Osaka Gakuin Univ., Japan), Dec. 20, 2009

[Posted on Dec. 24, 2009]

TRIZ Home Page in Japan

For going back to Japanese pages, press buttons. Japanese translation of this page is not scheduled.

Editor's Note (Toru Nakagawa, Dec. 20, 2009)

This page is Part G of my Personal Report of Japan TRIZ Symposium 2009. Please see the Parent page for the overall description of the Symposium and the general introduction to the Personal Report. I am thankful to the Authors for their permitting me to cite their slides here for introduction.

Note: (TN, Mar. 11, 2010) Click here for the PDF file of this page of Personal Report.

G1.	**Kimihiko Hasegawa,** Hiroshi Ueda, Nozomu Takeuchi, Teruyuki Kamimura, Toshimitsu Kataoka, Narumi Nagase, Hirotake Makino, Mikio Suzuki, Shigeru Suzuki	([Intellectual Property Creation Study Group, Japan TRIZ Society])	Invention Analysis through the Patent Journal (Part 2)	
G2.	**Hideaki Kosha** (Fujifilm Corp.), Yuji Mihara, Noritaka Nakayama, Kouichi Nakamura, Hirotake Makino	([MPUF USIT/TRIZ Study Group])	Study on USIT Operators Application Examples	

Top of this page	Parent page	1. Outline	2. Organization	3. Keynotes	4. Methods in TRIZ	5. Integration with other methods	6. Case Studies	7. Promotion	8. Education and Academia	9. Patent Studies
10. Non-technical		11. Miscellaneous	12. Concluding	TRIZ Symp 2009 Official page	TRIZ Symp 2005 Personal Report	TRIZ Symp 2006 Personal Report	TRIZ Symp 2007 Personal Report	TRIZ Symp 2008 Personal Report	Japan TRIZ Society Official Page	Japanese page

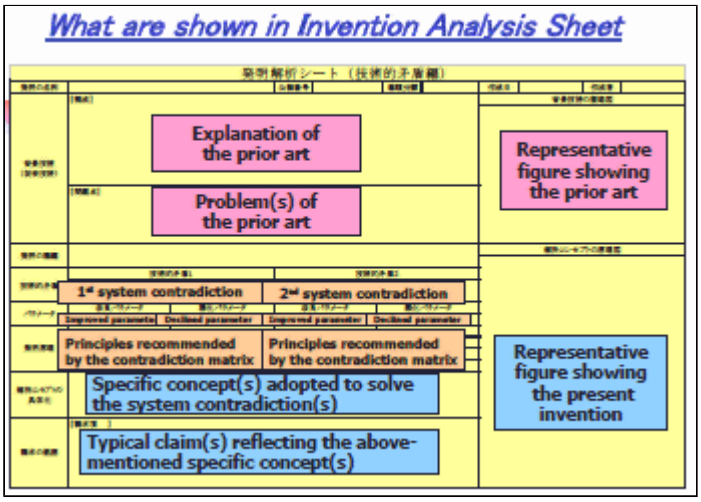
9. Patent Studies and Tools

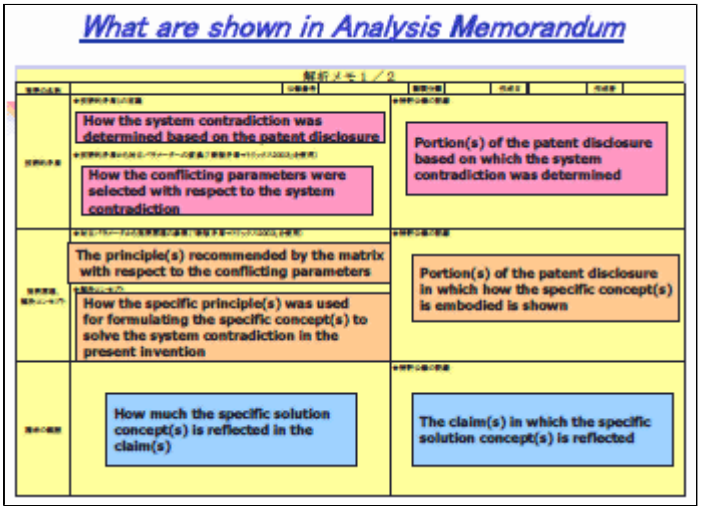
Kimihiko Hasegawa, Hiroshi Ueda, Nozomu Takeuchi, Teruyuki Kamimura, Toshimitsu Kataoka, Narumi Nagase, Hirotake Makino, Mikio Suzuki, Shigeru Suzuki ([Intellectual Property Creation Study Group, Japan TRIZ Society]) [J12 P-A4] gave a Poster presentation on **"Invention Analysis through the Patent Journal (Part 2)".** This group is one of the two Study Groups belonging to the Japan TRIZ Society. Engineers and patent specialists coming from various companies voluntarily formed the Study Group. They analyzed various patents from the TRIZ view individually and documented them in the fixed formats defined together beforehand. They have been working for nearly 2 years and met once every other month for discussing and

sharing their results. Now I will quote the Authors' Abstract:

> We have analyzed lots of patent documents in several technical fields since last year to figure out from each patent document one or more technical contradictions involved in and principles applied to solve the contradictions. In the last year's symposium, we have already reported around fifty examples of our patent research. This year, we will show new examples of the subsequent patent research. For every example, we put all the results of each patent analysis into a one-page summary named "Invention Analysis Sheet". Also, for each of a substantial number of examples, we added a supporting sheet named "Analysis Memorandum," where we placed our standpoint of analysis and the original sentences in the relating sections of the corresponding patent document. This supporting information will make our methodology of patent research more accessible for TRIZ beginners. You may want to assess the reasonableness of our analyses by referring the original patent documents with the above-mentioned material. This report includes a few good examples relating to IT field which were analyzed based on Darrell Mann's 21 x 21 style "IT Contradiction Matrix" and "TRIZ Principles for Information Technology (Japanese edition)" Engl by Umakant Mishra.

The two formats are shown in the slides (below). [It is unfortunate that you can not read actual examples of documents written in Japanese.] They have analyzed the patents in the fields of general machinery, construction and civil engineering, commodity; electricity and electronics, optics, computer software; and chemistry, food, and biotechnology. They have published a draft version of their analysis documents. This presentation obtained an Award by the participants voting.





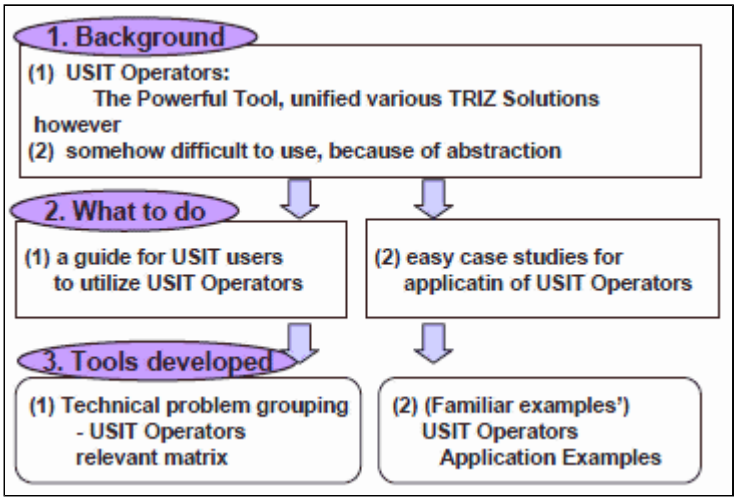
*** This type of patent analysis and documentation has been performed again and again in the TRIZ history in Japan, partly because Altshuller's original work and Darrell Mann's recent work are regarded as a basic approach for building up and learning TRIZ. In these studies it is found that the analyst's understanding of the patent need to be clarified and verified as the basis of any research afterward. That is why the Authors defined the formats and added the auxiliary memo sheets. The use of Contradiction Matrix, mostly in the new edition (Matrix 2003, etc.) Engl by Darrell Mann et al., is still popular to many engineers in Japan.

Hideaki Kosha (Fujifilm Corp.), Yuji Mihara, Noritaka Nakayama, Kouichi Nakamura, Hirotake Makino ([MPUF USIT/TRIZ Study Group]) [J26 P-B5] gave a Poster presentation with the title of **"Study on USIT Operators Application Examples".** The Authors belong to another voluntary study group coming from many different companies. (Concerning to MPUF USIT/TRIZ Study Group, see Part D. Maeda et al.) The Authors' Abstract is quoted here first:

> The aim of our study team is to offer a guide for USIT users to utilize USIT Operators. USIT Operators were developed as clues to generate ideas from viewpoints of Object-Attribute-Function. We tried to derive the index from relationships between technical problems and solutions by case studies of familiar examples, in which we imagined to use USIT Operators to solve the assumed problem. We will present what we obtained from those case studies we made.

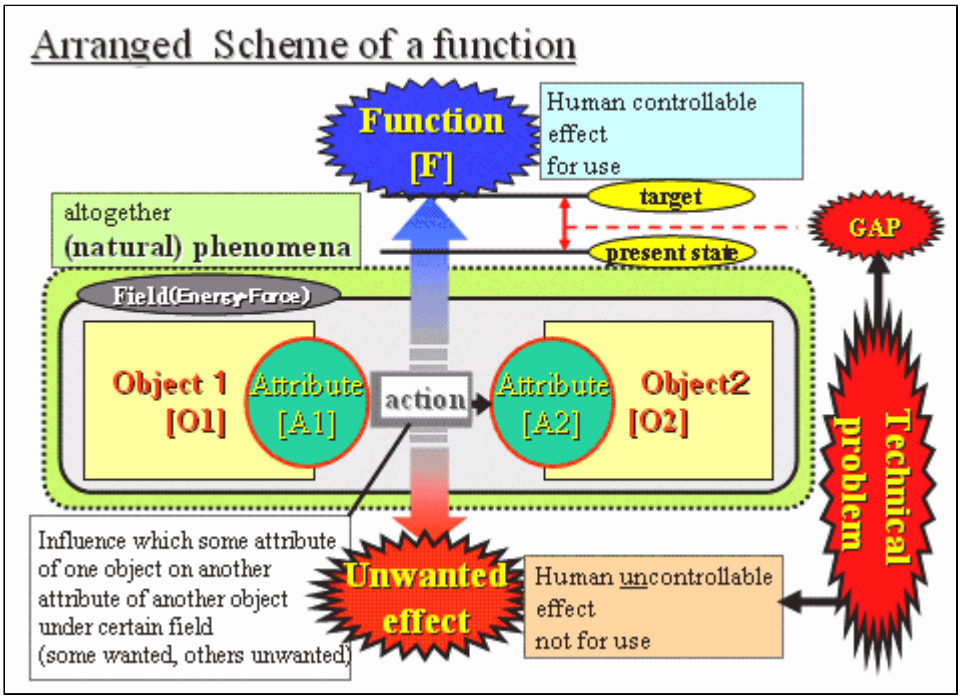
The structure of this work is shown in the slide (right). The principal intention is to make the

USIT Operators easier to understand and apply. H. Kosha and Y. Mihara are coauthors with T. Nakagawa in the original paper of deriving the USIT Operator System (2002) Engl. The USIT/TRIZ Study Group is now planning to build up a knowledge base of familiar examples of applying USIT Operators. For summarizing the example cases they build a one-page format (you will see this later). And they further try to build a new index matrix, where the user first identify the (abstract) type of problem and then look up the USIT Operators often applied in such a type of problem. [*** With these descriptions you may think that the present work is very similar to the ordinary TRIZ approach, e.g. the preceding one by K. Hasegawa et al., but it actually differs in the basic concepts due to more abstract nature of USIT Operators.]



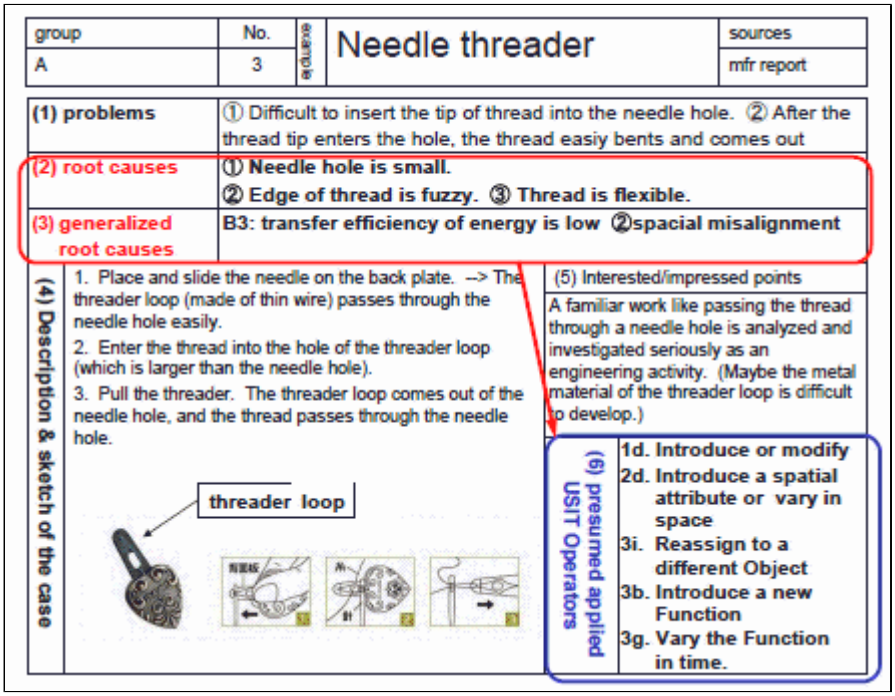
The basic understanding has come from Hideaki Kosha's work Engl presented 3 years ago in Japan TRIZ Symposium 2006. The slide (right) reflects his basic understanding of the relationship among Object-Attribute-Function, and Unwanted effect and Technical problem.

The Authors also think it important to understand the detailed process in any phenomena or action.

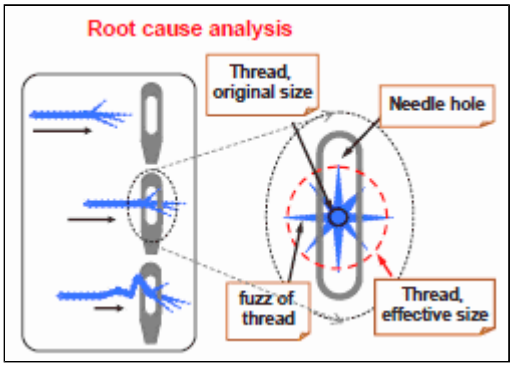


Now let us see the documentation style by the Authors. The slide (right) is a fixed-format document of a case example. This is a needle threader having a back plate for easier positioning of the needle against the threader loop. Examples may be taken from familiar/new products, patents, techniques, etc. The items to be described in this format are mostly quite natural, including (1) problems, (2) root causes, (4) description & sketch, and (5) interested/impressed points. Whereas the description of '(3) generalized root causes' is a result of further abstraction (or categorization), which will be

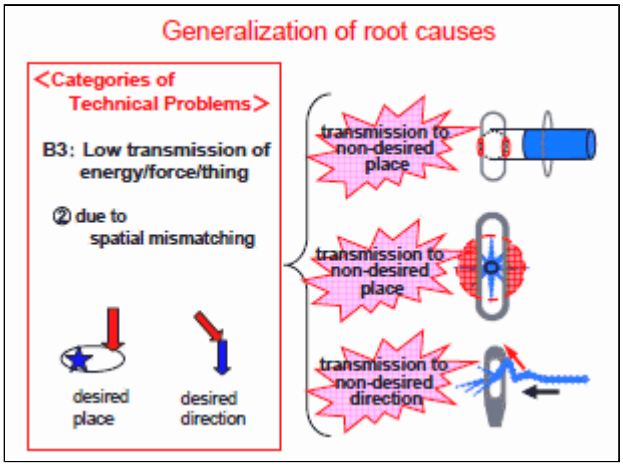
explained later. The description of '(6) presumed applied USIT Operators' is the result of analyst's interpretation of the inventor's way of thinking to develop the new product/process.



USIT emphasizes to observe the mechanism and to draw sketches of the problematic scene, especially for the root cause analysis. The 3 sketches in the left column of the slide (right) tell the difficulties: The needle hole is small and the thread is fuzzy. Even when the tip of the thread enters the hole, the fuzz of thread is out of the hole and is blocked. If one pushes the thread, it vends easily and does not pass through the needle hole. The effective size of thread with fuzz is often much larger than its original size and than the hole size. This is one of the root causes. This kind of root cause analysis is carried out on the basis of concrete observation and physical/chemical/etc background.

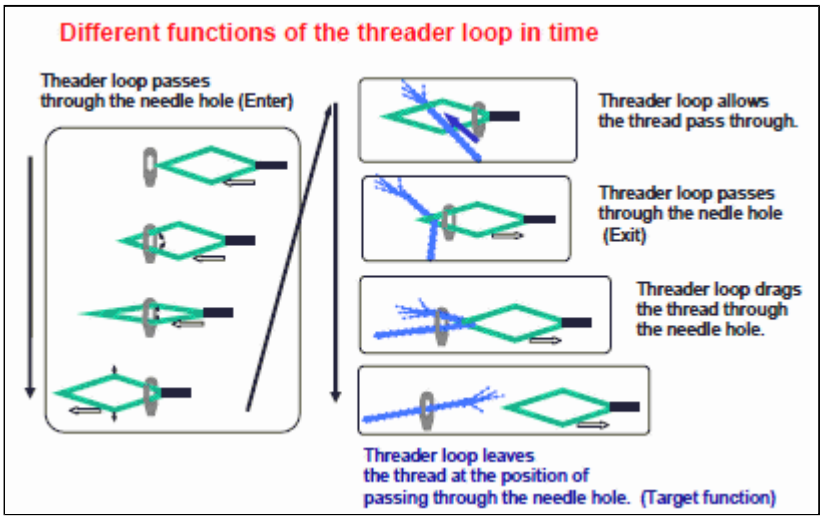


In the present work, the Authors try to generalize or categorize the root causes (see slide right), with the intention of categorize various (technical) problems from the USIT/TRIZ point of view. The Authors classify technical problems in the four main categories: A. Excess of functional achievement, B. Insufficiency of functional achievement, C. Unstable functional achievement, and D. Appearance of Undesired/Harmful effects. One of the sub-categories of B is: B3 Low transmission (efficiency) of energy/force/thing. And its further subcategories include: B3(2) due to spatial mismatching (in place or in direction). Knowing these categories, the Authors assigned the root causes in the present case as: difficulty of placing the thread into the hole --> B3(2) due to spatial mismatching in place; difficulty caused by the fuzz --> B3(2) due to spatial mismatching in place; and difficulty in the bending of the thread --> B3(2) due to spatial mismatching in direction.



The Authors also observe the function of the needle threader, or its essential part (i.e., threader loop), carefully along its process of work. The whole process of using the needle threader is shown schematically in the slide (right). The threader loop plays different roles/functions in time. It passes through the needle hole by changing its

apparent width by virtue of its soft elastic character, allows the thread pass through its large diamond-shaped hole, passes back through the needle hole, drags the thread through the needle hole, and finally leaves the thread at the position of passing through the needle hole. By observing these functions closely, we can understand various key properties necessary for performing them. All these observations are reflected in the description of the '(6) presumed applied USIT Operators', in the format of the case example.



[*** Note that the Authors pay much attention to the basic idea of the needle threader. The role of the back plate of the (new) product has another auxiliary function.]

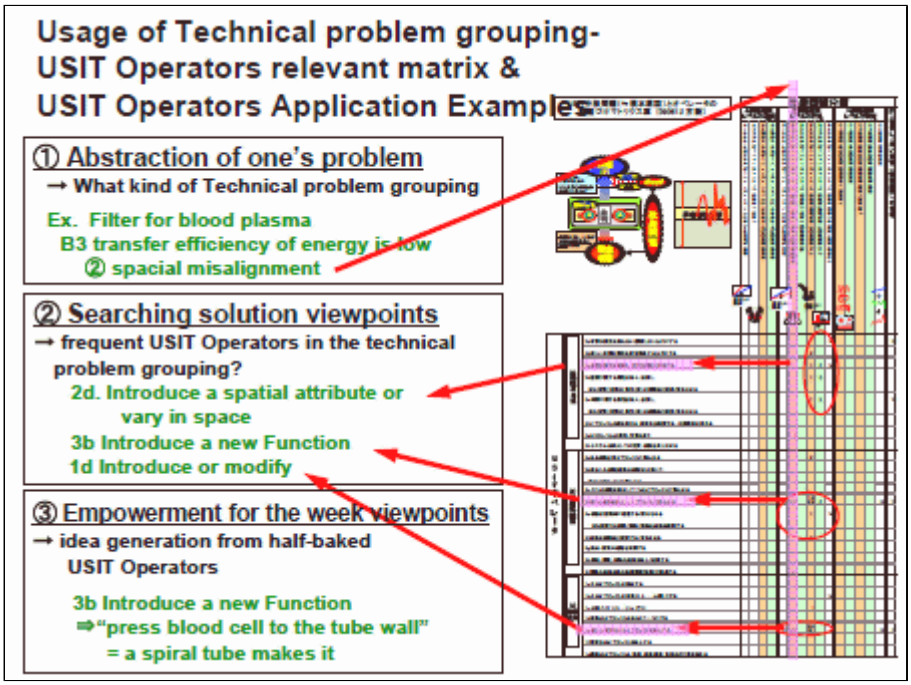
The Authors categorize the technical problems in a hierarchical way as follows:

A. Excess of functional achievement	A1. Excessive in the function of the original energy/force/thing	
	A2. Concentration (distribution) of the energy/force/thing is excessive	
	A3. Increase (concentration) by other energy/force/thing to the excessive level	spatial concentration
		temporal concentration
B. Insufficiency of functional achievement	B1. Insufficient in the function of the original energy/force/thing	
	B2. Dispersion/resistance of the energy/force/thing (distribution)	spatial dispersion
		temporal dispersion
	B3. Low transmission efficiency of the energy/force/thing	spatial mismatching (in place and in direction)
		temporal mismatching
	B4. Consumption of energy/force/thing to other function (including heat, vibration)	
C. Unstable functional achievement	C1. Periodic disturbance	spatial periodicity (e.g. shape)
		temporal periodicity
	C2. Non-periodic disturbance	spatial disturbance (e.g. shape)
		temporal disturbance
	C3. Overlap of non-constant functions	
D. Appearance of Undesired/Harmful effects.		

Using these categories of problems and the hierarchical system of USIT Operators, the Authors are planning to accumulate the analyses of

cases, just as described above, and eventually construct an Index Matrix as shown in the slide (right). The columns of this Matrix are the 16 categories of technical problems (see above), while the rows are USIT Operators. In this slide, 24 (among 32) USIT sub-operators are arranged in the order of Attribute dimensional change, Function distribution, and Object pluralization methods.

The slide (right) explains the process of using the Index Matrix, together with some examples in the case of developing a filter for blood plasma [this case is not explained in this review].



*** As reviewed here, the Authors' work of collecting the case-study analyses based on USIT is much different in its core concepts from the ones based on TRIZ (and Technical contradiction) in spite of their apparent similarity. The general concept of functions and problems is sound, and the approach of close observation of mechanism of problem/function is powerful to reveal the essence. I wish the Authors' group extend their work further and to get useful results for easier usage of USIT Operators.

General index	New Information	Introduction to TRIZ	TRIZ References	TRIZ Links	TRIZ News & Activities	TRIZ Software Tools	TRIZ Papers and Tech Reports	TRIZ Lectures	TRIZ Forum	General index Jap.
Home Page	New Information	Introduction to TRIZ	TRIZ References	TRIZ Links	TRIZ News & Activities	TRIZ Software Tools	TRIZ Papers and Tech Reports	TRIZ Lectures	TRIZ Forum	Home Page Jap.

Last updated on Mar. 11 , 2010. Access point: Editor: nakagawa@ogu.ac.jp