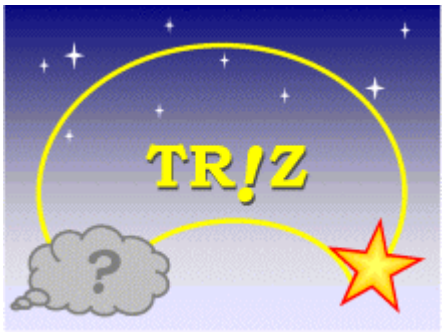
TRIZ Forum: Conference Report (18)

TRIZ シンポジウム 2007
The Third TRIZ Symposium in Japan



TRIZ Home Page in Japan Jap.

Personal Report of The Third TRIZ Symposium in Japan, 2007

Held by the Collaborative Board of TRIZ Promoters and Users in Japan on Aug. 30 - Sept. 1, 2007, at Yokohama, Japan

Toru Nakagawa (Osaka Gakuin Univ., Japan),
Oct. 9, 2007

[Posted on Nov.18, 2007]

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

Editor's Note (Toru Nakagawa, Oct. 9, 2007)

We held the 'Third TRIZ Symposium in Japan' with 202 participants (including 11 from overseas) and 37 presentations (including 10 by overseas presenters). Here is my personal report of the Symposium for the purpose of introducing this significant TRIZ event held in Japan to people over the world who are interested in TRIZ and its applications. Please refer to the Official Reports and Documents Engl. Jap. posted in the Official Pages of the Organizer, i.e. 'Collaborative Board of TRIZ Promoters and Users in Japan' (or 'Japan TRIZ CB') Engl. Jap. .

The present report is written 'personally' along the line of my series of 'Personal Reports' of important TRIZ conferences, including TRIZCONs in USA Engl., ETRIA TFCs in Europe Engl., and TRIZ Symposia in Japan Engl.. I would like to introduce you to the present Symposium, especially in its scientific contents, in a manner as fair as possible even under the limitation of my personal view. I served as the Chairperson of the Program Committee of the Symposium, but my main face here is just a researcher in TRIZ who has been working to promote TRIZ. A report of this kind would be helpful, I believe, for you to understand the current TRIZ situations in Japan and the world and for you to read some further documents. (Please see my previous reports (e.g., Engl.) for some more description about my intentions in writing 'Personal Reports'.) The paragraph starting with *** shows my (especially) personal comments.

[Note (Toru Nakagawa, Nov. 14, 2007): I finished writing this draft on Oct. 22, 2007, then requested the Authors for their permision of my citing their slides, and finally, after coming back from the trip to ETRIA TFC 2007, I finalized this report today for posting. Since this report has become so long (about 80 printed pages), I also post this in PDF Engl. PDF (KB).]

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1. Outline of the Symposium

Name of the conference:	The Third TRIZ Symposium in Japan, 2007
Date:	Aug. 30, 2007 (Thu.) 10:00 -- Sept. 1, 2007 (Sat.) 16:20 (3 days)
Location:	TOSHIBA Kenshu Center (or TOSHIBA Institute of Training and Education), Kohoku-ku, Yokohama City, Kanagawa Prefecture, Japan (A training and seminar facility owned by TOSHIBA group, and located near the JR Shin-Yokohama Station)
Held by:	Collaborative Board of TRIZ Promoters and Users in Japan Engl (Abb. 'Japan TRIZ CB') (Chairperson: Toshihiro Hayashi (T. Hayashi Professional Engineer's Office))
Participants:	202 in total (191 from all over Japan, and 11 from overseas)
Presentations:	2 Keynote Lectures, 3 Invited Talks, 2 Tutorials, 16 Oral Presentations + 14 Poster Presentations, + 2 Opening/closing addresses
Proceedings:	English Edition and Edition for Japanese people:

Please refer to the Official pages Engl Jap. for the Agenda (in a sheet) Engl PDF, the detailed Agenda Engl PDF, Abstracts Engl PDF, etc. The Opening Address Engl PDF by **Toshihiro Hayashi** (Chairperson of Japan TRIZ CB) is also useful as an overall view of the present Symposium.

At the bottom of this Personal Report, a list of all the presentations is shown in the order of their appearance in the Proceedings (i.e., at the same time, in the actual order of presentation). The Keynote Lectures have been published already in the Official pages of Japan TRIZ CB Engl, and some of contributed presentations will be posted later in this Web site, "TRIZ Home Page in Japan". Presentations are referred here with the numberings in the Proceedings by enclosing them in [ ].

2. Organization of the Symposium (with some pre-history)

The present Symposium is the third one annually held in Japan by the 'Collaborative Board of TRIZ Promoters and Users in Japan' Engl Jap. . The CB was established in January 2005 to provide a unified and open opportunity for different groups of promoters and users of TRIZ in Japan. The CB, composed by about 15 voluntary members coming from user industries, academia, and vendor/consultancy, has been working to organize the TRIZ Symposia so far three times in 2005, 2006, and 2007 successfully. With these results, the CB has been supported by almost all the parties and individuals involved/interested in TRIZ in Japan.

The following table briefly summarizes the growth of our TRIZ Symposium in Japan for these three years:

	First TRIZ シンポジウム 2005 The First TRIZ Symposium in Japan	Second TRIZ シンポジウム 2006 The Second TRIZ Symposium in Japan	Third TRIZ シンポジウム 2007 The Third TRIZ Symposium in Japan
Date	Sept. 1 (Thu) - 3 (Sat), 2005	Aug. 31 (Thu) - Sept. 2 (Sat), 2006	Aug. 30 (Thu) - Sept. 1 (Sat), 2007
Place	Laforet Shuzenji, Izu, Shizuoka	Pana-Hills Osaka, Suita, Osaka	TOSHIBA Kenshu Center, Yokohama
Organizer	Japan TRIZ CB	Japan TRIZ CB	Japan TRIZ CB
		Keynotes: 2 (H.J. Linde;	Keynotes: 2 (L. Ball; S.

Invited talks	Keynotes: 2 (T. Nakagawa; D. Mann) ; Vendor talks: 4 (Y. Konishi; M. Sawaguchi; M. Hotta; M. Zenko)	E. Sickafus): Invited talks: 2 (S. Hibino; K. Yamaguchi) Introductory: 1 (M. Sawaguchi)	Dewulf); Invited talks: 3 (T. Hayashi; S. Tamai; N. Okuzumi); Tutorials: 2 (N. Nagase; M. Sawaguchi)
Contributed papers	11 Oral presentations; 5 Poster presentations	17 Oral presentations; 12 Poster presentations	15 Oral presentations; 14 Poster presentations
Other features	Opening & Closing Addresses; Closing discussion	Opening & Closing Addresses	Opening & Closing Addresses; Meeting of Japan TRIZ CB & Japan TRIZ Society.
Participants	104 (Japan 100; overseas 4)	157 (Japan 139; overseas 18)	202 (Japan 191; overseas 11)
Official Report	2005 Pre Engl, Post Engl	2006 Pre Engl, Post Engl	2007 Pre Engl, Post Engl
Personal Report	Nakagawa 2005 Engl Jap.	Nakagawa 2006 Engl Jap.	Nakagawa 2007 Engl Jap.

The First Symposium in 2005 was indeed a trial for us CB, and was essentially a National and hence domestic conference inviting/accepting a few TRIZ leaders from overseas. It established, however, the way of organizing and operating the Symposium openly on the basis of publicly calling for papers and for participation. The Second Symposium in 2006 developed and established our own style of Symposium, i.e. Primarily National AND partially (but as much as possible) International. For this purpose we had to overcome the common problem of language barriers. The Third Symposium this year essentially followed [with some refinement] the strategies and styles of the Second Symposium. Thus, I would like to quote here the description in my Personal Report of the Second Symposium, with minor comments/insertions in [ ]:

> For the Second TRIZ Symposium this year [2006 and again 2007], we set its goals in three main points:
>
> The first goal is to make the Symposium an open and active conference of all the people involved in TRIZ on the basis of a standard procedure as an academic conference. This procedure was actually carried out very smoothly [in 2006 and again in 2007]: In February we announced the plan of Symposium and called for papers openly (both in Japanese and in English) [for 2007 Engl PDF], while in March we announced five Invited/Keynote speakers. In May, by receiving one-page abstracts of contributed papers, we reviewed them and set up a tentative agenda. In early June, we announced the agenda together with the abstracts and called for participation openly [for 2007 Engl]. The final manuscripts of slides and (optional) full papers were collected by the end of July (the official due date), and prepared for publishing the Proceedings. We are very happy and proud of having done this smoothly, as you see the agenda carried out actually has only very minor changes in the agenda announced in June, i.e. three months prior to the Symposium.
>
> The second main goal was to provide as much opportunities of presentation and discussion among all the participants. We would like to have as many and as high-quality presentations as possible. The Program Committee (of three members) reviewed all the submitted abstracts and decided to accept them all [in 2007 except for 2 which were far out of our scope of Symposium] and to arrange them in an Agenda composed of plenary invited sessions, plenary contributed sessions, double-track oral sessions, and 6-track poster sessions. The period for each presentation was set as 60 minutes for invited talks, 40 minutes for contributed oral presentations, and 80 minutes for poster presentations, all including the time of Q&A. The time setting in this manner was evaluated highly satisfactory for the presenters as well as for the audience.
>
> Our way of Poster presentations should be remarked more: Just before lunch time, we had a short 'Introduction to Posters' session where every author outlines their work in 2 minutes and then just after lunch we had the Poster session of 6 posters [6 or 8 posters in 2007] in parallel. Almost all the Symposium participants visited several poster presentations one

after another. Presenters at the Poster sessions reported afterwards that they presented and discussed for full 80 minutes with eager participants and that they were glad to have given their presentations in the form of posters. -- We feel that in the next year we will be able to accept even (slightly) larger number of presentations essentially in the same scheme.

The third main goal was to increase the International nature of the Symposium by somehow overcoming the language barriers. This point was discussed in the last section of my Personal Report of the First TRIZ Symposium Engl. 'Either National OR International' is a form of contradiction. We set the target of the Symposium this year [and in 2007, too] as 'Primarily National AND Partially (as much as possible) International'.

The ordinary solution of overcoming language barriers (between Japanese and English languages, in the present case) would be using interpreters. This solution faces with the difficulties in getting skilled interpreters and in cost, and moreover, the sequential interpretation loses half of the time and the simultaneous interpretation needs special facilities. In contrast to such a temporary/contemporary/oral assistance, we have chosen a new solution of translating the slides beforehand and projecting the slides in two languages in parallel, and publishing the Proceedings in the two language editions. This is a solution based on 'Prior Action' and 'Using Another Sense' (visual assistance). The solution was implemented by the cooperation of Japanese authors to provide both Japanese and English slides and by the CB members' voluntary work of translating English slides into Japanese. The application of this solution to poster presentations were limited to the 2-4 slides each [2 slides each in 2007] used in the 'Introduction to Posters' Session, and its application to other slides was left to each author.

This solution has been evaluated highly by most of the participants and even the authors, according to their answers to our post-conference inquiry [the same in 2007]. It is useful and good enough for most of Japanese people, who understand English more or less in listening. For people from overseas, however, this solution is helpful to a large extent but not fully, depending on the ways of making slides. When the authors writes only keywords and schematics in the slides and presents the logics only in talks in Japanese, overseas participants feel much frustrations. Hence, some overseas people have suggested to use full papers in English; but it would put much burden on Japanese authors. Thus, in the present Symposium, full papers in English (or in Japanese) are accepted on an optional basis. All the authors from overseas submitted full papers in English [in 2006, but no in 2007, unfortunately] but rather few authors from Japan submitted their full papers either in English or in Japanese. -- This issue need to be considered and improved further step by step.

Anyway, the Second TRIZ Symposium in Japan received 18 overseas participants giving 11 presentations [whereas in 2007 we received 11 overseas participants giving 10 presentations]. The presentations were given by the people coming from USA, UK, Germany, Russia, Korea, India, Taiwan, and China (Hong Kong) [whereas in 2007 by the people coming from USA, Belgium, UK, Russia, Korea, and Thailand]. We are very happy to have received world leaders in TRIZ and also people working actively in Asian countries. We have learned that TRIZ is now penetrating gradually or even rapidly in these Asian countries. The communication and understanding among Japanese and overseas participants was one of the biggest results of the present Symposium. It is my personal impression that active contributions of papers by overseas TRIZ leaders encouraged much the presentation and participation by Japanese TRIZ promoters and users. Then, good presentations and a large number of participants naturally encouraged much all the participants and resulted in a big success of the present Symposium, to our thanks.

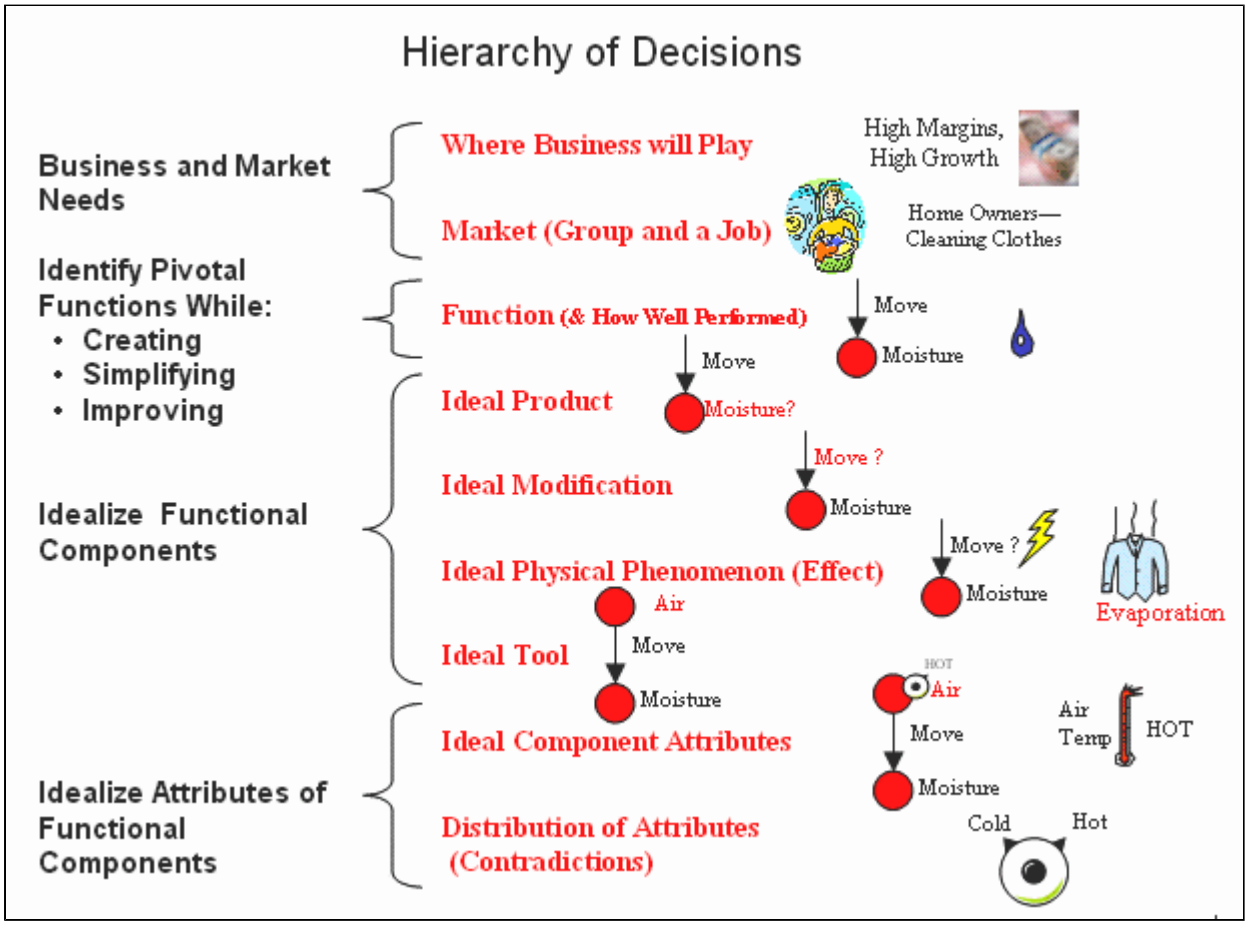
As you see, the style of our Japan TRIZ Symposium described above was established last year (2006) and refined this year (2007), and it has brought a big success shown in the rapid growth in the number of participants and also in their pretty high evaluations in the post-conference inquiries. One of the problems in this style is the necessity of intensive work inside the organizing team, which is coming close to the limit of voluntary work.

3. Keynote Lectures

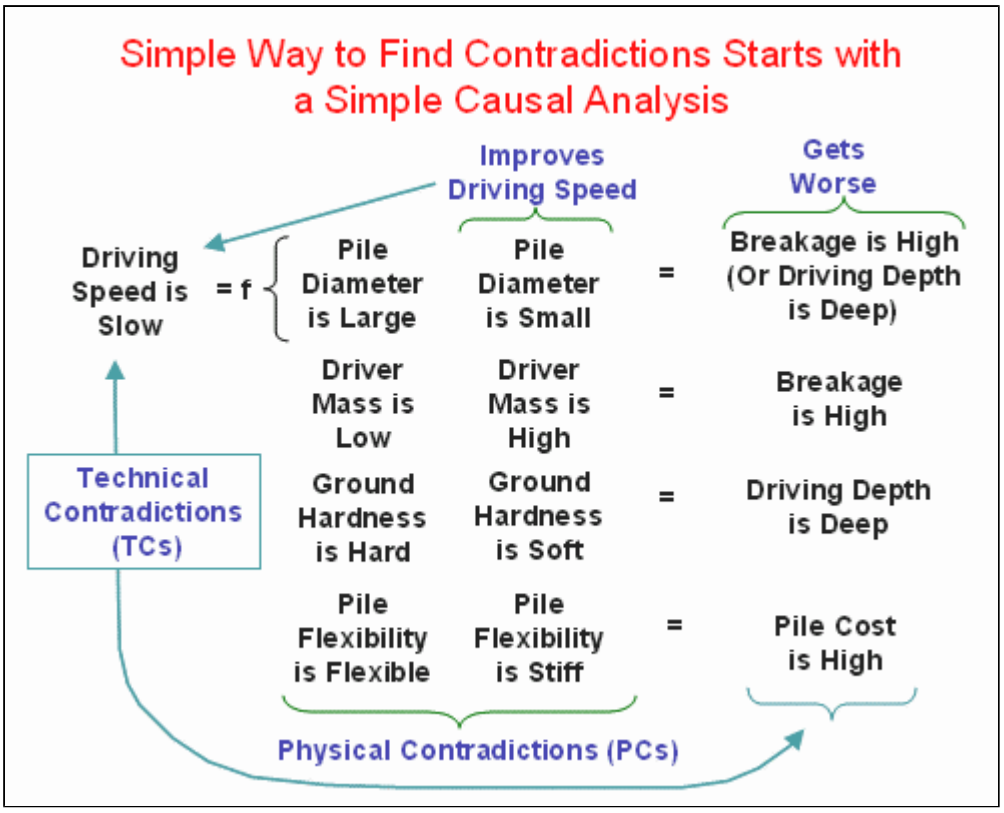
The real highlights of the present Symposium were the two Keynote Lectures given by Larry Ball and by Simon Dewulf. -- For some readers this sentence might be taken just as a formal and polite expression by a Japanese organizer. But not like that. Indeed the above sentence must be my first sentence in my 'Personal Report' in reviewing all the presentations in the Symposium.

Larry Ball (Honeywell, USA) [11] gave us the Keynote Lecture "**Hierarchical TRIZ Algorithms**" in the second day morning for 80 minutes (including 20 minutes discussion). As you might know, he posted an intensive course material of the same title in the TRIZ Journal in a series from May 2005 to April 2006. In Japan, Toshio Takahara and myself translated the course material (of about 160 pages) into Japanese and reposted it in "TRIZ Home Page in Japan" in a series from February to September, 2006 for the simplified parts and from January to July, 2007 for the detailed parts. The Author's unique way of explaining TRIZ and a plenty of nice illustrations in the material have attracted a number of TRIZ people in Japan. Thus I myself was most excited when we received Larry Ball's email message of accepting our invitation to the Keynote. Having finished the posting of the whole course material in Japanese a month before the Symposium, we were looking forward to meeting him for the first time and to attending at his lecture. His lecture was as follows (see his presentation slides in PDF in the Official Page of Japan TRIZ CB):

Larry Ball argues first that TRIZ has so many tools partly overlapping and yet partly missing, and hence that we should better decompose them and regroup them into like tools so as to clarify the next generation of Innovation Theory. Thus he is advocating "Hierarchical TRIZ algorithms". The naming with "Hierarchy" implies that the problem solving should follow a logical sequence of findings and decisions, where each decision selects a branch among a number of alternatives. Thus solving a problem should clarify the tree-like structure of hierarchy of decisions. His slide of 'Hierarchy of Decisions', i.e. principal process of problem solving, is shown below. (Sorry but I do not have enough time nor space to explain the contents very rich in the slide. The decision process should go from the top step by step down to the bottom. The small illustrations in the right are examples or schematics, especially in the form of a functional relationship, of the step.)

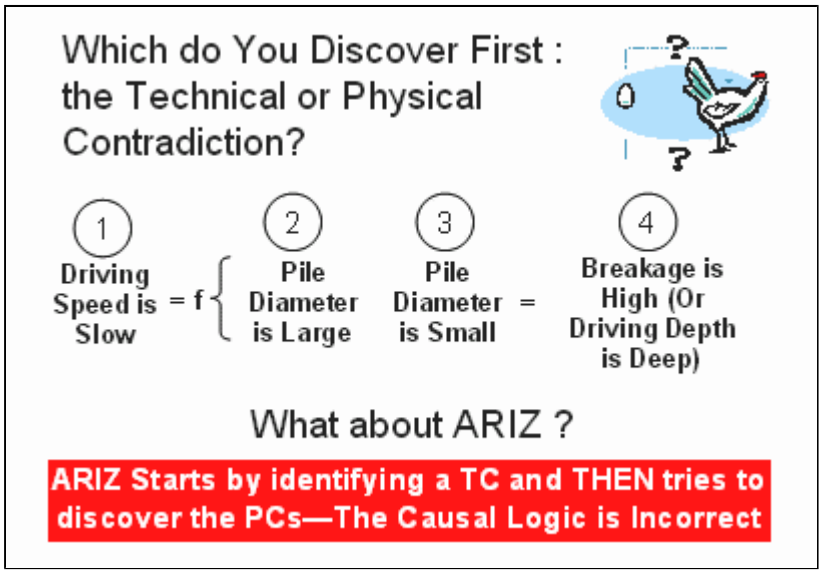


The main analysis tool used by the Author is the Causal Analysis. He shows his Causal Analysis in two forms. One is simple form of (qualitative) functional dependence. In the following slide, the problem of driving a pile into the ground (under the water?) is illustrated. The current problem is that the driving speed is slow. The direct cause of the problem is listed up as 'Pile diameter is large', 'Driver mass is low', etc. The problem is regarded as the dependent variable Y, while the causes as independent variables xi in the relationship Y = f (x1, x2, ...).



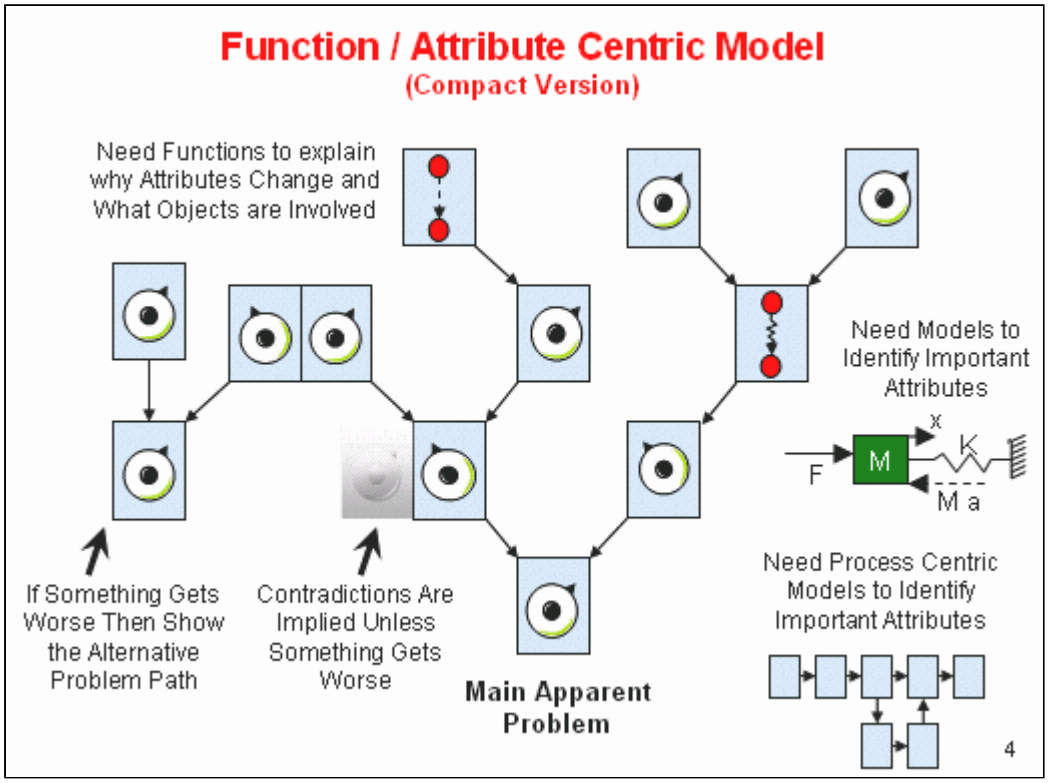
The above slide further discusses how to consider the means for solving the problem. First, to improve the driving speed, the pile diameter is tried to be small, the driver mass is chosen high, etc. Then, however, it is realized that such (simple) means causes a different difficulty, e.g. breakage of the pile is high. Now the Author explains that we have listed Physical contradictions (PCs) when we tried to make the pile diameter small instead of the current large size, and also that we have recognized the Technical Contradictions (TCs) when we find another kind of difficulty, e.g. pile breakage is high.

In this relation, the Author asks you 'Which do you discover first: the Technical Contradiction or the Physical Contradiction?' (See the following slide). The natural order is like the one, (1)(2)(3)(4) in the slide, he says. ARIZ, on the other hand, teaches us to identify a Technical Contradiction first and then to go ahead to discover the Physical Contradiction. Larry Ball says the Causal Logic in ARIZ is incorrect. *** This is a simple yet clear argument by the Author.



The second, more sophisticated form of representing the Causal Analysis is named 'Function/Attribute Centric Model' and is illustrated in the slide shown below. The analysis starts at the bottom center, showing 'Main apparent problem'. The symbol in the box is a 'Knob', standing for the Attribute or property of an object or event whose value can be qualitatively set 'high' or 'low'. In case of the 'Rake Leakage Problem', the Author starts with the problem 'Debris leakage is High' in this box. Then he finds two main reasons such as 'Leakage through is High' and 'Leakage Under is High'. The other type of boxes

contains a simple Function model, representing a functional relationship between two objects where the relationship is distinguished to be useful/harmful/insufficient etc. in the ordinary way in TRIZ.



As illustrated in this figure, the Author builds up the diagram to represent various observations in the Causal Analysis. He also advises to use, in the background of the above diagram, some other ways of modeling the causal relationships which include:

(a) Model centric causal analysis: Using models and equations, e.g. a mechanical model shown in the above slide, to understand relationship of attributes to results.

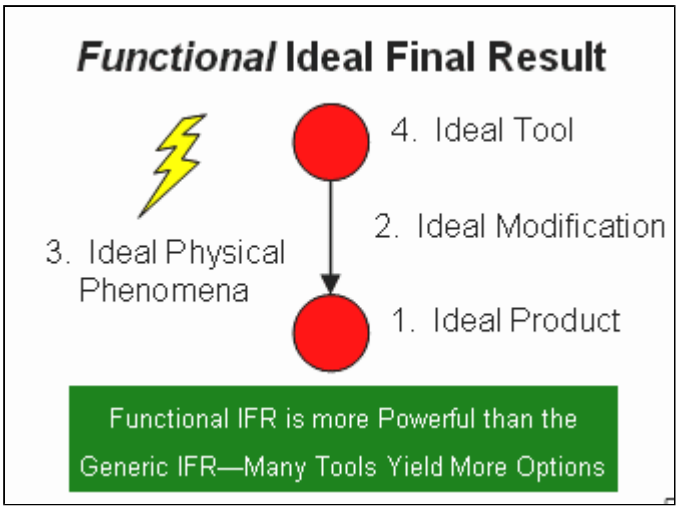
(b) Process centric causal analysis: Breaking down interactions finer and finer in time. Note that products are also processes, the Author writes.

(c) Function centric causal analysis: To show why objects are required and how they interact.

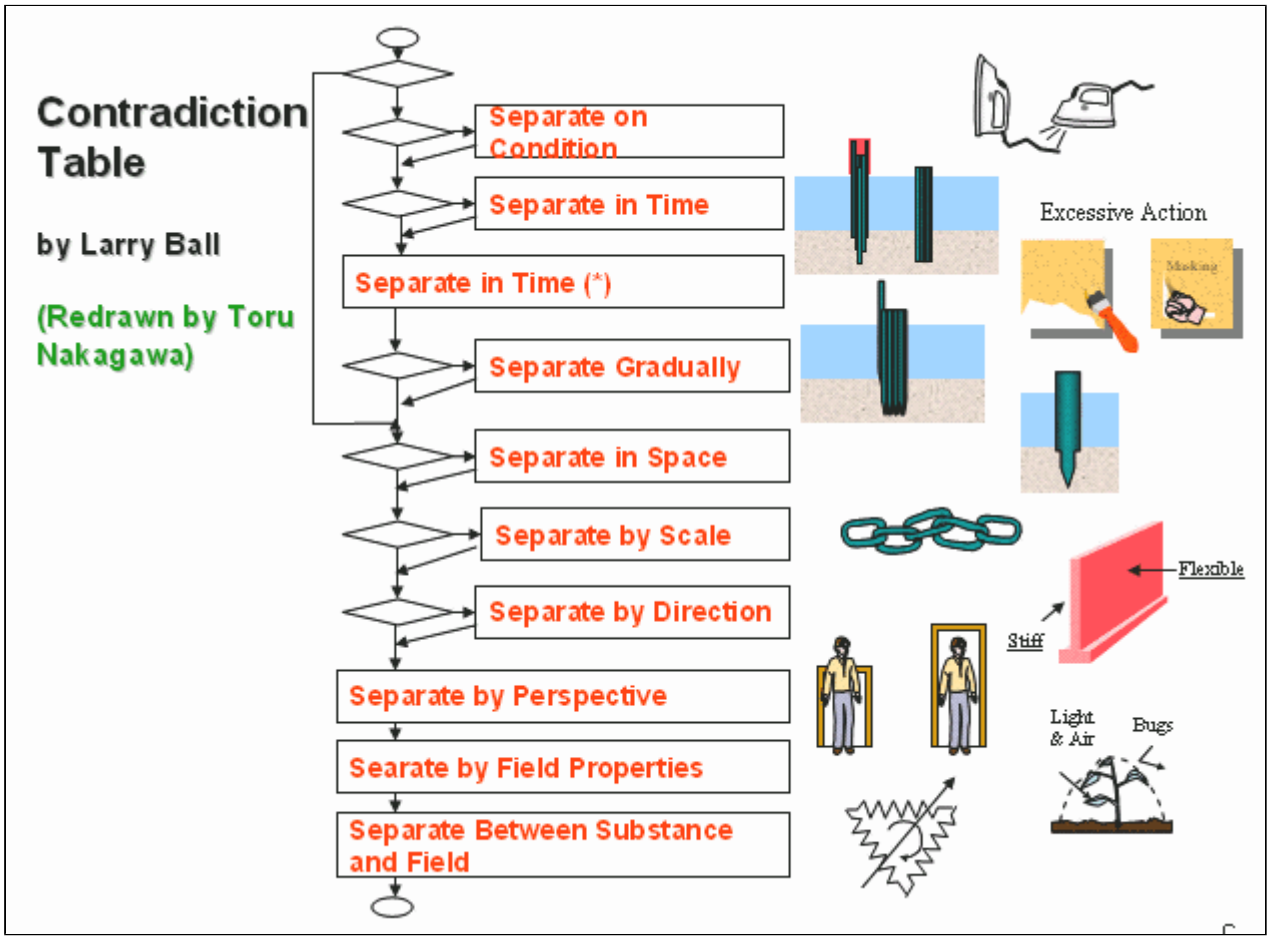
(d) Attribute centric causal analysis: To show 'What causes attributes to be what they are' by breaking down finer and finer shoeing causes.

Nevertheless the Author has chosen the 'Function/Attribute Centric Model' in representing the Causal Analysis as shown in the above slide. The reasons for this choice are, the Author says, that F/A Centric diagram helps you to idealize the functions, to identify many contradictions, and to identify alternative problems (i.e. possible different ways of solving the problem by shifting the aim).

Idealizing a functional relationship in the heart of the system is an important tool in the Author's 'Hierarchical TRIZ Algorithms'. This tool is named 'Functional IFR (Ideal Final Result)' and is illustrated in the following figure. The four components of a functional relationship are advised to be idealized, i.e. to find better and ideal items and replace with them. The terms of 'Product' and 'Tool' stand for any objects to be acted on and to act with, respectively. The term 'Modification' is used by the Author for representing the function or action, with his intention of emphasizing that the 'Modification' should modify/change (or control) an attribute of the 'Product'. It is also important that the Author mentions on 'Physical Phenomena' as one of the essential components for representing a functional relationship. This helps the problem solver to think about possibilities of using different physical phenomena, or different principles and mechanisms. As shown with the numbers in this slide, the Author advises to idealize the four components in the order: Product, Modification, Physical Phenomena, and Tool. The Author has shown, in his Course Material, many tools (i.e. Inventive Principles, Trends, Effects, etc.) for idealizing these four components.



During the processes of Causal Analysis and Functional IFR, one can find a large number of contradictions, especially in the form of Physical Contradictions. Therefore, the next step in the 'Hierarchical TRIZ Algorithms' is to solve the Contradictions by using the Separation Principles. As is mentioned earlier, the Author has decomposed all the TRIZ tools and knowledge bases and regrouped them for various purposes. Regrouping them for enhancing the Separation Principles has given an important results, named 'Contradiction Table'. In the Keynote Lecture as well as in the Course Material, the Author shows a large number of illustrated examples of using separation for solving a contradiction. Since I think the general structure of the Contradiction Table is important, I will show the simplified flowchart of the Contradiction Table in the following figure. This flowchart is a simplified version of Larry Ball's flowchart, Page J12 of the Course Material (May 2005), without showing the detailed logics for branching and details of the separation principles. The illustrations are taken from several slide in the present Keynote Lecture.



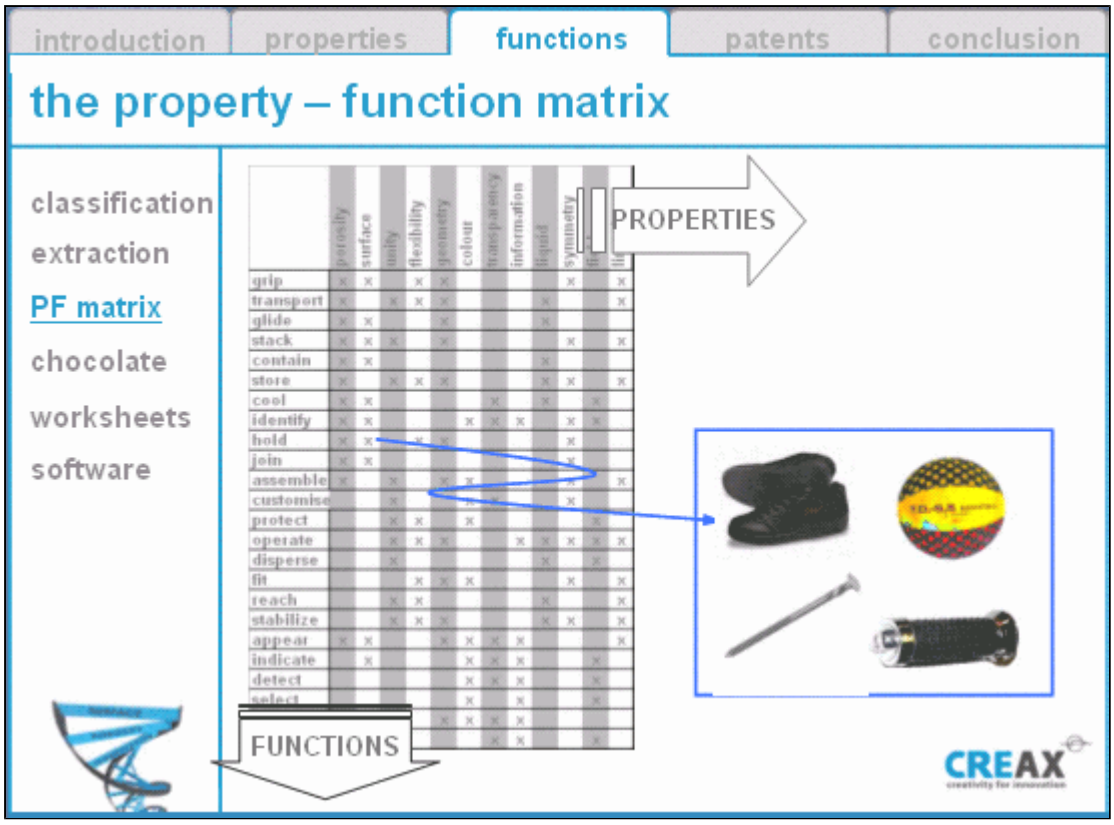
In addition to 'Separation in Space', 'Separation in Time', and 'Separation between Whole and Parts' (i.e. 'Separation by scale' in the above figure), which were found in Classical TRIZ, the Author has shown many different groups of separation principles, as shown in the above figure. In the Course Material the Author has shown a large number of examples with charming illustrations; it is quite enjoyable to watch them.

*** This Keynote Lecture was excellent in clarifying various important issues in TRIZ research and in showing a set of well systematized procedures and knowledge bases. The Author has presented 33 slides in the Keynote Lecture for introducing his whole thoughts and work, published in 160 pages of Course Materials. My short review here with only 6 slides may be difficult for readers to understand well, but can be helpful for you to learn about what the Author argues and shows and for you to access his work in Web sites. We wish Larry Ball write a full paper to explain his thoughts shown in the slides. [(Nov. 14, 2007) Larry Ball has kindly sent us an extended PPT file with the presentation notes. We are planning to post it in PDF in this Web site in English and in Japanese translation. Thanks Larry so much!]

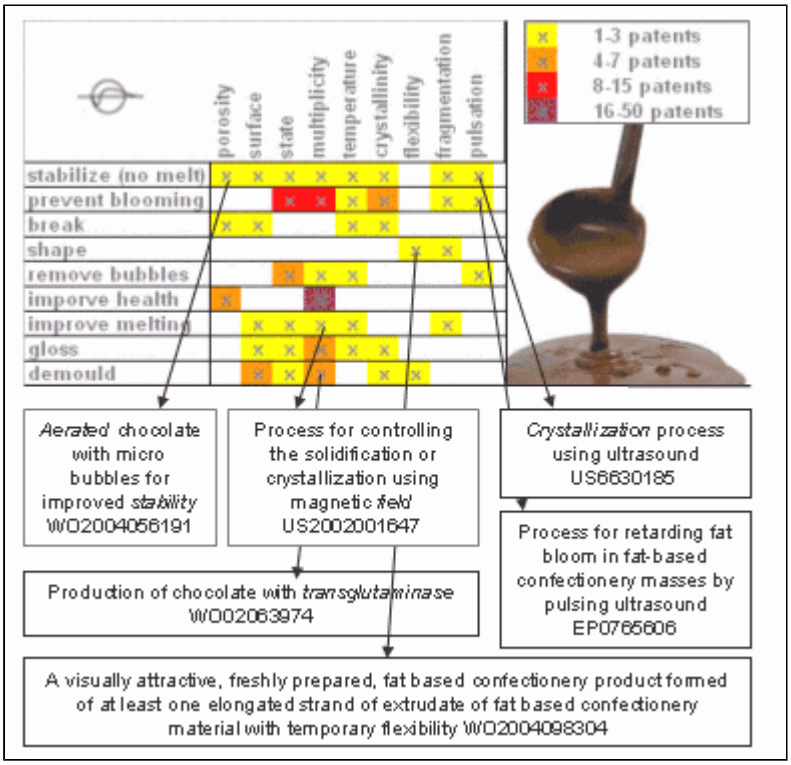
Keynote Lecture by Simon Dewulf (CREAX, Belgium) [28] was given on the third day morning for 60 minutes with the title of "**Variation of System Properties for New or Improved Functions**". In Japan, the big research project of patent analysis carried out in CREAX by Simon Dewulf and Darrell Mann during 2000-2004 have been well introduced and highly evaluated through Matrix2003 and the textbook "Hands-On Systematic Innovation". Simon Dewulf, young, active, and talented owner of CREAX, came to Japan for the first time and gave a strong impression to Japanese audience. He presented in the Keynote Lecture CREAX's new approach vividly with 39 slides. Introducing them to you here, however, is not easy because the logic was just spoken while showing slides with animations. We wish that the Author writes a full paper of this nice lecture. (His full paper presented at ETRIA TFC2007 was written almost at the same time and may be useful to supplement this Keynote Lecture.)

The essence of Simon Dewulf's approach is to focus on 'Properties' in order to derive innovative ideas for achieving some functions for new or improved products. He utilizes the extensive patent analysis again for extracting the core ideas in various technologies and devices. For example, in the case of a Bowling ball, the holes are installed to make the holding easy, i.e. the property of hole (or being porous) is used for the function of holding. Properties are usually expressed with adjectives while functions with verbs. Thus automatic semantic search of patents reveals the pairs of Property and Function, where the property is introduced in the patent for better achieving the function. The following slide illustrates a small number of such examples.

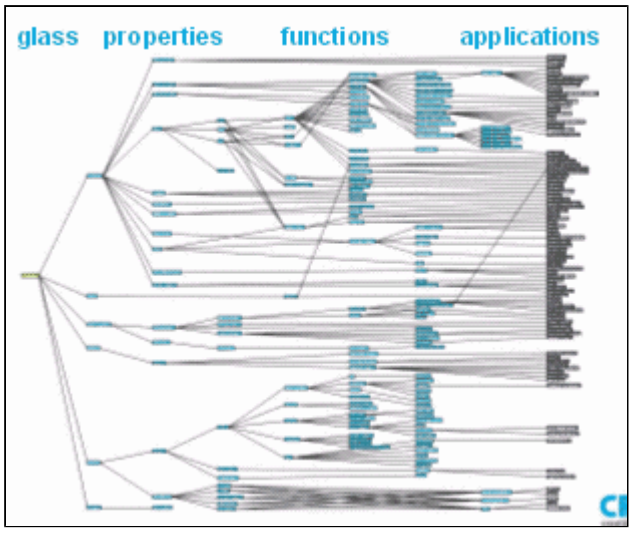
By accumulating such Property-Function pairs extracted from a huge number of patents into a matrix, the Property-Function Matrix has been constructed. Its structure is demonstrated in the following slide. In each cell of the matrix, for example 'Property Surface - Function Hold', illustrative examples are stored for the purpose of displaying on user's demand. [Please note that the slide framework such as shown here is trimmed off in other slides for helping readers focus on the topic.]



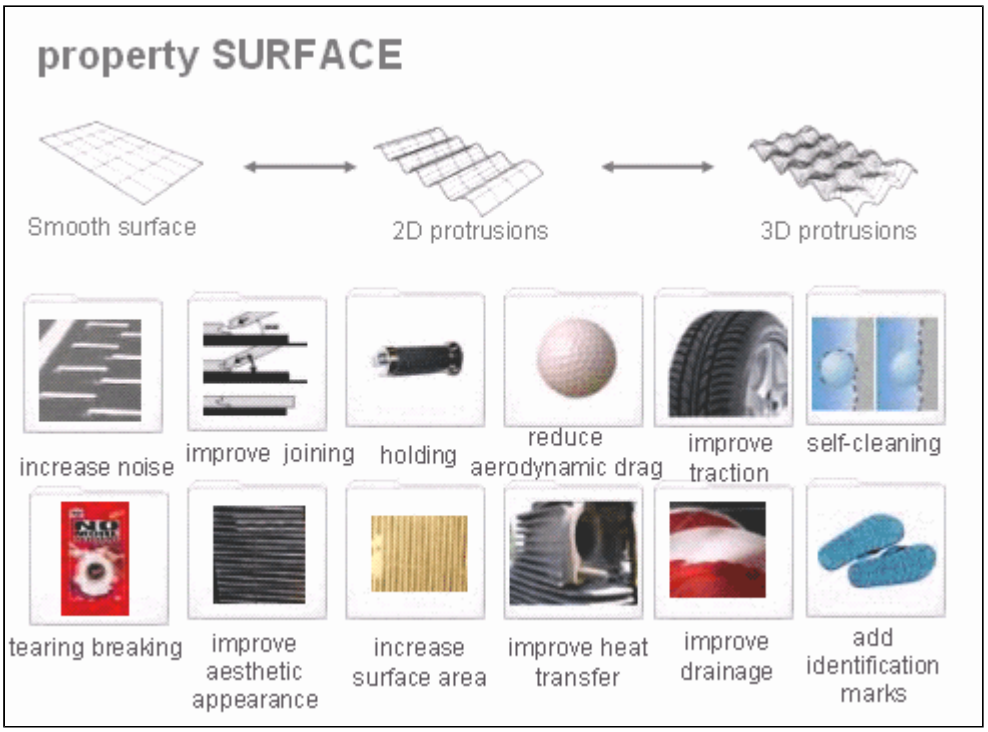
Usage of the Property-Function Matrix is demonstrated in the case of Chocolate, in the following slide. The PF Matrix was build by using the patents related only to chocolate. Then, various matrix cells with relatively rare cases are selected to show their ideas; these information may be useful to stimulate new ideas.



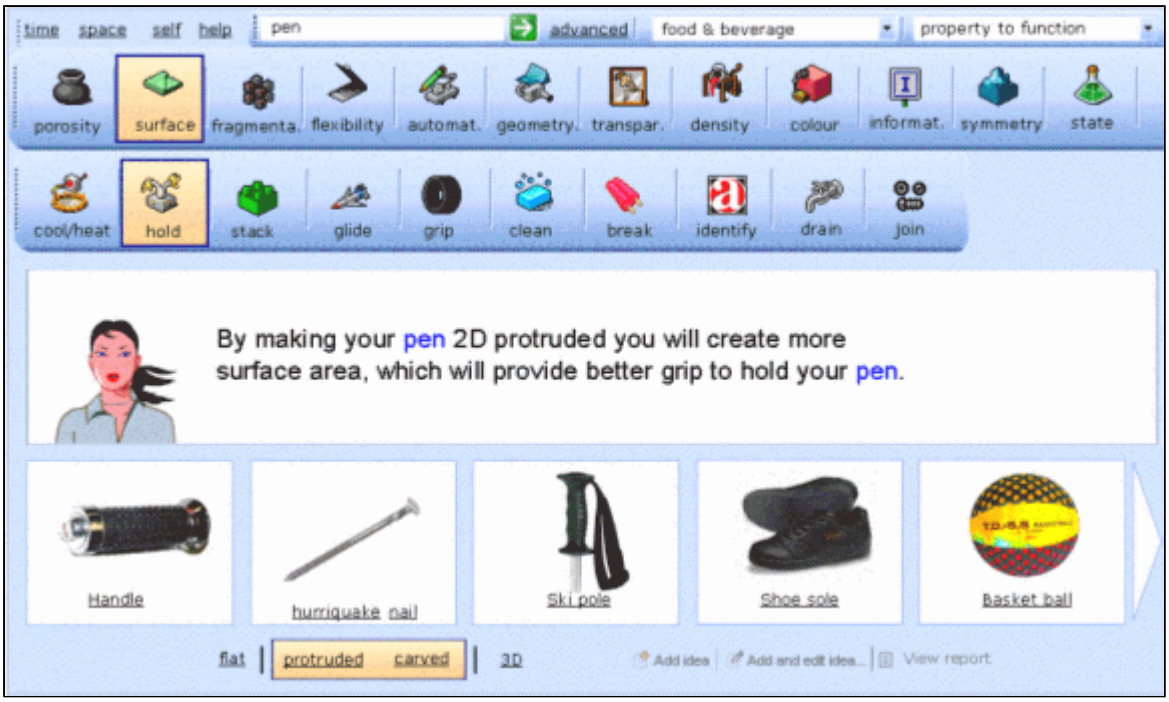
The Property-Function Analysis for a specific product is also demonstrated in the following slide; the case of glass. It is noticeable that this kind of analysis is automatized.



The knowledge base accumulated in the Property-Function Matrix is used to make 'PF Worksheets', as illustrated in the following slide.



The Property-Function Matrix is also implemented in a handy software tool, named DIVA. Its user interface seems to be simple and attractive as shown in the next slide. The user inputs the name of the product to be made newly or improved, and then clicks any Property and any Function. Getting the advice shown in the middle and looking at illustrated examples, one can be stimulated new ideas for his own products.



*** One may argue that CREAX's approach presented here is not new, just using the idea of Trends of Evolutions of Technical Systems and the well known basic concepts of Functions and Properties, and that many other TRIZ software tools already have similar user interfaces and illustration examples. However, CREAX's approach is new and important, I think, in the point of putting much stress on the role of Properties rather than Functions for inspiring new ideas for new or improving products. Not handling the Trends as one of many tools, CREAX has converted the Trends into the principal tool for supporting innovation. As shown in the above slides, all the examples are shown with illustrative photos, which are easy to understand and more stimulative than words. -- I wish again the Author, Simon Dewulf, write a full paper of the contents of this Keynote Lecture. [(Nov. 14, 2007) The Author presented a closely related paper in ETRIA TFC 2007; his full paper is helpful for you to undestand CREAX's approach.]

4. Tutorials and Invited Talks

In the morning of the first day, two Tutorial Courses were given in parallel for 2 hours. They are Basic Course for relatively new people in TRIZ and Advanced Course on a specific topic. These are new trials in our TRIZ Symposium in Japan, in order to respond needs by audience expressed last year in the post-Symposium inquiry. The Tutorials are given only in Japanese, so as not to put too much burden on the invited lecturers.

For the Basic Course of Tutorial, **Narumi Nagase (Panasonic Communications Co.) [1]** was invited as the lecturer. He has been working actively to promote and apply TRIZ in his company for about 6 years. He talked vividly and frankly with his background of TRIZ practices. The outline of his talk was as follows:

1. TRIZ Overview and Case Studies
   1.1 Needs of TRIZ ways of Thinking
   1.2 History of Development in TRIZ
   1.3 Three Principal Thinking Tools in TRIZ
      - Solving Technical Contradictions: 'Principles' Module (in terms of theIMC's software)
      - Patterns of Technical Evolution: 'Prediction' Module
      - Inverted Indices of technologies: 'Effects' Module
   1.4 Case studies of applying TRIZ in PCC
      - Developing a new product: Tele conference system with noise reduction
      - Improving a product: Reducing the package volume of an electronic whiteboard
      - Applying TRIZ in the manufacturing process: Eliminating defects in printer assembly process.
2. Overall Process of Applying TRIZ
   2.1 Process of Applying TRIZ
   2.2 Processes outside TRIZ -- QFD and Taguchi Method

3. Introduction to TRIZ Software Tools

For the Advanced Course of the Tutorial, the Symposium organizer chose the topic of '**Future-Generation Product Planning Activities Based on the Patterns of Technical Evolution**' and invited **Professor Manabu Sawaguchi (SANNO Institute of Management) [2]** as the lecturer. This topic was chosen with the intention of responding to one of common questions on TRIZ applicability. The lecturer talked energetically showing 85 slides (plus 34 more appendix slides). The contents of his talk were as follows:

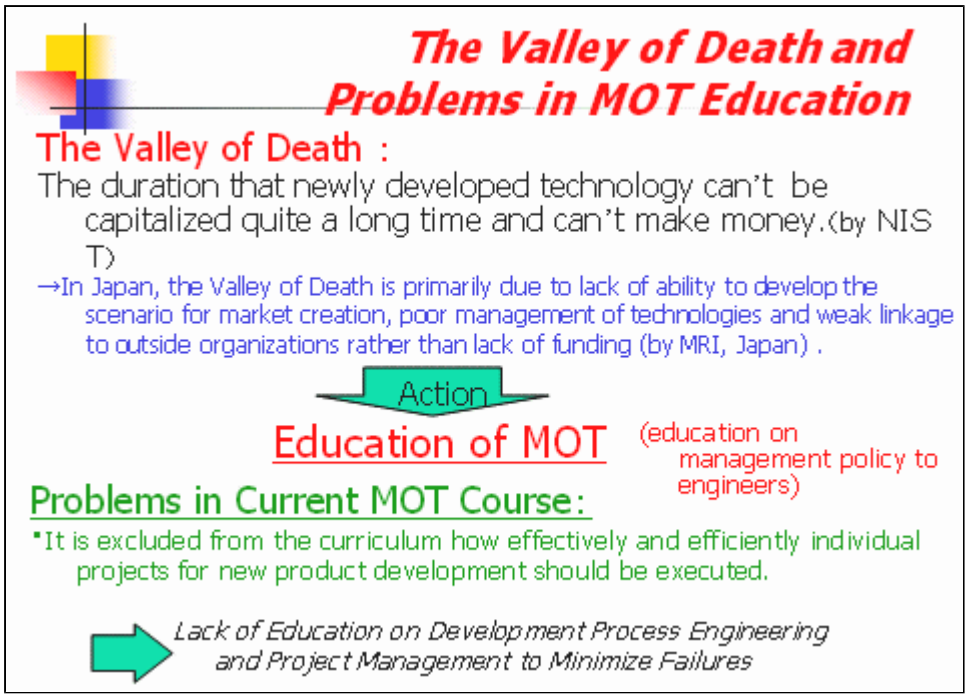
1. Evolution of Society and Technology
2. A Report of Inquiry on Manufacturing to Japanese Managers and Engineers
3. Four Types of Innovation and Their Technology Strategies Considered with the S Curves
4. Creation of Company Values and the Needs of TRIZ
5. Next-Generation Product Planning Based on Technology Evolution Trends: "TRIZ-DE"
6. STM-DE (Directed Evolution based on SANNO Technology Management Approach): Overall Procedure
7. STM-DE: Principal Tools
8. Appendix: References to Super-Super Systems
9. Appendix: References to Super Systems
10. Appendix: References to Systems
11. Appendix: References to Sub Systems
12. Futuristic Technology Strategies Based on TRIZ-DE.
13. On the TRIZ Activities in the World

It is hard to summarize the contents of the two Tutorials here, because of their large volumes and because of no English slides. The Japan TRIZ CB has decided not to post the slides of Tutorials in the Official Web site.

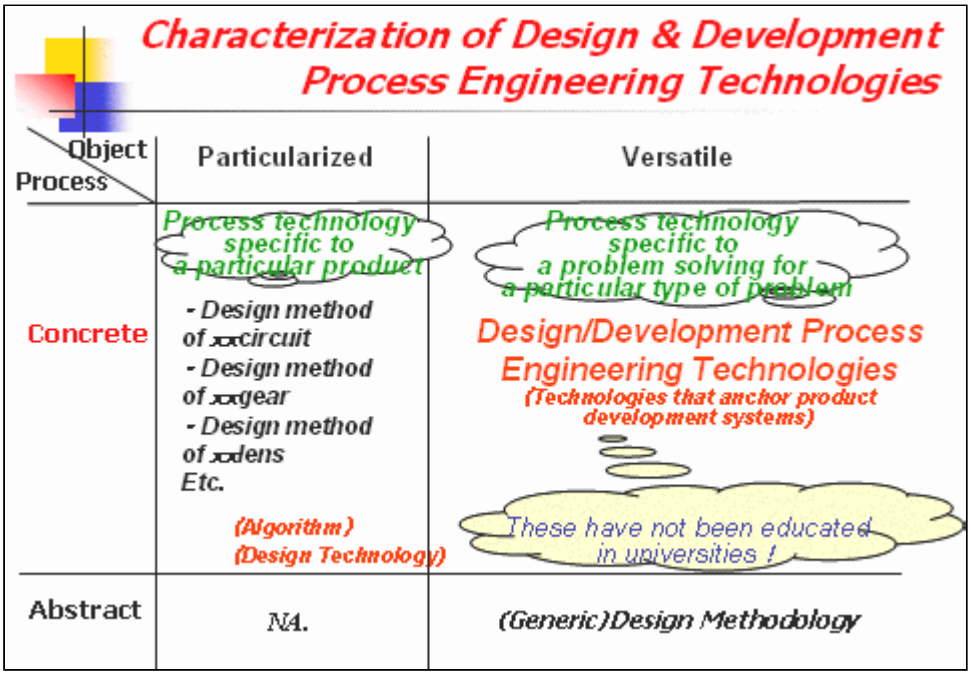
On the first day afternoon we had three Invited Talks. They are given by three people from Japanese industries.

Toshihiro Hayashi [4] gave the first Invited Talk. Until last March, he was a manager in Hitachi Co., Ltd., responsible for promoting scientific methodologies including TRIZ to all the engineering divisions. After retiring Hitachi, he operates his own office as a Professional Engineer. As noticed above, he has been Chairperson of Japan TRIZ CB since its start in Jan. 2005 and is Chairperson of new Japan TRIZ Society. He gave a 40 minutes talk with the title of "**Design and Development Process Engineering Technologies and TRIZ -- MOT for Design and Development Engineers**". This topic was his own motive and slogan to promote the methodologies in Hitachi. In the following, I will quote several of his slides and explain them briefly, because the Author describes his logic well in his slides.

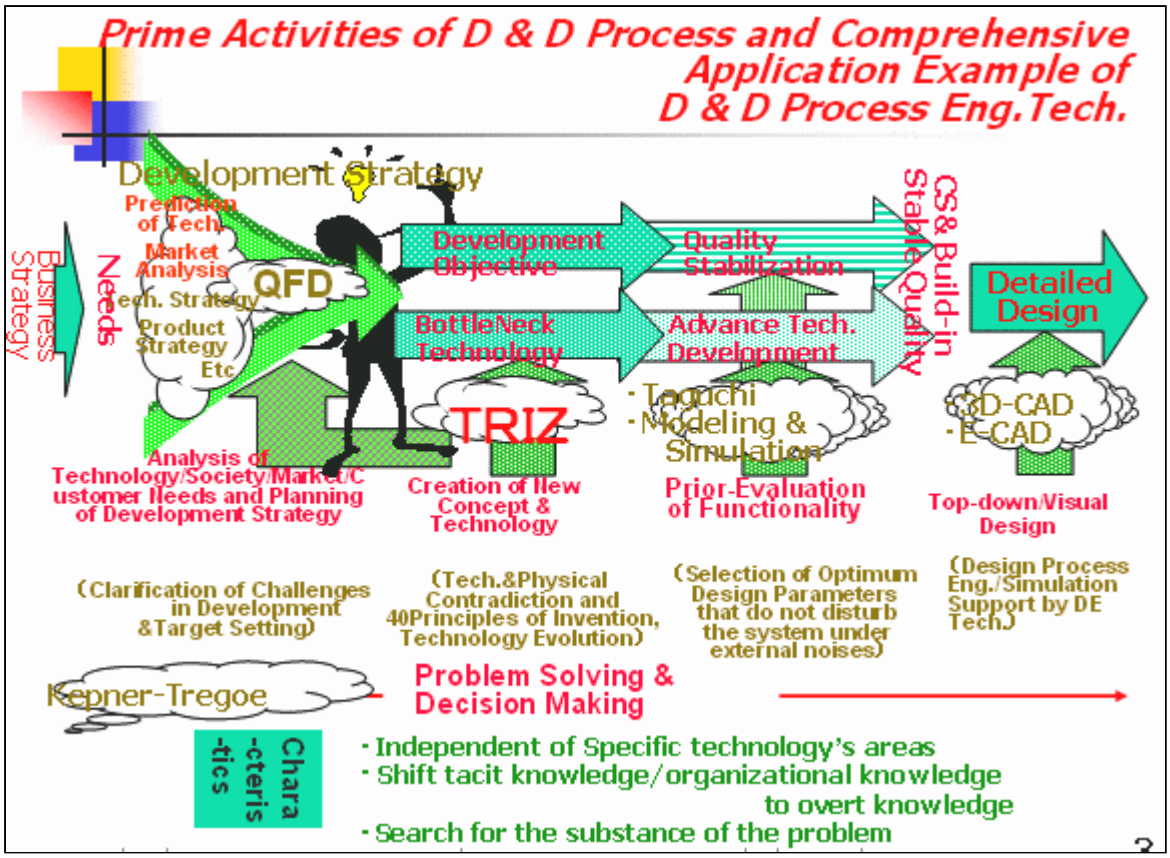
In the following slide the Author describes his background motivation by mentioning the problem of 'The Valley of Death' not in the sense of USA but in the sense of Japan. Thus he does not quite agree the approach of MOT (Management of Technology) in the USA sense and proposes the needs of education of development process engineering.



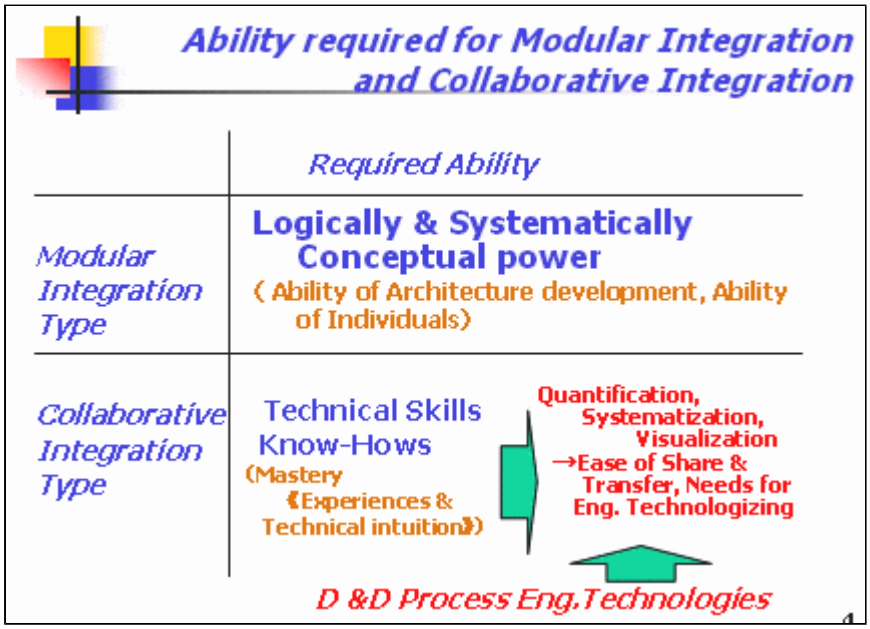
The Author characterizes 'Design & Development Process Engineering Technologies' as concrete (not abstract) in the process and versatile (not particularized) in the object (or the target product). Such technologies should handle some specific process of problem solving for a particular type of problem which can deal with any product without limited in the technology field. Such technologies, including QFD, TRIZ, Taguchi Method, etc., have not been taught in universities, the Author says.



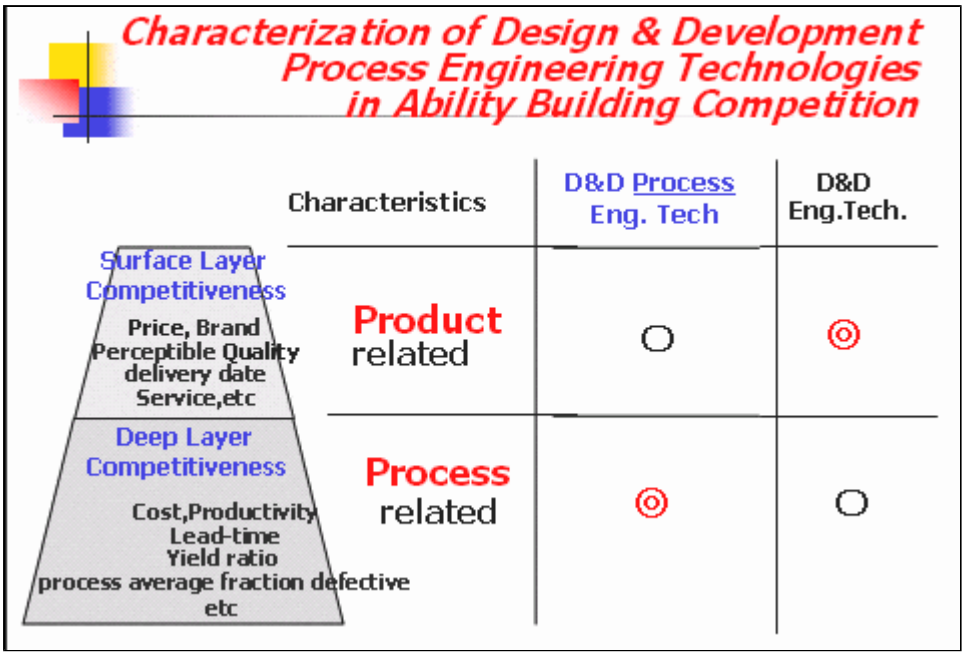
The following slide shows the principal activities of Design and Development Process and shows various methods of 'D&D Process Engineering Technologies' in the framework of these activities. The 'D&D Process Engineering Technologies' include Development Strategy, QFD, Kepner-Tregoe, TRIZ, Taguchi, Modeling & Simulation, 3D-CAD, and E-CAD, among others. The role of these methods are shown in the slide.



The Author mentions about the work styles. In the work style of 'Collaborative Integration Type', which is supposed to be more common in Japan, 'D&D Process Engineering Technologies' are required more than in the work style of 'Modular Integration Type'.

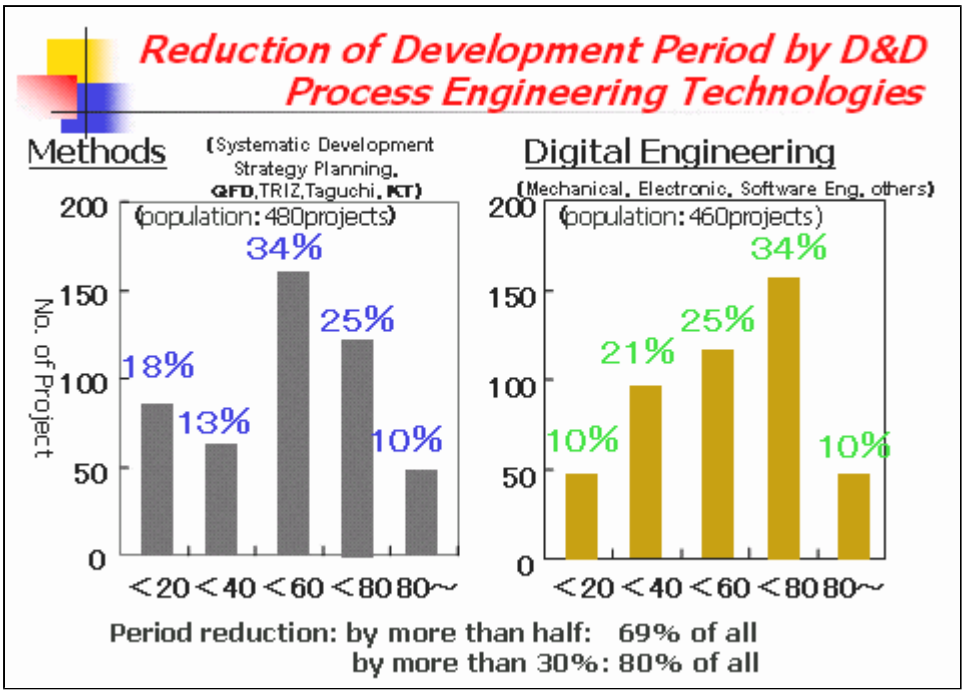


The role of D&D Process Engineering Technologies is also shown here in the aspect of 'Product related' vs 'Process related'. The 'D&D Process Eng. Tech.' are more Process related than Product related, and hence can contribute more to 'Deep Layer Competitiveness' than to 'Surface Layer Competitiveness'.

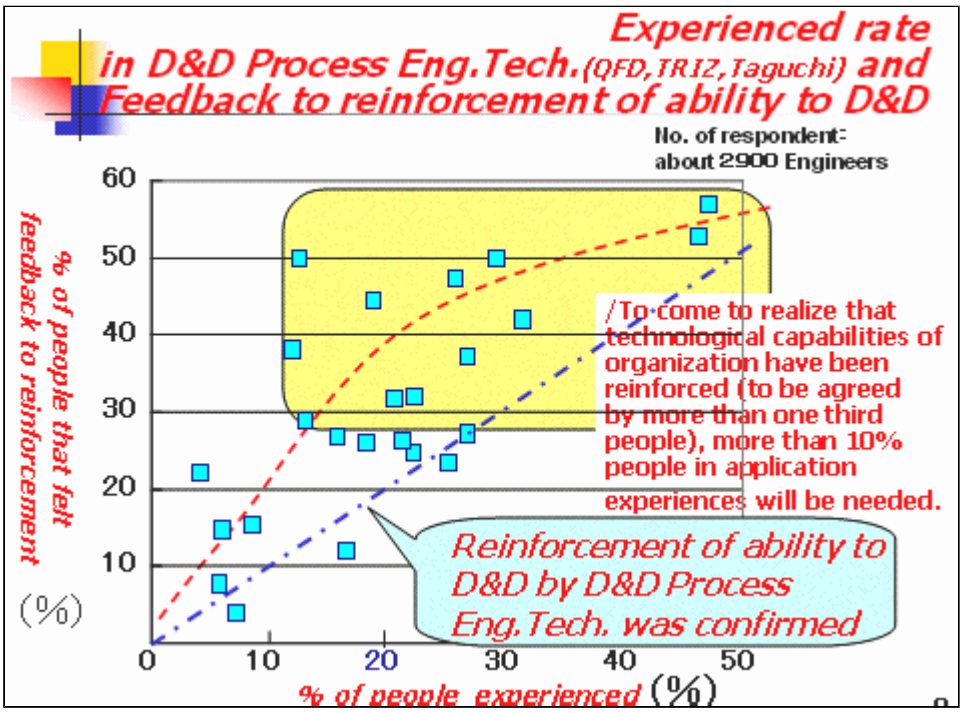


Now the Author summarizes what happened in D&D sites in Hitachi as the results of his promotions for bout 10 years. These are the verbal summary of the engineers answers.

The following slide shows the results in more quantitative manner. These graphs show the answers of 480 projects. The results in the reduction of development period by the D&D Process Eng. Tech. is plotted here. As shown at the bottom, period reduction by more than half was achieved by 69 % of all the projects (in the survey where more than 480 projects answered).

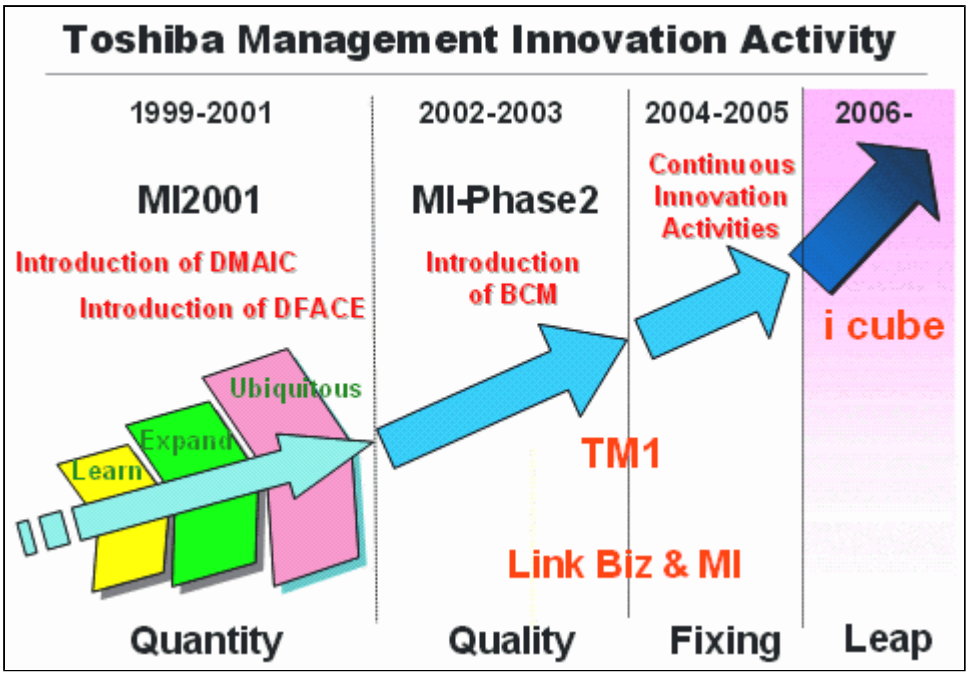


The next slide also shows the results in Hitachi. Obtaining answers to inquiries from about 2900 engineers, the percentage of people experienced with the technologies and the percentage of people that felt feedback to reinforcement are evaluated in each engineering division. The plot of these two indices revealed an interesting observation summarized in the middle right of the slide. It says: "To come to realize that technological capabilities of organization have been reinforced (to be agreed by more than one third people), more than 10% people in application experiences will be needed."

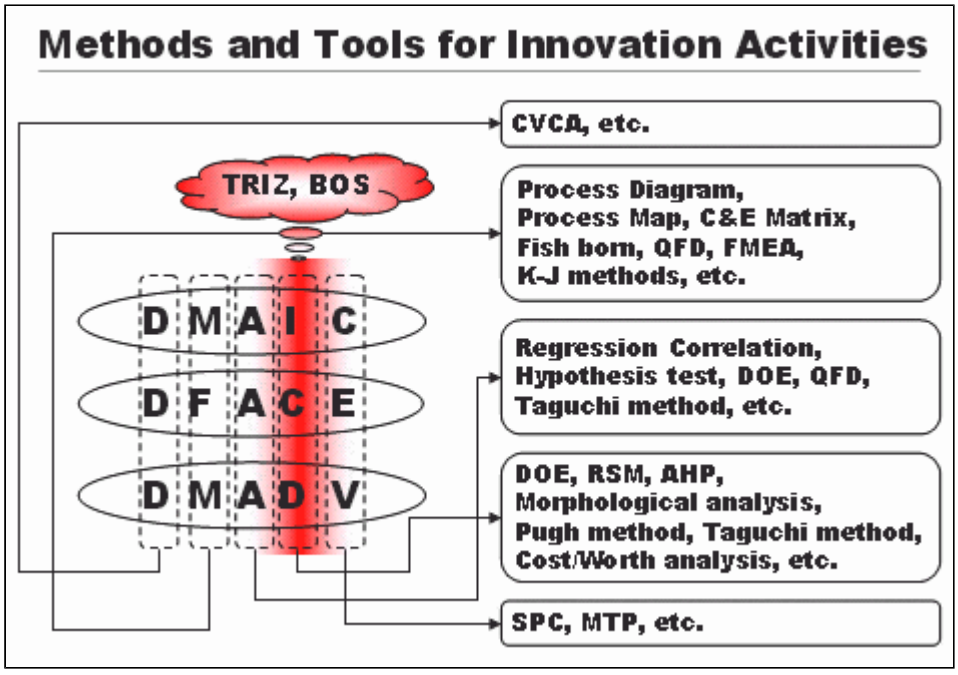


*** This Invited Talk is a nice summary by the Author who promoted these technologies including TRIZ for 10 years or so in Hitachi, one of the leading manufacturing company in Japan. Hitachi has been promoting TRIZ in the company-wide scale as shown here. The TRIZ approaches in Hitachi are also demonstrated in the present Symposium by the two nice poster presentations by Arisaka et al. [35] in the HDD development and by Shonai et al. [17] in the computer architecture design (See below).

Naoaki Okuzumi (TOSHIBA Co.) [9] gave an Invited Talk on "**Introductory Review of Innovation Activities in Toshiba - Application of Various Tools in Toshiba; Six σ, Taguchi Method, QFD, TRIZ and so on**", as the manager who led the innovation activities in TOSHIBA. The historical overview of Management Innovation Activities in TOSHIBA is shown in his slide cited below.



They introduced Six Sigma in 1999 and have built up the experiences of various methods and tools for innovation activities, as shown in the following slide. They have recently found the needs of enhancing the stages shown in red, i.e., I (Improve) in DMAIC, and started to introduce TRIZ and BOS [sorry but no explanation about BOS].

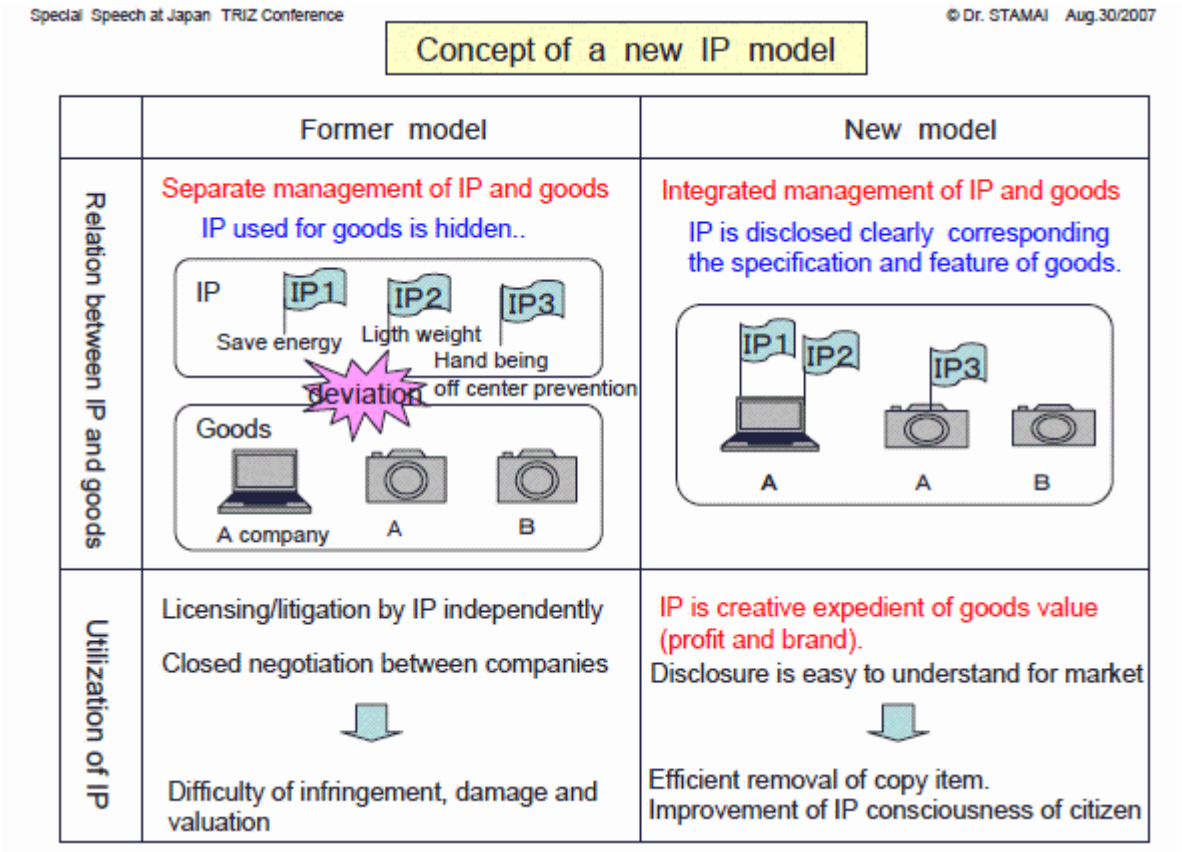


The TRIZ activities in TOSHIBA are summarized in the following slide. This company is relatively new in TRIZ and is studying various examples to decide how to introduce TRIZ to the company.

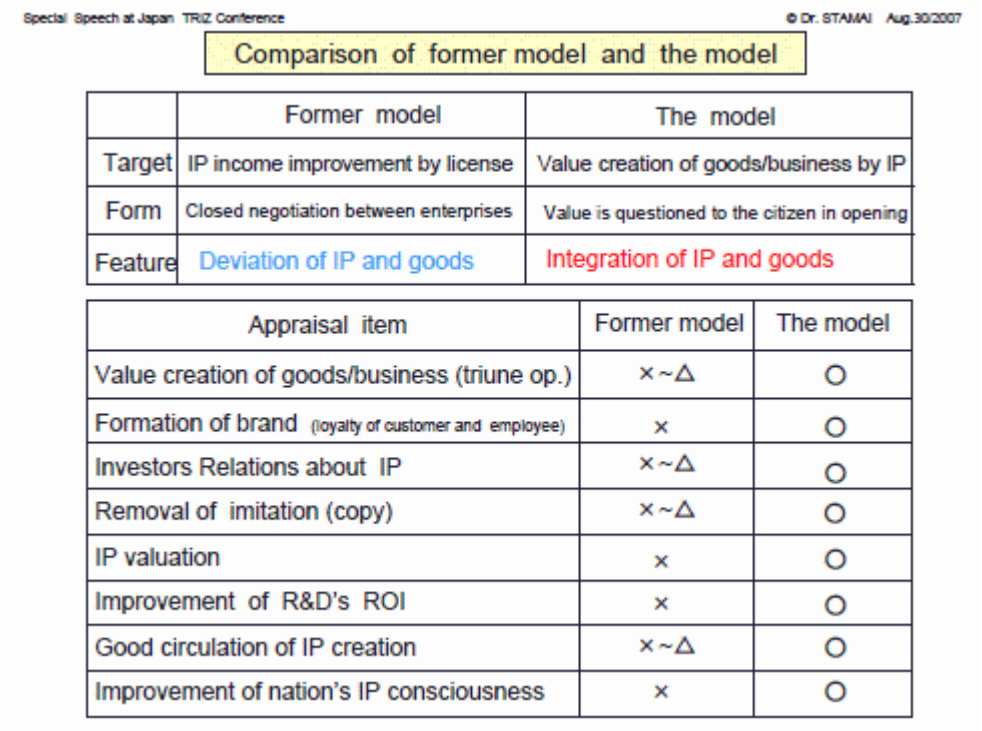
TRIZ Activities in Toshiba

- Business area of Toshiba in which we have tried TRIZ.
  Semiconductor Business, Power Systems Business,
  Medical Equipment Business, Industrial Systems Business, etc.
- Introduction of TRIZ in Toshiba.
  FY 2003
- Typical examples of TRIZ in Toshiba.
  - To investigate cause of troubles in fab.
  - To plan strategy of technology among R&D section.
  - To develop new products in R&D section.
  - To find breakthrough of dead lock in R&D div.
- Future utilization of TRIZ in Toshiba.
  - We are now studying in-house examples and outside information to make our plan to introduce TRIZ to Toshiba.

Seiichiro Tamai (Matsushita Electric Industries Co.) [6] gave an Invited Talk with the title of "**A New Intellectual Property Model for the Knowledge-based Society – A Brand Value Creation Model by the Intellectual Property –**". He is a manager in the Intellectual Property division of Semiconductor Company of Matsushita. In the talk he proposed a new IP model as shown in the following slide.



In his new IP model, named as IP Brand Model, has the features and merits as shown in the following slide, he says:


Special Speech at Japan TRIZ Conference © Dr. STAMAI Aug.30/2007

Comparison of former model and the model

	Former model	The model
Target	IP income improvement by license	Value creation of goods/business by IP
Form	Closed negotiation between enterprises	Value is questioned to the citizen in opening
Feature	Deviation of IP and goods	Integration of IP and goods

Appraisal item	Former model	The model
Value creation of goods/business (triune op.)	×~△	○
Formation of brand (loyalty of customer and employee)	×	○
Investors Relations about IP	×~△	○
Removal of imitation (copy)	×~△	○
IP valuation	×	○
Improvement of R&D's ROI	×	○
Good circulation of IP creation	×~△	○
Improvement of nation's IP consciousness	×	○

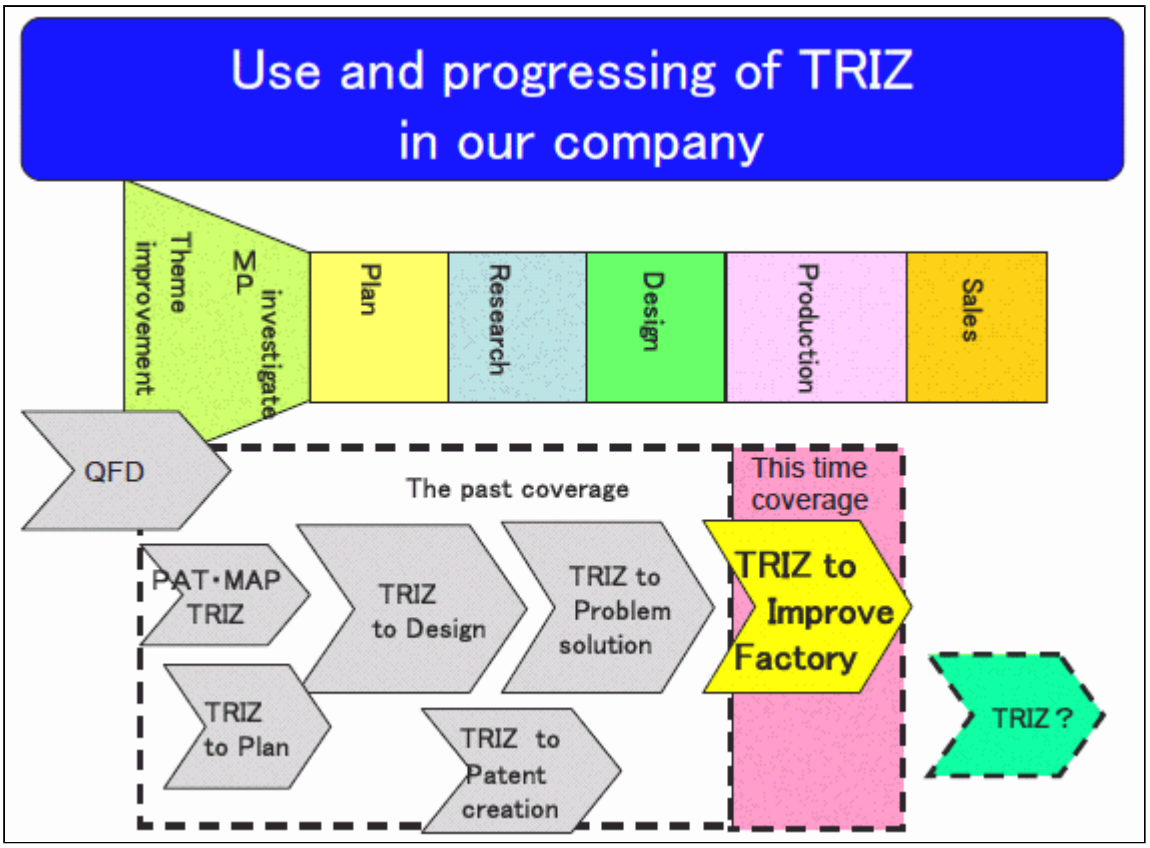
*** In the present Symposium, we had the three Invited Talks as described above. As you may notice, all the three speakers are (and were) high level (though not executive) managers of leading manufacturer companies, especially in the electric industries. Hitachi and Matsushita are the two companies most active in TRIZ in Japan and promoting it in the top-down manner in the company wide scale. They have chosen QFD, TRIZ, and Taguchi Method as principal tools in addition to digital engineering. Toshiba, on the other hand, had a different approach by choosing Six Sigma as the main methodology.

*** These three invited talks on the first-day afternoon were unfortunately too heavy for most of the attendants, especially in the point that they are mostly related to the framework much wider than TRIZ itself. This happened due to various situations in preparing the Symposium; I should have coordinated them better as the Program Chairperson.

5. Case Studies in Industry

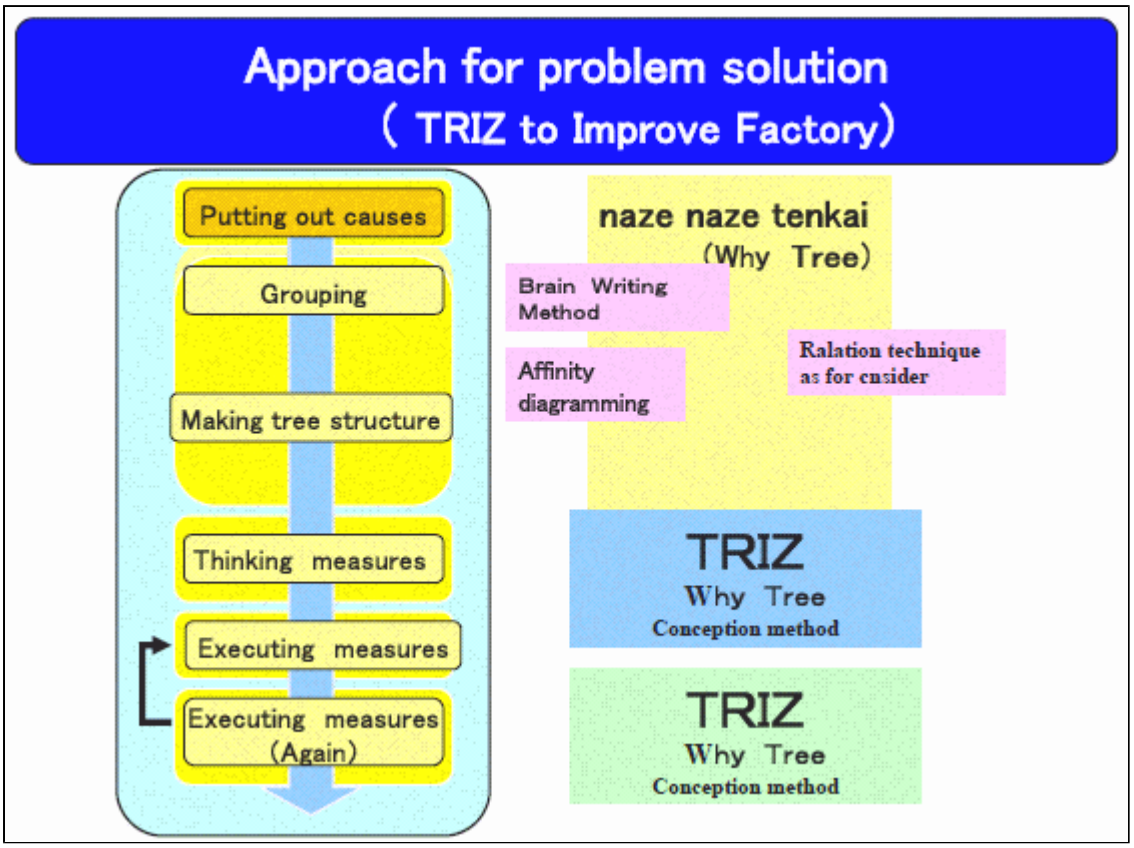
Yosuke Koga (Panasonic Communications Co.) [5] gave an excellent presentation of his case study with the title of "**Application of TRIZ to Manufacturing Phase -- Case Study of Eliminating Defects in Printer Assembly Process --**". Panasonic Communications Co. (PCC) is most active in applying TRIZ company-wide and to a wide range of problems. PCC has already established several tens of TRIZ specialists in its 'Development Process Innovation Group', who are working actively to support various divisions in the company (and also other companies in the Matsushita Group). The present case was carried out in spring, 2005, at their Saga Plant in the manufacturing process of a color laser printer. Here I am going to quote 11 slides to reproduce this valuable case study.

The following slide shows the position of this paper in the aspect of deploying TRIZ to further down-stream stages of manufacturing in the PCC. The Author tried to use TRIZ, in this case study, to the Production stage, or speaking more directory, to improve a factory.

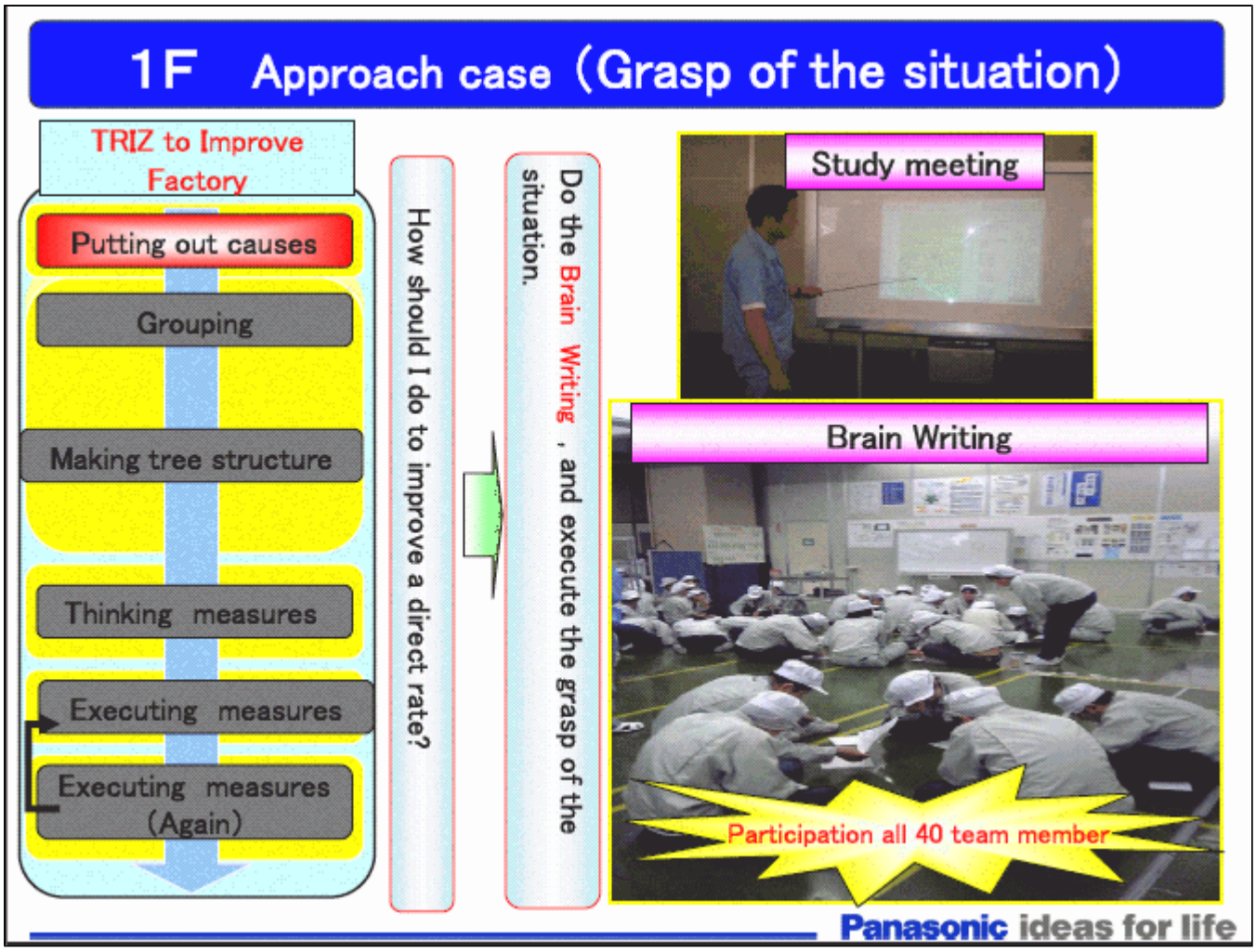


The plant was manufacturing a new color laser printer, but had a lot of trouble at first. Using various methods the troubles were reduced, but still there remained two big problems in the printer cartridge plant (on the 3rd floor) and in the main body assembly plant (on the 1st floor). The TRIZ team assisted first to solve the problem caused in the printer cartridge plant and succeeded in solving it. Then the manager of the 1st floor requested the TRIZ team to support solving the bigger problem in the main body assembly plant. The problem was the high defect rate of the printer mostly due to appearing spots and stripes on the printed papers.

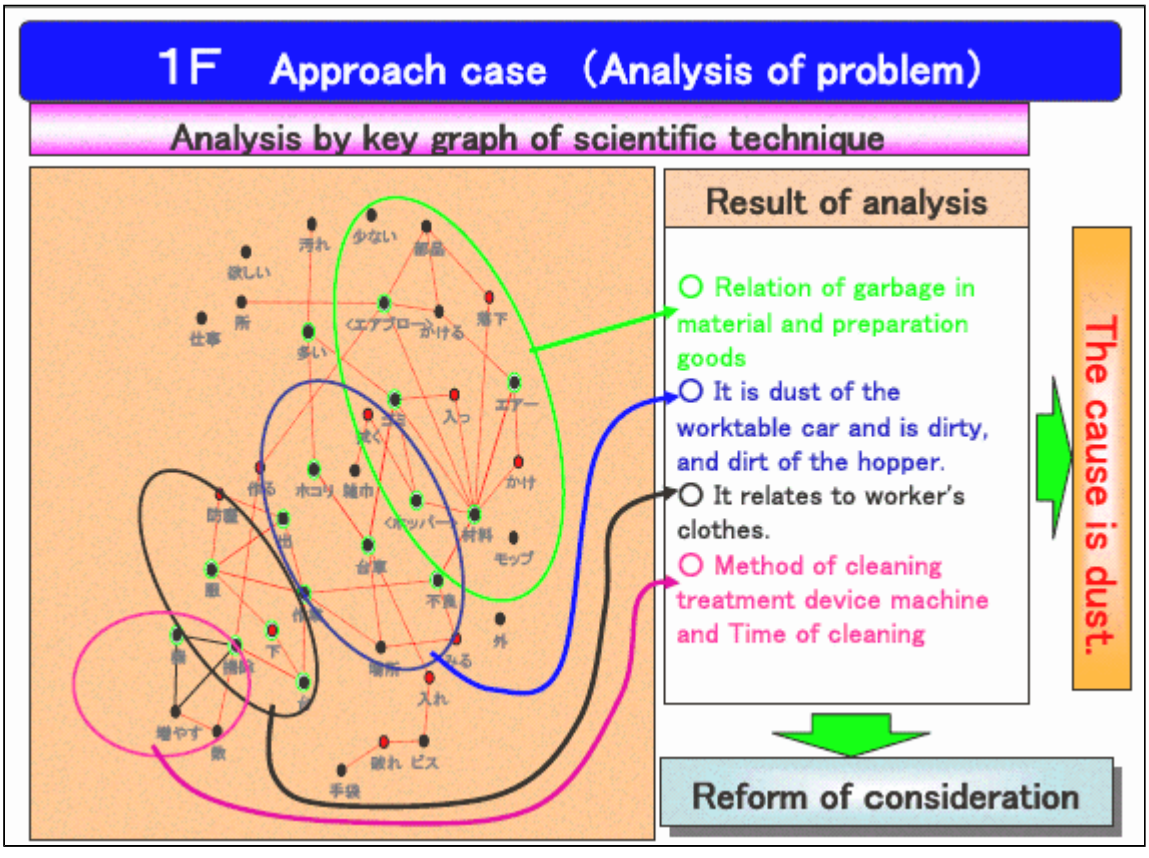
The following slide shows the overview of the approach for 'Applying TRIZ to Improve Factory', actually used in solving the '1st Floor Problem', i.e. the second and bigger problem mentioned above. The process will be described below step by step along with illustrations and photos.



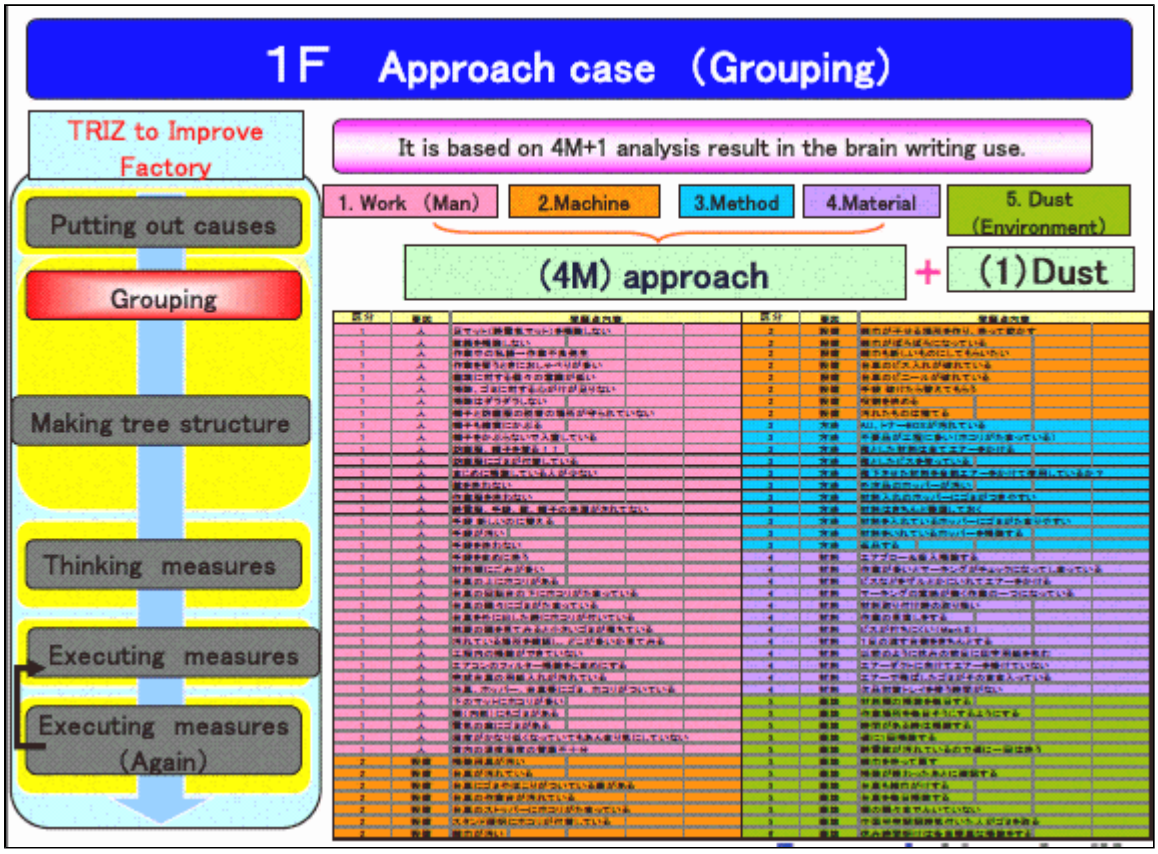
The first step is to state the problem, or the undesirable results, and to understand the current situations and to find causes of the problem. In such a step, TRIZ groups in PCC usually apply the 'Naze-Naze Tenkai', or the procedure to ask 'Why?' and 'Why?' several times for going down to 'root causes'. However, the Author did not use the method in this case, because such 'Why?' questions tend to sound blaming somebody or the members themselves and tend to close the members' hearts. The Author held a study meeting of all the section members to explain the trouble situations, and then made the Brain Writing Session with the participation of all the section members. The members are requested to write down their ideas freely with the question 'Why the defects occur?'. All the section members participated in this Brain Writing and wrote down 638 ideas all together in 30 minutes (see the bottom right photo in the slide below).



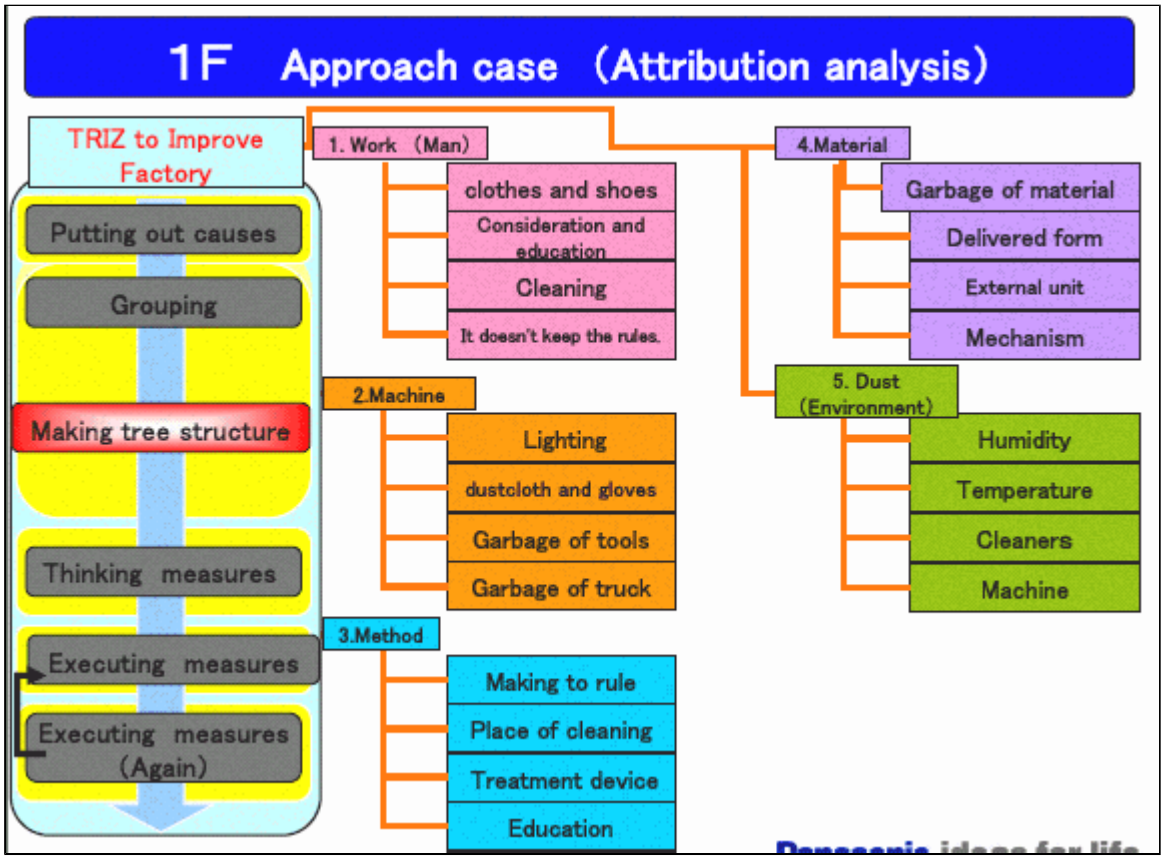
Then all these ideas are analyzed by the TRIZ team by using the Key Graph Method (shown in the slide below) to find out the relationships among the items mentioned by the members and reveal the hidden main structure of the causes. With this analysis, it is found that the main cause of the defects is the dust, and that the reform of members' mind is indispensable. The defects are also analyzed with scientific methods, such as observing the dusts with microscopes.



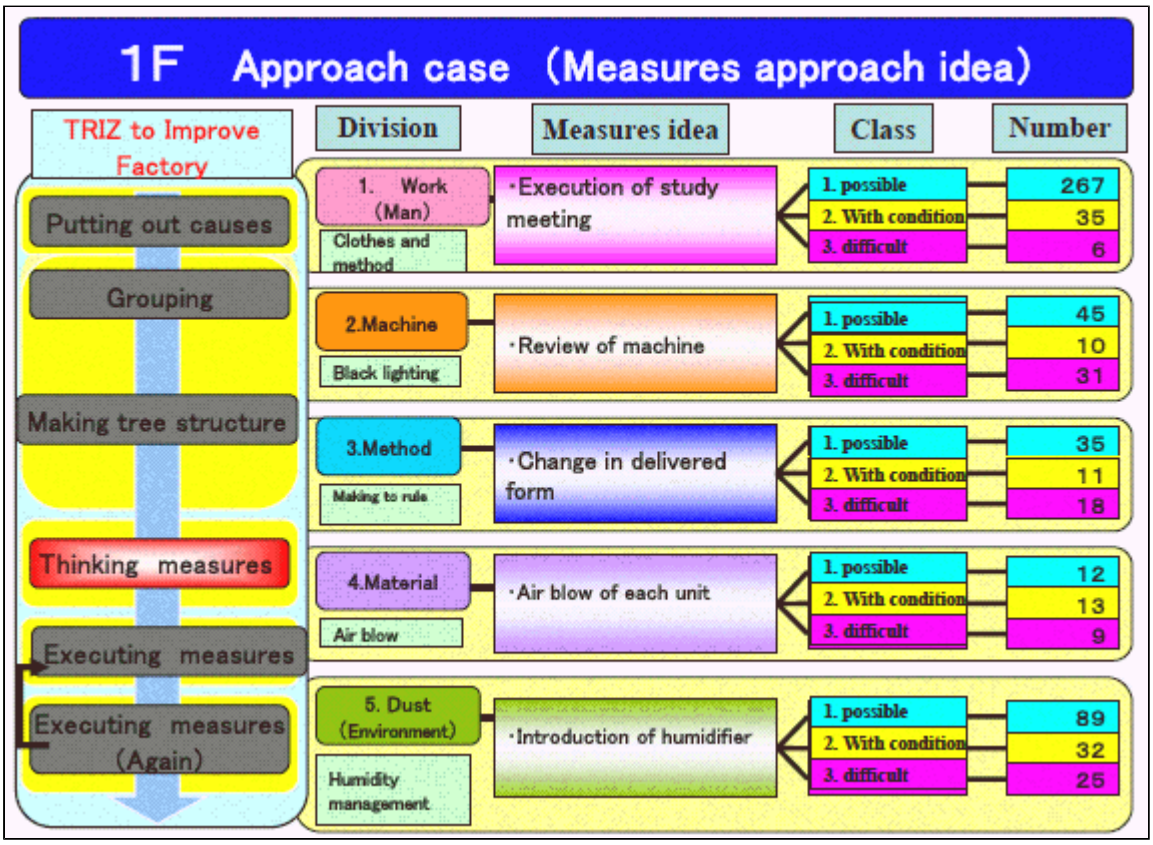
Then all the Brain Writing comments on the causes and on ideas for improvement are analyzed to form groups. The framework of 4M (i.e., Man (or Work), Machine, Method, and Material) + 1 (Environment) is used. The results of grouping are shown in the slide below.



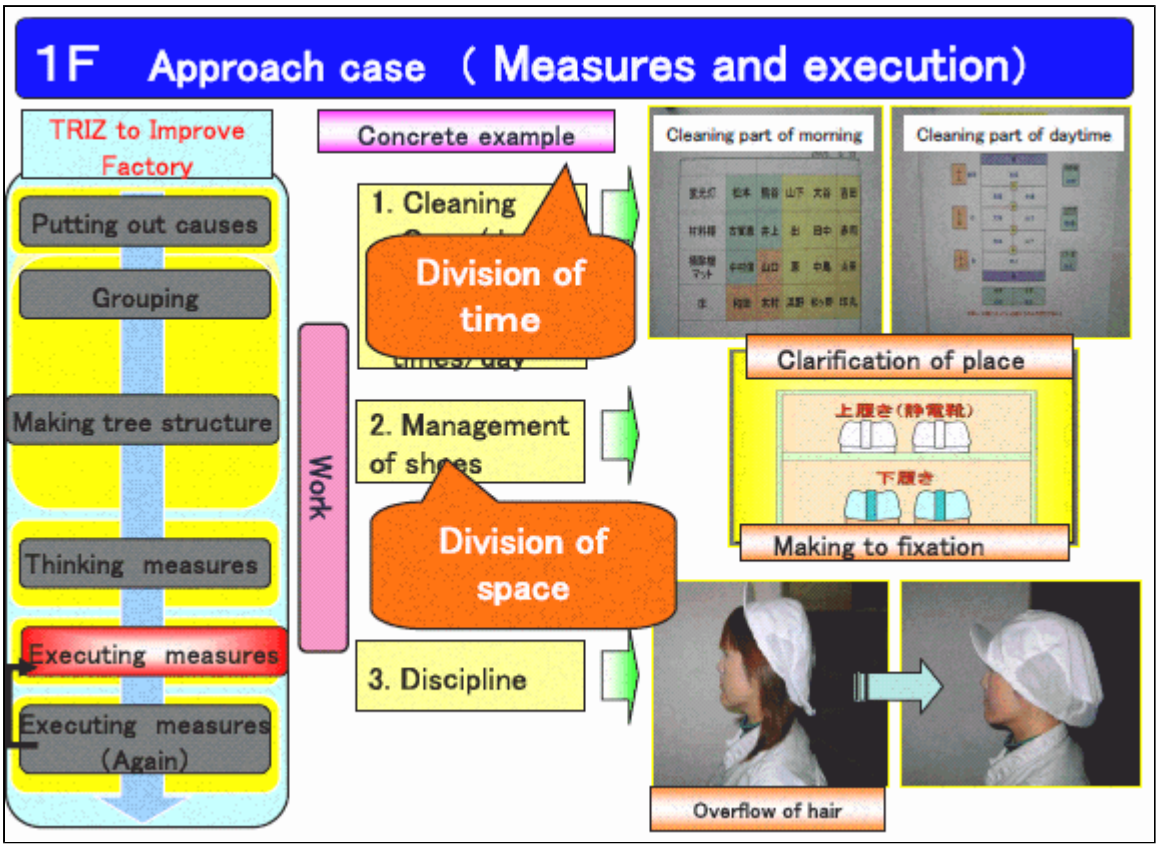
Then the ideas are further classified in the form of a tree structure of factors as shown in the following slide. [Unfortunately, wordings in English in this and other slides seem not be appropriate in various points. Maybe the following changes make more sense: consideration --> awareness/mind/attitude; garbage of tools --> dirt on tools; etc.]



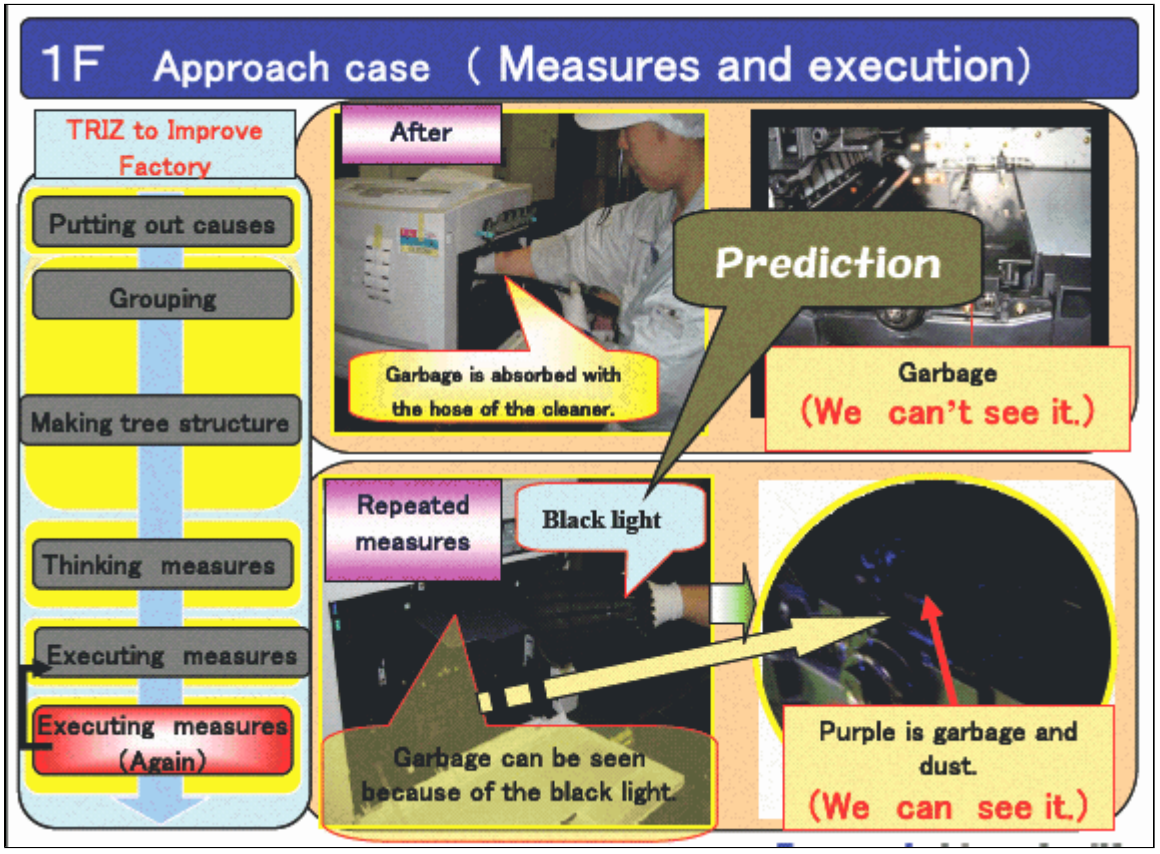
Then the ideas written by the factory members are built up into a system of solution ideas keeping the framework of the tree structure. As shown in the left part of the slide, all those ideas are classified in the classes of readiness of practice; they are: possible (or ready to apply immediately); with condition (or ready to apply with some preparation or after solving some minor problems); difficult (or need much preparation or difficult to apply in spite of being desirable). Numbers of such ideas in these categories are shown in the right-most column of the slide. Thus a huge number of solution ideas are obtained, even though in the column of 'Measures idea' only one of them is written in each box. (You will see some of such solution examples in the following slides.)



Then a large number of solutions were implemented into applicable measures and were actually executed. The next slide shows some examples of measures in relation to work (or working style/behavior of people). (1) The cleaning time is increased from once a day to three times a day while the places to be cleaned are divided in time and the rotation of people is posted on a board explicitly. (2) In the shoes closet at the clean room entrance, the places to put shoes are specified, i.e. the shoes for for the clean room are to be placed at the upper box while those for outside at the lower box. (3) Discipline is enforced to put hair inside the working cap. All these measures were executed at the same time.

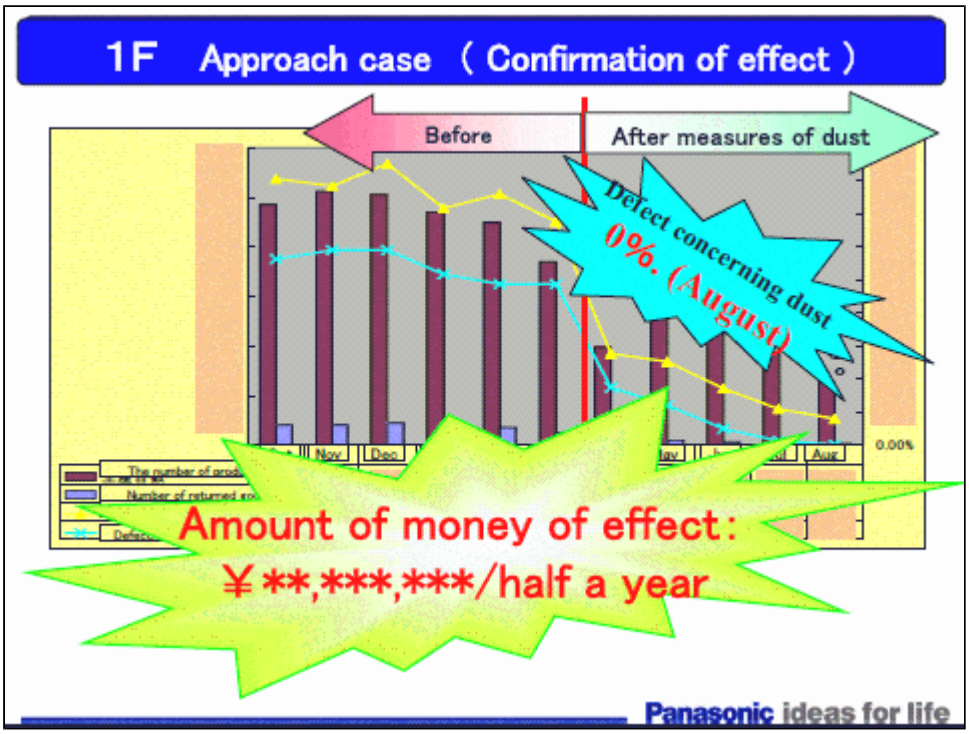


After executing such a large number of measures, the defect rates of the products were reduced much, but not zero yet. Thus the problems and their solutions were checked again with the eyes of TRIZ. For example, as shown in the following slide, even though the dirt and dusts were collected with a vacuum cleaner, some dirt's are still remained because we cannot see them well. Then with the aid of 'Prediction' module of a TRIZ software tool, the 'Black light' (i.e., the UV light source which cannot be seen with human eyes but can excite some dirt's to emit fluorescent visible light) was introduced to see the dirt and dust more clearly (See the bottom right of the slide). These activities to find solutions were navigated by the TRIZ specialist team.

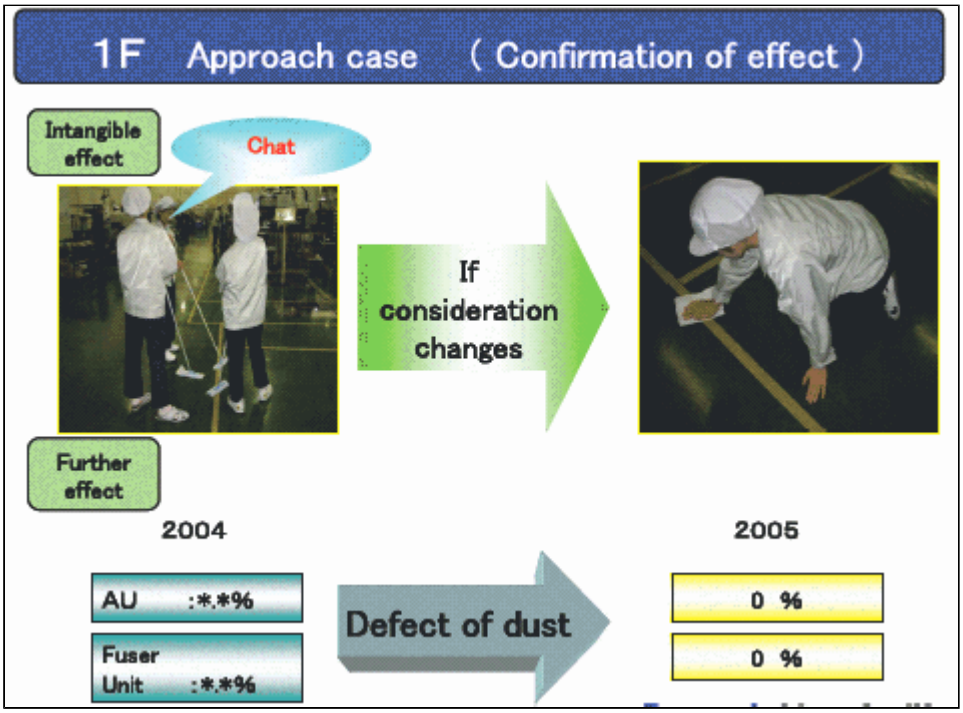


Eventually, the factory have executed 549 measures in response to the 638 ideas. The results of

executing all these measures are clear in the following graph of the defect rates plotted monthly. The defect rates dropped dramatically since the project started in April 2005, and finally became zero in August in relation to the dust problem. These results are evaluated to be nearly one million dollar savings per year.



The influence of this project on people is clearly seen in the photos shown below.



The Author summarizes the key points of their 'TRIZ Way of Improving Factory' as follows [I tried here the English translation of their Japanese slide]:

1. Construction of the root-cause tree without a 'Why? Why? ...' session, and use of TRIZ
   ## Participation by all the members in the Factory section, and
   activities reflecting all the ideas coming from individual members

2. Guiding people with the TRIZ philosophy, generating 500+ ideas in a short time, and managing to execute a large number of measures to solve the problem

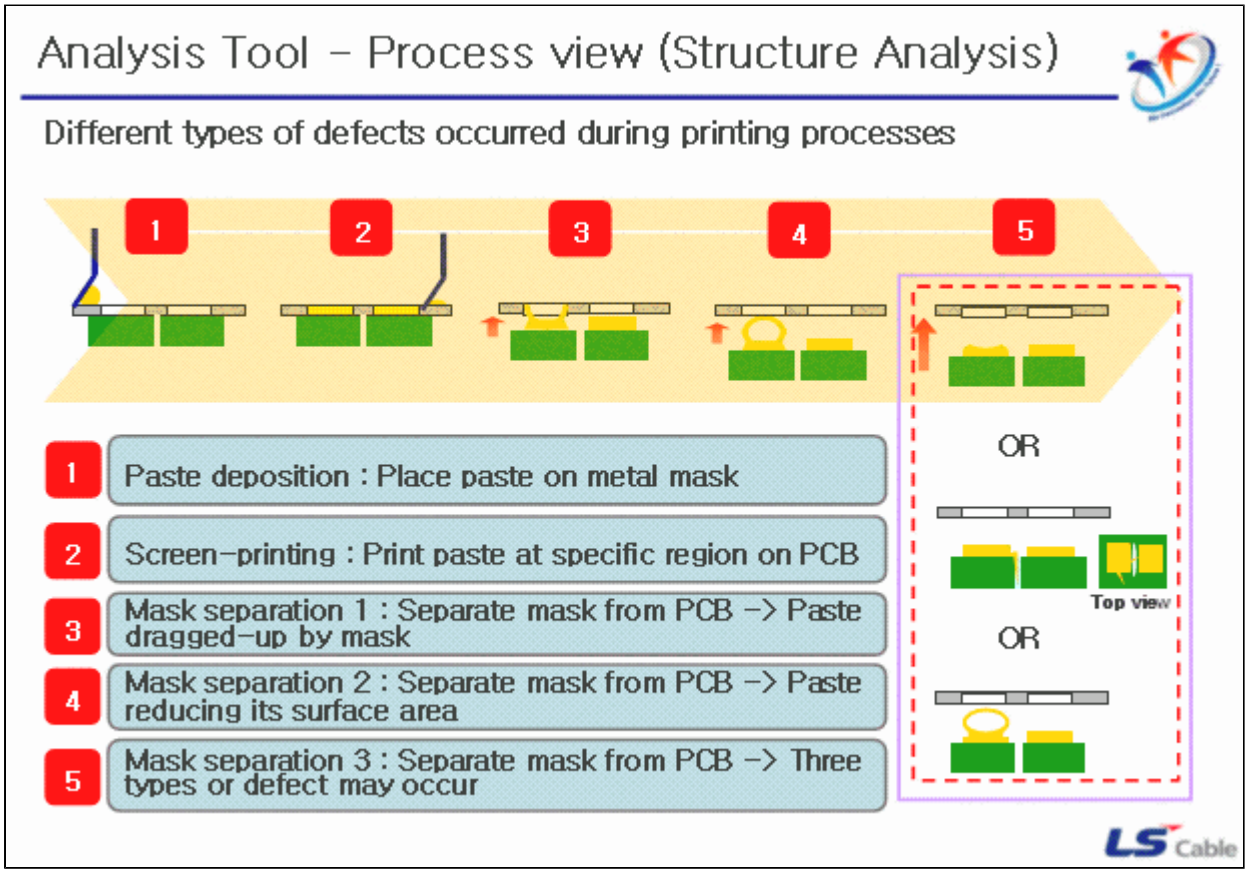
management does not care the validation of individual measures

3. Integrated use of multiple methods to derive tasks and to generate solutions
People have experienced a sure achievement, and thus obtained strong self-confidence

4. Collaboration of TRIZ experts with all the factory people,
where TRIZ experts guide (with the TRIZ philosophy) the factory people to generate ideas
for improving their own work and work place.

*** This case study is most impressive in many points: achieving to solve a big problem in a short time by generating many solution ideas, deriving effective measures, executing many measures at once, etc. In the photos of the slides we can see that people seriously got involved in this project and had experienced the change in their mind. This is also an excellent case study for stepping up the TQC style activities into much elaborated one with the philosophy of TRIZ. --- This case study is worthy of written down in a full document in Japanese and in English and published/posted widely. -- [(Nov. 17, 2007) I have invited this presentation to my Web site and obtained their permission already. In the near future, you will see their presentation slides in full length both in Japanese and in revised English translation here in "TRIZ Home Page in Japan".]

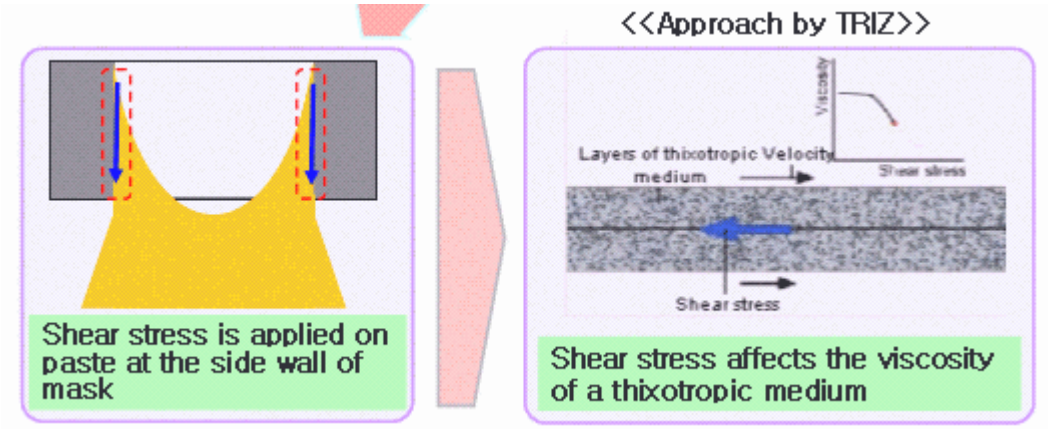
Jae-Hoon Kim, Joon-Mo Seo, Young-Ju Kang, Byoung-Un Kang (LS Cable, Korea) [19] gave a nice presentation in a Poster session with the title of "**Improvement of Material Properties of Printable Adhesive**". The problem is related to the printing process of adhesives on the print circuit board (PCB). The printing process is shown in the following slide, with the Steps 1 through 5. Three types of defects resulted in the printing are shown at the right column (i.e. Step 5); they are called Clogging, Bleed-out, and Bubble, respectively from the top to the bottom.

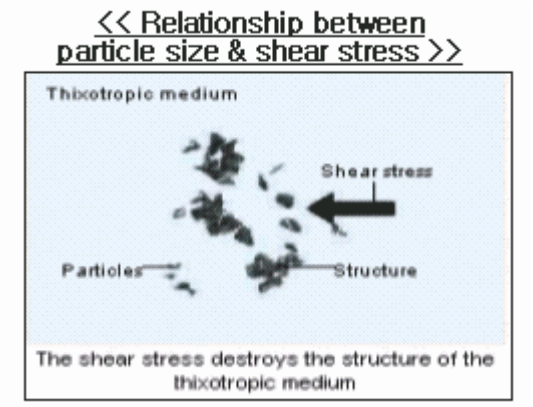


A good point in the present case study (and also several more published recently from this company, i.e. LS Cable, Korea) is its systematic way of analyzing the problem and its clear and detailed description of the findings. Observation of the whole printing process has revealed a common cause for deriving the three types of defects, as shown in the above slide. Namely, in Step 3 the paste is dragged up by the mask due to somewhat high viscosity. The Author carried out systematic analyses of the problem from

the Process view (with Structure analysis) and from the Material view (with Knowledge analysis and with Patent analysis).

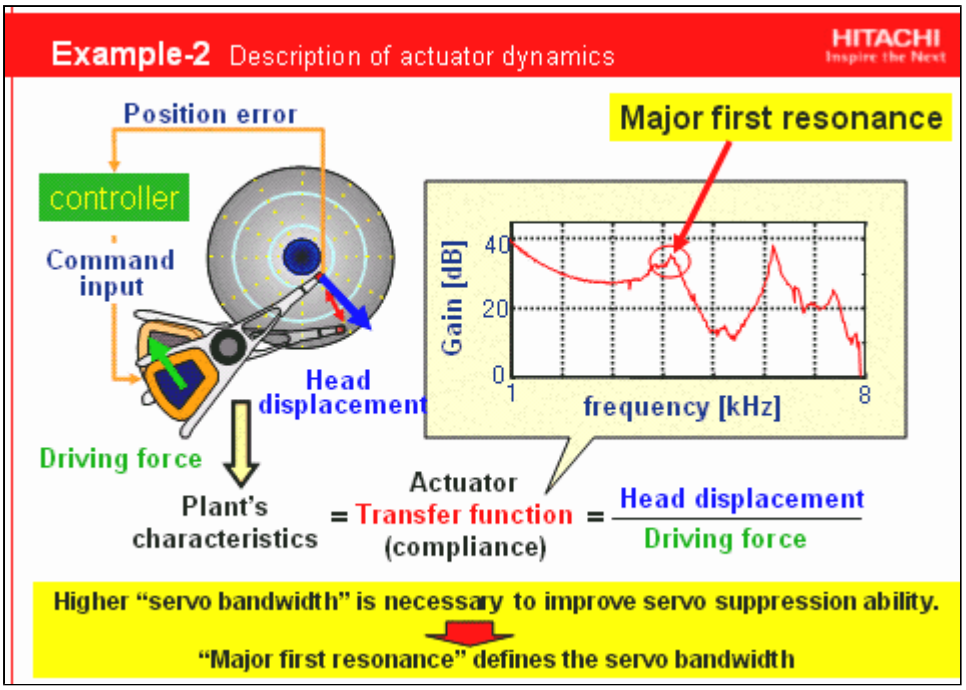
With these analyses and with the help of TRIZ knowledge bases, the Author has found the mechanism of the present problem as shown in the following figures. The adhesive paste is viscous and is drug up with the edge of the mask when the mask is lifted. The paste is not a simple liquid of polymers but contains small particles to make it into a thixotropic medium, which means no flowing when it is free but flowing when it receives shear stress. Effects knowledge base in IMC's Goldfire Innovator explains that the shear stress destroys the micro-structure around the particles in the thixotropic medium to let it flow, and hence the smaller the particles the smaller shear stress is enough to let it flow. On the basis of this knowledge, the Author made experiments of introducing smaller sized particles in the paste polymer, and achieved good results of solving the three types of defects.



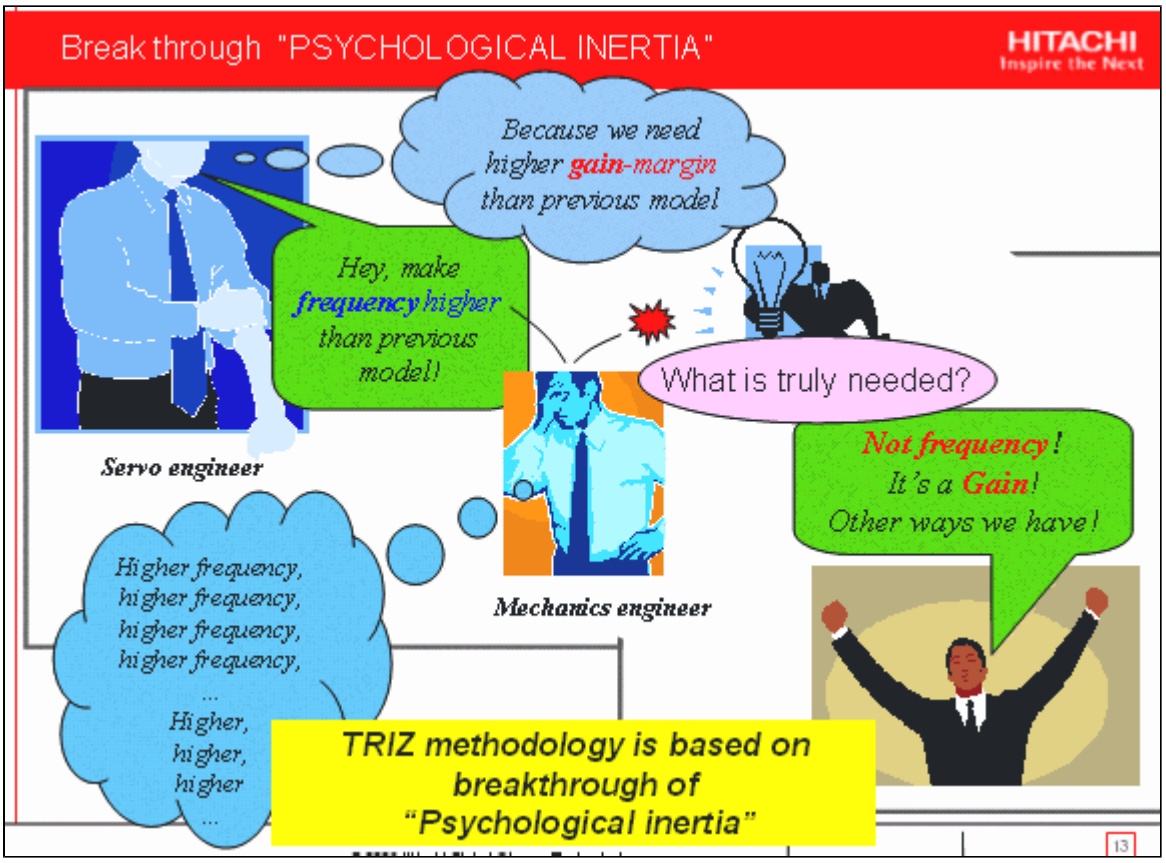


Toshihiro Arisaka, Kazushi Tsuwako, Hiroyuki Suzuki (Hitachi Global Storage Technologies Japan, Ltd.) [35] gave a poster presentation with the title of "**Introduction of the Activity to Promote TRIZ for Engineer and its Application Examples in Hitachi GST**". This presentation contains 3 topics. (1) For making TRIZ easy to access for engineers working in the field of HDD (Hard Disk Drive), technical terms in HDD area are interpreted with the parameters in the Contradiction Matrix and application examples in HDD area are listed corresponding to 40 Inventive Principles. (2) Actual TRIZ application: An error recovery mechanism using low RPM operation. (3) Another actual TRIZ application: New design in an actuator mechanism. All the three topics are valuable, but here I will cite the topic (3).

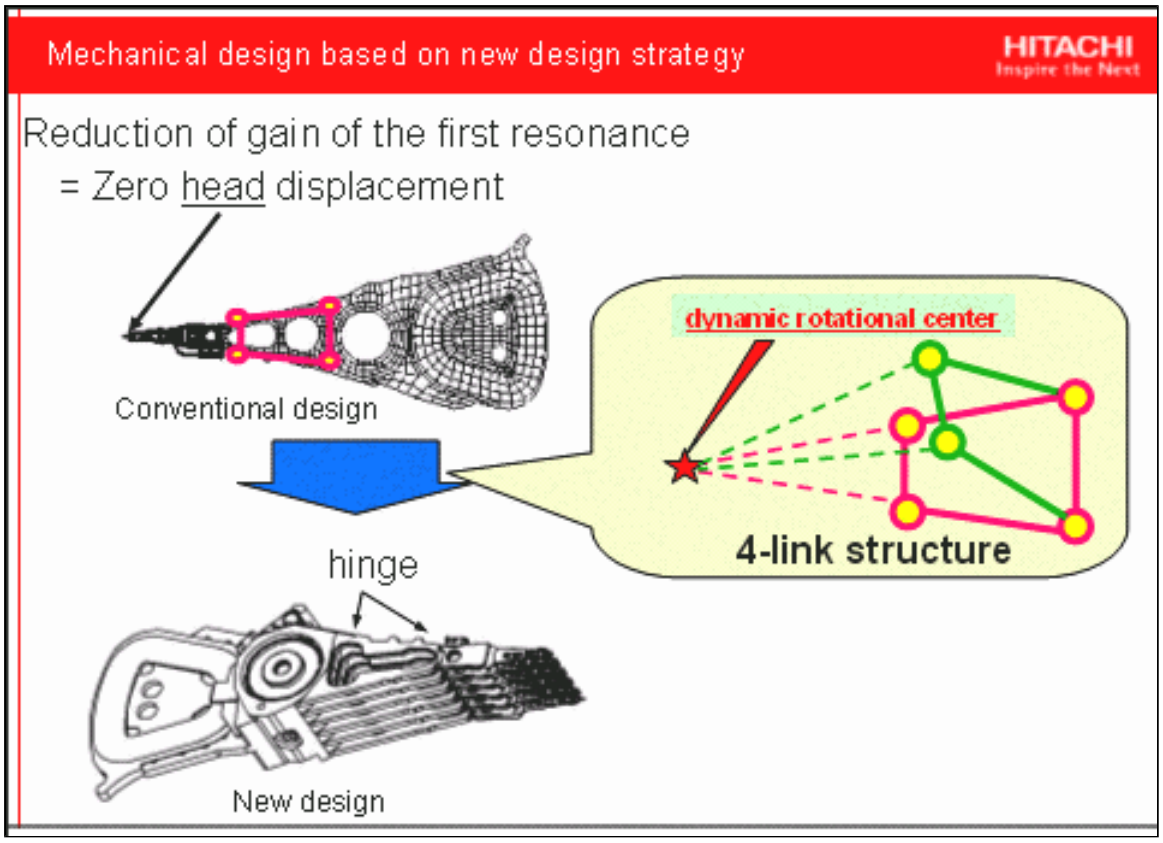
The following slide shows the problem situations. In the actuator design we have a request of better control of the head position in the servo feedback system. (Sorry but I cannot follow the logic exactly.)



Thus the typical way of thinking traps the engineer in a 'Psychological Inertia'. Thinking the question 'What is truly needed?' breaks this trap of PI.



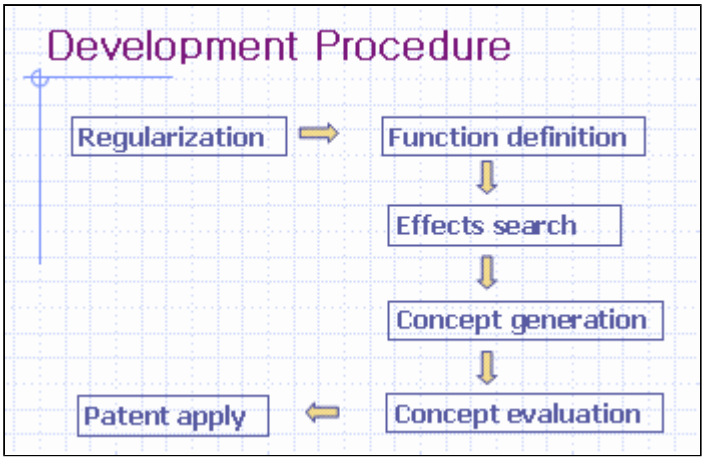
The new target of designing 'Zero head displacement' has lead the engineer to remind of the '4-link structure'. Using this structure and placing the head at the 'dynamic rotational center', the zero head displacement is achievable. The new design with hinges at the corners of the 4-link structure was implemented in the product.



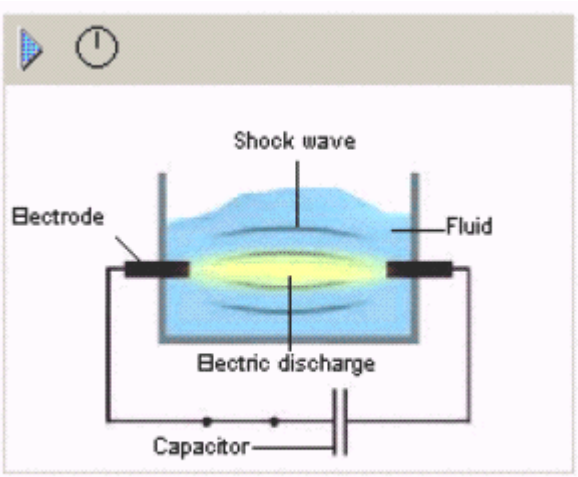
*** This presentation shows a steady way of penetrating TRIZ in a specific field, i.e. HDD technologies in the present case.

Ik Cheol Kim (Korea TRIZ Association, Korea) [22] gave an oral presentation on "**TRIZ Application for New Product Concept Development**". The Author is the President of Korea TRIZ Association and is active in consulting work. The Author tried in this presentation to respond to a common offensive question: 'TRIZ is an analysis tool only for present product, it can't apply on new product development'. The Author's answer is 'Many people develop new products by using TRIZ'. And in the present paper he demonstrates that he has invented a new type of ink jet printer head.

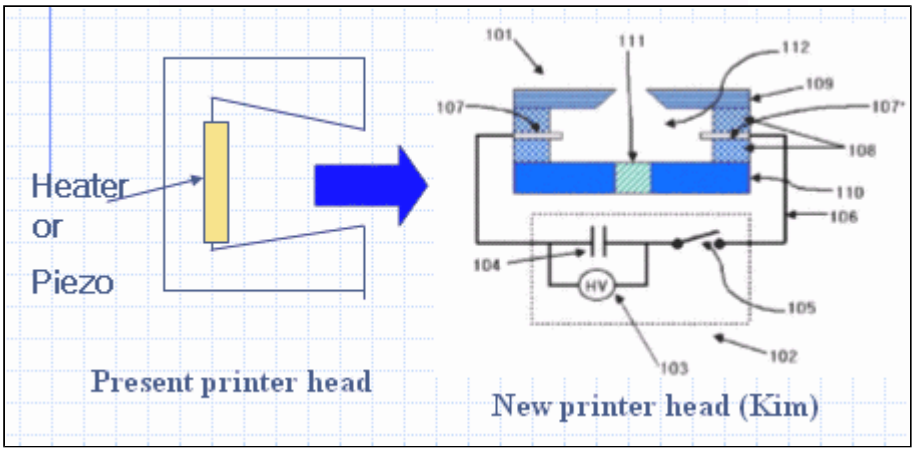
His scheme of work for inventing a new product is briefly shown in the following slide. 'Regularization' is to generalize the problem: In the present case, the problem of 'ink jet head' is generalized to 'inject liquid in a pipe'. Thus the function definition is 'How to inject liquid in a pipe'.



Then he surveyed the Effects Database in the IMC software tool, and noticed the method of Electric discharge in a liquid, as shown in the following figure (See left). Then he applied this method to the ink jet head and designed the head as shown in the figure at the right. After checking patent database, he submitted a patent to Korean Patent Office.

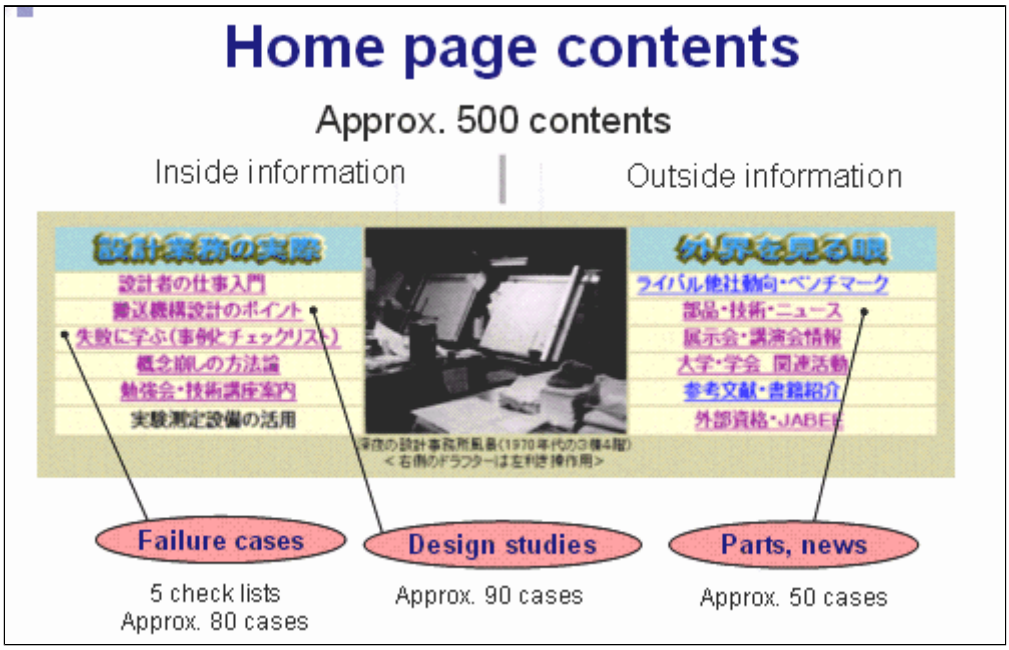


An electric discharge creates a shock wave in fluid

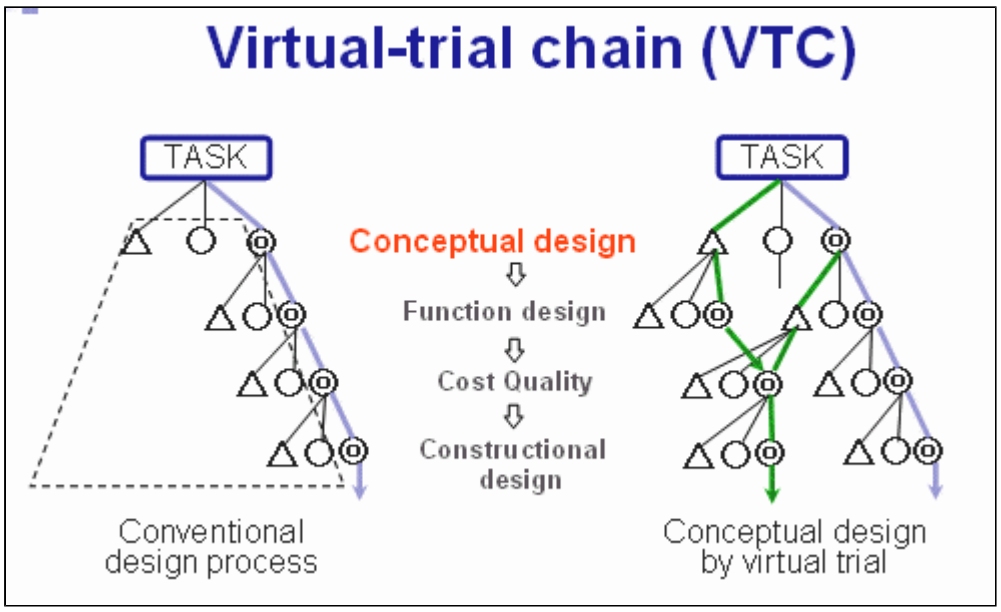


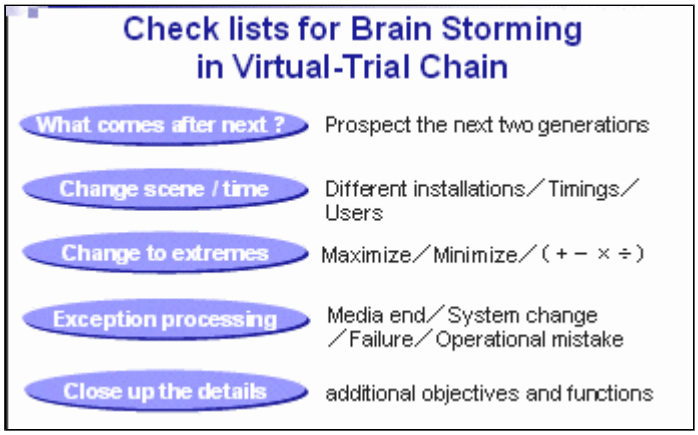
*** Listening to this presentation, I recalled the scheme of 'Functional IFR' in the Keynote Lecture by Larry Ball [11].

Kunio Fukatsu (Toshiba Social Automation Systems) [8] gave an oral presentation on "**Technical Knowledge Transfer by USIT Application for Paper Handling Mechanism**". One of the big issues in current Japanese industries is 'how to transfer technical knowledge to younger generations' especially because a large population of engineers in the post-war baby-boom generation are going to retire at the age around 60 and because this particular generation is very active in engineering (Actually many of the Japan TRIZ CB members belong to this generation, though not me). Thus the Author, a senior managing engineer in his company, has been trying to do his best for such transfer by establishing an intranet Home Page and a design methodology. His intranet site is shown in the following slide:



And he has developed a design methodology in his own way in the scheme named VTC (Virtual Trial Chain) having the checklist for brainstorming discussion, as shown in the following two slides:





However the Author feels a serious limitation in these approaches. His slide says as follows:

Limitation of the former activities

- **Intranet Home Page**

  The information in HP becomes obsolete quickly, and it might become the obstacle against the creation of new concepts.

- **Virtual Trial Chain**

  VTC has been developed as an independent methodology in a design division and some parts remain as tacit knowledge, and hence it is not easy to penitrate it widely.

In such a situation the Author met TRIZ and USIT recently. Last year at the Second TRIZ Symposium he gave a presentation on the extension of 'TRIZ 9-Windows Method' to show/consider 'What follows after next' on the basis of VTC. He also had an experience of attending at a USIT 2-Day Training Seminar instructed by Nakagawa. Thus the Author reports his experiences of solving his own problem together with several engineers coming from different companies.

The problem is to improve a paper stacker system:

Improve a Paper Stacker with Impeller

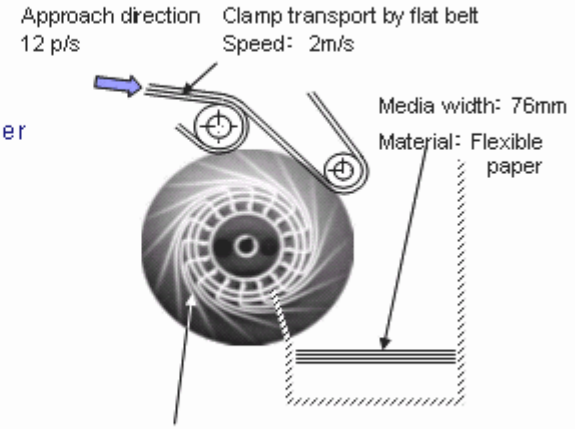
Present structure

This mechanism is highly reliable. But the impeller of a large diameter occupies the stacking space, and has become a restriction for downsizing of the mechanism.

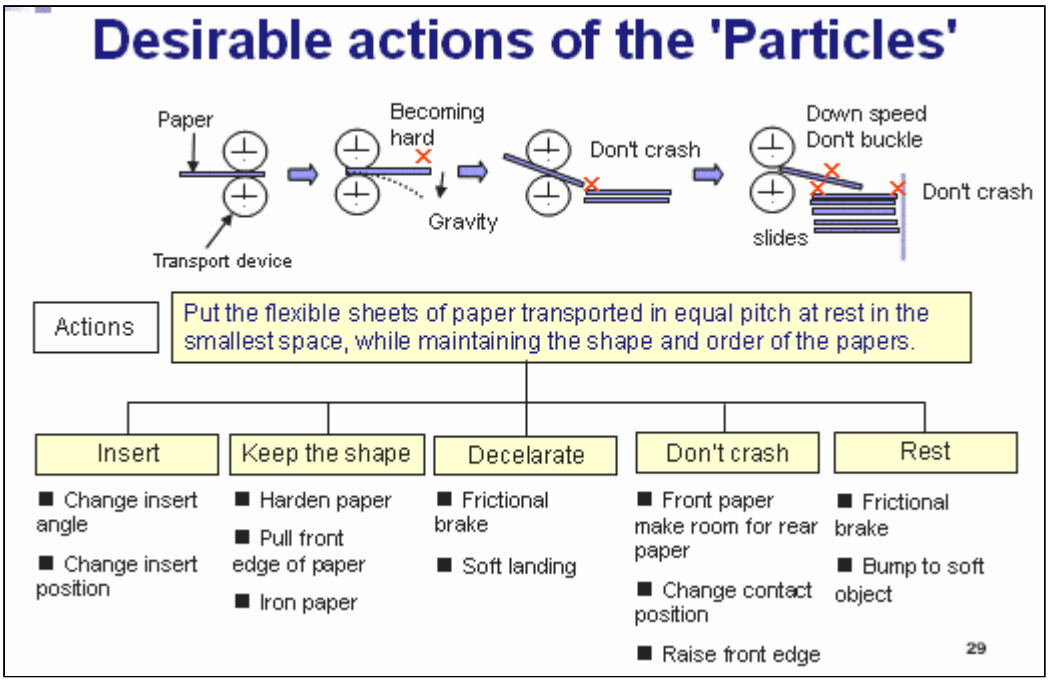
Objectives

Make these Compatible

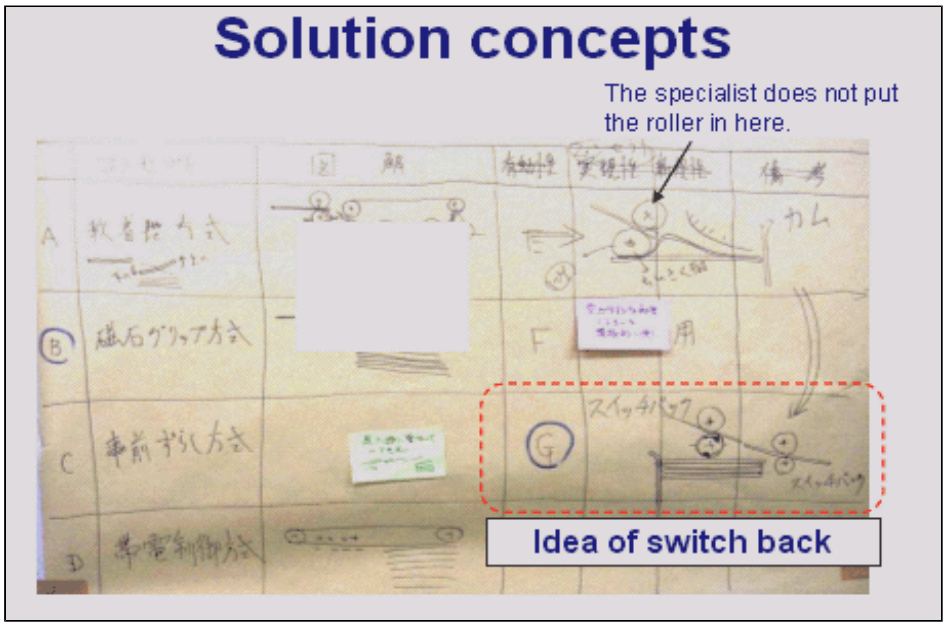
Downsizing | High Reliability



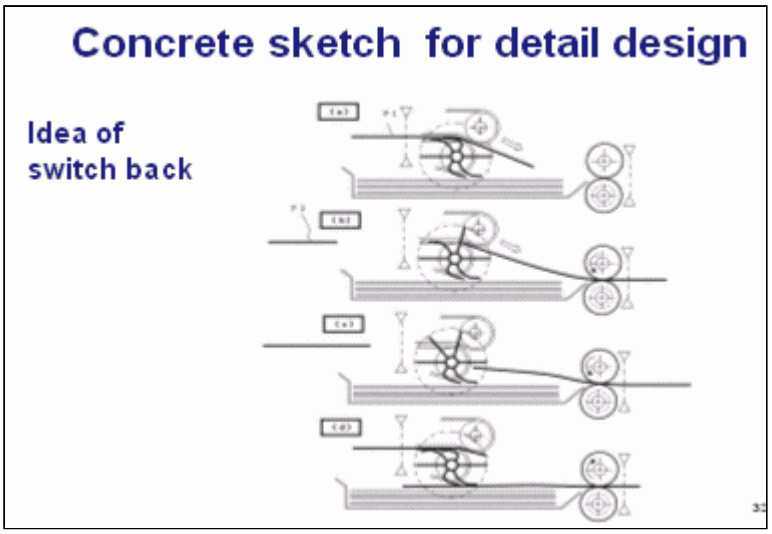
The Author reported how the problem was analyzed and solved by use of USIT, in several slides. Sorry but I will skip most of them for saving space here. The following slide shows the analysis of desirable actions for the Ideal system, by using USIT's Particles Method, i.e. an extension of Altshuller's SLP (Smart Little People's Modeling).



The following slide shows the almost-final stage of building up solution concepts. The Author, as an expert in this field of technology, was much impressed with the idea 'G. Switch-back' generated by an non specialist engineer. (*** I, as an non-specialist, personally prefer the idea of 'A. Soft-landing with aerodynamic slowing-down' which I suggested during the seminar.)



Then he drew a detailed sketch of the method, as follows:



In conclusion the Author writes: Transferring the methodology of technical idea creation is important for transferring knowledge to the next generation. USIT has a possibility to support young engineers' idea creation and has a possibility to support transferring knowledge to the next generation.

6. Promotion of TRIZ in Industries

Toru Shonai (Hitachi), Shun Kawabe (Meisei University), Naoki Hamanaka (Hitachi) [17] gave a poster presentation with the title of "**Application of Contradiction Table to Computer Architecture - Sub-matrix and Invention Principles for Computer Problems –**". This presentation seems to have the background of research since 1999 for trying to apply TRIZ to the field of IT, especially in the field of computer architecture. They have proceeded in the following four steps.

(1) First, they have analyzed known patents in the IT field in the eyes of TRIZ Contradiction Matrix. In the slides of the poster presentation they have shown four cases by example: Reduction of bank conflicts in multi-banked caches; Fast cache-access technique in a symmetric multi-processor system; Improving the cache hit ratio by finding out data with high locality; Reducing skew variation (due to the phase shift in signals) of signal interface circuits between LSIs. (You might feel these computer terms difficult to understand. But never mind, they are not important.) During these analyses, the Authors find it necessary to 'rephrase' various Matrix parameters and Inventive Principles so as to match in the IT field.

(2) As the results of these case studies, they have summarized as follows:

2.2 Summary of case studies

HITACHI Inspire the Next

- **Paraphrase of inventive principles**
  - [32] color changes → Marking data with tags and distinguishing the data from others.
  - [24] intermediary → Interpreted as the time for the events involved, such as block transfers and interruptions. Considering a switching time point may inspire new ideas.
- **Paraphrase of improving/worsening parameters**
  - More performance → [25] loss of time、
  - Increase number of logic gates or chip area → [6] area of stationary object
  - Cache coherency → [24] loss of information
- **Submatrix**
  - There are some parameters with less relation to architecture and processing techniques. These parameters are deleted and a submatrix with only 14 parameter's is made.
  - The area of the submatrix is a quarter of the original one.
  - The submatrix is so small that it can be included in an A4 sheet or on a PC display with 800x600dots, and it is easily used by beginners using TRIZ.

Their 14x14 Contradiction Submatrix for computer architecture field is consisted of the following parameters: Area of stationary object, Speed, Force, Shape, Durability of moving object, Durability of non-moving object, Loss of information, Waste of time, Amount of substance, Reliability, Harmful factors acting on object, Harmful side effect, Convenience of use, and Reparability. The submatrix is shown in one of their slides and in their paper.

(3) Then they applied their Submatrix to the problems in wider fields in IT, related to: Parallel computers, Storage systems (RAID, NAS), Database systems, IT system management, and Image/voice/text processing, etc. They added four parameters to their Submatrix, i.e. Manufacturability, complexity of device, complexity of control, and productivity.

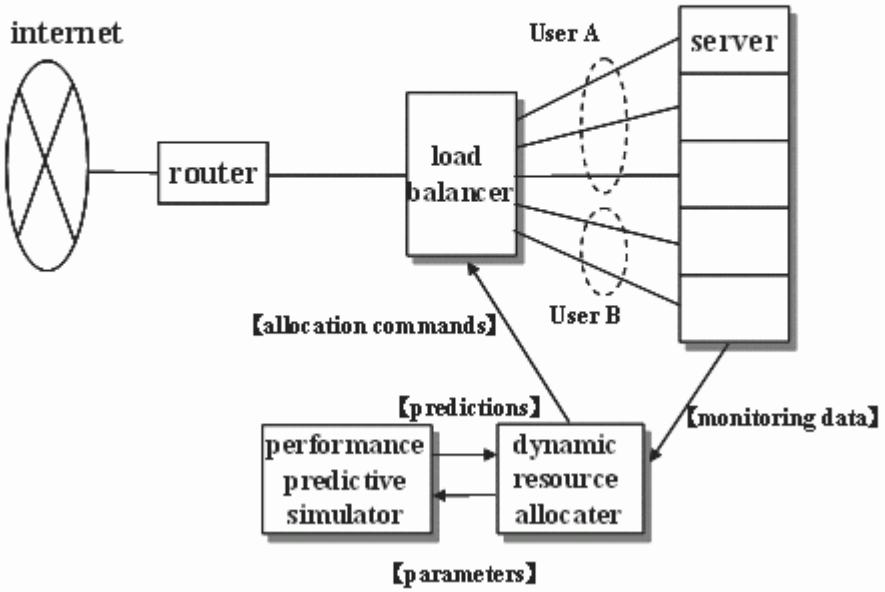
(4) They also used the Submatrix in their real problems for generating new solutions. The Authors show a case of internet data centers (iDCs), in which they developed new ideas, obtained patents, and implemented their ideas in Hitachi's Service Platform Concept and Integrated Service Platform around 2001-2003. In the following I will show their four slides describing their real case in some detail:

4. Application to real patent generation(1/4)

HITACHI Inspire the Next

- Problems at internet datacenters (iDCs)
- Response degradation due to surges in internet traffic became a problem
  - Frequent shortage of "i-mode" services due to excess user usage became a social problem(1999-2000)
- We innovated new ideas.
  - Virtual Private Data Center (VPDC)
  - A datacenter architecture that can share resources such as servers, storage, and network bandwidth with different users and applications in a cost-effective manner and can respond to surged internet accesses in excess of the prior expected amount of accesses by using dynamic resource allocation.
- We used TRIZ in the process of making patents from the above basic idea.

- **Problem formulation**
  - ① When internet accesses surge, servers must be reallocated and must supply optimal throughput.
  - ② Number of servers must be decreased so as to be cost-effective.
  - ③ Optimal reallocation must be done without lots of human operations.



- Contradiction problem(1)
  - Improving: to increase throughput by optimally reallocating resource like servers・・・・①
  - Worsening: to decrease the number of servers・・・・・・・・・・・・・②
- Inventive principles
  - [35] state transformation、[38] strong oxidants、[18] mechanical vibration、[16] partial/excessive actions
- Interpretation
  - TRIZ advises the inventor to act partially/excessively by state transformation (prediction) while considering periodic or wavy actions.
  - "State transformation" may be efficiency change of CPU, memory, and IO of servers, which should be monitored.
  - "Partial/excessive actions" are thought to be optimal allocations of a limited amount of resources, e.g., servers.
  - "Periodic or wavy actions" may be periodic variation of loads.
- Optimal allocation and ③ become another contradiction.

- **Contradiction problem(2)**
  - Improving: to reallocate optimally with fewer or no human operations ・・・・③
  - Worsening: optimal reallocation requires more time.
- **Inventive principles**
  - [4] asymmetry、[28] mechanical substitution、[10] preliminary action、[34] discarding and recovering
- **Interpretation**
  - To reallocate optimally in advance by prediction with modeling and simulation, or actual measurements (preliminary action)
  - To reallocate optimally by discarding/reusing servers (discarding and recovering)
- **Parts of this idea are used in *Hitachi's Service Platform Concept Harmonious Computing* and *Integrated Service Platform BladeSymphony*.**

Their conclusion slide is shown below:

5. Final remarks

HITACHI Inspire the Next

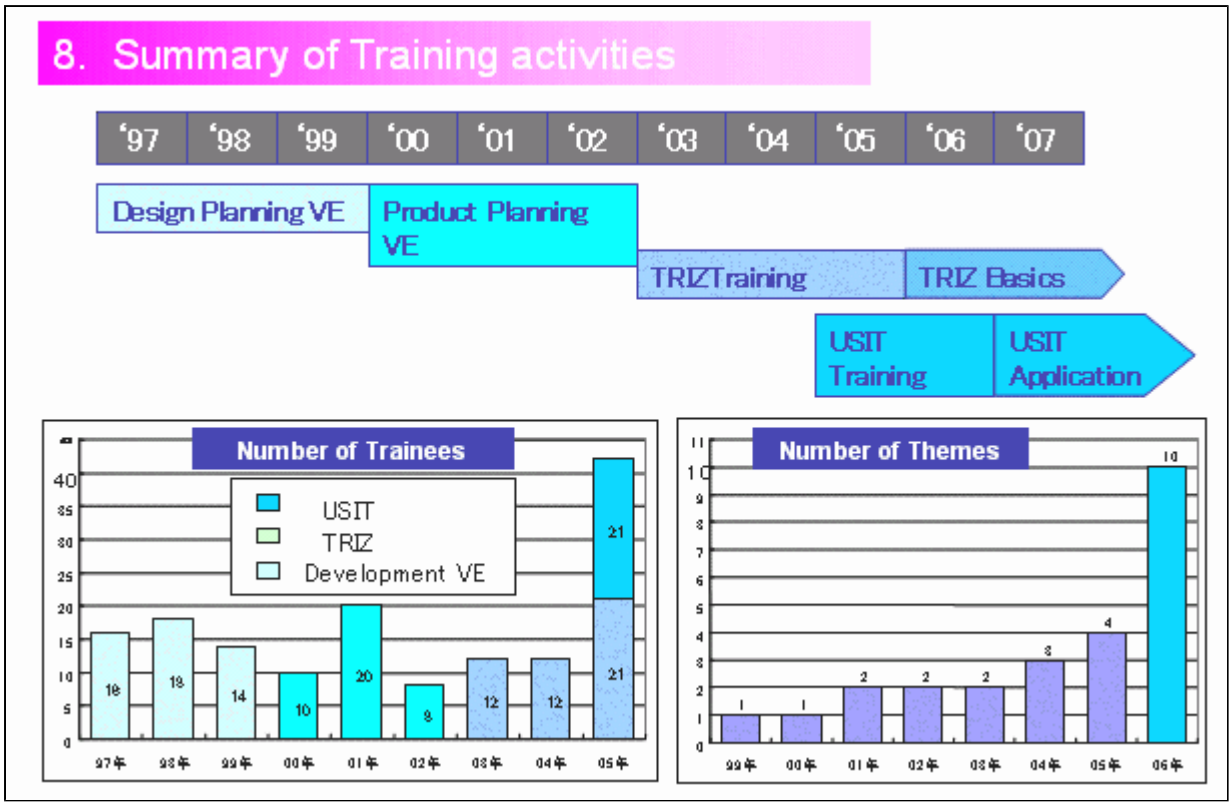
- **Conclusion**
  - I have described paraphrasing of words in inventive principles and submatrixing when contradiction table and inventive principles are applied to computer problems.
  - These methods are effective when we use TRIZ in our department at Hitachi.
- **However**
  - They do not guarantee good ideas.
  - Application of TRIZ with superficial understanding of technical problems and ideas results in no gain.
  - It is necessary to understand technical backgrounds and whole problems deeply, choose appropriate TRIZ tools depending on situations, and abandon previous ways of thinking.
- **About Matrix 2003**
  - Its improving/worsening parameters reflect recent US computer patents.
  - Although the inventive principles are the same as the older ones, the approach described here is thought to be effective with Matrix 2003.

*** The case study presented by the Authors is, as far as I know, the first report published in the world concerning to the application of TRIZ to a real problem in the IT field. It is remarkable that the Authors worked on TRIZ for IT so many years ago and achieved new patented and implemented results. For these few years, some of the TRIZ consultants in the world got involved in the problem solving in IT and found the ways of applying TRIZ to IT with some adjustment, or rephrasing in the present Authors' term. Such experiences and knowhows should be, and will be, published in near future.

Kazuyasu Ikeda (Sekisui Engineering Co., Ltd) [20] gave a poster presentation with the title of "**History of TRIZ Activities in Sekisui Chemical Group**". This was a nice and frank presentation about his company's 10 year activities for introducing TRIZ (and USIT). (This poster presentation is not

translated, unfortunately, into English except 2 introduction slides.) In the early days of 1997-1999, two different sections of Sekisui Chemical Co. tried to introduce two different approaches of TRIZ. One was research laboratory which tried to introduce TRIZ/USIT in the problem solving; this activity lasted about 2 years but faded out. Second was the activities carried out by the VE group (especially the present Author) in the Production System division with getting consulted by SANNO Institute. Training programs of VE and TRIZ-DE were conducted for many years by SANNO. One of the results of this activities was reported in TRIZCON2002 by Manabu Sawaguchi (SANNO) on the development of a portable toilet chair as shown in the following slide.

The activities of the VE group has been extending steadily in Sekisui Chemical Group, and has started the TRIZ Study Group in the Kansai Branch of Japan VE Society (See the Oral presentation by Matsuda, Unno, and Ikeda [30]). The training programs of VE and TRIZ-DE are kept running. In 2006 the Author invited Nakagawa to give USIT 2-Day Training Seminars. The USIT Training was carried out four times in a year to tackle with 10 real problems in total to solve by the group practices in the seminar. Now the Author is serving as the in-company consultant in TRIZ-DE and USIT to assist solving problems in various engineering divisions and to penetrate these methods. Their history in the Training activities is summarized in the following slide.



Eiji Yoshii, Jiro Hashizume (Matsushita Electric Works) [34] gave a Poster presentation with the title of "**Introducing USIT in Matsushita Electric Works**". In 2004 they invited me to give 2-Day USIT Training seminars three times for solving their real problems in the field of Mechanical, (Information) System, and Materials. Since 2005 they have been conducting the USIT problem solving workshops for themselves to solve real problems in their company together with engineers in corporate and division research laboratories. They already have experiences of solving 24 projects with the results of obtaining average 27 ideas/project. Since 2006, they have started one-day USIT Practice Seminars. For conducting these USIT workshops and seminars, the Authors have built up their own course materials, knowhows, case studies, etc. In their slides in Japanese there are a plenty of information which is new and attractive even for me, but they are not translated into English yet. I would like to show the two English slides they used in the 'Introduction to Posters' Session:

National

Matsushita Electric Works' USIT Promotion Activities

1

Matsushita Electric Works, Ltd.
Eiji Yoshii, Intellectual Property Department
Jiro Hashizume, R&D Administration Department

[Purposes and background]

Introduction of the Unified Structured Inventive Thinking (USIT) activities, in their third year of autonomous operations

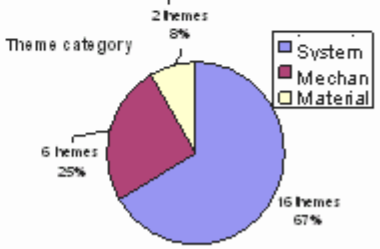
- Establishment of business entry barriers through patent applications
- Efficient research and development (issue resolution)
- Knowledge management (improvement of logical thinking capabilities)

[Development steps and devices]

Implementation of autonomous operation themes

The USIT is applied to a total of 24 themes, which have progressed as required.

1. It is important to coordinate the identification and definition of problems in the introduction stage.
   - Identification and organization of "undesirable effects"
   - Identification and organization of "root causes"
2. A one-day seminar on the USIT method is held for the general training of in-house engineers.
   - To allow them to understand the method using our products close to them.

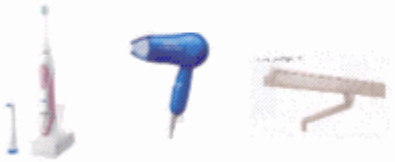


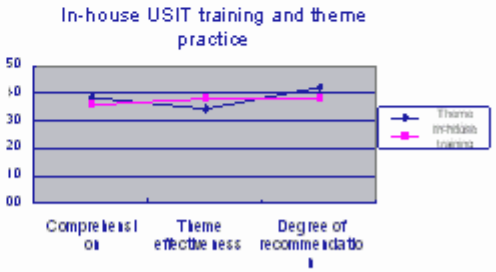
Matsushita Electric Works, Ltd.

[Results]

Theme practice: A group discussion is held by three to five formal committee members, plus one advisor and a person in charge of patents.

1. Attention has been focused on the identification and organization of issues and root causes in the introduction stage (problem definition) to coordinate the members' viewpoints in order to concentrate on the direction of issue resolution and the identification of causal relationship.
2. General training for in-house engineers: Two seminars per year (approx. 15 engineers/seminar) have been held since last year to allow engineers to understand the method for using our products that are close to them.

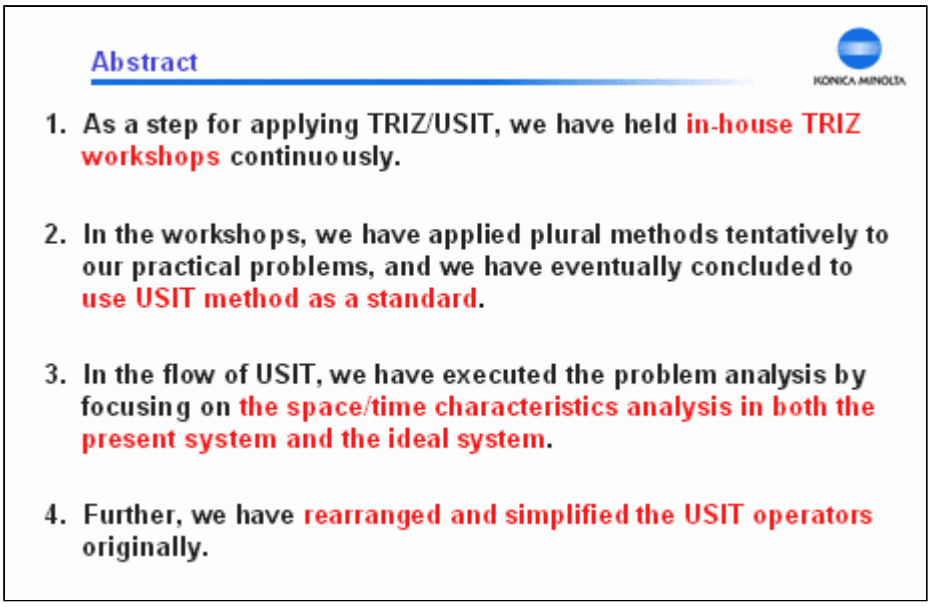




[Future development]

To proceed with the implementation and practice of themes and improve the level through the improvements

Shoichi Tsuge, Osamu Yamada, Tateki Oka (Konica Minolta Business Technologies, Inc.) [15] gave a poster presentation on "**Practices of Applying TRIZ/USIT in Konica Minolta Business Technologies, Inc. (2)**". The company started their TRIZ study group in 2004 and invited me to give a 2-Day USIT Training Seminar in 2005. Their activities and strategies of promoting TRIZ/USIT is summarized in the following slide (sorry but no other poster slides are translated into English):



Their USIT workshop for solving real problems is conducted in one day (for introduction to TRIZ/USIT, case study examples, problem definition, problem analysis, and short practice of applying USIT Operators) and then they have a few times of follow-up meetings to generate solutions with USIT Operators and to make a tree of solution ideas. The Authors have selected 10 USIT (sub-)Operators which are frequently used in their and other companies' patents. Roughly saying those USIT Operators are Divisions (of objects or functions), Arranging (attributes or functions) in space or in time, Introducing new or modified (objects, attributes, or functions), and Enhancing useful or suppressing harmful (attributes or functions). They separately use 2 other main USIT Operators, i.e. the Combination Methods and Generalization Methods.

In the last slot of the double track sessions on the third day afternoon, we had a 'Special Session', where four people coming from Thailand gave a joint presentation of their 'Position Papers' for 20 minutes and then had 20 minutes free discussion among the participants on the floor. This session was arranged two weeks before the Symposium for receiving the people who are eager to introduce TRIZ into their country.

Kritaya Suparnpongs, Saranya Chandravat (Siam Cement PLC, Thailand), Chiraphon Rayakaeo (Thai Paper Co., Thailand), and Yuthapong Matejitkul (SCG Paper PLC, Thailand) [41] gave a joint oral presentation with the title of "**TRIZ in SCG**". They say 'SCG (The Siam Cement Group) is the largest industrial conglomerate in Thailand covering 5 core businesses of Cement, Chemicals, Paper, Building Materials, and Distribution. The group comprises of over 100 companies with 24,000 employees.' SCG has been active in TQM and the four people are the leaders of in-house consultants in various methods in TQM. SCG started recently to introduce TRIZ. Last year they received TRIZ training at Technology Promotion Association (TPA Thailand-Japan) instructed by Shinsuke Kurosawa (SANNO Institute of Management). And they also sent a group of about 15 people for the mission of surveying TRIZ activities in Japanese industries, by visiting SANNO, Fuji Film, Panasonic Center, and Nissan. They have started their TRIZ activities for the period of 2007-2008 with the following three goals:

- Integrate with kaizen system for technical problem solving in factory
- Integrate with QFD to solve conflicting quality elements for new product development
- Integrate with Task Achieving QC story

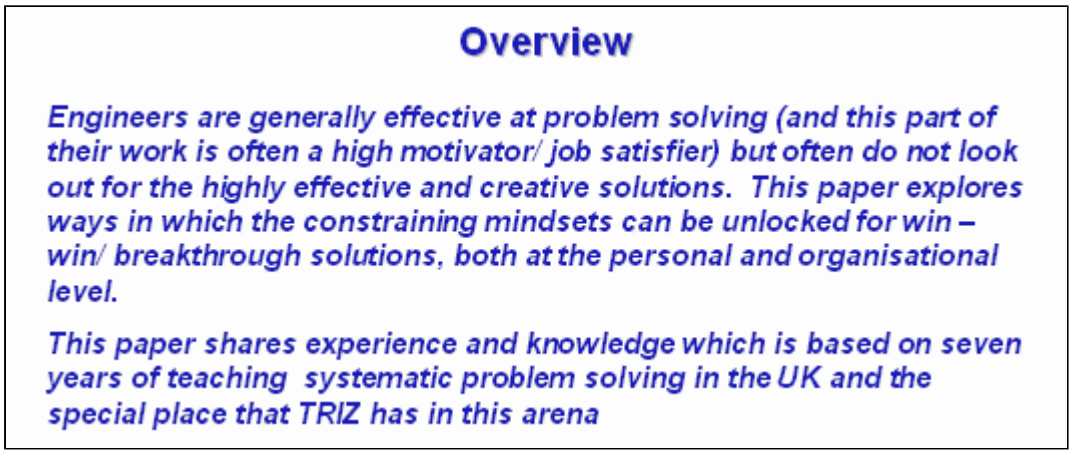
These goal settings are unique in expressing their clear intension of introducing TRIZ in the form of enhancing their current TQM activities.

The free discussion in the Special Session was done in a frank, friendly, and positive atmosphere by the people including Larry Ball, Simon Dewulf, Paul Filmore, Toru Nakagawa, Shinsuke Kurosawa, Mikio Adachi (Denso), etc. The discussion was recorded by the people from Thailand and recently annotated by the speakers. I am going to post this record of discussion separately in the "TRIZ Home Page in Japan". [(Nov. 14, 2007) In a separtate page, the slides of the joint Position Paper in PDF and the Record of Discussion in HTML and in PDF are now posted.]

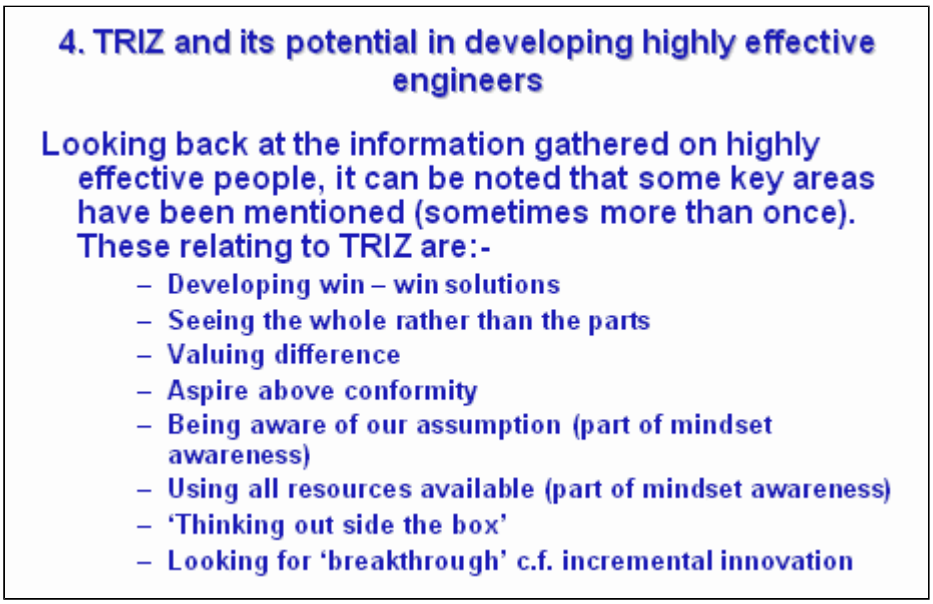
7. Usage of TRIZ in Academia

Six presentations were reported from academia in UK, Russia and Japan.

Paul Filmore (Univ. of Plymouth, UK) [29] gave an oral presentation on the title of "**Developing Highly Effective Engineers**". The intention of the present paper can be seen in its 'Overview' slide as shown below.



The Author showed 38 slides with a lot of citations to reference works, thus I feel it difficult to extract his saying briefly here. His main points of discussions may be summarized in the following three consecutive slides:



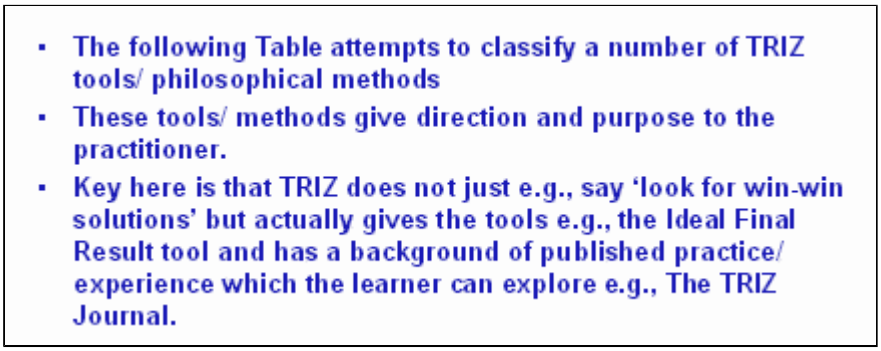


Table 2: TRIZ tools etc. related to key characteristics/ approaches demonstrated by highly effective people.

Seeing the whole rather than the parts	IFR tool, Functional Analysis
Valuing difference	Being a creative TRIZ practitioner can make one have this awareness as one is always looking for difference.
Aspire above conformity	Being a TRIZ practitioner by definition at present, means aspiring to learn better tools
Being aware of our assumption	9 Windows, Resources tool
Using all resources available	Resources & Constraints tool
'Thinking out side the box'	Trends, 9 Windows, Functional Analysis, Smart Little People, Space-time-interface-cost
Looking for 'breakthrough' c.f. incremental innovation	IFR tool, Trends

The following slide is also very interesting:

Levels of TRIZ practitioner development

- Beginner – Uses the Matrix and considers some Trends
- Professional - uses all the basic tools and defines the problem carefully
- Expert - systematically uses all tools in a methodological way and sees the world through TRIZ eyes/ understanding. Is also able to see TRIZ limitations and uses other methods when more appropriate.
- Master - systematically uses all tools in a methodological way and sees the world through TRIZ eyes/ understanding AND lives through a TRIZ philosophy and works to update and change TRIZ. Is also able to understand TRIZ limitations and uses other methods when more appropriate.

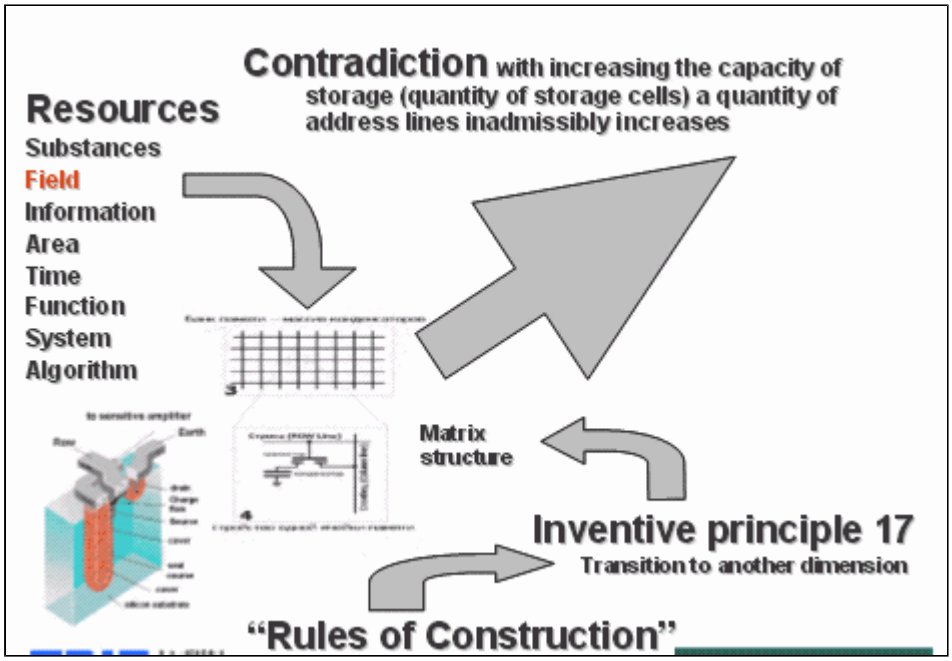
Victor Berdonosov (Komsomolsk-na-Amure State Tech. Univ., Russia) [39] gave an oral presentation on the title of "**TRIZ-Fractality of Knowledge**". The Author's arguments are as follows:

> The purpose of the report is to show the possibilities of widening of TRIZ application area for knowledge systematization.
> The basic Contradiction of Education is the volume of knowledge to be delivered and the time required for mastering it.
> Teaching the systematization of knowledge will permit to solve the main contradiction in education .

Using the following table, the Author demonstrated the analogs and he concluded that "Knowledge is fractal as everything in nature".

the Analogs	Pattern	Resources	Rules of construction
Fractality in Geometry	an initial geometrical object	a geometrical area	the iterative rules
Fractality in Crystal	the seeding grain	salt solution	doubling of the seeding grain (image) lattice
Fractality in Plant	protogene	soil mineral substance	laws of cell division
Fractality in Animals	genes	proteins fats carbohydrates	laws of cell division
Fractality of Applied Knowledge	Fundamentals of correspondence problem domain	resources of problem domain	developing axioms according to Su-Field conversion and ways of solving contradictions
Fractality of Fundamental Knowledge	axioms starting positions	observations facts	developing axioms according to the principles of Integration

The ways of constructing the knowledge, or understanding the systematic structure in the knowledge, is shown in the following figure (sorry but I cannot explain this slide well).

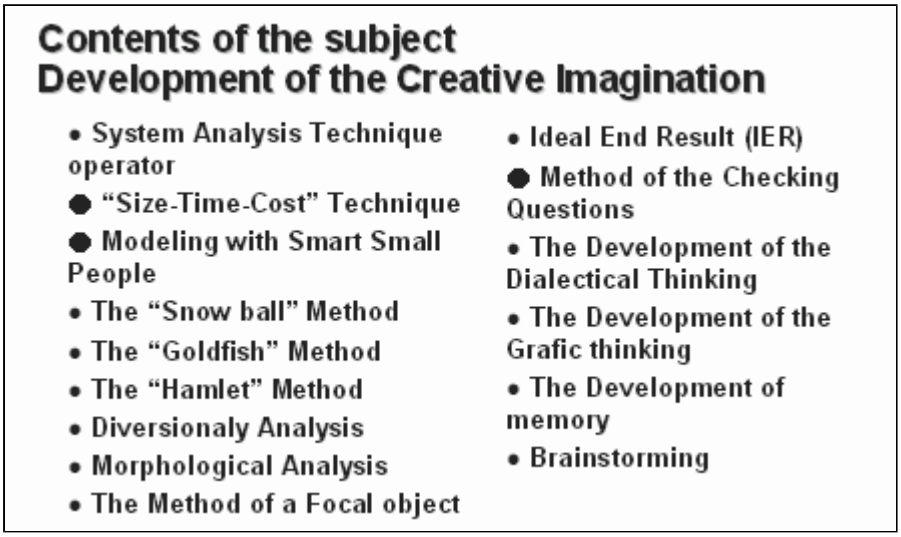


Boris Dolotov, Victor Berdonosov, and Marina Dolotova (Komsomolsk-na-Amure State Tech. Univ, Russia) [14] gave a poster presentation on "**IQ Increase under the Influence of TRIZ**". They say:

> The purpose of the report: To estimate the efficiency of teaching TRIZ.
>
> The tasks of the report: (1) To choose method of the testing, (2) To make technique of estimation, (3) To accomplish testing, and (4) to make the conclusion.

The subjects they taught to the students are the 'Development of the Creative Imagination (DCI)'. Even though DCI is not so much introduced in the Western countries, it seems to be an important part of Altshuller's methodology, especially for making our mind flexible and intuitive (You can feel the flavor of it in Yuri Salamatov's Textbook "TRIZ: The Right Solution at the Right Time" Engl and also in Natalia Rubina's workbook of "Creative Imagination Development Course for Children (Grade 1-3)" Engl posted in my Web site "TRIZ Home Page in Japan"). The contents of DCI are shown in the following slide (I

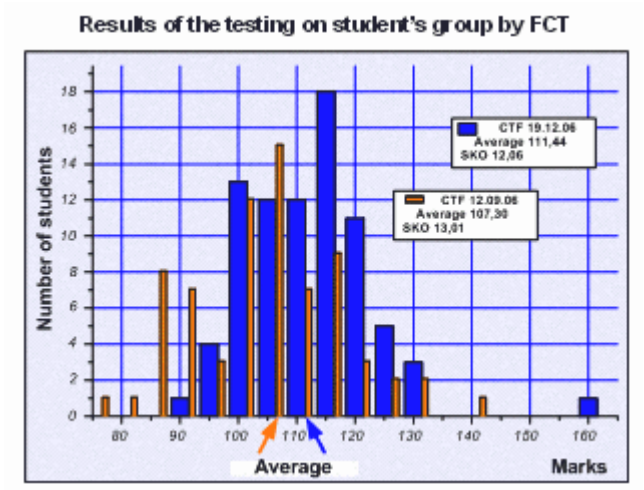
suppose the bigger dots are the items the Authors taught to the students in the experiments of this report).

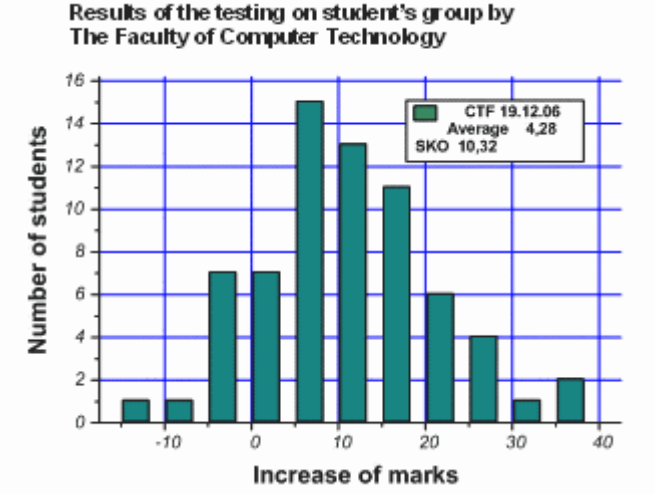


The scheme of the experiment to check the influence of teaching DCI is simple as:

-- Each student is tested by the Eysenick's test (IQ test) (40 questions, 0.5 hour) [on Sept. 12, 2006]
-- Teaching DCI
-- Each student is tested by another Eysenck's test (40 questions, 0.5 hour) [on Dec. 19, 2006]

The results of the IQ tests before and after the DCI teaching are summarized in the following graphs:





With these results the Authors concluded as follows:

* The average IQ level of students doesn't depend on the years for which they study.
* The average level of IQ increased from 15% to 30% according to the number of correct answers.

*** This is an interesting results. It must be worthy of learning/introducing DCI more in the Western countries. Such a training in DCI may need man-to-man instruction.

Mitsuo Morihisa, Hiroshi Kawakami, Osamu Katai, Takayuki Shiose (Kyoto University) [36] gave a poster presentation on "**Educational Seminar Project 2007: Introduction to the Inventive/Creative Thinking System 'To Instruct Students How to Invent Creatively'**". This presentation is a report of a Seminar Class in an engineering department of Kyoto University. They have been teaching TRIZ to third year undergraduate engineering students for 1.5 hr x 6 since 1998. In the academic year of 2004 and 2005, training of writing patent specification was introduced. Starting fall of 2006, the seminar class was enhanced with TRIZ and with doubling of the times (1.5 hr x 12). Their Seminar schedules for the past year 2006 and for the coming year 2007 are shown in the following slide.

Step-by-step Improved Seminar Schedule

	[Step3] Year 2006 Seminar (Accomplished)		[Step4] Year 2007 Seminar (Plan)	
1	10/3	TRIZ Introduction	10/2	CREAX Software Introduction
2	10/10	Inclusive Design Exercise	10/9	TRIZ Summary Exercise (1St)
3	10/17	Invention Statement Draft Exercise (1St)	10/16	-- (2nd)
4	10/24	-- (2nd)	10/23	Inclusive Design Exercise
5	10/31	-- (3rd)	10/30	TRIZ use Patent Specification Exercise (1St)
6	11/7	-- (4th)	11/6	-- (2nd)
7	11/14	-- (5th)	11/13	-- (3rd)
8	11/21	Patent Specification Exercise (1St)	11/20	-- (4th)
9	11/28	-- (2nd)	11/27	-- (5th)
10	12/5	-- (3rd)	12/4	-- (6th)
11	12/12	-- (4th)	12/11	-- (7th)
12	12/19	Results Report Meeting	12/18	Results Report Meeting

Masanori Igoshi (Tokyo Metropolitan Univ. & ACP Study Group) [24] gave an oral presentation with the title of "**Practice of MONODUKURI Education Based on PBL by Comparison of Real and Digital Product**". First the Author explains the background of engineering education, especially from the viewpoint of MONODUKURI (a Japanese word meaning Product Design and Manufacturing):

Background of MONODUKURI Education

(MONODUKURI means Product Design and Manufacturing)

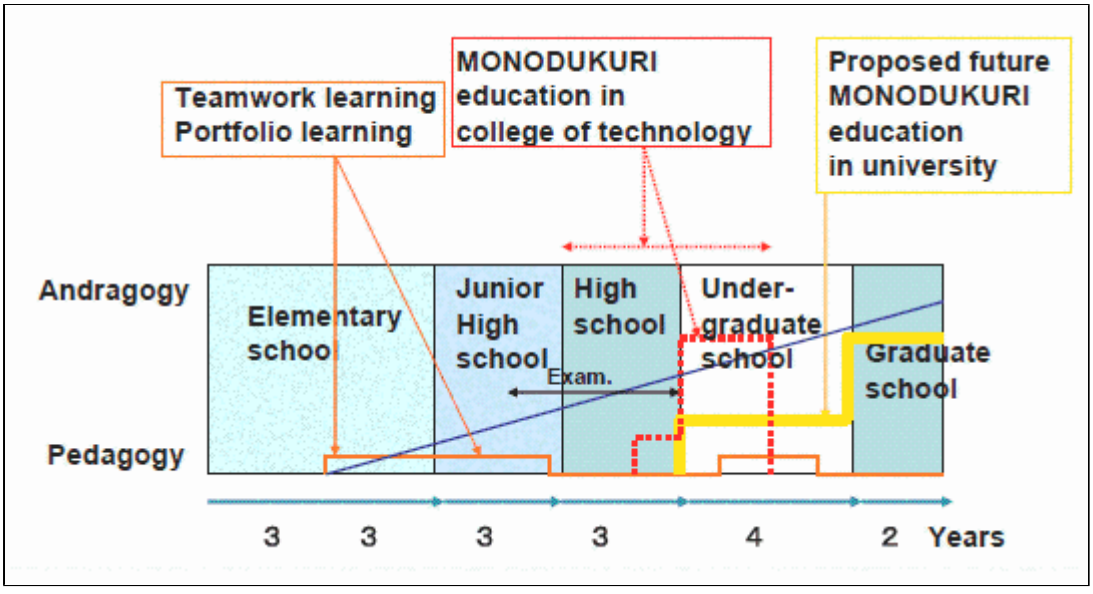
1. The youth staying off of engineering and technology field
   Diversified feeling of value and interesting matter
2. Limitation of conventional education
   Limitation to teach knowledge by teachers
3. Lack of motivation
   Lack of positioning of the curriculum
4. Ingrainedness of virtual world by IT
   Danger of non actuality-based MONODUKURI

Then he distinguishes the types of education, Pedagogy (for education for children) and Andragogy (for education for adults), as shown in the following slide:

Pedagogy (for children) ---> Andragogy (for adults)

Teach	—>	Learning support
Simultaneous teaching	—>	Individual and team learning
Result	—>	Process
Teacher responsibility	—>	Learner responsibility
Transfer knowledge	—>	Search knowledge
Isolated knowledge	—>	Widely related knowledge
Motivation by reward and punishment	—>	Motivation by inner interest
Hierarchical society	—>	Flat society
Evaluation by teacher	—>	Self evaluation

The Author worries about the current situation of education in Japan, which is depicted in the following figure showing the ratio of Andragogy vs. Pedagogy. The current education in Japan is very poor in Andragogy type education, shown with the thin orange curve, except for special cases of college of technology (i.e. Kogyo Koto Senmon Gakko), as shown with a broken orange curve. The Author advocates to increase the Andragogy type education in the MONODUKURI education in universities as shown in the thick yellow curve.



Thus the Author started the PBL (Project Based Learning) type education in the Tokyo Metropolitan University in the following classes. The present paper reports the "CAD Exercise Class" for the 3rd grade

students.

1. Undergraduate School
   Mechanical Engineering Department
   "Design Project" (2nd Grade)

   Precision Engineering Department
   "Creation Project" (2nd Grade)
   environmental issues, Venture Industry, Robot・・
   "CAD Exercise (This Report, 3rd Grade)
   Comparison of Real and Digital in Product Design and Making (MONODUKURI) Process

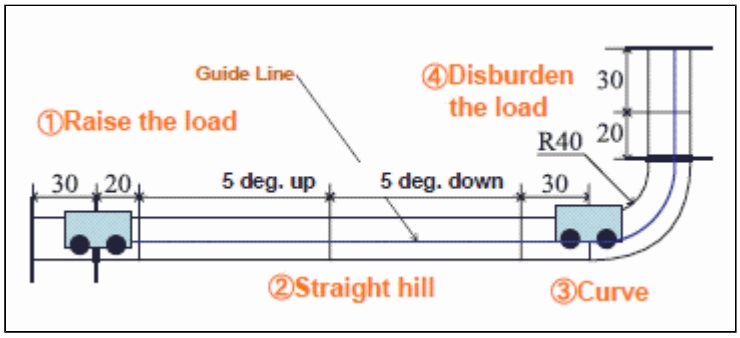
2. Graduate School
   Mechanical Engineering Department
   Advanced Design Engineering (QFD, TRIZ/USIT,etc)
   Advanced CAD/CAM (Digital Product Development)

The subjects in the class are three fold as shown in the following slide. The students are requested to build a model of crane car with LEGO parts alone and to drive it along the course shown in the slide below.

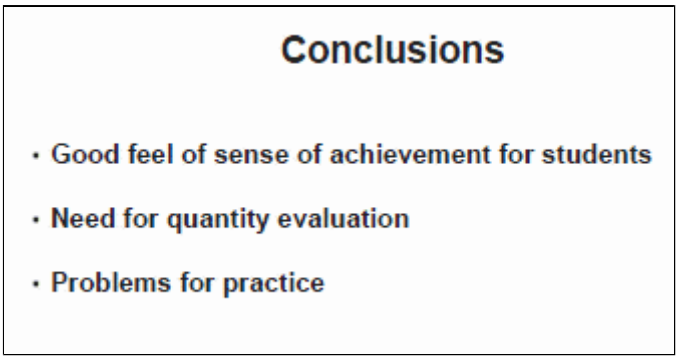
1. Preliminary Subject:
   Brief "crane car model" by LEGO parts only and GUI-Program
   Up and down arm, Straight course by 3 m
   (4 weeks: 3 hours/week)

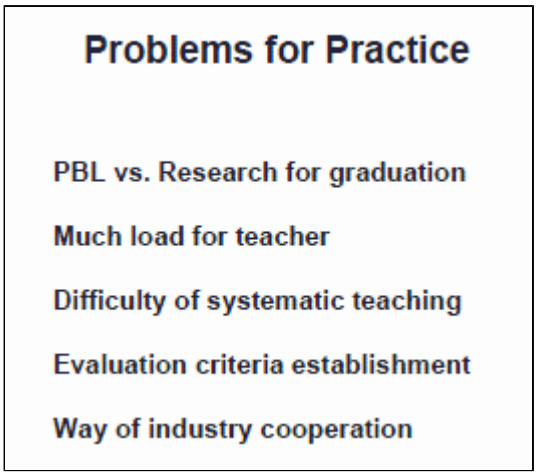
2. Main Subject 1 (Design): Design a Crane Car Model
   Comparison of hand work and CAX tool
   Maximize performance, Environment consideration,
   From brief to detailed model, Use of engineering science subjects,
   Use of wooden board, etc. (5 weeks)

3. Main Subject 2 (Manufacturing): Make and Modify the Crane Car Model
   Comparison of real and digital model
   Consideration of actuality and virtuality (4 weeks)



I do not have enough space here to describe the students' works. The Author's conclusions and problems for practice are shown in the two slides as follows:



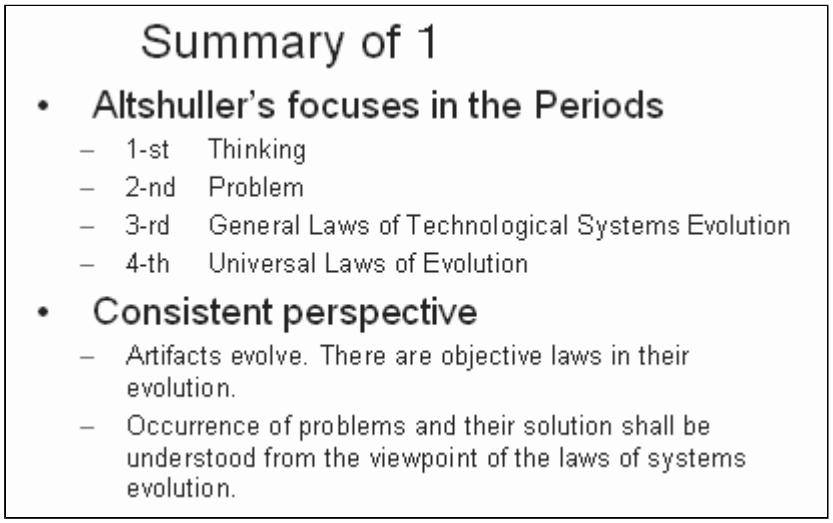


8. Methodologies in TRIZ

Shinsuke Kurosawa (The SANNO Institute of Management) [12] gave an oral presentation on "**Methodological Background of Effectiveness of TRIZ**". The Author is specially talented in the Russian language and reads Altshuller's texts in Russian. I would like to quote his Abstract here:

> If TRIZ has a unique effectiveness which all preceding methods lacked, there should be causes that result in the effectiveness. From a viewpoint of a practitioner that thinks it impossible to deny positive effect of TRIZ on problem solving, the paper tries to clarify the methodological background of the effect. It first defies [defines ?] TRIZ on the basis of an essay which Altshuller wrote in 1975. Secondly, it discusses TRIZ's methodological uniqueness in comparison with the natural sciences, the engineering, the economics and the psychology. Lastly, in order to find the interrelationship between the methodological uniqueness and the effect, it attempts to analyze the meanings of basic TRIZ concepts such as Technological System, Evolution, Ideality, Substance-Field Resources and Conflicts.

The essay he referred to is (according to his Extended Abstract): "Contemporary Situation of TRIZ" written in 1975 by G.S. Altshuller and G.L.Filkovskiy. The essay specifies four periods of development of TRIZ: 1st period 1946-1948, 2nd period 1949-1964, 3rd period 1964 - (1975) -, 4th period (1974) - . The Author, S. Kurosawa, gives a summary of this essay in the following slide:



Then he goes on to compare the uniqueness of TRIZ with other disciplines. The Part 2 of his paper may be summarized in his two slides shown below:

② Methodological Features of TRIZ

A) Objects of the Study

- (Artificial) Functional Systems
- = Structure of Means that realize significance for people
- = Interface between People and Artifacts

B) Purpose of the Study

- Discovery of Laws of Evolution of Artificial Systems and Development of their application
- Elucidation of the mechanisms of the Evolution

Systems and Functions

- in TRIZ
  - Systems are not mere Objective Matters (as in natural sciences) but they are Systems of Functions.
  - Functions are real nature of Objective Matters through which they have significance for men (human community) as Tools in their broadest sense.
  - Systems are sets of functions that constitute pieces of tool-links in the hierarchical entity where the ultimate aim is something like "happiness of an individual or welfare of a community"

Then in Part 3 the Author starts to discuss the background of the Effectiveness of TRIZ. I will quote his first two slides.

③ Background of the Effectiveness

(1) Essential approach to Problems

- TRIZ
  - In the hierarchical structure of functions, Problems are:
    - Absence of UF, Inadequate UF, Existence of HF
    - Occurrence of Conflicts
- Other learning
  - Differences between desirable and existing situations
    - Objective definition of Problems that fails to grasp their true nature
    - Lack of the Concept of Ideality that indicates the hierarchical structure of functions

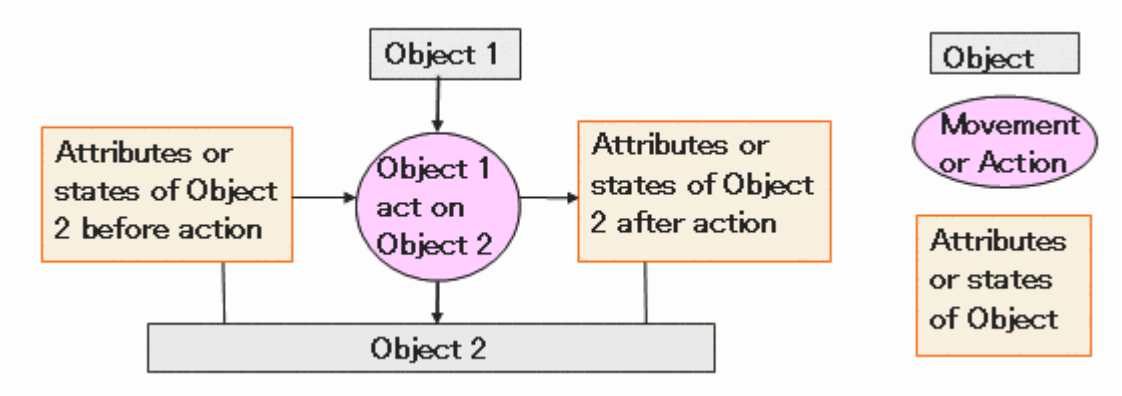
(2) Problems are solved in the same domain as they develop

- TRIZ
  - Problems are solved as interrelationships of functions
  - Problems are solved by giving meanings to resources that come across in the functional domain
- Other learning
  - Efficient problem solving can not be effected through efforts to change interrelationships between objective matters, because problems do not develop there. Only existing method is try and error.
  - Therefore, problems are solved only by chance (Creativity, Serendipity and etc.) if not through try and error "method".

*** As you see the Author's description is deep and philosophical. Even though I think it worthy of introducing you several more slides, I will stop here. I really wish the Author write these presentation slides into a full paper and publish it in the very near future.

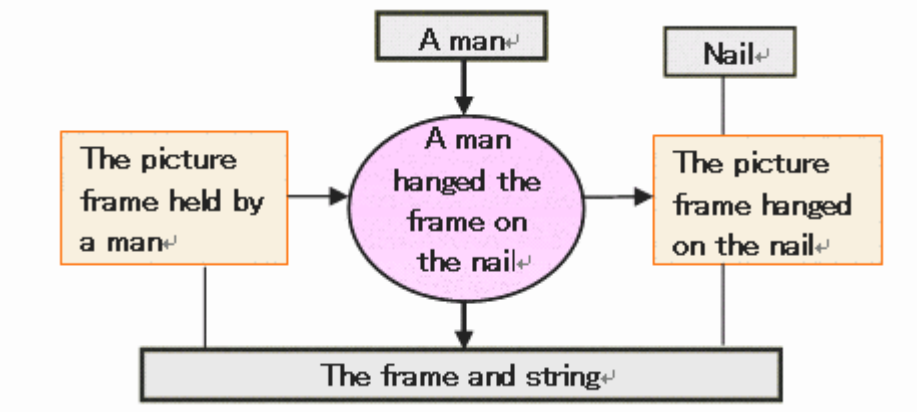
Toshio Takahara [18] gave a poster presentation on "**A Method of Resolving Differences Based on the Concepts of Functions and Process Objects: Part 2**". The Author served, with me, for translating the Larry Ball's Course Material "Hierarchical TRIZ Algorithms" Jap. The present paper is highly theoretical, but fortunately the Authors' intention and logic can be read in English in his full paper published in the Proceedings. As shown in the title, this paper is an extension of his paper presented last year in the Second TRIZ Symposium. His way of representing cause-effect diagrams have become clearer and are now understandable for me.

The basic unit of Cause-Effect Diagram (i.e. a representation of Objects-Attributes-Functions relationship in an ordinary sense) is shown in the following figure. This figure expresses that Object 1 acts on Object 2 and hence the Attributes or states of Object 2 before the action changes into those after the action.

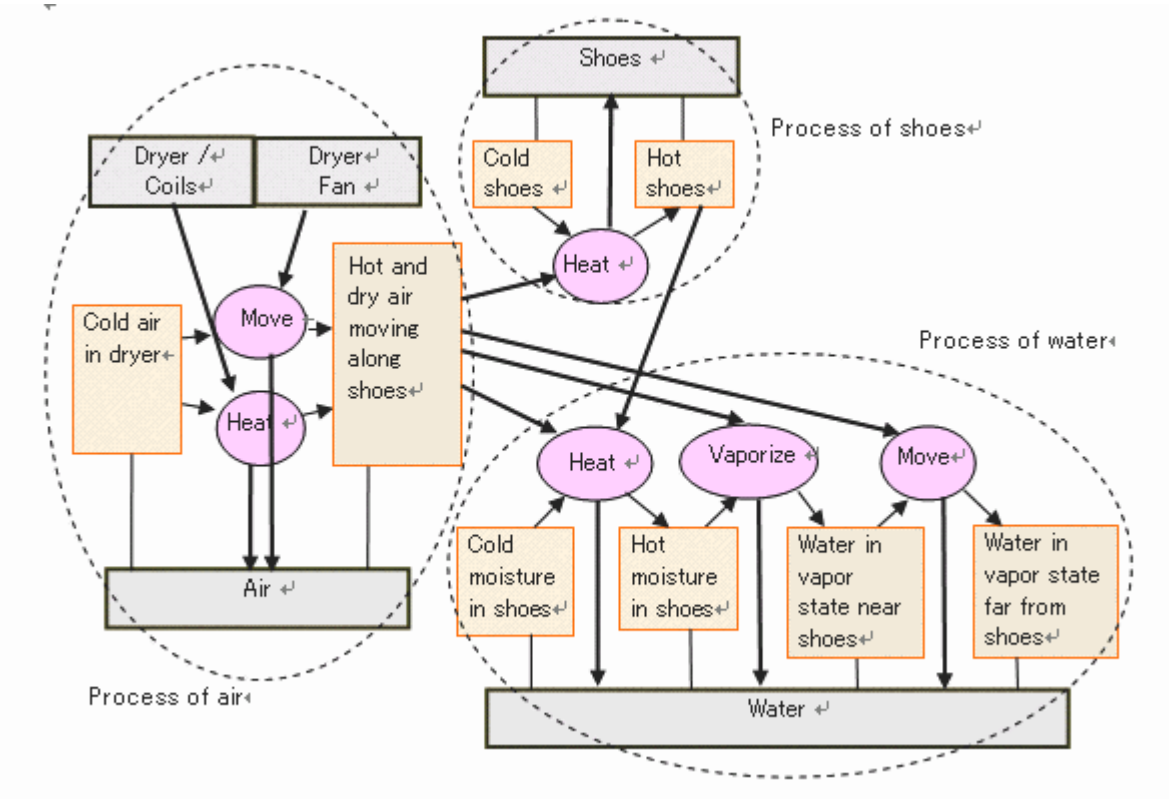


The Author tries to express all these relationships as general and uniform as possible, so as to include, for example, concept of time change, space change, etc. Thus he classifies the properties of an Object into Attributes, whose values are not apt to change, and States, whose values are apt to change. The Author also includes Actions and Movements together in his concept of 'Process'. With these introduction you may probably understand the following three examples of Cause-Effect Diagram smoothly without much explanation.

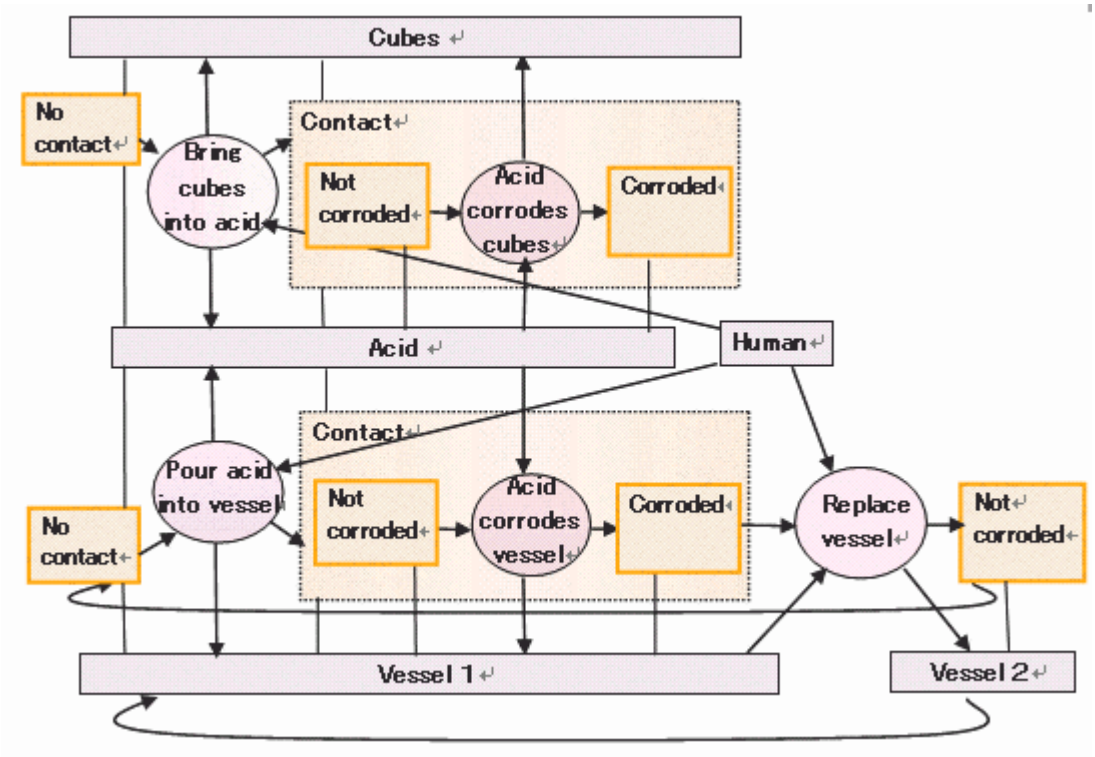
An example of Cause-Effect Diagram for the action of a man hanging a picture frame on the nail with a string:



Another example of Cause-Effect Diagram for Shoes Dryer. The hot and dry air generated in the Dryer heats the shoes, and the hot shoes heat the water moisture of the shoes, vaporize it, and move it far from the shoes. As shown with the broken circles, the Author recognizes the higher level (or larger granularity) of processes; namely process of air, process of shoes, and process of water.



Here is another example of Cause-Effect Diagram for the case of corrosion of cubes with acid in a vessel, and the vessel is also corroded with the acid and need to be replaced from time to time. You may notice here that 'Human' is also included in this diagram for his actions to bring cubes into the acid, to pour the acid into the vessel, and to replace the vessel. Anyway by watching this diagram closely you may understand various relationships of the Objects, their properties, and processes.

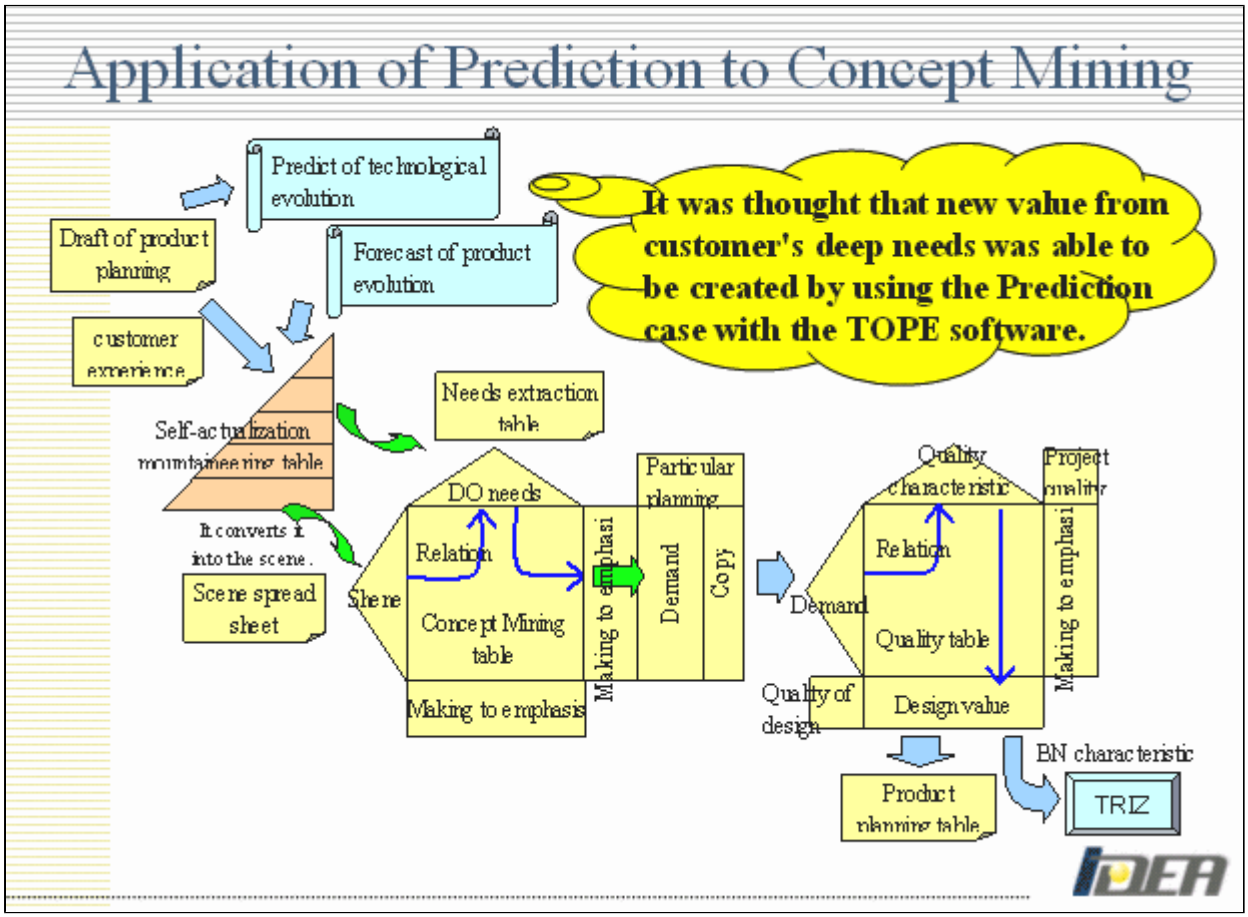


The description here shows just the beginning of the Author's paper. He goes on and on introducing various concepts, such as 4 types of operating Object by person, 3 principles of Object transformation, etc. Then he wants to discuss general structures of 'Resolving Differences'. I will skip all these theories here, because I cannot follow his logic well yet partly because no concrete examples are shown in the paper.

*** Reading the Author's papers in our Symposia 2005, 2006, and 2007, I now understand his intention partly as shown here. With the examples shown above, the Author uses the term of 'Process Object'

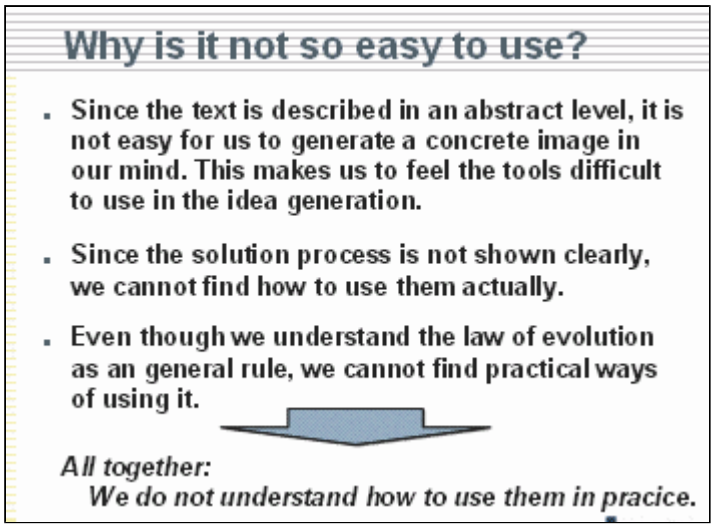
instead of 'Process'; I still don't see the necessity of this terminology, because the Author always represent Objects (or 'System Object' in the Author's terminology) with rectangles and Processes (or 'Process Object') with ovals. Calling just Objects and Processes may be easier to understand. Anyway, I am happy to invite this paper to publish in "TRIZ Home Page in Japan". [(Nov. 14, 2007) The full paper will be posted in English and in Japanese.]

Yoshiharu Isaka (IDEA Co., Ltd) [32] gave a poster presentation on "**Application of TRIZ Technology Evolution to Concept Mining －For the Blue Ocean Creation－**". The phase of product development discussed in this presentation may be seen from the slide:

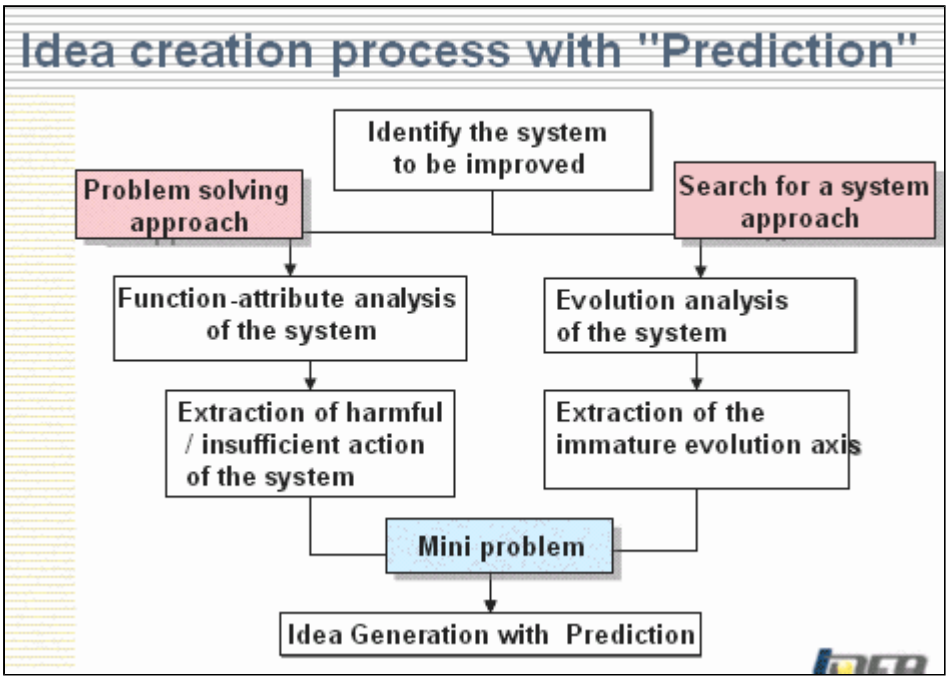


The Author shows many detailed diagrams and tables in this poster presentation. Since they are too much detailed I will not show them here. I will also skip the Author's conclusion slide, because the translation is poor, unfortunately.

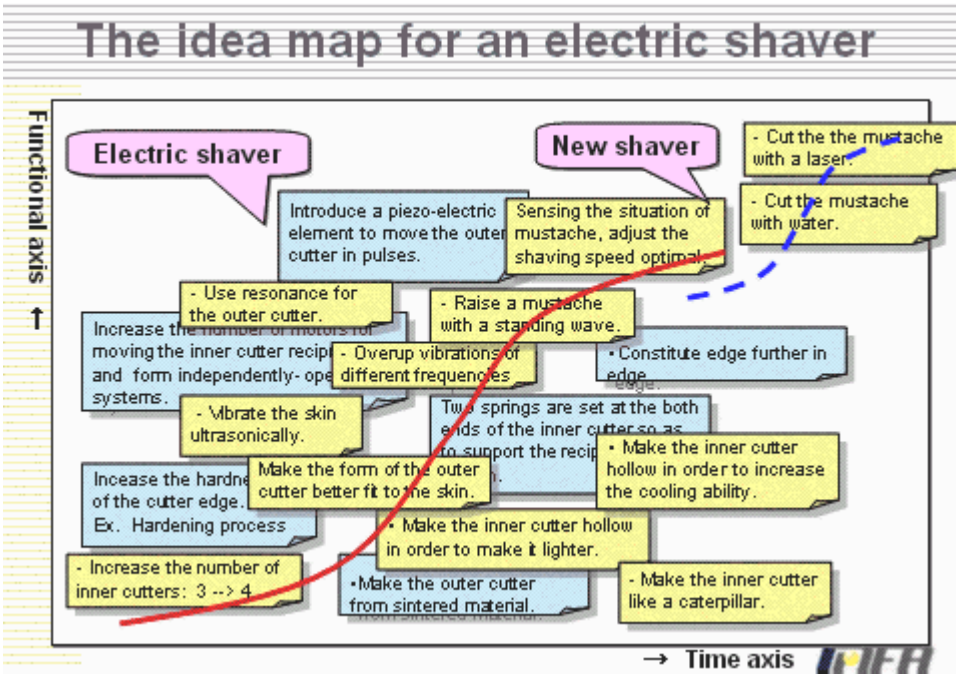
Masahiro Kuwahara (IDEA Co., Ltd) [38] gave an oral presentation on "**Conception Method of the Next Generation System by Law of Engineering System Evolution ('Prediction' Module)**". The Author is one of most active consultants in TRIZ in Japan. The Author's intention in the present paper is to respond to a common situation of TRIZ users (especially in using the 'Prediction Module' of IMC's software tool):



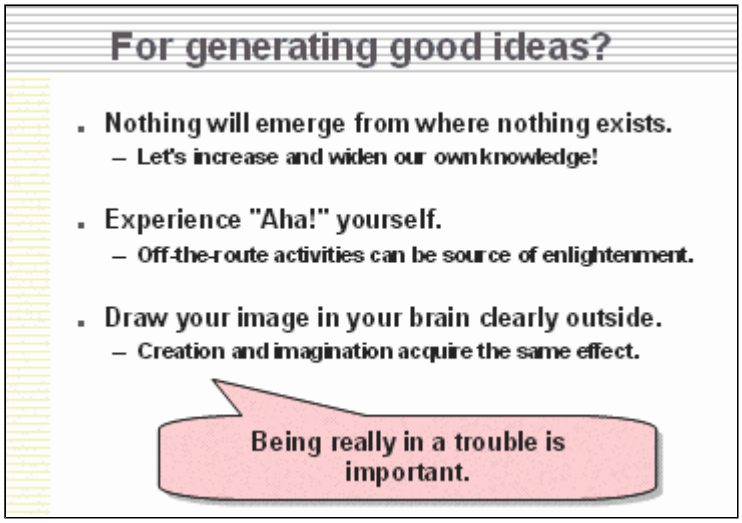
The outline of the usage is shown in the following figure.

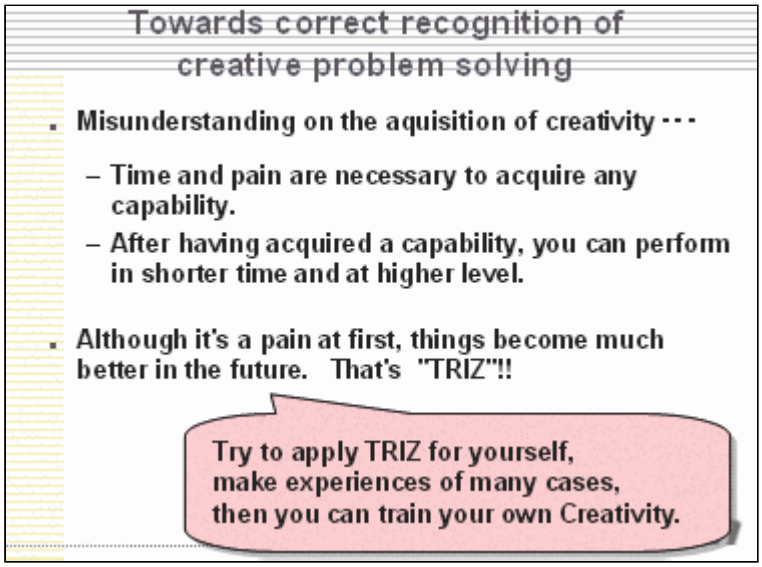


The Author demonstrates the detailed process and its key points of using the software module with the example of an electric shaver. Since the contents of his demonstration are long and more or less known standard, I would like to skip them. At the end of the idea generation process, the Author advises to build up a (rough) load map of the ideas obtained, as shown in the following slide:



The following two slides shown at the end of his presentation are worthy of citing here as the key point advices from an experienced consultant in TRIZ:





Nobuhide Matsuda (Matsushita Electric Industrial Co.) , Makoto Unno (Kawasaki Heavy Industries), Kazuyasu Ikeda (Sekisui Engineering Co.), et al. [30] gave an oral presentation, standing for TRIZ

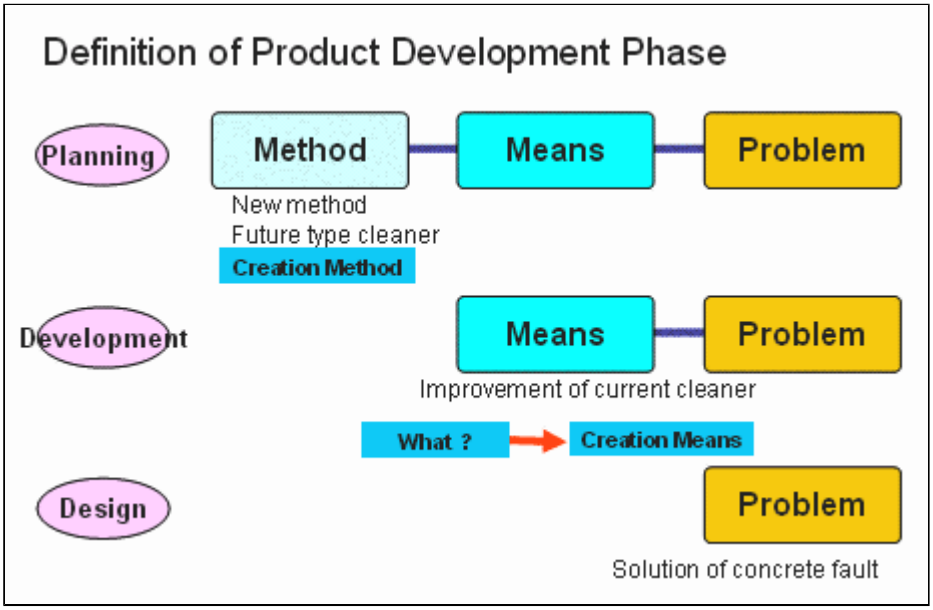
Spread/Practical Use Study Group of Japanese VE Association Kansai Branch. Their topic was "**Study of the Development-types TRIZ**". This Study Group is very unique. First I will quote the first half of their Abstract:

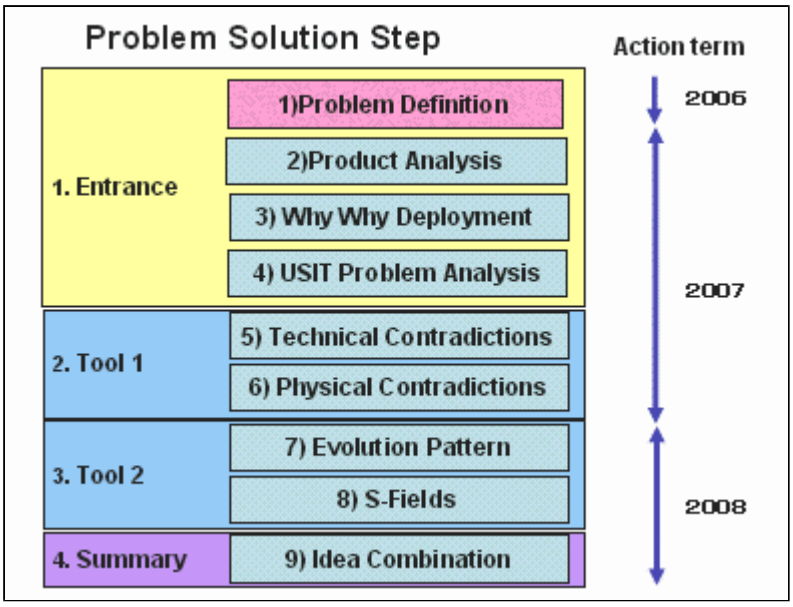
> In Japan VE Association's Kansai Branch, we got interested in the TRIZ technique as a new means of value-adding creation within the VE procedure. Thus in 2003 we established "TRIZ Spreading/Use Study Group". With the aim at studying and penetrating the integrated use of VE and TRIZ, we have examined to perform various kinds of individual TRIZ tools. Starting in 2006, we have launched a case study project for the purpose of establishing and improving an efficient and integrated problem-solving procedure.

Japan VE Association (formally: 'Society of Japanese Value Engineering') has four Branches, representing the zones of Eastern Japan (in cluding Tokyo), Central Japan (including Nagoya), Kansai (including Osaka), and Western Japan. In the Kansai Branch, the Authors and some more VE people got interested in TRIZ and formed this Study Group as one of the special interest groups, authorized by the Branch. The group is now working very actively. They have 21 members coming from 14 different companies (including JR West, Honda, Mazda, Nitto EW, Matsushita EW, etc.). They hold regular monthly meetings at the members' sites by turn; thus visits and tours in other companies and then giving lectures by turn and making joint practices are their usual activities. -- Now we should go ahead to the latter half of their Abstract:

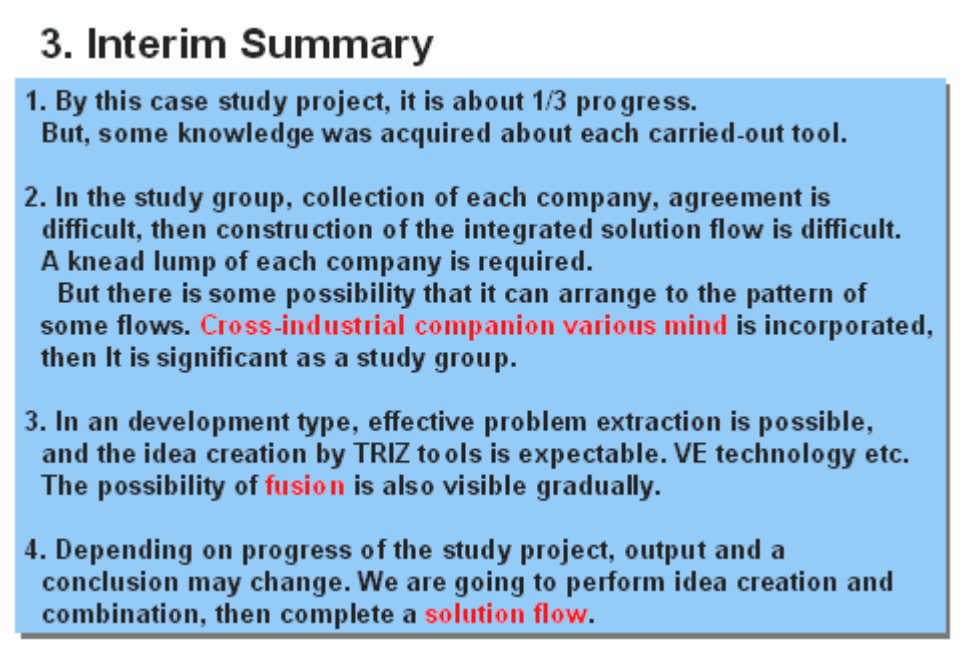
> Product development generally involves three steps, i.e., product planning, development, and design. TRIZ has been recognized mostly as a problem-solving tool and to be effective for applying in the product design phase. Whereas manufacturer users want to apply it to the phases of product planning for new value-adding creation and of product development. Thus we have examined to apply TRIZ to the technical development phase, especially to try to construct an effective application flow in the development phase and to clarify the features of individual TRIZ tools. The Study Group is working under a three-year plan, from 2006 to 2008, with two main steps, i.e., problem analysis and idea creation. In the presentation, we will give an interim report of our progress in the first step, namely the problem analysis.

The following two figures are useful to understand some more about what the group is planning to do:





We do not have enough space here to introduce you the actual example diagrams they built in their joint practice on the case study project with the subject of 'Develop a next-year model of domestic vacuum cleaner'. The group has just finished the 4th step shown above. The interim summary may be seen in the final slide of their presentation as shown below (unfortunately the English translation is not so good, but you can probably understand the Authors' intension):



*** As shown in the Interim Summary, it may be difficult for the study group to set up a common/standard procedure of members consensus. Communications and exchange of experiences among the members may be most useful in this study group. -- We have invited a member of the office of Japan VE Society to our Symposium. He has kindly reported on our TRIZ Symposium in the VE Letter, and their Web site. This kind of report is valuable for TRIZ to be introduced to a wider range of people.

Rikie Ishii (Dunamis Co., Ltd./ NEDO), Toshinori Ito (Industrial Technology Institute, Miyagi Prefectural Government) [37] gave an interesting poster presentation with the title of "**Challenge to TRIZ User Increase: Original Tool Development of Miyagi TRIZ Society**". This presentation was done as the report of the activities of 'Miyagi TRIZ Society'. Miyagi Prefecture is one of the 47 prefectural units in Japan, located in the northern part of Honshu with its prefectural capital Sendai City. The two young authors are collaborating actively to promote innovations in the area. Rikie Ishii has spun off a company and is now working as a NEDO fellow (i.e., persons receiving a fellowship from the governmental organization NEDO (= New Energy and Industrial Technology Development Organization) Engl and working for promoting innovative activities) in a small venture company, Dunamis Co. He and Toshinori Ito, an

official of the prefectural institute, established a study group 'Miyagi TRIZ Society' for penetrating innovation methods especially TRIZ into local industries. They call their group 'Mi-TRIZ' in short, which sounds like a Japanese word 'MITORIZU' meaning a design plan or a map. I will cite their Abstract slide first:

> After a TRIZ seminar, we have found that the seminar participants have met difficulties in explaining their fellows how TRIZ promote the idea creation work.
>
> Thus, we started to develop a tool which can be used to generate creative ideas in an easy and pleasant manner, just like playing a card game. We will report the contents of the tool and its effects.

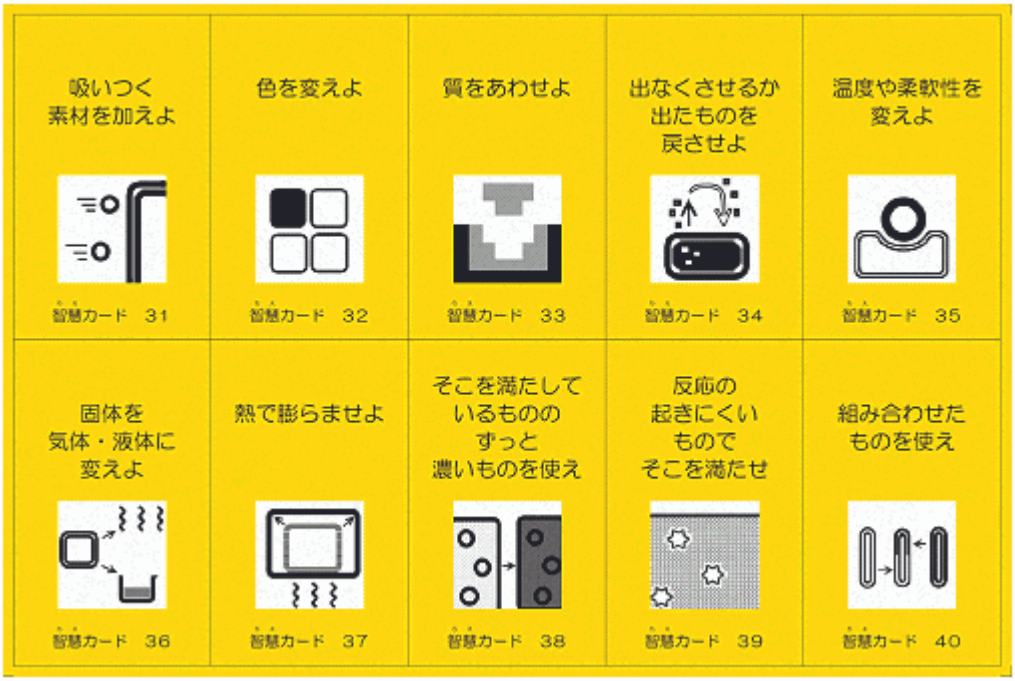
The Authors tried to make the TRIZ 40 Inventive Principles into 40 small cards easy to understand and stimulative to generate new ideas for ordinary engineers. They have made the 40 cards as follows, with the name of 'Wisdom Cards'. The cards are not translated into English yet. So I will show you my translation at the right column in order to convey the flavor of these cards to you.

1. Divide it.
2. Separate it.
3. Change a part of it.
4. Make it unbalanced.
5. Join the two.

6. Make it useful for others.
7. Put it inside.
8. Make it balanced.
9. Step back before you go.
10. Expect and prepare beforehand.

31. Introduce something adhesive.
32. Change the color.
33. Match the qualities.
34. Stop getting out or put it back.
35. Change the temperature, flexibility, etc.

36. Change a solid into a gas or a liquid.



37. Expand it with heat.
38. Use more concentrated one.
39. Fill the space with a non-reactive thing.
40. Use something combined.

The Authors suggests three ways of using the Wisdom Cards:

(a) Using the Wisdom Cards personally: With a problem to solve in mind, turn to see the Card one by one (maybe for 10 seconds per Card) and try to find a solution(s) inspired with the Card.

(b) Using in a Group for solving a problem: Distribute all the Wisdom Cards to the group members (2 to 8 members). Members think of ideas seeing the Cards for 3 minutes, and write them down in Post-it Notes. Then the members explain his/her ideas (up to 3) for 1 minute by turn, showing the stimulating Wisdom Card. Other members, if inspired, should write down the ideas in the Post-it Notes. Such derivative ideas should be explained at an early timing, not necessarily keeping the turn.

(c) Use in a Group as a game for solving a practice problem: Set a theme of problem first. Put all the Wisdom Cards with face down at the center of the table. One of the members takes the top Card, reads it aloud, and tries to think of a solution idea inspired with the Card. If he/she can tell an idea in 30 seconds, the Card is put in his/her stack; if not, the Card has to be put back at the center. Then the next member takes the next Card, by turn. In 20 minutes the game ends. The member who has obtained the largest number of Cards wins the game.

The Authors have used the Wisdom Cards in various opportunities and have got nice and encouraging results. People often say that generating ideas in this manner was hard but very interesting, the Authors write.

*** This tool of Wisdom Cards is simple and cheap but very interesting. The trials made by the Mi-TRIZ are encouraging much new trials in companies, schools, and voluntary groups.

Takeo Higuchi (Idea Marathon Institute) [7] gave an oral presentation with the title of " **'Idea Marathon Method' for Underlying TRIZ with Everyday-Thinking Habits**". The Idea Marathon Method originally developed by the Author since 1984 is a very simple yet very powerful method. It just advises you to write your ideas EVERYDAY as long as possible in a small notebook. In February 2006 I listened the Author's presentation at a symposium and much impressed. So I invited him at our TRIZ Symposium (but not in the form of Invited Talk, sorry for the Author). 20+ years ago the Author was a businessman for a general trading company for sales in Saudi Arabia. For his sales work he needed various new ideas and he started writing down such ideas he got in mind every day, and he has built up his own way, now named the Idea Marathon Method (or IMS).

The basic action is as simple as shown in the first slide, and the way of using notebook is written in the second slide.

What is Idea-Marathon?

Basic Action

1. Think of something original daily & get Ideas
2. Write the ideas into notebooks
3. Draw pictures
4. Talk to your neighbors

How you write your notebooks

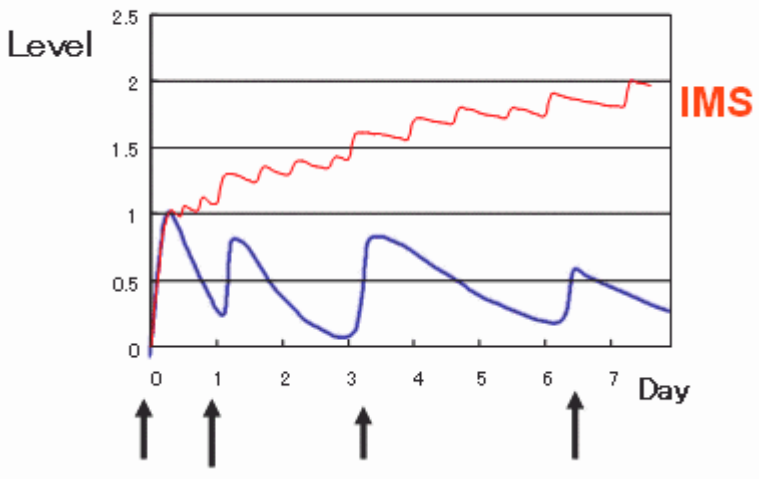
1. A5 size is the best.
2. Do not write in many notebooks.
3. Write ideas timewise
4. Don't skip pages nor leave any blank page.
5. Don't make sections among one notebook.
6. Date at Top Left & Page#s at Top Right

The concept of IMS is to keep the brain always active, as shown in the following slide. This concept is depicted with the model of the Motivation Curve, where big but few stimuli are not good enough to accumulate while small but many stimuli (in IMS) are well accumulated to reach a higher level of motivation.

IMS Concept

1. Keep your brain always in thinking mode
2. Create bud ideas and write them down.
3. Notebooks are your brains external memory
4. Let PC support your brain and notebooks

Motivation Curve



It is important to write at least one idea every day. The continuation becomes the habit and confidence in the following way:

Turning points of IMS

1. 3 days Must survive
2. 3 weeks Starting to feel confidence.
3. 3 months Stabilizing thinking custom in the work and life
4. 6 months Custom of Continuity

The Author has been continuing this method for 23 years, and has achieved 269,550 ideas by Aug. 15, 2007, with current rate of 50 ideas per day. He has been promoting this method with many people in companies, universities, and schools in Japan and many more people in other countries. If IMS is started in a group or in company-wide scale, usually occur no drop-out people, he says.

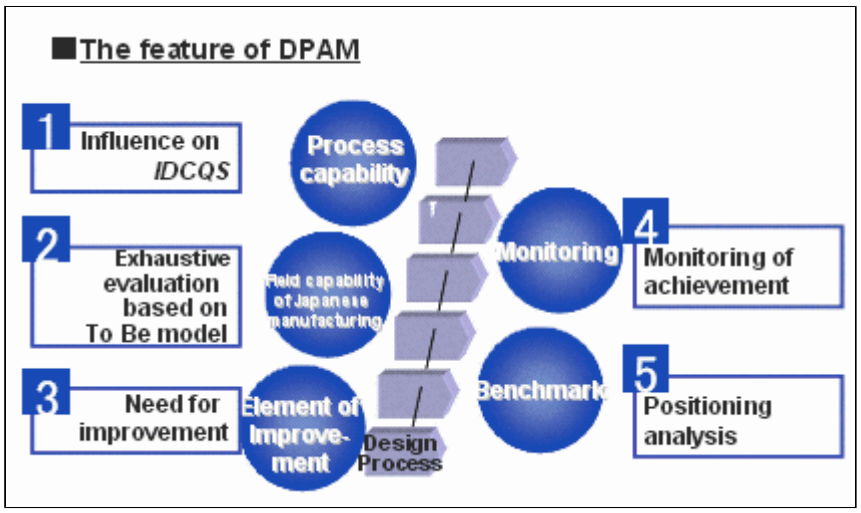
Thus, the Author advises all of us to try this. IMS will be a good training for using your brain everyday and for keeping your brain highly motivated and activated. Thus IMS training can be a good basis for TRIZ training.

*** The achievement of IMS is really wonderful. [You may visit IMS Web site in English Engl and in Japanese Jap.] Probably I should start this together with my students. ... (I have not started IMS-style notebook yet, but currently "TRIZ Home Page in Japan" is my way of notebook.)

Kunichika Fukuoka (Fujitsu), representing the DPAM Study Group, gave a poster presentation on "**DPAM (Design Process Assessment and Improvement Model)**". I will quote their Abstract here.

> In recent years, the Japanese manufacturing companies is facing fierce competition of product innovation. As a result, those companies are required to enhance their competitiveness by addressing the requirements of customers through agile development, cost-cutting effort. In addition, the high-tech products such as cell phone and digital appliance have become multi functional and complex design. Therefore it is imperative for Japanese manufacturing companies to establish the design process which has strong cooperation in a wide range of technology, machinery, electric technology and software (embedded software). The design process index standardization group of JEITA Standardization Committee has started to examine DPAM (Design Process Assessment and Improvement Model) in 2005. DPAM is the design process assessment model which is taking unique design process of Japanese manufacturing companies into account.
> This presentation shows the basic concept of DPAM and the activities of the DPAM working group.

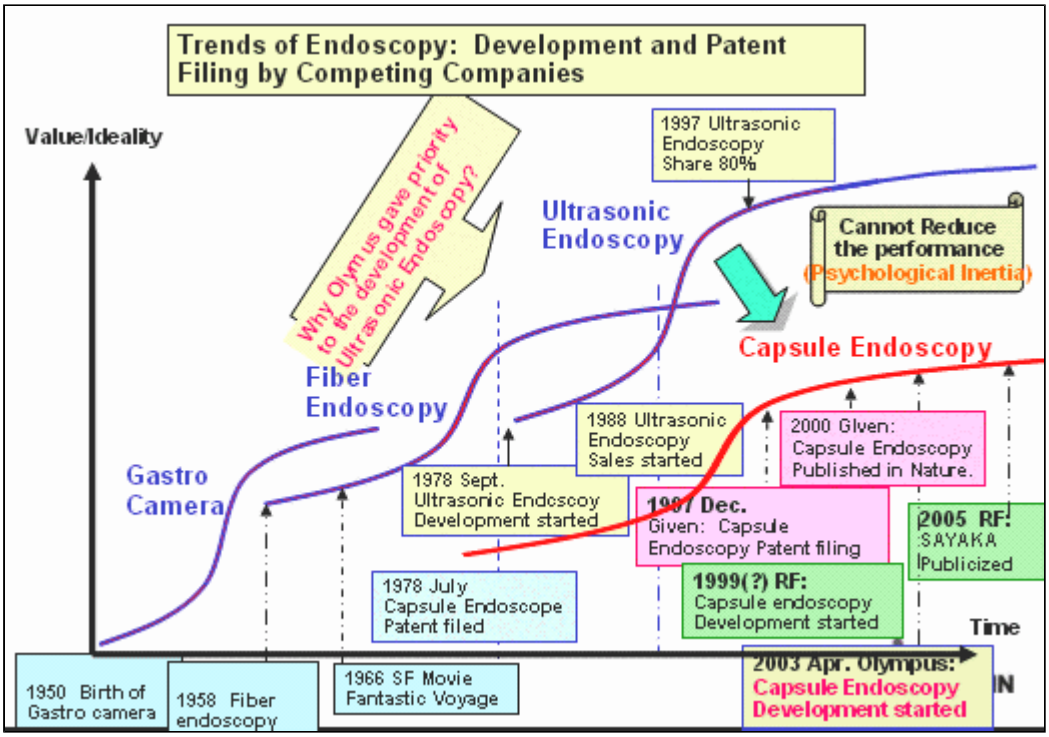
The following slide is a summary of the features of DPAM. The project has published a detailed document, but sorry we cannot reproduce them here.



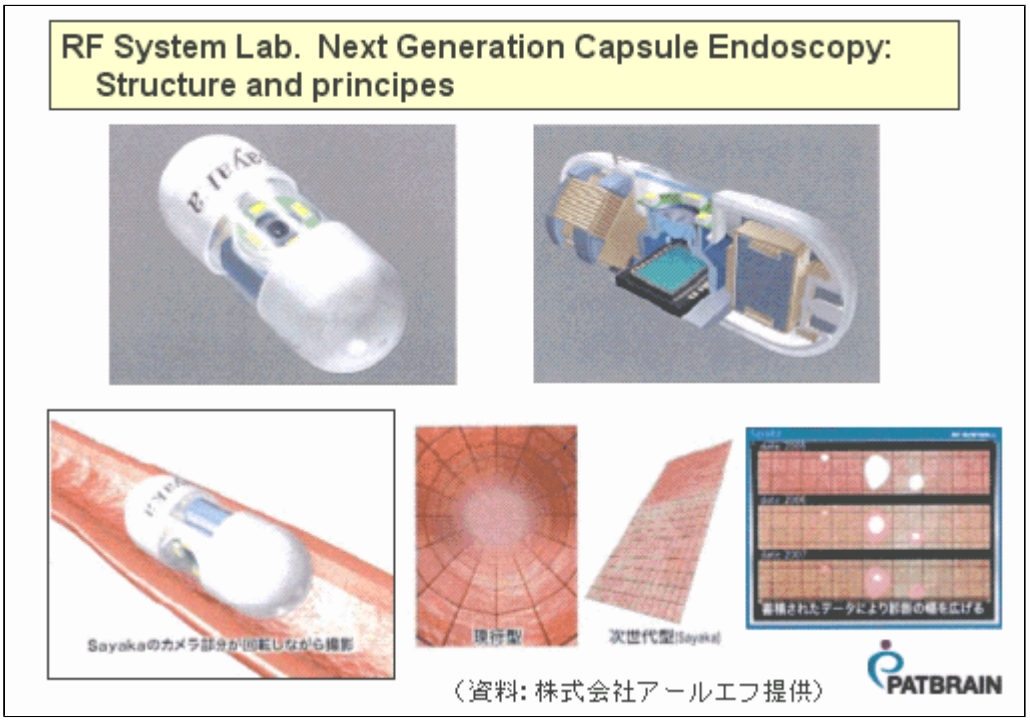
Yuichi Furukawa [33] gave an poster presentation on "**Impressions of TRIZ**". The presentation was an brief essay on his activities in TRIZ.

9. Patent Studies

Toshimitsu Kataoka (Patbrain Corporation) [26] gave an oral presentation on "**Intellectual-Property Strategies for Capsule Endoscopy — Review with TRIZ —**". This is a kind of review paper on the IP strategies in the case of capsule endoscopes, i.e. to a small cell-type medical equipment for inspecting/surveying inside the human bowels. I will show you first the results of his review summarized in the form of the S-Curves:



As shown in the map, there are three main players: Olympus (Japan) with basic capsule endoscope patent filed in 1978; Given Imaging (Israel) with capsule endoscopy patent filed in 1997; and RF Co. (Japan) starting the development around 1999 and publicized its model in 2005. The next-generation type 'Sayaka' publicized by RF is shown in the following slide (source by RF Co.):



In the capsule the camera is equipped in the direction vertical to the capsule axis (i.e. the direction of migration of the cell) and takes 30 photos every second while rotating around the cell axis. The electric power is provided from outside the body and the images are sent to the computer to generate the detailed map of the bowel wall in the form shown at the bottom-right.

The progress in these capsule endoscopy was reviewed from the TRIZ views, especially in terms of the technical contradictions and the Inventive Principles. The following table shows the summary:

Reviewing Capsule Endoscopy from the TRIZ Views : Technical Contradiction

Problems in Endoscopy	Focus of Conventional Develoment	Essential component technologies	TRIZ Views: Technical Contradiction ==> (Inventive Principles)
Client's pains at the time of insertion	thinner tube (almost mature)	Make the insertion part wireless	Volume (moving) vs Reliability => (Curvature, Segmentation, Composite Material, Prior protection)
Client's pains while observation/diagnosis	Improving the bending operability	IC technology (minimization)	Volume (moving) vs Detection/measurment => (Hydraulic, Mechanism substitution, Asymmetry)
Information necessary for assisting the operator	Detecting the inserted position	Power supply	Energy loss (moving) vs volume (movng) =>(Parameter change, The other way round, vibraion)
	Inserting to deeper places	Driving control	Duration of time (moving) vs Energy loss (moving) =>(Mechanism substitution, Universality, Parameter change, mechanical vibration)
		Image transmisson	Luminosity vs volume (moving) => (Taking out, The other way round, Prior action)

The Author concluded as follows:

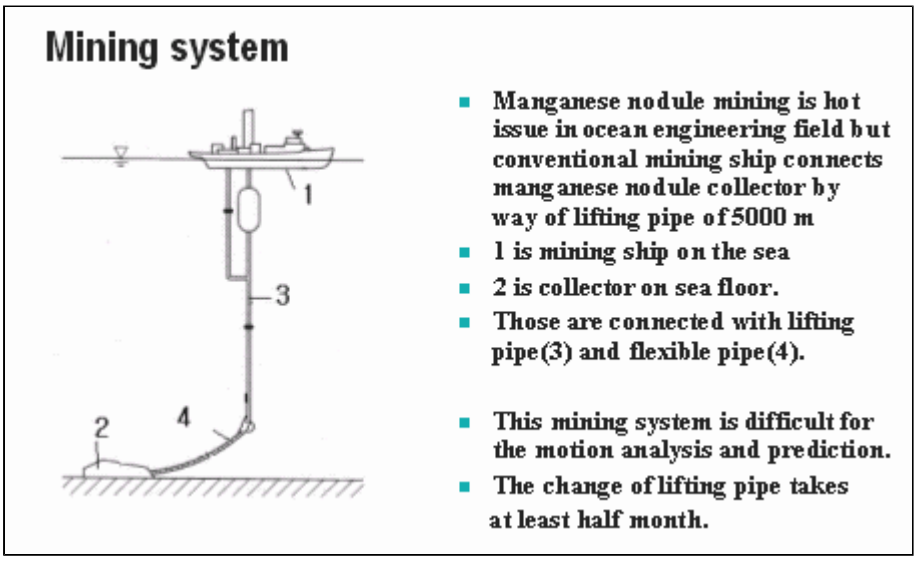
Conclusion

- Innovation can emerge from the view points of ordinary people.
- Patent analysis and proactive use of TRIZ enhance idea generation and make strong patents obtainable.
- Key point of IP strategy is claims.
- Use IFR to examine IP, management, and technology strategies.
- Champions of destructive innovation are oriented to publicizing and putting things in the public domain.
- New IP Strategies: Use of copyrighs and use of Act Against Unfair Competition

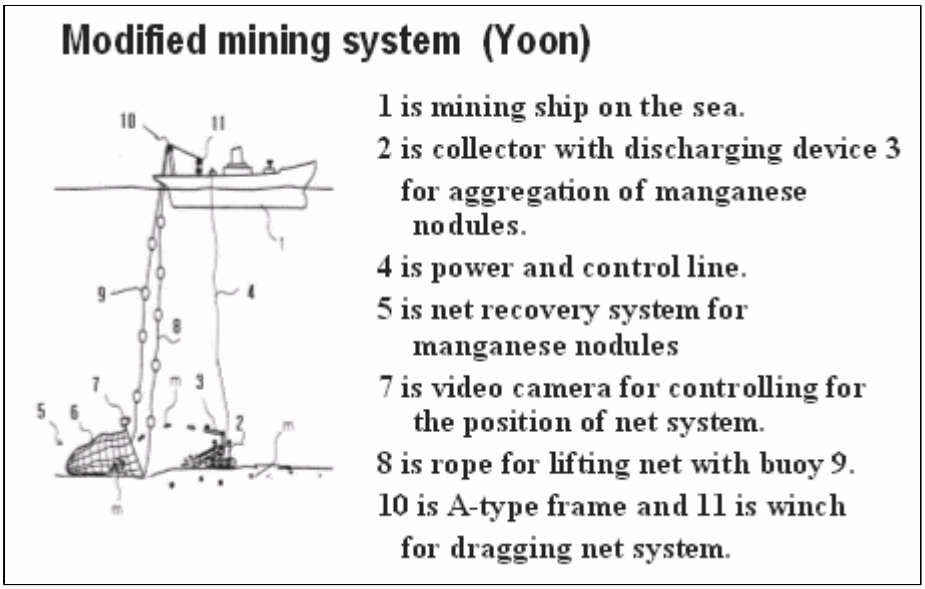
Gil Su Yoon (Pukyong National Univ., Korea), Haruo Kodama (National Institute of Multimedia Education), Young Won Park (University of Tokyo) [27] gave an oral presentation with the title of "**How to Apply TRIZ to the e-Learning from Invent, Patent to IP for SME**". I would like to quote the Authors' Abstract:

This paper suggested a method how to apply TRIZ to the e-learning for invent, patent and IP for small and medium enterprises. We reviewed briefly e-learning cyber universities in Korea at first. Secondly we presented an example of how we modified the lifting method of manganese nodules with TRIZ and ASIT. Thirdly we discussed how to apply the Korean patent with the experience of the process of PCT. It is important to teach from invention to IP for SME for our next generations and we propose a simple training method by way of e-learning education.

The problem of lifting manganese nodules from the ocean bottom is shown in the following slide, illustrated with the currently known method:



The Author, G.S. Yoon, applied TRIZ and ASIT (Advanced Systematic Inventive Thinking) to obtain the following solution and filed a patent.



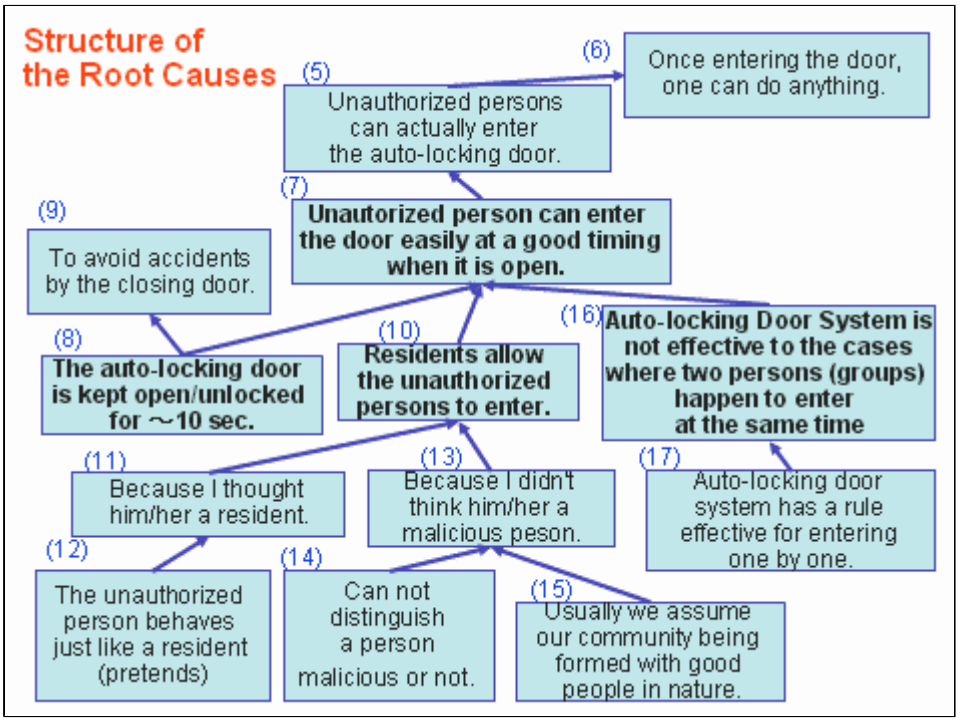
10. Applications to Non-technical Areas

Toru Nakagawa and Arata Fujita (Osaka Gakuin University) [23] gave an oral presentation with the title of "**How to Prevent Unauthorized Persons from Entering the Auto-locking Door of Apartment Building: Applying TRIZ/ USIT to A Social & Technical Problem**". This is an extension of the thesis work of my student Arata Fujita. I will quote the Abstract here:

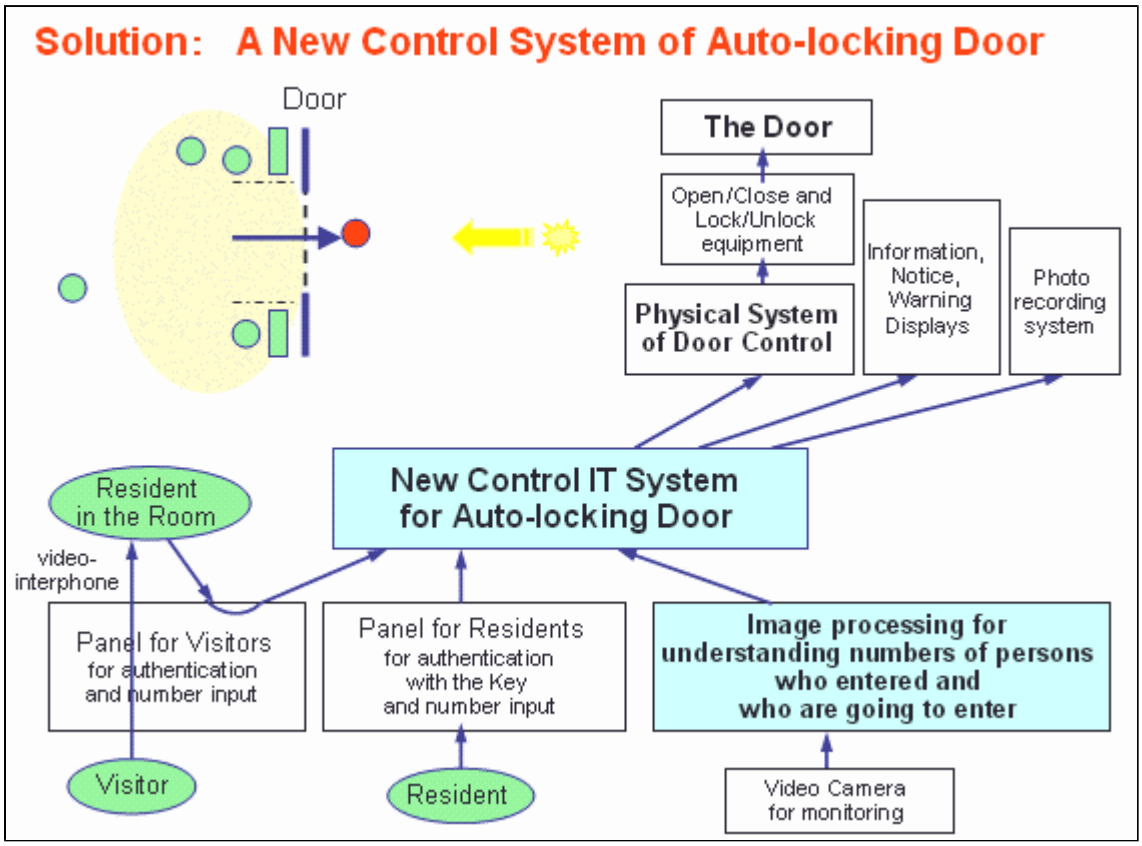
For securing the entrance of residential apartment buildings, the auto-locking door system is typically installed. Visitors without authorized keys have to communicate with the residents through the (video-)interphone to get the door unlocked. In reality, however, unauthorized

persons can easily pass through the entrance door, simply by behaving just like a resident and following other residents. This problem is relevant more to psychology and social behavior of people than to technology. In the present case study, we analyzed the problem by using standard methods of TRIZ/USIT, represented the cause-effect relationship in the RCA+ method to find root contradictions, and generated various solutions. The solutions involve not only technical but also psychological and sociological aspects. The present study has demonstrated that TRIZ/USIT can be applied smoothly and effectively to non-technological problems.

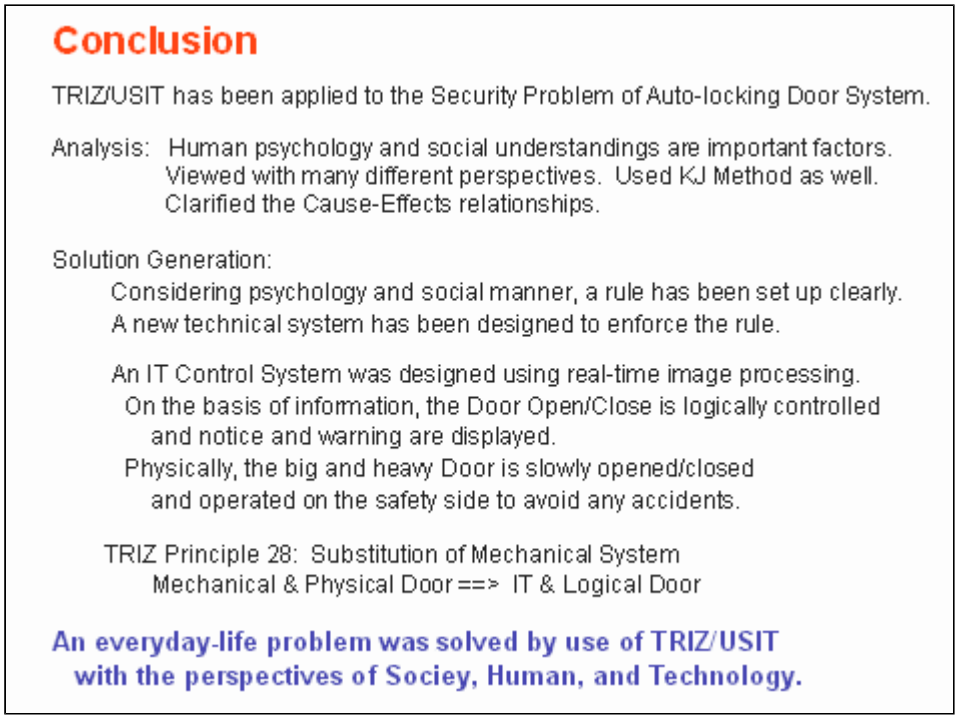
Since I have already posted my presentation slides in English (and my slides and full paper in Japanese) in my Web site "TRIZ Home Page in Japan", please refer to them. The following is the structure of the root causes why unauthorized persons can enter the door easily. The diagram shows three direct causes: The door is kept open/unlocked for about 10 seconds; Residents allow unauthorized persons to enter; and the system is not effective in the cases where two persons (or two difderent groups) happen to enter at the same time.



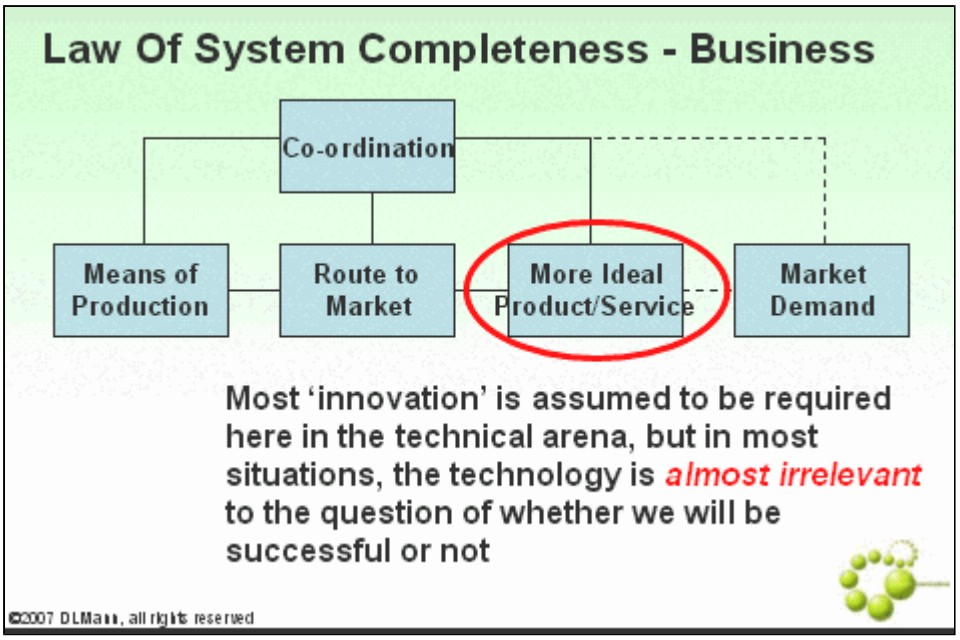
We have solved many contradictions revealed in the root cause analysis, and generated ideas. The solution outlined in the following figure has been built (Please see more detail in the separate page of my presentation).



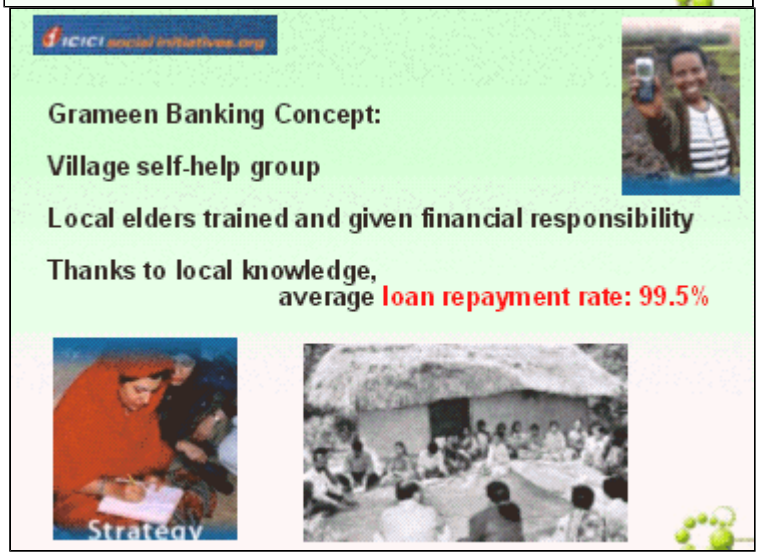
The following is my slide of conclusion:



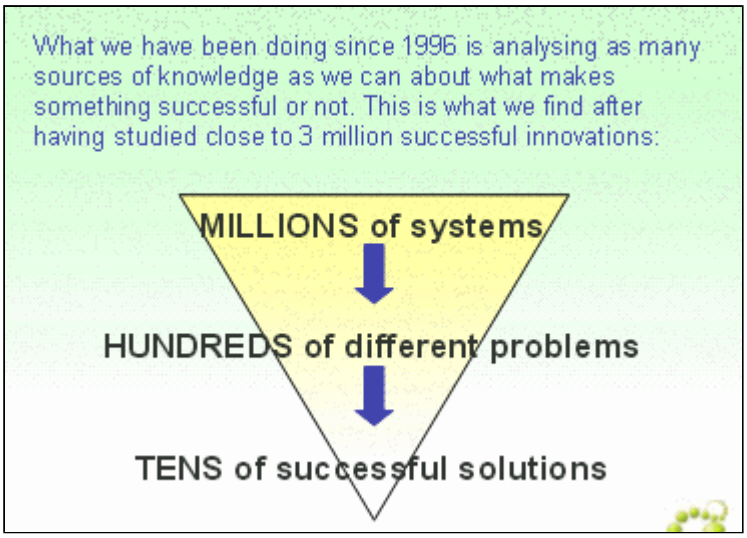
The paper (or slides) by Darrell Mann (Systematic Innovation Ltd, UK) [25] on "**Systematic Innovation For Business & Management: Experiences 1994-2007**" was presented in an Oral session by Paul Filmore, because the Author became unable to attend the Symposium (the presentation was fluent and attractive, thanks to Paul!). One of the motives for the Author to work in the field of innovation for business and management comes from the fact that so many innovations (with good technological inventions) fail before or after reaching the market. The 'Law of System Completeness in Business' (by the Author) is shown in the following slide with the relationship to the technical arena.



The type of the problem is demonstrated in the following two slides (chosen among several others):

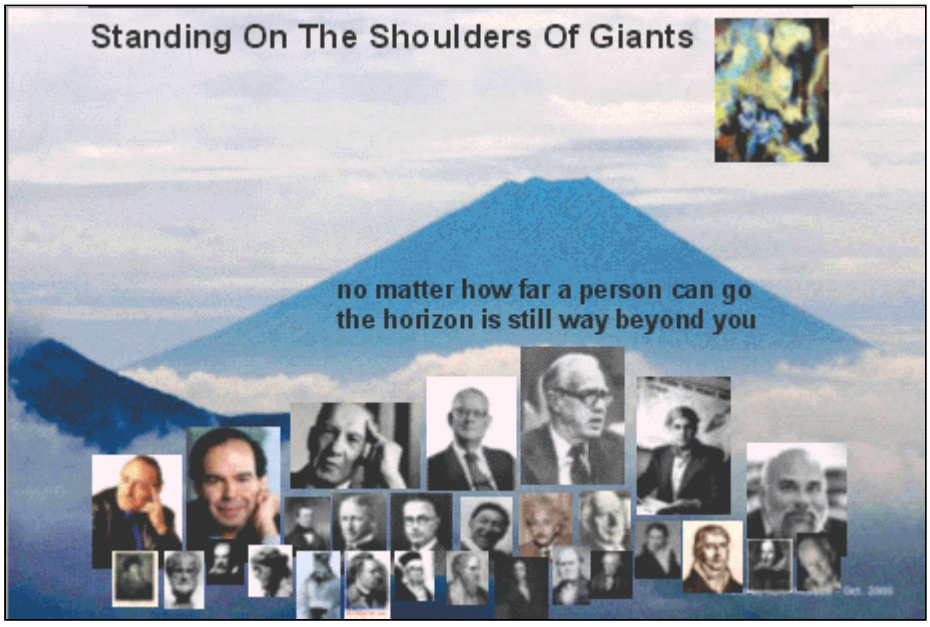


The approach of the Author's research is shown in the following slide. As many of you know the Author published the book "Hands-On Systematic Innovation: Business and Management" (2005).



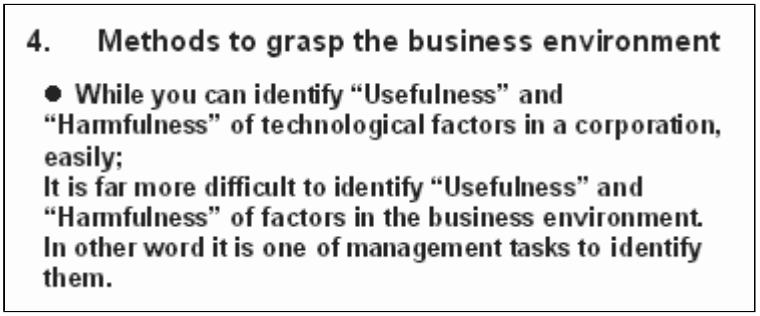
One of his findings is illustrated in the following slide:

The Author's advice is shown in the following slide: (Darrell is so kind to use Mt. Fuji in this slide.)

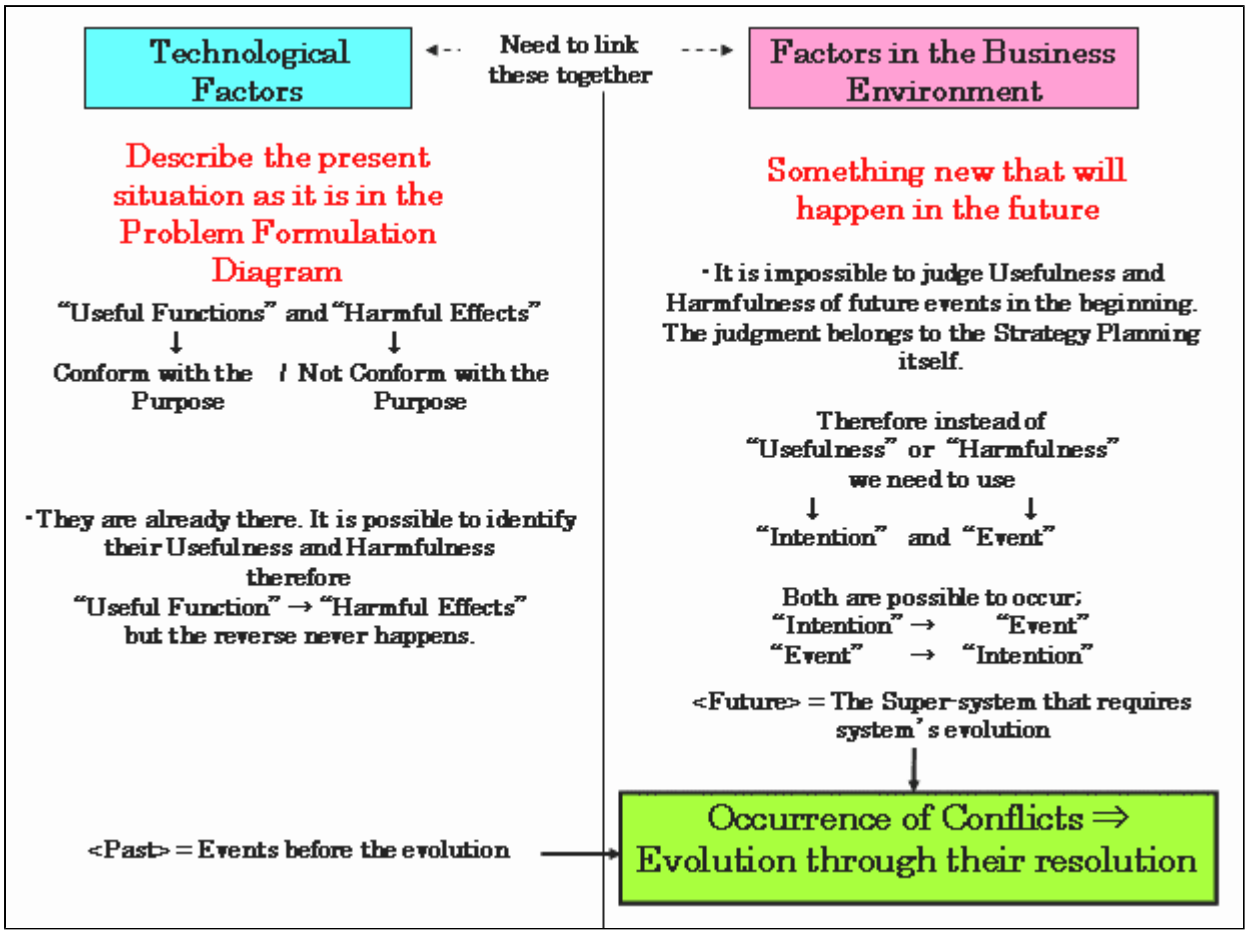


Nine people from **MRA Knowledge Creation Research Group [16]** gave a poster presentation on "**Application of TRIZ to Business & Management Field (The Activity Result of MRA Knowledge Creation Research Group)**". The Authors are: **Hajime Kasai (IDEA, Inc.), Masayuki Ishii (Sumitomo Electric Industries), Eisaku Oshima (RCS Institute), Toshimitsu Kataoka (Patbrain, Co.), Fumiko Kikuchi (Pioneer Corporation), Osamu Kumasaka (Pioneer Corporation), Hironori Tsugane (Anritsu Corporation), Kimihiko Hasegawa (Sano & Associates International Patent Firm), Mikio Fukumura (Sozo Kaihatsu Initiative)**. This is a study group of voluntary members coming from different user companies of IMC software tools and is organized by MRI Associates Co. The study group carries out their activities on annual basis, thus starting Jun. 2006 and finishing Apr. 2007. Their purpose was to study how to apply TRIZ to the business and management field. They have mostly used Darrell Mann's HOSI for Business and Management as the textbook and tried to apply Mann's method to several selected problems. The example problems they applied include: Mobile phones, Environmental business, Web2.0 —Wikipedia, and TRIZ education. They have translated essential tables of Mann's book and generated their own template for analyzing the evolution potentials.

Takao Adachi (SANNO Institute of Management) [40] gave an oral presentation on "**Identification of Engineering Problems That Correspond with the Corporate Business Strategy —Linking Logics of Business Strategy and Engineering Problem Solving using TRIZ Concept of Conflict –**". (Though I missed his presentation,) I am interested in the latter half of his talk. The part begins with the following slide:



This situation is explained in some more detail in the following side.

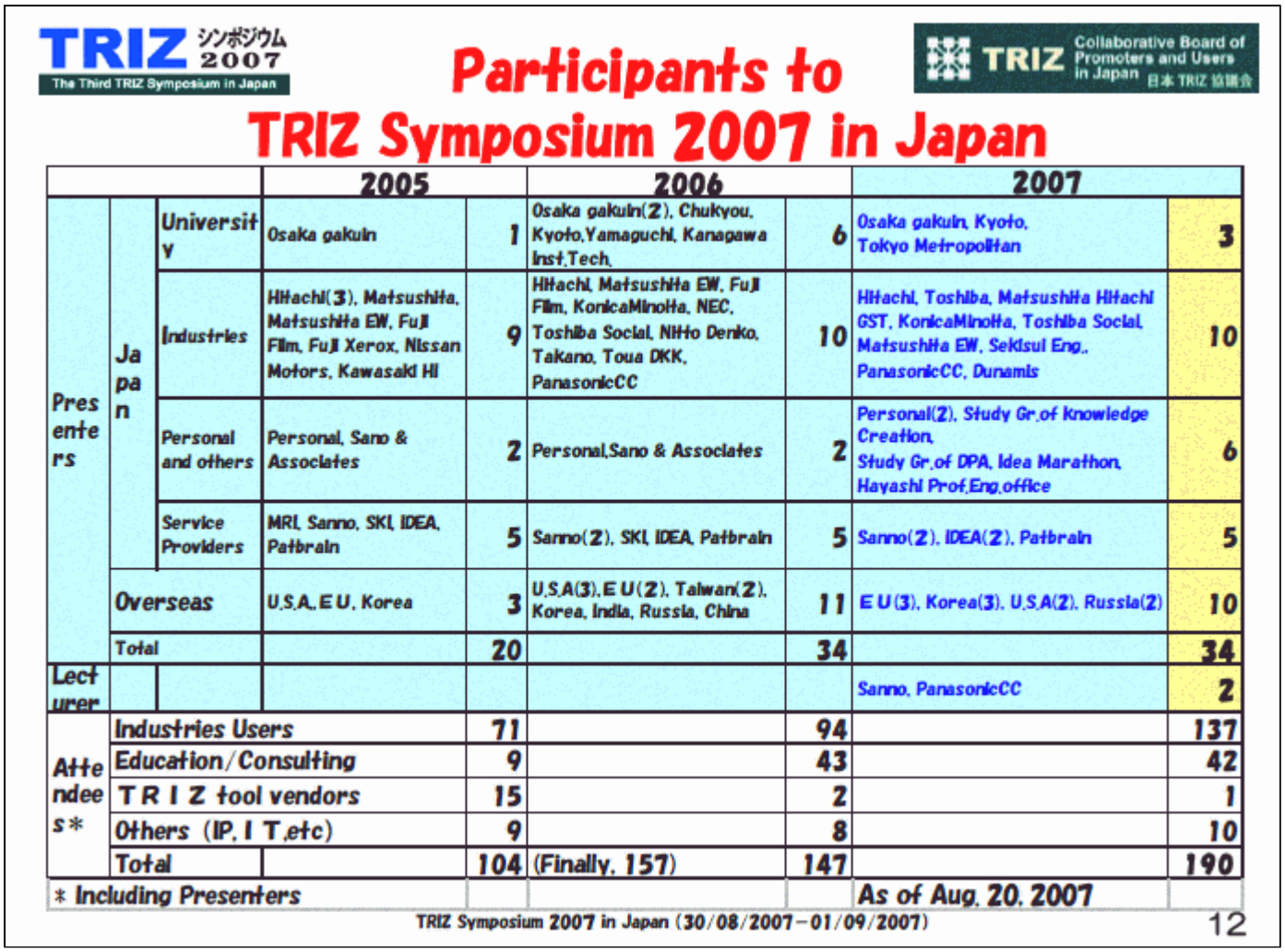


There are some more slides presented, but they do not convey much information, unfortunately. No meaningful examples are shown in the Proceedings, even though the actual work done with CANON achieved much more, I guess.

11. Concluding Remarks

Thus far I have reviewed all the works presented at the Third TRIZ Symposium in Japan, 2007.

As an aid for you to make an overview summary of our TRIZ Symposia, 2005 to 2007, I would like to quote a slide from the Opening Address by our Chairperson, Toshihiro Hayashi:



TRIZ シンポジウム 2007 The Third TRIZ Symposium in Japan

Participants to TRIZ Symposium 2007 in Japan

TRIZ Collaborative Board of Promoters and Users in Japan 日本TRIZ協議会

			2005		2006		2007	
Presenters	Japan	University	Osaka gakuin	1	Osaka gakuin(2), Chukyou, Kyoto,Yamaguchi, Kanagawa Inst.Tech.	6	Osaka gakuin, Kyoto, Tokyo Metropolitan	3
		Industries	Hitachi(3), Matsushita, Matsushita EW, Fuji Film, Fuji Xerox, Nissan Motors, Kawasaki HI	9	Hitachi, Matsushita EW, Fuji Film, KonicaMinolta, NEC, Toshiba Social, Nitto Denko, Takano, Toua DKK, PanasonicCC	10	Hitachi, Toshiba, Matsushita Hitachi GST, KonicaMinolta, Toshiba Social, Matsushita EW, Sekisui Eng., PanasonicCC, Dunamis	10
		Personal and others	Personal, Sano & Associates	2	Personal,Sano & Associates	2	Personal(2), Study Gr.of knowledge Creation, Study Gr.of DPA, Idea Marathon, Hayashi Prof,Eng.office	6
		Service Providers	MRI, Sanno, SKI, IDEA, Patbrain	5	Sanno(2), SKI, IDEA, Patbrain	5	Sanno(2), IDEA(2), Patbrain	5
	Overseas		U.S.A, E U, Korea	3	U.S.A(3), E U(2), Taiwan(2), Korea, India, Russia, China	11	E U(3), Korea(3), U.S.A(2), Russia(2)	10
	Total			20		34		34
Lecturer							Sanno, PanasonicCC	2
Attendees*	Industries Users			71		94		137
	Education/Consulting			9		43		42
	TRIZ tool vendors			15		2		1
	Others (IP, IT,etc)			9		8		10
	Total			104	(Finally, 157)	147		190
* Including Presenters							As of Aug. 20, 2007	

TRIZ Symposium 2007 in Japan (30/08/2007-01/09/2007) 12

(Note: The number of participants this year increased after the date of this table, and was 202.)

On the second day morning, we had a Meeting of Japan TRIZ CB and Japan TRIZ Society. As you have seen in this report and in the Official pages, Japan TRIZ CB Engl (or 'Collaborative Board of TRIZ Promoters ans Users in Japan') has been working to organize this TRIZ Symposium as an voluntary organization of leaders in TRIZ in Japan. For furthering a wide range of TRIZ activites in Japan, the needs of more official and well-founded organization have become clear. Thus, members of Japan TRIZ CB decided to start a new organization named 'Japan TRIZ Society' as the successor of the CB. The Japan TRIZ CB is formally established in March 2007 with 13 members and has submitted an application of Approval as a Non-Profit Organization (NPO) to Tokyo Metropolitan Office in April 2007. The approval was (and still is) certainly expected though not ready. Thus in August, we started the call for joining members in the the Japan TRIZ Society, and obtained about 120 people as members. Thus in the Meeting, the activities of the CB were reported and the plans of the new Society were explained to all the participants of TRIZ Symposium. The Japan TRIZ Society is planning to organize the Fourth TRIZ Symposium in Japan next next year. See the Official Web site of Japan TRIZ Society Jap. at www.triz-japan.org (at moment operated in Japanese only).

During the three days of Symposium, for the prpose of free discussions and personal communications we have set much time of intermisions, lunch time, and especially 'Buffet dinner & communication'. In the evenings of the first day and the second day, most of the participants attended at the Buffet dinner and met and talked with many old and new friends.

Here are some of my concluding remarks:

(1) It is clearly seen that the TRIZ activities in Japan have been growing steadily for these (at least recent three, four) years especially in industries and some in academia. The TRIZ Symposia have contributed much to encourage the TRIZ people in Japan, I believe.

(2) The current main focus of TRIZ in Japan is the understanding of TRIZ in its essence and applying

TRIZ in the real situations in industries. These 10 years of experiences of study and application of TRIZ in Japan have brought a certain level of width, depth, volume, duration, etc. in TRIZ in Japan.

(3) Most of the presentations are delivered by industry people, as you see. However, we know that there are some more industries working with TRIZ; we eagerly wish them to make their TRIZ activities and experiences open and communicate with other people.

(4) One unique feature of the present Symposium is the presentations given by a few groups of multi-company members. Study Group in Japan VE Association is a remarkable case of integration of TRIZ and other methods in the 'person' level. Miyagi (Prefecture) TRIZ Society is another encouraging case of TRIZ promotion in the municipal level; such activities can be carried out by groups of voluntary members with the support by various levels/forms of municipal communities.

(5) TRIZ has been taught in several universities in Japan; but still they are very minor cases. Research in TRIZ and education of TRIZ need to be done much more in universities. Education of TRIZ is not introduced yet in schools and in out-of-school activities in Japan. This is also related to the fact that TRIZ is not yet recognized by academia and by national/manucipal governmental people in Japan. We still have a lot of things to do.

(6) Extension of TRIZ towards non-technical areas is growing slowly also in Japan. We will need good case studies of application and also new types of people who carry out such trials.

(7) We are happy that more than 10 people came from abroad and gave nice presentations and participated in discussions. Our strategy of 'Primarily National AND Partially (as much as possible) International' seems to be supported by these people from abroad (as well as by Japanese participants) according to our post-Symposium inquiry. We are going to continue the efforts for overcoming the language barriers by preparing English and Japanese slides and Proceedings. (We can not provide simultaneous interpretation service yet.) Presentations and participations especially by people from Asian countries are important in the eyes of global penetration of TRIZ.

(8) One issue for this Symposium is the preparation of full papers (in Japanese and/or in English) and of English translation of slides. At moment, full papers are optional, and English translation of presentation slides is optional in poster presentations. These rules are set after considering the burdens on Japanese authors. We will need to go forward step by step for making the Symposium to be well recognized by the international standard.

Preliminary Anouncement (Nov. 17, 2007):

The Japan TRIZ CB has decided at the Board Meeting yesterday as:

The Fourth TRIZ Symposium in Japan, 2008
To be held by Japan TRIZ Society:

Date: Sept. 10, 2008 (Wed) through Sept. 12, 2008 (Fri.)
Venue: Laforet Biwako, Moriyama City, Shiga Prefecture, Japan
(A resort hotel and training facility on the shore of Lake Biwa;
1 hour by local train and bus from Kyoto.)

We wish you to join us and present your works in this active TRIZ event held in Japan next year!!

Agenda & List of Presentations

The First Day (Aug. 30, 2007), Thursday

[No.] Category	Authors (Affiliation)	Title of the Presentation	Posting
[1] Tutorial 1 I05	Narumi Nagase (Panasonic Communications)	Basic Tutorial: TRIZ Procedures and Practical Ways of Creative Problem Solving	
[2] Tutorial 2 I06	Manabu Sawaguchi (SANNO Institute)	Advanced Tutorial: Future Generation Product Planning Activities Based on “the Patterns of Technical Evolution” — Implement Innovation Activities—	

[3] Opening Address	Toshihiro Hayashi (Chair-person of Japan TRIZ CB)	On Holding the Third TRIZ Symposium in Japan	Official page (Oct. 8, 2007)
[4] Invited Talk 1 I03	Toshihiro Hayashi (T. Hayashi Professional Engineer Office)	Design and Development Process Engineering Technologies and TRIZ - MOT for Design and Development Engineer -	
[5] Oral 1 #20	Yosuke Koga (Panasonic Communications)	Application of TRIZ to Manufacturing Phase - Case Study of Eliminating Defects in Printer Assembly Process -	
[6] Invited Talk 2 I04	Seiichiro Tamai (Matsushita Electric Industrial Co.)	A New Intellectual Property Model for the Knowledge-based Society – A Brand Value Creation Model by the Intellectual Property –	
[7] Oral 2 #30	Takeo Higuchi (Idea Marathon System)	'Idea Marathon Method' for Underlying TRIZ with Everyday-Thinking Habits	
[8] Oral 3 #22	Kunio Fukatsu (Toshiba Social Automation Systems)	Technical Knowledge Transfer by USIT Application for Paper Handling Mechanism	
[9] Invited Talk 3 I07	Naoaki Okuzumi (Toshiba Co.)	Introductory Review of Innovation Activities in Toshiba - Application of Various Tools in Toshiba; Six σ, Taguchi Method, QFD, TRIZ and so on	

The Second Day (Aug. 31, 2007), Friday

[10] Meeting	Report of Activities of Japan TRIZ Collaborative Board & Explanation of Plan of Japan TRIZ Society (Only in Japanese)		
[11] Keynote 1 I01	Larry Ball (Honeywell, USA)	Hierarchical TRIZ Algorithms	Official page (Oct. 8, 2007)
[12] Oral 4 #19	Shinsuke Kurosawa (The SANNO Institute of Management)	Methodological Background of Effectiveness of TRIZ	
[13] Introduction to Posters A	All the Presenters of Poster Session A	Introduction to Poster Papers A	

[14] Poster A1 #09	Victor Berdonosov (Komsomolsk-na-Amure State Tech. Univ, Russia)	IQ Increase under the Influence of TRIZ	
[15] Poster A2 #10	Shoichi Tsuge, Osamu Yamada, Tateki Oka (Konica Minolta Business Technologies, Inc.)	Practices of Applying TRIZ/USIT in Konica Minolta Business Technologies, Inc. (2)	
[16] Poster A3	[MRA Knowledge Creation Research Group] Hajime Kasai (IDEA, Inc.), Masayuki Ishii (Sumitomo Electric Industries), Eisaku	Application of TRIZ to Business & Management Field (The Activity Result of MRA Knowledge	

#11	Oshima (RCS Institute), Toshimitsu Kataoka (Patbrain, Co.), Fumiko Kikuchi (Pioneer Corporation), Osamu Kumasaka (Pioneer Corporation), Hironori Tsugane (Anritsu Corporation), Kimihiko Hasegawa (Sano & Associates International Patent Firm), Mikio Fukumura (Sozo Kaihatsu Initiative)	Creation Research Group)	
[17] Poster A4 #12	Toru Shonai (Hitachi), Shun Kawabe (Meisei University), Naoki Hamanaka (Hitachi)	Application of Contradiction Table to Computer Architecture - Sub-matrix and Invention Principles for Computer Problems –	
[18] Poster A5 #21	Toshio Takahara ( )	A Method of Resolving Differences Based on the Concepts of Functions and Process Objects Part 2	
[19] Poster A6 #24	Jae-Hoon Kim, Joon-Mo Seo, Young-Ju Kang, Byoung-Un Kang (LS Cable, Korea)	Improvement of Material Properties of Printable Adhesive	
[20] Poster A7 #28	Kazuyasu Ikeda (Sekisui Engineering Co., Ltd)	History of TRIZ Activities in Sekisui Chemical Group	
[21] Poster A8 #32	[DPAM Study Group] Kunichika Fukuoka (Fujitsu)	DPAM (Design Process Assessment and Improvement Model)	
[22] Oral 5 #02	Ik Cheol Kim (Korea TRIZ Association, Korea)	TRIZ Application for New Product Concept Development	
[23] Oral 6 #13	Toru Nakagawa and Arata Fujita (Osaka Gakuin University)	How to Prevent Unauthorized Persons from Entering the Auto-locking Door of Apartment Building: Applying TRIZ/ USIT to A Social & Technical Problem	Engl Jap (Sept. 13, 2007)
[24] Oral 7 #18	Masanori Igoshi (Tokyo Metropolitan Univ. & ACP Study Group)	Practice of MONODUKURI Education Based on PBL by Comparison of Real and Digital Product	
[25] Oral 8 #01	Darrell Mann (Systematic Innovation Ltd, UK) [Read by P. Filmore]	Systematic Innovation For Business & Management: Experiences 1994-2007	
[26] Oral 9 #26	Toshimitsu Kataoka (Patbrain Corporation)	Consideration of a Creative Intellectual Strategy Related to Capsule Endoscope Using TRIZ	
[27] Oral 10 #03	Gil Su Yoon (Pukyong National Univ., Korea), Haruo Kodama (National Institute of Multimedia Education), Young Won Park (University of Tokyo)	How to Apply TRIZ to the e-Learning from Invent, Patent to IP for SME	

The Third Day (Sept. 1, 2007), Saturday

[28] Keynote 2 I02	Simon Dewulf (CREAX, Belgium)	Variation of System Properties for New or Improved Functions	Official page E PDF J PDF (Oct. 8, 2007)
[29] Oral 11 #15	Paul Filmore (Univ. of Plymouth, UK)	Developing Highly Effective Engineers	

[30] Oral 12 #14	[Japanese VE Association Kansai Branch, TRIZ Spread/Practical Use Study Group] Nobuhide Matsuda (Matsushita Electric Industrial Co.) , Makoto Unno (Kawasaki Heavy Industries), Kazuyasu Ikeda (Sekisui Engineering Co.), et al.	Study of the Development-types TRIZ	
[31] Introduction to Posters B	All the Presenters of Poster Session B	Introduction to Poster Papers B	

[32] Poster B1 #07	Yoshiharu Isaka (IDEA Co., Ltd)	Application of TRIZ Technology Evolution to Concept Mining －For the Blue Ocean Creation－	
[33] Poster B2 #16	Yuichi Furukawa ( )	Impressions of TRIZ	
[34] Poster B3 #23	Eiji Yoshii, Jiro Hashizume (Matsushita Electric Works)	Introducing USIT in Matsushita Electric Works	
[35] Poster B4 #25	Toshihiro Arisaka, Kazushi Tsuwako, Hiroyuki Suzuki(Hitachi Global Storage Technologies Japan, Ltd.)	Introduction of the Activity to Promote TRIZ for Engineer and its Application Examples in Hitachi GST	
[36] Poster B5 #27	Mitsuo Morihisa, Hiroshi Kawakami, Osamu Katai, Takayuki Shiose (Kyoto University)	Educational Seminar Project 2007: Introduction to the Inventive/ Creative Thinking System “To Instruct Students How to Invent Creatively”	
[37] Poster B6 #29	[Miyagi TRIZ Society] Rikie Ishii (Dunamis Co., Ltd./ NEDO), Toshinori Ito (Industrial Technology Institute, Miyagi Prefectural Government)	Challenge to TRIZ User Increase: Original Tool Development of Miyagi TRIZ Society	
[38] Oral 13 #06	Masahiro Kuwahara (IDEA Co., Ltd)	Conception Method of the Next Generation System by Law of Engineering System Evolution	
[39] Oral 14 #08	Victor Berdonosov (Komsomolsk-na-Amure State Tech. Univ., Russia)	TRIZ-Fractality of Knowledge	
[40] Oral 15 #31	Takao Adachi (The SANNO Institute of Management)	Identification of Engineering Problems That Correspond with the Corporate Business Strategy －Linking Logics of Business Strategy and Engineering Problem Solving using TRIZ Concept of Conflict –	
[41] Special Session #33, #34, #35	Kritaya Suarnpongs, Saranya Chandravat (Siam Cement PLC, Thailand); Chiraphon Rayakaeo (Thai Paper Co., Thailand); Yuthapong Matejitkul (SCG Paper PLC, Thailand)	Introducing TRIZ into Thailand [Presentation of a joint position paper and Free discussion]	Engl (Nov. 18, 2007)
[42] Closing Address	Yuji Mihara (Vice Chairperson of Japan TRIZ CB)		

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