TRIZ Forum: Conference Report (22-H)

Personal Report of The Fifth TRIZ Symposium in Japan, 2009

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

Part H. Non-technological Applications of TRIZ

Reviewed by Toru Nakagawa (Osaka Gakuin Univ., Japan), Jan. 30, 2010

[Posted on Feb. 4, 2010]

TRIZ Home Page in Japan

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

Editor's Note (Toru Nakagawa, Jan. 30, 2010)

This page is Part H of my Personal Report of Japan TRIZ Symposium 2009. Please see the Parent page for the overall description of the Symposium and the general introduction of the Personal Report.

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

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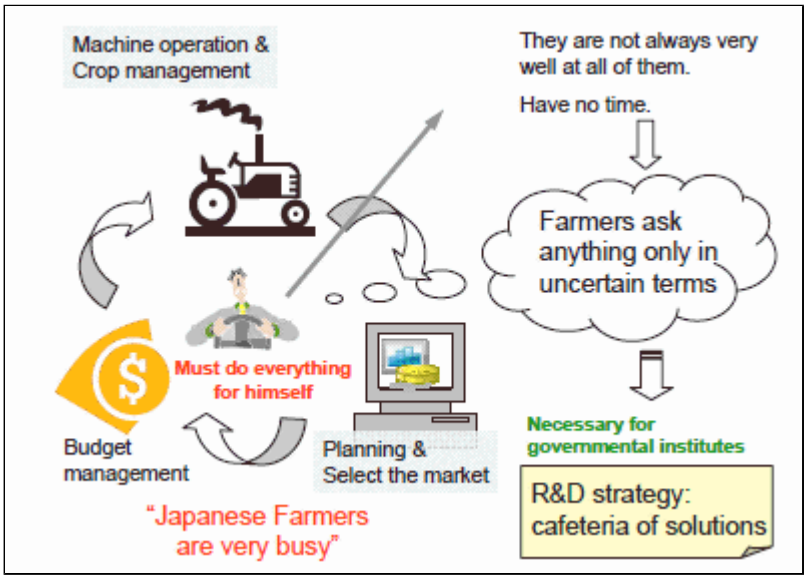
10. Applications to Non-technical Areas

Atsushi Takeuchi (Niigata Institute of Agricultural Research) [J02 P-A1] gave a Poster presentation with a unique title of **"Rather "Que Solar, Solar" Than the "Systematic Innovation" on Agro-technology in Japan with TRIZ/USIT".** This is the first report in Japan of introducing TRIZ (and also USIT) to the field of agriculture. The Author is a researcher working for R&D of agricultural methods at the municipal owned institute of Niigata Prefecture, which is the area famous for excellent Japanese rice cropping. He has been interested in TRIZ and USIT for these 7-8 years. I will quote the Author's Abstract first:

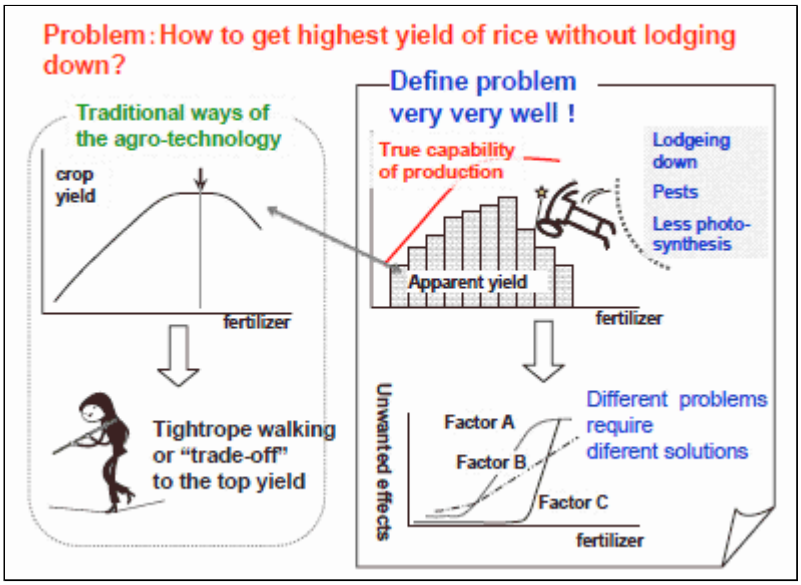
> We will report here the example of introduce TRIZ/USIT to agro-technology in Japan. Focusing the environment of the research and development in Japanese agriculture suggests that the crop farming requires the evolution to next stage with some inventions. As reducing the cost earning ratio, the innovation is necessary. And the case study shows that TRIZ/USIT will work effectively on invention of rice culture method. Now we are trying to introduce USIT/TRIZ training as a R&D skill. USIT/TRIZ will be a powerful tool to promote the technology on agriculture in Japan.

The slide (right) shows the background situations of farmers in Japan. Ratio of farmers among the working population is about 3.5 %, and the average fields per farmer is 3.0 ha. Almost all the farmers in Japan are working in the units of family, with some loose cooperation in agricultural cooperatives. Thus Japanese farmers must do everything for themselves, without having R&D capability. Hence the governmental institutes are requested to serve publicly to support them in various issues. Thus the R&D strategies for the institute is like a cafeteria of solutions. Farmers bring with different problems to the institutes, but their problems are not well defined. So the first thing we should do is to clarify or define the problem.

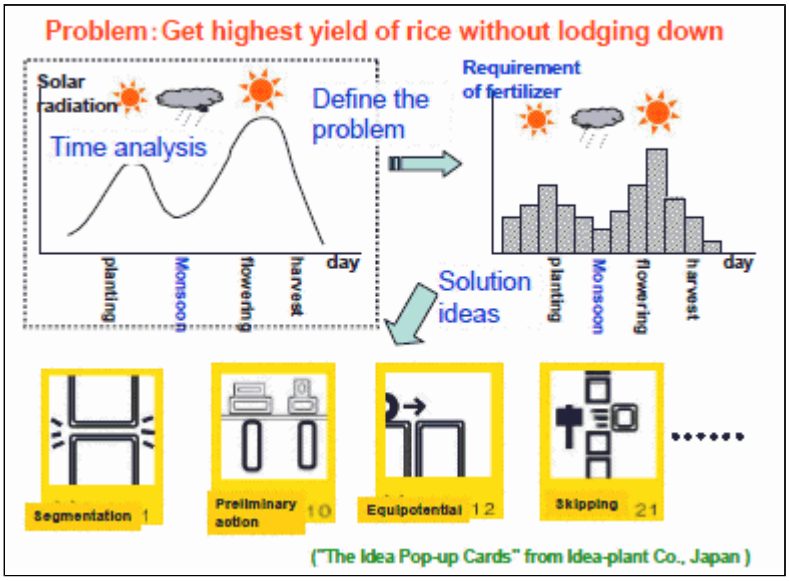


Here shows a problem, which has been most important for the rice farmers in Niigata. How to get highest yield of rice without lodging down? The traditional ways of developing agro-technologies are

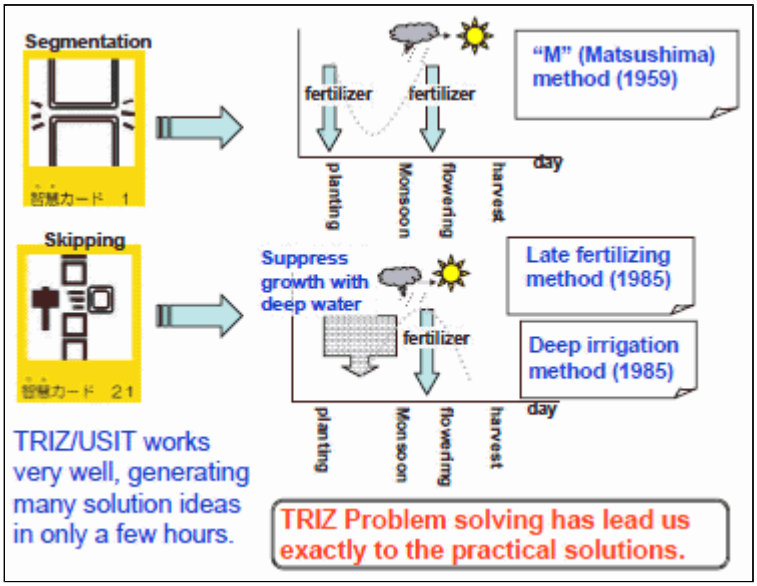
shown in the left part of the slide (right). We should now define the problem more closely. We think the apparent yield of rice is lower than the true capability of rice production because of different factors, e.g. lodging down, pests, less photosynthesis, etc. And it is important to understand the unwanted effects caused by individual factors, and then to think of different solutions requested to solve different problems.



The slide (right) shows the process of problem analysis with TRIZ and USIT. The graph (top-left) is an illustration of the Time Analysis (i.e., a standard process in USIT) of this problem. It shows the solar radiation per day. When planting rice (in May) we have good sunshine, but in June and early July we have a rainy season (Monsoon) in Japan. Then in July-August-September, rice plant grows, blooms, and ripens under sunny and hot weather. Thus we can naturally see that the requirement of fertilizer is not constant but varies in time as shown in the top-right graph. Once we understand this fact we should go ahead to think of solution ideas for better rice production. We have used, in our training seminar, the TRIZ 40 Inventive Principles in the form of the Idea Pop-up Cards delivered by Rikie Ishii (Idea-plant Co.).



With the hint of Segmentation Principle, we can have an idea of fertilizing separately at the time of planting and at the time of just after the rainy season, before blooming. This idea matches with the M method, developed by Matsushima in 1959. With the hint of Skipping Principle, we have an idea of fertilizing much just after the rainy season, before blooming and also of suppressing the growth of rice plant before the rainy season (with deep water). These ideas are the same as the Late fertilizing method and the Deep irrigation method, respectively, both developed in 1985. In the TRIZ/USIT training seminar, we obtained many solution ideas in only a few hours, some of which exactly match the solutions that were developed after long R&D periods in the history.



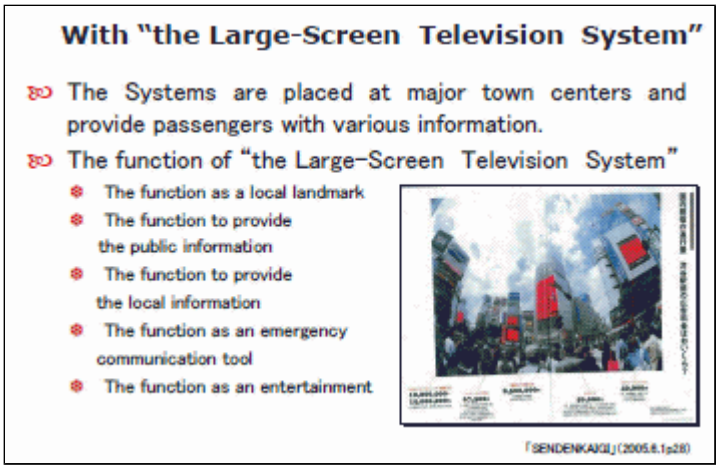
*** The Author of this presentation has been working as one of the principal researchers who developed the current top-brand rice 'Koshihikari'. Thus it is very encouraging that he has found the TRIZ/USIT methodology is applicable also to the field of agricultural technology. We wish the Author to promote TRIZ

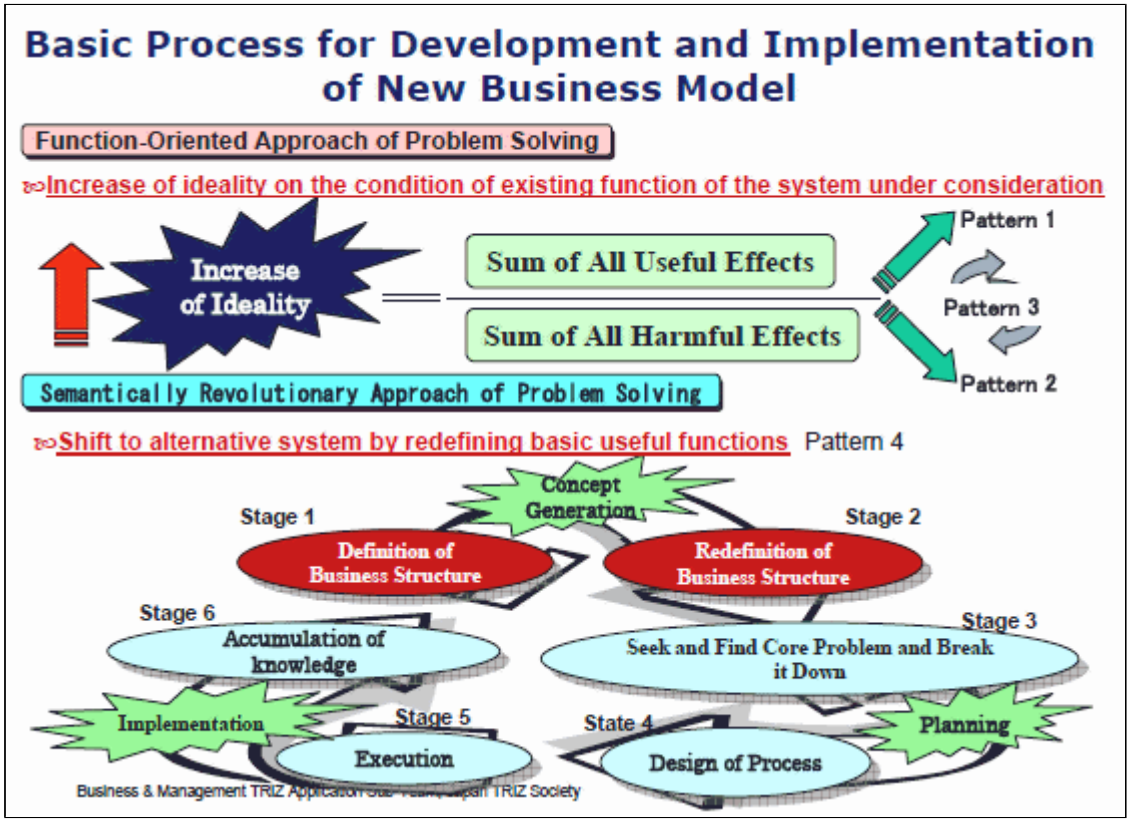
steadily in this new field of application.

Ikuo YOSHIZAWA (SANNO Inst. of Management), Kazumasa YOKOYAMA (Toshiba), Kimihiko HASEGAWA (Sano & Associates International Patent Firm), Akira SATO (Keio Univ.), Shigeru KUNO (NKN Consulting), Yasuo MORIYA (Fujitsu Advanced Technologies), Takuo MAEDA (Takumi System Architects), Teruyuki KAMIMURA (Willfort International Patent Attorneys), Fumiko KIKUCHI (Pioneer Co.) [Business & Management TRIZ Application Study Group, Japan TRIZ Society] [J07 P-B1] gave a Poster presentation on **"Application of TRIZ Way of Thinking and Its Tools to Develop a New Business Model".** This group is one of the two study groups of Japan TRIZ Society. The Authors' Abstract is quoted here:

> Most of reported TRIZ applications are for solving technological problems. One of the challenges for TRIZ to be deployed in much wider scale is to prove its capability to help solve business and management problems.
>
> The B & M Application Sub-Team of the Japan TRIZ Society was organized two years ago to address this challenge. We plan to study methods how to apply TRIZ to tackle business and management problems through analysis of real life cases. We intend to make up the guidance for TRIZ application for the purpose. The present report is about our effort up to the present time and some of its results. The subject we choose is “TRIZ application for developing a new model of business that brings in the best economic performance for a given product.”
>
> We divided the process of our study into following 5 phases;
> 1. Selection of the target. (A product or a field of business)
> 2. Understanding the present situation (Interviews and analysis of available information)
> 3. Drawing a scheme for developing a new business model.
> 4. Developing the business model based on the scheme.
> 5. Presentation of the model and the evaluation. (Presentation to subject matter experts and interviews)
>
> We choose as our first target “the Large-Screen Television System”. This report focuses on the above-mentioned phase 3 in the course of our study and clarifies a basic scheme of developing a new business model.This report also provides the results of our research for identifying the components of the new business model for “the Large-Screen Television System,”which we have developed using the above-mentioned basic scheme and based on the result of our previously-conducted study at phases 1 and 2.

The 16 slides for presentation contain rich contents in Japanese, but only the first two of them are available in English. The slide (right) shows the topic of the Large-Screen TV System, selected as a case study for discussion. The slide (below) describes the basic process for development and implementation of new business model. It shows two different approaches. The first one is the Function-Oriented Approach, having three patterns. The second one is Semantically Revolutionary Approach of Problem Solving (with pattern 4). The approach is depicted in 6 stages. The whole presentation discusses on these 6 stages of approach in detail. -- *** Sorry but I cannot explain them further in this report.

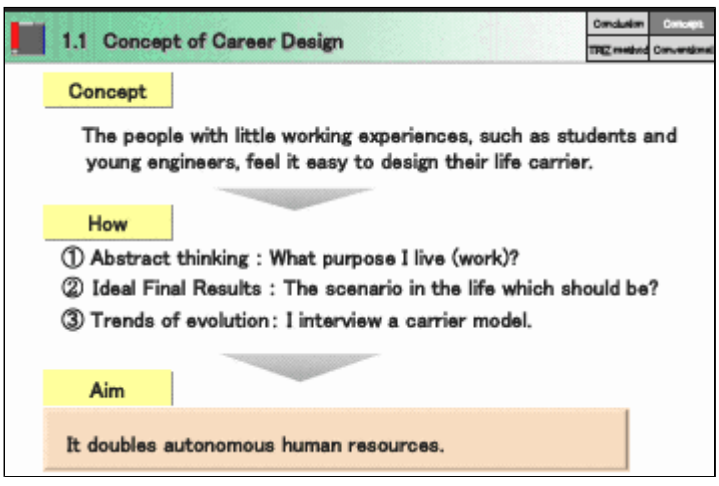


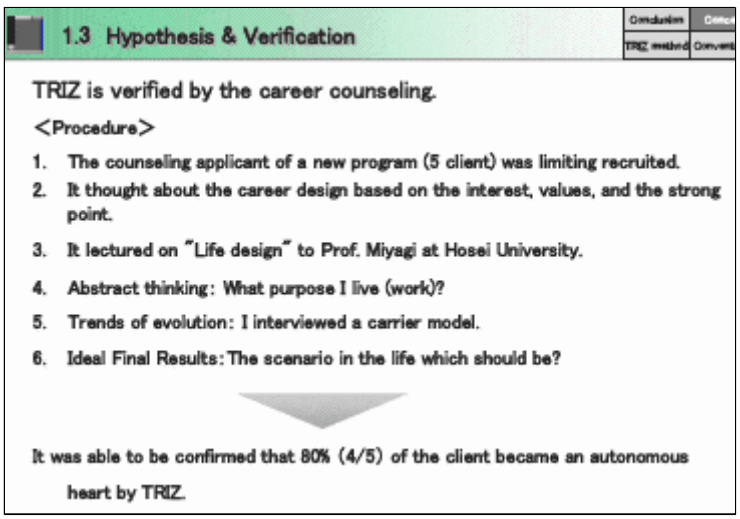


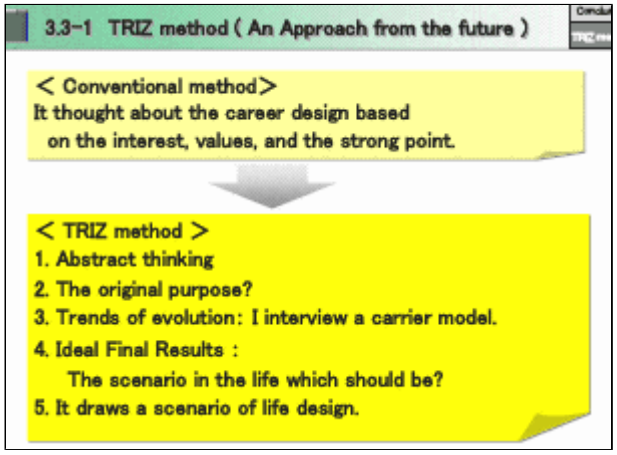
Shigeru Kasuya (Pro Engineer Institute) [J08 O-19] gave an Oral presentation with the title of "Effective Use of TRIZ, in the “Career Design” Education". The Author's Abstract is quoted here first:

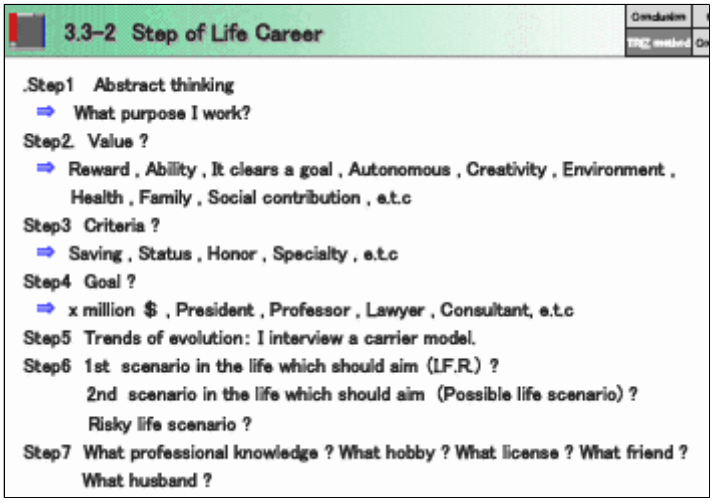
> To increase motivation of learning and work in the university and the company, it got to think much of the carrier education. The old carrier design was designed based on the past experience, its interest, a sense of values, etc. In this report, I developed a way of designing our life by TRIZ and experimented for new employee of some company. As a result, TRIZ was very useful for the motivation of people with little working experience only compared with the method of the conventional carrier design.
>
> For several years, I have experimented about the subject of career education. It was difficult for the person with little working experience to design life carrier. In order to solve this subject, two TRIZ Tools were applied to career education. The first is "Ideal Final Result". The goal of a life was transposed to ideality. The second is "Abstraction". It thinks of the purpose to work deeply.

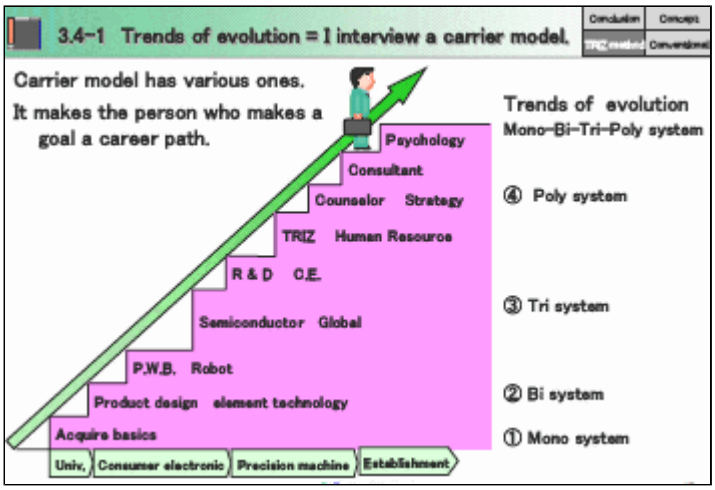
In the following I will quote 6 among 20 slides written in English. -- *** Please forgive me not to be able to explain them further in this report.

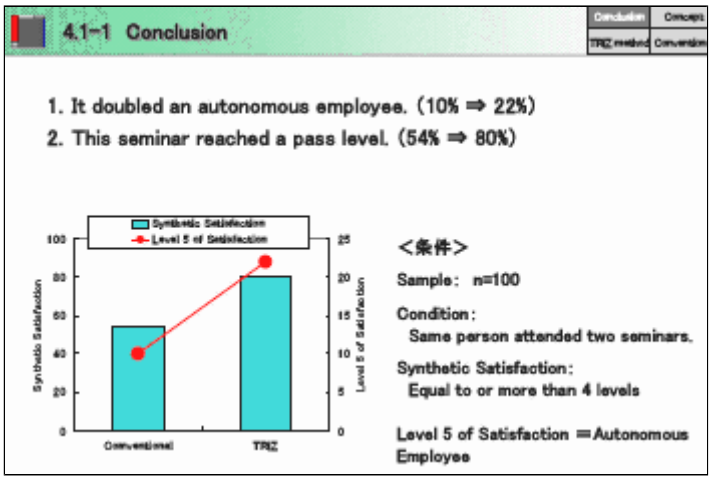












Atsuko Ishida (Hitachi Consulting Co.) [J18 O-11] gave an Oral presentation with the title of "Pursuing Essence of Innovation through Applying TRIZ to Problem-Solving on Business". Here is the Author's Abstract:

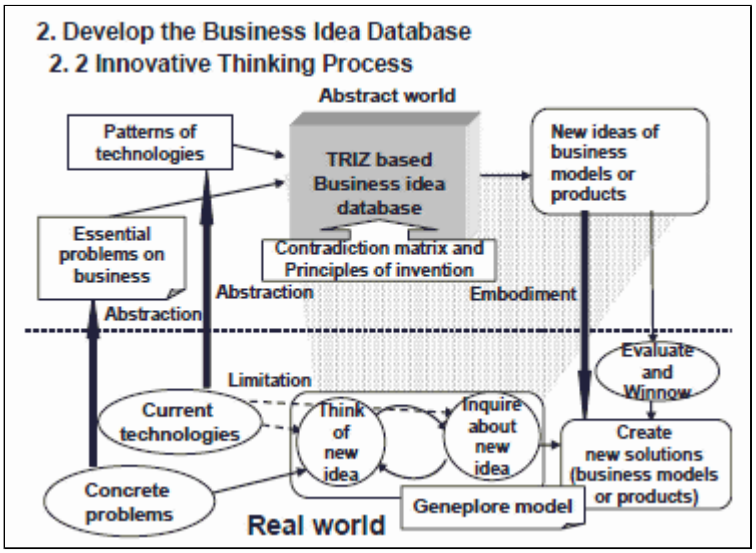
> The author proposed the business idea database based on 40 inventive principles and the contradiction matrix for creating innovative business models and products, in 2003. It suggested solutions of business problems by finding their essential subjects and contained contradictions. It was revised in 2008. The revised one includes business contradiction statements based on improving / degrading parameters to find potential business problems before finding contradictions and a way of finding hidden technical needs.
>
> It was applied to three business solutions. Using results of application, thinking processes were analyzed and relation between TRIZ and innovation was examined. Two points were come to light. (1) Abstraction of thinking process can bring ideas to unexpected direction and make them progressive. (2) Knowledge and experience about a domain of problem could be useful to clear problem definition and convince parties of final ideas, but they could decrease progressiveness. Finally, importance of technologies and tools for sympathizing, about essential problems and recognizing final ideas was discussed.

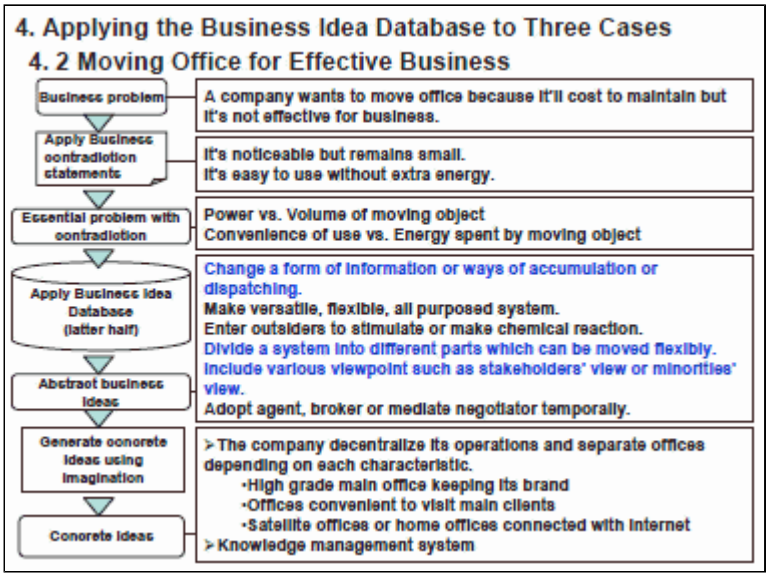
The Author illustrates the innovative thinking process as shown in the slide (right), i.e. essentially the Four Box Scheme of problem solving. She places her TRIZ-based business idea database at the main position of problem solver in the Abstract world. The Author says that the Business idea DB was revised in her paper (2008).

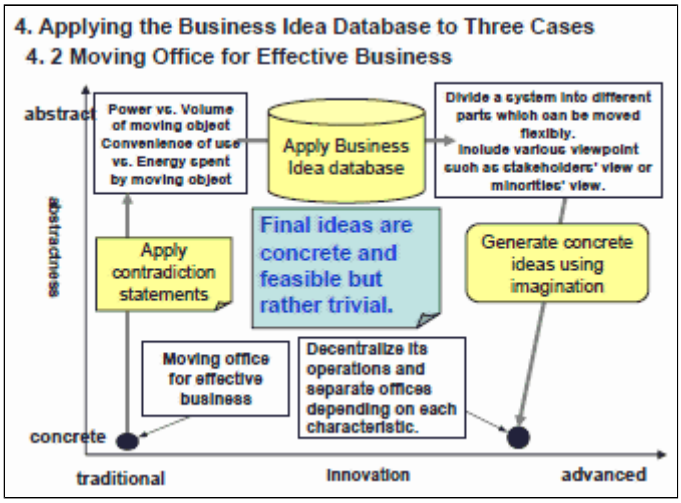
The Author demonstrates 3 case studies. In

the slide (below-left), the step-wise processes of application and the contents of information obtained at respective stages are shown. This is Case 2, where the problem is to move the office for effective business and the principal solution is to decentralize its operation and separate offices depending on each characteristics.

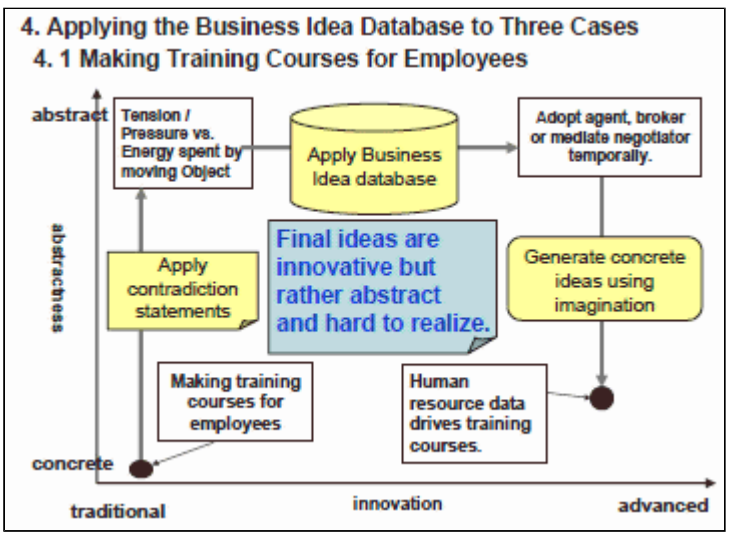
The slide (below-right) summarizes the solution process and evaluates this case study as 'Final ideas are concrete and feasible but rather trivial' probably because the problem is concrete, common, and and well experienced.

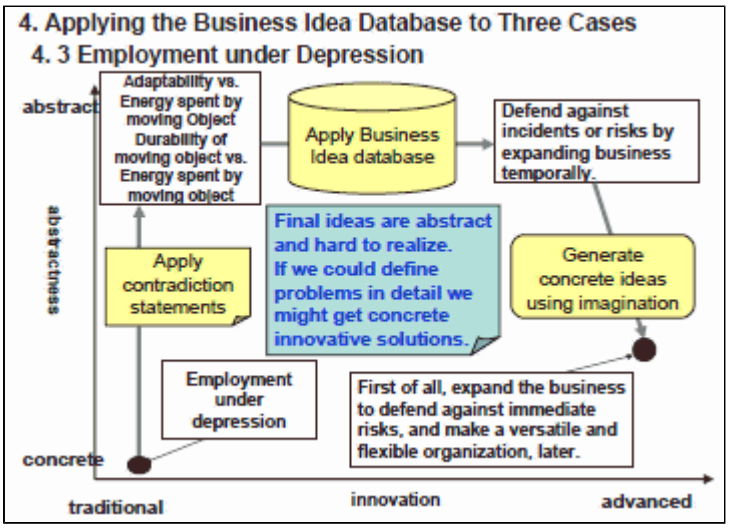




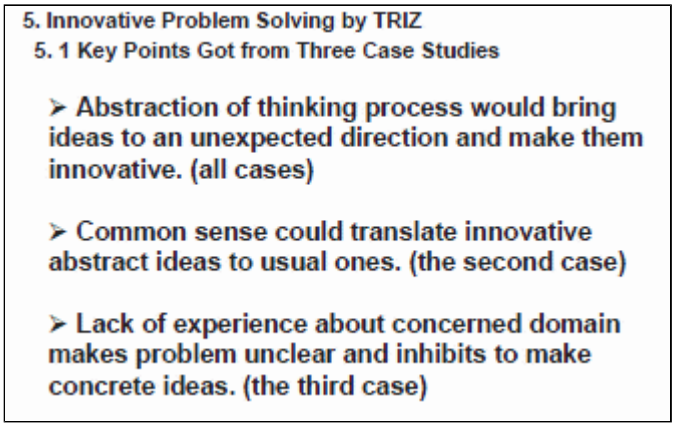


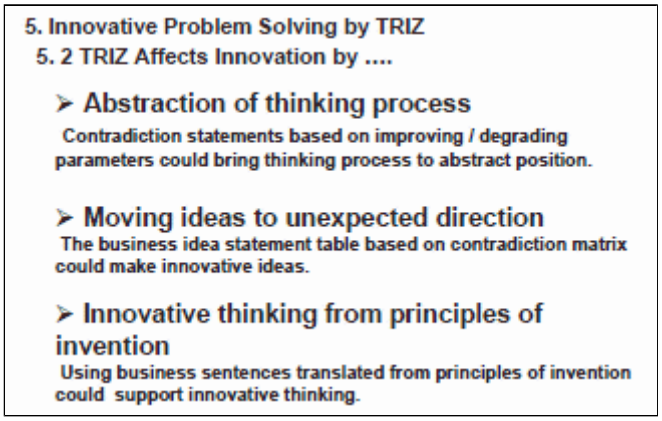
The Author shows two more case studies, as summarized below. The slide (below-left) is the case of making training courses for employees. The results is written as 'Human resources data drives training courses', and is evaluated: 'Final ideas are innovative but rather abstract and hard to realize'. The slide (below-right) handles a much larger problem of 'Employment under depression' and has obtained as 'First of all, expand the business to defend against immediate risks, and make a versatile and flexible organization, later.' The Author's evaluation for this case is 'Final ideas are abstract and hard to realize'. And the Author's additional comment in the slide (below-right) is 'If we could define problems in detail we might get concrete innovative solutions'. -- *** This comment seems quite natural in any type of problem solving, especially based on the knowledge bases coming from former experiences.



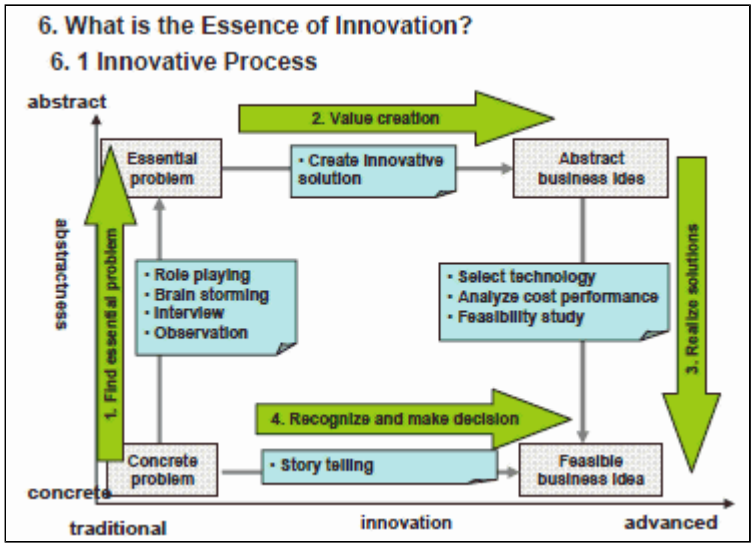


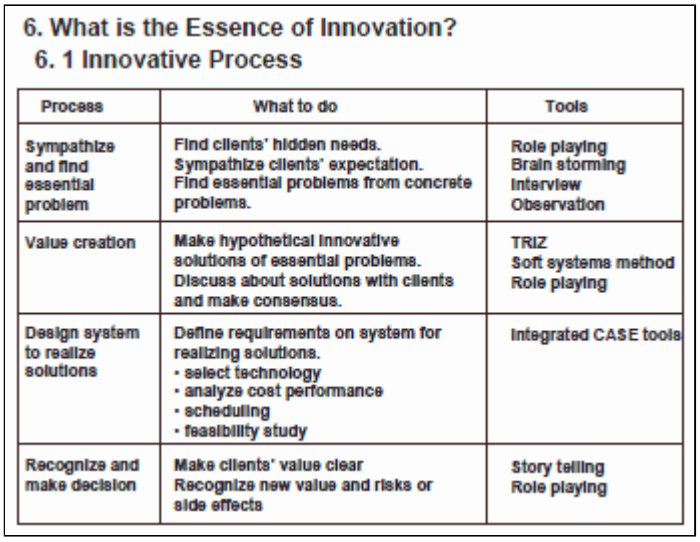
On the basis of these and other case studies, the Author concludes as shown in the following two slides (below).





For the further work of applying TRIZ to (Business) Innovation, the Author shows the following two slides. The basic scheme is the steps (1) Find essential problem (by abstracting the concrete problem), (2) Value creation (i.e. to create abstract business ideas), and (3) Realize solutions (to construct feasible business ideas). Then the Author describes the final step as (4) Recognize (the solution) and make decision (for actual actions). The Author writes that she focused steps (2) and (3) in this presentation and is going ahead to think more about the steps (1) and (4).





6. What is the Essence of Innovation?

6. 1 Innovative Process

Process	What to do	Tools
Sympathize and find essential problem	Find clients' hidden needs. Sympathize clients' expectation. Find essential problems from concrete problems.	Role playing Brain storming Interview Observation
Value creation	Make hypothetical innovative solutions of essential problems. Discuss about solutions with clients and make consensus.	TRIZ Soft systems method Role playing
Design system to realize solutions	Define requirements on system for realizing solutions. · select technology · analyze cost performance · scheduling · feasibility study	Integrated CASE tools
Recognize and make decision	Make clients' value clear Recognize new value and risks or side effects	Story telling Role playing

*** I feel the Author has been making progress for herself step by step in the field of business application of TRIZ for these several years, even though I am not so familiar in the field.

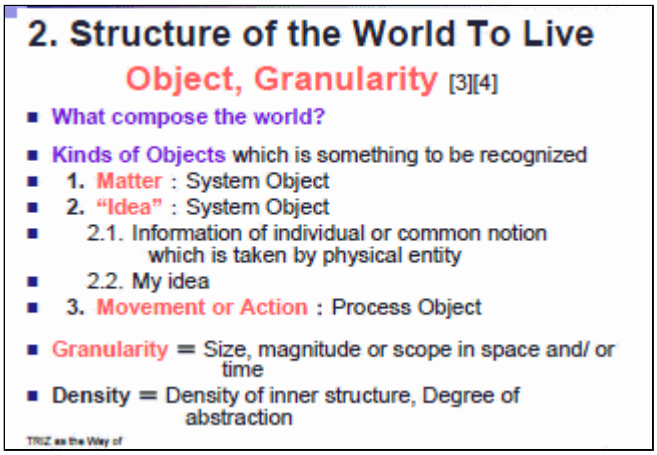
Toshio TAKAHARA [J10 O-20] gave an Oral presentation with a unique title of "TRIZ as the Way of Life?". This is quite a philosophical and serious paper with a big scope. I will quote the Author's Abstract first:

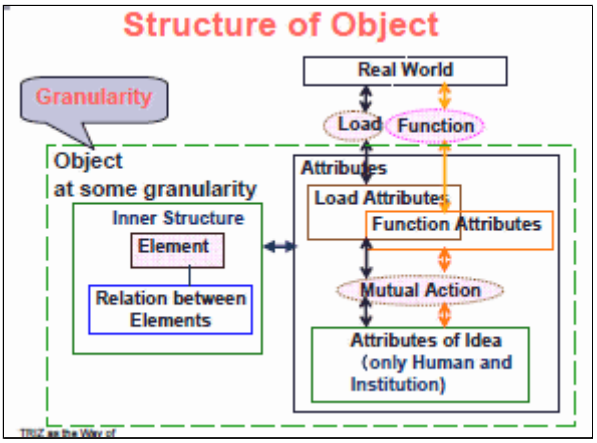
> TRIZ is an assemblage of methods (i.e., processes) consisting of changing attributes, solving "physical contradictions" and "technical contradictions", segmenting and merging of attributes and objects, as I presented at the Japan TRIZ Symposium last year. TRIZ could be applicable to every area including technological area and institutional area, I believe. To live is to change objects to realize our purposes. So the way of life includes our purposes and our attitudes how to realize and change the world. This paper shows that the concepts of structure, function, and granularity (or scope) of objects can build up unified purposes and guideline of attitudes how to realize and change the world. In this sense I apply Nakagawa's Essence of TRIZ in 50 Words to a much wider area: "TRIZ provides a dialectic way of thinking, i.e., to understand the problem as a system, to make an image of the ideal solution first, and to solve contradictions."

The Author's intention of this paper is to understand the structure of the whole World where we live in and to understand the Ideal Way of Life, from his view point of TRIZ. The Author has been developing a system of theories and presenting/publishing them in the Japan TRIZ Symposia (Please refer a collection of his papers

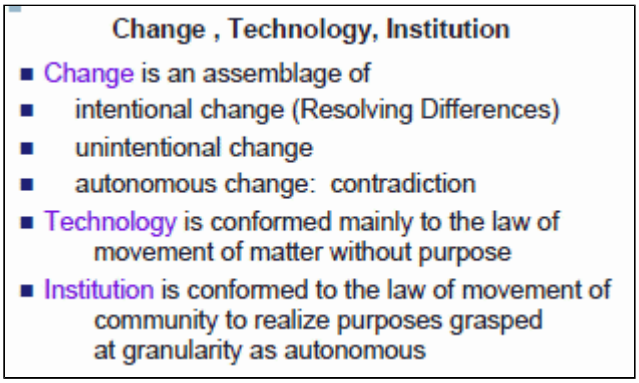
(2003-2007) posted in this Web site and another paper presented in 2008)

In his terminology, anything recognizable is called Object. Thus, as shown in the slide (below-left), the Author recognizes 3 kinds of Objects, i.e., Matter, "Idea", and Movement or Action. Granularity is the scope of understanding an Object (or a system) in space and/or time. The structure of Object is depicted in the slide (below-right), where the inner structure (i.e., elements and their relationships) and Attributes are shown.

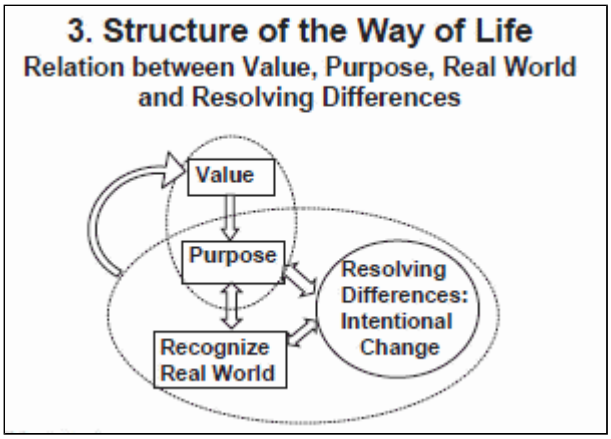


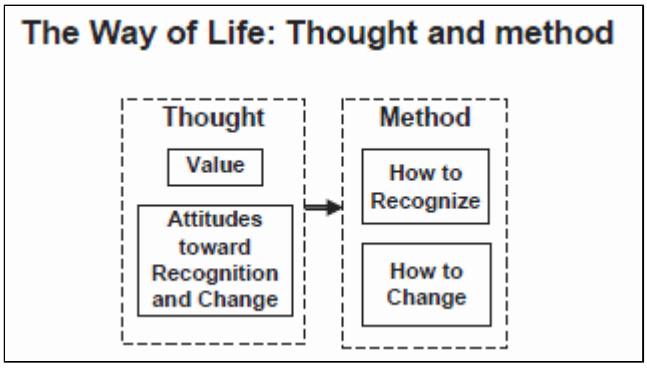


Then the Author introduces the concepts of Technology and of Institution (slide below-left). Change is the key word for representing the intentional changes by humans, unintentional changes, and autonomous changes.



Then the Author goes ahead to think of the Way of Life (slides below). In the slide (below-left) he understands the philosophical concepts of value, purpose, recognition of the real world, and intentional changes (i.e., human activities for resolving differences between desire and reality). And in the slide (below-right), he summarizes the relationship of Thought and Method.



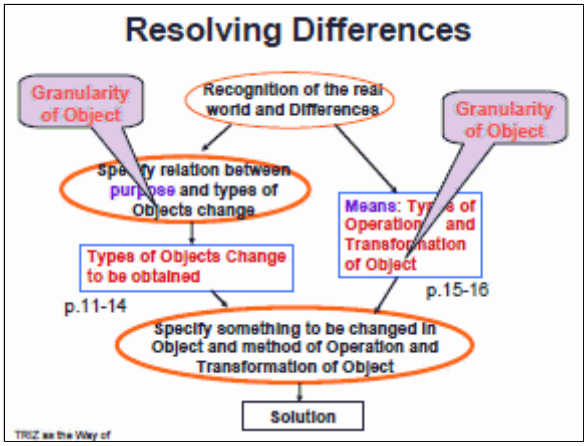


Then (in slide below-left) he visualizes each action by humans; recognition and resolving differences. The slide (below-right) shows the structure of resolving differences more closely.

Structure of Way of Life

- Generally (Function vs Structure),
  Function (Granularity of Object vs Function),
  Structure (Granularity of Object vs Relation or Logic between Sub-Objects)
- Visualize each action
- Recognition: Decide function, Granularity of Object, and relation between sub-Objects
- Resolving Differences: Decide Purposes, Granularity of Object, and Logic of change of sub-Objects
- Granularity of Object is most decisive

Resolving Differences



On the basis of all these preparatory consideration, the Author states his view of 'Ideal Way of Life'. The slide (right) is the summary statement of the Ideal Way of Life. The four slides (below) are some more explanations of these items (with somewhat different order). 'No perfect recognition and no perfect method to change' is his basic understanding, which urges him Continuous change, Criticizing existing ideas, and seeking for better recognition. With these understanding the Author derives the 'Roots of Values', in the sense of objective values as well as subjective values.

4. Ideal Way of Life

- Ideal Way of Life is
- to be modest about fact including existing idea,
- to believe in nothing, [3]
- to seek for value and method of realizing value criticizing existing idea and
- to continue to change myself, others and outer world simultaneously.

4.1. Continuous Change

- No Perfect Recognition and No Perfect Method to Change.

Therefore,

- Continuous Action or Change is important, not result
- Thought that bring about Change is important
- Method that deal with Change or Movement is important

4.2. Criticize Existing Idea

For Better Change:

- Continue to verify Input and Output,
- Be modest about fact including existing idea,
- Believe in nothing,
- Continue to criticize existing idea

4.3. Seek for Exhaustiveness of Objects and Complete Recognition

- Exhaustiveness of Objects and Objects Change: A classification into kinds of Objects and Objects Change as Types which cover the whole of Objects and Objects Change
- Criticize existing idea. Especially Dialectics, trend in evolution of Institution

4.4. Roots of Values

- Objective Value: Number of Life, Love, Liberty, Zero Load on Nature
  - Love is a sense of unity into history, nature, others and institution, and effort to enhance them
  - Liberty is an ability to recognize, judge and act
- Subjective Value: Modesty, Sincerity

The slide (right) is the Conclusion of this presentation. The Author states about the Ideal Way of Life, which is based on the facts, he says. To be modest about facts, and to believe in nothing. And thus to continue to criticize existing idea and myself, but at the same time, to continue to enhance others and outer world simultaneously. *** As far as I understand, the Author derived these conclusions from the viewpoints of TRIZ, and hence the Author is posing that "this is the Way of Life derived by TRIZ, and hence TRIZ as the Way of Life (?)".

5. Conclusion

- Ideal Way of Life based on fact:
  To be modest about fact,
  to believe in nothing,
  to continue to criticize existing idea and myself
  and
  to continue to enhance others and outer world simultaneously.

- TRIZ as the Way of Life?

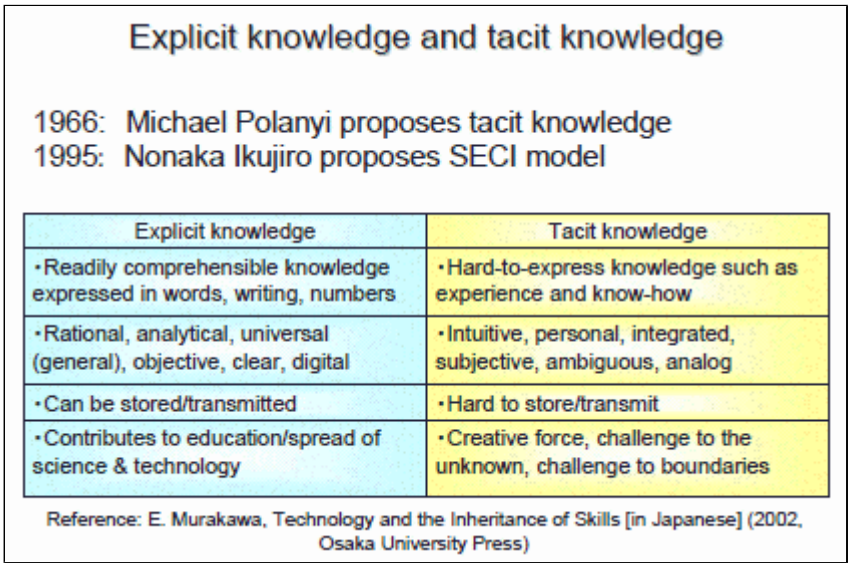
*** This is an amazing presentation, philosopnical, very deep and wide. Recently I received from the Author the Japanese scripts of the presentation. I am told he is going to write the English version as well. You will see them in this Web site in

the near future.

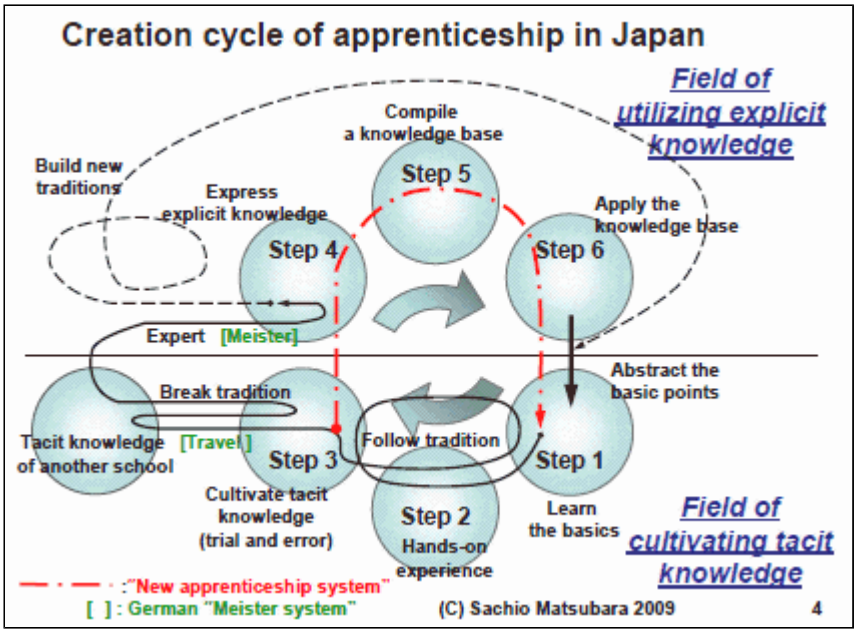
Sachio Matsubara (Niigata Univ.) [J15 O-6] gave an Oral presentation on **"Transitions of Japanese Manufacturing Methods from the Viewpoint of Constructing and Utilizing Explicit and Tacit Knowledge - The Rise of New Empiricism -".** The Author's Abstract is quoted here first:

> Since 2007, after receiving a Grant-in-Aid for Scientific Research (Exploratory Research) provided by MEXT, we have been performing research and promoting follow-up classes regarding the utilization of TRIZ in university education at Niigata University. Regarding the introduction of TRIZ and other creativity methods in school education, we aim to nurture extensive creativity by raising the independence of the students, as well as to introduce learner-oriented teaching methods. In this paper, upon reviewing the transitions of Japanese manufacturing methods, we discuss the rise of the new empiricism and "High-Concept" by Daniel Pink from the point of view of explicit and tacit knowledge.

The whole discussion of this paper is based on the concepts of 'Explicit knowledge' and 'Tacit knowledge', whose characteristics are described in the slide (right). The Author is interested in examining the historical changes in the training/schooling practices in Japan from the view point of the balancing of these two types of knowledge. He discusses such practices in the eras of Edo (1600-1868), Meiji and Pre-war (1868-1940), and Post-war (1945-), and then proposes a new direction for the future.



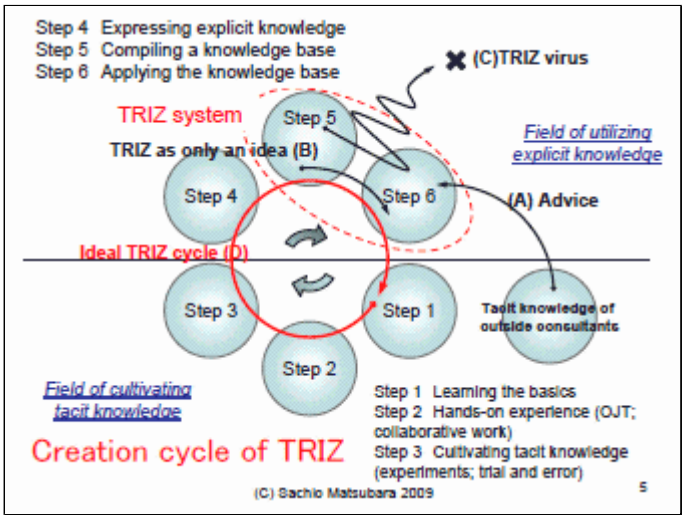
The slide (right) is drawn by the Author based on E. Murakawa (2002) and Nonaka Ikujiro's SECI model. It describes the apprenticeship system in traditional manufacturing in Japan, typical in Edo as well as Pre-war era. The basic strategy for apprenticeship was clearly stated in the 15th century in the field of Nogaku and later in tea ceremony. It says Shu-Ha-Ri: Shu is the stage to follow the tradition at 15-30 years of age, Ha is the stage to break the tradition little by little at 30-60 years of age, and Ri is the stage to establish a new, separate school/tradition at 70 years of age for real masters. Such a traditional apprenticeship system in Japan is quite similar to the traditional Meister system in Germany. The steps of the training are shown in the slide (right).



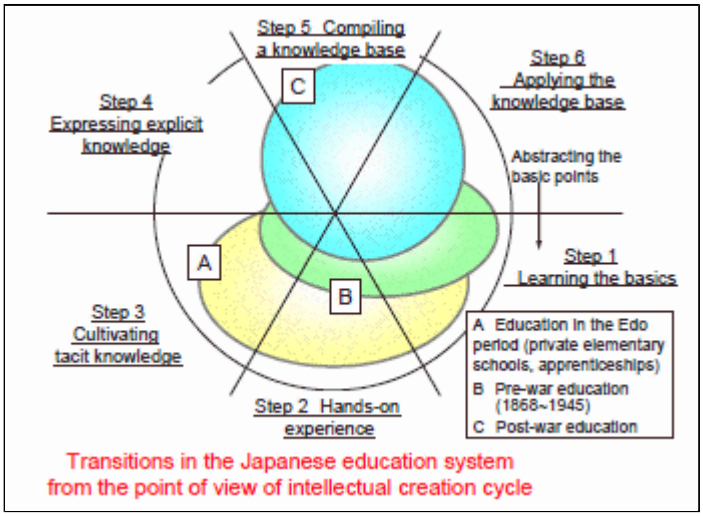
In reference to the above scheme, the Author illustrates the creation cycle of TRIZ. The lower half, Steps 1 through 3, is the steps for cultivating tacit knowledge, while the upper half, Steps 4-6, the stages of using explicit knowledge. The Author regards the TRIZ system, such as TRIZ software

tools, being related to Steps 5 and 6. (A) is the way of getting advices from (TRIZ) experts (e.g., TRIZ consultants). (B) is the way of utilizing TRIZ knowledge bases (either in the software tools or in handbooks). (C) is the case of so-called 'burning out with TRIZ virus'. (D) is shown as 'Ideal TRIZ cycle'.

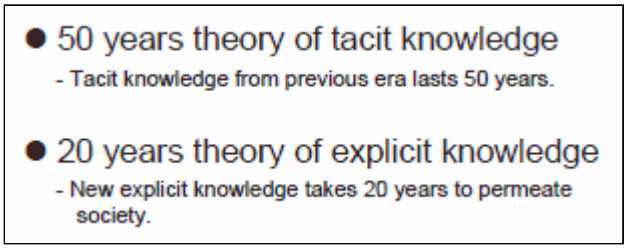
*** I feel the wording of 'TRIZ system' by the Author is not appropriate. The whole methodology of TRIZ contains much more thinking process. Studying TRIZ, working and using TRIZ, mastering TRIZ, and rebuilding TRIZ need all the steps shown here, just like (D). ***



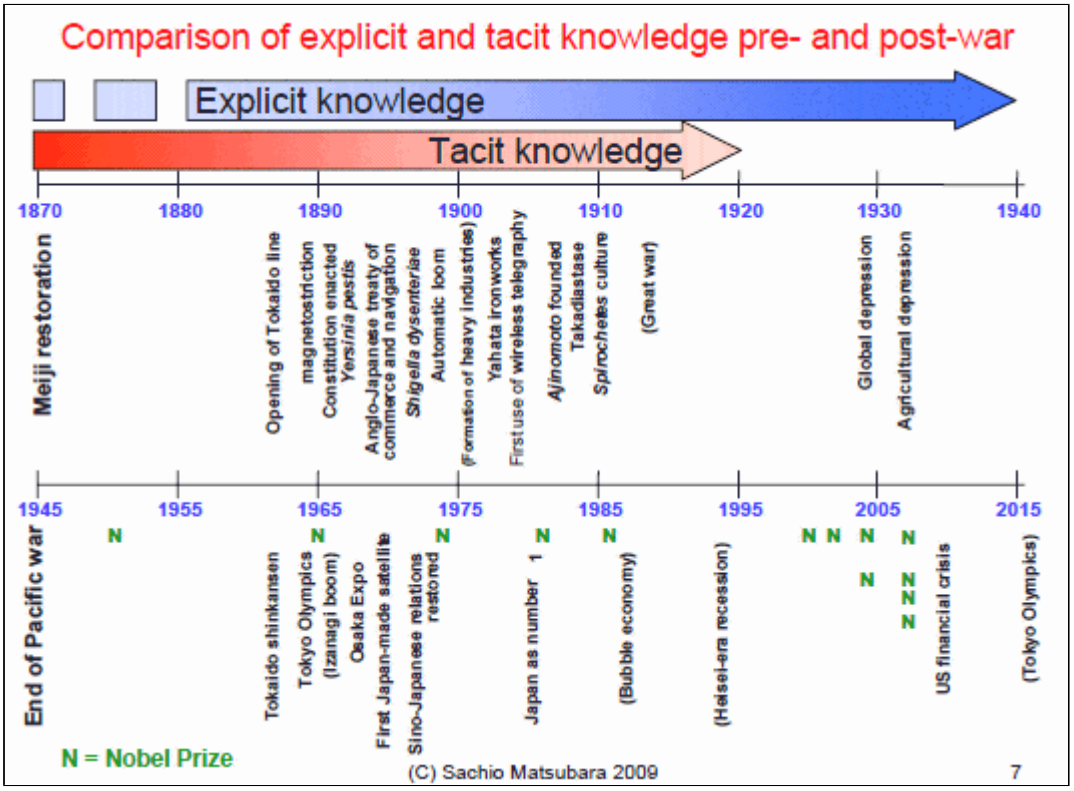
The historical transition in the Japanese education system is shown in the slide (right) from the view point of intellectual creation cycle. The space is characterized by the six steps of intellectual creation cycle. The area A represents the education in the Edo period, having private elementary schools (called Terakoya) and apprenticeship in all the job areas. The area B stands for the Pre-war education, while C for the Post-war education. The weights of education has shifted from the tacit knowledge (or tacit way of teaching/learning) to the explicit knowledge.



From the observation of history the Author proposes an interesting hypothesis as shown in the slide (right). (1) "Tacit knowledge from previous era lasts 50 years". People of 10 years of age at the end of the last era retire the society after 50 years at the age of 60. Tacit knowledge obtained in the young age lasts life long. (2) "New explicit knowledge takes 20 years to permeate society." These hypotheses have been derived from the observation of history of drastic change in Japanese society, as shown in the next slide.

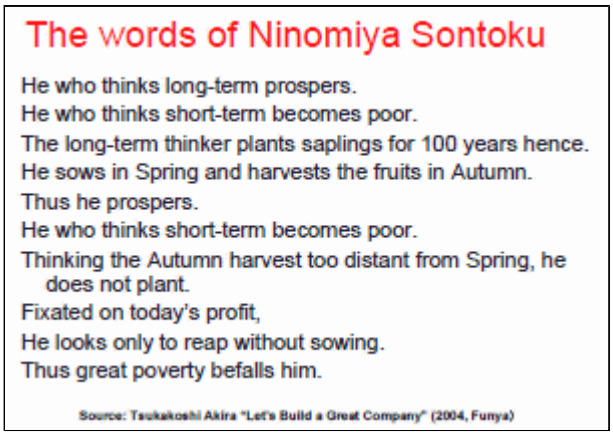


The slide (below) displays the history of Meiji & Pre-war era in comparison of the history of Post-war era in Japan. Meiji restoration in 1868 was a drastic change from Edo society to the start of modernization. After 20 years, opening of Tokaido line (i.e., railroad from Tokyo to Osaka), enacting of constitution, etc. showed the establishment of a new society system. Various world-class inventions were achieved and heavy industry started. The end of the Pacific War in 1945 was the start of another drastic change. In this case the nation's experience of the disastrous failure of militarism formed the strong tacit knowledge of desiring peaceful society and joy in being able to work in peace, the Author writes. In 20 years the economic rise started and in 40 years the phrase "Japan as No. 1". Then serious depression came after the Bubble economy, in 1990s, i.e.,about 50 years after the end of war.

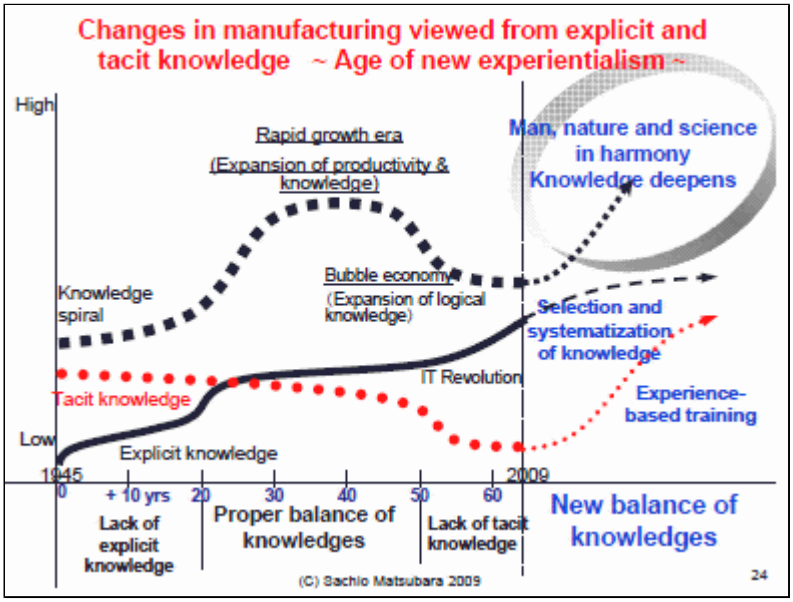


The Author discusses that the high-rise of the society was achieved when both of (old) tacit knowledge and (new) explicit knowledge were active. In this sense the 260 years long peaceful Edo era was remarkable. The Author discusses that the Edo shogunate had special strategies to keep/renew the instillation of tacit knowledge for avoiding domestic wars.

As an example of such thought, the Author quotes the words of Ninomiya Sontoku (1787-1856). He was a son of farmer and became famous in managing villages for having saved from poverty and famine.

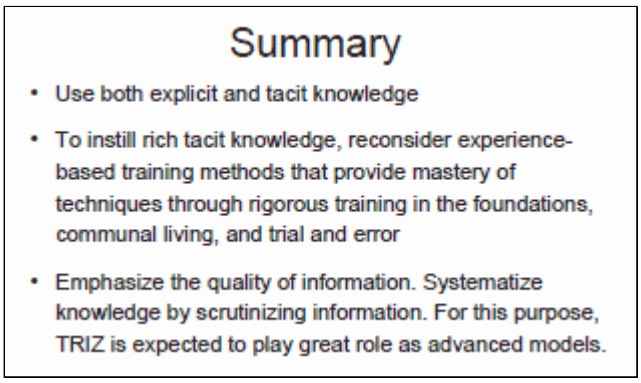


The slide (right) is the Author's interpretation of the Post-war history of Japan from the viewpoint of explicit and tacit knowledges. During the period of 20 to 50 years after the war, Japan had a proper balance of knowledges and hence enjoyed the rapid growth era. Since around 1995 (i.e., 50 years after the end of war), the tacit knowledge faded and hence Japanese society lost its vitality. Hence the Author proposes to put more weights on the tacit knowledge by experience-based training. New balance of these two types of knowledge will be the key to the new society where man, nature and science in harmony.



The Author also quotes several examples of current manufacturing companies (mostly SMEs) which have been emphasizing the tacit knowledge and achieving long-term growth and profits. *** But I need to skip them here because their slides are mostly written in Japanese.

The slide (right) shows the conclusion by the Author. "Use both explicit and tacit knowledge" is his main message. For this purpose he proposes to instill rich tacit knowledge by experience based training and to emphasize the quality of information. TRIZ is expected to play a role as the advanced models for systematizing high-quality information.

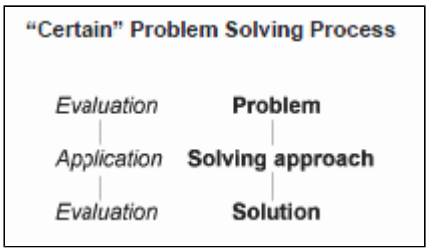


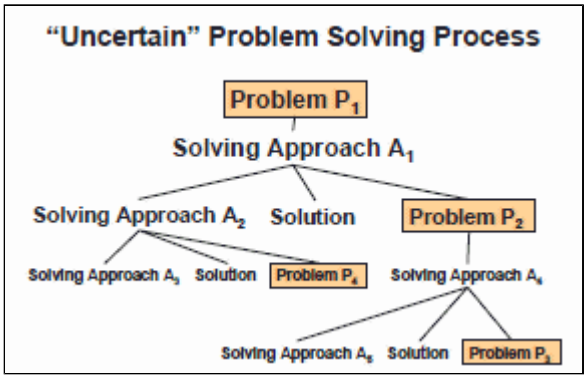
*** The Author's interpretation/discussions on the cultural history of Japan is interesting. The parallelism of Meiji & Pre-war era and Post-war era is remarkable. -- Since the Author submitted a full paper besides the presentation slides in English as well as in Japanese, they will be made available in this Web site in the near future.

Vitali Altholz (International Graduate School Zittau, Germany) [E03 O-10] gave an Oral presentation with the title of "Legitimacy of A Problem Solving Approach and Its Success in Practice As A Decision Criterion". The Author's Abstract is quoted here:

> Providing a critical-analytical review about issues such as a problem solving approach and its legitimacy, this paper comes to the conclusion that even if there are no universally valid concepts or models for problem solving, a certain framework of requirements for effective problem solving can be created. By developing a general problem solving process and a perspective of problem solving under uncertainty, the author argues that the success of a particular problem solving approach is an important, but still in some cases, insufficient criterion for choosing a successful approach. This paper recommends adding a base of legitimacy to the criterion “success in practice” when choosing problem solving approaches. Such a legitimacy base would consist of three points: (1) demonstration of similarities between a new and previously solved problem, (2) possibility to reconstruct the successful problem solving approach, and (3) a similar as possible application of the successful approach to the new problem.

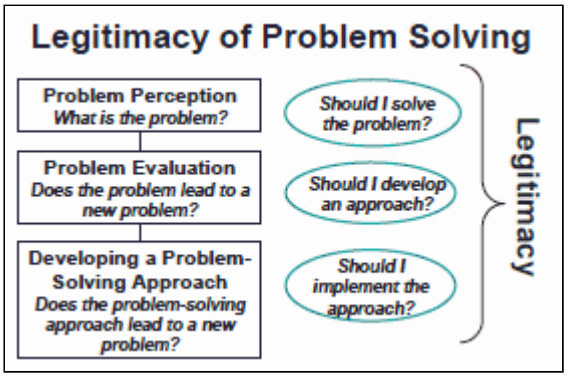
This paper discusses on the legitimacy (i.e., reasonability, sensibility) of a wide range of problem solving approaches. In ordinary cases we expect a problem solving process to be 'certain' (as shown in the slide (center)), but in some other cases problem solving processes are 'uncertain' (in the slide (right)), generating new (sub)problems.

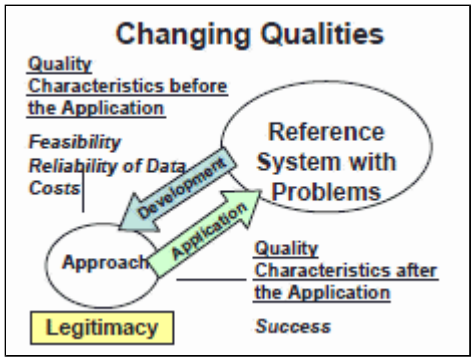




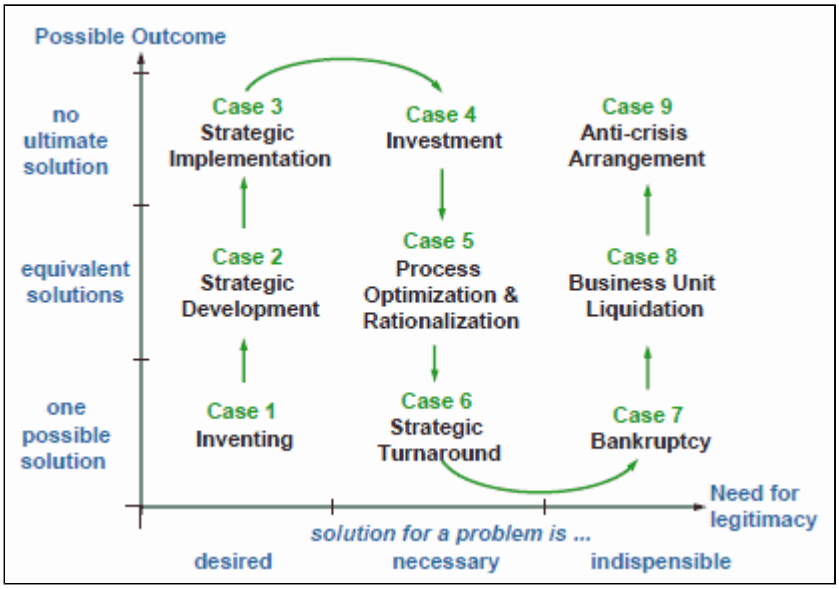
The criteria for legitimacy of problem solving (approaches) are explained in the slides (center and right).

[*** I still feel somewhat unclear about the Author's concepts of 'legitimacy of problem solving'.]





The Author demonstrates a variety of problems for an automobile supplier company XY. The slide (right) is the framework of characterizing the problems. The abscissa distinguishes whether the solution for the problem is either desired, necessary, or indispensable; whereas the ordinate distinguishes whether the possible outcome is either one possible solution, equivalent solutions, or no ultimate solution. The Author describes nine cases as examples of the types of problems in this 3x3 matrix. Those nine cases are shown in the slides below, which are arranged in the scheme presented in the slide (right). Please note a unique numbering of the cases to be explained.



Case 3: **Strategic Implementation**

In this scenario, the intended strategy of company XY is to be implemented. Strategic activities and decisions derived from a strategic plan would not show any definite short-term effects, and it is not possible to make a clear prediction about whether the strategic outcome would be positive or not. Thus, implementation of a corporate strategy is a long, iterative and complicated process without any particular ultimate solution and, again, the question of legitimacy remains a matter of internal concern.

Case 4: **Investment**

Even if business expansion is usually part and parcel of a strategic plan, investments and strategic running expenses are, for the most part, not explicitly included in a corporate strategy concept. Still, for the company to grow, it is necessary to invest in various types of activities, regardless of whether the effects of the investment are entirely predictable or not. Since there are many possible "solutions" concerning the problem of how to conduct investments, the investment activities of company XY should be legitimized due to the demands of various internal and external stakeholder groups such as, for instance, employees and financial institutions.

Case 9: **Anti-crisis Arrangement**

From a state of global economic disturbance to economic problems within a particular industry sector, company XY has to find certain solutions in order to ensure its own survival. Therefore, when conducting problem solving approaches within complex environment circumstances, any problem solving strategy would become questionable even before its implementation. The company would not receive any particular effects in the short run from the implementation of its problem solving strategy and probably would not be able to observe any particular effects in the long term either. Because of the complexity, unpredictability and high risk of any problem solving activities when facing economic disturbances, anti-crisis arrangements should be explicitly legitimate within the company's internal business structures as well as within its external environment, taking into consideration general legal and political conditions and requirements.

Case 2: **Strategic Development**

There are many small and medium-sized companies which do not have an explicit, strategic concept. Nevertheless, company XY decides to develop a general business strategy. In this case, the company's management is confronted with the task of choosing the most appropriate strategic plan among various possibilities and often equivalent alternatives. The legitimacy of the initial strategic choice remains solely an internal issue.

Case 5: **Process Optimization and Rationalization**

Through the development of a technical perspective of company XY and, in particular, optimization and rationalization of the activities surrounding its internal business processes, there are basically several equivalent solutions for choosing the appropriate approach: An improvement in technical issues is more calculable in this case than strategy-related investments. However, similar to the case of investments, the optimization and rationalization of processes remains a matter of legitimacy regarding, for example, the company's employees and environmental agencies.

Case 8: **Business Unit Liquidation**

Closing a business unit of company XY is an individual case. When confronted with this issue, the company must often decide which business unit should be closed down and to what extent, taking into consideration a variety of equivalent solutions. As with the particular case of bankruptcy, business liquidation demands a legitimate explanation to, for instance, the company's employees, business partners and authorities.

Case 1: **Inventing**

An experienced engineer, who works in the R&D department of company XY, is confronted with the task of developing a new, improved snow tire tread. The company has allocated him a subsequent testing of materials, so that basically the engineer has to legitimate the development of a particular tread material and conduct (trial-and-error) experiments by calculating costs and the time required.

Case 6: **Strategic Turnaround**

The desire of a company to carry out a strategic reorientation is based, in the most extreme case, on a total negation of its previous strategy. Thus, since it is necessary for company XY to repudiate its corporate strategy, there would be only one possible solution, i.e. strategic turnaround, which should be legitimized by the company's interest groups.

Case 7: **Bankruptcy**

If company XY should totally fail in the fulfillment of its business strategy, declaring itself bankrupt would be the one and only possible solution for the entire liquidation of the company. Still, this step should be justified and discussed from a social, ethical, legal and sometimes political point of view, answering the question of whether there could be any other possibilities of keeping a particular company "alive" or not.

*** This presentation poses a wide scope of problem areas in the field of business applications of TRIZ.

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