The 17th Japan TRIZ Symposium 2021

Abstracts

June 15, 2021 **(1st announcement)**

Symposium Executive Committee

EI01 Isak Bukhman（TRIZ Solutions LLC）

(Keynote lecture)

Trend of TRIZ Application in Industries in the World

Isak Bukhman

(*President of Altshuller Institute for TRIZ Studies, USA*)

It is very difficult (maybe even not possible) to create a clear trend of TRIZ (TRIZ Technology for Innovation) application in industries around the World. We do not have an exact number of projects where TRIZ was used. We do not have information about these projects' importance and how good they were created in hundreds of big and small industrial companies in the World. We do not have access to these projects' details; it is very secure and secret information in most cases.

I prepared my presentation based on my personal experience of working with many leading and famous industrial companies. I also have used precious information received from many of my partners and colleagues around the World.

In the presentation will be highlighted the following moments:

1. Which kinds of projects were successfully created by using TRIZ for different companies around the World?
2. Strategy and tendency of using TRIZ in industrial companies.
3. Integration of TRIZ into different companies
4. Positive and negative lessons we learned on the way of using TRIZ in different companies.
5. Recommendations for integration and using TRIZ for industrial companies.

JI02 **Koichi Sumikura, Professor, National Graduate Institute for Policy Studies**

(Special lecture)

Open innovation by academia-industry cooperation

Koichi Sumikura, Professor, National Graduate Institute for Policy Studies

Private companies in R&D oriented industries are moving toward open innovation, not only depending on knowledge inside but using outsider knowledge for creation of new products and services and introduction of new processes. Universities are expected as a provider of knowledge for innovation and various forms of academia-industry cooperation are going on. In this presentation I argue how to overcome misunderstanding or mismatch between academia and industry to implement innovation sustainably by their cooperation.

JO1 Koichi Akagi (Mitsubishi Power, Ltd.)

Proposal of how to use TRIZ for work improvement Verification with a large gas turbine

Koichi Akagi (Mitsubishi Power, Ltd.)、Manabu Sawaguchi (Ritsumeikan University)

Improvements to conventional on-site work have been carried out by small group teams that are mainly on-site, and IE and QC have been mainly used as methods to be utilized. And this activity has definitely been successful. However, due to the decrease in the number of field workers due to the declining birthrate in recent years and the rapid progress of ICT, it is necessary to change the method of improving field work. The authors are promoting the improvement of field work according to the concept of the SECI model of organizational knowledge creation. This converts field work information into explicit knowledge information to build a database, and uses that information to implement organizational improvements. Next, it is an activity to provide improved information to the site and share the information throughout the organization including the site. The authors devised a procedure to combine FAST and TRIZ as one method to utilize this information to implement organizational improvement. First, the problems of field work are visualized by the FAST diagram. And as a method of continuous improvement, TRIZ's "Technical Contradiction and Invention Principle" will be utilized. On the other hand, TRIZ's "Trend of technological evolution" will be utilized as a method of destructive improvement. In this practical paper, we discuss this method and report a practical example of using this method to create an improvement plan for the processing of parts of an actual large gas turbine.

J02 Koichi Akagi (Mitsubishi Power, Ltd.)

Survey of application of solution tools to manufacturing improvement ideas

Koichi Akagi (Mitsubishi Power, Ltd.)

Based on the results of the 10-year manufacturing VE that has been carried out by

Mitsubishi Heavy Industries, we will extract specific examples of brainstorming ideas from functions. As a concrete example, we investigate which of the TRIZ solution tools was applied to come up with the same idea. Using the results of this survey, we will be able to actively apply TRIZ solution tools as well as brainstorming.

J03 Atsunori Someya（Ritsumeikan University）

Proposal of an approach to innovate maintenance and repair t echnology utilizing physical contradiction resolution

Atsunori Someya（Ritsumeikan University）、
Masao Oda（Ritsumeikan University），Manabu Sawaguchi（Ritsumeikan University）

Most of the existing domestic infrastructure (hereinafter abbreviated as infrastructure) such as road structures has been developed after the period of high economic growth, and the proportion of infrastructure that has been constructed for more than 50 years will increase at an accelerating rate. Under these circumstances, there is a social background such as a declining population, a declining birthrate and an aging population, and there is concern about a shortage of engineers. Therefore, extending the life of infrastructure is an issue, and innovative technologies for maintenance and repair are required. There is. This paper focuses on the development of road structure maintenance and repair technology, and designs an innovative and concrete ideal form by combining the dialectic aufheben process and TRIZ's physical contradiction resolution method (law of separation). We propose an approach for this.

J04 Yoshinori Takagi

”Triz's 9-screen method” 3 screen division and labeling, application example

Yoshinori Takagi

TRIZ's 9-screen method is powerful, but usage opportunities ≒ improvement opportunities were limited. Therefore, we adopted labels such as "environment / element" and "user / invention element" on the vertical system axis. In addition, we tried multiple usages with the horizontal axis as the "right column for ideas and hypotheses" such as "conventional → new → guessing". This makes it a thinking support tool that can consistently "organize-> think-> transmit" information in a wide range of daily life.

Past achievements and challenges TRIZ is powerful, but the place to use = opportunity to improve is limited Planning staff involved in product planning	Achievements and issues of this proposal Increase opportunities for improvement and popularization by using the 9-screen method on a daily basis For the University of Tokyo, Sony, parents and children	Social contribution Increasing number of people who can use their abilities for the benefit of society
Comparison 9 screen method of TRIZ ~ Future product planning	Presentation subject Trie's 9-screen method	Future plans 9 screen method x other tools ○○ 9 screen
↑ element ・ 3x3 9-mass structure ・ Upper / lower system axis ・ Linear past → present → future	↑ element ・ 3 horizontal screens and 3 vertical screens ・ Environment / element, Why / How ・ Old and new facts → Guess	↑ element (ToDo) ・ Cooperation with other TRIZ tools ・ Utilization of 9 screens in multiple fields ・ Practice and public relations of cross-border cases

J05 Motoharu Miki (OLYMPUS Corporation)

Promotion of Olympus's Scientific Approach including TRIZ

～All New Graduators Experience TRIZ with Fun and Interest～

Motoharu Miki (OLYMPUS Corporation)

Olympus has promoted “7 solutions” based on QFD, TRIZ, and Taguchi Method to meet the needs of R&D engineers with focusing on upstream of the development process since 2012.

By our activities, R&D engineers have begun to recognize the above 3 Scientific Approaches. However, only engineers in some departments were utilizing them and the situation did not reach the company-wide expansion that should be aimed at. Therefore, in order to broaden the base of utilization of scientific approaches, we held a seminar (*) where the new graduators could experience TRIZ as a part of company-wide group training for them in collaboration with the Human Resources Education Department. As the result, we were able to promote the attendance of in-house training on the scientific approach and we were able to get a chance for the company-wide expansion.

*: The arrangement of the tutorial that was held at the 2018 TRIZ May Seminar

J06 Yasunori Nakao

Development and results of business model idea idea tool that applies TRIZ invention principle and evolution pattern

Yasunori Nakao

TRIZ and I-TRIZ can be applied to various things and can be used as problem / problem solving, but it seems that it is difficult for new human resources to come in. Therefore, people who aim to become entrepreneurs in the accelerator program (entrepreneur support program) that they were doing to start a business are interested in TRIZ based on the idea idea, and think that they should enter the world of TRIZ. Developed the tool. The idea idea tool (name: TOITOKU tool) also applies the knowledge of TRIZ's invention principle and evolution pattern, and introduces the development process and results of the tool.

J07 Toshimitsu Kataoka（Pat Brain Co., Ltd.）

"Pinch is a chance!" Consideration of TRIZ spread - Challenge to regional revitalization -

Toshimitsu Kataoka (Pat Brain Co., Ltd.)

We will report on the presenter's encounter with TRIZ, the history of dissemination activities, and how he tried to disseminate TRIZ in regional revitalization activities. Since 2017, the "Machida Future Business Idea Contest" has been held under the auspices of the Machida New Industry Creation Center in the third sector co-sponsored by Machida City and the founding support facilities in the city. The contest aims to match idea proposers with local companies and revitalize Machida City with new business ideas. The presenter participated as a judge from the beginning. Since 2019, he has been in charge of idea creation orientation and workshops. We will report the results of the BS method, checklist method, and TRIZ awareness survey. One person tells three friends, and if seven people gather, seven samurai. Let's aim to popularize TRIZ by doubling the power!

J08 Narumi Nagase (Japan TRIZ Society)

TRIZ-Rx Subcommittee Activity Report Part 2 Symposium Announced Information Database Construction Status

Narumi Nagase (Japan TRIZ Society), Shinsuke Kurosawa (Japan TRIZ Society),
Yuji Mihara (Japan TRIZ Society), Toshimitsu Kataoka (Japan TRIZ Society),
Kimihiko Hasegawa (Japan TRIZ Society), Osamu Ikeda (Japan TRIZ Society),
Fumiko Kikuchi (Japan TRIZ Society)

As a new subcommittee activity, the activities and examination results of the TRIZ-Rx subcommittee (TRIZ symposium already announced information utilization research subcommittee), which was launched at the 2018 TRIZ symposium, after 2019 will be summarized and announced. The purpose of the activities of the TRIZ-Rx subcommittee is "to organize the contents presented at the symposiums so far and consider smarter utilization. It will lead to development. " In this presentation, we will introduce countermeasures for some issues found in the prototype construction of the simple database that we worked on in the first year, the database released as a sample version, and future activities.

J09 Narumi Nagase（Japan TRIZ Society, Intellectual Property Creation Research Subcommittee）

Examination of TRIZ that is close to beginners and beginners
ー With the fusion thinking of QFD and TRIZ operator ー

Narumi Nagase（Japan TRIZ Society,
Intellectual Property Creation Research Subcommittee）

At the Intellectual Property Creation Research Subcommittee, the recent slump in the spread of TRIZ practice is regarded as a problem, and people in various positions can be personalized by anthropomorphic thinking, or the opinions of people they have met in the past can be reflected. Then, I looked at TRIZ negatively and clarified the reason and cause of saying "I don't like TRIZ". Starting from the information of "I don't like TRIZ", I will utilize the thinking method of VOC generation of QFD (Quality Function Development) and the operator of I-TRIZ in a fusion manner, especially targeting beginners and beginners of TRIZ. I examined improvement measures such as spreading and promoting understanding of TRIZ. The summarized policy proposal was disclosed to the members of the Intellectual Property Creation Research Subcommittee, and although it was partial, preliminary evaluations were also conducted before implementation, such as receiving opinions in favor of the policy content. In this presentation, along with the introduction of the measures, we will also disclose this thinking process, and in particular, introduce

the effectiveness of efforts by integrating methods for social issues.

J10 Toru Nakagawa (Osaka Gakuin University)

World TRIZ-related Sites Project (WTSP) (4) Construction and Enhancement of World WTSP Catalogs of TRIZ Sites and Around-TRIZ Sites

Toru Nakagawa (Osaka Gakuin University, Japan),
Darrell Mann (Systematic Innovation Network, UK),
Michael Orloff (Academy of Instrumental Modern TRIZ, Germany),
Simon Dewulf (AULIVE & Innovation Logic, Australia),
Simon Litvin (GEN TRIZ, LLC., USA),
Valeri Souchkov (ICG Training & Consulting, Netherlands)

The WTSP Project intends to construct a system of Catalogs which collect and introduce valuable Websites in the world in the fields of TRIZ and related methodologies. It started in December 2017 on a volunteer basis, and constructed and publicized the Preliminary Edition of World WTSP Catalogs in October 2019. The Beta Edition was publicized last year.

World WTSP Catalogs of TRIZ Sites were compiled with the manuscripts from 4 countries (i.e., Japan, Malaysia, China, and Russian Language Region) and from two internet surveys (i.e., of the sites in the world and in USA). They include Most-important ◎ 23 sites and Important ○ 39 sites. World WTSP Catalogs of Around-TRIZ sites were constructed after visiting about 1000 sites obtained in multiple internet surveys with different keywords such as Creative Problem Solving, Innovation, etc. Most-important ◎ 33 sites and Important ○ 127 sites are introduced. We have already established the structure and its construction process of World WTSP Catalogs, which are easy to update and enhance.

For the purpose of making the WTSP Catalogs really attractive and useful, we are now seeking (1) to get introductions of individual sites written by their site owners and (2) to build Country WTSP Catalogs in many individual countries. And for supporting these bottom-up activities, (3) we are working to do internet surveys of sites in

individual countries. The World WTSP Catalogs will certainly grow into a valuable and useful information source, for beginners, users, and experts all over the world (of course including Japan).

J11 Hiroki Ikegaya (Japan TRIZ Society, Intellectual Property Creation Research Subcommittee)

About the process of TRIZ beginners becoming familiar with TRIZ

Hiroki Ikegaya (Japan TRIZ Society,
Intellectual Property Creation Research Subcommittee)

I hear that the boom of TRIZ in Japan has been about five years since it was introduced in the Nikkei Mechanical magazine in 1997 as "super-invention" until about 2002. Many companies abandoned the use of TRIZ and withdrew because it was not as effective as expected. Why was TRIZ not fully utilized in Japan? (1) TRIZ proficiency rate for beginners tends to remain low due to the difficulty of TRIZ itself. (2) Organizational efforts are required, and there is difficulty in continuing. Isn't it possible to think of the above? It is difficult and difficult to continue because TRIZ requires an unhabitual thinking process. How can beginners establish TRIZ's non-habitual thinking? In other words, how can engineers self-teach and self-teach TRIZ thinking without relying on the organizational efforts of companies? I would like to introduce my own learning efforts as a beginner and propose effective learning methods for TRIZ.

J12 Sachio Matsubara (Former professor at Kyushu University)

Transitions of Japanese manufacturing methods from the viewpoint of constructing and utilizing explicit and tacit knowledge: the second report ～The win-win relationship between tacit knowledge and TRIZ～

Sachio Matsubara (Former professor at Kyushu University)

The author presented a paper with the same title (the first report) at this symposium in 2009; this is the second report. The first report considered societal transition, comparing the two eras of Japan's Meiji Restoration and the period that began after the end of the Second World War. The author hypothesized that tacit knowledge of the previous era disappears in 50 years and that society will prosper when this tacit knowledge coexists with new explicit knowledge.

The first cycle, which began with the Meiji Restoration, shifted to the second cycle after 75 years. If the same logic is applied to the second cycle, which began at the end of the Second World War, a transition to the third cycle should occur in 2020. Consistent with this premise, major global cataclysmic events began in 2020. To make this imminent new era rich and fruitful and so that it exists in harmony with the environment, it is necessary to be even more proactive than before in incorporating the process of fostering tacit knowledge into education and production.

To achieve this aim, the current study leverages TRIZ as a tool for cultivating in-depth tacit knowledge, examines tacit knowledge as an environment that maximizes the functions of TRIZ, and considers the conditions for building a win-win relationship between the two.

J13 Ikuo Yoshizawa (NPO Japan TRIZ Society)

Research on general-purpose application methods of "evolutionary trends" ~How to use the "evolution trend" that can be seen from the evolution of the business model in the new corona virus ~

Business / Management TRIZ Research Subcommittee
(NPO Japan TRIZ Society)
Osamu Ikeda, Hisataka Izawa, Mamoru Ohashi, Fumiko Kikuchi, Yasuo Moriya, Ikuo Yoshizawa

In this study group, we aim to develop research and guidance for utilizing TRIZ, such as application methods and case studies, for issues in the fields

of business, management and management, and to contribute to the spread and development of TRIZ. doing. In the activities so far, TRIZ-style analysis tools (management-related contradiction matrix and invention principle, evolution trend and evolution level, etc.) have been roughly prepared. We selected several "models" from all aspects and analyzed (reverse) the success factors in the TRIZ style. Then, at the 12th TRIZ Symposium (2016), the business model was specified as "LCC (Low Cost Carrier) Model", and the framework of TRIZ style business model creation was applied to explore the evolutionary business model. At the 13th and 14th TRIZ symposiums, we focused on specific tools and examined how to apply the "evolutionary trends" proposed by Darrell L. Mann. This time, we will explore the future trends of specific businesses centering on "evolution trends" and present a method for identifying new functions (success factors & competition factors) that should be satisfied in the future.

1. **As an application method of "evolution trend", it is sublimated from personal application to a tool with some versatility.**
2. **We will analyze the factors that transform specific businesses in the new corona disaster, explore business environment trends, and conduct case studies to build evolutionary business models.**

J14 Takuya Fujii
(Japan TRIZ Society, Intellectual Property Creation Research Subcommittee)

Proposal of ideas for improving TRIZ symposium using creative techniques

Takuya Fujii (Japan TRIZ Society,
Intellectual Property Creation Research Subcommittee)

The TRIZ Symposium has a history of 17 times from the first in 2005 to this year, and has been responsible for the spread and development of TRIZ and the exchange of TRIZ related parties as Japan's largest TRIZ event. However, in recent years, while other thinking technologies such as design thinking and art thinking

have been whispered by the media and companies in Japan, it can be seen from the tendency of Google search results that the degree of attention to TRIZ is decreasing year by year1). In line with this, the number of participants and presentations of the TRIZ symposium is also declining, and it must be said that the spread of TRIZ in Japan is currently stagnant. The Intellectual Property Creation Research Subcommittee regards this as a "crisis of systematic TRIZ activities", and each member examines solutions to the problem of "TRIZ does not spread" using various creative techniques such as TRIZ. I went to. In this presentation, we will focus on the TRIZ symposium, which is the front line of the spread, development and exchange of TRIZ, and report the results of examining improvement ideas using various creative techniques.

J15 Kimihiko Hasegawa
(Japan TRIZ Society, Intellectual Property Creation Research Subcommittee)

Proposal of TRIZ organizational activity dissemination measures by analysis of TOC thinking process

Kimihiko Hasegawa
(Japan TRIZ Society, Intellectual Property Creation Research Subcommittee)

Due to the influence of the new coronavirus infection, the symposium sponsored by the Japan TRIZ Association last year was canceled, and it is expected that this year's symposium will be held on a small scale. Meanwhile, the Intellectual Property Creation Research Subcommittee has no direct relationship with the new coronavirus infection, but in view of the recent slump in the number of participants in events hosted by the Japan TRIZ Association. , It was decided to consider measures to popularize TRIZ activities in Japanese companies and other organizations. However, even in the IP Creation Research Subcommittee, it was difficult to have lively discussions on such a big theme in the environment of Web conferencing, and it was difficult to combine research activities for a specific purpose into one result. It was decided that each person would consider and announce the measures to be considered in their respective fields of specialization.

Therefore, from the standpoint of working as a consultant for the TOC thinking process in addition to the TRIZ consultant, I analyzed the current situation of TRIZ's organizational activities, and based on the results, I learned anew about how to promote TRIZ's organizational activities. I decided to propose a new method (idea tool for innovation).

J16 **Takayoshi Ohtsu**（Numazu National College of Technology）

Practice of lessons in TRIZ to solve problems of local governments

Takayoshi Ohtsu（Numazu National College of Technology）

Understanding of "intellectual property" has become important in the development of human resources who will be responsible for Society 5.0 with the development of local industries. Therefore, we will promote university-wide intellectual property creation education and build a "spiral-up type university-wide intellectual property creation education system" that allows first-year students to major students to continuously touch intellectual property at least once a year. did. Engineering Basics II Seminar for all 1st graders, Intellectual Property Basic Seminar for all 2nd graders, Intellectual Property Application Seminar for all 3rd graders, and "Society and Engineering", a compulsory subject for all 4th graders even in the upper grades In, we are stepping up to a curriculum that analyzes the situation of local governments and companies and proposes "solution ideas that are conscious of utilization" using the TRIZ (Tries) of the idea method as a weapon. .. Furthermore, from the perspective of preventing new coronavirus infectious diseases, we are practicing distance learning-type intellectual property learning content. For students who want to learn intellectual property with a deeper awareness of utilization, there is a special club "Intellectual Property TKY (Terakoya)" as a place for TRIZ education in subject research and intellectual property education in collaboration with the community. As one of the results, he participates in the "Patent Contest". Therefore, I will report on those activities.

J17 **Takayoshi Ohtsu**（Numazu National College of Technology）

Project research "My TRIZ Searching for invention principles around us"

Takayoshi Ohtsu, **Mei Sekino, Sayuri Nagaoka, Shun Watanabe, Shinya Fujimoto, Osamu Mochizuki, Yuuya Suzuki**
(Numazu National College of Technology)

At Numazu National College of Technology, we promote university-wide intellectual property creation education, and a "spiral-up type university-wide intellectual property creation education system" that allows first-year students to major students to continuously touch intellectual property at least once a year. Is being built. Engineering Basics II Seminar for all 1st graders, Intellectual Property Basic Seminar for all 2nd graders, Intellectual Property Application Seminar for all 3rd graders, and "Society and Engineering", a compulsory subject for all 4th graders even in the upper grades Is. For students who want to learn intellectual property with a deeper awareness of utilization, there are TRIZ education in subject research and a special club "Intellectual Property TKY (Terakoya)". The subject research is to study more than 30 hours a year under the guidance of an academic advisor. Corona's research theme for 2020 was "My TRIZ Searching for Invention Principles Around us", and it was conducted in a remote presentation format. The outline of the course content is "Soociety 5.0 Human resource development is required to develop the ability to create ideas, protect ideas, and utilize ideas / rights. There are various products / products around us, and ideas / rights are utilized. We will search for the 40 invention principles of TRIZ used there. In particular, by summarizing "My TRIZ" that students are interested in, they will understand the creative method (principle of TRIZ invention) that is conscious of utilization.

J18 **Takayoshi Ohtsu**（Numazu National College of Technology）

TRIZ learned from life-size 3D block coelacanth production

Takayoshi Ohtsu, Yuki Hida, Minami Iwata, Kenta Watanabe, **Shun Watanabe**, Shinya Fujimoto, Sango Ueno, **Osamu Mochizuki, Yuuya Suzuki, Mayumi Suzuki, Marii Mochizuki**

(Numazu National College of Technology)

In 2016, we established a special club "Intellectual Property TKY (Terakoya)" with the aim of fostering value-creating future industrial human resources who will be responsible for Society 5.0. Taking advantage of regional characteristics, through the challenge of the real thing with TRIZ as a weapon, we will discover problems, create ideas, and challenge solutions. In particular, we are practicing Education-TRIZ's "Tongs model", which states that we will nurture solutions to technical problems by understanding ideals and reality and clarifying the differences. The main activities are as follows. (1) Challenge the F1 course at Suzuka Circuit with the KV-BIKE, a battery bicycle with 40 rechargeable AA batteries. (2) Deep sea survey of Suruga Bay utilizing the regional characteristics of Suruga Bay (2500m deep sea), which is the deepest in Japan (3) Program robot classroom using 3D blocks with the theme of regional characteristics In 2020, it was a corona wreck, but in order to express the charm of the deep sea, a life-sized model of coelacanth, which is said to be a "fish that calls for happiness," was realized with 11,000 blocks for teaching materials. I wanted to freely shape what I thought, but I challenged the technical contradiction that strength is required with the invention principle of TRIZ, and also experienced practically that "value" is created in the work.