TRIZ Forum: Conference Report (22-D)

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 D. Case Studies in Industries

Reviewed by Toru Nakagawa (Osaka Gakuin Univ., Japan), Nov. 28, 2009

[Posted on Dec. 6, 2009]

TRIZ Home Page in Japan

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

Editor's Note (Toru Nakagawa, Dec. 5, 2009)

This page is Part C 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. I am thankful to the Authors for their permitting me to cite their slides here for introduction.

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

D1.	Takahiro Shoji, Yosuke Koga	(Panasonic Communications Co.)	Practical Use of Scientific Creative Techniques for the Development of Telecommunication Devices	
D2.	Paul Devaraj	(Intel, Malaysia)	An Innovative Approach on Module Ionizer Efficiency Management	
D3.	Surendran Selladurai	(Intel, Malaysia)	Innovative Leakage Safety Detection System using TRIZ	
D4.	Darin Moreira, Sushiph Sum Bun, CT Ong	(Intel, Malaysia)	Simplifying Conventional and Enhancing Outgoing Product Quality on the ICOS Vision System with TRIZ	
D5.	Ragubalan Shanmugam; Cheng, Chiew Shan	(Intel, Malaysia)	Customize Picoclock Checkers (Software Program)	
D6.	Jahau Lewis Chen, J.-F. Wang	(National Cheng Kung Univ., Taiwan)	Eco-Innovation by Using Unified Structured Inventive Thinking	
D7.	Shoichi Tsuge, Tateki Oka	(Konica Minolta Business Technologies, Inc.)	Case Study for Verifying the Effectiveness of Applying USIT	
D8.	Hajime Kasai	(IDEA, Inc.)	Application of TRIZ to Environmental Problems: For Further Extension of TRIZ	

D9.	**Takuo Maeda** (*1), Kazushige Aoki (*2), Masaaki Ohogami (*3), Fumiko Kikuchi (*4), Kazunori Kurabayashi (*5), Toru Shonai (*6), Hirotake Makino (*2), Yuji Mihara (*7)	[SW/IT Working Group of MPUF USIT/TRIZ Study Group] (Takumi System Architects), (Yokogawa Electric),(USIT Planning),(Pioneer), (Accenture Japan), (Central Research Laboratory, Hitachi), (Creative Technology Institute)	Practical USIT Workbook to Develop New Ideas on Software/IT Products	
D10.	**Wolfgang Sallaberger**	(Congelo, Austria)	The Evolution of Cooking with TRIZ	

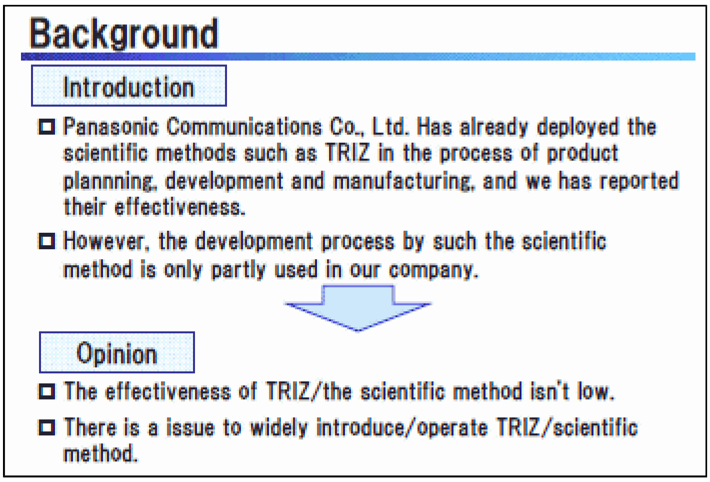
Top of this page	Parent page	1. Outline	2. Organization	3. Keynotes	4. Methods in TRIZ	5. Integration with other methods	6. Case Studies	7. Promotion	8. Education and Academia	9. Patent Studies
10. Non-technical		11. Miscellaneous	12. Concluding	TRIZ Symp 2009 Official page	TRIZ Symp 2005 Personal Report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

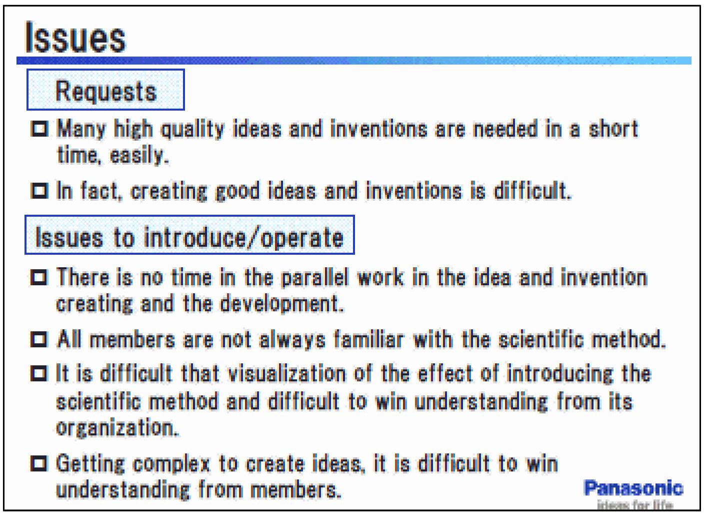
6. Case Studies in Industries

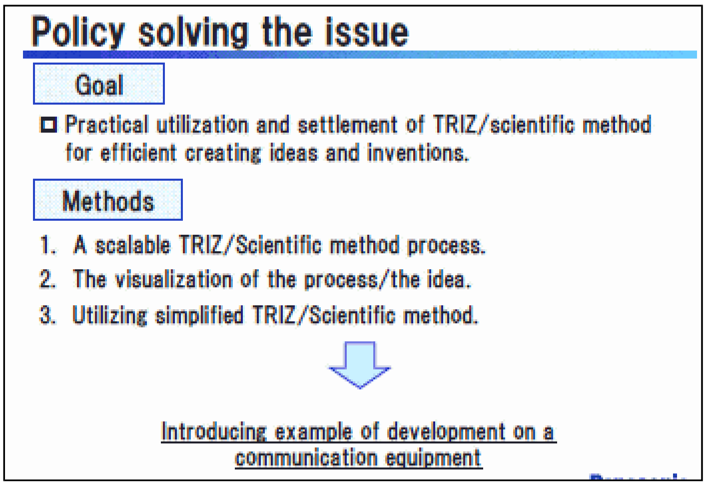
Takahiro Shoji and Yosuke Koga (Panasonic Communications Co.) [J23 O-3] gave an nice Oral presentation with the title of **"Practical Use of Scientific Creative Techniques for the Development of Telecommunication Devices".** This presentation obtained the Award as the result of the voting by Japanese participants. I will quote the Authors' Abstract, first.

> Panasonic Communications Co. (PCC) has already deployed the scientific methods including QFD, TRIZ, and Quality Engineering (or Taguchi Method) and utilized them in the processes of product planning, development, and manufacturing.As we reported several times already in the preceding Japan TRIZ Symposia, the effectiveness of such methods has been proved well in real projects in our company .However, such a set of scientific techniques are regularly utilized only in some divisions in our company; thus they are not yet in the stage of company-wide utilization.One of the causes, as we understand, is the fact that most of such scientific approaches require rather high skills in the manipulation and take much time in the processing.
>
> For the purpose of overcoming this difficulty, we have developed a creativity method and a process of technical problem solving, which can be applied easily even by the beginners of scientific methods or creativity methods and even in the busy situations when the engineers need to do the development work and the problem solving in parallel.We will report such a process and method and also a case study of applying them to the development of telecommunication devices.

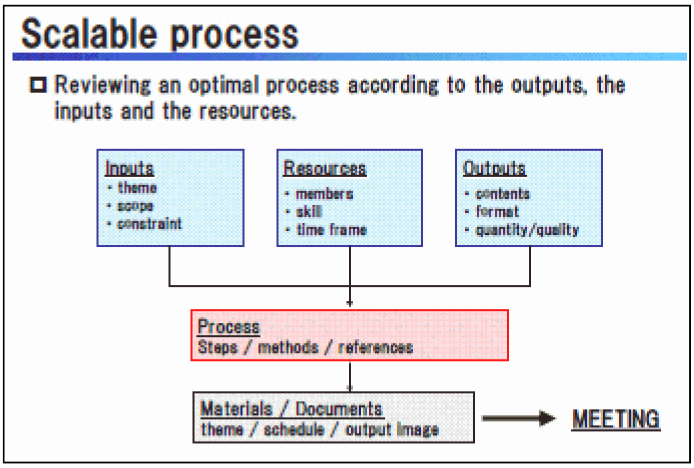
This company, Panasonic Communications Co. (PCC), has the history of actively introducing TRIZ together with QFD and Taguchi Method, as they reported in the Japan TRIZ Symposia for these 5 years (see: Koga (2007)). Their first 3 slides are shown below. They have already introduced and deployed the full set of QFD/TRIZ/TM and succeeded in demonstrating their effectiveness in some of their real products, and they now have met the difficulty of applying them to many ordinary projects. Easier and more effective/productive application practice is required for regular basis. Thus the Authors' strategies are: to make the method 'scalable' depending on the size/requirements of the project, to make the process and ideas visual, and to make the methods simpler. [*** Unfortunately, the English translation in the slides seems not so high quality as their work itself. I will try to convey their work to you, even though I missed to attend at this presentation due to the double track session.]







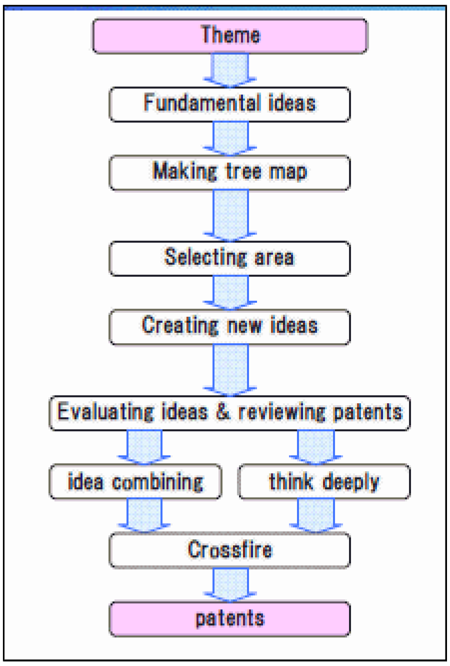
The slide (right) shows the process of applying their TRIZ/Scientific method to the project in a scalable manner. Before starting the TRIZ process, the TRIZ coordinator meet with the manager of the engineering team and discuss/review/define the possible inputs, available resources, and desirable outputs. Thus they design (or adjust) the process of TRIZ application with respect to steps, methods, and references. And they prepare some materials and documents, which describe the theme, schedule, and output image of the TRIZ application project. After these preparation, the TRIZ project meetings are held by the TRIZ coordinator(s) and the engineering team.



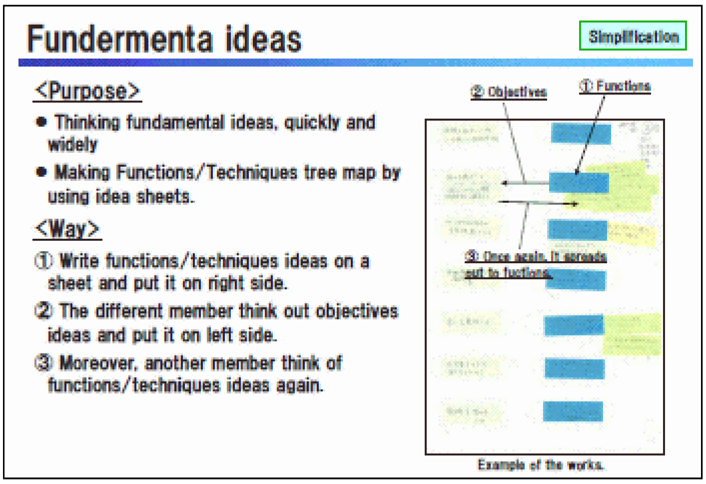
The slide (right) shows the full process of applying the new TRIZ/Scientific method . The whole process starts with the setting up the theme, and finally ends with the filing of patents of created solutions. The process is composed of 3 main phases:
(I) The first phase is to generate many fundamental (or preliminary, existing) ideas of functions and to make a tree-style map of the ideas with respect to their purposes of functions in order to understand the overall view of the problem and desirable solution fields.
(II) The second phase is to select the areas on which the solution efforts should be focused and then to force the members to create new/inventive ideas in the selected areas.
(III) Finally in the third phase, the ideas generated so far are evaluated (with some understanding/reviewing of the levels of the patents in the relevant fields) and then the possible highly-evaluated ideas are to be enhanced by combining subsidiary ideas, thinking

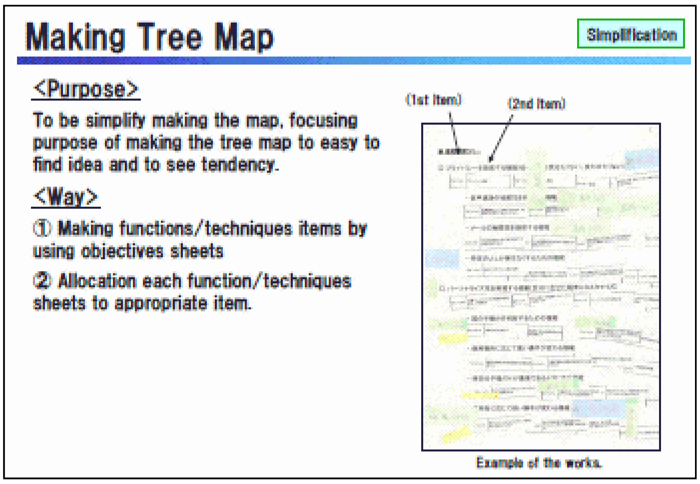
deeply, and looking from different angles (such as your competitors' views). Thus the ideas are elevated to the solutions which are possible to be implemented and to be filed as patents.

All these processes are designed to be simple, straightforward, visualized, and scalable. The process has been applied to some real projects so far in PCC.

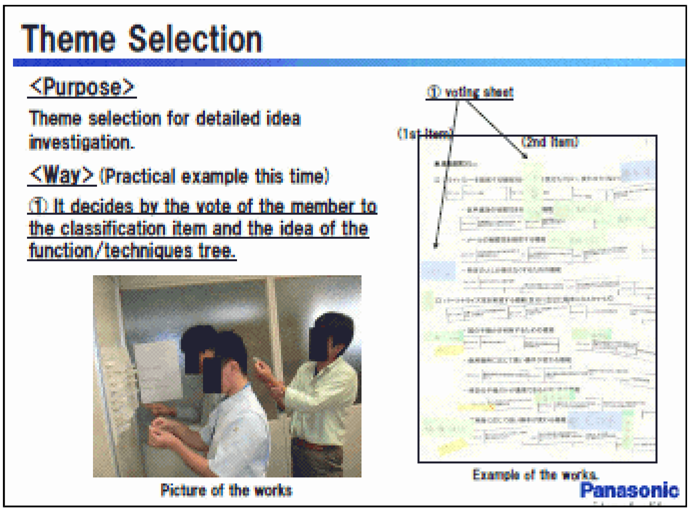


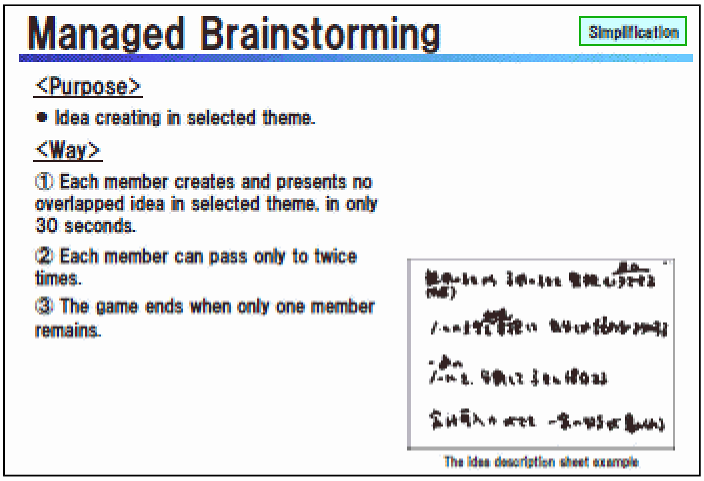
(I) The following two slides (below) demonstrate the purposes and the methods of the first phase with examples in a real project. In this phase, the main objective is not to generate new ideas but to list up all the existing and desirable functions of the product to be developed. All the members are encouraged to think of such functions/features and write them on post-it sheets one after another. Then a different member should write the objective/purpose of the function, and other members are encouraged to think of further desirable functions. Then all the objectives and functions are rearranged in a hierarchical tree-type structure to form a map of functions.

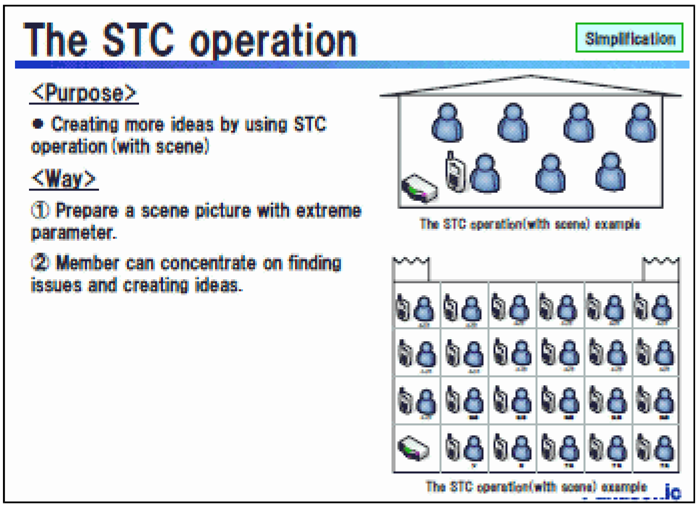


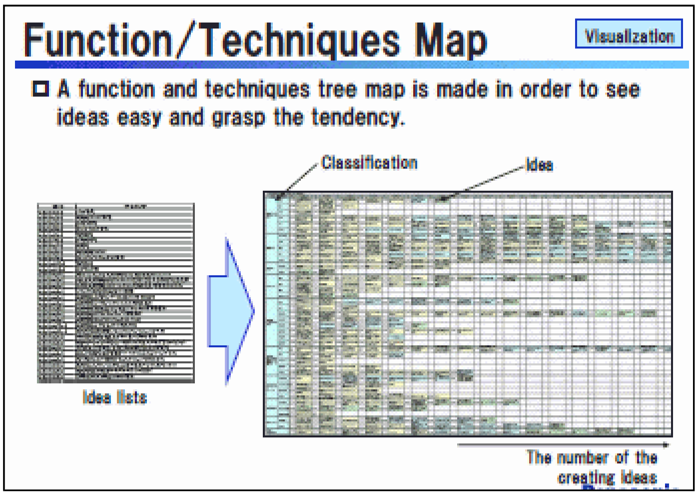


(II) The second phase is demonstrated in the following four slides (below). The first task in this phase is to select the areas/themes where the project should develop new ideas. For generating new ideas in each theme, the project applies 'Managed Brainstorming' as shown in the slide (upper-right). The members are pushed to generate ideas in 30 seconds by turn. Another method is the use of STC operator together with the scenario thinking (slide bottom-left). All the ideas generated are listed in the form of Function/Techniques Map (slide bottom-right).

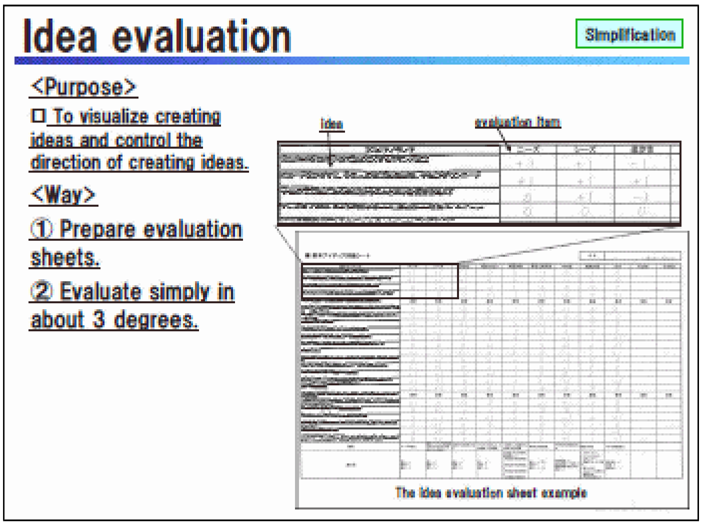


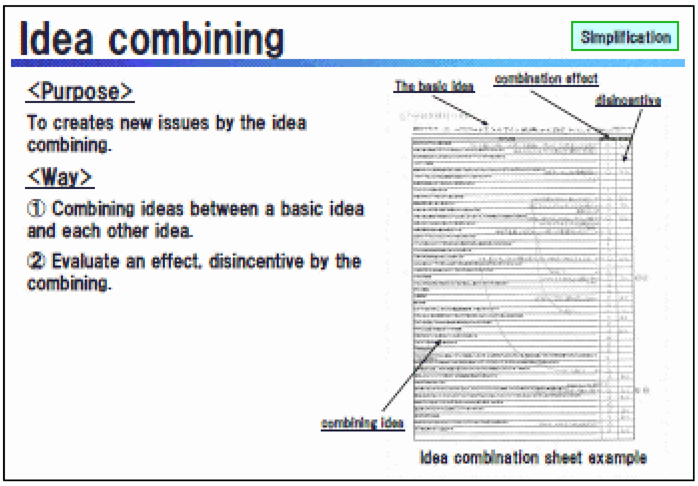


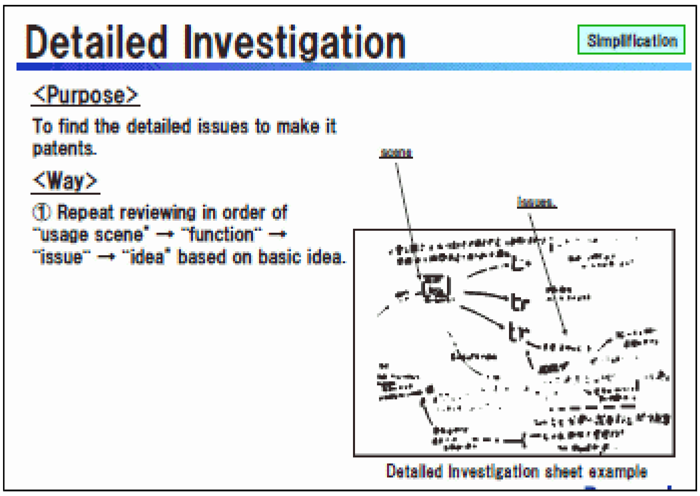


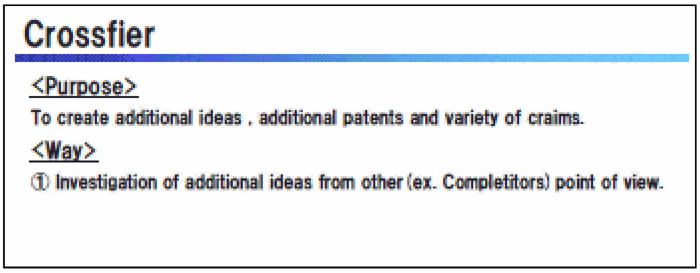


(III) Then in the third phase, all the ideas are evaluated quickly by using an evaluation sheet having the criteria (including novelty, effectiveness, needs, seeds, etc.) as shown in the slide (below, upper-left). The highly-evaluated ideas are further enhanced in this phase by combining other subsidiary ideas (upper-right), investigating closely how it works in a usage scenario (bottom-left), and considering about it from competitors' view points (bottom-right), etc. This phase intends to make strong patents from the generated ideas.

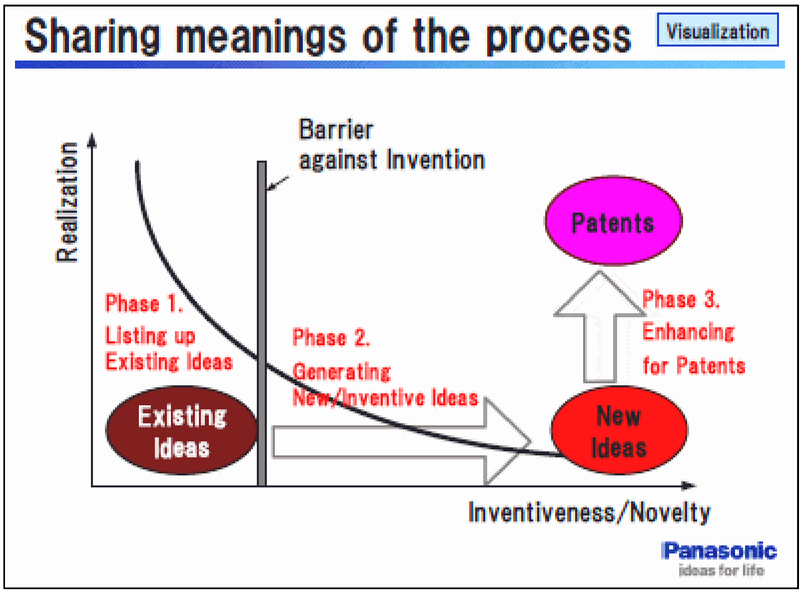




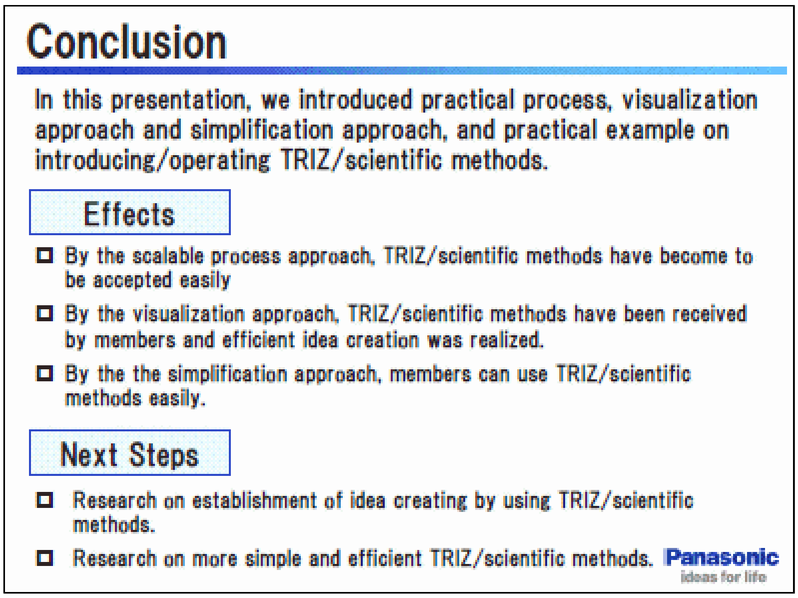




The present work put much stress on making the whole process clear to the members and their managers and sharing the motivation for innovation. The slide (right) visualizes the meaning/intention of the present three-phase process. The graph intends to show the positions of ideas with respect to the novelty (in abscissa) and the degree of realization (in ordinate). Phase I is to list up existing ideas and desirable features, which are not yet solution ideas with any inventiveness. Phase II is the process of Managed Brainstorming for generating new and inventive ideas which may not be implementable in this stage. In Phase III, such ideas are filtered through a simple process of evaluation and good ideas are further enhanced for making them implementable and patentable.



The slide (right) shows the Authors' Conclusions. They say that simplification, visualization, and scalability are the three most important approaches in their present method which are accepted much better in their real projects. Simplification is clear in the point that the present method is explained with very few TRIZ terms so that ordinary engineers can understand and carry out the whole process easily. Visualization is apparent in their ways of using post-it notes, building Function/Techniques Map, evaluating ideas with Evaluation Sheet, and presenting the meanings of the process. Scalability of this process can be seen in the management meeting at the start and in the adjustability in generating and screening the ideas (in all the phases) in the number and depth of treatment. The Authors say the present method has been accepted well by engineers.



*** When I read the slides (without attending at the Oral presentation), I was not clear at first about the significance of the whole process and how TRIZ (and QFD/TM) methods are introduced in it. I have realized

them little by little while I wrote this review by reading their slides in Japanese and in English. I would be happy if this review could convey the Authors' thoughts properly.
Phase I reflects QFD and TRIZ, especially in the hierarchical deployment of purposes and functions.
Phase II is the stage of enforced idea generation, and the Authors use Managed Brainstorming (with TRIZ STC Operators and Scenario thinking). In this phase various TRIZ knowledge (especially Inventive Principles and Trends of Evolution of Technical Systems) may be useful as the background; thus engineers (or TRIZ beginners) having learned these TRIZ knowledge bases can do this process much better, I suppose.
In Phase III various TRIZ methods/knowledge may be introduced for enhancing the ideas.

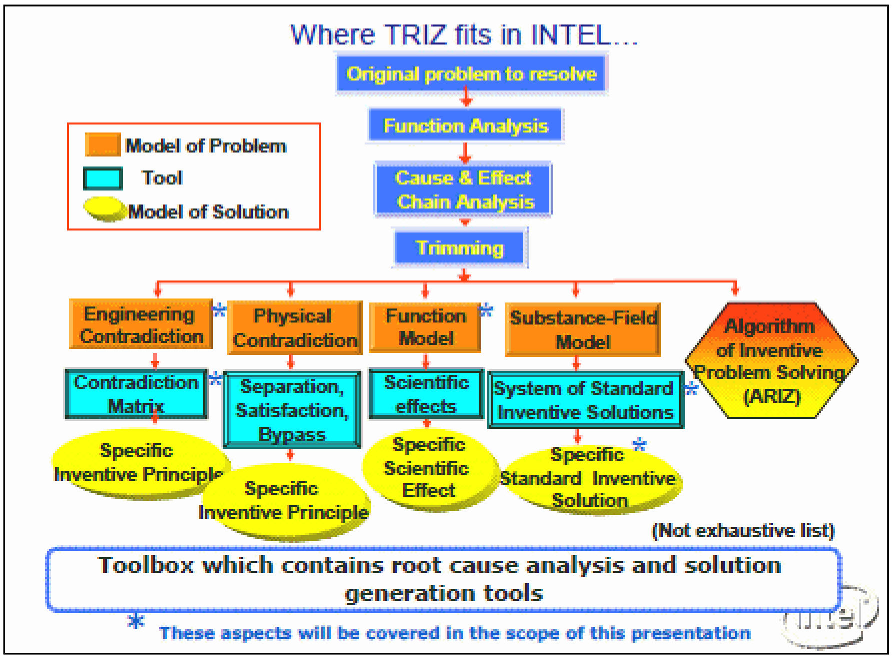
*** In short, the present process seems to be designed to use ordinary ways familiar to the engineers with backing up by TRIZ and other methods implicitly. This seems to be a valuable approach in applying TRIZ to real projects relatively large and yet short in time. We wish to hear about the Authors' further extension and experiences of this approach in the near future.

It is our pleasure that Intel Corp. has contributed 4 real case-study papers this year again to our Symposium. Two engineers coming from Intel Malaysia gave 2 Oral and 2 Poster presentations, covering their colleagues' works as well. The 4 presentations from Intel Malaysia are reviewed here in sequence. (Last year, Amir Roggel Engl gave a Keynote Lecture, and 4 more people gave 4 real case-study papers Engl.)

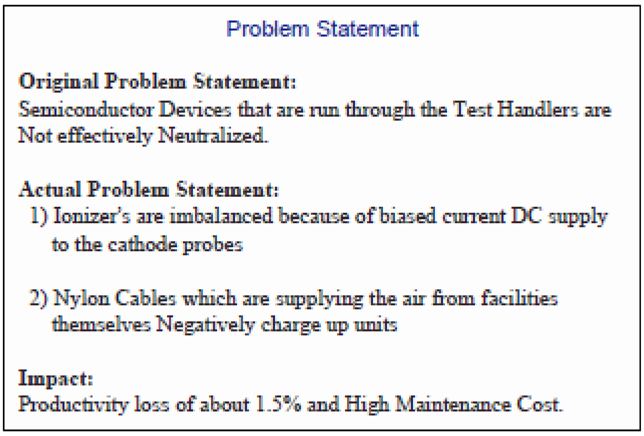
Paul Devaraj (Intel, Malaysia) [E01 O-2] gave an Oral presentation, read by S. Selladurai, on "An Innovative Approach on Module Ionizer Efficiency Management". The Author's Abstract is as follows:

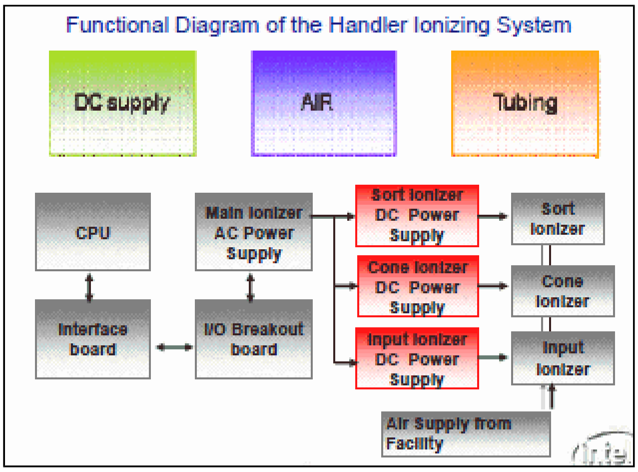
> Delta designed - RFS test handlers are an automatic device handling machine that's been in service all across Intel Test Factories worldwide for many years. They are reasonably reliable and relatively easy to maintain. However there are some key weaknesses in some of their systems that needed our attention. One such 'Achilles heel' was their ESD Ionizing system. Not only was it unstable, but it was also very expensive to maintain. Annually Intel Test factories world-wide spend hundreds of thousands of US Dollars to maintain them. This represents a key challenge. The control system of this feature often fails, the Ionizing probes often accumulates dust particles which reduces the Ionizing efficiency of the system. This paper discusses the key design weaknesses of the DELTA RFS test handler's ESD Ionizing System and how the team innovated and improved the system with TRIZ problem solving technique while maintaining output Quality. The simple and effective strategies from TRIZ have been a unique eye opener to us to 'see' the problem in a different perspective. This eventually solved the 5 years old problem saving Intel USD1.2Million in 4 years. TRIZ once again proves as great problem solving tool which resulted in increase management focus in this 'art' recently.

The slide (right) is a nice introduction of the TRIZ Toolbox used in Intel (or Intel Malaysia). This describes that after the problem definition, the methods of Functional analysis, Cause & effect chain analysis, and Trimming are commonly used for all the problems. Then, depending on the nature of the problem, different sets of tools are used in the typical sequence of modeling the problem, using an appropriate tool, and generating solutions by the assistance of model of solutions. The tools contain the Contradiction matrix, Physical contradiction method, Scientific effects DB, Su-field model, and ARIZ. Note that this is not an exhaustive list, the Author writes.

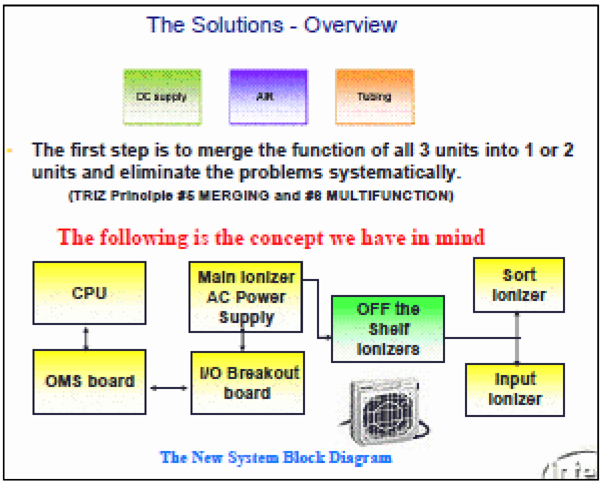


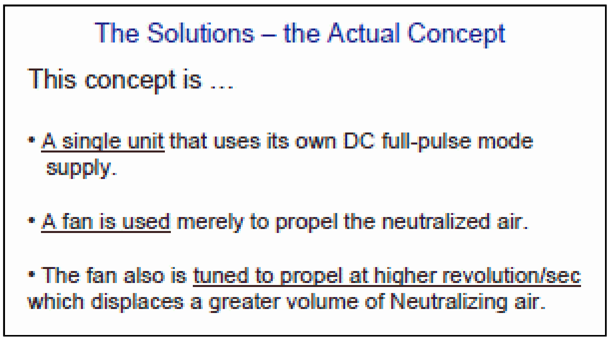
The problem statement of the present case is shown in the slide (below-left). And the Functional diagram of the present system is illustrated in the side (below-right). It is noticed that the present system has three sets of ionizers having their own DC power supply.



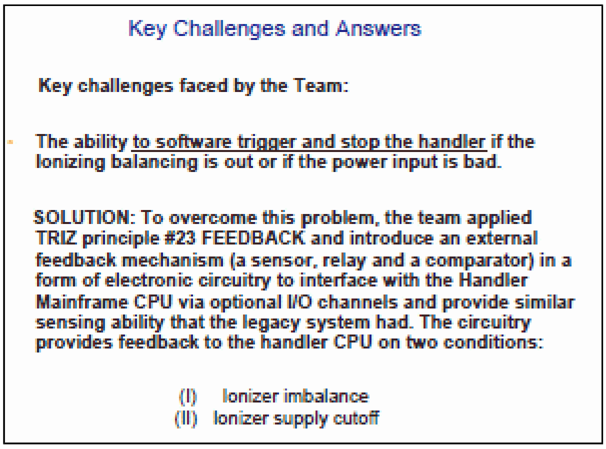


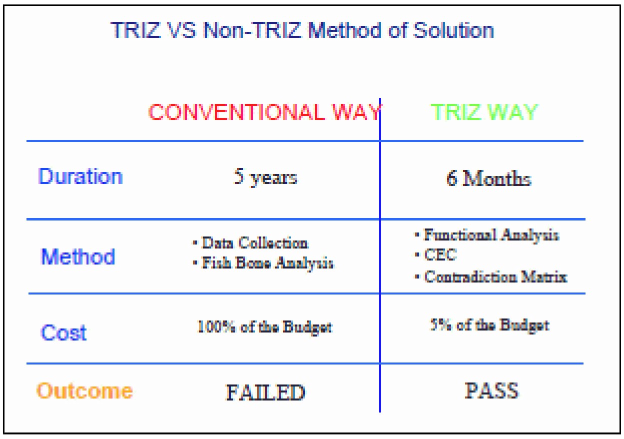
Thus, at the step of Trimming, it was natural to think of the trimming of the three sets of ionizers with individual power supplies into one set. The solution idea is shown below in the initial form of overview (below-left), and in the final form of concepts actually adopted (below-right).





One more step was taken for solving the key challenges with the introduction of feedback (below-left). The final results of this TRIZ case study are summarized in the slide (below-right), in comparison with the results of former non-TRIZ approaches for the same problem.



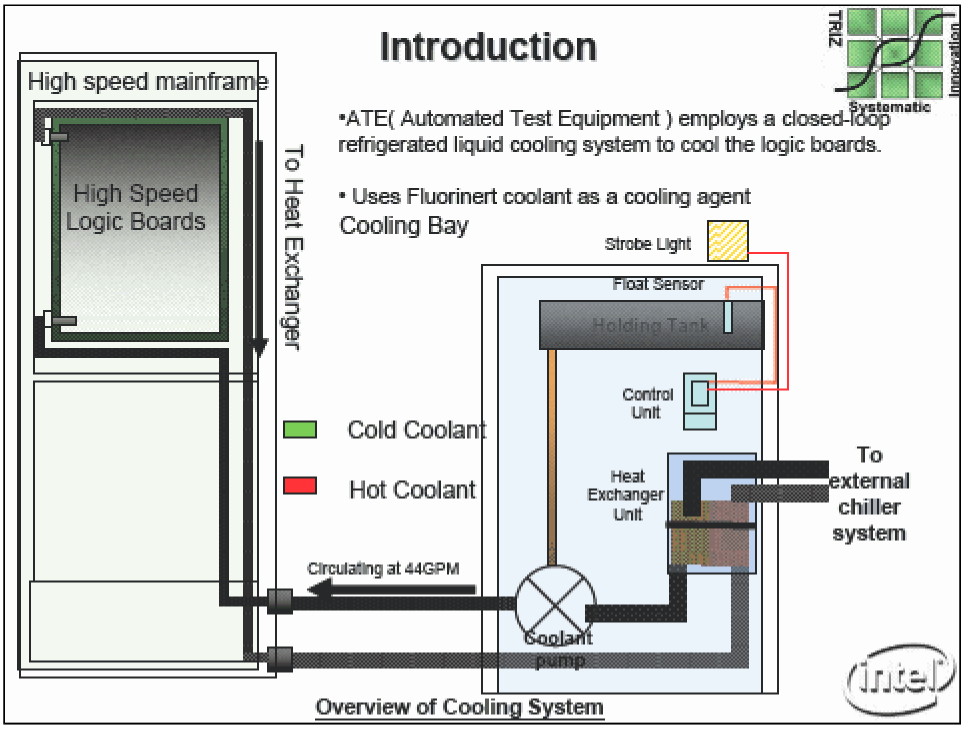


[*** The solutions of this case study seem quite natural. Probably this is yet another case demonstrating that finding problems to attack is more important and valuable than the actual work of solving them.]

Surendran Selladurai (Intel, Malaysia) [E04 P-A8] gave a Poster presentation on "Innovative Leakage Safety Detection System using TRIZ". The Author's Abstract is quoted here:

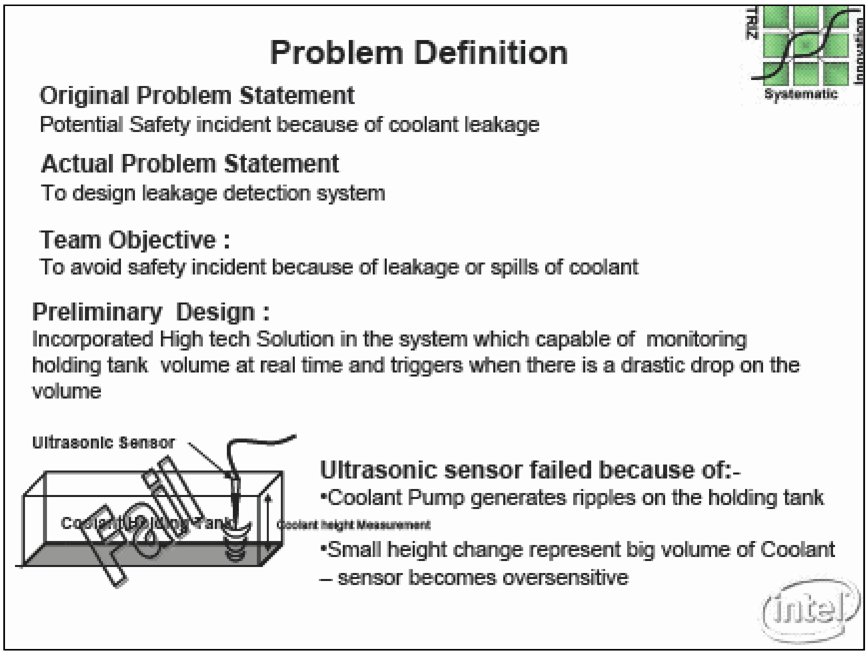
S9K (ITS9000) FX/GX ATE uses FC-77 coolant as a cooling agent circulating in a closed-loop refrigerated system to cool down the board components in the testers with hundreds of joins and connector to this board . FC-77 coolant can create a severe slip hazard if it spills or leaks as this liquid is colorless and odorless .The biggest challenge face by the team was to design a system capable of differentiating between leakage and natural losses (FC-77 coolant has high evaporation rate). This physical contradiction was resolved with the help of TRIZ which lead to a major breakthrough through its ability to distinguish between leakage and natural evaporation.

The slide (right) shows the system of the problem. A large test equipment (ATE) is cooled by the closed-loop cooling system with fluorinert as the cooling liquid. The coolant is colorless and odorless and can have severe slip hazard if it leaks.



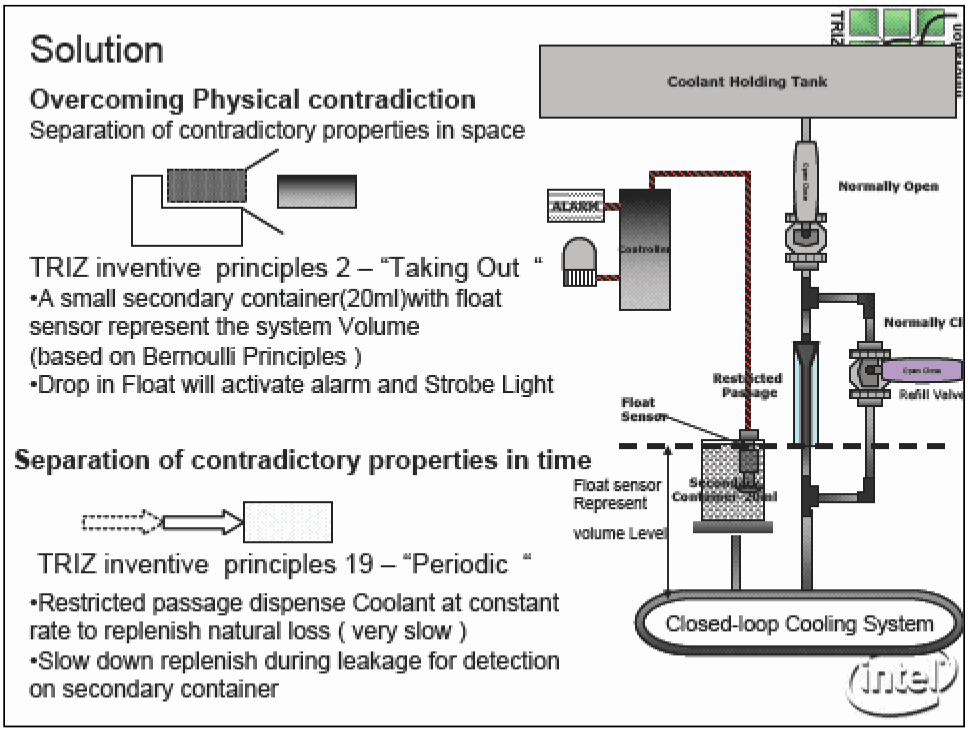
The problem of the present work were defined as shown in the next slide (below right). [It seems typical in Intel's case studies to describe the 'Original problem statement' first and then define the 'Actual problem statement' in a more specific manner.]

Thus they tried to design a leakage detection system of the coolant. Their preliminary design was to monitor the surface level of the coolant in its holding tank by using an ultrasonic sensor. Since the tank is large, they have to monitor the surface level with high precision to detect a certain volume of leakage. However, the coolant pump generates vibration of the tank and causes ripples of the surface level of the coolant, thus makes the monitoring difficult.



Looking at the problem more closely, the team understood the necessity of distinguishing the large and sudden leakage from the small, slow and nearly constant leakage of the coolant.

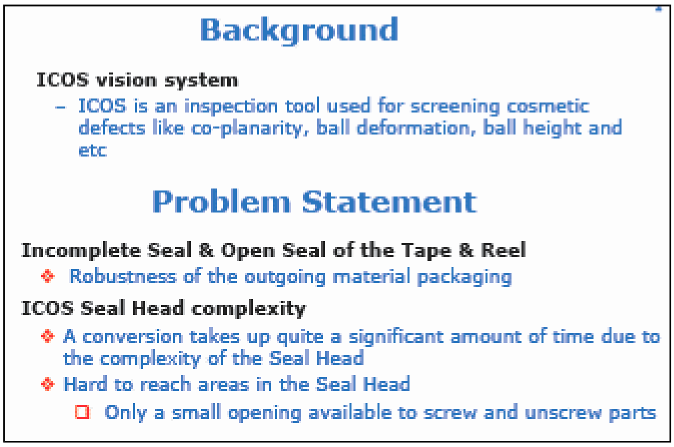
With the help of TRIZ Inventive Principles, the team reached the solution as described in the slide (right). The solution has two basic ideas. (1) The surface level of the coolant in the closed-loop cooling system (instead of the holding tank) is now monitored directly by introducing a small secondary container. The position of the float sensor in the container is monitored without affected by the pump vibration. (2) For compensating the slow constant leakage, a restricted passage is installed between the coolant holding tank and the cooling system. This cancels the effect of normal leakage and allows close-up view of the possible incidence of accidental leakage which needs quick alert.

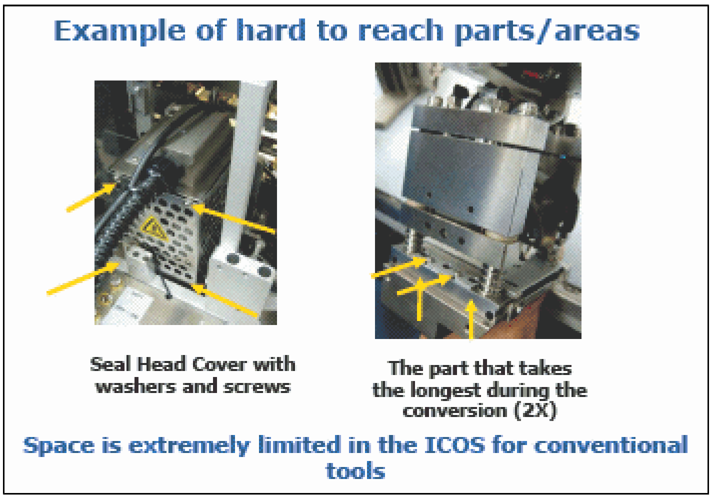


Darin Moreira, Sushiph Sum Bun, CT Ong (Intel, Malaysia) [E02 P-A6] gave a Poster presentation on "Simplifying Conventional and Enhancing Outgoing Product Quality on the ICOS Vision System with TRIZ". The Authors' Abstract is quoted here first:

> The ICOS module is the final screening gate for cosmetic defects at the factory prior to going out to the customers. Being a HMLV (High Mix Low Volume) factory, there is a big pool of different dimension products that will be screened. Long conversion time and conversion related downtime has been a big problem that has been gating the factory output and on top of that a concerning number of customer complaints which root cause originate from the conversion on the ICOS itself. TRIZ enabled the reduction of downtime by 50% and at the same time minimized the conversion time by 35% that eventually returned more than anticipated.

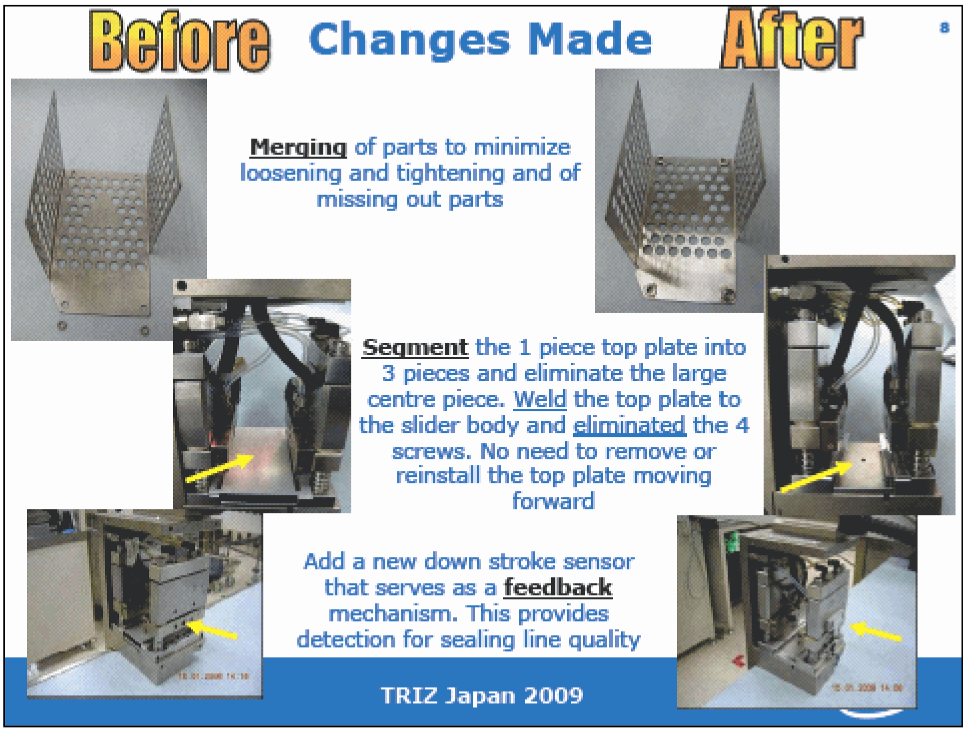
The problem is stated in the slide (below-left) and its detailed examples are shown with the pictures of the equipment (slide below-right).



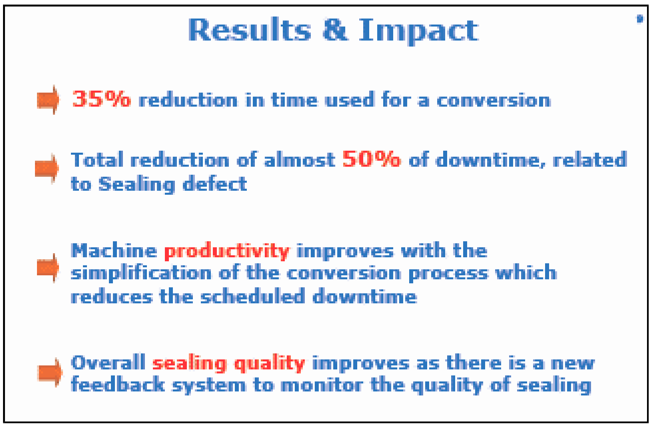


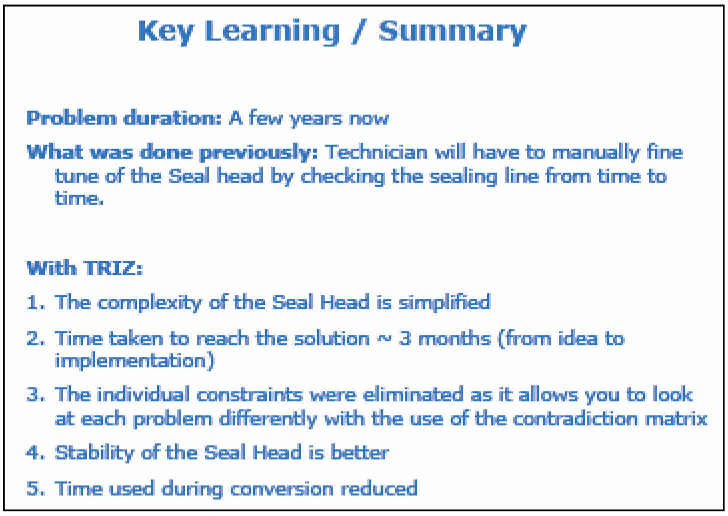
The Authors' TRIZ team applied their standard methods of TRIZ Toolbox, including the Functional analysis, 40 Inventive Principles, and Trimming.

As the results they obtained the solution ideas and implemented them in their equipment. The changes they actually made are demonstrated with the detailed pictures of their real equipment. Inventive Principles such as Merging, Segmenting, and Feedback were used as the guidelines of these solutions.
[*** We are thankful to the Authors and Intel Corp. for their publicly showing us these detailed pictures of solution examples. This also shows the advantage of revising and improving the own instruments for oneselves.]



The results of the TRIZ application project and its impacts on the job processes are shown in the slide (below-left). The Key Lessons learnt are summarized in the slide (below-right).



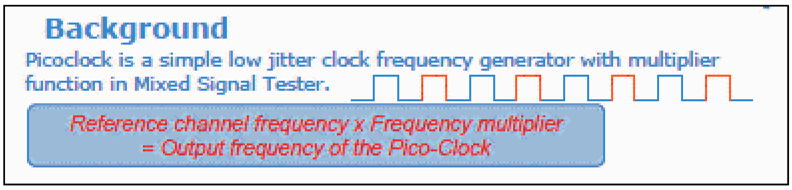


Ragubalan Shanmugam; Cheng, Chiew Shan (Intel, Malaysia) [E06 O-8] gave an Oral presentation with the title of "Customize Picoclock Checkers (Software Program)".

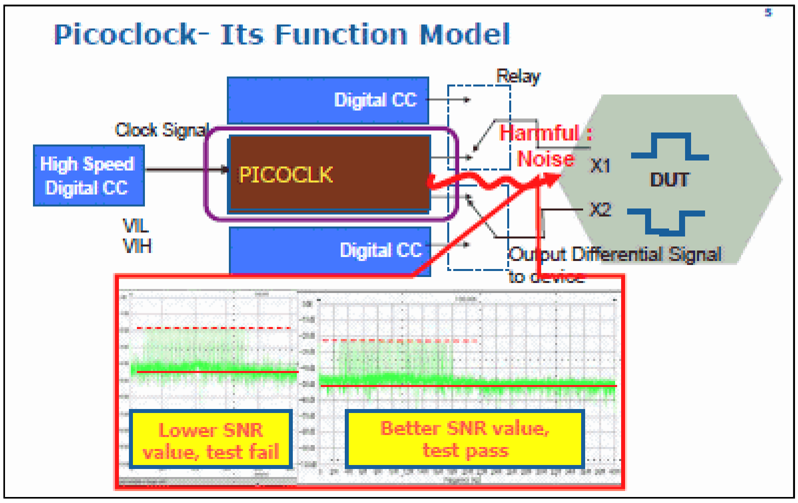
[*** I believe this case study has given a very interesting and useful solution to a confusing problem in an equipment which tests the performance of electric circuit boards. Unfortunately, however, I do not understand well the problem situations and the achieved solution. Reading the Authors' Extended Abstract in 1 page in May, and the Final Presentation Slides at the end of July, I asked the Authors to revise their manuscripts somewhat clearer for non-specialists; but their materials were not revised. So I will use the Authors explanation directly (inside ' '), for the purpose of avoiding from making further confusion. Someday I would like to make a better introduction with the help by the Authors.]

The slide (right) shows the background of the problem. The task to perform is the Mixed Signal Test of some digital circuits. The Pico-clock board supplies the high frequency reference signal voltage to the Tester.

Before reading the explanation of the Problem statement, we should better read the Functional Analysis of the system.

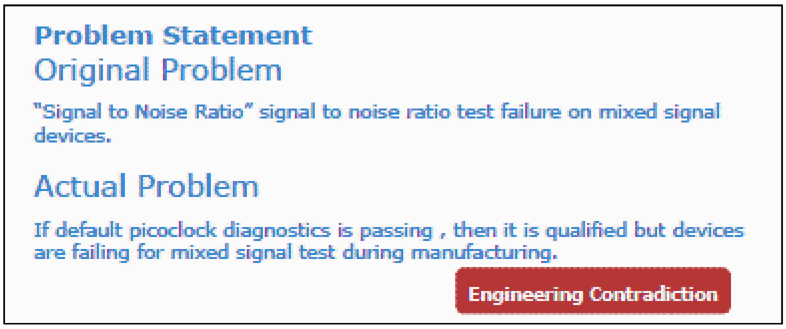


The slide (right) shows the Functional Model of the Picoclock for the Mixed Signal Test of a digital device, i.e., DUT (Device under the test). Receiving the clock signal from the High Speed Digital CC, the Picoclock board sends higher frequency (of pico-second order) reference signal to the DUT.
[*** I do not understand what kind of signal the Picoclock board send (through the Tester) to DUT and what kind of other input signals the DUT receives and what kind of output signals it outputs to the Tester. I do not understand either how the Tester generates the graphs of SNR (Signal to Noise Ratio) shown at the bottom.]
If the SNR value is better than a certain value, the DUT pass the Test.

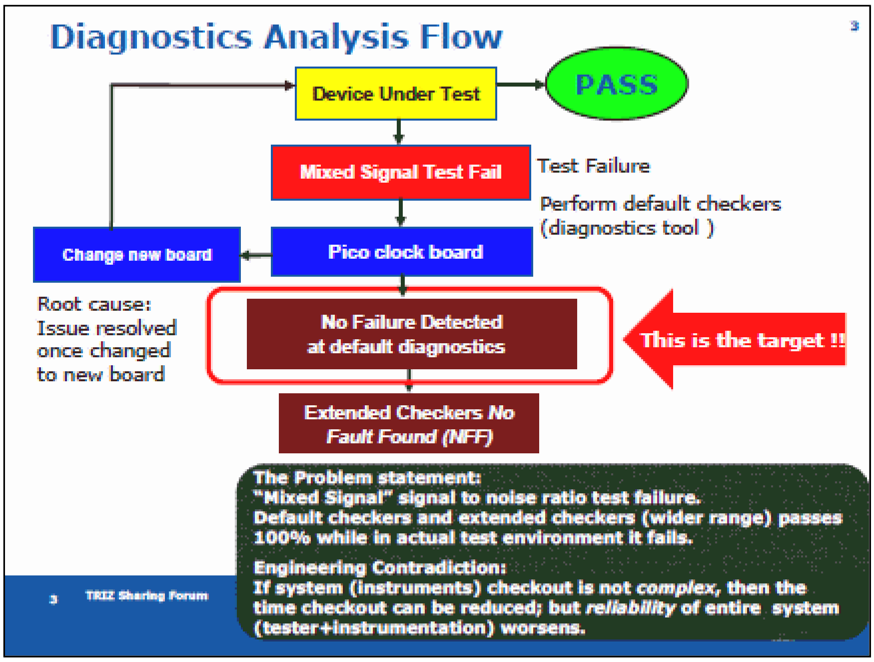


Now let's read the Authors' explanation of the problem situations with reference to the slide (right) and the next (right-below):

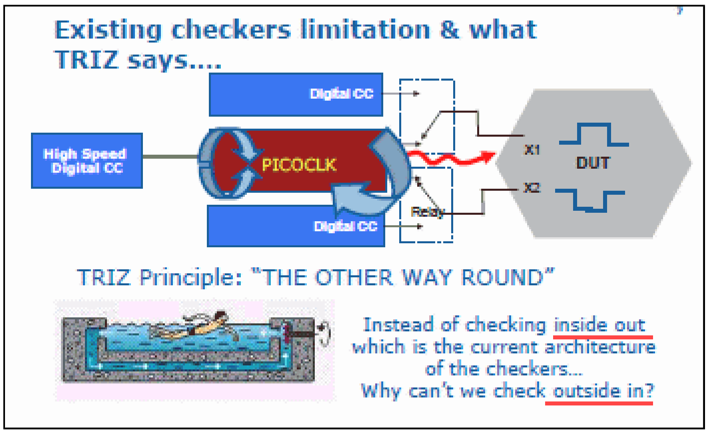
' **The Problem** - PCFD issues have been hitting Catalyst Tester's as one of the biggest pareto on meeting goal for Tool Utilization, product EUPH, PCS triggering and tool uptime. Pico clock (low jitter clock frequency Generator - Electronics Card) highest failure pareto is Bin Rx71/Tx81 "SNR" signal to noise ratio test. This Electronics Card (PICO Clock) will 'PASS' its default supplier tester diagnostics test but fails SNR test during actual HVM test. '



' This fault has bigger impact in downtime and confuses root cause trouble-shooting. This is the condition which we call Pass Checker Fail Device issue "PCFD". CEC analysis shows that the default Catalyst tester diagnostics is not attuned enough to detect latent failures in PICO Clock which 'PASSES' the diagnostics but fails the equivalent SNR HVM test on live products. To that end, to make matters worst even the suppliers 'EXTENDED DIAGNOSTICS' are unable to detect this form of failures. They often report to us a result of "no fault found" for boards that was sent tagged PCFD. '

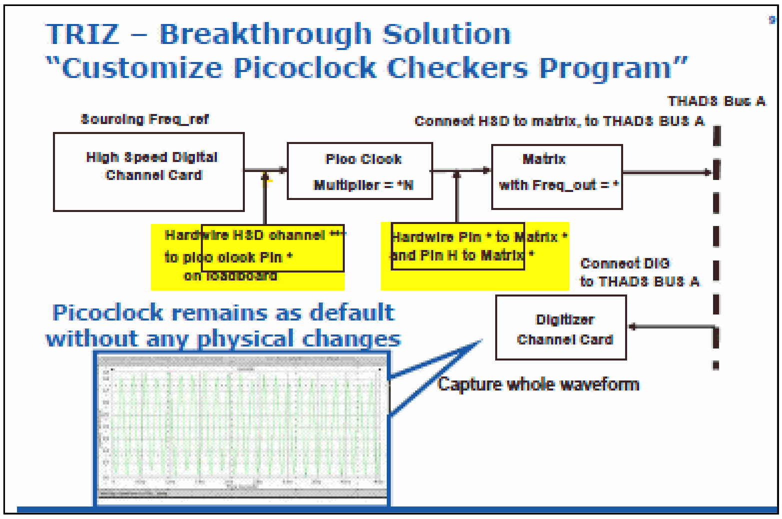


' **The Solution** – In order to understand further the nature of the problem, we simulated the problem in a controlled DOE (make it worst). Based on these findings a complete CEC and FUNCTIONAL DIAGRAM were developed to understand and define the interactions of the components.' [*** See the Functional diagram quoted earlier in this review.]



' After looking through the INVENTIVE PRINCIPLES LIST - "The Other Way Round" was chosen. So based on the 'output' we recorded from the DOE, we developed an algorithm of the failure we saw (SNR output). This was then coded into the existing board diagnostics program. So the methodology of a detecting these faults were changed from the earlier 'test through parametric measurement' to 'test by sampling failures'- the other way around! '

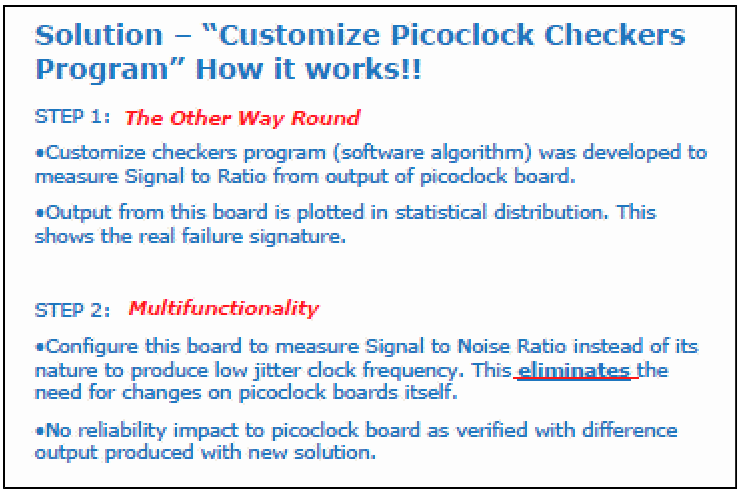
The slide (right) show the detail of the solution described above.



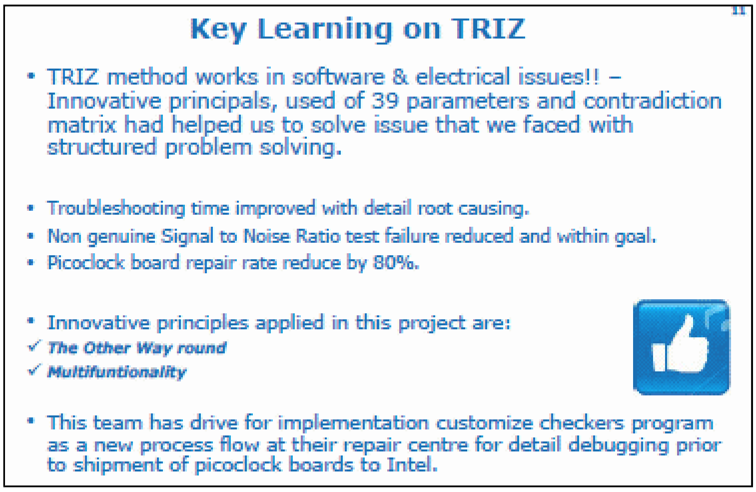
The significance of this solution is described in the Extended Abstract by the Authors as follows:

' In this way a new generation of diagnostic program was born which is highly sensitive to actual test performance output expectations – based on the products we're running. An unexpected benefit from this application is the recognition from the supplier themselves that this is the state-of-art method to analyze this board performance and have committed this 'form' of analysis for other failures too. For us this has improved our previous single function diagnostics into a 'Multifunctional' highly accurate diagnostic tool.'

I will quote the Authors' Conclusion in the Extended Abstract:



' **Conclusion** – Through TRIZ, 2 innovation principles used, PCFD issue has been successfully resolved – a data driven result! Intel also leads to implement these new diagnostics program and have driven the supplier at repair centre for detail debugging prior to shipment of picoclock boards to Intel. This project has managed to improve tool utilization, product health (retest recovery), reduction of PCS & MTP triggering, MT competency during troubleshooting has improved with better uptime met and ROI study shows positive 42KUSD saved from repair cost with projected 111KUSD savings in next 2years. Proliferation of this concept to VF factory will lead Intel to World Class Test Manufacturing Operation.'

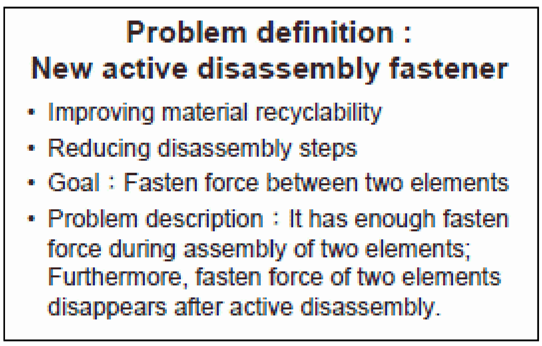


[*** As I mentioned earlier, I do not understand the details of the problem situations and the solutions. But I understand that their 'Outside in' solution is a type of 'Blackbox Test', where the system under test is treated as a blackbox whose behavior is observed from outside without considering/analyzing the inner structure. Because of such a nature of the 'Blackbox Test', it can be applied widely without depending on the detail of the inner structure.]

*** We now have reviewed the four case studies by Intel Malaysia. We should learn that they have been performing these case studies step by step for these several years. The usage of TRIZ tools itself seems rather typical and not so sophisticated. Many of them use the set of 'Technical contradiction - Contradiction Matrix - Inventive Principles'. However, they seem to have obtained good solutions which work well in the real situations of products and processes. We should learn their ways of finding right problems and obtaining right solutions.

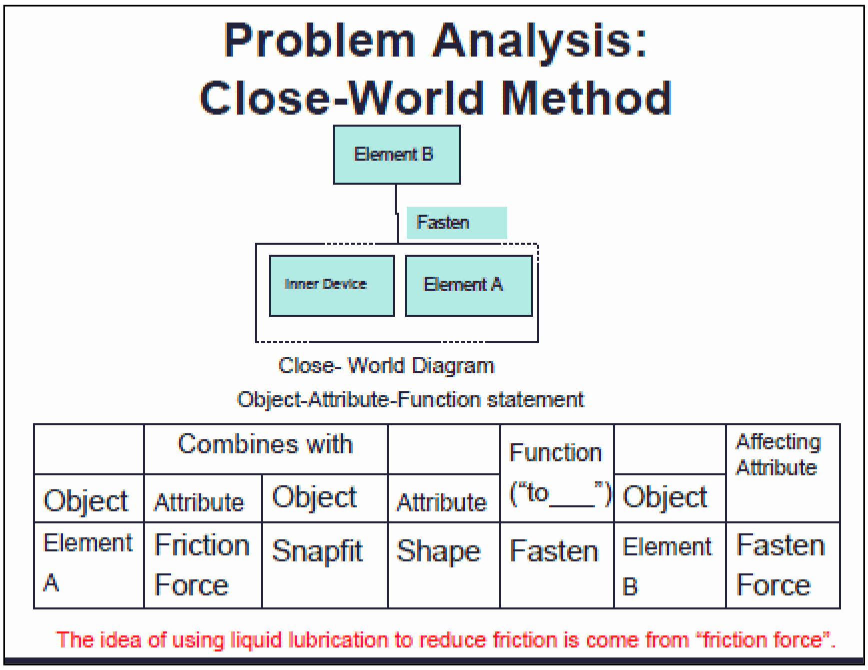
Jahau Lewis Chen, J.-F. Wang (National Cheng Kung Univ., Taiwan) [E08 O-12] gave an Oral presentations with the title of "Eco-Innovation by Using Unified Structured Inventive Thinking".

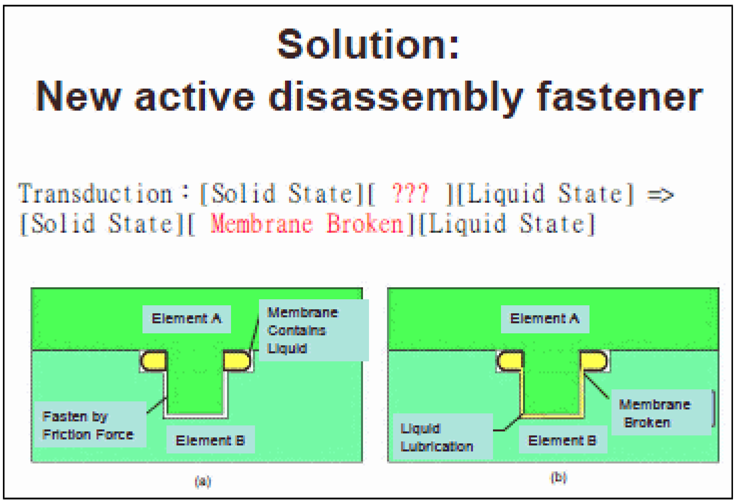
The Authors' way of applying USIT is illustrated here with one of their examples, i.e. developing new ideas for active disassembly fastener (see slide (right)). 'Active disassembly' is one of the concepts for eco-designing, where some components of a product can be easily disassembled at the end of the product's lifecycle. In case of an active disassembly fastener, the requirement for the fastener is stated in the slide (right).

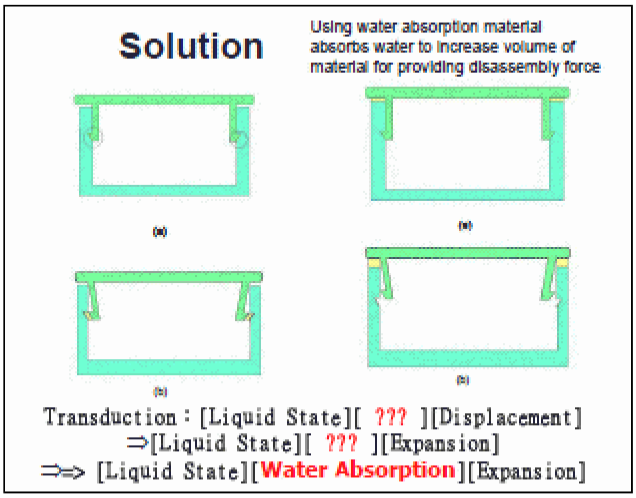


The Authors use the Closed-World Method and the OAF (Object-Attribute-Function) Diagram in the style originally developed by Ed Sickafus (i.e., the developer of USIT). The OAF diagram in this case can be read as: The Function 'to Fasten' is achieved by the combination of the Element A's Friction force attribute and the Snapfit's Shape attribute affecting on the Element B's Fasten force attribute. With this OAF statement, the idea of reducing the friction force (of Element A) can be stimulated for the purpose of reducing the Function 'to Fasten'.

The Authors show two solution ideas (see slides below) generated by use the OAF diagrams.





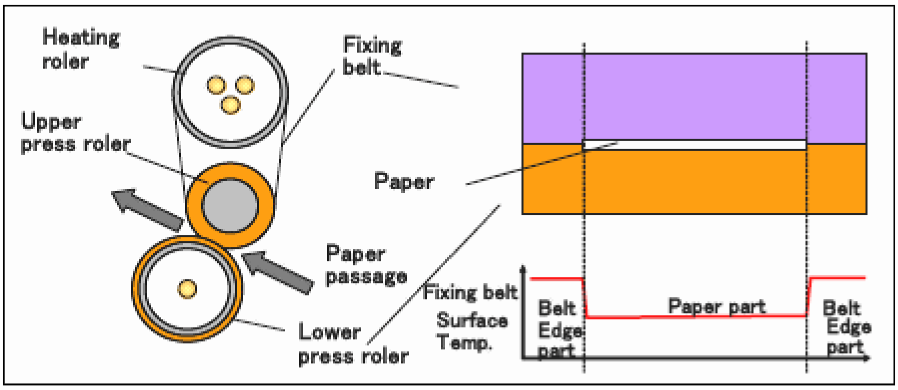


[*** OAF diagram is a representation developed by Ed Sickafus in his USIT Textbook (1977). Nakagawa has not introduced it so much in Japan, partly because I feel it trying to be somewhat too literal/rigorous. Ed Sickafus' comment on this issue can be read in his communication Engl.]

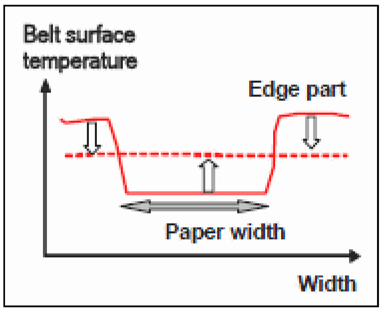
Shoichi Tsuge, Tateki Oka (Konica Minolta Business Technologies, Inc.) [J21 P-A7] gave a Poster presentation on "Case Study for Verifying the Effectiveness of Applying USIT". I will quote the Authors' Abstract first:

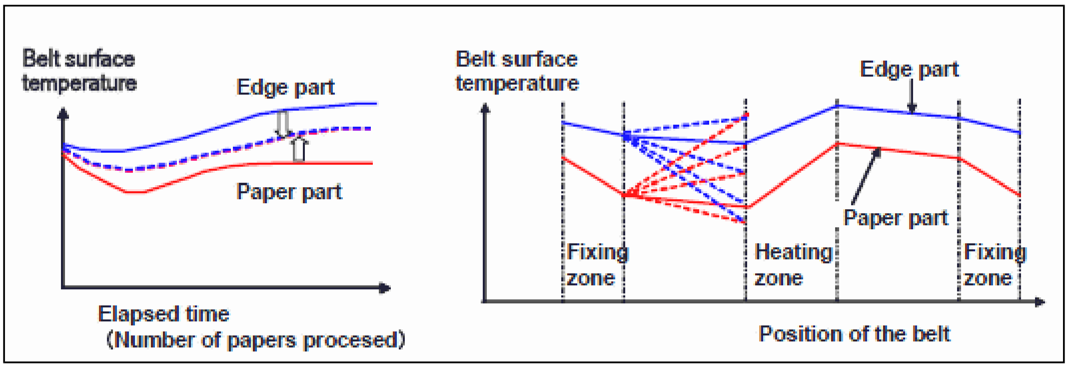
> In order to verify the effectiveness of applying USIT, we chose a theme to which it was recognized that there were no more ideas by the conventional idea generation method. Applying USIT to this theme, we judged the effectiveness of USIT by whether effective ideas (that could not be generated by the conventional idea method) could be generated or not. As a result, we were able to apply for 8 patents, and none of the patent contents was able to be generated by the conventional idea method. We take this as an example that could verify the effectiveness of applying USIT, and it became clear that especially the space/time characteristics analyses and the particle method were effective.

The problem chosen is related to the toner-fixing process of a copier system. As shown in the slide (below), the fixing-belt is heated and pressed between the rollers with the paper having printed toner on it. While processing a number of papers, the surface temperature of the belt becomes lower at the main part than at the edges due to the heat transfer to the papers. And this temperature difference sometimes causes problems in the quality of the processed image.



When we analyzed this problem with USIT, the Space & Time Analysis was found very productive. The system's characteristic behavior in temperature was drawn in several diagrams from different angles, as shown in the following slides (below). These drawings encouraged the team members to think of various solution directions to reduce the temperature difference. Thinking of the ideal situations and of solution behaviors by the Particles (i.e., a revised version of SLP) was also much stimulated. As shown in the right graph, there can be several ways of solution (or target) behabior and thus futher more variety of achieving the solution behaviors.





*** Diagrams drawn in USIT, especially in its Space & Time Analysis, are quite natural and easy to make, and yet they are often very productive as shown in the present case.

Hajime Kasai (IDEA, Inc.) [J06 O-13] gave an Oral presentation with the title of "Application of TRIZ to Environmental Problems: For Further Extension of TRIZ". The Author's Abstract is quoted here first:

> In recent years the environmental problem becomes more serious. To the sustainable development of our society, the solution of this problem is indispensable. This shows that the consideration of E (environment) becomes the lifeline of the company as well as the conventional three elements of product development: Q (quality), C (cost), and D (delivery). We've been participated in various businesses of JEMAI (Japan Environmental Management Association for Industry) for nearly ten years, and appealed that TRIZ has been very effective as a tool of DfE (Design for Environment). As a result, the evaluation rises considerably in these several years.
>
> In this presentation, I introduce this reliable response and specific example to support the spread activity of you dealing with TRIZ promotion in the company.

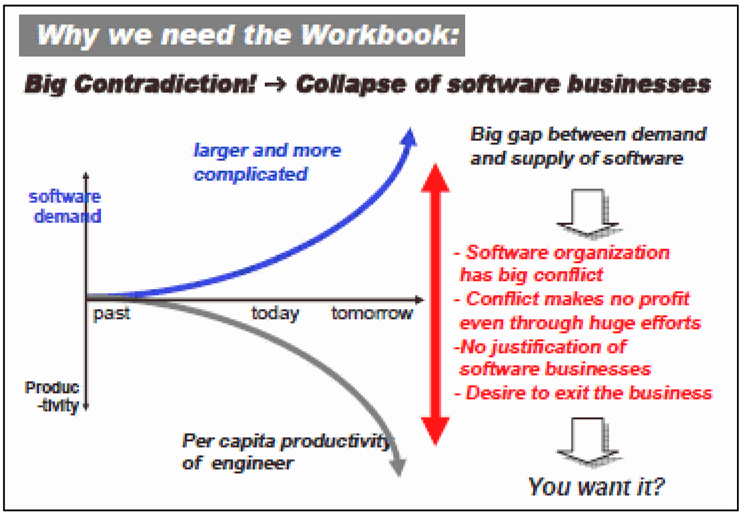
[*** Note: This Oral presentation was given only in Japanese, and hence no English slides are available at moment. However, since I believe this presentation is worthy of being introduced in English as well, I am asking the Author to provide us several selected slides in English translation. Whenever I receive them, I will write and post my review/introduction of the paper here.]

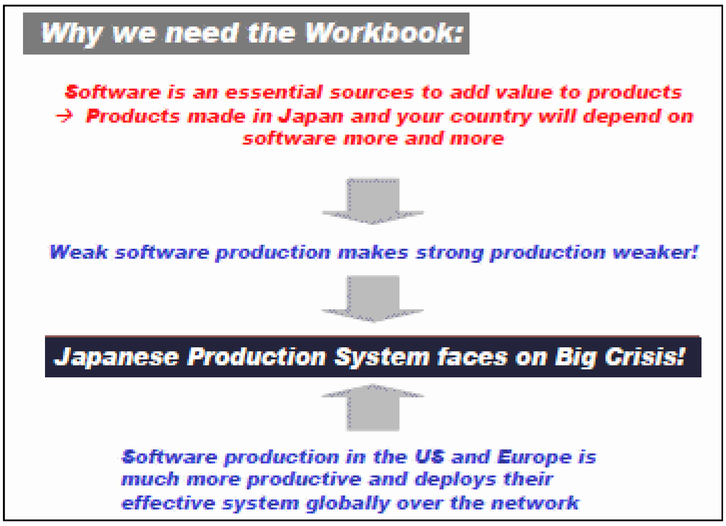
Takuo Maeda (Takumi System Architects), Kazushige Aoki (Yokogawa Electric), Masaaki Ohogami (USIT Planning), Fumiko Kikuchi (Pioneer), Kazunori Kurabayashi (Accenture Japan), Toru Shonai (Central Research Laboratory, Hitachi), Hirotake Makino (Yokogawa Electric), Yuji Mihara (Creative Technology Institute) [SW/IT Working Group of MPUF USIT/TRIZ Study Group] [J16 P-A6] gave a Poster presentation with the title of "Practical USIT Workbook to Develop New Ideas on Software/IT Products".

MPUF is a large-membered (more than 12000) networking group, organized by Hirofumi Hasaba and Keiko Ichinoki, for voluntary study on various methods of Project Management. It has about a dozen of active off-line study groups, including USIT/TRIZ Study Group. The Study Group was organized by Toru Nakagawa and Yuji Mihara in March 2007, and have been meeting off-line every month in Tokyo (see my report Jap.). It has operated 3 Working Groups so far. Software/Information Technology Working Group is led by Takuo Maeda, a software architect having strong sense of crisis in the (embedded) software business in Japan. The WG met about 15 or 20 times off line to adopt USIT for the use in SW/IT design and to create a handy Workbook (WB) useful along the problem solving process. I will quote the first half of Authors' Abstract, where the sense of crisis as a software architect is vividly stated.

> More and more new products with software and software itself, such as business applications, are demanded and furthermore in the future. But software engineers waste their valuable time to fix problems called bugs with no business value and don't have enough time to develop new ideas and/or products with software, even if software constitutes key components for new products and/or businesses. They need to change their situations towards developing new ideas and products, which requires some sophisticated and practical method as well as the practical guidebook, hopefully step by step, to lead them to specific final results on new ideas of products and businesses with software.

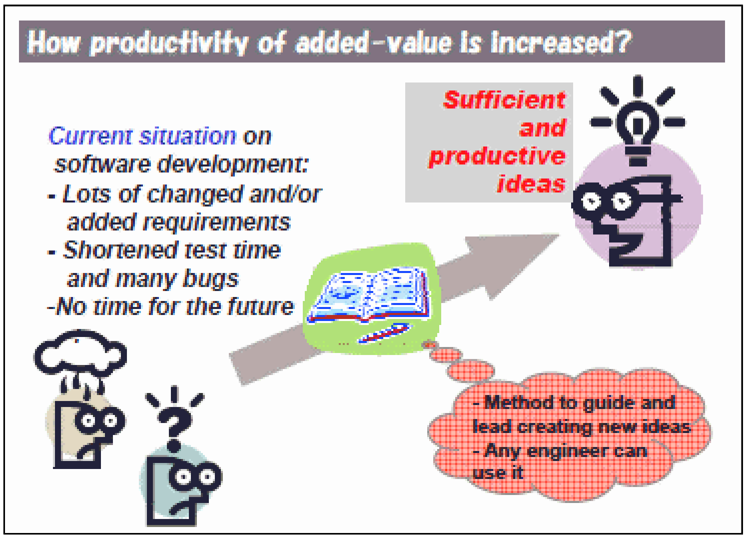
The slide (below-left) shows the big contradiction we currently face in the field of software business. The demands on software are getting larger and more complicated, whereas the productivity of engineers is reducing for handling such a size and complexity of the target software. Next slide (below-right) explains that the software is an essential source to add value and that the products depend on software more and more. Currently the software production in the US and Europe is much more productive, e.g. with the use of software product-line methods and global outsourcing, and hence Japanese production system (i.e., not only the IT/SW industries but also almost all other industries) faces on Big Crisis, the Authors say.





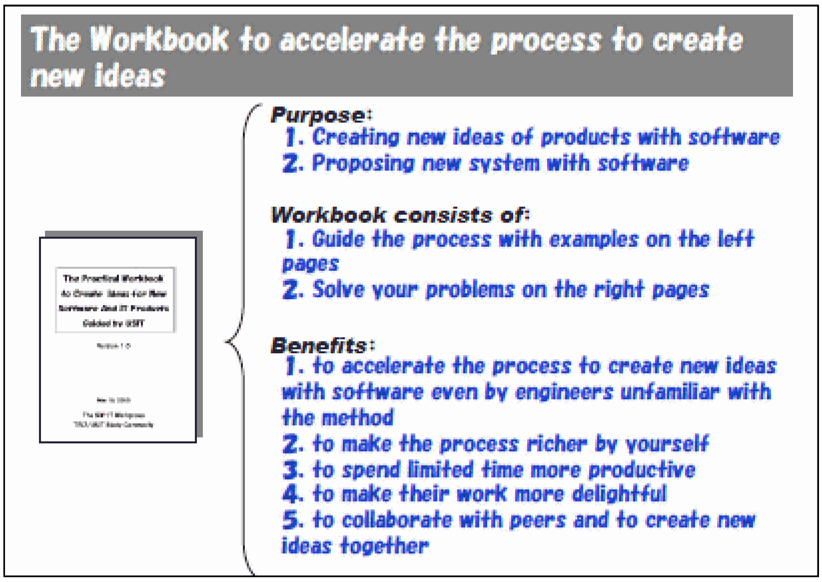
The slide (right) shows the Authors' basic strategy for increasing the productivity of added-values. They think that productive ideas, especially the ones of creating new types and functions of software, should be stimulated and enhanced by using some guides. Thus, they try to provide the methods to guide engineers for creating new ideas. They chose the USIT process for such a method and tried to adopt it to the requirements of problem solving in software/IT field.

As a convenient tool for software engineers, the Authors developed a Workbook (WB) of USIT. Let me quote here the latter half of the Authors' Abstract.



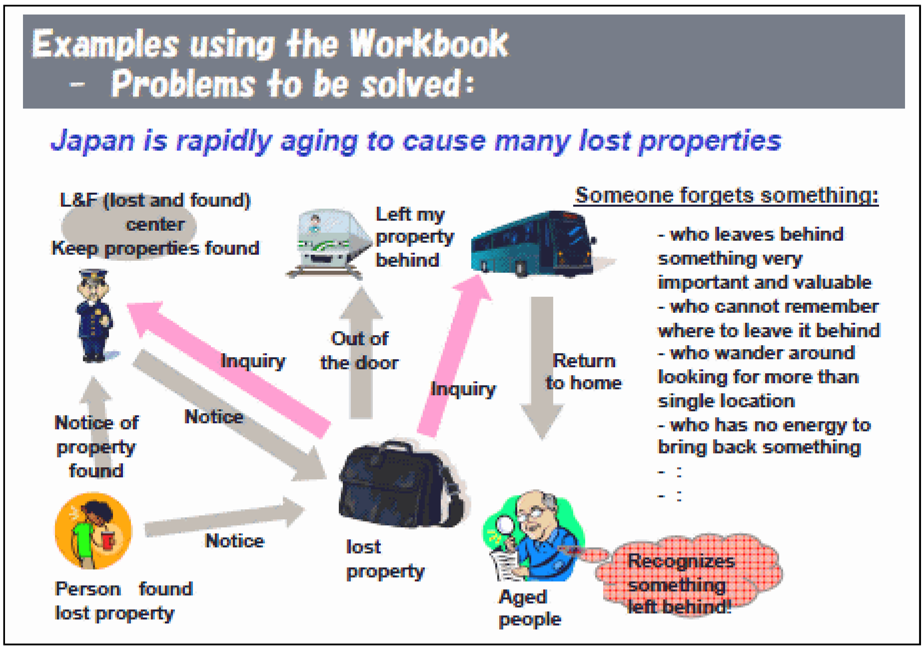
This Workbook (WB) is for such software engineers to create new ideas and products. They are neither familiar with USIT nor other methods like TRIZ. The WB guides the process in the manner of step-by-step. They can focus on each step of the WB towards new ideas and products. The left pages of the WB show where you are in the creation process, what you must do there, how to describe your intermediate ideas, how to move to the next steps to improve your ideas, and how to research current ideas and products on what they are pursuing and/or your competing ideas. The right pages of the WB remain blanked and must be filled by them according to the guide on the left pages. This idea creation processes are done at their discretionary time, such as commuting time to add more value to their time. The WB is designed to utilize their limited and valuable time, brought by them at any time and written down their ideas on it.

The slide (right) summarizes the concepts of the Workbook. It intends to be used for the purpose of creating new ideas of products with software, and of proposing new system with software. It has the special layout, where the left pages have the step-by-step description of the process and examples while the right pages are left blank so that the user has to fill in.



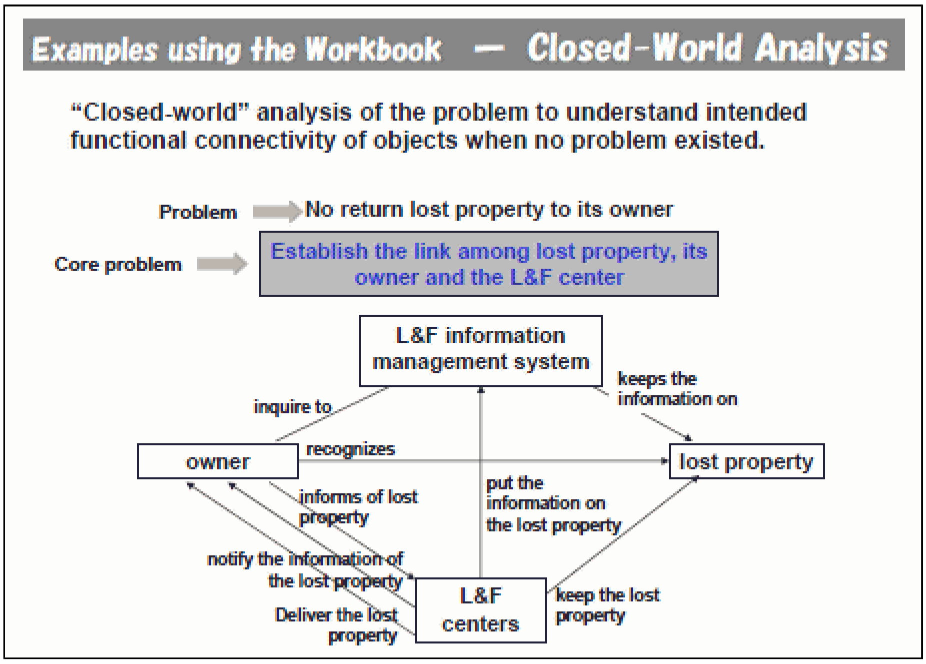
This WB is intended to be useful even for the beginners of USIT. Reading the process description and examples, the user may think of his own problem and write his problem situations, analysis, ideas, etc. (Maeda already have a number of successful experiences to develop WBs in this style of layout for promoting other methods, e.g. developing Request for Proposal (RFP).)

The WB contains a demonstration of solving a SW/IT problem in its full length. The example problem is shown in the slide (right). This slide illustrates the initial stage of the problem definition. The user is advised to write the background situation and needs of the problem. The problem situation is sketched here, especially by using simple illustrations of objects (or actors) for the purpose of encouraging the user to think of real situations as vividly as possible. Roles of the actors are shown by adding some words and the relationships among the actors are shown with arrows accompanied by short description. [*** Even though this sketch looks similar to functional diagram, it can/should be drawn intuitively without any strict rule for the purpose of enhancing the user's image of the real problem.]

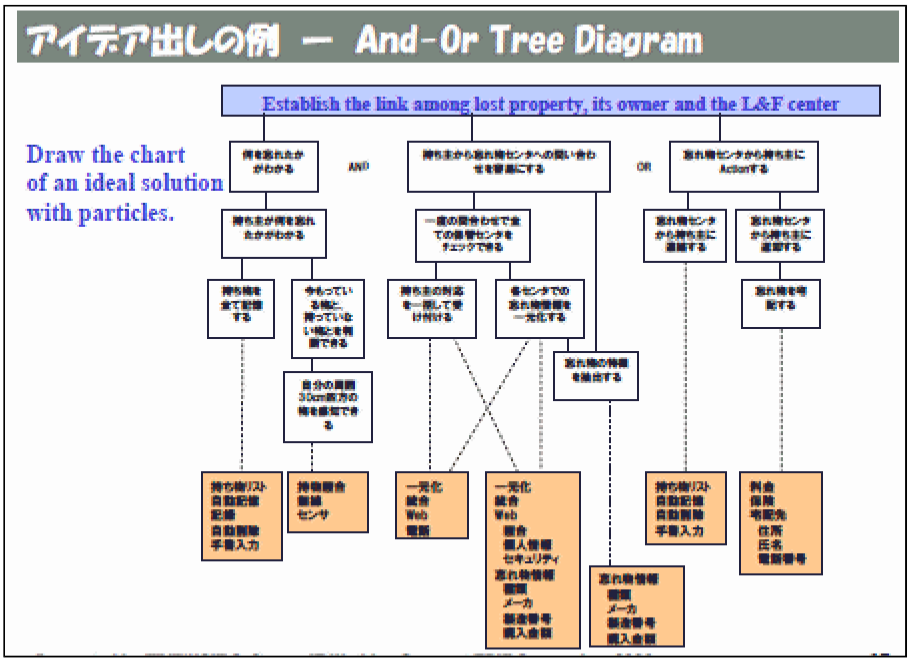


The slide (right) is the example

in the WB at the stage of analyzing the existing (or currently developing) system in terms of the functional relationships. [In USIT, "Closed-world" analysis is the stage of analyzing the present problem system in terms of Objects-Attributes-Functions. "Closed-world" diagram, as shown here, is a form of functional relationship diagram, and intends to describe the positive side of the system.] The Authors suggests to state the 'Core problem' in a positive form (i.e. 'Core task'). Now the software system 'L&F information management system' has appeared in this diagram as the 'main actor' of the solution system. The functional relationships of the objects/actors are represented here in a more formal way than in the sketch of the problem situations. [The essence of the solution direction in this example is that the new 'L&F information management system' is not within a specific L&F center but rather covers many L&F centers (of different organizations).



The slide (right) shows the example at the stage of building the "And-OR Tree Diagram" of solution ideas in the Particles method of USIT. Particle method is an extension of SLP (Smart Little People) Modeling. By using a concept of imaginary power of 'Particles', desirable behaviors of ideal solutions are generated one after another and are built into a hierarchical diagram of solution ideas. The diagram has the task statement at the top, solution strategies at the second to third level, and solution ideas (stated as desirable behaviors of Particles) at the lower levels (shown with white labels). Furthermore, as shown with orange labels at the bottom in the slide, possible desirable properties of the new system are listed up. In the later stages of USIT, solution ideas are much enhanced and the hierarchical system of solution ideas are rebuilt by reorganizing the "And-Or Tree



Diagram".

The Authors have applied USIT to a few SW/IT problems for mastering and adapting USIT to the SW/IT system development. In parallel to the problem solving of cases, the writing/revising of the WB have been done. The Authors displayed the first public version of the WB at the Symposium and are improving the WB further by applying it to different problems in the WG activities of the USIT/TRIZ Study Group.

*** The USIT/TRIZ Study Group of MPUF is another example of a very active group of people coming from many different companies and studying and developing USIT and TRIZ for themselves. They have off-line meetings once a month on Friday evening at Shinjuku, Tokyo, and their WGs have extra off-line meetings once or twice a month. The members are TRIZ and USIT promoters in their own companies, and exchange and share their experiences and passion in these MPUF off-line meetings. In the previous Japan TRIZ Symposium 2008, another WG presented an interesting Poster presentation on new designs of Compact Umbrella .

*** The SW/IT WG has active members who really get involved in SW/IT projects. Hence their trials of applying USIT to case studies in SW/IT will evolve actively and they will develop their own way of applying USIT to SW/IT problems. I am expecting much in their further work.

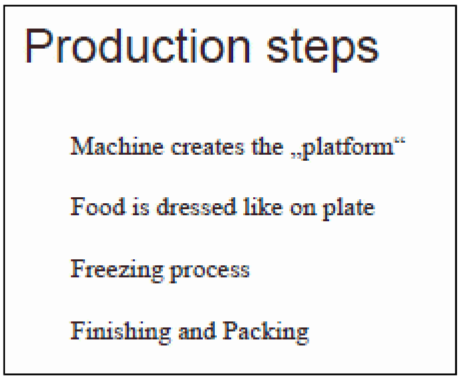
Wolfgang Sallaberger (Congelo, Austria) [E13 O-4] submitted a paper having the title of "The Evolution of Cooking with TRIZ" for an Oral presentation but was absent. His topic is very unique, reflecting his unique profile. He has been an owner chef of a restaurant and has started his life of invention in the kitchen (read more in the introduction of his paper presented at Japan TRIZ Symposium 2008). I will quote the Author's Abstract:

> Banquets with 500-1000 meals, prepared in 11 minutes, are a normal task in banquet business for Chefs in Hotels. These are hard to handle with old “classical” structures and methods. This old fashioned system with its hierarchy comes from the time of the Visionary Master Chef and Culinary Genius August Escoffier (France). Escoffier had the vision that the “Evolution of cooking will go with the changes in Society”. In our time this old system can be a beautiful show but it is not effective for Leadership in Business. At the time of Escoffier it was groundbreaking - where the Classical European Kitchen was developed and defined.
>
> New Kitchens and cooking have to be much more efficient in using space, in crew size and in other factors. These bring to the requirement “more with less” or higher Value. Banquets, Congresses, Meetings, Wedding Ceremonies bring the main Value in large kitchens, but they destroy the innovation and the creative power of the Kitchen Brigade. This paper demonstrates what TRIZ can do to improve the situation.

The Author's vision and approach are quoted here (center) from his paper. The statement is simple and clear.

The picture (center-bottom) is the food the Author actually developed and sell.

The production in a kitchen or a kitchen factory is very



With or without marketing/transportation.

simple (slide right-top). The final processing for serving is also very simple; easily done in a kitchen of restaurant or at home (slide right-bottom).

Final steps for users

Unpack

Dress on Plate

Heat in steam oven
10 minutes
126 °c with steam
Serve

The Author describes how he has reached this solution, how the food is evaluated, and how large business opportunities he expect from this style of food.

*** I miss the Author, not being able to come and present the paper at the Symposium. The paper and presentation slides will be posted in this site "TRIZ Home Page in Japan" in due course (after posting many others).