The Fourth TRIZ Symposium in Japan, 2008
Held at Laforet Biwako (Moriyama, Shiga)
on Sept. 10-12, 2008

TRIZ activities in Corporate R&D Division of Matsushita Electric Industrial Co.

—Applications to system, architecture, and software technologies —

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Yojiro Fukushima
System Engineering Center
Matsushita Electric Industrial Co., Ltd.

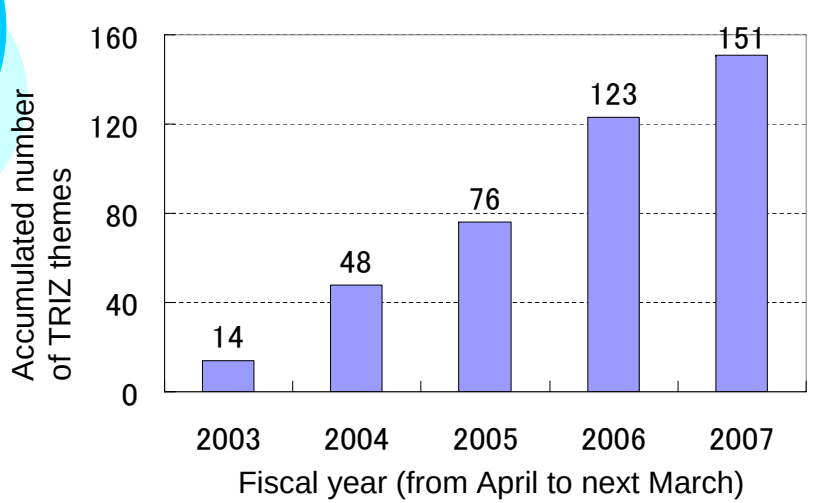
Contents

Our targets and practices

Targets
- Improvement of engineers' skills
- Innovation in development processes and improvement of business efficiency

Fiscal Year	Training with consultants	dissemination of TRIZ knowledge
2003	Trial	
2004	One-day training	
2005	Practical training	Reports of practical trainings
2006		
2007		New text book and TRIZ news

Number of themes addressed by TRIZ



Execution programs

1. Solving real problems in business

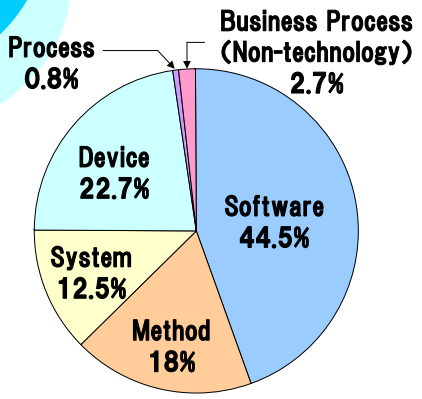
No.	Standard time required	Main activities	Theme	members	Executed ratio
①	120h	Problem definition, Solving, Evaluation	Real problems in the job	Team from 3 to 6 people	76%
②	70h	Problem definition, Solving			21%
③	24h + free	Problem definition, Solving			1.5%
④	16h	Short problem definition, Solving			1.5%

2. Understanding TRIZ

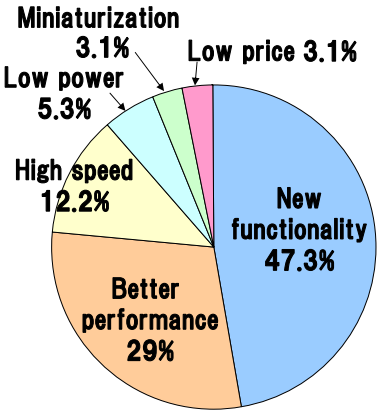
Standard time required	Main activities	Theme	members
One day	Basic lecture and exercises	hypothetical problem	About 30 persons all together

Fields and purposes of application

Technology fields

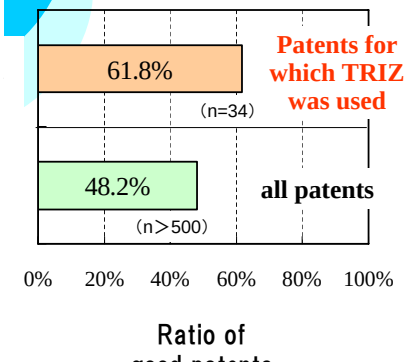


purposes of applicaton

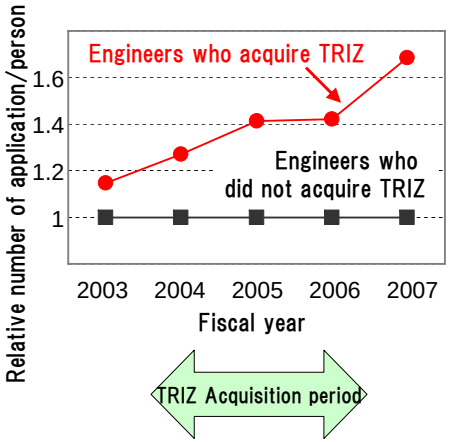


Effects of Using TRIZ (1. in patent application)

1. Quality of patents:
Comparison in the ratio of good patents.

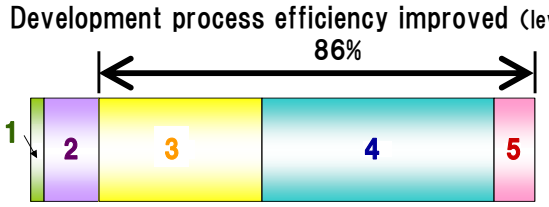


2. Engineer' skill:
Comparison in the number of patent applications



Effects of Using TRIZ (2. Business efficiency improvement)

● Engineers' evaluations of the results obtained with TRIZ

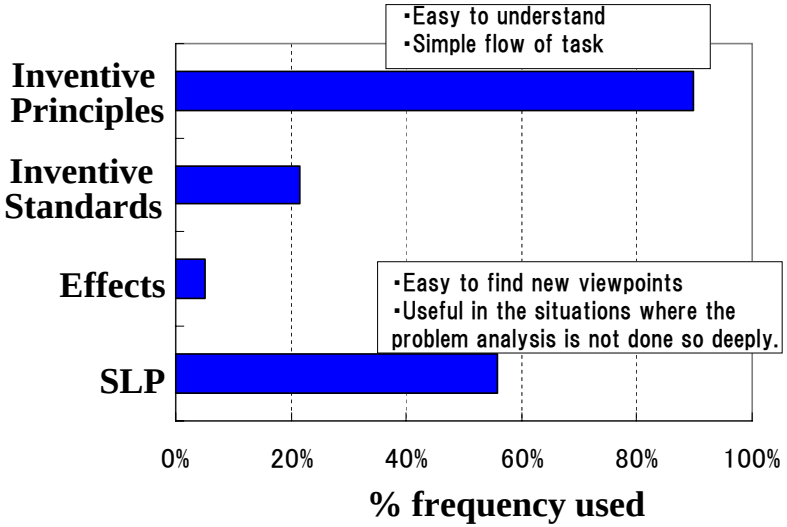


distribution of engineers' evaluation on the solution development efficiency

1 : Idea that may come out without cutting and trying; process is less efficient than before.
2 : Idea that may come out without cutting and trying; process is nearly the same efficiency than before.
3 : Idea that may come out without cutting and trying; process is more efficient than before.
4 : Idea that would not come out without cuts and try.
5 : Idea that are amazing and can not expect surely even with cuts and tries.

TRIZ techniques used (1) Idea generation

TRIZ tools used for idea generation



TRIZ techngues Used (2) Inventive principles

Top 10 Inventive Principles most often used

10. Preliminary action
2. Taking out
3. Local quality
28. Mechanics substitution
24. Intermediary
13. The other way round
5. Merging
4. Asymmetry
19. Periodic action
7. Nested doll

(These 10 Inventive principles are used in 79 % of all the usage of Inventive Principles.)

Basic approaches for applying TRIZ to the fields of systems. architecture, and software technologies

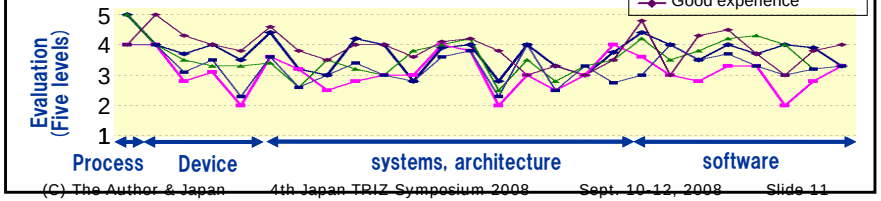
e expected that

TRIZ is the thinking methods extracted from a huge number of past patents.

⇒ It may be regarded as the basic, general principles when humans think, and hence should also be effective when software engineers think on their problems.

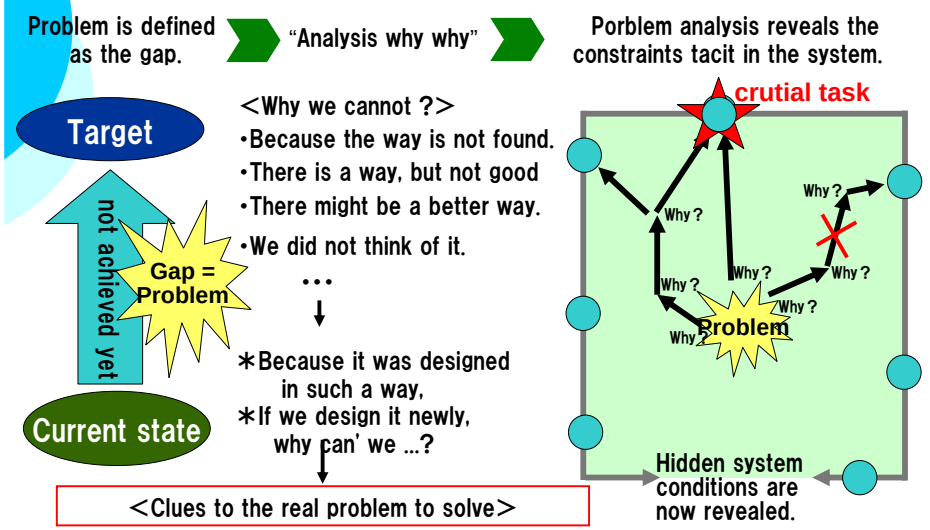
Verification1: We analyzed 13 patents in the software field.
⇒ Basic ideas of the patents can be derived by using the TRIZ techniques. (Analyzed by SKI)

Verification2: Engineers' evaluations of TRIZ
⇒ No difference depending on the fields of engineers

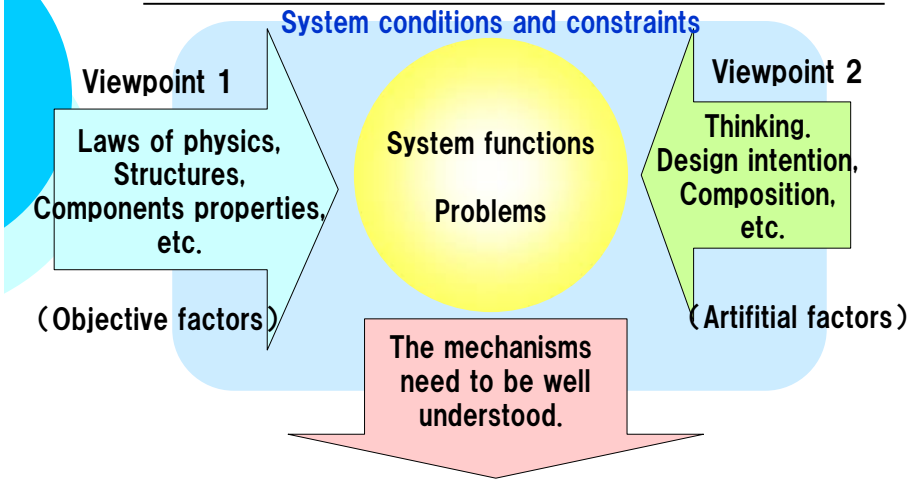


"Analysis why why" is good to find causes, and also to reveal tacit constraints and new clues.

Problem is defined as the gap. → "Analysis why why" → Porblem analysis reveals the constraints tacit in the system.



A model of problem analysis



① System functions work to the full extent?
② What are the core problems?

Clues to problem solving !!

Extension of concepts in some TRIZ Tools

Interpretation of Inventive Principles
2 . Mechanics substitution: Think more flexibly.)
Ex. 1: Use diferent data parameters means etc.
Ex. 2: Replace it with a diferent application.

Use of Inventive Standards Prediction in T PE)
(In general use) ⇒ (In software application)
・Add a new substance ⇒ Add new data or a module.
・Add a gap ⇒ Add a flag which includes no data.

Recent textbooks and software tools for software application
- Darrell Mann : 'TRIZ For Software '
  www.trlz- ournal.com/archives/2004/10/04.pdf
- **Innovation Suite** by **CREA**
- oldfire Innovator by Invention Machine Corporation
- Umakant Mishra : TRIZ Principles for Information Technology Draft)

These references show that all Inventive Principles will be applicable to software technology.

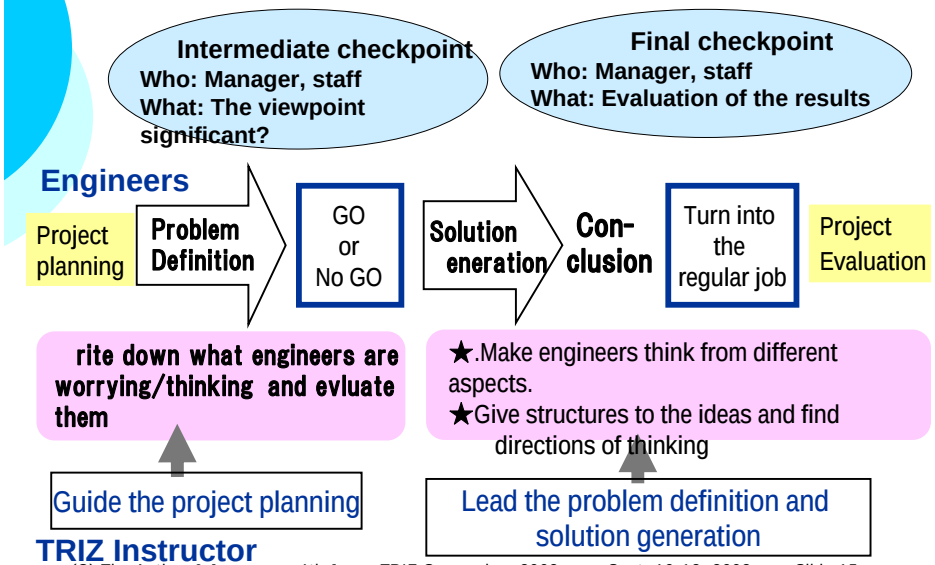
Top 10 Principles most frequently used

Principles	Classification*1
10. Preliminary action	Human thinking
2. Taking out	
3. Local quality	
28. Mechanics substitution	Physical means
24. Intermediary	Human thinking
13. The other way round	
5. Merging	
4. Asymmetry	
19. Periodic action	Human thinking / Physical means
7. Nested doll	Human thinking

＊1：Edited by Mitsubishi Research Institute Inc. "Illustration of TRIZ" pp. 56～84

Usage of TRIZ in the real pro ects and obs

—Engineer's thinking is guided to fit with the organization's policy.—



Remarks on some of engineers complaints.

Engineers often complain:
・Solution ideas are common ones.
・ Not patentable.
・ Conventional and not new.

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Generated ideas still stay in the generic/abstract world.
No significant change yet in one's own thinking.

Suggestions for response
Build up the image of the system where the solution ideas are implemented.
The scheme built up becomes the solution.
If there is a problem in the scheme, it is the true problem.

Suggestions for procedure
1. The KJ method is useful to give a structure to many ideas. ==> Good for elminating unrelevant facts and for finding new aspects.
2. Solution evaluation and combination (e.g., Pugh method): Good to modify the whole solution and enhance/compliment the solution.

How to turn the TRIZ results into the regular job: Use TRIZ without being constraint by TRIZ tools

— How to use TRIZ method more effectively —

1. Before starting to solve a problem with TRIZ, the problem/task must be positioned and evaluated in the framework of business.

Write down the background, targets (final results), constraints, etc.

2. Together with TRIZ tools, it is usefull to organize knowledges by using simple, general methods:

Write down all the ideas and knowledges;
=> Notice some new facts/aspects;
=> Recognize the structure of technology and find solution directions.

- **In the team activities, stimulate each other.**

Interest in other's tacit knowlege -> organizational knowledge
=> sympathy -> stimuate tacit knowledge again.
Similar to SECI Model (Ikujiro Nonaka et al. " ", p. 93).

- **Combining TRIZ with familiar idea generation methods is useful.**

The KJ Method, Brainstorming, Brainwriting, etc.

Conclusion

- We applied TRIZ to system, method, and software technology. As a result, we learnt TRIZ had contributed to the improvement of engineer's ability. In the future, we hope that many cases in this field will be researched.

- Problem will be solved if engineer thinks well by squeezing it in the direction of the solution that TRIZ indicates. This means that the engineer who experienced TRIZ process discovers his own ability.
  He begins to think deeply about problem itself.
  He will consider "Problem that should be solved" instead of "Problem can be solved".