

# Bibliography

## 1. The position of the papers

The central part of figure show the structure of Resolving Differences which consists of problem solving, making new function and idealization based on the concepts of “function” and “process object”. Around the central part is the short name of my papers.

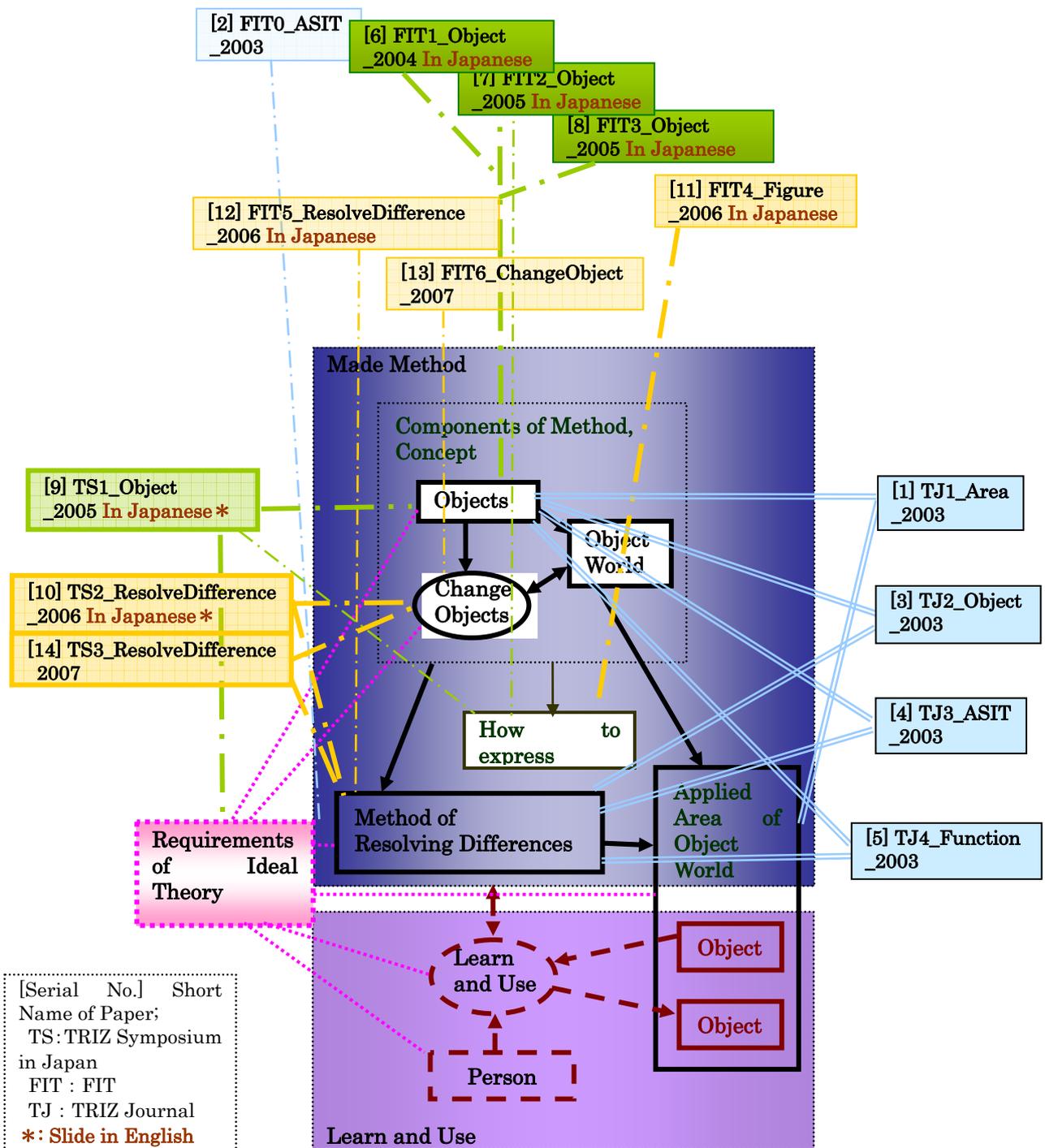


Figure: Thema of Takahara’s Paper in FIT, TRIZ Symposium and TRIZ Journal

Elements of structure of made method are;

1. Basic elements(Object, Object Change, Object World) and common concepts(Attributes of Object, Granularity, Function)
2. Method of Resolving Differences
3. Applied area

Elements of structure in use mode are;

4. Using person
5. Process of learning and using

## **2. Bibliography**

### **The TRIZ Symposium in Japan**

I intend to build the ideal formal theory of recognizing and changing world using TRIZ at the TRIZ Symposium in Japan. I don't intend to touch existing contents of TRIZ in the area of problem solving or idealizing system which is useful as it is. But I believe it would be more useful if it expanded to deal with Process Object explicitly and combined with this method. The basic principles of handling Process Object will become the base of the method of "Resolving Differences" which include recognition and operation of the real world including usual problem solving, idealizing system and making new system.

These are also necessary to expand TRIZ to so-called "non technical" area without using logic of analogy as usual.

For those who do not agree with these articles I strongly recommend first to expand the possibility of recognizing and changing System Object and Process Object explicitly. Secondly if you want a smaller parameter value, please note that eliminating the Process Object which has the parameter in question is also a candidate for the purpose every time.

#### **[9] TS1\_Object\_2005** (Short name in the figure)

Takahara Toshio: "How to Adapt Reconsidered Object to TRIZ, USIT and ASIT",  
(6 pages in Japanese, 20 pages in English slides)

1. I made clear the requirements of the ideal formal theory; the requirement for object, operation of object, applied area and using people. (This is my starting point to build the ideal formal theory of recognizing and changing world.)

2. I grasp object as something to be recognized including something to be recognized and operated which is of practical use. Important thing is something I can change. But it is difficult to discriminate what I can change it or not in advance. And something to be recognized includes something to be changed. And also it is easy to specify what I recognize.

Object consists of system objects which express material being, contents of idea that are born by physical entity and process objects which express processes of movement.

How to express objects and their behavior are shown.

3. I consider the way to adapt the reconsidered object to TRIZ, USIT and ASIT.

#### **[10] TS2\_ResolveDifference\_2006**

Takahara Toshio: "A Method of Resolving Differences Based on the Concepts of Function and Process Object—Or a Comment on "Hierarchical TRIZ Algorithms" —",  
(10 pages in Japanese, 19 pages in English slides)

1. I reconsider the law of dialectics. Then I studied the structure of movement. What causes

movement and what is a result of movement make clear the structure of movement. On this basis I made the table of object operation which showed the relation between purpose and object operation.

2. I explained the types of differences and the types of means of solution as the element of Resolving Differences. I explained the types of Resolving Differences as a whole and classify the existing TRIZ.

3. I took a famous TRIZ example of acid attack problem from Larry Ball's "Hierarchical TRIZ Algorithms" to explain my method and concepts including process object and function. Also I made some comments on his book.

#### **[14] TS3\_ResolveDifference\_2007**

Takahara Toshio: "A Method of Resolving Differences Based on the Concepts of Functions and Process Objects: Part 2"

(16 pages, 19 pages in slides)

As this is the first paper written in English in TRIZ Symposium in Japan, I add the summary of the previous paper as a preparation of discussion including how to grasp object and function and how to express cause effect diagram. And I also add a part of previous paper so I took a famous TRIZ example of acid attack problem from Larry Ball's "Hierarchical TRIZ Algorithms" to explain my method and concepts including process object and function. Also I made some comments on his book.

This article improves the framework of the method of Resolving Differences which consists of problem solving, making new function and idealization based on the concepts of "function" and "process object".

1. We can not touch process object directly. This article shows the "principle P" dealing with process object. There are three principles of transforming object including the "principle P" and two types of operating object by person. (I showed only conclusion of them in the paper.) We obtain the figure and the table of "Operation and transformation of object" by combining two types of operating object and three principles of transforming object in processes of real world. This figure and table express every possibility of one to one relation which is relation between operated object as input and target as output.

2. Three types of Resolving Differences have a unified input-output relation. We resolve differences in the following way. We set the purpose in terms of Object as an output. Then we find out input of object to get this purpose of object for every kind of logical types of changing Objects using the figure or the table of "Operation and transformation of Object".

Among three types of Resolving Differences, idealization has many issues to be investigated. I studied some of them.

#### **FIT (Forum on Information Technology in Japan)**

FIT is the forum held every year since 2002 by Information Processing Society of Japan (IPSJ) and the Institute of Electronics, Information and Communication Engineers (IEICE).

#### **[2] FIT0\_ASIT\_2003**

Takahara Toshio: "A Study on Thinking Tool or Problem Solving Tool"

(3 pages)

I took a brief outlook of "process object" and "structure and function" and proposed the outline of "THE TOOL" (later called "Enhanced ASIT") which was a framework of thinking tools or problem solving tools.

#### **[6] FIT1\_Object\_2004**

Takahara Toshio: “Reconsidering Object”

(4 pages in Japanese)

1. I made the first definition of object that is something which interacts with other thing expanding the concept of being by I. Kant and K. Marx. Something to be recognized and operated by me is the object in this sense. There exists a being (matter or idea) which I can recognize and operate. And there exists a movement which I can recognize and operate. These being and movement are called system object and process object respectively.
2. I investigated concept of attributes and function.

#### **[7] FIT2\_Object\_2005**

Takahara Toshio: “Reconsidering Object 2—The Minimal Object Set for Real World—”

(4 pages in Japanese)

1. I grasp object as something to be recognized (third definition) including something to be recognized and operated (second definition) which is of practical use. Important thing is something I can change. But it is difficult to discriminate what I can change it or not in advance. And something to be recognized includes something to be changed. And also it is easy to specify what I recognize. Object consists of system objects which express material being, contents of idea that are born by physical entity and process objects which express processes of movement.
2. We can express object world by objects, their relation in space and their relation in time. I make the rule of expressing figures. (More extended detail is in [11] FIT4\_Figure\_2006)

#### **[8] FIT3\_Object\_2005**

Takahara Toshio: “Reconsidering Object 3—Viewpoint and Granularity—”

(4 pages in Japanese)

1. Viewpoint and granularity of object are discussed.
2. Relations between objects can be seen as causal relation or mutual relation according to set granularity.
3. We must have a viewpoint to tell whether the object world is true or false, verify reliability or evaluate function. We should seek a means to have these jobs accomplished.

#### **[11] FIT4\_Figure\_2006**

Takahara Toshio: “How to Express a Structured Object World—Reconsidering Object 4—”

(4 pages in Japanese)

We can express object world by objects, their relation in space and their relation in time. Movements form relations between objects in time. What causes movement and what is a result of movement make clear the structure of movement.

Movements change attributes of object, qualitatively change object, delete object or generate object.

I make the rule of expressing figures of object world in each case. A part of expressing figures of object world is shown in [14] TS3\_ResolveDifference\_2007.

#### **[12] FIT5\_ResolveDifference\_2006**

Takahara Toshio: “A Method to Change Object World —Reconsidering Object 5—”

(4 pages in Japanese)

1. I reconsider object and the law of dialectics. Then I studied the structure of movement. What causes movement and what is a result of movement make clear the structure of movement. On this basis I made the table of object operation which showed the relation between purpose and object operation.

2. I explained the types of differences and the types of means of solution as the element of Resolving Differences. I explained the types of Resolving Differences as a whole and classify the existing TRIZ.

(Details are in [10] TS2\_ResolveDifference\_2006)

### **[13] FIT6\_ChangeObject\_2007**

Takahara Toshio: "The Principles of Handling Process Object in the Method of Resolving Differences — Reconsidering Object 6"

(4 pages)

Practically one of the reasons Process Object has not been treated explicitly so far is that we don't grasp the way how to deal with it. This paper shows the outline of dealing with changing Object including Process Object. Three principles of transforming object and two types of operating object by person form the principles to change object physically.

Before changing Object physically we must decide logical contents of changing Object which is a result of recognizing differences to be resolved depending on the situation as the functional purpose.

(Details are in [14] TS3\_ResolveDifference\_2007)

## **TRIZ Journal**

### **[1] TJ1\_Area\_2003**

Takahara Toshio: "Application Area of Thinking Tool or Problem Solving Tool"

(5 pages)

Among other creatures human being is characterized as having the indirect way of recognition and operation via medium. Until now we have had the vast accumulated indirect media consisting of "technology" born by the technical means and "institution" born by common concept. We must think "object" is everything to be selected and decided to solve a problem or to design something. We can grasp that "object" is not only "system object" consisting of the element of technical system or institutional system but also "process object" consisting of the element of process of system action or human action.

We have technical area, institutional area and personal area to which thinking tool or problem solving tool can apply.

### **[3] TJ2\_Object\_2003**

Takahara Toshio: "How People Interact with Objects using TRIZ and ASIT"

(13 pages)

I discuss the role of "process object" and "system object" which are the key concepts connecting life with problem solving tools.

I examined ASIT to find ASIT has the great ability to deal explicitly with "process object".

Afterwards, related examinations of "the 40 principles" of TRIZ and their relations with ASIT were also given.

### **[4] TJ3\_ASIT\_2003**

Takahara Toshio: "Logical Enhancement of ASIT"

(10 pages)

I gave the outline of "structure/function/attribute". And I reconsidered the problem solving tools from the viewpoint of "system/process object" and "structure/function/attribute".

On this basis I drew the outline of a tentative framework of "Enhancement of ASIT". I enhanced ASIT adding three tools to obtain more logical structure maintaining the Closed World condition. Afterwards related examination on the relations between "the 40 principles" of TRIZ and ASIT and Enhancement of ASIT was also given.

### **[5] TJ4\_Function\_2003**

Takahara Toshio: "How Function is Realized in Problem Solving"  
(12 pages)

I made clear the way how function is achieved in the real world with examples to find out several types of function realization in problem solving. The correspondence between ASIT and several types of function realization was shown.

### **3. References**

#### **The TRIZ Symposium in Japan**

**[9] TS1\_Object\_2005** (Short name in the figure)

Takahara Toshio: "How to Adapt Reconsidered Object to TRIZ, USIT and ASIT",  
The First TRIZ Symposium in Japan. 2005.09.01-03  
(6 pages in Japanese, 20 pages in English slides)

**[10] TS2\_ResolveDifference\_2006**

Takahara Toshio: "A Method of Resolving Differences Based on the Concepts of Function and Process Object—Or a Comment on "Hierarchical TRIZ Algorithms" —",  
The Second TRIZ Symposium in Japan. 2006.08.31-09.02.  
(10 pages in Japanese, 19 pages in English slides)

**[14] TS3\_ResolveDifference\_2007**

Takahara Toshio: "A Method of Resolving Differences Based on the Concepts of Functions and Process Objects: Part 2"  
The third TRIZ Symposium in Japan. 2007.08.30-09.01.  
(16 pages, 19 pages in slides)

#### **FIT (Forum on Information Technology in Japan)**

**[2] FIT0\_ASIT\_2003**

Takahara Toshio: "A Study on Thinking Tool or Problem Solving Tool", K-068, FIT2003,  
Sept.2003.  
(3 pages)

**[6] FIT1\_Object\_2004**

Takahara Toshio: "Reconsidering Object", FIT2004, K-053, 2004.09.  
(4 pages in Japanese)

**[7] FIT2\_Object\_2005**

Takahara Toshio: "Reconsidering Object 2—The Minimal Object Set for Real World—", FIT2005,  
K-084, 2005.09.  
(4 pages in Japanese)

**[8] FIT3\_Object\_2005**

Takahara Toshio: "Reconsidering Object 3—Viewpoint and Granularity—", FIT2005, K-085,  
2005.09.  
(4 pages in Japanese)

**[11] FIT4\_Figure\_2006**

Takahara Toshio: “How to Express a Structured Object World—Reconsidering Object 4—”, FIT2006, K-093, 2006.09.

(4 pages in Japanese)

**[12] FIT5\_ResolveDifference\_2006**

Takahara Toshio: “A Method to Change Object World —Reconsidering Object 5—”, FIT2006, K-094, 2006.09.

(4 pages in Japanese)

**[13] FIT6\_ChangeObject\_2007**

Takahara Toshio: “The Principles of Handling Process Object in the Method of Resolving Differences — Reconsidering Object 6”, FIT2007, D-015, 2006.09.

(4 pages)

## **TRIZ Journal**

**[1] TJ1\_Area\_2003**

Takahara Toshio: “Application Area of Thinking Tool or Problem Solving Tool”, The TRIZ journal, Jun.2003.

<http://www.triz-journal.com/archives/2003/06/e/05.pdf>

(5 pages)

**[3] TJ2\_Object\_2003**

Takahara Toshio: “How People Interact with Objects using TRIZ and ASIT”, The TRIZ journal, Aug.2003.

<http://www.triz-journal.com/archives/2003/08/d/04.pdf>

(13 pages)

**[4] TJ3\_ASIT\_2003**

Takahara Toshio: “Logical Enhancement of ASIT”, The TRIZ journal, Sept.2003.

<http://www.triz-journal.com/archives/2003/09/e/05.pdf>

(10 pages)

**[5] TJ4\_Function\_2003**

Takahara Toshio: “How Function is Realized in Problem Solving”, The TRIZ journal, Nov.2003.

<http://www.triz-journal.com/archives/2003/11/b/02.pdf>

(12 pages)