Six-Box Scheme Representation of Published Papers

(1) 18 Papers by Toru Nakagawa (2000 - 2016)

Toru Nakagawa
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December 15, 2016

Six-Box Scheme Representation of Published Papers

Preface (Toru Nakagawa, Dec. 15, 2016)

Six-Box Scheme is the new paradigm of creative problem solving, which I found in 2004 through my work related with TRIZ and USIT and I have been promoting actively since 2012 in much more general context.

'Creative problem solving' implies a wide range of intellectual activities;
- not only solving difficulties/undesirables but also achieving goals/desirables,
- not limited to inventions/discoveries but including ordinary intellectual works,
- academic or non-academic, theoretical or practical, published or not, completed or not, etc.

Till recently, for the purpose of demonstrating the Six-Box Scheme, I was trying to make a new case study of applying USIT (or other) method to some problem by following the Six-Box Scheme. Thus the demonstration has been done slowly only in a small number.

But I now realize that almost all serious intellectual works, such as published papers, can be represented in the Six-Box Scheme, because of its generality as the basic paradigm. Some works may emphasize some part and skipping some other part of the Six-Box Scheme. That's fine. Six-Box Scheme plays the role of template for describing intellectual works, just like the standardized patent format.

Thus I started to represent my own published papers in the standard format of Six-Box Scheme. I tried it first for my ETRIA TFC papers presented in 2002, 2004-2005, 2012, and 2014, because they are important for me. Then, having found the representation meaningful, I described all my ETRIA TFC papers published every year from 2000 through 2016 in the Six-Box Scheme, as you see here.

Every published paper can be represented meaningfully in the Six-Box Scheme. You may also trace how the concept of the Six-Box Scheme has been developed through these works.

Table of Papers (by Toru Nakagawa) Represented Here in the Six-Box Scheme

Table	Title
TRIZCON 2000	Approaches to Application of TRIZ in Japan
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ETRIA TFC 2001	Learning and Applying the Essence of TRIZ with Easier USIT Procedure
ETRIA TFC 2002	Reorganizing TRIZ Solution Generation Methods into Simple Five in USIT
ETRIA TFC 2003	USIT Approach in Japan for Simpler and Powerful Process of Creative Problem Solving in TRIZ
ETRIA TFC 2004	USIT Operators for Solution Generation in TRIZ: Clearer Guide to Solution Paths
TRIZCON 2005	Overall Dataflow Structure for Creative Problem Solving in TRIZ/USIT
ETRIA TFC 2006	A New Paradigm for Creative Problem Solving: Six-Box Scheme in USIT
ETRIA TFC 2007	Education and Training of Creative Problem Solving Thinking with TRIZ/USIT
ETRIA TFC 2008	Applying TRIZ/USIT to A Social & Technical Problem: Auto-locking Door System of Apartment Building

year	Title
ETRIA TFC 2009	How to Prevent Cords and Cables from Getting Entangled: A Study of Systematic Classification of Various Solutions
ETRIA TFC 2010	A Large Variety of Writing Instruments: Studying the Evolution of Technologies in Familiar Items
ETRIA TFC 2011	Problem Solving in Everyday Life: On Methods and Tools for Weeding (or Removing Weeds)
ETRIA TFC 2012	Establishing general methodologies of creative problem-solving / task-achieving: Beyond TRIZ
ETRIA TFC 2013	General methodology for creative problem solving and task achieving (CrePS): Its vision
ETRIA TFC 2014	General Methodology of Creative Problem Solving & Task Achieving (CrePS): Reorganizing Various Application Cases and Their Methods in the 'Six-Box Scheme'
ETRIA TFC 2015	USIT: A Concise Process for Creative Problem Solving Based on the Paradigm of 'Six-Box Scheme' -- USIT Manual and USIT Case Studies --
ETRIA TFC 2016	TRIZ/CrePS Approach to the Social Problems of Poverty: 'Liberty vs. Love' Is Found the Principal Contradiction of the Human Culture

Approaches to Application of TRIZ in Japan

Toru Nakagawa (TRIZCON2000)

Abstract

History and current activities of introducing TRIZ in Japan are summarized. TRIZ has been introduced into Japan for these three years and gradually getting popularity among pioneering engineers in industries. But Japanese TRIZ learners/practitioners still have much difficulty in mastering the way of thinking and in applying TRIZ to their actual problems.

For overcoming this difficulty, several textbooks have been published in Japanese and a public WWW site "TRIZ Home Page in Japan" is serving. Needs of easier process for creative problem solving has been recognized, and USIT (Unified Structured Inventive Thinking) developed at Ford has been introduced as a simplified TRIZ methodology. Case studies and training practices of USIT are presented. The "Slow-but-Steady" strategy of introducing TRIZ into Japanese industries is recommended.

Approaches to Application of TRIZ in Japan

Toru Nakagawa (TRIZCON 2000)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)

Thinking World

Box 3 — Under-standing of the ideal system

To understand the essence of TRIZ and prepare for a TRIZ-based method easier to understand and apply to real problem solving jobs. And to proliferate it widely.

Under-standing of the present system

TRIZ is now emphasized in its tools using technological knowledge bases. Its philosophy and methods of creative thinking should be important but difficult to understand, probably because of their unnecessary complication. USIT is a simplified derivative of TRIZ.

Generate Ideas

Box 4 — Ideas for a new system

At the present stage of introducing TRIZ in Japan, we should adapt USIT as a simplified version of TRIZ and take time for us to understand TRIZ better with various studies and practices for ourselves, instead of hurrying to apply TRIZ without enough understanding.

Construct Solutions

Analyze the Problem .

Box 2 — Well-defined Problem

Task: To find out a suitable strategy of promoting TRIZ in Japan and to find/prepare for good TRIZ methods, publications, practices, organizations, etc.
Root cause: Information about the TRIZ method is insufficient and TRIZ is too complicated to understand/proliferate smoothly.

Box 5 — Concept-ual Solutions

Slow-but-Steady Strategy of promoting TRIZ by use of USIT is proposed and applied. USIT method is introduced and its case studies are demonstrated in a public Web site.
Activities for understanding TRIZ better are to be carried out in parallel.

Real World

Define the problem

Box 1 — Initial problem situations (User's specific problem)

TRIZ has been introduced into Japan since 3 years ago. It is promoted actively aiming at drastic change in R&D with classical TRIZ. Many engineers are interested in it but have much difficulty in understanding and apply TRIZ.

Implement the solution

Box 6 — Implemented Solution (User's specific solution)

Various activities of introducing TRIZ have been promoted in Japan.
USIT Training Seminars are carried out openly with engineers of different companies, and USIT case studies are posted publicly.

Essence of TRIZ in 50 Words

Toru Nakagawa (TRIZ Home Page in Japan, May 2001)

Abstract

What is the Essence of TRIZ? This question must be most basic and important for us to teach/learn TRIZ.
There are many important principles and methods in TRIZ, such as: 40 Inventive Principles, 76 Standard Solutions, Trends of Evolution, ARIZ, etc. Any of these, however, is too huge to be regarded as the core essence of TRIZ. Essence of TRIZ does not exist at this level of handbook-type knowledge, but exists much deeper at the philosophy level.
Looking at the overall structure, TRIZ has the following 3 aspects: (a) Methodology: New view of technology, (b) Methodology: Thinking way for problem solving, and (c) Knowledge bases: A collection of examples implementing the methodology (a) and (b).
Reflecting on (a) and (b), my current understanding of the Essence of TRIZ is summarized in 50 words in English as follows:

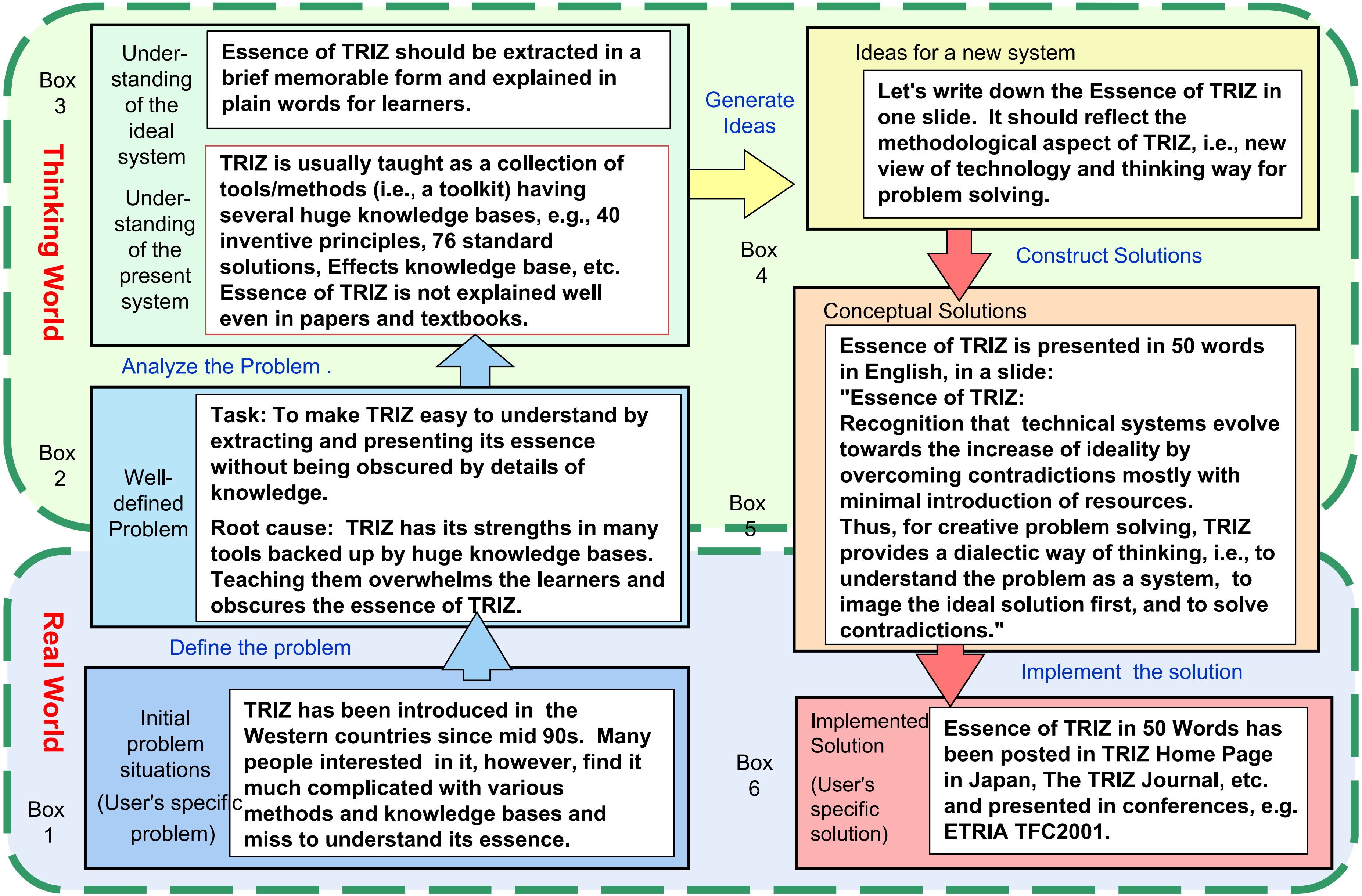
> Essence of TRIZ:
>
> Recognition that technical systems evolve towards the increase of ideality by overcoming contradictions mostly with minimal introduction of resources.
> Thus, for creative problem solving, TRIZ provides a dialectic way of thinking, i.e., to understand the problem as a system, to image the ideal solution first, and to solve contradictions.

Essence of TRIZ in 50 Words

Toru Nakagawa (TRIZ Home Page in Japan, May 2001)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



Learning and Applying the Essence of TRIZ with Easier USIT Procedure

Toru Nakagawa (ETRIA TFC 2001)

Abstract

Possible reasons for making the introduction of TRIZ into western industrial countries slow are discussed. It is suggested that the presentation of the huge body of TRIZ knowledge and methodology has screened its essence and has overwhelmed the learners.

For solving this difficulty, the author's understanding of the essence of TRIZ is presented in 50 words and explained briefly. The needs of simpler and clearer procedures are argued for solving problems creatively with the spirits of TRIZ.

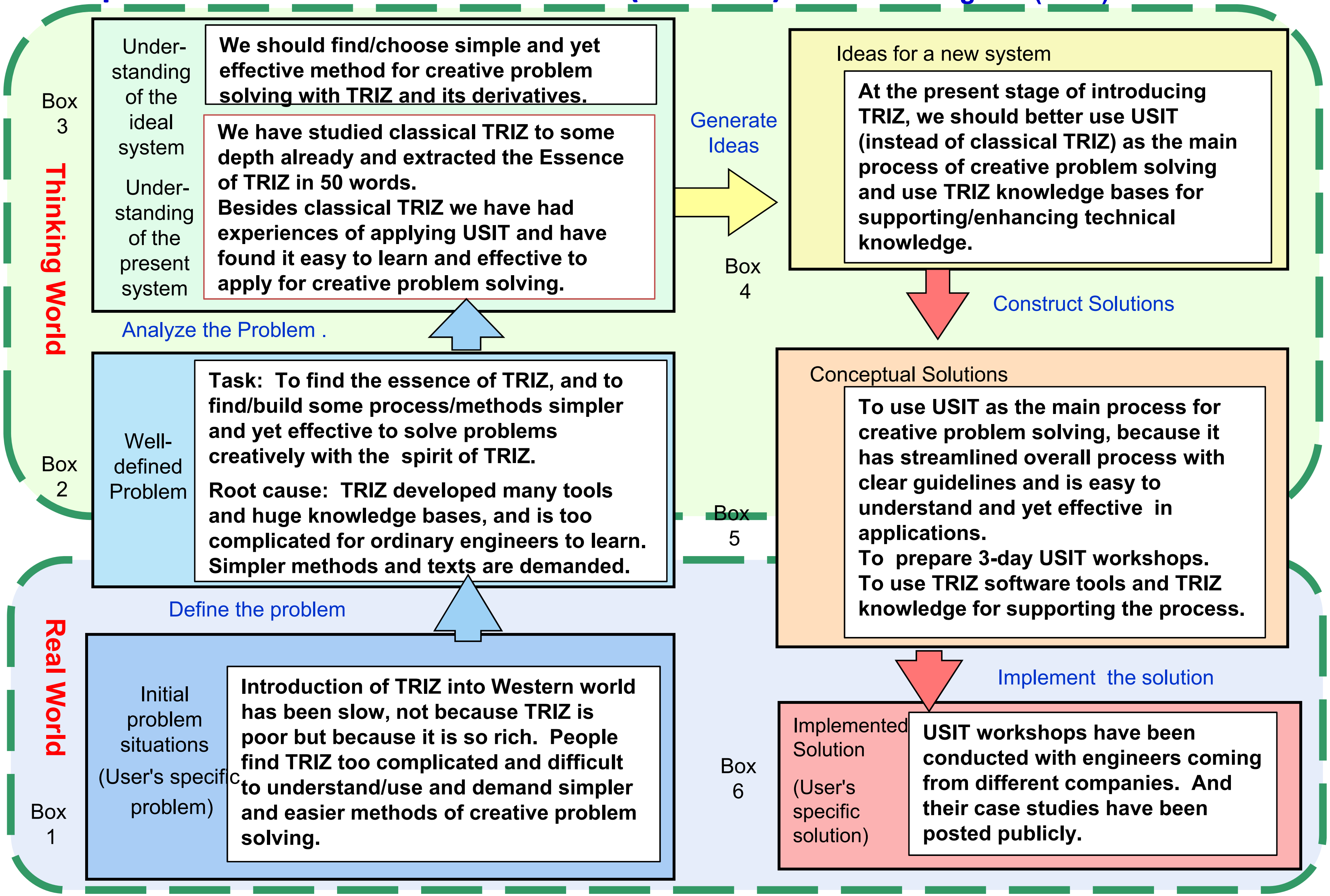
The author finds that USIT (Unified Structured Inventive Thinking) developed by Ed Sickafus is a good candidate for such a simplified TRIZ procedure. Hence he explains the USIT procedure in relation to the essence of TRIZ and demonstrates his practices of training/applying USIT in Japan.

Learning and Applying the Essence of TRIZ with Easier USIT Procedure

Toru Nakagawa (ETRIA TFC 2001

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



Reorganizing TRIZ Solution Generation Methods into Simple Five in USIT

Toru Nakagawa, Hideaki , Yuji Mihara (ETRIA TFC 2002)

Abstract

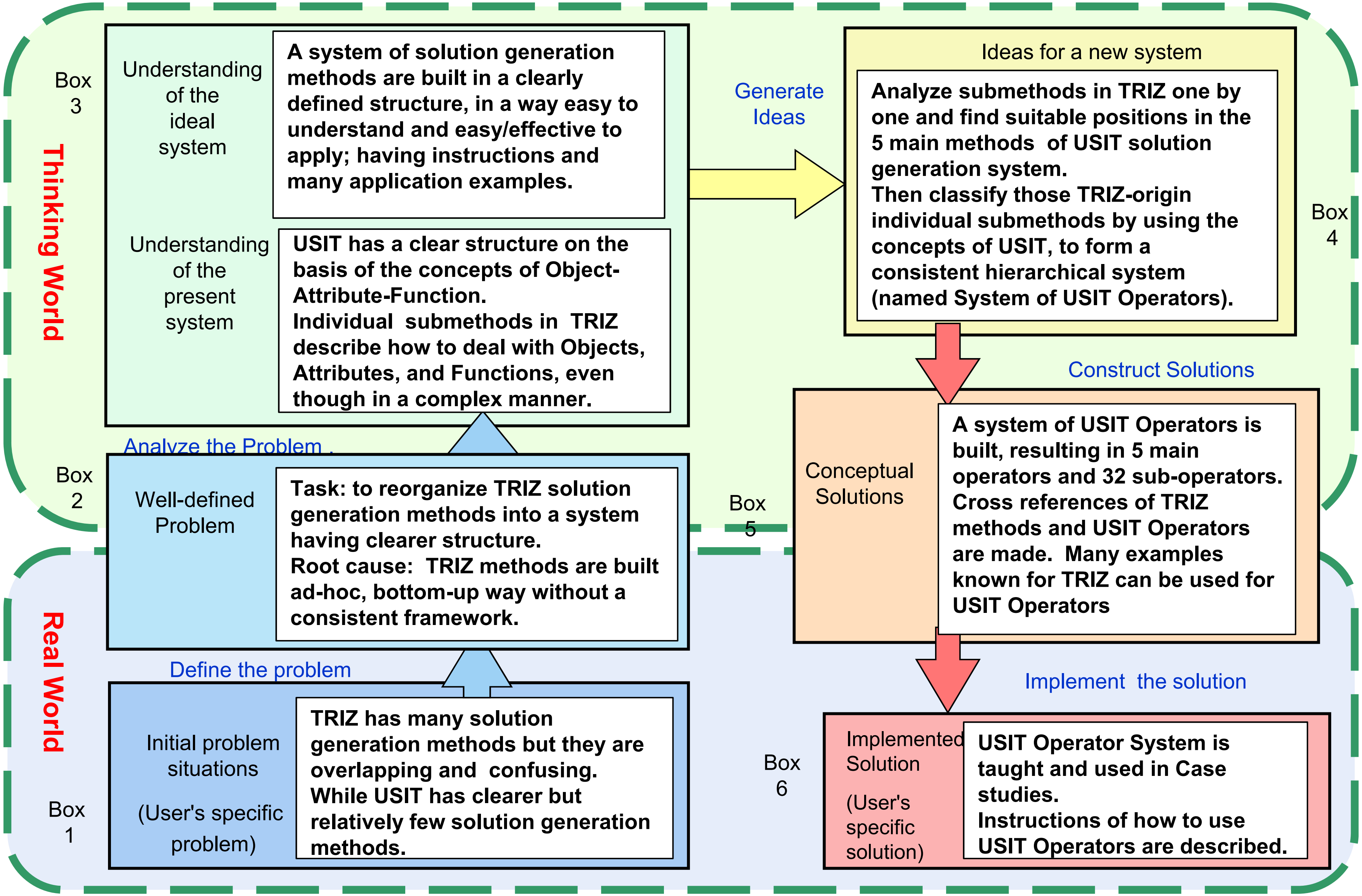
As Solution Generation methods, TRIZ has provided a large number of techniques and principles: 40 Principles of Invention, 76 Standards of Inventive Solutions, Trends of Evolution of Technological Systems, Separation Principle, etc. This shows the richness in TRIZ, but also makes pitfalls of difficulty and confusion. In the present study all these TRIZ methods are reclassified in the framework of USIT (Unified Structured Inventive Thinking). USIT has only five Solution Generation Methods: i.e. Object Pluralization, Attribute Dimensionality, Function Distribution, Solution Combination, and Solution Generalization Methods. It is remarkable that the huge variety of TRIZ methods are smoothly mapped onto these five USIT methods. The USIT Solution Generation Methods are now enhanced much with TRIZ-origin methods and have clear guidelines. Thus the present work has reorganized TRIZ into a much simpler yet more effective process for problem solving: namely, USIT.

Reorganizing TRIZ Solution Generation Methods into USIT Operators

Toru Nakagawa, Hideaki Kosha, Yuji Mihara (2002)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



USIT Approach in Japan for Simpler and Powerful Process of Creative Problem Solving in TRIZ

Toru Nakagawa (ETRIA TFC 2003)

Abstract

Simplification of TRIZ should be the key for TRIZ to be widely adopted in industries.

Essence of TRIZ can be expressed in 50 words, and the process of problem definition (including root cause definition) and problem analysis in terms of Objects, Attributes, Functions, Space and Time can be achieved in a straightforward way in USIT.

Also all the tools of TRIZ (including Inventive Principles, Inventive Standards, Trends of Evolution, and Separation Principles) have been reorganized and unified in the USIT solution generation methods.

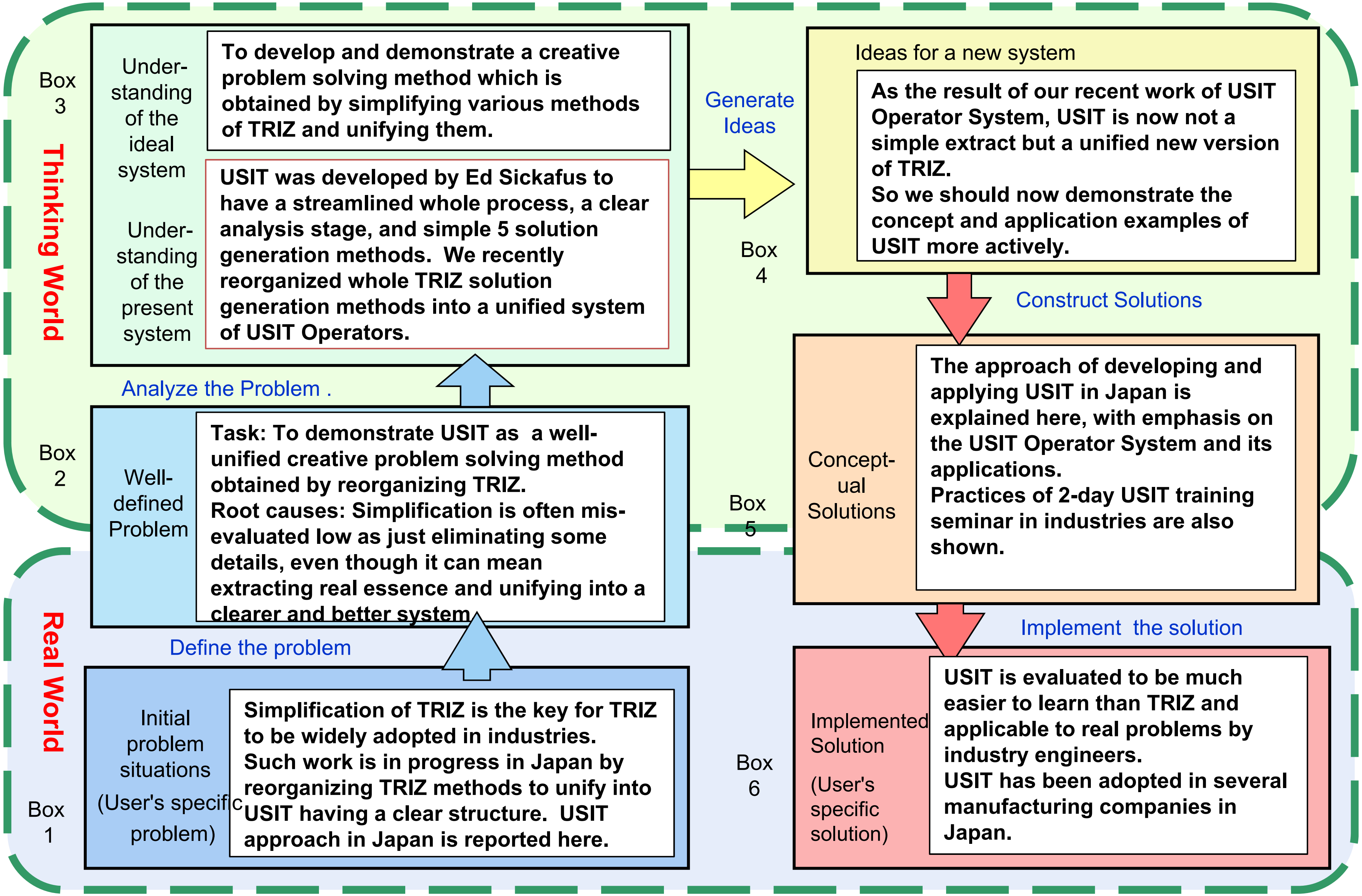
In Japan the author has conducted 2-day USIT training seminars in industries, where TRIZ/USIT is introduced to beginners and 3 real industrial problems are solved successfully in parallel along the full course of the USIT process. USIT method has been adopted in several manufacturing companies in Japan.

USIT Approach in Japan for Simpler and Powerful Process of Creative Problem Solving in TRIZ

Toru Nakagawa (ETRIA TFC 2003)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



USIT Operators for Solution Generation in TRIZ: Clearer Guide to Solution Paths

Toru Nakagawa (ETRIA TFC 2004)

Abstract

The biggest reason for slow penetration of TRIZ into industries in Western countries is that very rich contents of TRIZ knowledge bases and individual methods of problem solving have been tried to teach without clear overall procedure/structure for problem solving. It has been traditional that principal solution generation methods in TRIZ, including Inventive Principles, Inventive Standards, and Trends of Evolution, are applied separately on the basis of their own problem analysis methods.

Present paper demonstrates, on the other hand, that Unified Structured Inventive Thinking (USIT) is a simplified and unified version of TRIZ which has overcome the above-mentioned weak-point. All the solution generation methods in TRIZ have been reorganized into a unified hierarchical system of USIT Solution Generation Operators. On this basis, USIT has a clear procedure for creative problem solving process as shown in a flowchart and also has a clear structure, as shown in a dataflow diagram, of transforming problem information stepwise into solution information.

User's specific but vague problem is (1) first converted into a 'well defined problem' at the problem definition phase, then (2) further converted into the understanding of the problem system in terms of objects, attributes, functions, space, time, ideal actions, and ideal properties at the problem analysis phase, (3) modified by applying the USIT Operators into pieces of ideas of a new system in the solution generation phase, (4) constructed into conceptual solutions on the basis of user's technological background capabilities, and (5) finally implemented into user's specific solution(s) in the implementation phase. USIT guides at the steps (1) through (4). USIT has been taught fully in 2-day training seminars at the level of solving real industrial problems by the participants themselves.

Overall Dataflow Structure for Creative Problem Solving in TRIZ/USIT

Toru Nakagawa (TRIZCON 2005)

Abstract

It has been a common understanding in TRIZ and many other scientific/technological problem solving procedures that instead of trying to go directly from one's specific problem toward specific solution(s) one should better go around through a generalized problem and its generalized solution in some standard model. This scheme, however, is often based on mapping by analogical thinking and has pitfalls of ambiguity in the model selection before analysis and of forcing different ways in analysis after selection.

The overall structure of creative problem solving in USIT has been built into a six-box scheme in the dataflow representation. User's specific but vague problem should be converted into a well-defined user's problem, and analyzed to obtain understandings of the present system and of its ideal system, then transformed (by USIT operators for solution generation) into ideas of new system(s), and further built into conceptual solutions, and finally implemented into user's specific solutions.

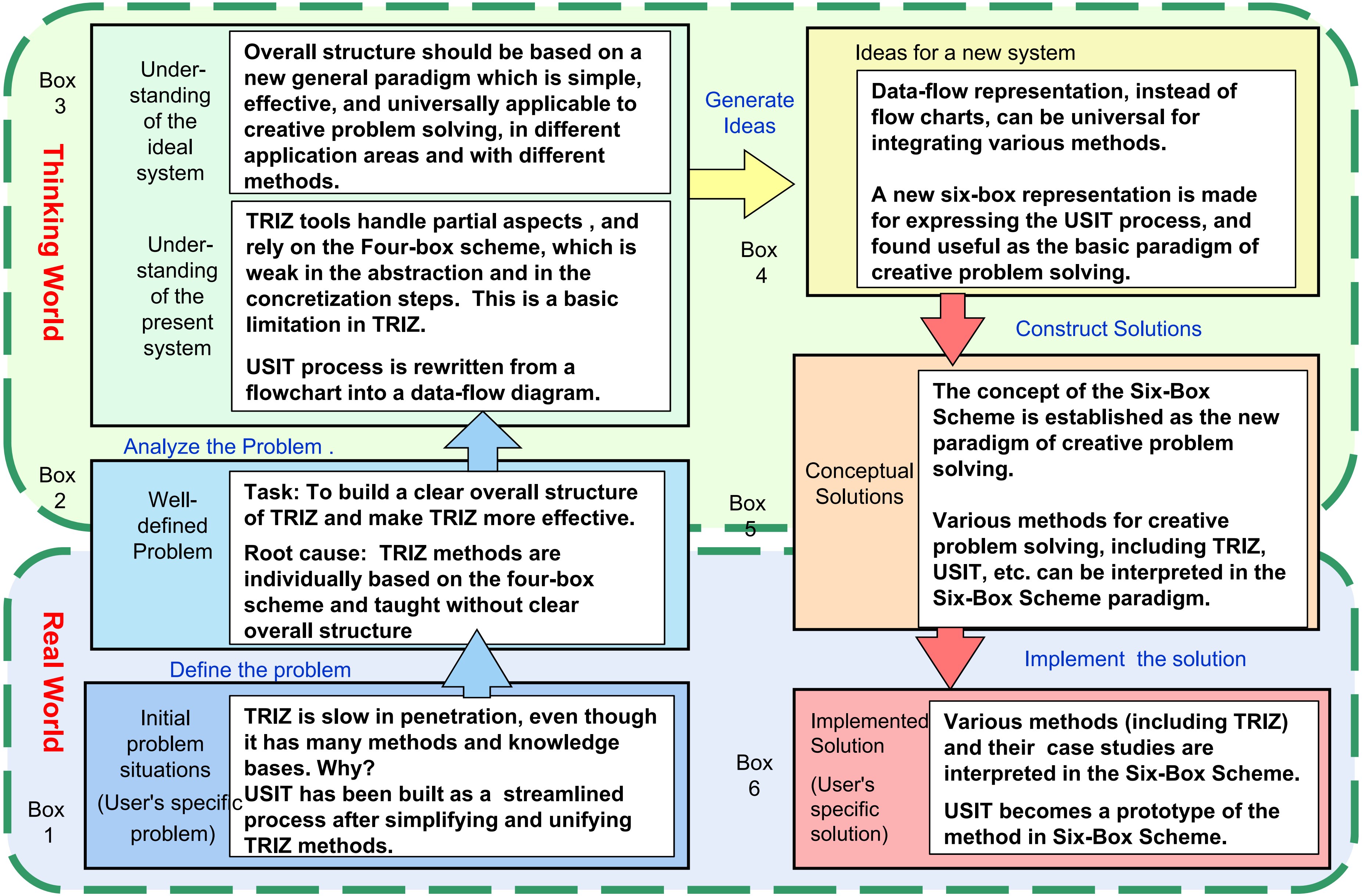
It should be noted that the analogical mapping is eliminated. Problem solvers are guided all through the procedure in a logical and yet creative way. The difficulty in the multiple-path structure of TRIZ has been streamlined. All the methods and knowledge-bases developed in TRIZ have been reorganized, unified, and simplified in this new scheme.

Realizing the Six-Box Scheme of USIT as the New Paradigm of Creative Problem Solving

Toru Nakagawa (ETRIA TFC 2004, TRIZCON 2005)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



A New Paradigm for Creative Problem Solving: Six-Box Scheme in USIT

Toru Nakagawa (ETRIA TFC 2006)

Abstract

The 'Four-Box Scheme' of problem solving has long been regarded as a standard in TRIZ and science and technologies in general. Now that a huge number of models and knowledge bases have been accumulated, the Scheme has been found lacking in the meaningful general description of the contents of the four boxes.

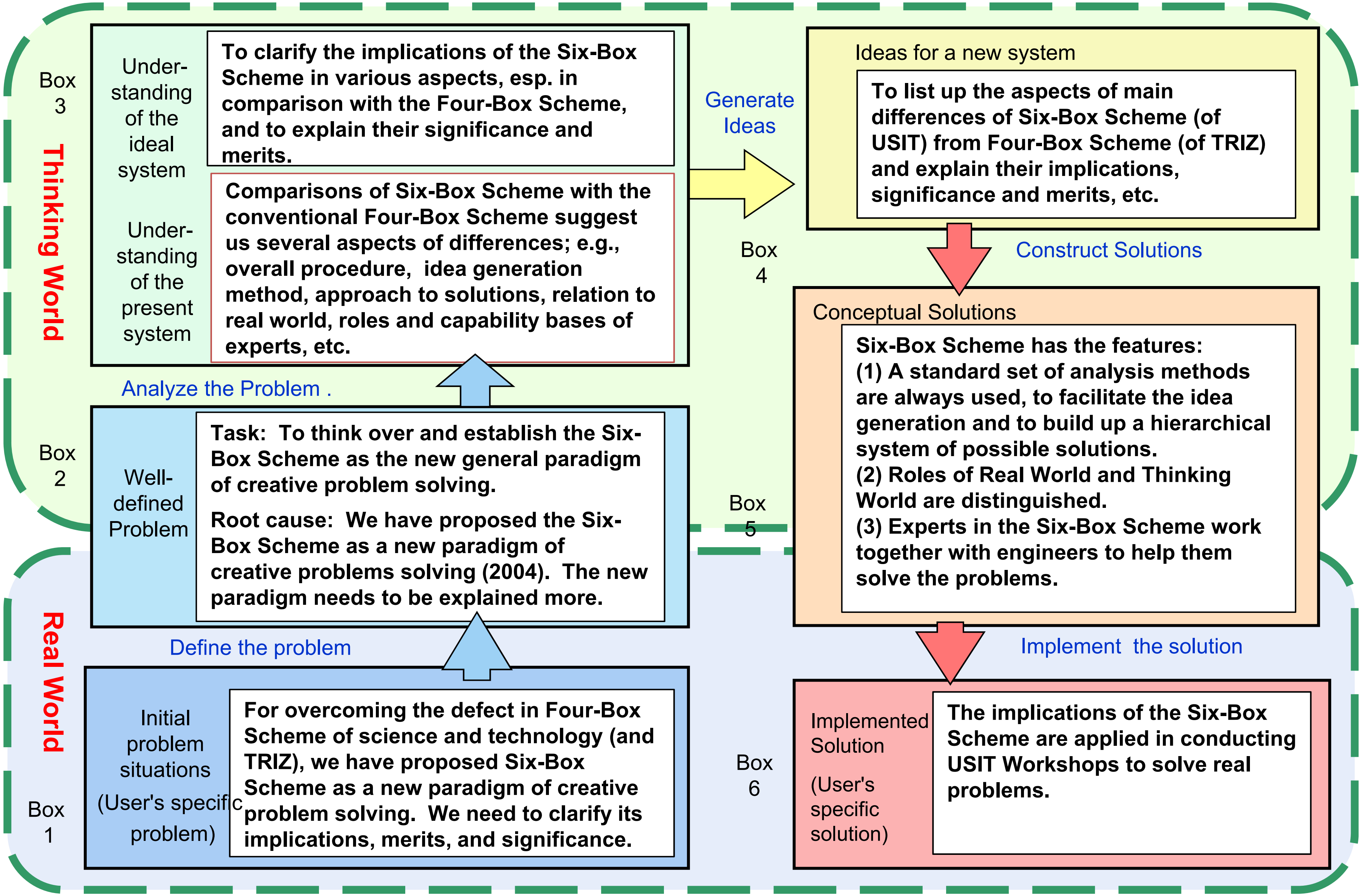
The present author has proposed the 'Six-Box Scheme of Creative Problem Solving' on the basis of detailed description of the overall structure of the USIT methodology. The procedure for performing the Scheme is already well established in the form of USIT.
Implications of the 'Six-Box Scheme' with USIT are discussed in comparison with the 'Four-Box Scheme' with traditional TRIZ.

A New Paradigm for Creative Problem Solving: Six-Box Scheme in USIT

Toru Nakagawa (ETRIA TFC 2006)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



Education and Training of Creative Problem Solving Thinking with TRIZ/USIT

Toru Nakagawa (ETRIA TFC 2007)

Abstract

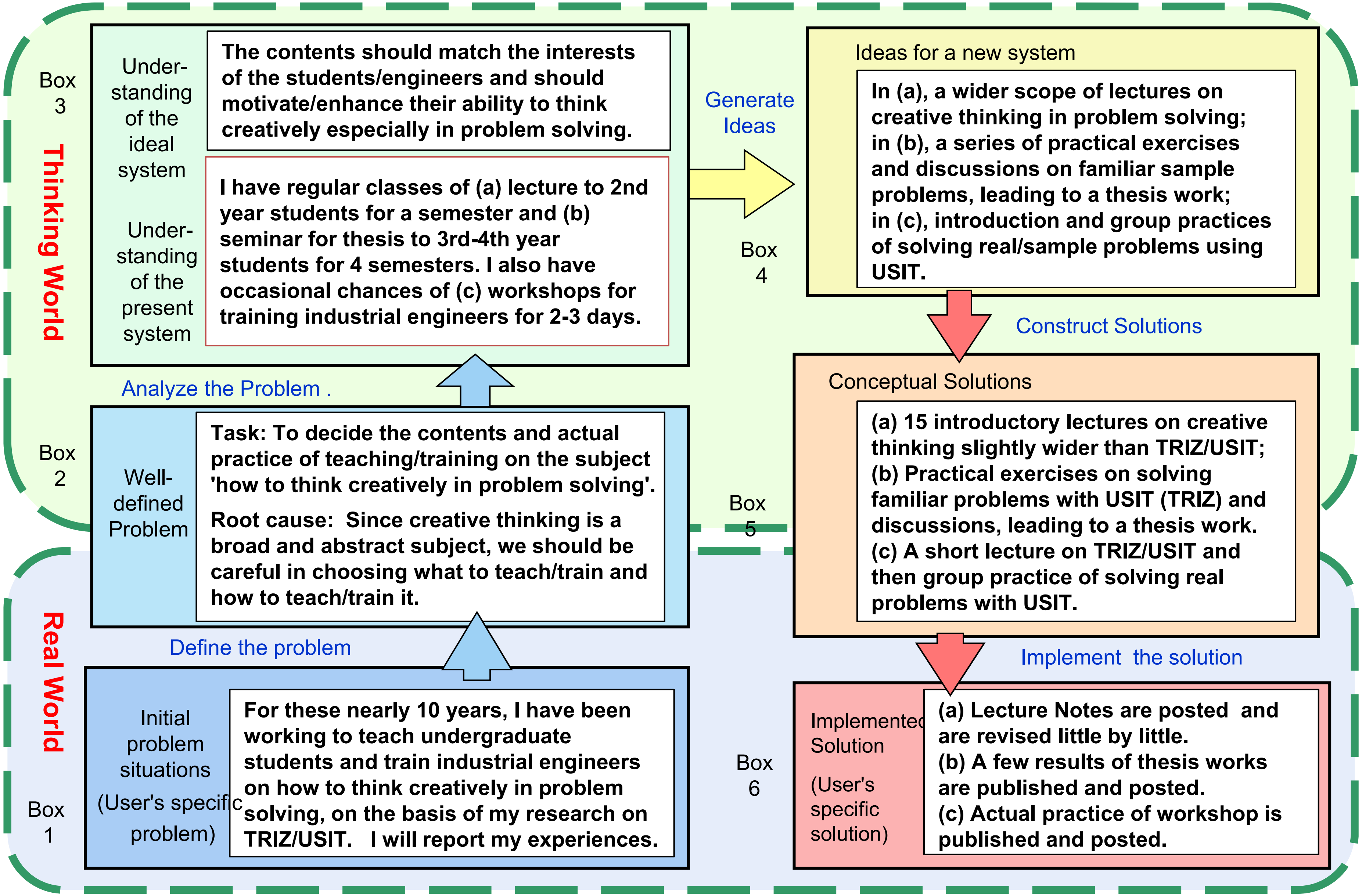
Experiences of teaching under-graduate students and training industrial engineers on how to think creatively in problem solving are reported.
The contents are based on the TRIZ methodology but have been further reorganized and unified into USIT (Unified Structured Inventive Thinking) for easier to learn and apply.
Case studies, published by engineers in technologies and obtained by students for everyday-life problems, are found useful in both teaching/training situations.

Education and Training of Creative Problem Solving Thinking with TRIZ/USIT

Toru Nakagawa (ETRIA TFC 2007)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



Applying TRIZ/USIT to A Social & Technical Problem: Auto-locking Door System of Apartment Building

Toru Nakagawa and Arata Fujita (ETRIA TFC 2008)

Abstract

Students' discussions were guided with TRIZ and USIT to solve an everyday problem. The security problem of auto-locking door system of apartment building needed to be solved in the human psychology and social behavior first and then must be ensured in the technology. Mechanical & physical system of door has been shifted to IT & logical system.

Outline:

Based on Thesis work by Fujita + further research by Nakagawa.

To try to solve an everyday problem creatively: 'How to Prevent Unauthorized Persons from Entering the Auto-locking Door of Apartment Building'. Such a person can enter the door, simply by following a resident.

We found 3 main causes: technical, human psychological, and social ones. Students' group discussions were guided with TRIZ/USIT, and analyzed with the KJ method and RCA+ diagram, etc.

We propose a new Scheme/System of Auto-locking Door: IT & logical system of door control is introduced over the current Mechanical & physical control system. This will solve all the three aspects of problems together.

Applying TRIZ/USIT to A Social & Technical Problem: Auto-locking Door System of Apartment Building

Toru Nakagawa and Arata Fujita (ETRIA TFC 2008)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)

Thinking World

Box 3

Understanding of the ideal system

Ideal door system must be safe and secure solving the problem in three aspects, i.e. (a) technical, (b) psychological, and (c) social, together.

Understanding of the present system

Discussions are analyzed with the KJ method and RCA diagrams, revealing:
(a) the door is kept open for ~10 sec.
(b) Residents may unintendedly allow the unauthorized persons to enter.
(c) the system is not effective when two groups happen to enter at the same time.

Generate Ideas

Box 4

Ideas for a new system

To solve the problem first in (c) social aspect by setting a rule that each group must get authorized stating the number of members despite the door is open or closed. Then the solution should be supported (a) technically by introducing an IT control system, thus eliminating the psychological problem (b).

Construct Solutions

Box 5

Conceptual Solutions

Each group (either residents or visitors) must get authorized stating their number of members, even when the door is open. An IT system monitors the numbers of persons who get authorized and who entered, and orders the present door system to open/close the door and warns/records any violation in real time.

Implement the solution

Analyze the Problem .

Box 2

Well-defined Problem

Task: To make the auto-locking door system safe and secure by preventing unauthorized persons from entering the door.

Root cause: Since the door moves slowly for safety, unauthorized persons can enter the door by just following a resident who opens the door.

Define the problem

Real World

Box 1

Initial problem situations

Thesis work by Fujita is guided and extended further by Nakagawa.
Auto-locking doors of apartment buildings have well-known safety risks that unauthorized persons can easily enter the door by just following a resident.

Box 6

Implemented Solution

(User's specific solution)

The new system has been designed in detail conceptually and reported in conferences.

This solution is worthy of implementation both socially and technically; but no actual plan of implementation has been made yet.

How to Prevent Cords and Cables from Getting Entangled: A Study of Systematic Classification of Various Solutions

Toru Nakagawa, Tomoyuki Itoh, et. al. (ETRIA TFC 2009)

Abstract

Cords and cables often cause troubles by getting complex and entangled, around appliances at home, around PCs at offices, around equipment in labs, etc. The present study started to think of methods of preventing cords and cables from getting entangled. Since the problem lasts so long and spreads so widely, there must be a lot of different solutions known and used in the world, we thought. Hence, as an educational case study, we set our goal to collect different solutions and build up a hierarchical system of solutions to this common problem. Classifying/categorizing solutions has fundamental significance in systematically understanding the whole solution space.

We first searched for various methods, tools, devices, equipment, etc. which are used for such a purpose, at home, at offices, at hardware stores, at PC shops, etc. Then we classified all these cases, in a bottom-up manner into a hierarchical system of methods.
Recognizing the need of a more systematic approach, we introduced the scope of the target system and expanded it stepwise. As the result of reorganization, we have built up a system of solutions to this problem, namely:
(A) As for a cord or cable, to adjust its length so as not to get entangled.
(B) As for multiple cords or cables, to bundle them, to combine and unite them.
(C) As for the connecting parts between devices and cords/cables, to standardize them for easy connection and disconnection and to use simple connection modules.
(D) As for the system containing devices and cords and cables, to reorganize the devices in their functions, structures, methods, and arrangements, and to set and store cords and cables in appropriate places.

How to Prevent Cords and Cables from Getting Entangled: A Study of Systematic Classification of Various Solutions

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Recognizing the need of a more systematic approach, we introduced the scope of the target system and expanded it stepwise. As the result of reorganization, we have built up a system of solutions to this problem, namely:
(A) A single cord: to adjust its length and properties.
(B) Multiple cords: to bundle, combine, and unite them.
(C) Connecting parts: to standardize them for easy connection/disconnection, to use simple connection modules.
(D) The whole systems: to reorganize the devices in their function, structures, methods, and arrangements, and to set the cords in appropriate places.

How to Prevent Cords and Cables from Getting Entangled: A Study of Systematic Classification of Various Solutions

Toru Nakagawa, Tomoyuki Itoh, et. al. (ETRIA TFC 2009)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (Dec. 20,2016)

Thinking World

Box 3

Understanding of the ideal system

The system should be ideal at different levels of system hierarchy; i.e.,
A single cord --> Multiple cords --> Connection parts
--> The whole system (composed of multiple devices and multiple cords).

Understanding of the present system

Many, different known solutions and their ideas are surveyed and are classified in a bottom-up manner.
We need a more systematic way of thinking.

Generate Ideas

Box 4

Ideas for a new system

To classify known (and new) solutions and systematize them in a hierarchy of possible solution ideas at the following 4 stages:
A single cord ---> Multiple cords ---> Connection parts ---> The whole system with multiple cords and multiple devices.

Construct Solutions

Box 5

Conceptual Solutions

A hierarchical system of possible solution ideas has been built: i.e., in essence:
A single cord: to adjust its length and properties. Multiple cords: to bundle, combine, and unite them. Connecting parts: to standardize them for easy connection/ disconnection. The whole systems: to reorganize the devices in their function, structures, methods, and arrangements, and to set the cords in appropriate places.

Analyze the Problem .

Box 2

Well-defined Problem

Task: To build a system of possible solution ideas for the problem 'How to prevent cords/cables from getting entangled'

Root Causes: Similar problems have been existing everywhere since long ago, despite many different solutions and solution products.

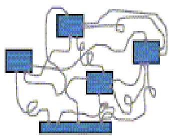
Real World

Define the problem

Box 1

Initial problem situations

Want to learn about creative thinking with the theme 'How to prevent cords/cables from getting entangled' around PC, etc.
(Thesis work for Bacheller Degree.)



Implement the solution

Box 6

Implemented Solutions

Modeling of some solutions and considering root contradictions are discussed further.

No attempt is made for implementing new solutions.

A Large Variety of Writing Instruments: Studying the Evolution of Technologies in Familiar Items

Toru Nakagawa and Kurumi Nakatani (ETRIA TFC 2010)

Abstract

This paper reports the activities in Nakagawa's Seminar Class for the 2nd year students (with 10 members) in the 1st semester, i.e., from April to July 2010. The students selected (or were assigned to) this Seminar class just after reading my syllabus with the title shown above. Without any knowledge about technology development, systems engineering, creativity techniques, or, of course, TRIZ, the students started this class.

At first, for recognizing a variety of writing instruments, the students were requested to show their own items which they are carrying around at school and to describe the good points of their favorite items. Then homework was assigned to visit stationery stores and home-centers and to report about as wide variety of writing instruments as possible. Then they are advised to observe various writing instruments, to consider their mechanisms/principles of writing and their merits, and further to classify them in a hierarchical manner. Then the wide range of intended use were considered to specify 'what, on which, and how (during the process and as the results)' to write/draw, and were built up into a hierarchical system.

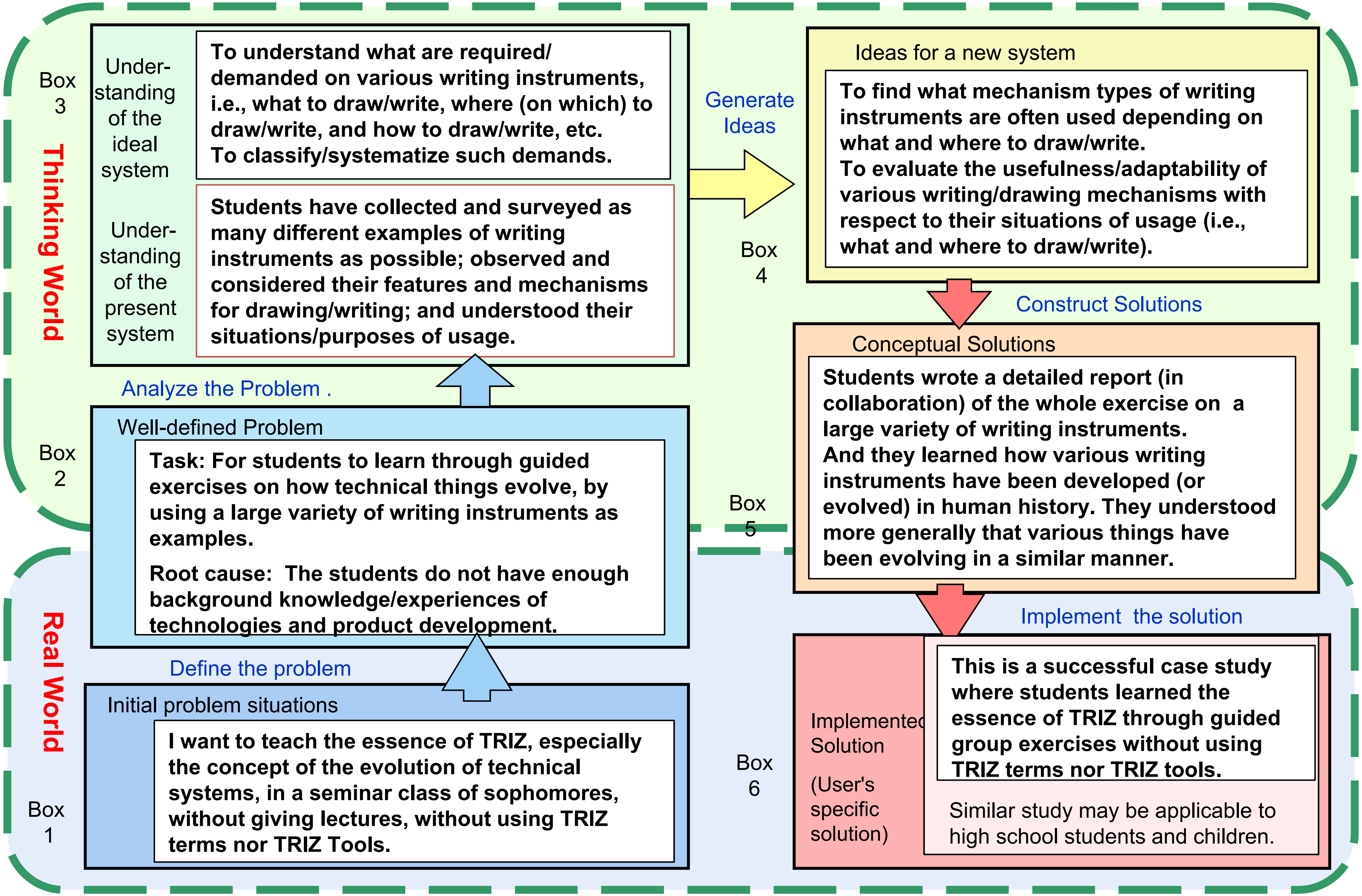
The students gradually understood that with the requests of different use a variety of writing instruments have been developed, such as different in their mechanisms/principles, in shapes, in the characteristics of materials (e.g. inks), etc. This class is designed to make gradual understanding of the ways of evolution of technologies through familiar items, and understanding of important TRIZ concepts without using TRIZ terms.

A Large Variety of Writing Instruments: Studying the Evolution of Technologies in Familiar Items

Toru Nakagawa and Kurumi Nakatani (ETRIA TFC 2010)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



Problem Solving in Everyday Life: On Methods and Tools for Weeding (or Removing Weeds)

Toru Nakagawa, Takahisa Miyke (ETRIA TFC 2011)

Abstract

"Weeding" (or removing weeds) is a labor work which has been performed since ancient days, and hence a large variety of tools and machines have been developed. However it is still a heavy burden of labor at home, at farms, in parks, in town, etc. How can we reduce the burden of weeding?

This problem appears small and simple at first sight, but it is actually big and difficult. The difficulty stems from the fact that the problem situations are quite different (especially depending on the climates and culture in different countries/regions).
What is the purpose (i.e., what types of results one wants), at what kind of place/ground, what kinds of weeds/grass are growing, what kinds of useful plants are there, etc.

How can we classify the methods of weeding (i.e., cutting/pulling/removing/etc. weeds)? How should we classify the tools?

On the basis of consideration from these viewpoints, we have built up the guidelines where in various situations (of purposes, places, types of weeds, etc.) we recommend the types of methods and types of tools/machines to be applied.
One of the concluding recommendations is 'cutting the weeds just below the ground surface' rather than 'cutting the weeds above the ground' or 'pulling the weeds out'.

Problem Solving in Everyday Life: On Methods and Tools for Weeding (or Removing Weeds)

Toru Nakagawa, Takahisa Miyke (ETRIA TFC 2011)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)

Thinking World

Box 3

Understanding of the ideal system

We should follow the framework of thinking in the direction: Purposes --> Goals --> Methods --> Tools. We should notice that this selection structure is not a tree but a cascade allowing merging at lower stages.

Understanding of the present system

We have classified the problem situations in terms of the purposes, goals (or final image), places, distributions of weeds and crops, etc.; then considered various types of methods, characterizing by attacking part of weeds, mechanism, ways of usage, etc.

Generate Ideas

Box 4

Ideas for a new system

Methods of removing weeds are categorized as: Preparation, No tools, Cut the upper parts (of weeds), Pull up by the root, Cut just under the ground, Dig the ground and remove the weed or turn the ground over, and others. Existing Tools for each methods are listed up and examined.

Construct Solutions

Box 5

Conceptual Solutions

Methods and Tools are systematized and evaluated in the scheme: Method --> Typical tools/machines --> Their principles/ mechanisms --> Style of use --> Effectiveness/ efficiency --> Evaluation.
Relatively highly evaluated tools are: Scraper, Hook, Sickle, Rotary cutter, Powered lawn mower, and By hands without tools.

Analyze the Problem .

Box 2

Well-defined Problem

Task: We have to classify the problem situations, in terms of purposes and goals of removing weeds, and then think over methods and tools for doing the jobs thus defined.

Root cause: The problem situations are diverse in the aspects, such as places and situations of ground, types of weeds, purposes and goals of removing weeds, climate and culture, etc.

Real World

Define the problem

Box 1

Initial problem situations

Removing weeds is a labor work in everyday life at home, at farms, etc. even though various tools and machines are known. We want to reduce the labor by finding/ proposing some good methods/ tools.

Implement the solution

Box 6

Implemented Solution

(User's specific solution)

A case study how to solve vaguely-defined everyday life problems. The present study has a unique emphasis on cutting the root stem of weeds just (say 1 cm) below the ground surface with "Scraper".

No new commercial proposals yet.

Establishing general methodologies of creative problem-solving / task-achieving: Beyond TRIZ

Toru Nakagawa (ETRIA TFC 2012)

Abstract

The research presented in this paper was motivated by the detection of a problem (especially in Japan): "Why is the use of a creative problem solving method, TRIZ, not practiced more among (especially younger) people? What should we do?". This problem is not technological, where TRIZ has its strengths, but it is a quite common type of problem in a non-technological area where the problem situations are vague and complex and hence TRIZ seems not have enough power.

The problem was investigated on the basis of personal experience and views. The approach adopted in the present study is to describe the problem situations in models viewed from different perspectives step by step, using informal diagrammatic representations. They include:

(a) a model for a person to learn and master TRIZ,
(b) a model for an engineer and a company to learn and master TRIZ,
(c) a model describing the overall activities of TRIZ promoters within Japan,
(d) a model of areas where the application of TRIZ is expected and desirable.

These models guided me to notice that what is really needed to learn and apply is not TRIZ itself but something more general and commonly applicable. Thus a new general target was defined: "To establish a methodology of creative problem-solving / task-achieving, to spread it widely, and to apply it to problem-solving / task-achieving jobs in various domains in the whole country (and the world)".

After this insight some more models were described supporting this new target. They include:

(e) a model describing activities needed for achieving this new target.
(f) a model describing the characteristics of the new 'creative problem-solving / task-achieving method', in technological and non-technological areas.

In the above models (a) to (f), apparently no TRIZ tools are used, but the systemic thinking in TRIZ has guided the model description. The views used in building models (a) to (f) were set along the process of understanding the current problem situations, understanding the ideal situation, obtaining ideas for a new system, and constructing conceptual solutions. Such a process is typical in the general scheme of creative problem solving, as described in Model (f). Thus the present study may be regarded as a case study of problem solving in non-technological area, by using the generalized method proposed here in place of TRIZ.

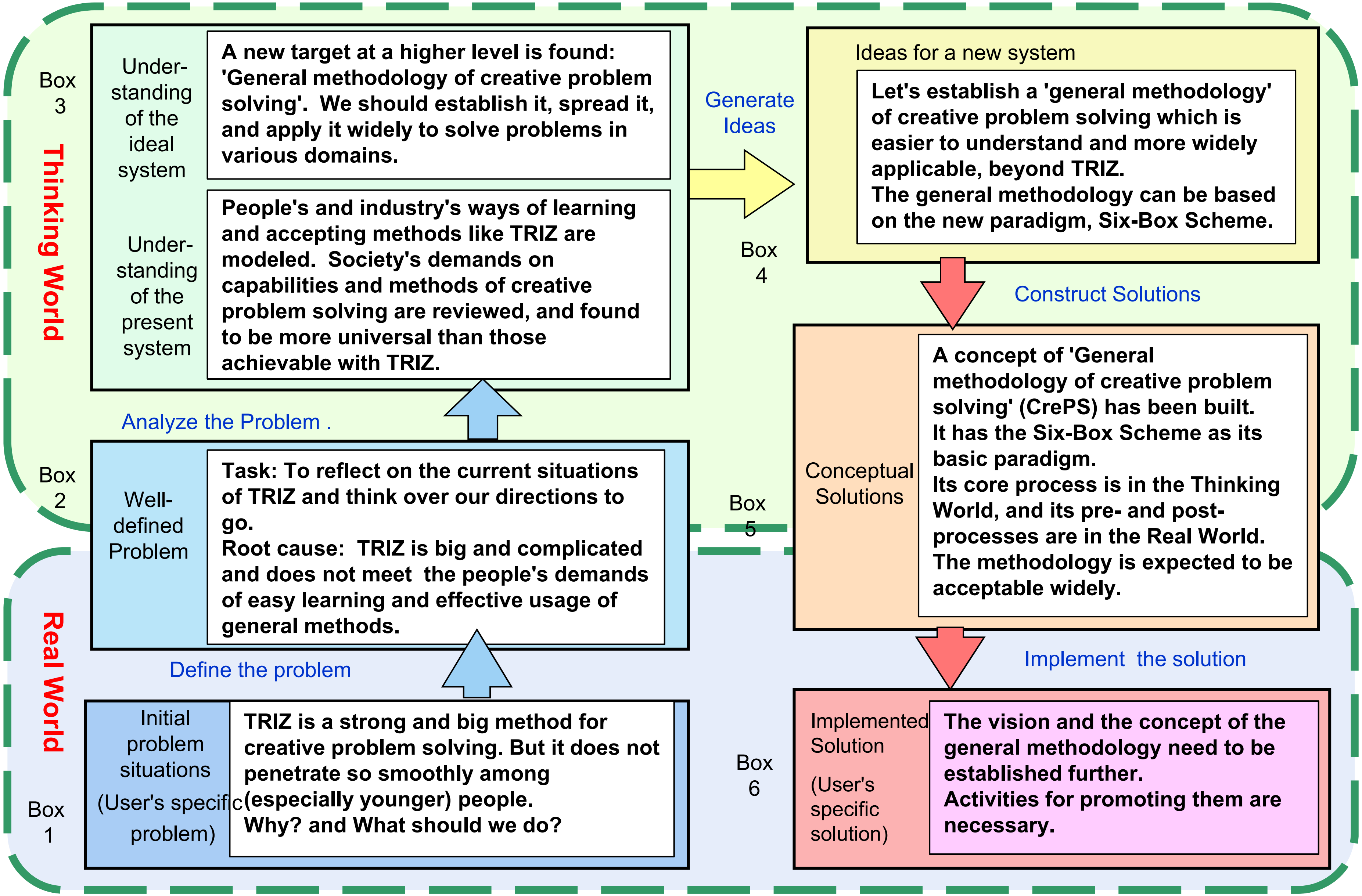
Further discussions on the models, especially on the new target, are desired and expected.

Establishing General Methodology of Creative Problem Solving (CrePS) beyond TRIZ

Toru Nakagawa (ETRIA TFC 2012)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



General methodology for creative problem solving and task achieving (CrePS): Its vision

Toru Nakagawa (ETRIA TFC 2013)

Abstract

'Creativity techniques' and 'Problem solving methods', including TRIZ, have been studied and practiced actively in the world for many decades but they have not proliferated so widely as being desired. There are so many different methods putting stress on different partial aspects and being promoted separately in competition. Lack in a proper framework to integrate these different methods is the reason for these unfortunate situations, I believe.

The present study is proposing to introduce the 'Six-Box Scheme', which was first recognized in USIT, as the framework for integrating the conventional studies and to establish a 'General Methodology of Creative Problem-Solving and Task-Achieving' (abbreviated as 'CrePS'). The methodology specifies the information to be obtained at every stage of the creative problem solving process. In the initial part of the CrePS process, one should recognize/grasp some problem (Box-1) in the 'Real World' and focus it down into a 'Well defined user's specific problem' (Box-2). In the main part of the CrePS process in the 'Thinking World', one should analyze the problem (Box-2) to obtain the 'Understanding of the present system and the ideal system' (Box-3), and then generate the 'Ideas for a new system' (Box-4), and further construct the 'Solution concepts' (Box-5). In the finishing part of the CrePS process, the Solution concepts (Box-5) should be implemented into the 'User's specific solutions' (Box-6) by the corporate activities in the 'Real World'.

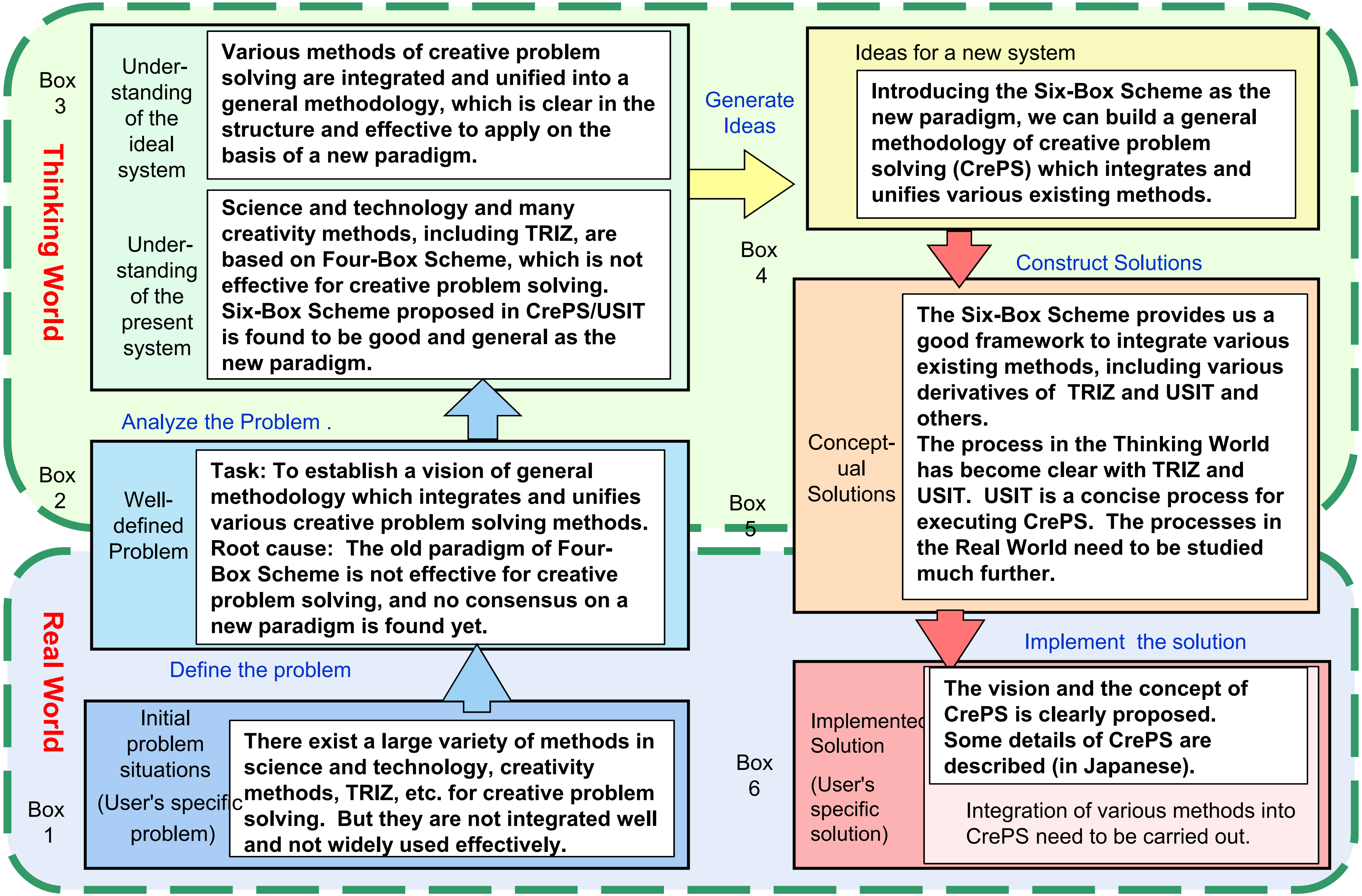
A vision of establishing and proliferating the CrePS methodology is presented here, with the hope of making a cooperative work with people involved in TRIZ and other different methods relevant to creative problem solving.

Vision of CrePS (General Methodology of Creative Problem Solving)

Toru Nakagawa (ETRIA TFC 2013)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



General Methodology of Creative Problem Solving & Task Achieving (CrePS): Reorganizing Various Application Cases and Their Methods in the 'Six-Box Scheme'

Toru Nakagawa (ETRIA TFC 2014)

Abstract

'Creativity methods' or 'Problem solving methods' have been much studied, but have not been spread widely enough so far. It is because such methods have been partial and not organized well due to the lack of general frameworks. Thus the present author have been proposing since 2012 to establish 'General Methodology of Creative Problem Solving & Task Achieving' (abbreviated as "CrePS") and spread it widely.

In the present paper I am clarifying the vision of the CrePS methodology and am reporting the progress in the research of establishing it. As the framework of the CrePS methodology we adopt a new paradigm of creative problem solving, i.e. Six-Box Scheme. This scheme clarifies the different roles of the 'Real World' and the 'Thinking World'. The Six-Box Scheme, on the contrary to the conventionally used 'Four-Box Scheme' of abstraction in science and technology, has clear and detailed guidelines of what information is to be obtained/clarified in each box, or the stage of problem solving.

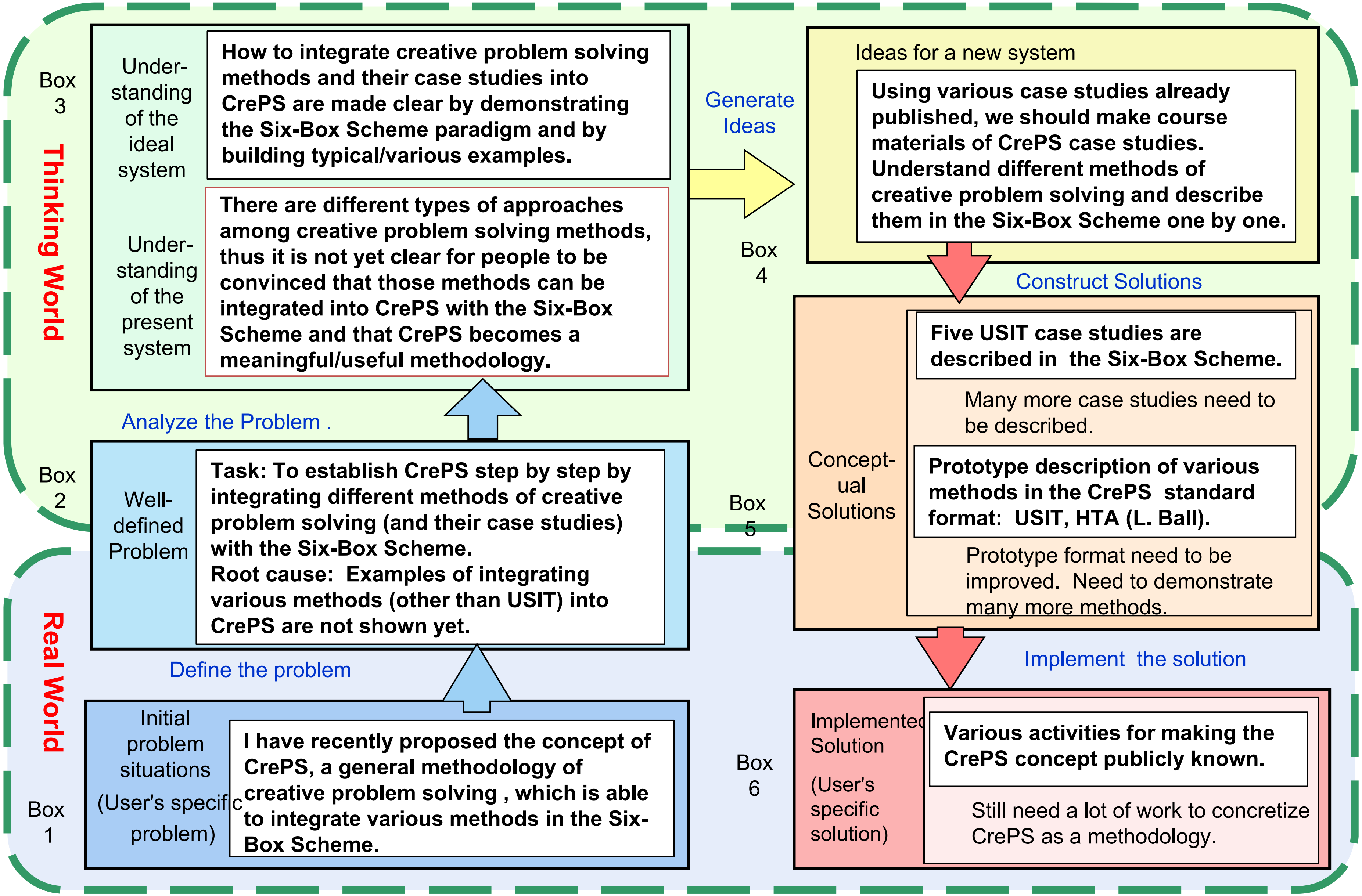
I am currently working to interpret various case studies of creative problem solving in terms of the Six-Box Scheme to build a collection of case studies of applying CrePS methodology. I am also working to describe what kind of information is desired at each stage (or box) of CrePS and how to obtain it, in a hierarchical manner. Such description is expected to make a common platform to discuss about the methodologies of creative problem solving on academic and objective bases. I wish you to share the vision and to collaborate in the study.

Integrating Various Methods and Case Studies into CrePS

Toru Nakagawa (ETRIA TFC 2014)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



USIT: A Concise Process for Creative Problem Solving Based on the Paradigm of 'Six-Box Scheme' -- USIT Manual and USIT Case Studies --

Toru Nakagawa (ETRIA TFC 2015)

Abstract

USIT (Unified Structured Inventive Thinking) was originally developed by Ed Sickafus in 1985 as a concise whole process of creative problem solving and has been developed further since 1999 in Japan.

In 2002 we reorganized all the solution generation methods of TRIZ into a System of USIT Operators.

In 2004, I represented the whole USIT process in a data-flow diagram and realized it as a new paradigm for creative problem solving and named it the 'Six-Box Scheme'.

In 2012, I realized that what are really wanted by society are not individual methods but a more general way of thinking for creative problem solving. So I am proposing to integrate different methods of problem solving into a unified general methodology CrePS on the basis of the 'Six-Box Scheme'. Hence, USIT is now regarded as a simple process for executing the CrePS methodology.

In the present paper, the USIT Manual was prepared and more than10 published cases of creative problem solving have been documented along the 'Six-Box Scheme'. The present paper discusses about

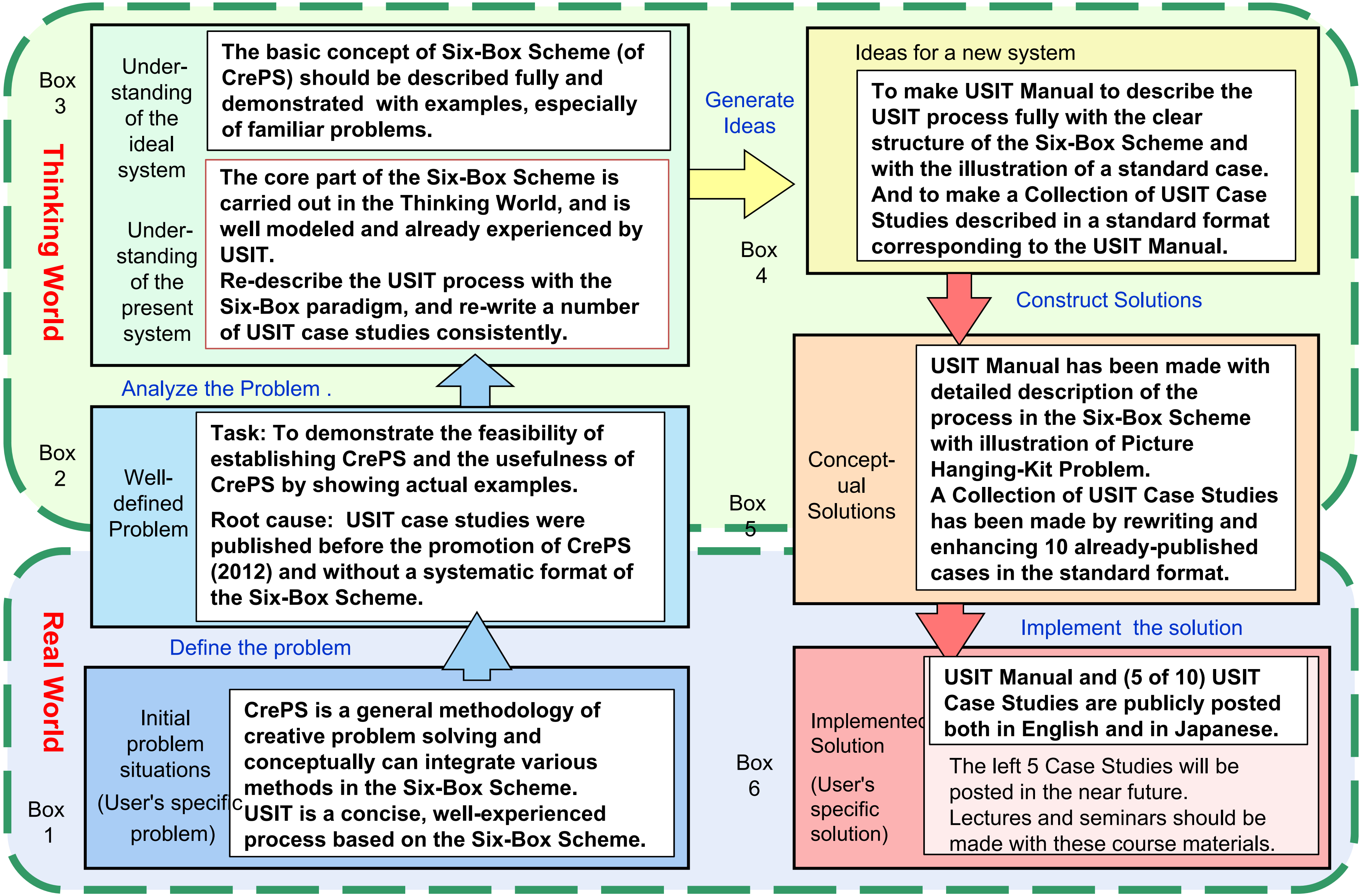
(1) the Six-Box Scheme in comparison with the conventional schemes,
(2) possibility of integrating diverse methods of creativity and innovation into CrePS,
(3) overall process of USIT, especially how to support the idea generation step,
(4) documenting various case studies executed with other methods in the USIT Six-Box Scheme,
(5) further issues and tasks for pursuing the new vision/target of establishing CrePS. .

USIT: A Concise Process of Executing CrePS: USIT Manual and USIT Case Studies

Toru Nakagawa (ETRIA TFC 2015)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (2016)



TRIZ/CrePS Approach to the Social Problems of Poverty: 'Liberty vs. Love' Is Found the Principal Contradiction of the Human Culture

Toru Nakagawa (ETRIA TFC 2016)

Abstract

This is the first report of applying the TRIZ/CrePS methodology to real social problems. The problem of poverty among the elderly people in Japan is selected. I used “The Low-living Elderly (LLE)” book (T. Fujita, 2015) as the reference, and fully visualized its logic by use of the Fuda-Yose Tool (developed by A. Katahira). The book author explains that many LLE people are produced by the current social system and many more will be in future. However, in the customer reviews, many readers evaluate this best-seller book poorly, saying “For falling into LLE, the LLE people themselves are responsible, not the society”.

Underneath these arguments I recognized the conflict of two social philosophies: “Win or Lose in the competitive world” on one side, and “Be kind and fair to all” on the other hand. I formalized the observation in a hypothesis:

Human Culture takes Liberty as the First Principle while Love as the Second. The two Principles however often conflict. ‘Liberty vs. Love’ is the Principal Contradiction inherent in the Human Culture. Humans have been trying to solve the Principal Contradiction. But the ‘Liberty vs. Love’ contradictions exist and newly appear everywhere, and getting even more difficult to solve.

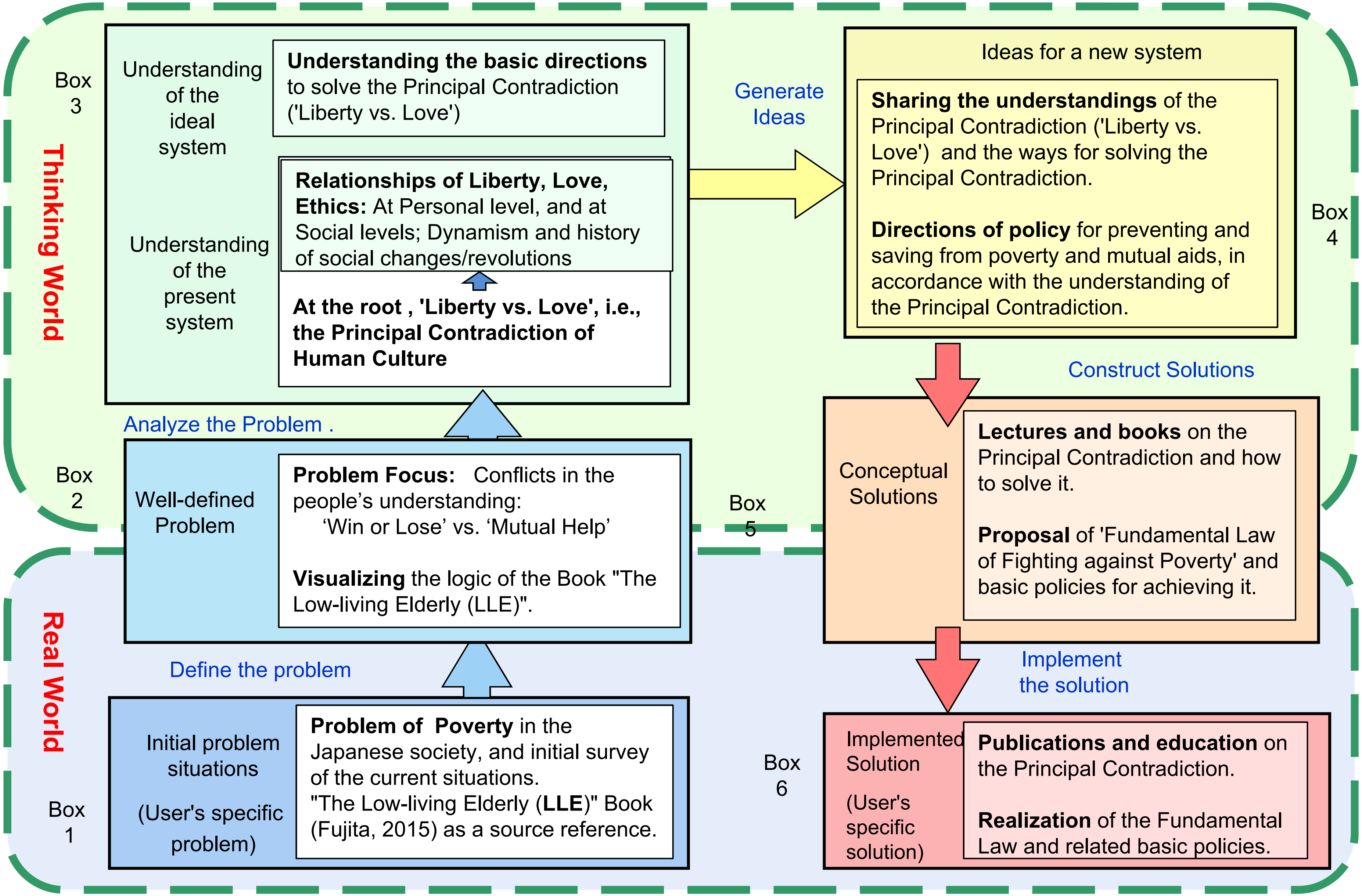
Revealing why and how they are made difficult to solve and investigating what are the ideal situations of coexisting of Liberty and Love are the important future tasks. The present study was guided by the CrePS process and the TRIZ philosophy of contradiction.

Thinking over Poverty in the Japanese Society with Visual Thinking

Toru Nakagawa (ETRIA TFC2016)

Represented in the Six-Box Scheme (of CrePS)

Toru Nakagawa (ETRIA TFC2016)



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Represented in the Six-Box Scheme (of CrePS)

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