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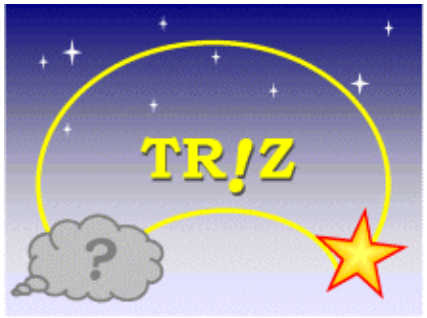

Establishing General Methodologies of Creative Problem-Solving / Task-Achieving: Beyond TRIZ

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Introduction: Intention of the present study

Motivation: Why the creative problem solving method, TRIZ, does not penetrate more smoothly among (especially younger) people?

What should we do?

Recognition and Approach:

(1) TRIZ is strong in technological cases, but weak in non-technological cases where mechanisms are complex and not clear.

(2) The difficulty of spreading TRIZ is a “common” type of problem in non-technological area related to people, organizations, and society.

(3) Thus I tried to tackle this problem with all my capability of TRIZ and others.

(4) I built many models to understand the problem from different aspects. They helped me to proceed step by step to find our new general target and directions to achieve it.

Steps of the present study with multiple modeling

Model (a) of a person to learn TRIZ

Model (b) of an engineer and an industry to learn and accept TRIZ

Model (c) of activities of TRIZ promoters (in Japan)

Model (d) of areas where the application of TRIZ is desired.

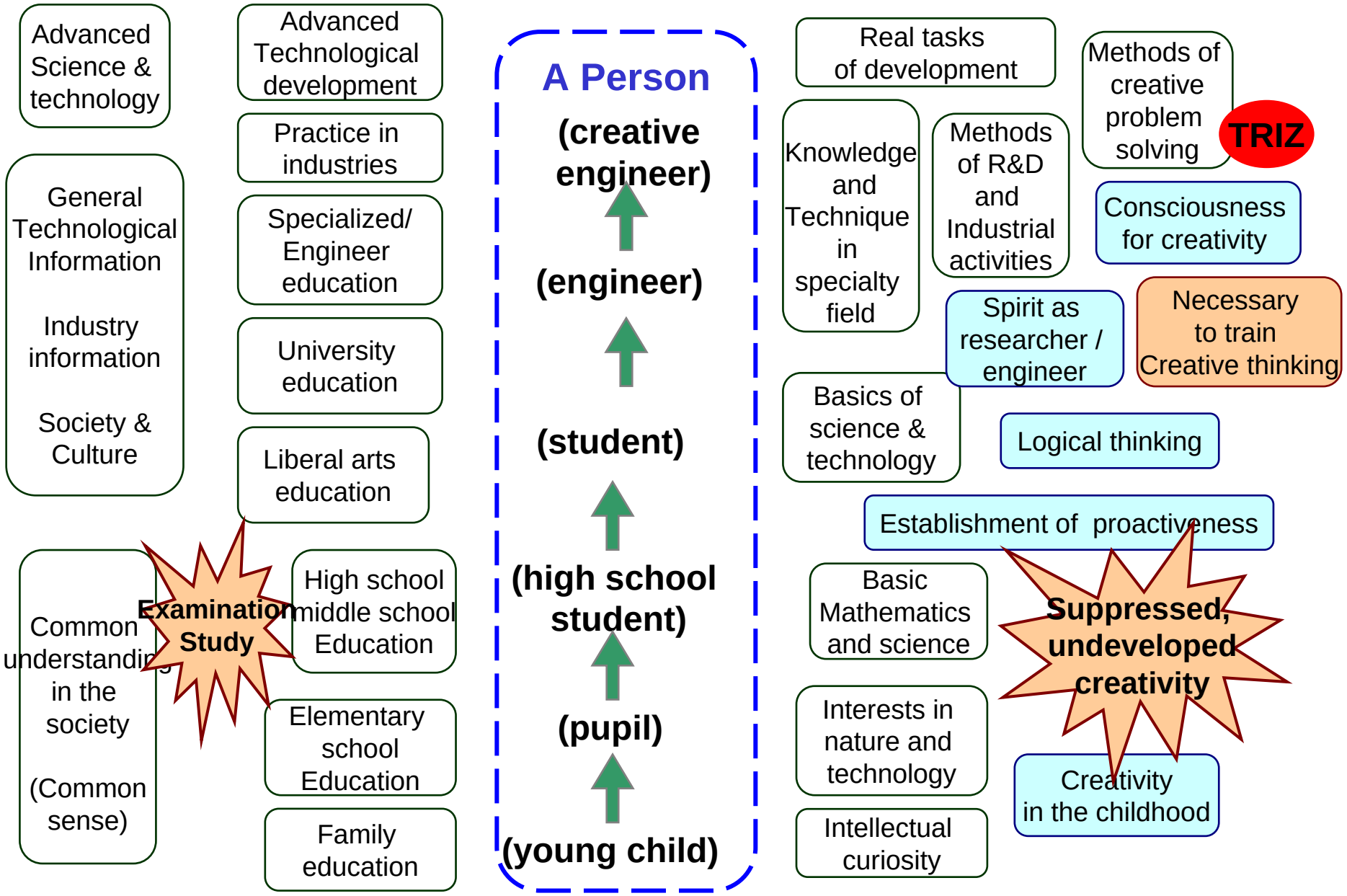
The models have guided us to a new target at a higher level:
'General methodology of creative problem solving'

Model (e) of activities to achieve the new target

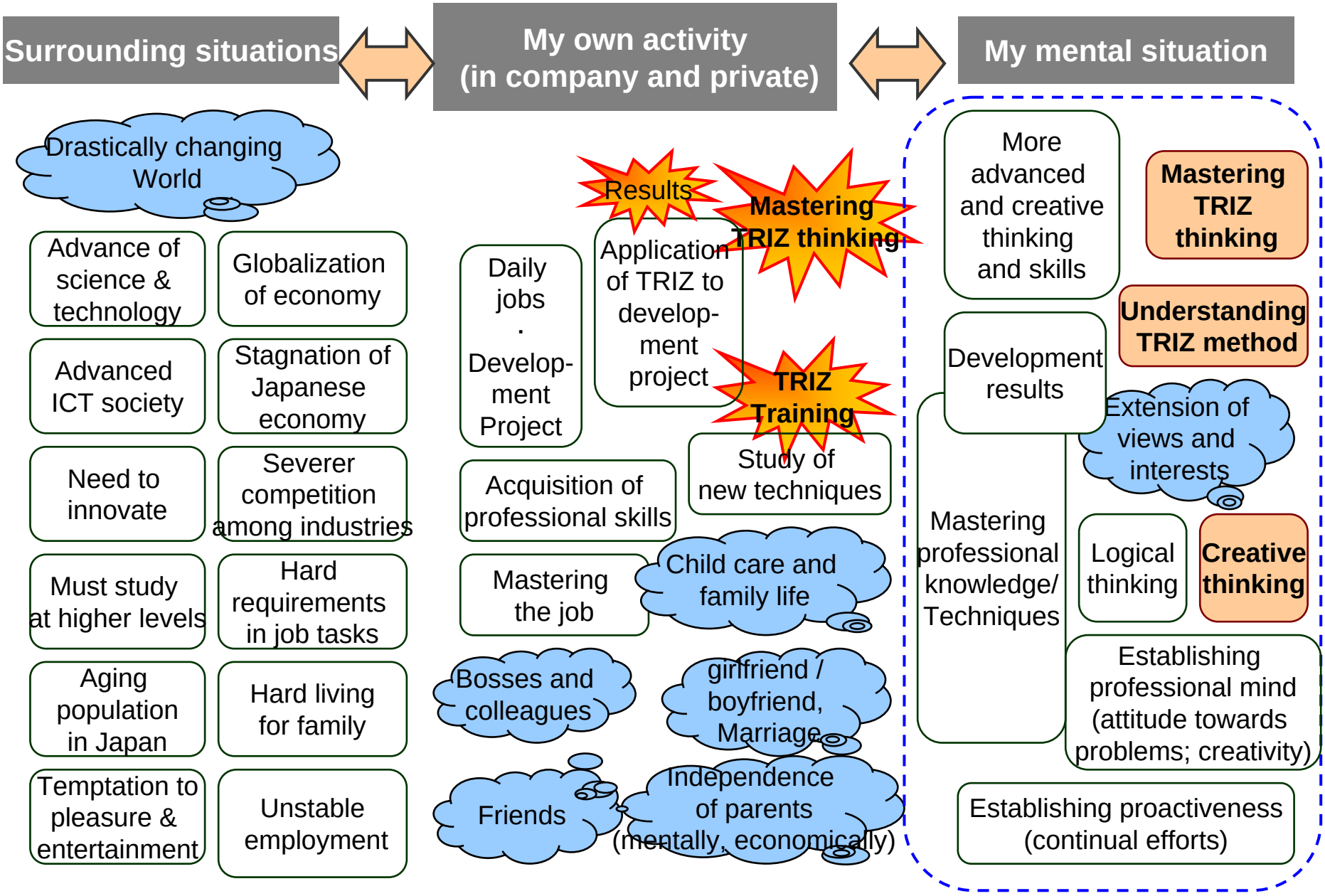
Model (f) of the contents of the new target methodology

-- Discussions

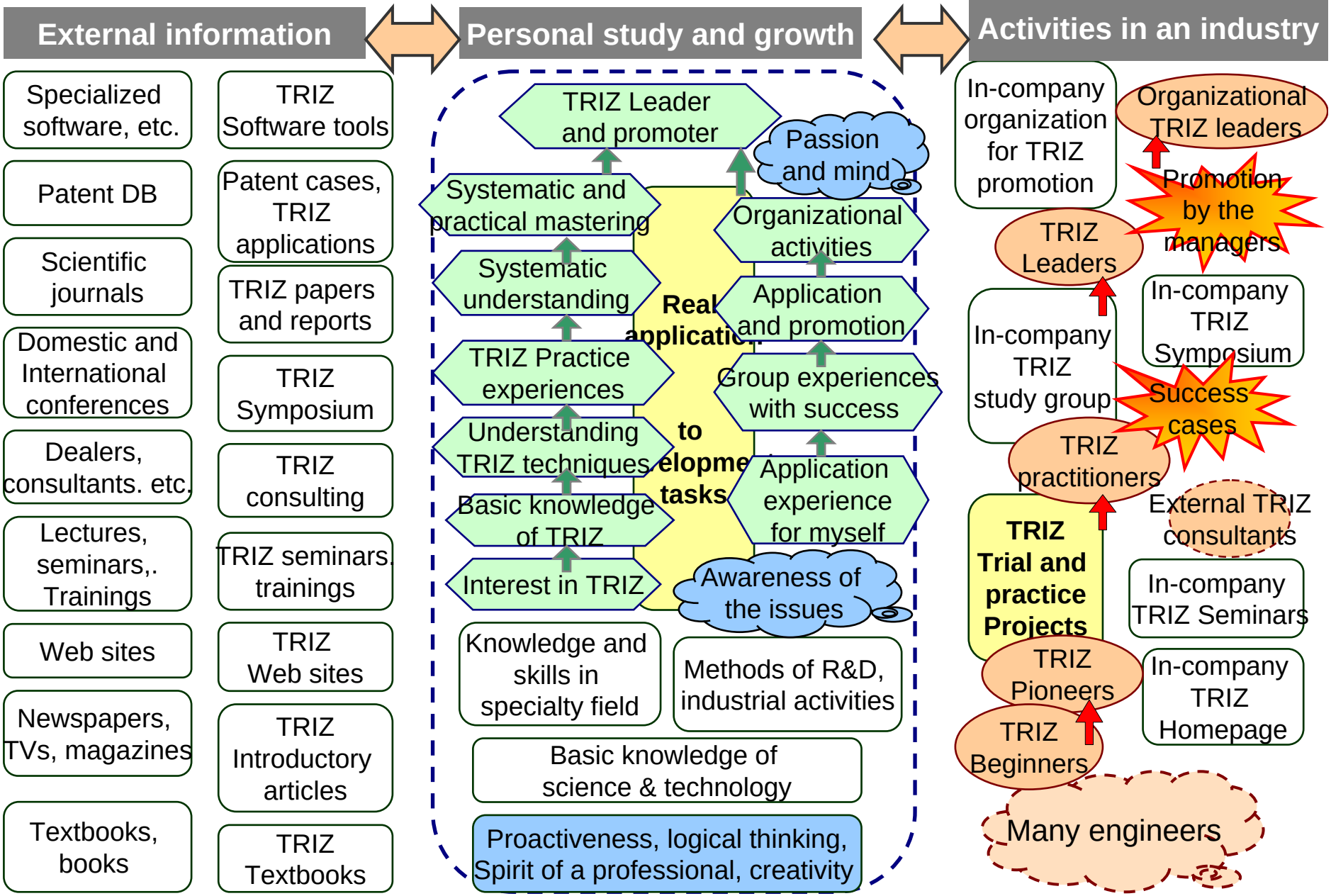
Model (a) of a person to learn and master a technique like TRIZ



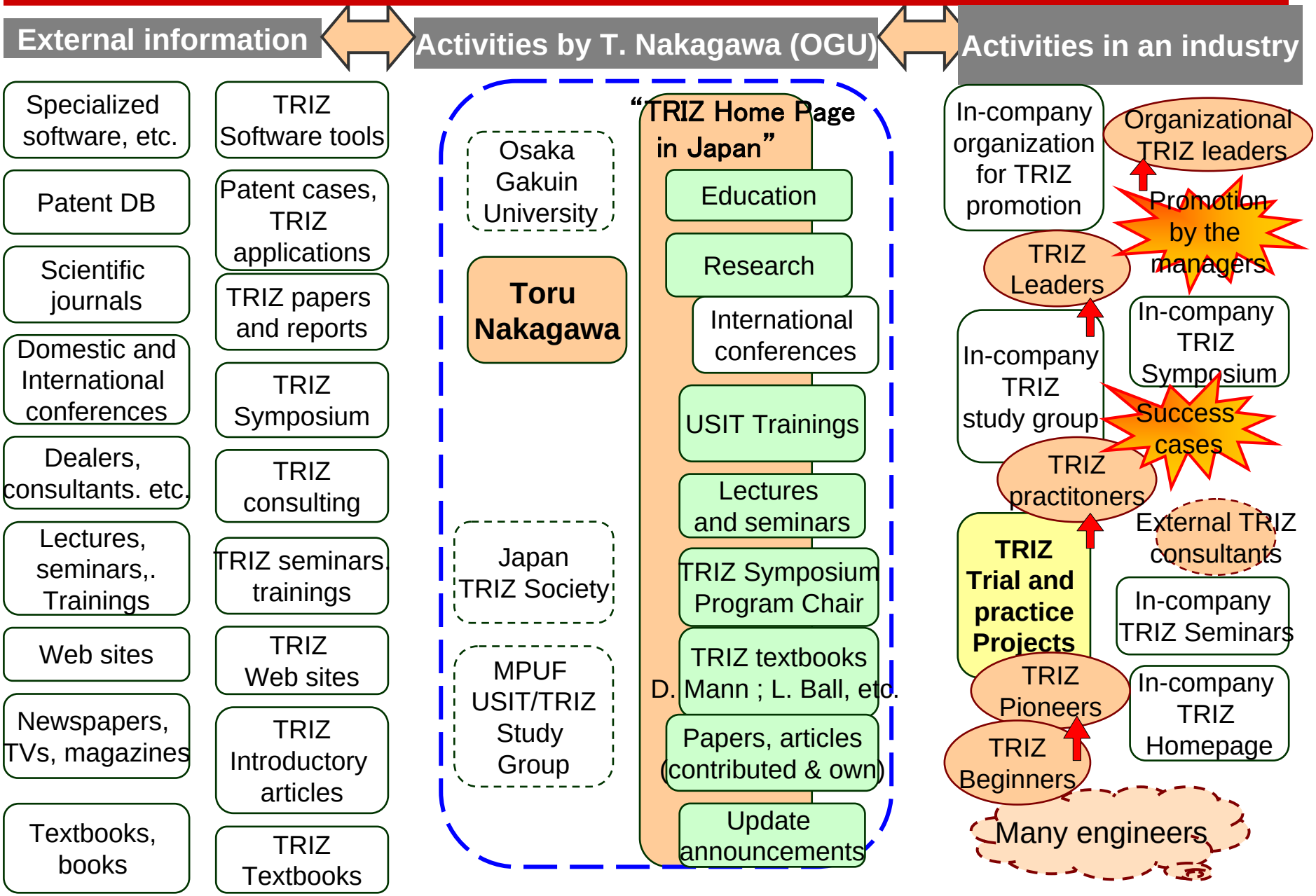
Model [A-5] of positioning (in life) of studying TRIZ (Part 2) Young engineers



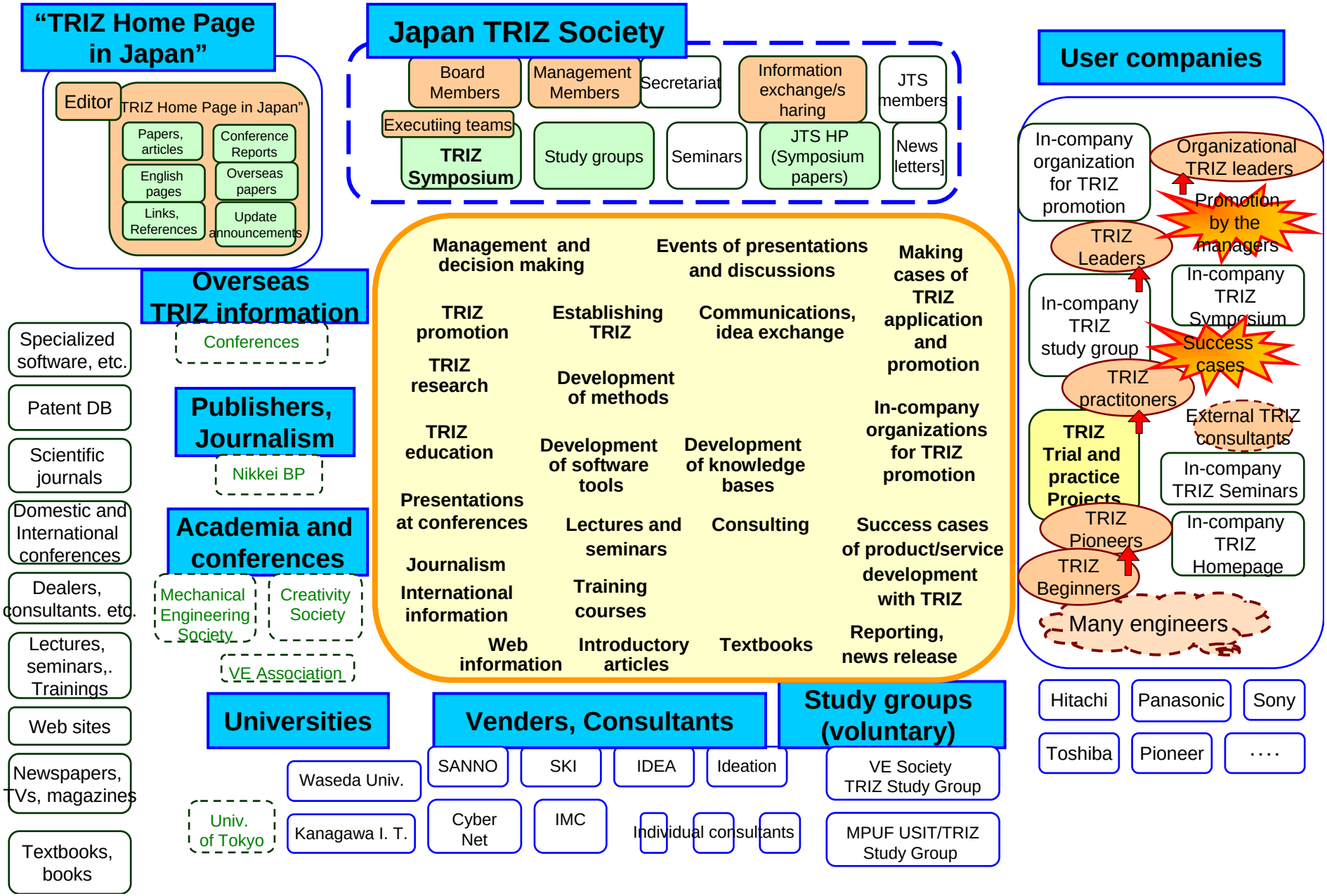
Model (b) of activities for an engineer and a company to learn and master TRIZ



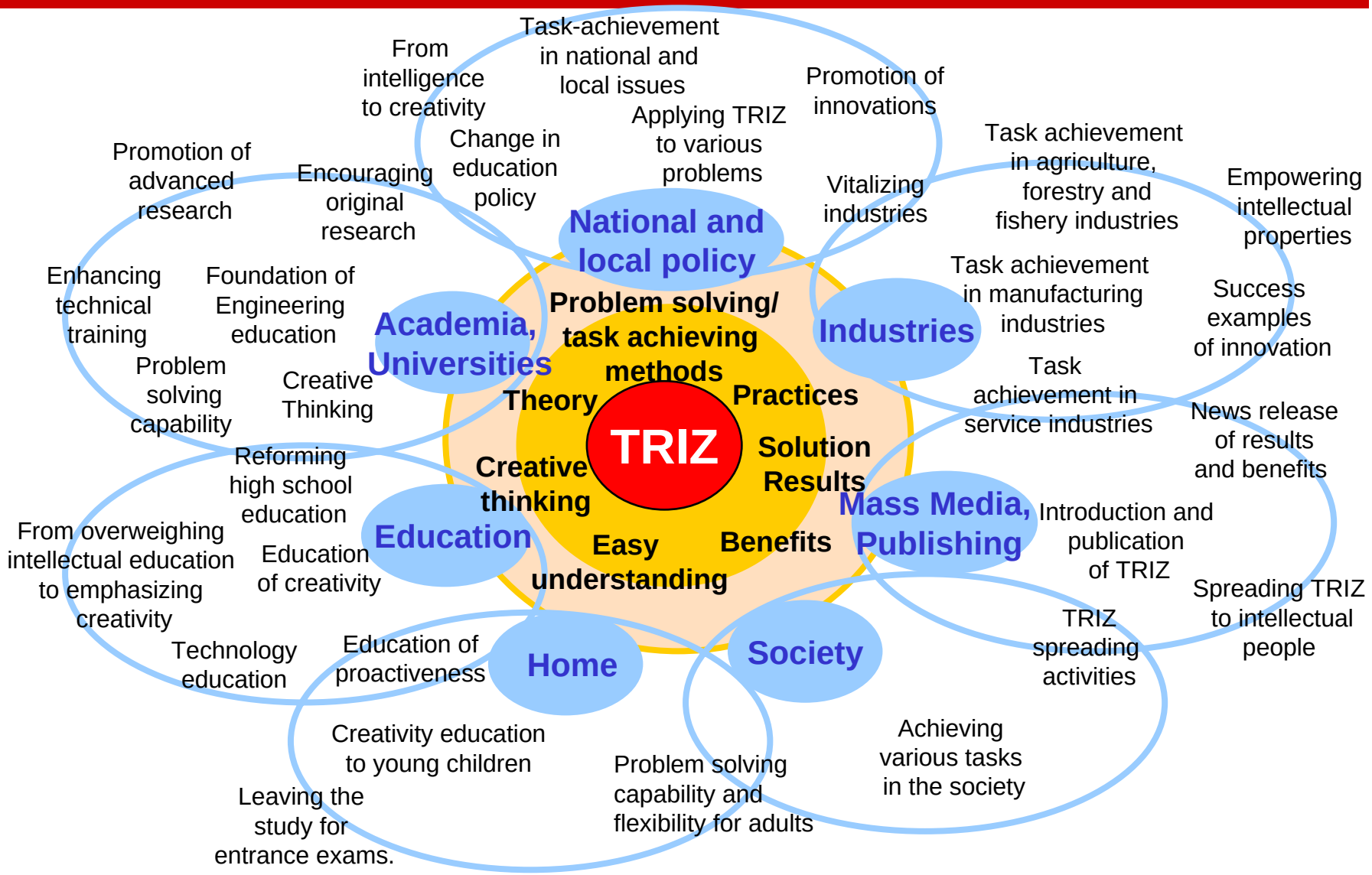
Model [B-1] of activities of TRIZ promoters (Case 6) T. Nakagawa (OGU)



Model (c) of overall activities of TRIZ promoters in Japan (Merged)



Model (d) of areas for TRIZ application ➔ Our new general target



We put TRIZ in the center. But we need a more general method !

The models have guided us to a new target at a higher level.

General Target :

To establish a methodology of
creative problem-solving / task-achieving,

to spread it widely, and

to apply it
to problem-solving and task-achieving jobs
in various domains
in the whole country (and the world)".

Model (e) of activities for achieving the new tasks

Task: To establish a methodology of creative problem-solving / task-achieving, and to spread it widely

Development of method

- Research of TRIZ methods
- Research of USIT
- Development of software tools
- Development of knowledge bases

Promotion

- Strategy, Management

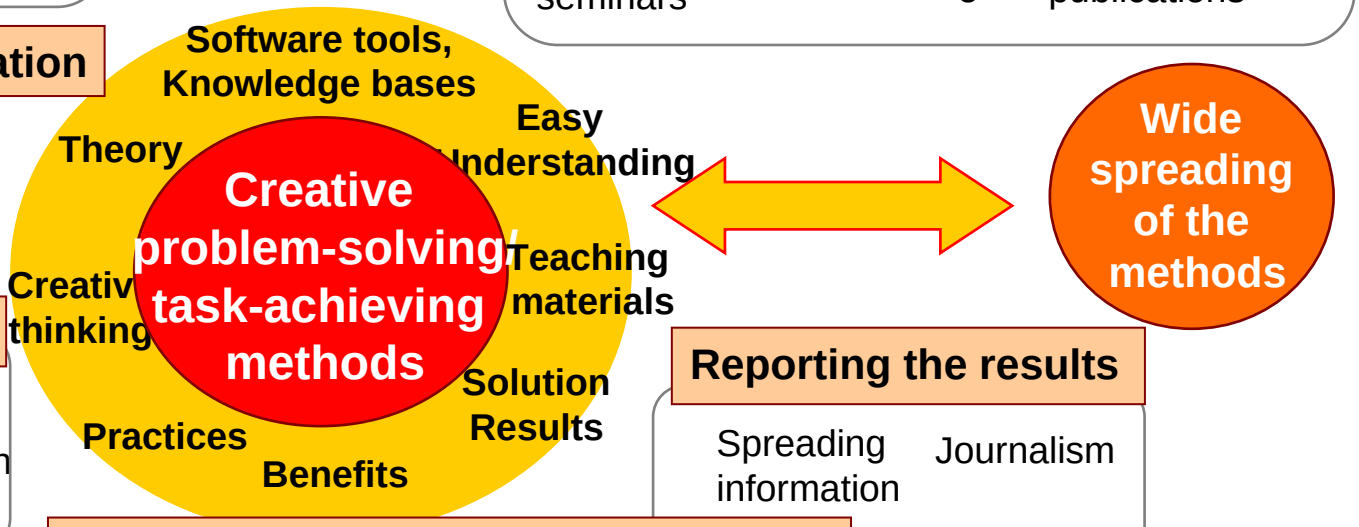
[Japan TRIZ society]

Education and spreading

- Introductory articles
- News letters
- Lectures, seminars
- Spreading with Web site
- Trainings
- Consulting
- ["TRIZ Home Page in Japan"]
- [JTS Home Page]
- Textbooks, publications

International cooperation

- International conferences
- Textbooks translation



Holding conferences

- presentation, discussion, communication

[TRIZ Symposium]

Reporting the results

- Spreading information
- Journalism

Practices of application and promotion

- Application experiences
- Success cases
- In-company promotion
- in-company organization for TRIZ

Information exchange

- Email Communication
- Information sharing

Note: [ ] shows the current effective activities in Japan.

Model (f) of "General Methodology of Creative problem-solving" (Outline)

For technological problems

(0) Whole procedure

(1) Finding the problem

(2) Understanding the present system

(3) Imaging the ideals

(4) Generating ideas

(5) Constructing solutions

For non-technological problems

(0) Whole procedure

(1) Finding the problem

(2) Understanding the present system

(3) Imaging the ideals & visions

(4) Generating ideas

(5) Constructing solutions

Further extension of TRIZ
guided by the new paradigm of the 6-Box Scheme of USIT

Model (f1) of "Creative problem-solving/task-achieving methods" (for technology)

Requirements at the preceding stage

- Applicable widely to science & technology
- Mechanical, electrical/electronic, chemical, etc.
- biological, medical, etc.
- Using effectively the whole information in science & technology
- Implementing the S & T information in the method.
- Effectively using patent information
- Possible to use concepts, theories, and methods in the subject-matter fields.
- Use the method of system analysis in the subject-matter field.

- Clear relationships with methods for technology development
- Able to find and understand the problem in the real world
- Able to focus down the problem and clarify the task.
- Able to refer to S & T information whenever necessary
- Able to apply to preparing for patents
- Able to apply for circumventing existing patents.
- Able to transfer knowledge and techniques in other areas.

Able to solve problems creatively in the fields of Science & Technology

Whole procedure
- Consistent whole procedure
- Simple/ specialized processes

Finding the problem
- Understanding the problem systematically
- Consider the goals and tasks
- Consider from broad perspectives
- Focusing the problem

Understanding the present system
- understanding difficulties and root causes
- Understanding the mechanism of the present system
- Functions & attributes
- space & time char-acteristics
- Clarifying contradictions
- Examine various present solutions
- Learn similar tasks in different fields

Imaging the ideals
- Thinking the images of the ideals
- Desirable behaviors & properties
- Consider the direction of evolution

Generating ideas
- Techniques of idea generation
- Collection of possible hints
- Resolve contra-dictions
- Generate ideas as widely as possible
- Identifying excellent ideas

Constructing solutions
- Extending the ideas
- Improving solutions with the ideas
- Designing new solutions
- Introducing good ideas used in different fields
- Solving secondary problems
- Identifying and evaluating excellent solutions

- Introductory articles & materials
- Textbooks of the methods
- Application examples
- Software tools & knowledge bases
- Easy-to-understand methods.
- Practical application methods
- Chances to learn
- Chances of training

Requirements at the succeeding stage

- Able to construct solutions
- Able to use designing techniques in the subject-matter field
- Able to implement the solutions
- Coordinated with methods for implementing solutions (CAD/CAE/CAM, Taguchi method, etc...
- Able to evaluate the solutions in the real world
- Coordinated with industrial and company infrastructure, e.g., designing, manufacturing, and sales

Model (f2) of "Creative problem-solving/task-achieving methods" (for non-technology areas)

Requirements at the preceding stage

- Applicable widely to non-technological areas
- Areas related to humans, society, business, etc.
- From wide perspectives on world situations, society, etc. and also with delicate sense of humans
- Using various preceding methods
- TRIZ is extended from technical to non-technical areas.
- Effectively using the knowledge of different areas
- Possible to use concepts, theories, and methods in the subject-matter fields.
- Use the method of system analysis in the subject-matter field.

- Considering from wide perspectives on world situation, history, etc.
- Able to find and understand the problem in the real world
- Able to focus down the problem and clarify the task.
- Able to refer to many previous cases and knowledge whenever necessary
- Able to apply for policy making and solution planning
- Able to apply for finding solutions in the cases of serious conflicts of interests/ opinions
- Able to merge the knowledge and abilities of all the persons involved

Able to solve problems creatively in non-technology fields (e.g., humans, society, business)

Whole procedure
- Consistent whole procedure
- Simple/ specialized processes

Imaging ideals & visions
- Thinking the images of ideals
- Stating the vision
- Consider the directions & steps of evolution

Finding the problem
- Understanding the problem systematically
- Consider the goals, tasks, and visions
- From multiple perspectives
- Focus the problem
- Consider in steps

Generating ideas
- Techniques of idea generation
- Collection of possible hints
- Resolve conflicts & contradictions
- List up the ideas as widely as possible
- Identifying excellent ideas

Understanding the present system
- understanding difficulties and root causes
- Understanding the mechanism of the present system
- Functions & properties of organizations & persons
- space & time character-istics
- Clarifying contra-dictions
- Examine preceding cases
- Learn similar tasks in different countries, companies, and fields

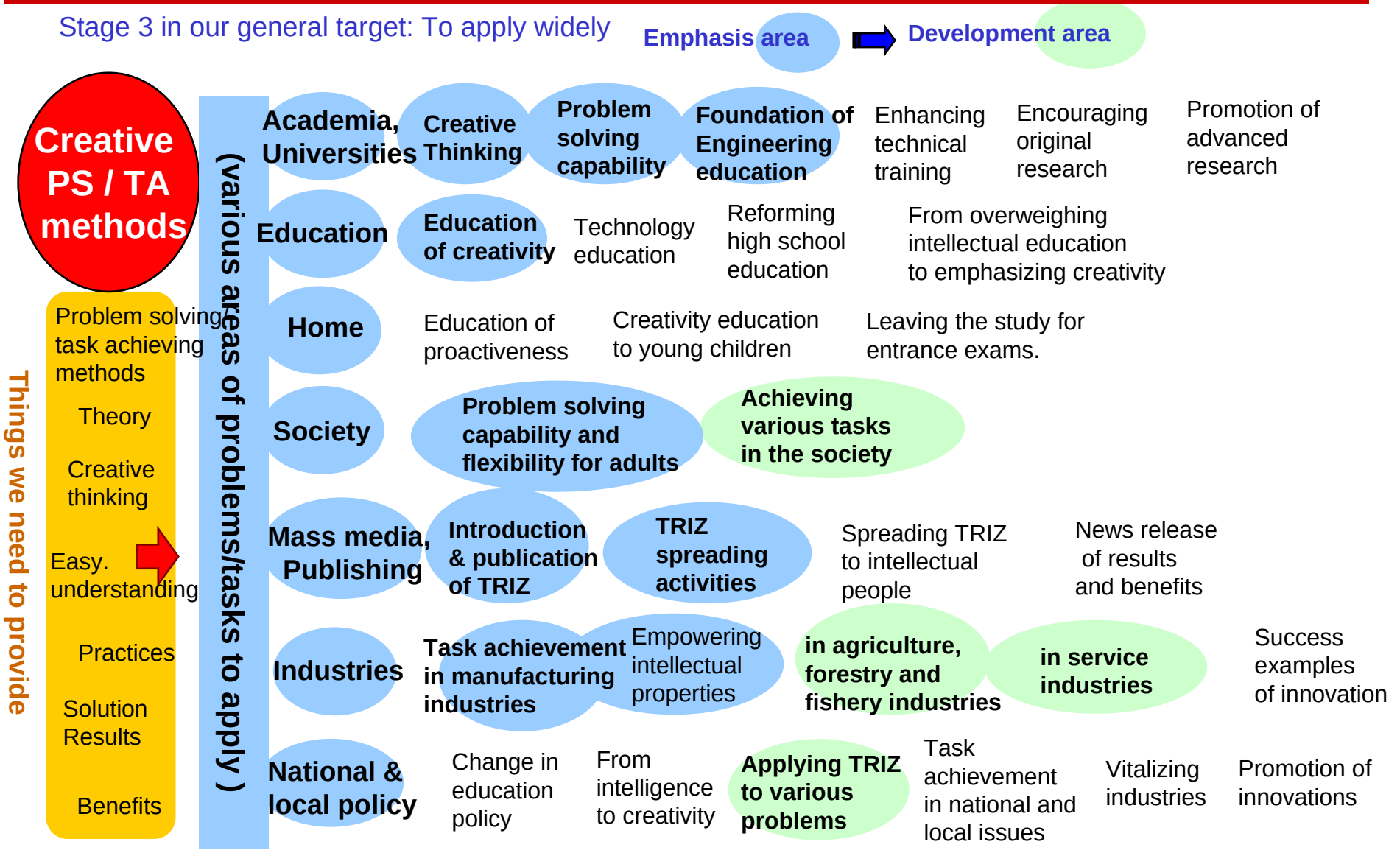
Constructing solutions
- Extending the ideas
- Improving solutions with the ideas
- Designing new solutions
- Introducing good ideas in different countries and fields
- Solving secondary problems
- Identifying and evaluating excellent solutions

- Introductory articles & materials
- Textbooks of the methods
- Application examples (with the results)
- Software tools & knowledge bases
- Easy-to-understand methods.
- Practical application methods
- Chances to learn
- Chances of training
- Methods to transfer to different fields

Requirements at the succeeding stage

- Able to construct solutions
- Able to use methods and institutions in the subject-matter field
- Able to implement the solutions
- Coordinated with various methods & institutions for implementing solutions
- Solutions are effective and beneficial in the real world
- Coordinated with real-world infrastructures, e.g., society, culture, and environment

Model [D-5] of areas for applying our ‘Creative PS/TA Methods’



Note: Actually, we should find and get specific opportunities to try and apply the Creative PS/TA methods. Development of the method and extension of application area should be carried out in parallel. .

Concluding Remarks

(1) For understanding the difficulty in penetrating TRZ widely, especially to younger people, **multiple models** of the current situations have been built from different aspects.

(2) One main lesson is that **TRIZ is just one of many items** for a person, e.g., a young engineer, to learn and to handle with in his life and jobs.

Thus, the contents of TRIZ and occasions to convey them should be either **well customized** for the (narrow range of) target persons or **well generalized** for the (wider range of) target persons.

(3) Individual persons can learn TRIZ
from outside information, e.g., textbooks and Webs,
from the company's promotion, but
mainly from his personal learning and experiences.

The accumulation of personal learning and outside impacts in a person is the key to mastering TRIZ (or any other) thinking.

(4) **For an industry to accept TRIZ**, personal growth of TRIZ practitioners/ leaders, application of TRIZ to real projects, and promotion by the management need to go together.

(5) TRIZ is applicable in the technological areas and also in the **non-technological areas.**
Thus TRIZ has a very wide range of application areas.

(6) However, **not TRIZ itself but a more general methodology** is desired for such a wide range of applications.
Thus we have been guided to **a new target at a higher level.**

(7) **'General methodology of creative problem solving'** is expected to be a further extension of TRIZ,
especially guided by the 6-Box Scheme of USIT.

(8) Realizing the higher level target, we will be able to **choose correct directions** in our application, development, and promotion activities.

(9) Models are drawn in **informal diagrams,** without any pre-fixed rules or format. Flexibility is important for viewing from different aspects. Diagrams are more useful than sentences for describing the structure of the situations/systems.

(10) In the modeling, **the systemic thinking in TRIZ** is fully used.

(11) The process of the present study
is guided by the 6-Box Scheme of USIT, and
is actually an illustration of the general methodology
of creative problem solving, to be pursued in the new target.

(12) In the present study,
macroscopic views are used in the modeling and hence
the solution obtained is also macroscopic and abstract.
If we use microscopic, specific views,
we would obtain microscopic, specific solutions.

(13) The models **should be discussed and shared** in the TRIZ community.