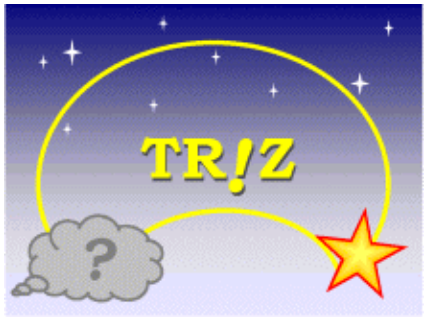
TRIZ シンポジウム 2012
The Eighth TRIZ Symposium in Japan

*The 8th TRIZ Symposium in Japan, 2012*




# Multiple Modeling to Set Up the Problems/Tasks:

# Establishing and Penetrating the Methodology of Creative Problem-Solving/Task-Achieving

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*September 8, 2012*

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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:**

(1) TRIZ is a strong method **in technological cases**, where the problem and its mechanism are understood clearly;
TRIZ resolves contradictions and derives powerful solutions.

(2) TRIZ is weak, however, in finding the problem focus in complex situations in the real world, typically **in non-technological areas** where mechanism is usually not clear.

(3) **The difficulty of spreading TRIZ** is not a technical problem.
It is related to people, organizations, and society.
It is a “common” type of problem in non-technological area.

(4) Dealing firmly with the difficulty of spreading TRIZ is an important issue for further development of TRIZ, I believe.

## Approaches of the present study:

(a) To deal firmly with the problem of difficulty in spreading TRIZ.

(b) To fully use the ability obtained so far in the study of TRIZ.

(c) To use my own ability and methods without limiting to TRIZ.

(d) **To build multiple 'Models'** viewed by multiple aspects, respectively.
A model is a description of the 'System' viewed from an aspect,
and clarifies the structure of the system.
Models are made in figures/diagrams, whose formats may be flexible.
Models are to be used for the basis of discussions from the aspects.

(e) To build higher-level Models on the basis of descriptions/discussions of multiple Models.

(f) **To write down statements and documents** on the basis of graphical representation of Models so as to clarify from what aspects the system is considered and what are understood from the Model.

(g) As a result, to obtain the understanding of the problem situations and the directions for solving the problem.

# Steps of Multiple Modeling and Analysis

## [A] Modeling of Person's learning and Industry's acceptance of techniques.

Model of how a person to learn, apply, and master the TRIZ method under the influences of external information and in-company activities.

## [B] Modeling of activities of various organizations promoting TRIZ.

Models of activities of individual organizations are accumulated and merged to see the activities as a whole.

## [C] Modeling of areas where TRIZ can/should be applied and penetrated.

This gives us the statement of our overall goal (or target requirement):

"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 world)".

## [D] Modeling of tasks to achieve the goal (in TRIZ itself and in its activities).

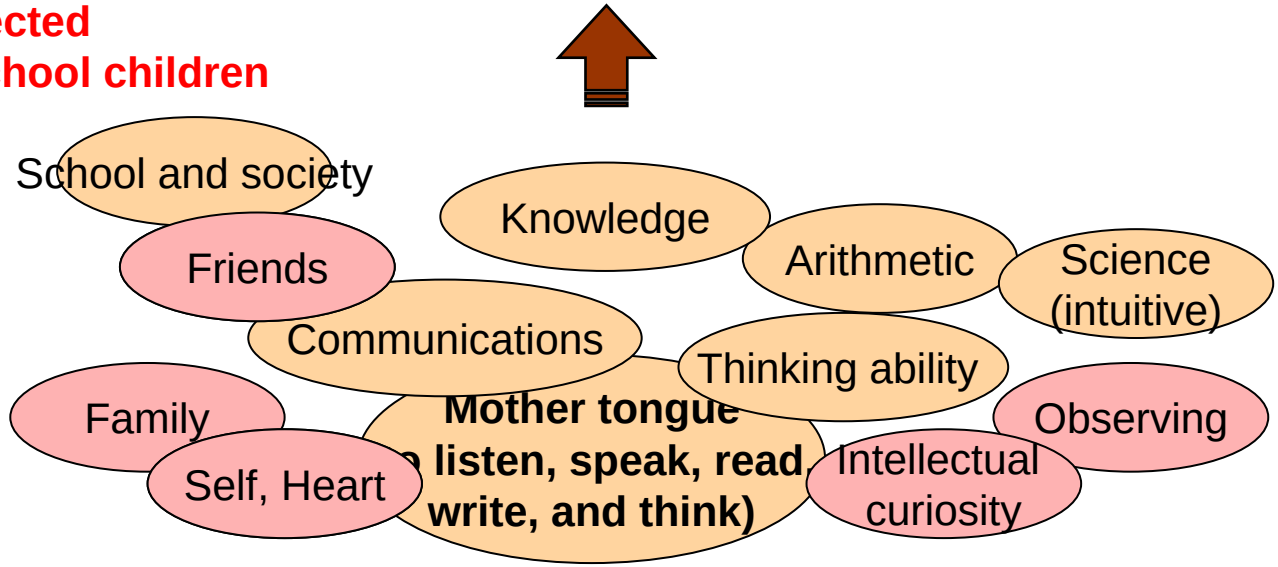
## [E] Modeling of micro problem situations preventing TRIZ penetration.

This serves for modeling concrete solutions to the problems.

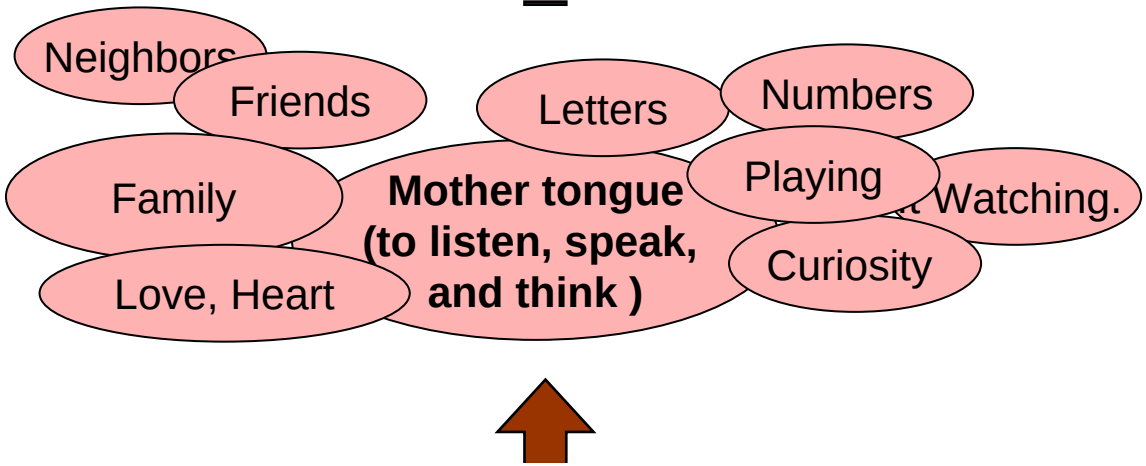
# [A] Models of person's learning and industry's acceptance of techniques

## [A1] Model of personal growth and expected inner quality (Part 1)

**(2) Inner quality expected for elementary school children**

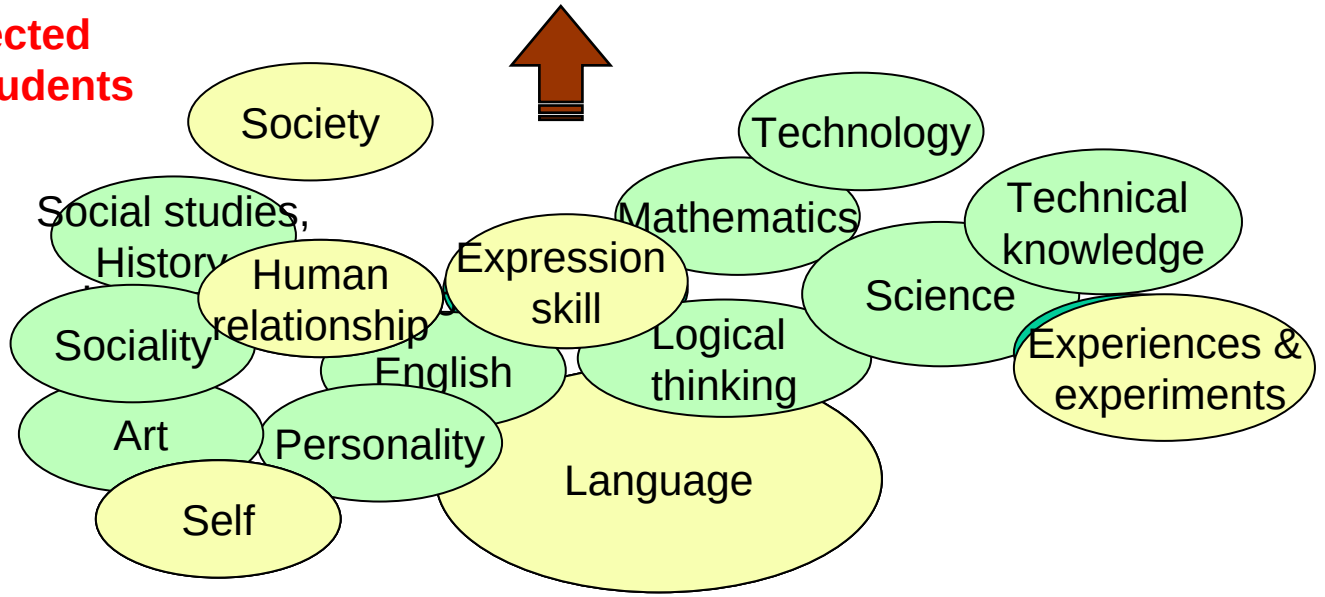



**(1) Inner quality expected for young children**

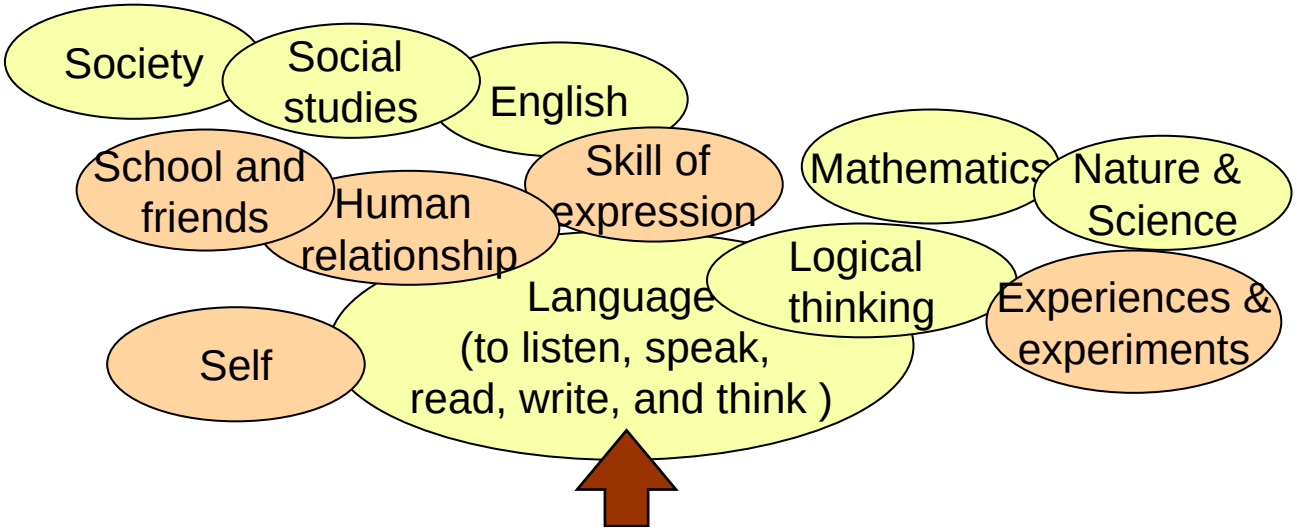


# [A1] Model of personal growth and expected inner quality (Part 2)

**(4) Inner quality expected for high school students**

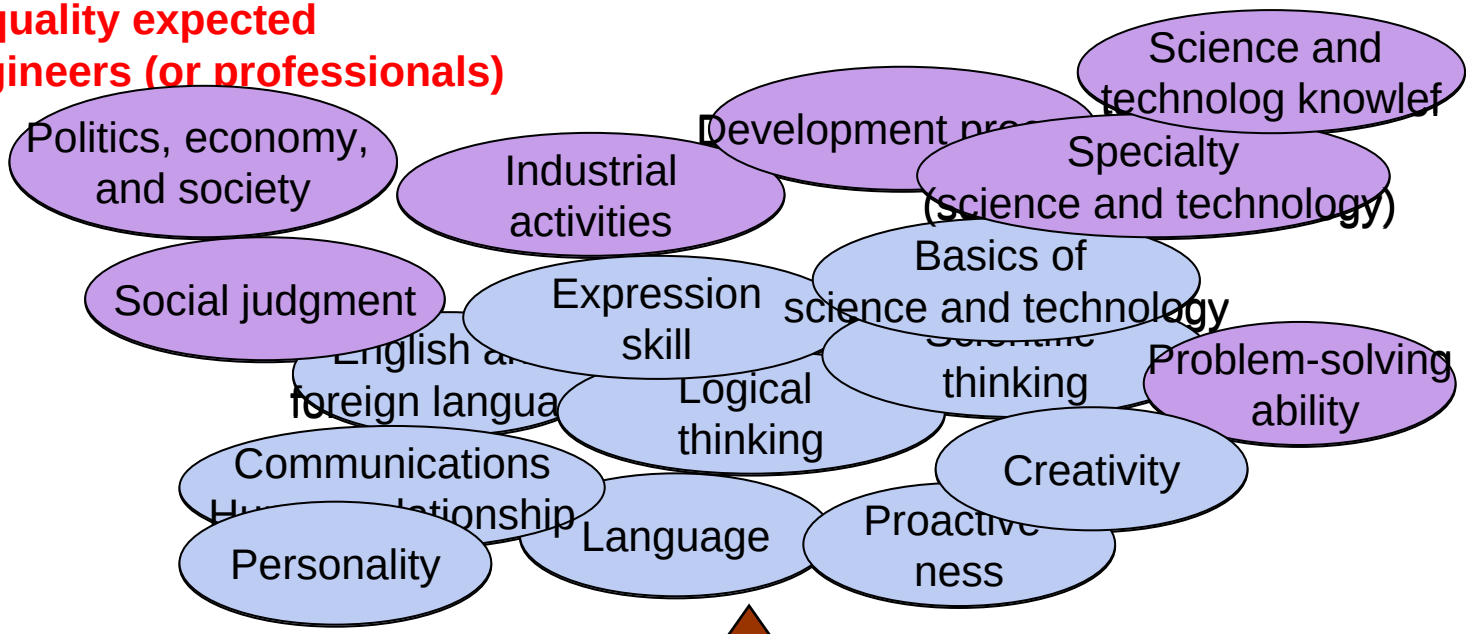



**(3) Inner quality expected for junior high school students.**

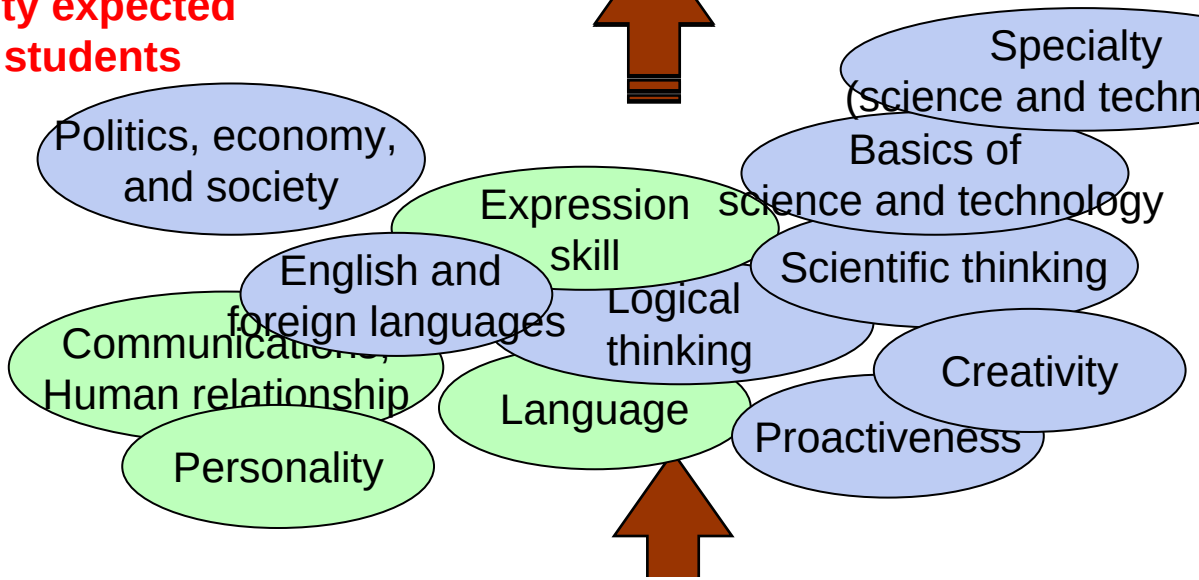


# [A1] Model of personal growth and expected inner quality (Part 3)

**(6) Inner quality expected for engineers (or professionals)**




**(5) Inner quality expected for university students**

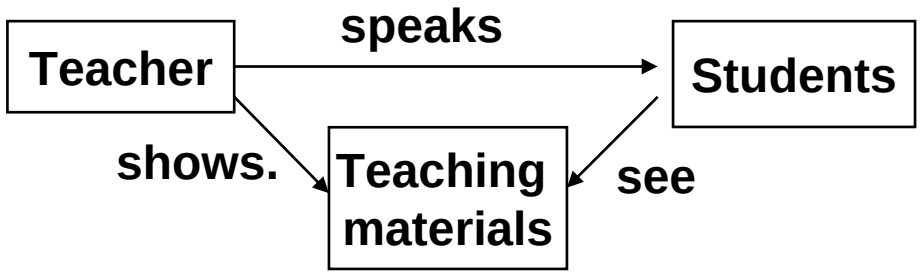


# [A2] Model of mechanism of a class (Part 1)

Toru Nakagawa: OGU
Lecture material (2007)

## Let's think about the mechanism of a class:

**First, choose basic elements and draw the skeleton structure among them.**

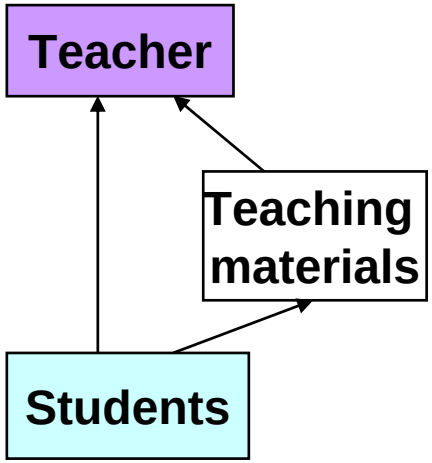


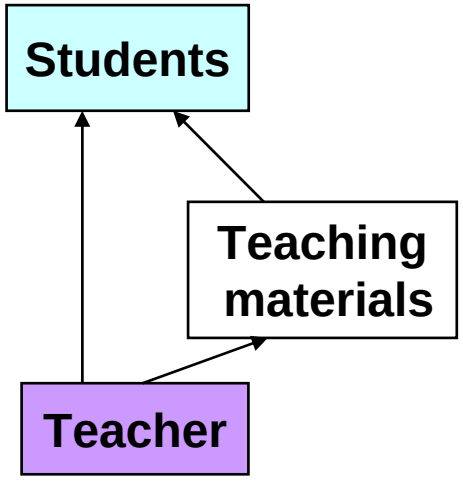

Analysis with USIT method

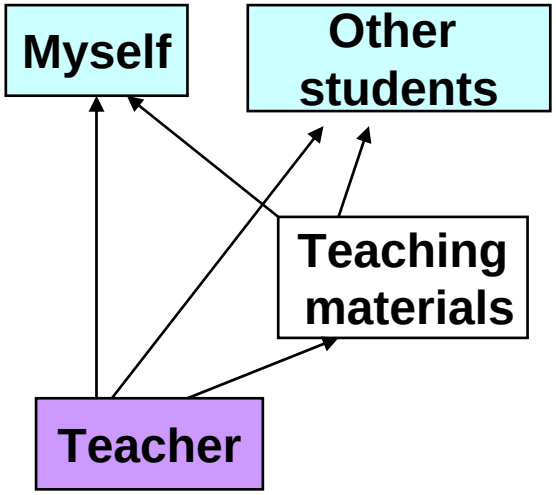
Put at the top the most important element for the purpose of "a Class".

Arrange the elements in the order that the lower elements support the upper ones in the sense of functions.

Connect the supporting element to the upper one with an arrow with a note of its function.



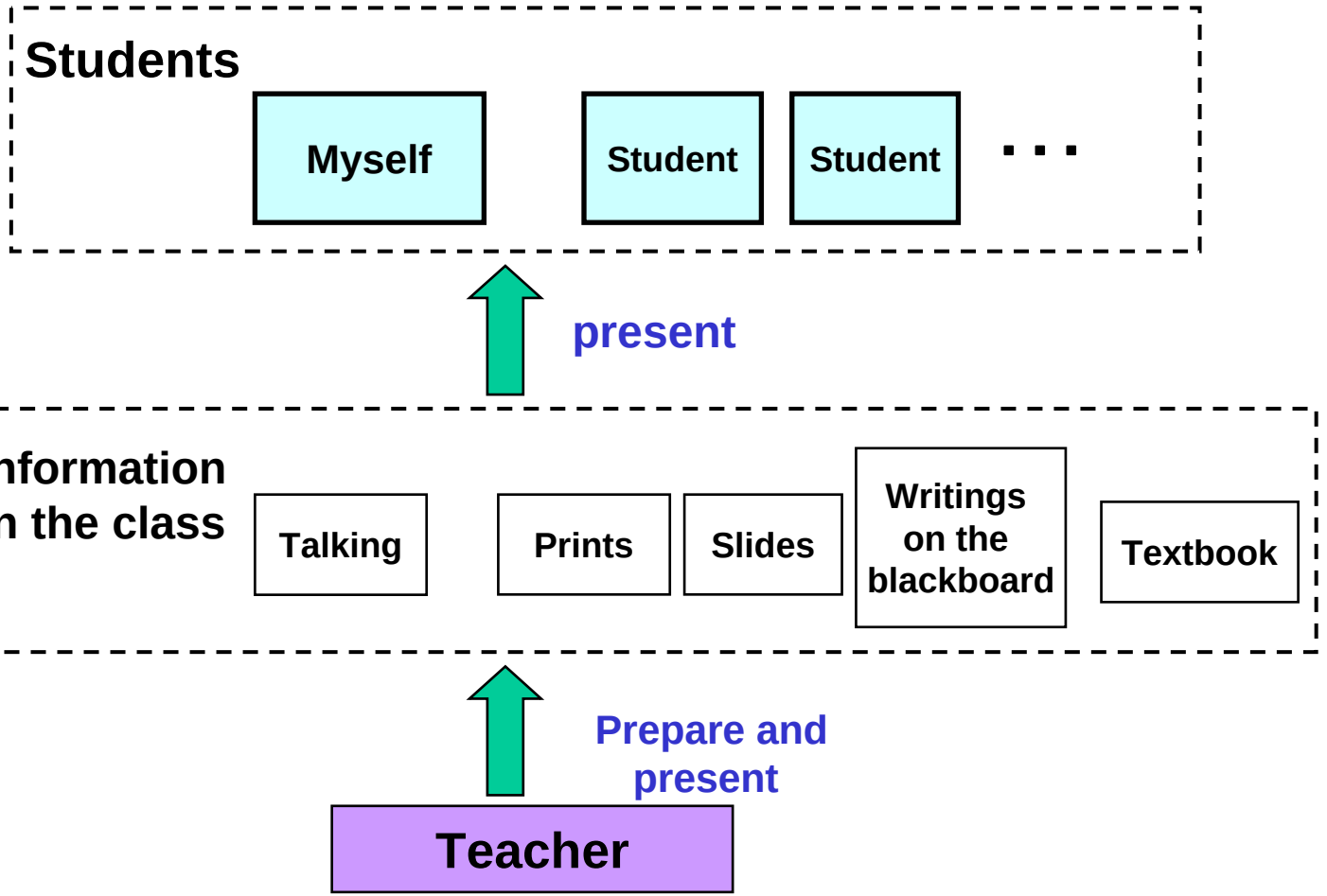
# [A2] Model of mechanism of a class (Part 2)

## Show the functional relationships among the elements of the Class.

Put at the top the most important element for the purpose of “a Class".

Arrange the elements in the order that the lower elements support the upper ones in the sense of functions.

Connect the supporting element to the upper one with an arrow.

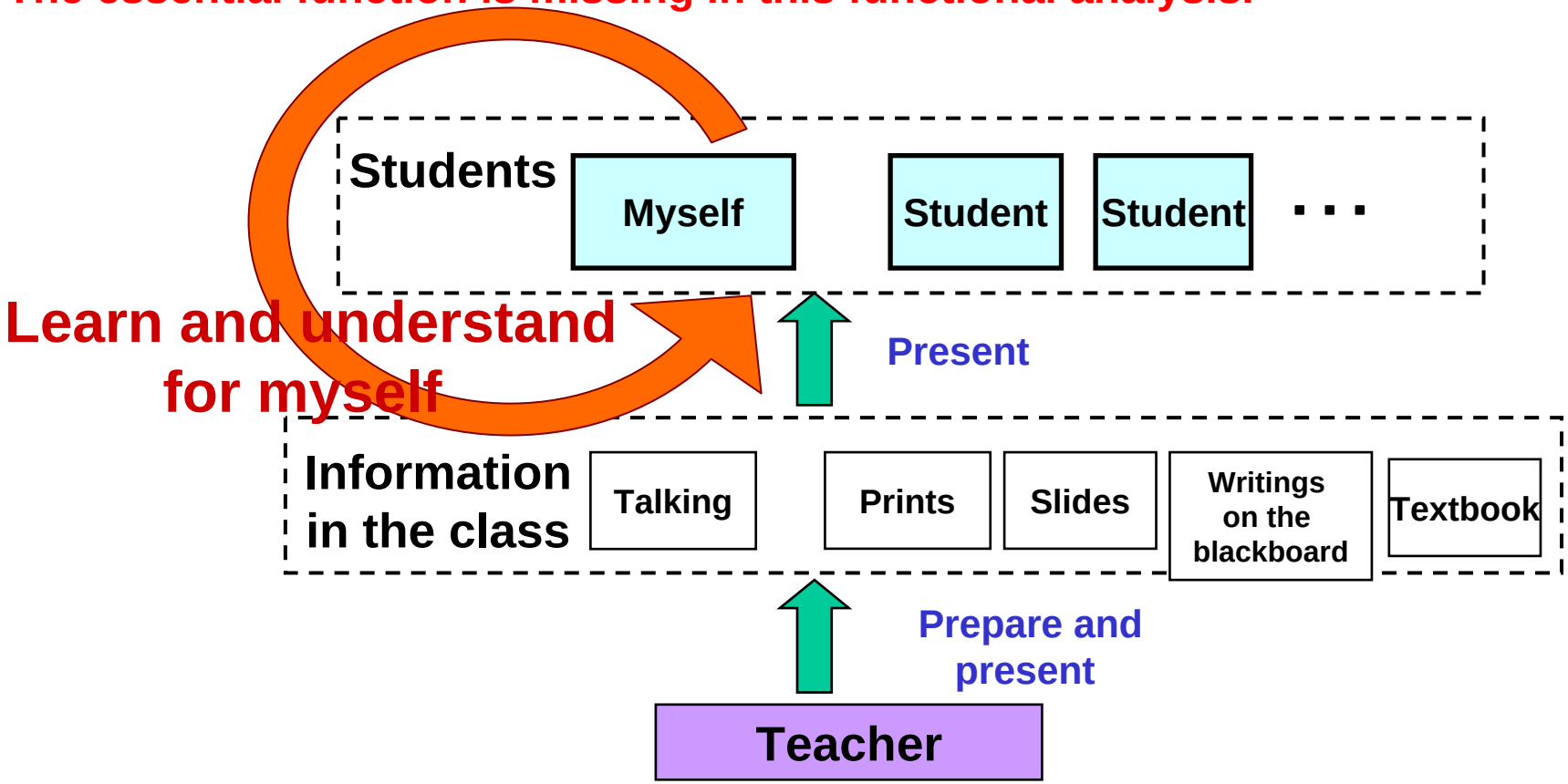



*** However, this figure is somewhat WRONG. ??? ***

# [A2] Model of mechanism of a class (

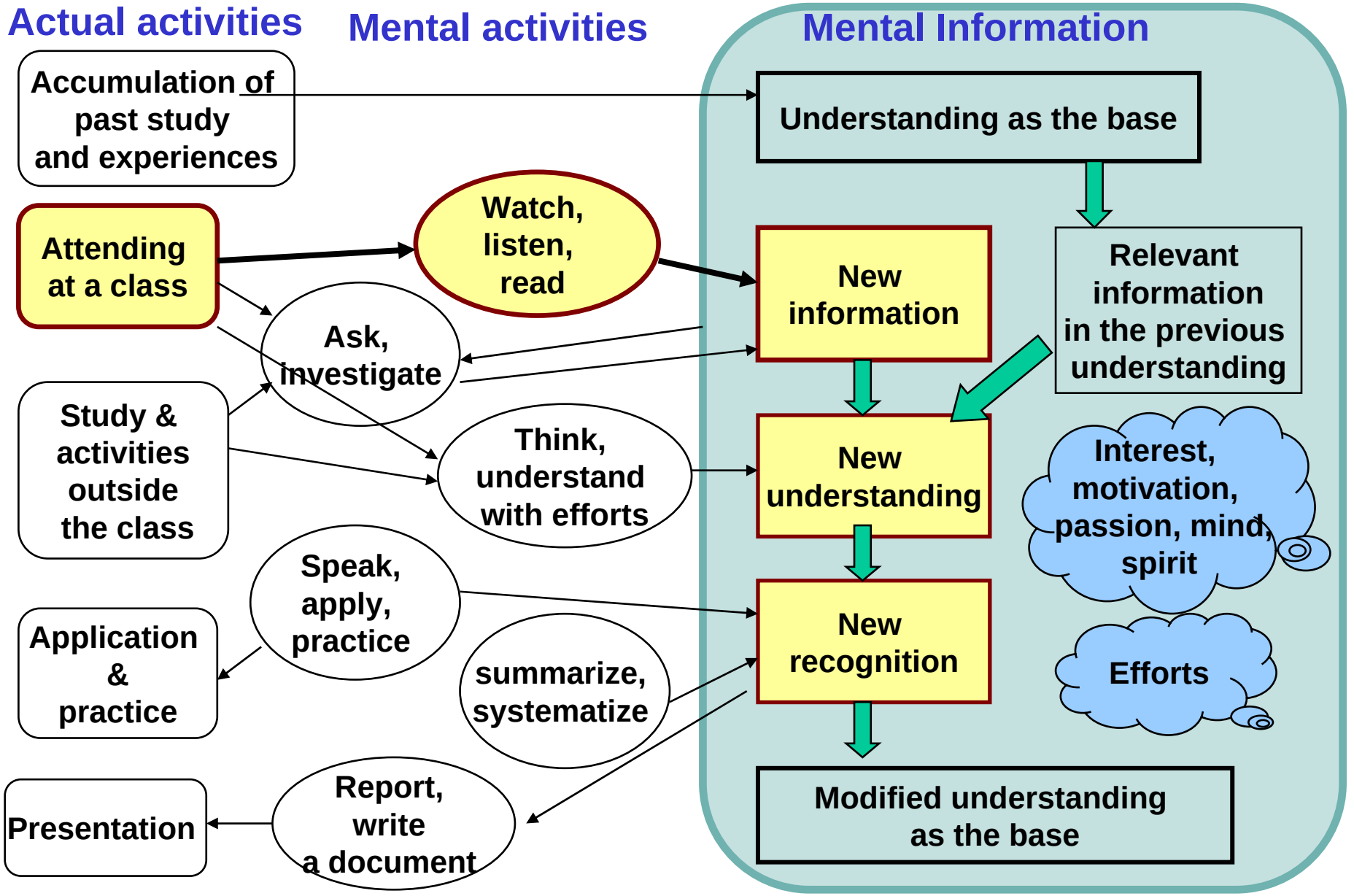
Students (myself) only receive the information presented in the class.
They are served but do not have their own activities, in this diagram.
The students' activities of "Learning" and "Understanding" are not expressed.
(Even if the students are sleeping, this "Class" functions well, the diagram says.)

**The essential function is missing in this functional analysis.**

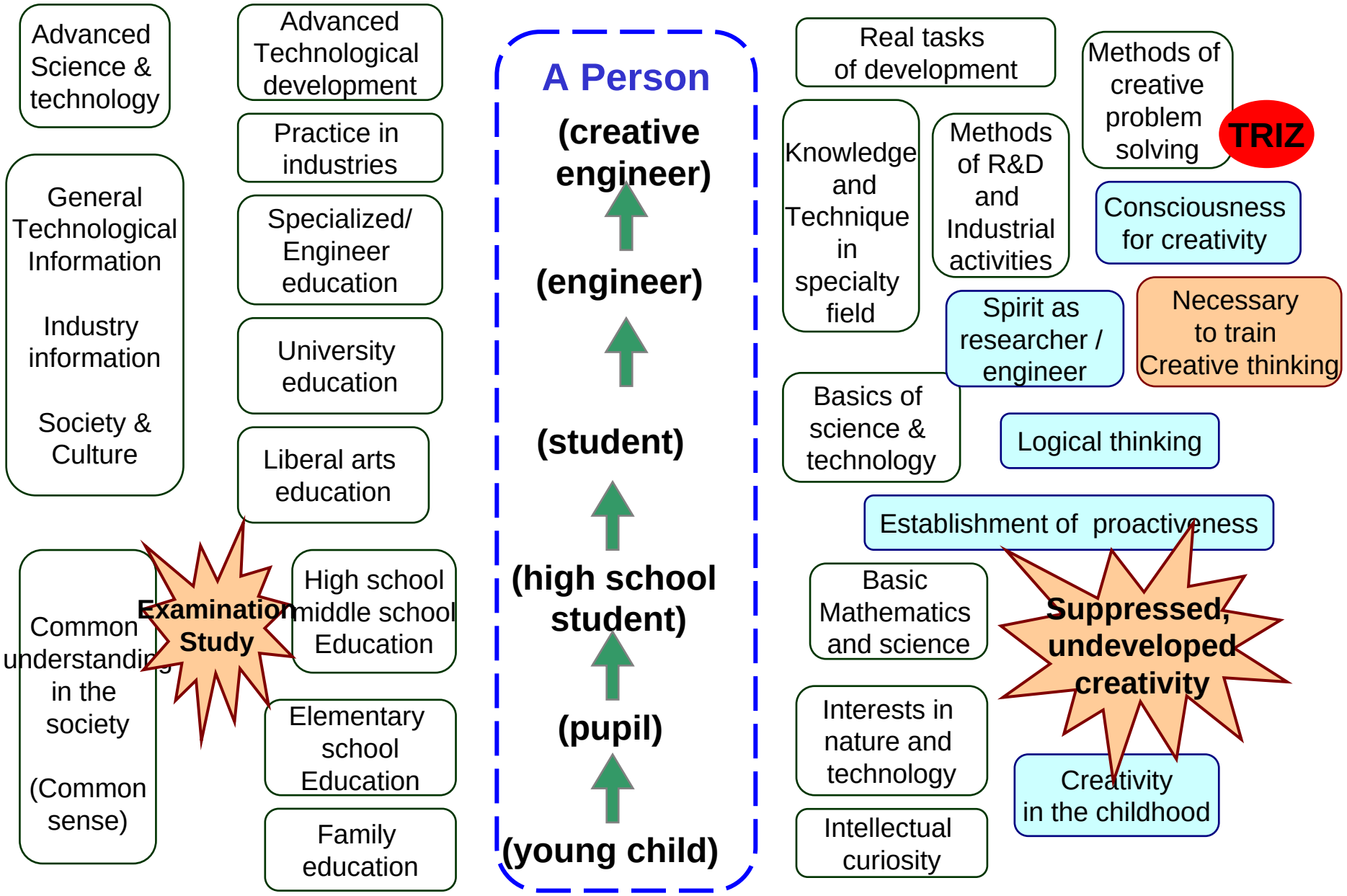


# [A-3] Model of mental activities to learn and understand

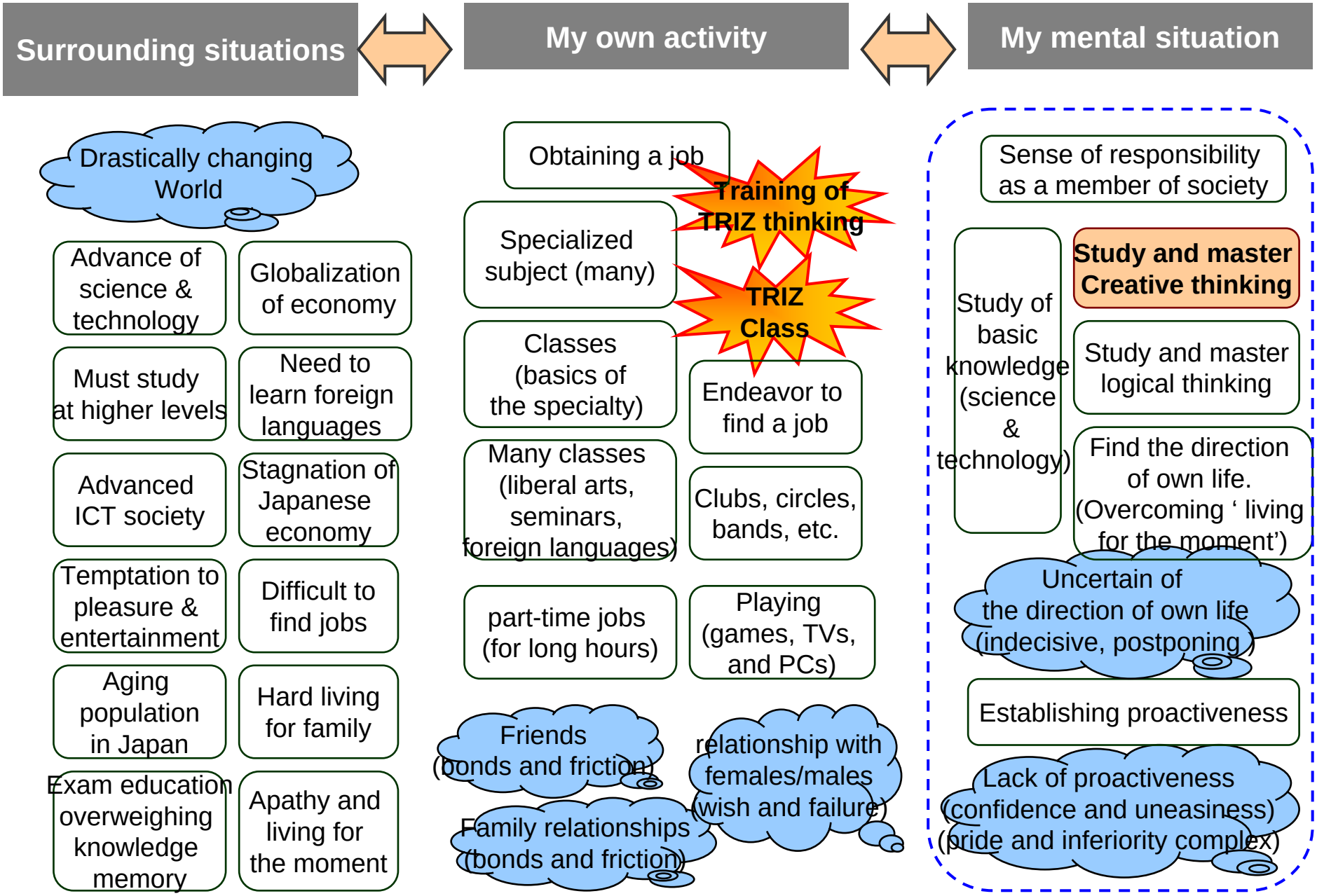
Toru Nakagawa: OGU
Lecture material (2007)



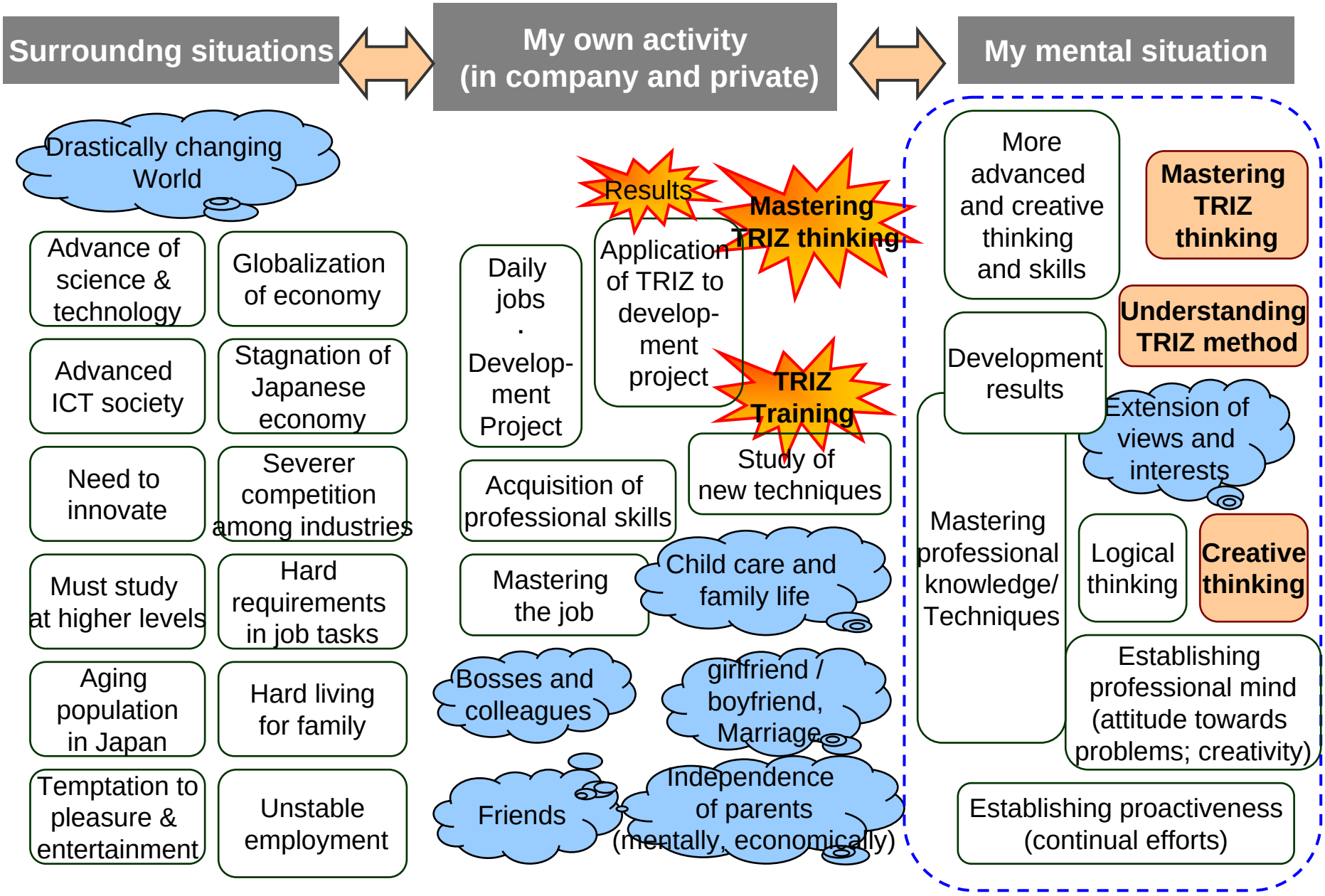
# [A-4] Model of a person to learn and master a technique (i.e. TRIZ)



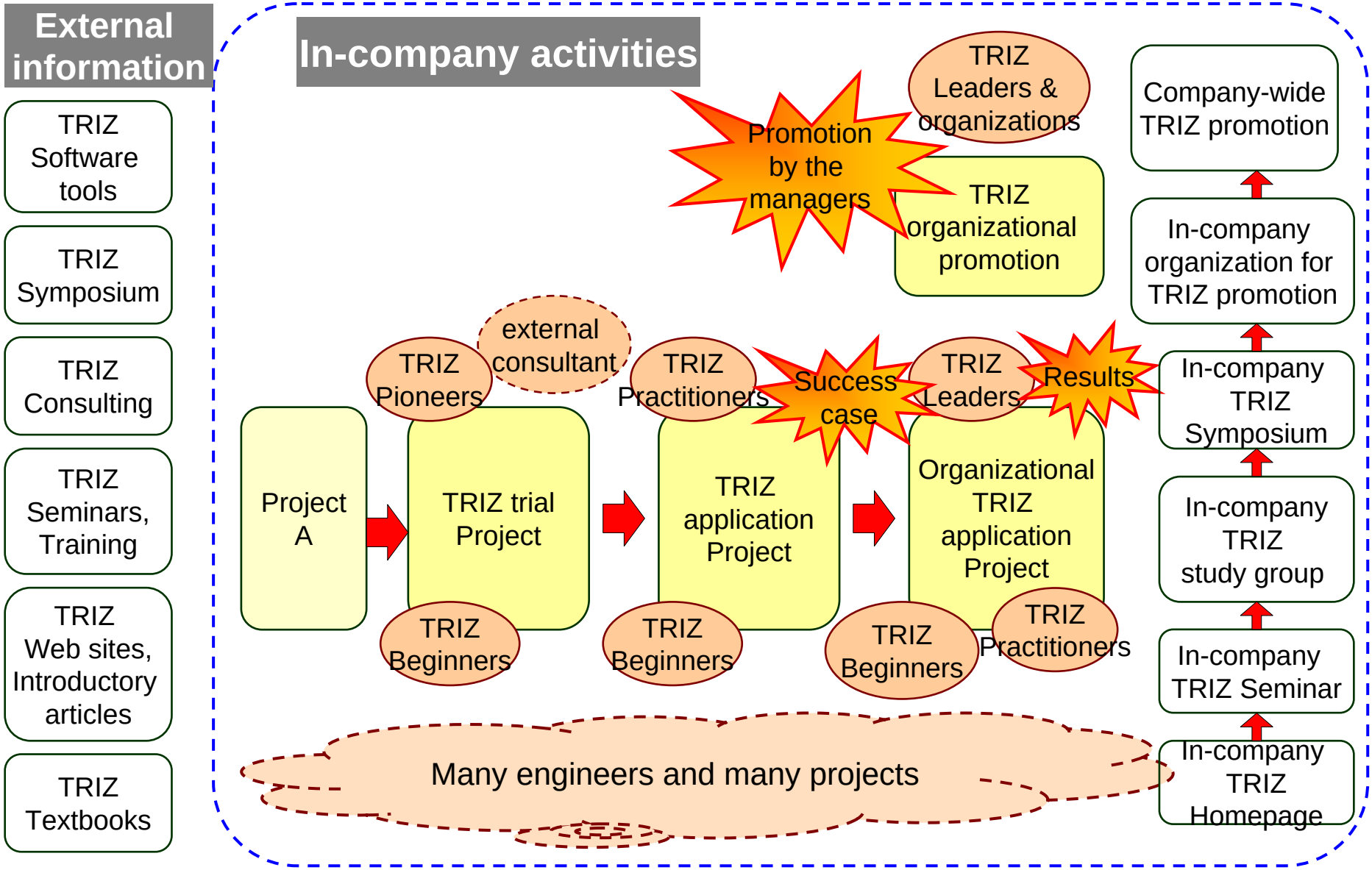
# [A-5] Model of positioning (in life) of studying TRIZ (Part 1) Undergraduate students



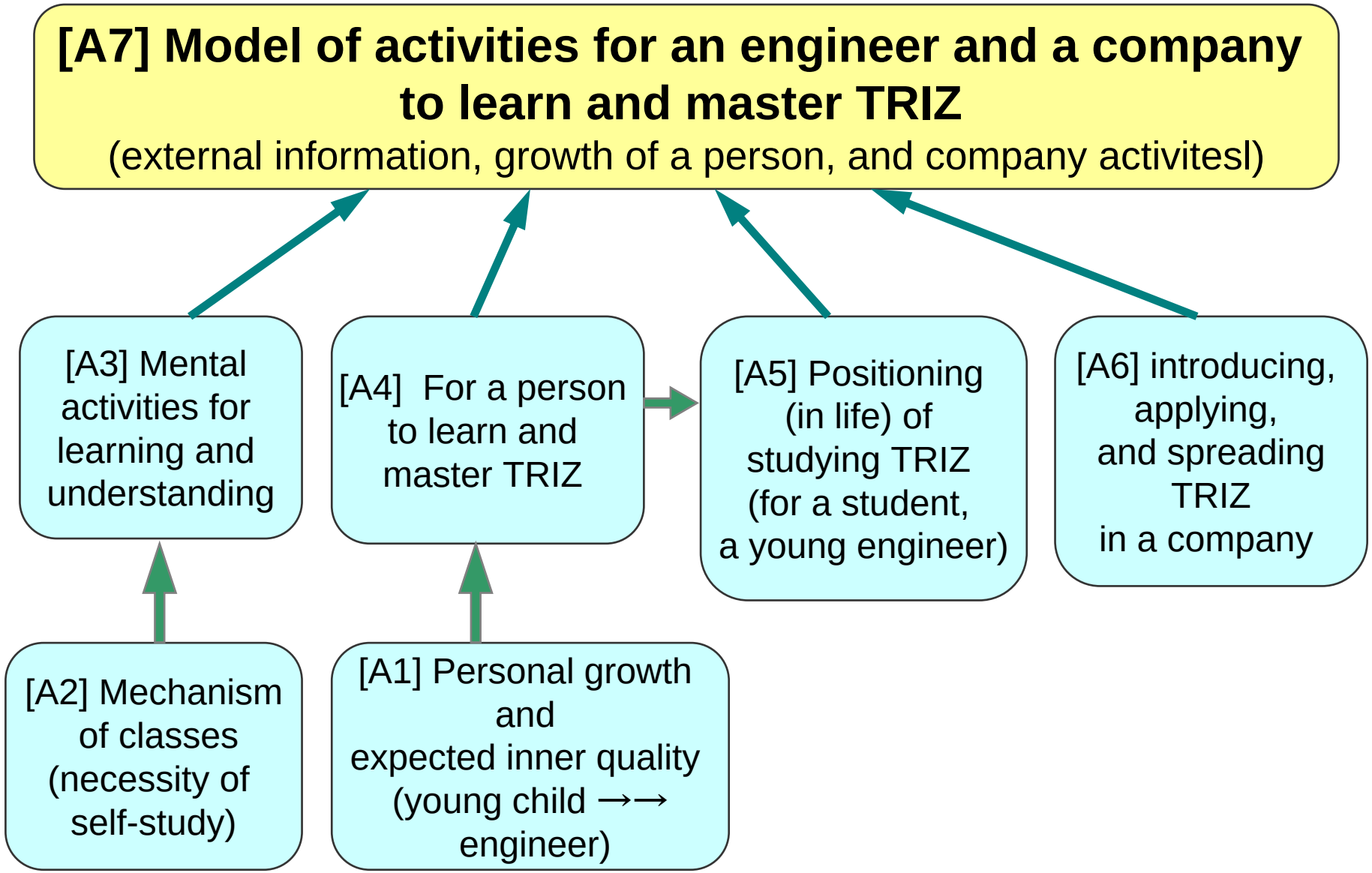
# [A-5] Model of positioning (in life) of studying TRIZ (Part 2) Young engineers



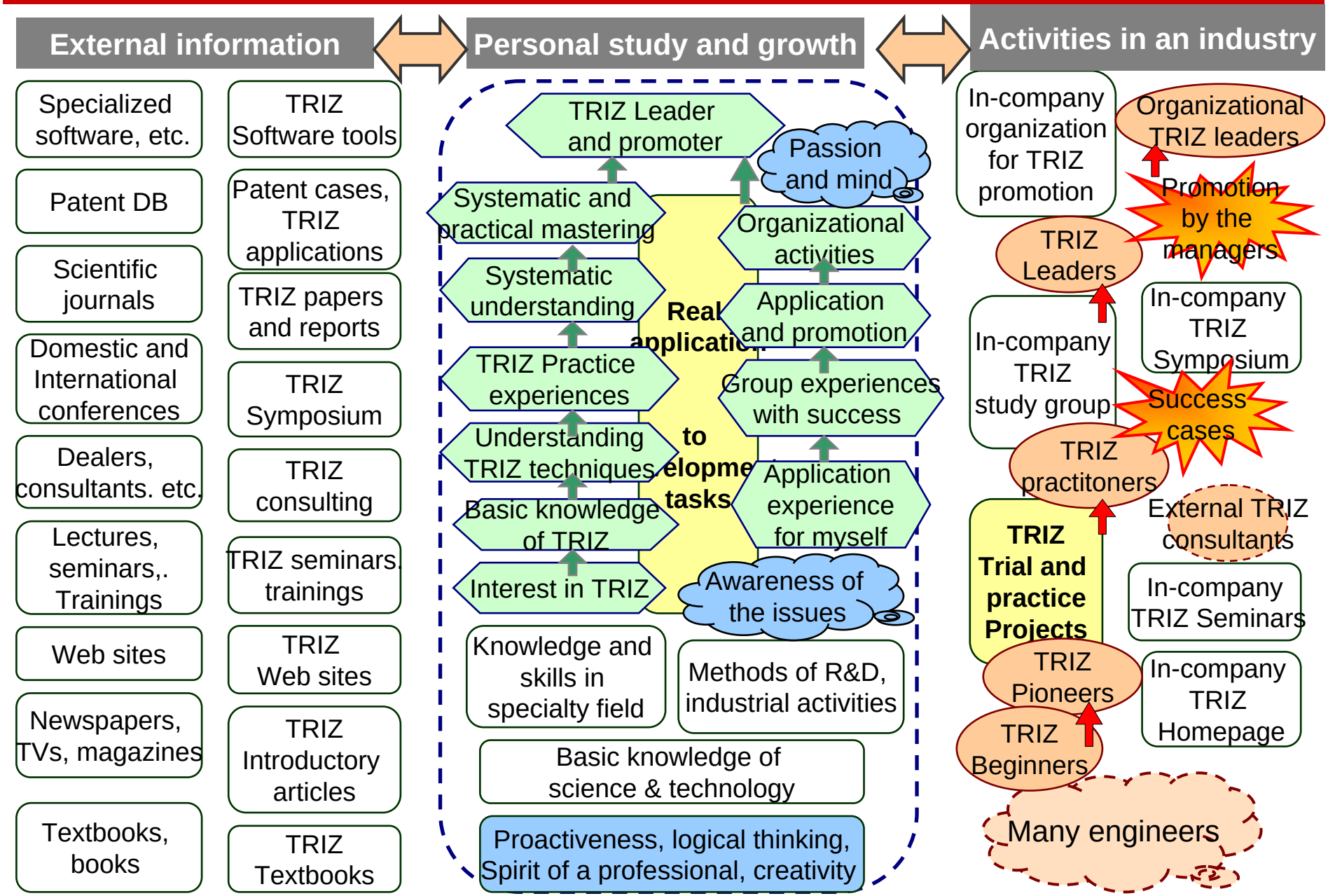
# [A-6] Model of introducing, applying, and spreading TRIZ in a company



**By merging the previous models, higher-level models can be derived.**



# [A-7] Model of activities for an engineer and a company to learn and master TRIZ



# [B] Models of activities of TRIZ promoters

## [B-1] Model of activities of various TRIZ promoters in Japan

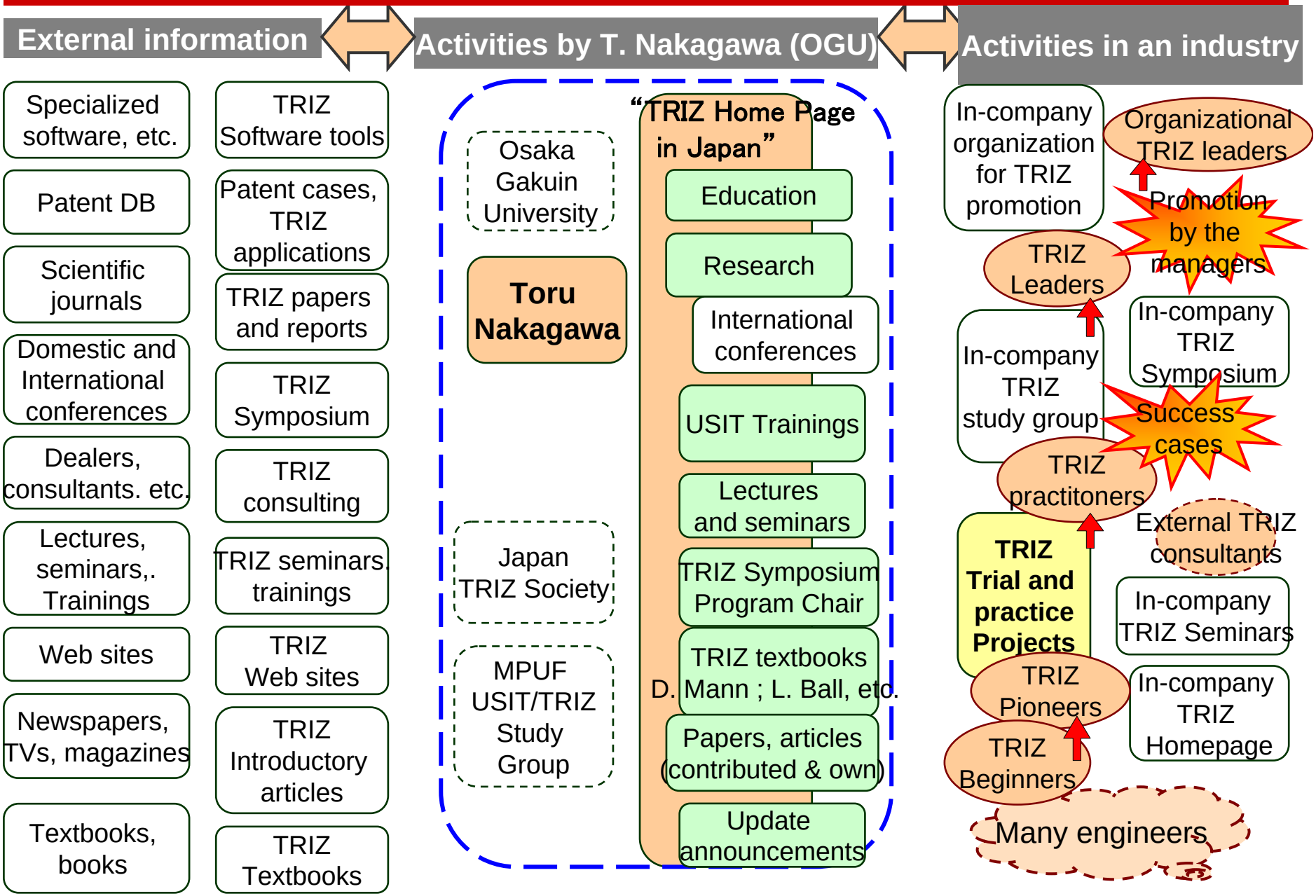
The following organizations were described in the model.

(case 1) (former) Mitsubishi Research Institute, Knowledge Creation Department
(case 2) SANNO Institute of Management
(case 3) (former) Nikkei BP, “Nikkei Mechanical' Journal
(case 4) Japan VE Society Kansai Branch, TRIZ Usage & Spreading Study Group
(case 5) (former) Prof. Y. Hatamura’s group at The University of Tokyo
(case 6) Osaka Gakuin University, Prof. Toru Nakagawa
(case 7) IDEA Co.
(case 8) Japan TRIZ Society

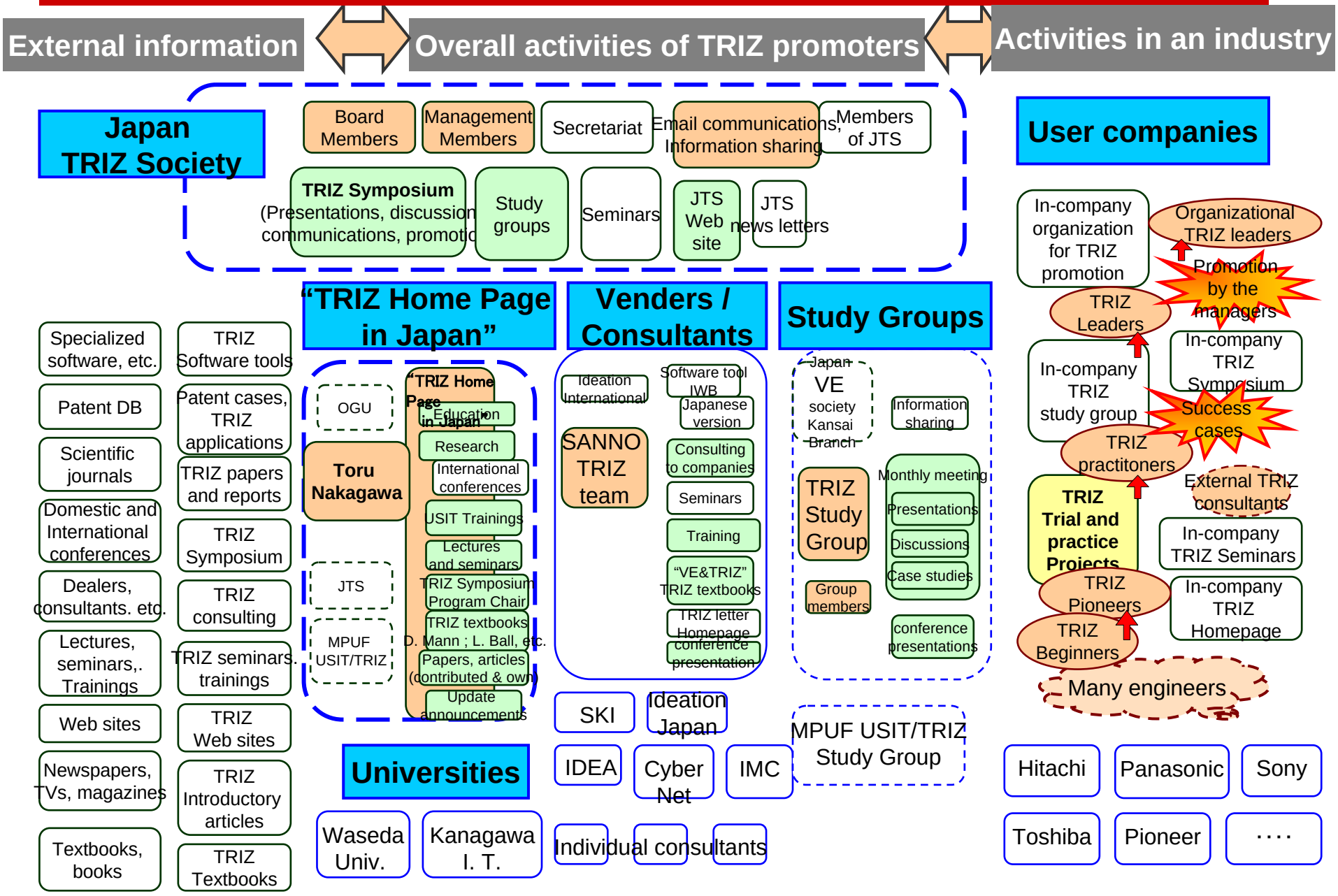
The Model describing (case 6) is shown in the next slide as an example.
The central part of model A-7 is replaced with the activities of the organization.

Next we should think how to organize the ‘external information’
by some cooperative activities in the TRIZ community in Japan.

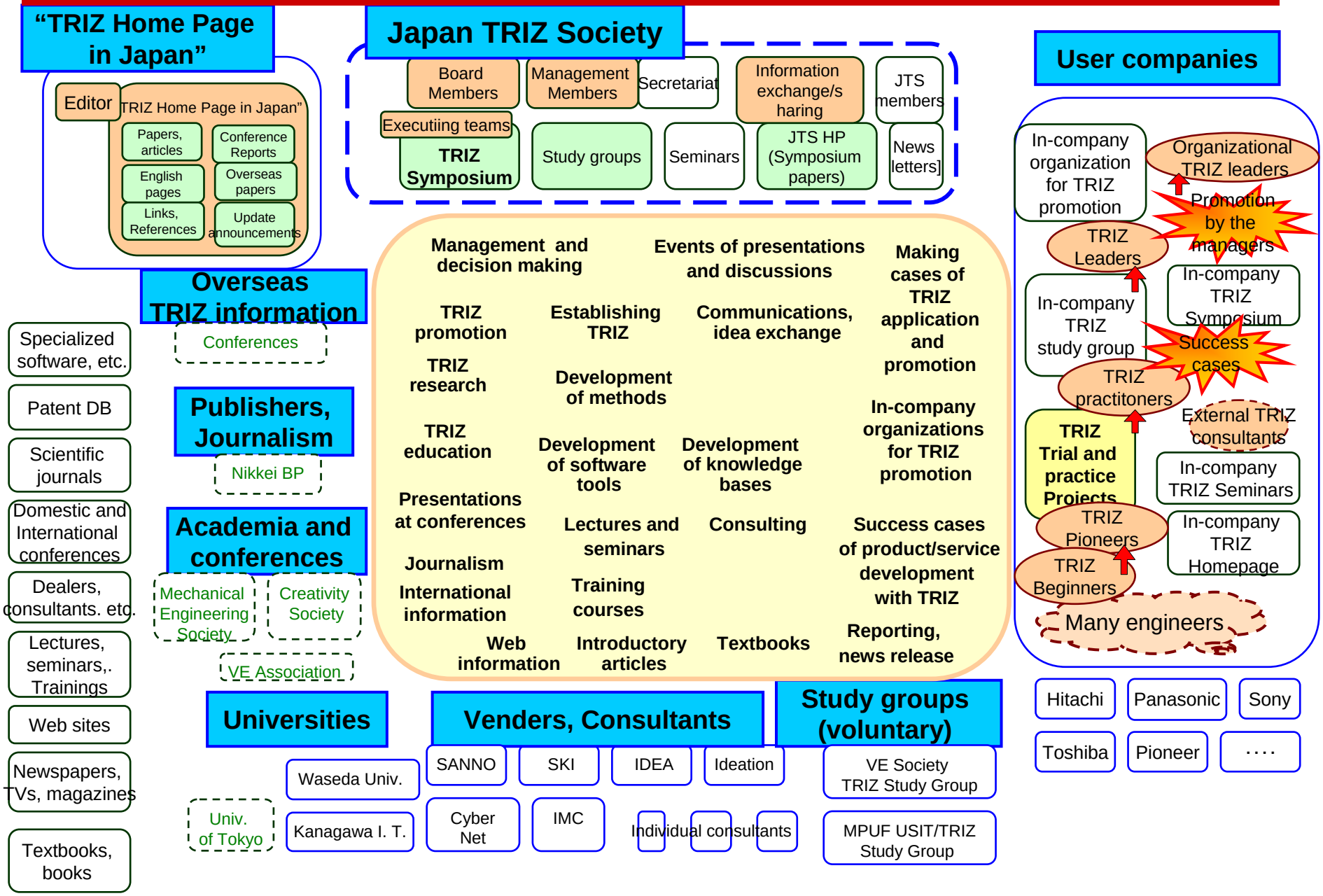
# [B-1] Model of activities of TRIZ promoters (Case 6) T. Nakagawa (OGU)



# [B-2] Model of overall activities of TRIZ promoters in Japan (current)



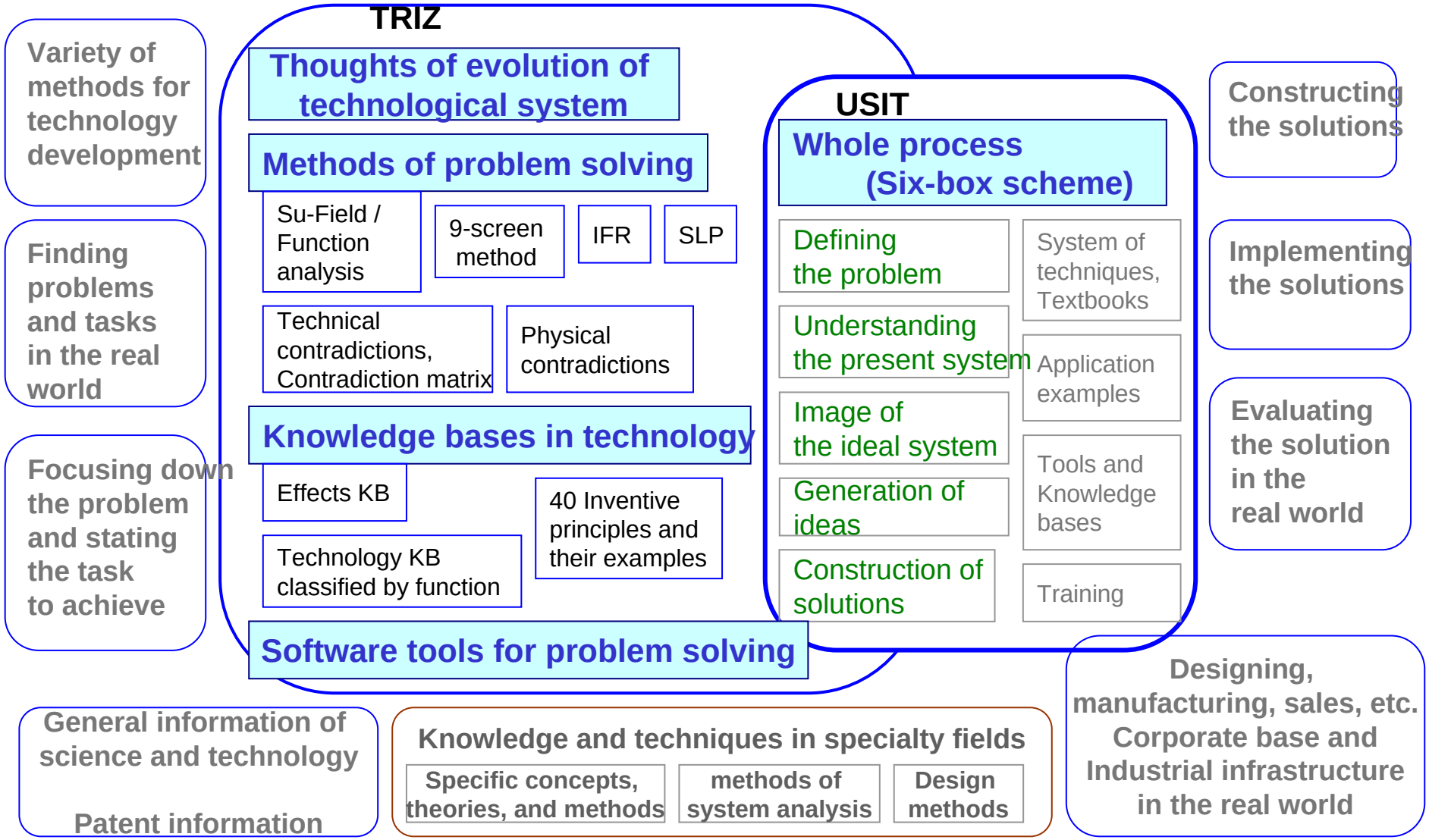
# [B-2] Model of overall activities of TRIZ promoters in Japan (Merged)



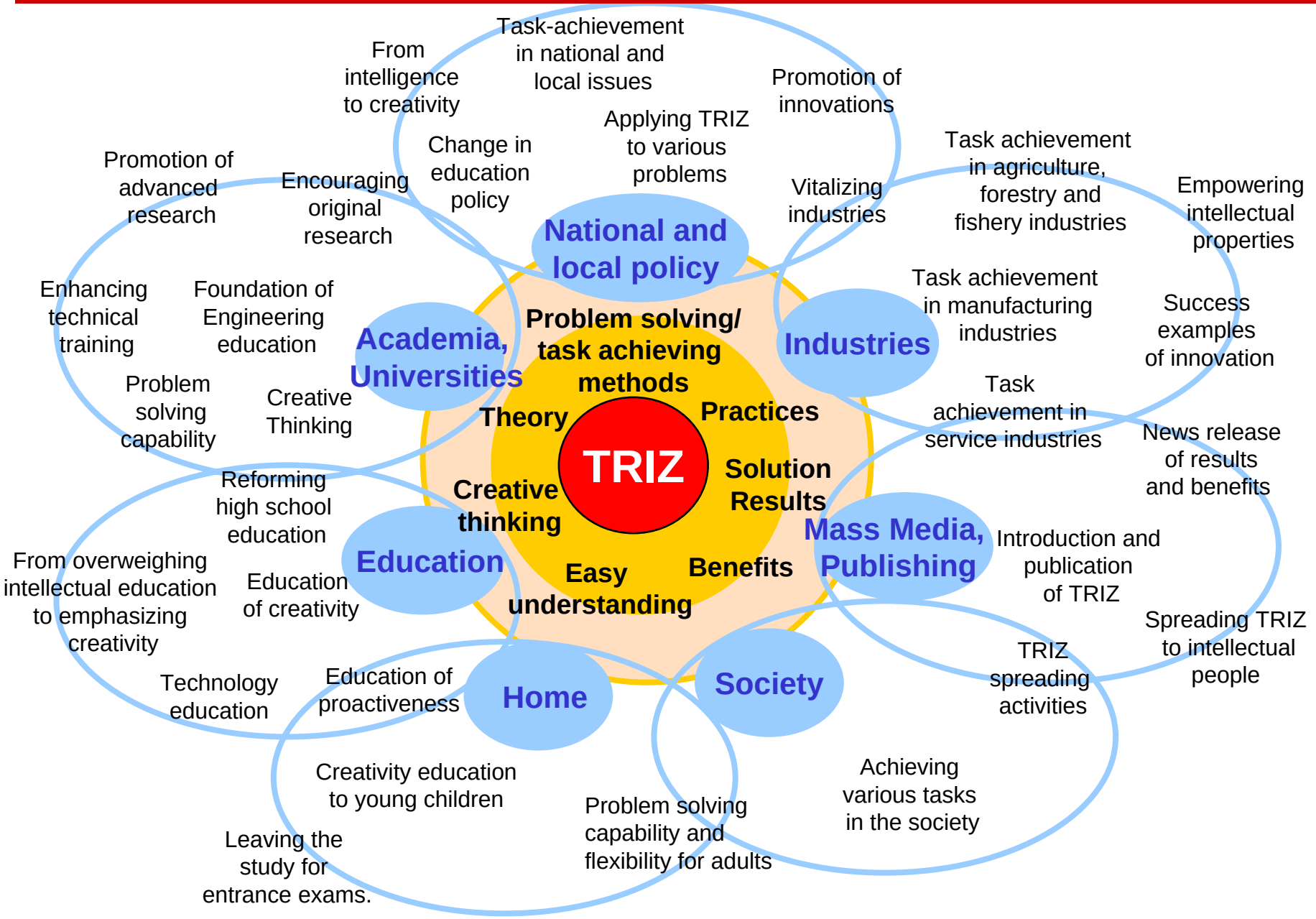
# [C] Modeling of areas for TRIZ application and penetration

## [C-1] System of TRIZ (and USIT) methodology (present)

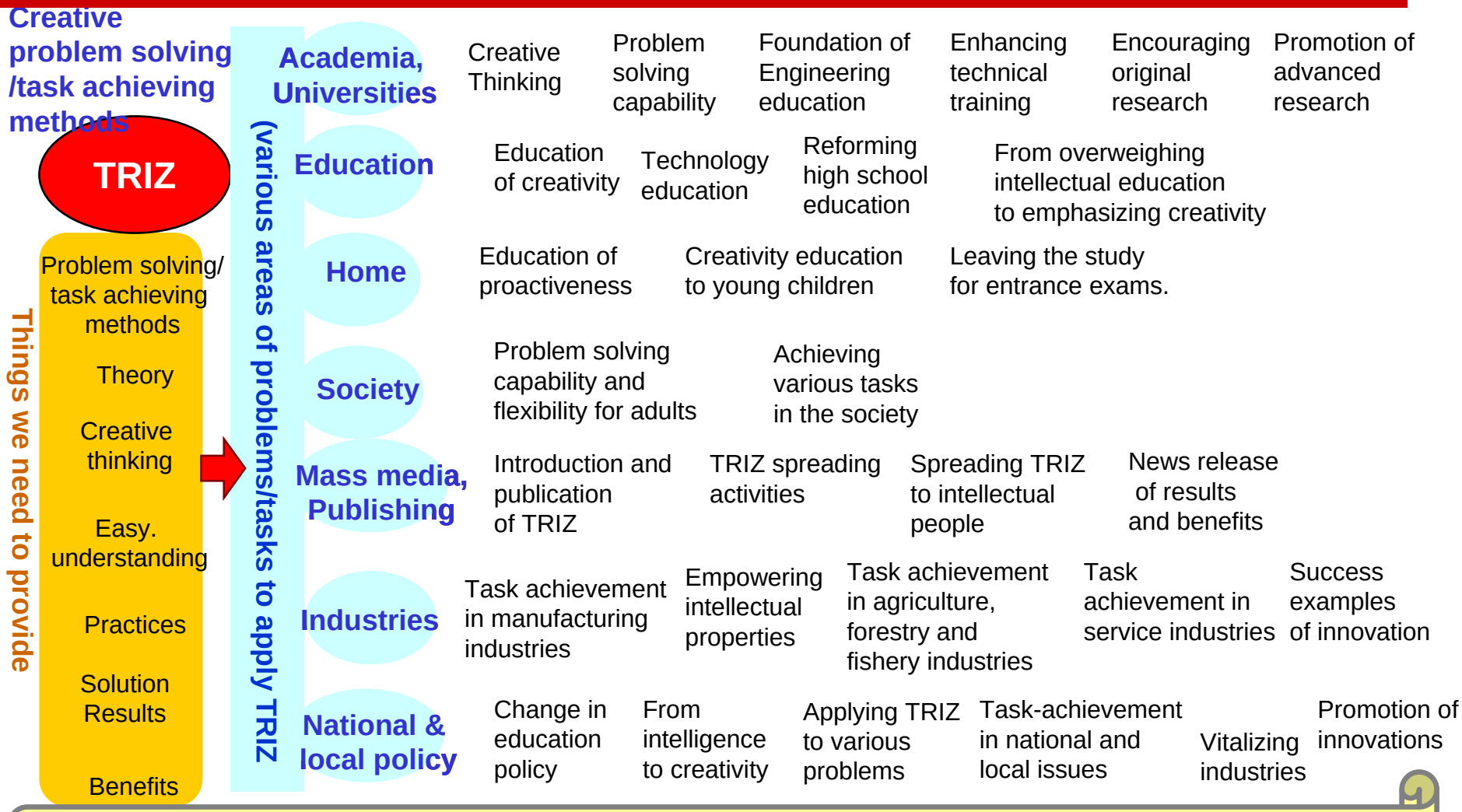
Presented at MPUF USIT/TRIZ Study Group (2012)



# [C-2] Model of areas for TRIZ application and penetration



# [C-3] Model of areas for TRIZ application ➔ Our new general target



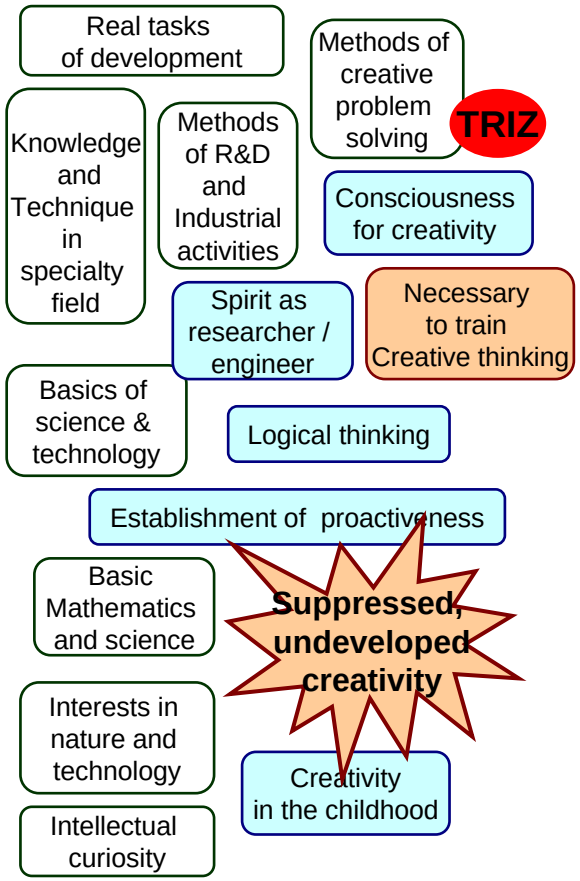

**General Target (Task Requirement):**

**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 world)".**

# [D] Models of tasks to achieve the goal (in TRIZ itself and in its activities).

**process: From the models we built so far, the parts relevant to the tasks are collected:**

## [A-4] Base of mastering




## [A-6] External information


## [B-2] Necessary activities


## [C2] Areas of application

# [D-1] Model of establishing & promoting TRIZ and their results (working)

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

**Creative problem solving /task achieving methods**

Things we need to provide

- Problem solving/ task achieving methods
- Theory
- Creative thinking
- Easy. understanding
- Practices
- Solution Results
- Benefits

### Establishing TRIZ

TRIZ research | Method development | Software tools development | Knowledge base development

presentation at conferences | Meetings for presentation & discussion | Meetings for communication | International conferences | research information

### Real application of TRIZ

Application experiences | In-company promotion | Success Cases | In-company Promotion organization | Consulting

### Education and spreading of TRIZ

Introductory articles | Web information | Lectures, seminars | Trainings | Journalism | Textbooks

### Reporting results of TRIZ

Public reporting

### TRIZ promotion

Strategy | Management, meetings

**Necessary Outputs**

- TRIZ Software tools
- TRIZ Symposium
- TRIZ Consulting
- TRIZ lectures, seminars, trainings
- TRIZ education
- TRIZ Web sites Introductory articles
- TRIZ Textbooks

Note: The 5 main tasks described in the center are mutually related. Such relationship should be expressed in a better way. ( ) is the items relevant to TRIZ itself..

# [D-2] Model of activities for achieving the 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

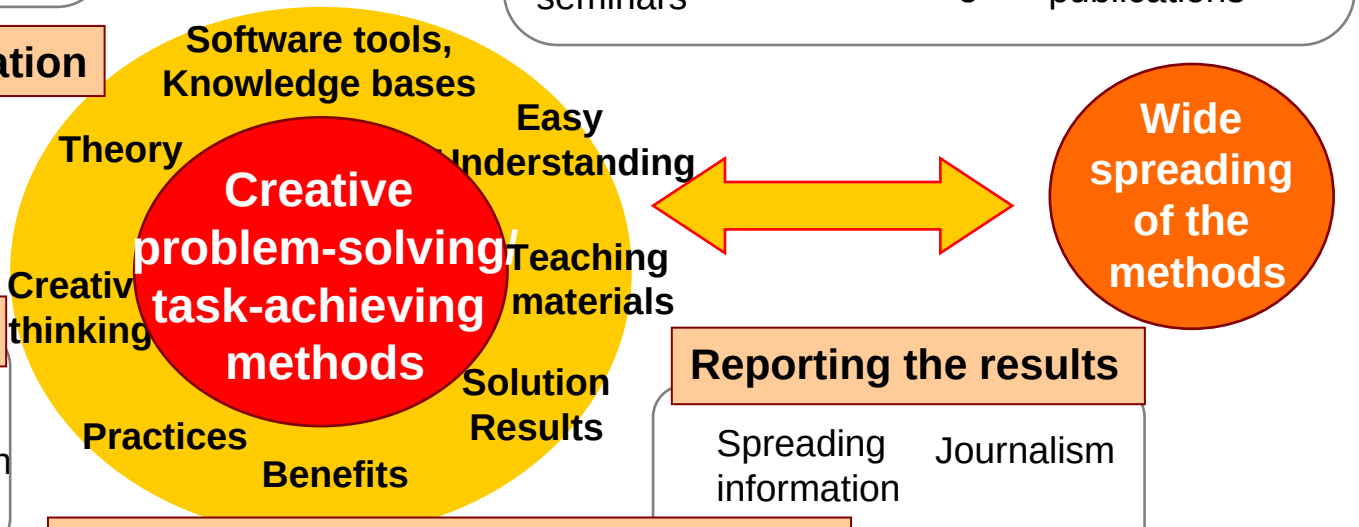
[Japan TRIZ society]

## 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

# [D-3] Model 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

# [D-4] Model 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

### Finding the problem

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

### 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

### Imaging ideals & visions

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

### Generating ideas

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

### Constructing solutions

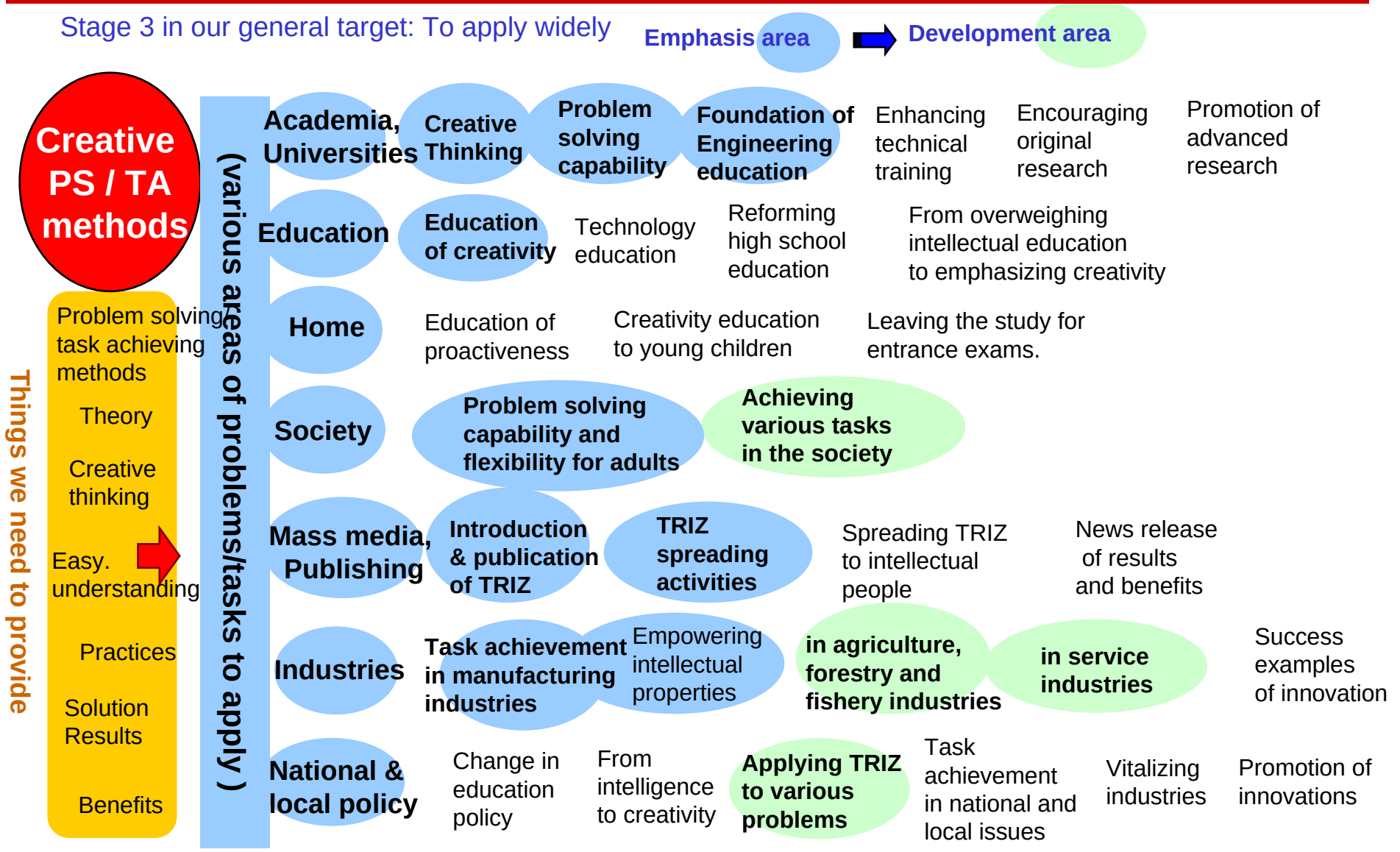
- Extending the ideas
- Improving solutions with the ideas
- Designing new solutions
- Introducing good ideas in different countries and fields
- Solving secondary problems
- Identifying and evaluating excellent solutions

- 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

# [D-5] Model 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. .**

# Conclusion

1. For finding and understanding the non-technology problem in complex situations, **a method of building models viewed from multiple perspectives** is demonstrated.
   -- Each model illustrates the problem system from a different perspective.
2. Multiple models are found useful for understanding the problem from different perspectives, considering the present system and ideal system, and thinking of solution directions

3. Throughout the presentation, a problem is illustrated as an example: **"What should we do to penetrate TRIZ into younger people?"**
4. The key to the penetration is reconfirmed to be **"the method should be easy to understand and effective to apply depending on the user and the application field".**
5. We obtained the statement of **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 world)".**
6. We also obtained the directions of activities toward this target.