

TRIZ as the Way of Life?

1. Preface: TRIZ as the Way of Life?	02
2. Facts, Life and the Way of Life	03–05
3. The Ideal Way of Life	06–09
4. The Ideal Final Way of Life	10–13
5. Conclusion	14
References	15
Appendices	16–27

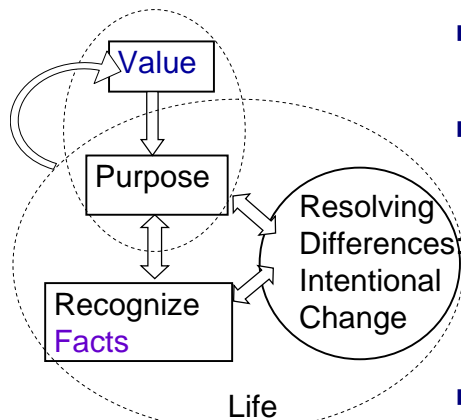
TAKAHARA Toshio 2009.09.11

1. Preface: TRIZ as the Way of Life?

- Is TRIZ a method of technology?
- Is TRIZ a method of change?
- **TRIZ could be an unified thought and method applicable to every action in every area.** (→ p.9)
- Reconsider **the way of life** based on Nakagawa's **Essence of TRIZ in 50 Words** [7]:
 “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.”

2 Facts, Life and the Way of Life

2.1 The Way of Life and Facts



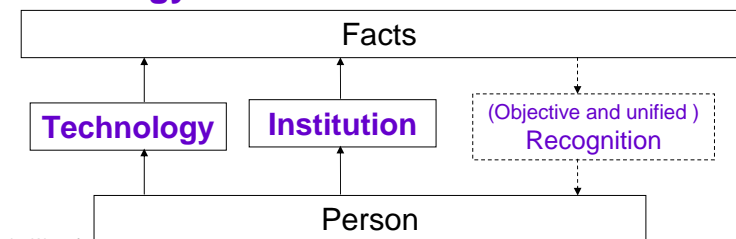
- **The way of life is thought and method for life.**
- **To live is to use, manage and change facts including myself.**
Elements of fact: Matter, Mind, Relation (movement)
- **Facts**= Real movement of Matter and Mind + history

Technology and Institution^[6] make facts

Matter and its movements
 → **Technology**

Mind and its movements (including religion, sense of value): Common Idea
 → **Institution**
 e.g. Politics, Economy, Family, Company

- Intentional change (Resolving Differences) via **Technology and Institution**



2.2 Object, Granularity^{[3][4]}

- Kinds of **Objects** which is something to be recognized as fact
 1. **Matter** : System Object
 2. **“Idea”** : System Object
 21. Information of individual or common notion which is taken by physical entity
 22. My idea
 3. **Movement** or Action : Process Object
- **Granularity**= Size, magnitude or scope in space and/ or time
- **Density**= Density of inner structure, Degree of abstraction
- **Function**= (primarily) Meaning of Process Object, (secondly) Meaning of attributes of Object
- **Structure**= Granularity and inner structure

3. The Ideal Way of Life 3.1 Exhaustiveness, Granularity of Object, Dialectics 1

- To use, manage and change facts correctly, we need
- **a. Structural Exhaustiveness** of Object
 - (in advance) Types of **Objects**, Types of Objects change, etc.
 - (according to each situation) Candidates of solution
- **b. Select Granularity of Object**
 - Recognition**: Decide Attributes (Function), **Granularity of Object** and relation between sub-Objects
 - Resolving Differences**: Decide Purposes, **Granularity of Object** and logic of changing attributes of Object or sub-Objects
- **c. Dialectics** as method:

Exhaustiveness, Granularity of Object, Dialectics 2

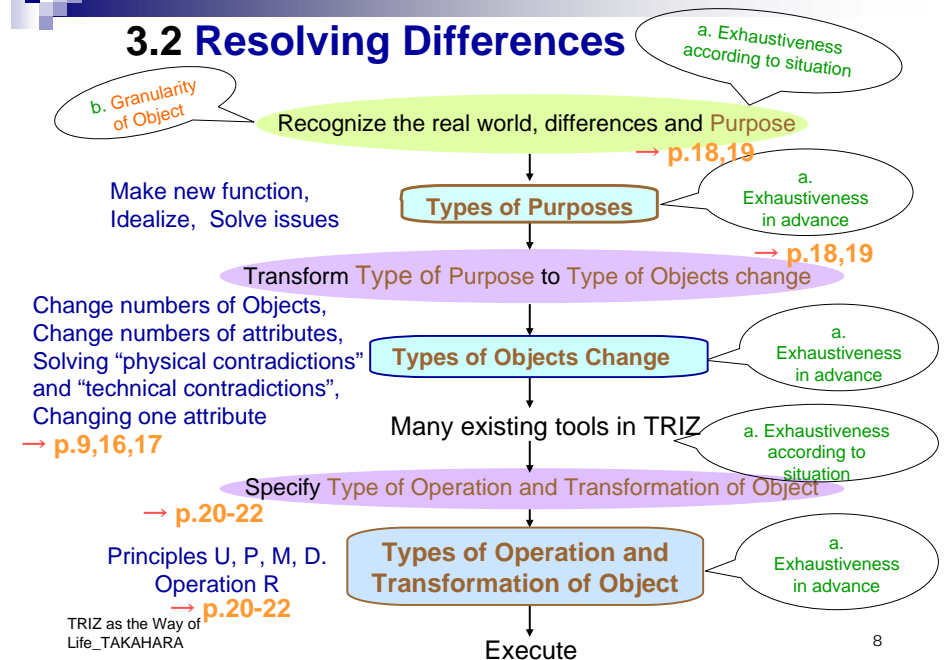
- **a. Structural Exhaustiveness** of object
- **b. Select Granularity of Object**
- **c. Dialectics** as method

Change is an assemblage of
intentional change (Resolving Differences)
unintentional change
autonomous change: contradiction

Change Objects by cause- effect relation summarizing contradiction or using knowledge of contradiction

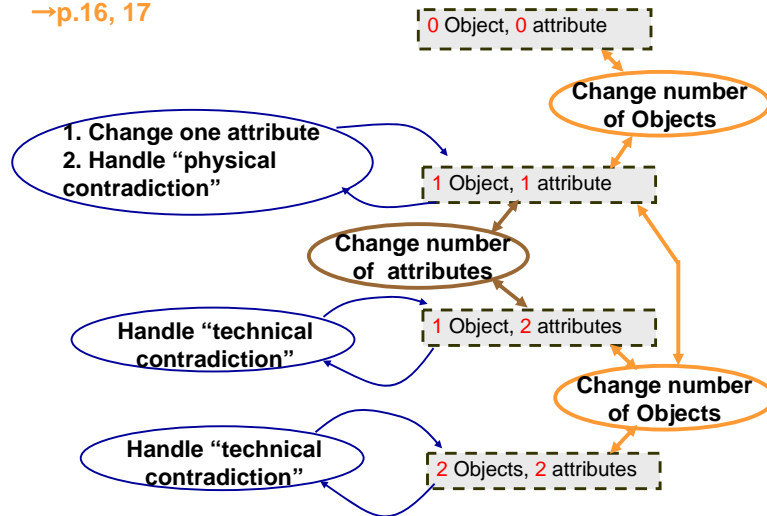
- **1. Method dealing with contradiction**; to summarize contradiction and solve “physical contradictions” and “technical contradictions”,
- **2. Use trend of results of contradictions** according to coincidence of history with logic. → p.23

3.2 Resolving Differences



Types of Objects Change (General Picture of TRIZ) [4]

→p.16, 17



4. Ideal Final Way of Life 41. Continuous Change

- No final target and no ideal state. No final target and no ideal state of the way of life. Therefore, Important things are
- Continuous effort, action or change, not result,
- Thought that bring about continuous change and
- (If possible) Method that deal with change or movement

42. Criticize Existing Idea

- Attitudes for better change are
- To continue to verify input and output,
- To accept facts including existing idea and purposes of others modestly and
- To believe in no existing idea and to continue to criticize it

43. Seek for structural exhaustiveness and complete recognition

- Seek what? We need
- To criticize exhaustiveness of types of Objects and Objects Change
- To criticize existing granularity
- To criticize existing idea. Especially dogma of religion, thought or philosophy.
e.g.: text of dialectics

44. Roots of Values

- Another contents of criticism which are to be investigated continuously are
- Objective Value (at middle granularity): **Number of Life, Love, Liberty, Zero Load on Nature**
- Subjective Value: **Modesty, Sincerity**
 - Love** is a sense of unity into history and others which consists of nature, institution and others and effort to enhance others
 - Liberty** is an ability to recognize, judge and act

5. Conclusion

- **An unified thought and method applicable to every action in every area is necessary.** TRIZ has a possibility for this. It lacks in unified method, structural exhaustiveness and viewpoint to set granularity.
- **Ideal Final Way of Life** based on facts:
 - To be modest about facts,
 - To believe in nothing, to continue to criticize existing idea and myself **objectively** and
 - To continue to enhance others and outer world **sincerely with love.**

References

- [2] Takahara Toshio: "A Method of Resolving Differences Based on the Concepts of Functions and Process Objects", The 2nd Japan TRIZ Symposium 2006. (Slide only) http://www.osaka-gu.ac.jp/php/nakagawa/TRIZ/eTRIZ/epapers/e2008Papers/eTakahara2003-2007/eTakahara10_TS2_ResolveDifference_Slide_2006.pdf
- [3] Takahara Toshio: "A Method of Resolving Differences Based on the Concepts of Functions and Process Objects: Part 2", The Third Japan TRIZ Symposium 2007. <http://www.osaka-gu.ac.jp/php/nakagawa/TRIZ/eTRIZ/epapers/e2007Papers/eTakaharaTRIZSym2007/eTakaharaTRIZSym2007-071207.html>
- [4] Takahara Toshio: "The General Picture of TRIZ From the Viewpoint of Changing Objects — A Method of Resolving Differences Based on the Concepts of Functions and Process Objects Part 3—", Japan TRIZ Symposium 2008, <http://www.osaka-gu.ac.jp/php/nakagawa/TRIZ/eTRIZ/epapers/e2009Papers/eTakaharaTRIZSym2008/eTakahara-TRIZSym2008-090708.html>
- [6] Takahara Toshio: "Application Area of Thinking Tool or Problem Solving Tool", The TRIZ journal, Jun.2003.
- [7] Nakagawa Toru: "Essence of TRIZ in 50 Words", <http://www.osaka-gu.ac.jp/php/nakagawa/TRIZ/eTRIZ/eTRIZintro.html>, <http://www.trizjournal.com/>

Types of Objects Change within Two Attributes and Objects and TRIZ 1 [4]

p.9 →	Types of Objects Change	Means to realize in TRIZ
1) Change number of Object 0/ 1, 1/ 0	11) Generate Object	Principle 24. Intermediary
	12) Delete Object	Principle 34. Discarding
2) Handling one attribute of one Object 213) One value don't change	211)221)231) Mutually exclusive conditions of two opposites of value lead to movement	"Physical Contradiction" in TRIZ: Type 1, Real movement
	212)222)232) Two opposites of value can be separated	Separation of "Physical Contradiction" in TRIZ : Type X
	223) Not qualitative change of attributes	Many Principles in TRIZ
	23) Qualitative change of attributes 233) 2331) Delete attributes	Principle 34. Discarding
3) Change number of attributes 1/ 2, 2/ 1	2332) Transformation of attribute to the other attributes	(Transformation of attribute to be studied)
	31) One attribute to two attributes 311) Add attribute	Principle 6. Universality Principle 25. Self-service, others
	312) Segmentation of attribute	Principle 1. Segmentation
	32) Two attributes to one attribute 321) Delete one of the two	Principle 2. Taking out Principle 34. Discarding
	322) Two merge into one	Principle 5. Merging

Types of Objects Change within Two Attributes and Objects and TRIZ 2 [4]

p.9 →

4) Handling two attributes of one Object	41) No change of attributes	Type Y
	42) Not qualitative change of attributes Meet two values of requirements simultaneously	"Technical Contradiction" in TRIZ: Type 2
	43) Qualitative change of two attributes to the other two attributes	(Transformation of two attribute to be studied): Expansion of "Technical Contradiction" Type 3
5) Change number of Object 1/2, 2/1	51) One to two	Principle 1. Segmentation: Type 4
	52) Two to one 521) One of the two extinguishes	Principle 34. Discarding
	522) Two merge into one	Principle 5. Merging, Delete contradiction by merging opponents: type Z
6) Handling two Objects of two Objects	Same as 4)	Same as 4) ?

TRIZ as the Way of Life_TAKAHARA

17

Processes of Type of Purpose to Type of Objects change

Recognize the real world, differences and Purpose

p.8 →

1. (If possible) **Make list that covers all the candidates** of purposes.
2. Specify the purpose.

c. Method with mutual relation (handling contradiction)

Transform Type of Purpose to Types of Objects change

3. Change attributes of Object, delete Object or generate Process Object?
4. Solve "physical contradictions" and/ or "technical contradictions"
5. Specify the **Types of Objects Change**

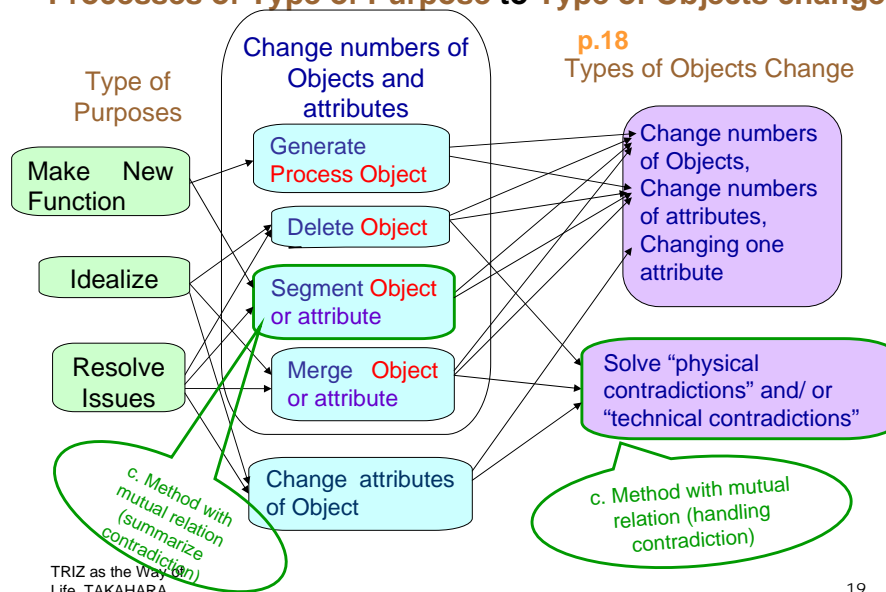
p.16,17

TRIZ as the Way of Life_TAKAHARA

18

Processes of Type of Purpose to Type of Objects change

p.18
Types of Objects Change

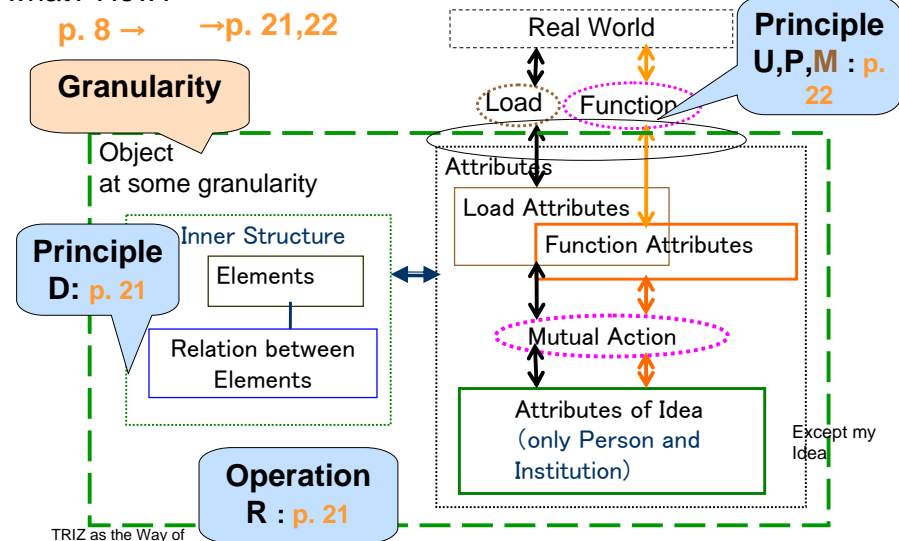


TRIZ as the Way of Life_TAKAHARA

19

Types of Operation and Transformation of Object Change what? How?

p. 8 → →p. 21,22



TRIZ as the Way of Life_TAKAHARA

20

p. 20 → **Types of Object Operation and Transformation**

Object Transformation Principle D [3] [4]: **Change of inner structure consisting of elements and the relation between them** can change plural attributes of Object, generate new Object and delete Object itself from inside.

Object Operation R [3]: We can bring in, bring out or replace Object or its element of existing single Object or Object in “Object 1- Process Object- Object 2 model” freely regardless they are existing or not.

p. 20 →



Object Transformation Principle U [3]

Object 1 and movement can change attributes of Object 2 or Object 2 itself.



Object Transformation Principle P [3]

Object 1 and Object 2 can change attributes of movement or movement itself.



Object Transformation Principle M

Object 1, Object 2 and movement continue to act each other.

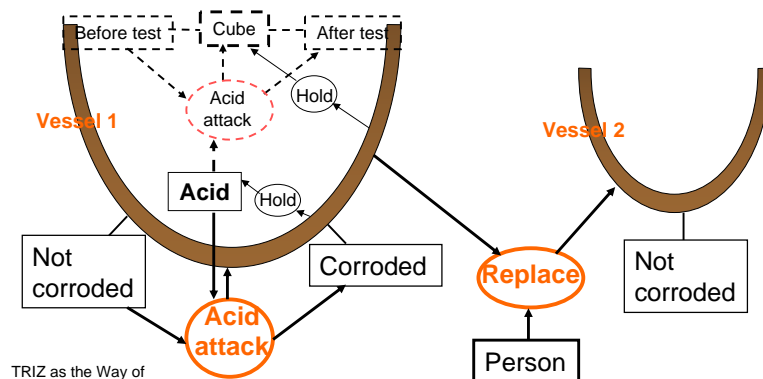
p. 7 → **Coincidence of history with logic**

- “Man’s reflections on the forms of social life, and consequently, also, his scientific analysis of those forms, take a course directly opposite to that of their actual historical development. He begins, *post festum*, with the results of the process of development ready to hand before him.” (Marx, “Capital”, Vol,1, Chap.1, Sec. 4), <http://www.marxists.org/archive/marx/works/1867-c1/ch01.htm#S4>
- “The transcendence of self-estrangement follows the same course as self-estrangement.” (Marx, “Economic and Philosophical Manuscripts of 1844”), <http://www.marxists.org/archive/marx/works/1844/manuscripts/comm.htm>
- “In logic, the history of thought must, by and large, coincide with the laws of thinking.” (Lenin, “Plan of Hegel’s Dialectics (Logic)” <http://www.marxists.org/archive/lenin/works/1915/misc/01.htm> (Other important Concept) **Contents and form, Objectivity and unification**

p. 8 →

Example: Acid attack-1 [2][3]

Cubes are placed in acid to investigate the effect of various acids on the cubes. The vessel that holds the acid and cube is corroded. Because the acid is so reactive, the vessel must be replaced frequently. Reduce the cost of replacing the vessel.



Example: Acid attack-2 [2][3]

System Objects: Cubes, Acid, Vessel (Attribute: cost, its value: C)

Process Object:

Test of Cubes (Attribute: operating time, its value: t),

Corrode Vessel (Attribute: operating time, its value: t), (Attribute: rate of corrosion, its value: replace n times in t)

Replace Vessel (Attribute: cost of vessel, its value: C), (Attribute: cost of work of replace, its value: Cr)

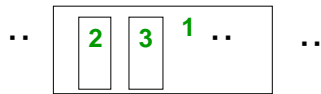
Enumerate candidates of purposes

Examples of purposes are to

Minimize cost of replacement per unit time $(C + Cr) n / t$: **1**

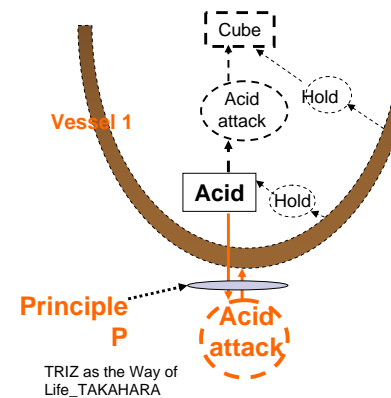
Eliminate Process Object that acid corrodes vessel: **2**

Eliminate Process Object to replace vessel: **3**



Example: Acid attack-3 [2][3]

Example of solution **2**: If we eliminated vessel to eliminate corroding vessel by acid using Principle P, we could not execute test of cube because of a side effect that vessel lost the function to hold acid and cube.



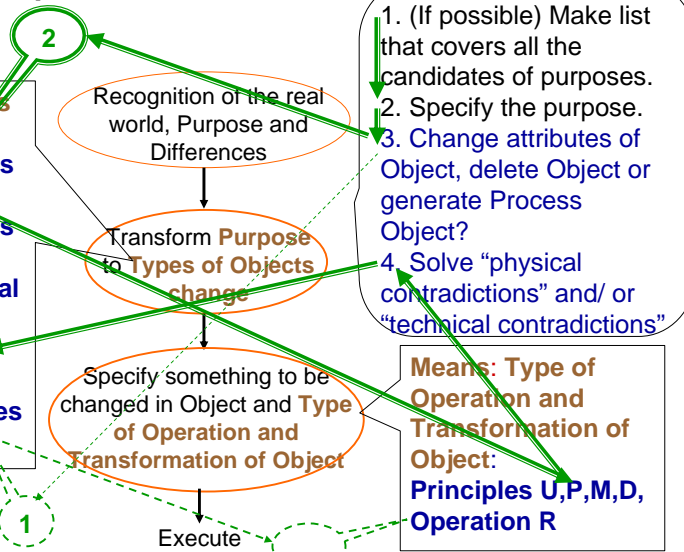
Solve the technical contradiction at various granularity.

1. Test of cube vs eliminating vessel
2. Holding cube and acid vs eliminating vessel
3. Contact of acid and cube vs eliminating vessel
- (4. Contact of acid and cube vs no contact of acid and vessel)
- (5. Acid corrode cube vs acid not corrode vessel)

Example: Acid attack-4 [2][3]

Types of Objects Change:
Change numbers of Objects,
Change numbers of attributes,
Solving "physical contradictions" and "technical contradictions",
Change attributes simply

p9, 16-19



1. (If possible) Make list that covers all the candidates of purposes.
2. Specify the purpose.
3. Change attributes of Object, delete Object or generate Process Object?
4. Solve "physical contradictions" and/ or "technical contradictions"

Means: Type of Operation and Transformation of Object:
Principles U,P,M,D,
Operation R

p.20,22