A Method of Resolving Differences Based on the Concepts of Function and Process Object

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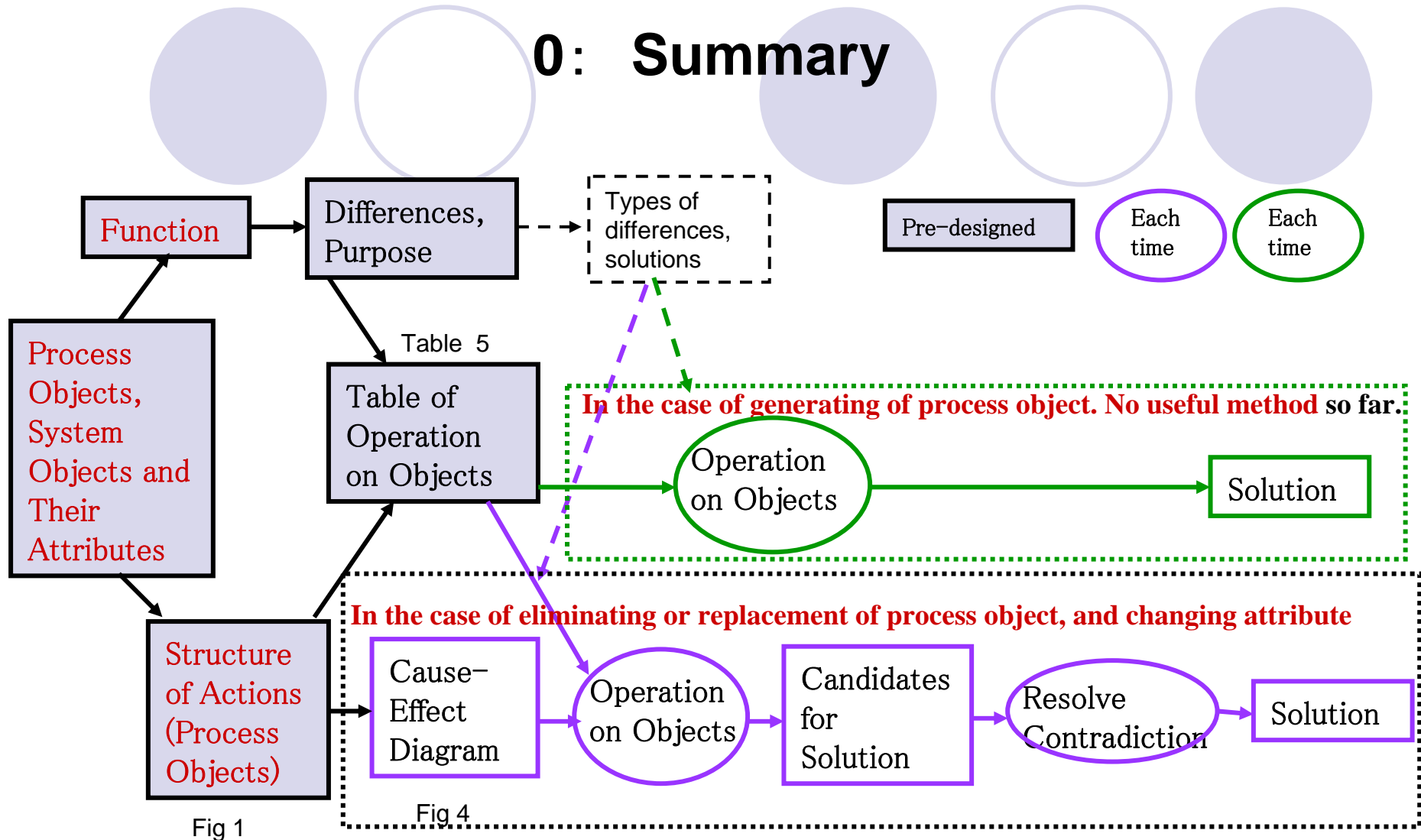# 0：Introduction

Premises：1. **Objects**: **Everything to be recognized**.（**Definition**）

2. **Operation on Objects**: **Cover All Types of Operation** **(Fig.1)**

Strong Points：A Methods That Differences Itself Shows the Way to Resolve Differences

Weak Points：Needs to Redefine "Objects", "Function", "Attributes", "Technical Contradiction", "Physical Contradiction", "Opposites", "The law of the mutual transformation of quantitative and qualitative changes"

0： **Summary**

Function → Differences, Purpose ⇢ Types of differences, solutions

Pre-designed | Each time | Each time

Process Objects, System Objects and Their Attributes → Function

Table 5

Process Objects, System Objects and Their Attributes → Table of Operation on Objects

In the case of generating of process object. No useful method so far.

Table of Operation on Objects → Operation on Objects → Solution

Structure of Actions (Process Objects)

In the case of eliminating or replacement of process object, and changing attribute

Cause-Effect Diagram → Operation on Objects → Candidates for Solution → Resolve Contradiction → Solution

Fig 1

Fig 4

1.Preparation： **Object**, **Granularity**

Object＝ Something to be recognized

1. **Matter (Being)**：System Object
2. **"Idea" (Being)**：System Object
 21. Information of individual or common notion which is born by physical entity
e.g.: Information on document
 22. My idea

3. **Action**：Process Object

Granularity＝Scope or Sphere in space and time , Degree of abstraction

1.Preparation： **Attribute，Function**

1. Attribute is a concrete description of object.

Attribute (not easy to change) and State (easy to change) of upper level object＝ Total Attribute, Total State＋Structure of lower level object (Object of lower level, its number, its structure)

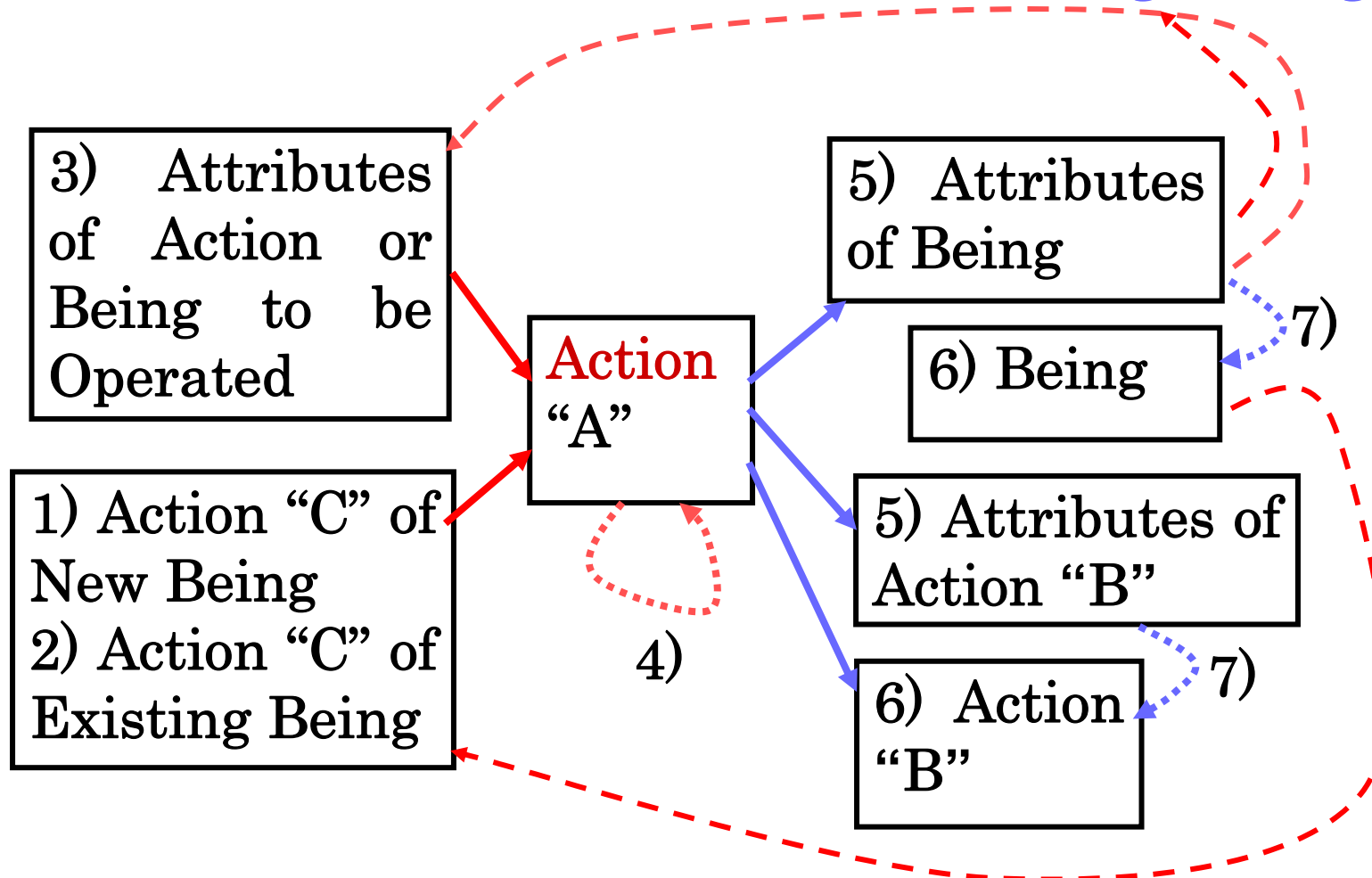## 2. Function

Fundamental Function ＝positive meaning of process object

Subsidiary Function ＝positive meaning of attribute of object

1.Preparation：**Fig-1** The Model of Structure of Action (Process Objects)

（**Can convert into the Table of Operation on Objects：Table-5**, **Can take a concrete form of Cause-Effects Diagram：Fig-4**）

3) Attributes of Action or Being to be Operated

1) Action "C" of New Being
2) Action "C" of Existing Being

Action "A"

4)

5) Attributes of Being

6) Being

7)

5) Attributes of Action "B"

6) Action "B"

7)

1.Preparation：**Structure of Action**

b) Anything that Could Cause Action

 1)2) The Action of External Being. 3) Attributes or States of Being or Action Themselves to be Operated.: Causal Relation
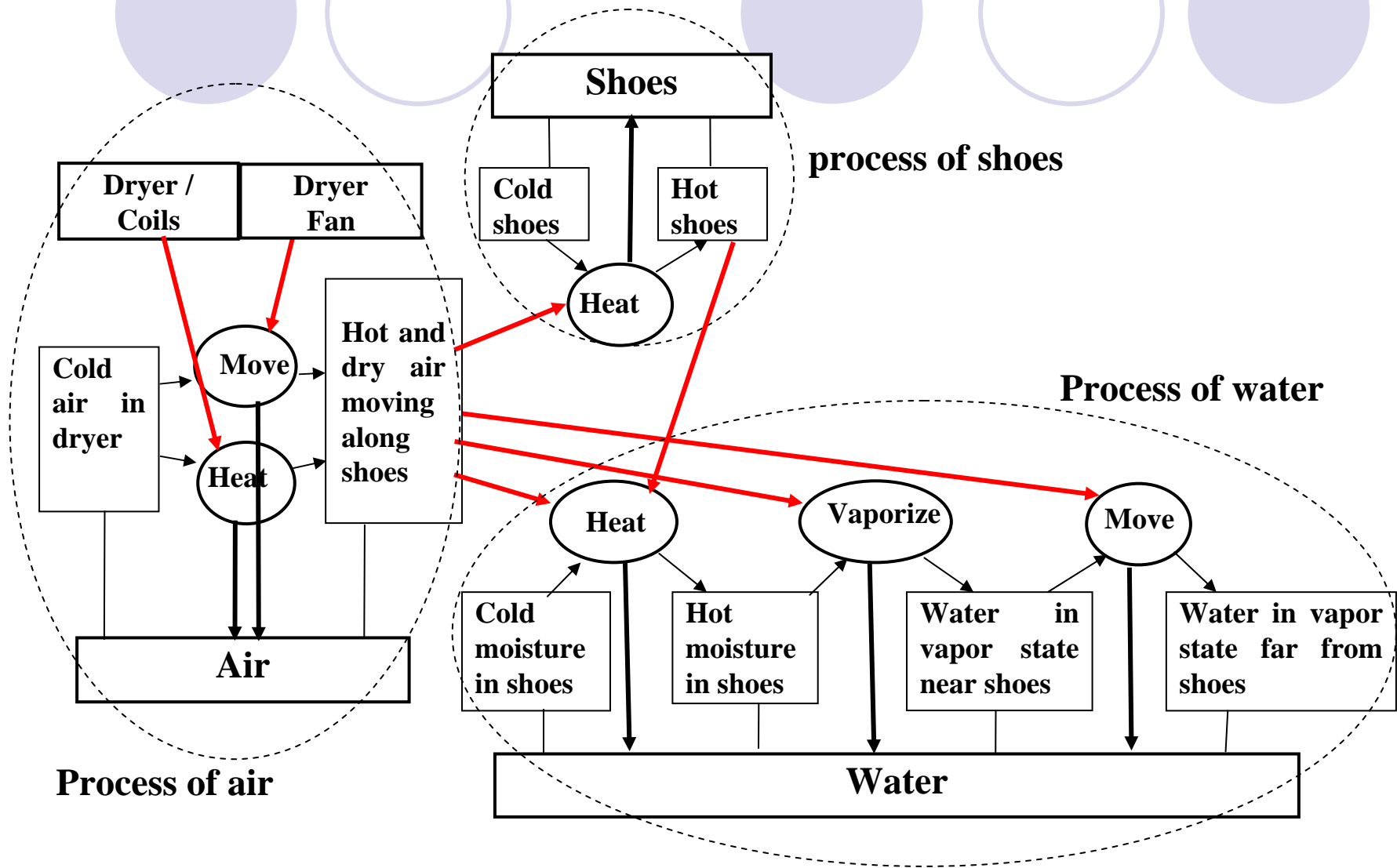
 4) Autonomous Change of Action Itself.: Dialectical Relation

a) Effects of Operation of Action

 5) Change of Attributes or States of Being or Action. 6) Change of Action Itself: Causal Relation
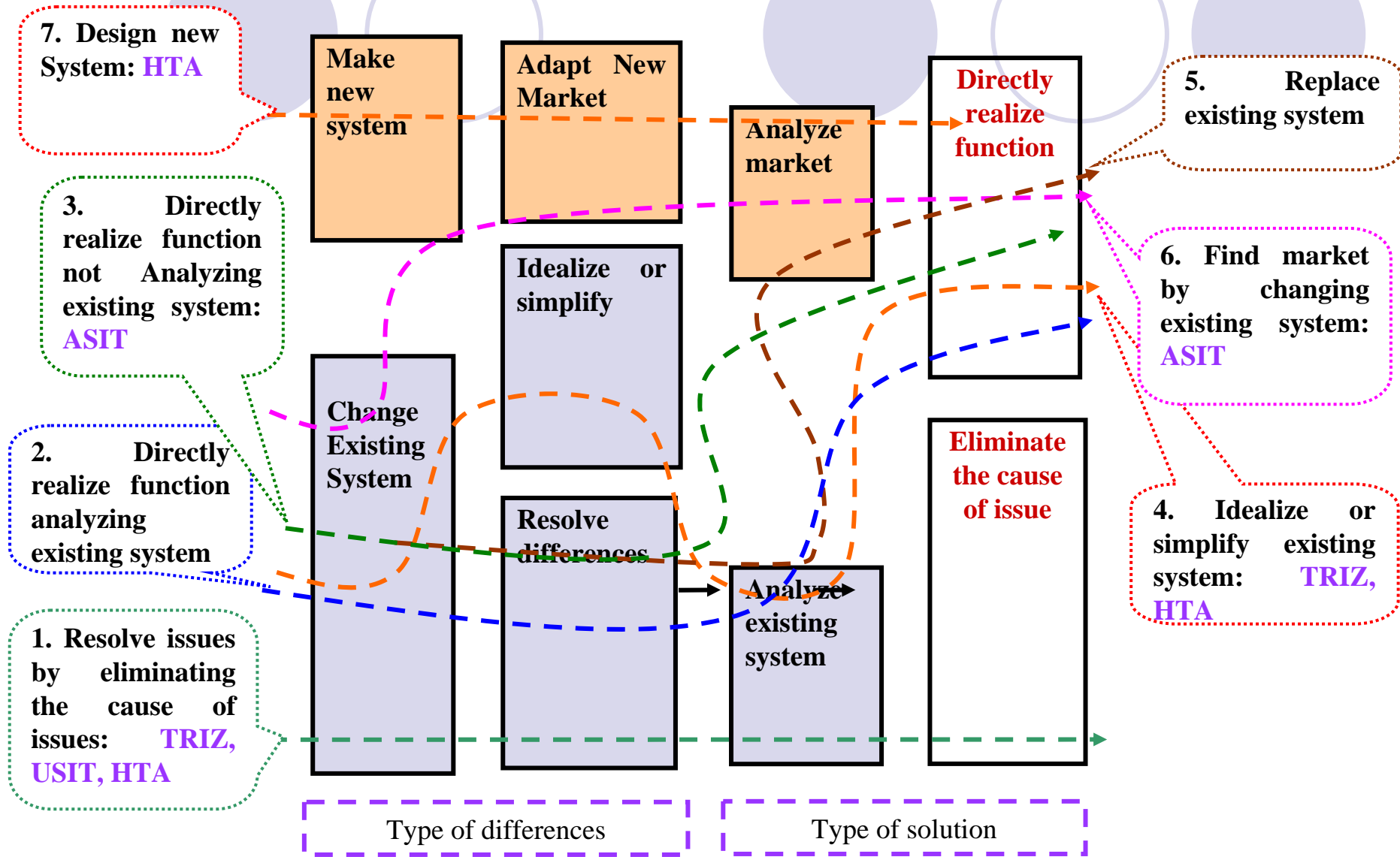
 7) Change of Being or Action is Caused by the Change of Attributes of Being or Action. : Dialectical Relation

Example : Cause-Effect Diagram of Shoes Dryer (HTA, p.D4）

7. Design new System: HTA

3. Directly realize function not Analyzing existing system: ASIT

2. Directly realize function analyzing existing system

1. Resolve issues by eliminating the cause of issues: TRIZ, USIT, HTA

Make new system

Adapt New Market

Analyze market

Directly realize function

5. Replace existing system

Idealize or simplify

6. Find market by changing existing system: ASIT

Change Existing System

Resolve differences

Analyze existing system

Eliminate the cause of issue

4. Idealize or simplify existing system: TRIZ, HTA

Type of differences

Type of solution

2：Purpose of resolving differences

Purpose of resolving differences	Generate or eliminate process object	Change attribute
Make new system — Generate process object	Purpose	
Change existing system — Generate or replace process object	Purpose	
Change existing system — Eliminate process object	Purpose	Purpose
Change existing system — Change attribute		Purpose

Making a system object cannot be a purpose.
If you want a smaller parameter value, eliminating the process object is also a candidate for purpose.

2： Purpose of resolving differences and its method

	Purpose of resolving differences	Directly realize function	Eliminate the cause of issue
Make new system	Generate process object	Possible [Note1]	
Change existing system	Generate process object	Possible [Note1]	
	Eliminate or replace process object	Possible	Possible [Note2]
	Change attribute	Possible in some case	Possible

[Note1]: No suitable method in the context of this article so far.

[Note2]: See example.

2: Table-5 Table of operation on object

Generate, Eliminate, Change

| Generate or eliminate process object						
Generate or eliminate process object	from outside	✕	—	—	By action of newly bringing in system object
		✕	✕	✕	By action of existing system object
		✕	✕	✕	My behavior
	setting condition **by operated objects**	✕	✕	—	Bring operated object into the field
		✕	✕	—	Set inner state of operated objects
		✕	✕	—	Set the condition of process objects
	by changing attribute of **process object itself**	✕	✕	✕	Total attribute
		✕	✕	✕	Number of elements
		✕	✕	✕	Structure
		✕	✕	✕	Elements of structure
Change attribute	Change attribute	—	—	✕	Total attribute
		—	—	✕	Number of elements
		—	—	✕	Structure
		—	—	✕	Elements of structure

Example : the container corroded (in TRIZ)

Cubes are placed in warm acid to investigate the effect of various acids on the cubes. Unfortunately, the container that holds the acid and cubes is corroded. The container is made from a gold and is very expensive to replace. Because the acid is so reactive and the test is performed often, the pan must be replaced frequently. This operation is very expensive and we would like to reduce the cost of replacing the container.

Example :Fig-4 Cause-Effect Diagram of corrosion（HTA，p.G6,H6）
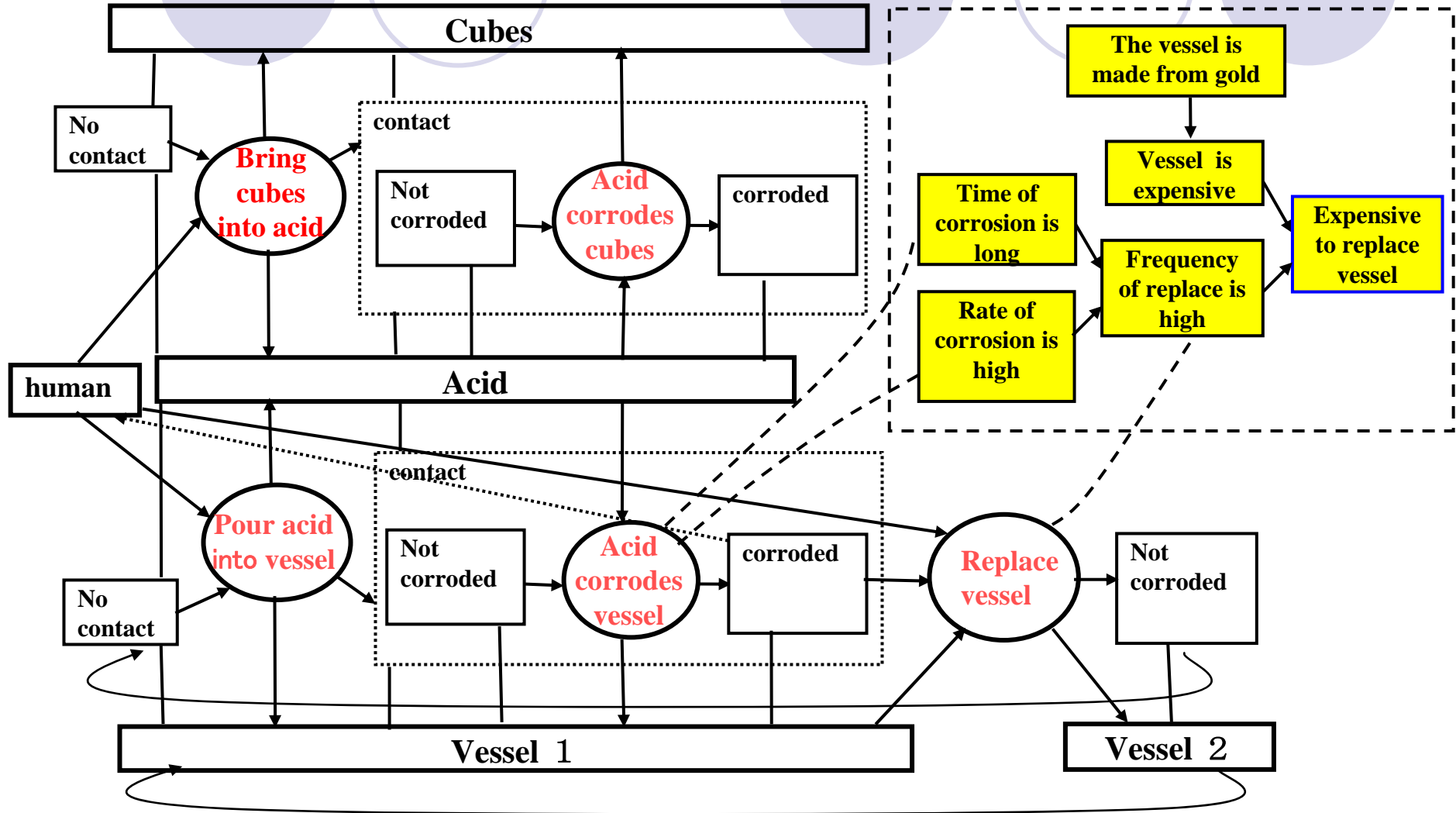
Example： Objects and purpose of example

System Objects：

Cubes ， Acid

Vessel（Attribute：cost, its value：C）

Process Object：

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

Vessel Corrosion（State：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,

State：It takes time to replace vessel, its value：tr ）

Purpose：

(Minimize cost of replacement per unit time $nC / (t + ntr)$ ） or

Eliminate process object that acid corrodes vessel

Example : Object operation and resolving contradiction
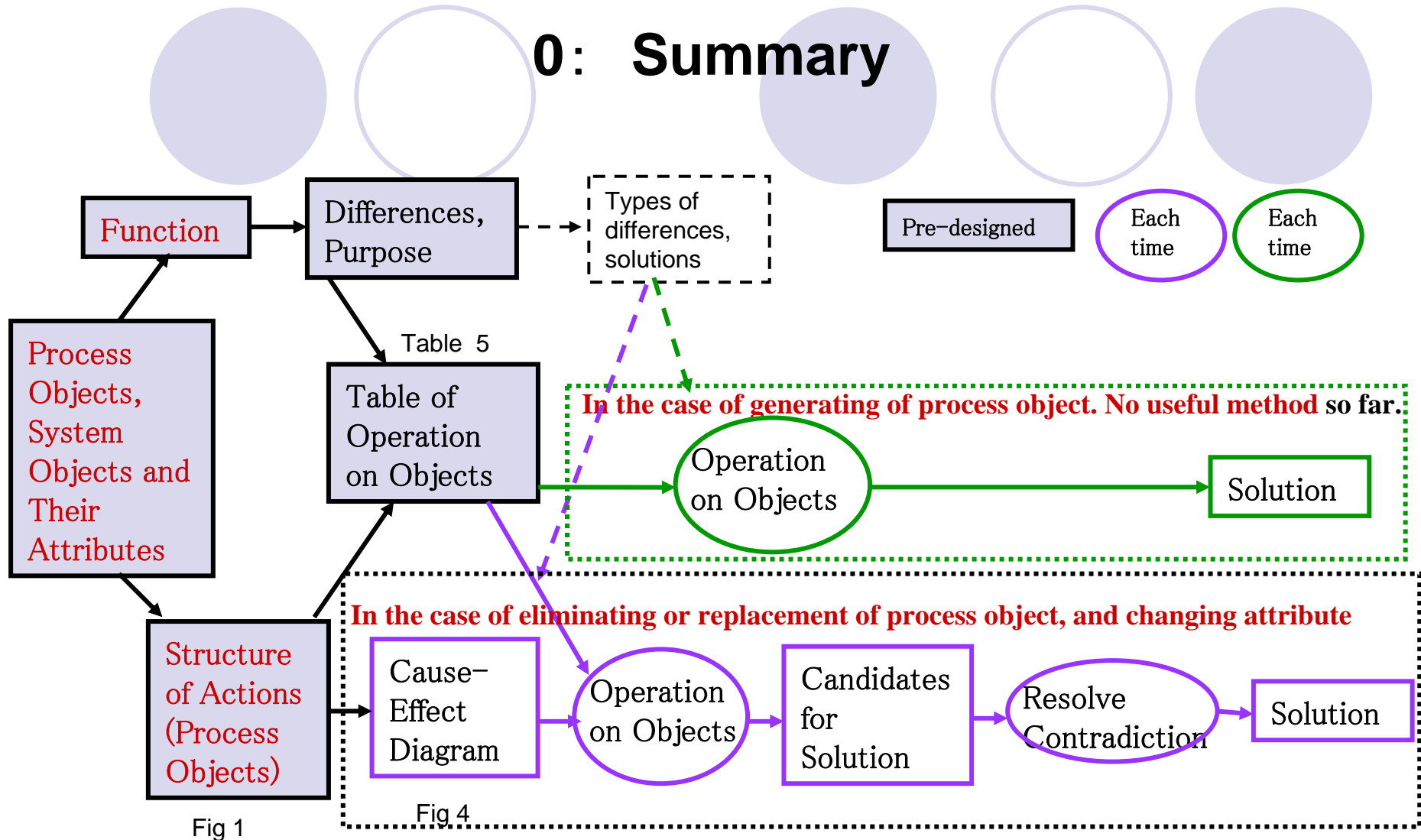
Apply Table of Operation on Object to Cause-Effect Diagram
3) Eliminate relation between acid and vessel that keep them contact,
4) Eliminate process object pouring acid to vessel,
5) Eliminate system object of acid or that of vessel,

In the step of 4), "opposites" of the fully formed contradiction is
" not to pour acid into vessel not to make contact each other" and
" to pour acid into cubes to make acid contact with cubes". The
solution is " to pour acid into cubes not to make contact with vessel".

In the step of 5), "opposites" of the fully formed contradiction is "to
eliminate acid or vessel not to make contact each other" and "not to
eliminate acid and container to keep in acid". The solution is "to
eliminate vessel and make cubes to keep in acid".

0： **Summary**

Function

Process Objects, System Objects and Their Attributes

Differences, Purpose

Types of differences, solutions

Pre-designed

Each time

Each time

Table 5

Table of Operation on Objects

In the case of generating of process object. No useful method so far.

Operation on Objects

Solution

Structure of Actions (Process Objects)

In the case of eliminating or replacement of process object, and changing attribute

Cause-Effect Diagram

Operation on Objects

Candidates for Solution

Resolve Contradiction

Solution

Fig 4

Fig 1

3： Covering area of "Hierarchical TRIZ Algorithms"

7. Design new system

Make new system

Adapt New Market

Analyze market

Directly realize function

Change attributes

System object

Generate process objects

4. Idealize or simplify existing system

Idealize or simplify

Change Existing System

Resolve differences

Analyze existing system

Eliminate the cause of issue

Change attributes

Generate process objects

Eliminate process objects

System object

Change process objects

1. Resolve issues by eliminating the cause of issues

Type of differences

Type of solution

３： How to use "Hierarchical TRIZ Algorithms"

1．Use this book totally and systematically as a TRIZ methodology in each area.

2．Use a part of this book as a database, such as
Chap. I "Resolve Resulting Contradictions" including Contradiction Table and Table of Field
Chap. K "Appendix: Idealizing Functions"
Chap. L "Appendix: Table of Knobs"