

The 10th TRIZ symposium

How to Lead Beginners to TRIZ in the Place of Practice?

2014/9/12

Shigeru Hisanaga
Professional Engineer
(Mechanical Area)
DENSO CORPORATION





Establishment December 16, 1949

Capital 187.4 billion yen

Sales	Consolidated	4,095,900,000,000 yen
	Single	2,490,800,000,000 yen

Current profit	Consolidated	419.6 billion yen
	Single	299.3 billion yen

Number of employees	Consolidated	139,842 people
	Single	38,581 people

Number of consolidated subsidiaries 185
(Japan62, North America26, Europe35, Australian/Asia56, South America/others6)

Number of equity method application related companies 33
(Japan13, North America4, Europe3, AustraliaAsia11, South America/others2)

※Additionally, there are two company unconsolidated subsidiary.

/ As of March 31, 2014

● Environment

Product for gas-and-electric-powered car and electric vehicle

Gasoline engine management system

Diesel engine management system

Starter, alternator, and radiator, etc.

● Safety and Safety

Sen Synge system for driving support system

Actuator & computer for ABS/ESC

Headlamp control system (AFS)

Sensor & computer for air bag

Monitoring system around vehicle and combinations meter

Wiper system etc.

● Comfort and Benefit and Convenience

Car air conditioner system

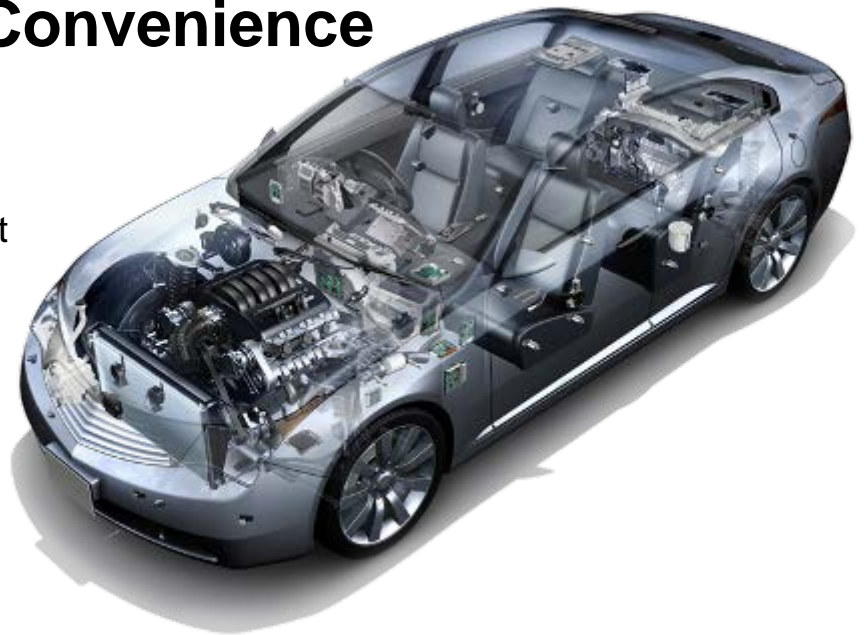
Air conditioner and air cleaner for bus

Car navigation system and ETC on-board equipment

Remote security system

Remote touch controller and smart key

Vehicle operation system (driving partner) etc.



Our company introduces TRIZ and ten years or more have passed. It can be said that TRIZ in-house promotion of ten years came at the practice center. What is practice? TRIZ is applied to the problem of a first of all actual business. And, the utility is acknowledged, and the promotion method of increasing "Repeat customer" and "New user". Therefore, many of practitioners are TRIZ beginners.

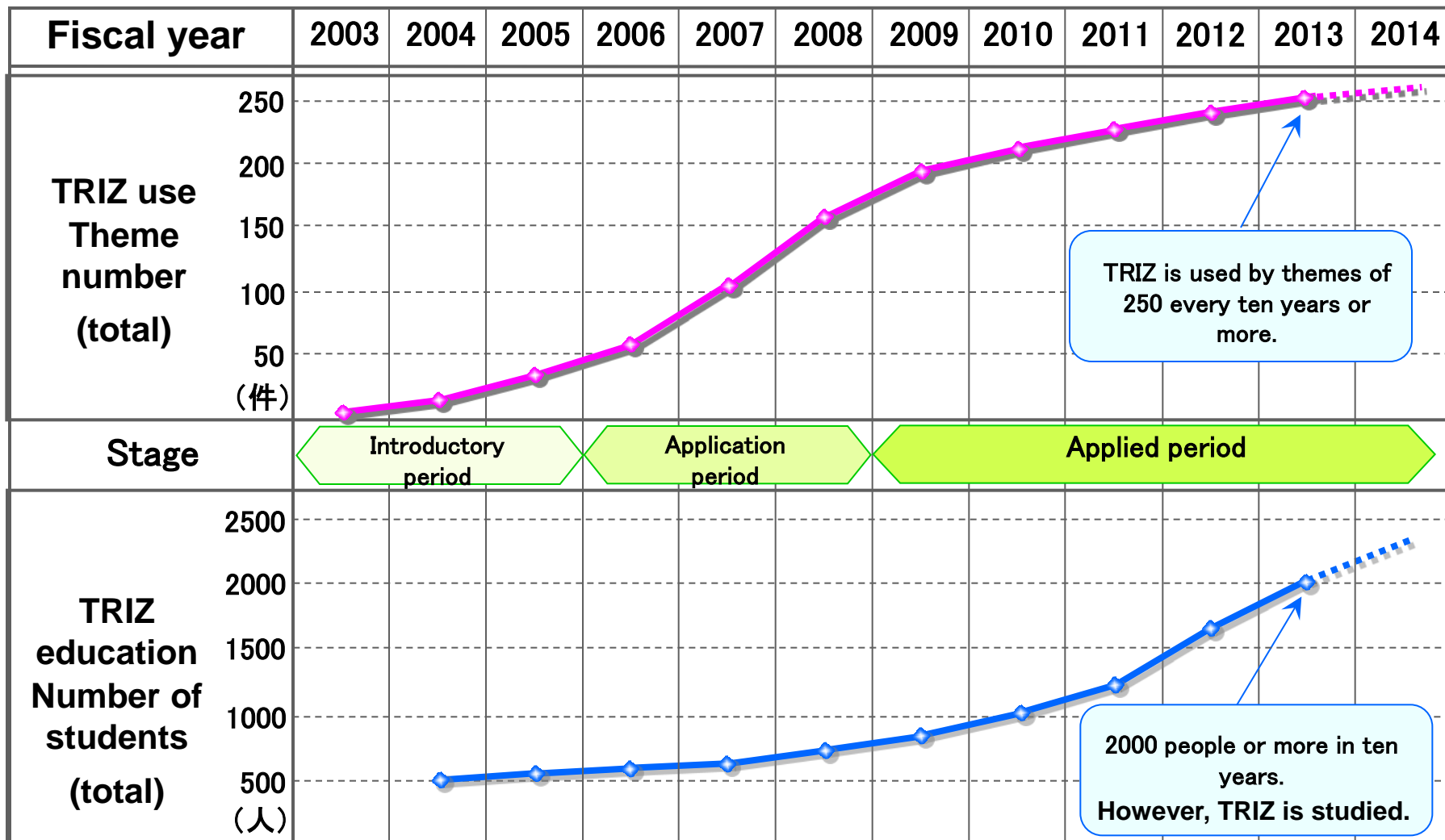
The motive for which the beginner tries to use TRIZ is various. When the tool and the approach are selected by the propeller, it is necessary to match it to the beginner needs more than matching it to the theme.

"Case that goes well" and "Case that doesn't go well" are analyzed in the promotion activity of ten years and the encountered various scenes are analyzed. And, to answer the beginner needs, "How is the beginner led to TRIZ?" is considered.

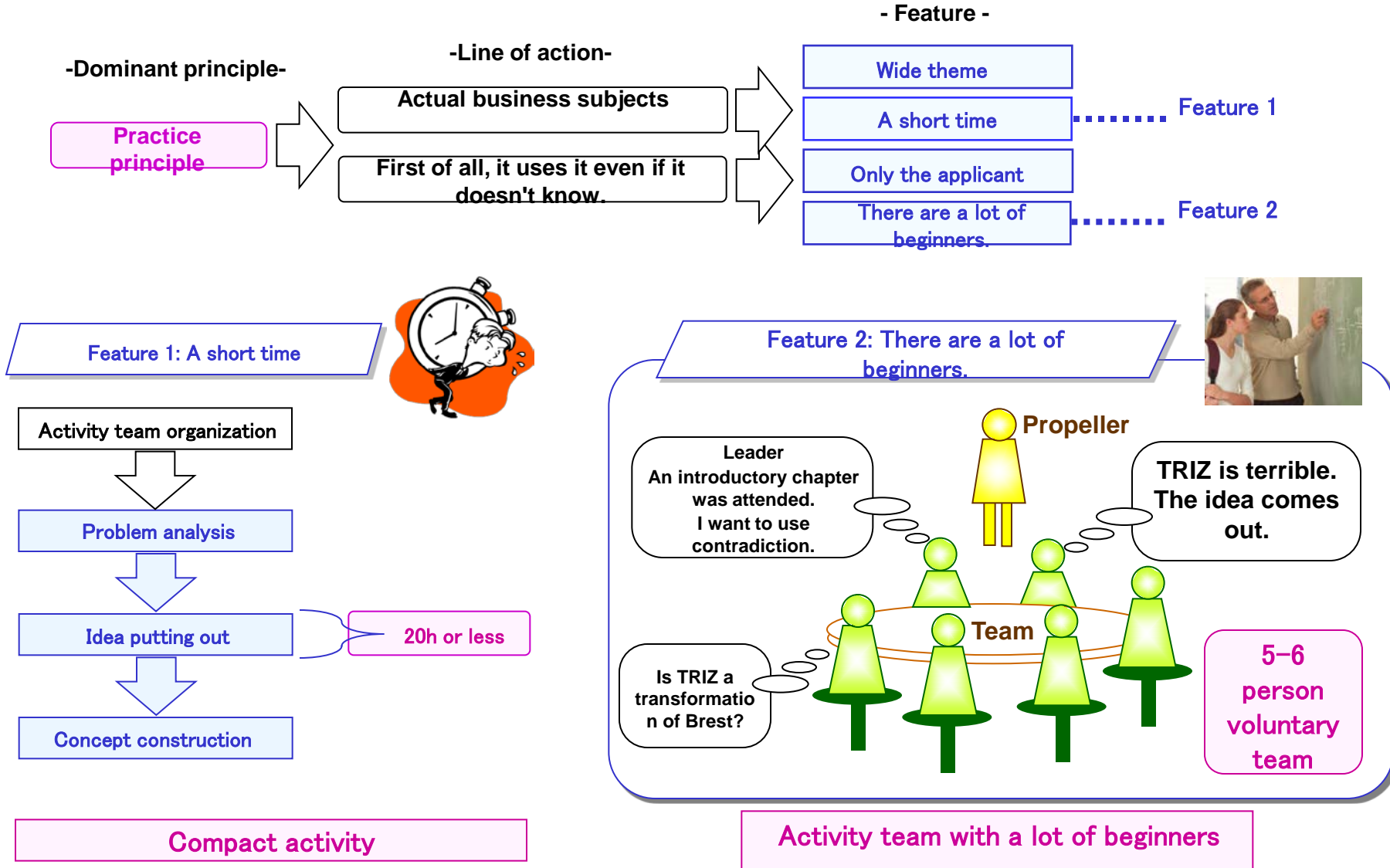
【 contents 】

1. Our TRIZ development transition
2. Content of report in 2013
3. This point under discussion
4. Beginner needs in place of practice
5. Beginner needs read from experience of practice
6. Summary of beginner needs in place of practice
7. Connection

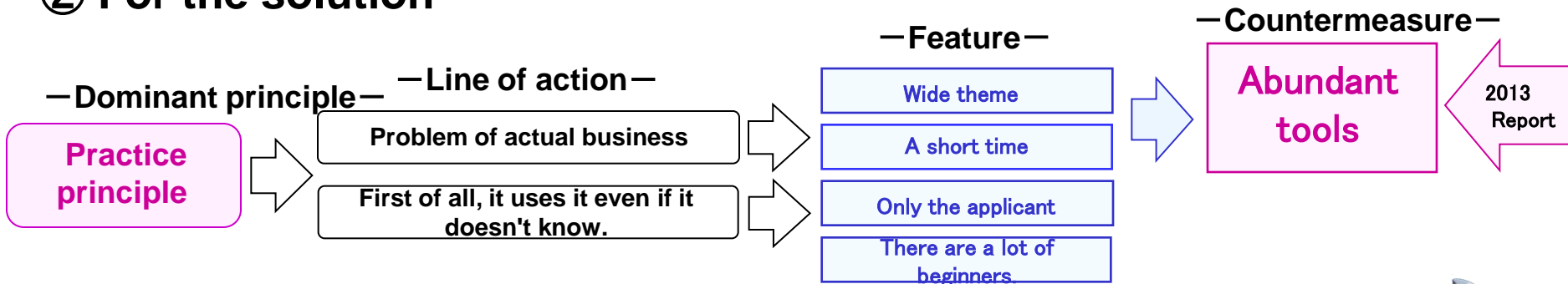
1. Our TRIZ Development Transition



① Feature of TRIZ activity of our company



② For the solution



The category of the theme is subdivided to six.

The number of tools that can be used according to the theme is increased.

テーマのカテゴリー		使えるツール群 		
		問題分析	アイデア発想	アイデア収束
将来型企画	① ターゲットを探る		◆技術進化の系譜図	◆8つの進化の法則
	② ターゲットを決める	◆S字カーブ分析	◆SLP ◆擬人化	◆DE
	③ 方式を決める	◆進化のトレンド分析		◆究極の理想解
次期型構想	④ 手段の選択肢を広げる	◆物質-場分析	◆マルチスクリーン	◆QFD-TM
	⑤ 手段を決定する	◆問題階層探索	◆物理矛盾	◆31の進化のトレンド
問題解決	⑥ 短期の問題解決	◆リソース分析	◆リバースTRIZ	◆イフェクツ ◆KJ法
		◆デバイス分析	◆知識検索(Gf)	◆プレディクション ◆ピュー
		◆制約分析	◆トリミング	◆ポートフォリオ ◆成案作り
			◆工学矛盾	◆発明標準解 ◆40の発明原理
		◆原因結果分析		

3. This Point under Discussion (1)

① It is not enough only by the tool and the approach matched to the theme.

Case that doesn't go well often experienced

User's impression after it acts

- A lot of time has been taken in the problem analysis though a lot of ideas were expected to be shown.
- It was disappointed in "Analysis why why" in which the first work was known well though many had been expected of the new method named TRIZ.
- Though the charm was felt in the idea of contradiction of TRIZ、when turning around、It is made sure of what and not made sure whether contradiction was really canceled because of contradiction.
- It worked as said about the propeller. What you do now has not been understood easily from what being aimed.

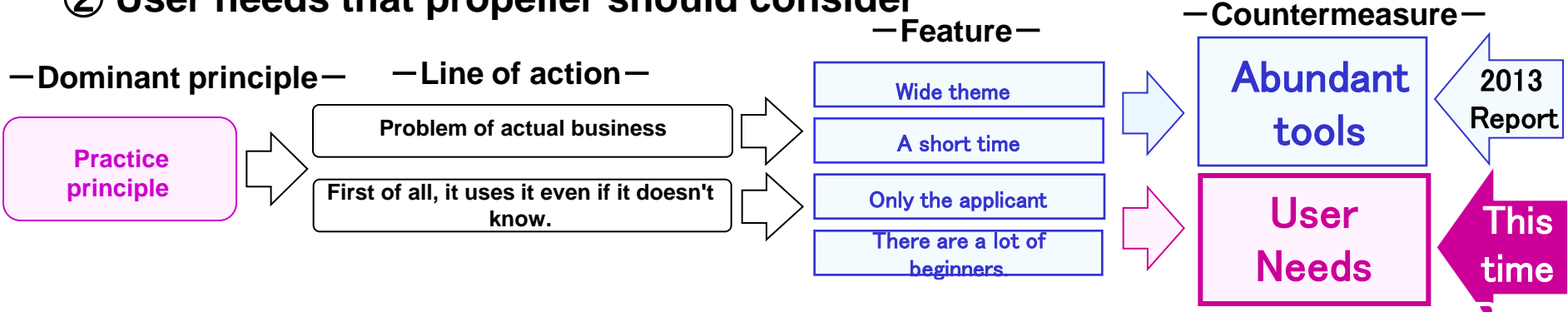
It did not go well.
Many of case



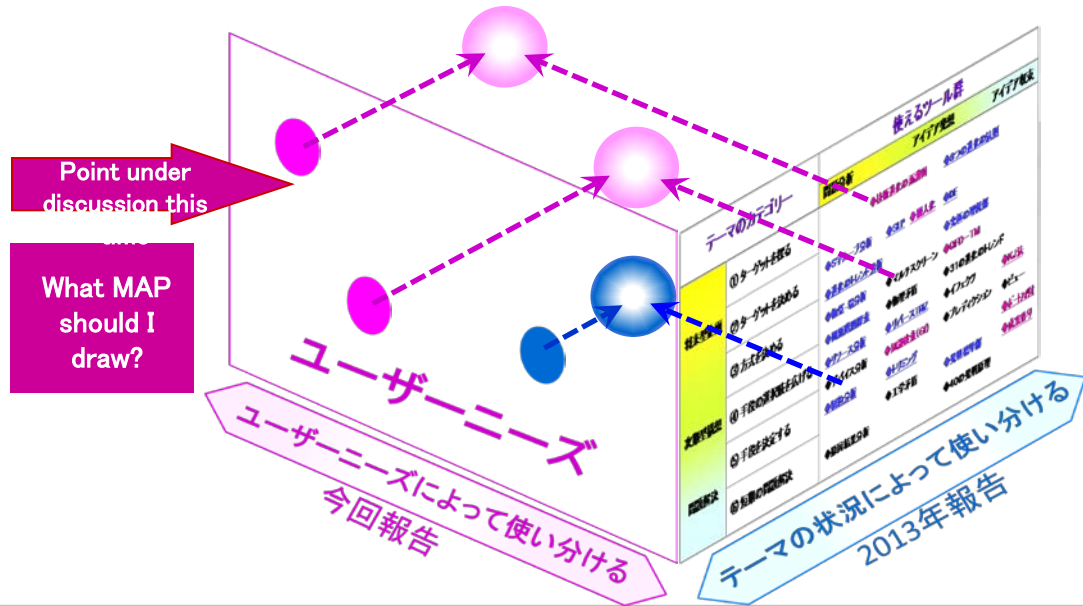
Unmatch of user needs and tool/approach

3. This Point under Discussion (2)

② User needs that propeller should consider



Tool/approach matched to both the situation and the user needs of the theme is necessary.



To make the TRIZ activity succeed (success = result × satisfaction rating)

It matched it to the situation of the theme. It is not good in a selection of tool/approach alone.

It is necessary to select tool/approach matched to users' needs.

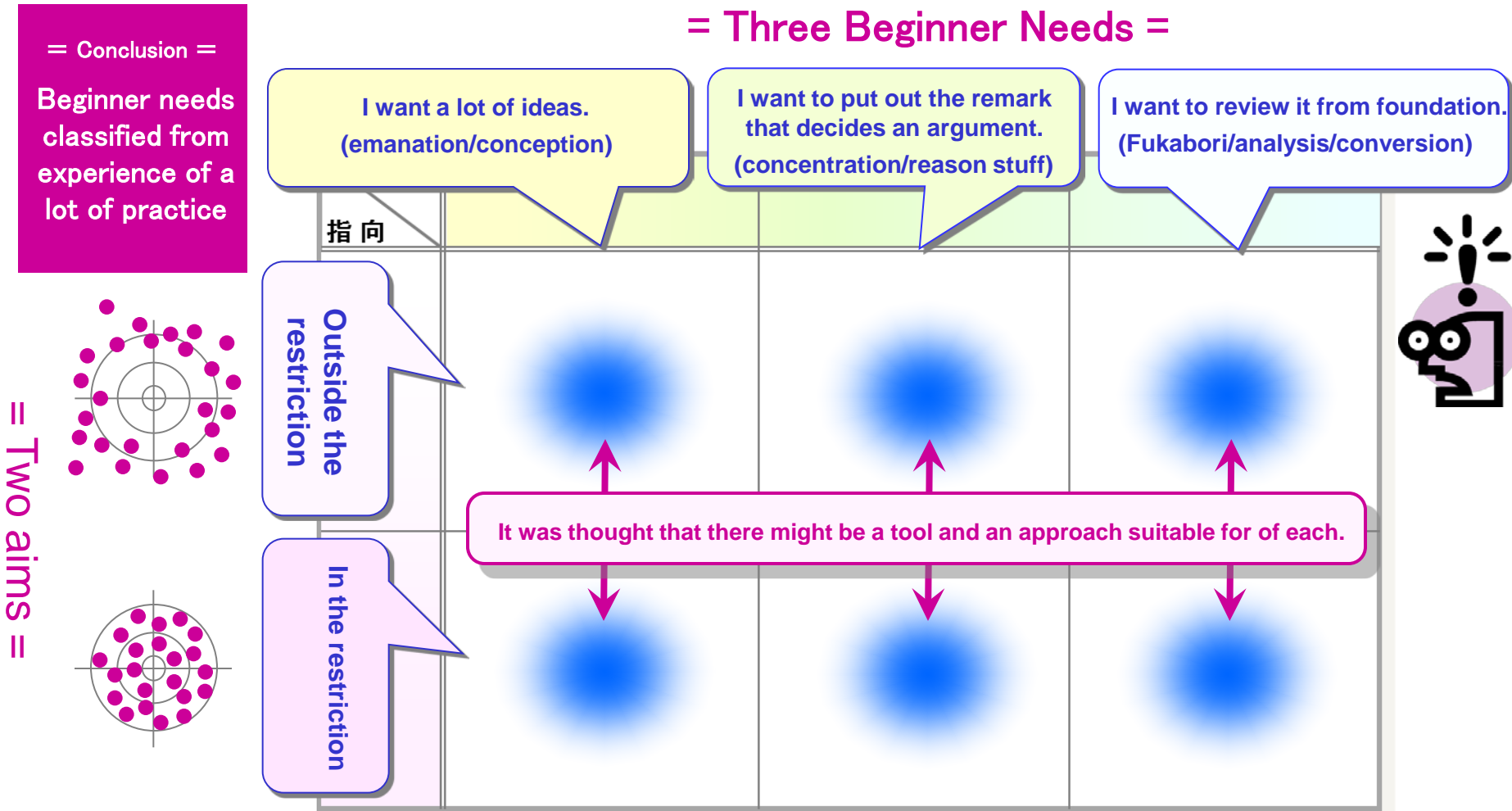
Many of users are beginners in our company. User needs → Beginner needs and saying in other words

In the place of practice **This theme**

How is the beginner led to TRIZ?

4. Beginner Needs in Place of Practice (1)

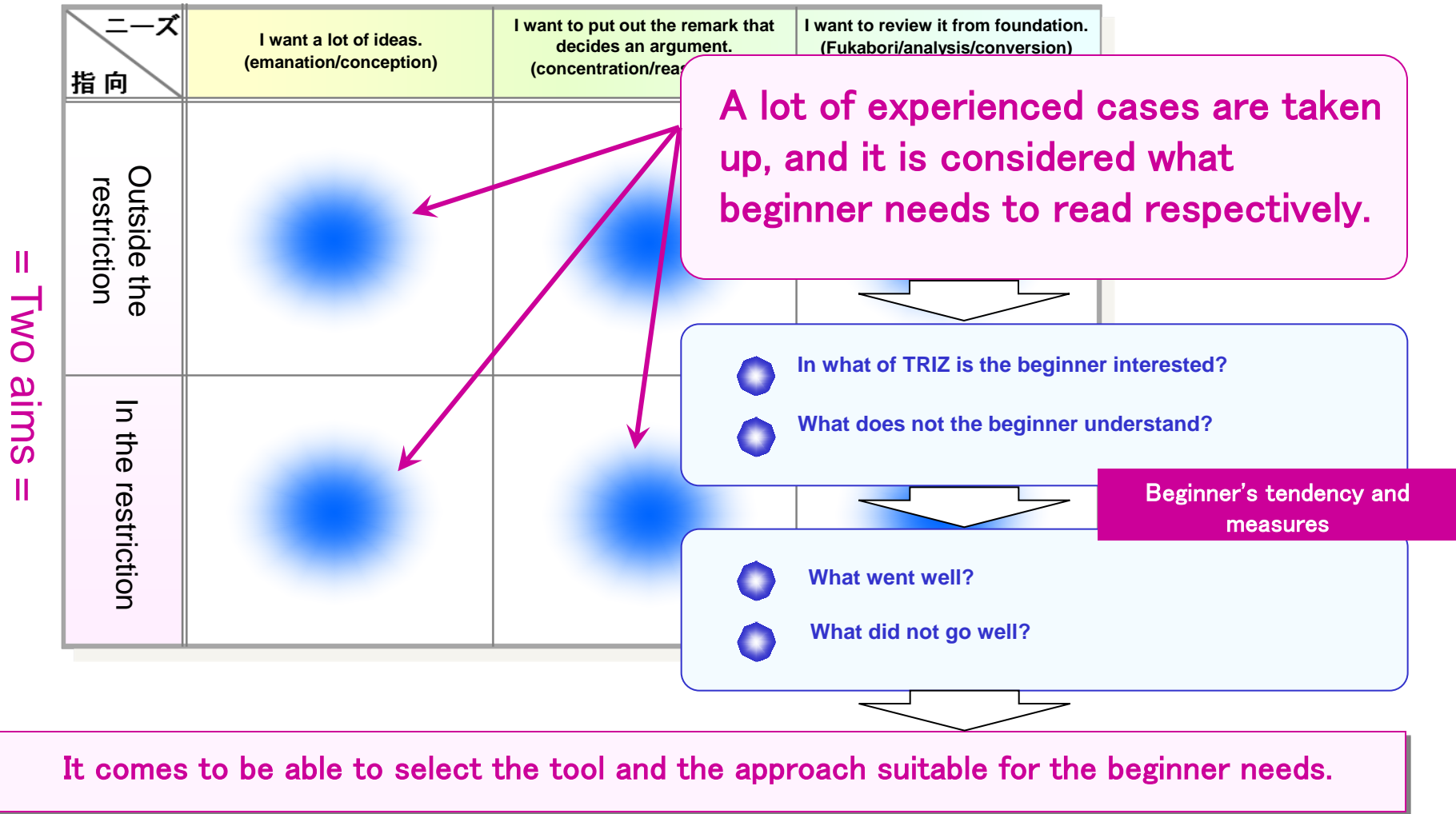
① Three Beginner needs seen in Place of a lot of Practice and Two Aims



It was thought that it looked back on a lot of practice, and it was divided into three beginner needs and two aims.

② The Beginner Needs are Read from the Case.

= Three Beginner Needs =



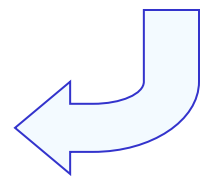
5. Beginner Needs Read from Experience of Practice

= Practice Case to be Introduced =

Beginner needs	Aim	Result	Tool/approach	
		It went well.	Reverse TRIZ	Case ①
I want to put out the remark that decides an argument.		It did not go well.	Cause - consequence analysis	Case ②
	In the restriction		Specific of primary cause	Case ③
			Selection of characteristic parameter	Case ④
I want a lot of ideas.			The invention principle of 40 is used in the checklist.	Case ⑤
	Outside the restriction	It went well.	The evolution trend of 31 is used in the checklist.	Case ⑥

Beginner needs In what are you interested? What do not you understand?

Beginner's Tendency and Measures are Read.



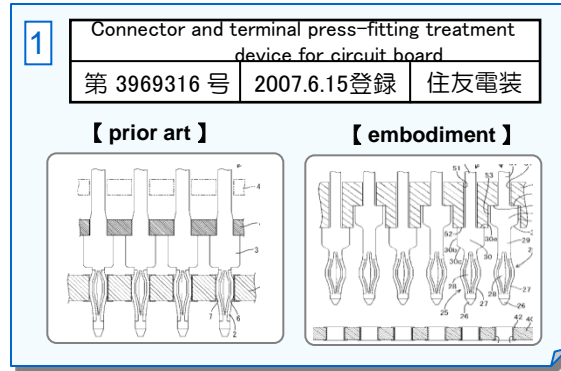
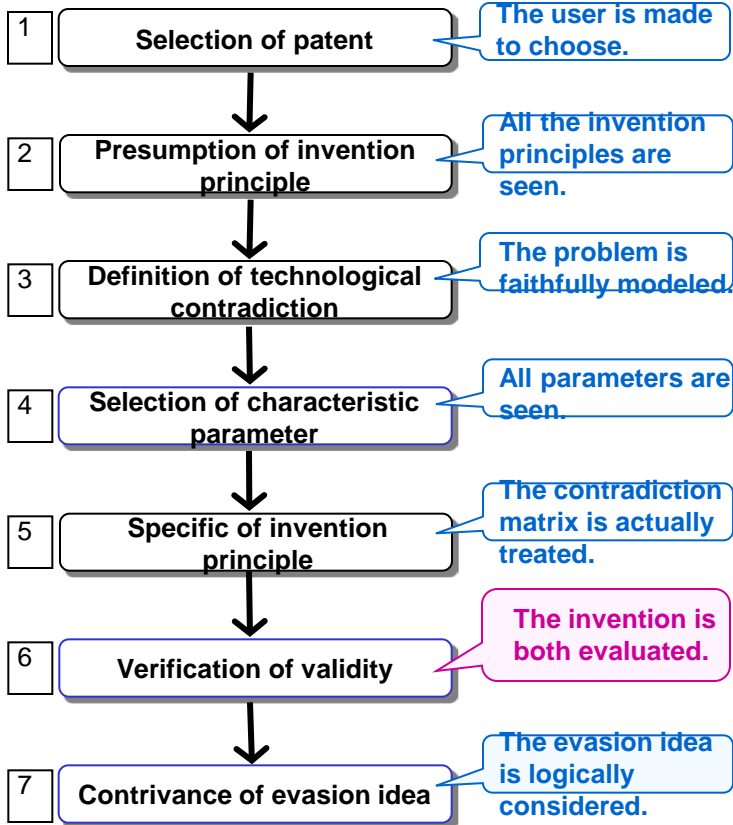
5. Beginner Needs Read from Experience of Practice (1)

Case that goes well

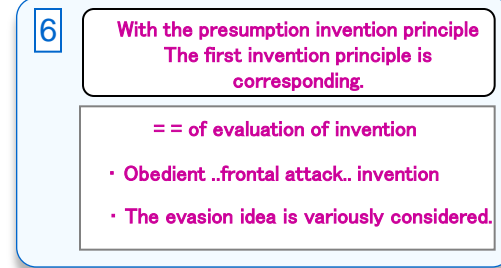
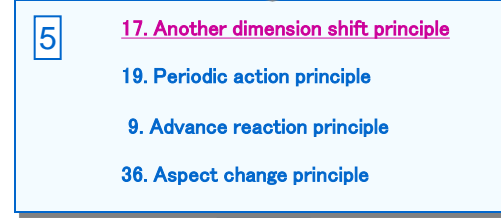
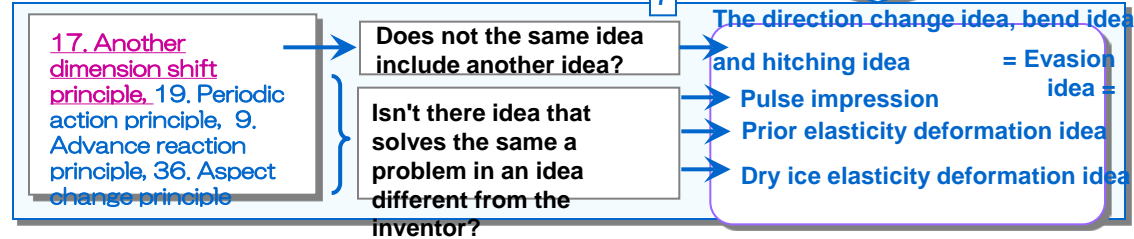
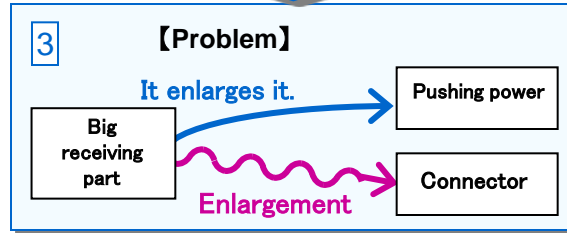
① I want to put out the remark that decides an argument in the restriction: The case with reverse TRIZ.

Procedure of reverse TRIZ

Point to be led



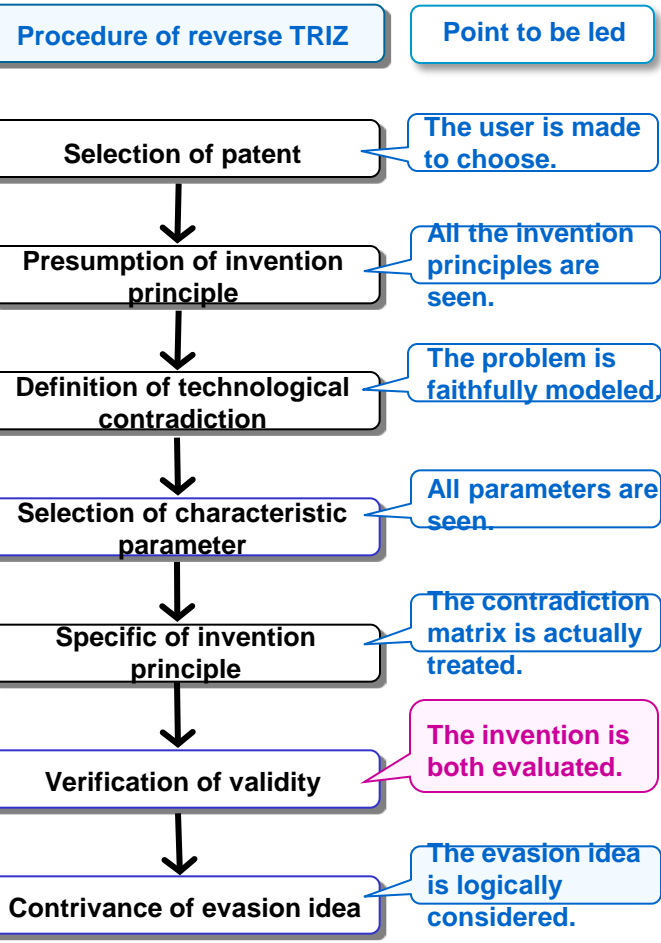
2 17 :Another dimension shift principle



5. Beginner Needs Read from Experience of Practice

Case that goes well

① I want to put out the remark that decides an argument in the restriction: The case with reverse TRIZ




1	Connector and terminal press-fitting treatment device for circuit board
第 3969316 号	2007.6.15登録 Sumitomo

4	Characteristic to be improved	Deteriorating characteristic
	10 Power	2 Length of

The beginner shall be interested.


- Idea "Contradiction"
- "The invention is appreciable."



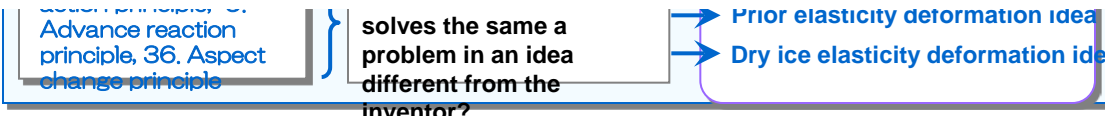
Tendency

Advantage of reverse TRIZ

- The flow of technological contradiction is understood.
- The meaning of each procedure is understood.



Measures

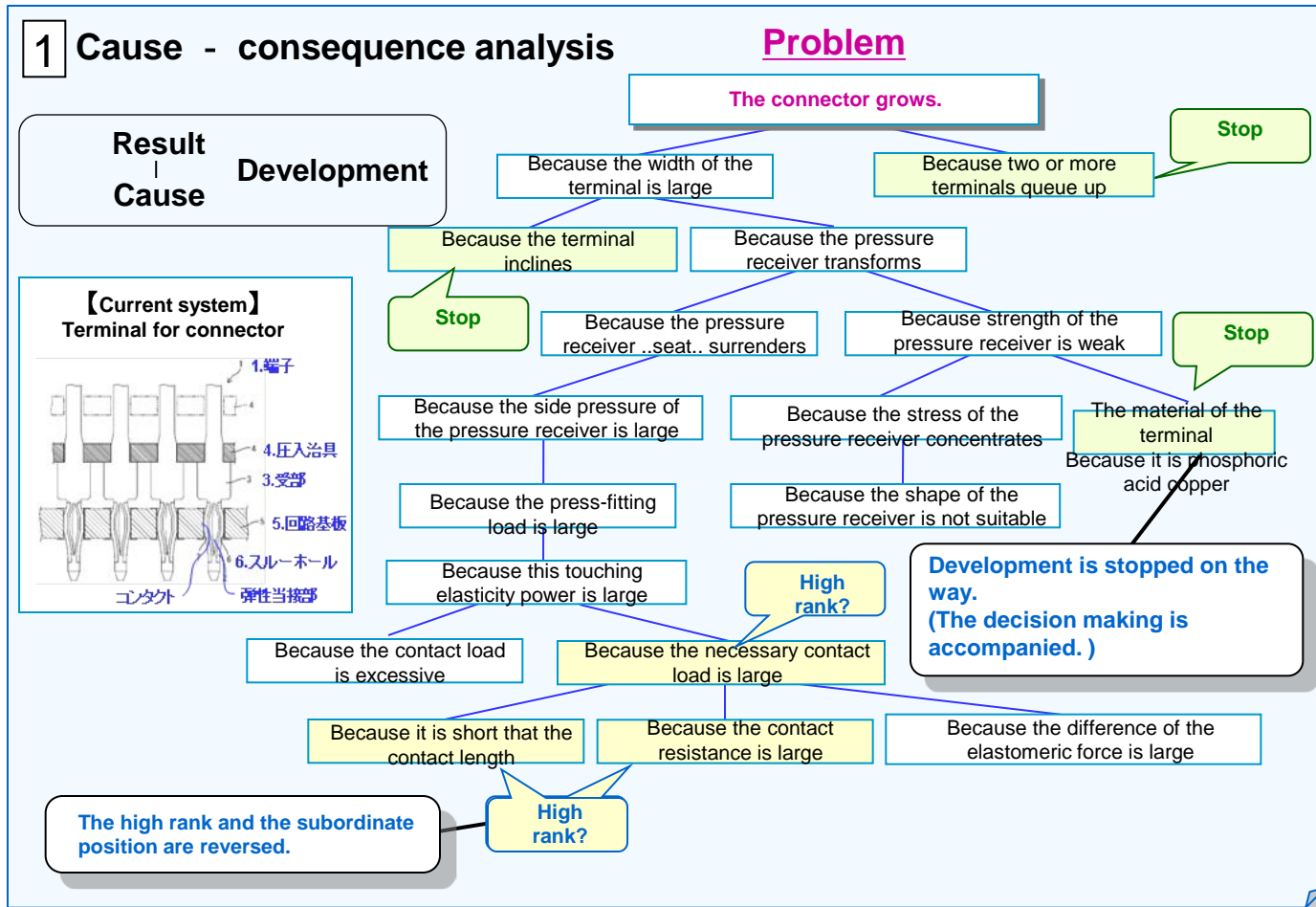
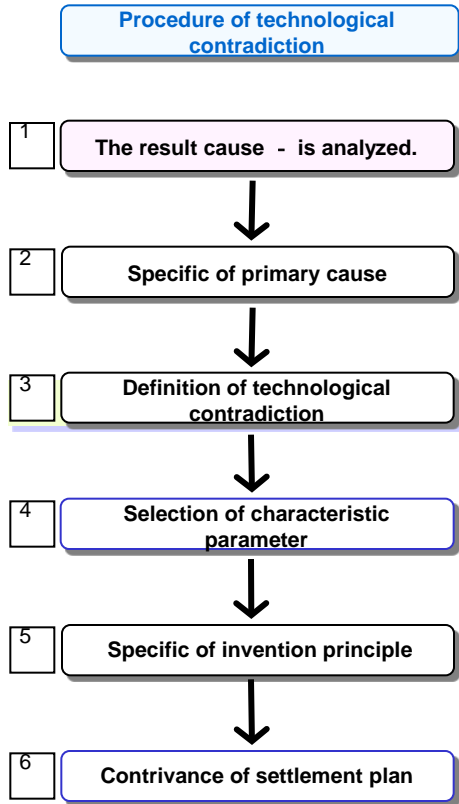


The success rate of reverse TRIZ is high (especially, theme related to the patent).
It understands and, in addition, it is interested.

5. Beginner Needs read from Experience of Pactice (2)

It did not go well.

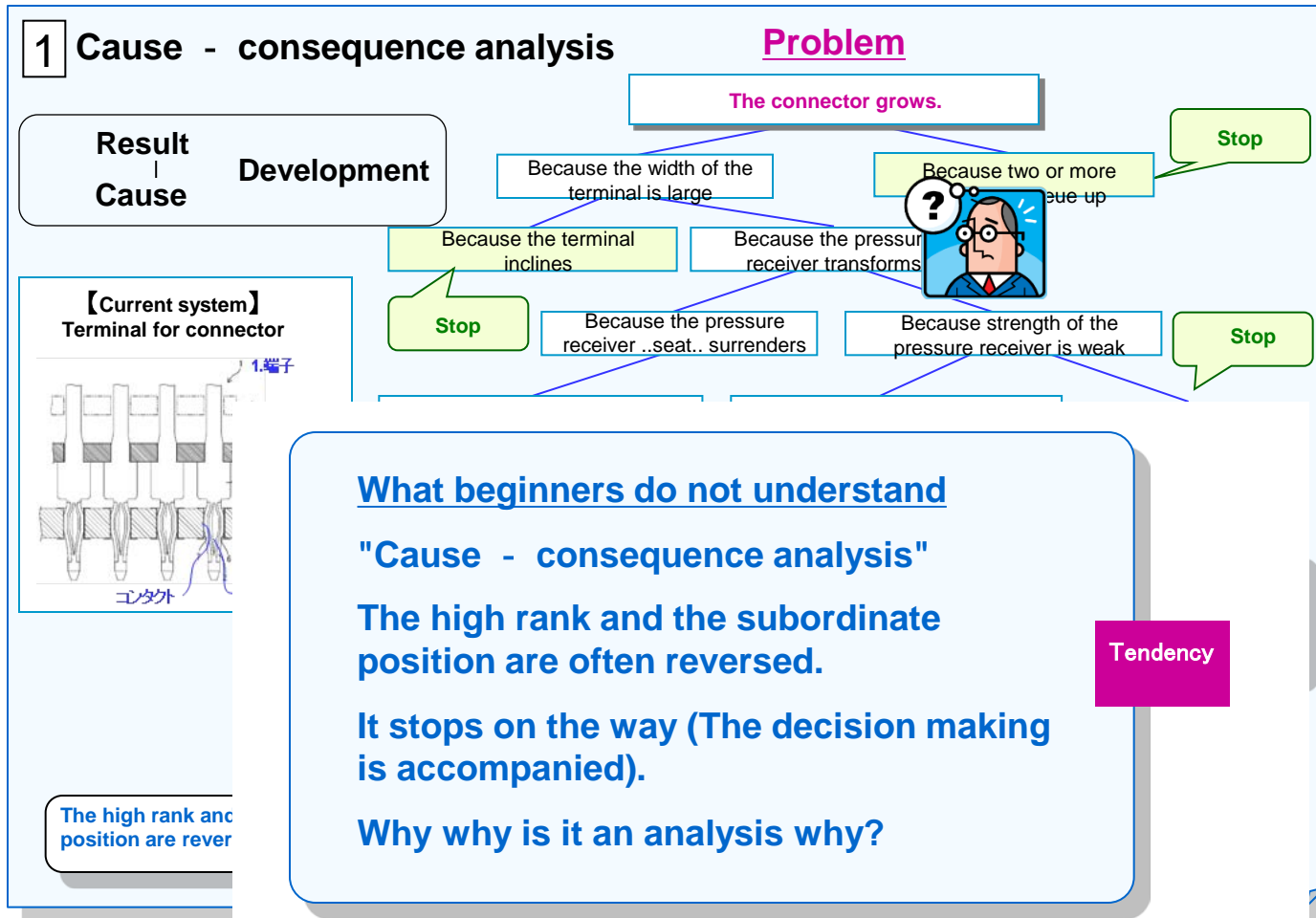
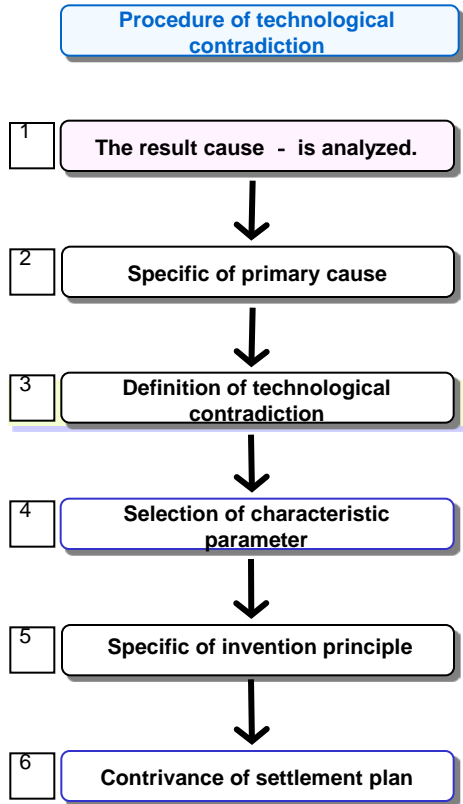
② I want to put out the remark that decides an argument in the restriction: The case with cause - consequence analysis.



5. Beginner Needs Read from Experience of Practice (2)

It did not go well.

② I want to put out the remark that decides an argument in the restriction: The case with cause - consequence analysis.

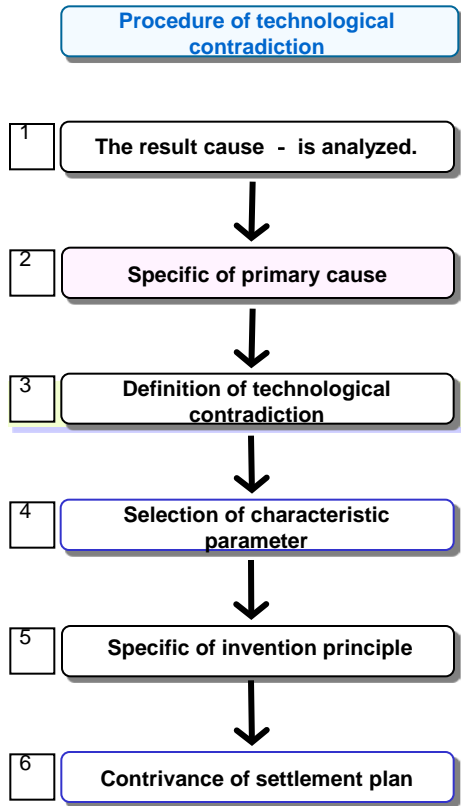


"Cause - consequence analysis" doesn't often go well when pursuing it too much. (It is not "Analysis why why" that the beginner is expecting it.)

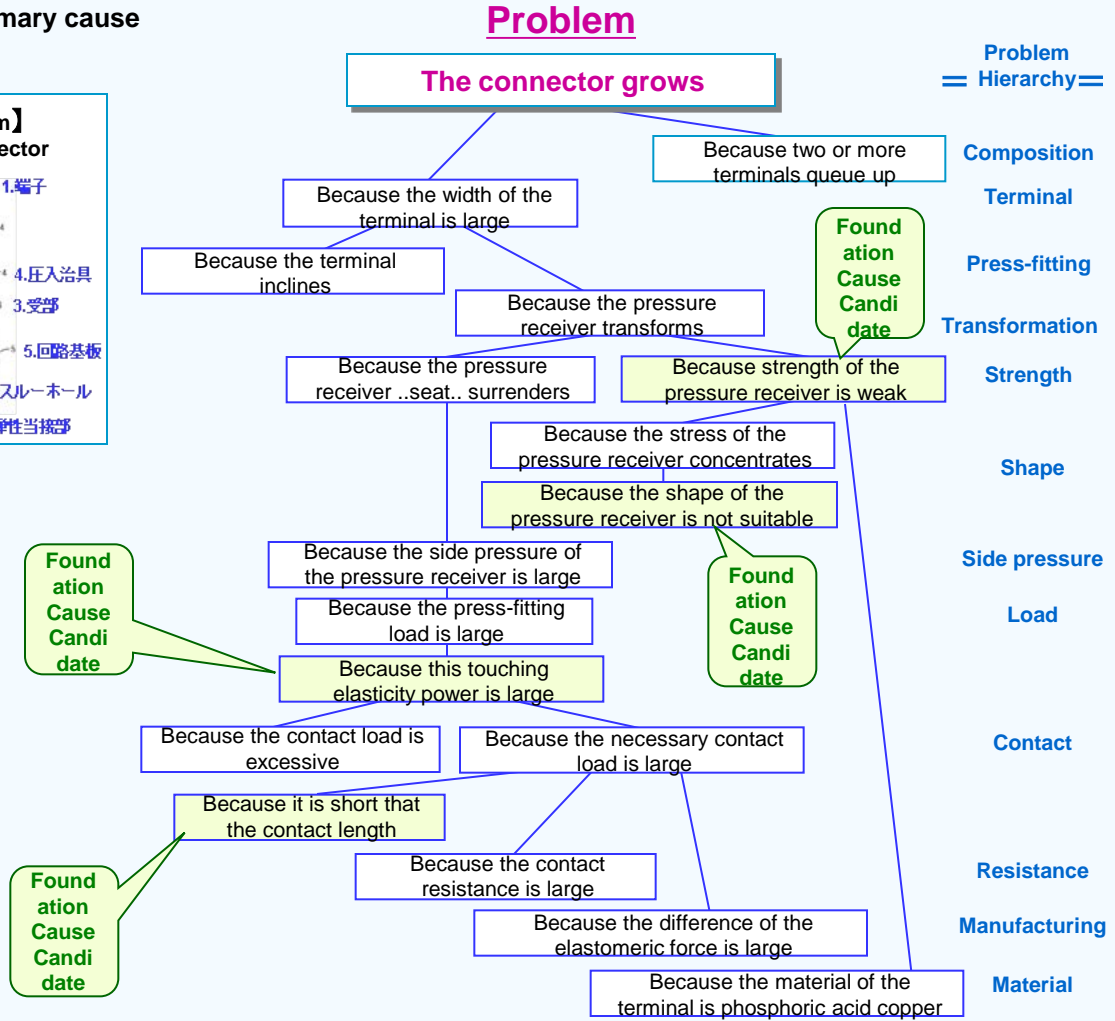
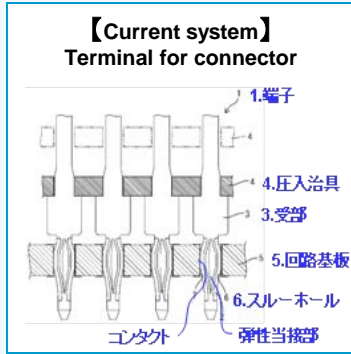
5. Beginner Needs Read from Experience of Practice (3)

It did not go well.

③ I want to put out the remark that decides an argument in the restriction: The case with a specific primary cause. (1)



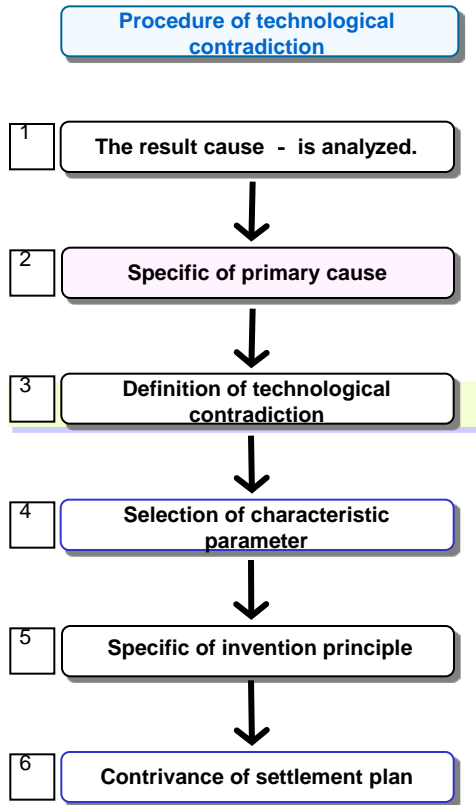
2 Specific of primary cause



5. Beginner Needs Read from Experience of Practice

It did not go well.

③ I want to put out the remark that decides an argument in the restriction: The case with a specific primary cause (1).



2 Specific of primary cause

Problem

The connector grows.

Problem = Hierarchy

What beginners do not understand



Tendency

● At which level should I specify the primary cause in the hierarchy of the problem?

● Even if the minimum problem is recommended, it doesn't have the persuasive power. (It is not only a problem solving.)

Tendency

● The beginner has a lot of high-ranking aims.

● Plural of the primary cause selection doesn't often go well.

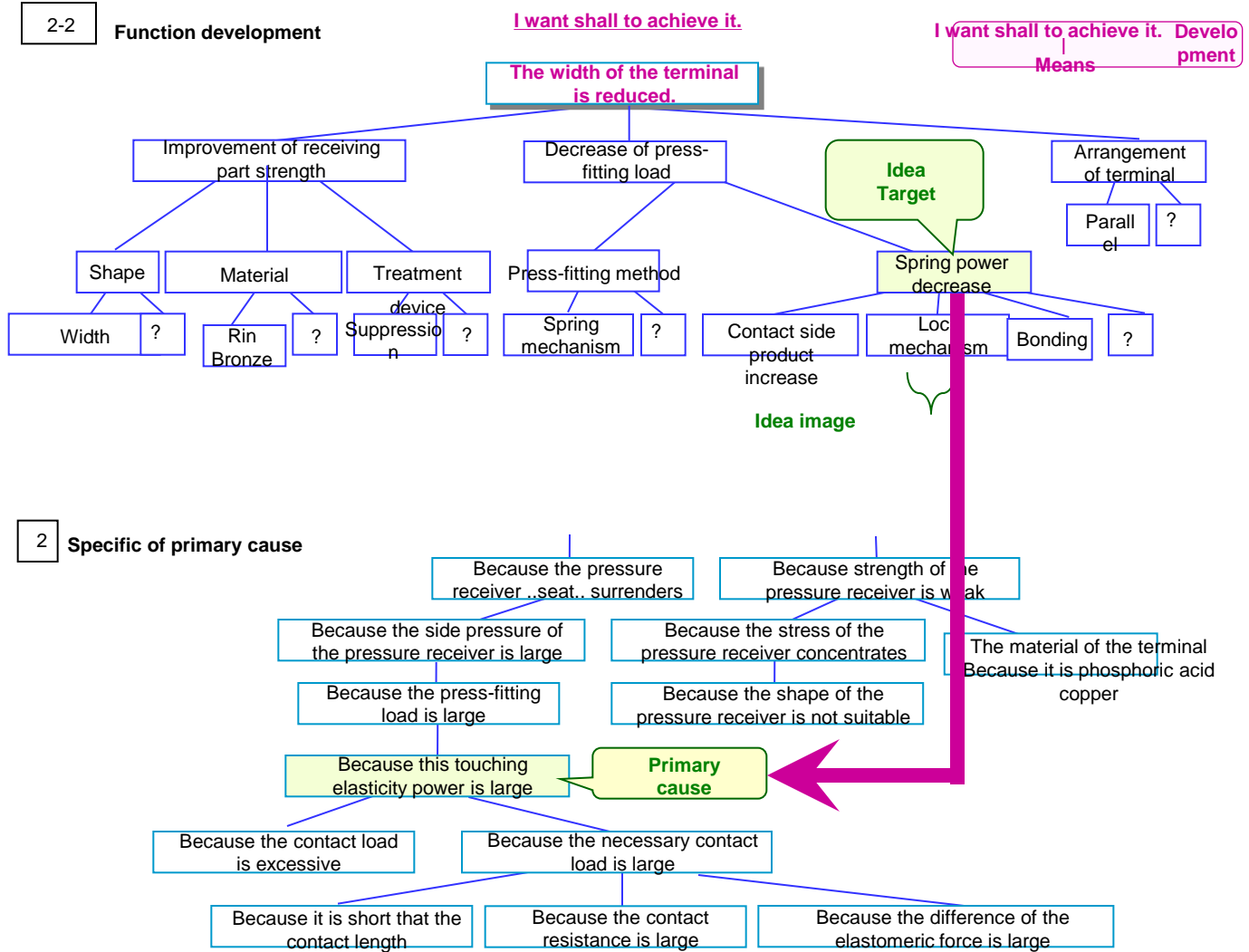
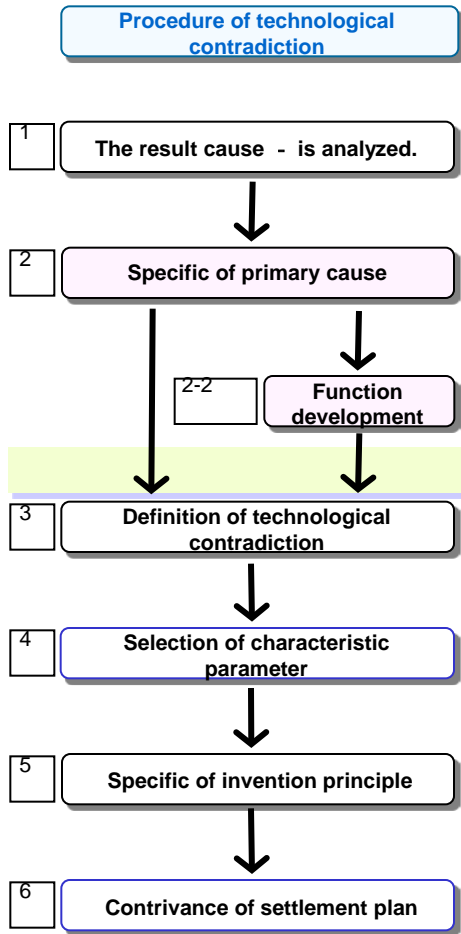
Specific of the primary cause is decision making, and it is difficult in "Cause - consequence analysis".

→ It is easy to obtain specific mutual agreement of the primary cause because of the function development (means development).

5. Beginner Needs Read from Experience of Practice (2)

Case that goes well

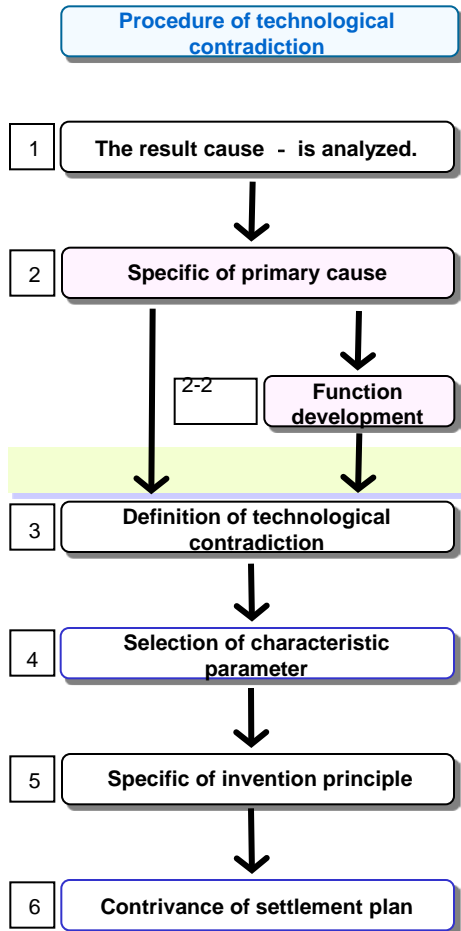
③ I want to put out the remark that decides an argument in the restriction: The case with a specific primary cause (2).



5. Beginner Needs Read from Experience of Practice (2)

Case that goes well

③ I want to put out the remark that decides an argument in the restriction: The case with a specific primary cause (2).




2-2 Function development

I want shall to achieve it.

The width of the terminal is reduced.

I want shall to achieve it.
| Means Development

Function development (means development)



It starts from "I want to achieve it", and "Thought means" is developed.

- When the function develops Consent increases to squeezing the idea target.
- It is easy to obtain mutual agreement in the team.
- It is effective as the decision making tool.

Tendency

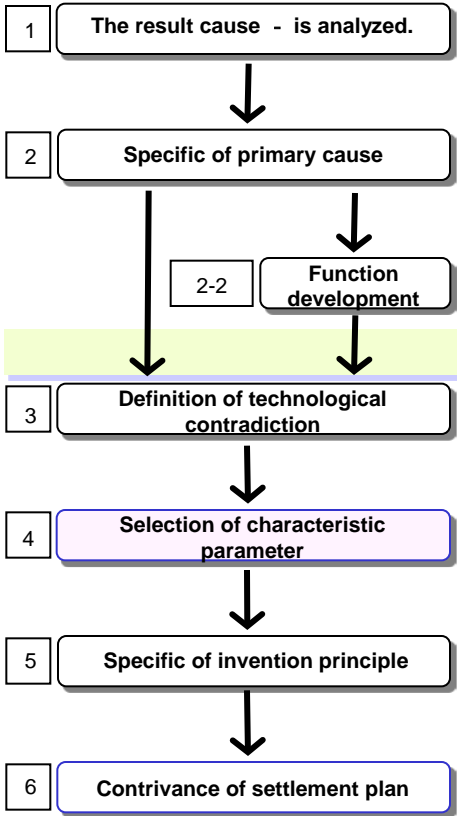
It tends to become "That and this" in "Cause - consequence analysis".
→ The decision making (narrow of the target) is pressed by the function development.

5. Beginner Needs Read from Experience of Practice (4)

It did not go well.

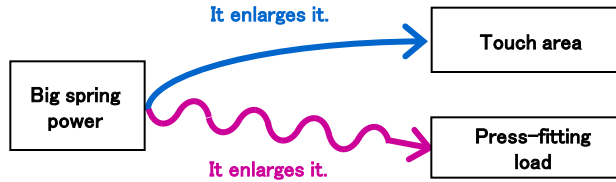
④ I want to put out the remark that decides an argument in the restriction: The case with the characteristic parameter selection.

Procedure of technological contradiction



3 Definition of technological contradiction

4 Selection of characteristic parameter



Improvement parameter: 05. Area of movement object

Deterioration parameter: 10. Power

Beginner's Tendency



Improvement parameter: 05. Migration area

27. Reliability

35. Adaptability

Deterioration parameter: 10. Power

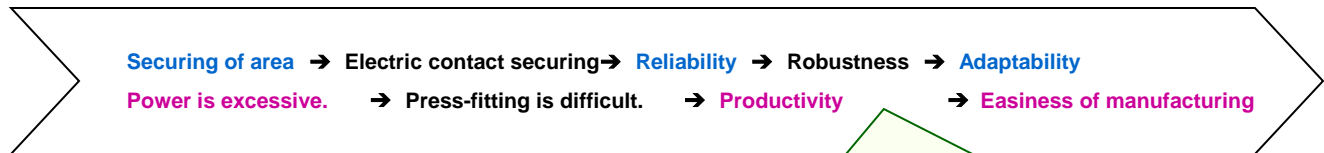
39. Productivity

32. Easiness of manufacturing

- 19: Periodic action principle
- 30: Thin film use principle
- 35: Parameter change principle
- 02: Separation principle

- 01: Division principle
- 35: Parameter change principle
- 29: Fluid use principle
- 38: High density oxygen use principle

- 01: Division principle
- 13: Reverse-conception principle
- 31: Porous quality use principle



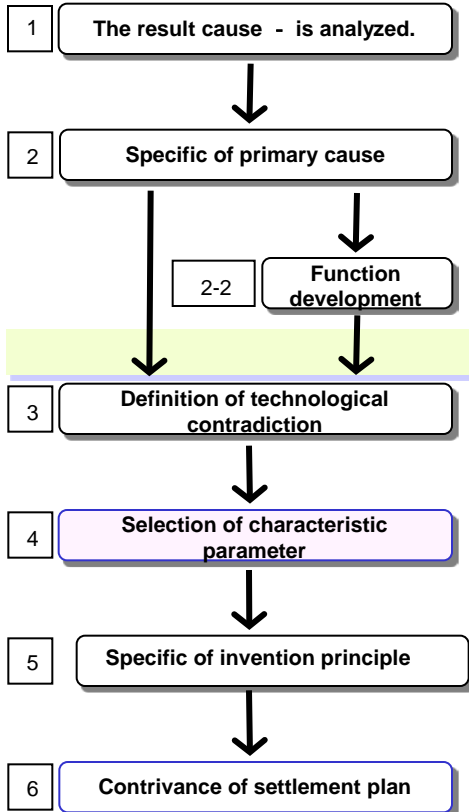
It tends to think about the background.

5. Beginner Needs Read from Experience of Practice (4)

It did not go well.

④ I want to put out the remark that decides an argument in the restriction: The case with the characteristic parameter selection.

Procedure of technological contradiction



3 Definition of technological contradiction

4 Selection of characteristic parameter

The beginner shall not understand.



Which characteristic parameter should I select in two or more candidates who are?

The beginner wants to choose the characteristic parameter of the broader concept.

- I want to choose "- character".
- Eyes tend to go from "Action" to "Background".

Tendency

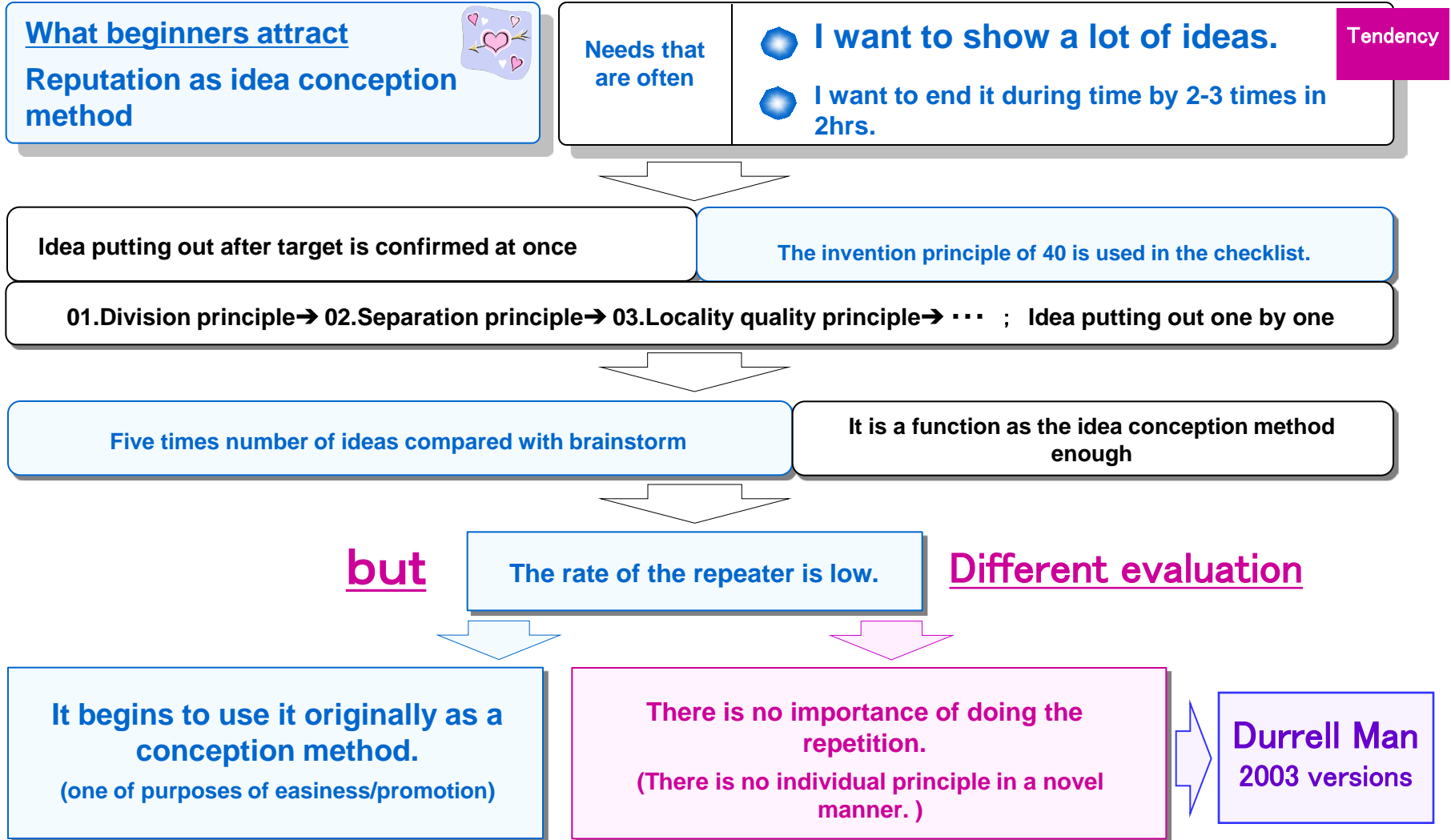
It is necessary to interfere with the selection of the characteristic parameter firmly.

→ If the parameter of the broader concept is chosen, contradiction becomes vague.

5. Beginner Needs Read from Experience of Practice (5)

It did not go well.

⑤ It wants a lot of ideas in the restriction: The case where the invention principle is used in the restriction (1).

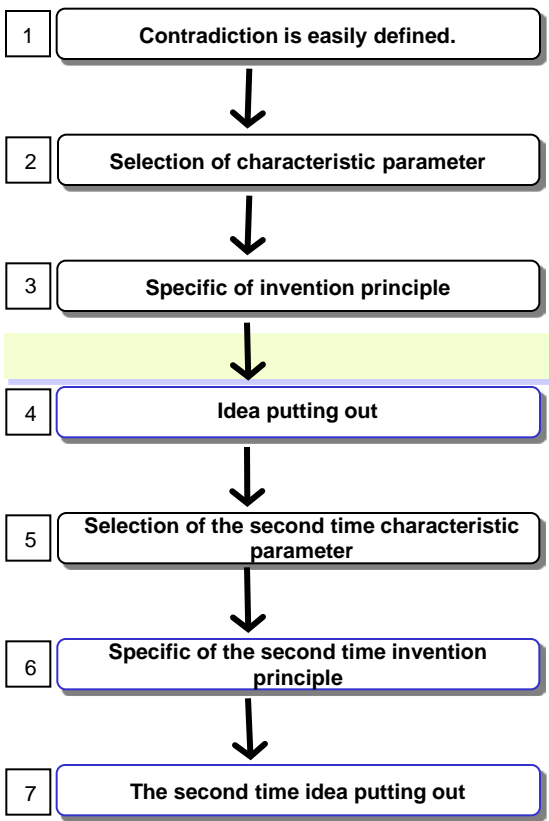


5. Beginner Needs Read from Experience of Practice (5)

⑤ It wants a lot of ideas in the restriction: The case where the invention principle is used in the checklist. (2)



Procedure of Durrell man 2003



1 I want shall to achieve it. Lose. Being possible to hold is asked.

I want shall to achieve it. Miniaturization of terminal
Lose. Decrease in press-fitting load

2 Characteristic to be improved Deteriorating characteristic
07: Volume of movement object
15: Power/torque

3 = 9Principle =
15: Dynamic 03: Locality quality 14: Curved surface
01: Division 36: Phase change 37: Thermal expansion
35: Parameter 04: Asymmetry 19: Periodic

4 Idea putting out

5 Characteristic to be improved Deteriorating characteristic
35: Reliability
44: Productivity

6 = 5Principle =
35: Parameter 28: Machine substitution 33: Homogeneity
01: Division 29: Fluid exploitation It matches it.
10: Advance work 32: Discoloration use 14 principles

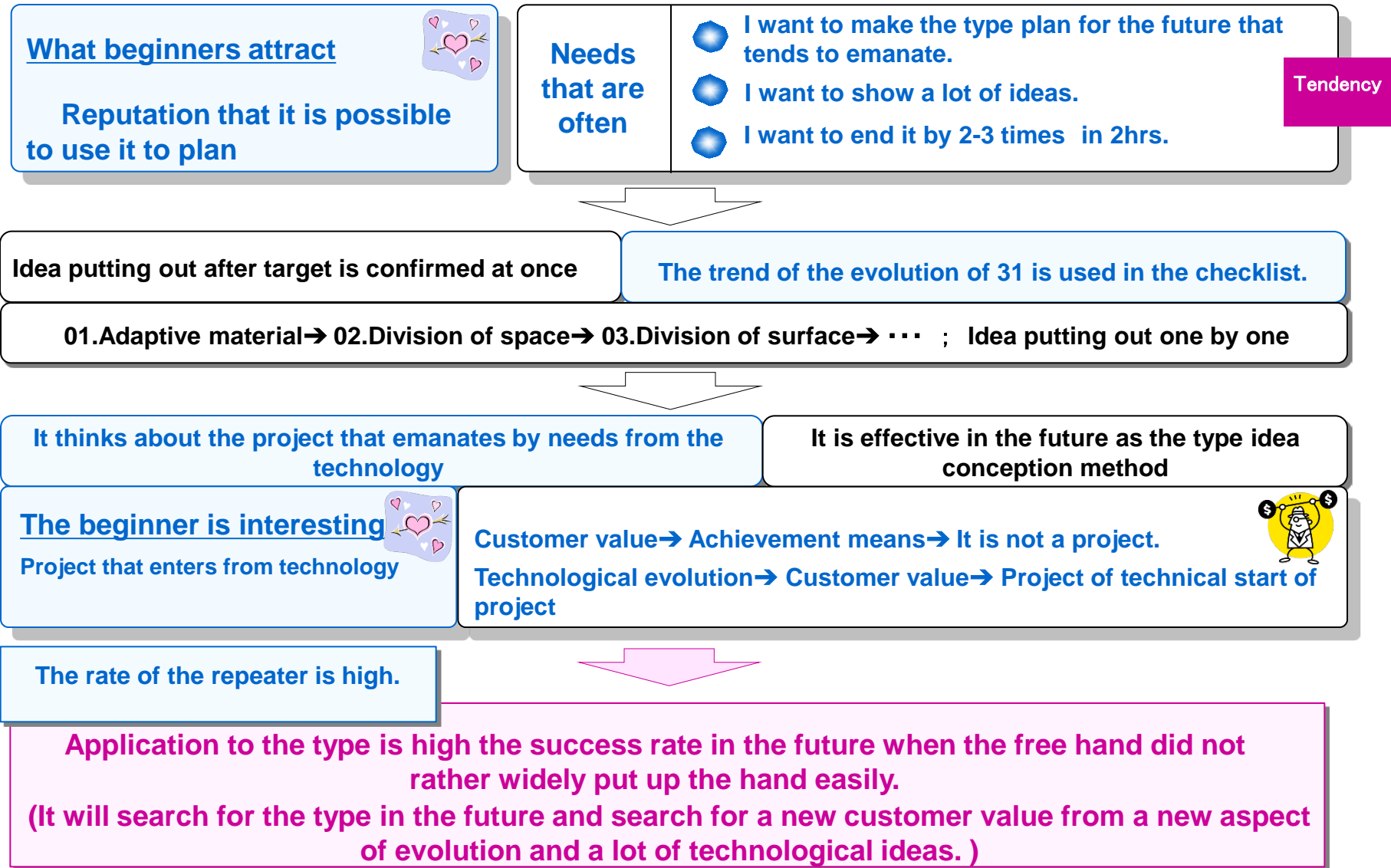
7 The second time idea putting out

Contradiction is defined even if it is easy, and 2003 Durrell man versions are used.
➔ A lot of satisfaction ratings go up in the number of invention principles.

5. Beginner Needs Read from Experience of Pro

Case that goes well

⑥ It wants a lot of ideas outside the restriction: The case where the evolution trend of 31 is used in the checklist.

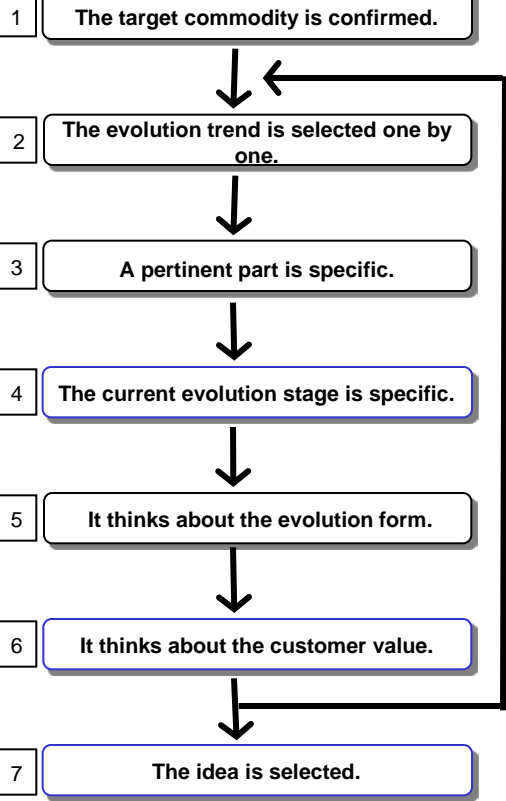


5. Beginner Needs Read from Experience of Practice (6)

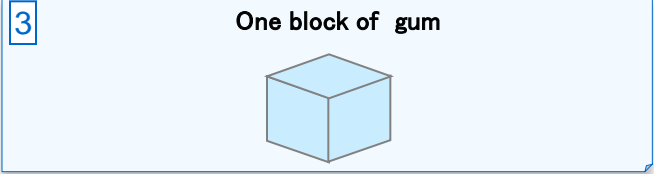
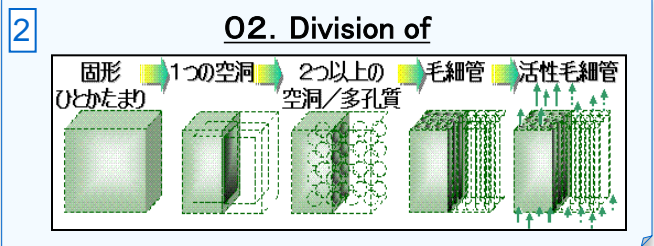
⑥ It wants a lot of ideas outside the restriction: The case where the evolution trend of 31 is used

Case that goes well

Procedure of evolution trend of 31



1 A new product of gum is planned.



4 Current stage = Leftmost "Solid"

2 It advances to the following evolution trend.

7 A promising idea is selected from the idea group.
A new product concept is constructed.

5 Idea 6 Customer value

The second "One cave"

Chewing gum of cave → [Sukasuka] texture

Chewing gum with jam → Enough jam taste

The third "Porous quality"

Chewing gum with empty bubble → Air texture

With mint Capsule → Indefinitely The stimulation taste continues.

The fifth "Revitalization capillary"

Chewing gum with mint tube → The mint gushes whenever biting.

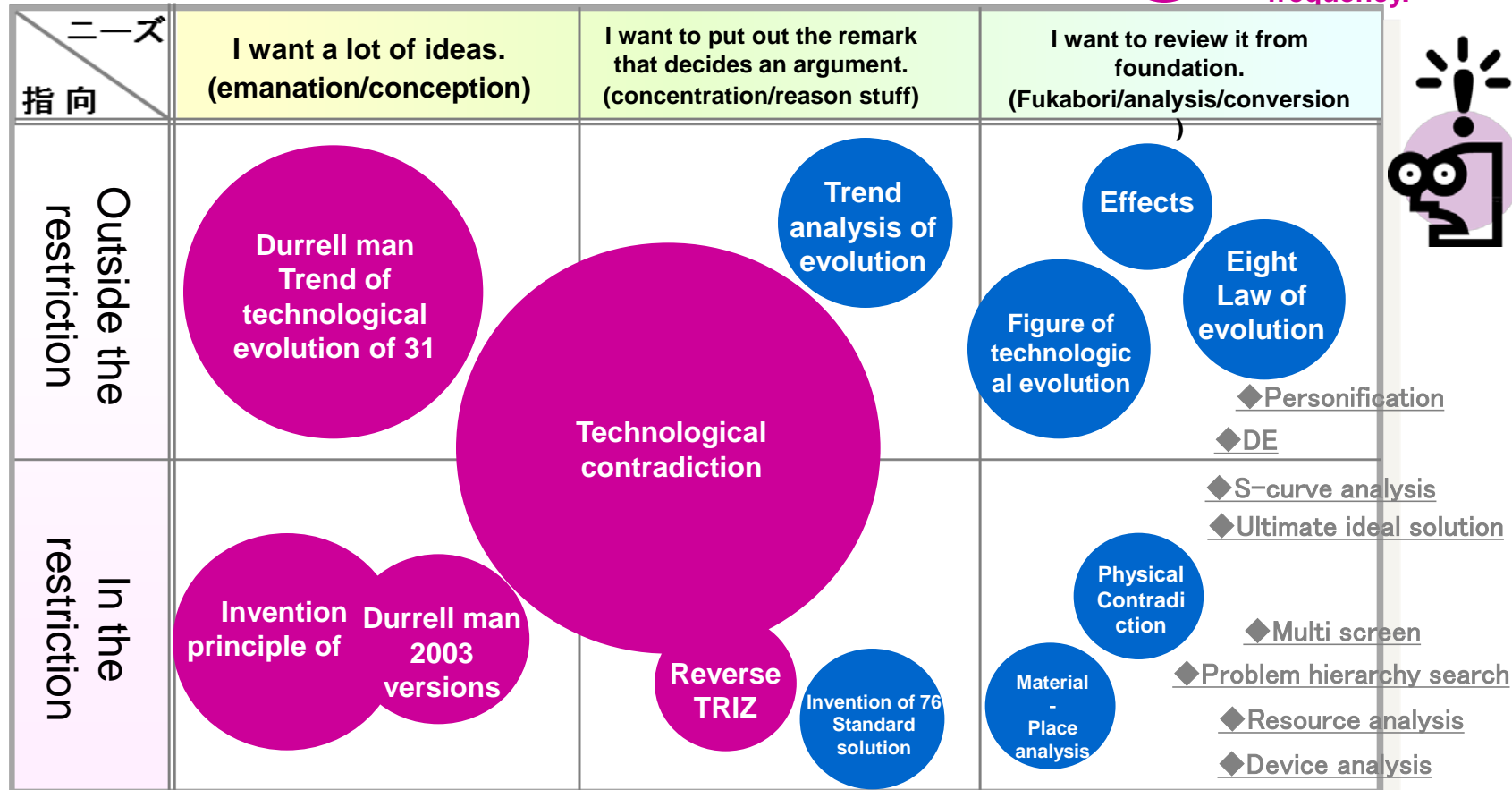
6. Summary of Beginner Needs in Place of Practice (1)

① Tool Matched to Beginner Needs (Current State)

= Three Beginner Needs =

This time
The size shows the operation frequency.

= Two aims =



The tool matched to the beginner needs is being used standard through a lot of practice.

6. Summary of Beginner Needs in Place of Practice (2)

② Summary of Beginner Needs

= Three Beginner Needs =

ニーズ 指向	多くのアイデアが欲しい (発散 / 発想)	決定打を出したい (集中 / 理詰め)	根本から見直したい (深堀 / 分析 / 転換)
制約の外へ 60%	比率 50% 30% 20%		
	モチベーション		
制約の中で 40%	発想法 成果 × 満足度	TRIZへの期待 TRIZ理論 成果 × 満足度	視点変換 成果 × 満足度
	初心者ニーズに十分配慮必要	推進者主導でOK	

= Two aims =



1. "How is the beginner led to TRIZ?" is an important point in TRIZ promotion.
 2. The mismatch of the selection of "Beginner needs" and "Tool/approach" is often experienced in the place of practice.
An in-house propeller should be sensitive to the beginner needs.
 3. The beginner needs are various.
Tool/approach selection matched to each beginner needs is necessary.
 4. It is necessary to analyze a variety of beginner needs, and it makes to the pattern and to understand the tendency.
It classified it from the experience of practice into three beginner needs and two aims.
 5. It proposed tool/approach according to the classification of the beginner needs.
It wishes to become some references.

— Notice inevitably by the process of analyzing the beginner needs. —
- ◆ Not only a technical result but also engineer's satisfaction rating relates closely to the success in the TRIZ practice.
 - ◆ It is a coaching from the consulting to raise engineer's satisfaction rating.

DENSO

Thank you for your attention