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# TRIZ use case introduction in JNC Ltd.

The 10th Japanese TRIZ symposium in fiscal year 2014  
2014/9/12

JNC Ltd. · Intellectual property room  
Naoyuki Yoshida



## Company profile

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Trade name: JNC Ltd.

Establishment: January 12, 1906

Establishment: January 12, 2011

The capital: 31.15 billion yen

Number of employees: 3,303 people (connection)

Holding company: Chisso Corporation

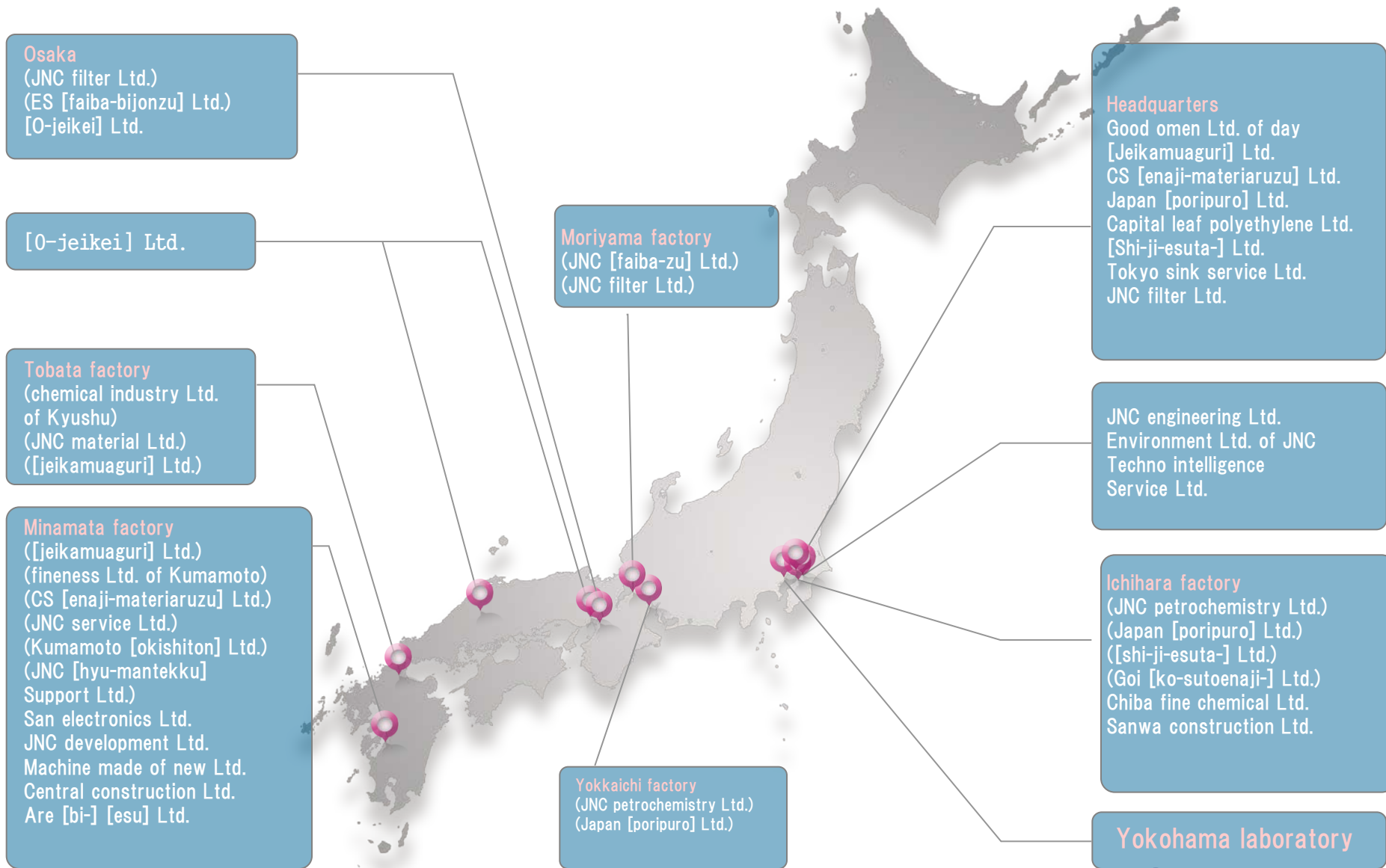
Headquarters: 〒100-8105

Tokyo Chiyoda Ward Marunouchi 2-2-1

New Ohtemachi Bldg 9F

Sales in fiscal year 2013: About 228.8 billion yen  
(connection)

# 事業拠点 In Japan



# 事業拠点

## Foreign countries



Denmark

ES FIBERVISIONS, ApS



Germany

JNC REPRESENTATIVE OFFICE



China

JNC (SHANGHAI) Co., Ltd.  
SHANGHAI JIN CHANG ENGINEERING  
PLASTIC Co., Ltd.  
CHISSO ES ASIA (CHANGSHU) Co., Ltd.  
GUANGZHOU ES FIBER Co., Ltd.  
GUANGZHOU JNC FILTER Co., Ltd.  
ES FIBERVISIONS HONG KONG, Ltd.  
ES FIBERVISIONS SUZHOU Co., Ltd.  
ES FIBERVISIONS CHINA Ltd.



South Korea

JNC KOREA Co., Ltd.



Taiwan

JNC TAIWAN Co., Ltd.



Vietnam

JNC FILTER VIETNUM Co., Ltd.



The United States

JNC AMERICA, Inc.  
JNC NORTH AMERICAN Corp.  
ES FIBERVISIONS LP



Thailand

JNC NONWOVENS (THAILAND) Co., Ltd.  
THAI NISSHO TRADING CO., LTD.

# JNC株式会社

2013~2015

## N C - S C R U M

New Centenary - Sustainable Chemical company with Revolutionary Unique Materials  
優れた技術で、社会の進歩に貢献する先端化学企業

1

事業ポートフォリオの変革

2

グローバルな事業展開



新規事業・製品開発

4

事業提携とM&Aの積極的推進



競争力極大化のための生産技術革新

# JNCの製品



# Research and development policy

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- **Review of research and development system**

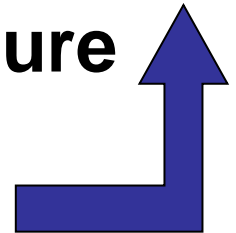
- **Cooperation with productive technique**



- Competitive edge improvement of productive technique
- New productive technique establishment
- Manufacturing reduction in costs

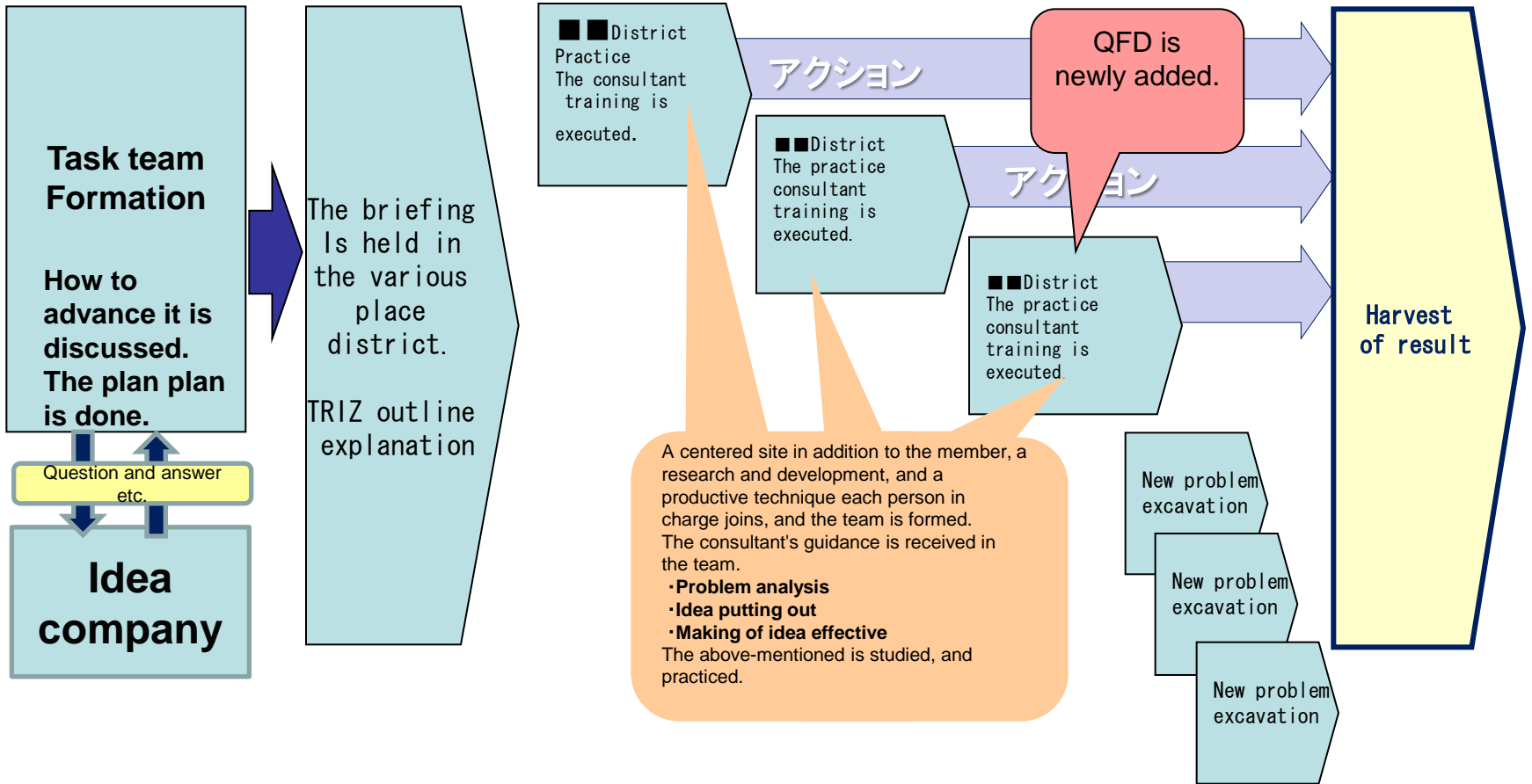
- **Research and development infrastructure**

- **Introduction examination of development supporting tool (TRIZ)**



It goes ahead of the competitor, the new method (tool) is taken, and the competitive edge strengthening and the personnel training are aimed at.

# TRIZ introduction action





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## **Result case**

# **Porous flat membrane experimental device**

# Member composition

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- **Manager of headquarters R&D section** **One person**
- **Manager of headquarters production technology section** **One person**
- **Leader of charge research group** **One person**
- **Charge researcher** **Six people**

# Problem

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- The porous flat membrane is developed.

The film of a small area was made handmade at the search early stage.

- ◆ Film of large area (length scale)
- ◆ Film thickness of various conditions
- ◆ Various processing (≡ Hardening treatment)

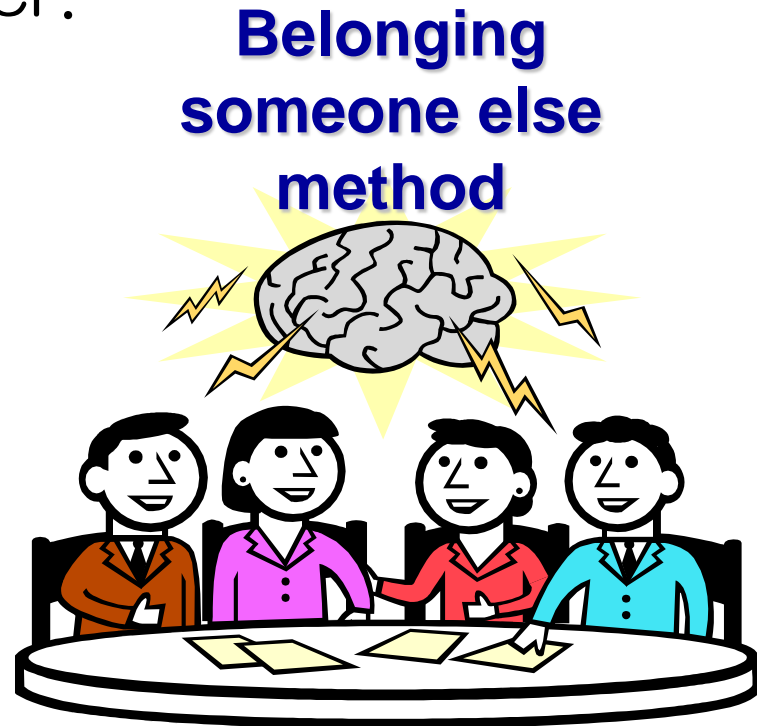
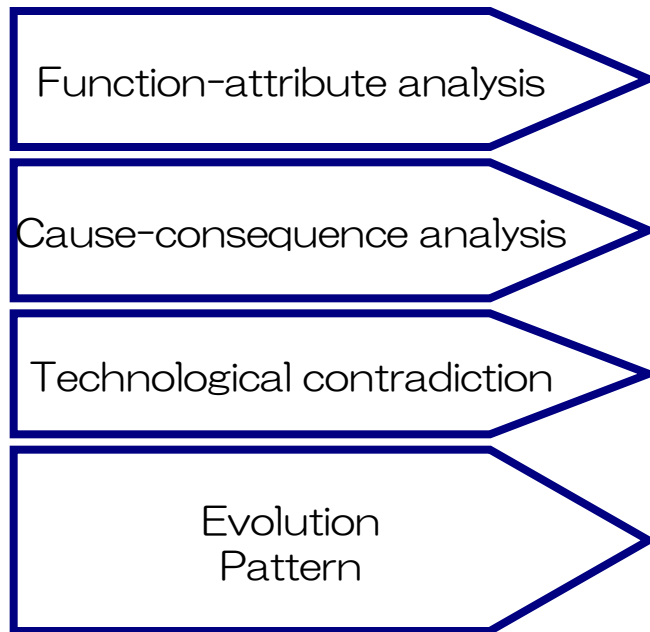
The porous flat membrane experimental device is designed.

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# Sharing of information among members

Brainstorming along technique of TRIZ  
The output is tag paper.

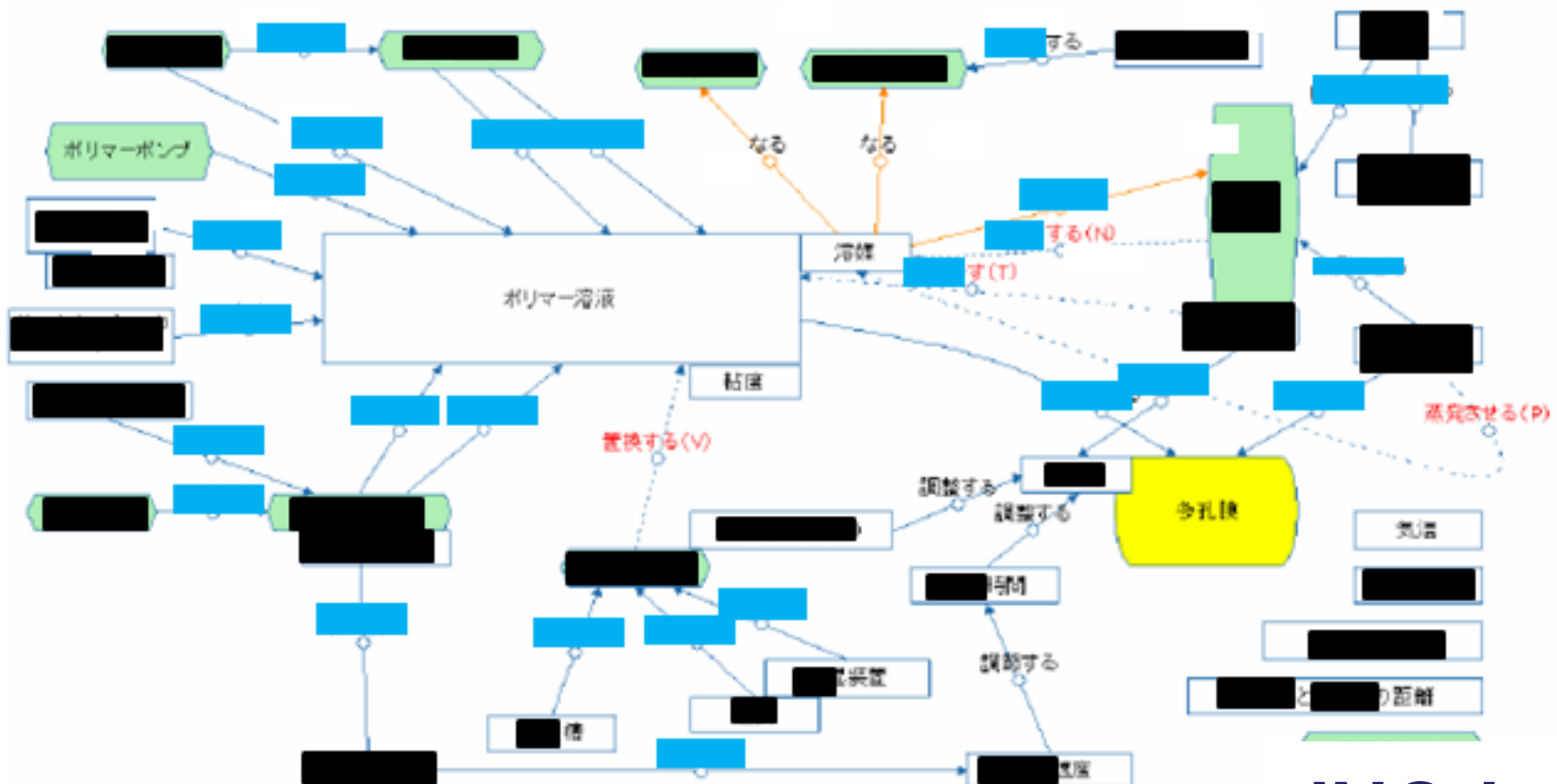


Function-attribute analysis

The relation of the present system element is clarified.

目的: システム全体構造を要素間の機能連鎖で分析し、問題を起こしている部分を明確化する。

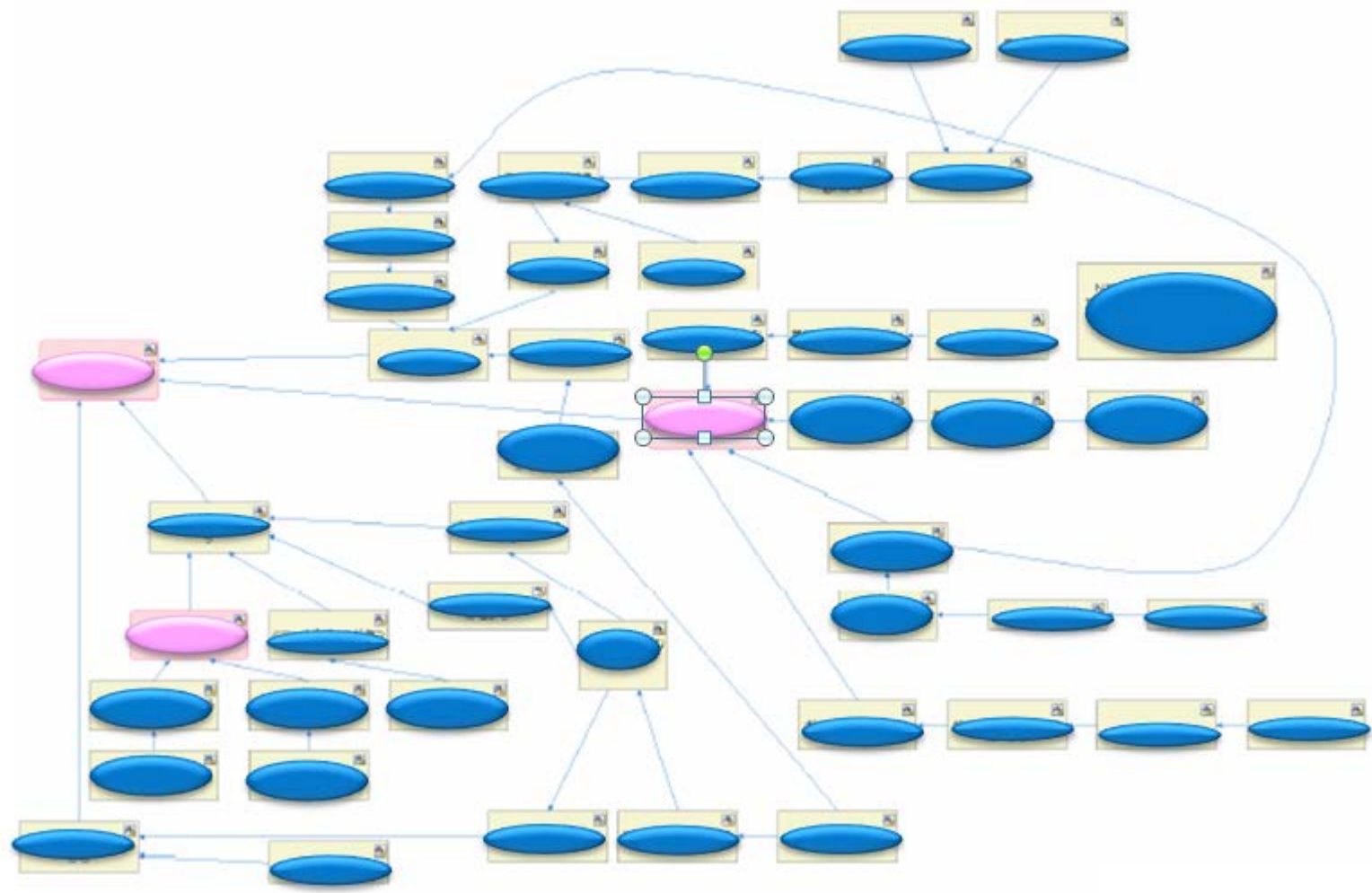
## 機能モデル



Cause-consequence analysis

The cause and the result of the problem are clarified.

目的:問題を起こしている要因を、原因と結果の関係で分析し、根本的な要因を明確化する。



# From development with technological contradiction to the invention principle

## Development example

### Primary cause

The place to be put ●● is small.



### Development with technological contradiction

small. ●● → ●● and ■■ Distance  
 → ▲▲ Distance

large. ●● → ●● and ■■ Distance  
 → ▲▲ Distance

*The relation of the trade-off is found.*

### Invention principle

- 14. Curved surface principle
- 35. Parameter change principle
- 2. Separation principle
- 3. Locality quality principle

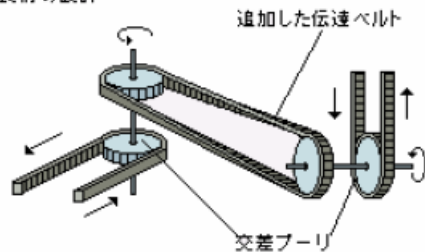
# Idea creation from invention principle

## Example of creating idea

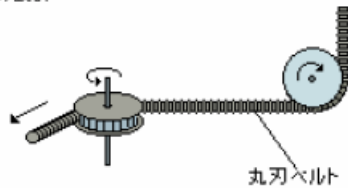
発明原理14: 曲面原理

Goldfire掲載のアイデア

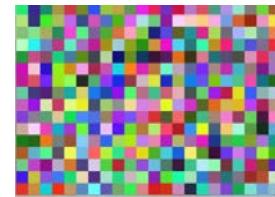
改良前の設計



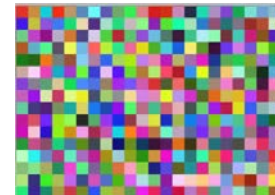
改良後の設計



Idea created from curved surface principle



●● It extends by doing.



■ ■ is piled up.  
▲ ▲ It enables it.



◆ ◆ It keeps movable.  
× × The change is enabled.

163 idea total from invention principle



## Idea creation from other techniques

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- ◆ Idea creation from "Pattern of evolution"
- ◆ **Idea creation from "Ultimate ideal solution"**
- ◆ **Idea creation from SLP (personification)**

**Total of final idea; 350**

## Arrangement/classification of created idea

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**350 ideas were classified by the purpose.**  
**The overlapping idea extracted the idea that seemed the arrangement, and high utility it, and designed "Subsystem".**



### **Classified idea :**

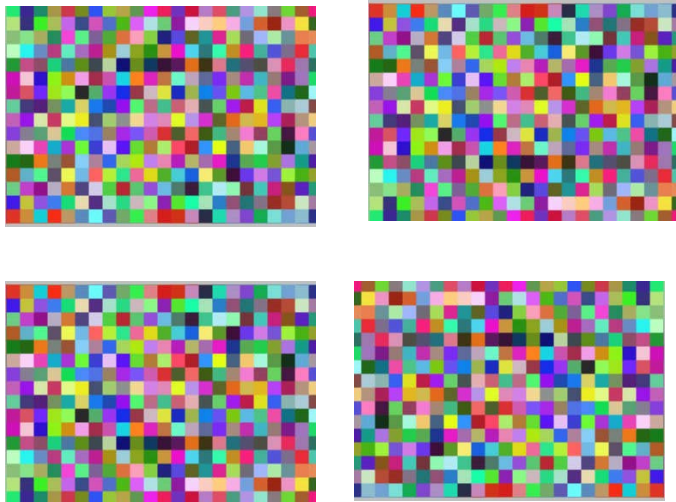
One idea in one tag sheet of paper it  
The Mozoushi1 piece corresponds to "Subsystem".

# Selection of concept of "Subsystem"

## Subsystem case

●● It can be a short cut doing at time.

■ ■ is long ▲ ▲ Subsystem



**Classified idea:**

●● Only when you want to do、  
× × It does. ▲ ▲ Length It earns it.

The idea was extracted to about 60 pieces, it arranged, and it brought it together in "Subsystem" of 21.

# Evaluation and concept making of "Subsystem"

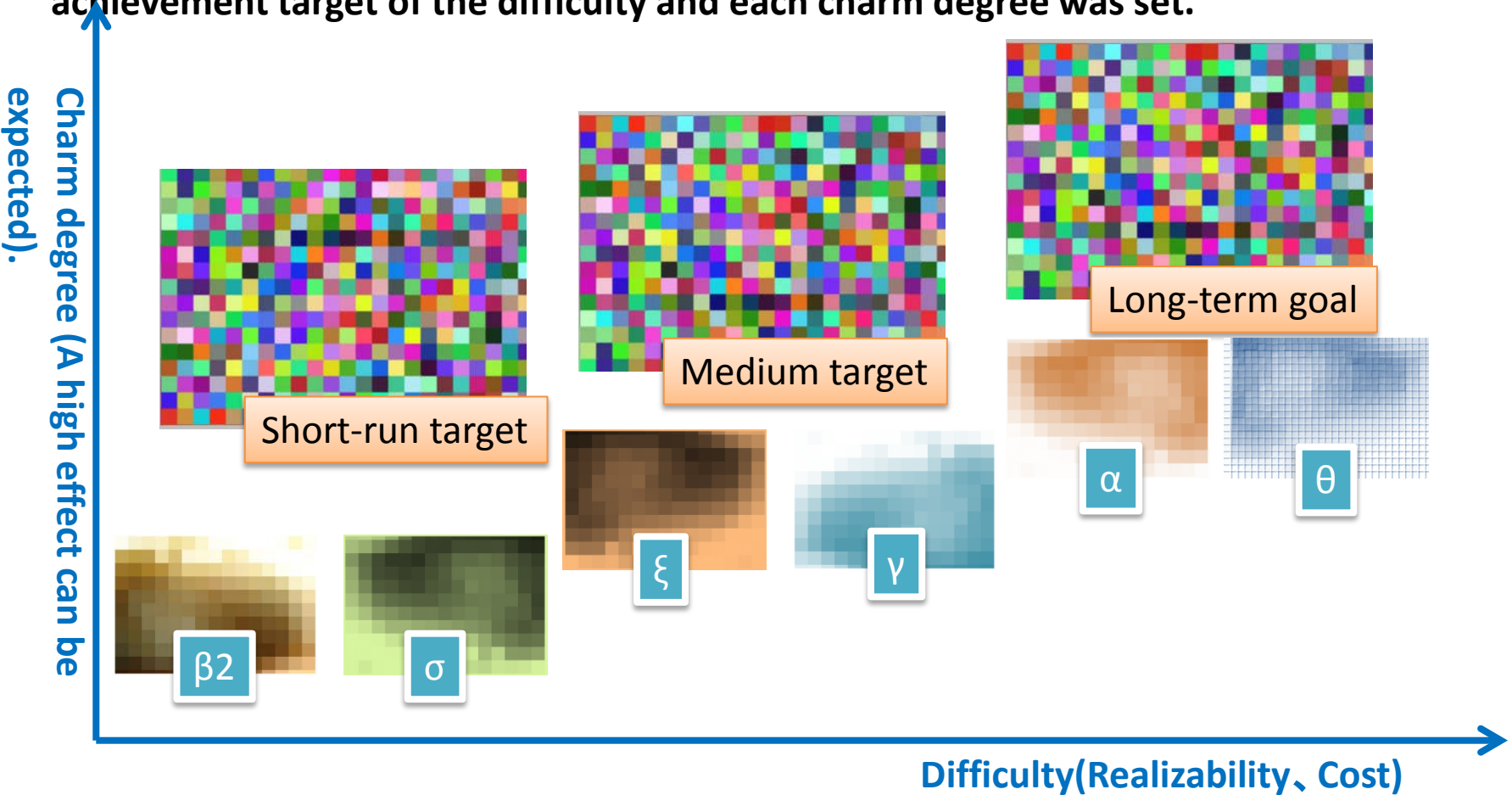
- ◆ The presence to the target characteristic (forecast) of each "Subsystem" in the effect was evaluated.
- ◆ A whole system is designed thinking about the combination of "Subsystem" for the balance of the positive and negative in the effect.

現状品に対しての相対的な性能評価      影響なし:※、特に効果あり:+、効果あり:S、逆効果:-

サブシステムの説明		[Redacted]						全体システムのコンセプト									
当面の目標値	> [Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	α	β	γ	δ	η	ι	ζ	θ	φ	ω
サブA-1	[Redacted]化	S	+	※	※	S	S										
サブA-2	[Redacted]調整	S	+	※	※	S	S										
サブB-1	[Redacted]処理	S	S	S	-	S	※	○				○					
サブC-1	[Redacted]付ける	※	※	※	+	※	※						○				
サブC-2	[Redacted]組み合わせ	※	+	S	※	S	※	○		◎							
サブD-1	[Redacted]御	※	+	S	-	※	※						◎				
サブD-2	[Redacted]にする	※	+	S	-	※	※								◎	○	
サブD-3	[Redacted]簡略化	※	S	※	+	※	※			○				○	○		
サブE-1	[Redacted]	※	+	S	-	※	※						○				
サブE-2	[Redacted]システム	S	+	S	S	※	※	○					○	○			
サブF-1	[Redacted]する	S	※	+	-	※	+		○		◎				○		
サブF-2	[Redacted]する	S	※	+	-	※	+										
サブG-1	[Redacted]	+	※	S	※	※	+	◎									
サブG-2	[Redacted]	S	※	S	※	※	+			○						○	
サブG-3	[Redacted]	S	※	+	-	※	+		○					◎	○		
サブH-1	[Redacted]形状を工夫1	+	※	S	-	※	+					○					
サブH-2	[Redacted]工夫2	+	※	S	-	※	+					○					
サブI-1	[Redacted]乾燥	※	※	※	-	+	※										
サブI-2	[Redacted]	+	※	S	+	+	+	◎	○			○		○		○	
サブI-3	[Redacted]	※	※	※	S	+	※				◎						
サブJ-1	[Redacted]乾燥	※	※	※	S	+	※										

# Mapping of whole system "

A whole system was set and a mapping wearing, short-term, mid-term, long-term achievement target of the difficulty and each charm degree was set.

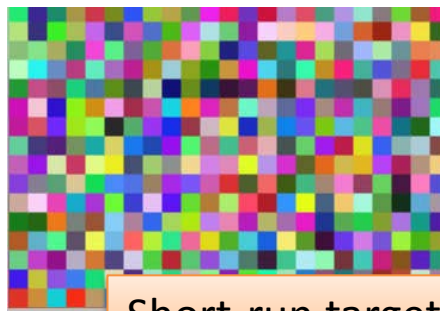


# Achievement of short-run target

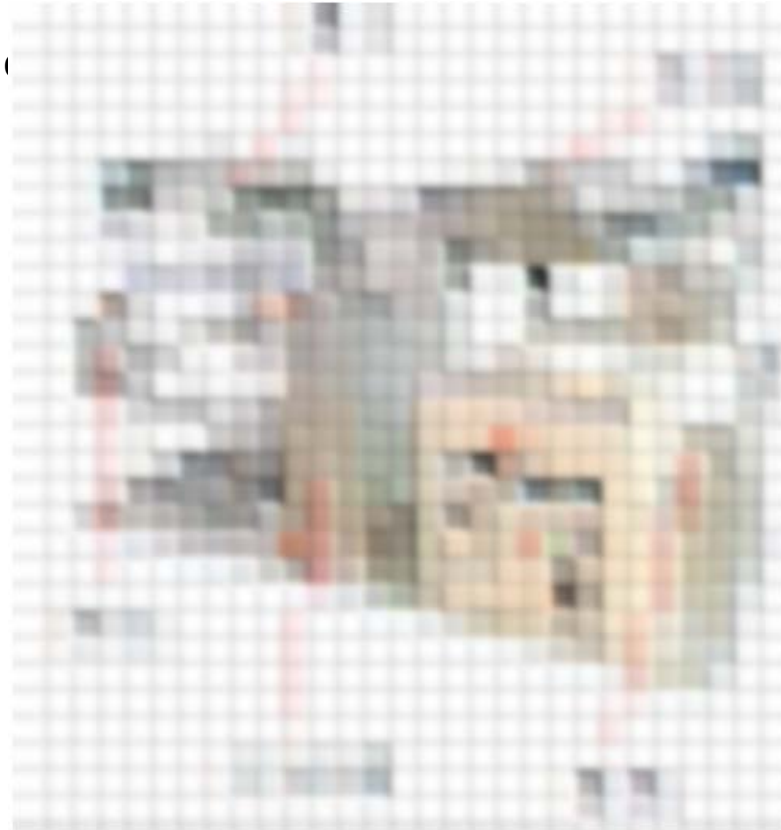
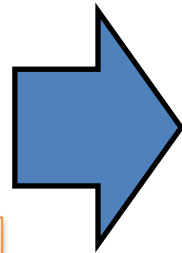
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Prototype completion After the moon



Short-run target



# Achievement of short-run target

## Advanced street liquid MF Film

(Sample work inside)

### Feature:

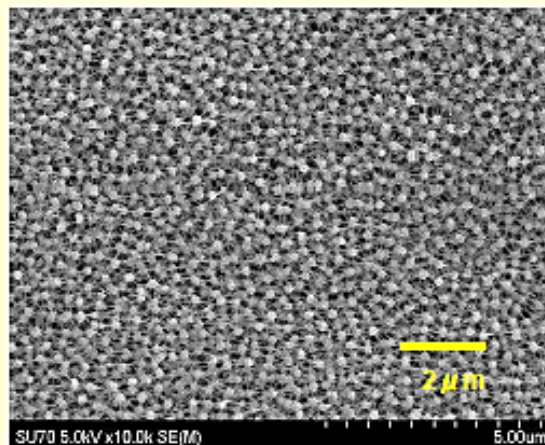
- Uniform, minute porous structure and high demarcation that originates in it
- High street liquid and permeability
- Chemical resistance and heatproof
- Fouling-proof

Material: PVDF/base material PET unweaved cloth

Shape: The surface is a three-dimensional reticulation structure minutely controlled.

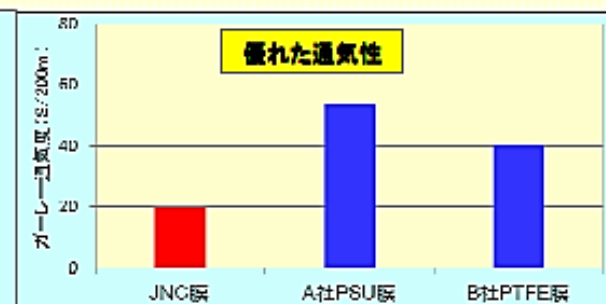
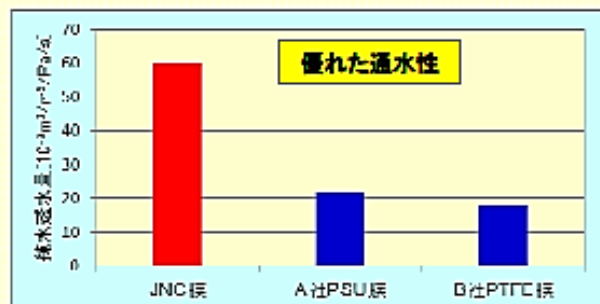
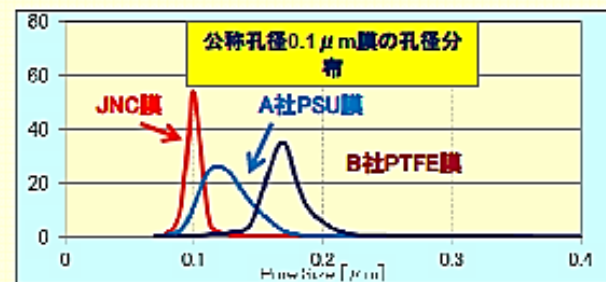


Image

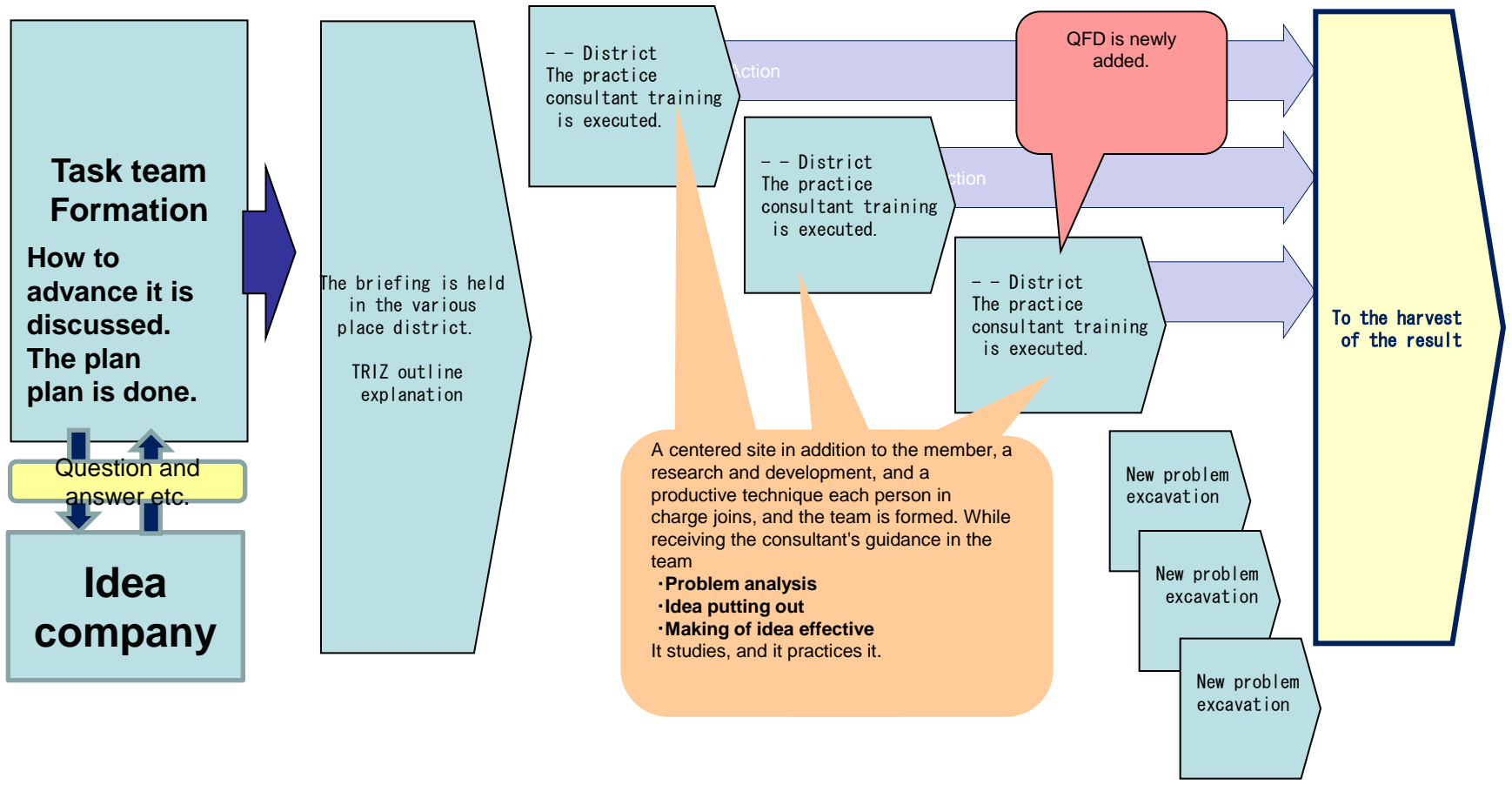


(JNC膜の性能)

平均孔径	純水透過量 [ $10^{-3} \text{m}^3/\text{m}^2/\text{Pa}/\text{s}$ ]	ガーレー通気度 [S/200ml]
0.1 $\mu\text{m}$	60	20
0.2 $\mu\text{m}$	130	8
0.3 $\mu\text{m}$	200	5



# TRIZ introduction action

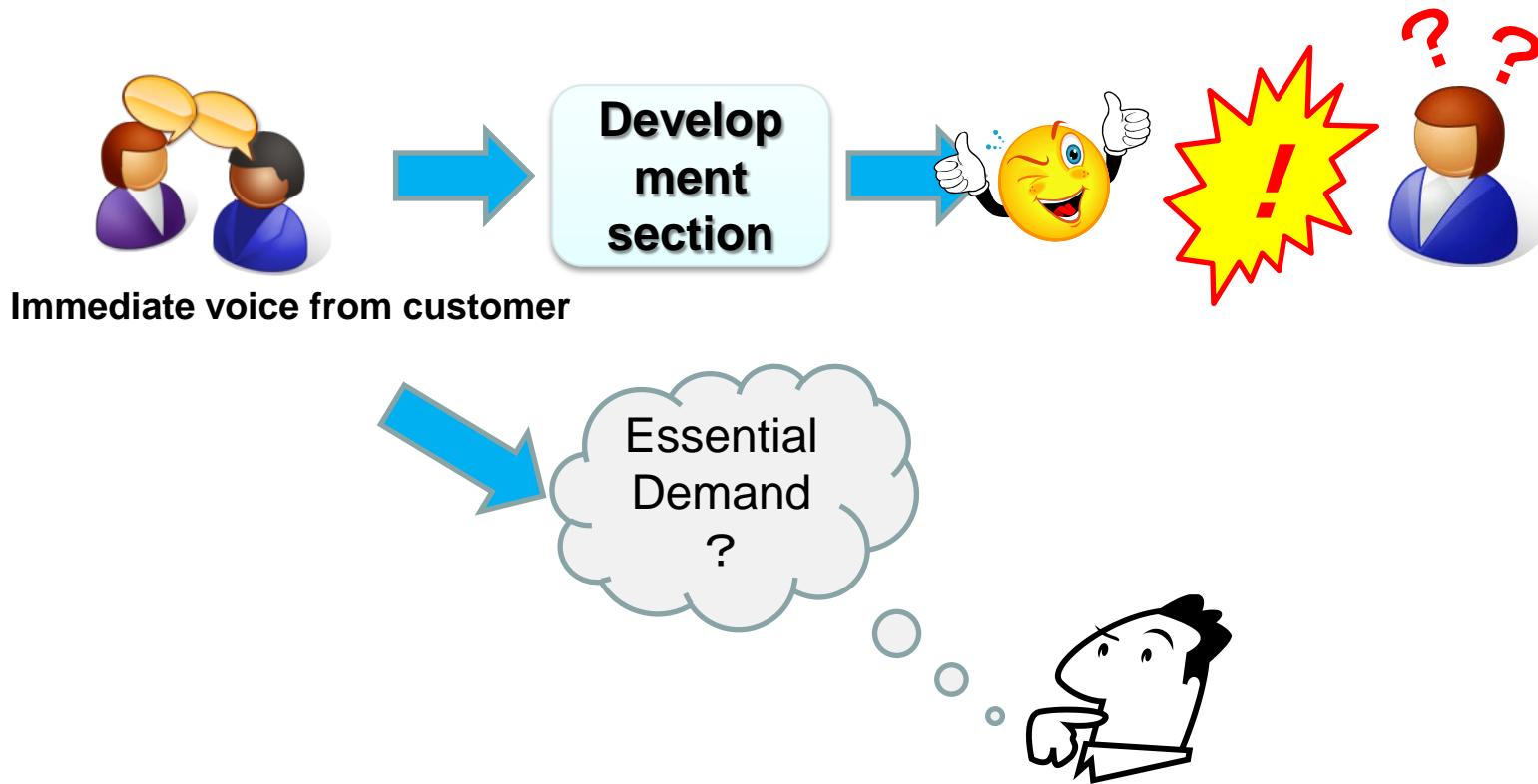




# TRIZ practice case 1

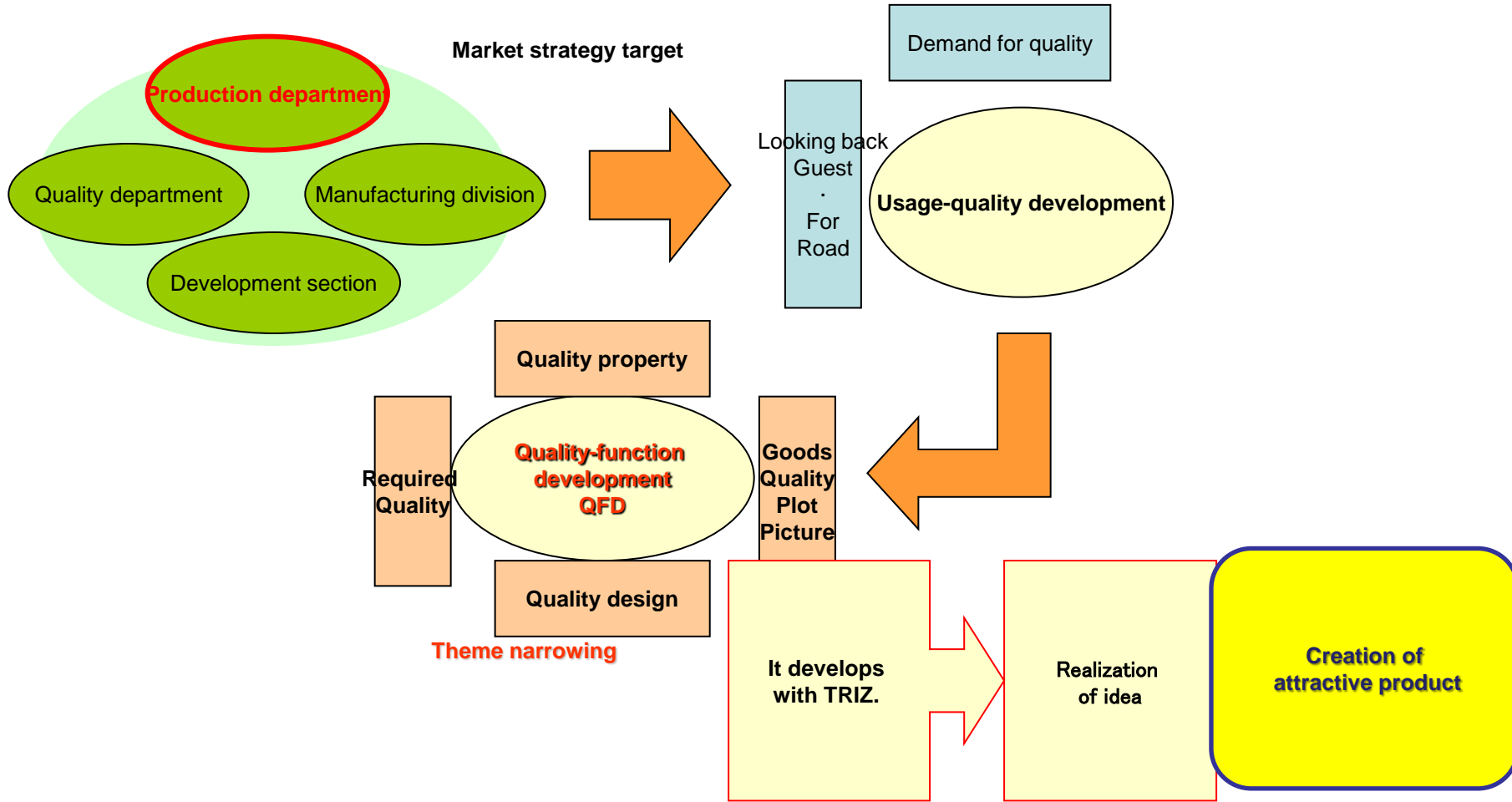
## In meeting with the executive of the business section

- Is the theme held now a theme that the customer is really demanding?
- What one is "Sell" product?

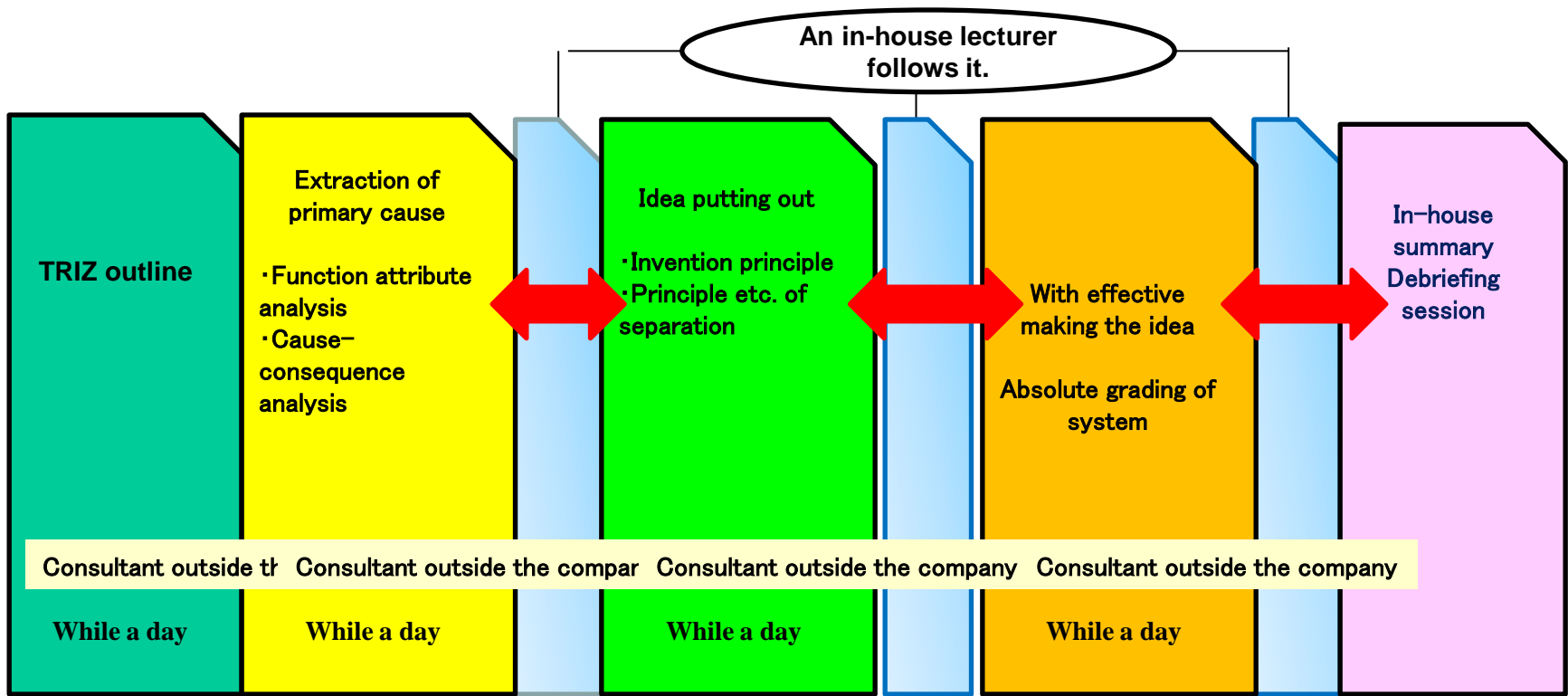


# QFD

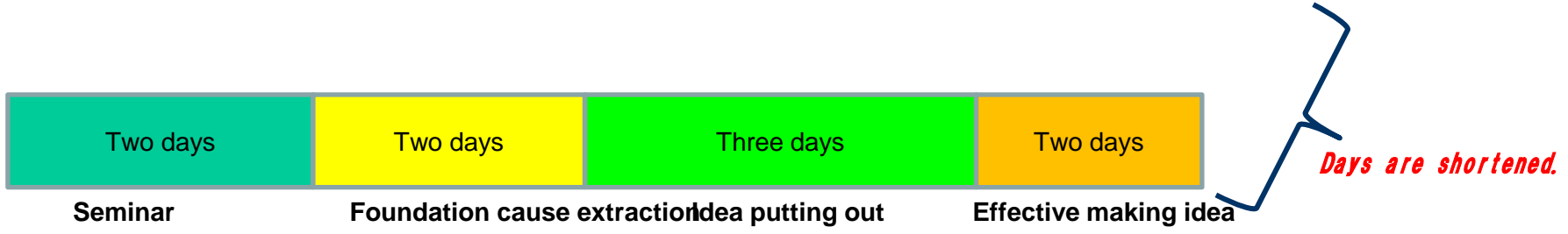
(Quality Function Deployment)



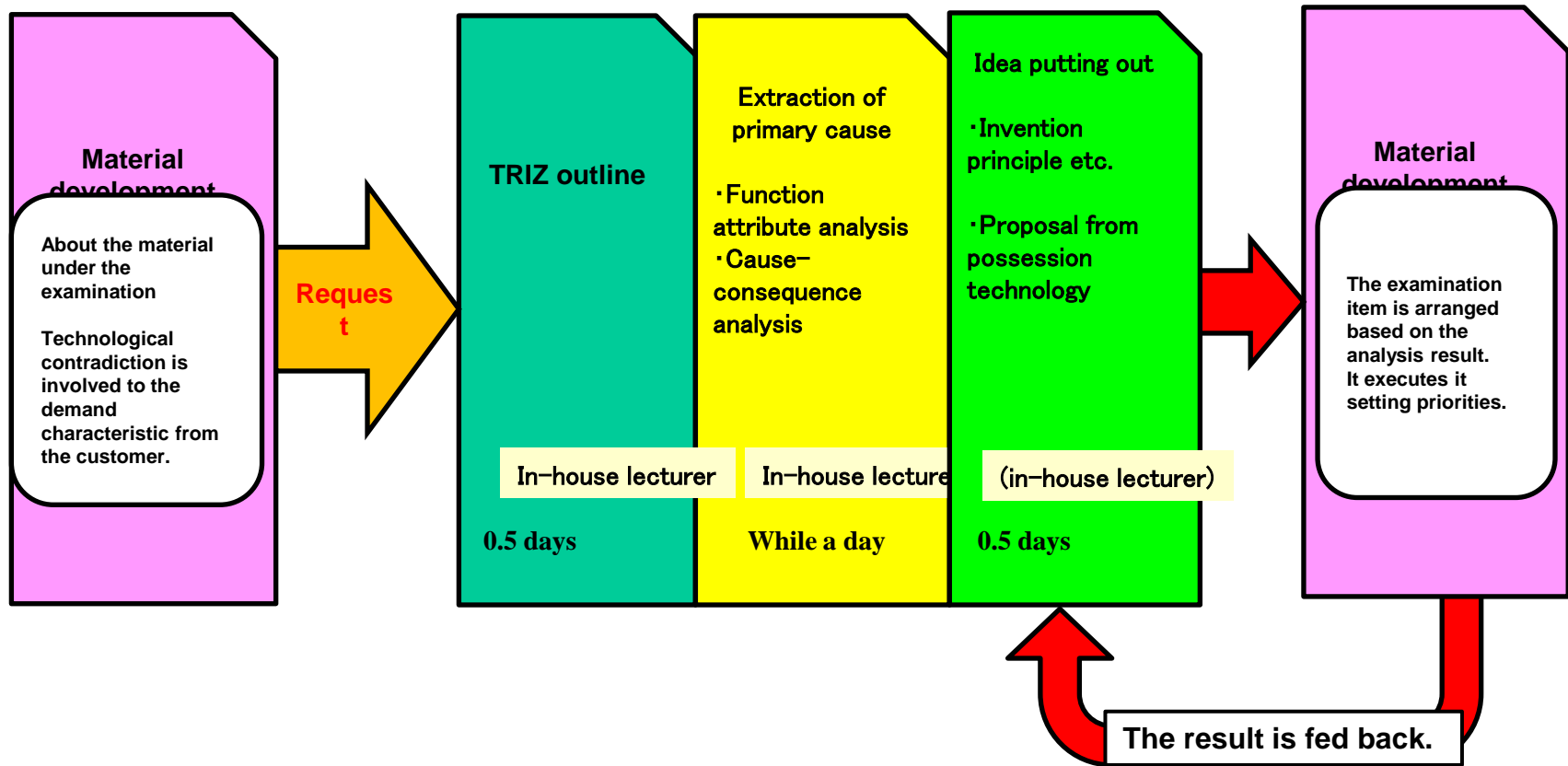
# TRIZ practice flow case 1



The past



# TRIZ practice flow case2



Last year's announcement

# TRIZ is introduced.

- Attribute analysis and cause function—The entire problem can share understanding because all project members execute the consequence analysis.
- By using Goldfire, The hint from the knowledge base like the invention principle etc. supports the idea putting out.
- The member's sympathy is obtained for the solution. ◦
- The member with a shallow experience is connected bottom-up.
- Time (training) is necessary for the technique acquisition. The in-house consultant's (specialist) promotion is preferable.
- Results of a machine and an electric electron system device are many. The improvement (read in a different way) matched to the chemistry or more system is being examined. ◦

It uses it for the improvement activity of the office.

Last year's announcement

# Approach in fiscal year 2013

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- The post that has a device or more and processed process in all companies is selected as "Object office".
- "Desire" as the post is valued. A strong will of the executive class was confirmed centering on the top.
- Beginning from "QFD" first of all. The extraction and the arrangement of the customer needs are executed centering on the production department.
- Enthusiastic "Theme" (It is said that it was sure to sell if this was able to be achieved (Will sell it)) was able to hang.
- The technique for the problem solving is used. (TRIZ, Taguchi Method ...).

# Do in fiscal year 2014?

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- The member understands an individual problem of holding it by ..function.. using the attribute analysis and the cause result analysis and it uses it as a tool that shares.
- Goldfire is used more as a tool of the idea putting out.
- Time (training) is necessary for the technique acquisition. The scene to be used repeatedly is understood and followed.
- Avoid the training of a long term, and in pinpoint guidance.
- An in-house consultant is effective. It is necessary to promote it.
- The improvement (read in a different way) matched to the chemistry or more system is being examined.
- It concentrates on "Spread (well-known) activity" and "Roundsman".

# Address of thanks

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Idea Ltd.

**Mamoru Zenko President**

**Hjime Kasai**

**Masahiro Kuwahara**

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**JNC Ltd.**