

# An In-company innovation promotion activity that uses QFD-TRIZ (sequel)

~ Towards the tire product development of "Surprise" and  
the construction of infrastructure  
for the "Innovative" technological development power ~

**【 the 13th Japanese TRIZ symposium 2017】**

**2017/09/22 (Friday)**  
**J09 (A Hall 14 : 00~14 : 25)**

The Toyo Rubber Industry Co., Ltd.  
The first headquarters of technology  
Tire early technology development department  
Design investigation and technological project group  
Naoto Kashihara, Kazuhiro Sakakibara

## Outline of announcement (contents)

- 1. Company introduction**
- 2. Tire technology introduction**
- 3. In-house innovation promotion**
- 4. Attention point**
- 5. Device point ① (problem setting)**
- 6. Device point ② (cause analysis)**
- 7. Peroration**

# 1.1 Company introduction: Outline

**Trade name** Toyo Tire & Rubber Co., Ltd.

Sales ratio according to business (period on December, 2016)

**Establishment** August 1, 1945

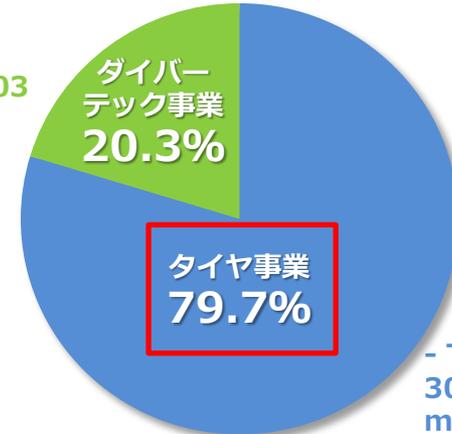
**The capital** 30,484,627,991 yen

**The stocks total** 127,179,073 stocks

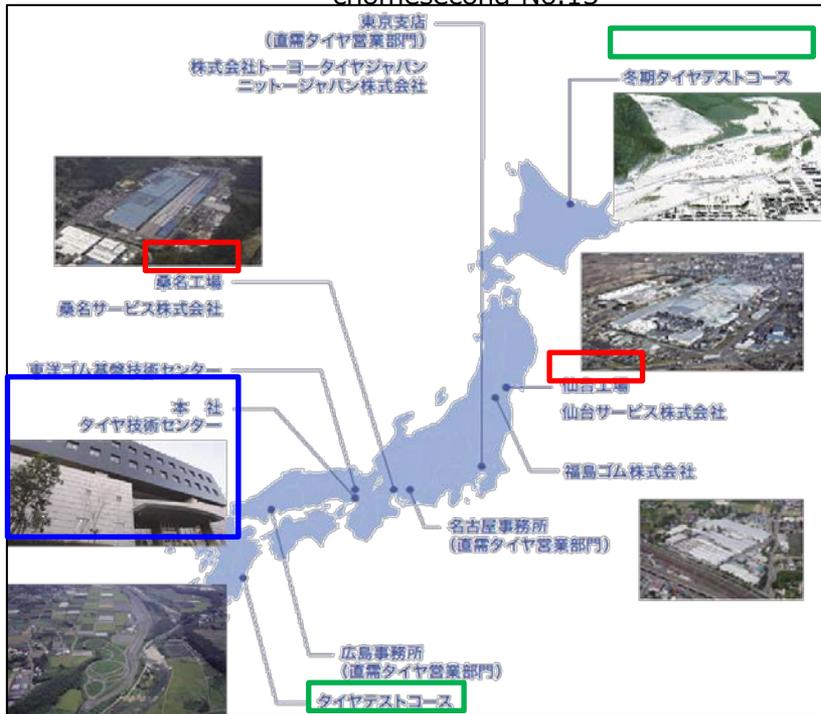
**Number of employees** (connection) 11,684 people

**Headquarters** 〒664-0847 Hyogo Prefecture Itami City wistaria [no] tree 2 chomesecond No.13

■ Diver Tec  
77 billion 503 million yen



- Tire  
303 billion 878 million yen



It centers on parts for the tire and the car, and the global expansion from a domestic technological base.

# 1.2 Company introduction: About the tire business

## Three branding strategies



## Technological concept



**In the tire, is there a surprise?**

CS(Customer satisfaction)⇒CD(Customer impression)

It is unique conception power and an innovation.

## Example of commodity lineup

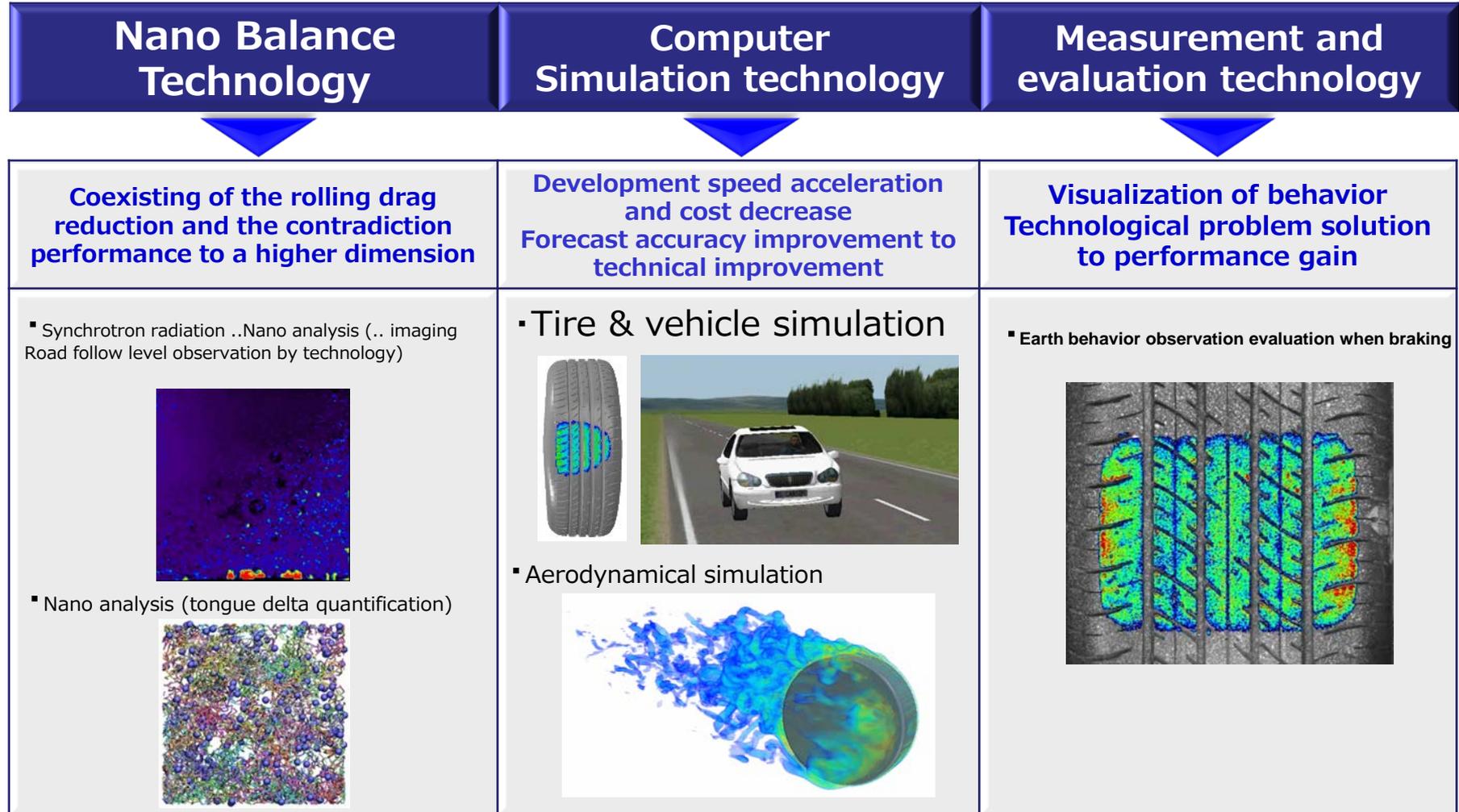
<b>Minivan exclusive use</b>	<b>Sporty</b>	<b>Low fuel cost</b>
<b>Pickup truck</b>	<b>studless tire</b>	<b>Track bus</b>

## Business form

- Goods on the market tire ⇒ BtoC
- Tire for new car ⇒ BtoB

**An approach (innovation) different from the past is necessary to offer the customer "Surprise".**

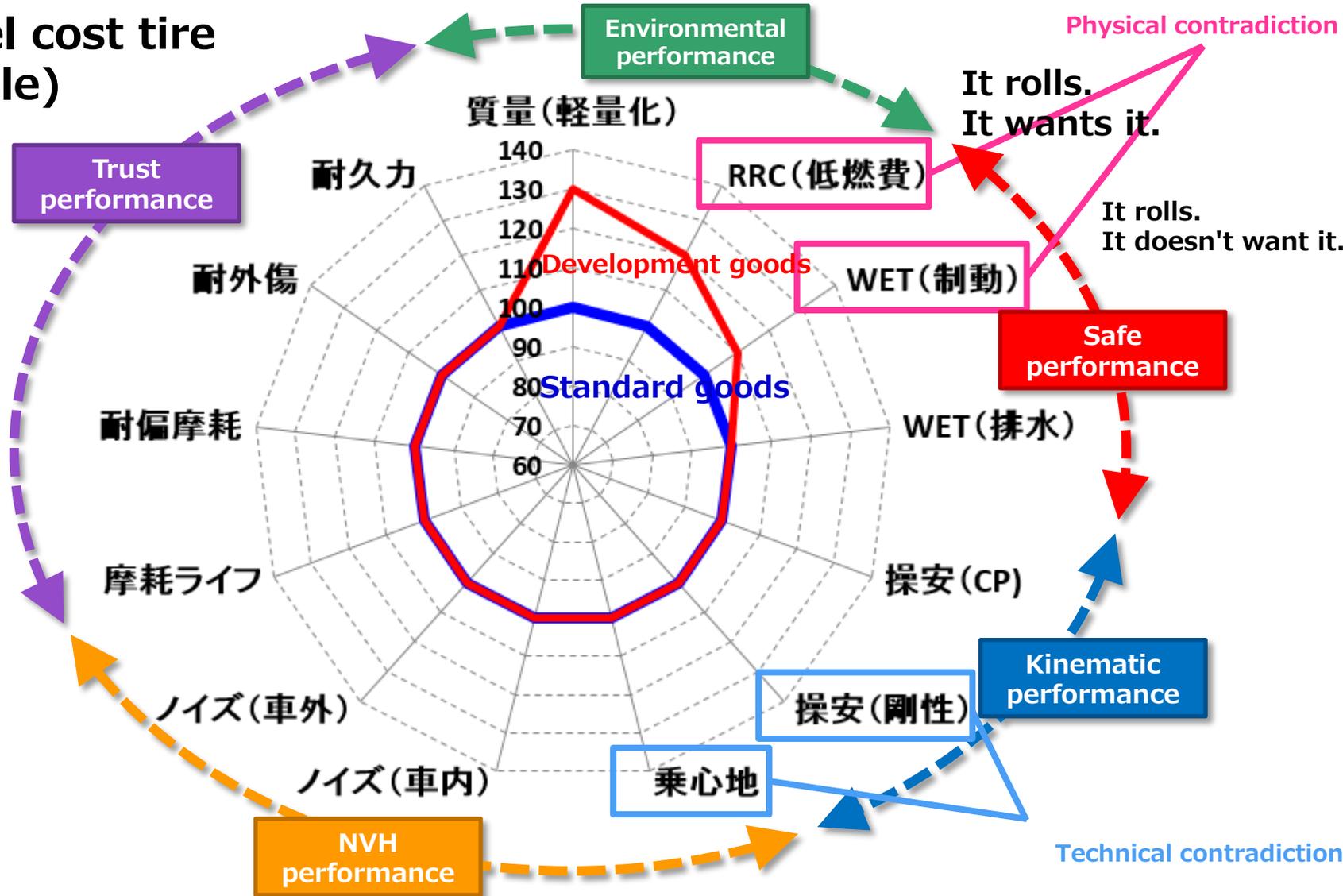
## Introduction of tire design base technology



**The contradiction breakthrough element technology is developed by strengthening a basic technology, and it applies to the commodity.**

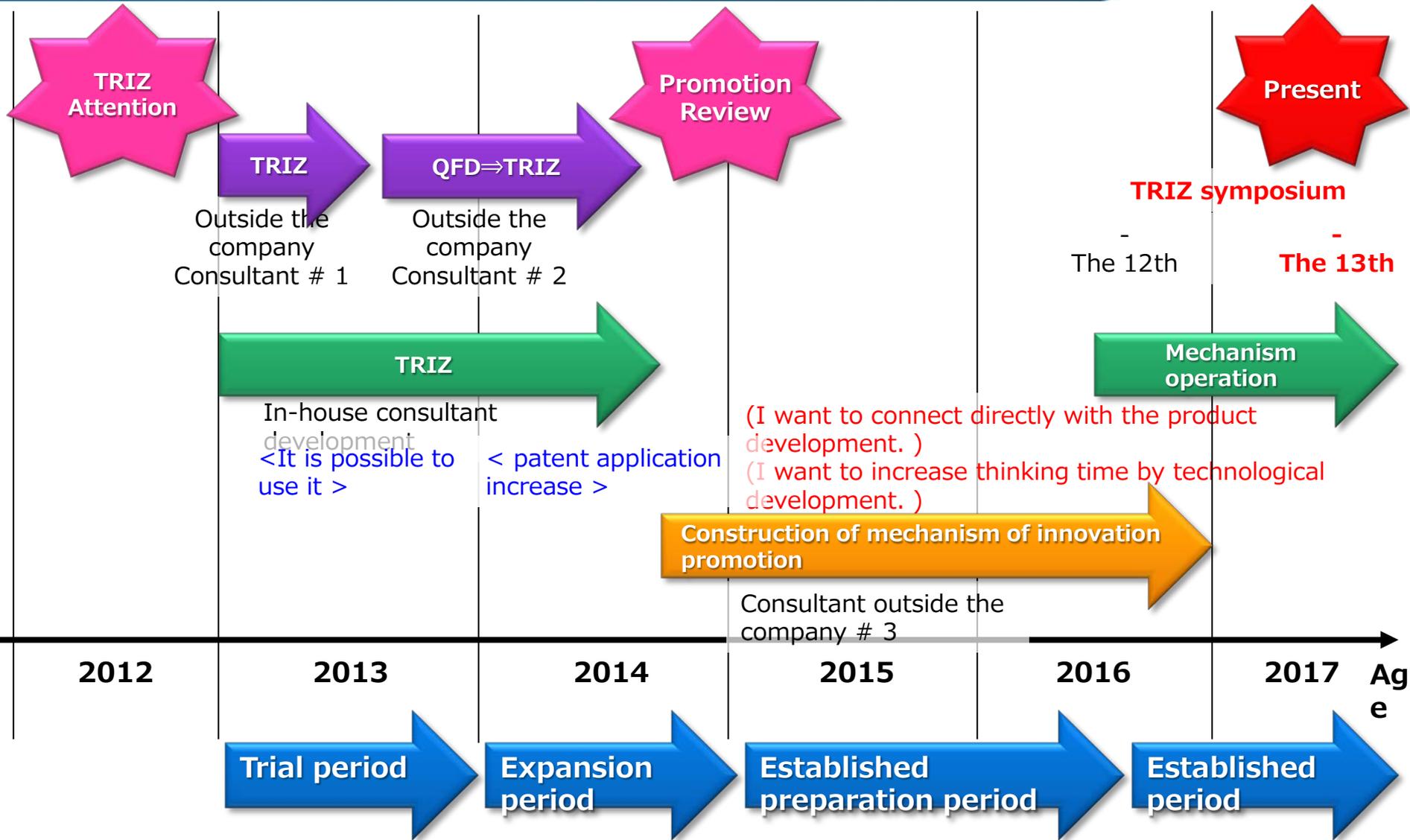
## 2.2 Tire technology introduction: Contradiction overcoming design

### Low fuel cost tire (example)



An effective, efficient problem solution is necessary for the tire technology development covered with contradiction. ⇒TRIZ is effective.

# 3.1 In-house innovation promotion: Activity details



**An in-house innovation that uses QFD/TRIZ is voluntarily practiced, and it develops while trying and erring.**

# 3.2 In-house innovation promotion: System chart

Current year

Last year

■ Mechanism system corresponding to problem solution scene

Application list Problem solution Scene	Mechanism (solution tool)					Software effective use (thinking time an increase)	
	Theme Setting	Problem Setting	Cause Analysis	Idea Conception	Idea Summary	Knowledge retrieval GF	Patent analysis BC
Needs search	(QFD)	-	-	-	-	-	-
Product planning	(QFD)	-	-	-	-	-	-
Trend survey	-	-	-	-	-	-	-
Technological project	-	-	-	-	-	-	-
Pure research (long term)	-	-	-	-	-	-	-
Early development (middle term)	-	-	-	-	-	-	-
Product development (short term)	-	-	-	-	-	-	-
Patent application	-	-	-	-	-	-	-
Quality improvement	-	-	-	-	-	-	-
VE	-	-	-	-	-	-	-

**In mid-term early technology development, the problem essence making (It is process in front of TRIZ) is important and recognizes it again.**

# 4.1 Attention point: Problem of each development term

Short-term theme (one ..~.. year)  
< product development >

It applies to the commodity.

It introduces it in the symposium of last year.

**QFD**

Customer needs ⇒ quality characteristic

Optimum design estimate  
(optimization of existing technology)

The lack performance is a problem.

Cause analysis

Mid-term theme (four ..~.. years)  
< early technology development >

Development of elemental technology

- Introduction \* at current year

Appropriate  
The problem setting is important.

**Even if it is too wide**  
**Even if it is too narrow**

Correct perception about the present state of affairs  
Adequate goal setting

**NG!**

Long-term theme (ten ..~.. years)  
< research >

Pure research and basic technology

- Needs search
- Bench mark
- Mechanism study

⋮

The problem  
It is not provided.  
(degree of freedom  
high [i])

**In each development term, the problem setting by a correct perception about the present state of affairs and an adequate goal setting is important.**

## 4.2 Attention point: Device of problem

### ■ Problem solution approach process

#### 【Example of the one-making】 Manufacturing process of tire (bread)

Material preparation  
Adjustment and  
mixing

**The former  
process**

It is  
construction.

**This process**

Baking  
Finish

**Post-  
processing**

**Problem setting**

⇒ Device point ①

**Idea conception**

**Idea summary**

**Functional assay**

**Cause analysis**

⇒ Device point ②

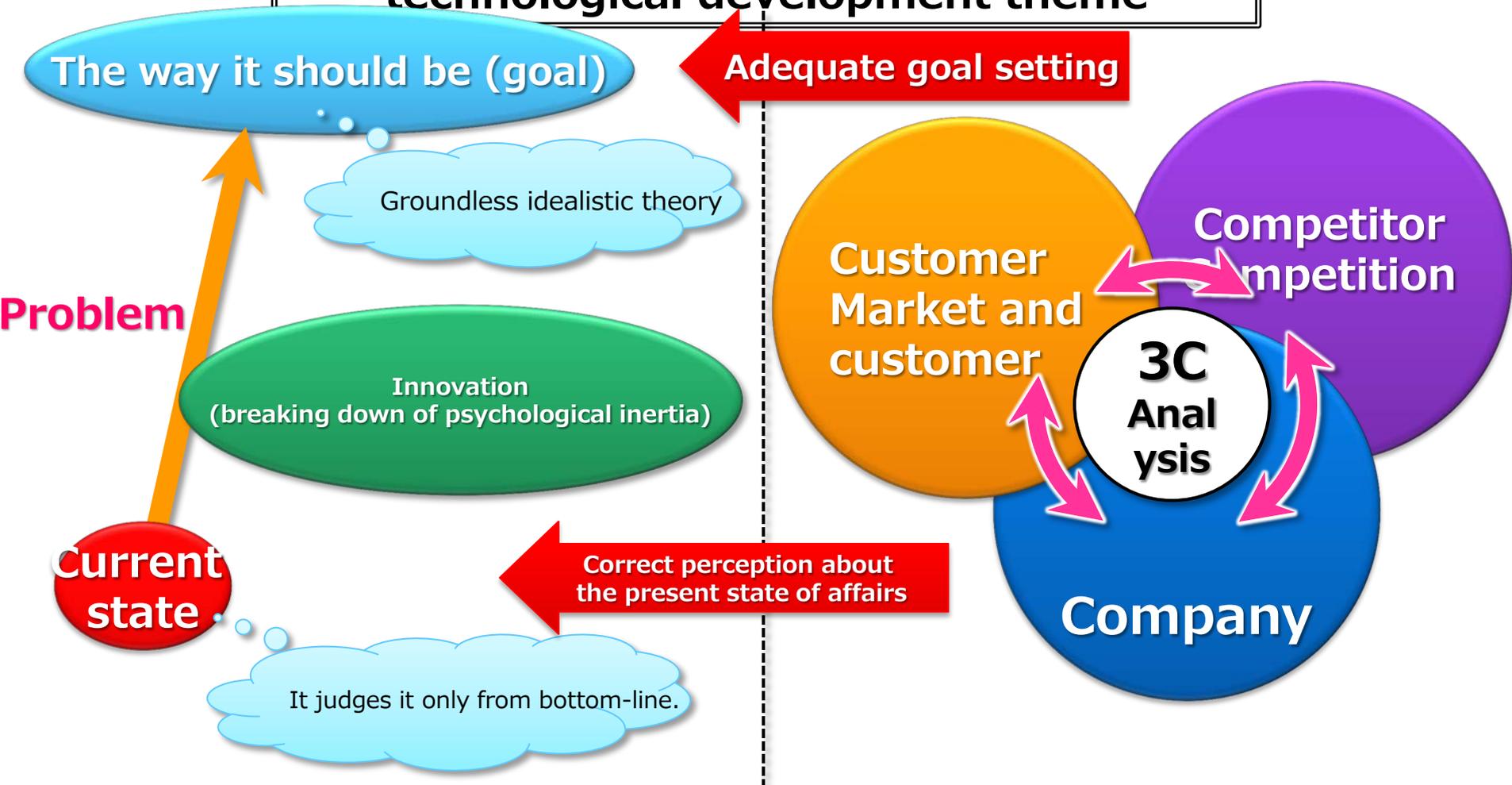
**(The importance)**

#### 【Example of applying TRIZ】 Approach process of problem solution

**It introduces the device point in the problem setting and the cause analysis in mid-term early technology development.**

# 5.1 Device point①(Problem setting) : Setting method

**Setting of problem of mid-term, technological development theme**



**The perception about the present state of affairs and the goal setting that uses 3C analysis are effective for an appropriate problem setting.**

It doesn't transmit even if talking about a general outline  
(It is not interesting).

However, practicing application experience cannot talk  
about the secret.

'Shoes' is made a theme there, and it introduces it concretely.  
("Jar" case with Olympus Co. material...)

Fact: Longevity contracts when a part of the shoe sole decreases extremely.  
(It is a complaint when falling below customer's expected value.)

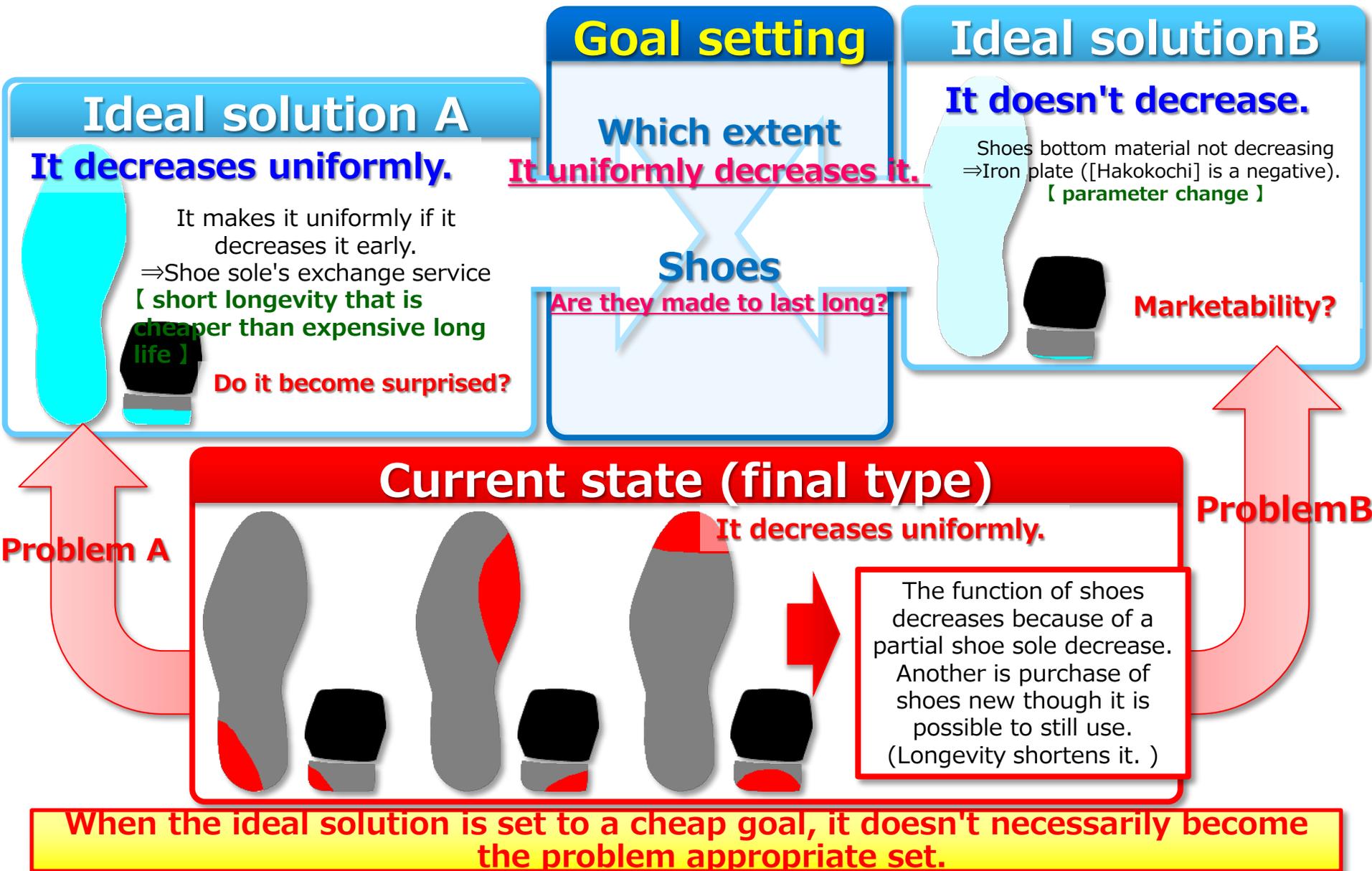
⇒ Why does the shoe sole decrease uniformly?

⇒ Why it so? = Current observation (why so?)

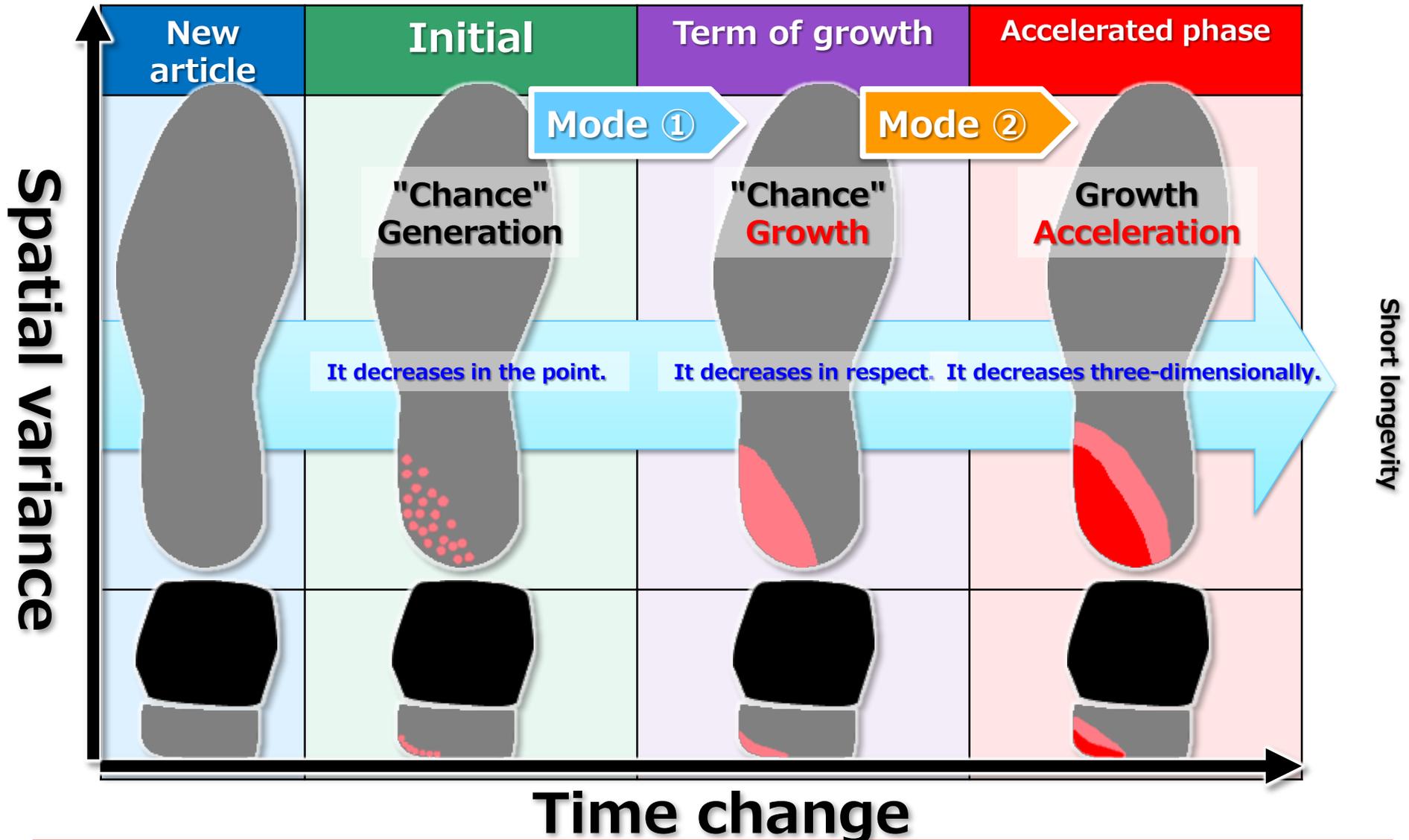


**It introduces it concretely and plainly by not practicing application  
experience but theme "Shoes".**

# 5.3 Device point①(Problem setting) : Goal setting

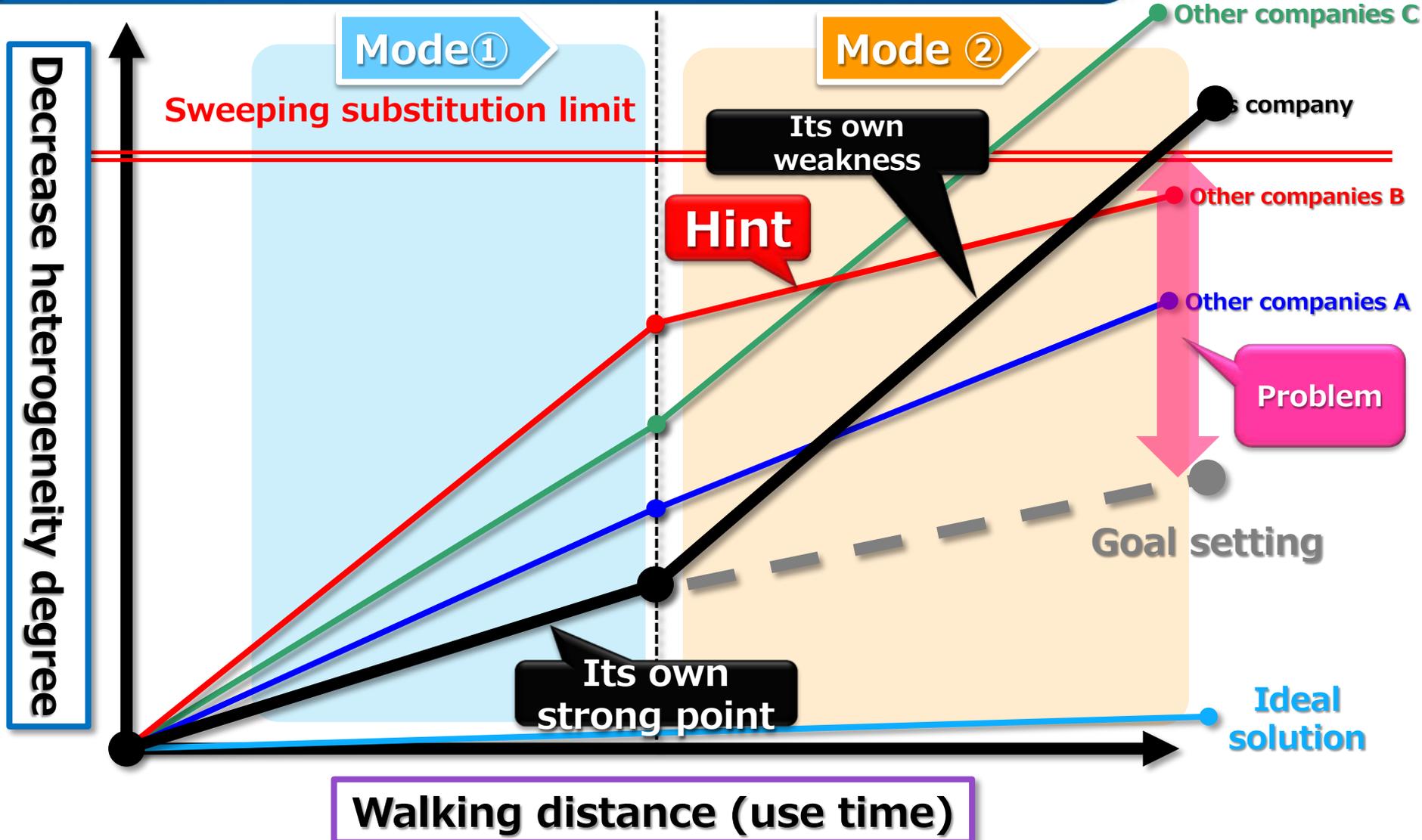


# 5.4 Device point①(Problem setting) : Perception about the present state of affairs



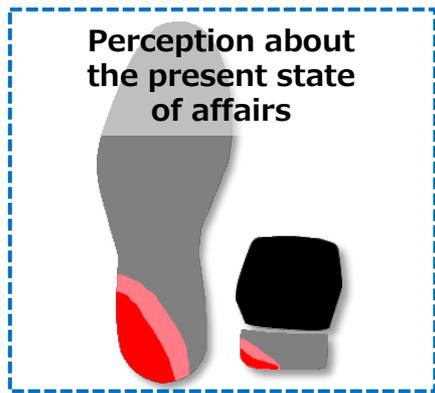
Correctly it observes and it analyzes it without recognizing the current state only by the final type, and dividing into time and the space.

# 5.5 Device point①(Problem setting) : Appropriate problem



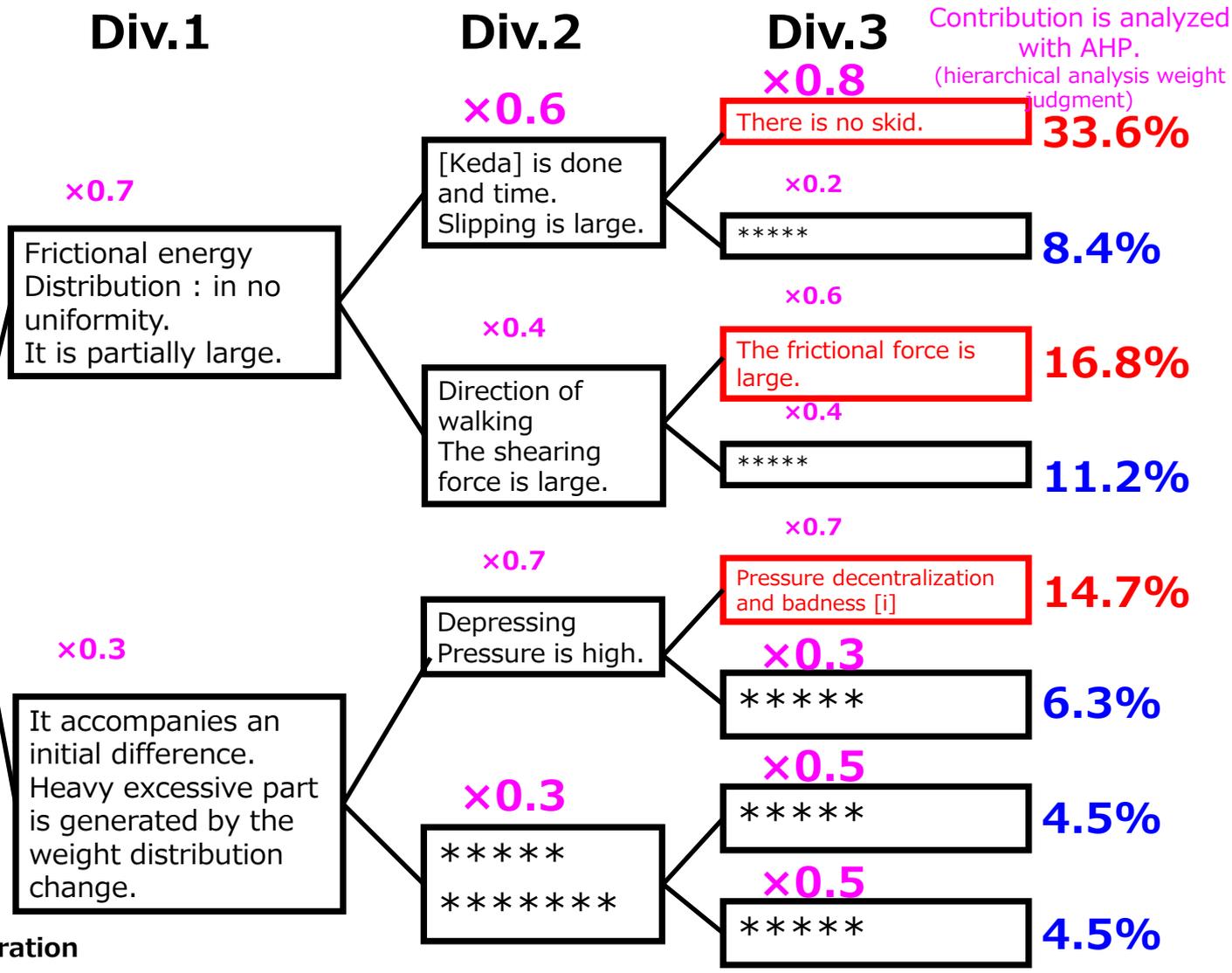
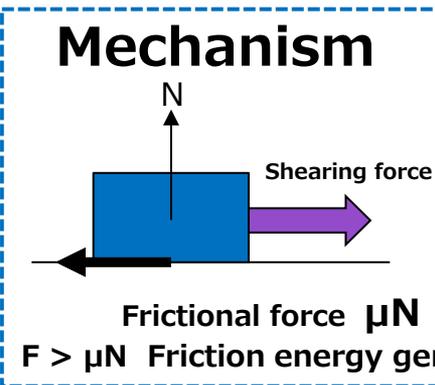
**Problem setting that analyzes its own strong point and weakness according to time and spatial variance, and pays attention to weakness**

# 6.1 Device point② (Cause analysis) : Law in the past



**Problem**

How of the shoe sole for the decrease  
It accelerates on the way.  
[Ni] grows up.



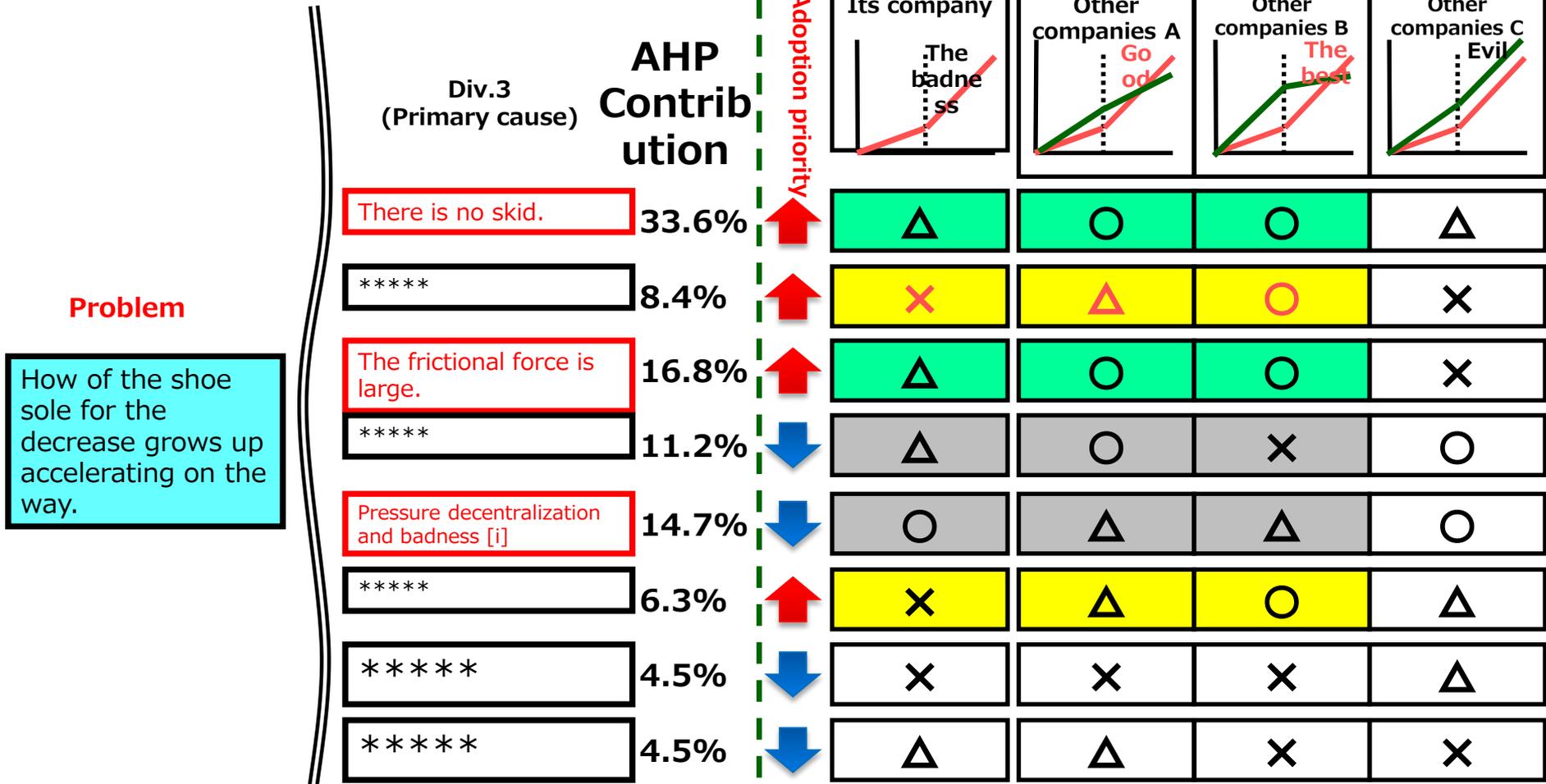
Contribution is analyzed with AHP. (hierarchical analysis weight judgment)

**The primary cause that contribution seems to be high is extracted, and it shifts to the idea conception (this TRIZ process).**

# 6.2 Device point②(Cause analysis) : New analysis method

## <Cause analysis>

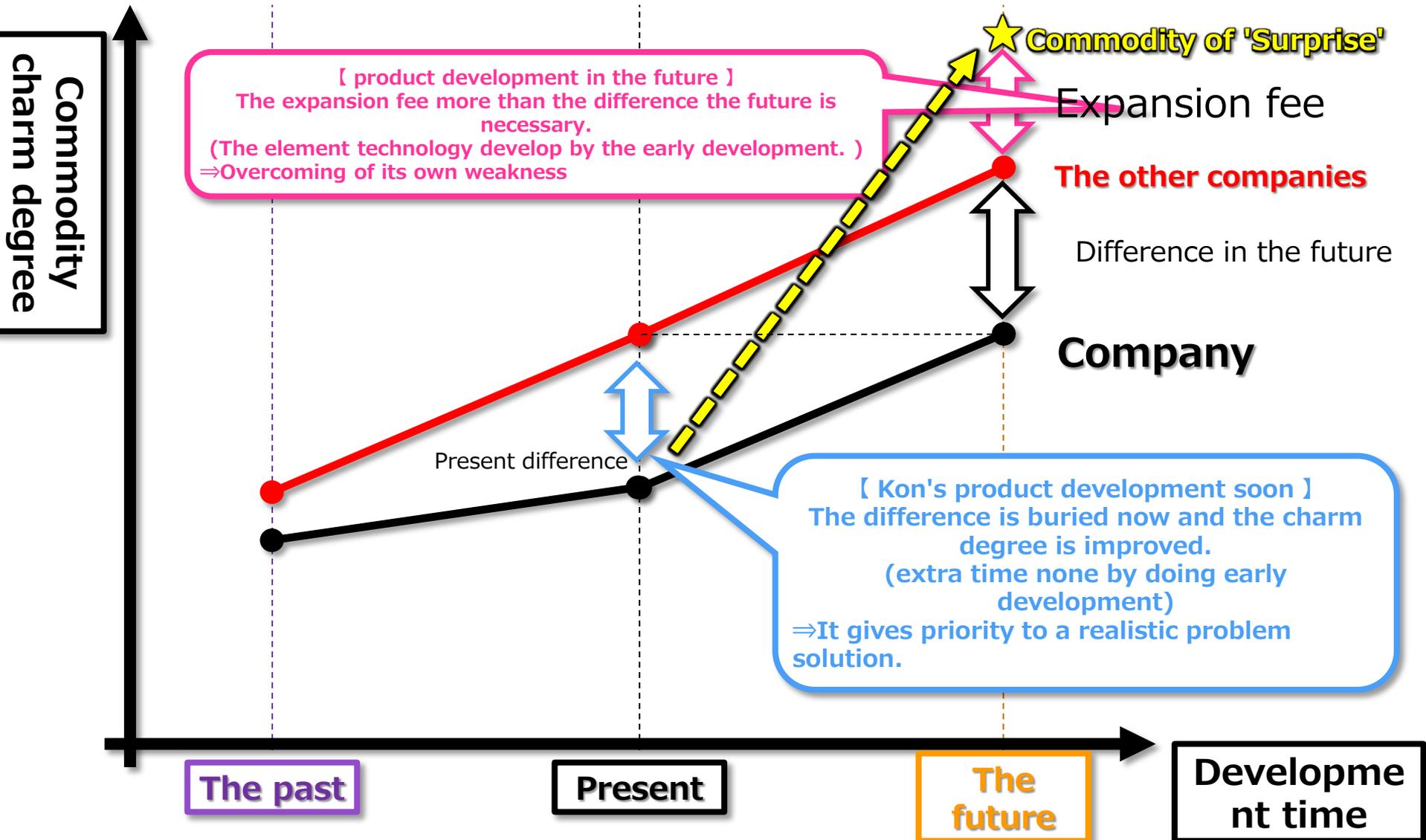
## <Countermeasure situation of each primary cause>



○:There are measures. △:Measures are insufficient. ×:Measures none

**The adoption priority changes if the countermeasure situation of its company and the other companies to the primary cause is arranged.**

# 6.3 Device point②(Cause analysis) : It is surprised and to the creation



**It tempers with the expansion fee by overcoming its own weakness by the early development to offer the commodity with the surprise.**

# 7. Peroration

- The innovation activity system that uses QFD/TRIZ almost completes.

⇒It is in-house development, and a settling. voluntarily practice and improve it continuously

- An appropriate setting of the problem is important according to the development term.

⇒Correct perception about the present state of affairs (time and spatial analysis) and adequate goal settings

Importance in the former process is recognized again in the problem solution approach.

- The contribution accuracy improvement when the cause is analyzed is effective for the problem solution at the early stage.

⇒The adoption priority is ascertained by the measures situation arrangement of its company and the other companies.

Our new corporate philosophy (mission):  
Impression and the surprise that exceeds the customer's expectation and satisfaction are invented, and it contributes to a rich social-making.

When you promote this innovation activity

I wish to express my gratitude to Mr. Kasai of the idea Ltd. to always judge validity from the broad outlook from the introduction to development and for new "Awareness" and appropriate advice to be offering deeply.

Thank you for listening.

***TOYO TIRES***  
*driven to perform*