2006 TRIZ Symposium

How Should We Utilize TRIZ for Managing Industries?

2006, 9, 1

Panasonic Communications Co., Ltd.

Kazuya Yamaguchi

Company Profile

* **Panasonic Communications Co., Ltd.**

*** Fukuoka City ,Japan**

*** Establishment**
1955

***Net Sales**
¥436 billion (2004)

***Number of Employees**
17,895 (2005)

Home Network Businesses

IP-Visual Communication

Office Network Businesses

IP-Office

Optical Disk Drive,Devices and Components businesses


世界が認めたパナソニックの
2.4GHzデジタルコードレス


大画面で見ながら選べる
ビエラ用プリンター。
KX-PG1
ホームプリンター
オープン価格


e-文書法
個人情報保護法
本人確認法
パナソニックスキャナーは、各種法令に ready です。


オフィスに新しい
使いやすさ
WORKIO
color C322/C262
Products Information

Lecture contents

Ⅰ、 The figure which a company aims at

1、Company activity !

1）A way of thinking of Konosuke Matsushita

2）A Way of thinking of JQA

3）What is a daily activity of a company?

2、The present conditions in development of products and the direction that we should aim at

3、JQA thought and application of scientific technique

Ⅱ、Trans-Disciplinary Fundamental Technologies

1、The action of PCC

2、QFD !

3、TRIZ !

4、Taguchi Method !

Ⅲ、Conclusion

How do you make the activity a success?

Ⅰ、 The figure which company aims at

1、Company activity！
   1）A way of thinking of Konosuke Matsushita
   2）A Way of thinking of JQA
   3）What is daily activity of company

2、The present conditions made with products and the direction that you should aim at

3、JQA thought and application of scientific technical method

（Note）Konosuke Matsushita

The founder of Panasonic

He is recognized as one of the respected people in Japan.

1、Mission of company activity

(Example)

Panasonic policy,

Panasonic plan improvement of social life through production / sales activities, and contribute to development of world culture.

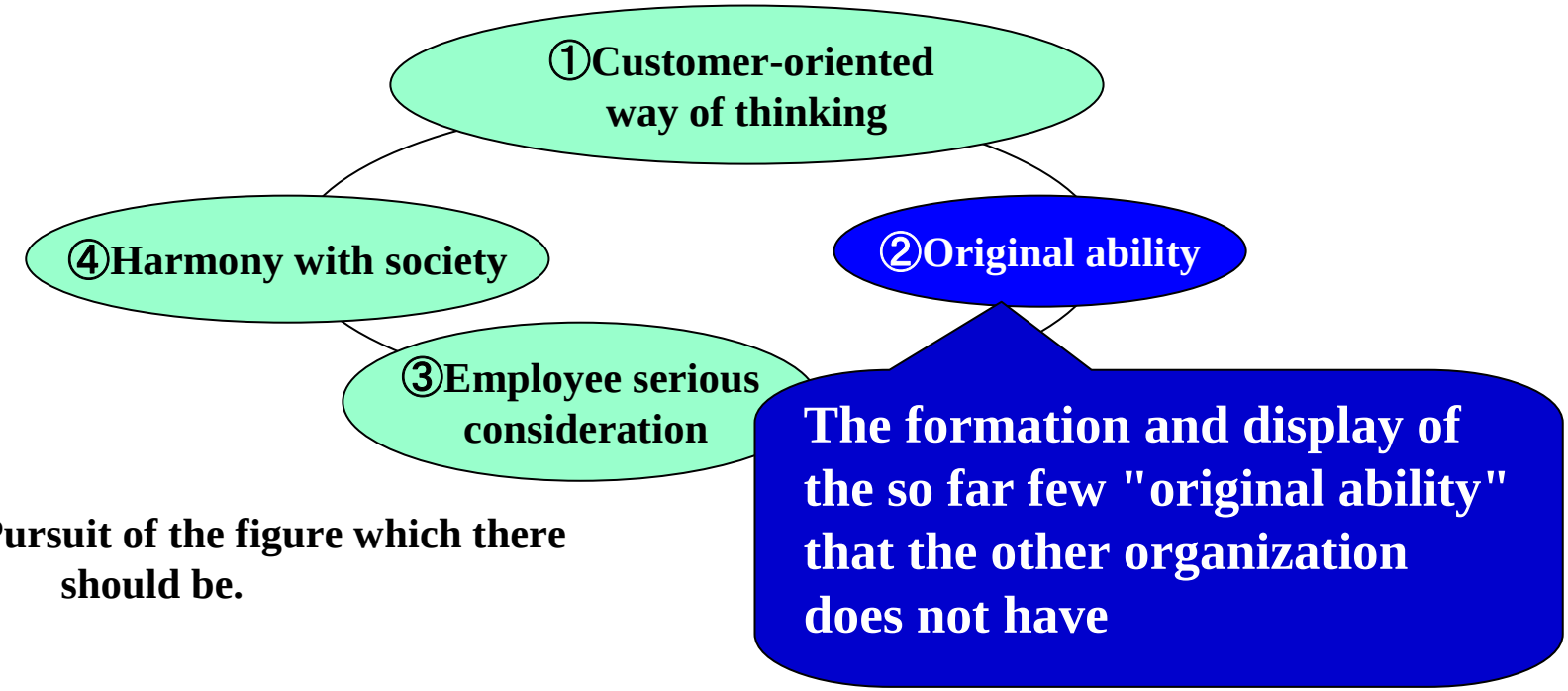
Customer-oriented way of thinking

Assessment standard of JQA (≒MB Award)

1、Direction to aim at : Pursuit of splendor of performance

2、Basic idea （The common sense of values that an organization should have）

1）4 elements of basic thought



2） Pursuit of the figure which there should be.

＊USA For improvement of national competitive power and start under Reagan Administration in 1987

「The Malcolm Baldrige National Quality Award (MB Award)」

What is daily activity of company?

It is worked on problem solution to realize happiness of a customer

Practice of JQA
Practice of Panasonic policy

Basic steps make for products

1、We get the voice of customer precisely and make product concept
2、We make the technical problems clearly
3、We determine the technical aim more than expectations of customer
4、We think about basic design supported by technology
5、We solve the important Development problems
6、Design so that there is not unevenness of quality of every product
7、Design so that there is not unevenness of quality in the factory
8、Design so that there is not unevenness of quality in the market
9、We sell it and meet the expectation of customer

work range of engineers

Ⅰ、 The figure which company aims at

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The present conditions in development of products

A way of thinking to assume that we are good at the level that we had

（Quality, the appointed date of delivery, cost, function）

We lose the trust of customers.

Waste of money,
Waste of time,
Lose competitive advantage

Nonscientific contempt

- **Inefficient activity of own way**

The direction that we should aim at

•Development of products by a scientific future prediction power

Good products of cost performance

Products which are superior to other companies

Good , early and cheaply

we have to realize necessarily, logically and scientifically

- **Development of products that We applied rational scientific technical method .**

Assessment standard of JQA

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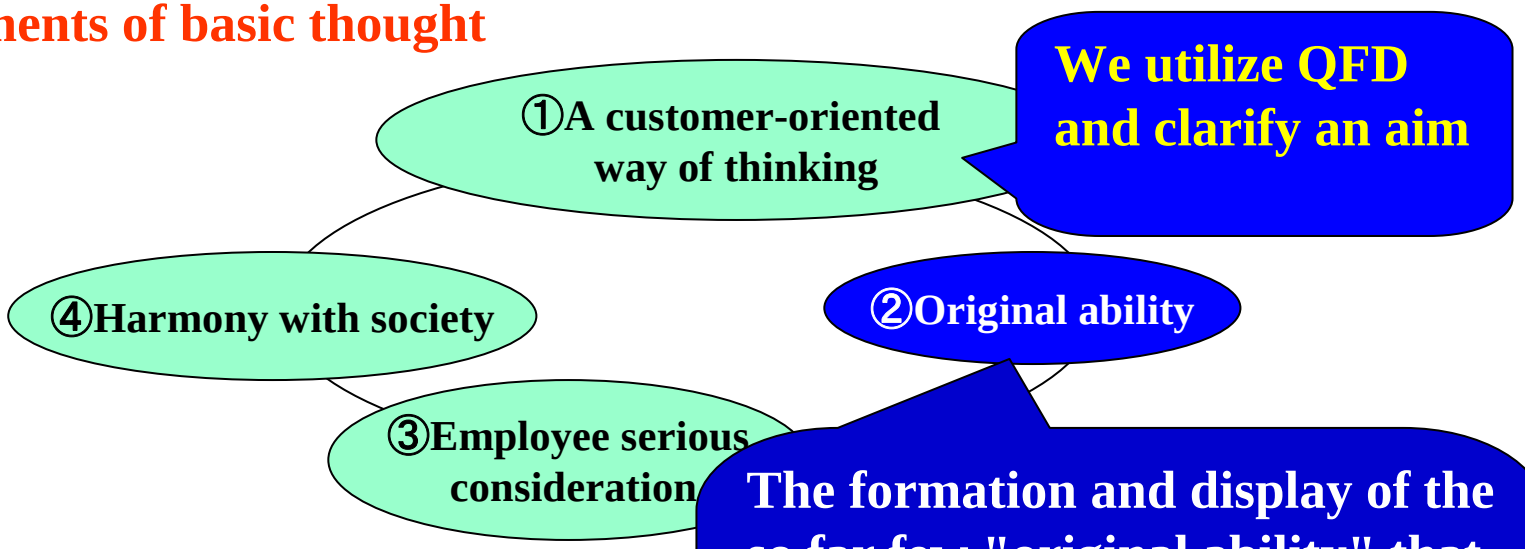

2） Pursuit of the figure which there should be.

Thought is same as TRIZ,Taguchi method,

What is daily activity of company?

It is worked on problem solution to realize happiness of a customer

Practice of JQA
Practice of Panasonic policy

Basic steps make for products

1、We get the voice of customer precisely and make product concept
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work range of engineers

- QFD
- TRIZ
- Taguchi Method

How is it improved when We use scientific technical method? (Q,C,D)

Conventional development technique

We can show only power of 30%

Why？

1、The management is difficult
2、Without using brain

Scientific technical method

We can show power of 130%

We can draw ability of engineers to the maximum.

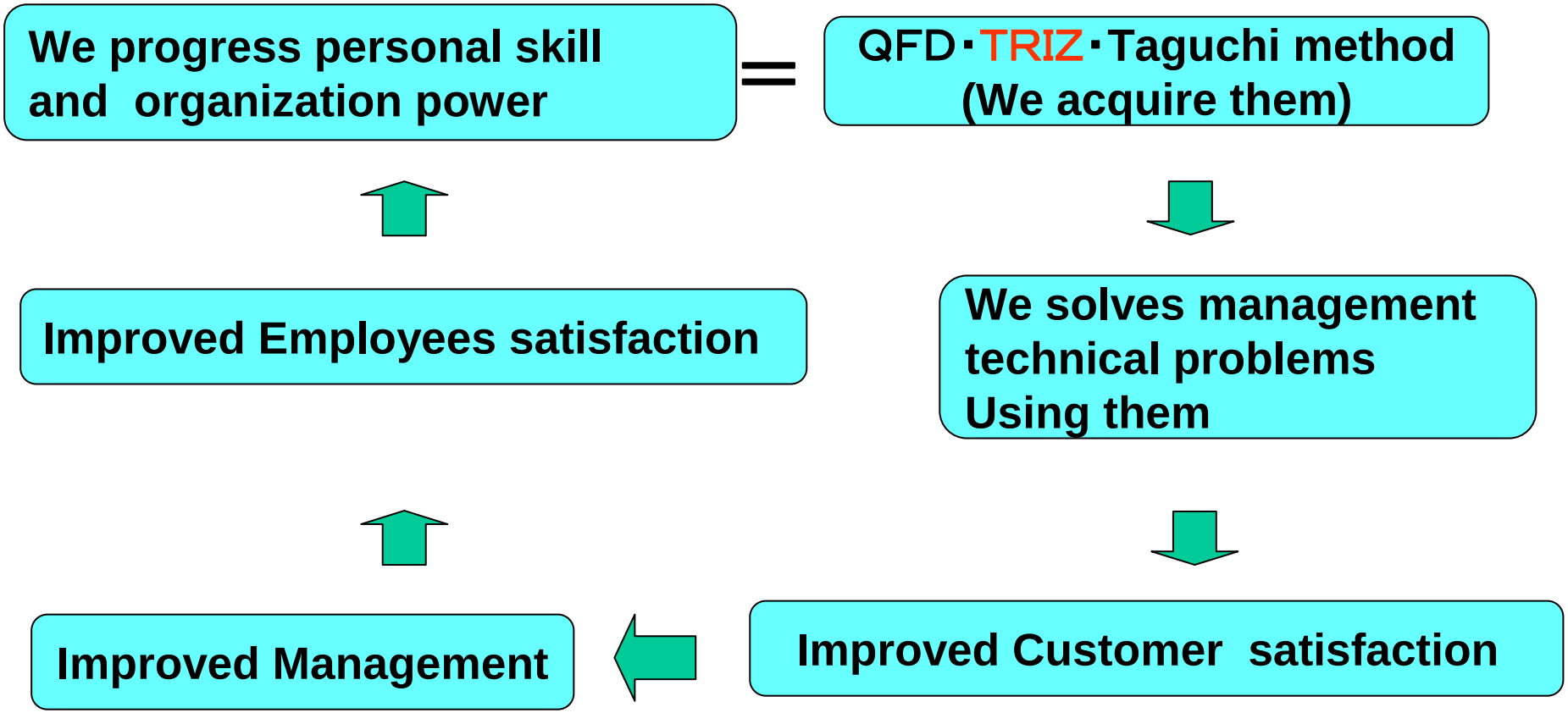
1、Tool is good
2、Technical argument is possible with many people

The cycle of corporate management should aim at

⇒ Thorough practice of JQA（MB Award)activity

⇒QFD・TRIZ・Taguchi Method

（Technical Acquirement and practice）



Ⅱ、Trans-Disciplinary Fundamental Technologies

1、The action of PCC

2、QFD！

3、TRIZ！

4、Taguchi Method！

Basic way of thinking of action

Aim：We continue offering the products which a customer is satisfied with by loud technology supported by scientific technical method at a reasonable price timely and aim at permanent development of a company

⇒Promotion of management

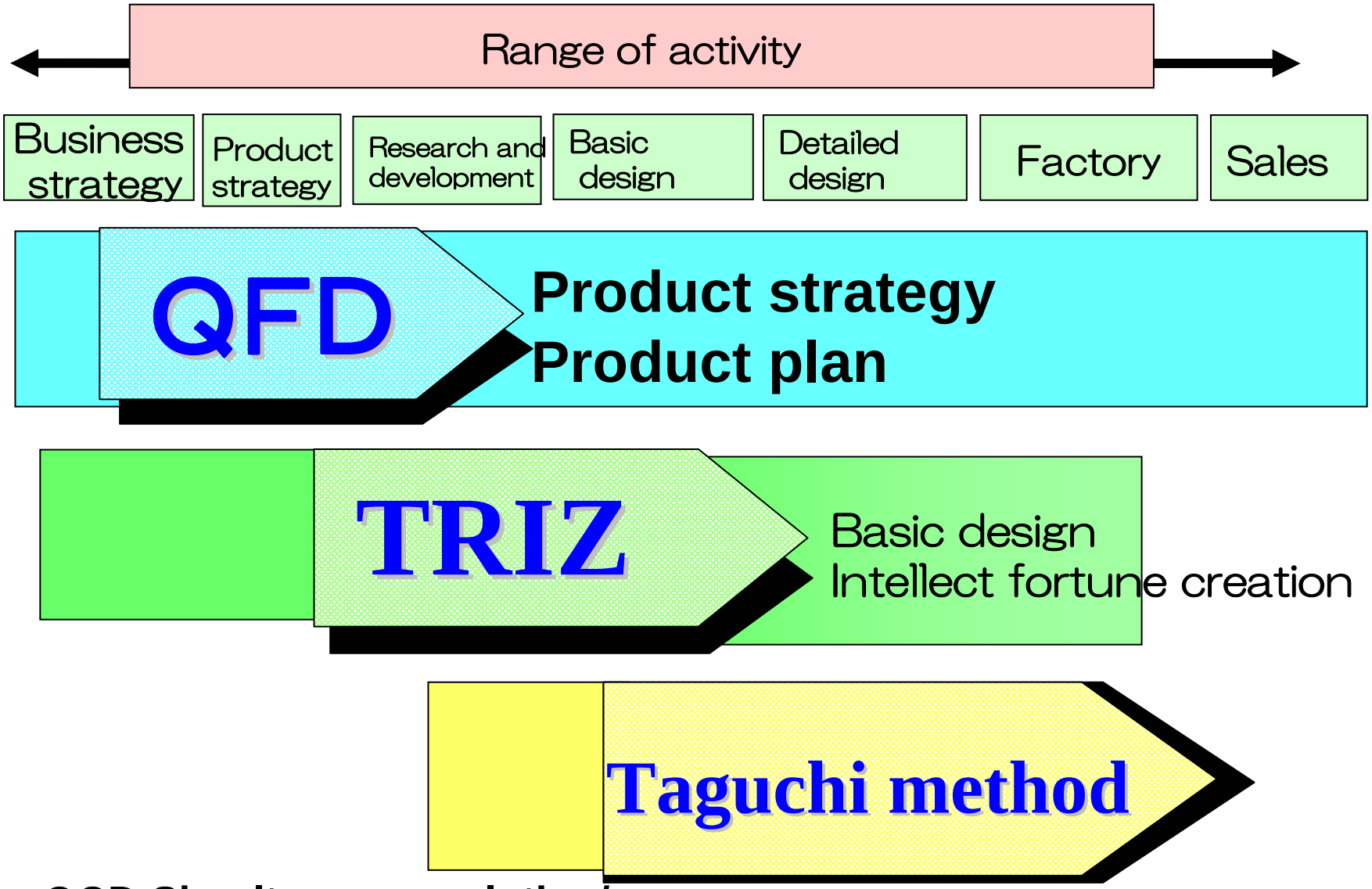
JQA thought

Action contents： Action of the Trinity
(management, development technique, IT tool)
JQA thought

Management	JQA,PM
Development technique	QFD、TRIZ Taguchi method
I T tool	3D－CAD、CAE

In the product development spot, application of technique is necessary to make use of knowledge

Development step and technique practical use



Progress

2001 2002 2003 ～ 2006

Organization start

*** Quality finish by Taguchi method**
*** Consider Robustness at design stage**

*Basic development by TRIZ
***Taking in advance of technology / intellect fortune**

*Product plan by QFD
*** Equality of needs and seeds**

Technique fusion
Soft field
CAE

・**We introduced Trans-Disciplinary Fundamental Technologies systematically**

Ⅱ、Trans-Disciplinary Fundamental Technologies

1、The action of PCC

2、QFD！

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QFD？

（Quality Function Deployment）

Quotation from QFD guidebook

Original purpose

１、 Utilize for development of new product

２、 Utilize for a guarantee of quality in a development stage of new product

１、It is an opening that Dr. Mizuno Shigeru taught QFD in Mitubishi jyukou in about 1972

2、Dr. Mizuno and Dr. Yoji Akao established a thought in 1978 and announced it .

3、It was inflected in American automotive industry, and QFD developed

4、QFD is reimported afterwards, and practical use began recently in many companies

Quotation from QFD guidebook

Original purpose

1、 Utilize for to development of new product

2、 Utilize for a guarantee of quality in a development stage of new product

Methodology

* The demand quality list which is organized by actual voices of market as language information.

* The quality characteristic list which is presented by technical characteristic about a product.

Quality list consists of demand quality list and quality characteristic list

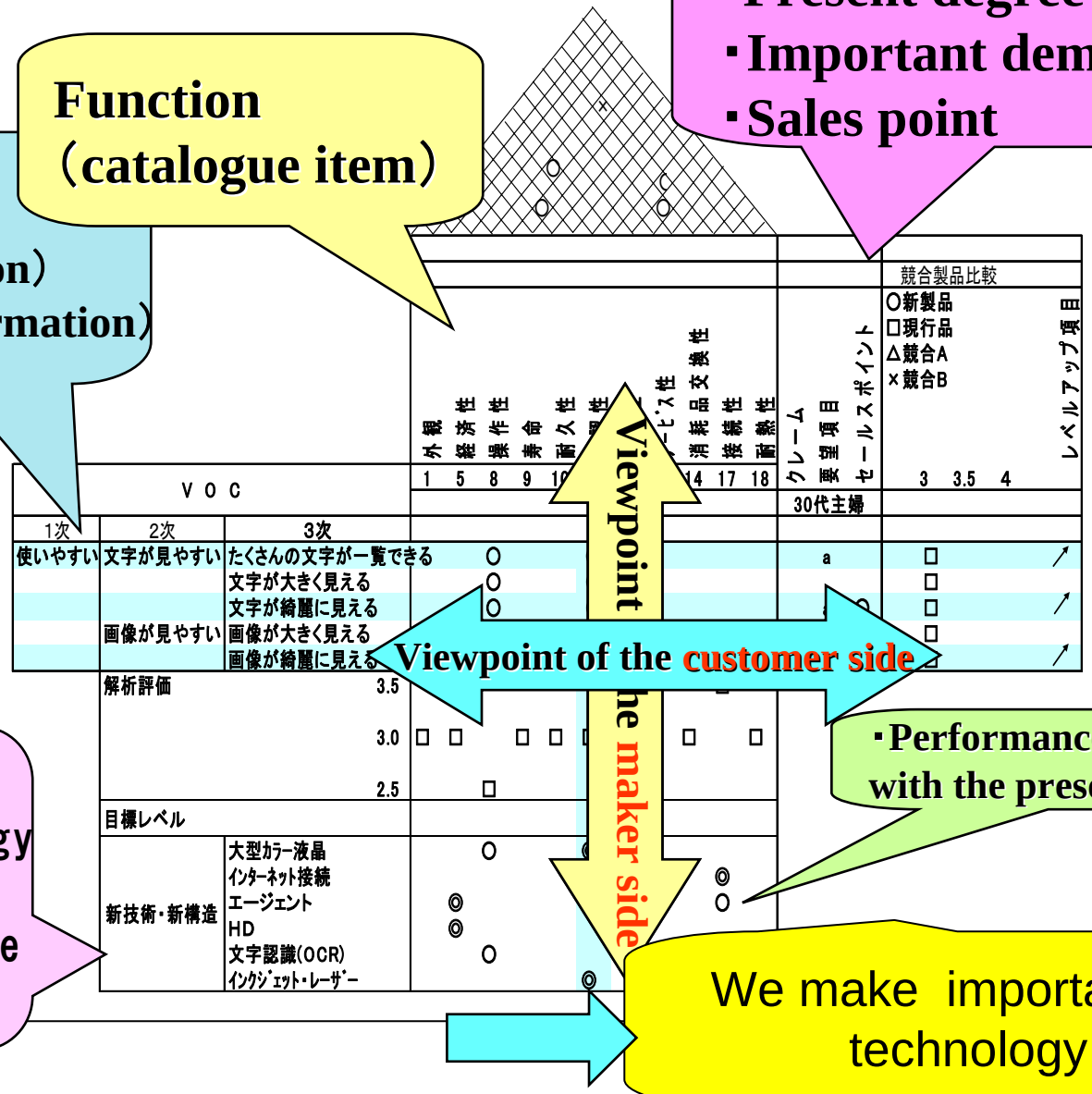
This method is the most suitable examination to make use of the customer demand in product strategy or product plan stage

QFD summary

VOC
（CS information）
（Business information）

Function
（catalogue item）

・Present degree of satiability
・Important demand
・Sales point



・Performance comparison with the present conditions

・New technology

・New structure

We make important points of technology clearly

Voice of customer（VOC）?

1、Voice of consumer

2、Voice of the person concerned

3、Someone wants to do it

4、What kind of products do we want to make?

5、Some opinions around me

6、What does our organization want to do?

.

.

.

What kind of method do you use to realize these voice's requests?

6、 How to use QFD actually?

1、Customer demand（The quality that customer requests）

*Product plan ・・・ voice of consumer（VOC）

*Research and development ・・・ What kind of product should we develop?
（The quality of customer requests）

* Daily work ・・・ What is our organization going to do?

2、We convert demand quality into a quality characteristic

*Product plan ・・・What kind of thing can be technically done?
*Research and development ・・・What kind of thing can be technically done?
* Daily work ・・・What kind of method does it really achieve?

3、 *In consideration of the situation of other companies or a characteristic of own company, and We decide importance.

* Secure design quality such as individual parts and reliability of products

* We offer the customer satisfaction

QFD is visible method of aim

What kind of method do you use to realize these voice's requests?

What is QFD？（summary）

This method is the most suitable examination
to make use of the customer demand
in product strategy or product plan stage

Good Point
It is possible to examine without leakage

Design quality?

What kind of thing can be technically done
FOR CUSTOMER ?

1、Targeted value　2、New technology 3、Reliability

（Concrete grounds of realization are unnecessary）

First of all, QFD exists in research stage / development stage / and design stage

TRIZ

Ⅱ、Trans-Disciplinary Fundamental Technologies

1、The action of PCC

2、QFD！

3、TRIZ！

4、Taguchi Method！

TRIZ is amazing, Why?

A way of conventional work

Nonscientific contempt

Inefficient activity of own way

TRIZ

This is the ultimate level of knowledge management

1、Person acquiring USA patent is world top-level human being
（There is all thoughts pattern of the human in 2,500,000 patents）

2、It is arranged well

3、Thought aiming at is good

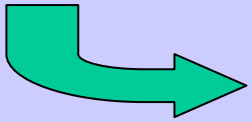
Extract of TRIZ

1、Thought

*Evolution of system and ideal-related thorough pursuit

*Maximum use of free resource

*Minimum use of pay resource



We can image 「Ideal solution」.

2、It is carried a lot of hint of solution to ideal solution

Characteristic of idea by TRIZ software practical use

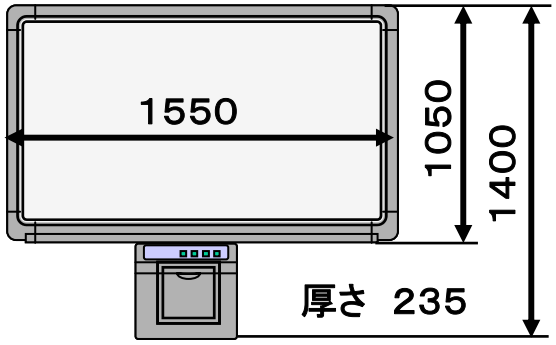
We can examine patent examples from every angle for hint

* There are few omission of idea And idea is equal to a purpose
* It is easy to make the number of conventional idea by 10 times.

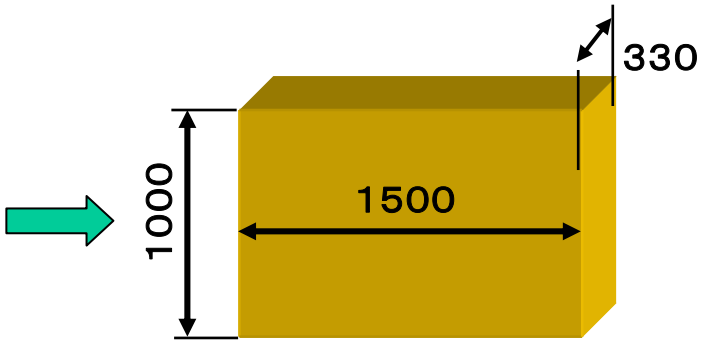
* Utilizing an enormous idea ,we can make the best concept
* The best concept should be determine based on QCD and realization possibility

Example 1

New electronic board
Packing size reduction by half



Electronic board(Current Model)



Packing size

The present size

KX-BP535

packing size

1500× 1000 ×330mm

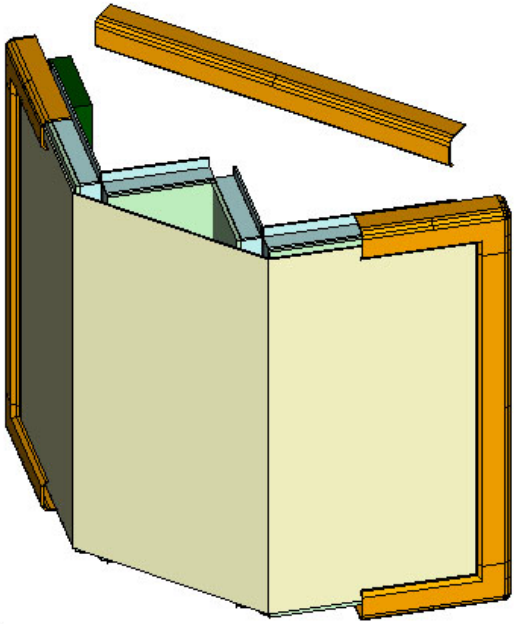
Improvement target

Packing size reduction by half

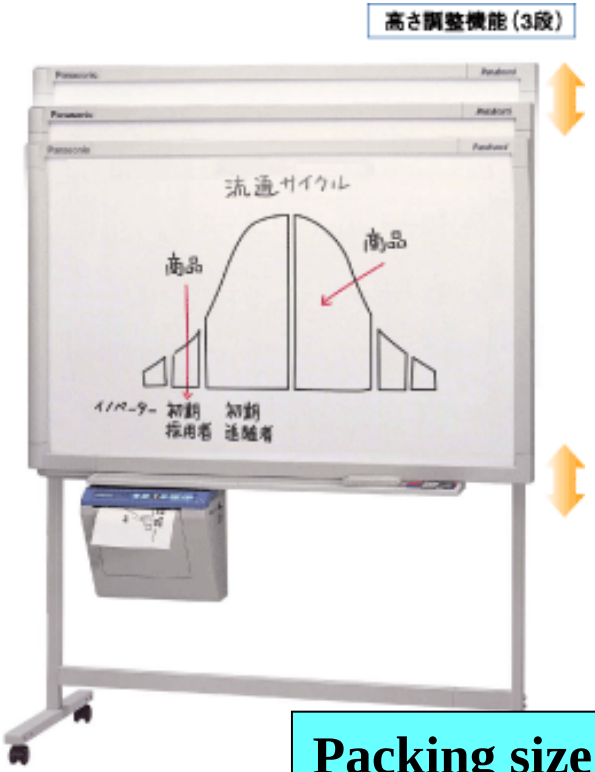
NEW Electronic board

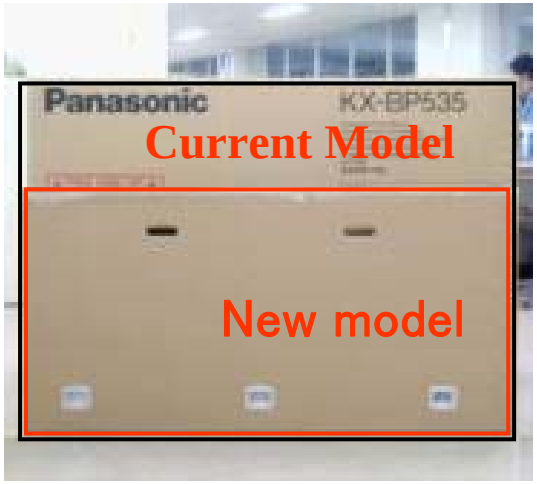
Assembled product size is the same as Current Model size

New folding structure adoption and part rationalization



NEW Electronic board





Packing size reduction by half

1500 × 1000 × 330mm

→ 750 × 1050 × 300 mm

1/2

Example 2

New category product of PCC

Speakerphone for meetings
「KX－TS730JPS」

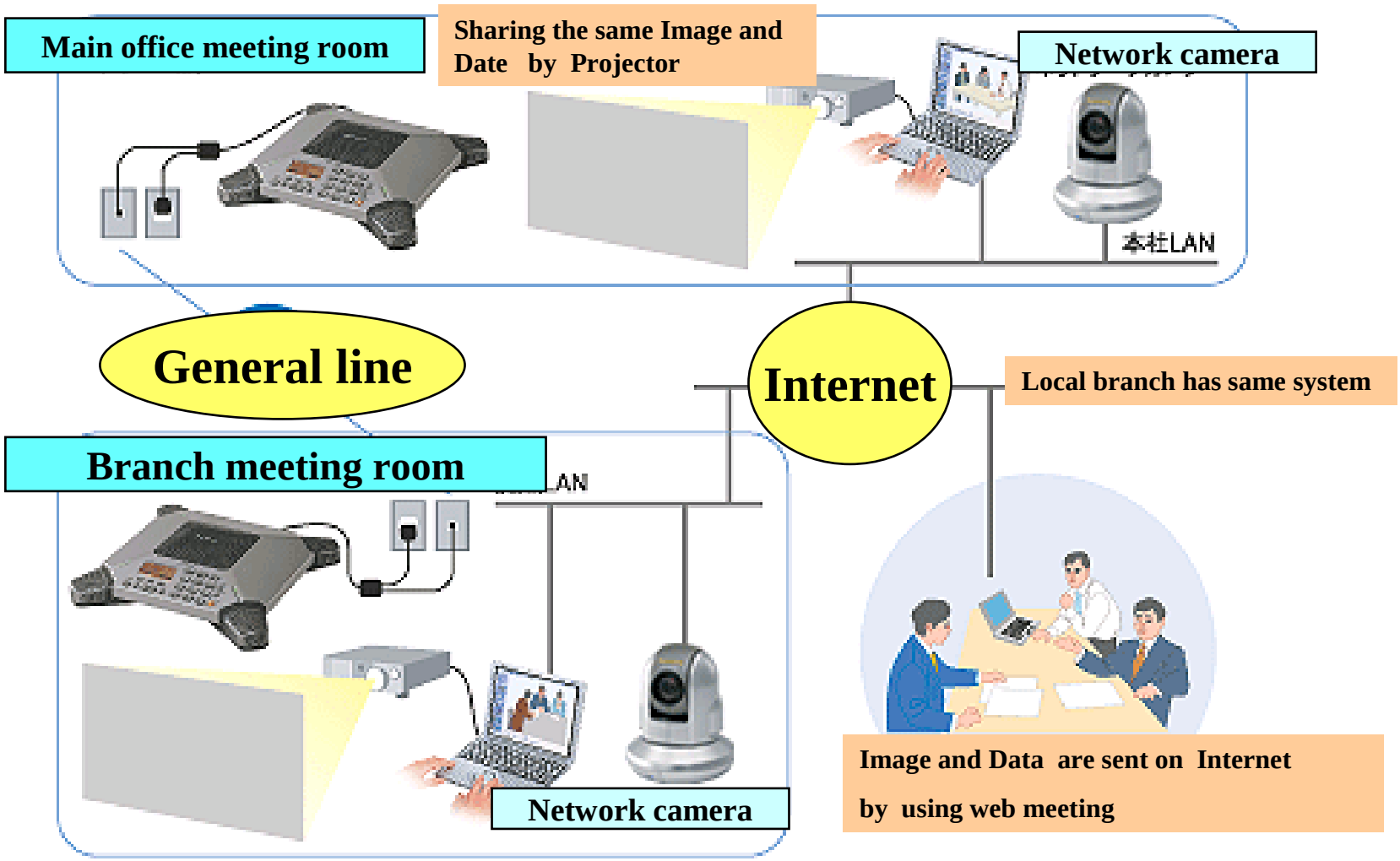
November 1, 2005 release

Main Technical predominance point

- **We largely reduced the return of a sound to a microphone using microphone of four mid side methods**
- **We possessed algorithm most suitable for every microphone and echo cancellation with the most suitable filter and added the echo suppressor which damped a remaining echo**

You can realize meeting full of sense of realities!

Figure of system of speakerphone practical use



Schedule to release

We solved problem by TRIZ technique

Intellectual property strategy / Article strategy / Technical strategy

Concept inspection

Soft technical effect inspection of echo cancellation

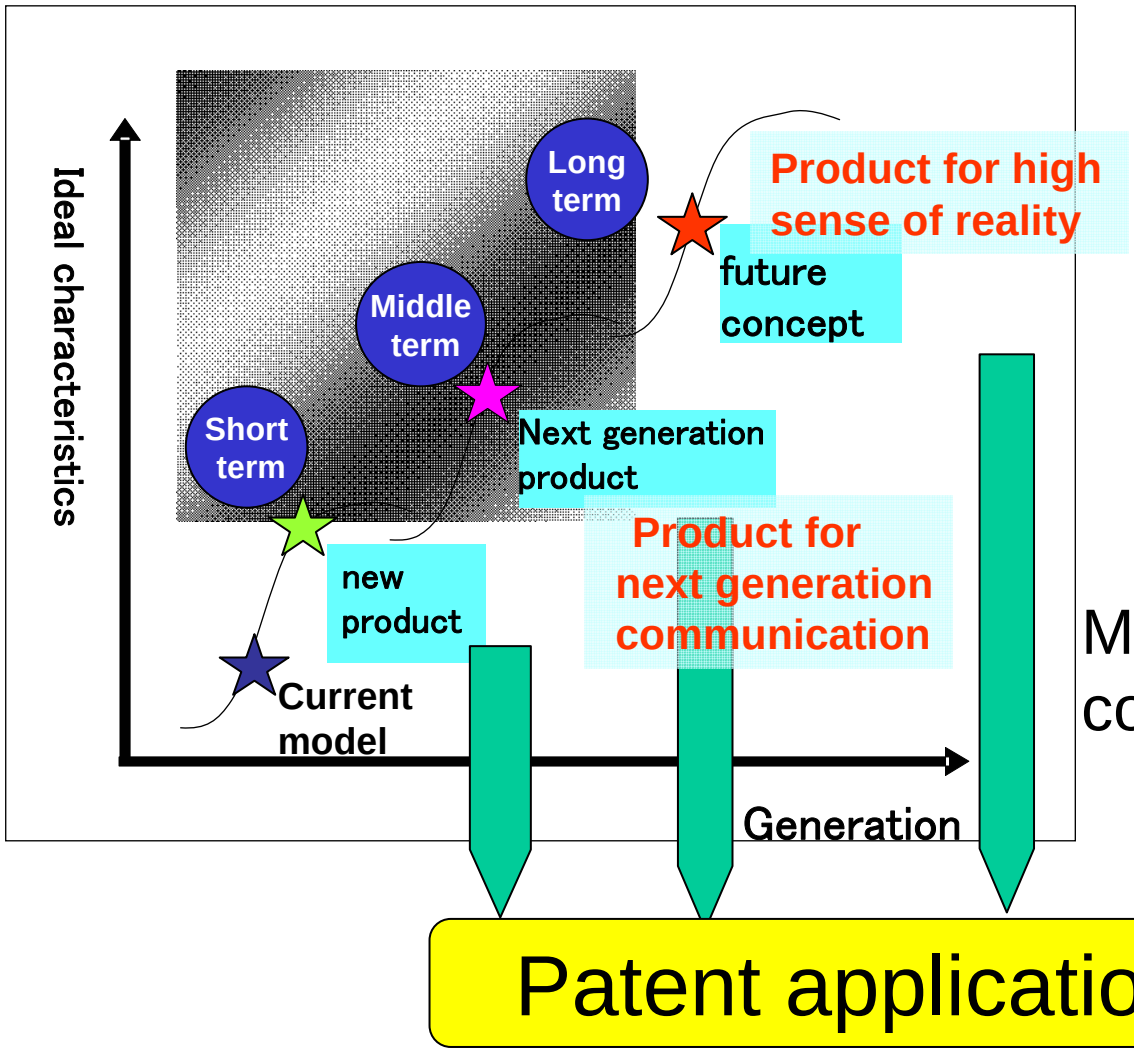
Patent application

Design ⇒Production

Release in U.S.A.

Release in Japan

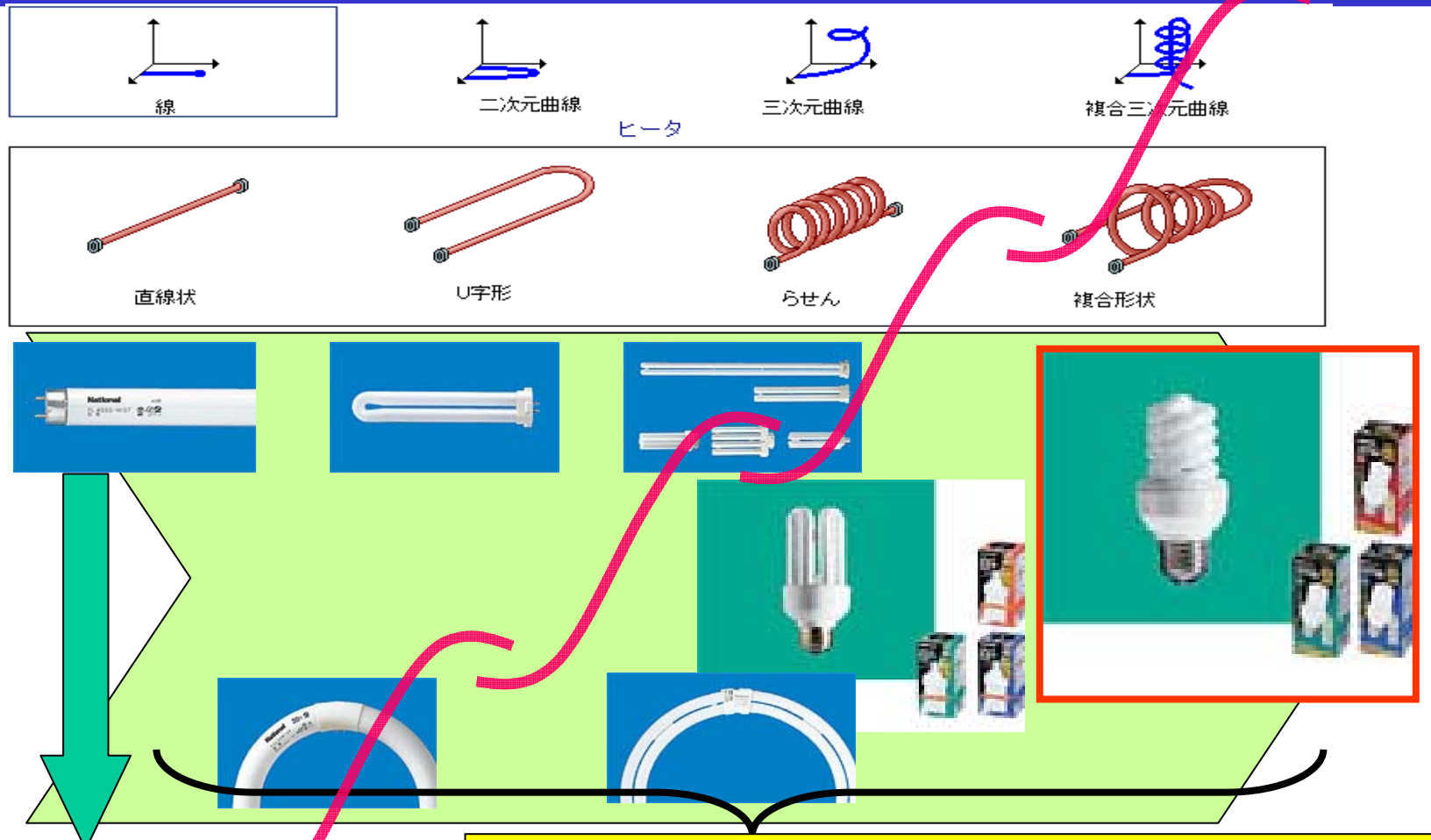
Utilize TRIZ and make the prospects from short term to long term



The engineer obtained new product release and next generation concept.

Manager must do decision commercializing concepts !

Law of evolution of TRIZ
and evolution of fluorescent lamp



Basic invention

We take a technical evolution pattern in advance and make product and want to continue winning. If we can do these development, it's Excellent!!

How to use TRIZ actually?

1、QFD

QFD is visible method of aim

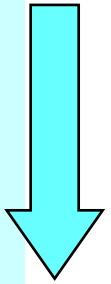
2、**Setting of high aim is necessary**

*Product plan・・・What kind of thing can be technically done?

*Research and development
・・・What kind of thing can be technically done?

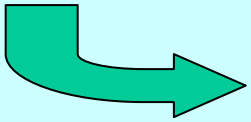
*Design ・・・We want to largely lower component cost

Product concept

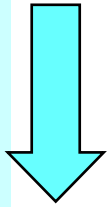


* Embodiment on the desk

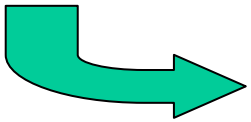
* Foresee the future



TRIZ



We can make basic design clear only with a brain.
What kind of constitution we should design it by.



Taguchi method

Little manufacturing variation

Robust design

Ⅱ、Trans-Disciplinary Fundamental Technologies

1、The action of PCC

2、QFD！

3、TRIZ！

4、Taguchi Method！

1）A way of thinking of Dr. Genichi Taguchi

2）The thing field which Taguchi Method suggests

3）Effect of Taguchi method practical

4）Basics of Taguchi method

5）Conclusion

（1） Solution of QCD

（2） Thought of Mr. Ino Chairperson Taguchi method

4、what is Taguchi method？

＊ **The world's best comfort technical method to secure quality in development / design stage**

1、**The founder　　Dr. Genichi Taguchi　（1924年～　　）**

2、**Action start from about 1950**

3、**In the middle of 1980's**

He is called the man who revivified the U.S.A.

He applied Taguchi method to stagnant American car technology, and he brought back the American auto industry

4、**1993　　"The Taguchi method forum" establishment in Japan**

5、**1997　　Dr. Taguchi achieved entering American car palace**

(The third Japanese. Five present)

1）A way of thinking of Dr. Genichi Taguchi

- The thing which aims
- The origin of Taguchi method theory

Thoroughly pursue construction of ideal society by a method of engineering

Expansion of productivity of freedom

Make the society which can buy more products with constant money

1, The development appointed date of delivery must be short.
2, Material's cost must be cheap.
3, We must destroy lack of performance.

Taguchi method

KEY WORD

Make product from every angle cheaply

2）Taguchi method suggest it to us

It is technical methodology to realize high quality, low cost and high productivity at the same time

Taguchi method is functional evaluation method and the improvement method

Functional evaluation?

* **It does not evaluate quality, and evaluate original work.**
* **If original work is good, quality characteristic is improved.**

Important !

It is important that we do not evaluate quality

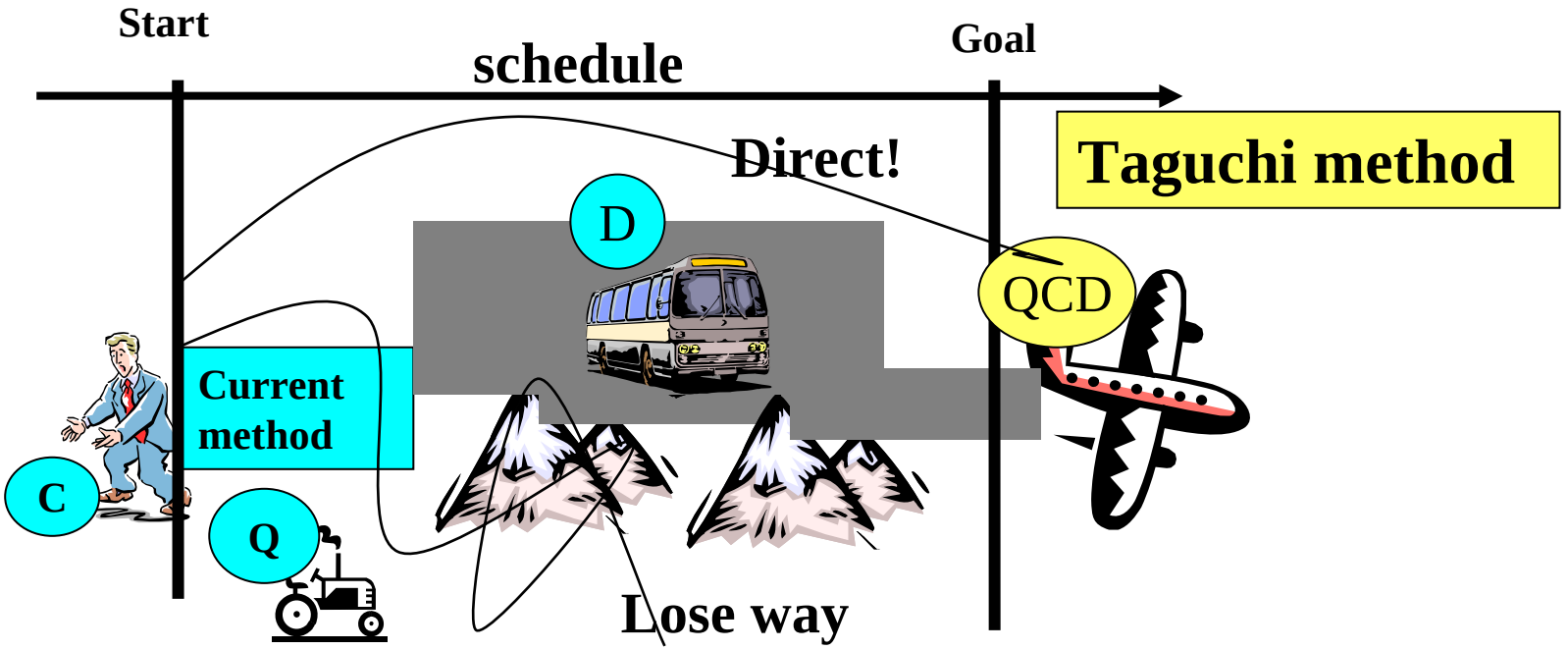
Functional improvement tool

* **The experiment that utilized orthogonal array**
* **Figure of factor effect**

Method to examine effect of many design factors at once

3）Effect image of Taguchi method practical use

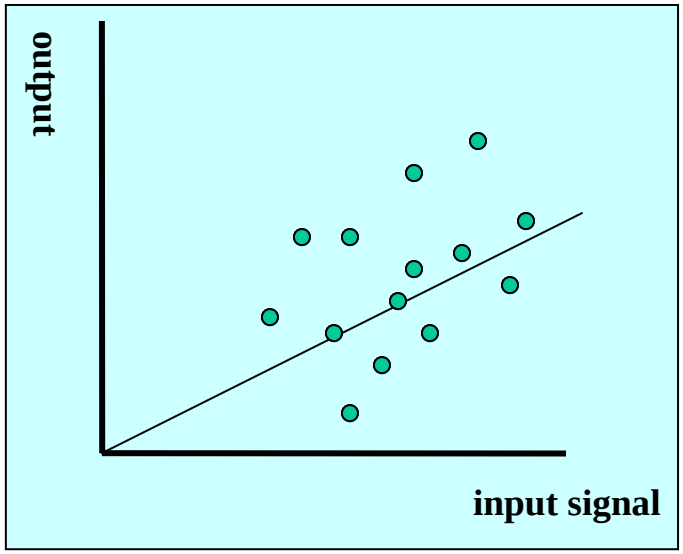
It is technical methodology to realize high quality, low cost and high productivity at the same time

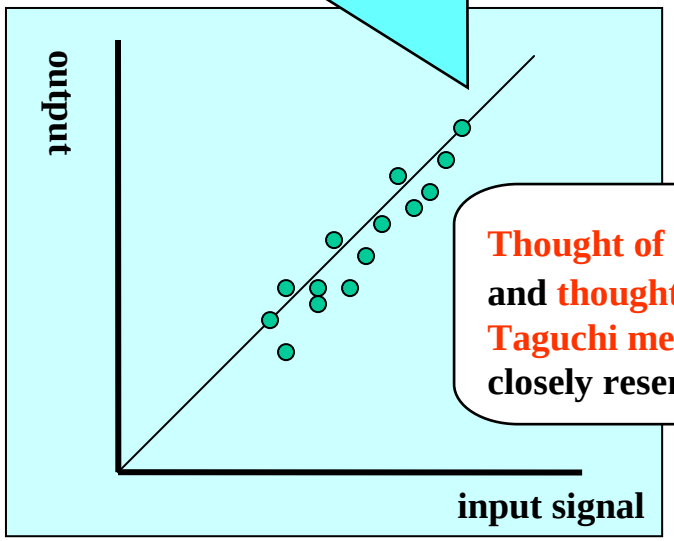


4）Basics of Taguchi method（1－1）

A general idea of control engineering

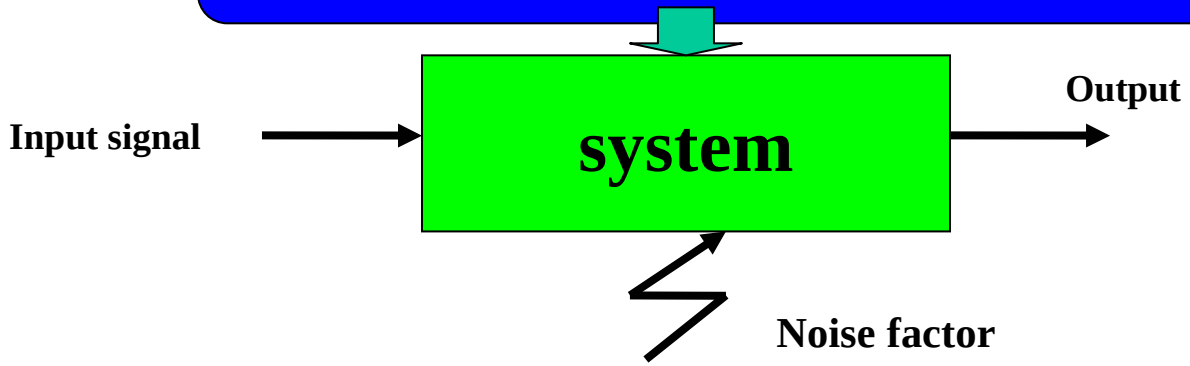
Ideal-related pursuit and the greatest use of resources





Thought of TRIZ and thought of Taguchi method closely resemble it

We have to control characteristic of control factors to minimize influence of noise factors



4）Basics of Taguchi method（1－2）

Control factor:

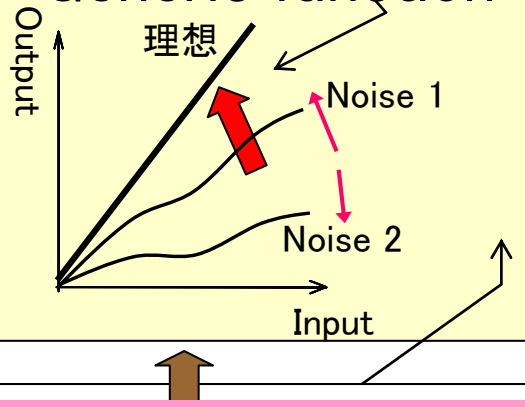
The factor which designer / manufacturer can control intentionally

＊The design fixed number

＊Production condition

Input

Generic function



Output

Change of generic function assumes it a small characteristic under condition of noise factor.
＝＞Robust design

Noise factor :

The factor which designer / manufacturer can not control intentionally

*Manufacturing variation of Parts

*Environment

*Material condition etc.

4）Basics of Taguchi method（2－1）

Two phases of designs

A decisive difference with a conventional experiment

Conventional experiment

Suddenly

* We are going to make the most suitable thing
* We are going to make a thing of good quality

→ As a result of demanding quality goods

↓

A made thing is defective product

Experiment of Taguchi method

*Minimize variation (first phase)

↓

*We find the optimum (second phase)

→ All the results are good with defective product

↓

we make quality goods with a confirmation experiment

4）Basics of Taguchi method（2－2）

Get rid of a change of an output characteristic by a noise

Robust design

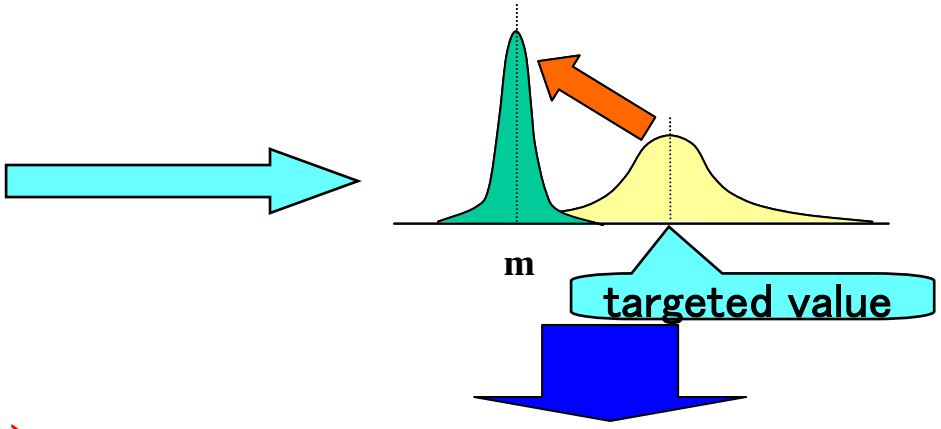
Two phases of designs

A decisive difference with a conventional experiment

Priority of design

（1）**Minimize variation (first phase)**

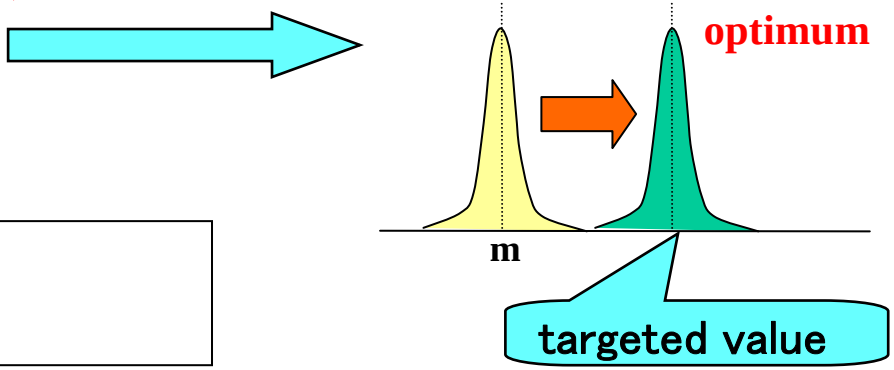
: SN ratio = 10 log (m^2/σ^2)



（2）**We find the optimum (second phase)**

It is crowded to the targeted value

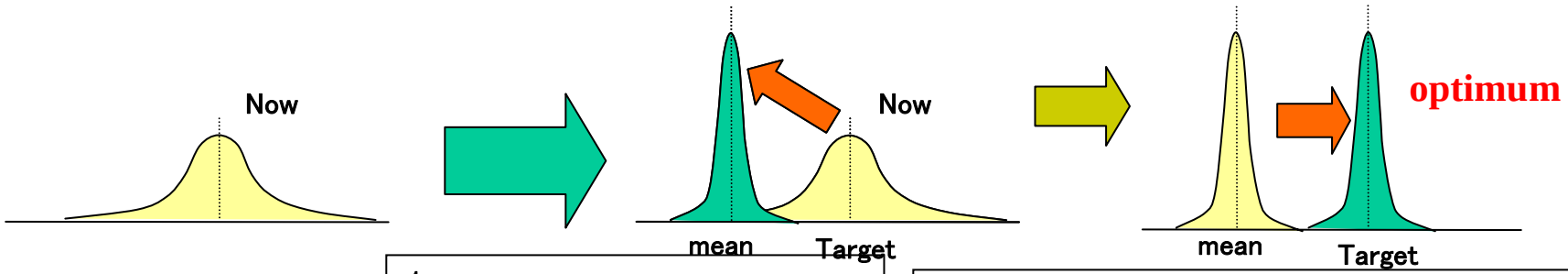
KANDO = 10 log (m^2)



σ ＝Standard deviation
m＝Mean(average)

4）Basics of Taguchi method（3）

Estimate of the optimum by Figure of factor effect



1st step:
Minimize variation
=> SN ratio : Very much

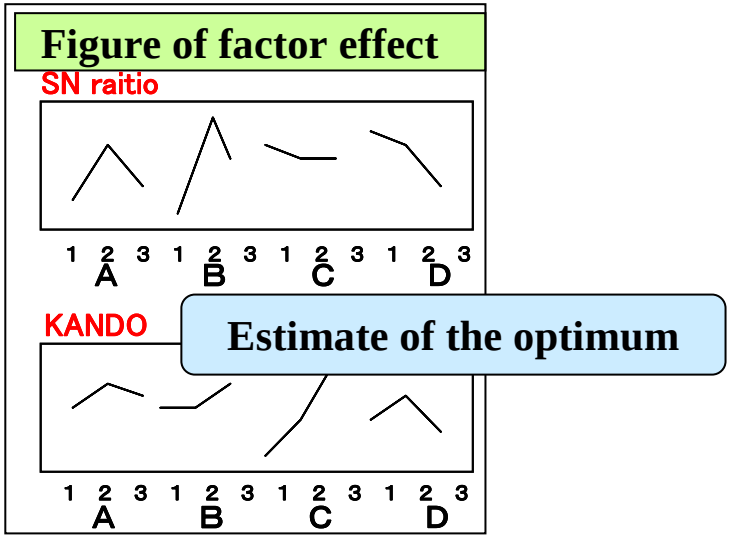
2nd step:
We match the mean with the targeted value with having kept variation small

From orthogonal experiment to figure of factor effect

Orthogonal experiment

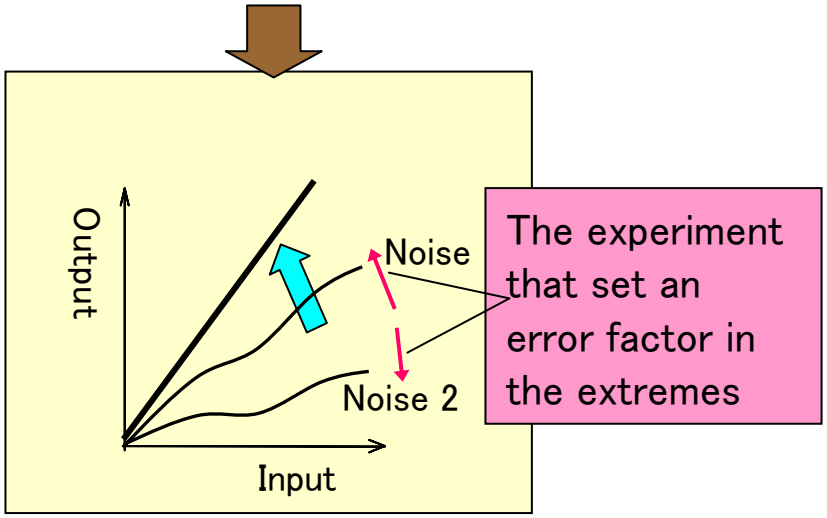
	control factor			
	A	B	C	D
1	1	1	1	1
2	1	2	2	2
3	1	3	3	3
4	2	1	2	3
5	2	2	3	1
6	2	3	1	2
7	3	1	3	2
8	3	2	1	3
9	3	3	2	1

Figure of factor effect



Estimate of the optimum

Image of the practical use that we used Taguchi method for



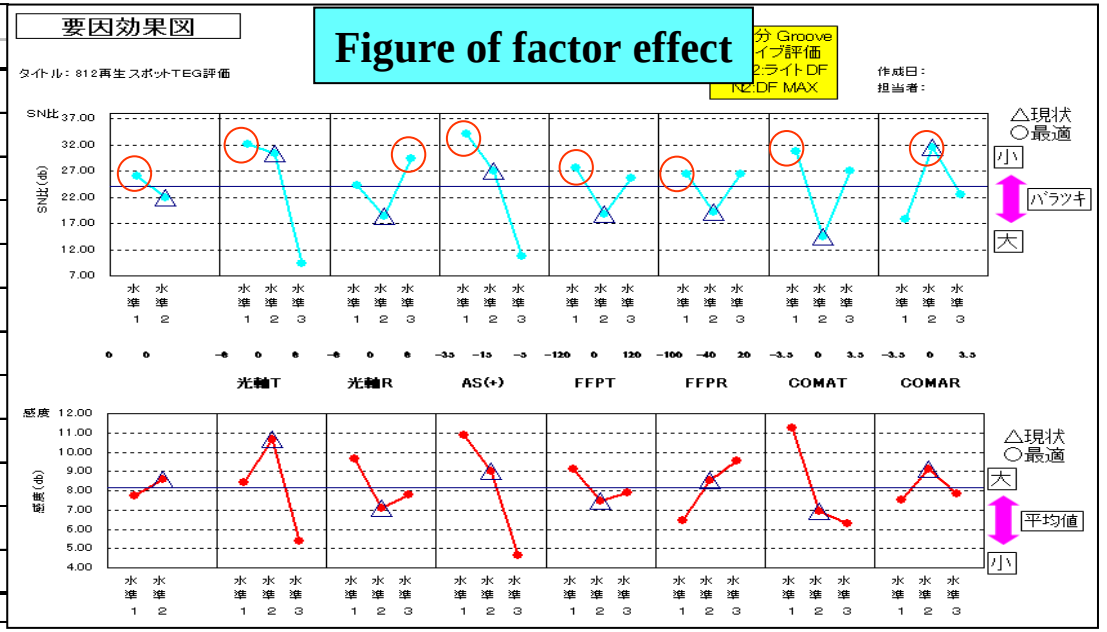
- We pay my attention to a generic function, we decide control factor and error factor.
- We carry out minimum experiment using orthogonal array.
- With a number of a factor effect, we minimize variation and we optimize it in a value aimed for afterwards.

Orthogonal array

実験直交表

	CHF3ガス流量	O2ガス流量	Power	He流量
1	40	5	100	20
2	40	10	300	40
3	40	20	400	80
4	50	5	300	80
5	50	10	400	20
6	50	20	100	40
7	80	5	400	40
8	80	10	100	80
9	80	20	300	20
現状	40	10	300	40
平均	–	–	–	–

Figure of factor effect



4）Basics of Taguchi method（4）
(Confirmation experiment)

At the same time

1, We do an experiment for confirmation using value of the control factor which we predicted.

2, We perform an experiment for confirmation under the limit condition of the variation（N1、N2）that took an error factor into account.

If basic design is a good system,

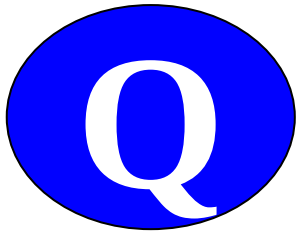
Basic design becomes a good case when we consider it in TRIZ

system with a little variation of good quality is completed.

If basic design is a bad system, a limit of a system becomes clear.

In this case a fresh design start is fundamentally necessary.

5）Summary of Taguchi method



Cost reduction

Taguchi method

Development　Design

It is had a trouble by quality security

● The best technique for a quality finish

Factory

There are many defective products in a factory

Overtime work and holiday work increase

● Technique to hold a little variation in quality thoroughly

Market　**There are many re-work and defective returned goods**

● Technique to meet change of environmental condition in markets thoroughly

5）Summary of Taguchi method

C

Cost is reduced when we use Taguchi method

A wise remark of Dr. Taguchi

“Quality is the first of all” crushes the company

Mission of company

Company has to make good products early and cheaply

The core of a wise remark?

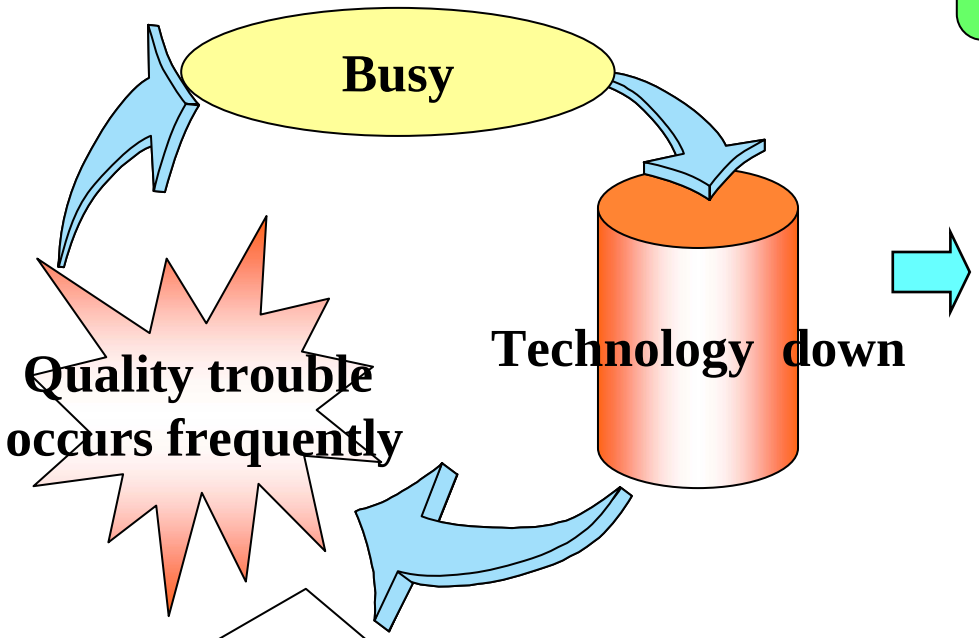
His wise remark means that how to make the no variation(good quality) products even if used the barrack parts (cheap parts).

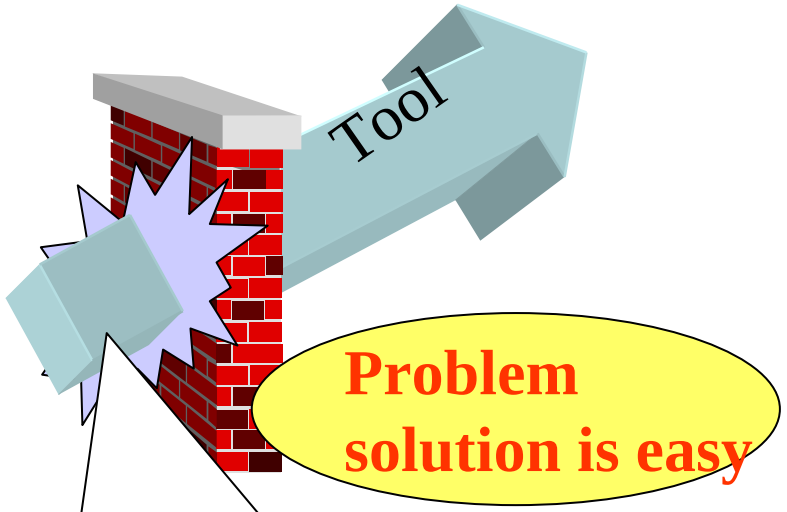
5）Summary of Taguchi method

D

Appointed date of delivery correspondence is easy

“A dangerous cycle”





Conventionally type

Development type to prevent from repeating failures

Taguchi method

Development type to solve the problems beforehand

Summary of Taguchi method（2）

Thought of Mr. Ino Chairperson Taguchi method

An article on the occasion of the chairperson assumption of office of Taguchi method society

Bad development

The development technique that believes that most companies and most people who do not use Taguchi method are the best firmly

ⅰ）At first they design it and make a trial product and detect malfunction and study a cause of malfunction and change a design to remove a cause.

ⅱ）They raise completeness by repeating this process many times.

ⅲ）Whenever malfunction happens in a market, they add a more minute test method and set a severer evaluation standard･

･･･････････Omission･･･････････････

Because in the first place a past does not have experience in such a totally new technical area, we cannot use development type to prevent from repeating failures based on accumulation of experience for many years. For totally new technical examination, we must use the Taguchi method that is development type to solve the problems beforehand

Field of new technology development ⇒ **Taguchi method**

Ⅲ、 Conclusion

1、Have confidence and pride for TRIZ！

1）Questions happening quite often about TRIZ
2）With the core of corporate management in manufacturing industry?

3）Positioning of TRIZ

2、How do you make the activity a success?

1、Have confidence and pride for TRIZ !

1）Questions happening quite often about TRIZ

Before the TRIZ use

Q1、I hate imitating it! ・・・・・

A 、You rely on a hint, and devise the first thing in your industry

Q2、Is an idea of what kind drawn? ・・・

A 、All the Development problem that you want to do get an idea of solution. Be relieved if an idea of solution is not given because nobody have ideas !

Q3、Is an answer found? ・・・・・・

A 、TRIZ is a hint. It is you that give an answer.

Q4、How much time do we take? ・・・

A 、The time that is need is fixed by importance of a problem

Q5、Is the same result given with anyone?

A 、Ability of the person and technology of the team appear in a difference of quality of idea clearly.

Q6、Do we challenge problem solution alone?

A 、It is preferable to do with many people.

Q7、Does an idea come true?

A 、It can come true by all means.

Q8、It takes too much time ・・・・・・・

A 、It is absolutely largely shortened if you take a long view

After

Q9、A valuable idea was not given

A 、You did not do it seriously.

Q10、Should all the engineers master it?

A 、It is impossible in a company that all the engineers masterTRIZ.

promotion

Q11、Spread activity is difficult ・・・・・

A 、It is surely difficult. It is a valuable thing because it is difficult.

Q12、The top does not give a policy ・・

A 、Draftsman of top policy is you!

Have confidence and pride for TRIZ !

Visible activity
: Offer of products to customers

2、With the core of corporate management in manufacturing industry?

My thought : Patent is the most important in companies (manufacturing industry)

Reason: we can entrust other companies other than patent entirely.
If there is not patent, we cannot say that company is independent .

The origin of competitive power of company

Technology development superior to other companies.
Research and development of products

The use of 

is the most effective

***Release new products**

***We can make pillar of company with patents**

Have confidence and pride for TRIZ !

3、Positioning of TRIZ

Effects of TRIZ increase more by when we use TRIZ together with QFD and Taguchi method.

My thought

1、There is QFD before TRIZ !

1）Problem setting of QFD should raise an aim to get customer satisfaction

2）It is unnecessary at problem setting point in time of QFD to think about realization characteristics of problem solution.

3）we can find out ideas to solve the technical problems (QFD target) using TRIZ by all means

2、There is Taguchi method after TRIZ !

1） we can commercialize the ideas that we thought about in TRIZ using Taguchi method surely.
（Big technical contradiction is finished with consideration in TRIZ）

2） Because there is Taguchi method, we can have 100% confidence for realization of ideas of TRIZ.

2、How do you make the activity a success?

1）The key of success is scientific technical method introduction

*** Innovation of company's custom**
*** Innovation of consciousness of engineer**

⇒ To management innovation!

① As a message in management policies by the company president.

Top-down activity

② Consciousness innovation of engineers and TRIZ staff .

⇒Collaboration impeller thought

Bottom up activity

（TRIZ staff have to have enthusiasm and responsibility of problem solution more than development engineers)

③ We have to appeal result to organization in periodical result report meeting.

Result appeal activity

2）1）The key of success is scientific technical method introduction

* Innovation of company's custom
* Innovation of consciousness of engineers
  ＝A terrible fight to let executive officers throw away the know-how of conventional success entirely

Awful, wall is thick!

Persuasion / satisfaction

It is grounded on concrete result of Development, and explains it!

Forcibly!

Perseverance is strong!

Logically!

Carefully!

3）Future product development and ideal style of organization

Collaboration

* The engineer who had a specialized field

First class technology is necessary for both technology

* The engineer who had Trans-Disciplinary Fundamental Technologies

(Scientific technical method)

Let's administer activity of company by scientific technical method, and let's make management result !

It is worked on problem solution to realize happiness of a customer

Practice of JQA Panasonic Policy

Basic steps make for products

1、We get the voice of customer precisely and make product concept
2、We make the technical problems clearly
3、We determine the technical aim more than expectations of customer
4、We think about basic design supported by technc
5、We solve the important Development problems
6、Design so that there is not unevenness of quality of every product
7、Design so that there is not unevenness of quality in the factory
8、Design so that there is not unevenness of quality in the market
9、We sell it and meet the expectation of customer

work range of an engineer

QFD

TRIZ

Taguchi Method

Thank you ！

2006, 9, 1

Panasonic Communications Co., Ltd.

Kazuya Yamaguchi