

9th TRIZ symposium

Meltex, Inc. Tajima

QFD and TRIZ Case Study in Surface Treatment Chemical



会社概要

メルテックスは2010年10月に創業50周年を迎えました。

私たちの使命は「技術革新」と「環境負荷低減」を同時実現し、
先進の表面処理プロセスを通じて、お客様の事業発展に貢献することです。

ロゴマークとコーポレートスローガン

商号	メルテックス株式会社 (Meltex Inc.)
設立	1960年10月
代表取締役	岩城 慶太郎
資本金	4億8,000万円
事業概要	電子工業薬品、 表面処理薬品の製造、販売 化学機器の設計・施工 化学薬品、金属の分析及び回収
従業員数	364名 (2012年11月末)
決算期	11月
販売区域	国内及び東南アジア諸国



ロゴマークの形は、「技術」「機能」「環境」
をつなぐ架け橋を、
青色は「技術」と「信頼」、水色は「環境調和」
を表現しています。

「Link to X」というスローガンには
「世の中のあらゆるものと
素晴らしい未来をつなぐ架け橋になりたい」
という強い決意を込めています。

取扱商品のご紹介

メルテックスは表面処理薬品の製造・販売を通じ、主にエレクトロニクス・自動車産業の発展に貢献しています。

Meltex メルテックス 株式会社



プリント配線板用薬品



電子部品用薬品



半導体用薬品



一般めっき用薬品



表面処理周辺商品

TCM 東京化工機株式会社



製造装置



トータルソリューション

表面処理に関する高い技術力と知識を活用し、商品だけではなく、お客様に最適な「トータルソリューション」をご提供いたします。

Chemical Process

各種表面処理薬品とプロセスをご提供すると共に、お客様のニーズに合わせた開発やカスタマイズもおこなっています。

Material & Machine

周辺材料、各種コントローラー、実験用装置から量産ラインまで、あらゆる表面処理周辺商品をご提供致します。

Support & Consultation

お客様が抱える問題を的確に理解し、お客様に合わせた処理方法や最適なサポート、ソリューションをご提案致します。



主要製品分野のご紹介

プリント配線板、電子部品用薬品を中心に国内・海外に広く展開しており、Smart PhoneやHybrid車などの高機能製品製造に広く使用されています。

プリント配線板用薬品

リジッド、FPC、パッケージ基板などあらゆる電子回路基板に使用されており、硫酸銅めっき添加剤やアルカリエッチング液を中心に、高いシェアがあります。

電子部品用薬品

コンデンサ、抵抗器などの受動部品、コネクタ、リードフレーム用薬品のほか、近年注目されているITOやガラスなど様々な素材に対応した薬品を取り揃えています。

一般めっき用薬品

装飾品、精密機器、自動車部品などに使用される素材に美観、耐食性を与えます。各種金属、プラスチックなど様々な素材に対応した薬品を取り揃えています。

半導体用薬品

半導体分野における電極へのバリアメタル形成、メタルシードの除去など半導体製造工程に必要な高機能・高品質な薬品を各種取り揃えています。

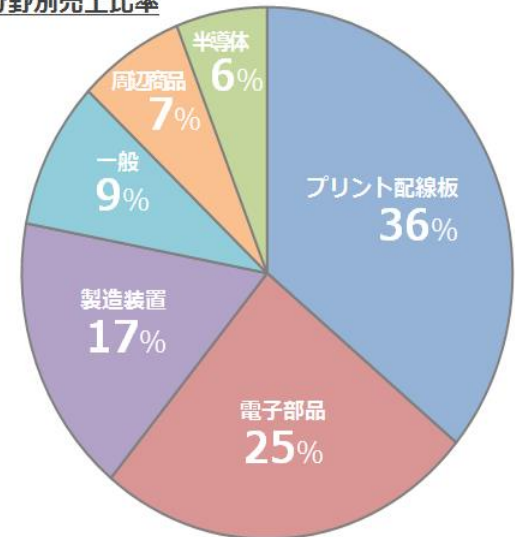
製造装置 (TCM)

国内外のお客様に2000台以上の水平搬送処理装置販売の実績を持ち、プリント配線板・FPD製造装置、最新技術を用いたHybrid Etching装置等取り揃えています。

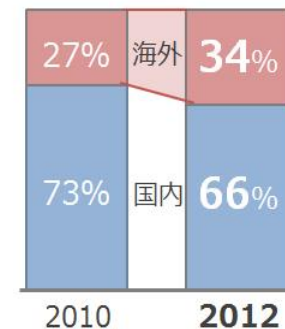
表面処理周辺商品

電極やフィルターなどの消耗品から、薬液コントローラー、鍍金ライン、テスト用めっき装置まで、あらゆる表面処理周辺商品を取り揃えています。

分野別売上比率

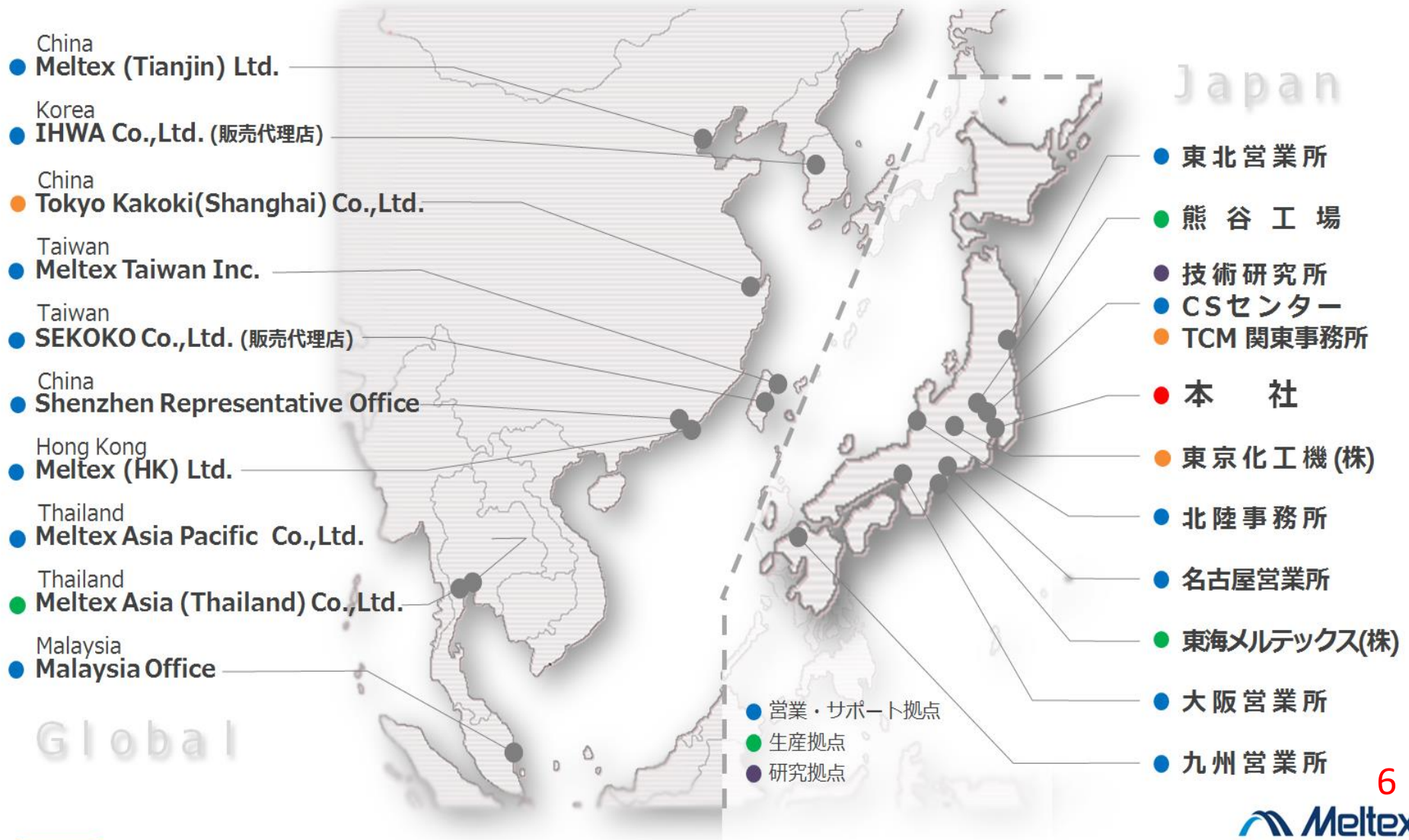


国内外売上比率



グローバルネットワーク

日本全国に展開した国内拠点のほか、中国、香港、台湾、韓国、タイ、マレーシアにも営業拠点を展開し、お客様を海外でも強力にサポートしています。



Application experience

To do the product development process more effective and efficiently, QFD (quality function deployment), TRIZ (invention and conception method), and QE (quality engineering) were executed in-house as one of the knowledge creation processes.

However, because the secret matter related to a detailed design is a lot of, QE is excluded from this report.

Period : From June to November, 2011

Number of themes :2 (SAP and ITO)

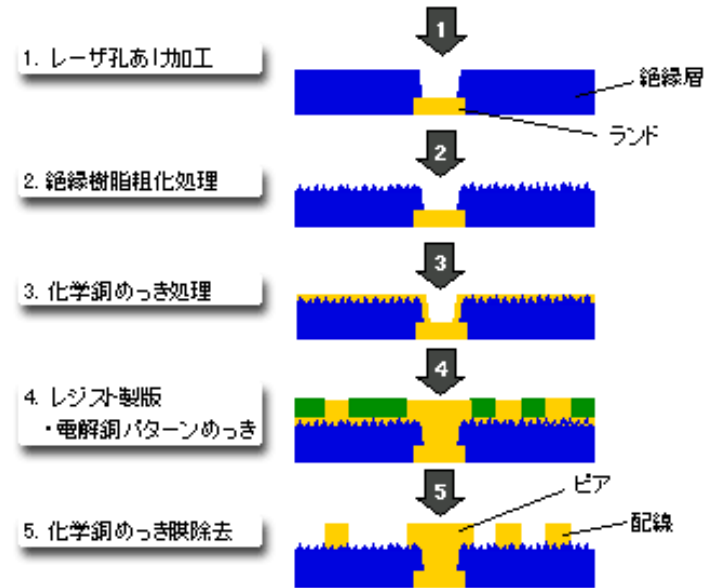
The number of men :15 each theme people (business, production, technology, and market)

Days :Program of 11 days (QFD 4 and TRIZ 7)

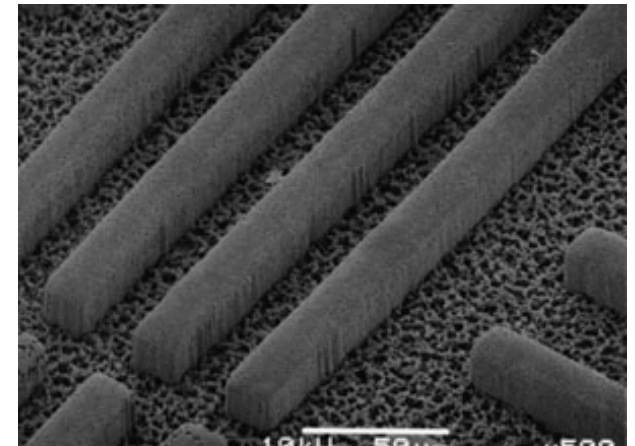
Case: SAP (Semi-Additive Process)

Development background:
Semiadditive process (SAP) that is one of the plater methods is used for the high density package substrate. However, there was not the technology that was able to propose it by our company, and original technological development was demanded.

Development goal:
Line thinning Line & Space 5 μ m or less of substrate



SAP process



Line and Space is the one that the copper circuit and the circuit gap distance were shown.⁸

QFD, TRIZ, and (QE) are used

1. Attractive commodity design that makes customer's potential needs by QFD visible

- It designs according to Kanoh model *.
- The trade-off is understood without “Drop/Leak”, and the risk is minimized.
- It uses it as a communications tool.

2. Attractive commodity concept creation by idea creation by TRIZ

- Attractive concept creation
- Product development that doesn't compromise
- Idea creation tool

3. Improvement and efficiency improvement of perfection of product by QE(TM)

- The optimum design will be made highly effective in a short time.
- Prior grasp when parameter is changed
- Robust design

- The quality is thought, and defined not to become an updated version product alone that collects negative information about customers in the attractive quality element (It satisfies, it doesn't fulfill, and do not exist if fulfilled either), the unified quality element (It is dissatisfied because of the satisfaction and no fulfillment if fulfilled), and the natural elegance quality elements (It is dissatisfied because of natural and no fulfillment if fulfilled). (This is called a Kano model.)

Eight problems that engineer faces

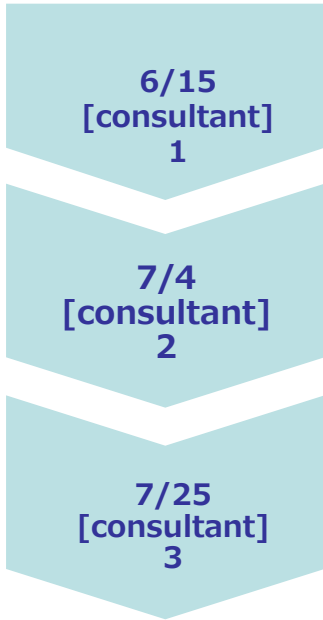
	QFD	TRIZ	Taguchi method
①Awareness of customer's needs	-	-	-
②Setting of attractive commodity concept	-	-	-
③It is easy to use and is a daring design.	-	-	-
④Faster time to market	-	-	-
⑤Solution of published market quality problem	- -	-	-
⑥Solution of bottleneck technology	-	-	-
⑦Decrease of cost	-	-	-
⑧Expansion of intellectual property	-	-	-

- :Immediate effect * :indirect effect

Application of each problem of development and design approach

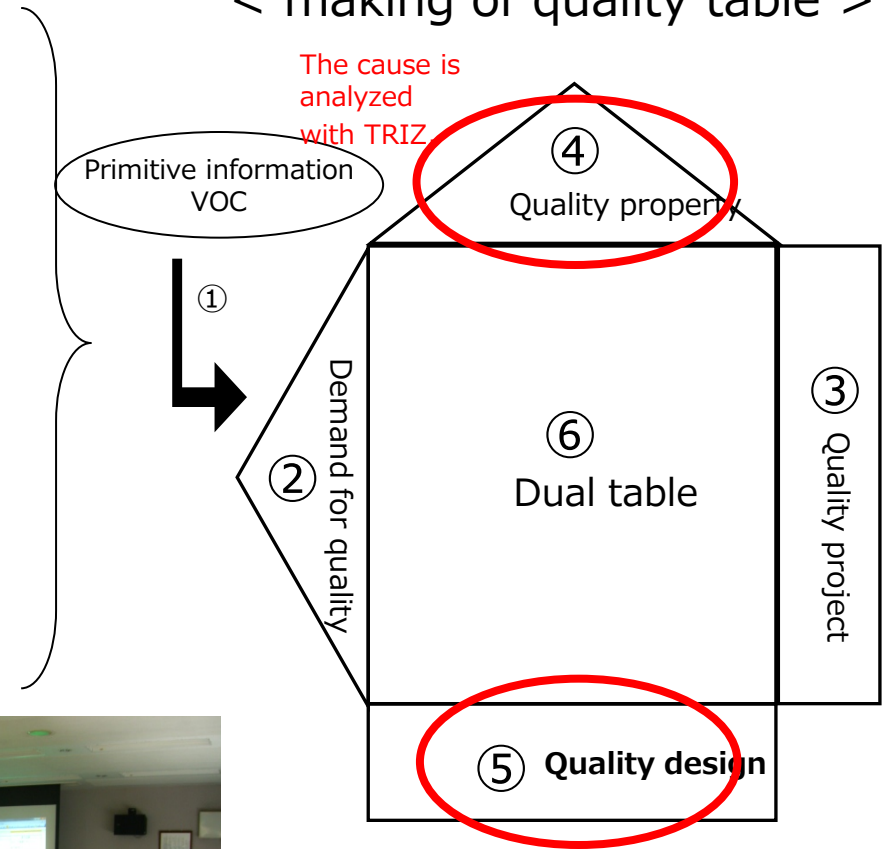
- It is general to apply the quality control method of FMEA and FTA.

Procedure of QFD (VOC⇒ technology conversion)



- ① Collection and analysis of primitive information
Conversion into demand for quality
- ② Making of demand for quality spread sheet
- ③ Examination of quality Planning Division
- ④ Extraction and arrangement of quality property
- ⑤ Quality design
- ⑥ Demand-characteristic relation

< making of quality table >



It solves it with TRIZ

To TRIZ to achieve the decided quality design



VOC=Voice of customer 11

Extraction and target setting of quality property

	品質企画			
	品質の性質	重要度	クレーム	要望項目
3次要求	レベルアップ項目			
It is easy to remove the catalyst.	○ ○ △ ◎	◎		◎
	○ ○ ○ ◎	◎		△
	◎ ○ ○ ◎	◎		△
	◎ ○ ○ ◎	◎		◎
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I want to improve adhesion by a minute circuit

When the circuit is formed, I want to peel off plated film (Cu,Pd) easily

It is a centerpiece as for the catalytic removal



The relation of the above-mentioned trade-off to TRIZ

Procedure of TRIZ

①: Making of problem essence

Function-attribute analysis
Cause-consequence analysis

Embarrassed thing

Primary cause

②: Observation and conception because of various angles

TRIZ

When seeing from side when seeing on
More in detail when dividing into two
When sideways cutting it when cutting it
in length
When making it to asymmetry

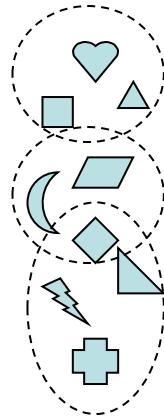
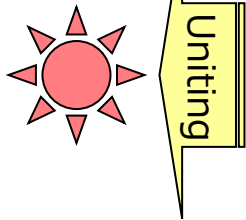
The good one arises when hundreds
of ideas are shown.

③: Making of idea (idea settling) effective

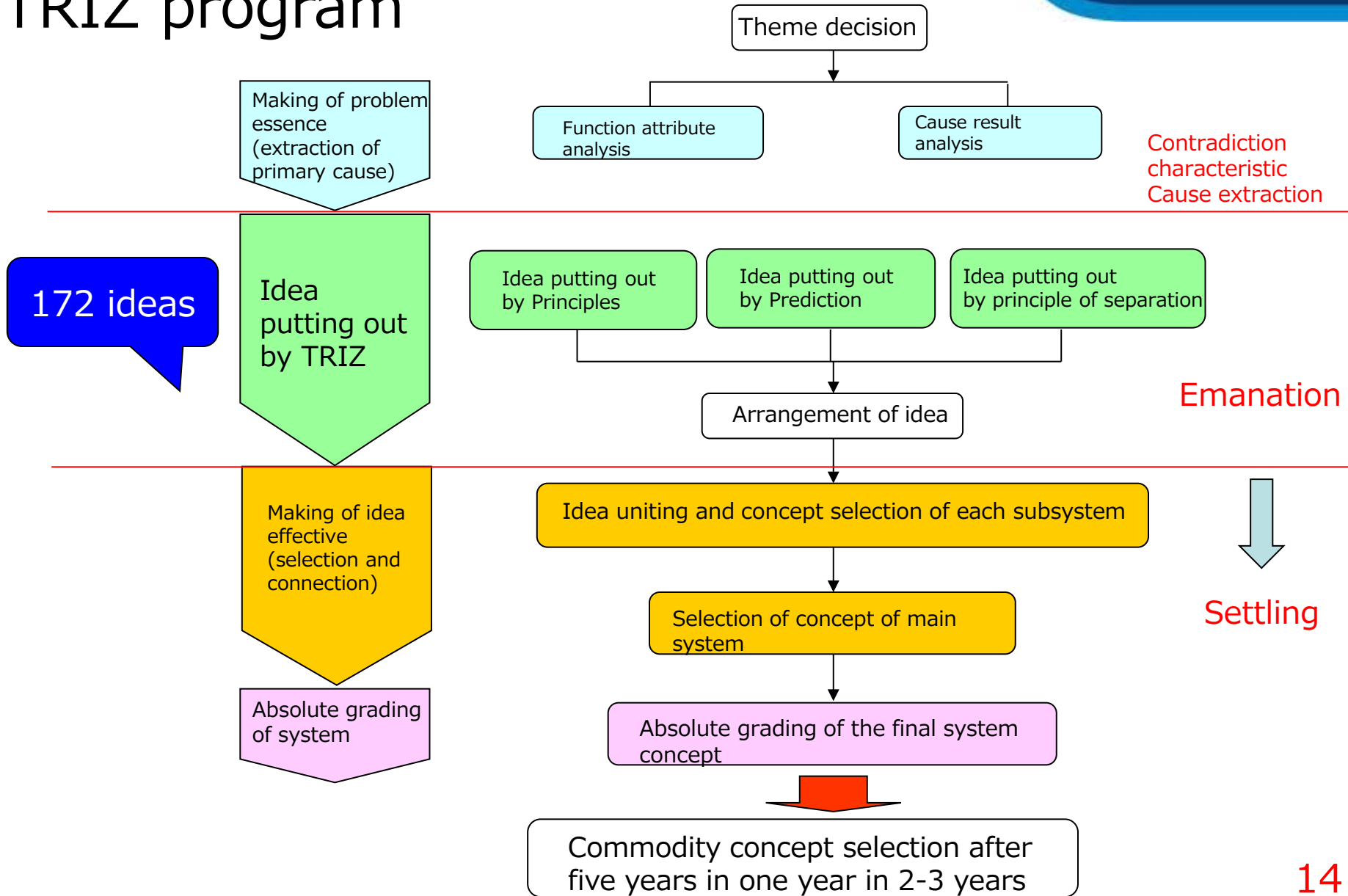
Selection and uniting of concepts

Ideas are united mutually and the quality is improved further.
Next, it thinks about reality.

④: Strategy Development theme decision

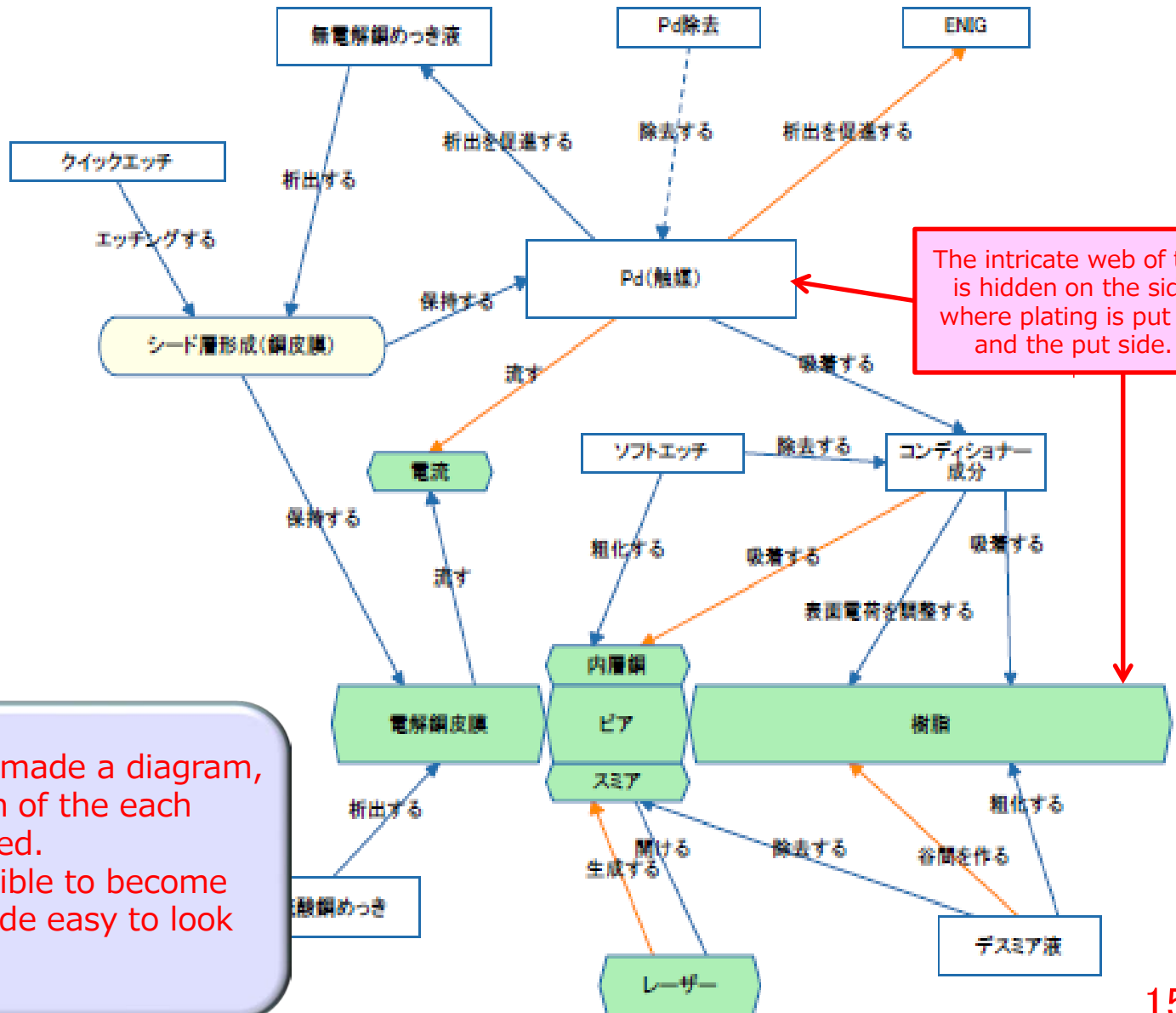


TRIZ program



Function attribute analysis

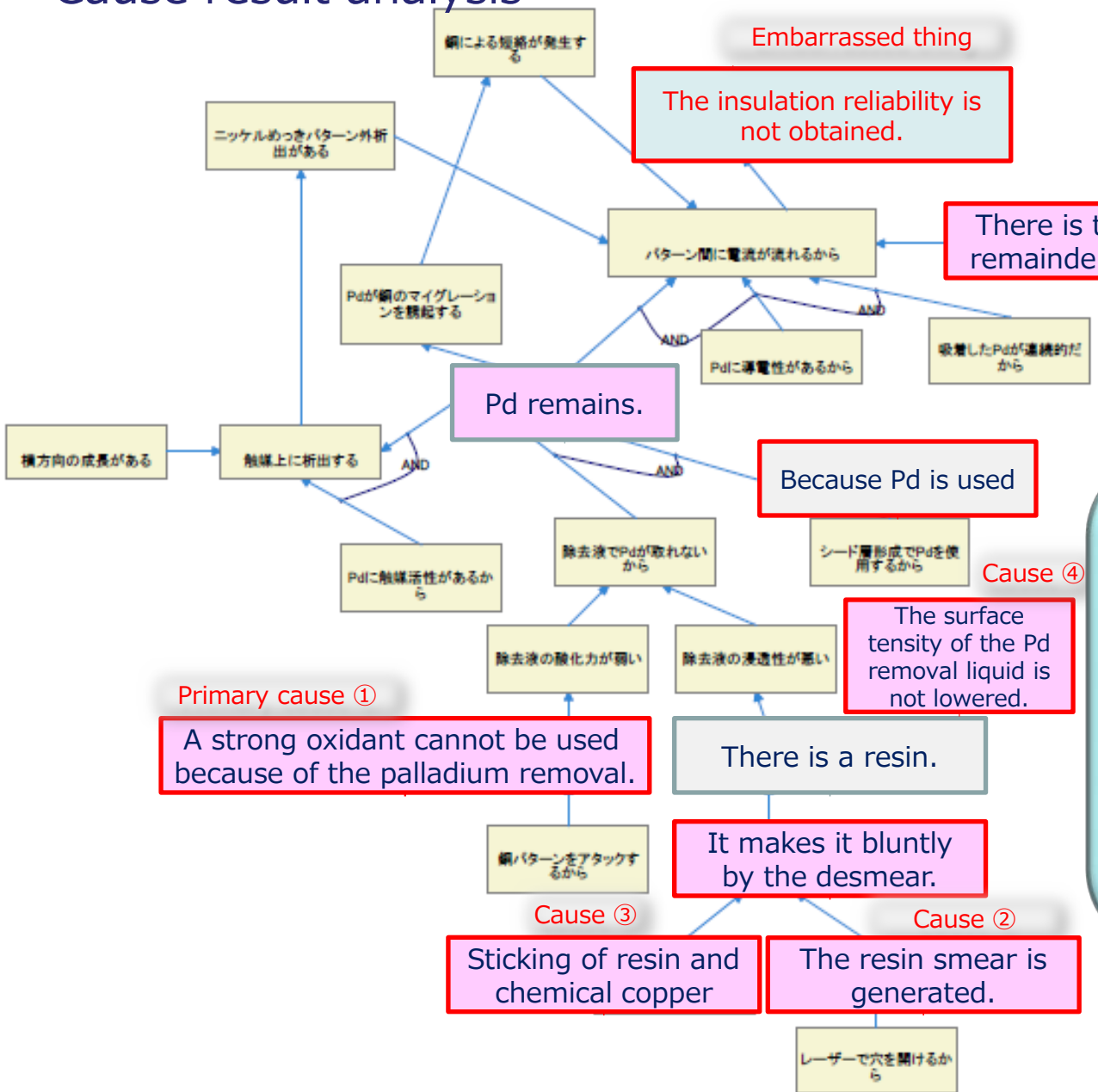
- ①デスマア
- ②クリーナーコンディショナー
- ③ソフトエッチ
- ④触媒付与
- ⑤シード層形成
- ⑥ドライフィルム露光現象
- ⑦電解銅めっき
- ⑧ドライフィルム剥離
- ⑨クイックエッチ
- ⑩Pd除去
- ⑪ENIG



The intricate web of ties is hidden on the side where plating is put up and the put side.

The process of SAP is made a diagram, and the causal relation of the each stage of work is clarified. The one that it is possible to become a primary cause is made easy to look for.

Cause result analysis

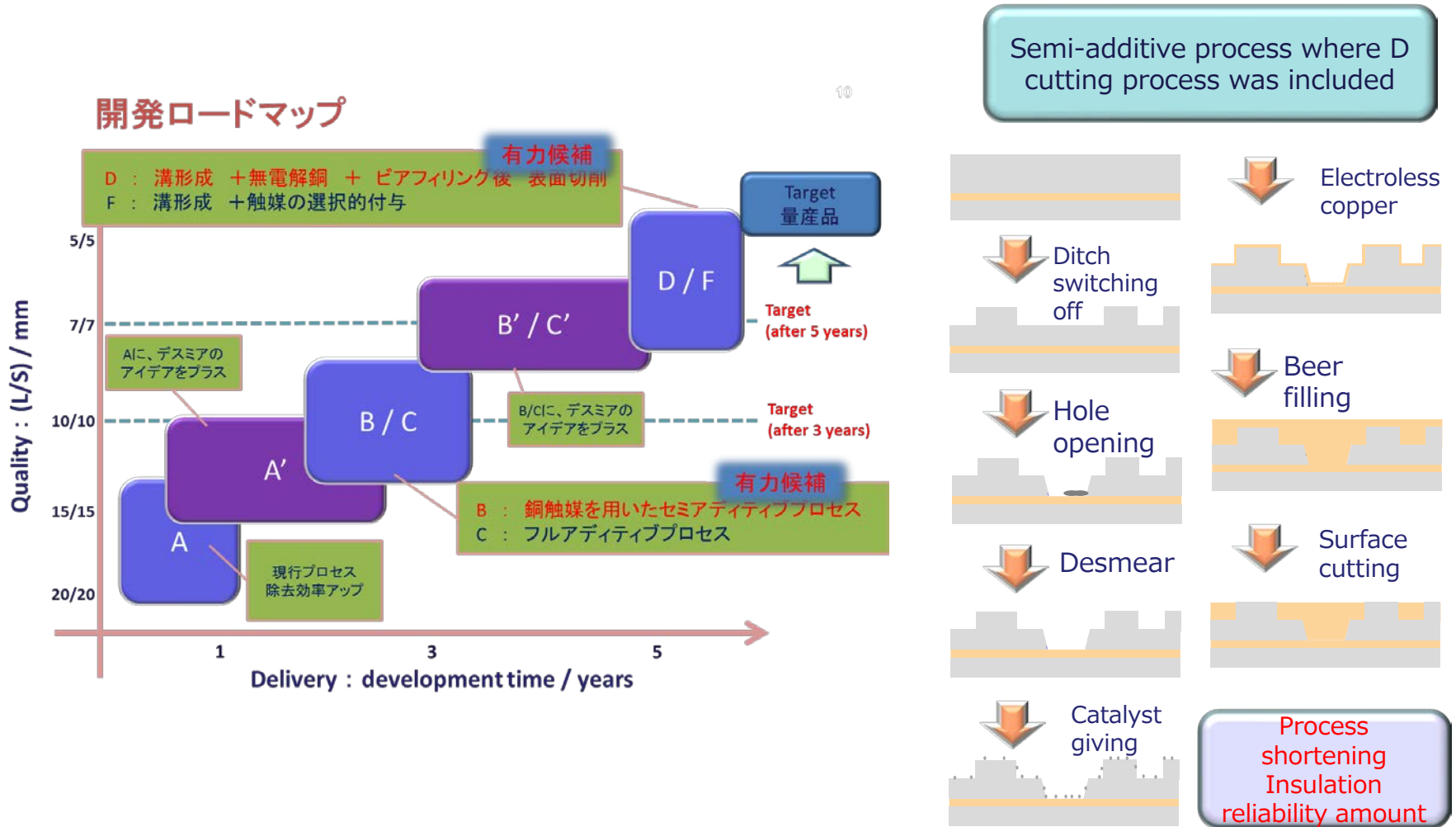


There are a lot of causes of originating in palladium.

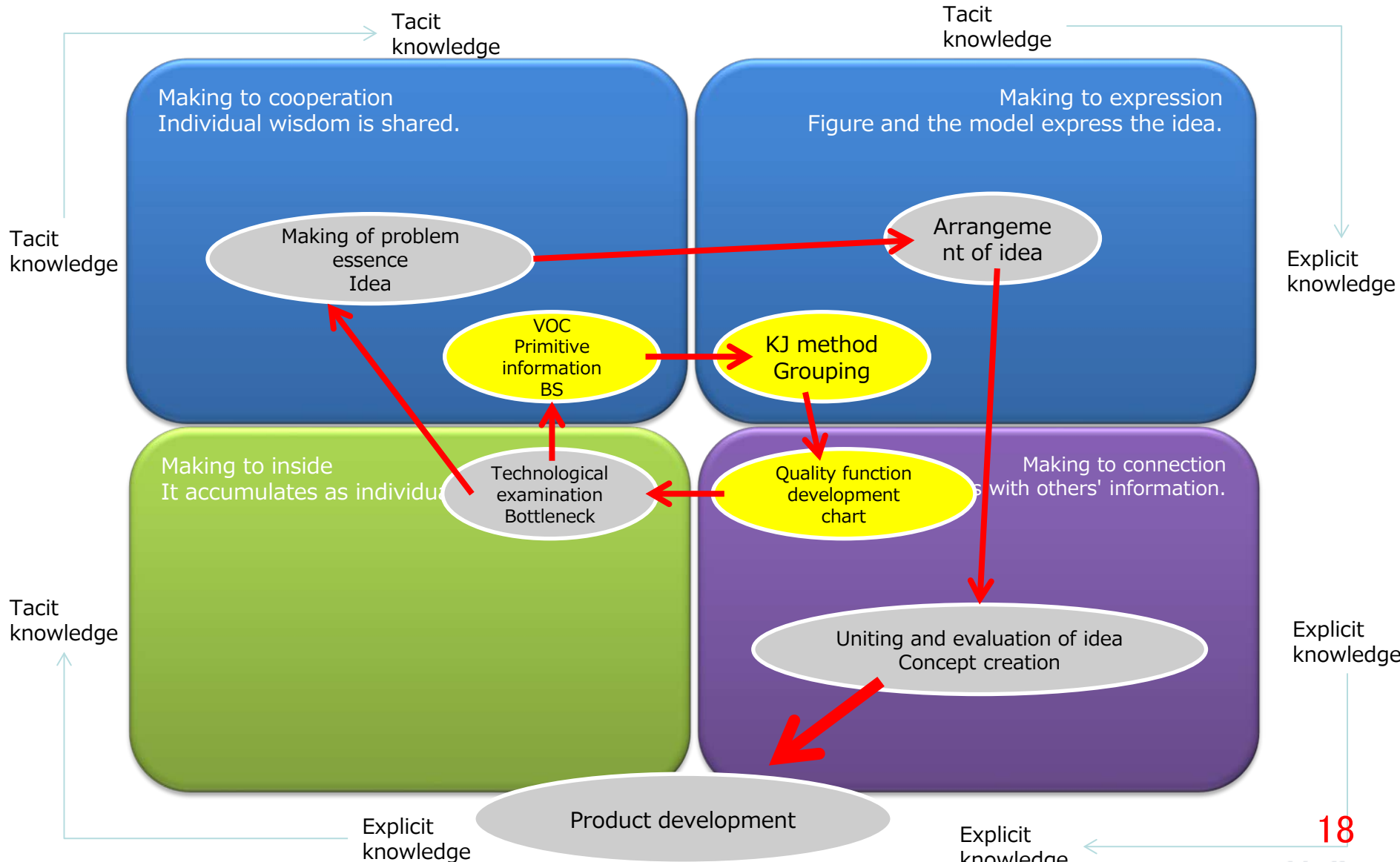
The ruggedness on the surface in the Smear removal is a problem.

Uniting of ideas by TRIZ

Various ideas were emanated, and it evaluated in the point of QCD, ideas were united, and the road map and the concept were created.



Knowledge transformation (SECI) model of QFD and TRIZ



Result and failure

Result

- The concept can be created from VOC by a chain of flows by QFD and TRIZ (Even the normal person :).
- The solidarity and communications can be attempted by sharing the place.
- It comes in the place of study from which old-timer's technology is instructed to the young man by the group examination.
- Shortening of development time
- Drop/Leak prevention (making to visible)
- The specific customer's influence is not received easily.
- Lack information is understood.

Improvement

- The idea of man who is well versed in the field contributes greatly.
- The person who doesn't make remarks that there are a lot of numbers of people comes out.
- There is a negative employee because taking time to make arrangements and the content are complex.
- The number of ideas depends on the ability.

Address of thanks

President Mamoru Zenko
Mr. Hajime Kasai
of Idea Ltd.

It actually felt that I believe I can
move mountains if I try