

Managing To Create Problem-Solvers

 **Lean Transformation**
Summit 2017
Carlsbad, CA | March 7-8, 2017

4 Types of Problems

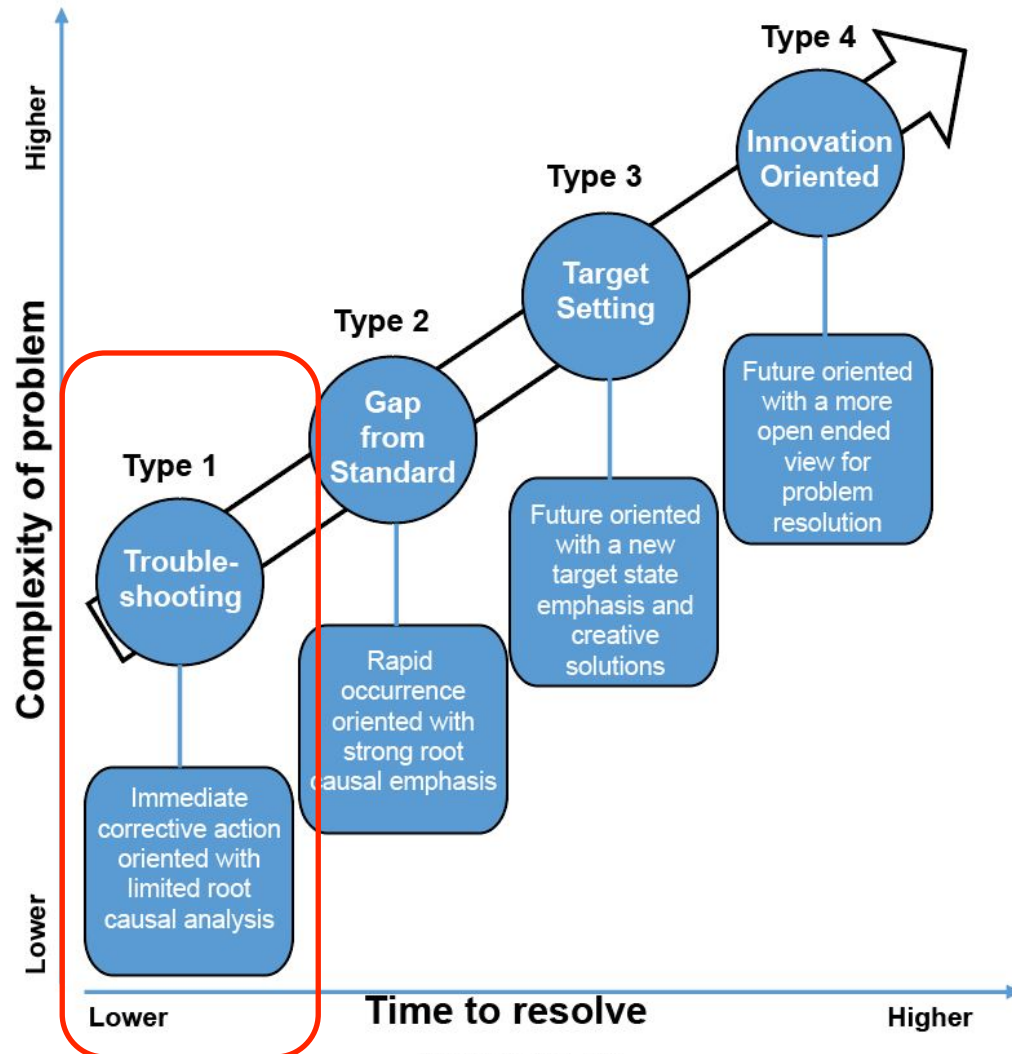
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President
Art of Lean, Inc.



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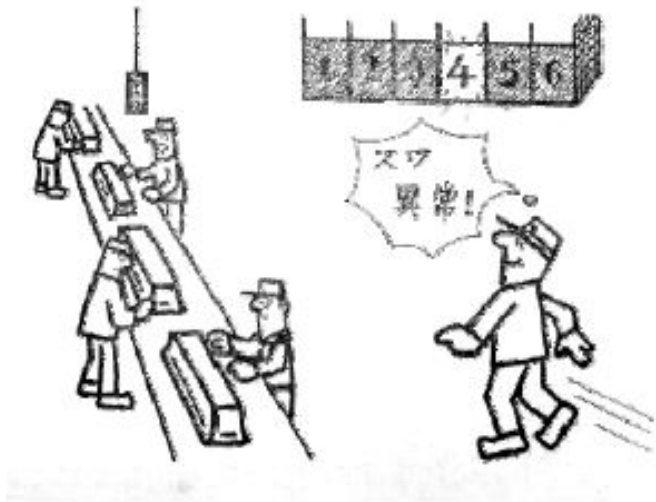
4 Types of Problems



Type 1 Problems: Effective Troubleshooting

- Concept of fixing problems now
- First responder mentality
- Protect the customer
- Protect the workforce
- Make a better day
- Displaying courage, creativity, and the spirit of challenge

Toyota Supervisor Image



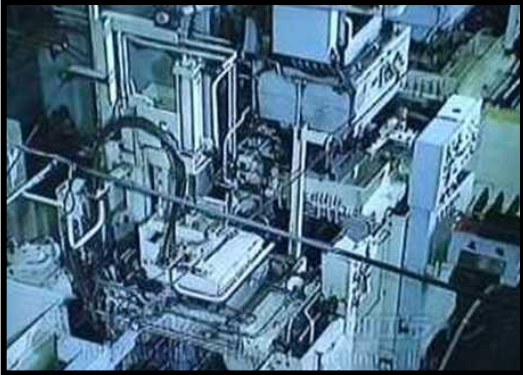
Rapid response to problems and abnormal conditions by production

- Team Member
- Team Leader
- Group Leader
- Manager
- Plant Manager

“All Mighty” Supervisor Image

1. Safety
2. Job Ability
3. Team Leadership
4. Kaizen Skills / Problem Solving
5. Technical Knowledge
6. Human Relations

Andon Response Example



1. Automated process cycling normally



2. Mechanical probe detects broken cutting tool and stops the machine



3. Probe signals an “andon” board for visual display

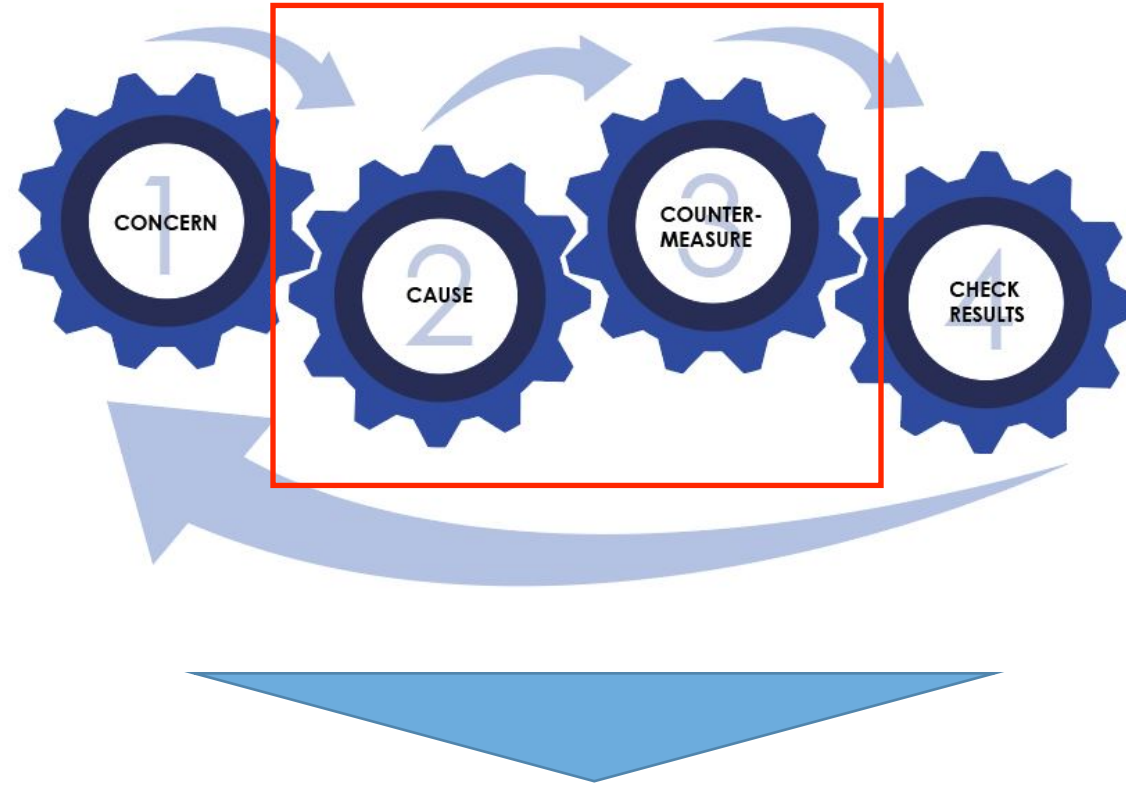


4. The operator **immediately takes corrective action** and confirms good products to the following process

In a large Toyota Facility:

- 10,000 Andon cord pulls / shift
- No way to hold 10,000 meetings
- No way to do 10,000 Six-Sigma projects
- No way to have 10,000 Kata sessions
- No way to write 10,000 A3 reports
- Hence we troubleshoot!
- 異常処置 / Ijō Shochi

4 C's Thinking



Minimal (if any) documentation involved. No A3's.
Mainly discussion, critical thinking, rapid action & follow up.

Type 1 – Troubleshooting

Production Analysis Board

Line/Cell Name:		Team Leader:		Date:	
Quantity Required:		Takt Time:		Shift:	
				Num of Operator:	
Time	Hourly		Cumulative	Problem/Causes	Sign-off
	Plan /	Actual			
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Rapid Problem Solving

- Concern
- Cause
- Countermeasure
- Check

Time & quantity based triggers
Updated hourly by Team Leader
Check hourly by Supervisor

“3 Why” Stage of TPS (1950’s)

Concern: Line did not achieve hourly production target (e.g. Plan 50 / Actual 42)

Causes

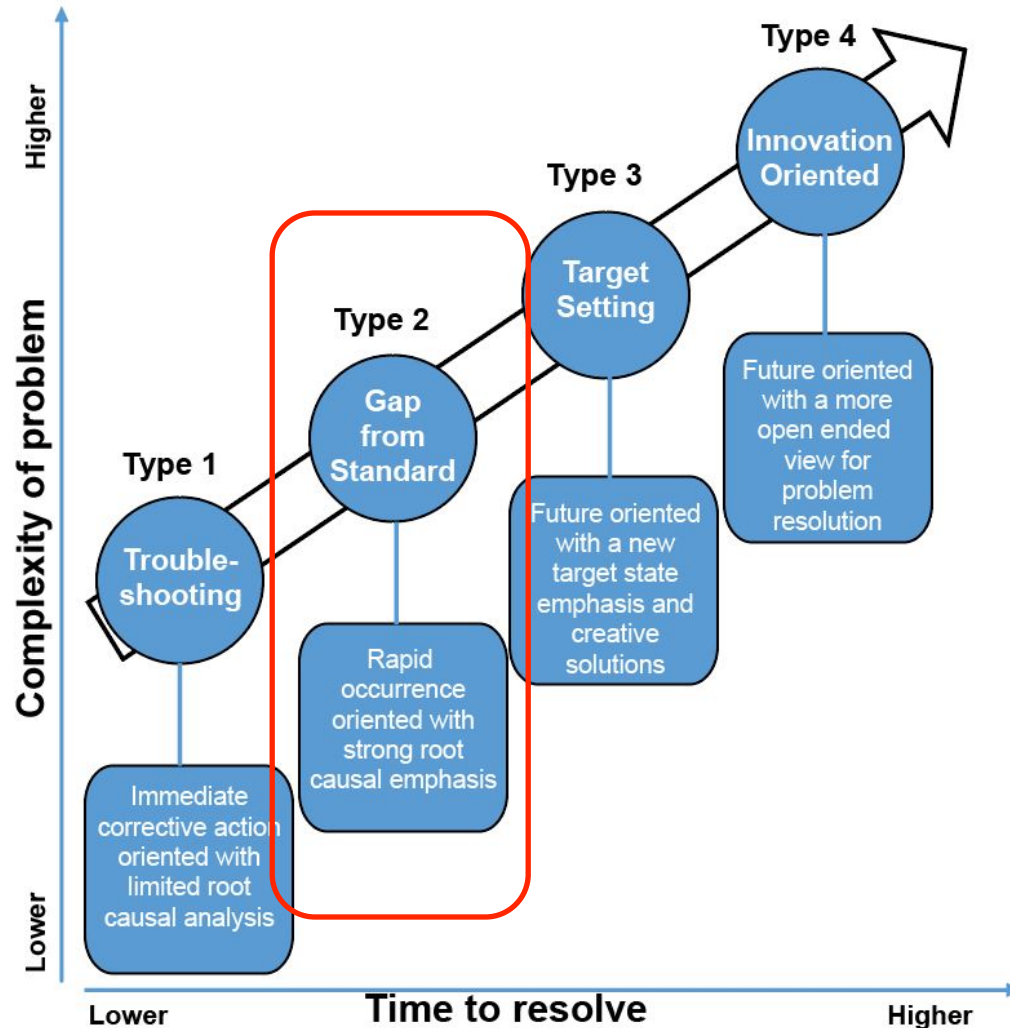
1. Op. 30 Milling Machine causing delays
2. Machine clamping faults
3. Cutting chip build up on fixture

Corrective Action: Clean the surface quickly!

Check: Next hour Plan = 50 / Actual = 50)



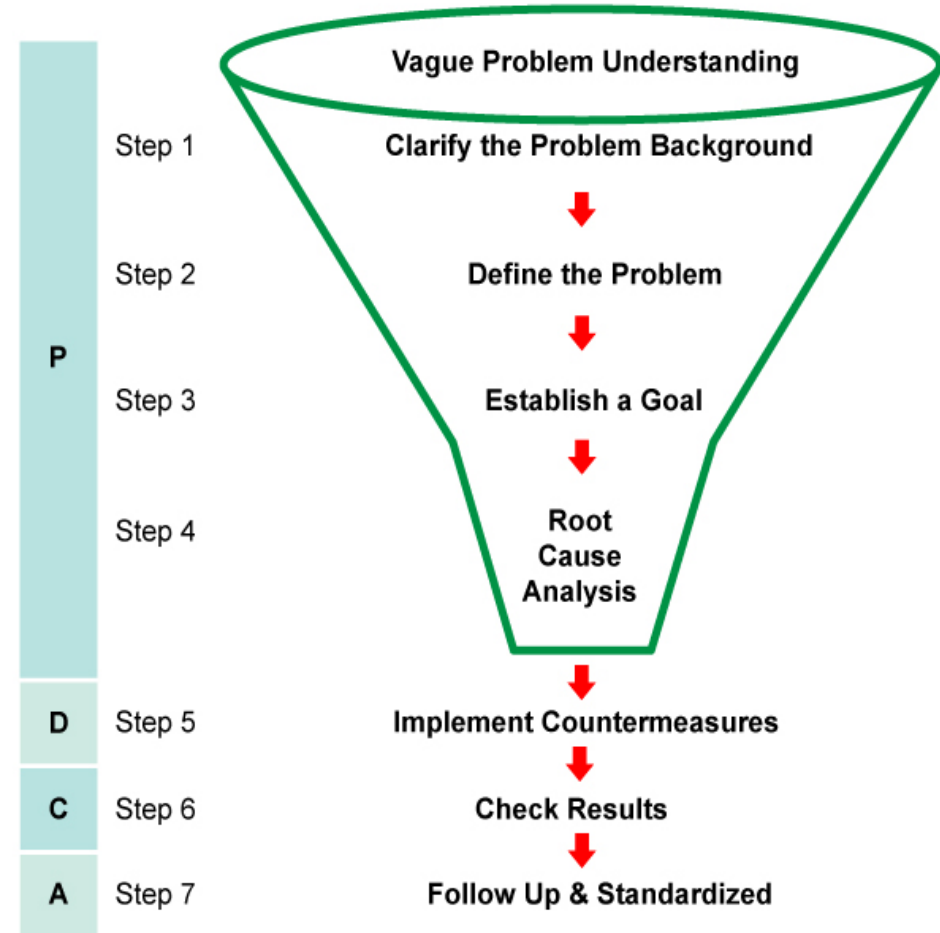
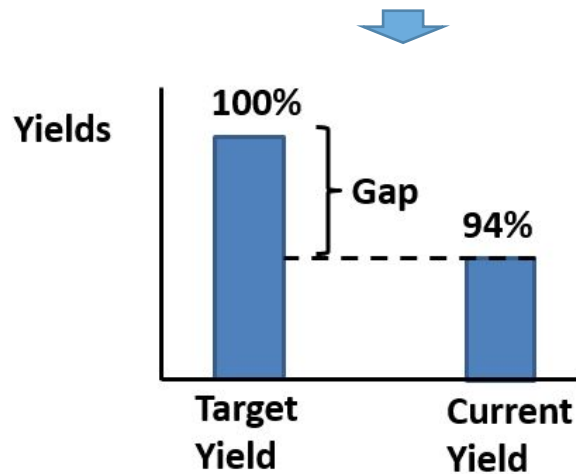
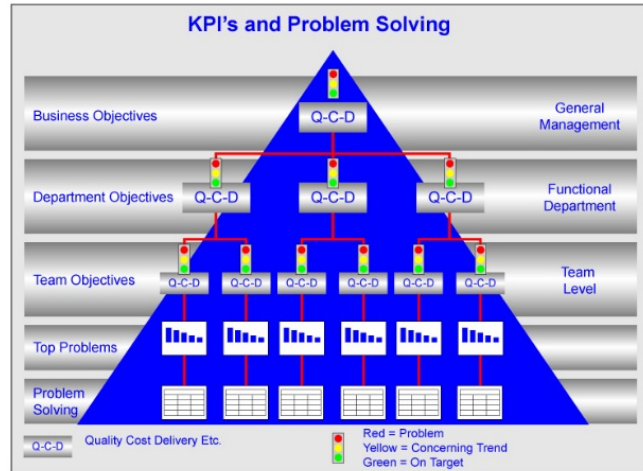
4 Types of Problem



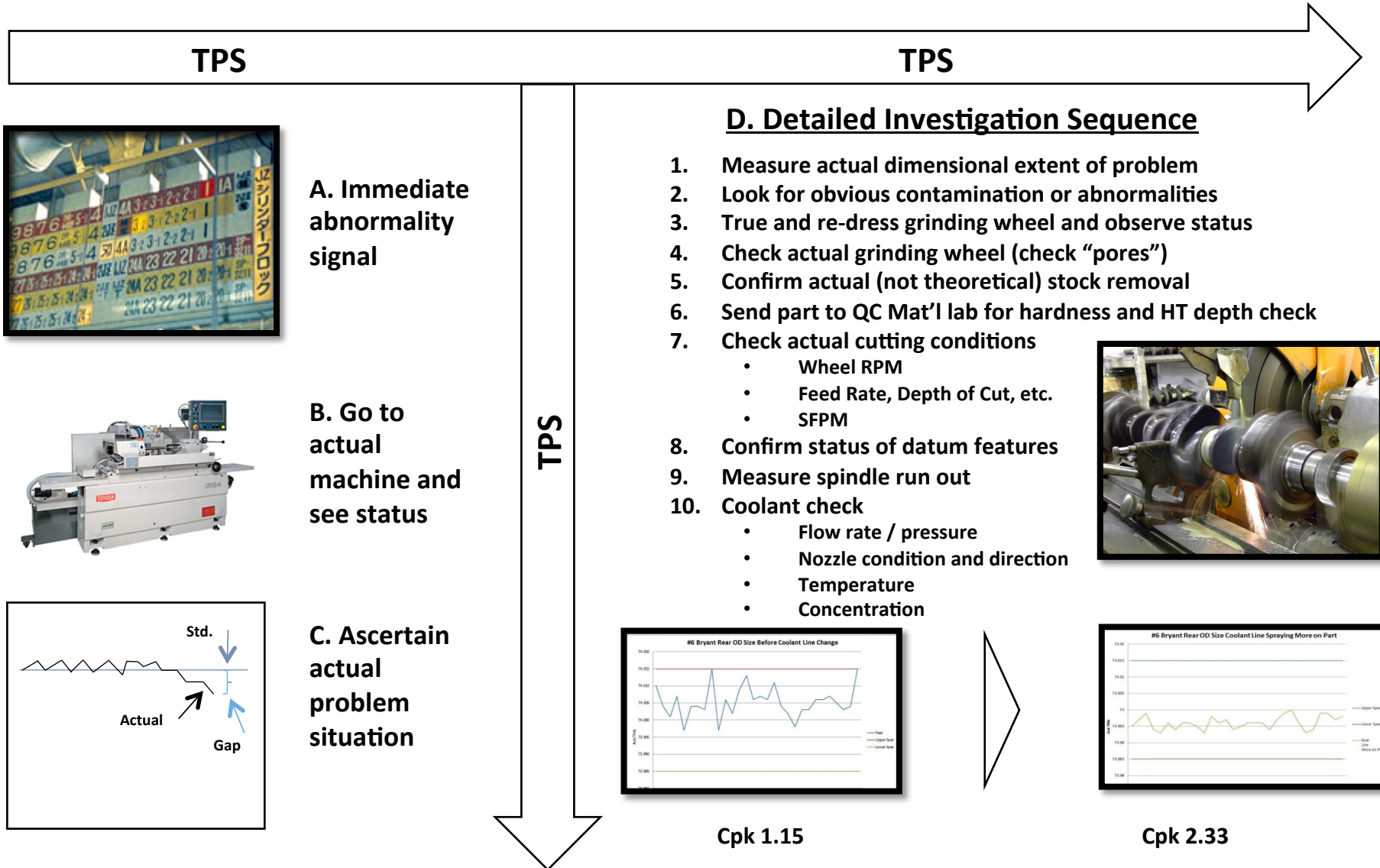
Some problems are severe, or recurring, or just a huge pain...troubleshooting won't solve these.

Convergent
Focused
Analytic
C&E Relationship
Standard attainment
Scope control

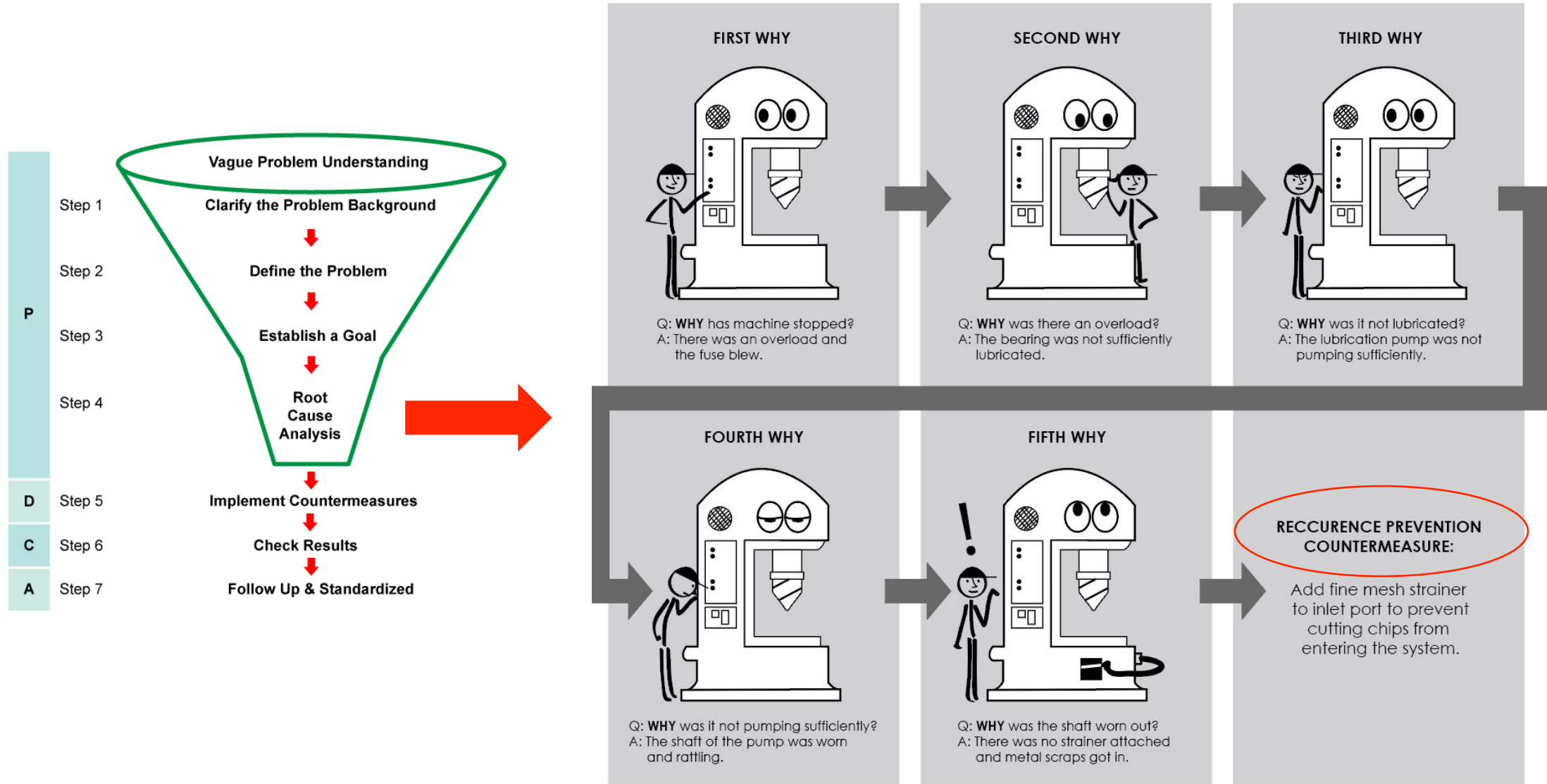
Type 2 – Gap from Standard



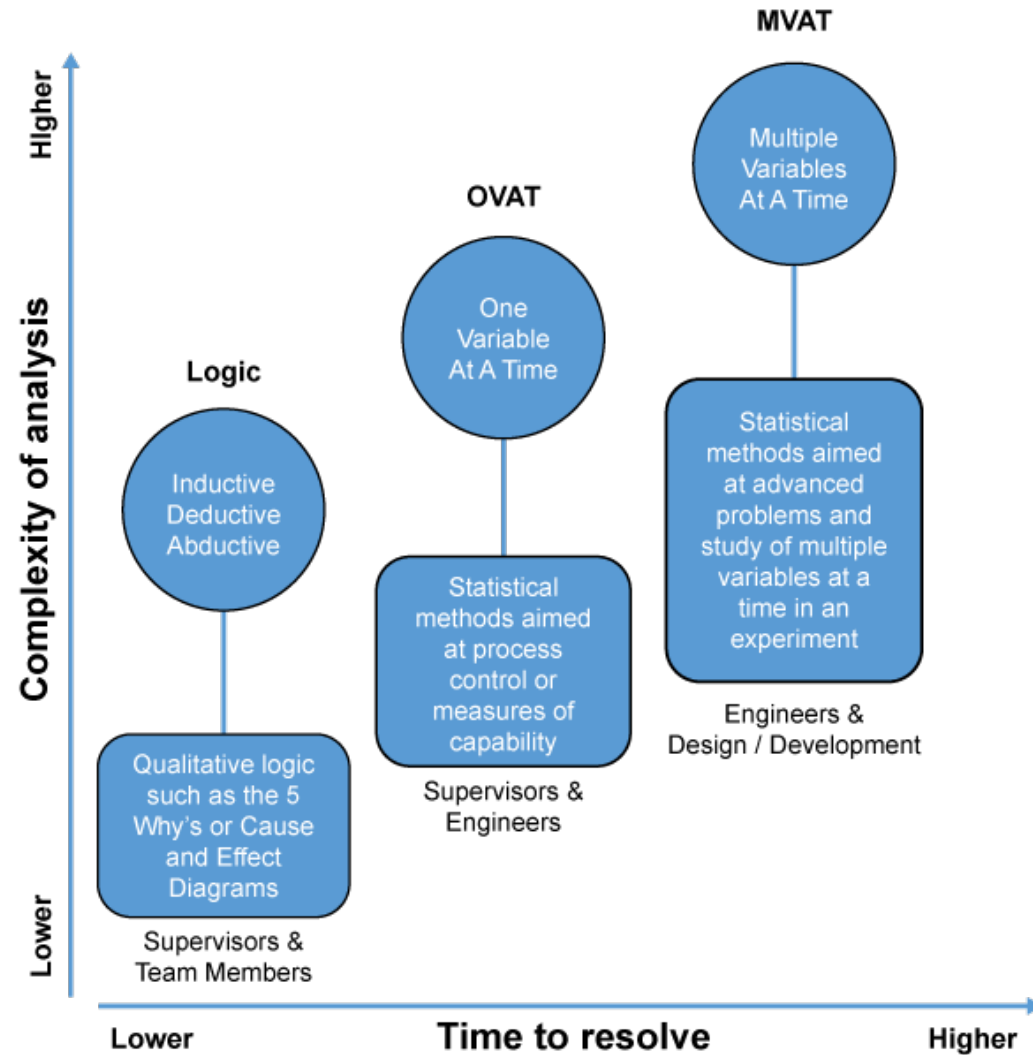
Problem Investigation



Birth of the 5 Why's – 1960's

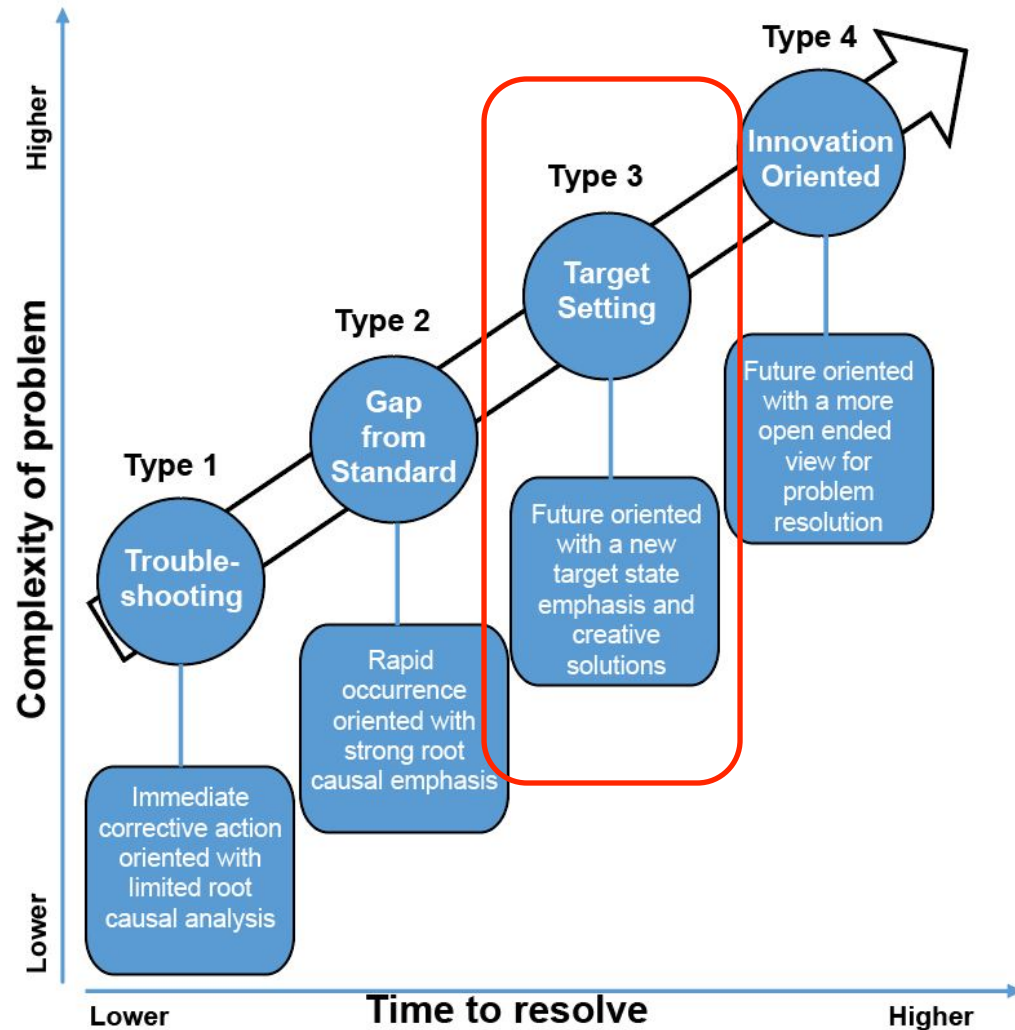


Type 2 – Analysis Types



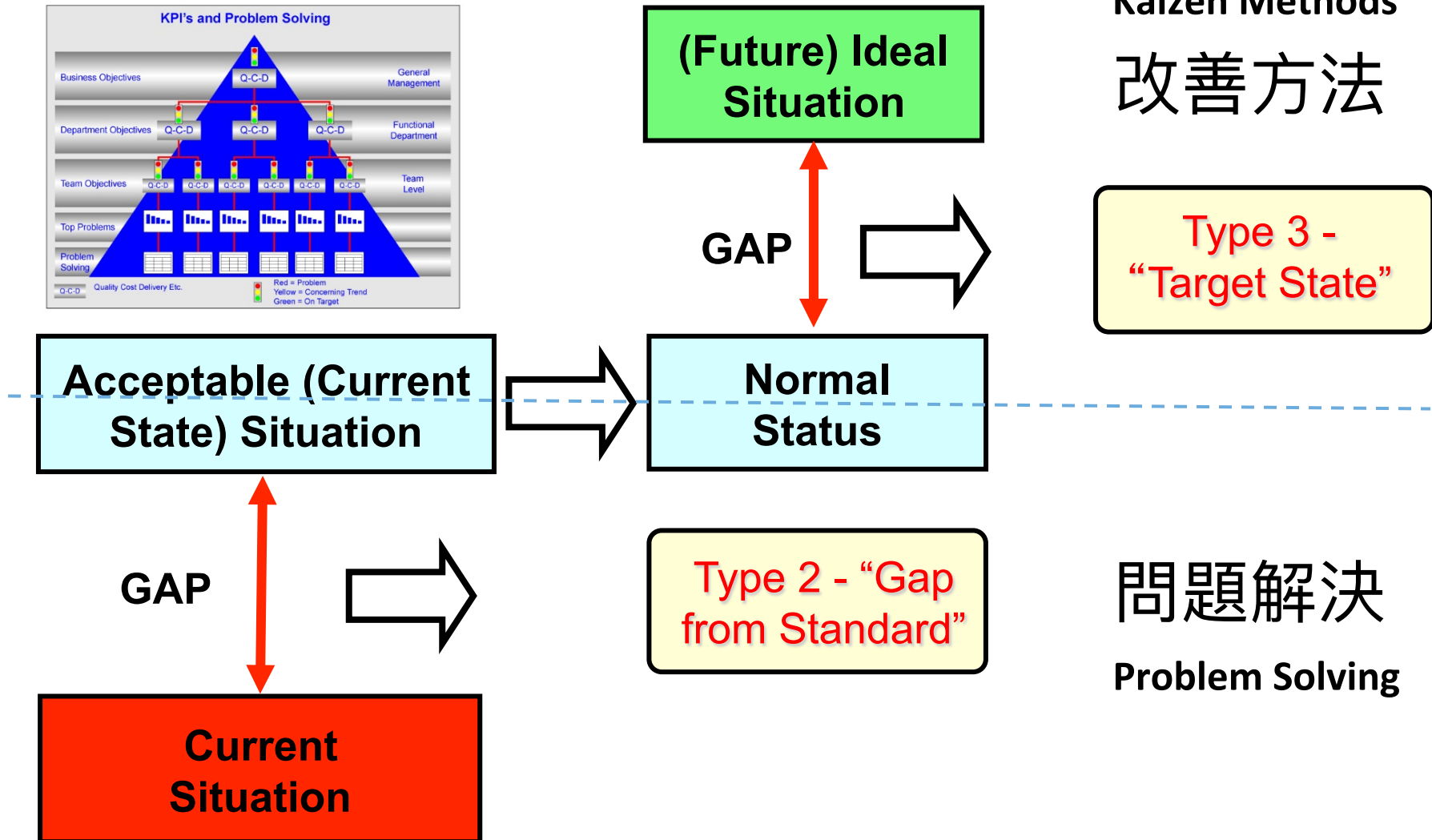
Convergent
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4 Types of Problems

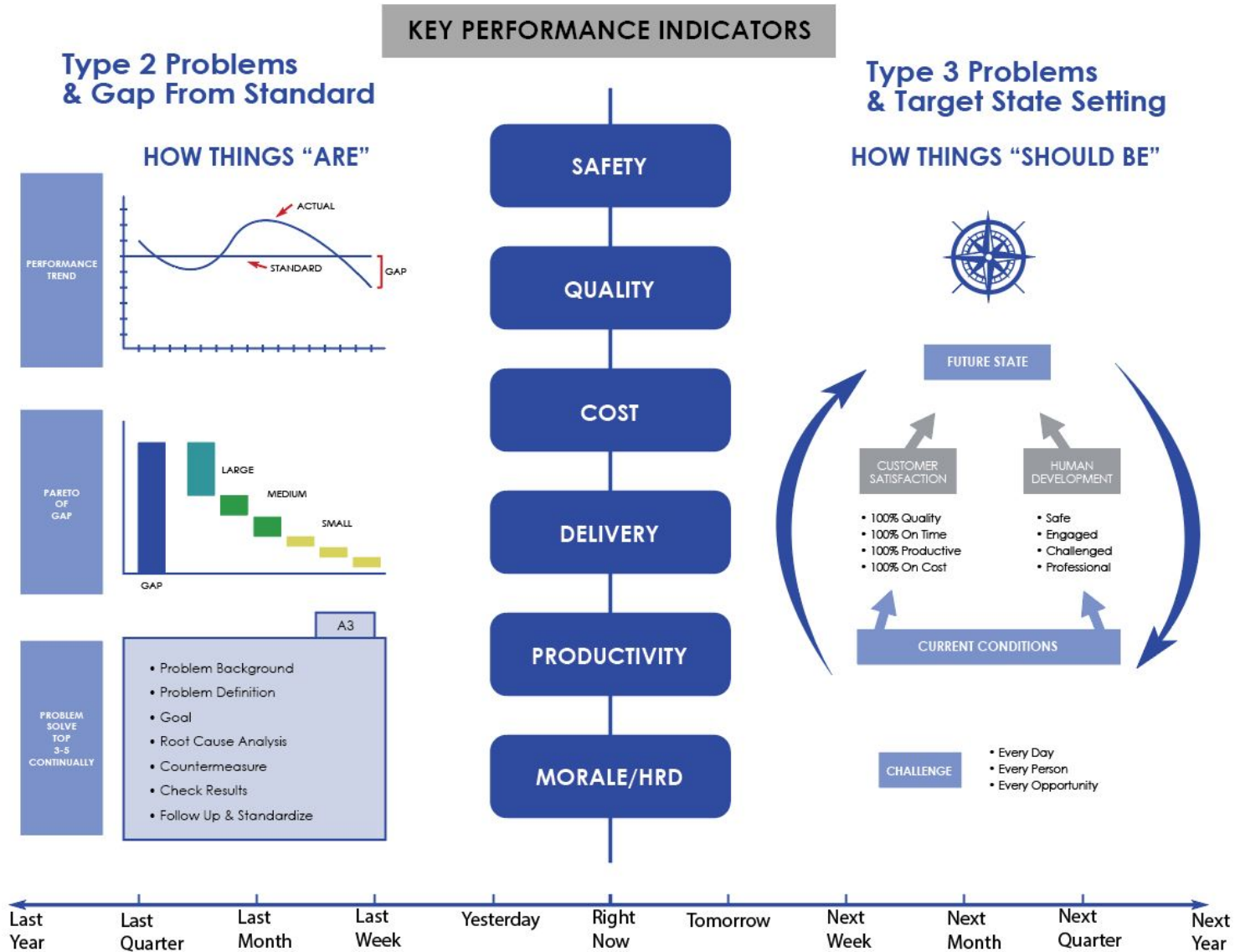


Divergent / Lateral Thinking
Focus is less clear initially
Analysis / Synthesis
Creativity emphasis
Improvement over existing standard
Scope is usually larger

Type 3 – Target State

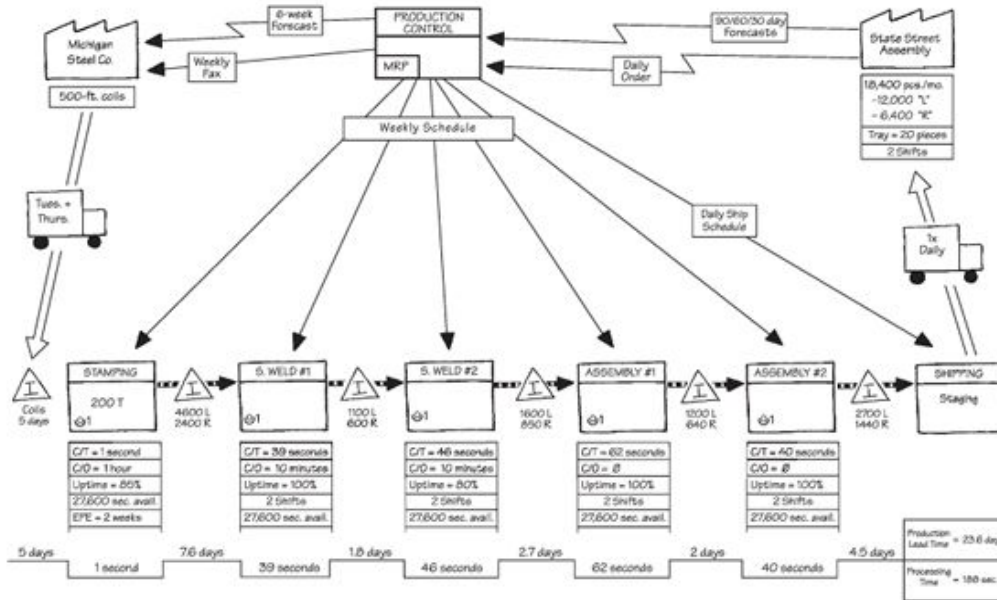


Target State Concept (Time Frame)



Value Stream Level Example

Current-State Value-Stream Map

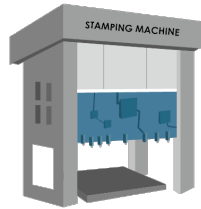


- Long lead-time
- Excess inventory
- Poor quality
- Low flexibility
- Poor responsiveness
- Customer complaints
- No single root cause to fix!

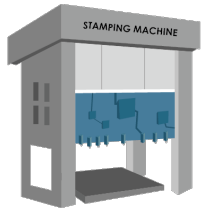


- Many problems / opportunities
- 7 Wastes everywhere
- No single root cause
- Systemic issues
- Creativity focus

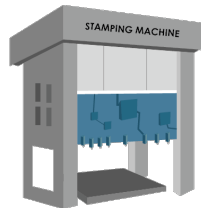
Process Level SMED Example



Dedicated Press
Part A



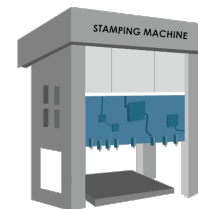
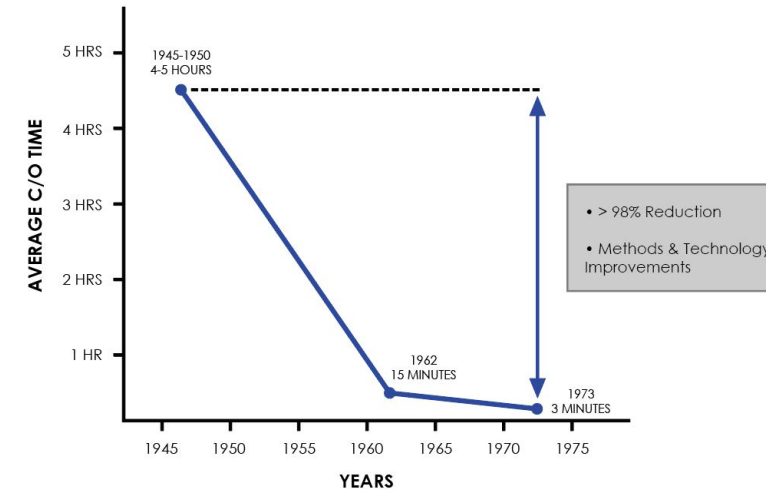
Dedicated Press
Part B



Dedicated Press
Part C

3 Dedicated Machines
No Flexibility
Each 30% Utilization
Make lots of inventory!

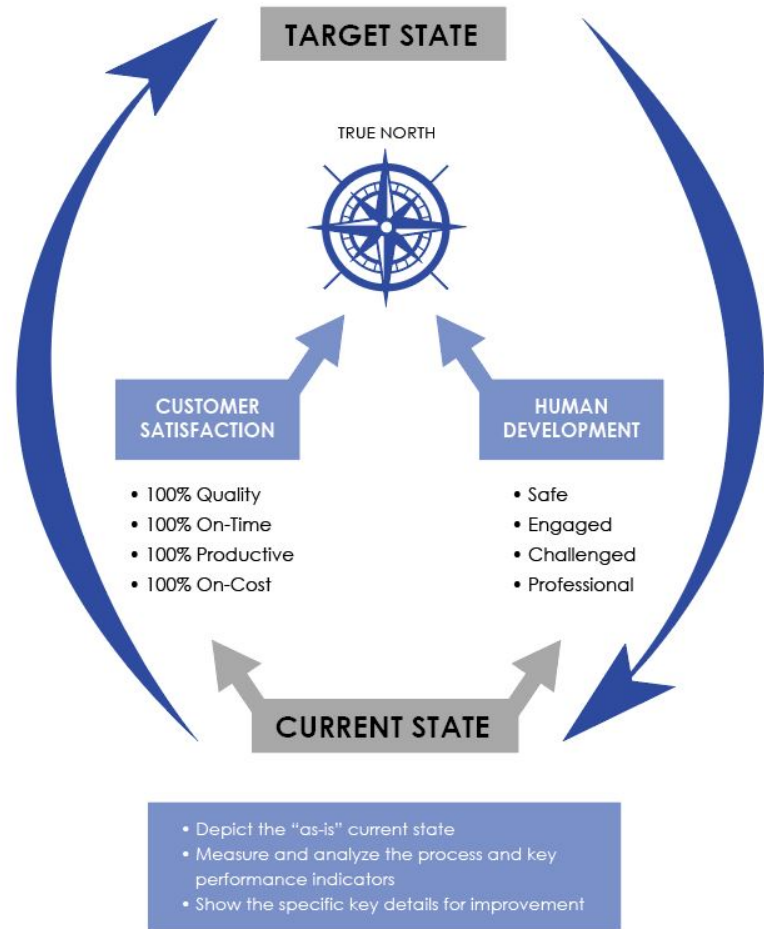
TOYOTA'S SET UP REDUCTION TIMELINE



Flexible Press
Parts A, B, & C

1 Machine / 3+ Tools
Change Over Flexibility
90% Utilization
Run more JIT style

Target State Improvement Steps



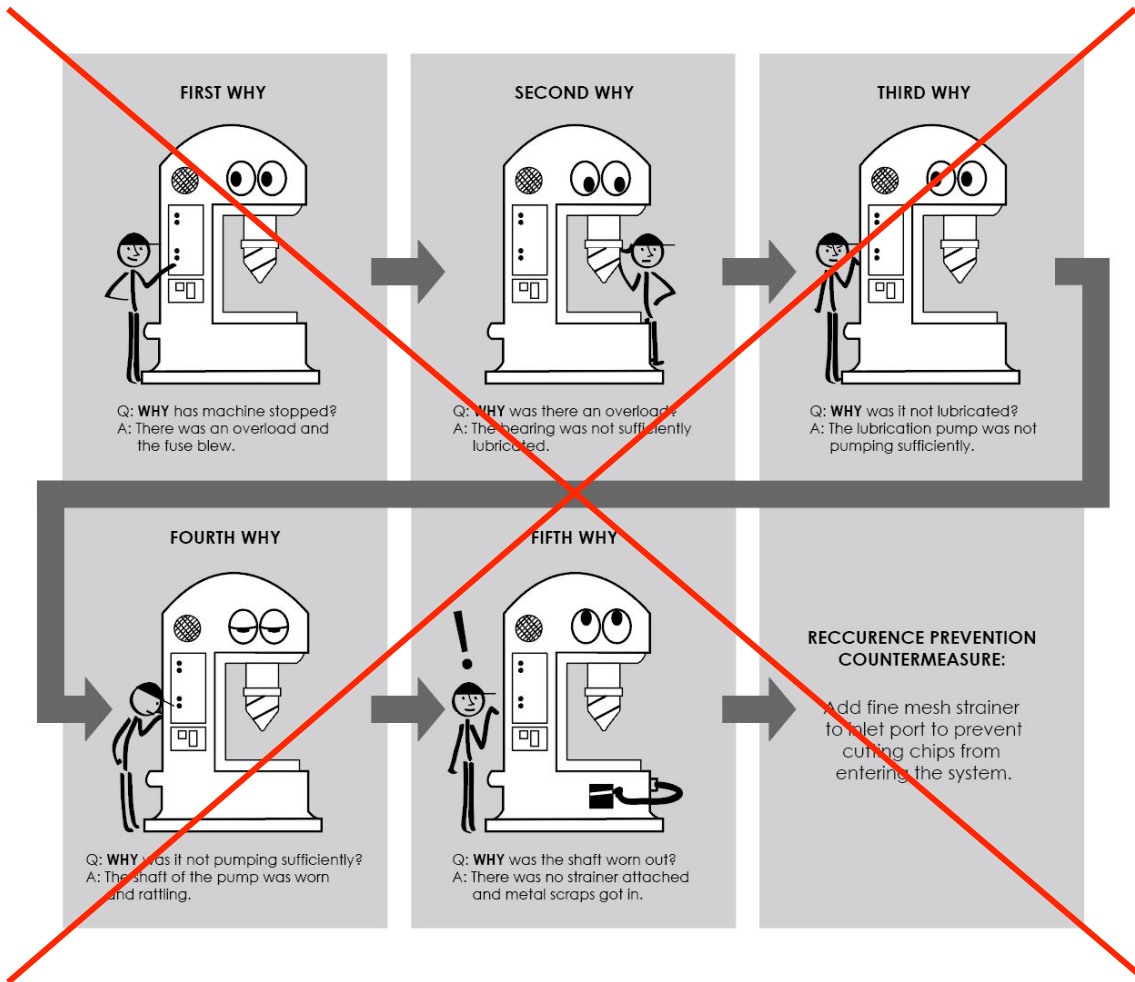
1	BACKGROUND
2	CURRENT STATE DEFINITION
3	CURRENT STATE ANALYSIS
4	GOALS
5	TARGET STATE DEFINITION
6	IMPLEMENTATION PLAN
7	CHECK RESULTS
8	FOLLOW-UP & STANDARDIZE

➤ The “steps” are not the key point

- Value Stream Mapping
- Standardized Work
- SMED Work
- Kaizen Activity

➤ Fundamental waste elimination methods to improve the process or value stream and get to a higher standard of performance

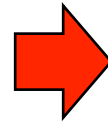
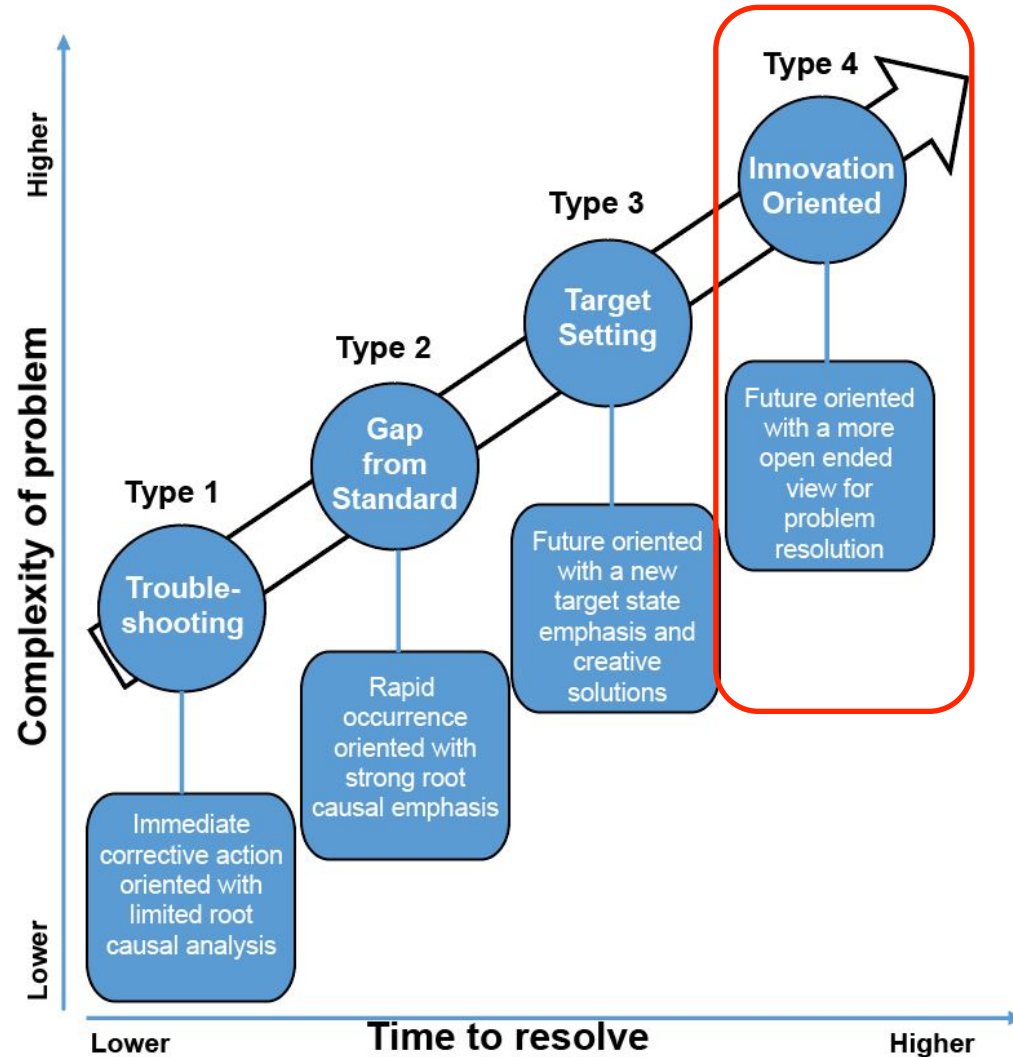
Revisiting the 5 Why's – Target State Lens



Target State / Improvement Thinking:

- **Make a smaller cutting chip**
- **Contain the chip inside the machine**
- **Create proper coolant flow**
- **Proper machine guarding and covers**
- **Flush the chip out properly**
- **Avoid the problem in the first place**

4 Types of Problems

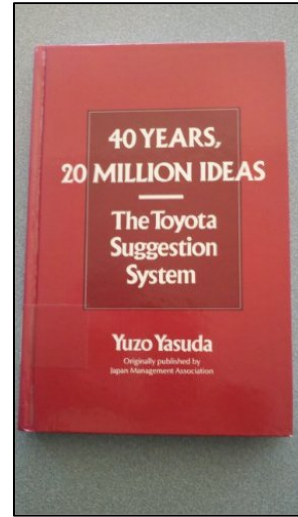


Small

Medium

Large

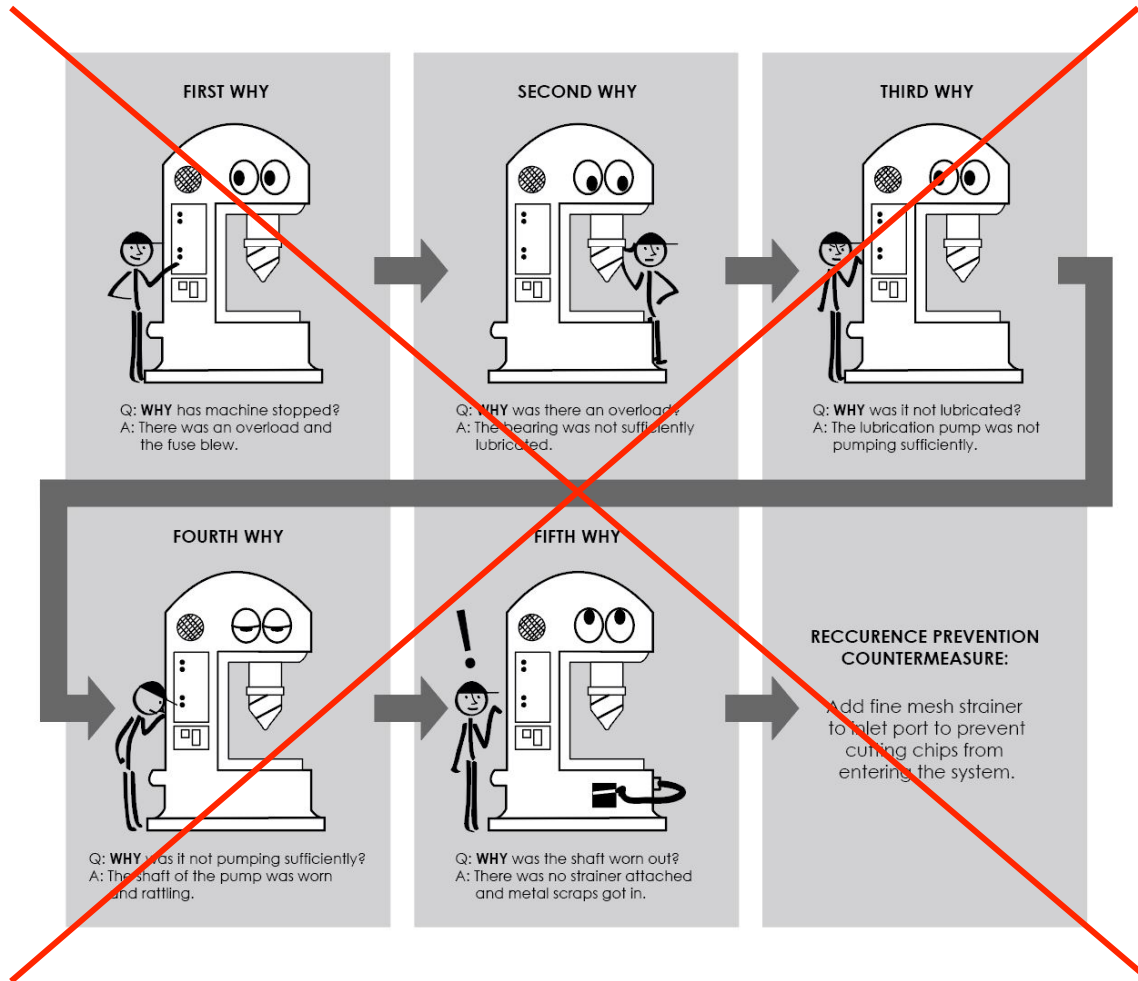
Toyota Creative Idea Suggestion System 1951



The system was introduced by Managing Director Eiji Toyoda in 1951 when it became clear during the post Second World War economic recovery that Toyota's production facilities needed improvement. Toyoda took the idea of TCISS (the creative ideas suggestion system) from a Ford Motor Company plant which he had visited in July 1950.

Although the TCISS offered incentives to employees, the real value of the system was that it provided motivation to employees by focusing on their skills and creativity. The TCISS systemized the practices that had been customary since the time of Toyota Motor Corporation founder Kiichiro Toyoda: respecting opinions from production and sales and conducting spontaneous on-site inspections while simultaneously inviting suggestions for improvements.

Revisiting the 5 Why's – Innovation Lens



Better product design

New process for cutting metal

Better tooling conditions

Alternate materials

Alternate lubrication method

Better coolant flow

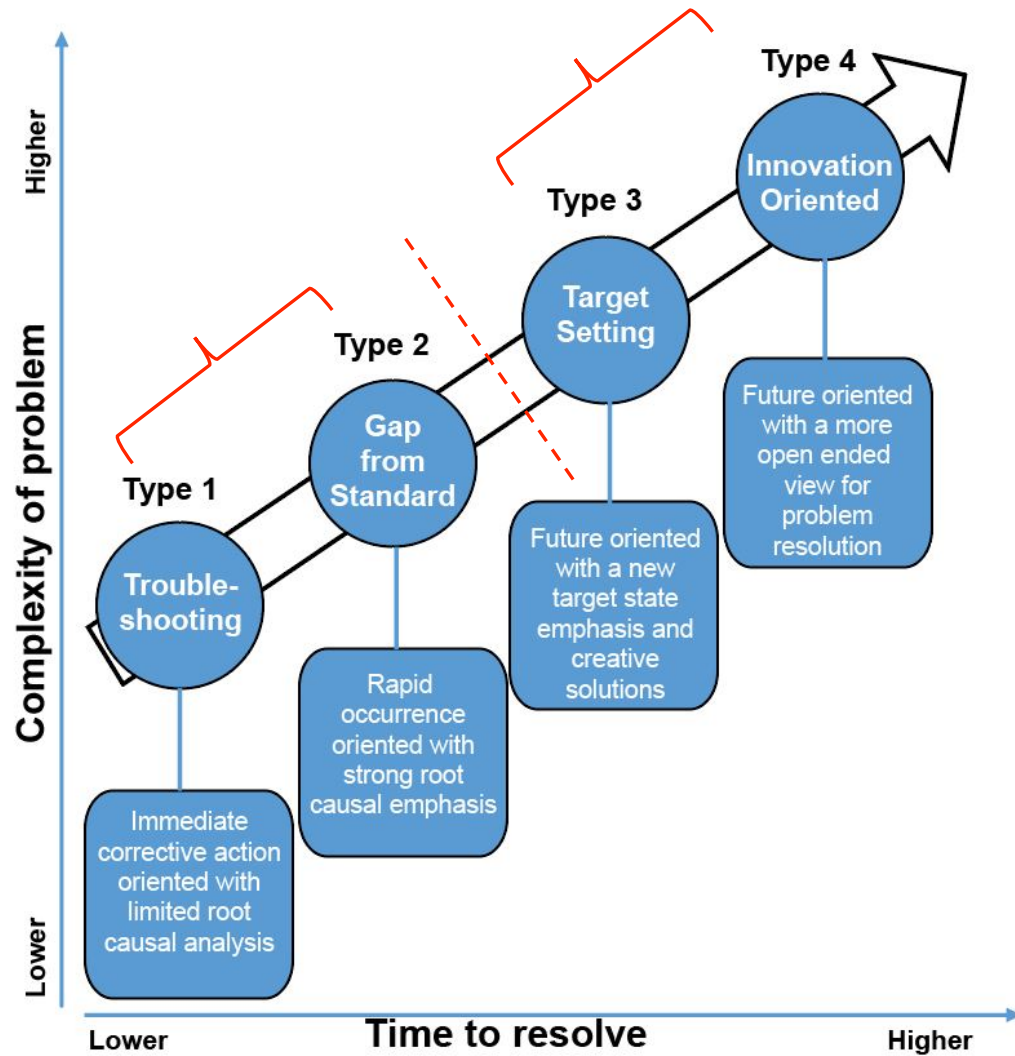
Problematic chip elimination

Type 4 – Open Ended / Innovation

How you?

Ten Types of Innovation to make your model stronger	CONFIGURATION	Profit Model	Make money	Gillette, Hilti
		Network	Connect with others to create value	UPS, GSK, Toshiba
		Structure	Align your talent and assets	Mc Do, Fabindia
		Process	Use Superior methods to do your work	Zara Ikea
	OFFERING	Product Performance	Employ distinguish features and functionality	Dyson, Mars, Inuit
		Product System	Create complementary products and services	Microsoft, Scion
	EXPERIENCE	Service	Support and enhance the value of your offering	Zappos, Car Glass, Sysco
		Channel	Deliver your offering to your customers and users	Nespresso Amazon
		Brand	Represent your offering and business	Intel, Virgin
		Customer Engagement	Foster interaction	Apple Foursquare

4 Types of Problems



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The Toyota 5 Why Cutting Chip Problem

Type	Era	Solution Focus	Countermeasure
Troubleshooting	1950's onward	Operator deals with the cutting chip mess	Cleaning better during the shift and after
Gap from Standard	1960's onward	5 Why level root cause insight	Strainer on inlet port in a tank outside the machine
Target State	1970's onward	Smaller cutting chip contained inside the machine	Control at the point of chip origin with better physics and tooling
Open Ended / Innovation	1980's onward	New processes and machine tool design – Ideal chip formation	Elimination of problematic chips and processes

4 Types Summary & Benkei Analogy

Benkei



Kaoru Ishikawa



The term "7 QC tools" is named after the seven tools of Musashibo Benkei the famous warrior monk. Benkei owned seven weapons which he used to win all his battles. Similarly from my own experience you will find that you will be able to solve 95% of the problems you face if you properly use the 7 QC tools.

Professor Emeritus
University of Tokyo

Baka / バカ / 馬鹿

馬鹿の一つ覚え
[ばかのひとつおぼえ
Baka no hitotsu-oboe

A fool remembers only one thing

A fool always uses the one thing he knows

An expert should know many ways

Let's be more like Benkei!

Appendix

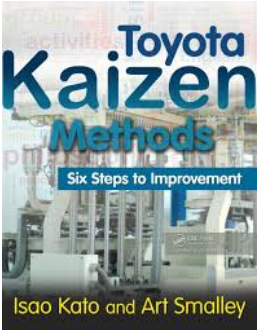
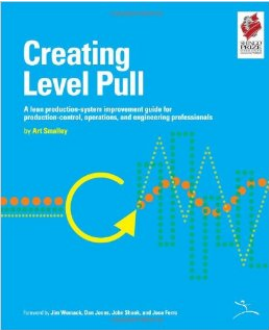
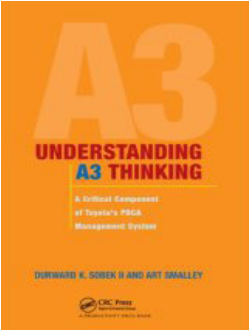
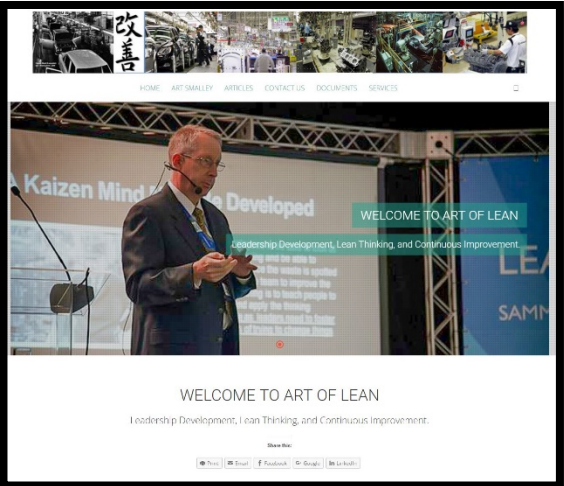
Background - Lean / Toyota



Toyota Kamigo Plant



Taiichi Ohno





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