4 Types of Problems

Art Smalley
President

Keynote Outline

- Background
- 4 Types of Problem Situations
- Type 1 – Troubleshooting
- Type 2 – Gap from Standard
- Type 3 – Target State
- Type 4 – Innovation
- Summary

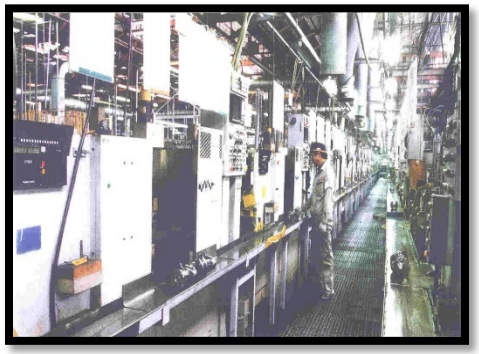
Background - Lean / Toyota

Toyota Kamigo
Overhead

Kamigo
Entrance

Taiichi
Ohno

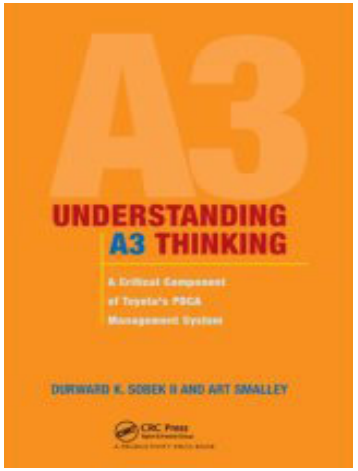
Precision & Machine
Intensive

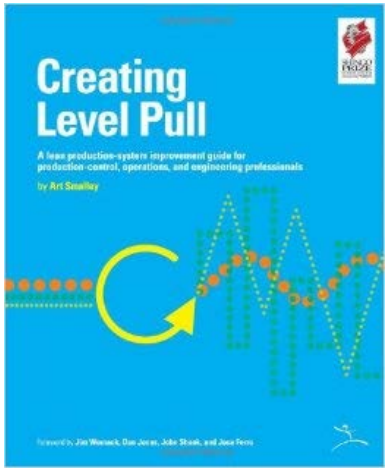


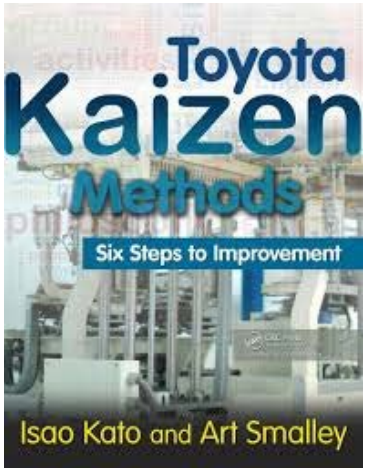
Lower Volume &
Higher Mix

High Volume &
Lower Mix

Other Background - Work







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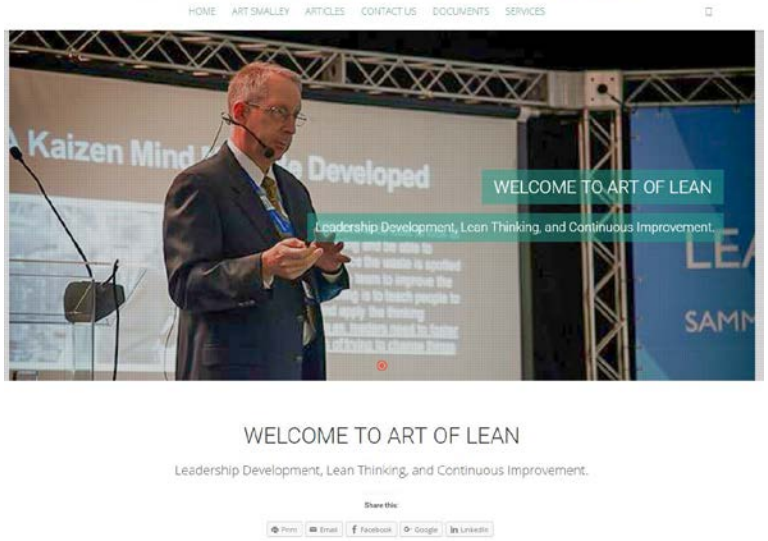
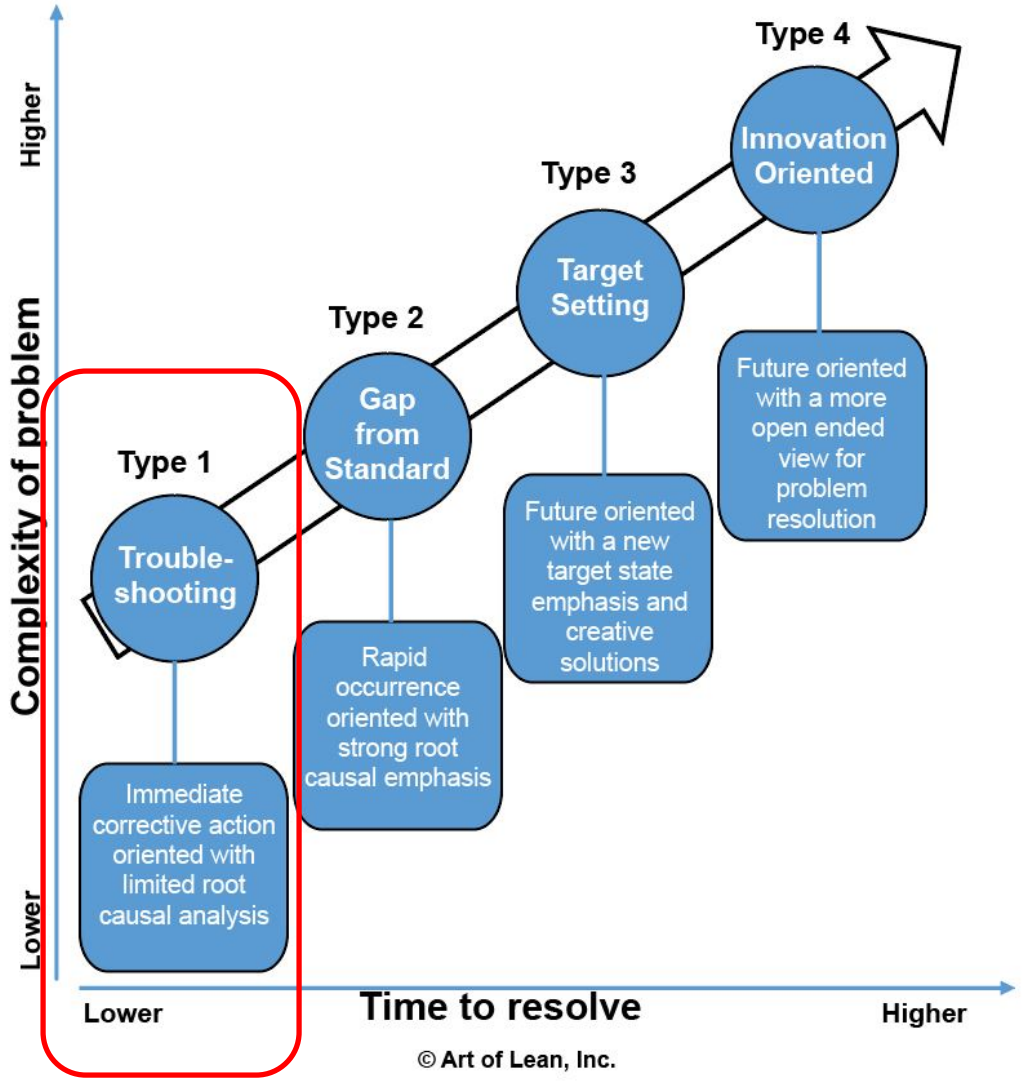
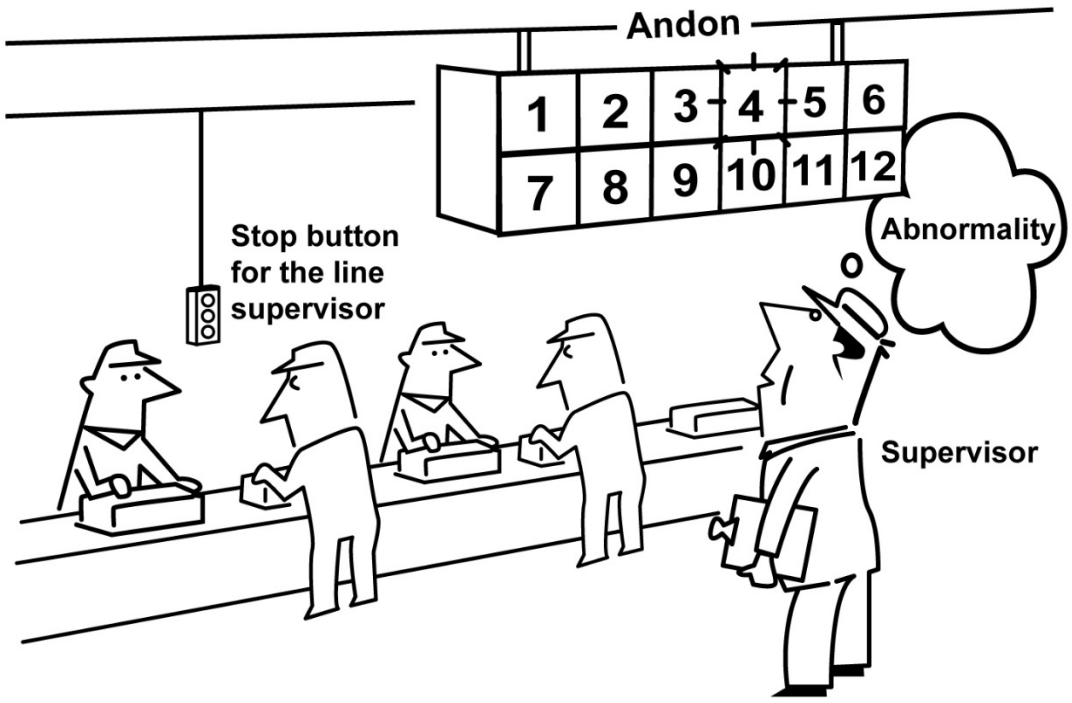


4 Types of Problem Situations

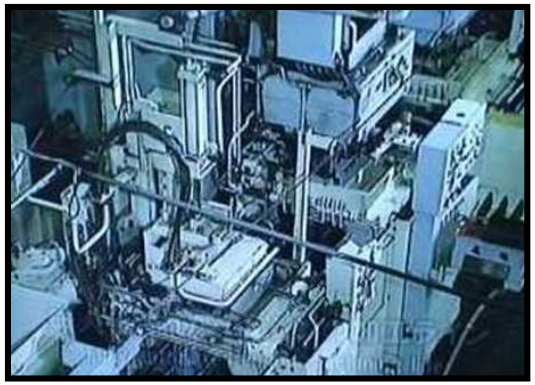


Type 1 – Troubleshooting



Condition based trigger
Either human or machine

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

Type 1 – Troubleshooting

Production Analysis Board

Line/Cell Name:	Team Leader:	Date:
Quantity Required:	Takt Time:	Shift:
		Num of Operator:

Time	Hourly Plan / Actual	Cumulative Plan / Actual	Problem/Causes	Sign-off
: ~ :	/	/		
: ~ :	/	/		
: ~ :	/	/		
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Kaizen Express

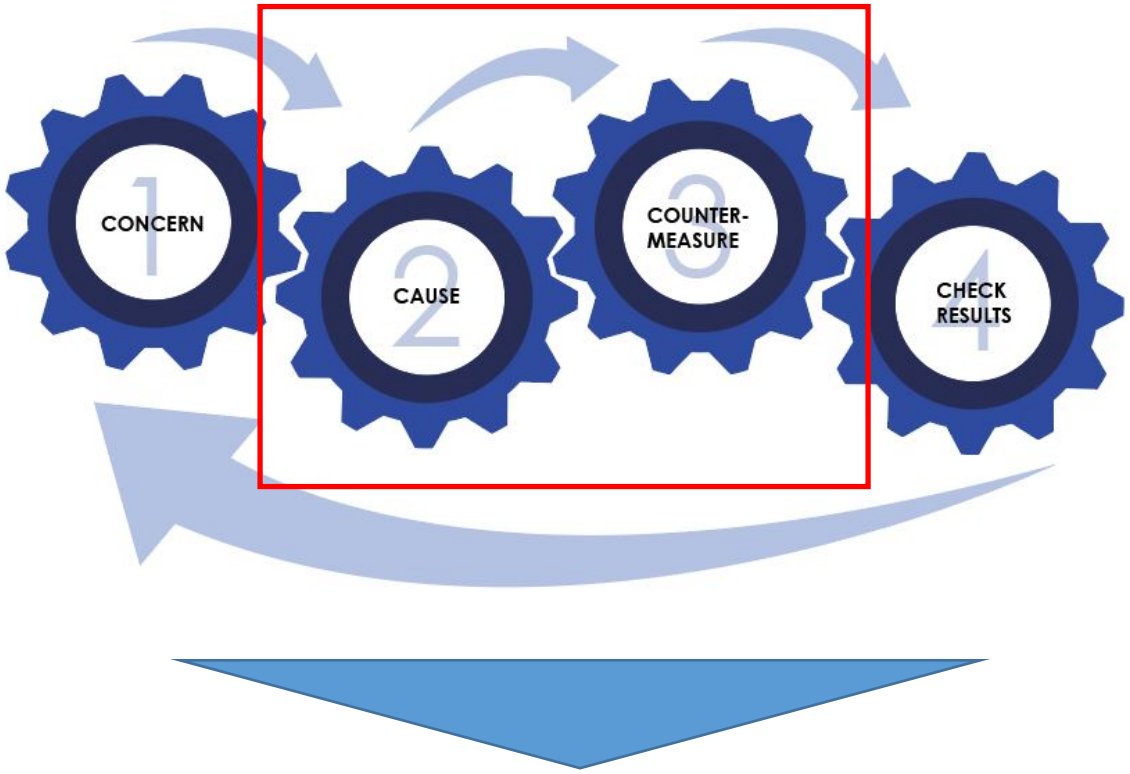
Lean Enterprise Institute lean.org

Rapid Problem Solving

- Concern
- Cause
- Countermeasure
- Check

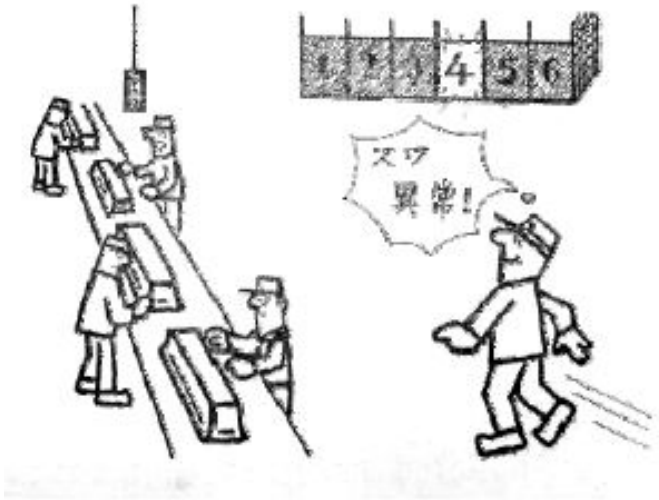
Time & quantity based triggers
Reviewed hourly by supervisor

4 C's Thinking



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

Toyota Supervisor Image



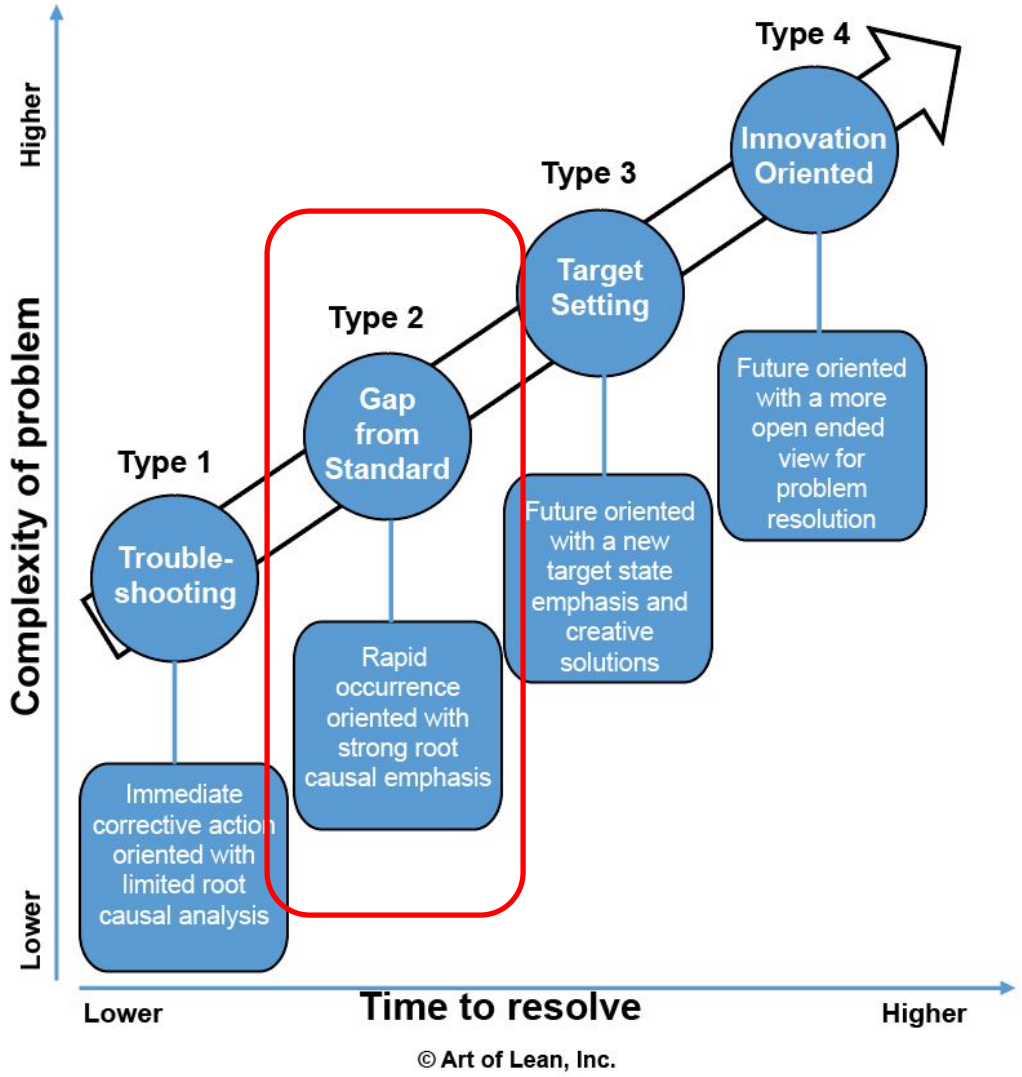
Rapid response to problems and abnormal conditions by production

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

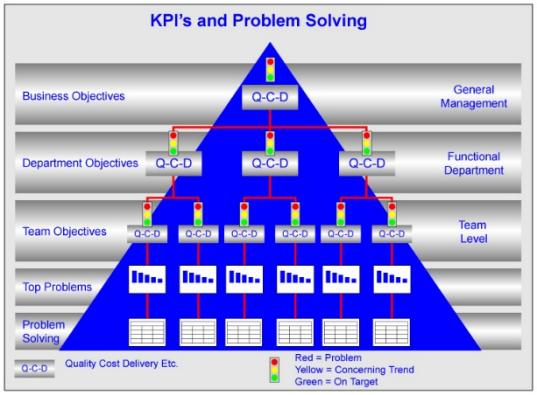
"All Mighty" Supervisor Image

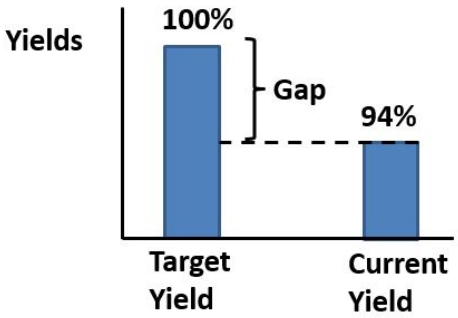
1. Safety
2. Job Ability
3. Team Leadership
4. Kaizen Skills / Problem Solving
5. Technical Knowledge
6. Human Relations

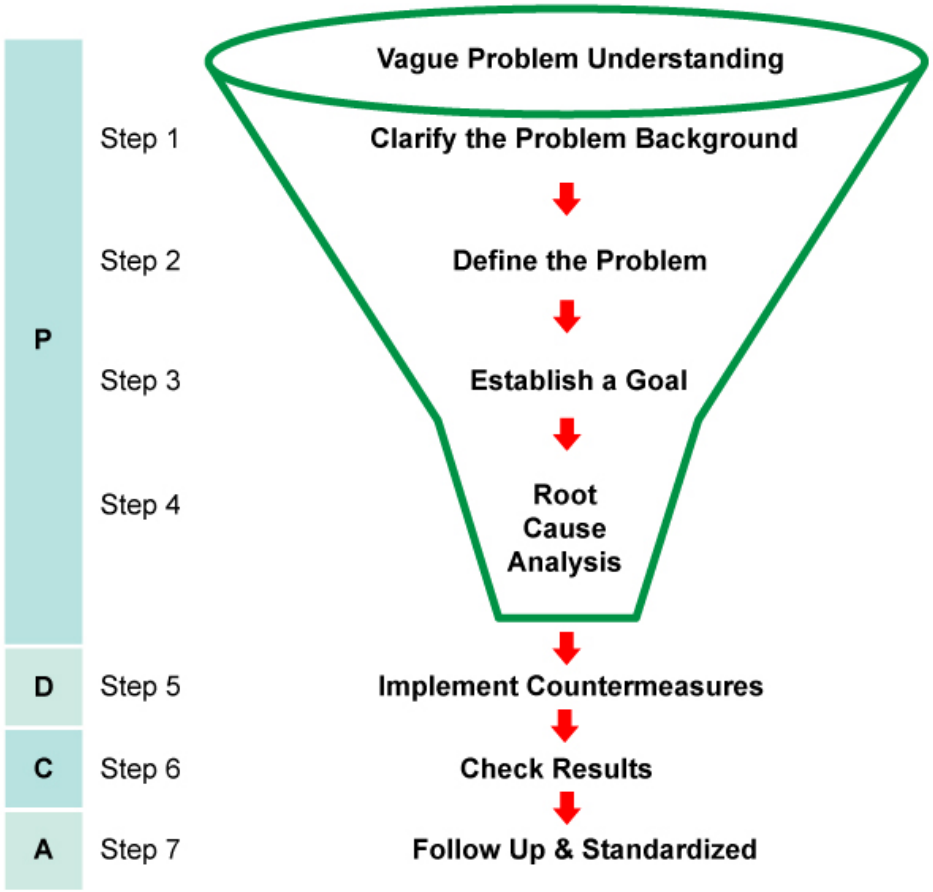
4 Types of Problem Situations



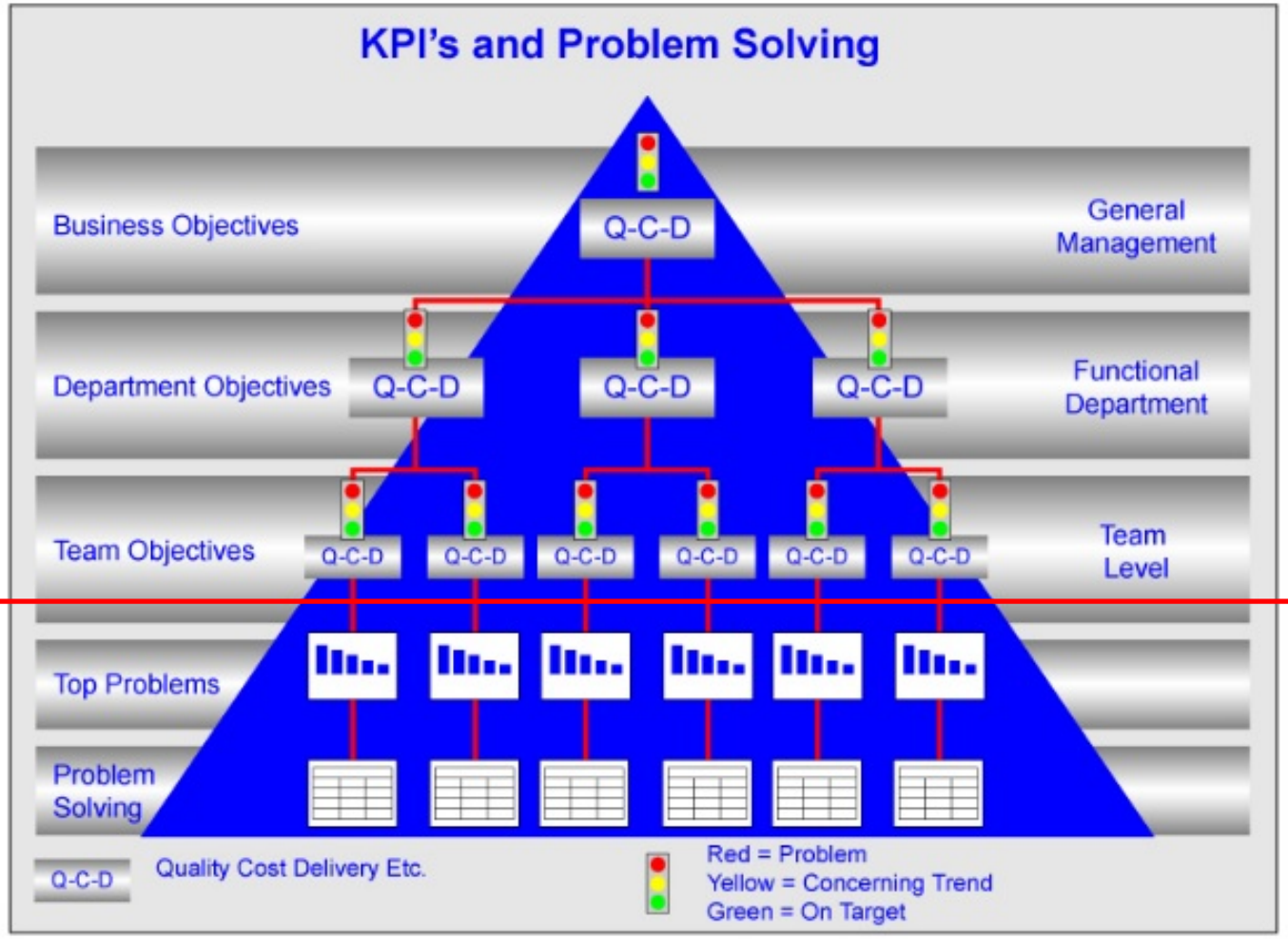
Type 2 – Gap from Standard







KPI's & Problem Solving



Problem Investigation

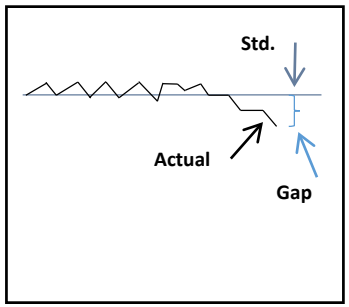
TPS

TPS

TPS

A. Immediate abnormality signal

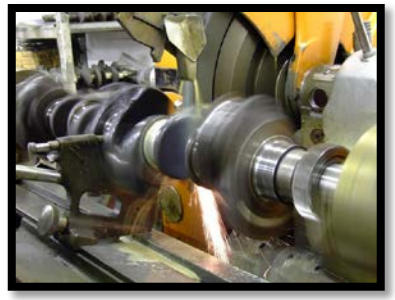
B. Go to actual machine and see status

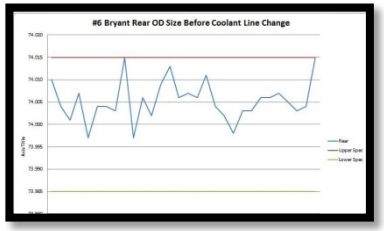


C. Ascertain actual problem situation

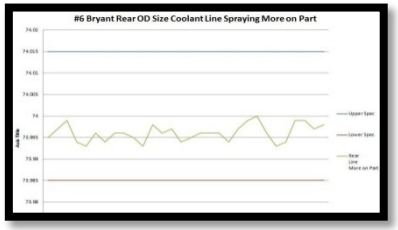
D. Coaching Investigation Sequence

1. Measure actual dimensional extent of problem
2. Look for obvious contamination or abnormalities
3. True and re-dress grinding wheel and observe status
4. Check actual grinding wheel (check “pores”)
5. Confirm actual (not theoretical) stock removal
6. Send part to QC Mat’l lab for hardness and HT depth check
7. Check actual cutting conditions
   - Wheel RPM
   - Feed Rate, Depth of Cut, etc.
   - SFPM
8. Confirm status of datum features
9. Measure spindle run out
10. Coolant check
    - Flow rate / pressure
    - Nozzle condition and direction
    - Temperature
    - Concentration



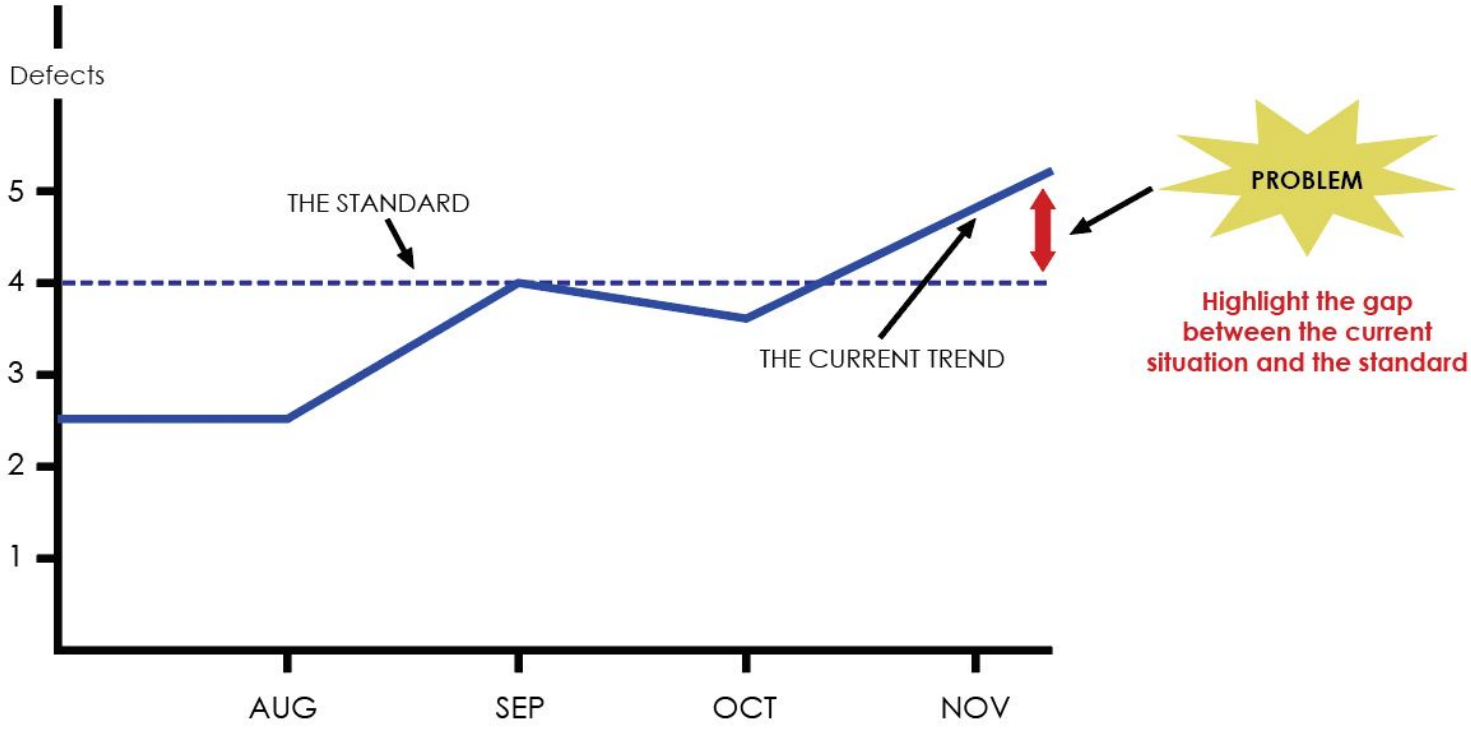


Cpk 1.15

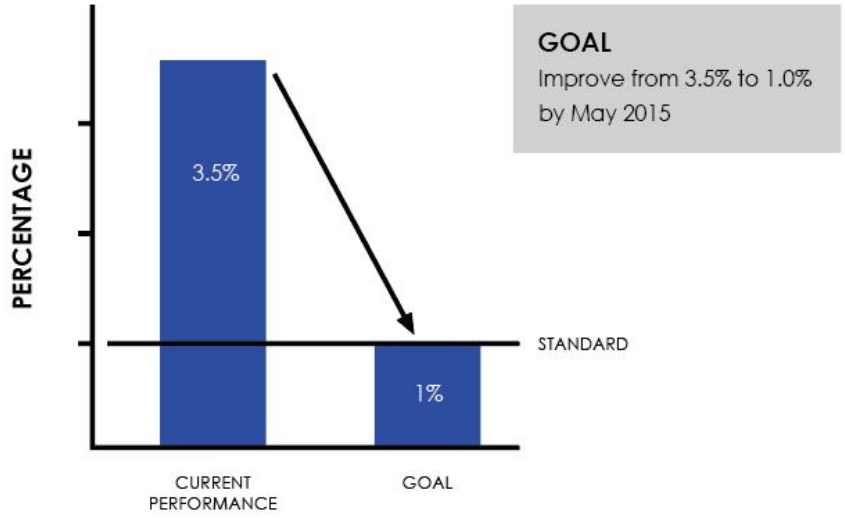


Cpk 2.33

Define the Problem



Set a Goal



3 Factors

From what level?
To what level?
By when?

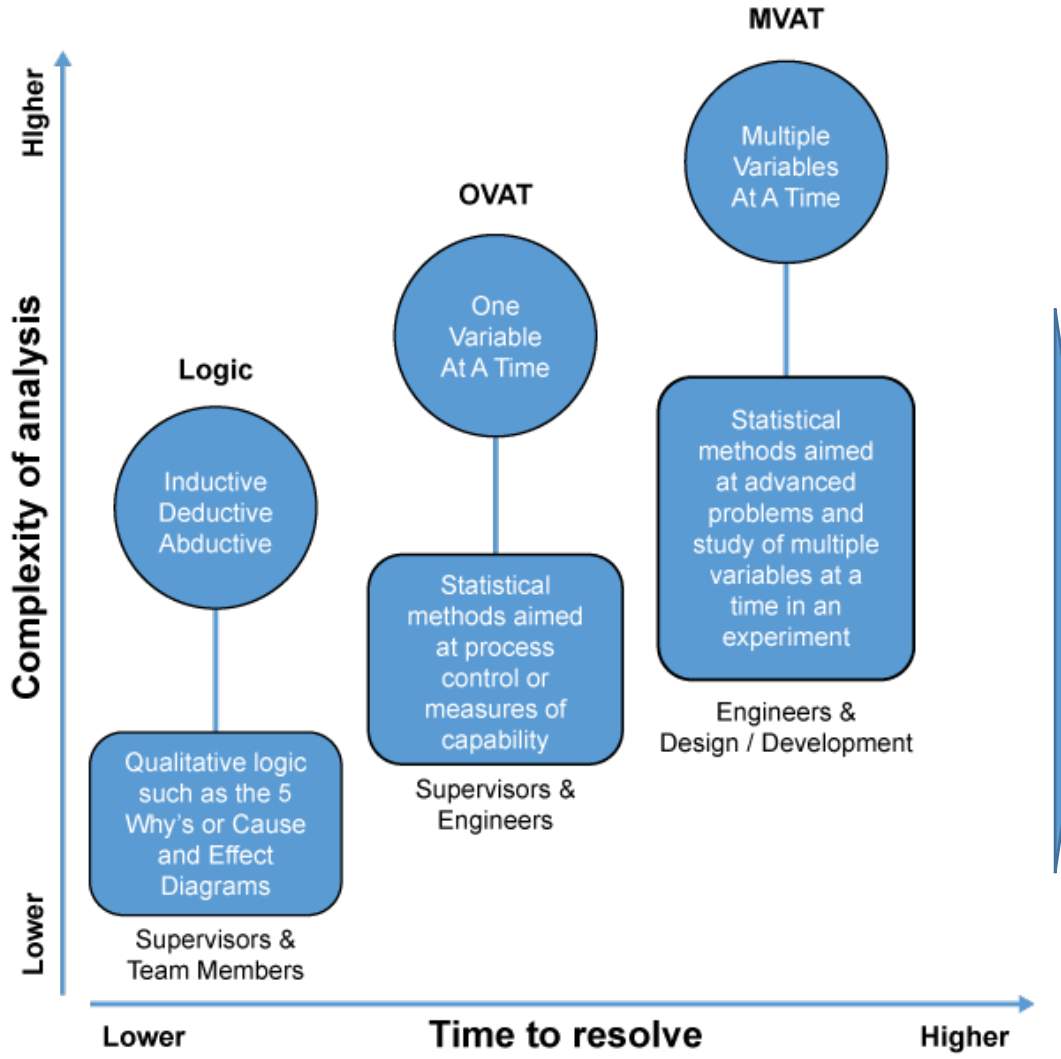
SMART

Specific?
Measurable?
Attainable?
Relevant / Realistic?
Time bound?

Poor examples include:

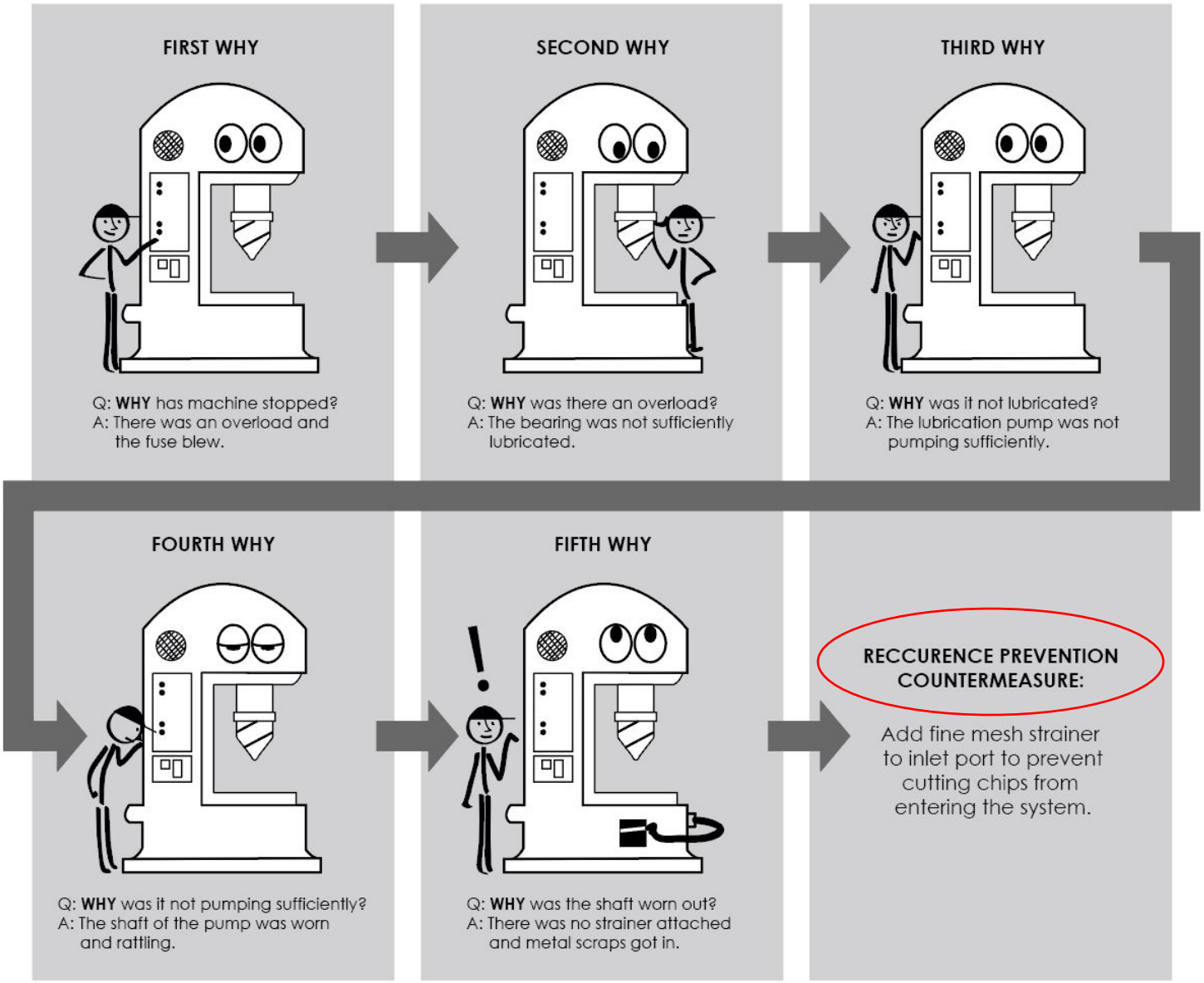
1) Find the root cause! (This is the next step of the process)
2) Implement lean tools like 5S or Standardize Work, etc. (This is an action item)
3) Train the employee (This is jumping to conclusions)

Type 2 – Analysis Types

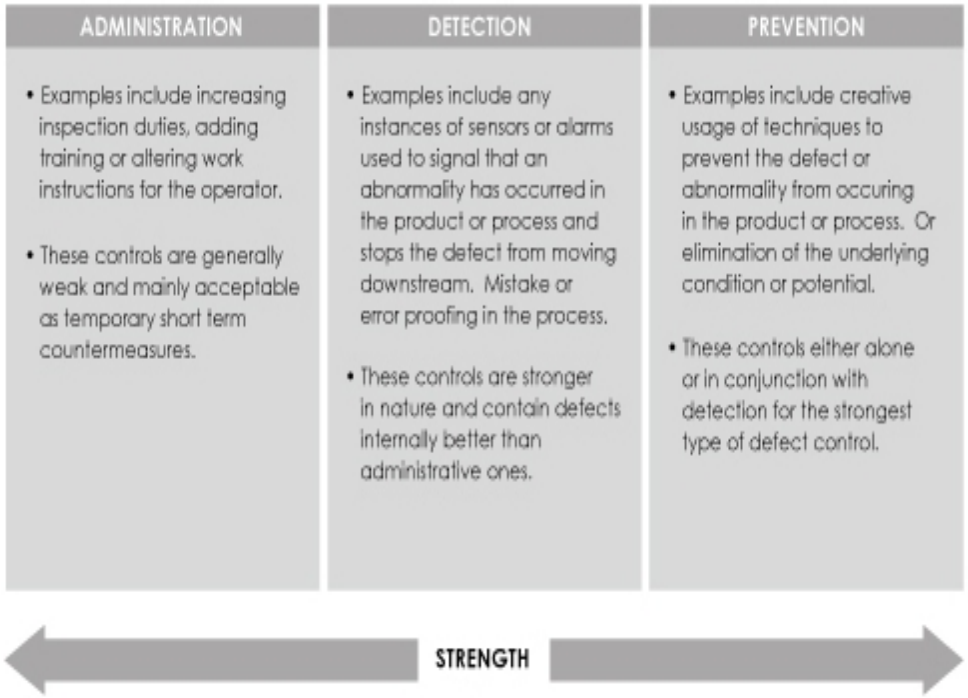


Convergent
Focused
Analytic
C&E Relationship
Standard attainment
Scope control

Key Point is the Countermeasure!



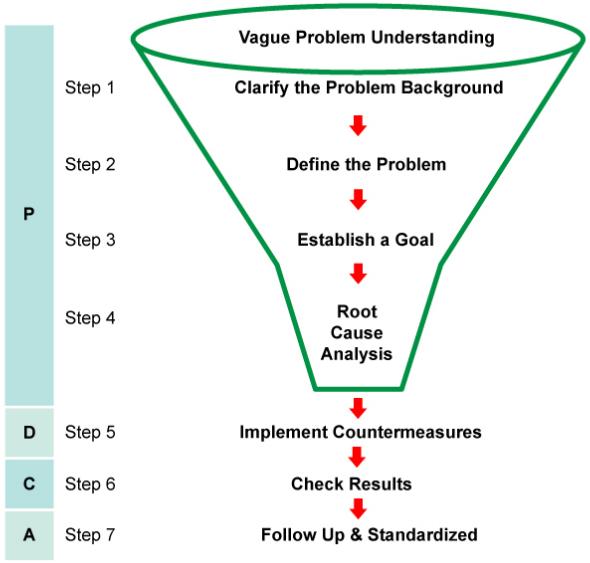
Type 2 – Countermeasure Types

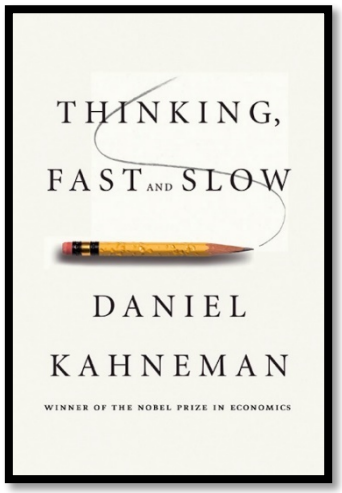


Weaker

Stronger

Type 2 Summary

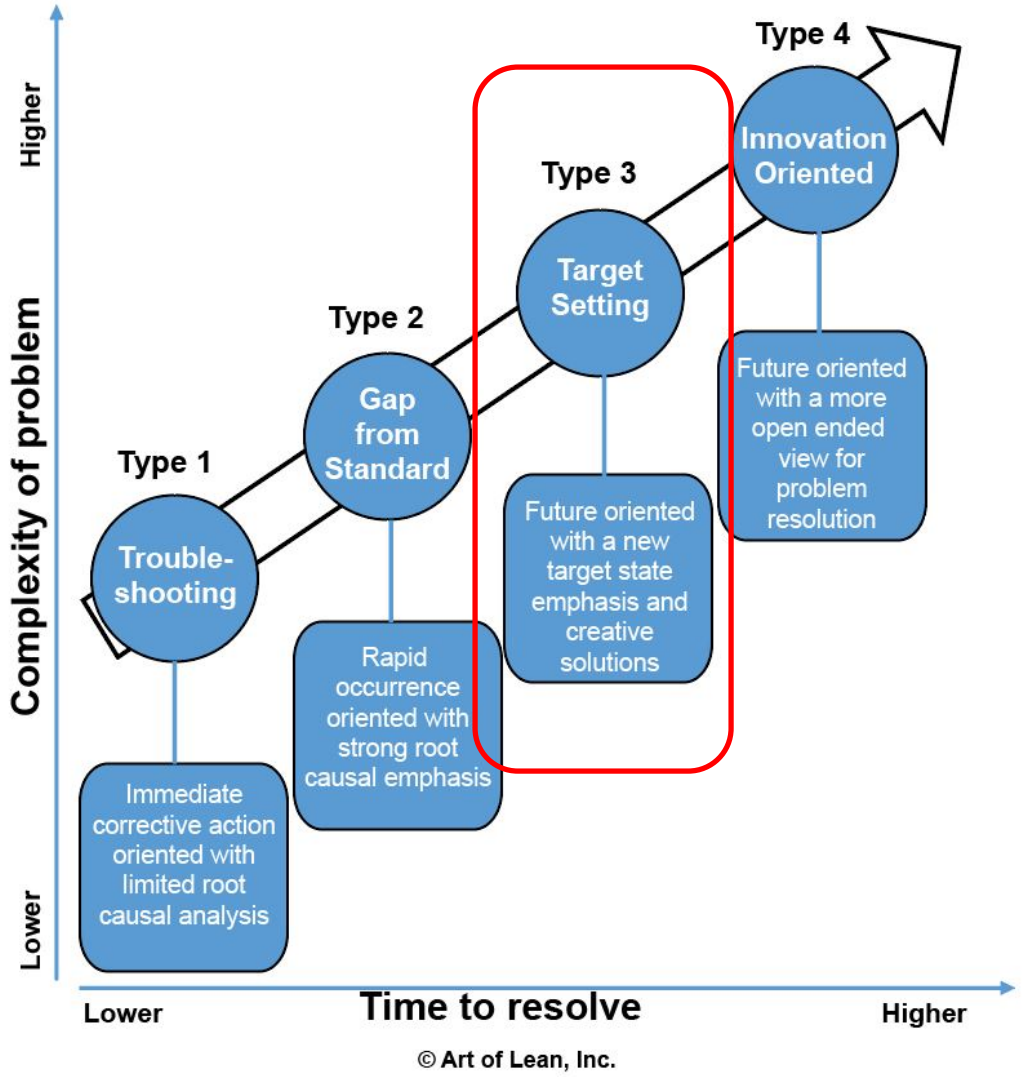




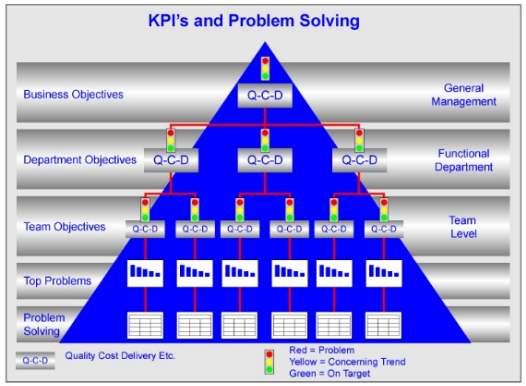
Type 1 Troubleshooting is about rapid action and response to the abnormal condition…an analogy is thinking fast.

Type 2 Gap from standard problem solving is about being more deliberate and slowing down to consider what is the **real problem** or **root cause**…an analogy is thinking slow.

4 Types of Problem Situations



Type 3 – Target State



(Future) Ideal Situation

GAP

Acceptable (Current State) Situation

Normal Status

GAP

Current Situation

Type 3 - "Target State"

Type 2 - "Gap from Standard"

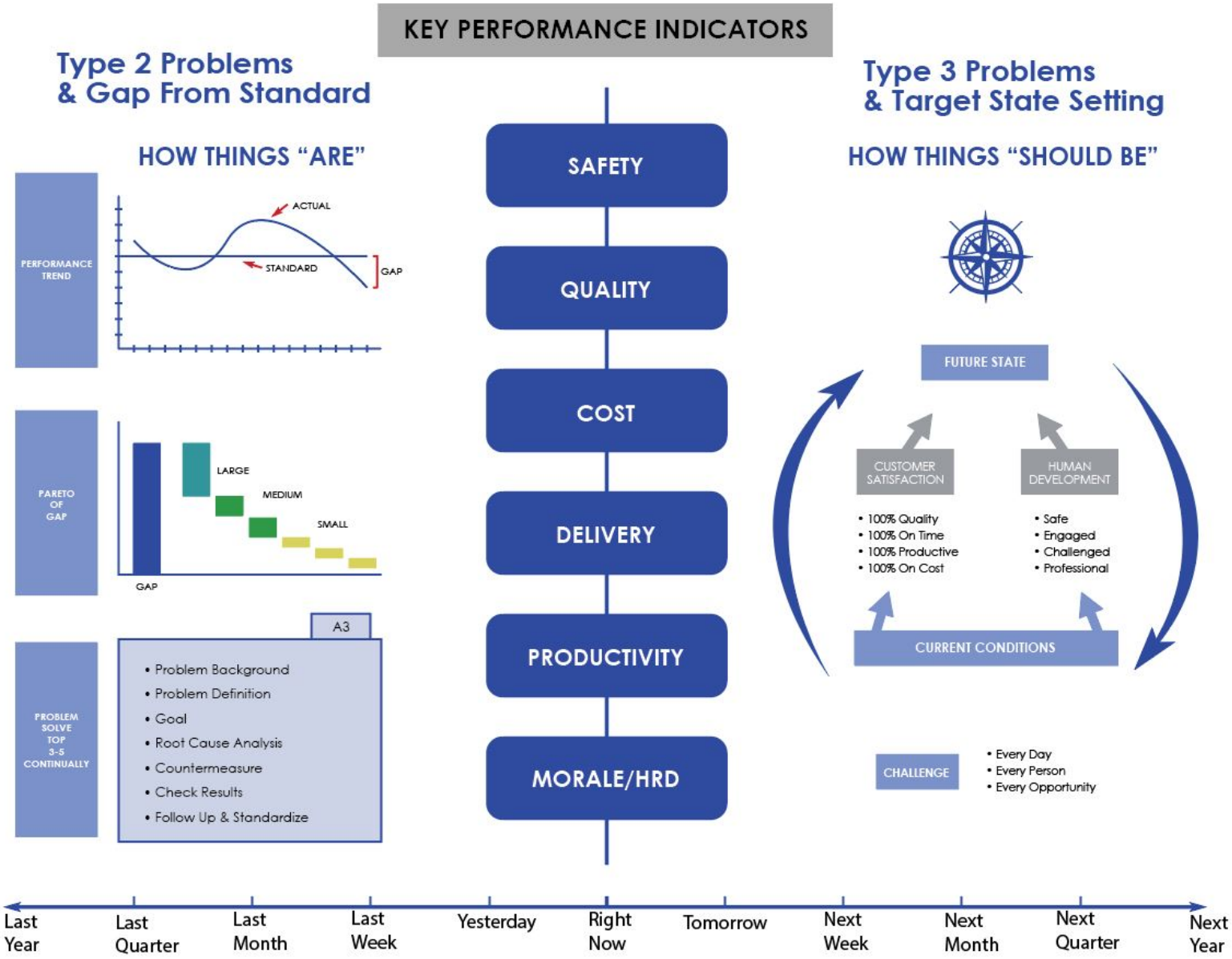
Kaizen Methods

改善方法

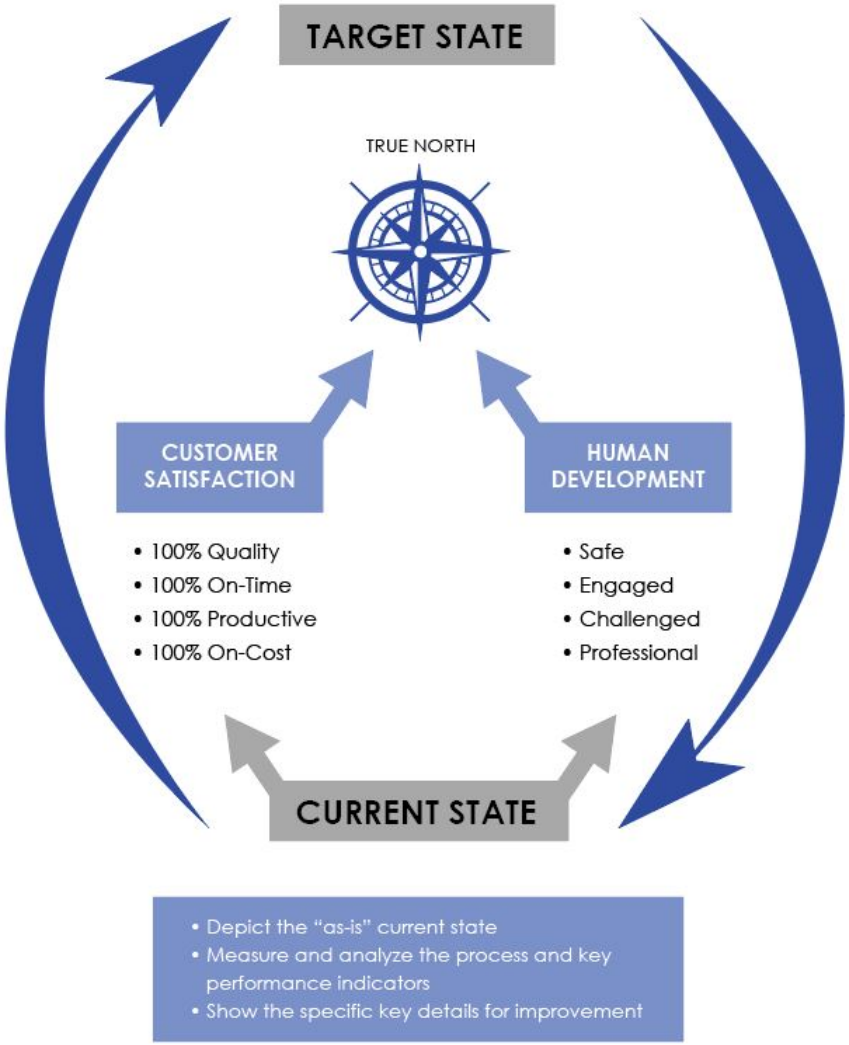
問題解決

Problem Solving

Target State Concept (Time Frame)



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

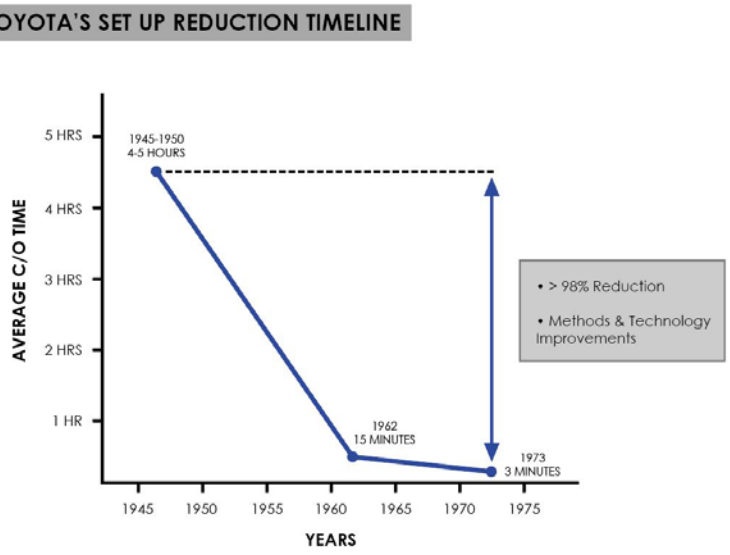
Process Example SMED Example

Dedicated Press
Part A

Dedicated Press
Part B

Dedicated Press
Part C

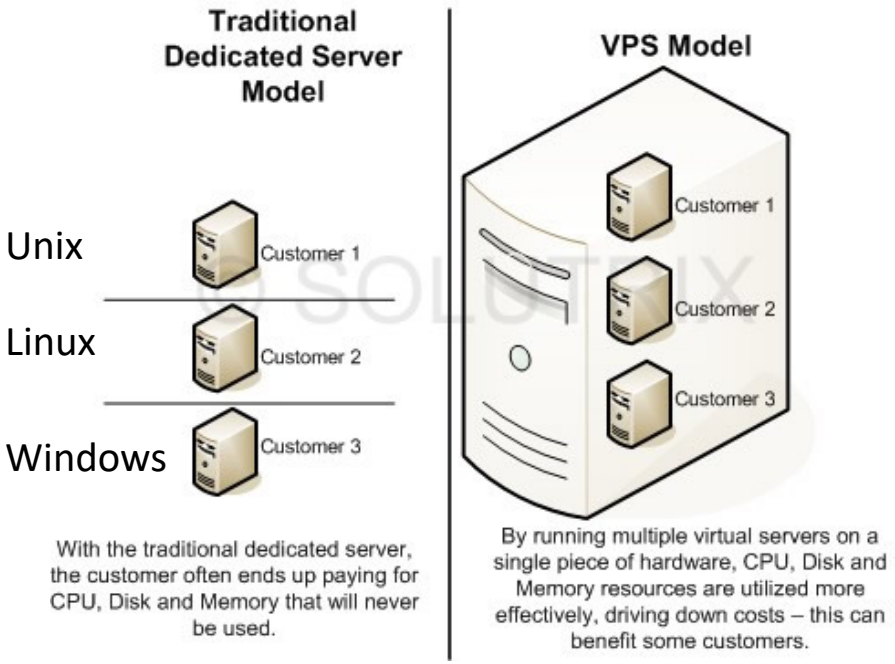
3 Dedicated Machines
No Flexibility
Each 30% Utilization
Make lots of inventory!



Flexible Press
Parts A, B, & C

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

Software Example



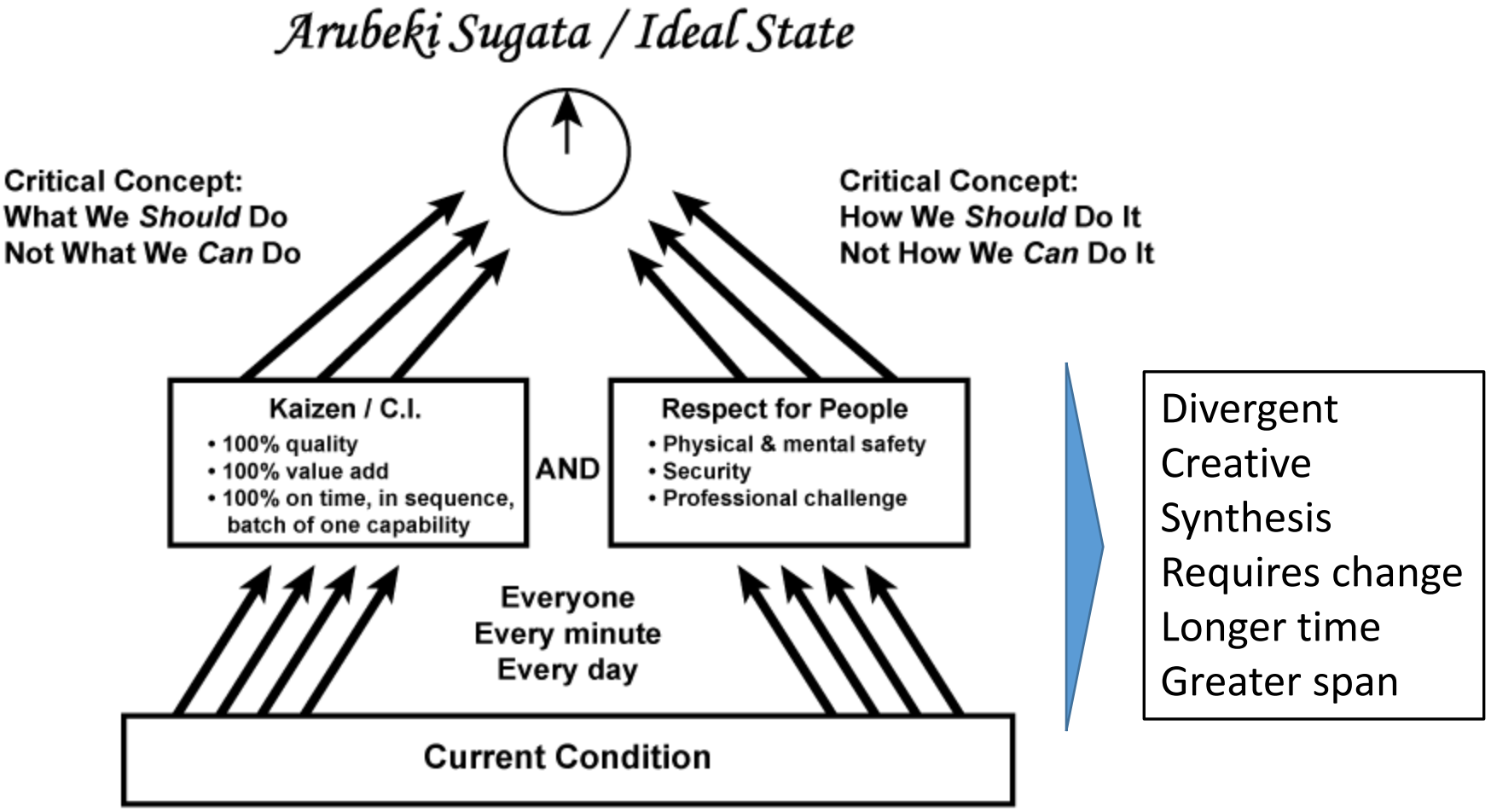
Same basic principle as SMED in die exchange…

Key here is not the time change over aspect but the software ability to act and host multiple server types…

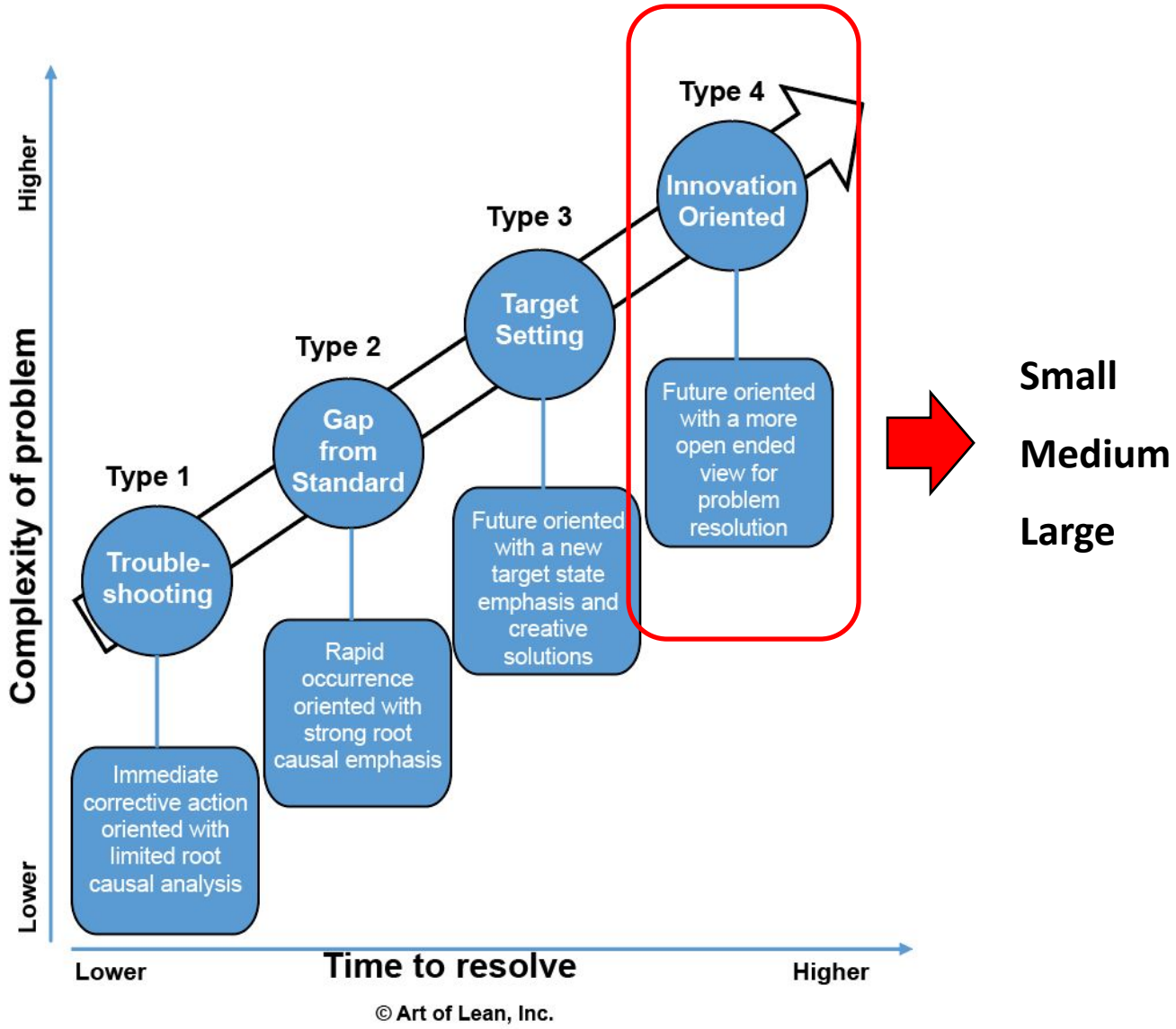
3 Dedicated Servers
Each 30% utilized
No flexibility
Stranded resources

1 Virtual Server
Now 90% utilized
Flexibility
Less waste

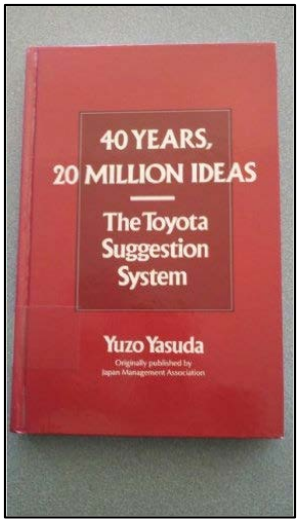
Type 3 – Target State Summary



4 Types of Problem Situations



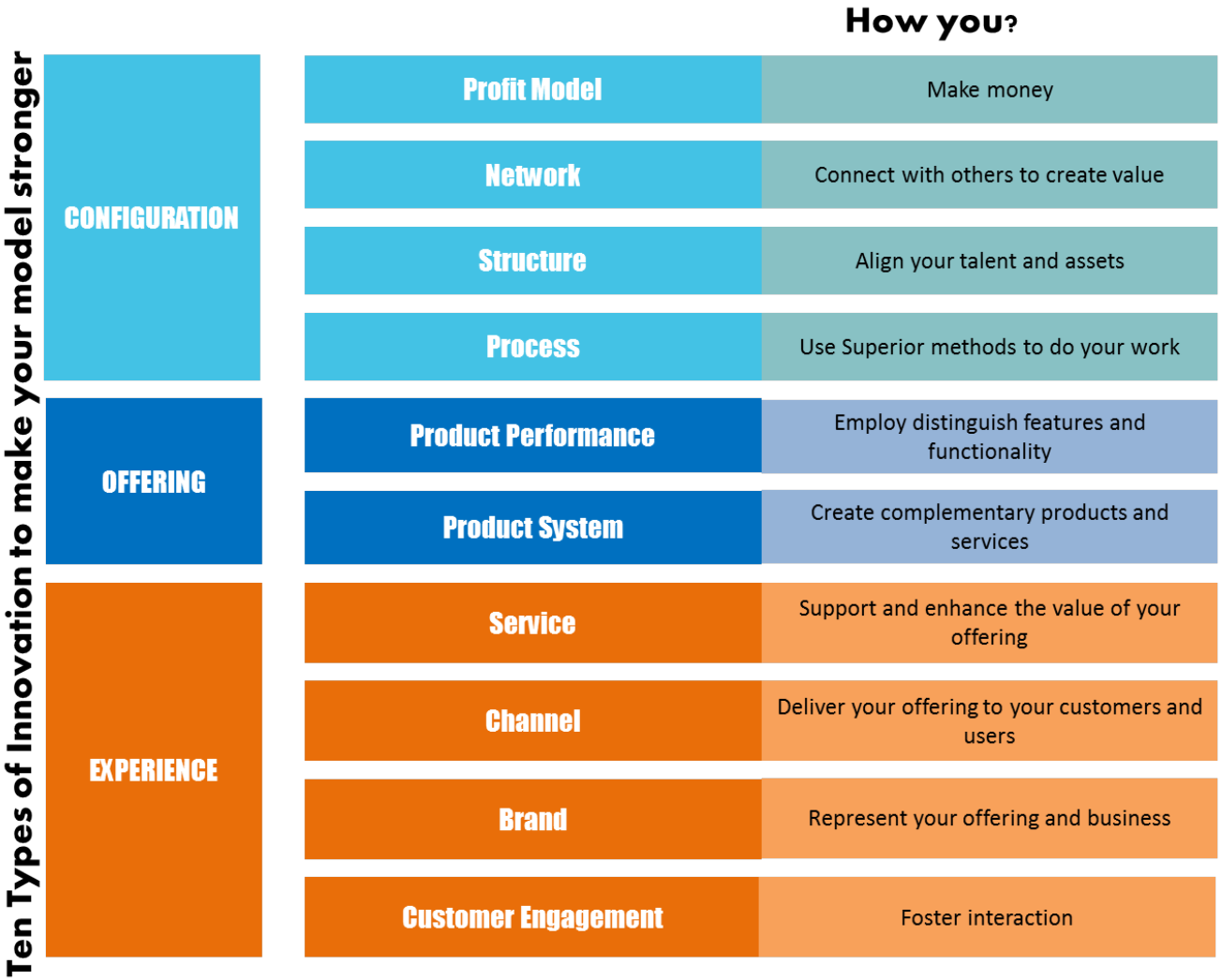
Toyota Suggestion System 1951



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.

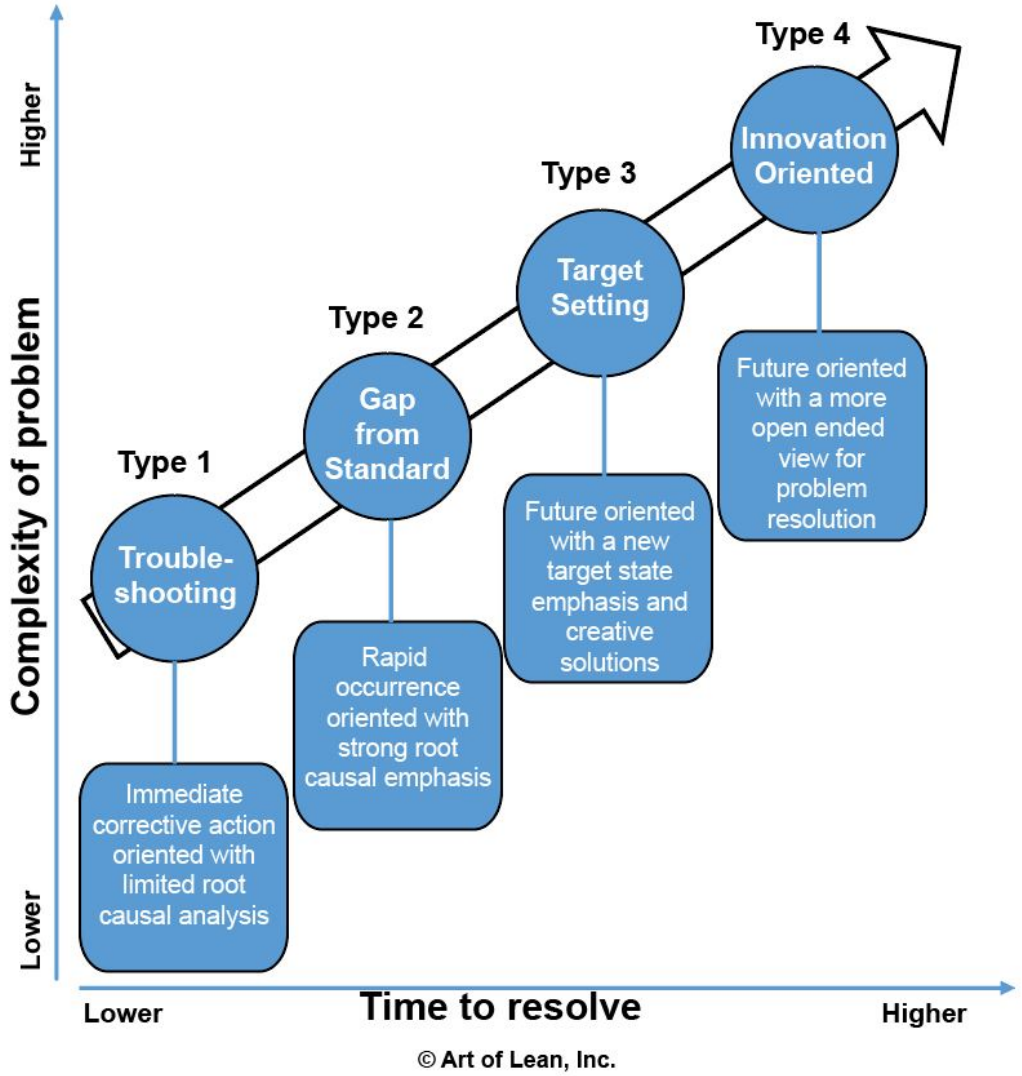
Although the TCISS offered incentives to employees, the real value of the system was that it provided motivation to employees by focusing on their skills and creativity. The TCISS systemized the practices that had been customary since the time of Toyota Motor Corporation founder Kiichiro Toyoda: respecting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

Type 4 – Vision / Innovation



Doblin: 10 Types of Innovation: The Discipline of Building Breakthroughs

4 Types of Problem Situations



4 Types & 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 knows only one way of doing things

Session Summary

- Benkei vs. Baka analogy and be careful of experts who only know one way
- Each type has a different cadence and focal point
- Reflection after doing is key as well. However you can’t just “think” your way to improvement
- Learning by doing is key for all four types
- Problem solving, innovation and improvement require perspiration and willingness to fail more than once