

品質導向

陳祖裕



學習目標

- 了解品質的理念
- 了解品質導向的彙整—精實作業
- 願意將Lean Thinking應用於日常生活



測驗時間：90分鐘

測驗架構與內容

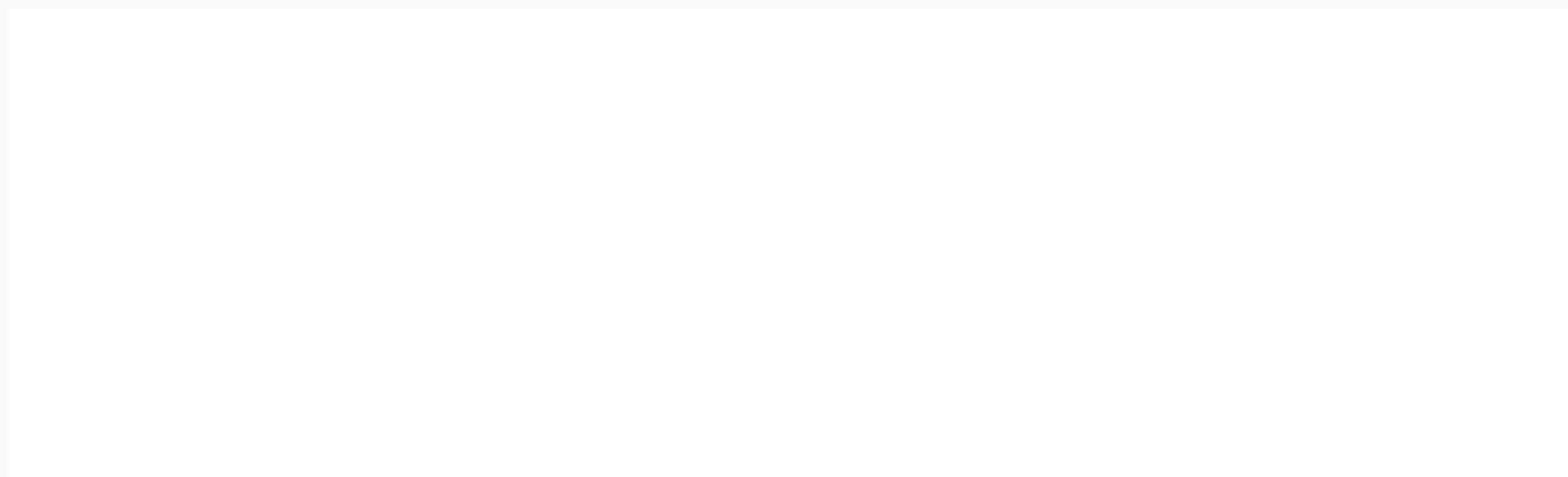
測驗簡介

測驗架構與內容

信效度驗證

結果報告範例

本量表包括45項職能行為向度，各職能定義如下：



1. 追求卓越：能為自己設定具挑戰性的工作目標並全力以赴，要求自己的工作表現達到高標準，並不斷尋求突破。
2. 品質導向：確實遵循工作標準程序，注重工作細節，能運用回饋機制找出品質問題並進行改善，不斷提升工作品質。
3. 工作管理：能依工作的輕重緩急排定優先順序，妥善運用自己的時間與資源，有效管理工作流程及進度。
4. 認真負責：確實達成工作職責及要求，能勇於承擔自己的錯誤或失敗，不歸咎他人並努力改善。
5. 工作活力：對工作充分投入，即使長時間工作或身心疲累，仍能維持應有的工作效能。
6. 主動積極：不需他人指示或要求能自動自發做事，面臨問題立即採取行動加以解決，且為達目標願意主動承擔額外責任。
7. 團隊合作：能尊重團隊成員意見，支持團隊決定，善盡個人職責，鼓勵成員積極參與團隊，共同合作達成團隊目標。
8. 執行力：能夠依據一定的作業流程，將組織策略或工作計畫有效落實，以達到組織既定的目標。
9. 持續改善：能夠運用適當方法找出改善的機會，並發展行動方案，主動採取行動以改善工作現況或流程。
10. 溝通協調：能視談話對象有條理地清楚表達想法，除確保對方專注聆聽及充分瞭解，並可正確解讀、回應、釐清他人所傳達的訊息以取得共識。

Handbook for TQM and QCC

Volume I
What are TQM and QCC?

A Guide for Managers

Acknowledgements

This book was prepared by a team of the **Development Bank of Japan (DBJ)** and **Japan Economic Research Institute (JERI)**, under contract with the Japan Program of the Inter-American Development Bank (IDB). The team was led by Ryu Fukui and comprises Nicholas Gibler, Rebecca González-Ávila, Yoko Honda, Harue Inoue, Noriharu Kaneko, Ichiro Miyauchi, Susana Soriano, and Yuka Yagi. Fukui, Honda, Inoue, Kaneko, Miyauchi, Soriano, and Yagi are jointly responsible as authors of the original English version. Honda, Inoue and Yagi took charge of designing, producing, and editing of charts and figures, and of making effective layouts for the manuals. Gibler and González-Ávila are responsible for the Spanish translation. (The above-mentioned names are in alphabetical order; their titles and institutions are listed at the end of the Handbook.) Besides the authors and translators, Hiromi Kyogoku and Sakiko Sakama of DBJ supported production of charts and figures; and Maiko Sudo of JERI provided logistical support.

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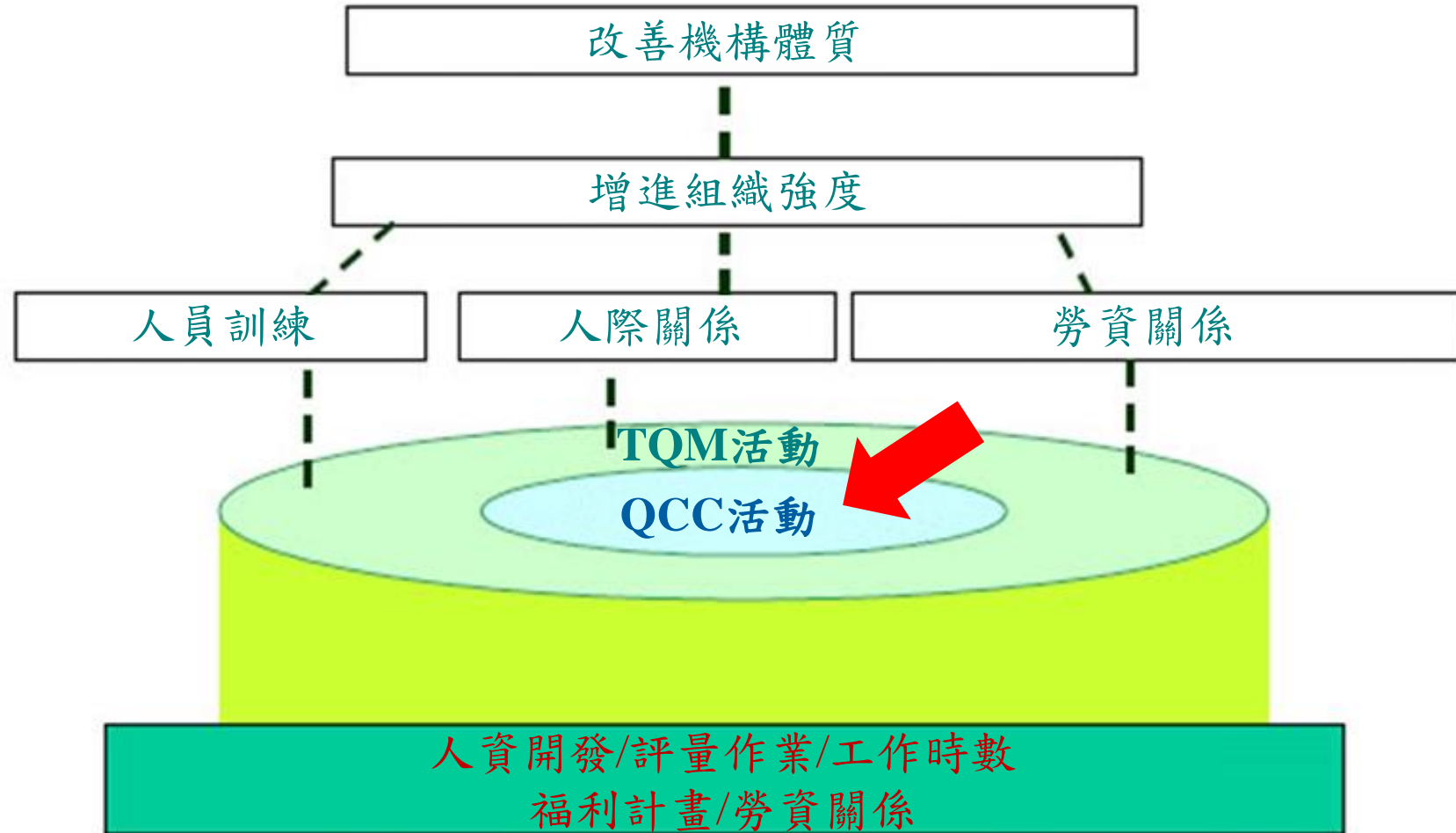
Part I Total Quality Management

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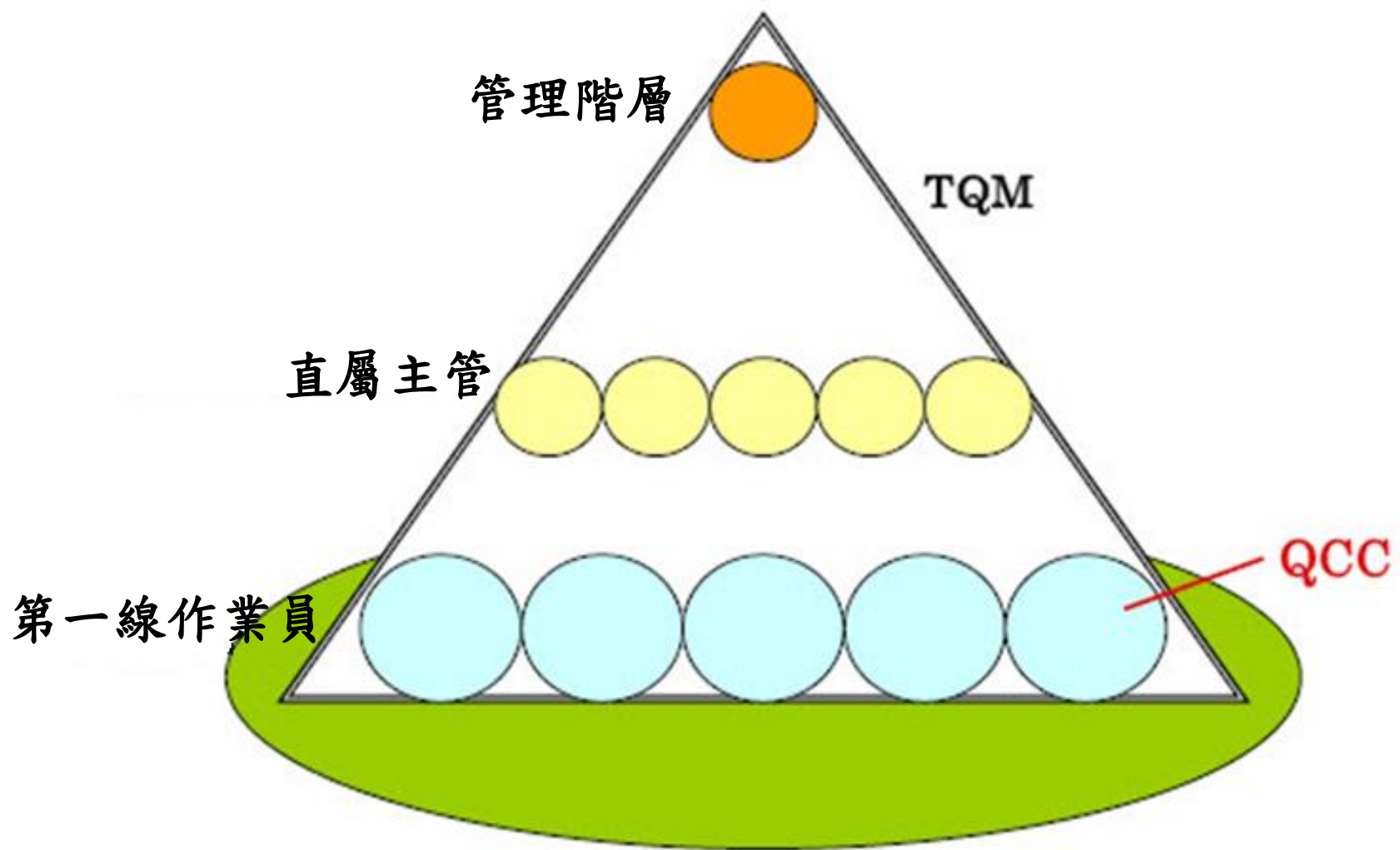
Volume I Part I

Total Quality
Management

改善機構體質與QCC活動的關係



TQM Committee 1998



(from University lecture by Noriharu Kaneko, 1995)

TQM and the “NEW QC Circle Activity” of Toyota Today



Year 1936 *Model AA*

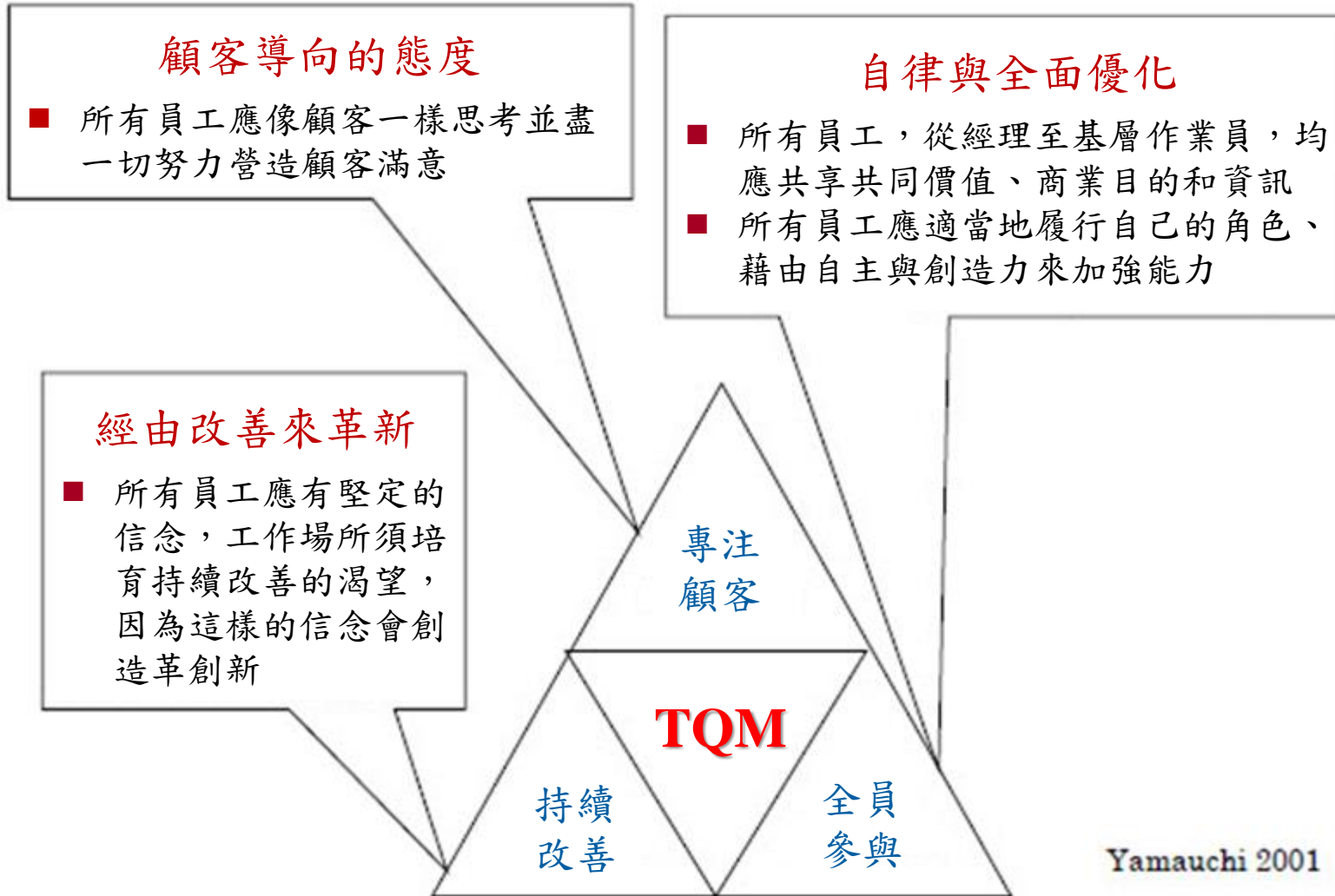
First passenger car for the masses realized in Japan



Year 2001 *Estima Hybrid*

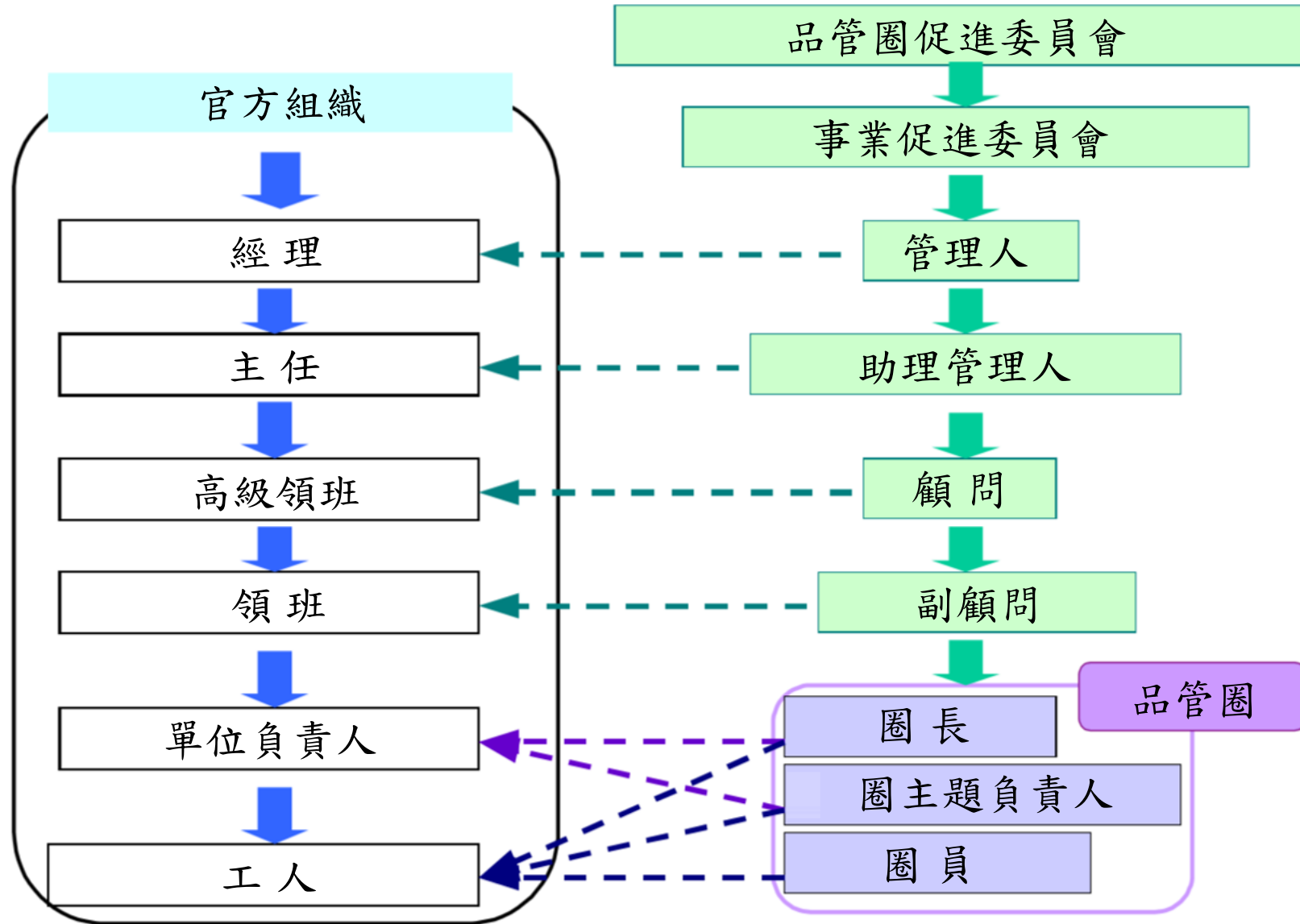
Ecological car with focus on saving energy and reducing air pollution

Toyota TQM的三個基本面向



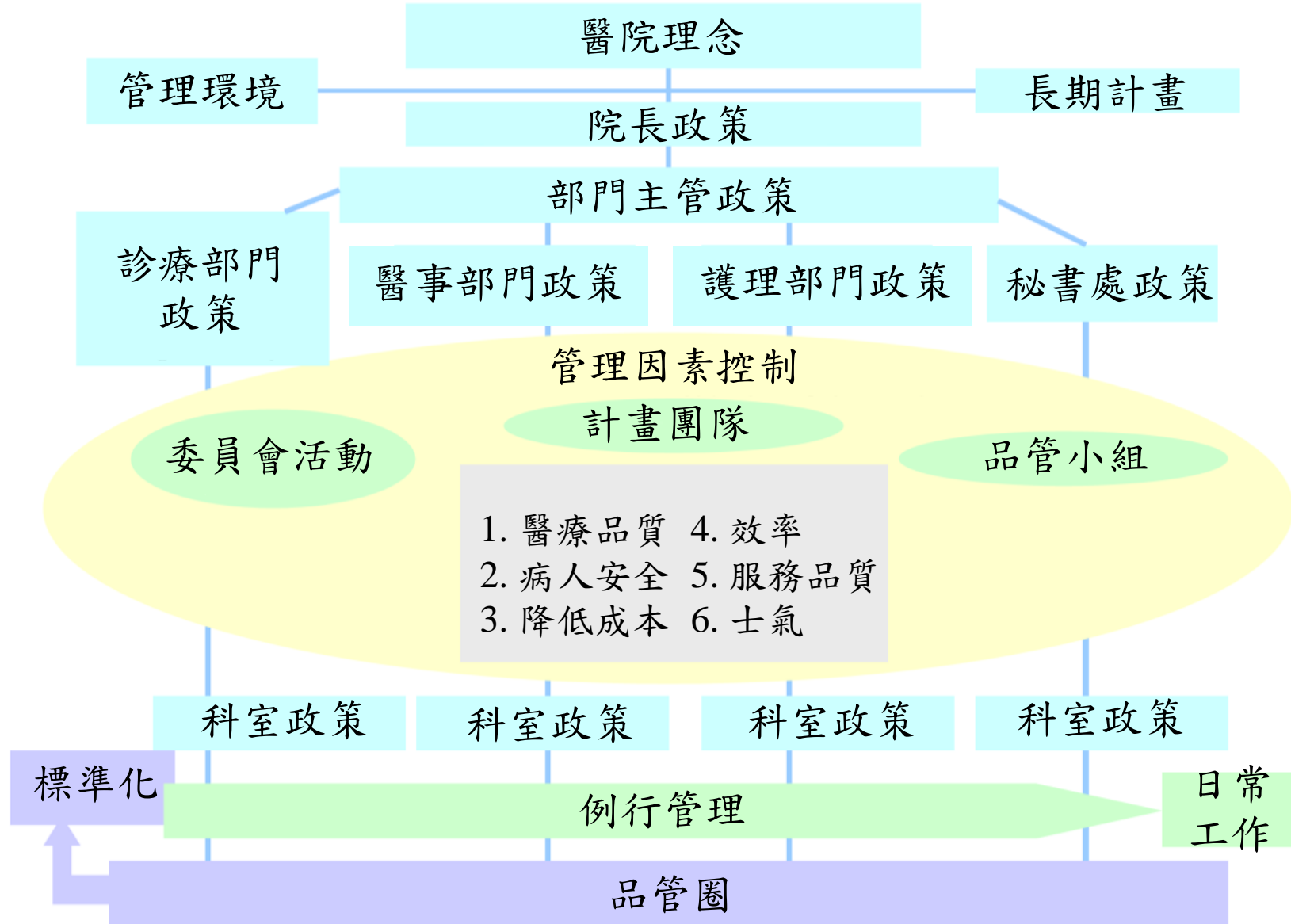
Yamauchi 2001

Organization of Toyota's QC Circle Activities



Ohta 1984

TQM and Its Management System

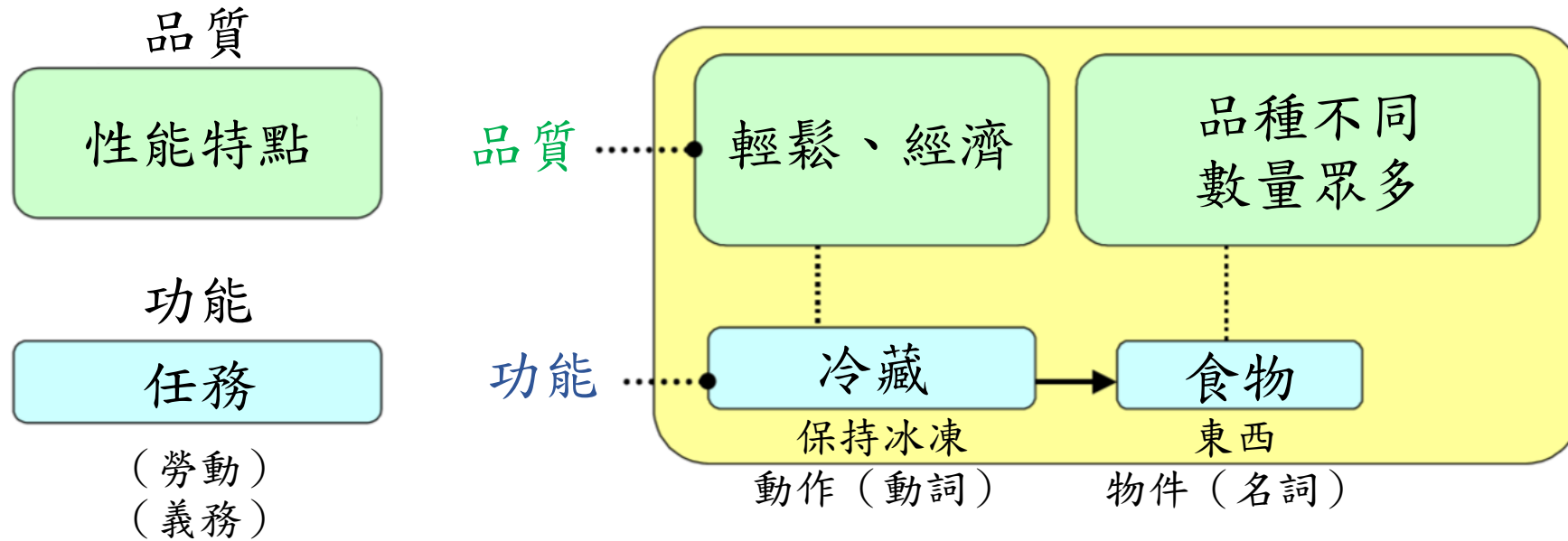


Kitajima 2003

什麼是品質？

品質 = 產品/服務的工藝及其性能

冰箱所需的品質和功能



為什麼重視品質？

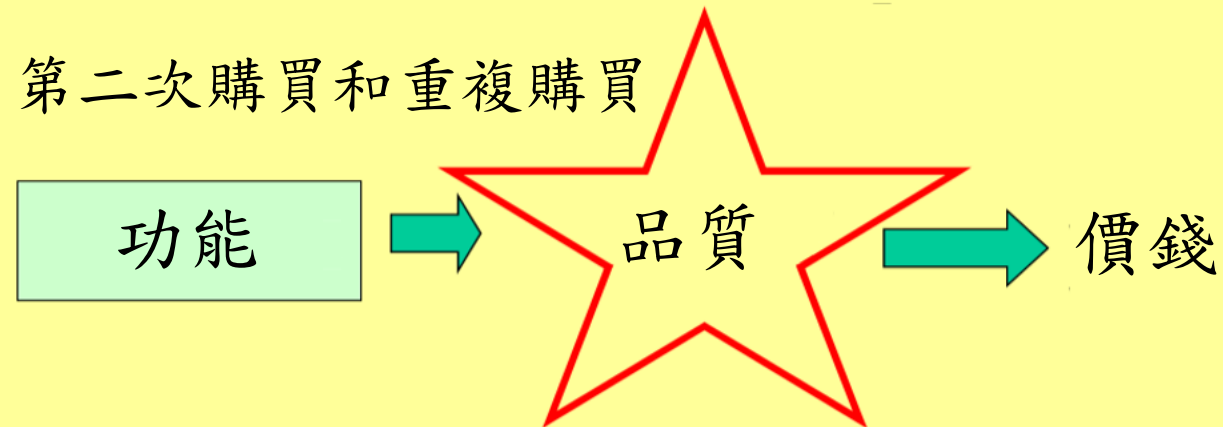
購買產品時

客戶視為優先之事項

第一次購買



第二次購買和重複購買



品質觀念的轉變

1950年代 適合標準

1960年代 適合使用

1970年代 適合成本

1980年代 適合需求（例如：安全性和可靠性、客戶滿意度）

1990年代 適合潛在要求（客戶喜愛）

2000年代 適合所有利益相關者的需求（例如：環保）

Figure 9



1950s



1960s



1970s

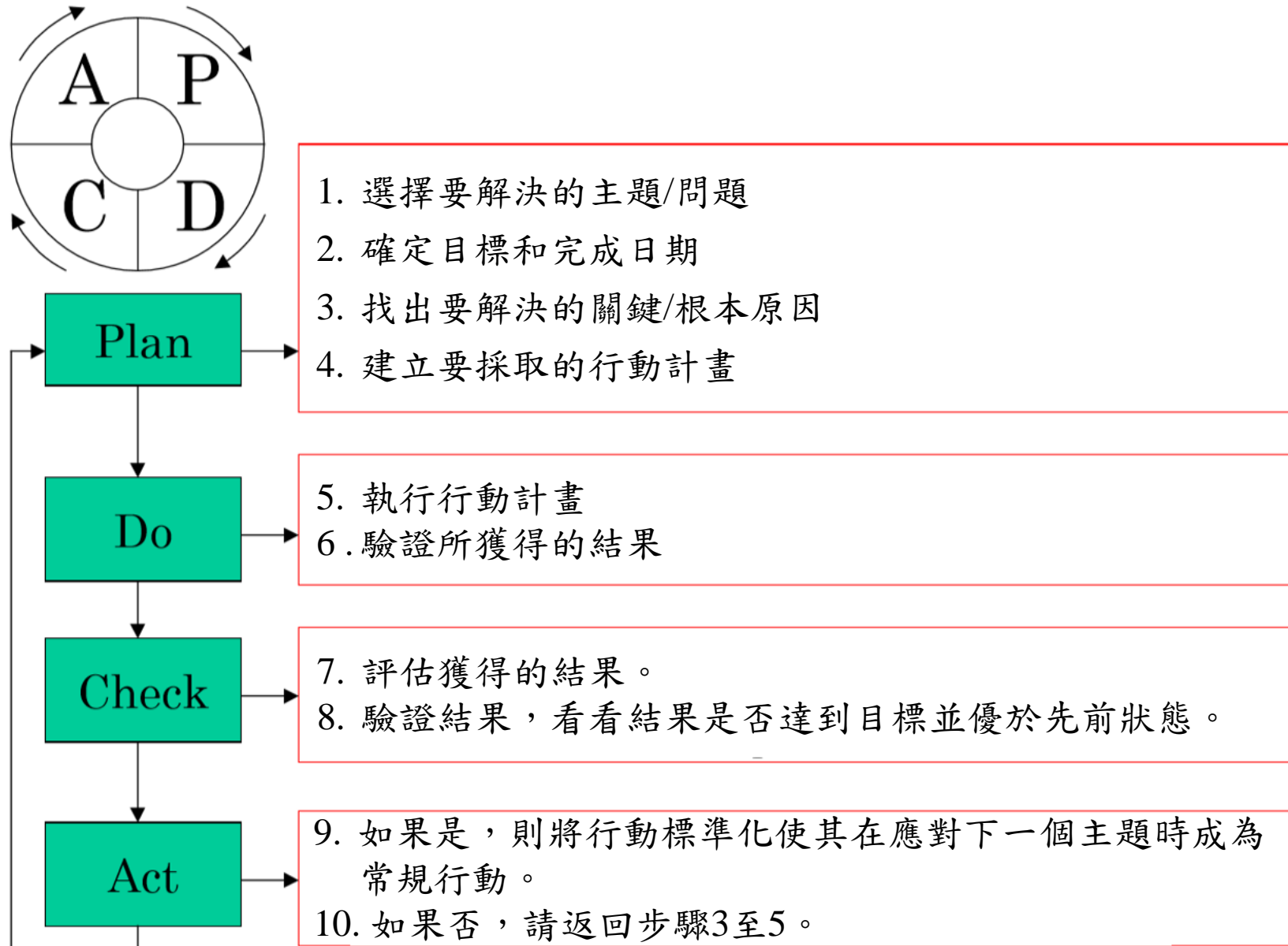


Years

品質觀念的轉變
以洗衣機為例

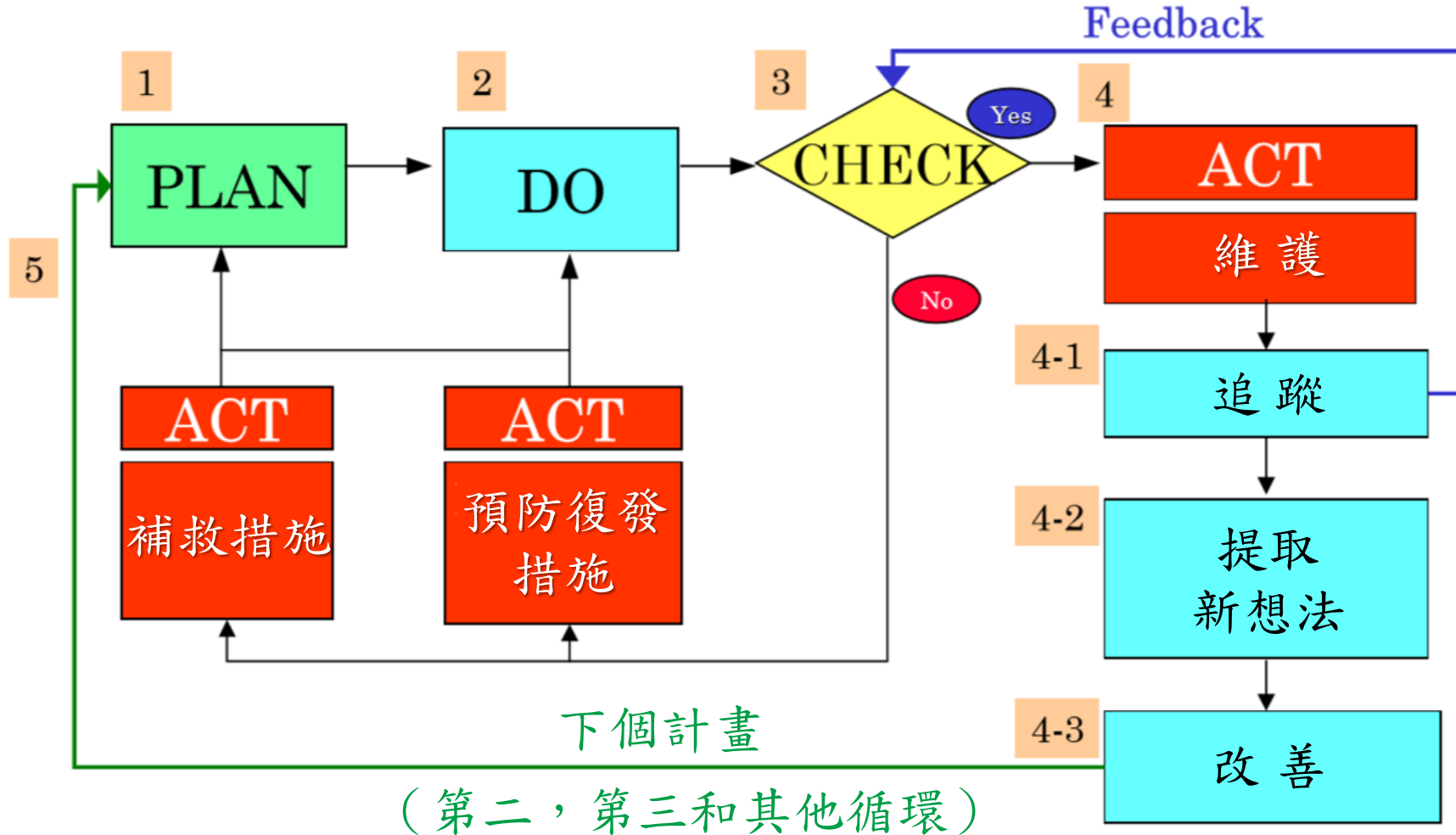
年代	品質決定因素	特徵
1950s	標準	用馬達驅動；按照標準洗衣服
1960s	使用	具自動擠壓功能而更加實用
1970s	成本	價廉、低能耗的機器
1980s	要求 (客戶滿意度)	無噪音運行 ⇨ 日夜可用
1990s	潛在需求 (客戶喜愛)	無纏結 快速 ⇨ 縮短洗滌時間 防黴/防黴 ⇨ 預防過敏
2000s	所有利益 相關者	無洗滌劑的洗滌 ⇨ 環保 具部分乾燥功能

PDCA Management Cycle Flow Chart



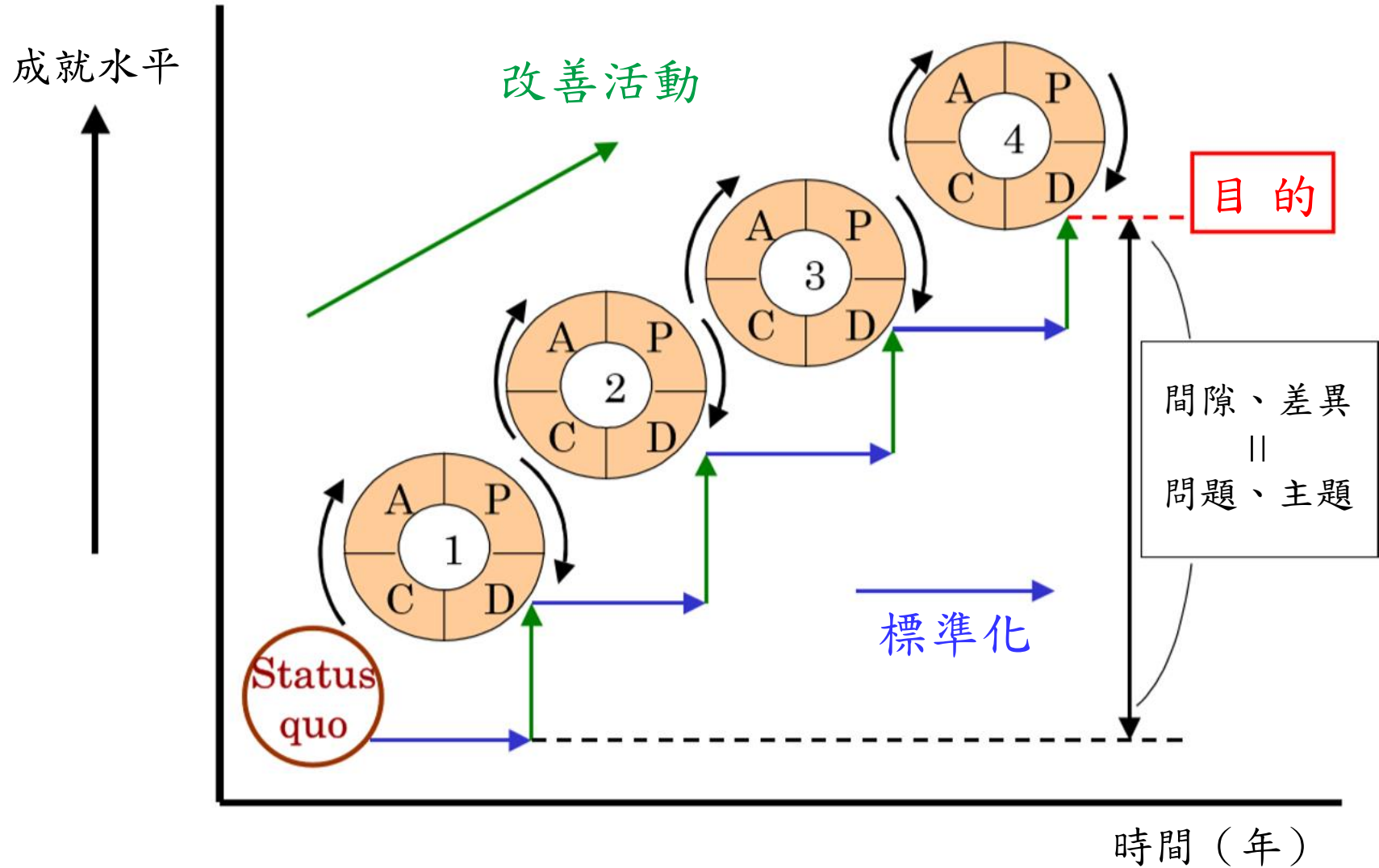
Management Cycle

PLAN - DO - CHECK - ACT

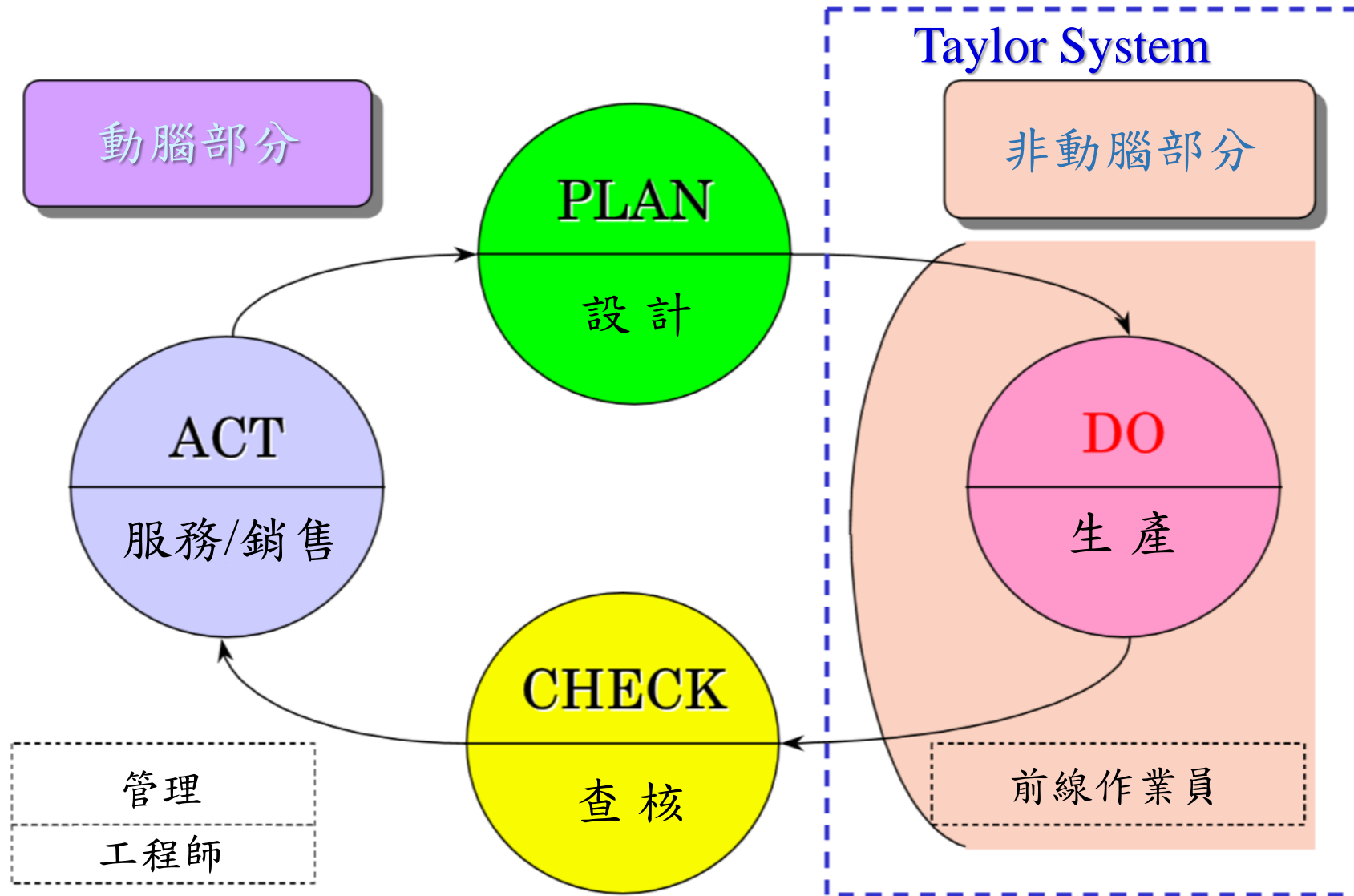


What is Management?

管理 = 標準化 + 改進活動

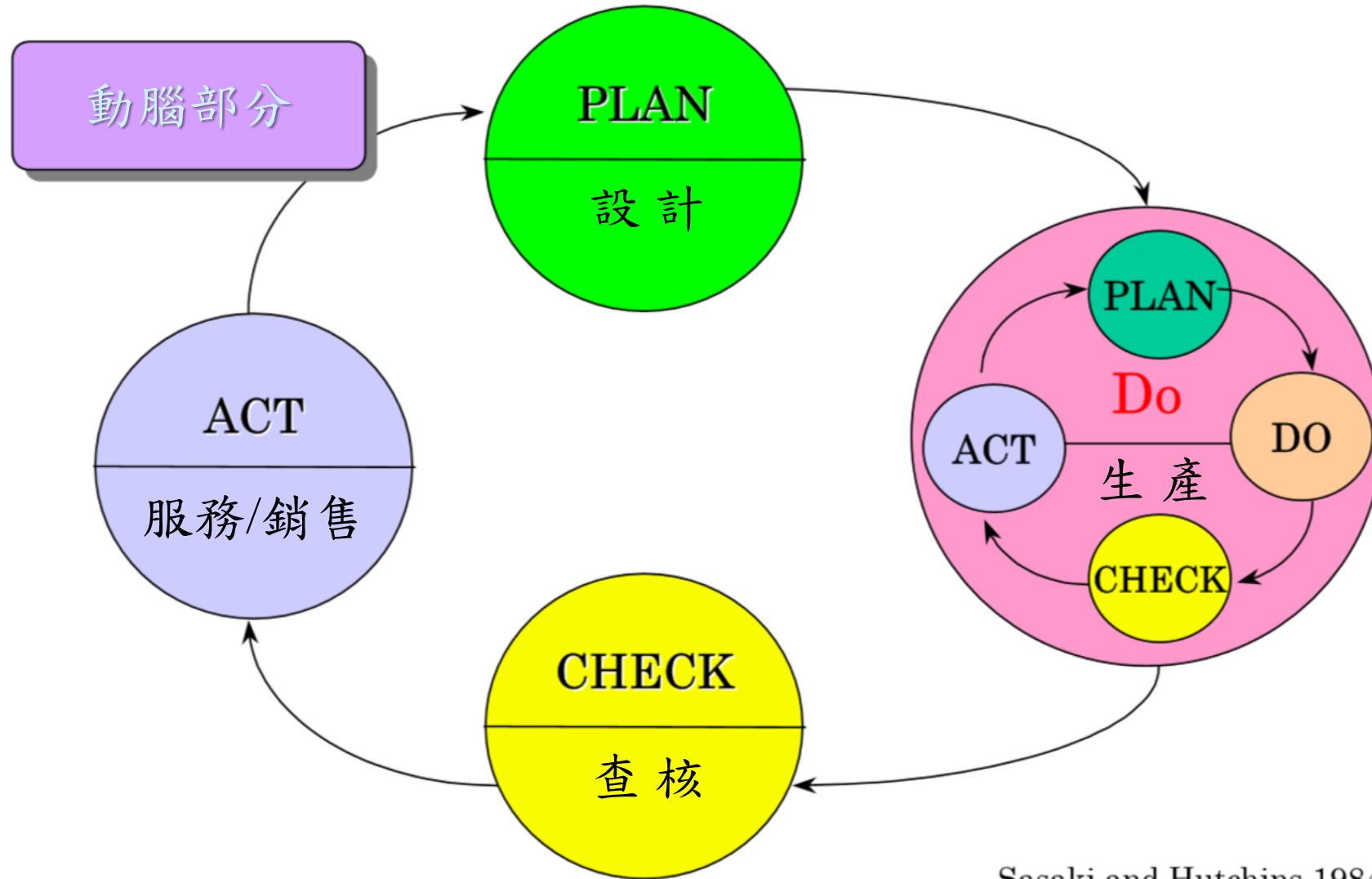


Management Cycle and Taylor System



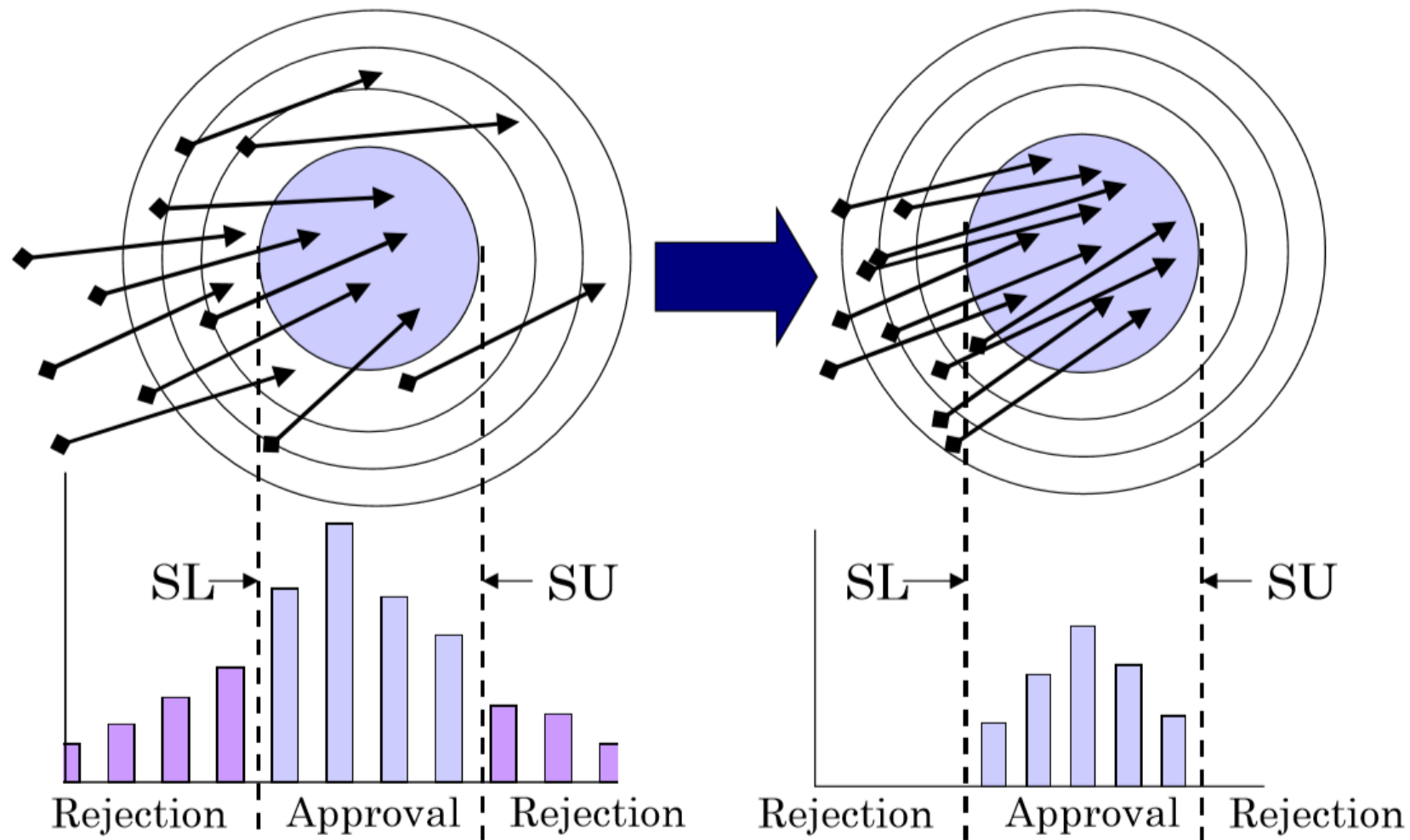
Sasaki and Hutchins 1984

The PDCA Cycle beyond the Taylor System



Sasaki and Hutchins 1984

什麼是品質保證？



SL : Specification Lower Limit / SU : Specification Upper Limit

Karatsu 1995

價值公式

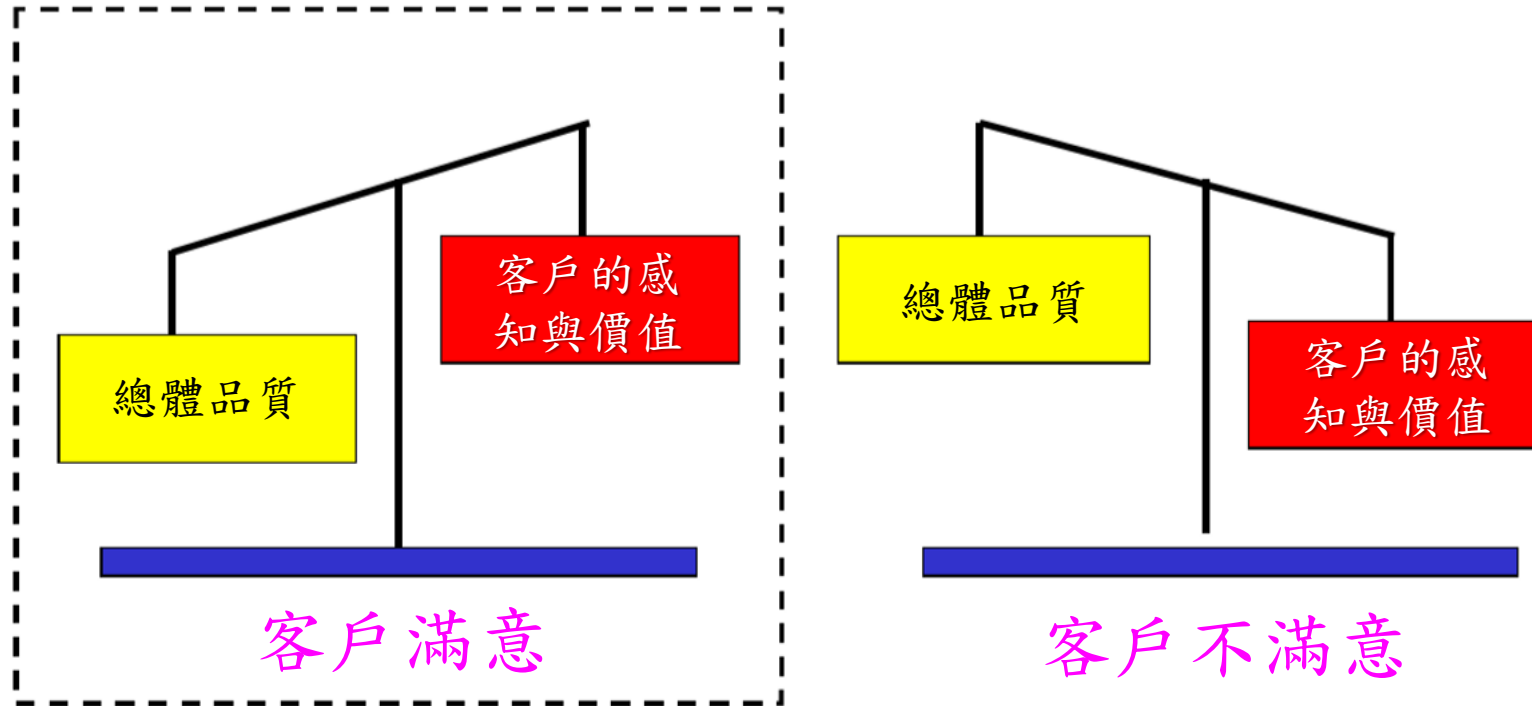
價值公式

$$\begin{aligned} \text{價值} &= \frac{\text{收到什麼}}{\text{支付什麼}} \\ &= \frac{\text{實際收到} + \text{感知}}{\text{支付的價格} + \text{不便} + \text{期望}} \end{aligned}$$

Cobb 1999

如何評估顧客滿意度

Customers' Perception + Value \leq Total Quality

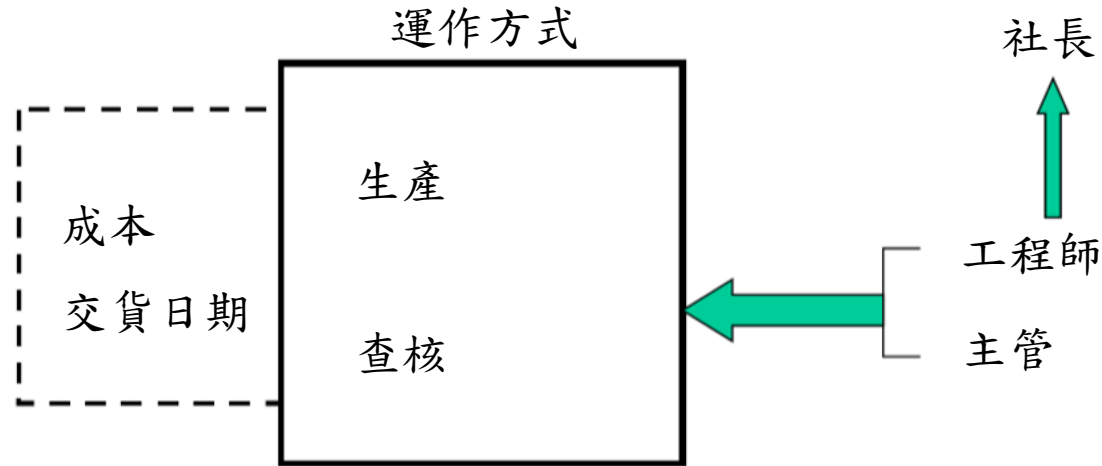


員工滿意度三個關鍵因素

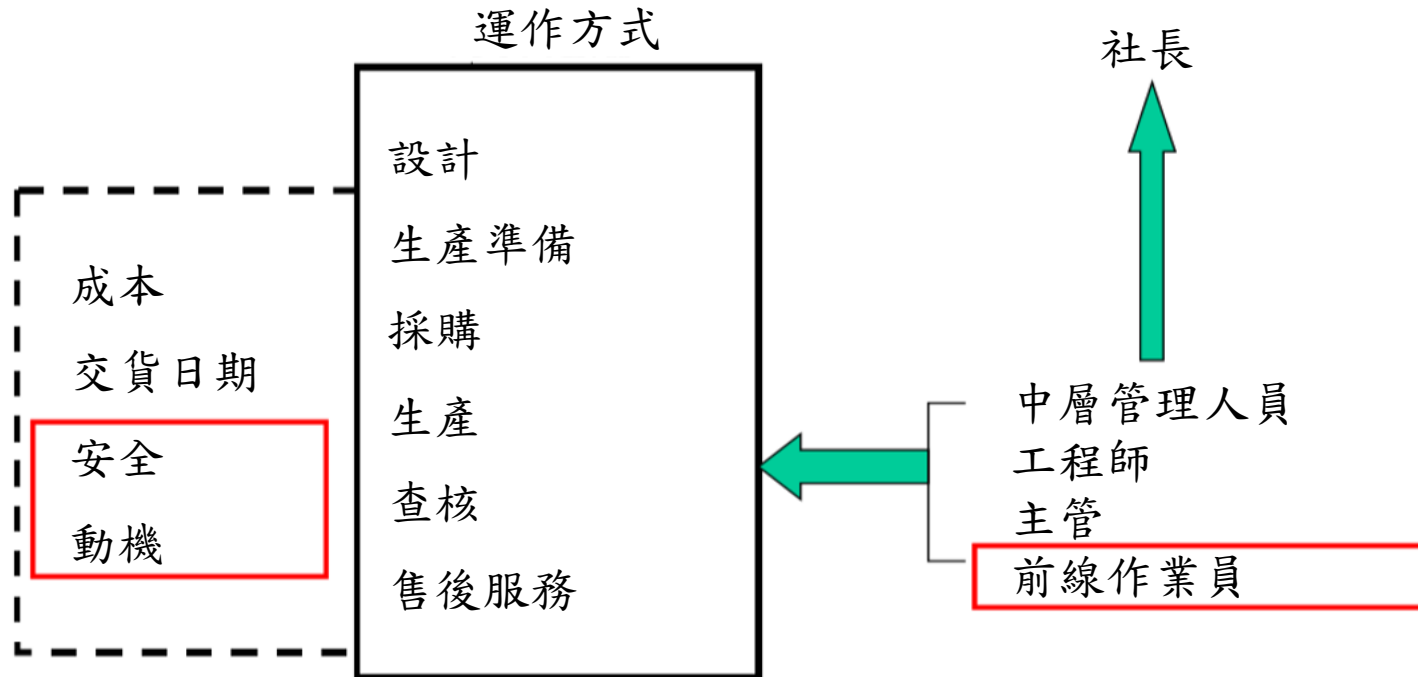
1. 開放且快速的溝通
2. 適於自我實現目標的工作場所
3. 合理的評估和福利

QC in the 1950s and 1960s

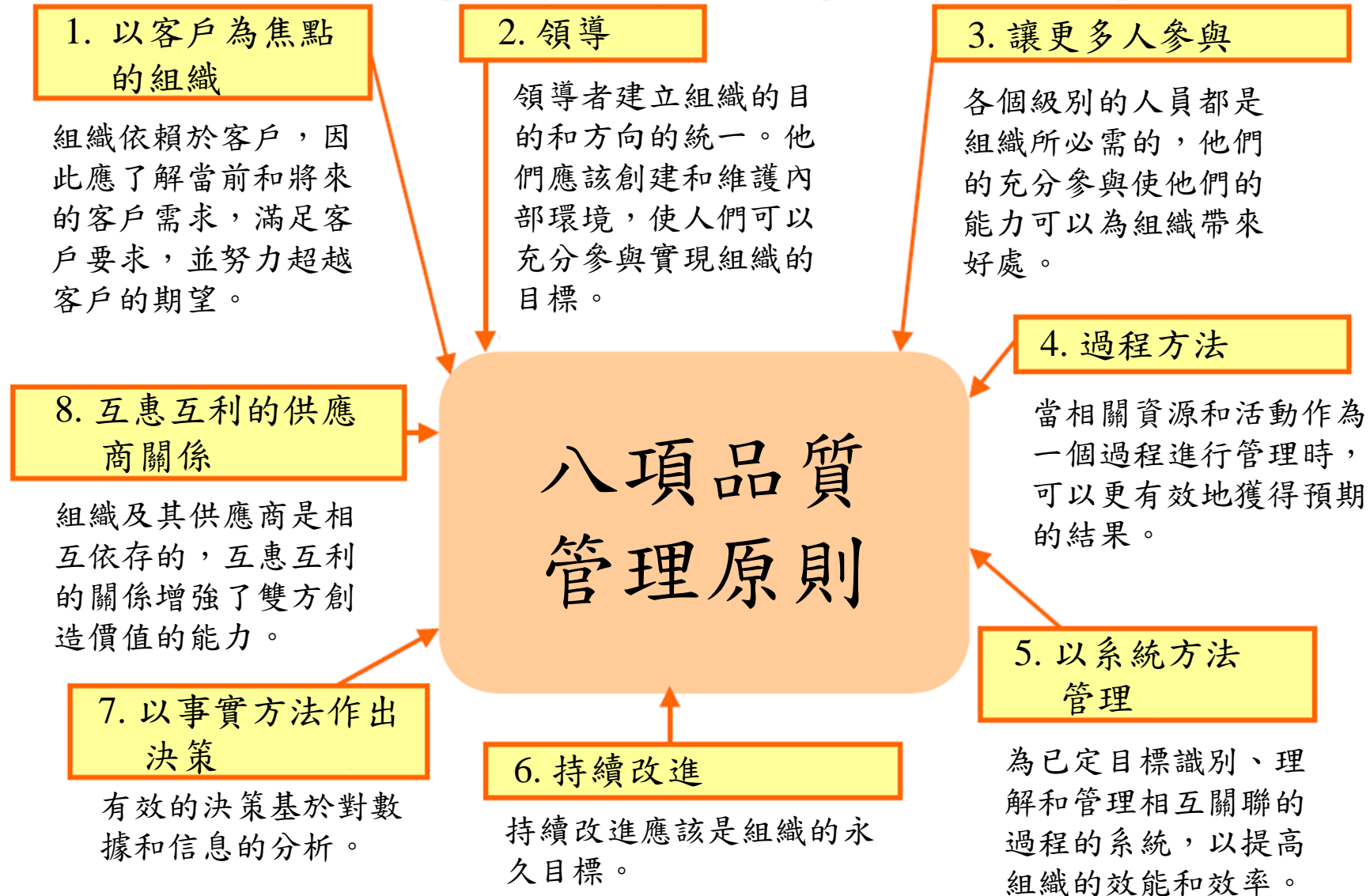
1950年代的品質控制



1960年代的品質控制



The Eight Quality Management Principles



品質導向

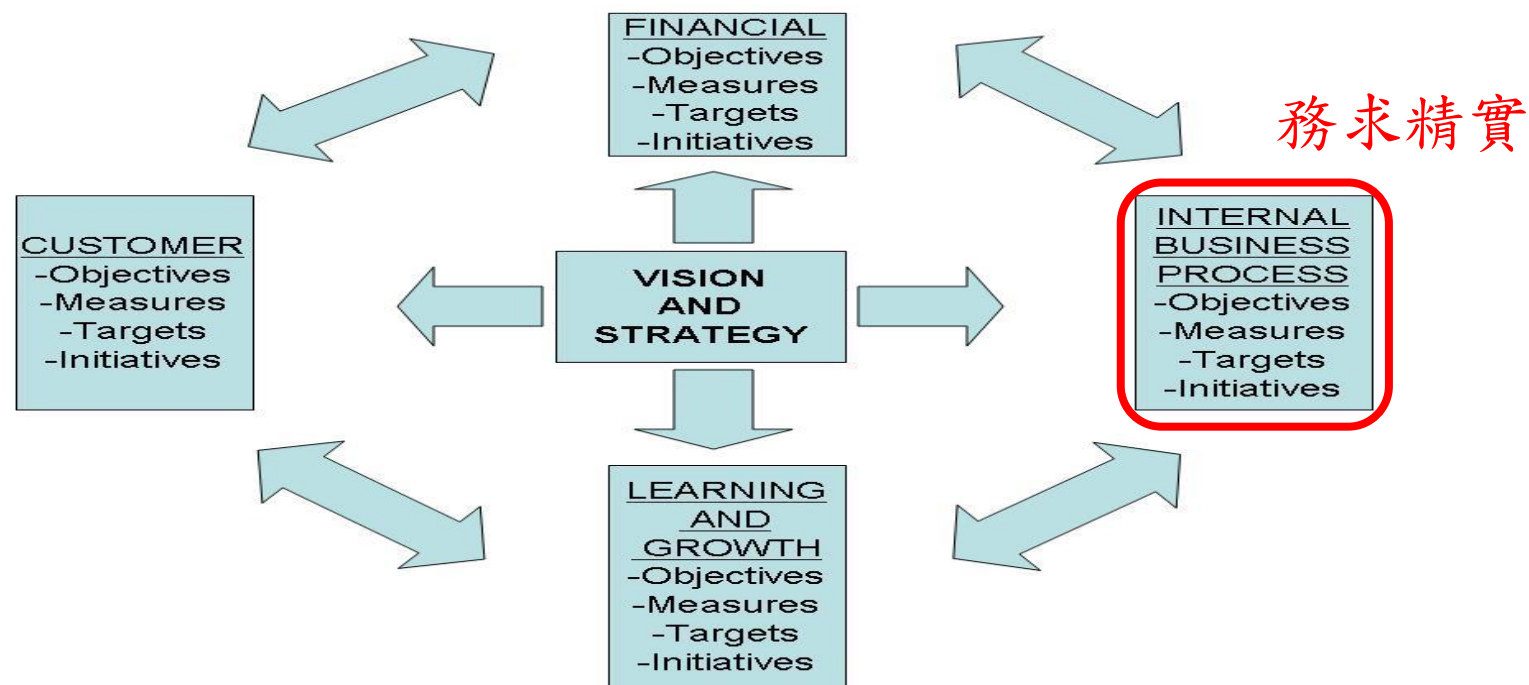
- ❑ TQM – Total Quality Management
- ❑ PDCA – Plan – Do – Check – Act
- ❑ BSC – Balanced Scorecard

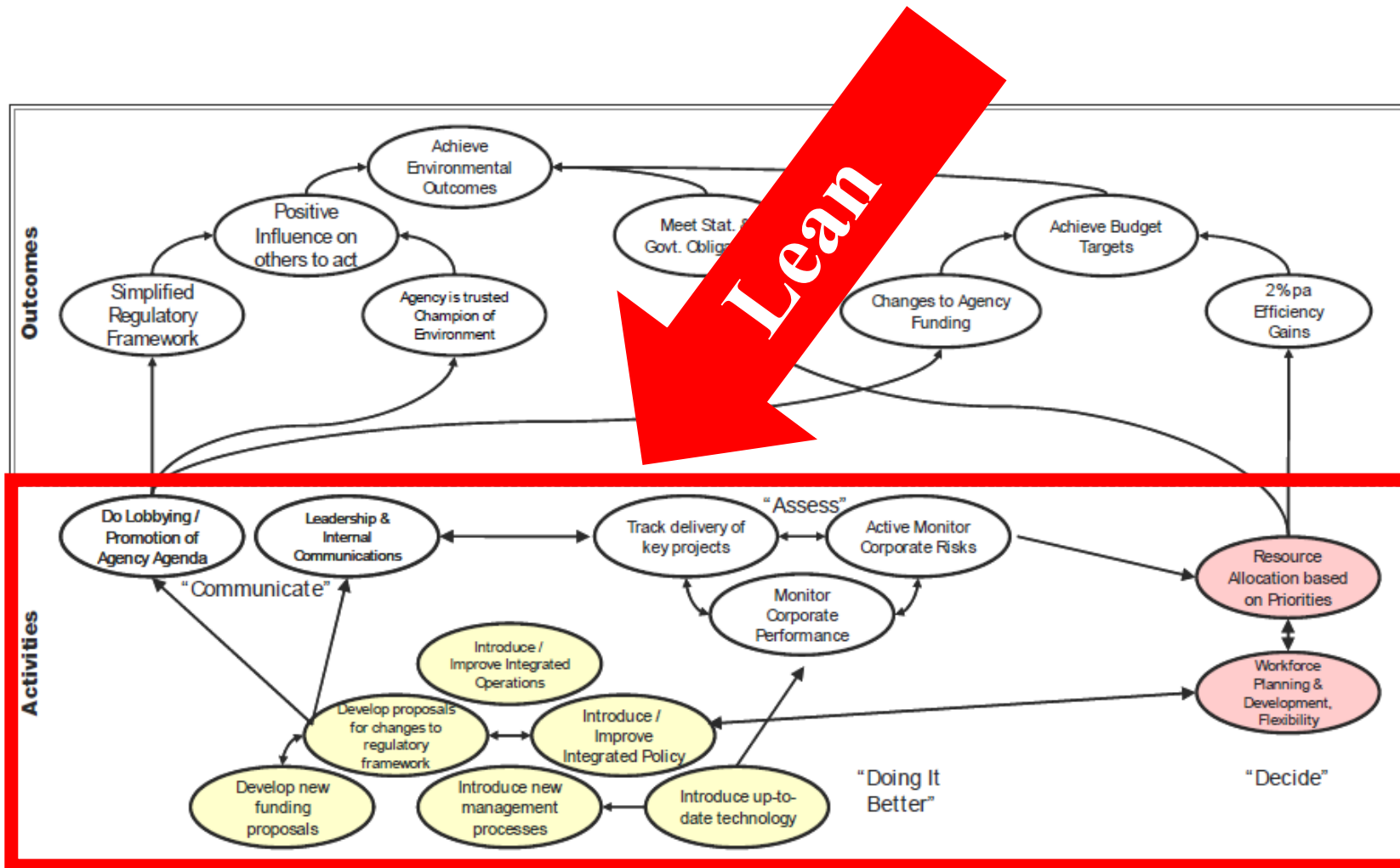
大綱

- 前言
- 待除虛耗
- 精實工具
- 規劃精實
- 履行精實
- 精實陷阱
- 結語

First Generation BSC

- 強調四個層面：財務、客戶、**內部業務流程**、學習和成長
- 需要選擇五到六個衡量工具
- 不易了解如何運用





Two-perspective Strategic Linkage Model (example taken from 2GC Internal Documents)

目錄

第一章 漫談精實醫療

第二章 醫院精實概述

第三章 價值與浪費

第四章 觀測流程和價值流

第五章 以標準化作業做為精實的基礎

第六章 精實方法：目視化管理、5S管理活動和看板

第七章 積極解決問題的癥結

第八章 透過防誤，從根本打造品質

第九章 改善流動

第十章 員工的參與及引領

第十一章 展開精實

第十二章 精實醫院的願景



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第三章：什麼是浪費（TIM-WOOD）

第四章：價值流製圖（value stream mapping，VSM）

第五章：豐田屋、SOPs

第六章：目視化管理、5S、看板

第七章：RCA、FMEA

第八章：防錯機制

第九章：每站一事作業流程（one-piece flow）、不均管理（mura management）

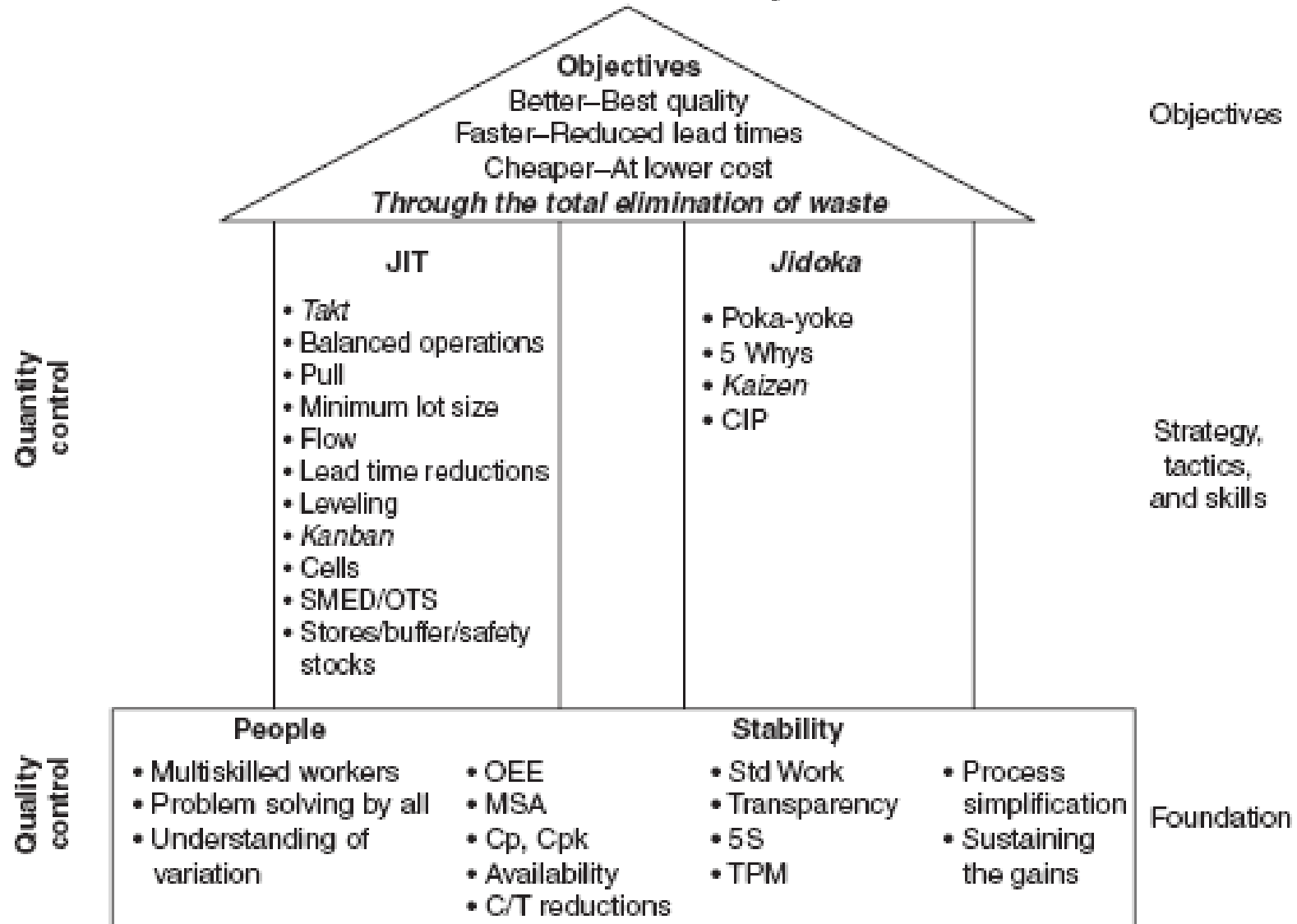


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- 第三章：什麼是wastes (TIM-WOOD)
- 第四章：value stream mapping (VSM)
- 第五章：**豐田屋**、SOPs
- 第六章：目視化管理、5S、看板
- 第七章：RCA、FMEA
- 第八章：error proofing
- 第九章：one-piece flow、mura management



The Lean Production System



Lean的相關名詞

- 日文
- 縮寫
- 其他

Lean的相關名詞：日文

- ❑ baka-yoke
- ❑ chaku-chaku
- ❑ gemba
- ❑ heijunka
- ❑ hoshin kanri
- ❑ Jidoka
- ❑ jishu kanri
- ❑ Jishuken
- ❑ Kaikaku
- ❑ Kaizen
- ❑ kaizen blitz
- ❑ kanban
- ❑ mizusumashi
- ❑ muda
- ❑ mura
- ❑ muri
- ❑ nagara
- ❑ poka-yoke
- ❑ seiban
- ❑ seiketsu
- ❑ seiri
- ❑ seiso
- ❑ seiton
- ❑ shigoto
- ❑ shitsuke
- ❑ shojinka
- ❑ teian
- ❑ yamazumi
- ❑ yokoten

Lean的相關名詞：縮寫

- ❑ 3G/Gen
- ❑ 3P
- ❑ 4M
- ❑ 5S
- ❑ 8D
- ❑ AIW
- ❑ CANDO
- ❑ CI
- ❑ DFM
- ❑ DFSS
- ❑ DMAIC
- ❑ EPE /EPEI
- ❑ ERP
- ❑ FIFO
- ❑ FMS
- ❑ IED
- ❑ JIT
- ❑ LIFO
- ❑ MITT
- ❑ MRP
- ❑ MTO
- ❑ MTS
- ❑ NVA
- ❑ NVAE
- ❑ OED
- ❑ OEE
- ❑ OEM
- ❑ OTED
- ❑ **PDCA**
- ❑ PFEP
- ❑ PPM
- ❑ QFD
- ❑ QRM
- ❑ RIW
- ❑ SMED
- ❑ TOC
- ❑ **TPM**
- ❑ TPS
- ❑ TQC
- ❑ VA
- ❑ VMI
- ❑ VSM
- ❑ VSN
- ❑ WCM
- ❑ WIP
- ❑ ZQC

Lean的相關名詞 (1/2)

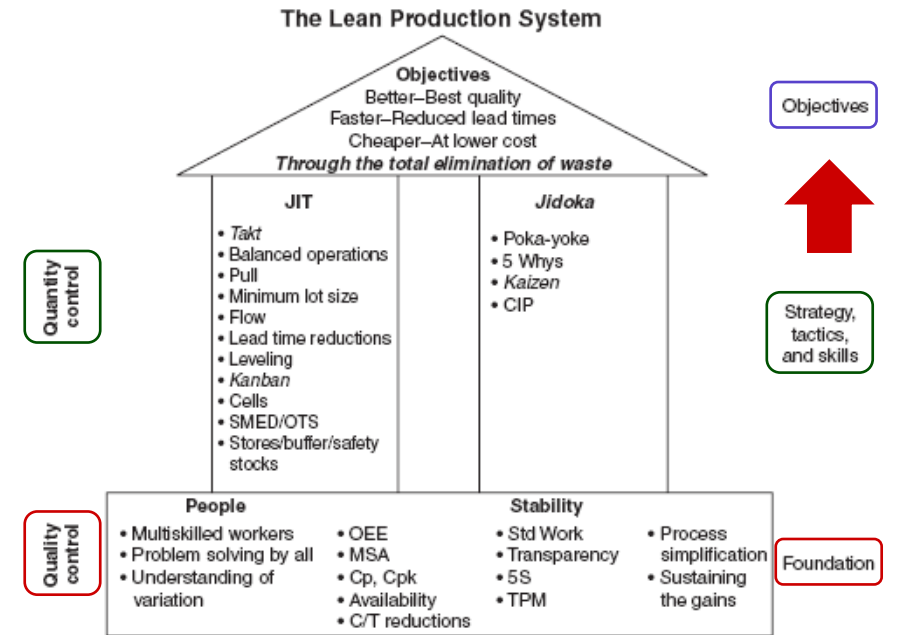
- ❑ 3 phases of improvement
- ❑ 5 Whys
- ❑ 6 sigma
- ❑ 7 habits
- ❑ 7 wastes
- ❑ 14 points
- ❑ agile manufacturing
- ❑ Batch
- ❑ continuous flow
- ❑ 'cost minus' principle
- ❑ cycle time
- ❑ Deming cycle
- ❑ downstream process
- ❑ error-proofing
- ❑ external setup
- ❑ flexible manufacturing
- ❑ flow cell
- ❑ hoshin planning
- ❑ house of lean
- ❑ in-process metrics
- ❑ internal setup
- ❑ inventory turns
- ❑ lagging indicators
- ❑ leading indicators

Lean的相關名詞 (2/2)

- lean
- lean accounting
- lean house
- lean sigma
- line balancing
- load-leveling
- milk run
- mistake-proofing
- mixed-model production
- one-piece flow
- paper airplane exercise
- Pareto chart
- production preparation process
- root cause analysis
- setup time
- single minute exchange of die
- single-piece flow
- Takt
- Toyota Production System
- transactional environments
- upstream process
- visual management
- waste
- water spider
- water strider
- zero defects

精實生產系統

- 目的
- 策略與技能
- 基礎



建立基礎（質之控制）

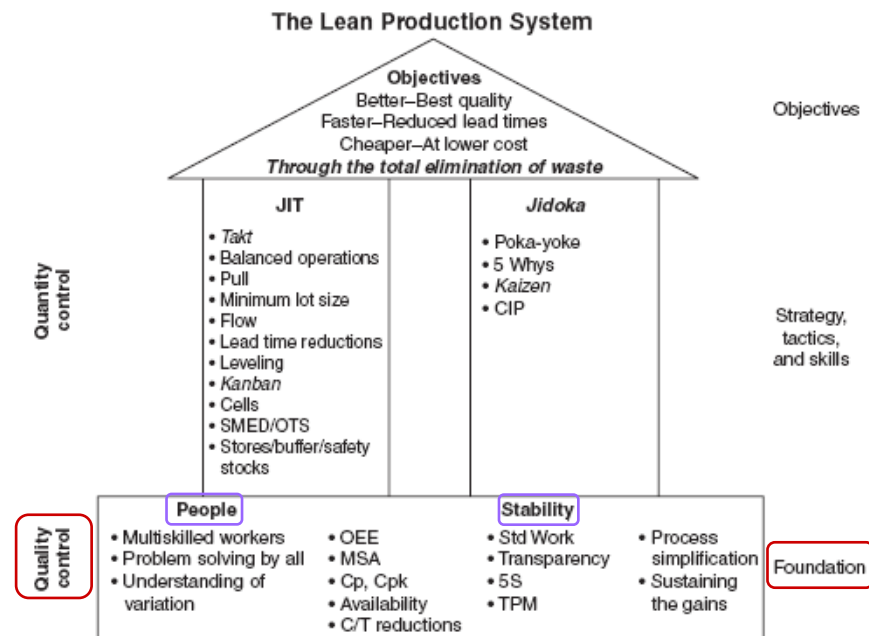
運用策略與技能（量之控制）



達成目的

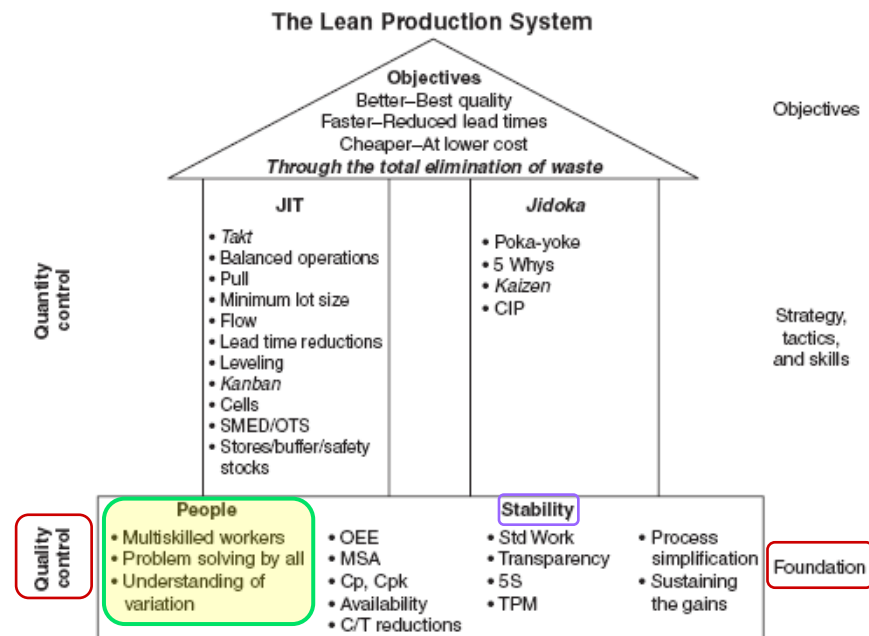
建立基礎 (質之控制)

- 人員
- 穩定



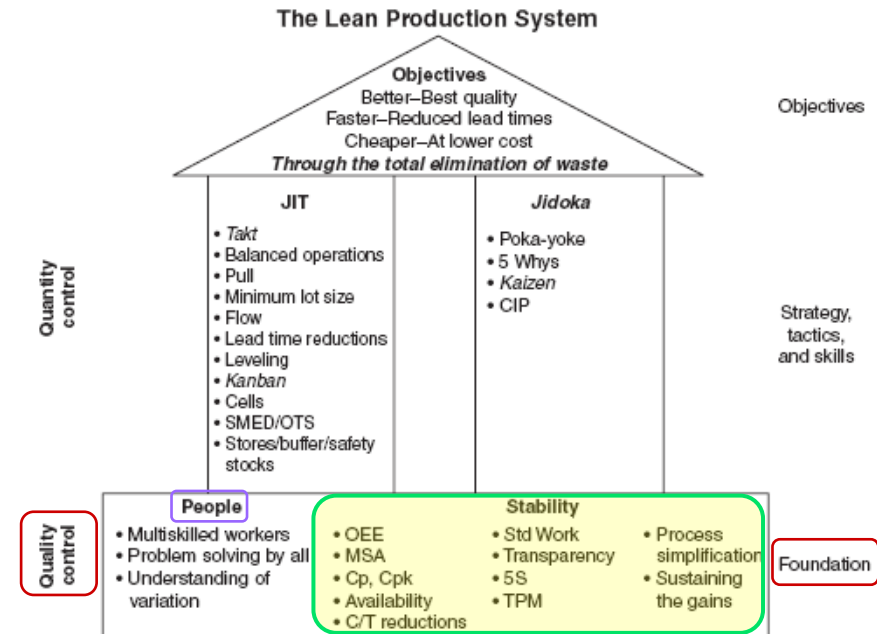
建立基礎：人員

- 具備多項技能
- 問題由全體解決
- 了解變異



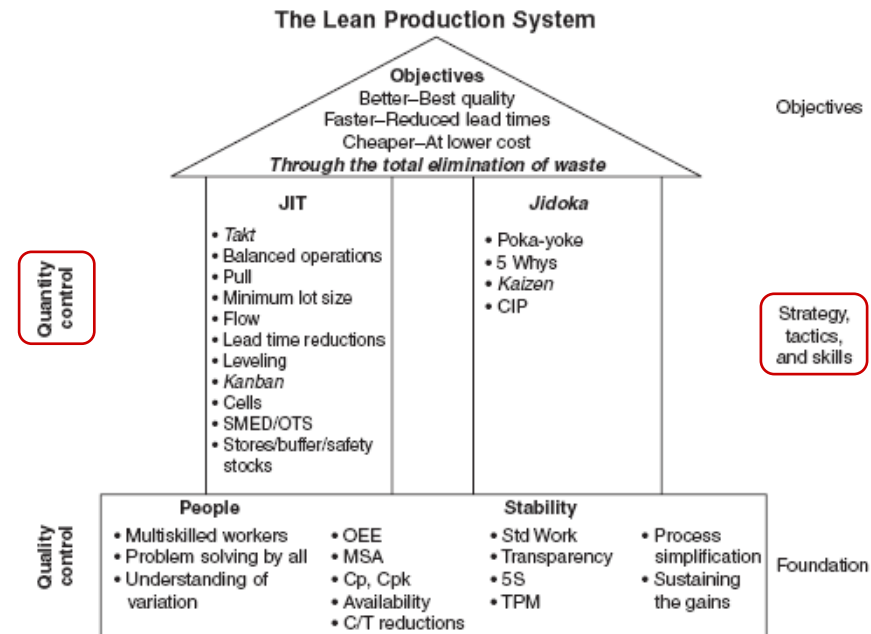
建立基礎：穩定

- ❑ 整體設備效能
- ❑ 測量系統分析
- ❑ 流程能力和流程表現
- ❑ 可用性
- ❑ 降低成本
- ❑ 工作標準化
- ❑ 透明
- ❑ 5S（整潔、定位、有條理）
- ❑ 總生產管理
- ❑ 簡化程序
- ❑ 持續獲利



運用策略與技能（量之控制）

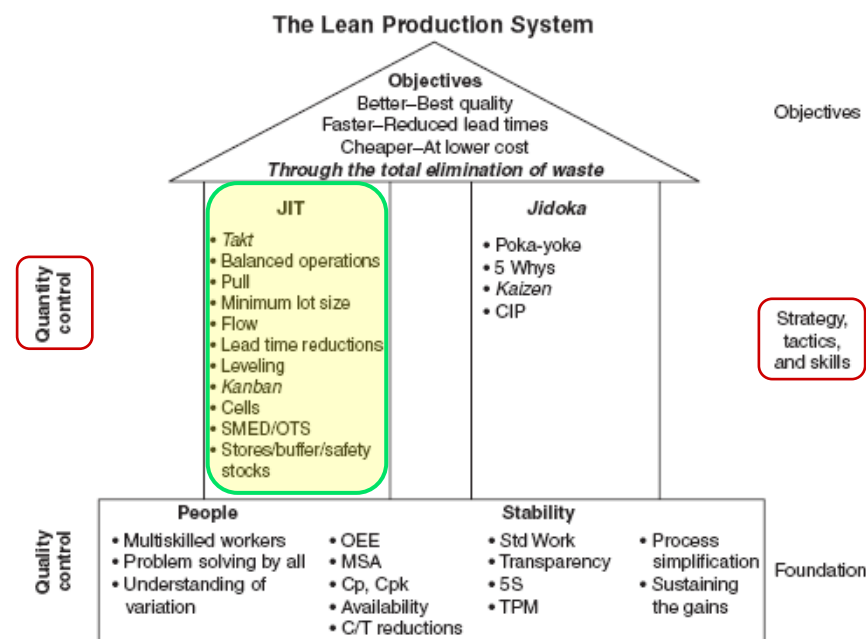
- JIT (just-in-time)
- Jidoka (自働化*)：當生產線或者設備出異常時，生產線或者設備能夠自行停止，不再繼續生產不合格品



*自動停

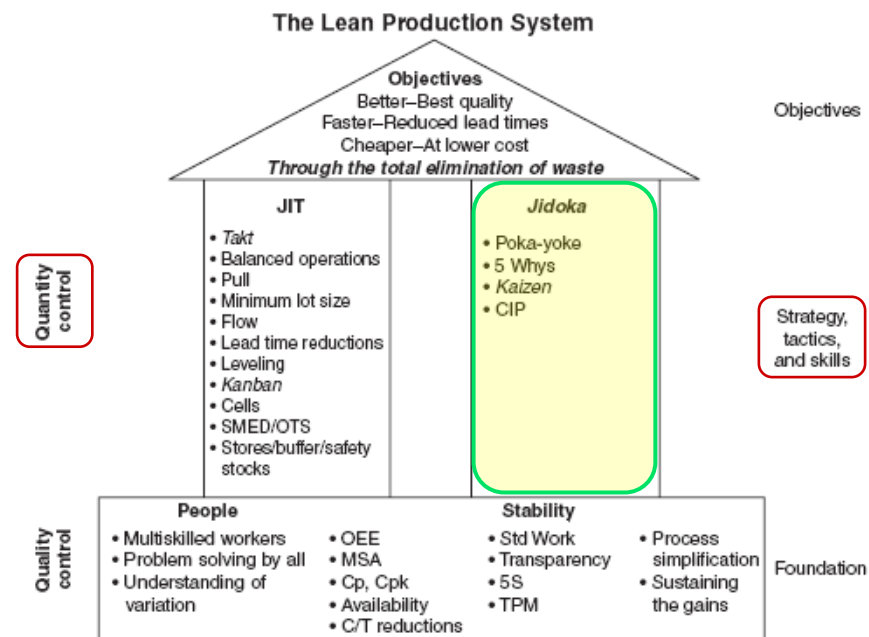
運用策略與技能：Just-in-Time

- ❑ 產能無浪費
- ❑ 平衡運作
- ❑ 訂單拉動生產線
- ❑ 批量最小化
- ❑ 生產流程合理化
- ❑ 生產線等候時間縮減
- ❑ 產品符合水平
- ❑ 看板
- ❑ 歸類明確
- ❑ 快速備妥
- ❑ 存貨足而不過多



運用策略與技能：自働化*

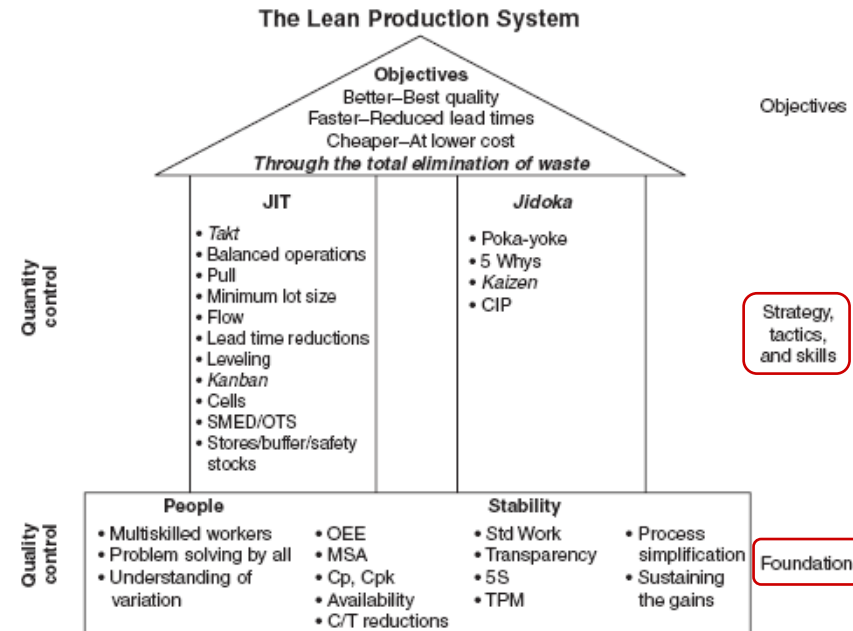
- 防誤設計
- 五個為什麼
- 改善
- 持續改進



*自動停

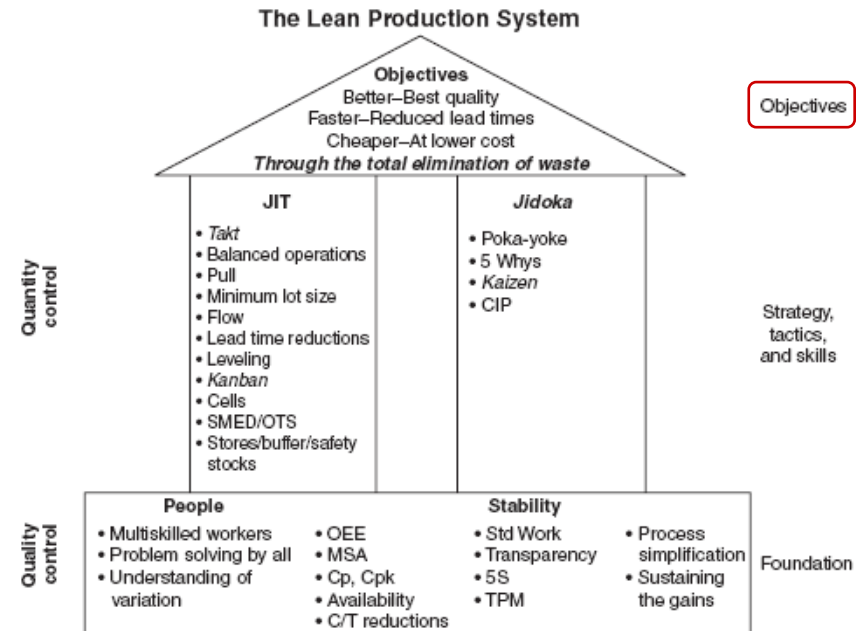
精實的兩個層面

- 建設基礎：優質的人員、穩定的環境
- 執行策略：just-in-time、自動化

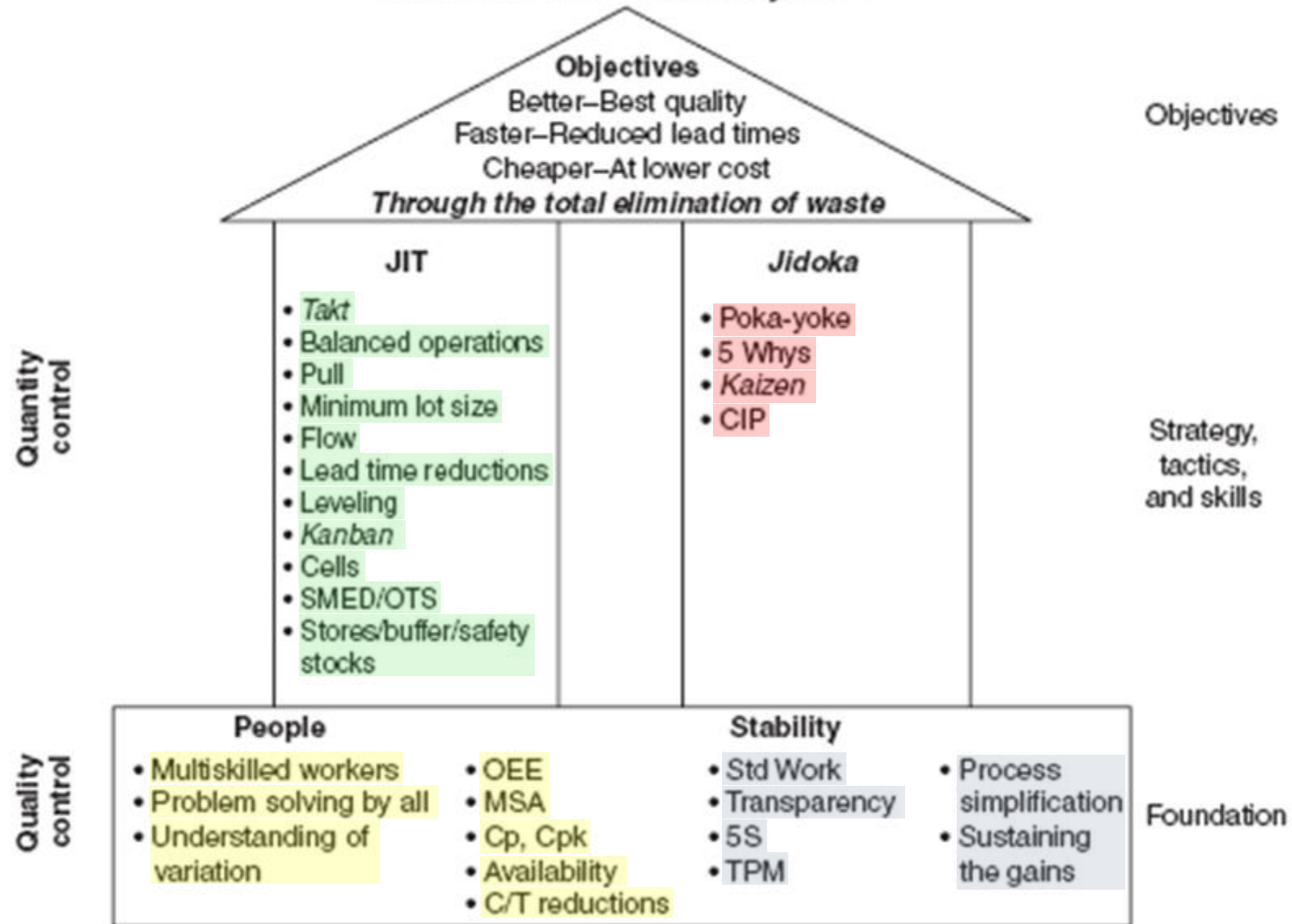


達成目的（經由清除所有虛耗）

- ❑ 更好－最好的品質
- ❑ 更快－減少準備時間
- ❑ 更廉－更低的成本



The Lean Production System



What is Lean?

- *“The endless transformation of waste into value from the customer’s perspective.”*
- 從顧客的觀點永無止盡地將浪費轉為價值

Waste = 廢物、浪費、虛耗

虛耗 = 無合理生產力的活動

價值 = 有合理生產力的活動

合理 = 質與量均符合預期

What is Lean?

- 是一組工具，用來辨識及清除虛耗 (waste*)
- 清除虛耗 ⇒ 降低生產時間和成本 ⇒ 品質改善

* waste = muda / muri / mura = 廢物 or 浪費 or 虛耗？

醫院內Lean的例子

- 使服務更具假值：
 - 一日可看多診次
 - 即時檢查及報告
 - 快速排程及處置
 - 快速及無錯繳費
 - 無等候急診醫療

Lean的發展史

- ❑ Pre-20th century
- ❑ 20th century
- ❑ **Ford** gets the ball rolling
- ❑ **Toyota** develops TPS



Pre-20th Century

- Benjamin Franklin：避免不必要的成本比增加銷售可獲利更多
- Frank Gilbreth：砌磚工人躬身撿起一塊5磅的磚再伸直腰花費許多時間，若改用與手腕同高的架子放磚則快速3倍且較不費力氣

20th Century

- ❑ Frederick W. Taylor：標準化 + 最好的作業配置
- ❑ Frank Gilbreth：建立PMTS（predetermined motion time system）的基礎
- ❑ Shigeo Shingo：SMED and poka-yoke

SMED = single minutes exchange die 快速換模法

Henry Ford

- 大規模裝配製造系統
- 看見農夫：徒手工作、做事缺乏邏輯性安排、用桶打水而不會配水管
- Design for Manufacture (DFM)：
 - 經由設計和標準化，去除無用部分並簡化必需部分，且可降低成本
 - 但他的方法只適合於穩定狀態的環境，不宜於今日千變萬化的時代 ⇒ **over production**

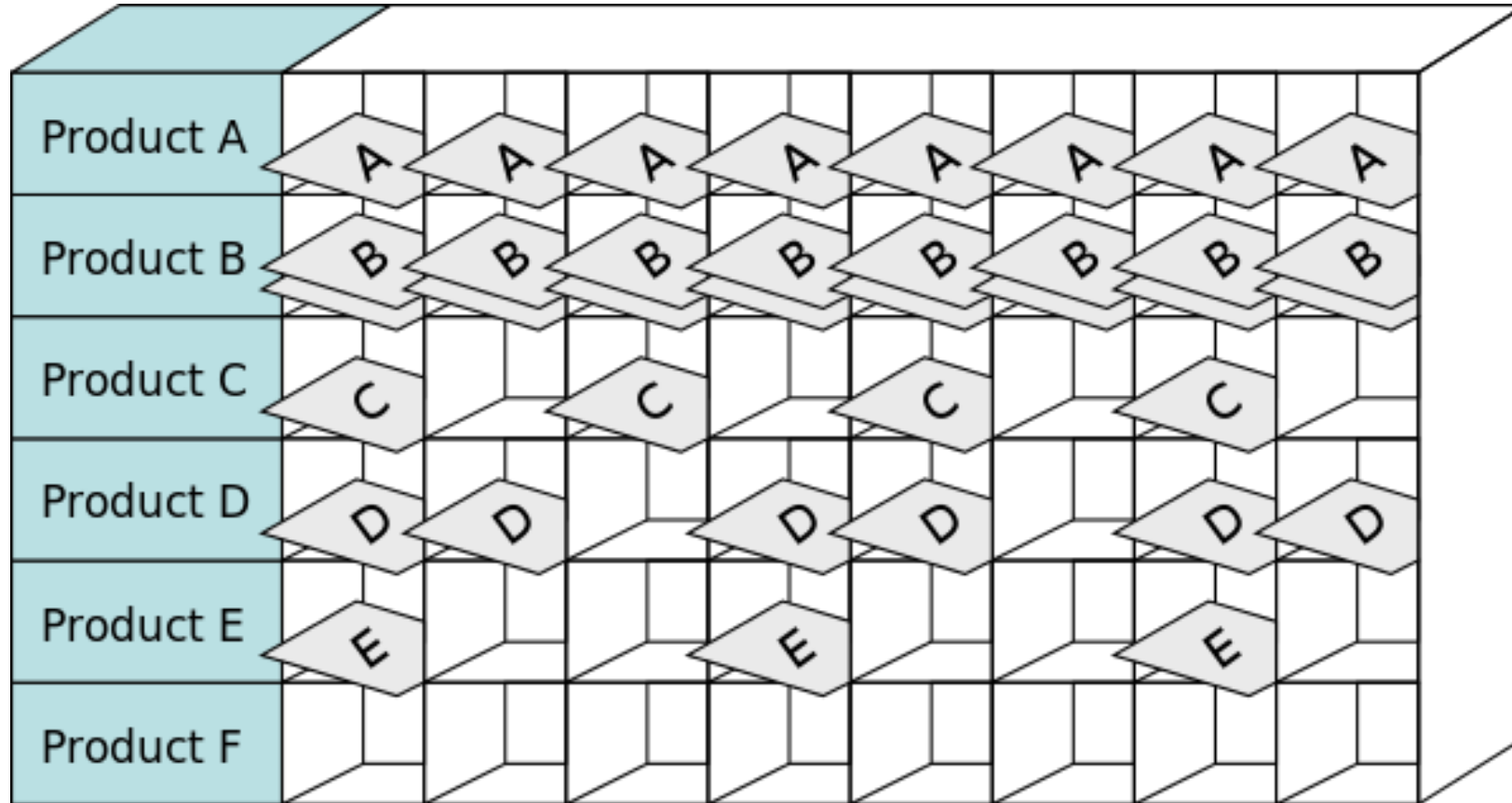
Toyota Production System (TPS)

- ❑ Taiichi Ohno : **Pull** (build to order rather than target driven **Push**)
- ❑ JIT = just-in-time

The Toyota Way

- 注意改善工作的「流動」或順暢度，因而經由系統去除不均勻（mura）而非從減少虛耗著手
- 改善「流動」的技巧包括：
 - 生產水平
 - 拉動式生產（“pull” production）——使用kanban
 - 生產均衡櫃（heijunka box）

Heijunka Box 生產均衡櫃



在固定的時間間隔裡，利用看板來平衡產品的型號和數量的工具，稱為生產均衡櫃。

虛耗

- Toyota's three broad types of waste:
 - **Muda** : non-value added or waste
 - **Muri** : the waste of overburden
 - **Mura** : the waste of unevenness

Muda

運動待存〇〇劣

□ The Seven Wastes : **TIM-WOOD**

- **T**ransport
- **I**nventory
- **M**otion
- **W**aiting
- **O**verproduction
- **O**ver-processing
- **D**efects

Muda之附加項目

- ❑ Womack et al., 2003：未符客戶需求或特定要求
- ❑ Geoffrey Mika, In: "*Kaizen Event Implementation Manual*" 1999：
 - ❑ 工作指標用錯或欠缺
 - ❑ 人員意見未能充分表達
 - ❑ 電腦用得不好
- ❑ 人才浪費
- ❑ 資源浪費
- ❑ 副產品未利用

Muri

- ❑ 過度負擔，包括人員和機械
- ❑ 可因mura及muda所致
- ❑ 避免機械過度負擔可保證產能
- ❑ 避免人員過度負擔可保證安全

Mura

- ❑ 不均勻，可見於客戶需求、每項產品的處理時間的波動，或不同操作者在周期時間的差異
- ❑ 彈性在低產量高產品變異的生產環境比在高產量低產品變異的生產環境來得重要
- ❑ 當mura沒有降低，便增加muri的可能性而導致muda
- ❑ 減少mura的方法：
 - ❑ 使供應鏈更開放
 - ❑ 改變產品設計
 - ❑ 對所有操作者制訂工作標準

What is Waste in Healthcare?

TIM-WOOD : Transportation

- 病人、檢體、器具或人員不必要的運送

TIM-WOOD : Inventory

- 被服
- 藥物
- 待檢檢體

TIM-WOOD : Motion

- 找尋或取送：
 - 病人
 - 藥物
 - 病歷
 - 器具

TIM-WOOD : Waiting

- 等待：
 - 床位
 - 出院
 - 檢查結果

TIM-WOOD : Over Production

- ❑ 發藥量過多
- ❑ 為已聘人力安排醫療服務
- ❑ 重複/不必要的檢查

TIM-WOOD : Over Processing

- ❑ 過多的查核
- ❑ 不必要的文書工作
- ❑ 重複的處置程序

TIM-WOOD : Defects

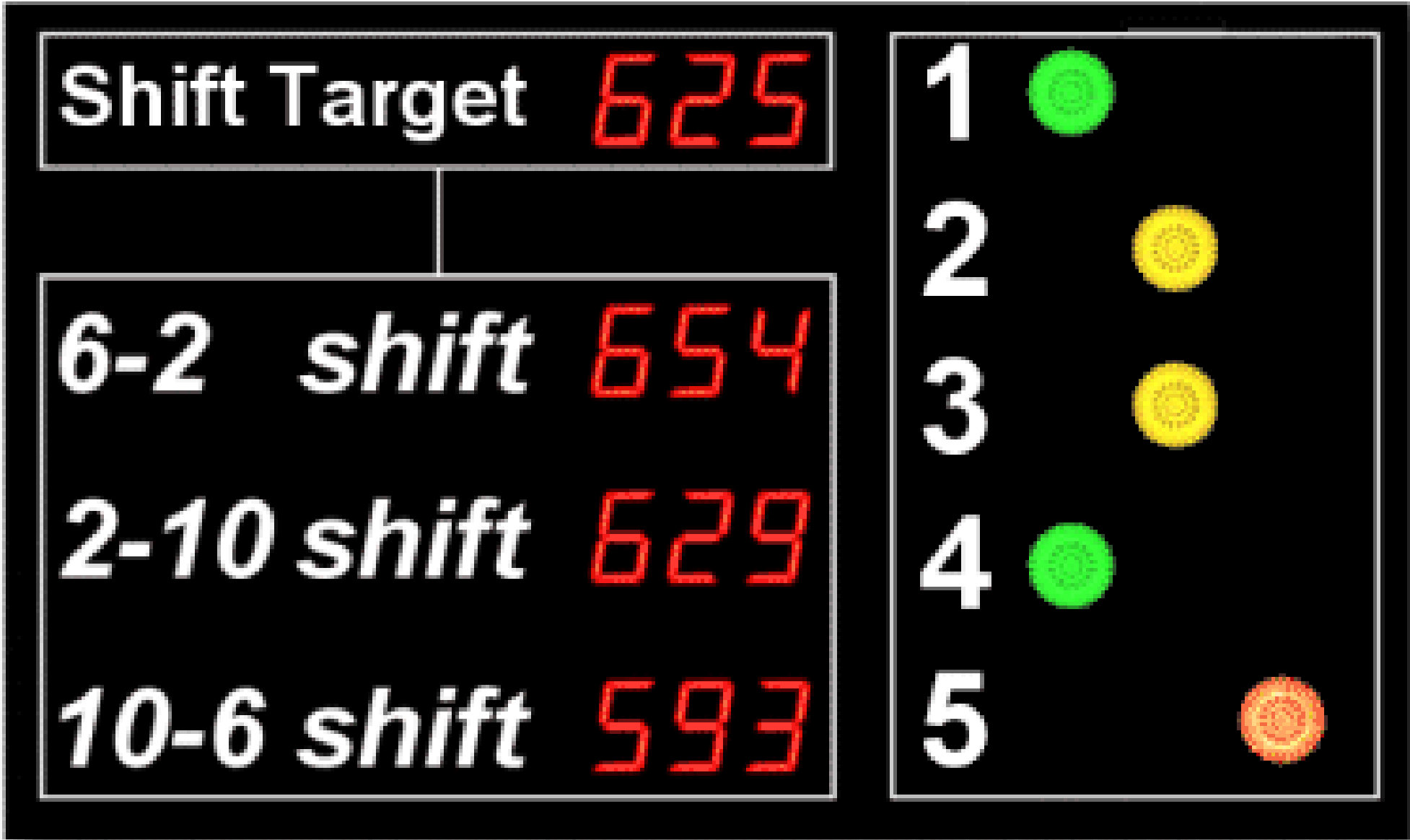
- ❑ 用藥錯誤
- ❑ 程序錯誤
- ❑ 病人錯誤
- ❑ 遺漏訊息

常用的精實工具

- ❑ Andon
- ❑ 5S
- ❑ Kaizen
- ❑ Kanban (pull systems)
- ❑ Line-balancing
- ❑ Poka-yoke
- ❑ Preventive & predictive maintenance
- ❑ Reduce batch sizes
- ❑ Schedule leveling
- ❑ Setup time reduction
- ❑ SMED
- ❑ Standardized work
- ❑ Takt time
- ❑ Value stream mapping
- ❑ Visual Management

Andon 安燈

- 是Jidoka（自働化）的主要工具之一
- 是一種「視覺控制」
- 如：電子告示板（安燈板）
- 展示目前工作狀況（如狀況、工作指引、工作進行資訊）
- 發生異常時立即發出訊號



呈現三個班5條生產線即時產量的安燈板

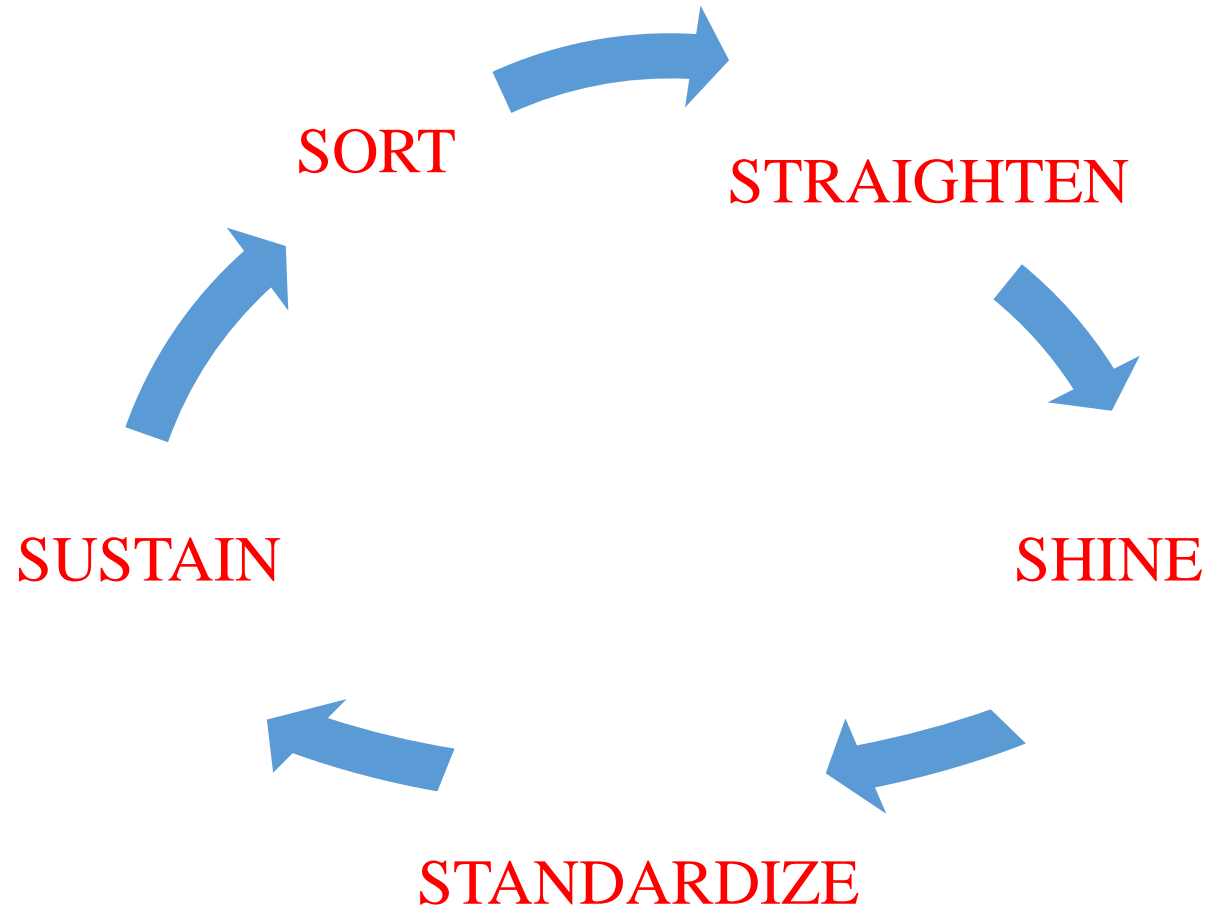
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5S

- Seiri (整理) ⇒ sort ⇒ sort (分類)
- Seiton (整頓) ⇒ straighten ⇒ simplify (簡化)
- Seiso (清掃) ⇒ shine ⇒ sweep (清掃)
- Seiketsu (清潔) ⇒ standardize ⇒ standardize (標準)
- Shitsuke (素養) ⇒ sustain ⇒ self-discipline (自律)

Clean it up, Make it Visual




5 S Checklist - Workplace Evaluation					problem	Score
Date: _____					5 or more	0
					3 to 4	1
					2	2
					1	3
					None	4
					Score	
Category	Item	1	2	3		
	Distinguish between what is needed and not needed					
Sort (Organization)	Unneeded equipment, tools, furniture, etc. are present					
	Unneeded items are on walls, bulletin boards, etc.					
	Items are present in aisleways, stairways, corners, etc.					
	Unneeded inventory, supplies, parts, or materials are present					
	Safety hazards (water, oil, chemicals, machines) exist					
	A place for everything and everything in its place					
Set in Order (Orderliness)	Correct places for items are not obvious					
	Items are not in their correct places					
	Aisleways, workstations, equipment locations are not indicated					
	Items are not put away immediately after use					
	Height and quantity limits are not obvious					
	Cleaning, and looking for ways to keep it clean and organized					
Shine (Cleanliness)	Floors, walls, stairs, and surfaces are not free of dirt, oil and grease					
	Equipment is not kept clean and free of dirt, oil, and grease					
	Cleaning materials are not easily accessible					
	Lines, labels, signs, etc. are not clean and unbroken					
	Other cleaning problems (of any kind) are present					
	Maintain and monitor the first three categories					
Standardize (Adherence)	Necessary information is not available					
	All standards are not known and visible					
	Checklists don't exist for all cleaning and maintenance jobs					
	All quantities and limits are not easily recognizable					
	How many items can't be located in 30 seconds					
	Stick to the rules					
Sustain (Self-discipline)	How many workers have not had 5S training					
	How many times, last week, was daily 5S not performed					
	How many times that personal belongings are not neatly stored					
	Number of times job aids are not available or up to date					
	Number of times, last week, daily 5S inspections were not performed					
Total						

CATEGORY		CRITERIA	AUDIT PERIOD			
Sort		Distinguish between what is needed and not needed	1	2	3	4
Sort Through & Discard Unused Items	Procedures are established to identify unnecessary items					
	Unneeded equip., storage, furniture, etc. exist					
	Unneeded items on walls / bulletin boards, etc. exist					
	Aisles, stairways, corners etc. are free of items					
		Unneeded inventory, supplies, parts, or materials exist (drawers / cabinets / work surfaces / storage areas)				
Set in Order		A place for everything and everything in its place	1	2	3	4
Use Labels, Lines, Signs & Colors to identify Normal vs. Abnormal Conditions	All items have a specific location					
	Shared drawers, cabinets, work surfaces, and storage areas are clearly labeled and well organized					
	Personal drawers, cabinets, desktops, and storage areas are clearly marked and/or well organized					
	All items are placed in the proper location					
		Aisleways, workstations, equipment locations are identified				
Shine		Routine discipline maintaining a clean and organized workplace	1	2	3	4
Cleaning is a Method of Inspection, Look for Hidden Defects	Equipment, computers, work surfaces, and storage areas are clean					
	Garbage and recyclables are collected and disposed correctly					
	E-mails and paper are filed daily					
	Shared areas are cleaned and maintained regularly					
Standardize		Preventing the area from having abnormal operating conditions	1	2	3	4
Standardize the Rules to Make 5S a Habit	Specific cleaning and organizing tasks have been developed and assigned for the work area					
	Staff is trained and fully understands 5S procedures					
	5S standards are clearly displayed					
	Visual management tools identify if work is complete					
Sustain		Stick to the rules (self-discipline)	1	2	3	4
Sustaining plans are developed to ensure accountability	Everyone is involved in the improvement activities					
	Standardized cleaning and work procedures are followed					
	5S documentation and instructions are current					
	5S audits occur regularly					
Comments						

SCORING SYSTEM	
Scale / # Problems	Rating / Score
High - 5 or more	0
3-4	1
2	2
1	3
Low - None	4

SHEET SUMMARY				
Average Scores	1	2	3	4
Sort	0.0	0.0	0.0	0.0
Set in Order	0.0	0.0	0.0	0.0
Shine	0.0	0.0	0.0	0.0
Standardize	0.0	0.0	0.0	0.0
Sustain	0.0	0.0	0.0	0.0
Total Average Score	0.0	0.0	0.0	0.0


Area Audited:
Auditor:

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Kaizen 改善

- 日本持續改進之父 **今井正明** (Masaaki Imai)
- 在《改善—日本企業成功的關鍵》一書中提出
- 是指逐漸、連續地改善
- 涉及每一個人、每一環節的連續不斷的改進
- 去除wastes，同時尋找「標準化的工作程序」
- 關鍵因素：
 - 質量
 - 所有雇員的努力、介入
 - 自願改變
 - 溝通引導字：combine、simplify、eliminate

Kaizen 改善策略

- ❑ PDCA + SDCA
- ❑ QCD (Quality, Cost and Delivery)
- ❑ TQM (Total Quality Management)
- ❑ TPM (Total Productive Maintenance)
- ❑ JIT (Just-In-Time)

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Kanban 看板

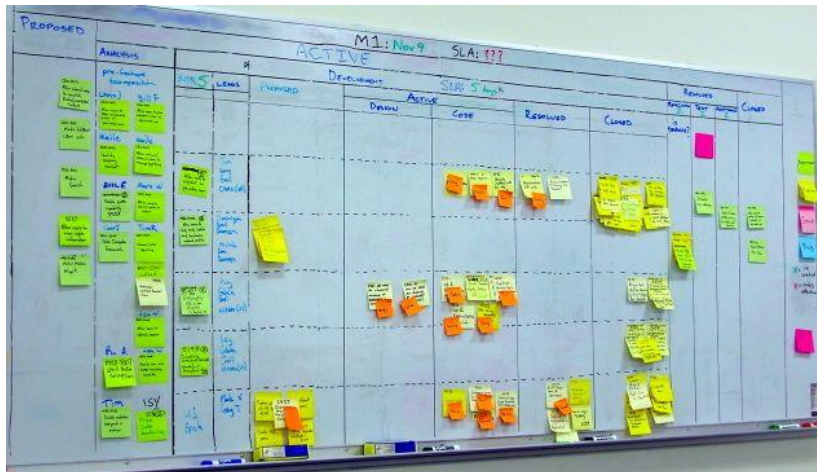
- ❑ Pull Inventory Management
- ❑ 用以對程序進行“visual control”來改善程序管理
- ❑ Kanban cards：告知工人須製造和已製造什麼
- ❑ 工人不可做Kanban cards所述以外之事
- ❑ 是達成just-in-time的一種方法

Your Logo Here		Kanban Replenishment Card			
Part Number	Description				
Part Number	Description				
Order Qty	U/M	Card 1 of	Container		
is Per. Cont of Mes	Card 1 of	Container			
Pull From	Supplier				
Pull From	Supplier				
Pull To:	Consuming Operation				
Shelf Location:	Consuming Operation				
Barcode					

Part Description				Part Number	
Smoke-shifter, left handed.				14613	
Qty	20	Lead Time	1 week	Order Date	9/3
Supplier	Acme Smoke-Shifter, LLC			Due Date	9/10
Planner	John R.	Card 1 of 2			
		Location	Rack 183		

Kanban 看板

- ❑ Toyota在1953年起使用此一邏輯
- ❑ 依實際消耗調整庫存
- ❑ 當物料被使用時會產生送貨的訊號
- ❑ 同時將訊號傳送使供應方及買方均看到
- ❑ 以需求率控制生產率



待辦事項		分析 3		實作 4		測試 2		可佈署
想法	Top 6	進行中	完成	進行中	完成	進行中	完成	
								■
■	■	■	■		■	■		■
■	■	■		■	■			■
■	■			■			■	
■	■							
				■				



雙容器看板：是看板的基本形式。

此特殊「看板貨架系統」將裝載不同物品的盒子整齊排列。

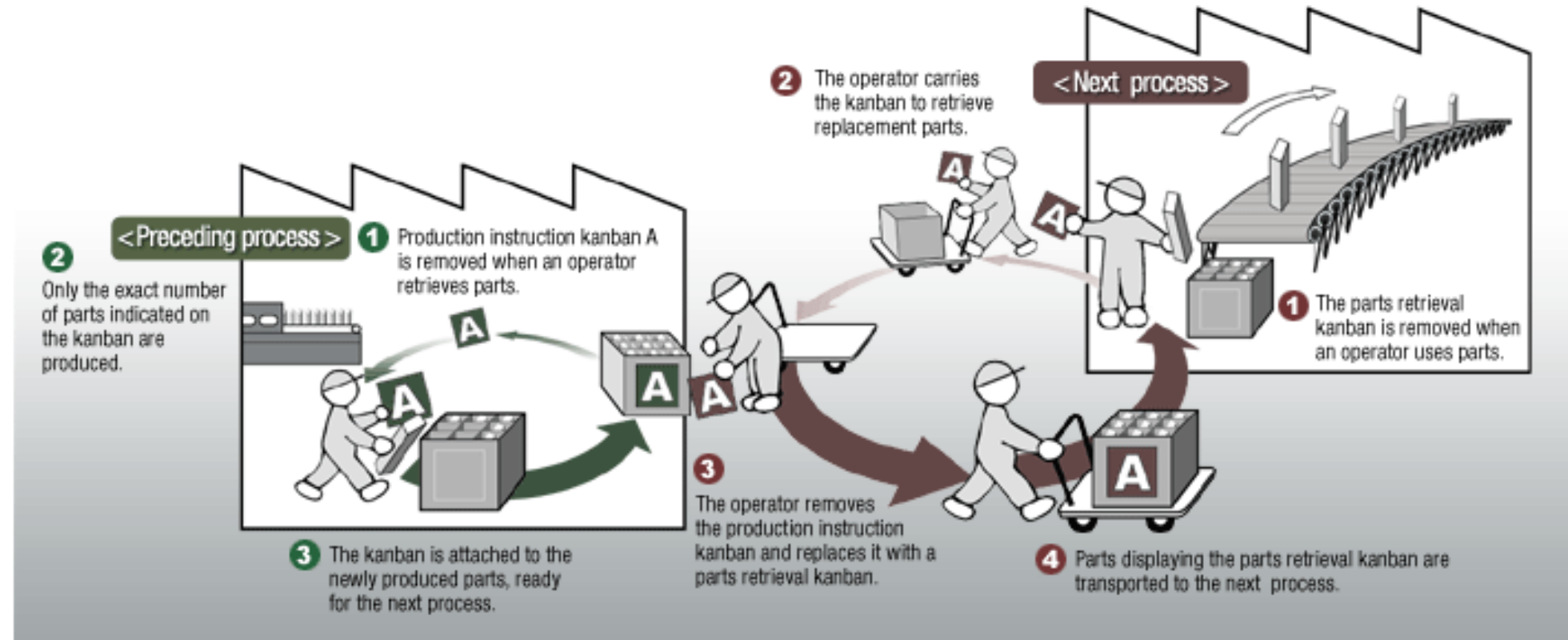
每一物品至少裝載於前後排列的兩個盒子中。

裝配人員在前排的盒子中取用物品，一旦它是空的，採購訂單便自動發出。

在採購期間裝配人員在第二個盒子取用所需要的材料。

Operational Flow of Production Instruction Kanban **A**

Operational Flow of Parts Retrieval Kanban **A**



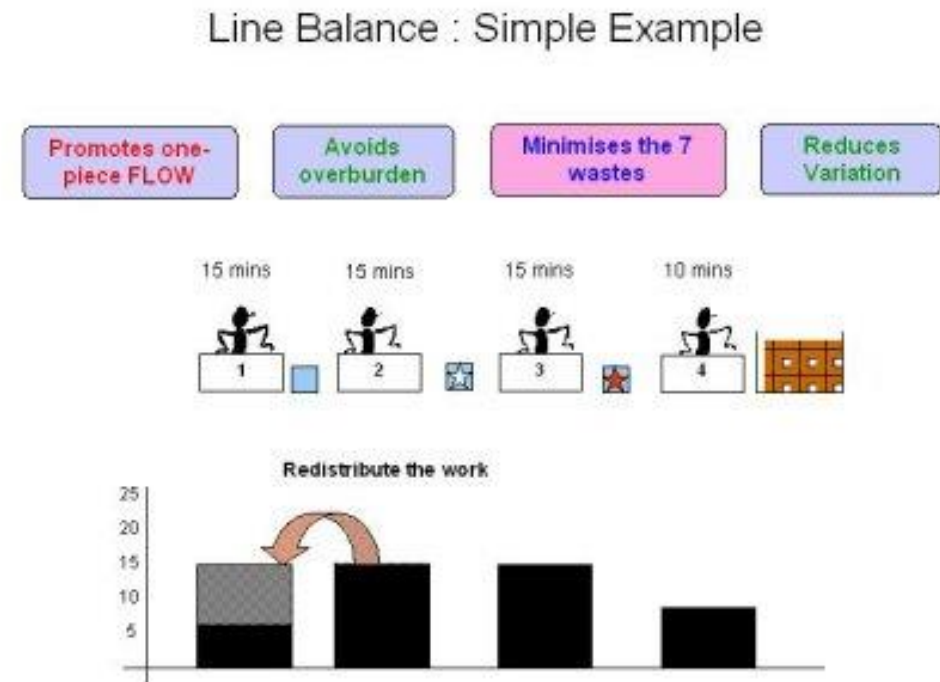
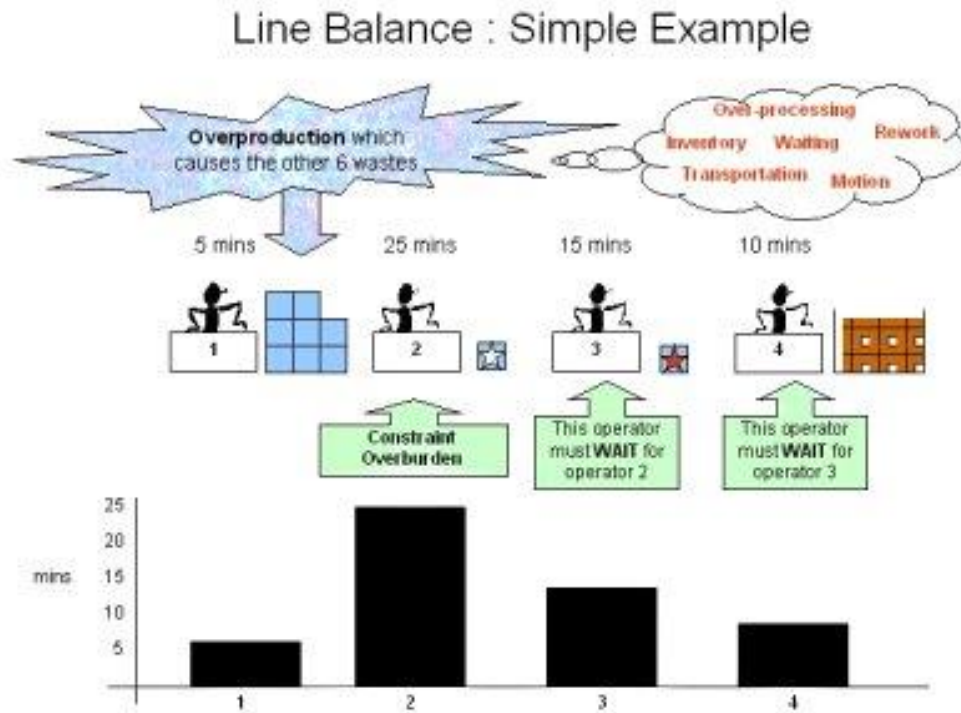
確保零件的生產量和使用量是相當的。

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Line Balancing 線上平衡

- 設法做到生產線上每一個工人「在工作時與其他工人的作業是無縫接軌」而不必相互等待或匆促應付



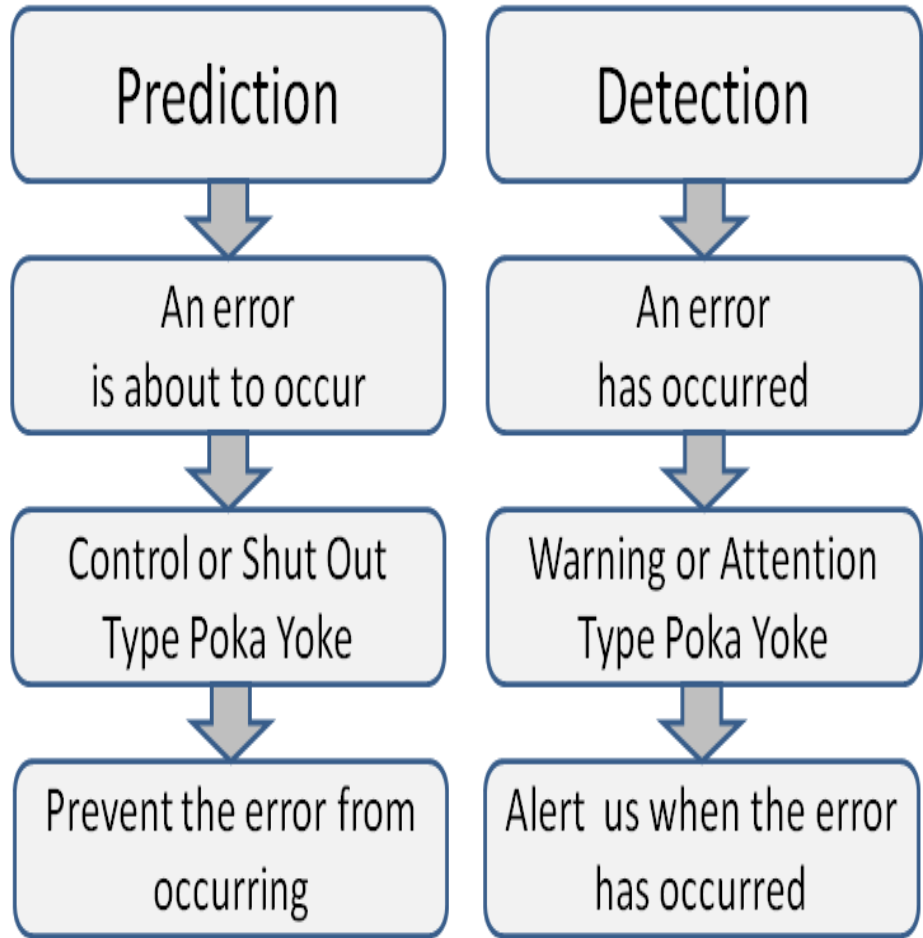
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Poka-yoke 防誤

- 五個原則
 - Elimination 去除
 - Replacement 取代
 - Facilitation 促進
 - Mitigation 緩和
 - Detection 偵測
- 做一些設計：
 - 確保錯誤不會發生
 - 改善工人的工作能力





Poka Yoke有三個方法:

接觸 Contact

以形狀、顏色或其他物理學特質作區別或防堵

如USB插頭、醫用管路

固定值 Fixed Value

以完成行動或活動之預設數值來設限

如自助加油、自動提款

活動步伐 Motion Step

以單一人員完成預訂步驟來設限

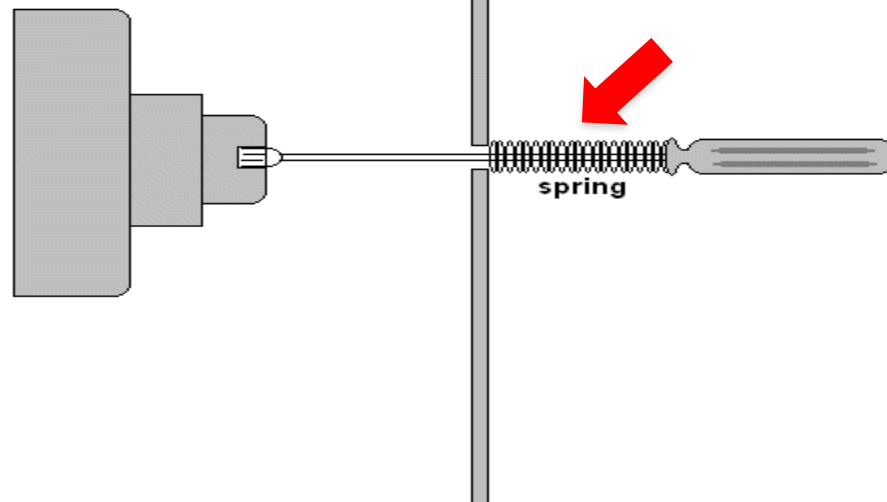
如網路購物、網路投票

- 根除**：將發生錯誤的原因排除，比如：折斷錄音帶上防再錄孔的塑膠片，即可防止再錄音。
- 保險**：共同或依序執行兩個以上的動作完成工作，比如：使用2支鑰匙開保險箱。
- 自動**：運用各種物理學（如：光學、電學、力學）、化學與機械結構學原理自動化執行或不執行，比如：水塔的浮球上昇至一定高度自動切斷給水。實際的應用除了浮力外還有秤重裝置、光線感應、計時器、單向裝置、保險絲、溫度計、壓力計、計數器等等。
- 相符**：利用形狀、數學公式、發音、數量檢測，如連接線接頭及帳號檢查號碼。常見如電腦是普遍卻又複雜的裝置，相關零組件大都有形狀相符的防呆設計，像記憶體模組上的凹洞祇有唯一正確的方向安裝才能相符插入。
- 順序**：將流程編號依序執行，如模型製作的操作說明書以編號表示零件別及組合程序。
- 隔離**：透過區域分隔保護某些區域，避免危險或錯誤，常見如：將藥品置放高處以免兒童誤食；一些重要的按鈕加上保護蓋以避免誤觸。
- 複製**：利用複製來方便核對，例如：統一發票的複寫列印、刷信用卡的拓印及命令複頌核對。
- 標示**：運用線條粗細形狀或顏色區別以方便識別，如用粗線框表示填寫位置，虛線表示剪下位置，紅色表示緊急，綠色表示通行等。
- 警告**：將不正常情形透過顏色、燈光、聲音警告，即時修正錯誤，例如：油表、各種警告燈及聲音。
- 緩和**：利用各種方法減免錯誤發生的傷害，如：緩衝包裝隔層、安全帶、安全帽。

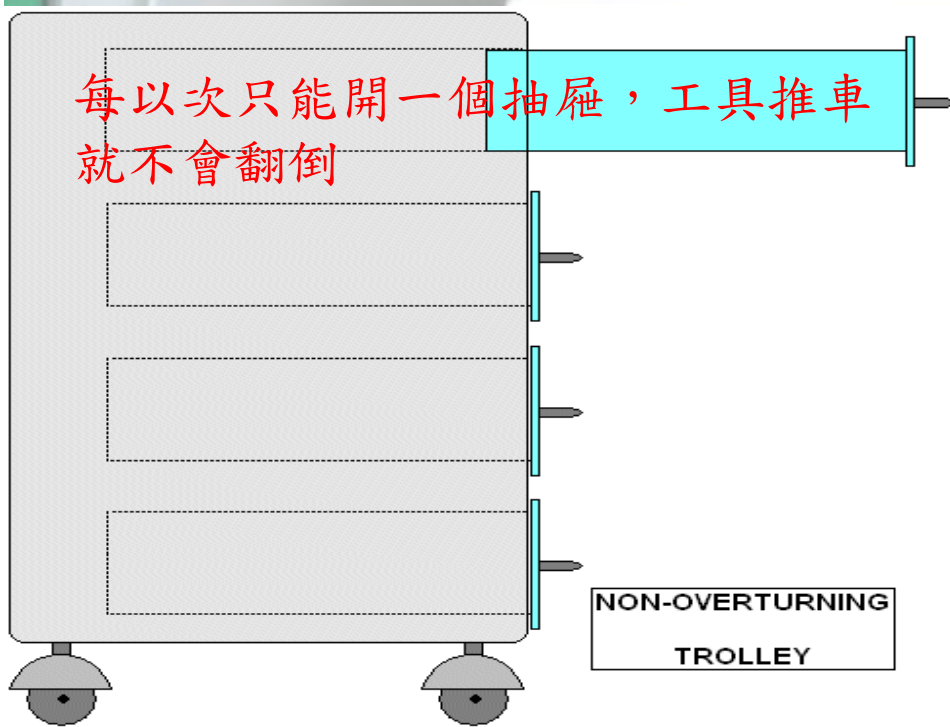
網路接頭：插對才能進入



加個彈簧就可防止忘記拿走螺絲起子



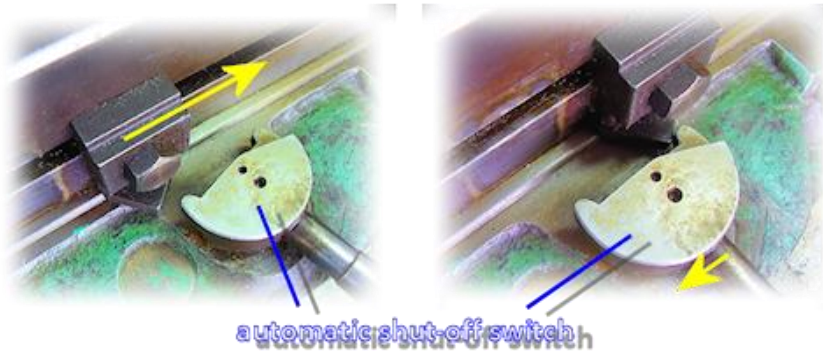
每以次只能開一個抽屜，工具推車
就不會翻倒



兩個接合零件只需在接口有不規則形狀就不會接錯



1. Poka-Yoke devices



An example of a poka-yoke device



Another example of Poka-Yoke: no way to get it wrong

2. Poka-Yoke methods

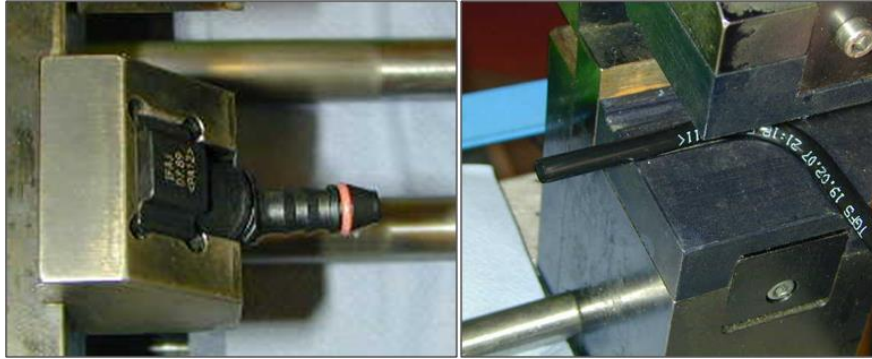


Poka-Yoke example: this simple habit will save your electric bill

結果...常要換手機



Poka-Yoke example: with this habit you will never forget to take your cellphone



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Choose a ID

You shouldn't pick a name that you may later want for your own Social Network. Your ID should be at least 6 characters, letters and numbers only.

Email Address

Password

Confirm Password

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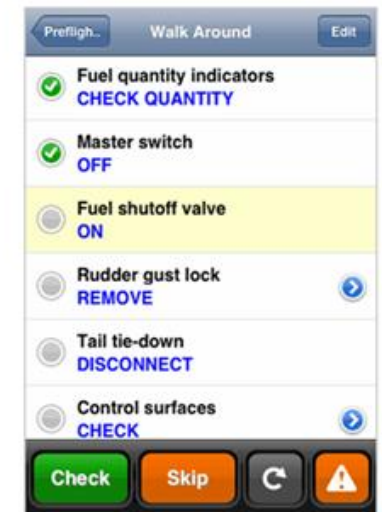
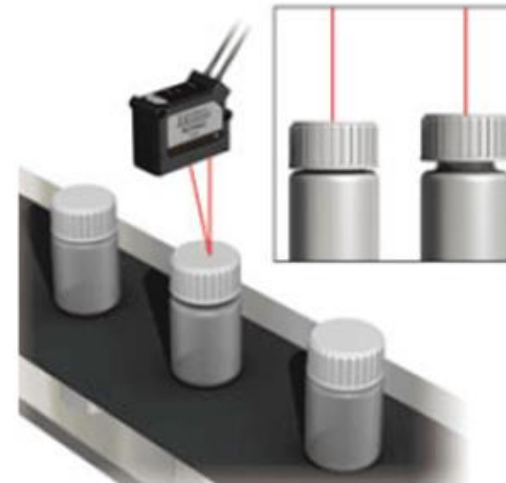
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Poka-yoke：醫院中的例子

- ❑ 禁用縮寫
- ❑ 電腦防誤
- ❑ 辨識 + Time-out

常用的精實工具

- ❑ Andon
- ❑ 5S
- ❑ Kaizen
- ❑ Kanban (pull systems)
- ❑ Line-balancing
- ❑ Poka-yoke
- ❑ Preventive & predictive maintenance
- ❑ Reduce batch sizes
- ❑ Schedule leveling
- ❑ Setup time reduction
- ❑ SMED
- ❑ Standardized work
- ❑ Takt time
- ❑ Value stream mapping
- ❑ Visual Management

Preventive & Predictive Maintenance

- 預防性維修：在例行服務期間對資產的基本需要給予照顧及了解以設備維持在良好狀態，非預期的downtime便不會發生
- 預測性維修：預防因正常使用下發生組件故障所造成傷害的行動，譬如公告例行維護時程，使每個人都知道且準備好在維護期間沒機械或設備可用時之因應

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Reduce Batch Sizes (Single Piece Flow)

- 在生產線上每一批次的產量盡量減少，甚至每批次生產一件產品
- 如此可以：
 - 容許每一件產品在生產線上從某一項操作流至下一項操作過程中沒有延誤、貯存或在產品庫存（work-in-process inventories）
 - 增加存貨周轉及幫助呈現何處可作程序改善
 - 容許快速發現品質議題

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Schedule Leveling 策劃持平

- 建立計畫表使每日產量在符合需求的前題下波動最小
- 可讓機構將顧客的計畫表與生產步調相連接
- 需有顧客的合作

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Setup Time Reduction 縮短準備時間

- 準備時間（setup time）：在前一批最後一件產品生產完成至下一批第一件產品開始生產所需的時間
- 應致力於降低setup time以增加產量

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SMED 快速換模法

- ❑ 快速換模法（single-minute exchange of die），或稱為10分鐘換模法
- ❑ 是日本豐田公司創造的一套應對多批少量、提高生產系統快速反映能力的有用技術
- ❑ 要點在於儘可能把內部作業轉換轉變為外部作業轉換，使換模所花的時間愈少愈好
- ❑ single-minute不意味換模要在一分鐘內完成
- ❑ 單動換模法（one-touch exchange of die，OTED）的概念與此類似，但要求換模時需在100秒內，其技術難度更高

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Standardized Work 工作標準化

- SOPs
- 無論做到第幾次，所做的工都是一樣的

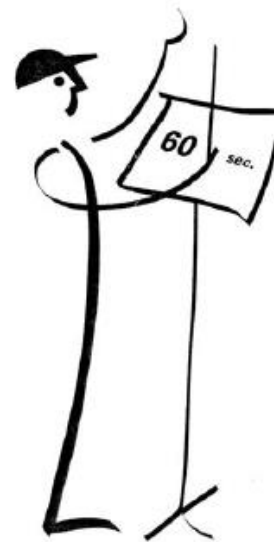
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Takt Time 節拍時間

- 源自德文
- 在符合客戶需求的前題下多久出產一件產品

$$\text{Takt time} = \frac{\text{Available working time per day}}{\text{Customer demand rate per day}}$$



$$\text{TAKT时间} = \frac{\text{每日可用生产时间}}{\text{每日顾客需求量}}$$

举例: $\frac{27,600 \text{ sec.}}{460 \text{ pieces}} = 60 \text{ seconds}$



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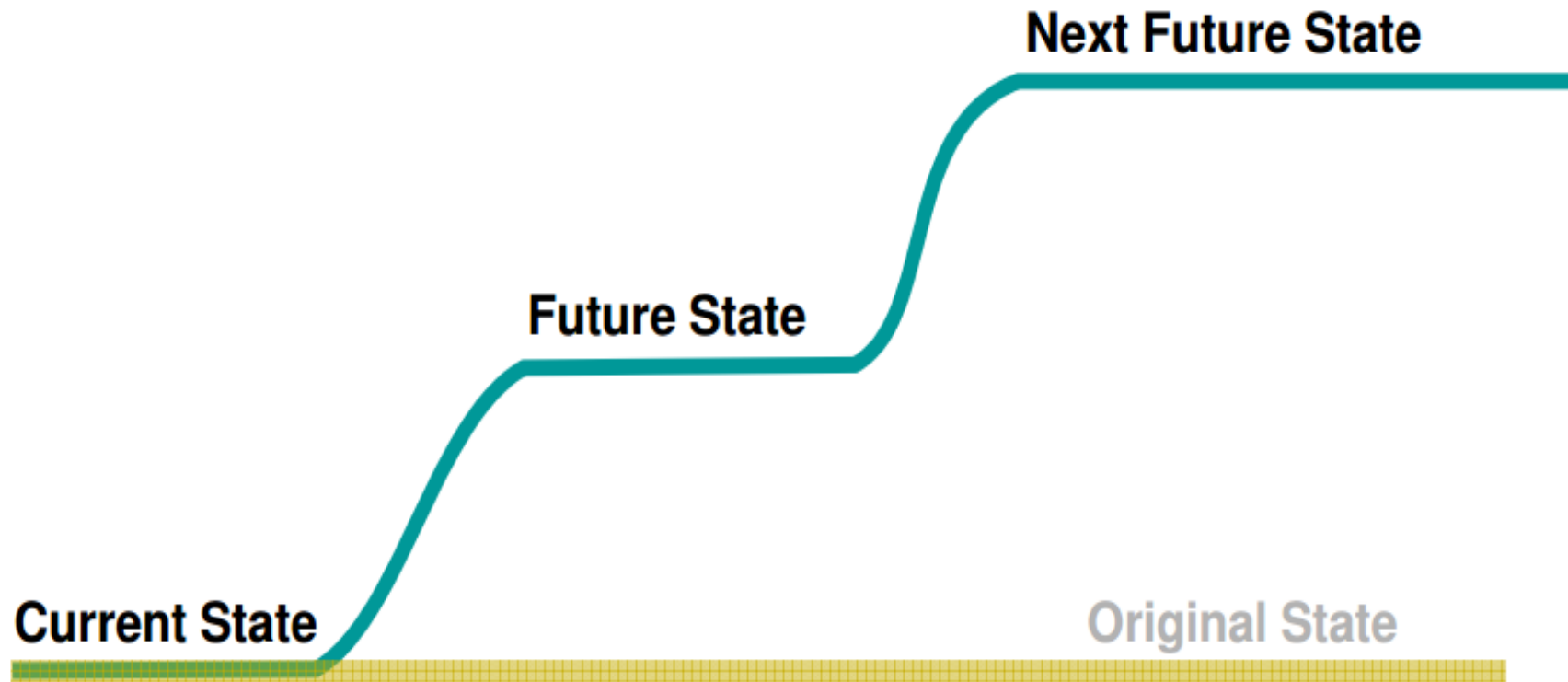
Value Stream Mapping 價值流圖示

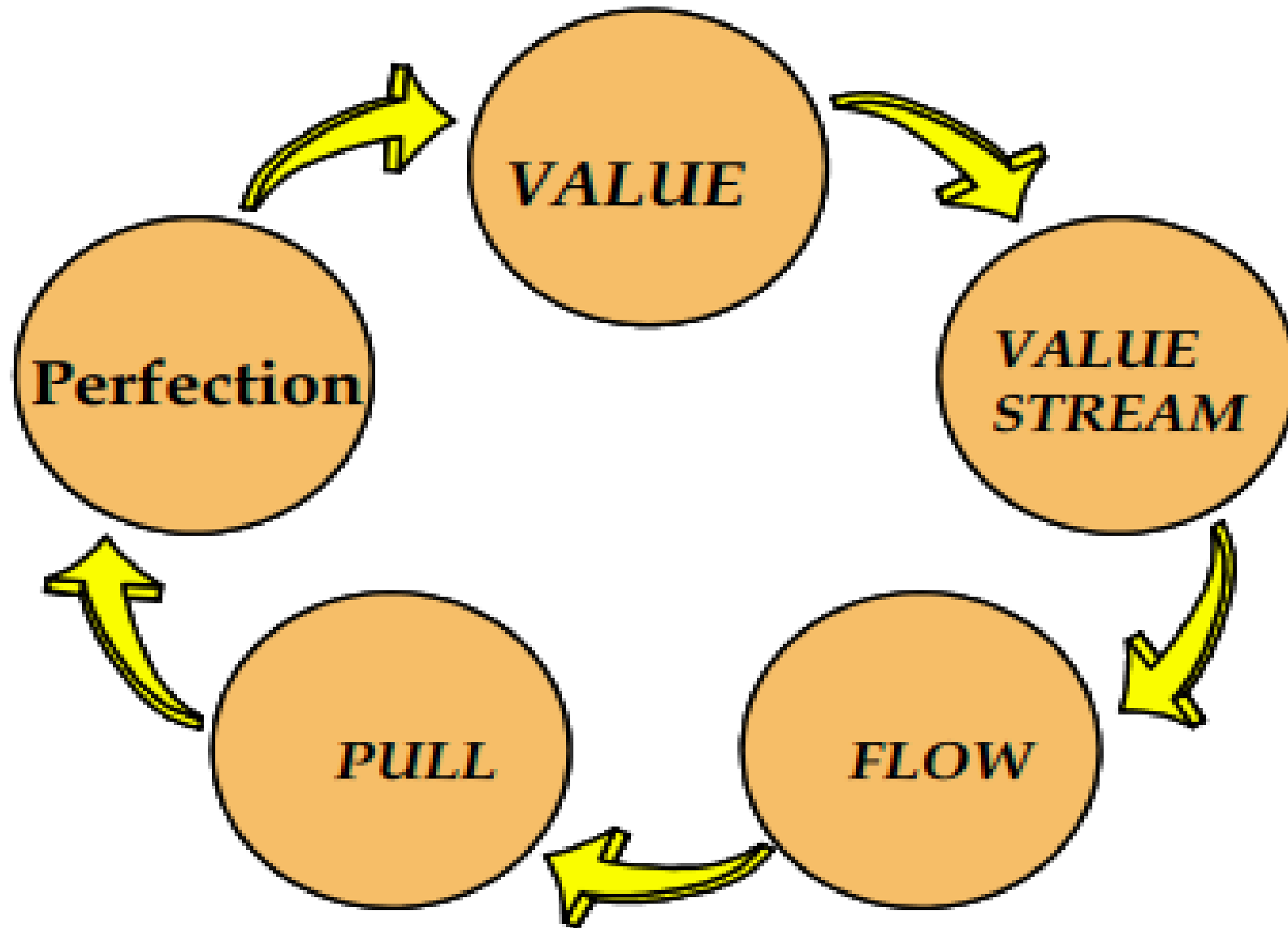
- ❑ 是豐田精實製造（lean manufacturing）生產系統框架下的一種用來描述物流和信息流的形象化工具
- ❑ 目的：辨識和減少生產過程中的浪費
- ❑ 角色：管理人員、工程師、生產製造人員、流程規劃人員、供應商以及顧客發現浪費、尋找浪費根源的起點
- ❑ 浪費＝不能夠為終端產品提供增值的任何活動

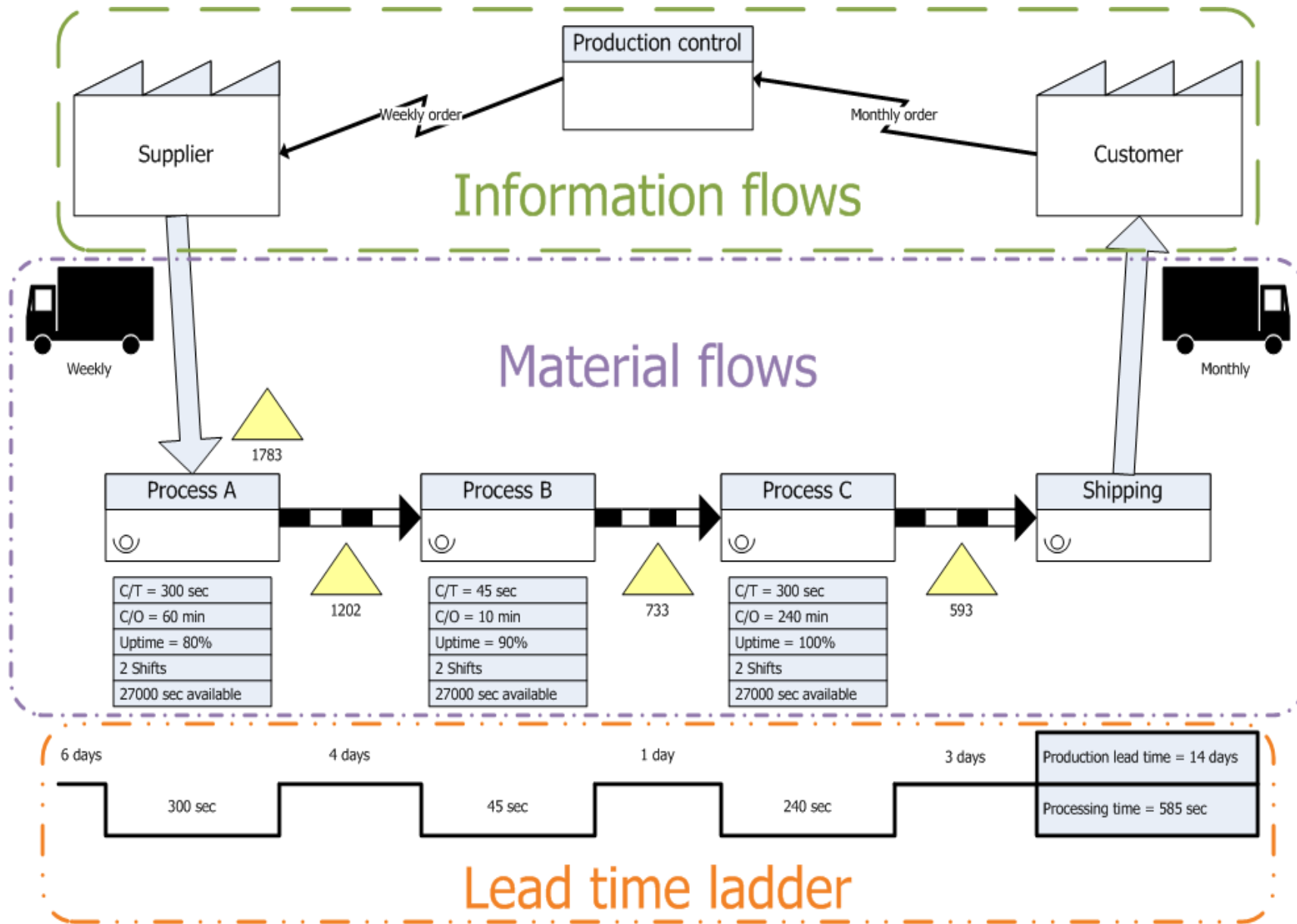
Value Stream Mapping 價值流圖示



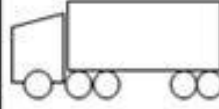
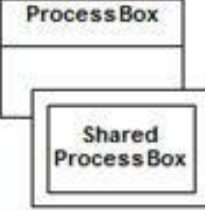


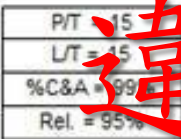


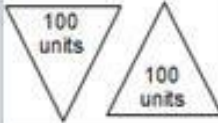


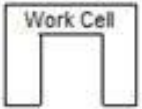



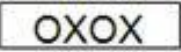
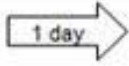


- ❑ 價值流是指自原料生產成可送到客戶手中的產品所需要的行動
- ❑ 價值流包括value / non-value added activities
- ❑ 價值流程序圖意在捕捉人們做工時所發生的活動
- ❑ 價值流程序圖將呈現何處可去除non-value added activities而達成改善

Value Steam Mapping Steps







	A	B	C	D	E	F
1	Symbols	Description	Symbols	Description	Symbols	Description
2		Customer/ Supplier Start or end point for material flow		Kaizen Blitz Area for improvement		External Shipment Shipments to or from suppliers
3		Process Machine, operation or department through which material flows		Supermarket Small inventory for immediate production		FIFO First in, First out lane
4		Data Box		Buffer Safety Stock		Information Queues
5		Inventory		Pull Symbols Replenish stock in supermarket		Internal Movement
6		Work Cell		Kanban Card Replenish stock in supermarket		People, phones, operators, etc.
7		Push Arrow		Load Leveling		
8		NVA Delay		Go and See When there is a problem, go and see what's wrong.		Scheduling

違反Lean之原則

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Visual Management 目視管理

- ❑ 能讓每一個人看著工作或看著工作的場所，一瞥即可見到放錯或做錯的事物
- ❑ 促使每件物件都有它存放的地方而每件物件都放在自己的地方

Lean Tools的運用

- 某人在某場合使用的點子
- 原則不變
 - 清楚且可見
 - 去蕪又存菁
 - 重點為中心
 - 不停地改進
- 請選用或自創合適自己的套餐

Examples of Process Improvement Tools

The A3 Report

To: _____
 By: _____
 Date: _____



THEME: "What are we trying to do?"

Background

- Background of the problem
- Context required for full understanding
- Importance of the problem

Target Condition

- Diagram of proposed new process
- Countermeasures noted as fluffy clouds
- Measurable targets (quantity, time)

Current Condition

- Diagram of current situation (or process).
- Highlight problem(s) with storm bursts.
- What about the system is not IDEAL.
- Extent of the problem(s), i.e., measures.

Implementation Plan

<i>What?</i>	<i>Who?</i>	<i>When?</i>	<i>Where?</i>
Actions to be taken	Responsible person	Times, Dates	
<i>Cost:</i>			

Cause Analysis

- List problem(s)
- Most likely direct (or root) cause:
 - Why?
 - Why? Why?
 - Why? Why?
 - Why? Why?

Follow-Up

<i>Plan</i>	<i>Actual Results</i>
<ul style="list-style-type: none"> • How will you check the effects? • When will you check them? 	<ul style="list-style-type: none"> • In red ink/pencil. • Date check done. • Results, compare to predicted.



The Toyota Way

14 Management Principles
to LEAN Development Process

The Toyota Way

1. 建立未來願景
2. 訂出行動目標
3. 選擇團隊成員
4. 開始團隊運作
5. 選擇試行領域
6. 產品所需活動
7. 團隊技術分析
8. 生產線/單位願景
9. 運作所需活動
10. 制定標準工作
11. 提高生產線彈性
12. 設計和審核生產線佈局
13. 測試行動表現
14. 開發業務案例

My Way

1. 今天開始
2. 持續思考
3. 用心履行
4. 逐步發展

履行精實

- 由上而下
- 全盤規劃
- 配套備齊
- 溝通宣導
- 教育訓練
- 持續監測
- 不斷改進
- 文化形成
- 成就永續

My Way

1. 認知
2. 應用
3. 反思
4. 改善

精實陷阱

- 人云亦云
- 沒有系統
- 自亂陣腳
- 化簡為繁
- 欠缺溝通
- 未遵原則

結語

- 機構管理的ABC
- 生涯發展的ABC