

CSQ 常務理事  
陳文魁 教授

## 數位品質4.0論壇 – QIF簡介

指導：經濟部標準檢驗局

主辦  
單位

中華民國品質學會

中華民國計量工程學會

中華多元智慧人才發展學會

山衛科技公司

# 陳文魁 簡歷

## Education:

Ph.D.: Operations Research, CWRU, May 1988  
Master: Operations Research, CWRU, May 1985  
Master: IE, ChengKung University, May 1977  
Bachelor: Mathematics, ChengKung University, May 1974

凱斯西儲  
成功大學

## Active Roles:

Director of Weko Industrial Co.,  
Director of Chinese Society for Quality, 1995 ~ Now  
Director of Foundation of Philips Taiwan, 1997 ~ Now  
Consultant for Kaohsiung City toward Service Quality Award

獨立董事  
飛利浦品質基金會

## Special Exploits:

1997 Philips IC: Consultancy for QS-9000 Certification  
1996 KYMCO Motors: Consultancy for QS-9000 Certification  
1996 Philips IC: Consultancy for Japan Prize Consultancy  
1996 KYMCO Motors: Consultancy for National Quality Award  
1991 Philips IC: Consultancy for Deming Prize

戴明獎大賞  
國家品質獎

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## Experience:

1. CSQ: Black Belt and Green Belt Trainer, 2009 - Present
2. Microsoft: Green Belt Trainer, 2017~2018
3. SRAM: Consultant and Green Belt Trainer, 2016~
4. APAQ: Black Belt and Green Belt Trainer, 2016~
5. Chroma ATE: MSA Consultant, 2011 June ~ 2012 June
6. Dell Taipei: Full training for Certified Quality Engineer, February ~ May
7. Kaohsiung City Government: TQM Consultant, 2009~2010
8. ASE Multilayer: TQM Consultant, 2010 November ~ 2011 March
9. Chinese Ship Building Corp.: TQM Consultant, 2003 ~ 2010
10. Philips Taiwan: SQC Consultant, 1985 January ~ 2006 December

## Journal articles

1. Wen-Kuei Chen, "Is the IsoPlot an Ellipse?", Journal of Engineering, vol. 26, no. 3, pp. 350-358, 2014.06
2. Chen, WK, "Nurses' Mechanism of Organizational Citizenship by Dual Rating Approach.", Special issues of JOQ, 2014.

量測行為  
建模

互評認知  
建模



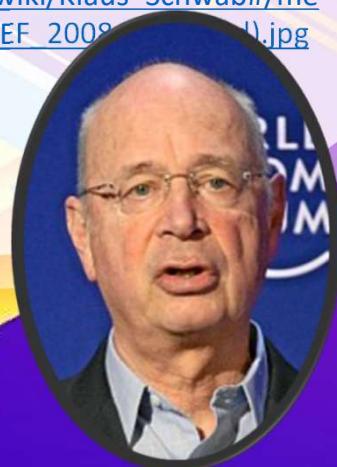
# 什麼是 工業4.0? 2011

- The Fourth Industrial Revolution or Industry 4.0, is the current transformation of traditional manufacturing and industrial practices with the latest smart technology. It primarily focuses on the use of large-scale machine-to-machine communication (**M2M**) and Internet of Things (**IoT**) deployment to provide increased automation, communication and self-monitoring of smart machines that can analyze and diagnose issues without the need for human intervention.

[https://en.wikipedia.org/wiki/Klaus\\_Schwab#/media/File:Klaus\\_Schwab\\_WEF\\_2008\\_\(cropped\).jpg](https://en.wikipedia.org/wiki/Klaus_Schwab#/media/File:Klaus_Schwab_WEF_2008_(cropped).jpg)

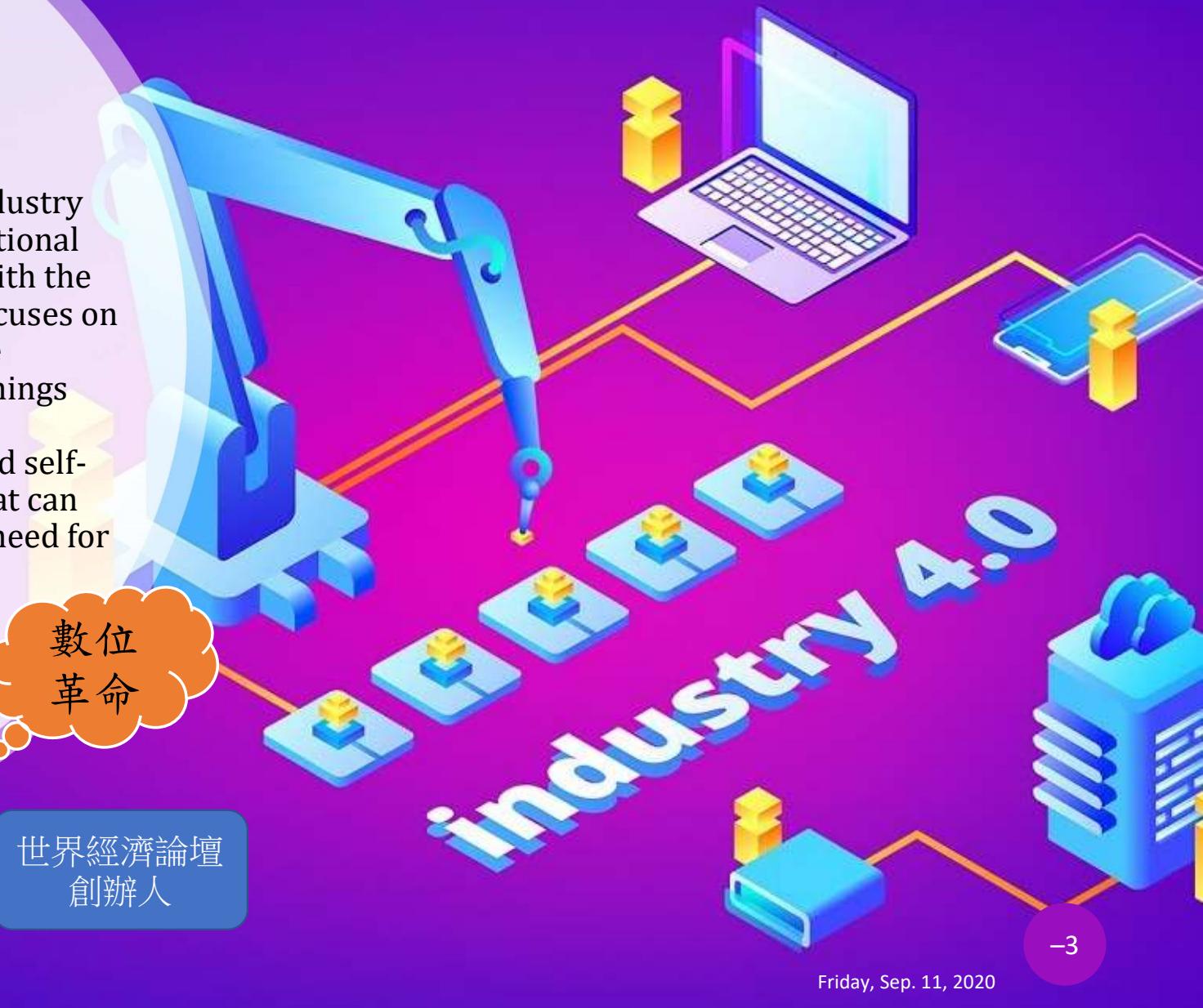
Founder and executive chairman of the World Economic Forum

Klaus Schwab  
30 March 1938



世界經濟論壇  
創辦人

數位  
革命



# SI Units 國際單位

國際  
公制

## SI base unit

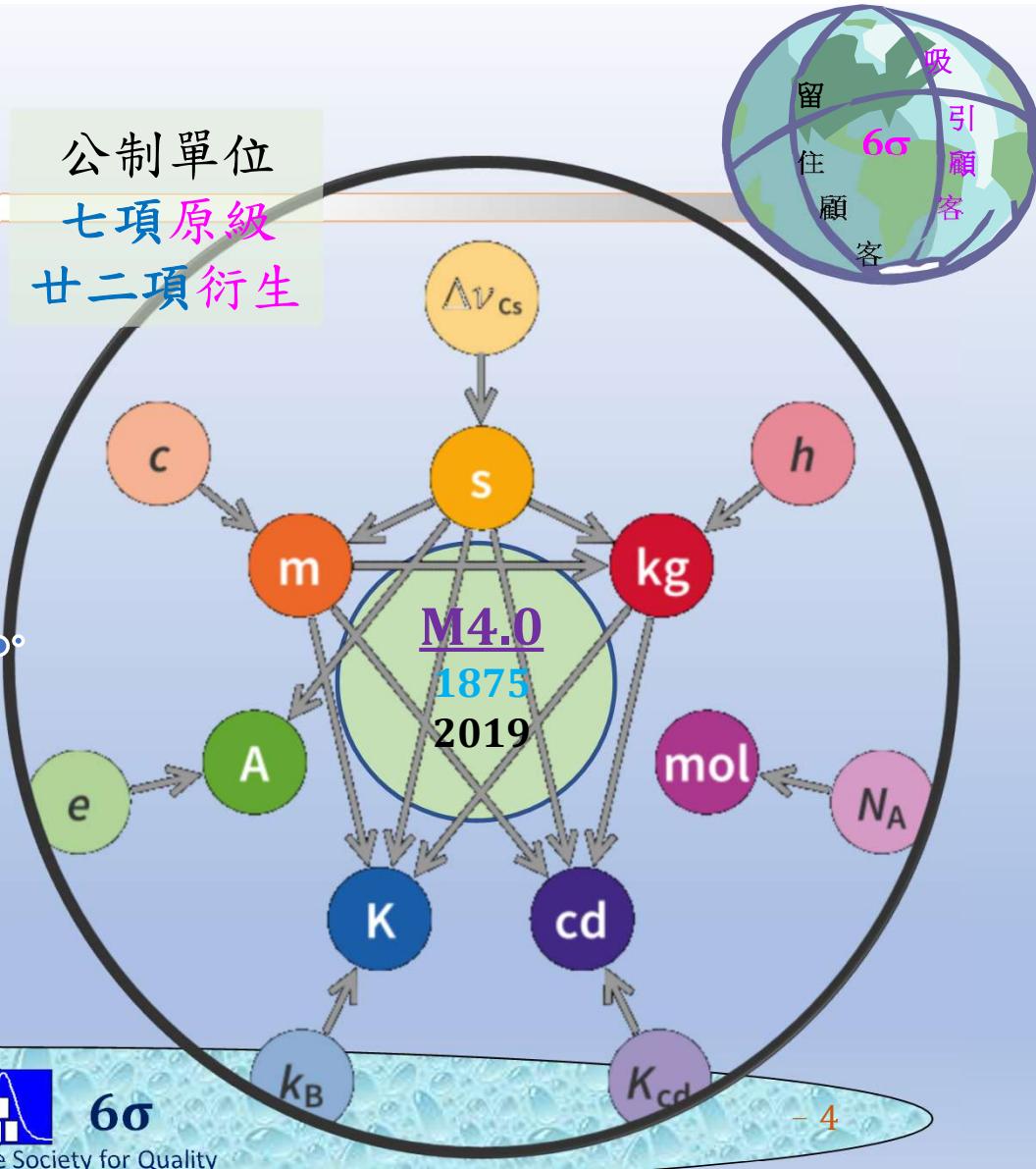
自 2019 年起，物理常數完全取代原件，定義七項原級單位及廿二項衍生單位。

- $s$  – second time
- $m$  – meter length
- $kg$  – kilogram mass
- $A$  – ampere electric current
- $K$  – kelvin thermodynamic temperature
- $mol$  – mole amount of substance
- $cd$  – candela luminous intensity

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計量 4.0  
超前佈署

公制單位  
七項原級  
廿二項衍生



6σ



6σ

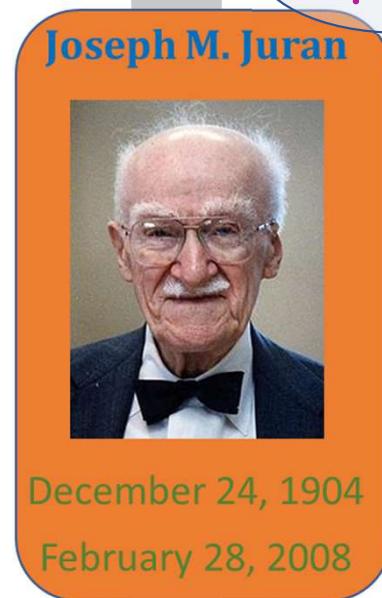
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1

# 品質 4.0 會是什麼？

- The core concept of Quality 4.0 is about aligning the practice of quality management with the emerging capabilities of Industry 4.0; to help drive organizations toward **operational excellence**.

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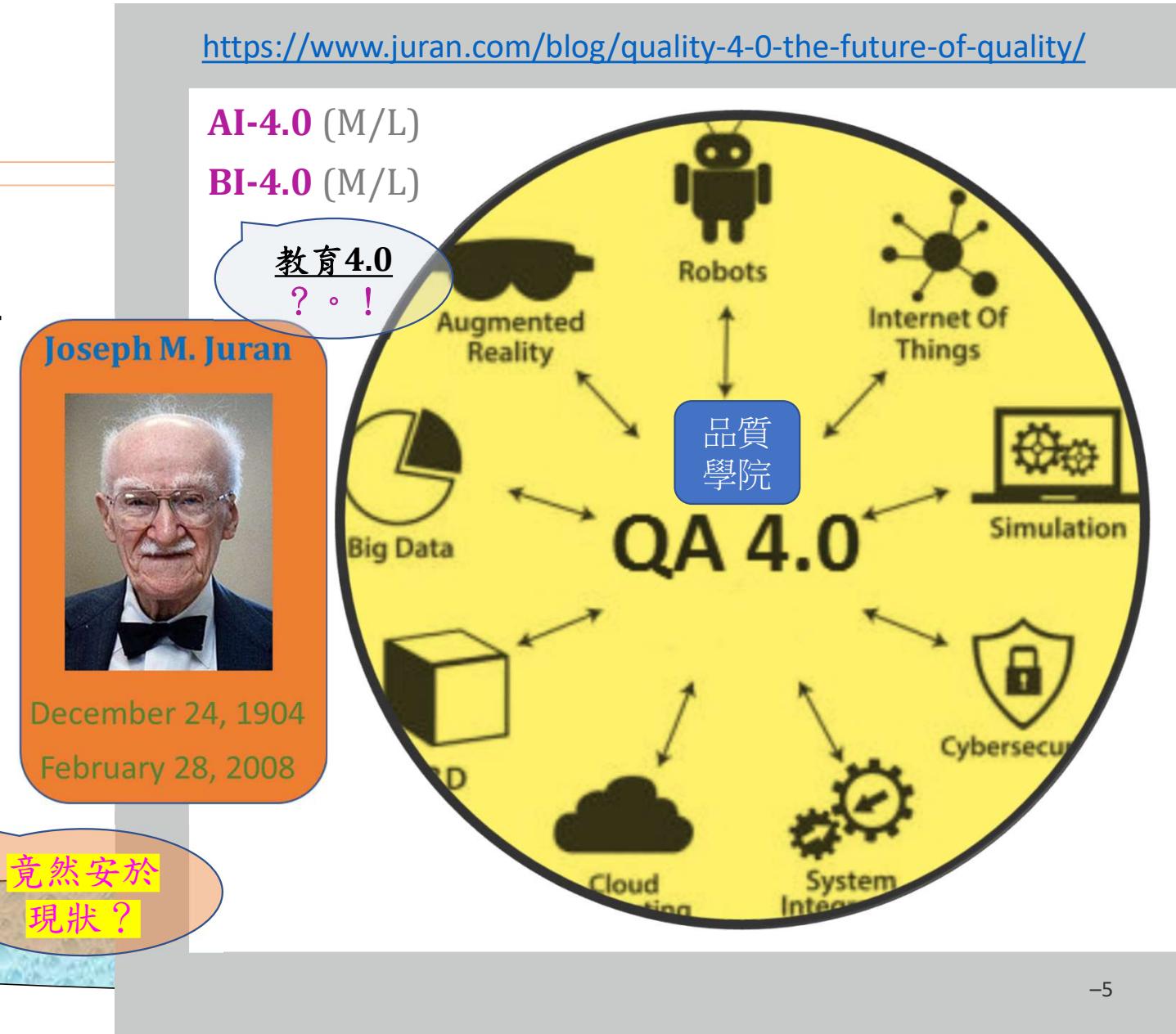


<https://www.juran.com/blog/quality-4-0-the-future-of-quality/>

AI-4.0 (M/L)

BI-4.0 (M/L)

教育 4.0  
? 。 !



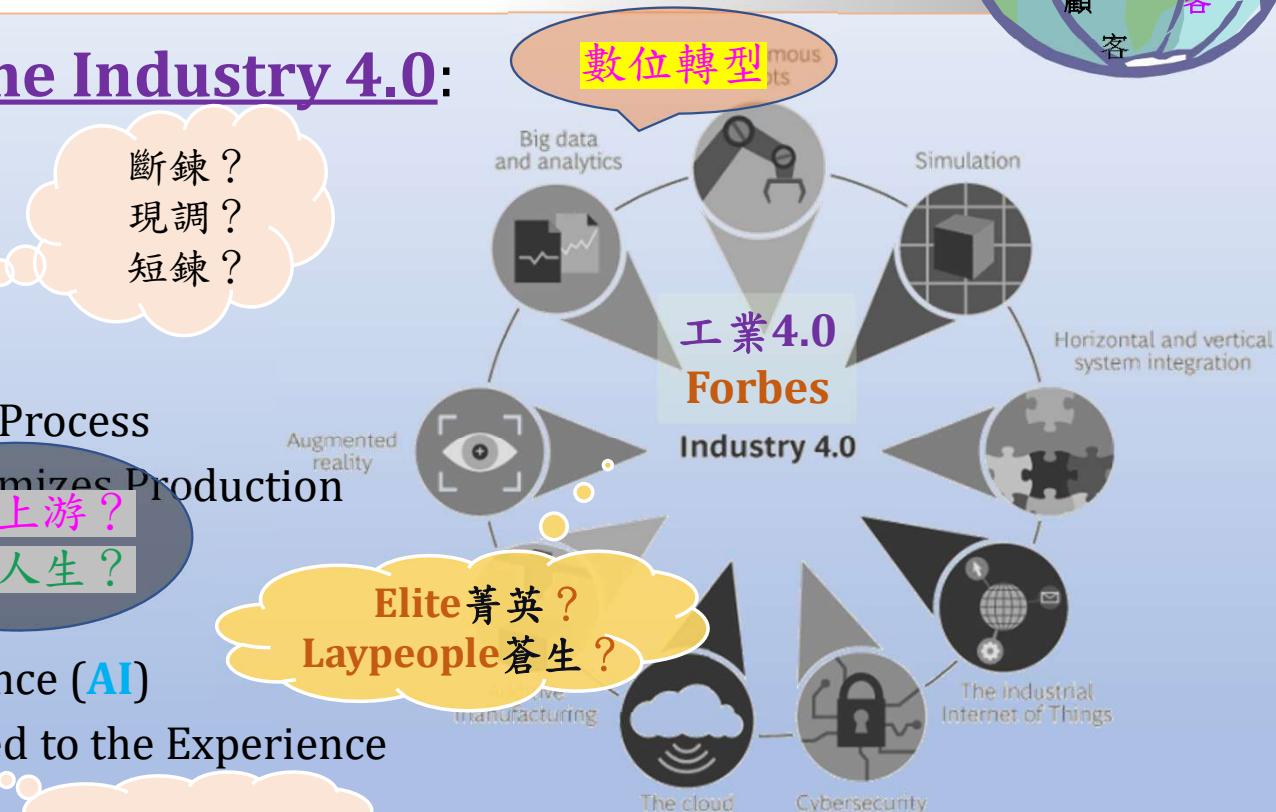
# 1.1 數位轉型十大趨勢



## 10 Trends to transform The Industry 4.0:

- 1) Lowering Energy Use
- 2) The Internet of Things (IoT)
- 3) New Developments in **3D Printing**
- 4) Increased Efficiency With **5G**
- 5) Tools to Connect **Employees** to the Process
- 6) More Use of **Cloud** Technology Optimizes Production  

- 7) Transformation in Product Design
- 8) Technology Maintenance
- 9) Improvements in Artificial Intelligence (AI)
- 10) Consumers Will Be More Connected to the Experience
- 11) **Virus Enabler**  

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## 1.1.1 製造七項演化

### Seven Trends Influencing Manufacturing

1. Factory Automation
2. Virtual, Augmented, And Mixed Reality
3. Digital Twin Technologies
4. Increasing Convergence Of IT And OT
5. Further Move Towards Digitalization
6. Increasing Use Of Cobots
7. Small Batch And Mixed Manufacturing

IT 吞噬  
工作機會？

何處是就  
業新市場？



教育4.0  
發展經濟  
？。！

客制式量產？

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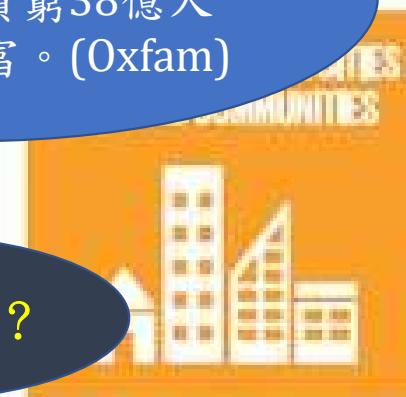
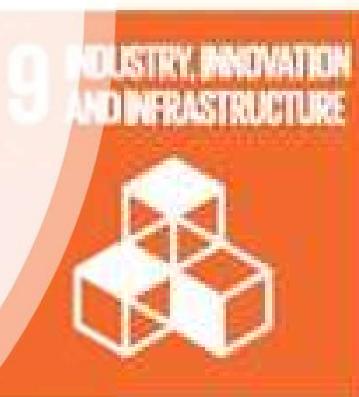


# 1.2 SDGs: 2030

宗旨：「實現全人類可長可久福祉藍圖」

大同世界2030年17項目標

- 無貧窮
- 零飢餓
- 身體健康
- 素質教育
- 性別平等
- 淨水與衛生
- 潔廉能源
- **尊嚴工作**與經濟成長
- 工業、創新和基建
- 降低不平等
- 永續城市與社區
- 擔當消費和生產
- 氣候行動
- 水下生活
- 地表生活
- 和平、正義與強壯機構
- 大同目標伙伴



全球26個最富人財富總和  
超過世界上最貧窮38億人  
擁有的全部財富。(Oxfam)

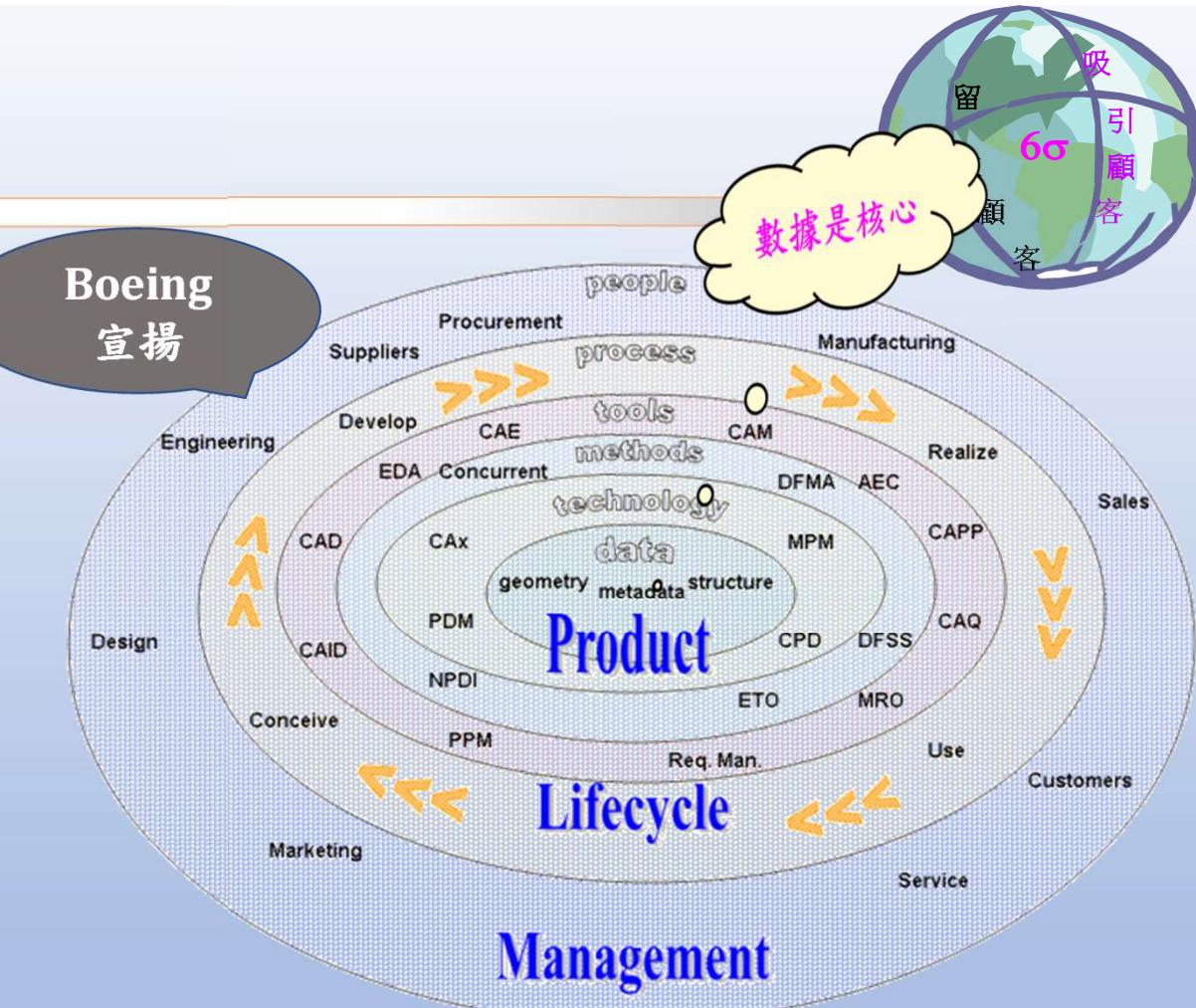
我國如何呢？

# 1.3 產品壽命管理

## PLM Product Lifecycle Management



Managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal .

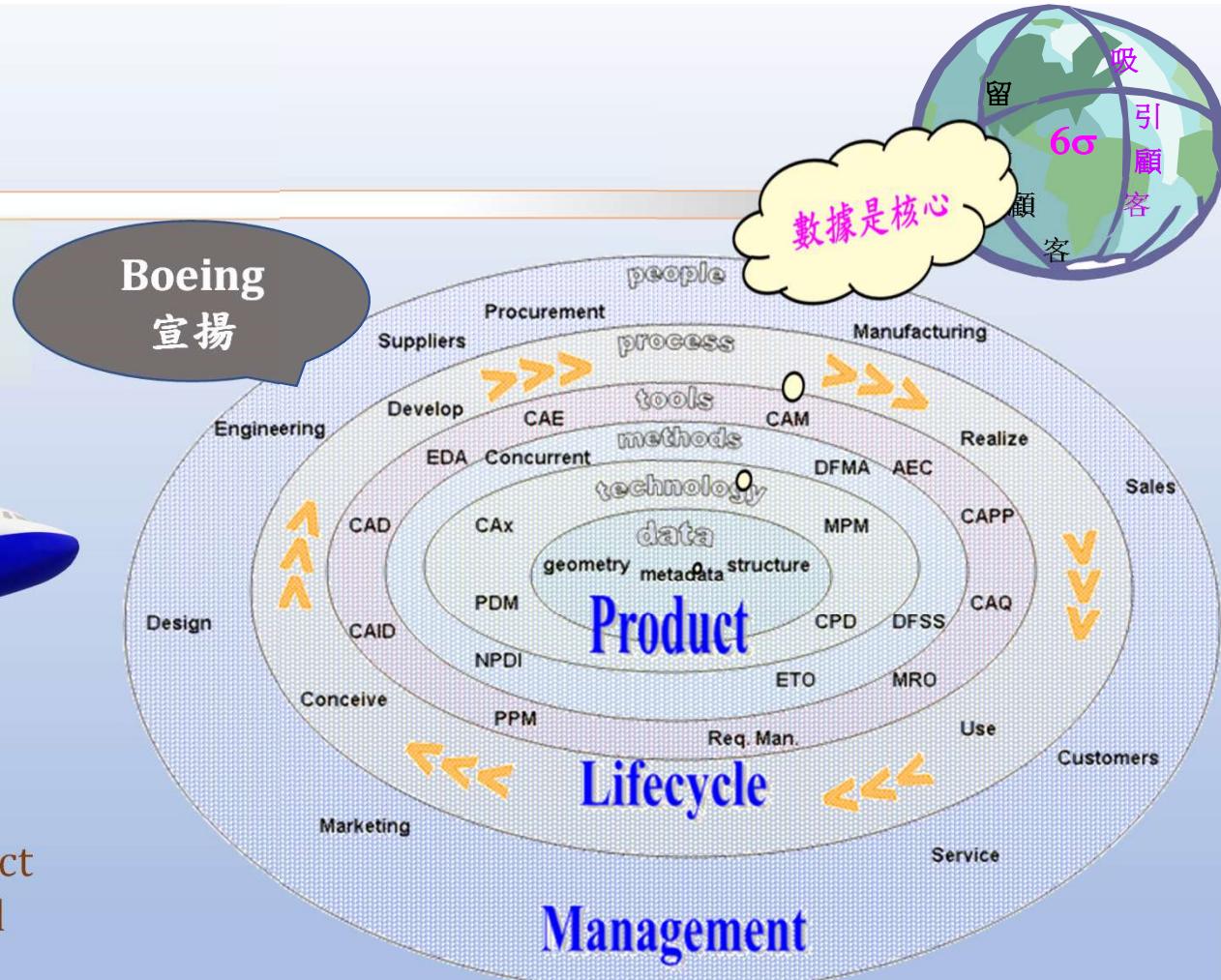


# 1.3 產品壽命管理

## PLM Product Lifecycle Management



Managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal .



# 1.4 數據追溯



產品品質數據流向

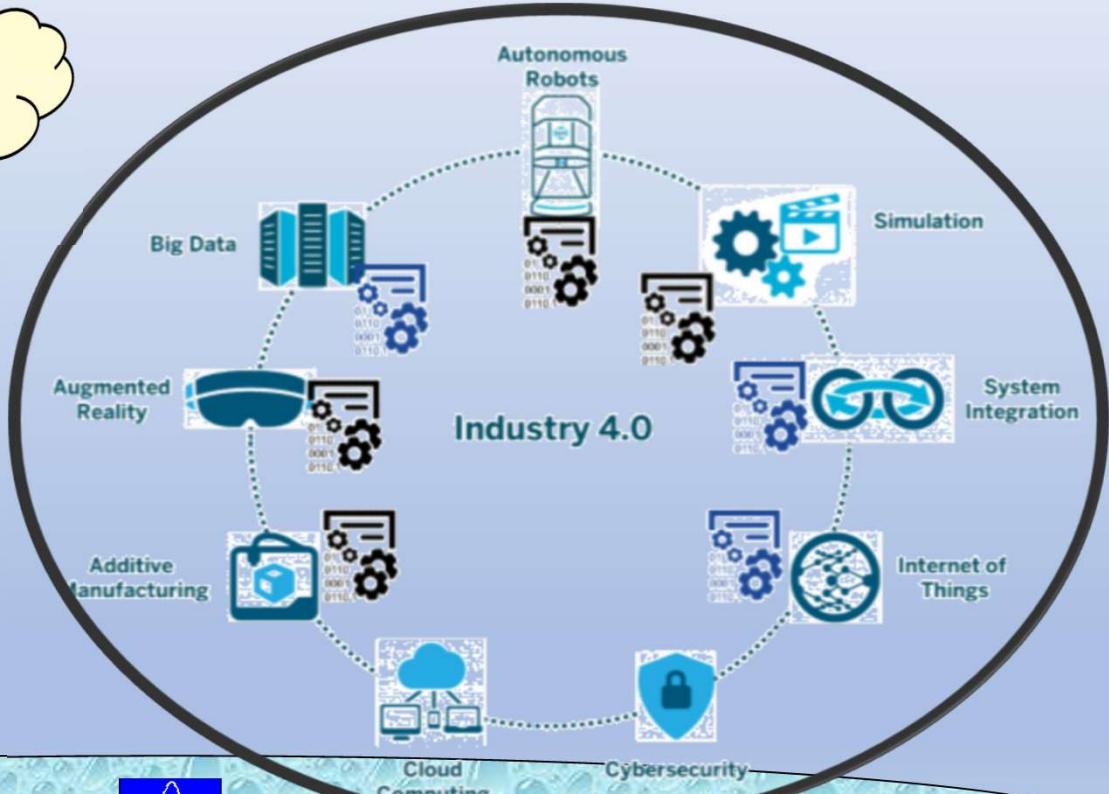
PLM is heavily reliant on  
**DATA**



Requirements of that **DATA**  
are that the **DATA** is:

- ✓ Semantic 人讀
- ✓ Machine readable 機讀
- ✓ Standard 標準
- ✓ Interoperable 互通

**PLM Requires Data Traceability**



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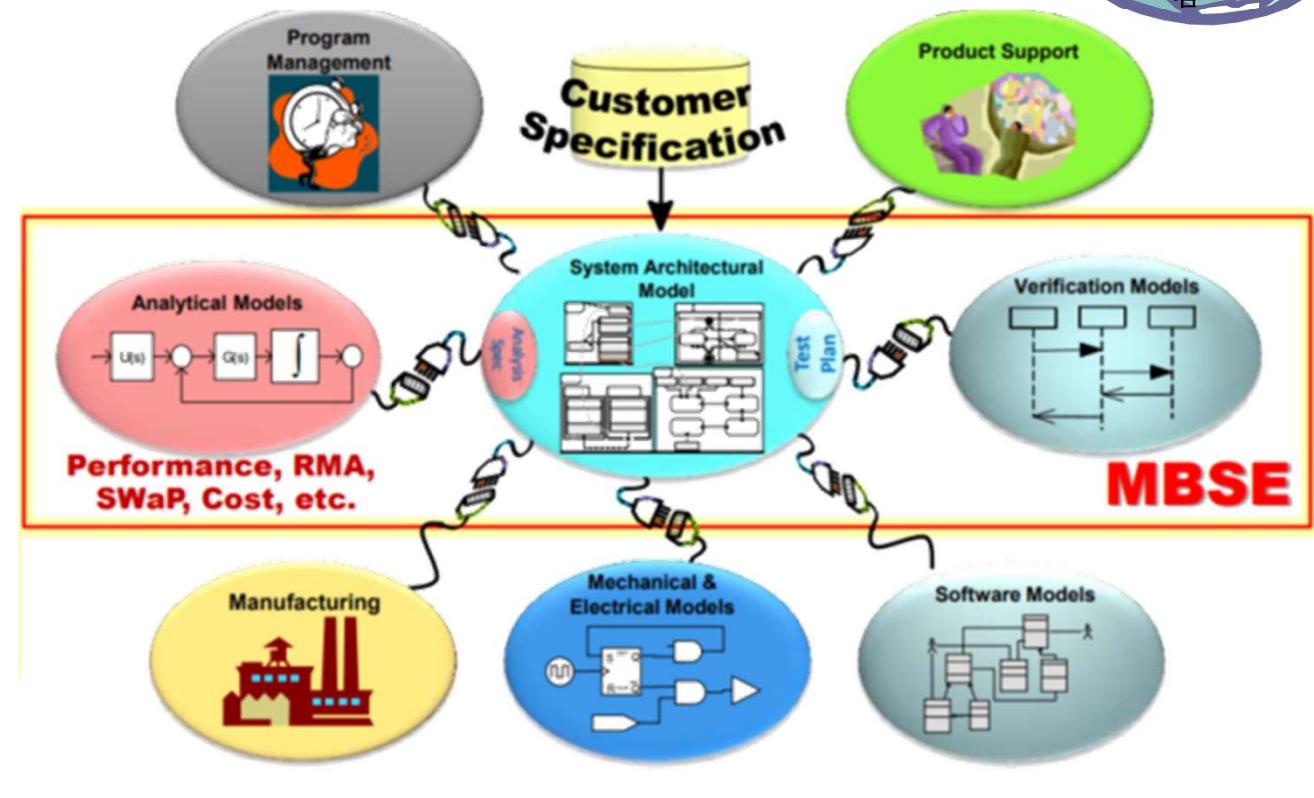
## ② MBD 必要嗎？



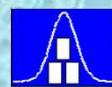
Tuesday, Sep. 11, 2020

### 模型根基定義

**MBD - Model Based Definition**



6σ



6σ

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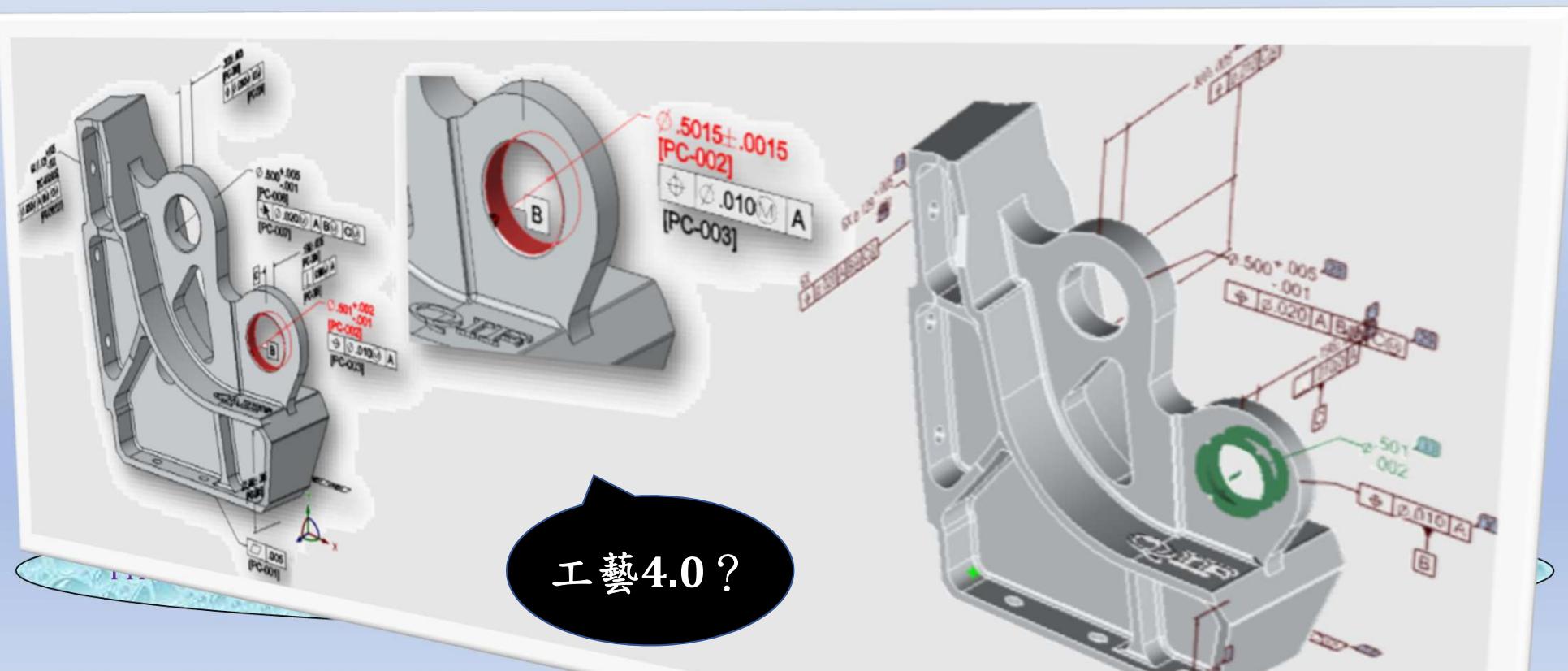
## 2.1 CAD 與 QIF



單份文件夾搞  
定產品一生？

QPID:8b40b2a0-30164d5c-b1ef-bb6f223c88b4

竟然  
不再只是夢想！



## 2.2 品質數據全向

品質數據能夠無縫流動嗎？

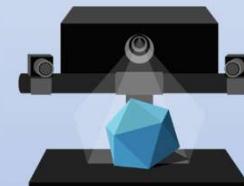
製造程序與智能自働



設計



製造

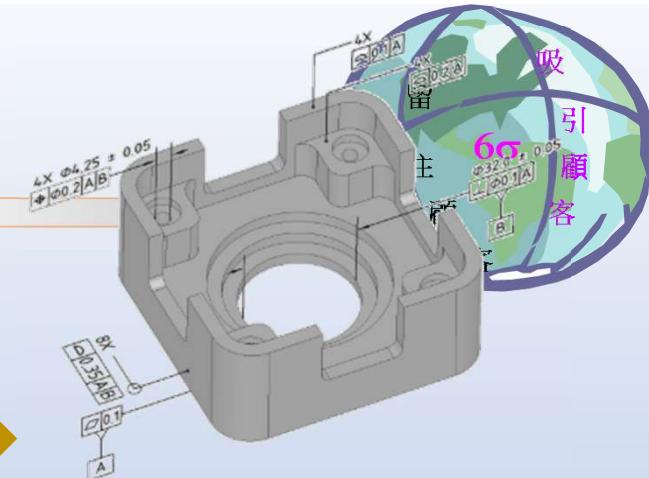


檢驗

解析用途數據

何需多言

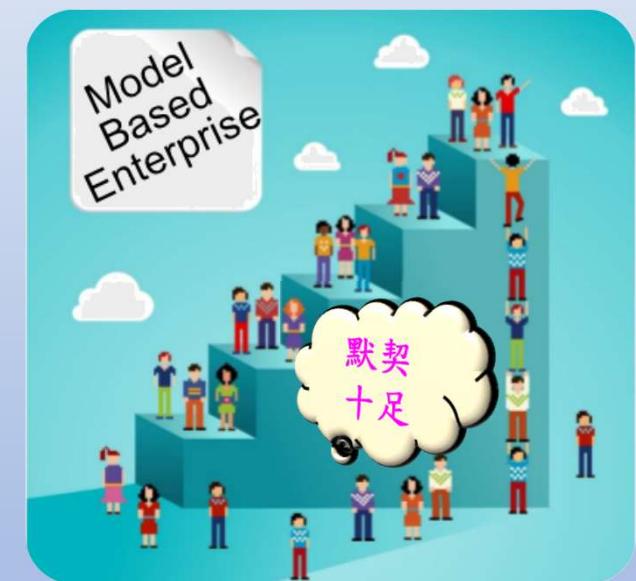
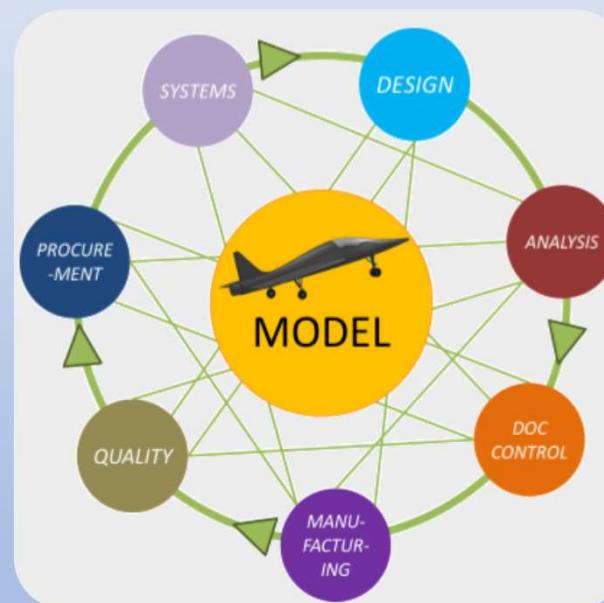
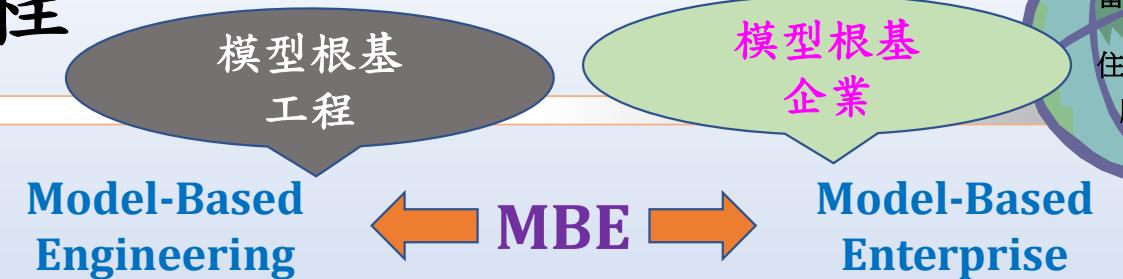
只怕  
數據黑鍊？



## 2.3 模型根基工程

### Model-Based Engineering

Model-Based Engineering is the formalized application of modeling to support system requirements, design, analysis, verification and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases.



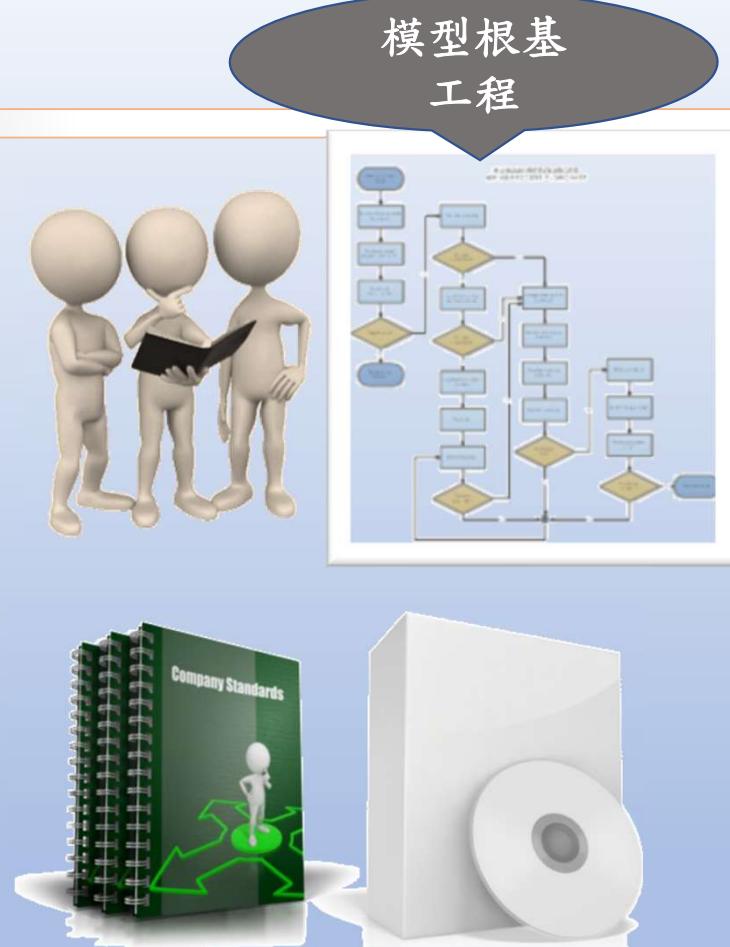
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# MBE

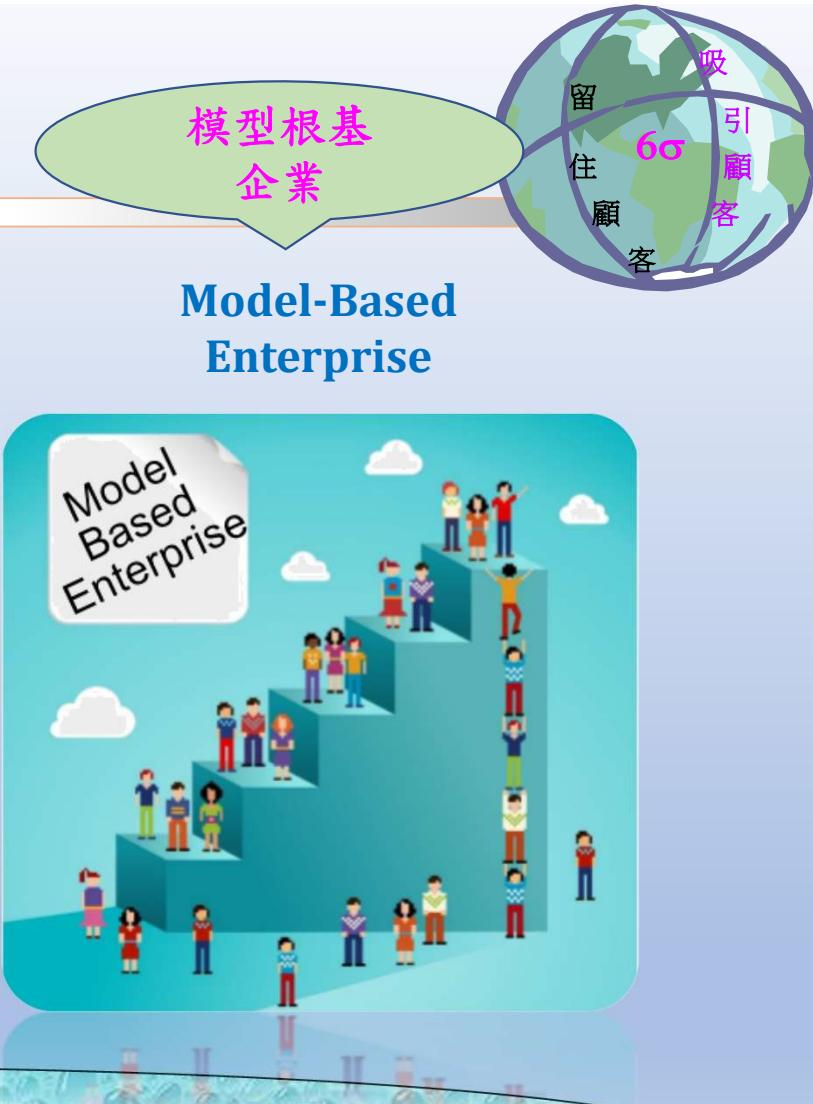
勝出關鍵

人才、  
工藝、  
標準、  
工具。

標準  
QIF-4.0



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## 2.4 特徵根基CAD

### Feature-based CAD

簡化CAD眾模型

- 作成邊界模型代圖
- 就代圖產生特徵根基模型
- 遞迴迭代分解模型之體積
- 簡化版套用至特徵根基模型

Feature-based simplification of boundary representation models using sequential iterative volume decomposition

Computers & Graphics  
Volume 38, February 2014, Pages 97-107



# 2.5 MBD

## Model-Based Definition

高效能方式界定產品  
3D標註模型及其關聯  
資料諸元，不需工程  
圖表。

引用

ASME Y14.4\*

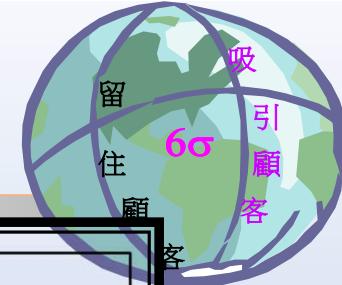
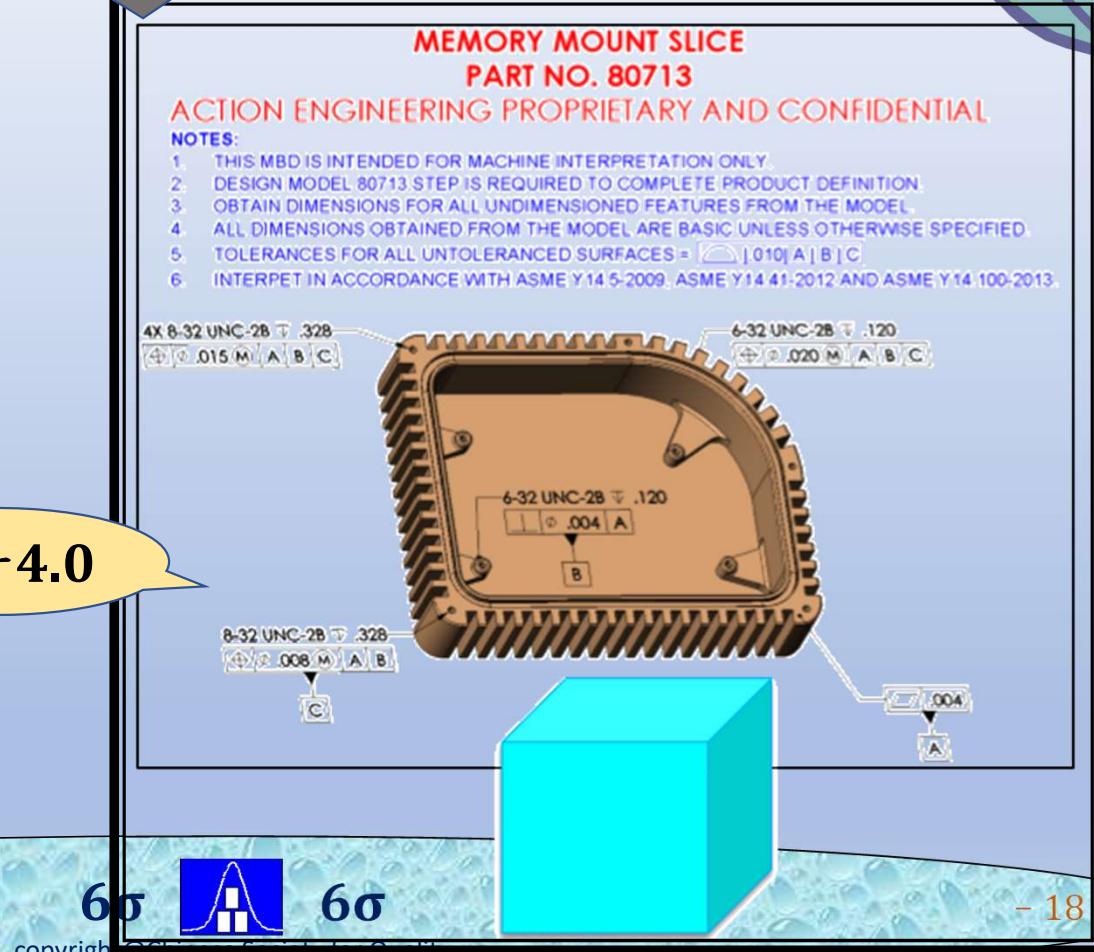
Committee (Nov 2016)

\* Under Development

模型根基  
定義

設計4.0

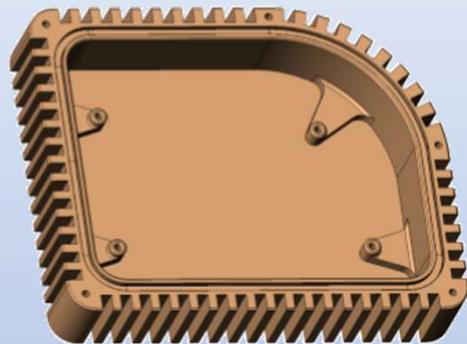
Friday, Sep. 11, 2020



## 2.6 資料大集合



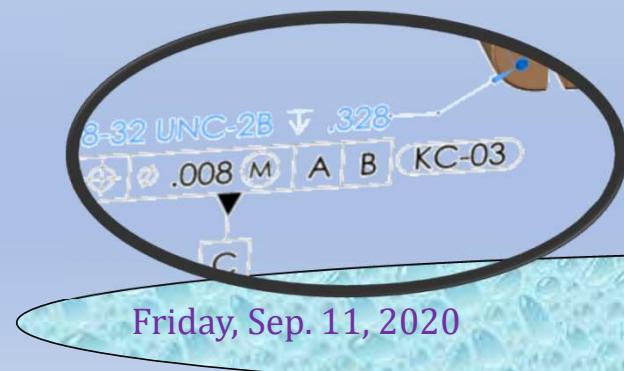
### 幾何 (Geometry)



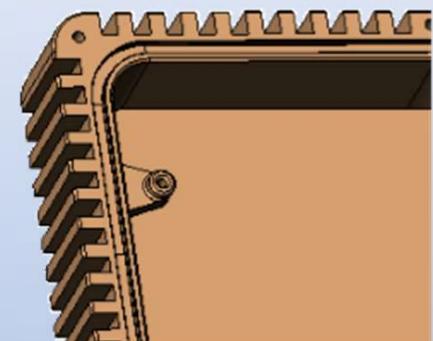
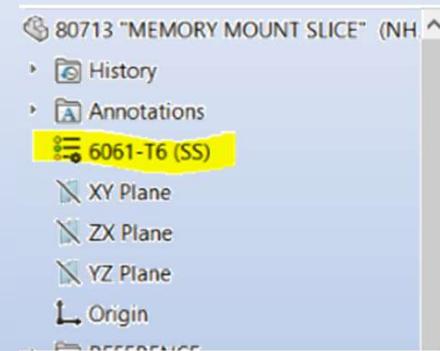
不怕海量  
只怕散漫

慧眼俱足

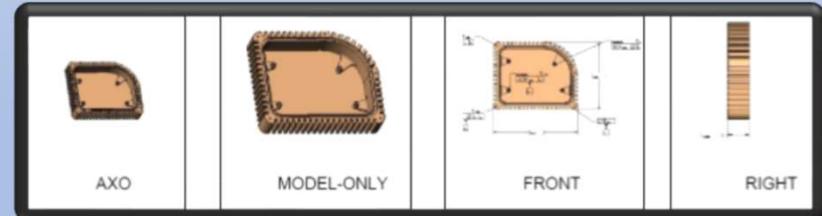
### 標註 (3D式)



### 眾屬性 (Metadata)

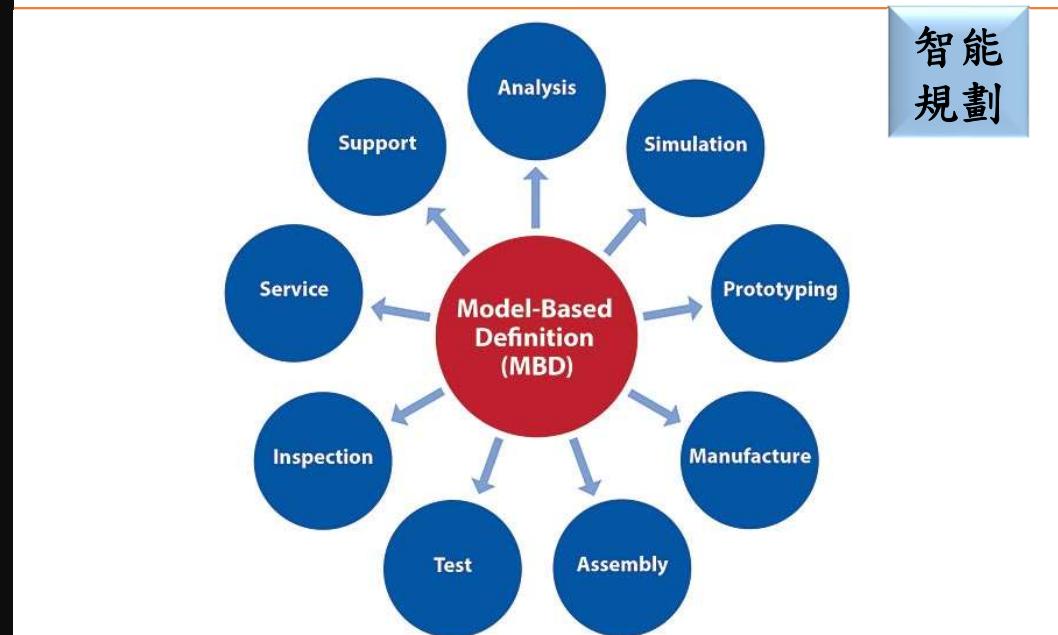
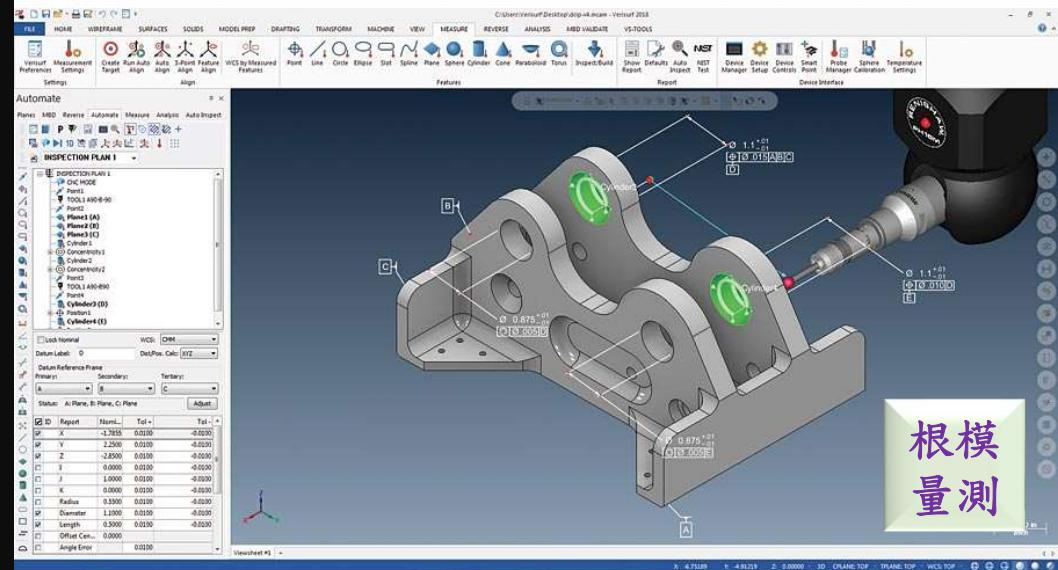


### 圖示 (Saved Views)



### 3 模型根基 檢驗

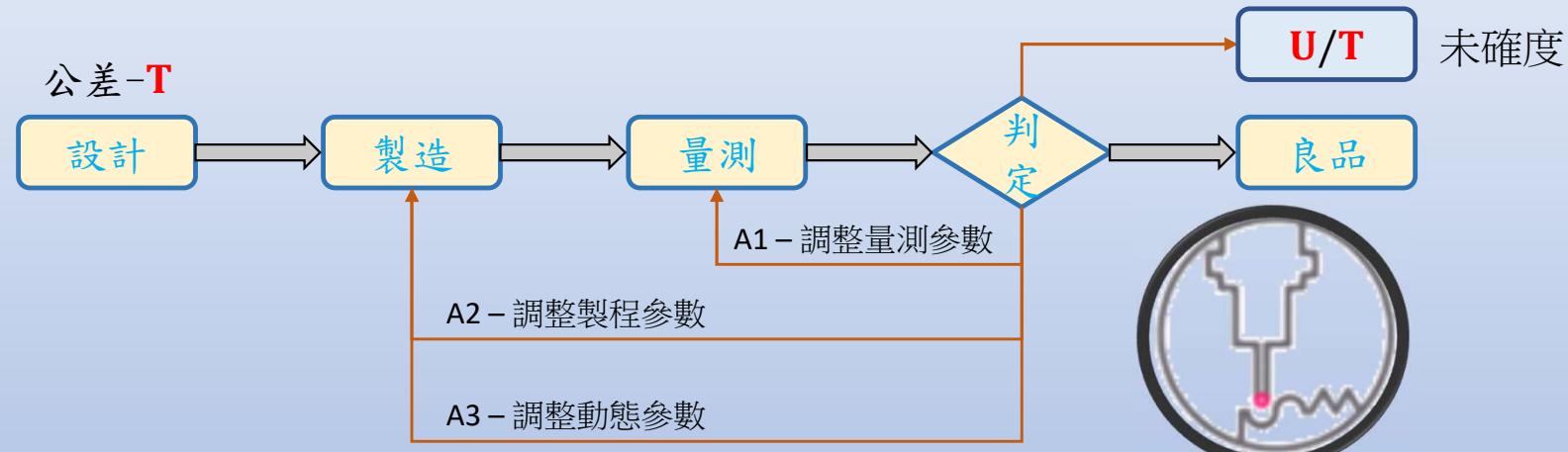
- GD&T and model-based inspection is a great place to start when moving towards MBD. It moves the CAD model from design to a manufacturing orientation. It opens the door to many advantages where software can automate and validate steps in the simulation, manufacturing and inspection processes.



## 3.1 就機量測



### 未確 OMT (On Machine Tools)



就在製造之中或者甫完之際，OMT提供對機台工件量測的可能性；這時工件的原有設定仍舊保持，不致因量測而將工件移出導致製程停頓。理性目標自是掌握量測器材的未確度，再轉化反饋機台，可追溯整合量測過程。

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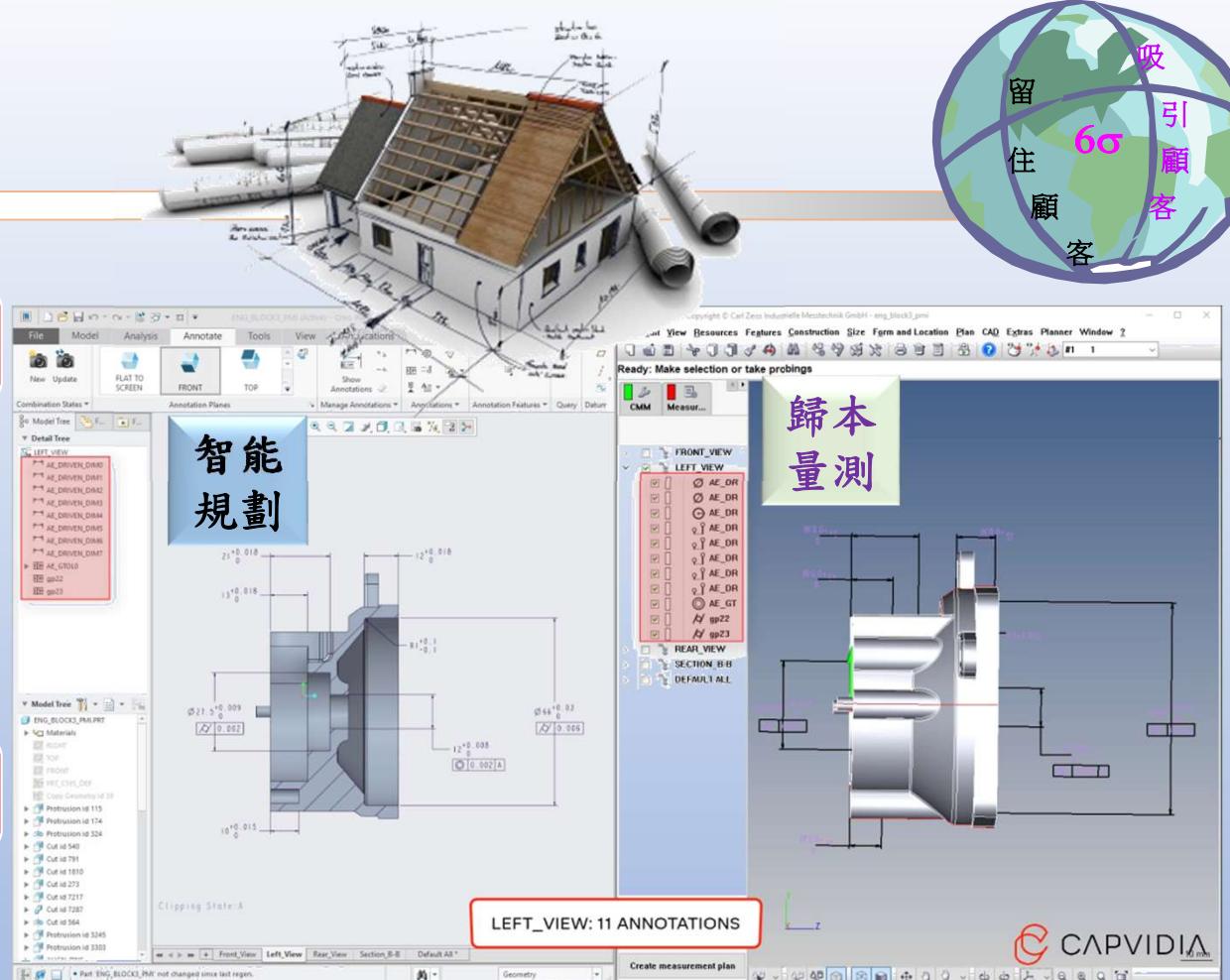
## 3.2 MBD與CMM

產品終於設計：

- Transcription errors eliminated
- Encoded design knowledge
- Process repeatability
- Frees up skilled engineers
- Reliance on process over personnel
- Drastic reduction of labor time

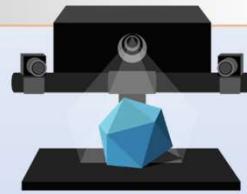
資料反璞歸真：

- Universally accessible data
- Data mapped to design model



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### 3.3 量測全程



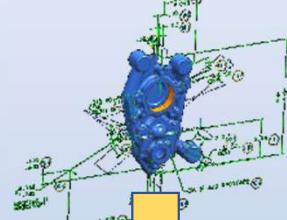
Data propagation in digital, interoperable format



④ Supplier FAI



① MBD Model



② Measurement Planning



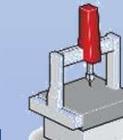
Digitally connected measurement results



Use PMI downstream

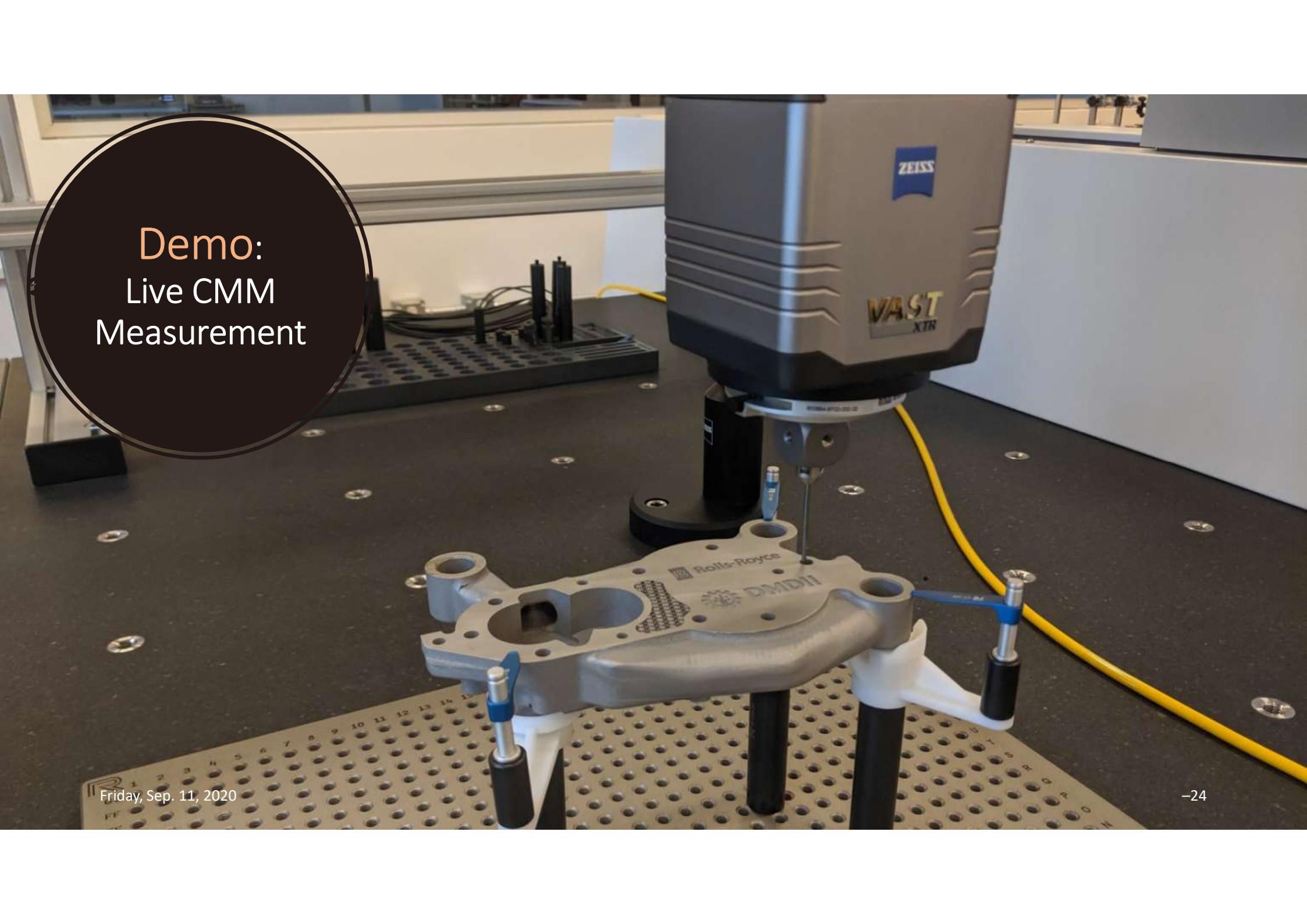


③ CMM/Scanner Measurement



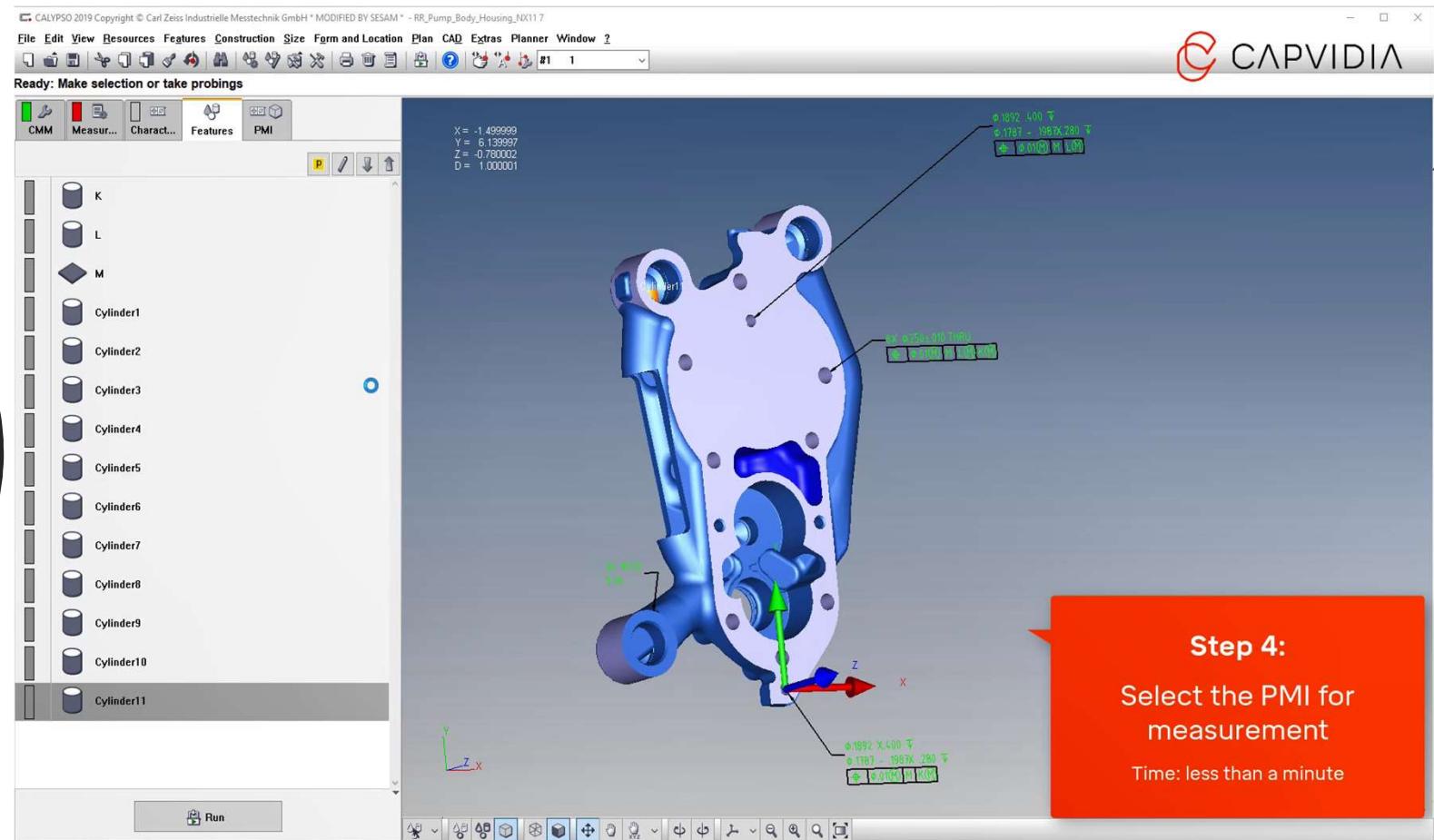
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Demo:  
Live CMM  
Measurement

# Demo: Offline Program Preparation



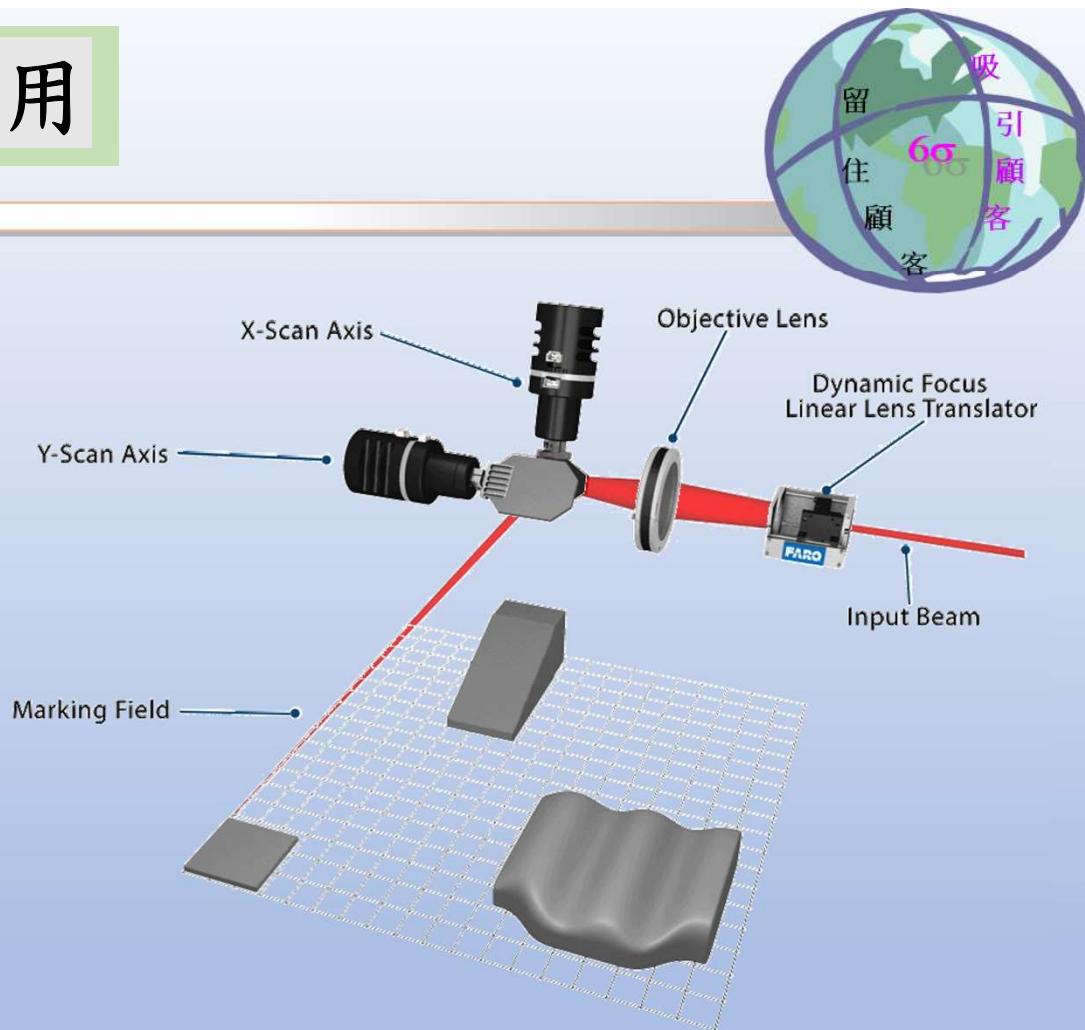
# 3D資料各式抓取系統運用

## Unc-OMT (On)

CMM(三次元量床)透過測頭接觸諸點測出物體的幾何形狀。測頭包括機械、光學、雷射和白光。CMM裝置根據笛卡爾參考座標系的位移量來指定探針位置。許多裝置允許控制探針角度來量測無法觸達的表面。

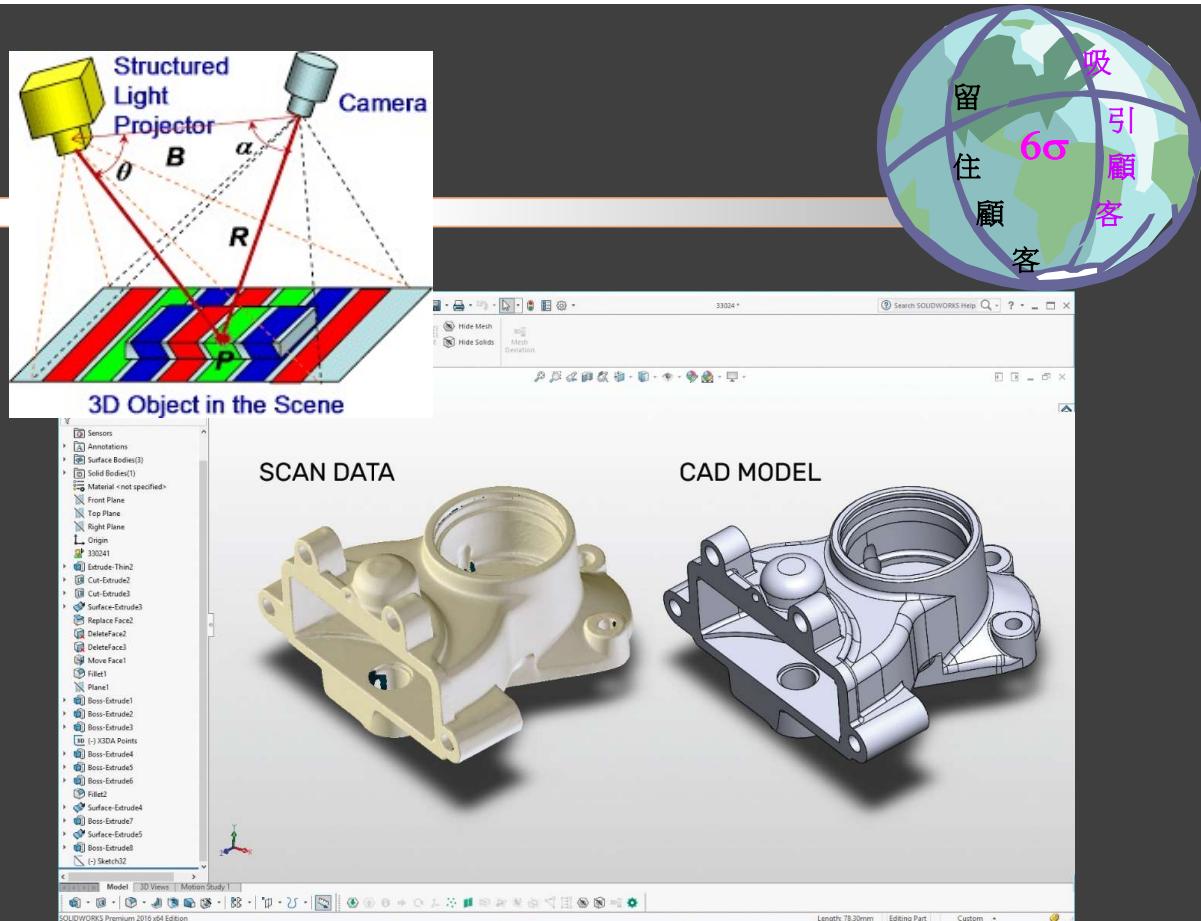


新式非接觸掃描攝取數千光點，用以檢查尺寸和位置，亦可將「點雲數據」傳輸到CAD軟件創建零件3D模型。



## 3.4 3D 扫描

- To meet the increasing demand for digitizing high-quality designs and CAD models, 3D scan to CAD is critical for getting products to market faster and without flaws. As quality requirements and processes evolve to be more complex, modeling of scanned parts becomes more of a challenge.
- A 3D scan shows an accurate representation of the real object, including defects. As part of the 3D modeling process, the scanned part gets inspected and a color deviation map can be generated to detect warps or missing pieces.
- In addition, a 3D CAD software for reverse engineering allows you to compare whether different scanned parts have the right dimensions, or you can compare the adjustments of two similar machines to determine whether there are differences in the alignment to correct.

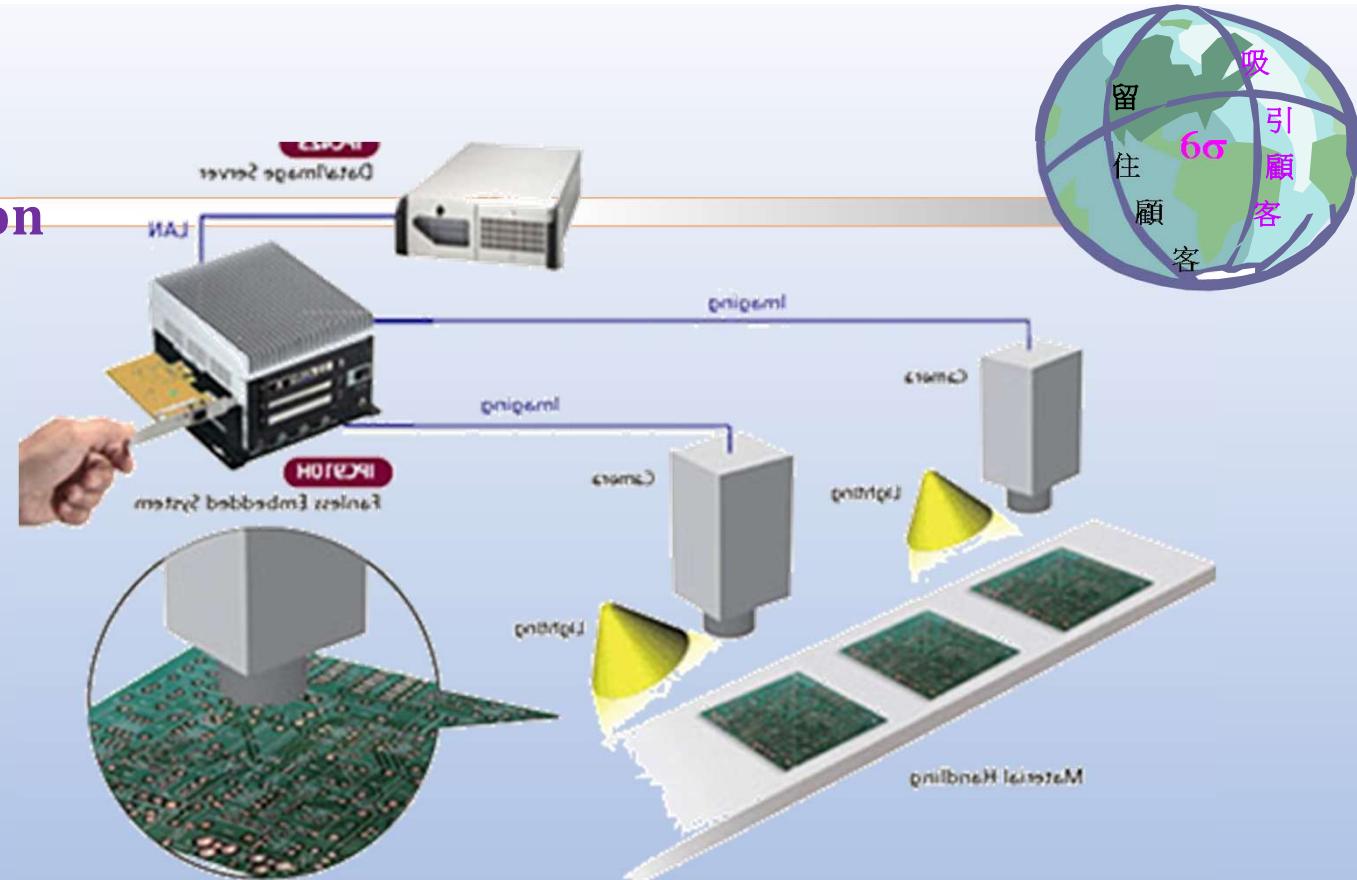


Quality control as part of the design process

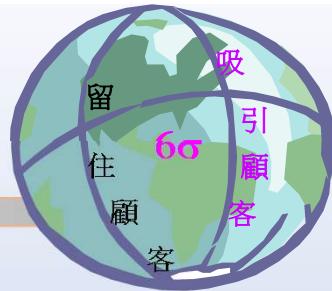
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# 3.5 AOI

## Automatic Optical Inspection



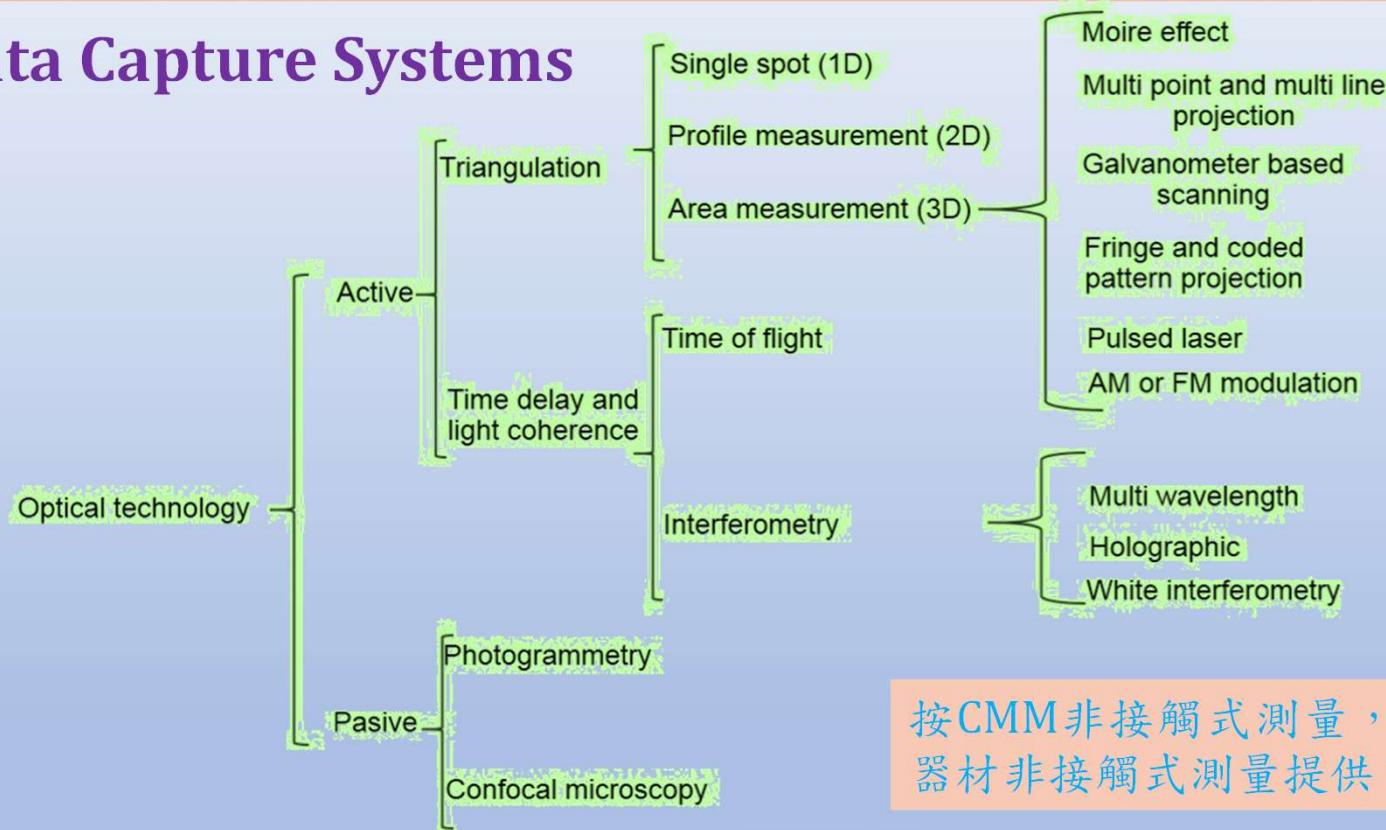
1 Groove, 2 scratch, 3 crack, 4 pore, 5 blowhole, 6 shrinkage hole, 7 fissure/chink/crevice, 8 wane, 9 concave buckle, 10 dent, 11 wart, 12 blister, 13 convex buckle, 14 scale, 15 inclusion, 16 burr, 17 flash, 18 deposits, 19 crater, 20 lap, 21 scoring, 22 chip rest, 23 skidding, 24 erosion, 25 corrosion, 26 pitting, 27 crazing, 28 spot/patch, 29 discoloration, 30 streak, 31 cleavage/flaking



# 3.6 光學非接觸



## 3D Data Capture Systems



按CMM非接觸式測量，光學技術為機台  
器材非接觸式測量提供了最大的潛力。

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# 3.7 模型根基檢驗的價值



## Model-Based Inspection



節省  
成本

### Reduce inspection costs

Inspection planning is a laborious task involving skilled technicians – automation decreases its cost significantly



快速  
檢驗

### Faster time-to-inspection

Faster product delivery. Inspection is typically a bottleneck in production – this approach can streamline manufacturing processes



品質  
保證

### Upgrade inspection quality

- Utilize measurement uncertainty simulation
- Implement organizational guidelines — rely on corporate process, not personnel



數位  
螺旋

### Bring data into the digital thread

Measurement data has immense value – don't use it for PASS/FAIL inspection and then discard. MBD traceable data is ready for analytics



減少  
錯誤

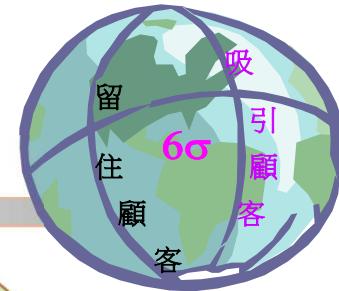
### Lower errors transcription & interpretation

Software automation lowers the risk of transcription or interpretation errors of data, and creates opportunities for validation of data

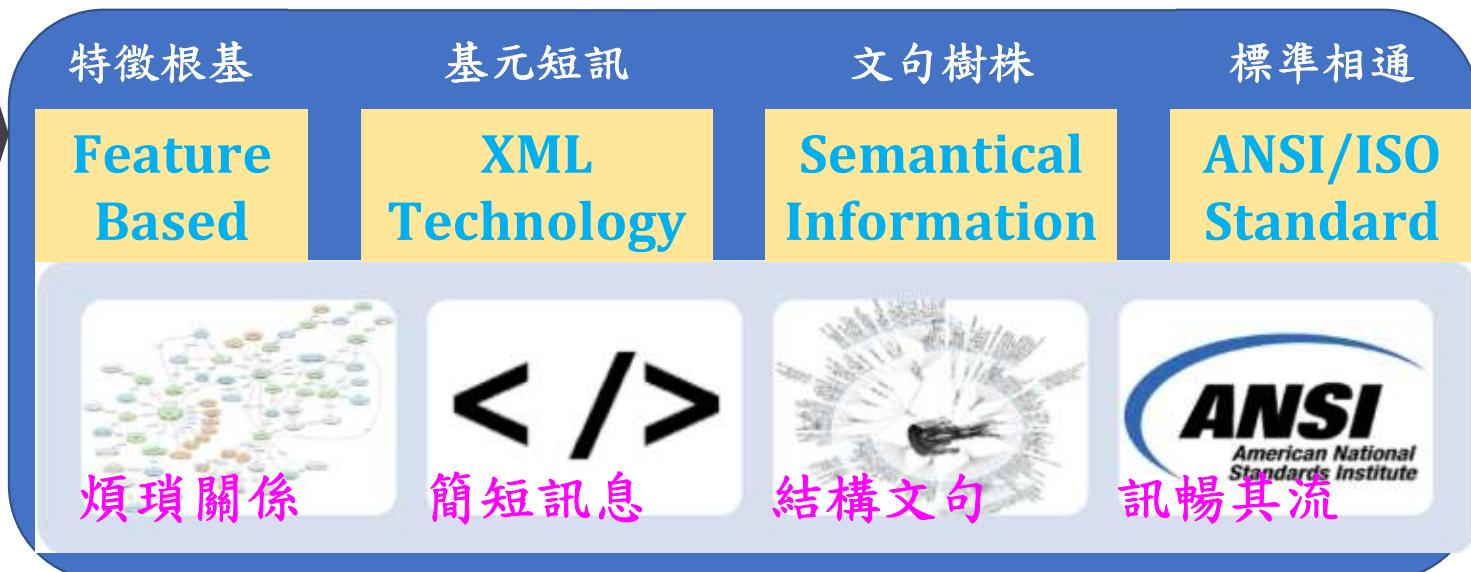
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# 品質資訊基盤

Quality Information Framework



## 4 QIF 是什麼？



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## 4.1 QIF



工業革命  
數位基盤

### QIF - Quality Information Framework

QIF是工業4.0的關鍵條件。它支撐3D的MBD，建基於人機語言XML，整合式QIF應用網路無障礙，高效支援物聯網。

於2013年QIF成為美國國家標準，它支援數位螺旋概念，工程應用貫穿產品設計、製造及品質檢驗。QIF館庫收藏XML框架，足以擔保資料統一和交換，促成歸本模型大計畫順暢執行。

2020年 ISO/DIS 23952

Automation systems and integration - QIF  
An integrated model of manufacturing Quality Information  
Technical Committee : ISO/TC 184/SC 4 Industrial data

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# QIF 本質

PMI (interoperability & traceability)  
maps back to CAD through QIF flow.

- Open-standard CAD format, is to introduce **digital transformation, digital thread, and IoT** to computer-aided technology and engineering applications.
- Built on the **XML** framework for easy integration & interoperability with other systems.
- Begin the MBD/MBE (model-based enterprise) process, especially for metrology-related information in PLM (produce lifecycle management) and PDM (product data management).



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# 4.2 XML 與 XSLT

## Example 1-1. Product Instance

```
<product effDate="2001-04-02">  
  <number>557</number>  
  <size>10</size>  
</product>
```

Element (Child)  
元素

Attribute 屬性

XML: Extensible Markup Language

XSD: XML Schema Definition

XSLT: XSL Transformations

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哇！  
格式完善。

## Example 1-2. Product Schema

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">  
  <xsd:element name="product" type="ProductType"/>  
  <xsd:complexType name="ProductType">  
    <xsd:sequence>  
      <xsd:element name="number" type="xsd:integer"/>  
      <xsd:element name="size" type="Size Type "/>  
    </xsd:sequence>  
    <xsd:attribute name="effDate" type="xsd:date"/>  
  </xsd:complexType>  
  <xsd:simpleType name="Size Type ">  
    <xsd:restriction base="xsd:integer">  
      <xsd:minInclusive value="2"/>  
      <xsd:maxInclusive value="18"/>  
    </xsd:restriction>  
  </xsd:simpleType>  
</xsd:schema>
```

Type 屬性

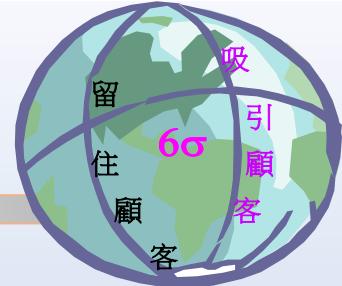
電腦不怕海量！

## 4.3 資料格式的重要

資料生來不平等

Different data file formats (e.g., PDF, TXT, TIF, CSV, XLS, STEP, JT, IGES, PRT, QIF, XML, etc.) from different software are either proprietary or lacking robust data capabilities to produce true MBD.

The incompatibility and inaccessibility prevents connecting data throughout the whole product lifecycle– traceability & automation in the digital thread.



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## 4.4 QIF參考文獻



- [1] SAE AS9102B (2014-10), Aerospace First Article Inspection Requirement
- [2] Walmsley, Priscilla., 2002. Definitive XML Schema. Prentice Hall, Upper Saddle River, NJ, USA.
- [3] ASME B89.7.2 – 2014, Dimensional Measurement Planning



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## 4.5 引用典詞

### AIAG/SAE

AIAG MSA Reference Manual 4th Edition, AIAG Measurement Systems Analysis

AIAG SPC – AIAG Statistical Process Control 2nd Edition

ANSI/DMIS 105.3, Part 1-2016, DMIS, DMIS 5.3 Standard, Part 1

SAE Aerospace Standard, AS9102B: Aerospace First Article Inspection Requirement. 2014.

### ASME

ASME B1.7 - 2006, Screw Threads: Nomenclature, Definitions, and Letter Symbols

ASME B89.4.10360.2-2008 Acceptance Test and Reverification Test for Coordinate Measuring Machines (CMMs) – Part 2: CMMs Used for Measuring Linear Dimensions

ASME B89.4.22-2004, Methods for Performance Evaluation of Articulated Arm Coordinate Measuring Machines

ASME Y14.36 - 1996, Surface Texture Symbols

ASME Y14.41-2012, Digital Product Definition Data Practices

ASME Y14.5-2009, Dimensioning and Tolerancing - Engineering Drawing and Related Documentation Practices

ASME Y14.5M-1994 (reaffirmed 2004), Dimensioning and Tolerancing - Engineering Drawing and Related Documentation Practices

ASME Y14.6 - 2001, Screw Thread Representation

AWS A2.4:2012 Standard Symbols for Welding, Brazing, and Nondestructive Examination

調和  
工業標準

航天及車輛產業

機械學會



# 引用典詞 (2)



## ISO

- ISO 1101:1983 Technical drawings -- Geometrical tolerancing -- Tolerancing of form, orientation, location and run-out -- General definitions, symbols, indications on drawings
- ISO 1101:2017 Geometrical Product Specifications (GPS) -- Geometrical tolerancing -- Tolerances of form, orientation, location and run-out
- ISO 1302:2002 Geometrical product specifications (GPS) -- Indication of surface texture in technical product documentation
- ISO 14405-1:2016 Geometrical Product Specifications (GPS) — Dimensional tolerancing — Part 1: Linear sizes
- ISO 14405-2:2016 Geometrical Product Specifications (GPS) — Dimensional tolerancing — Part 2: Dimensions other than linear
- ISO 14406:2010, Geometrical product specifications (GPS) – Extraction
- ISO 5459:2011 Geometrical Product Specifications (GPS) -- Geometrical tolerancing -- Datums and datum systems
- ISO DMIS: ISO 22093:2011 Industrial automation systems and integration -- Physical device control -- DMIS
- ISO/IEC 11578:1996: Information technology - Open System Interconnection - Remote Procedure Call (RPC)
- ISO/IEC 9834-8:2008. Information technology -- Open Systems Interconnection -- Procedures for the operation of OSI Registration Authorities: Generation and registration of Universally Unique Identifiers (UUIDs) and their use as ASN.1 Object Identifier
- ISO/IEC Guide 99:2007 (E/F) – International vocabulary of metrology – Basic and general concepts and associated terms (VIM)
- ISO/IEC JCGM 200 – International vocabulary of metrology – Basic and general concepts and associated terms (VIM)
- ISO/IEC 9594-8 (10/2012) Public-key and attribute certificate frameworks

國際標準機構

# 引用典詞 (3)



## XML/Internet

XML Schema Part 1: Structures Second Edition, W3C Recommendation 28 October 2004

XML Schema Part 2: Datatypes Second Edition, W3C Recommendation 28 October 2004

XSL Transformations (XSLT) Version 2.0, W3C Recommendation 23 January 2007

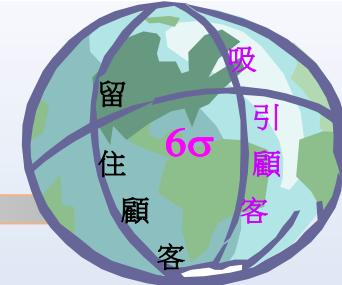
XML 1.0 (Fifth Edition), W3C Recommendation 26 November 2008

RFC 2045 MIME Part One: Format of Internet Message Bodies



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## 4.6 框架文檔



QIF館庫收藏了15隻「框架文檔」，支援「QIF應用框架眾文檔」



1. Auxiliary.xsd – 幾何輔助眾型態(types for auxiliary geometry)；
2. Characteristics.xsd – 特性眾型態(characteristic types)；
3. Expressions.xsd – 專用於QIF的表式眾型態，運用於QIF規則及計畫眾應用(expressions used in the QIF rules and QIF plan applications)；
4. Features.xsd – 特徵眾型態(feature types)；
5. GenericExpressions.xsd – 無關領域的算術、字串與布林表式型態(domain-independent arithmetic, string, and Boolean expression types)；
6. Geometry.xsd – 幾何眾型態 (CAD核心的一半) (geometric types (half of the core of CAD))；
7. IntermediatesPMI.xsd – 中生PMI眾型態(intermediate PMI types)；
8. Primitives.xsd – 用於整套QIF基礎眾型態(basic types used throughout QIF)；
9. PrimitivesPD.xsd – 用於產品解說基礎數值眾型態(basic numerical types used in product description)；
10. PrimitivesPMI.xsd – 基礎PMI眾型態(basic PMI types)；
11. Statistics.xsd – 支援QIF統計眾型態(types that support QIF statistics)；
12. Topology.xsd – 拓樸型態(CAD核心另外半數) (topology types (the other half of the core of CAD))；
13. Traceability.xsd – 品質量測追溯資訊(quality measurement traceability information)；
14. Units.xsd – 量測眾單位眾型態與單位數值(types for units of measurement and values with units)；
15. Visualization.xsd – 包含PMI的產品圖示眾型態(types for graphical display of products, including PMI)。

## 4.7 備便特徵

### MBD, XML-based, CAD-neutral, Open standard



- PMI (Product Manufacturing Information)
- GD&T (Geometric dimensioning and tolerancing)
- Measurement plans
- Geometry
- Bill of Characteristics
- Inspection Plans
- Other semantic data.

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## 4.8 採用 QIF 的好處



1. Automation: Defined business process & software compatibility leads to the possibility of automation.
2. Interoperability: Enables authority CAD file to be reused on different software by different departments and companies.
3. Single Source of Truth: Derivative models for robust, semantic PMI, metrology, back to any native CAD model.
4. Big Data: Manufacturing data is moved upstream for analytics & design improvement.
5. Faster Time to Market: Automation and decreased manual translation & validation begins production cycles.
6. Cost-Savings: Up to 80% of total hours saved for annotation, control planning, and inspection processes together, meaning less resources needed for a particular task and reducing overhead.
7. Work Efficiency: Automation is repeatability, relying less on human involvement (and possible error) and freeing the engineer to focus on other value-add work.
8. Process Over Personnel: Avoiding the “human-in-the-loop” method provides documented process-driven strategy.
9. Better Product: Faster time to market leads to more iteration and breakthroughs in product, process, or pricing.
10. Better Bottom Line: Automated work processes, less bottlenecks, and faster iteration & feedback for ideation all leads to cost savings in time & money.

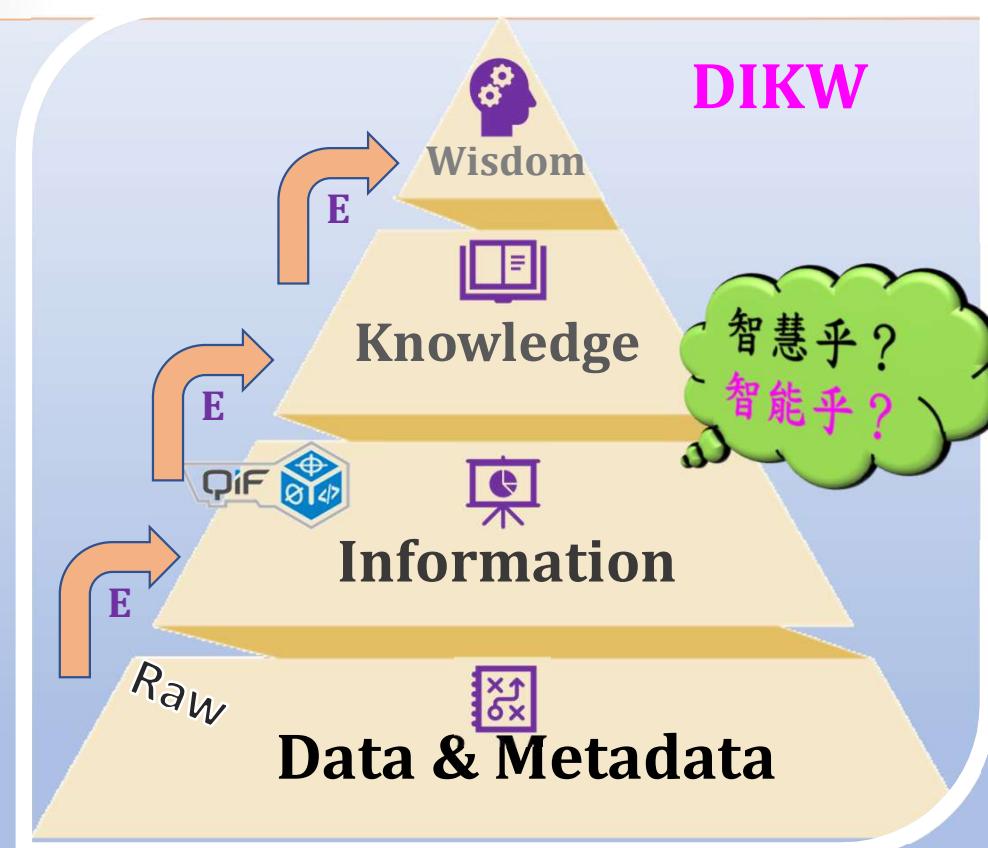


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# 4.9 智慧哲理

## 加持-Enablers

- 3D CADs
- 網頁 XML
- 框架 XSLT
- 資料交換
- 單位換算
- 座標轉換
- 仿真計算
- 模型模擬
- 3D 圖顯示



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# 4.10 如何啟動QIF？



## 概述 Overview

- CAD Translation & Validation
- Ballooning & First Article Inspection
- CMM Programming
- Harvesting Results

轉換及驗核

CAD

備妥

氣球與FAI

編程

CMM

座收  
成果

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# 品質資訊基盤：QIF

工作破壞：自動化、Robot化、~~職~~、~~職~~。

工作轉移：數據平臺、外包、共享經濟。

工作變化：數位科技、人性 / 智能界面、新式管理。

創造就業：新部門？新產品？新服務？

## ⑤ 你要跟上嗎？

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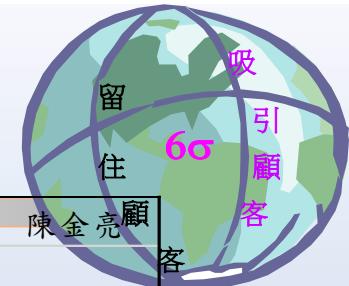


# 數位計量技術師

## CDMT課程計畫

課程內容	講師
QIF與GDT 1. 介紹新標準：品質資訊基盤 2. 介紹GDT：幾何吋法與公差制定	陳文魁
圖學技術 1. 介紹QIF文檔如何描述幾何圖形 2. 介紹QIF文檔如何描述組合件 3. 說明QIF文檔如何定義幾何與尺寸註記	王敬仁
QIF演練一 1. QIF文檔內容導覽 2. 如何定義量測規則	王敬仁
XML技術一	陳文舟
演練XML與Schema框架	

量測技術 1. 量測基礎 2. 量測技術介紹 3. 量測設備介紹	陳金亮 顧客
QIF演練二 1. QIF文檔內容導覽 2. 如何讀取量測項目 3. 如何寫入量測結果	王敬仁
XML技術二 演練XML與XSLT轉換	陳文舟
QIF演練三 1. 如何採用MBDVidia準備MBD模型 2. 如何編輯與修復PMI 3. 如何手動加入量測成果。	王敬仁
量測績效與製造績效 1. 量測績效評估作法 2. 製造績效評估作法	陳文魁



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# 4.11 未來課題



## QIF - Quality Information Framework

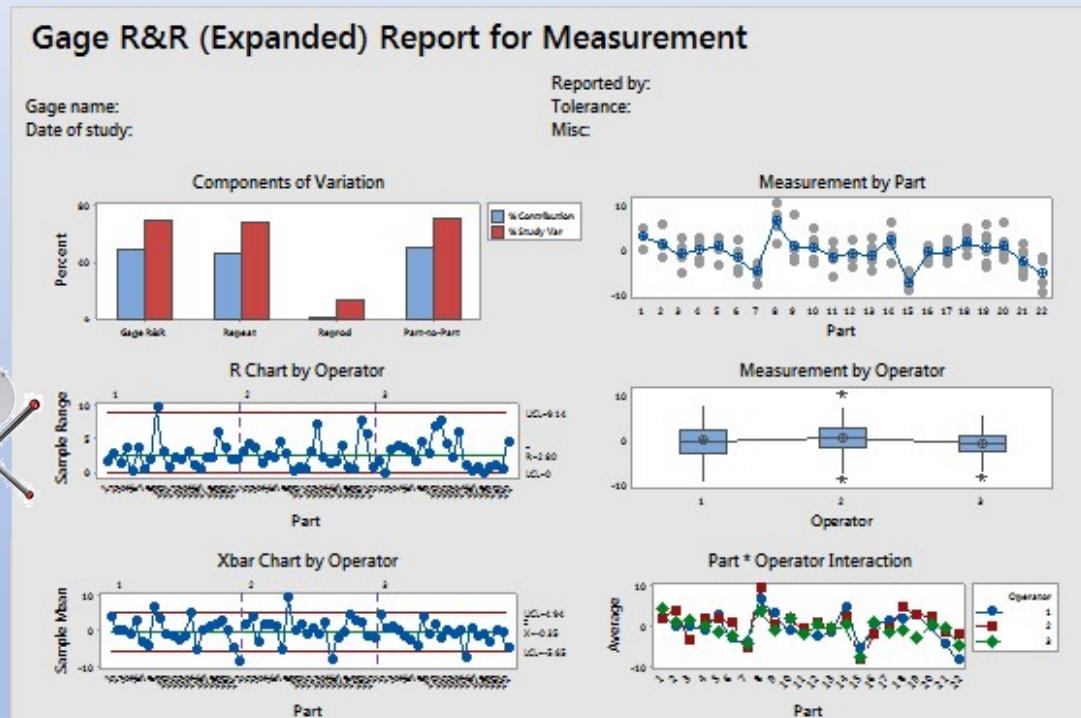
- 量測 The establishment of BOI (Bill of Instruments)  
with GRR(EV&DV) and GBS(BV & LV)
  - ❖ EV- Equipment Variation; DV- Device Variation
  - ❖ BV- Bias Variation; LV- Linear Variation
- 製造 The establishment of basic SPC  
with  $P_{pk}$  and  $C_{pk}$ 
  - ❖  $P_{pk}$  - Normal Probability Chart
  - ❖  $C_{pk}$  -  $\bar{x}$ -R charts with alarms

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# 未來課題 (2)

## QIF - Gauge R&R

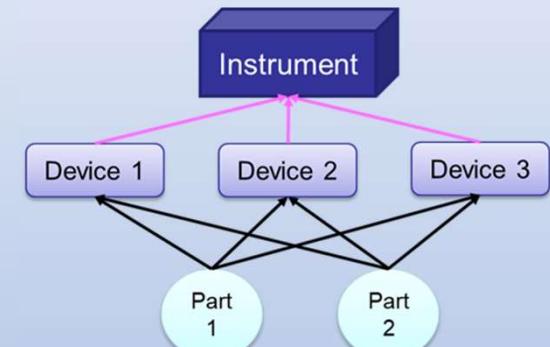
MSA



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### Nested GRR Study

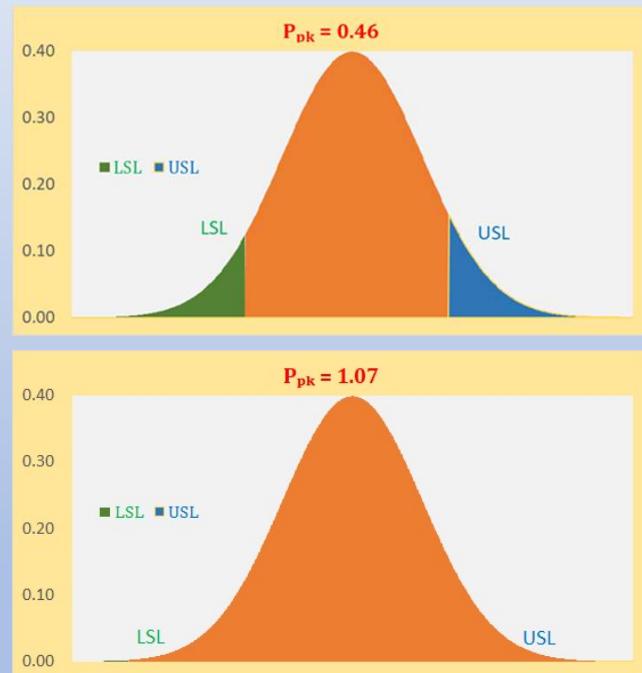


- The R-chart by operator is the key to reveal the false tiny AV issue.

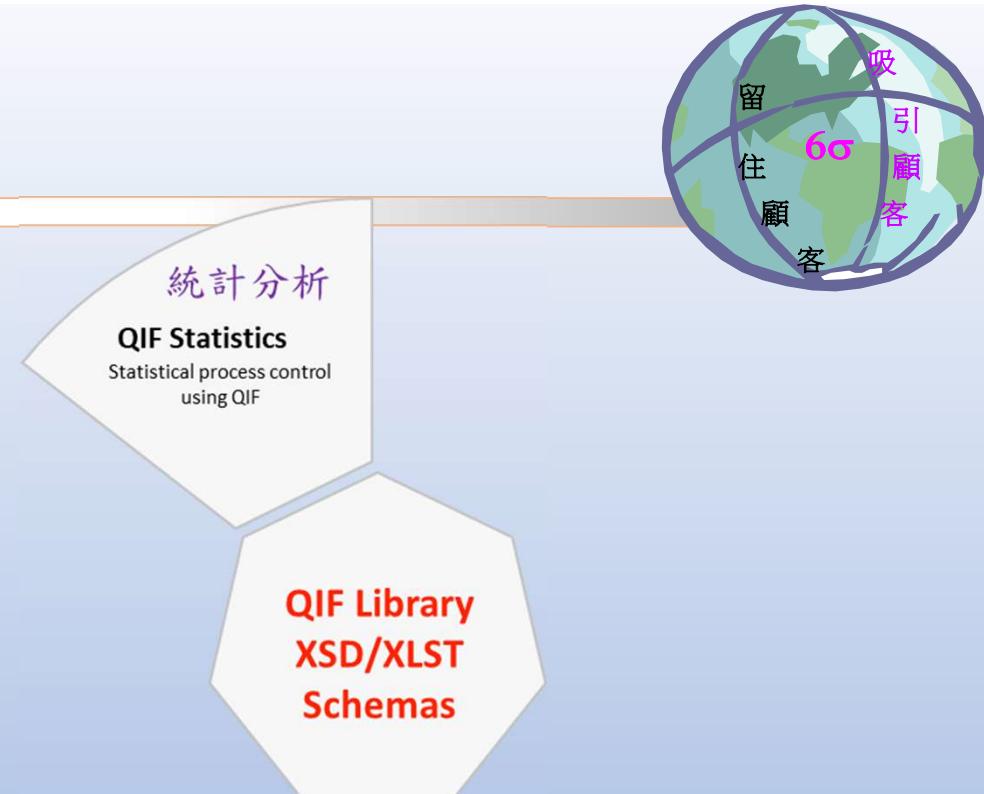
# 未來課題 (3)

## QIF - Statistics

SPC



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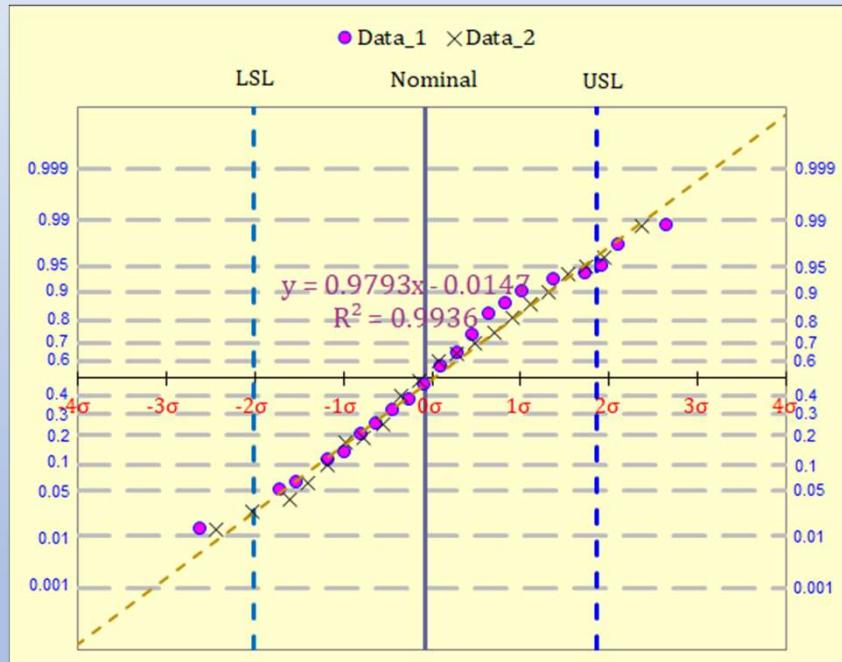


- The larger  $P_{pk}$ , the smaller tails out of the specification.

# 未來課題 (4)

## QIF - Statistics

SPC



- This plot provides more insights, and the verification of corrective action.

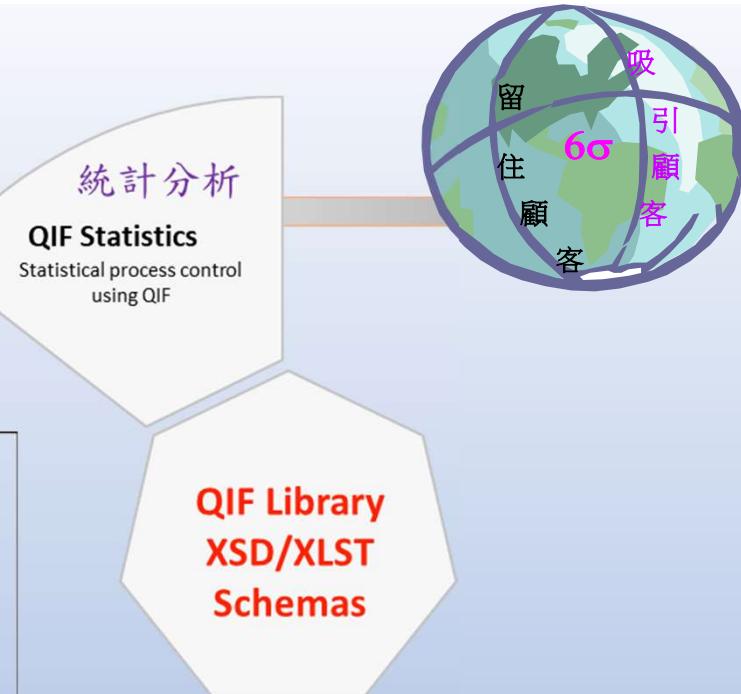
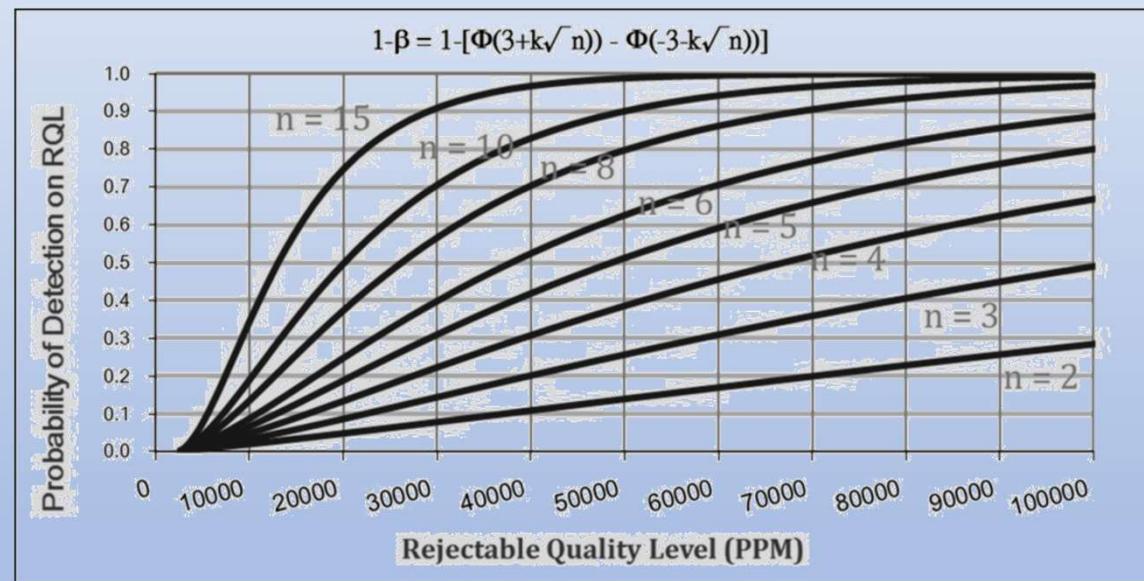
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# 未來課題 (5)

## QIF - Statistics

SPC



- Shewhart control charts are both efficient & effective in detecting special causes.

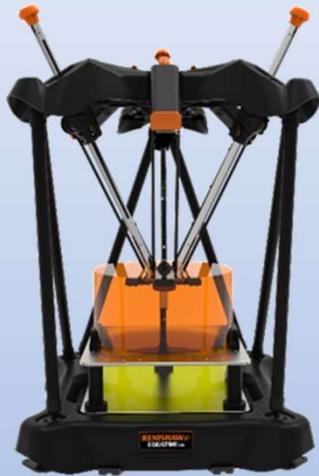
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# 未來課題 (6)



## QIF - Resources

MSA



QIF Library  
XSD/XLST  
Schemas

QIF Resources  
Measurement  
Resource information

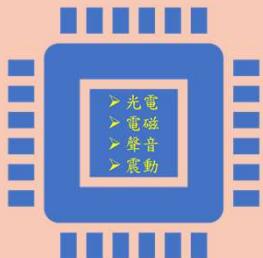
整備資源

- In manufacturing phase, the **On-line** or **in-line** measurement is carrying on ideally without inspectors.

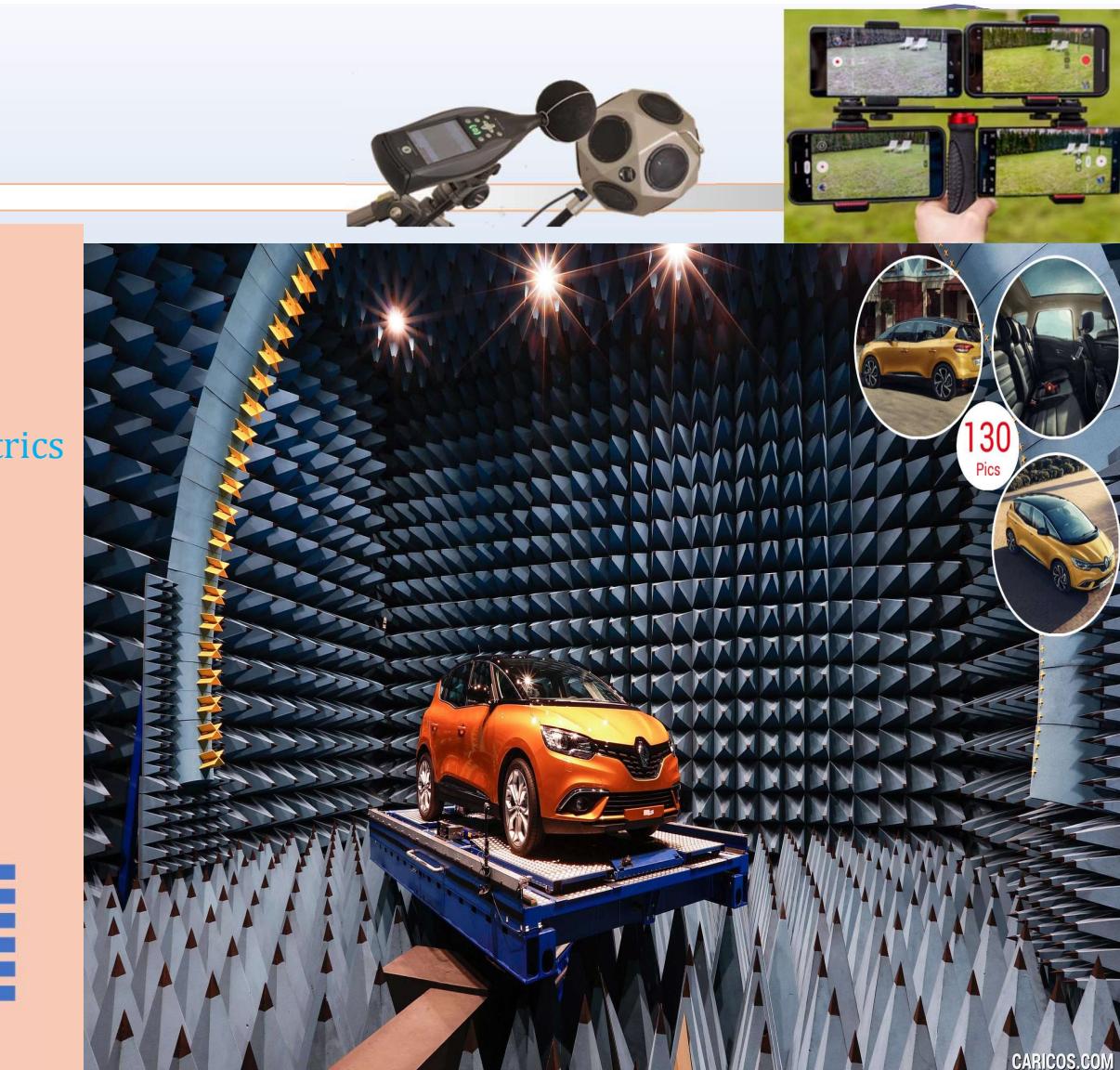
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# 聲音品質測試

- Defining sound quality
- The sound from an appliance
- Comparing methods of testing - subjective methods
- Comparing methods of testing - objective metrics
- Assessment methods
- Sound quality metrics
- Loudness
- Sharpness and booming
- Roughness - fluctuation strength
- Guidelines for using objective measures
- Using Adobe Audition
- MATLAB codes
- More metrics
- Customized metrics
- Kettle sounds
- Washing machine sounds
- Leaf blower sounds



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future digital  
world ?

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