

【亞洲·矽谷物聯網產業大聯盟】季會

AIoT國際發展趨勢與臺灣機會

楊瑞臨

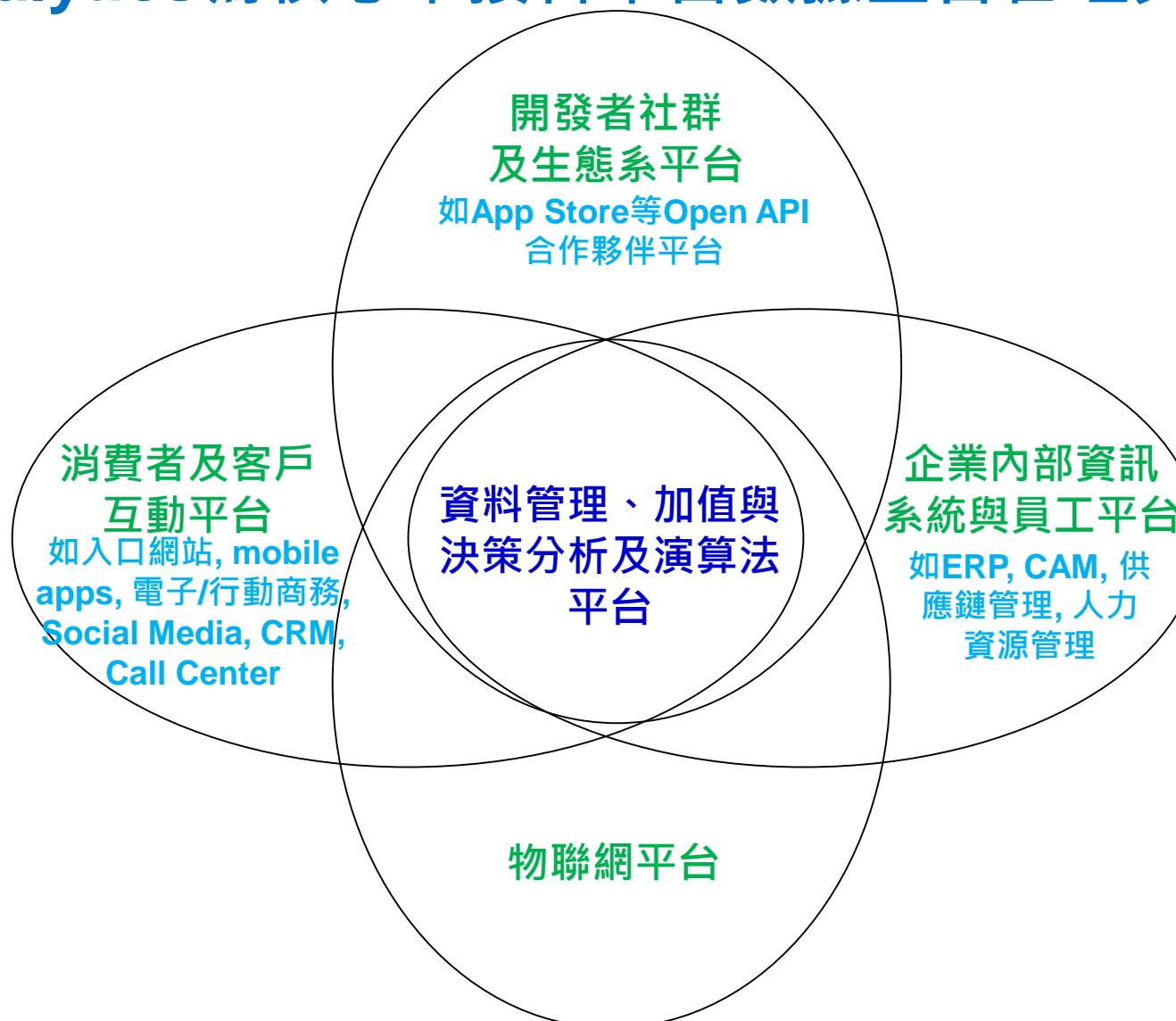
工研院產業科技國際策略發展所

2018年08月20日

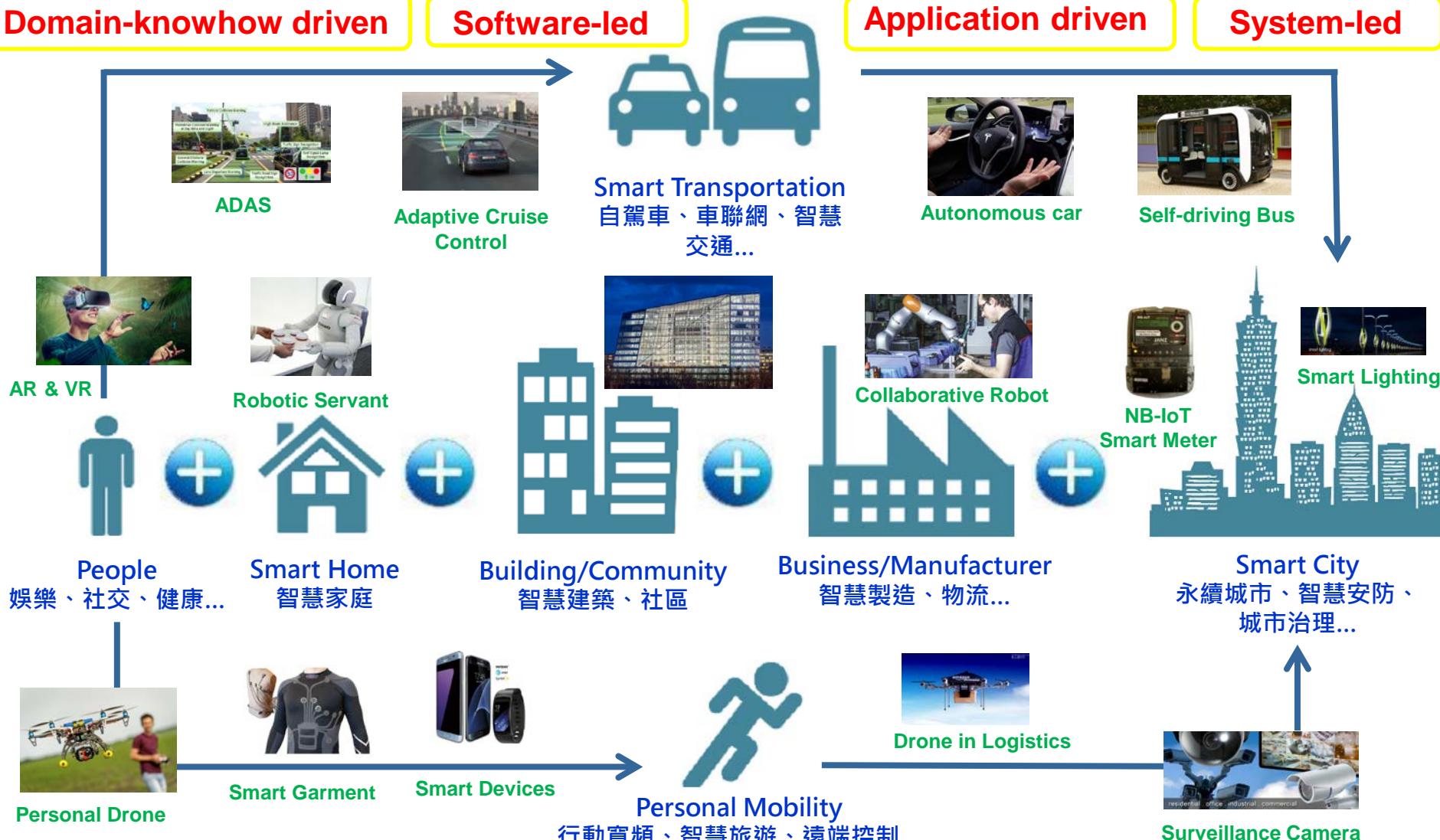


Digital Business五大數位平台

- Analytics為核心串接各平台數據整合管理與加值 -

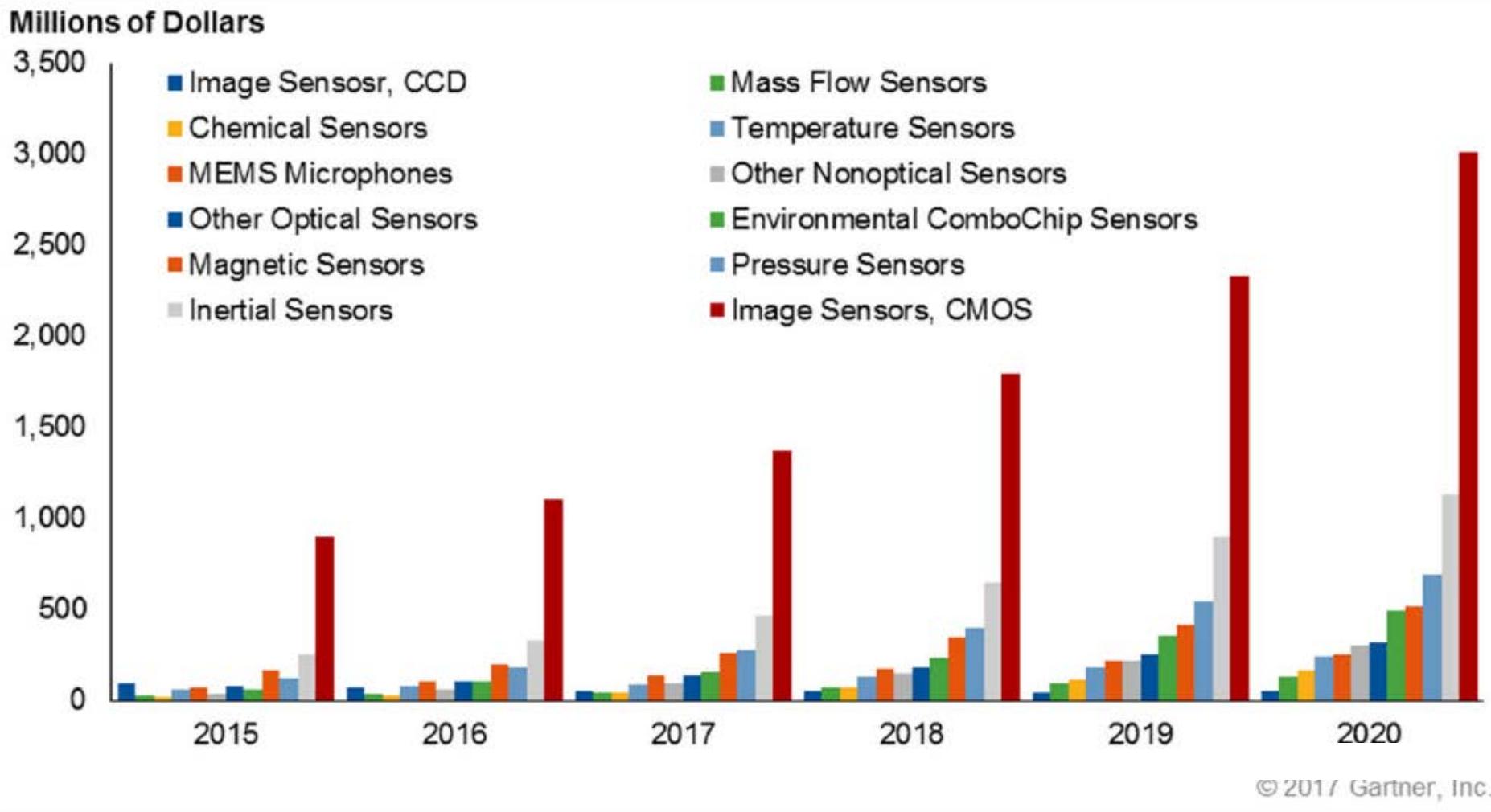


未來物聯網多元應用場域與新興終端載具 將帶動軟硬整合系統之發展

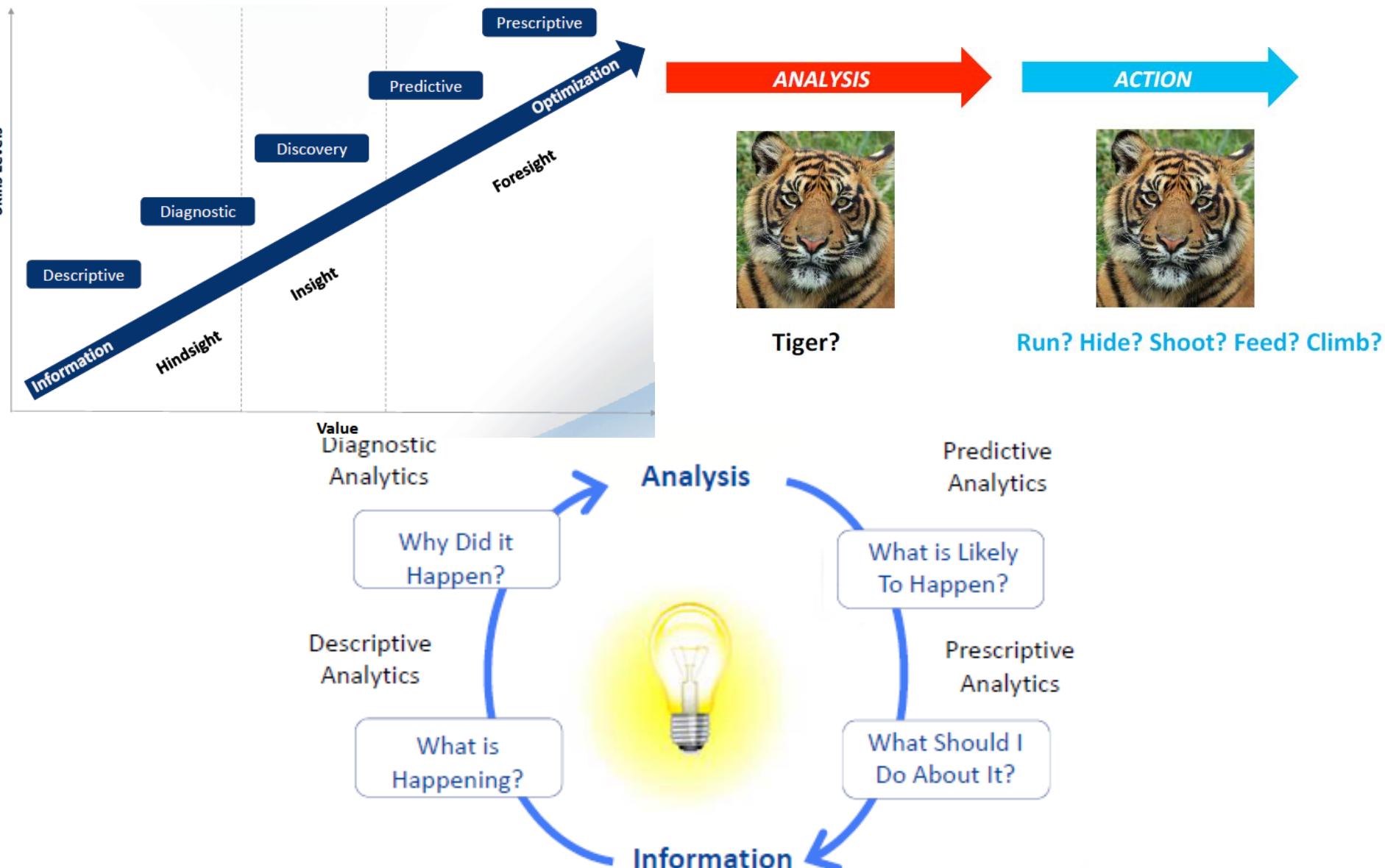


影像感知在物聯網愈發吃重，Analytics尤其關鍵

- 2020全球CMOS影像感測器市場有將近21%來自新興物聯網應用(2015年僅9%)
- 智慧機械、ADAS、AR/VR、無人機、服務型機器人、安防保全等產品應用大幅推升影像感測需求，內嵌演算法則是必然趨勢



傳統IoT分析工具 vs. AIoT Analytics

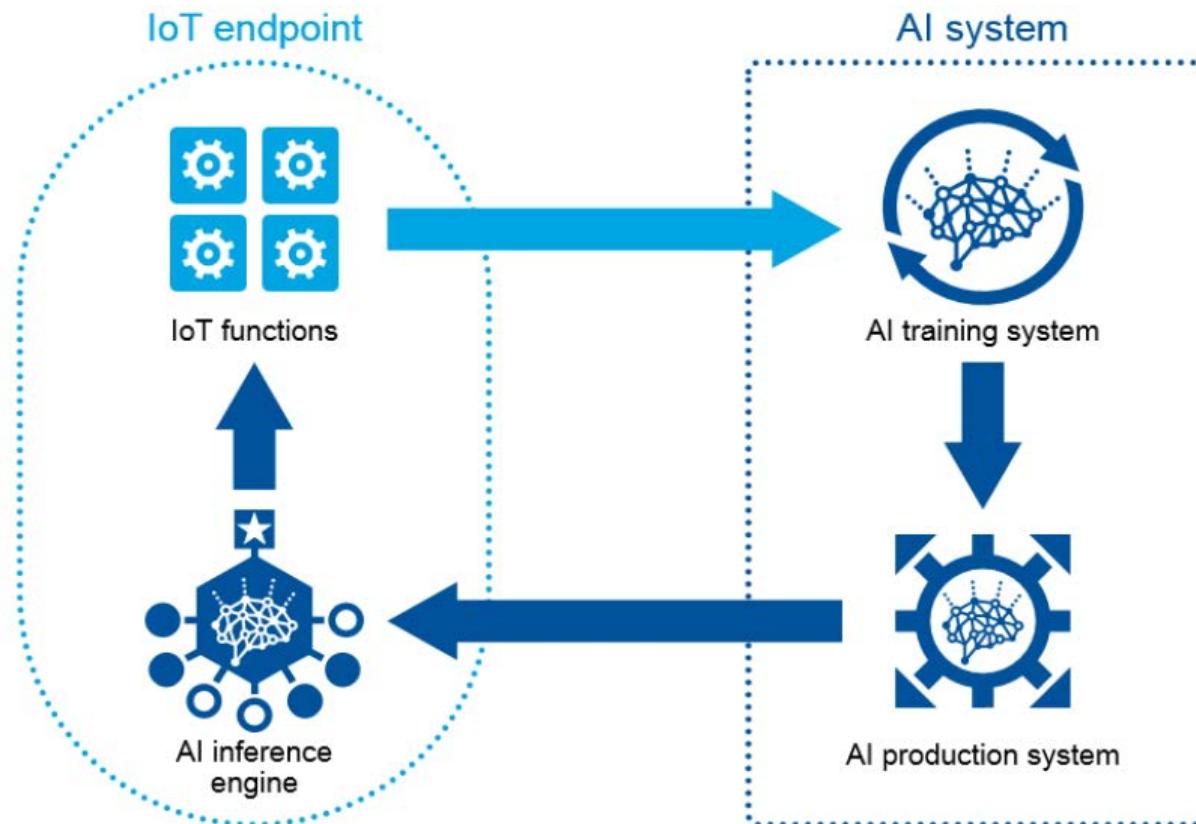


資料來源：Gartner ; Information Builders ; AriaNetworks(2017)

工業技術研究院
Industrial Technology
Research InstituteCopyright 2018
All Rights Reserved

機器學習和物聯網具共生互補性，正向激發彼此價值

- 機器學習需要大量的數據進行訓練，物聯網終端所生成的呈指數增長的數據則能幫助機器學習演算法不斷改進優化，從而使其預測診斷更加準確。
- 物聯網正以超快速度提供更多的數據以供分析，而機器學習則可改進企業組織分析研判數據的能力。二者的共生關係將使企業有機會提升營運效率，強化與客戶的互動，進而創造新的營收來源。

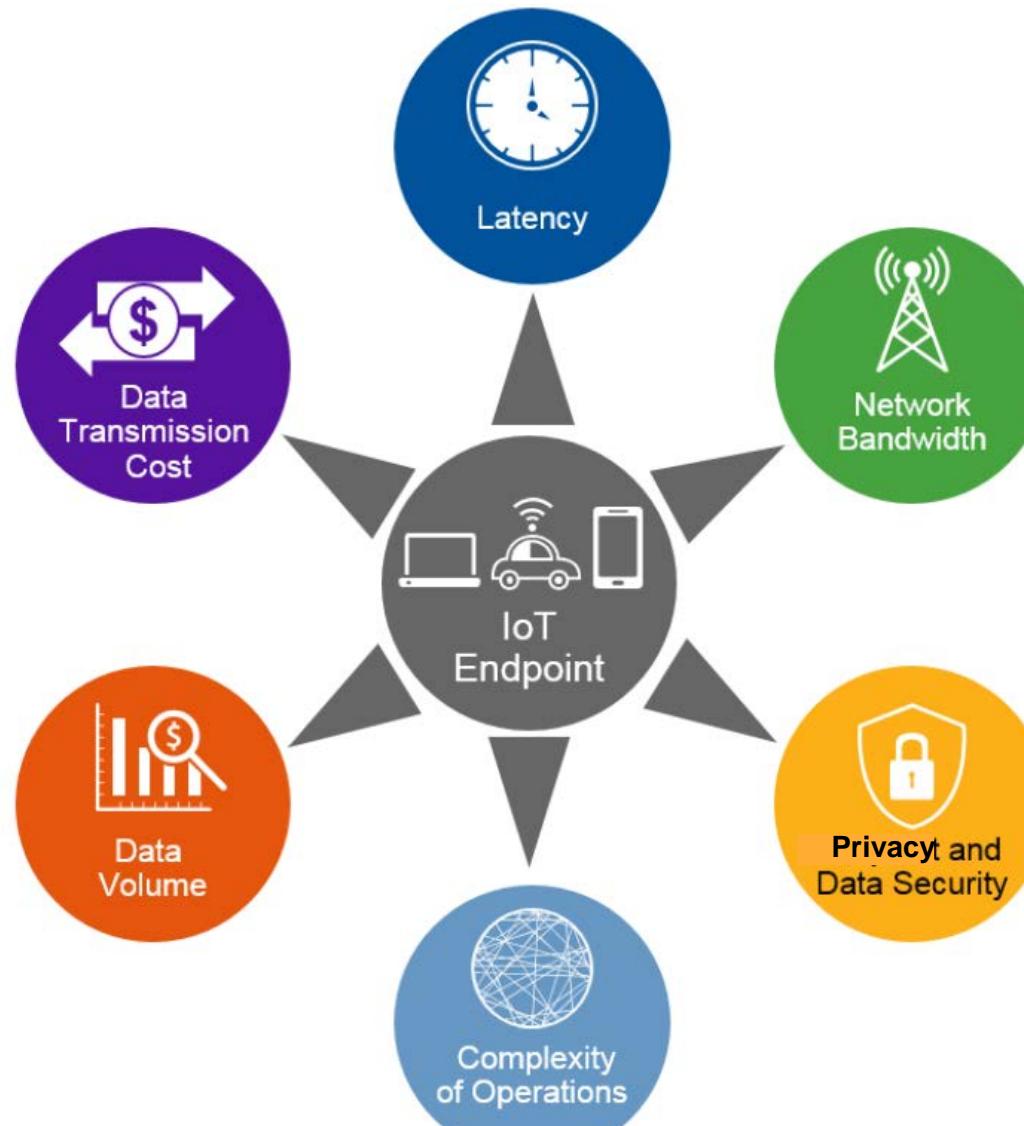


A Berkeley View of Systems Challenges for AI

- Challenges are driven by the realization that AI systems will need to make decisions that are faster, safer, and more explainable, securing these decisions as well as the learning processes against ever more sophisticated types of attacks, continuously increasing the computation capabilities in the face of the end of Moore's Law, and building composable systems that are easy to integrate in existing applications and can span the cloud and the edge.

Why AIoT analytics at edge/things??

Balance between performance, price, and power consumption



An NSF Expedition Project

REAL-TIME INTELLIGENT SECURE EXPLAINABLE

IN THE RISELAB, WE DEVELOP TECHNOLOGIES THAT
ENABLE APPLICATIONS TO MAKE LOW-LATENCY
DECISIONS ON LIVE DATA WITH STRONG SECURITY.

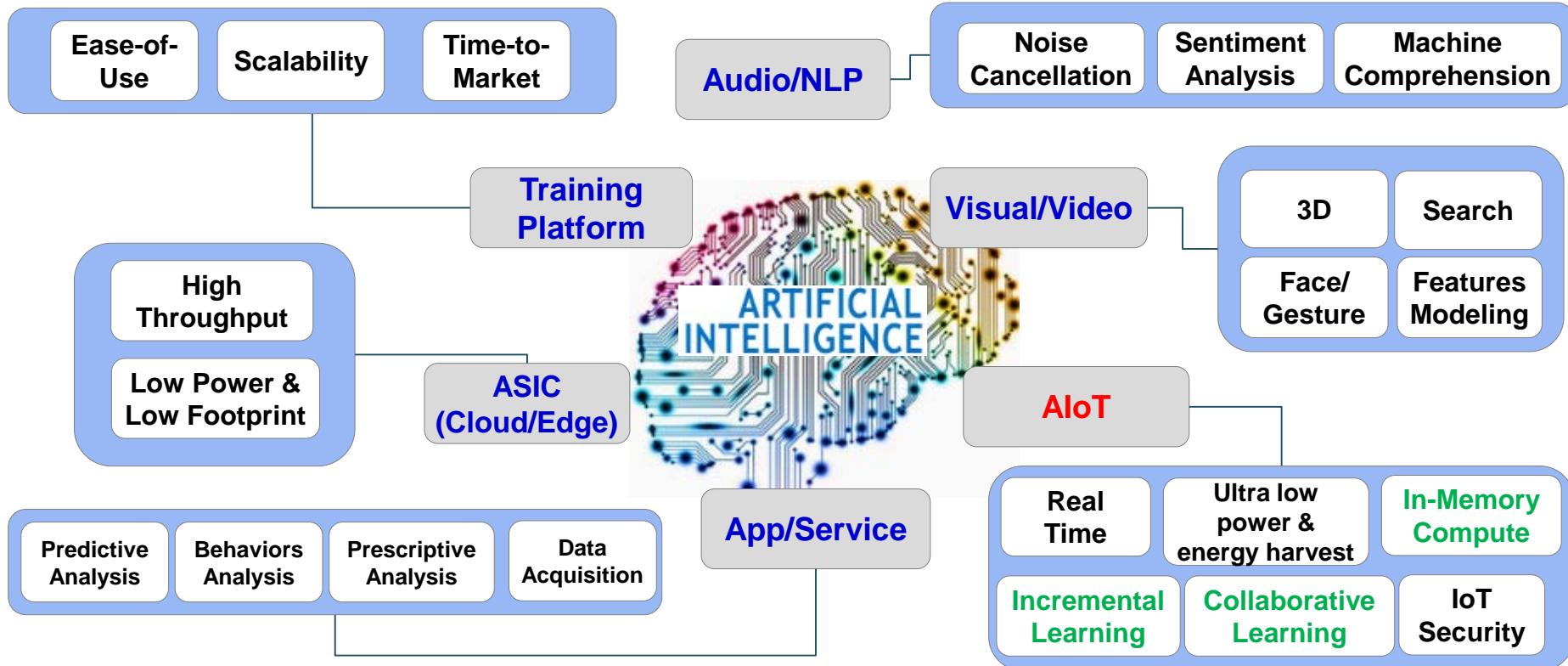


splunk > vmware



AI領域發展重點方向與臺灣機會

- ✓ AIoT晶片市場預計到2025年將達390億美元，CAGR為20%。
- ✓ AIoT少量多樣碎片市場特性提供臺灣新創參與全球End-to-End研發生態系並價值創造利基。



關鍵議題與展望：

- AI的全面導入與應用將大幅提升企業對未來預測掌握之精準性以及營運決策的即時性，同時提供客戶端更為貼切且適時適地適性的客製化服務。
- 跨領域跨學科協同合作是發展關鍵(電機、資工、機械、教育學、社會學、管理學、心理學)。

智慧製造意涵與發展趨勢

美國國家標準與技術研究院(NIST)的報告對智慧製造(Smart Manufacturing)的解釋為：

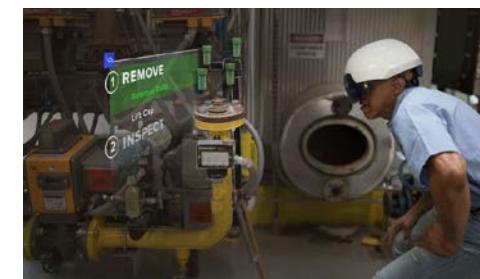
- 先進製造能力與數位科技的融合(synthesis)與協同合作，使客製化產品製造能更彈性快速、便宜、品質更好，同時生產過程更綠色環保



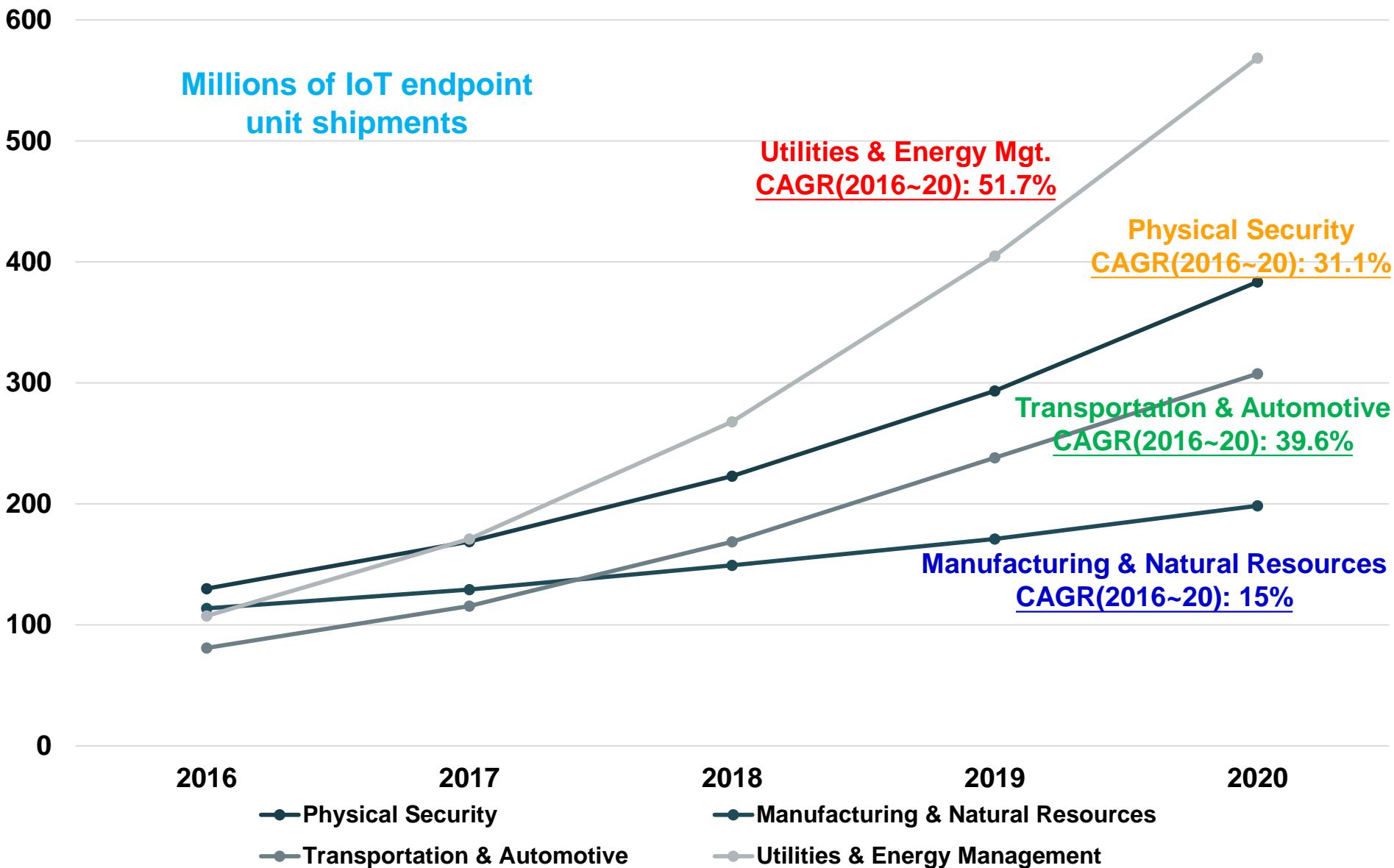
智慧製造發展關鍵技術與議題



- 以服務為導向、跨供應鏈跨企業的未來製造新商業與獲利模式
- 客製化、個性化、彈性化商品製造以滿足新世代與多元族群消費需求
- 機器設備、產線與工廠數位化、聯網化、智慧化、可視化，提升生產效能
- 確保具可靠、可知、可控的安全性人機界面與人機協作共工
- 先進材料與積層製造/3D列印
- AR/VR/MR的導入與應用



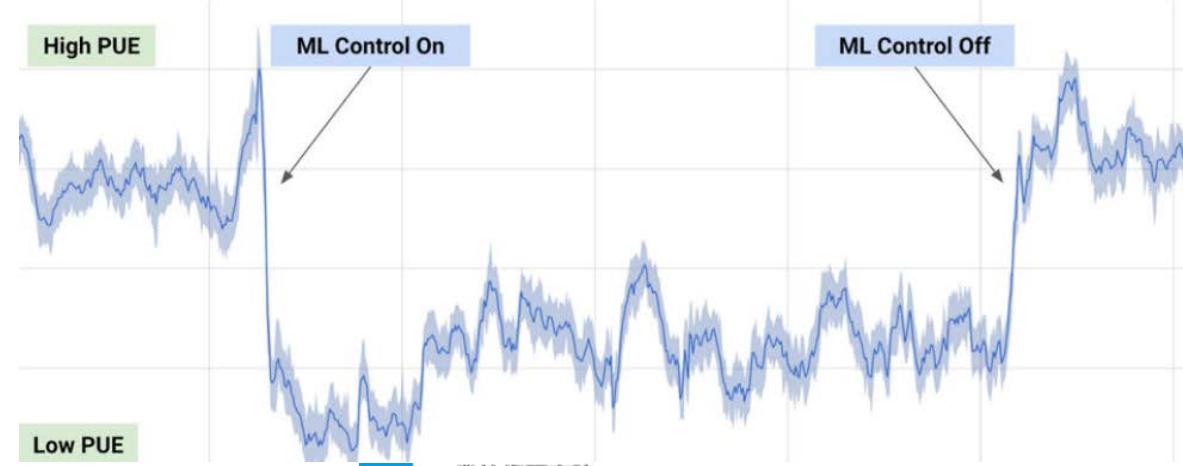
B2B物聯網終端在能源管理領域使用量最大



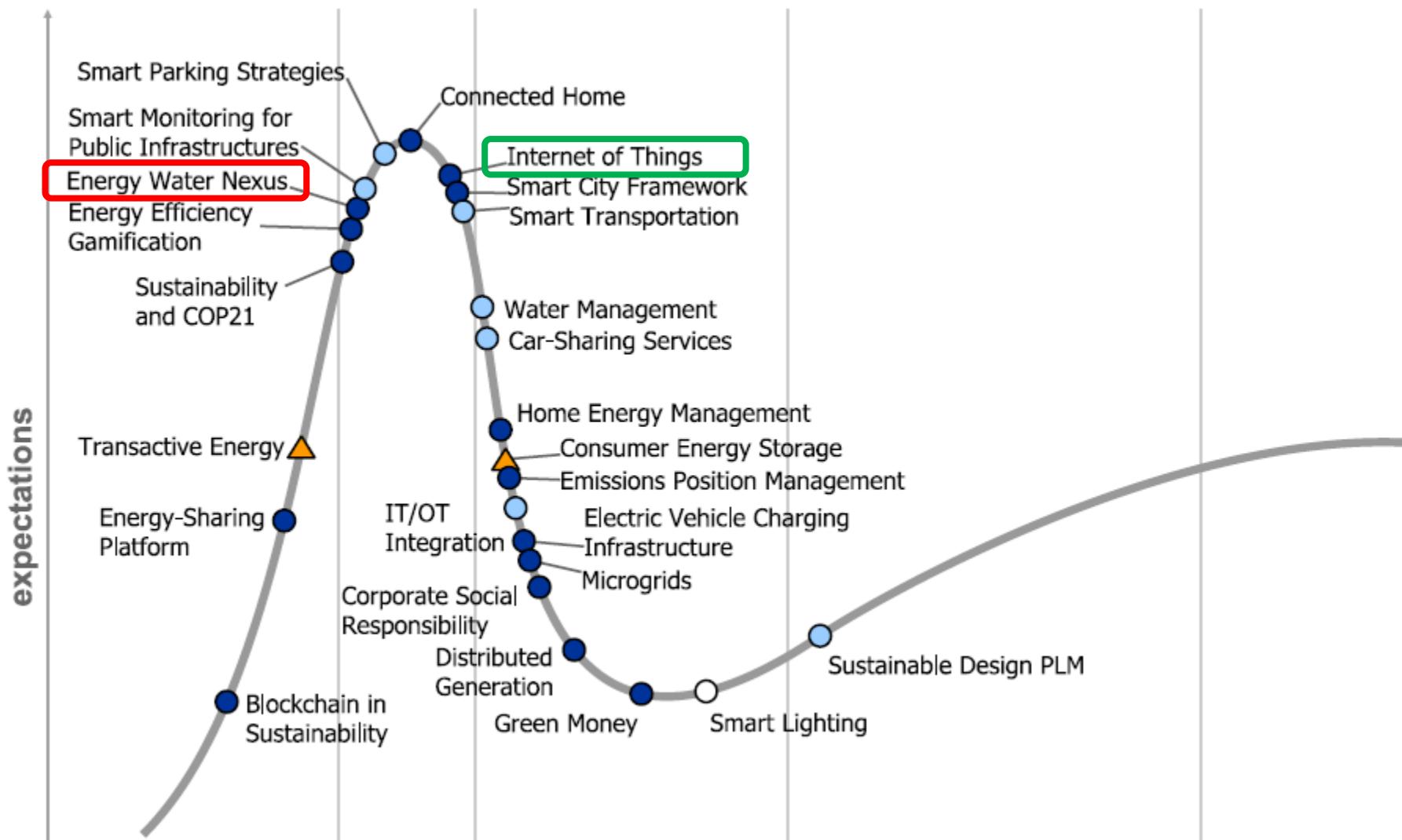
DeepMind reinforcement learning reduces Google data center cooling bill by 40%

- Gartner's 2016 IoT Backbone Survey found that internally focused IoT projects, particularly those addressing **operational efficiencies**, topped the priority list for organizations.
- Leveraging **thousands of sensors within the data center**, collecting data such as **temperatures, power, pump speeds etc.**, Google succeeded in reducing its cooling bill by 40%, and **improving energy usage around 3.5 times the computing power out of the same amount of power consumption**.

PUE = Power Usage Effectiveness



Hype Cycle for Sustainability Technology



微軟AI for Earth贊助計畫

Jane Goodall Institute (Africa)
Using the power of Azure cloud to identify chimpanzee habitat connectivity and conservation priorities in Africa
Biodiversity

International Center for Tropical Agriculture (Africa)
Enhancing food and nutrition resilience in Africa through a Nutrition Early Warning System (NEWS)
Agriculture

Southern California Coastal Water Research Project (USA)
Using imagery from unmanned aerial systems (drones) to identify trash in waterways to inform cleanup efforts and determine trash policy effectiveness
Water

Lakehead University (Canada)
Development of a forest resource inventory by utilizing deep learning for automated tree species identification, stand delineation and land classification
Biodiversity, Climate

University of Saskatchewan (Canada)
Image and Video Analysis for Rapid Crop Phenotyping: Predicting Crop Phenotypes from Genotypes with Deep Learning
Agriculture

Carnegie Mellon University (USA)
Improving Patrol Strategy to Combat Poaching using Deep Reinforcement Learning
Biodiversity

Ghent University (Belgium)
Applying ML and AI to ultimately turn agricultural data into automated animal health and welfare monitoring tools
Agriculture

Audubon Society (USA)
Using Cloud-based, High-throughput Image Classification Solutions to Conserve Biodiversity in Response to Extreme Weather Events and Rapid Landscape Change
Biodiversity, Climate

Brigham Young University (USA)
Improved streamflow forecasting service for flood and drought prediction at a local and global scale
Water, Agriculture, Climate, Biodiversity

University of Wisconsin-Madison (USA)
Development of an Automated Computer Vision System to Monitor Behavior of Dairy Calves
Agriculture

Michigan State University (USA)
Complexity as a holistic path to sustainability, not a roadblock
Agriculture, Climate, Biodiversity

Aalborg University (Denmark)
High-Resolution Spatialized Population Projections
Climate

Brown University (USA)
Assessing surface water sensitivity to permafrost extent using CubeSat imagery and machine learning
Climate, Agriculture

University of Missouri (USA)
Species Detection from camera trap images
Biodiversity

Duke University (USA)
Developing cloud-based workflows for mapping and censusing seabird breeding colonies at scale with Unmanned Aircraft Systems and machine learning
Biodiversity

International Crops Research Institute for the Semi-Arid Tropics (India)
Plant pest prediction models and farm advisory
Agriculture

Technical University of Munich (Germany); Indian Institute of Technology (India)
Low-cost Handheld Plant Health Monitoring Device for Resource Limited Regions
Agriculture

Indraprastha Institute of Information Technology (India)
Intelligent Tool For Monitoring Monkey Population
Biodiversity

Politechnico di Milano (Italy)
Deep learning for snow monitoring and predictive water system operation
Water

Northeastern University (USA)
The Networked Digital Earth for Harnessing Complexity and Designing Policy
Climate

Global Environment and Technology Foundation (USA)
Machine Learning for Improved Water Services
Water

iNaturalist (USA)
Using Azure to store and analyze data from citizen scientists recording observations on the distribution of Earth's biodiversity
Biodiversity

University of Sts. Cyril and Methodius (Macedonia)
Cloud Based General Weed Detection Service
Agriculture

Yale University School of Forestry and Environmental Studies (USA)
Systematic ground truthing, land classification and crop health
Agriculture

University of Oviedo (Spain)
Development of tools for risk assessment in coastal areas with Geographic Information Systems
Water, Climate

University of Bucharest (Romania)
Integrated assessment of the variability of the Urban Heat Island of Bucharest (Romania) using coupled WRF, LSM and satellite imagery
Climate

Taiwan AI (Taiwan)
Beyond Beauty – Homeland From Above
Agriculture, Climate

University of Maryland at Baltimore County (USA)
Predicting Climate Change Research Using Dynamic Data Assimilation for Topic Modeling
Climate

Tohoku University (Japan); University of California, Irvine (USA)
Dynamic Disaster Management Cloud Service Platform Based on Satellite Remote Sensing and Artificial Intelligence
Climate

Georgia Institute of Technology (USA)
Deep Learning for Fine-scale Population Maps
Water, Biodiversity, Climate

University of Waterloo (Canada)
Using Azure Services for Integrated Environmental Monitoring, Modelling and Decision Making
Water, Biodiversity, Climate, Agriculture

WetDATA (USA)
Democratizing access to water data to accelerate innovation through data visualization, predictive analytics and artificial intelligence applications
Water

The Trust for Public Land (USA)
The Trust for Public Land Microsoft Azure Data Science Machine Pilot Concept
Climate

University of Iowa (USA)
Knowledge Discovery, Integration and Communication for Extreme Weather and Flood Resilience Using Artificial Intelligence
Water, Climate

Cornell University (USA)
Artificial Intelligence Driven Yield and Crop Cover Forecasting Utilizing Real-Time Precision Agriculture Data
Agriculture

Long Live the Kings (USA)
Water, climate, and food web effects on the survival of Puget Sound salmon: bolstering marine ecosystem modeling with Azure cloud computing
Water, Climate, Agriculture

Chesapeake Conservancy (USA)
Giving organizations a faster, more effective, and lower cost land cover mapping tool to help them better analyze, monitor, and manage natural resources
Agriculture, Biodiversity, Climate, Water

Key

- ◆ AGRICULTURE
- ◆ WATER
- ◆ BIODIVERSITY
- ◆ CLIMATE CHANGE
- ◆ MULTIPLE



謝謝

楊瑞臨
研究總監
ray@itri.org.tw
02-27377357

IEK View

<http://ieknet.iek.org.tw>

以上簡報所提供之資訊，在尖端科技發展與產業變動中，無法保證資訊的時效性及完整性，使用者應自行承擔因使用本簡報資料可能產生之任何損害。著作權歸工研院所有，非經書面允許，不得以任何形式進行局部或全部之重製、公開傳輸、改作、散布或其他利用本簡報資料之行為。



工業技術研究院
Industrial Technology
Research Institute

Copyright 2018
All Rights Reserved