台灣產業升級之策略:
HPC, Cloud, Big Data & IoT

國家高速網路與計算中心

CECEA 林芳邦 組長

NARLabs 國家實驗研究院
國家高速網路與計算中心

National Center for High Performance Computing



1991
Taiwan's first National level supercomputer Center

1993
Hsinchu Headquarters

2003
NPO under NARLabs

2004
TWAREN services

2005
Tainan Office

2008
Taichung Office

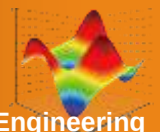
2011
177 TF Windrider super-computer

2016
200G Network Backbone

2016
Start Peta super-computer Building

NCHC Dev. & Service Framework

Applications


Engineering and Science


Biomedical Science


Environment and Disaster Prevention


Social Science and Economics


Digital Cultural Creation


Emerging Applications

Cloud Services

Infrastructure as a Service
- HPC /Virtual machines
- Storage
- Networking

Platform as a Service
- Big data analysis Platform Braavos
- Render farm
- simPlatform for HPC

Software as a Service
- NARL digital service
- Colife education platform
- Scientific & engineering simulation

Core Technologies

High performance computing | Cloud technology integration | Big data computing | Network and information security | Visualization

Core Facilities

High performance computers
Big data analysis clusters

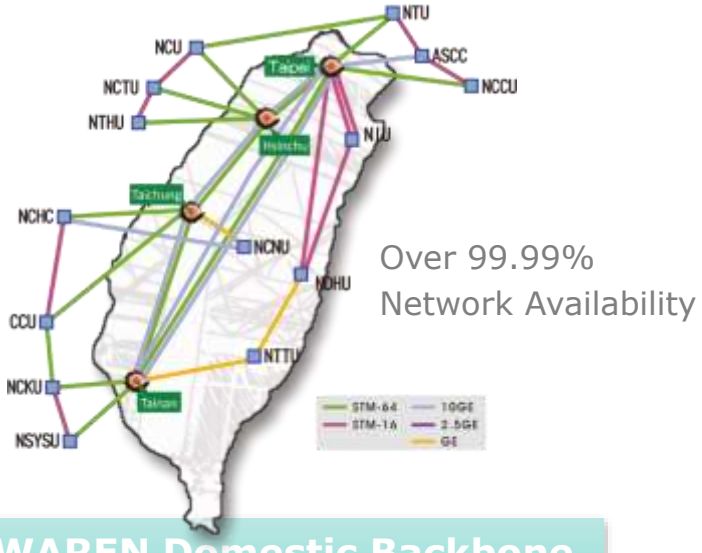

High performance storage equipment


High quality high bandwidth academic research network

Research and Education Network

TaiWan Advanced & REsearch Network

- **100G Bandwidth**
  12 regional networks
  94 universities & research institutes
  500 K. users
- Link with TANet: 4000 schools, 4.5 M. users



Over 99.99%
Network Availability

TWAREN Domestic Backbone

- **20G Bandwidth**
  w/35 int'l research networks

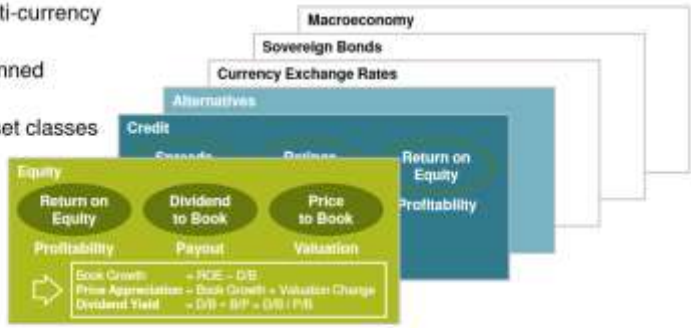
TWAREN International Connection

HPC impact on Finance Services

➡ **smart**

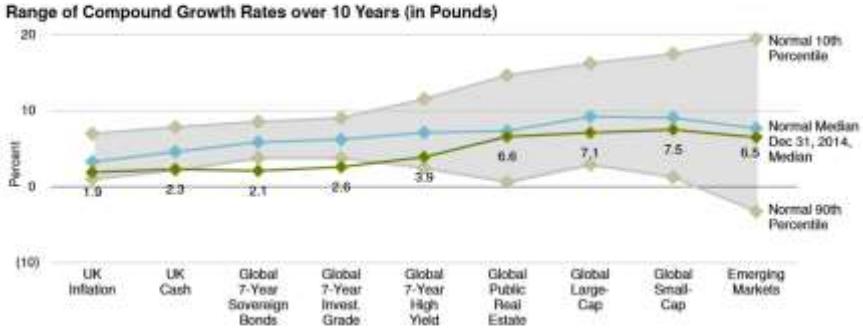
Capital Markets Engine Modelling the Economic Building Blocks of Return

- Global real-world scenarios
- Multiple horizons, multi-currency
- Economically underpinned
- Consistent across asset classes



Typically 10,000+ scenarios are needed for reliable outcomes such as converged prices and risk sensitivities and accurate measurement of tail risks

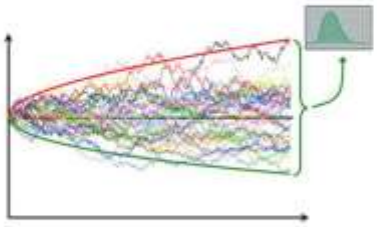
Multitude of Scenarios Captures both Risks and Returns

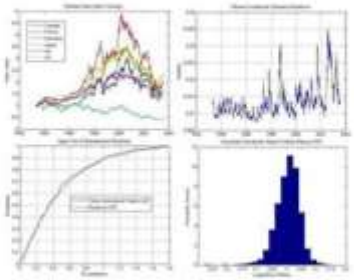


View of the future by means of probabilities, not point forecasts

Source: Erik Vynckier

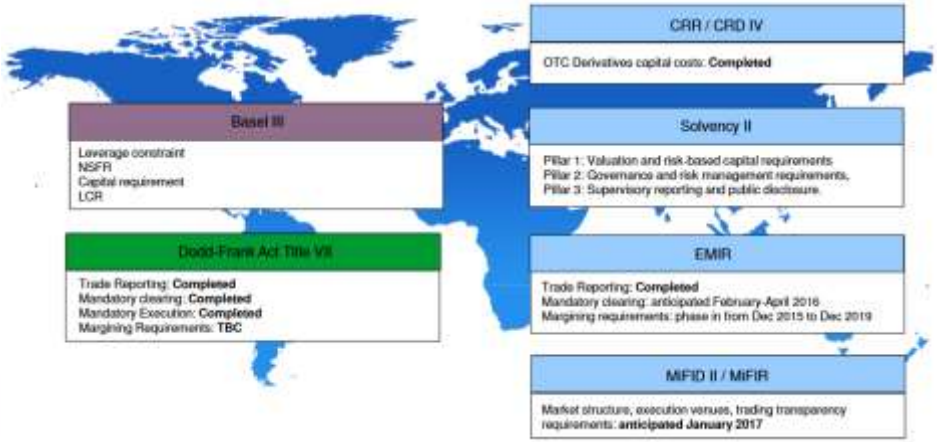
Computationally Intensive Monte Carlo Simulation in Finance Often Embarrassingly Parallel





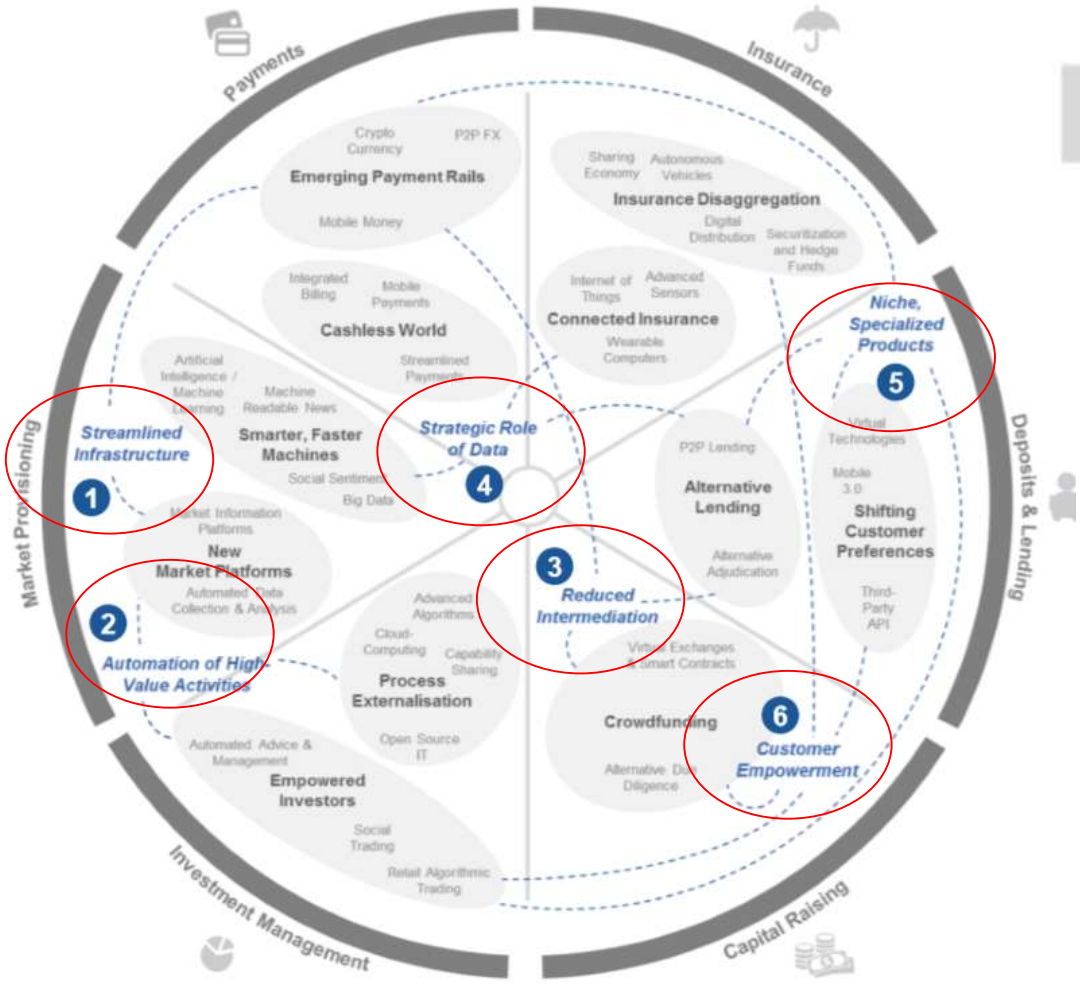
Entrenched method for modelling financial risks and deriving metrics, such as option pricing, risk sensitivities and Value @ Risk

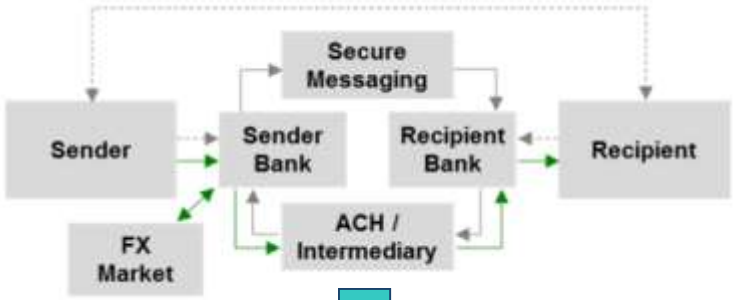
Regulations on Capital, Derivatives and Trading Affecting Corporate Banks, Investment Banks, Pension Funds, Hedge Funds …



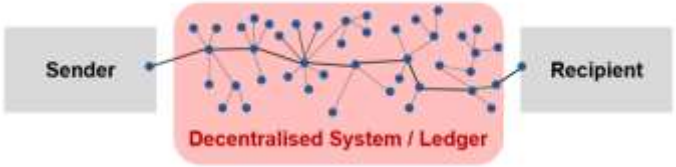
Enable “Fintech"

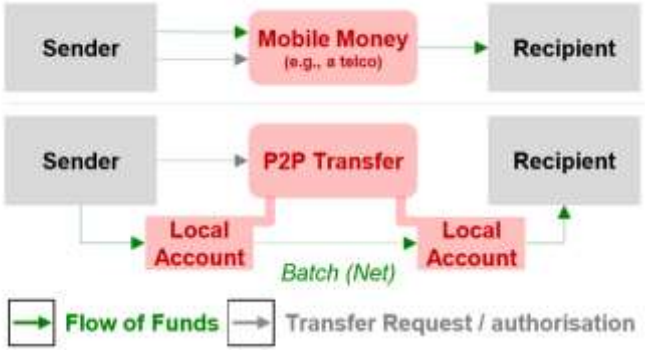
➡ connected & smarter





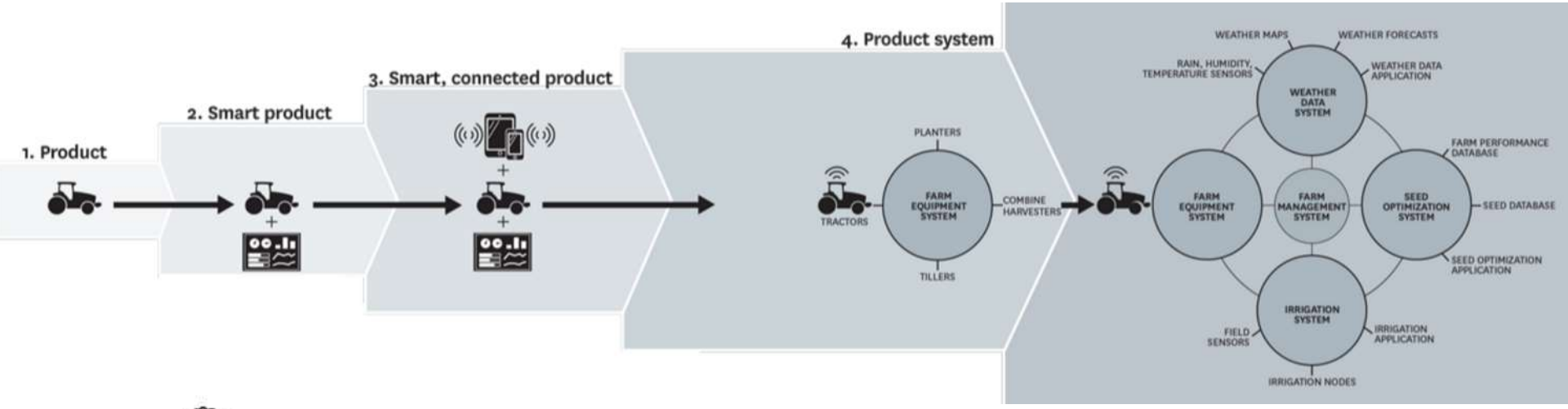
Illustrative Distributed Payment Network

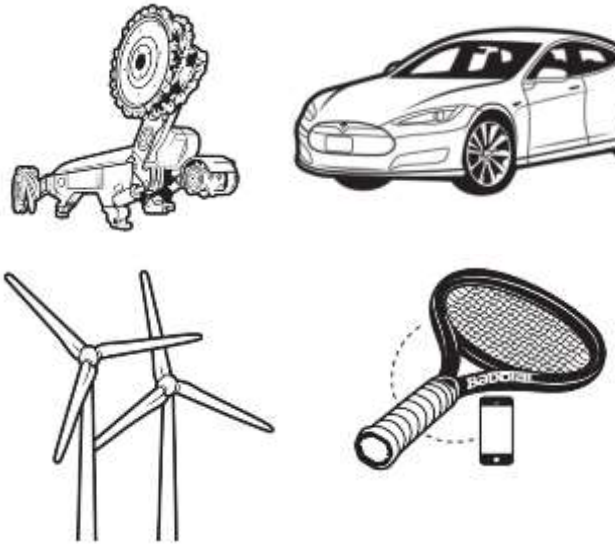




Source: WEFreport: “The Future of Financial Services”

How **Smart, Connected** Products are Transforming Competition





source:NASA Earth at night

Source: Michael Porter, HBR Nov, 2014

Cloud, Big Data & IoT: New Economics Opportunity

BIG DATA ECOSYSTEM : FROM DATA TO DECISIONS

DATA CREATION

PRODUCERS

- Machine and Sensors
- Geolocation
- Transaction and Usage Logs
- Mobile Apps Data
- Email and Messaging
- Relationships and Social Influence

VOLUME
VELOCITY
VARIETY

DATA ACQUISITION

ARCHITECTS / ENGINEERS

- Shared Nothing Scale-out Storage + SSD
- Converged Infrastructure
- MPP + In-Memory Compute
- Hi-Speed / -Resiliency Networking
- Non-relational DWH
- Hadoop
- Cloud

SYSTEMS INTEGRATION

OBJECTIVES

- DEEP INSIGHTS
- REAL-TIME EVENTS

INFO PROCESSING

ANALYSTS / SCIENTISTS

- Data Exploration
- Contextualized Data
- Modeling / Scenarios
- Forecasting
- Stream Processing
- Event Management

DELIVERY MODELS

- ON-DEMAND
- PUSH
- EMBEDDED

BUSINESS PROCESS

END USERS

- Access-Anywhere Analytics Services
- Context-Aware Business Applications
- Location-Based Services
- Alert and Respond
- Workflow and Interaction Automation
- Smart devices and systems

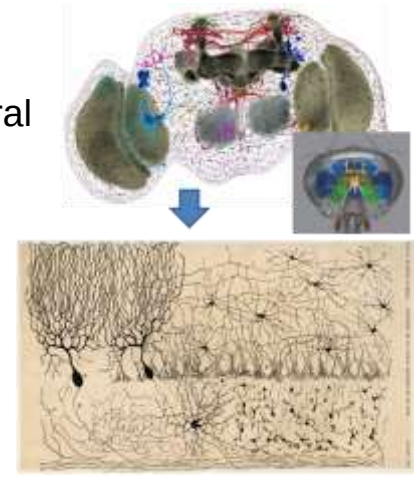
VALUE

Example in Trading Network

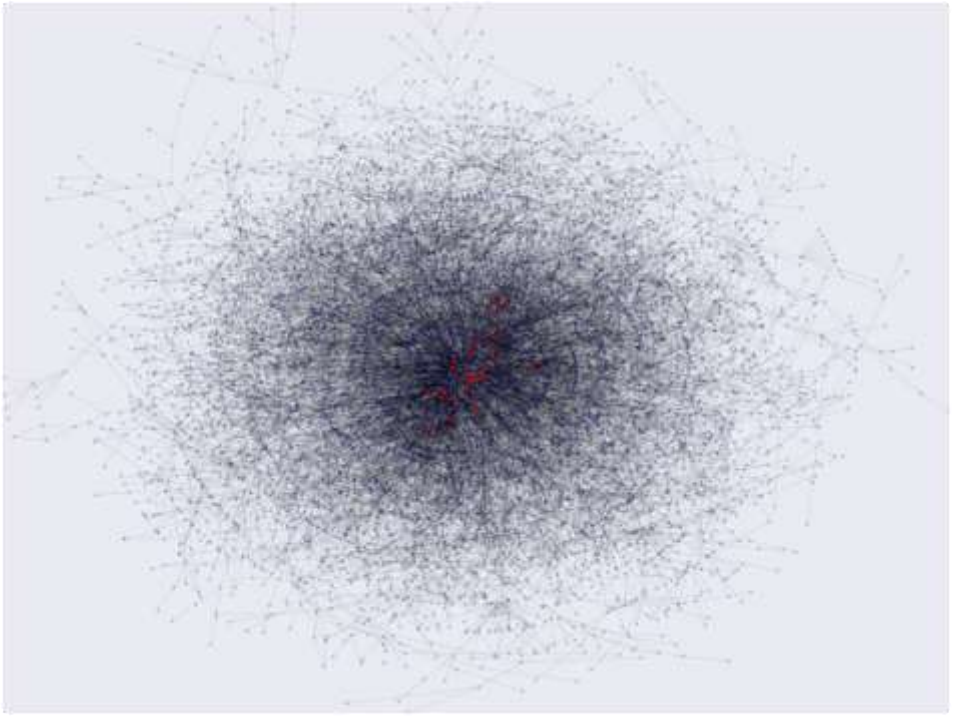
Search for Domestic Money Laundry

Trading records 100,000,000 ~1,000,000,000 per year

The relationship of Neural network matter
The number of connectivity reaches 10,000~100,000



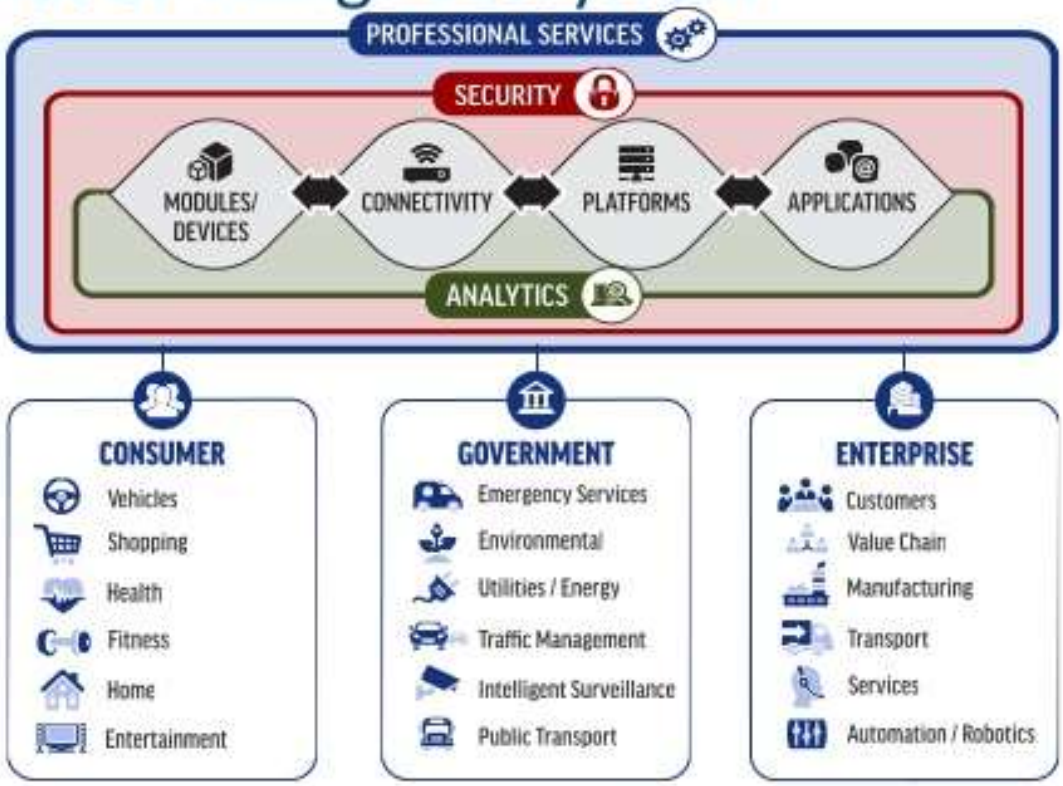
Source: Ramon y Cajal's first drawing on neural networks



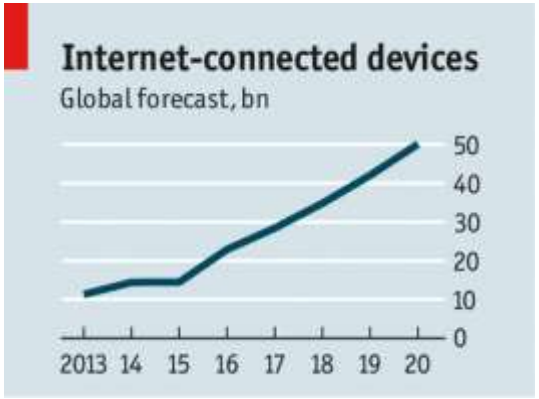
The trading activities between companies in Taiwan

Source: http://weichengliou.github.io/blog/blog/2014/08/06/twcom/

Internet of Things Ecosystem

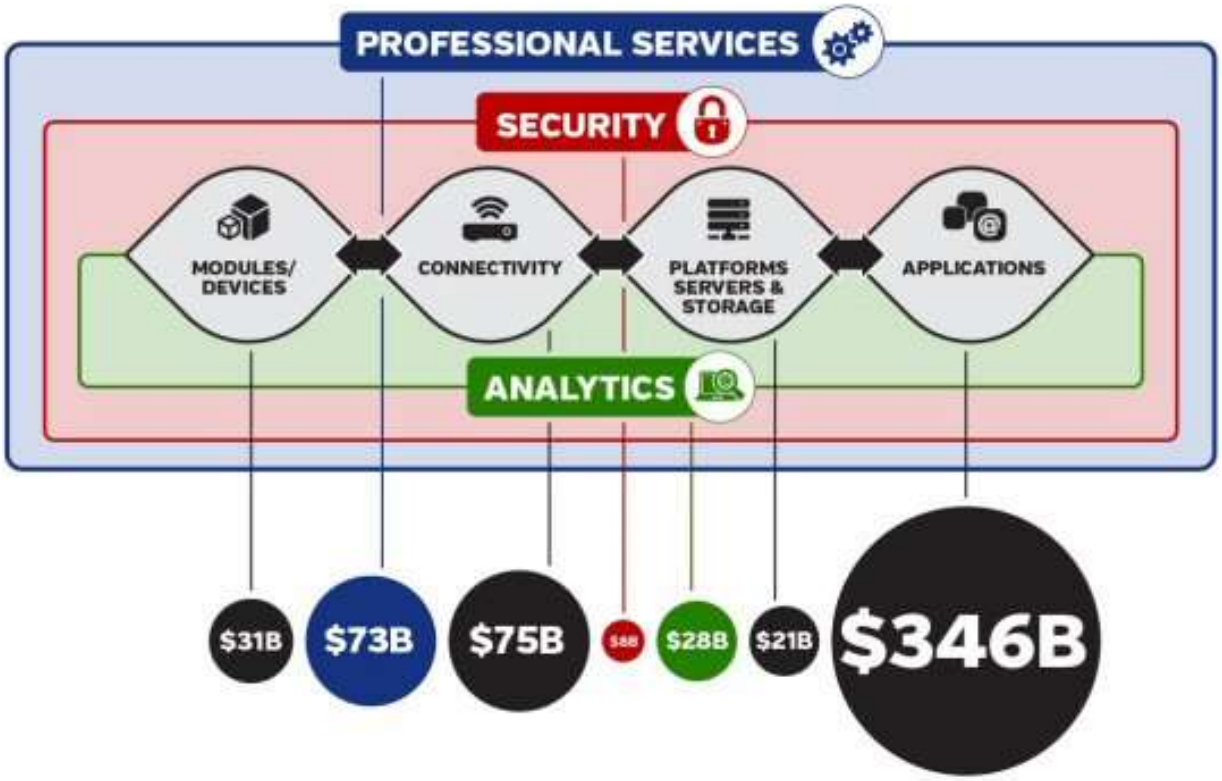


IDC



Source: Economist

THE IoT ECOSYSTEM MARKET OPPORTUNITY



Source: IDC & Economist

面對新的技術時, 如何創造價值？

Contents

CECEA

❖壹、我國產業現況

我國產業現況

- 以出口拉動國家經濟命脈
- 出口產品多為代工，產業型態以製造業為主
- 面臨產業轉型與重組之時刻

我國產業面臨之問題(1)

一、出口貿易衰退

1. 國際市場需求疲軟，以資通與視聽產品、電子零組件、基本金屬及其製品、 光學器材等減少較多，僅機械微幅增加
2. 主要出口市場方面，歐洲市場緩中趨穩，亞、美需求續顯疲弱。
3. 物聯網、大數據等新興應用持續拓展，帶動電子零組件需求隱現

圖 1　出口金額及年增率

表 2　出口貨品

單位：百萬美元；%

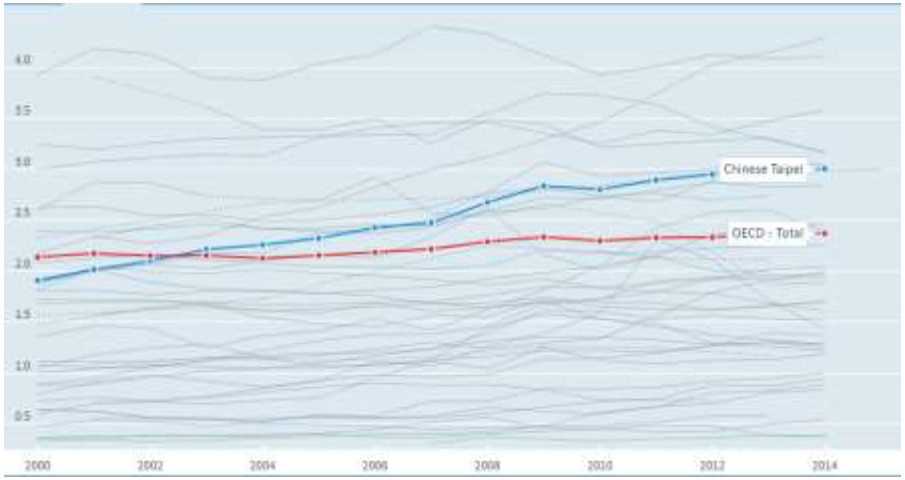
	4月				1～4月累計			
	金　額	構成比%	與上年同月比較		金　額	構成比%	與上年同期比較	
			增減金額	增減%			增減金額	增減%
按主要貨品分								
電子零組件	6,893	31.0	-244	-3.4	26,892	31.7	-1,192	-4.2
資通與視聽產品	2,381	10.7	-305	-11.4	8,996	10.6	-1,231	-12.0
基本金屬及其製品	1,908	8.6	-242	-11.3	7,386	8.7	-1,330	-15.3
機械	1,794	8.1	42	2.4	6,687	7.9	-448	-6.3
塑橡膠及其製品	1,711	7.7	-118	-6.4	6,281	7.4	-834	-11.7
化學品	1,477	6.6	-73	-4.7	5,515	6.5	-846	-13.3
紡織品	936	4.2	-55	-5.6	3,323	3.9	-330	-9.0
光學器材	871	3.9	-153	-15.0	3,276	3.9	-1,142	-25.9
礦產品	833	3.7	-106	-11.3	3,198	3.8	-772	-19.4
電機產品	813	3.7	-122	-13.1	3,012	3.5	-772	-20.4
運輸工具	810	3.6	-51	-5.9	3,363	4.0	-400	-10.6
按貿易結構分								
農產品	77	0.3	4	5.4	295	0.3	-31	-9.4
農產加工品	245	1.1	-11	-4.4	976	1.1	-21	-2.1
工業產品	21,928	98.6	-1,545	-6.6	83,646	98.5	-10,137	-10.8
重化工業產品	17,618	79.2	-1,320	-7.0	67,487	79.5	-8,605	-11.3
非重化工業產品	4,310	19.4	-224	-4.9	16,159	19.0	-1,532	-8.7

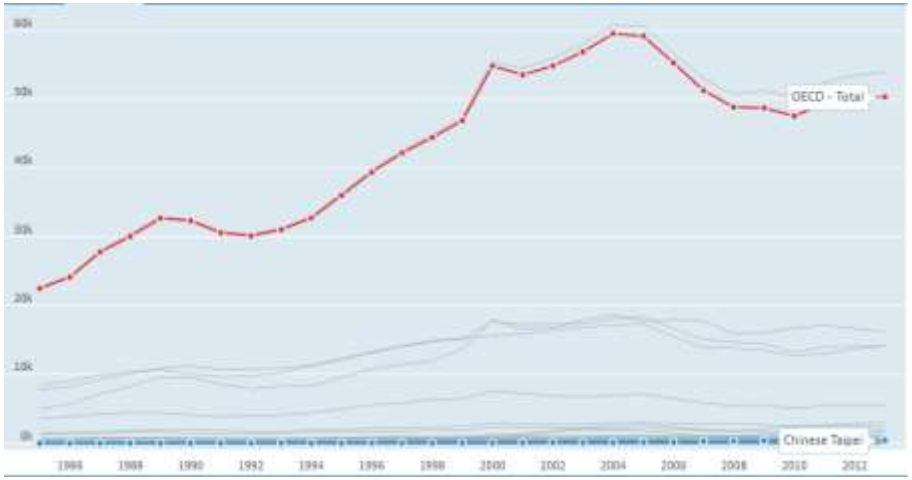
資料來源：財政部

我國產業面臨之問題(2)

二、產業空洞化

1. 我國產業特性為代工，製造技術極佳，但缺乏核心的關鍵技術
2. 重視成本端：製程改善及強化效率
3. 製造業廠商不需直接面對市場與消費者，更無需建立品牌與創新發明。





我國研發資金較OCED國家平均較高，然而，**「研發」**對於以代工製造為主的台灣來講，代表什麼意義？於研發費用中，到底「研究」比例佔多少？「發展」比例佔多少？另外，轉化為競爭力的優勢，研發資源配置的質變，更是重要。

多國專利支出上較OCED國家平均而言明顯不足，探究原因，我國在主要市場之專利佈局情形，以申請 USPTO 專利為主，多國佈局的傾向較弱，僅表現於「防禦」，並未特別重視從專利中獲取利益，可解釋我國技術貿易額偏低的原因，造成我國廠商在創造附加價值的能力上沒有先進國家企業佳。

資料來源：OECD官網統計

- 產業發展目標

我國未來發展目標

綠能科技

1.成熟再生能源產業
2.具開發潛力或全球獨特地位之再生能源
3.節能、儲能、綠色製程

國防產業

1.提升國防戰力
2.提升國防產業
3.三大核心領域：航太、船艦、資安

亞洲矽谷

1.連結矽谷與國際創新中心
2.搶進下一世代產業供應鏈
3.成為亞太青年創新與創業發展基地

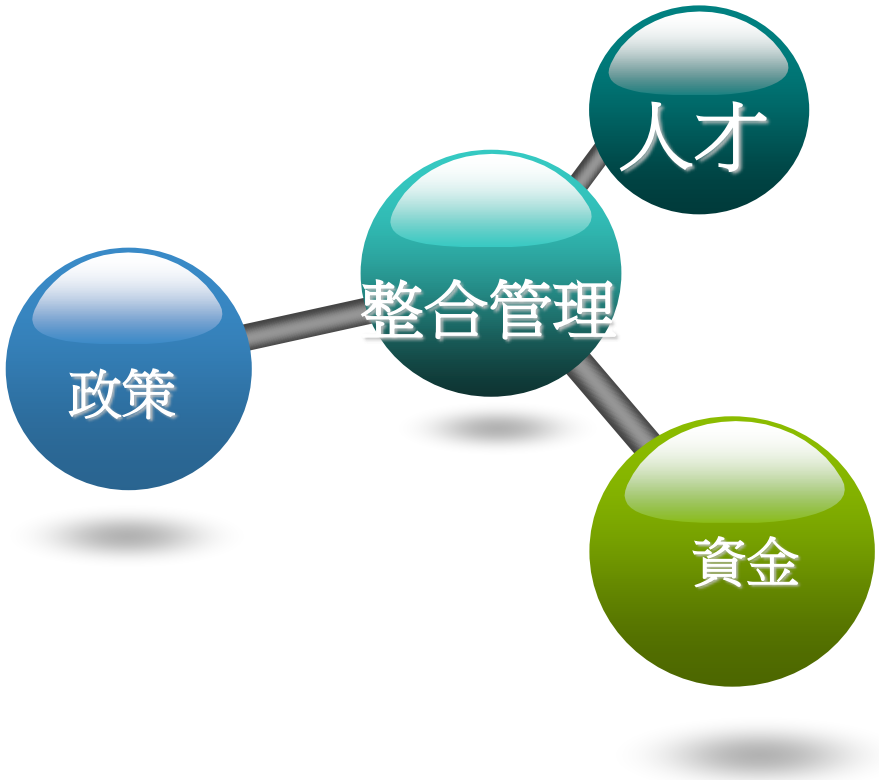
智慧機械

1.精密機械升級為智慧機械
2.成為全球前五大生產國，第三大出口國
3.轉型升級、創造就業、擴大輸出、解決社會問題
4.以台中為核心帶動中台灣發票

生技醫療

1.打造亞太生技醫藥研發產業中心

佈局策略



人才：
- 學術單位-基礎研究

科技部(能源國家型科技計畫)、國研院、中研院、大學研發單位、技職人才訓練
- 研究機構-應用研究

工研院、

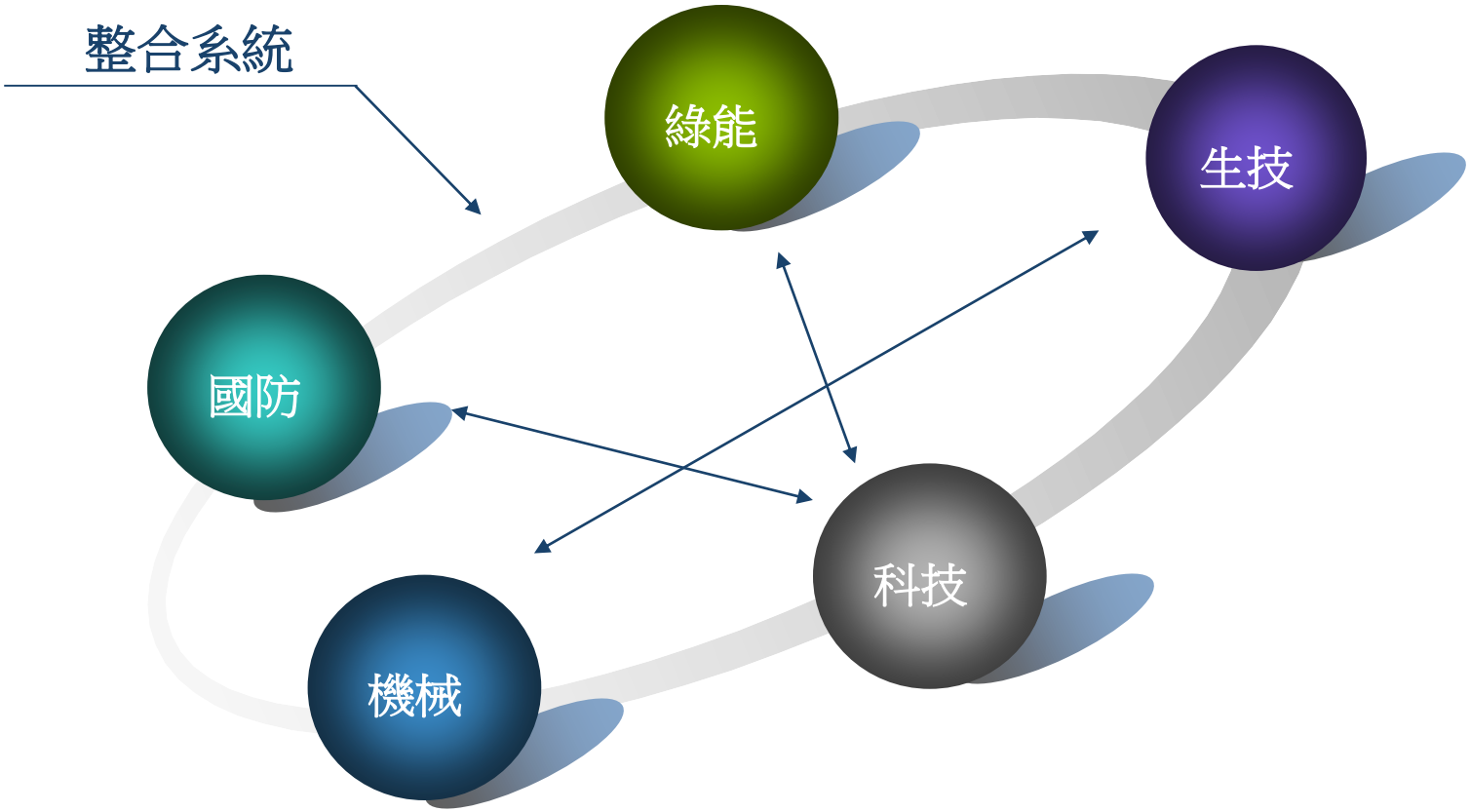
資金：
- 公務預算
- 天使創業基金
- 創新創業基金

政策：
- 建制並落實院級科技政策基本綱領
- 推動獎勵各界延攬與運用優質外科技人才辦法
- 強化技與社會溝通管道

整合管理：
- 加強基礎科學研發機構與社會、經濟的連結
- 產學合作平台與機制
- 強化科技與社會溝通管道
- 整合臺灣產業鏈
- 連結國際市場需求

❖ 產業鏈結

產業連結



流程圖

完善法規環境

人才、科技
資金、制度之完善

國內各產業均已發展成熟，惟大多停留在代工或加工出口，少有創新、加值型服務產業，政府應邀集產、官、學、研之專業人士，訂立人才、科技、資金之相關法令及完整配套措施，為後續建設奠定優良基礎。

產業整合

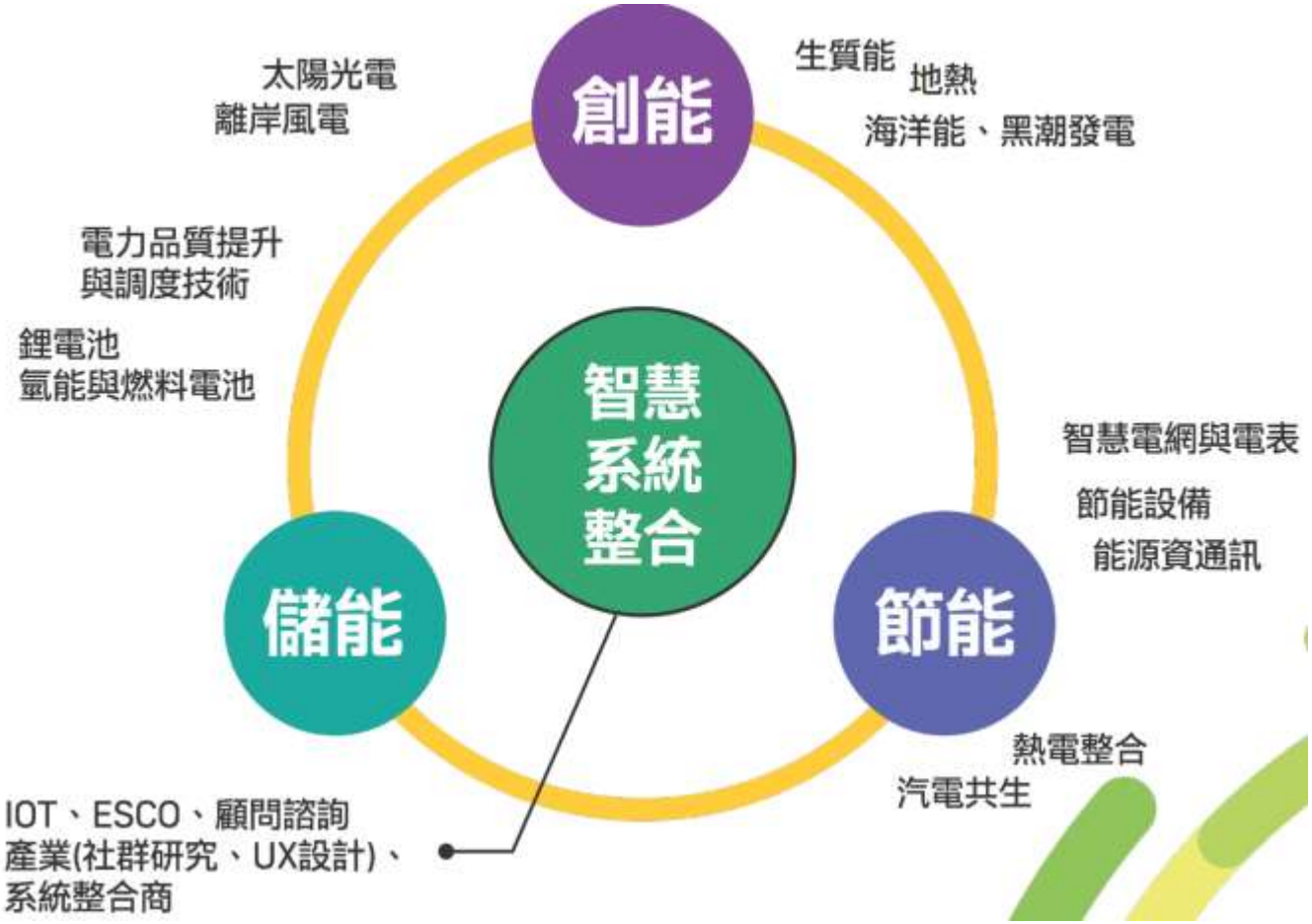
整合我國產業鏈結
實現綜效

實現產、官、學、研之連結，並成立科技、資金平臺，政府與社會、國際相互連結

綜效

智慧整合系統平臺

能源智慧系統整合範例


創能
太陽光電
離岸風電
生質能
地熱
海洋能、黑潮發電
儲能
電力品質提升
與調度技術
鋰電池
氫能與燃料電池
智慧
系統
整合
節能
智慧電網與電表
節能設備
能源資通訊
熱電整合
汽電共生
IOT、ESCO、顧問諮詢
產業(社群研究、UX設計)、
系統整合商

Thank You !

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