清華大學 產品開發研究室
PRODUCT REALIZATION LABORATORY

資訊系統子學門研究重點規劃

瞿志行

清華大學工業工程系

2013/09/04

國立清華大學
National Tsing-Hua University

感謝規劃委員協助

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資訊系統子學門定位

- 資訊科技於工業工程領域的角色不在資訊技術本身，而在於其對應用領域的創新、強化與效能改善。
- 發展重點為「數學原理與計算方法」促成之資訊系統，以及與「新興資通訊技術」的整合。
- 鼓勵跨領域的應用性研究議題，規劃六項研究重點
  - 產品與服務實現技術
  - 企業電子化
  - 新興工程技術應用
  - 永續發展應用
  - 醫療、復健與健康管理應用
  - 資通訊技術與文創社會

規劃研究重點

資訊系統子學門

資通訊工程技術

- IoT
- Sensing Technologies
- Cloud Computing
- Multi-Agent Systems
- Sensor Networks
- RFID
- Mobile Computing
- Semantic Web

產品與服務實現

企業電子化

新興工程技術

永續發展

文創社會

醫療復健照護

計算原理與方法

- Artificial Intelligence
- Machine Learning
- Search and Optimization
- Neural Networks
- Uncertain Reasoning
- Fuzzy Systems
- Soft Computing
- Control Theories

新興資通訊技術

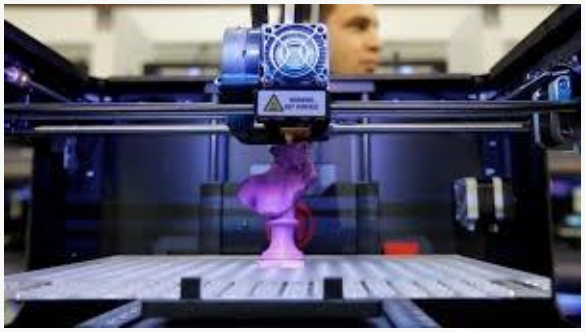
- 物聯網 (IoT, Internet of Things)
- 智慧型代理人 (Intelligent Agent)
- 深度感知技術 (Depth Sensing Technologies)
- 感知網路/普及計算 (Sensor Network/Pervasive Computing)
- 射頻辨識 (Radio Frequency Identification)
- 雲端運算 (Cloud Computing)
- 行動運算與裝置 (Mobile Computing and Devices)

產品與服務實現技術

- 電腦輔助設計 (Computer-Aided Design)
- 電腦輔助製造 (Computer-Aided Manufacturing)
- 電腦輔助製程規劃 (Computer-Aided Process Planning)
- 電腦輔助檢驗 (Computer-Aided Inspection)
- 電腦整合製造系統 (Computer Integrated Manufacturing)
- 協同設計 (Collaborative Design)
- 大量客製化與個人化 (Mass Customization and Personalization)
- 虛擬/擴充/混合實境 (VR/AR/MR)
- 永續設計 (Sustainable Design) 、永續製造 (Sustainable Manufacturing)
- 再製造、再使用與回收技術 (Remanufacturing, Reuse & Recycling)
- 三維列印/積層製造技術 (3D Printing/Additive Manufacturing)
- 三維量測 (3D Metrology)
- 產品服務系統 (Product Service System)

3D Printing

- 3D Printing (or additive/layered manufacturing) is not a new technology!
- Several 3D printing processes have been invented since the late 1980s.
- Traditional industrial applications include *rapid prototyping*, *rapid tooling*, and *mass customization*.
- Recent applications include *bio-material making*, *Nano fabrication*, *counter globalization*, and *digital art creation*.
- What can IE contribute to 3D Printing?



Courtesy by Prof. Carlo Sequin, UC Berkeley

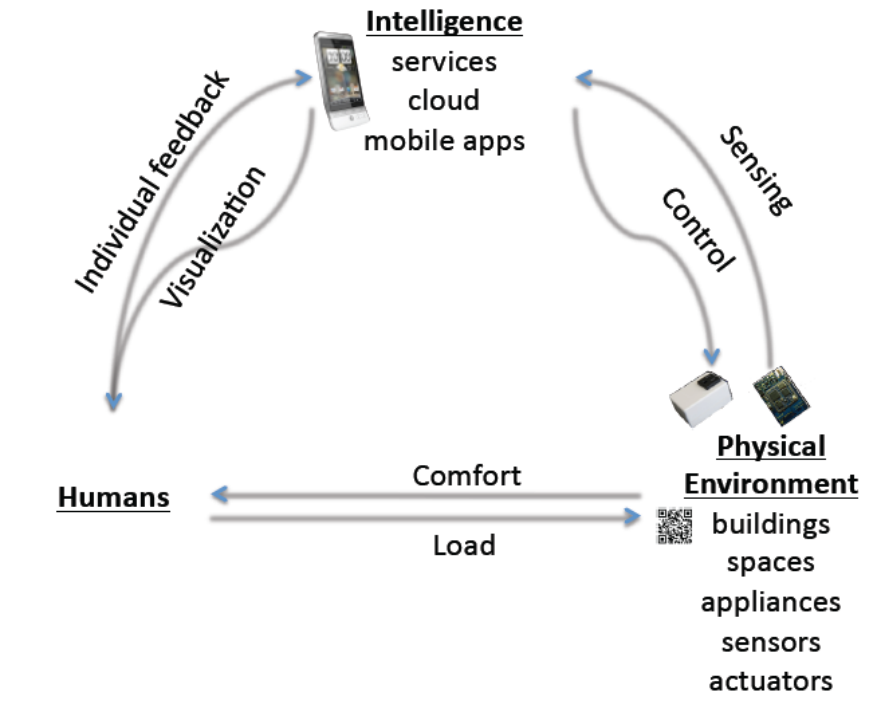
企業電子化

- 協同產品商務 (Collaborative Product Commerce)
- 產品生命週期管理 (Product Lifecycle Management)
- 企業流程管理 (Business Process Management)
- 企業資源規劃 (Enterprise Resource Planning)
- 供應鏈管理系統 (Supply Chain Management System)
- 需求管理系統 (Demand Management System)
- 協同規劃、預測與補貨 (CPFR)
- 客戶關係管理 (Customer Relationship Management)
- 商業智慧 (Business Intelligence)
- 知識管理 (Knowledge Management)
- 資產管理 (Asset Management)
- 智財管理 (IP Management)

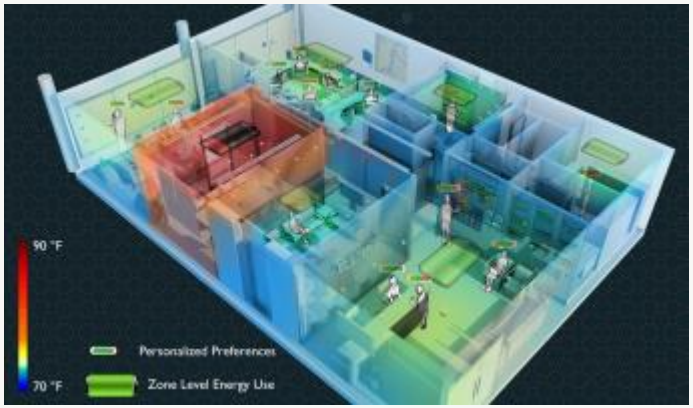
新興工程技術之應用

- 遠距監控與診斷 (Remote Monitoring and Diagnosis)
- 智慧建築 (Smart Building)
- 智慧生活 (Smart Living)
- 智慧工廠 (Smart Factory)
- 智慧型運輸系統 (Intelligent Transportation Systems)
- 智能電網 (Smart Grid)
- 巨量資料管理 (Big Data Management)
- 巨量資料儲存 (Big Data Storage)
- 巨量資料蒐集與加值促成 (Enabling Technologies for Big Data Collection and Value Addition)

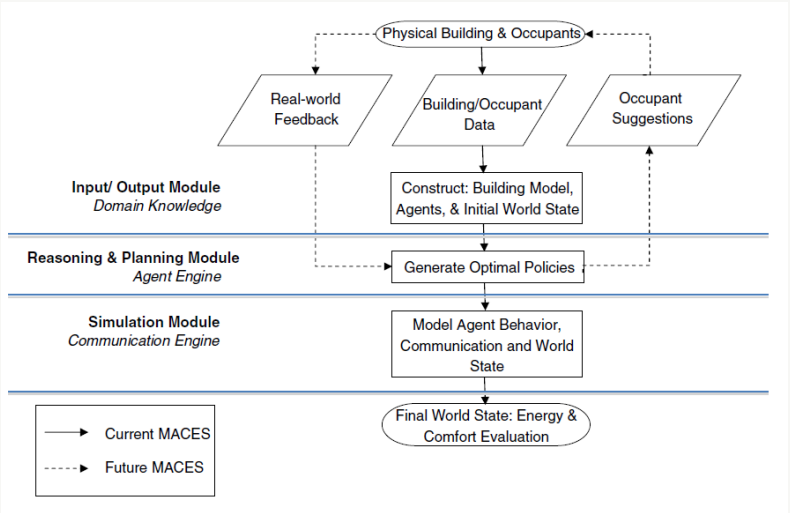
Human Building Interaction for Energy Management



Hsu et al 2010.

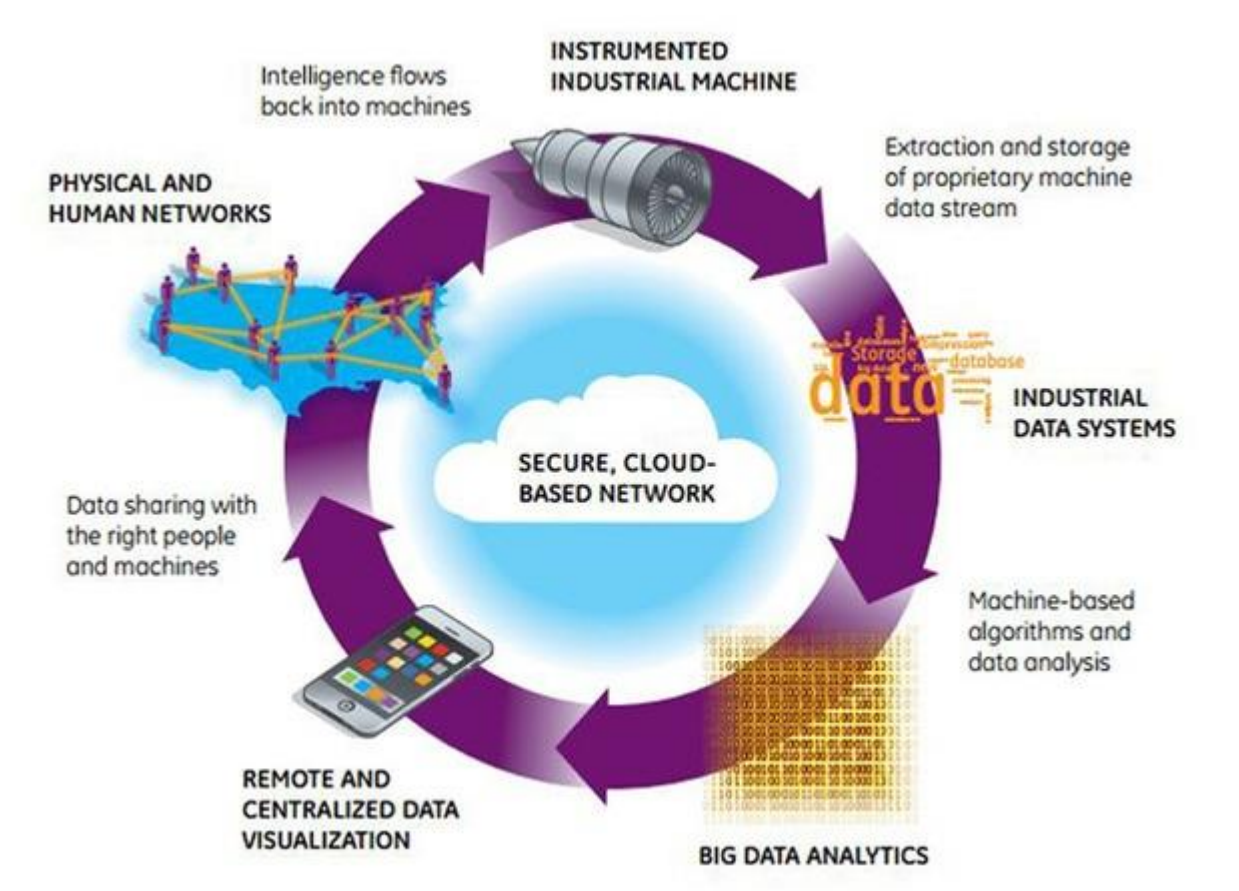


Building Energy Simulation: http://i-lab.usc.edu/sites.html



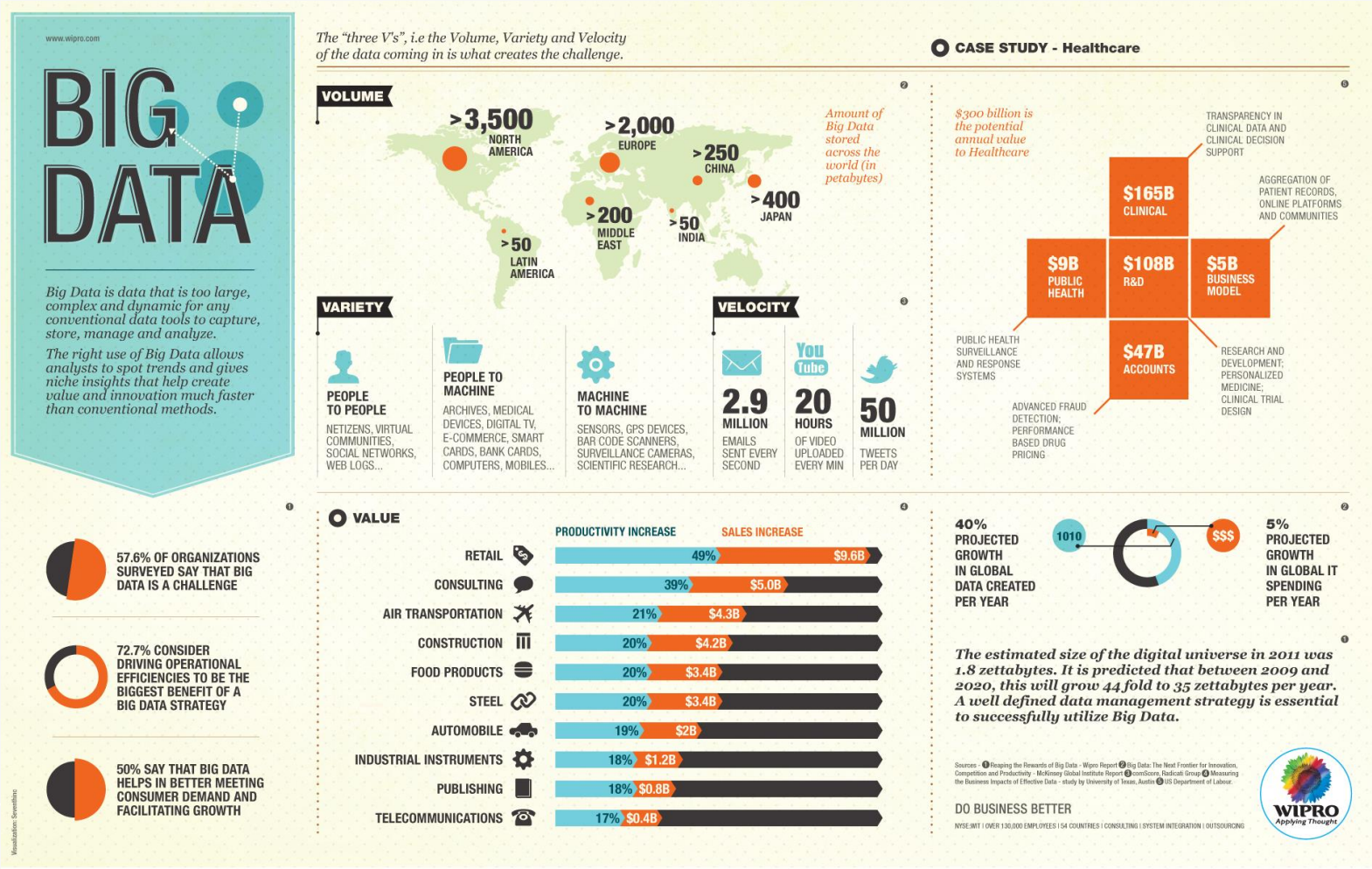
Klein et al. 2012

Cloud-based Automation



2013 IEEE TASE Board Meeting Presentation – Prof. K. Goldberg

Big Data Hype!



永續發展之應用

- 碳足跡管理 (Carbon Footprint Management)
- 供應商評估管理 (Supplier Assessment Management)
- 供應鏈風險管理 (Supply Chain Risk Management)
- 能源管理 (Energy Management)
- 資源管理 (Resource Management)
- 綠建築管理 (Green Building Management)
- 永續績效指標建置 (Sustainability Performance Indices)
- 社會生命週期評估 (Social Life Cycle Assessment)

醫療、復健與健康管理應用

- 醫療復健系統 (Medical and Rehabilitation Systems)
- 健康促進系統 (Health Promotion System)
- 醫療影像資料分析 (Clinical Analysis of Medical Image)
- 智慧輔助科技 (Intelligent Assistive Technologies)
- 行動健康照顧 (Mobile Health Care)
- 醫療健康決策輔助 (Medical and Health Decision Support)
- 電子健康紀錄、用藥資料與臨床資料之整合 (Integration of HER, Pharmaceutical and Clinical data)
- 病患賦能系統 (System for Empowering Patient)
- 在地老化 (Aging in place)

資通訊技術與文創社會

- 數位文創產業 (Digital Culture and Creative Industry)
- 社群媒體系統 (Social Media System)
- 網路學習系統 (E-Learning System)
- 遠距學習 (Distance Learning)
- 資通訊促成之社會創新 (ICT-Enabled Social Innovation)
- 資通訊促成之社會福祉 (ICT-Enabled Social Well-being)
- 社群網絡分析 (Social Network Analysis)
- 群眾外包 (Crowd Sourcing)
- 開放資料加值化 (Open Data Value Addition)
- 協同社群創新 (Collaborative Social Innovation)

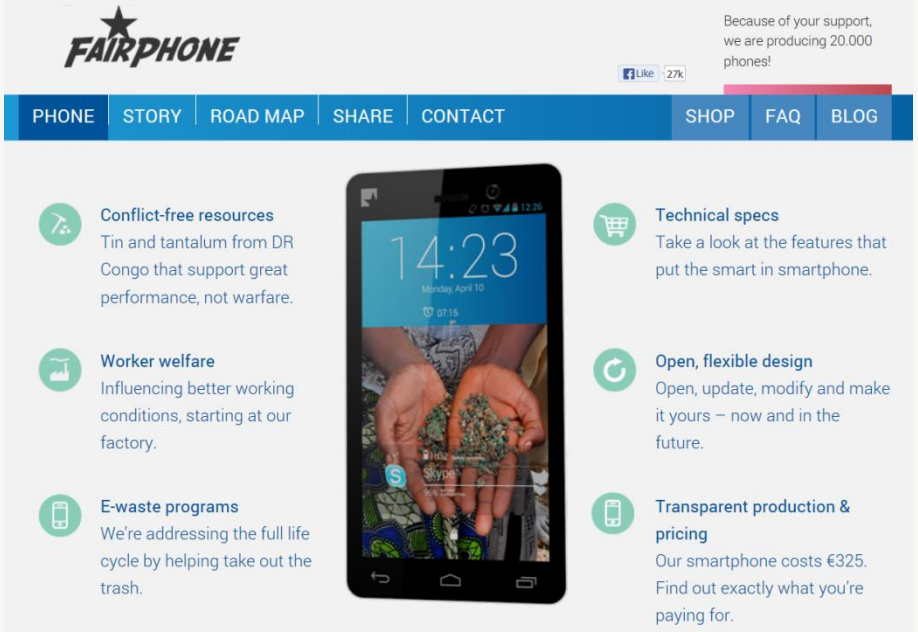
Crowd Sourced Big Data/Image

Data Mining Risk Management Behaviors Auto Insurance Coverage/Usage Footprint

Crowd Sourcing/Innovation

It's Official, Uber Is In Taipei.

Uber has officially launched in Taipei! You now have every reason to re-explore this city's hidden gems. Everything that we love about Taipei, whether it's the most bustling night clubs to night markets, just fire up the Uber app and we will get you where you need to go!



討論議題

- 鼓勵運用「數學原理與計算方法」加值、促成「新興資通訊技術」，產生創新性應用價值。
- 應積極進行跨學科整合，擴大其他領域的參與。
- 先進製造領域的再次崛起。
- 文創、社會創新與群眾共構為新興領域。
- 新興研究領域 Workshop?
- 單純軟體系統開發建置應考慮產學合作計畫。

Thanks for your attention!

PRODUCT REALIZATION
LABORATORY http://prl.ie.nthu.edu.tw/