TAIWAN'S HARDWARE & SOFTWARE INDUSTRY TRANSFORMATION
- A CASE FOR TRANSFORMING FROM IOT DEVICES TO SMART SERVICES ON THE CLOUD

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Institute for Information Industry (III), Taiwan
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Institute for Information Industry, Taipei, Taiwan, R.O.C

- **Expertise:**
  - Business/IT Strategy & Transformation Consulting, Innovation Management, BPM & Enterprise Integration
  - Cloud Computing, Big Data Analytics, Information Management, System Engineering, Enterprise Architecture, Service-Oriented Architecture, Asset Reuse & Knowledge Management, Compilers and Distributed Computing, Software & Services Development, Global Delivery, Sense and Respond Value Network Optimization

- **Education:**
  - Ph.D. & M.S., Computer Science, Purdue University, United States of America
  - M.S. & B.S., Mathematics, National Tsing-Hua University, Taiwan, R.O.C.

- **Past Experiences:** 20 years IBM experience (11 years business & IT executive)
  - IBM Distinguished Engineer (2000) and Partner (2010-2011): Led the GBS BPM practice; Served as the Research & Innovation Executive for IBM Global Services; Served as the CTO for various GBS organizations
  - Researcher (1988-1991) & Visiting Assistant Professor (1991): CS Department, Purdue University

- **Major Honors:**
  - 2009: IBM Academy of Technology Member
  - 2000: IBM Distinguished Engineer
  - 1997: IBM Outstanding Technical Achievement Award
  - 1997: IBM Consulting Group Division Award
  - 1997: Finalist, IBM Academy of Technology New Product Offering Symposium (competition)
  - 2000-2012 Mentored 12 people to become IBM Distinguished Engineers!
Is IoT a Fade?

Challenges

• IoT community focused too much on devices, sensor networks/communication, and ubiquitous computing
• IoT projects all look similar
• It has been a buzz word for too long without delivering real values
• IoT by itself is only one of many puzzle pieces needed to construct viable solutions for solving real world problems

Winning Strategy

• We need to focus on innovation, values and business models
• Like all competitions, winners differentiate themselves by focusing on unique values
• Focus on solving key pain points in business, living, manufacturing, government issues, not technology
• Have a solution architecture, not an IoT architecture
Agenda

1. Government’s Roles in Creating Innovative Industry
2. Paradigm Shift: The Challenges that Taiwan’s ICT Industry Faces
3. The Transformation from ICT Manufacturing to Smart Service Providers
4. Taiwan-Brazil Collaboration Opportunities
Government’s role in fostering an industry

• Best Practices for Government Initiated Initiatives:
  – Create institutes such as ITRI, III to act as catalysts for innovation
  – Invest in critical R&D areas that the industry won’t do on their own
    • Kick off initial efforts; Let the industry take over after showing initial successes
  – Develop clear and fair policy guidance and regulations
  – Provide incentives & an open environment (including open data)
  – Foster innovative culture, build VC community and focus on selected emerging areas
  – Be visionary and brave; Accept failures and move on
  – Stand on top of the giants
  – It’s a global game! Seek international collaborations
  – Get out of the way!

• An industry will die if it can’t sustain itself regardless what the government do
III and ITRI played a key role in Taiwan’s Transformation

Focus: Industrial Technology
Founded in 1973, ITRI has played a vital role in creating Taiwan’s high-tech industrial sector
- HQ in Hsingchu/Taiwan, focuses on six research labs & 19 centers & divisions
- 7500+ personnel; 75%+ with Master’s & Ph.D.s.
- Vision & Mission Statements: Innovative Research; Fostering Entrepreneurship and CEO Leadership
  - Applied research and technical services
- Biggest accomplishments:
  - Spin-offs: TSMC, UMC
  - 140 CEOs

Focus: Software & IT Services
Founded in 1979, III has played a key role in Taiwan’s e-government transf. and bridging the digital divides
- HQ in Taipei/Taiwan, with 8 R&D institutes and 8 divisions;
- 1900+ personnel; 75%+ with Master’s & Ph.Ds
- Vision & Missions Statements: The Driving Force of Taiwan’s Information Society; ICT R&D; Promotion of ICT Industrial Sectors; Development of Taiwan’s Information Society
- Biggest Accomplishments:
  - 1st Chinese encoding system (BIG-5)
  - Taiwan’s e-Government transformation and major government IT systems; government think tank
  - Trained 440,000+professionals => ICT Industry foundation
  - ADOC: 101 Digital Opportunity Centers in 10 countries, >600,000 people benefited, foster 2,600 SMEs starting new business, assist 4,000 street kids, drop outs, orphans back to schools.

6 Industrial Labs: Information and Communications, Electronics and Optoelectronics, Material, Chemical and Nanotechnology, Medical Device and Biomedical, Mechanical and Systems, Green Energy & Environment

Innovation, Compassion, Effectiveness
Major Achievements

- e-Government
- Agricultural Info
- Medical Network
- Financial Info
- Banking Solutions
- Logistics System
- Weather Forecasting
- Passport Visa Machine Read
- Traffic Scheduling
- Natural Disaster Warning System
- RFID Application
- Air/Land Traffic Control System
- Tax Online

Innovation, Compassion, Effectiveness

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Awards & recognition… (to name a few!)

...  
2013 — Zigbee CraneAbide  
2013 — BestLink  
2012 — RFID-MF (Metal-friendly)  
2011 — In-Snergy  

2012 — Interactive InMedia Bus info stop  
2011 — Portable ServBox  

...
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Taiwan is a world leader in ICT Manufacturing

<table>
<thead>
<tr>
<th>Product</th>
<th>Worldwide Market Share</th>
<th>WW No. 1</th>
<th>WW No. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notebook PC</td>
<td>93.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motherboard</td>
<td>94.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable CPE</td>
<td>95.1%</td>
<td></td>
<td></td>
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<tr>
<td>WLAN NIC</td>
<td>91.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netbook</td>
<td>88.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server (System &amp; Pure MB)</td>
<td>88.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCD Monitor</td>
<td>71.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSL CPE</td>
<td>64.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tablet Device</td>
<td>95.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP Phone</td>
<td>61.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSC</td>
<td>46.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desktop PC</td>
<td>46.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP STB</td>
<td>48.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server (System)</td>
<td>40.9%</td>
<td></td>
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</tr>
<tr>
<td>Smartphone</td>
<td>29.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODD</td>
<td>22.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: MIC, 04/2011
Global Drivers for Changes

Global Trends
- Continuous Economy Pressure
- Aging Population
- Rapid Rise of Emerging Economics
- Global Integration

Key Drivers for Changes
- The Migration of Values
- Continuous Commoditization
- Demand for Smart Experience
- Sustainability

Technology Drivers
- Mobile & IOT
- Cloud Computing
- Open Data / Big Data Analytics
- Enterprise Social Network

Rapid Commoditization of ICT Products
ODM/OEM Profits Squeezed

New Business Models
New Opportunities
The world is changing FAST!

Smart Phone Penetration

- 2007: WW ASP 380 USD (4%)
- 2012: WW ASP 282 USD (4%)
- 2018: WW ASP 193 USD (1.9%)

NB/Tablet Penetration

- 2007: WW NB ASP 540 USD (6.8%)
- 2012: WW NB ASP 480 USD (4.6%)
- 2018: WW NB 476 USD (4.6%)

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Taiwan’s ICT Industry is in a crisis

The Crisis
- Paradigm Shifted
- Fast Commoditization
- Market Share Shrinking
- Profits thinning
- Hungry New Comers
- Market Position Venerable
- Leadership Change

The Real Crisis
- Is there a Sense of Urgency?
- Has the culture changed?
- Has the processes changed?
- Has the people changed?
- Is there a roadmap?
- Is the leadership committed?
- Are you committed?
- Have you changed?
- Have you changed enough?
But The Opportunity is BiG

**BiG**: Smart **Business**, Smart **Living**, and Smart **Government**

Smart Solutions developed with Smart Cloud IT Technologies

Source: 2012 Ko-Ynag Wang, 活用新事業發展策略來加值和開發新契機
Our vision of four opportunities and a three stage development plan

Core Value
- Efficiency
- Innovation & Services
- Value-driven Smart Living

Innovations Capital of Asia

Population Changes
- Globalization
- Web 3.0
- Cross-discipline integration
- Ecofriendly manufacturing
- Effective use of resources

Ref: III 2006: 2015 Development plan

Innovations Capital of Asia

Live style Pioneer

Soft Economy Innovator

Industry technology leader

Global Resource Integrator

Smart Living
Smart Media
Smart Green
Smart Business

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Emerging Smart Cloud Applications Opportunities

- **Level 1**: Smart Devices (Interact)
- **Level 2**: Cloud & Comm. Services (Connect)
- **Level 3**: Media Convergence (Fusion)
- **Level 4**: Big Insight (Smart)
- **Level 5**: Smart Application Services ($$$)

- **Smart Government Applications**
- **Smart Health Management**
- **Smart Education**
- **Smart Green Management**
- **Smart Living/Community**
- **Other Smart City Applications**

- **Mobile & IOT**
- **Cloud Computing**
- **Open Data / Big Data Analytics**
- **Enterprise Social Network**
- **Migration to Cloud**
- **API Economy**

- **IDCs & Communication Service Providers**
  - **Audio/Video**
  - **Games**
  - **Ads**
  - **Papago**
  - **Open Data / Big Data Analytics**
  - **Migration to Cloud**
  - **API Economy**

- **Innovation, Compassion, Effectiveness** © 2013 Institute for Information Industry
Smart Cloud Applications Require the Integration of Key Technology Enablers and Sustainable Business Models

WAKE UP!
ITS NOT ABOUT IOT ANYMORE!
Key Success Factors

• Focus on Deep Experiences & Creation of Unique Values
• Innovative Business Model
• Content is King
• Analytic is Queen
• Who Pays
Challenges and Opportunities

• The Big Data era and the Uncertainty
  – Cost efficiently processing the growing **Volume**
  – Responding to the increasing **Velocity**
  – Collectively Analyzing the broadening **Variety**
  – Establishing the **Veracity** of big data sources
  – Analytics & Data Science are the key!

• Green ICT
• IoT generates a lot of data!
• Cloud Computing improves ICT efficiency and scalability, creates even more data
• Social Networks scales even faster
• Value shifted from faster data processing to agile business model enablement
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Taiwan’s i236 program

Living Lab. Application Initiative (i236)
(2 fields. 3 networks, 6 application domains)

2 fields: Smart Town & Intelligent Park

3 networks: sensor networks, wideband, digital TV

6 application domains:
- security & Disaster management
- Healthcare
- energy & sustainability
- smart transportation
- Convenience
- agriculture & leisure
## Proof of Service (POS): i236 Living Lab Projects

<table>
<thead>
<tr>
<th>Site</th>
<th>Type of Service</th>
<th>Users</th>
<th>Phase of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Songshan</td>
<td>Smart Healthcares</td>
<td>320 family demo sites</td>
<td>POS-Smart Senior Home Care Service (Comcare)</td>
</tr>
<tr>
<td></td>
<td>Smart Tourism</td>
<td>5 biz and service models</td>
<td>POB-Digital Signage Service (inMedia)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,100 accumulate users</td>
<td>POS-Wireless Social Networking Service (Pippo)</td>
</tr>
<tr>
<td>Kaohsiung</td>
<td>Intelligent Park</td>
<td>Nearly 70,000 service users, develop B2B2C model</td>
<td>POB-Blue collar Healthcare Service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attracts 3,000 immigrants</td>
<td></td>
</tr>
<tr>
<td>Ilan</td>
<td>Smart Public Services</td>
<td>Hot Springs Mktg Campaign</td>
<td>POS-Smart Navigation Service (Show Taiwan)</td>
</tr>
</tbody>
</table>

### Summary of Services

- **Smart Cities**
  - Counsel New Taipei City Government with integrated smart living programs to join ICF Smart City competition.

- **Service Diffusion**
  - Apply smart tourism services into Chungshing Village and support it with rich tourism activities to establish an image of a high technology research park.

### Reference

http://www.i236.org.tw/eindex.aspx
(POB): Smart Low Temperature Logistics enabled by IOT
Accelerated Change Scenario: Emergency Response, Disaster Recovery, National Security and Defense

Landslide Prediction and Risk Management

Real time Treat Analysis & Disaster Management

Source: Jimmy@gis.tw, Value-Added Service in Geospatial Information Application Based on Cloud Computing and Big Data

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Accelerated Change Scenario: Personalized Health Management and Analytics

Remote cares for Heart diseases patients

- Selective sharing/alert w/ family
- Real time and proactive care and services
- Event notifications
- 7 doctors

Users

- Collection of physical data
- Interaction and graphic interfaces
- Real time interaction, reminders, etc.

Medical Staffs

- Remote care center
- Call Center
- Case Manager

- Real time event notifications and handling
- Case management based on decision support tools
- Personalized care and services

Friendly UI

- Instant upload of personal vital information

GPRS/ADSL

Internet

Key Benefits:
- High level, personalized at home care – 24x7 monitoring of patients vital conditions
- More flexible hospital bed uses
- Lower healthcare expenses

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Accelerated Change Scenario:
Medical Tourism / Healthcare / Remote & Elder care

- Health IT Investment
  Over 10 Years: $150B
- US spending over
  16% of the GDP (Over
  $2.2 trillion per year)

- Medical Tourism
- Cosmetic Surgery
- Pampering
- Bio Tech
- Elder care
- Mental / Physical care
- Medical care

Intelligent Living

IoT

Integrated Cloud Platform
Intelligent, Comfort and Convenient

Safety
Privacy
Hazard Mitigation

High carbon/ Energy saving/ Energy conservation

Medical and Healthcare Cloud
Governmental and Public Service Cloud
Shopping and Entertainment Service Cloud
Travel Agent Cloud

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**Smart Tourism: Dynamic Real Time Travel**

**Hot Spot Information**

- Leverage the IoT & Social Sensing technology, automatically detect, scale and manage social feedback and status on POIs (such as scenery areas, shops, hotel, restaurants, etc.) identify mass trends, regional characteristics with seasonality, time, sentiments of targeted tourist groups, etc.

- Automatically establish and update POI information architecture and classification guidance, quickly merge POI data processing and provide scenario based travel information services.

- **Dynamic Hot Spots Map**
- **POI distribution maps based on time and regions**
Big Data for Smart Tourism / Smart Commerce

- Using text mining & semantic analysis of unstructured information such as community discussions, sharing, evaluation, etc., to help SMBs grasp the public sentiment on specific topics or service
- Provide competitive analytics for specific districts/sectors, to help improve service quality, price positioning, combining them with customer information to develop optimal marketing / advertising / sales / pricing strategies

Extraction of Social Index and Characteristics
Smart Green Building Management

- Multi-objectives optimization of energy, efficiency, and safety management, yield 17.8%~32.6% cost reductions

**Tech Transfer #1: a Telecom company**
- Reduce the electricity bill errors due to errors in data transmission from **206% to 17%**; reduced data error rate due to electric burst from 1613% to **5.94%**

**Tech Transfer #2: Taipei 101**
- Reduce daily electric forecast error rate to < 5%
- Use Smart Lighting system to reduce lighting cost by 20%
Smart City: Real-time monitoring and management of u-Bike/Subway hot spots

- Provide real-time monitoring of traffic route hot spots, identify patterns of activities in different periods, to avoid congestions and to maximize uses.
- Analyze the ride/activities information to identify popular public activity areas, combined with personal preferences & stores promotions to provide O2O shopping services, to expand the economic benefits of transportation hubs.

<table>
<thead>
<tr>
<th>Weekdays</th>
<th>Morning</th>
<th>Afternoon</th>
<th>Night</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image1" alt="Map" /></td>
<td><img src="image2" alt="Map" /></td>
<td><img src="image3" alt="Map" /></td>
</tr>
<tr>
<td>Weekend</td>
<td><img src="image4" alt="Map" /></td>
<td><img src="image5" alt="Map" /></td>
<td><img src="image6" alt="Map" /></td>
</tr>
</tbody>
</table>

- Frequently borrowing station
- Frequently return station
- Frequently borrowed & returned
- Others
III ARI & CSSI Solutions:
Enabling Smart Cloud Services through Smart System Services, Big Data Analytics. Big Data Appliance & API Economy

Innovative Business Services & APIs
Smart Services for Smart Cities and Smart Living

Smart Government Analytics
Smart Tourism Analytics
Smart Green Analytics
Smart Healthcare Analytics
Smart Media Analytics
Smart Business Analytics

Big Data Business Analytics Common Layer
API Economy Platform enabled by Smart System Services (S^3)

Big Data & Cloud System Platform

2012 12 18 Talk: III, G. Lin, Smart Industry Enabled by Smart System Services and Big Data Analysis
EU-Taiwan Cooperation
Agreed on April 28, 2013 at Taipei

1. Synchronisation of research communities (e.g. IERC and IOT Forum), Forming Value Nets and Communities
2. Joint Workshops, Events and Exchange Events (e.g. EU-Taiwan workshop in April 2012, 2013)
3. Define common areas of interest: (eg publish white paper) and plan common actions
   - Smart Cities, Smart Home, Smart Industry,
   - Semantic Interoperability, Big Data Analytics
4. IOT, Cloud and Services Integration: World wide Standardisation, Architecture Integration and Common Generic IOT platform
5. Project Collaboration: Match Making of Running Projects
6. Architecture, Security & Privacy, Ethics, Governance: Exchange on accompanying policy measures for IOT through IOT FORUM
7. The Synergy between Taiwanese Innovation Programs and H2020 Projects
8. Test-beds and Joint Field Trials
9. Exchange of R&D People
10. Participation in Associations and Collaboration at Country level
Opportunity for Collaboration
- Taiwan’s key values to Brazil

• World’s leading ICT hardware manufacturing
  – TSMC, UMC, ASE, Foxconn, Quanta, Inventec, Pegatron, AUO, Gigabyte, MicroLink, Delta, MiTAC, Acer, Asus, HTC, etc.
  – More than 90% of PCs, netbooks, laptops, mother boards, …

• Talents – more than 100 universities, some internationally ranked

• Respect for IPs and Innovations

• Making good progresses in Smart Cloud Service Technology
  – Smart System Services methods, tools and platform
  – API Economy platform that integrates key enabling technologies: APIs monitoring & management, IoT, Cloud, Social, Big Data, BPM, Decision Support

• Strategic location – last mile of R&D for localizing services to WW Chinese communities
Questions?

Thank You!

Come Visit Taiwan.
Use www.vztaiwan.com to get smart travel help while enjoying your stay in beautiful Taiwan!

E-mail: kyw@iii.org.tw
Thank You

Winning works of 2013 III Photography Competition

Passion, Innovation, Effectiveness