



**Bridging the Gap:  
What does it take for academic research to  
be translated into innovative industries?**

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**Knowledge Exchange** is an  
indispensable feature of the  
**Knowledge Economy.**

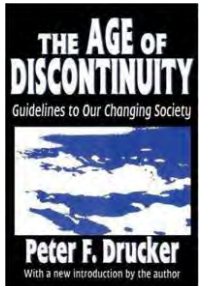



**Knowledge Exchange  
Mechanisms**

**Knowledge Exchange Mechanisms** are the  
pipelines/ conduits whereby **theoretical  
knowledge** is translated into new, useful  
**inventions, products (goods and services),  
processes, and systems** which impact our  
lives.




The idea of Knowledge  
Economy (or Knowledge-  
based Economy) was first  
postulated by management  
guru **Peter Drucker** in “**The  
Age of Discontinuity**”, first  
published in 1969.





## Knowledge Economy

- A Knowledge Economy is one which focuses on “knowledge as the new capital and as the central resource of an economy” (Drucker)
- In 1970s, the production and distribution of ideas and information rather than goods and services already accounted for **one-half of the total national output of the U.S.**



## S&T Intermediaries

### Science & Technology Intermediaries as Knowledge Exchange Mechanisms


- Science parks (often with incubator facilities or programs)
- Applied research centers
- Knowledge/ technology transfer offices of universities



## Silicon Valley -SRP


### Stanford Research Park (SRP)

- 1<sup>st</sup> Science Park in the World
- Built in 1951
- 283 hectares
- 162 buildings
- 140 companies
- 23,000 employees
- Notable tenants: HP, PARC, Facebook...

## Silicon Valley -SRP

### Palo Alto Research Center (PARC)



- Private applied research center founded in 1970
- Pioneered in application of the mouse (invented by nearby **Stanford Research Institute**);
- Developed the Graphical User Interface which inspired Apple Macintosh



**Silicon Valley -SRP**

**Strengths of Stanford Research Park**

- proximity to Stanford University campus
- opportunities to tap into Stanford University’s strong research capabilities
- support from Stanford’s Office of Technology Licensing
- researchers who move back and forth between faculty and industry

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**Silicon Valley -CRITIS**

**Center for Information Technology Research in the Interest of Society (CITRIS)**

- established in 2001
- Investors:
  - State of California
  - private and corporate sponsors
- Mission:
  - to “shorten the pipeline” between world-class laboratory research and the creation of start-ups, larger companies, and whole industries
  - to create IT solutions for social, environmental, and health care challenges



**Silicon Valley - CITRIS**

**Strengths**

- Strong academic and industrial involvement
  - 300 faculty members from numerous departments at four University of California campuses
  - industrial researchers from over 60 corporations
- Close working relationship with major state and federal bodies
  - California Energy Commission
  - U.S. Department of State
  - Federal Communications Commission.



**Silicon Valley – PnP Center**

**Plug and Play Tech Center**   
 PlugandPlayTechCenter.com  
 Silicon Valley in a Box

- A private incubator with over 300 startups
- Provides funding, mentorship, professional services, and a data center in addition to office space
- Partners with VCs, corporate investors, universities and foreign governments (e.g. Singapore)



## Taiwan – Hsinchu

### Hsinchu Science Park


- founded in 1980 by Li Kwoh-ting
- 653 hectares (Hsinchu Campus)  
1,342 hectares (Six campuses)
- 400 companies
- over 130,000 employees
- notable tenants: UMC, TSMC, Acer




## Taiwan – Hsinchu

### Strengths

- strong manufacturing capabilities in the park and its vicinity
- home to many national research institutions
  - National Synchrotron Radiation Research Center
  - National Center for High-Performance Computing
  - National Chip Implementation Center
  - Instrument Technology Research Center...
- near **Industrial Technology Research Institute (ITRI)** and two science and engineering powerhouses : **National Chiao Tung University** and **National Tsing Hua University**

## Taiwan – ITRI

### Industrial Technology Research Institute (ITRI)


- Role:
  - conducting R&D up to the level of a working prototype, then diffusing results to industry, which concentrates on final development and integrated design
- Achievements:
  - accumulated over 10,000 patents
  - cultivated 70 CEOs
  - assisted in creation of over 165 start-ups and spinoffs



## Success Factors

### Some success factors for technology transfers

- government and universities' intellectual property policies
- geographic location of the transfer agents
- demands for technologies and technical competencies
- excellent education and research institutions
- “commercialization-friendly” culture of universities and research institutes
- availability of venture capital
- well-developed information networks
- availability of managerial and technical talent
- regional/ international networks



## Success Factors

**Success factors for science parks (Kirk and Catts, 2004)**

- Clear vision and purpose
- Central involvement of at least one major research organization
- A high value placed on the research institution connection in branding the Park and shaping its culture.
- Strong interaction between the host academic / research campus and the Park
- A project champion with a clear and practical understanding of the Park's purpose
- A science park manager with a background in R & D
- Economic and social integration of the Park with the community and region
- Government playing a key leadership, facilitation and enabling role
- Sufficient capitalization and financial self-sufficiency
- A multi-phased, development period of 15 or more years
- An ongoing availability of substantial space



## Hong Kong

**Examples of S&T Intermediaries in Hong Kong**

- Hong Kong Science Park
  - 22 hectares, over 300 technology companies
  - Provides services to enhance industry and university collaboration
- ASTRI
  - “providing a focal point for industry-university collaboration in R&D” being one of its goals
- Offices/ programs for tech transfer and faculty entrepreneurship of individual universities



## Hong Kong

**“University-Industry Collaboration and Technology Transfer in Hong Kong and Knowledge-based Economic Growth” (Mowery, 2010)**



**Observations:**

- Efforts in technology transfer and faculty entrepreneurship have enjoyed mixed success.
- Challenges faced by faculty-founded startups include limited managerial talents and modest supply of venture capital
- The belief that Hong Kong industry lacks the absorptive capacity to collaborate with researchers is open to question.



## Hong Kong

**“University-Industry Collaboration and Technology Transfer in Hong Kong and Knowledge-based Economic Growth” (Mowery, 2010)**

**Recommendations:**

- A more detailed survey of incentives and impediments to technology transfer
- Expanded efforts to support **fundamental research capabilities** and “research entrepreneurship” to complement support for applied research and faculty entrepreneurship
- Enhanced **coordination of HKSAR and PRC** strategies
- **A clear technology strategy for HKSAR**

