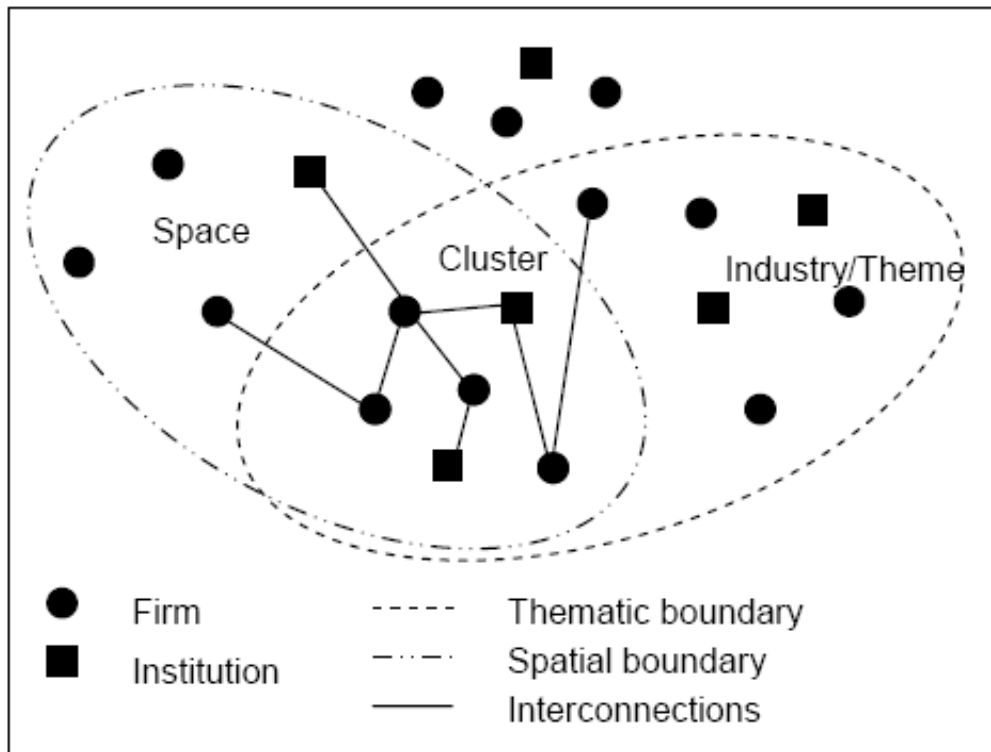


What are Clusters?

“Clusters are geographic concentrations of interconnected companies and institutions in a particular field”

M.E. Porter 1998

Cluster Characteristics (Menzel and Fornahl 2007)



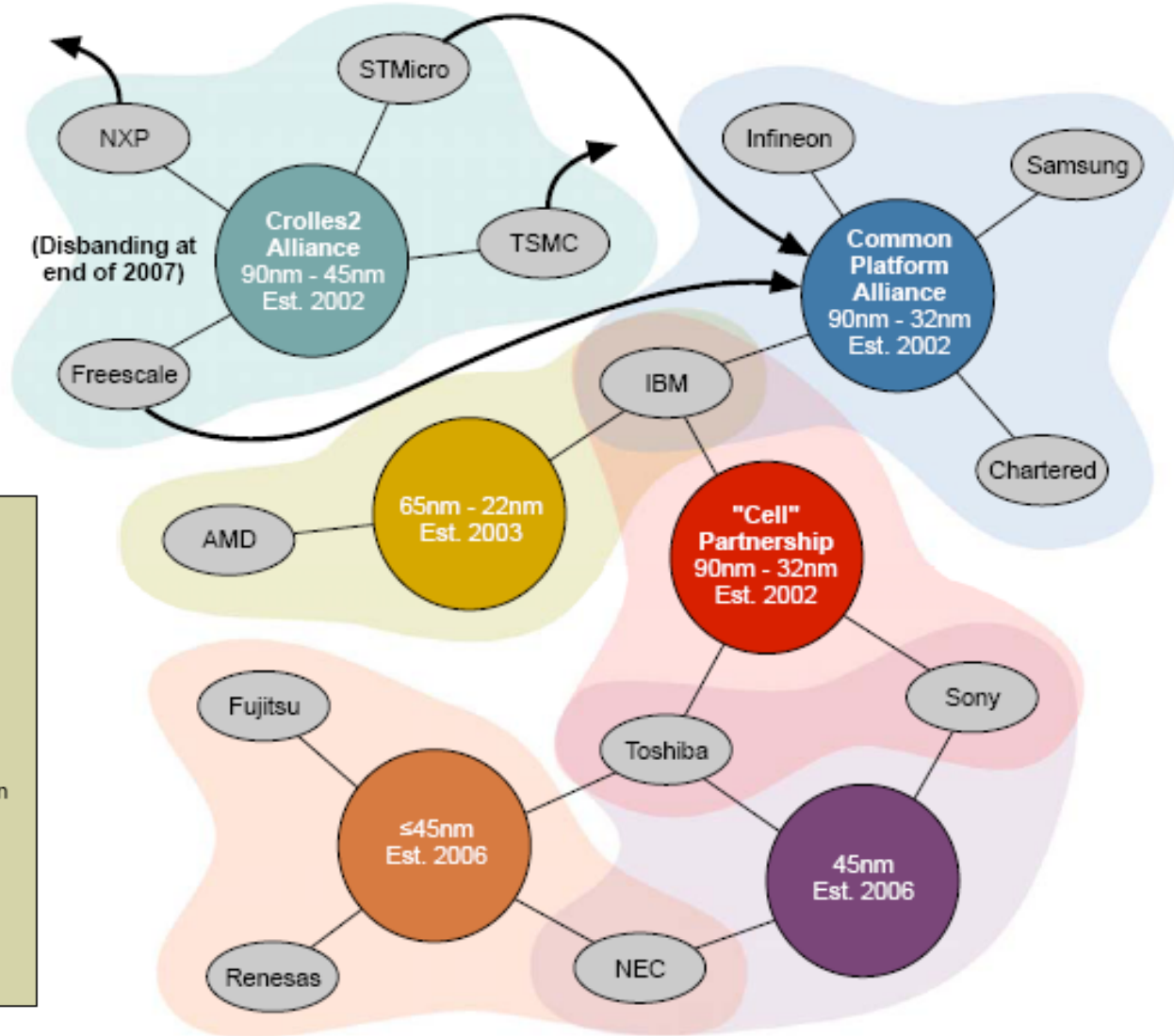
- Companies together with Research and Educational Institutions
- Institutions form the basis for networking and human capital
- Common 'theme' or focus shared by companies and institutions
- Common 'spatial' boundary or geographic location

Collaboration Needed At All Levels

High Cost of R&D



Competitors Working Together For Common Good



IMEC Est. 1984
Core Partners
Infineon/ Qimonda Intel Micron NXP Panasonic/ Matsushita Samsung STMicro TI TSMC
Other Partners
Elpida Hynix UMC

Sematech Est. 1986
Members
AMD Freescale HP IBM Infineon Intel Micron NEC NXP Matsushita Qimonda Renesas Samsung Spansion TI TSMC

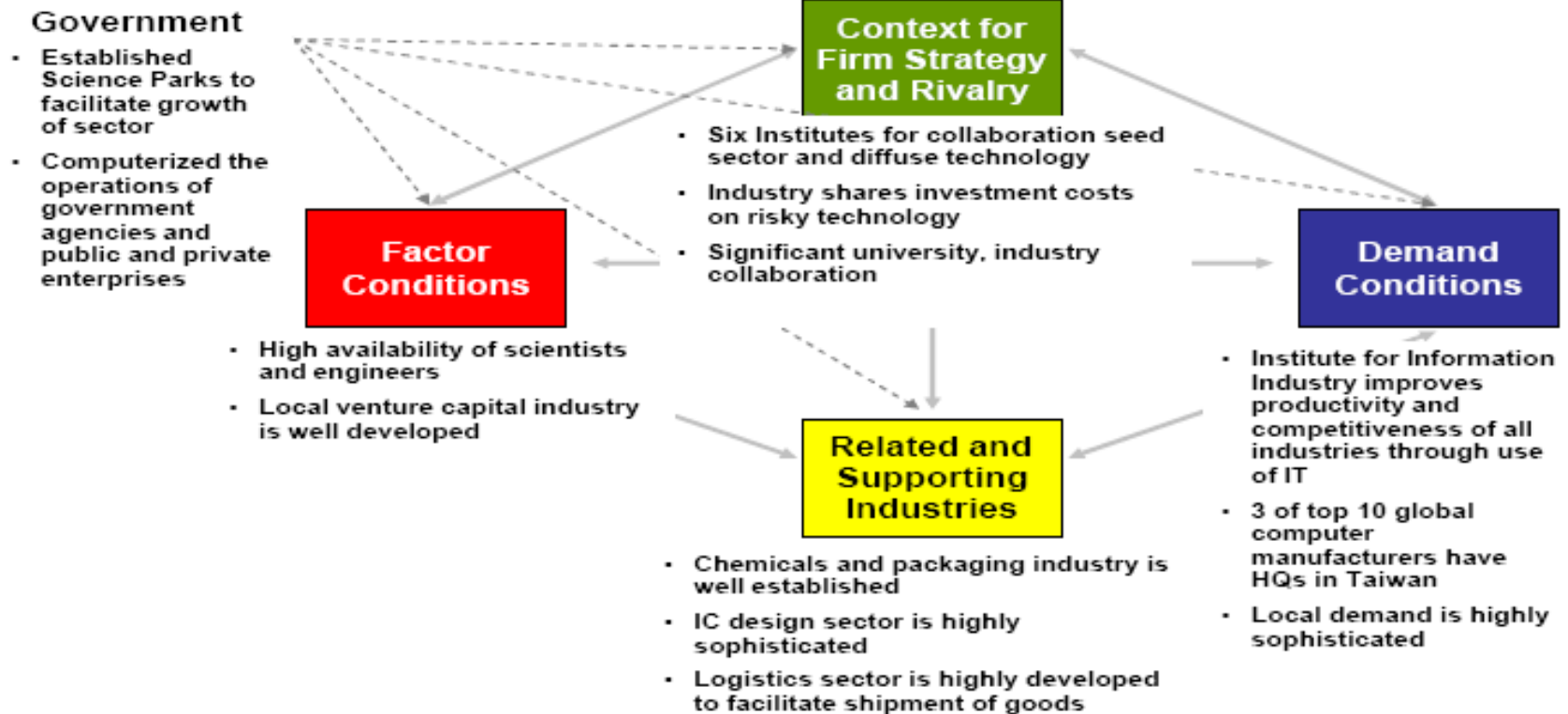
Selete Est. 1996
Members
Fujitsu Matsushita NEC Oki Renesas Rohm Sanyo Seiko Epson Sharp Sony Toshiba

Source: IC Insights

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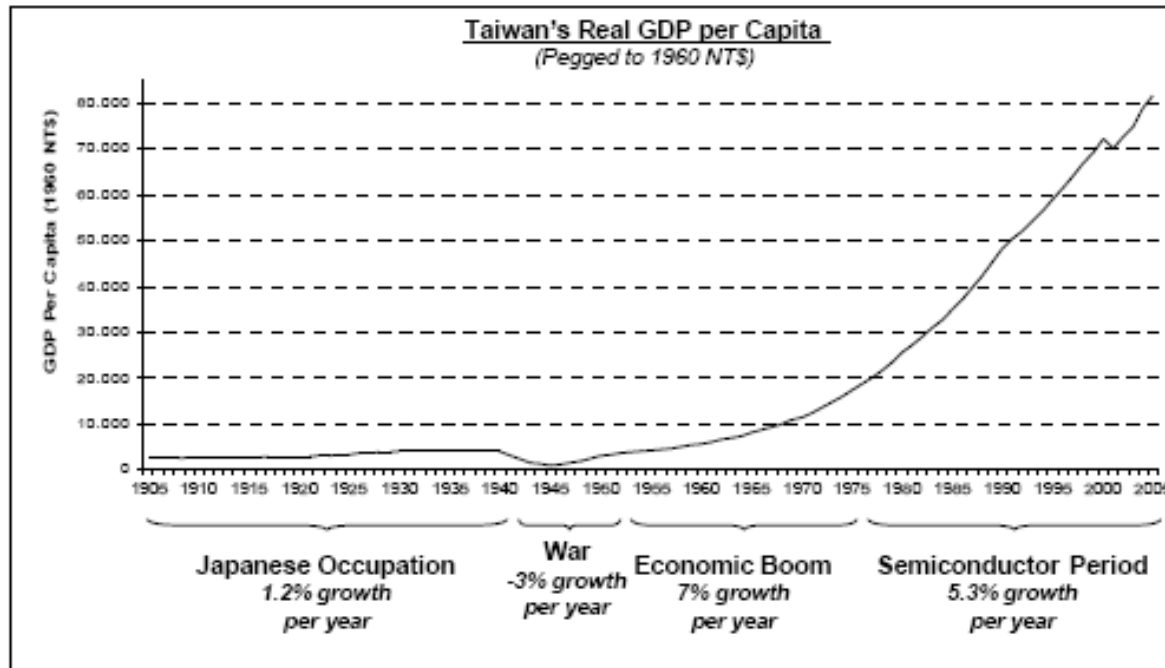
A Winning Example: Taiwan's Semiconductor Cluster

Taiwan's Semiconductor Cluster Diamond



Source: Source: John A. Matthews "A Silicon Valley of the East: Creating Taiwan's Semiconductor Industry", California Management Review (1997); Pao-Long Chang and Chiung-Wen Hsu, "The Development Strategies for Taiwan's Semiconductor Industry", IEEE Transactions on Engineering Management, Nov 1998 .

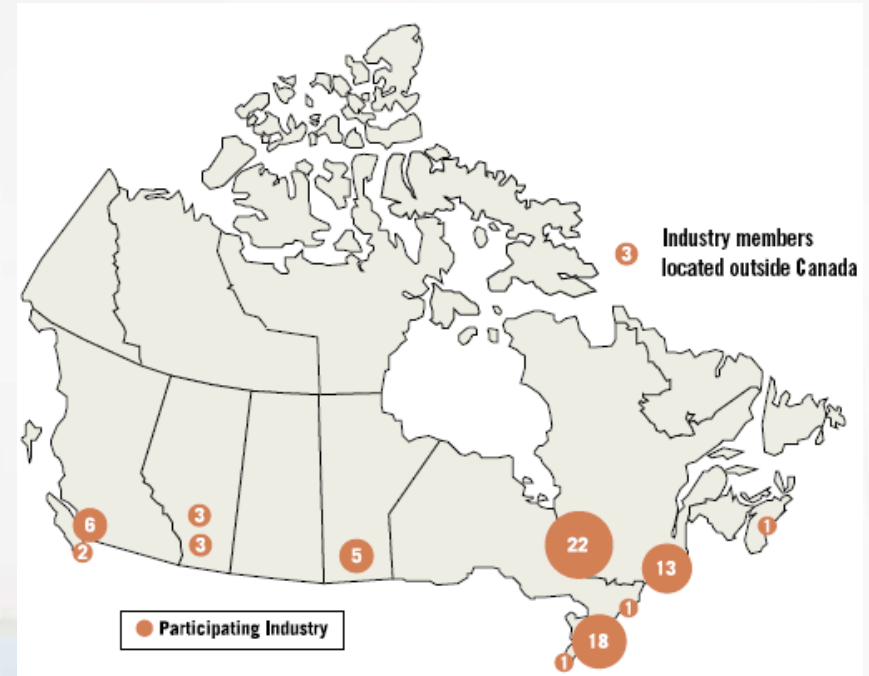
Taiwan's Semiconductor Cluster



Source: Taiwan of Department of Investment Services, Professor Tsong-Min Wu (National Taiwan University)

- Taiwan #1 In Pure-Play Foundaries
- Taiwan #1 In PC And Related Board Assemblies
- Taiwan More Patents Per Year Than Germany,

Microelectronics In Canada



- Microelectronics Entities Are Grouped Geographically Across Country
- Centers of Expertise:
 - Ottawa Area – Telecom, Data communications, Intellectual Property
 - Greater Toronto Area – Video, Images and Graphics
 - Montreal -- Multimedia

Greater Toronto Area – A Video & Graphics Hub

A Number of World Leading Companies and Start-ups:

- AMD/ATI – High Performance Graphics
- Broadcom/ATI – Image Processing for Televisions and Monitors
- Christie Digital – Digital Projection for Cinema and AV
- Dalsa – Machine Vision, Ultra High Resolution Cameras
- Evertz – Studio Broadcast Equipment
- Harris/Leitch – Studio Broadcast Equipment and Towers
- Fresco – Television Demodulators
- Gennum – Studio Broadcast Transport and AV
- Silicon Optix – New startup focused on Image Processing
- Sigma Designs – Image Processing and Media Processors
- ST/Genesis – Image Processing for Televisions and Monitors
- ViXS – Video Encoders/Transcoders/Decoders
- Zoran – Image Processing for Televisions and DVD Players

One of World's Leading Hubs For Video & Graphics Electronics

A Video Cluster In Greater Toronto Area

- Build On Current Company Base
 - Leadership in several sectors
- Extend Center of Expertise
 - Shared Pre-Competitive Research
 - Shared Human Capital Development
- Win On Value and Quality
 - Not Cost
 - Engineer in China -- \$12k
 - Engineer in India -- \$15k
 - Engineer in Taiwan -- \$30k



How To Build Clusters

Taiwan Example: Successful Clusters Involve Firms, Universities and Active Government Facilitation.

- Increase Government Support of Joint University-Industry Research
 - Attract the Best Professors to create the Best Students
 - Encourage Cluster relevant research and visibility
- Dramatically Increase Support of Multi-Company-University Projects
 - Encourage joint company pre-competitive research and sharing
- Government Facilitation of Networking and Branding
 - Third party logistics and facilitation for cluster meetings, research project tracking and submission, conferences, attracting members
- Additional Government Facilitation of Human Capital
 - Incentives for Internships from University (Also Transfers Technology)
 - Incentives for New Skilled Hires in cluster