ICT/Life Sciences Converging Technologies Cluster Study

Presented to:

Intergovernmental Committee for Economic and Labour Force Development
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Presented by:

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Agenda

- Background
- Methodology
- Toronto Results
- Cross-Cluster Comparisons
- US Comparisons (Biotechnology)
- Key Findings

Project Overview

- **Qualitative** analysis:
  - ICT, Life Sciences and converging technologies
  - Vancouver, Toronto, Montreal and Ottawa
- **Partners:** Industry Canada (ICT and Life Sciences Branches), NRC, Canadian Biotechnology Secretariat and the Canadian Institutes of Health Research
- **Methodology:** Previously-validated framework for cluster analysis
- **Reports:** Individual city reports and final comparative report
- **Presentations** of results to key stakeholders interested in cluster development

Project Objectives

- Provide improved understanding of ICT/Life Sciences & converging next generation clusters leading to **improved policy decisions and the design of new initiatives**
- **Help break down silos**
- Help accelerate cluster development
- Suggest realistic growth scenarios
- Provide a comparative analysis (Canada & US)
- Build on previous work

Geographic Scope of Study

- **Vancouver Data Mapping**
  - Lower Mainland and Lower Fraser Valley
  - ~280 ICT companies, ~100 LS companies
- **Toronto Data Mapping**
  - Greater Toronto Area (GTA)
  - ~500 ICT companies, ~205 LS companies
- **Montreal Data Mapping**
  - Montreal Metropolitan Community
  - 257 ICT companies, 200 LS companies
- **Ottawa Data Mapping**
  - Ottawa-Gatineau Census Metropolitan Area
  - 251 ICT companies, 100 LS companies

Sector Scope of Study

- **ICT Sector Scope**
  - Manufacturing
  - Intangible Services (including tele-health companies)
  - Goods Related Services
- **Life Sciences Sector Scope**
  - Research & Development in Life Sciences (inc. Health Biotechnology)
  - Pharmaceutical & Medicine Manufacturing
  - Medical Devices Manufacturing
  - Other Biotechnologies (Agriculture, Aquaculture, Energy, Environment, Forestry and Mining)
- **Focus on "trading" companies**

Study Methodology

- Use analytical framework to build an understanding of current cluster capacity and operational dynamics
- Conduct extensive literature review
- Map approximately 200-500 key ICT and 100-200 life sciences companies per city
- Interview approximately 10 key stakeholders per city
  - Top of mind perspective
  - Review success factors using preliminary spider diagrams
  - What they would like to see from government
- Assess cluster dynamics and performance
- Compare results across sectors and cities
- Note: U.S. comparisons for biotech based on Brookings' indicators for research and commercialization

Toronto: Cluster Capacity

ICT Cluster

- ~9,000 companies (~4,000 core), ~200,000 people
- Dominated by MNEs
- Little manufacturing, except local assembly
- Many small service providers
- Really 3 clusters (Downtown, Markham, Mississauga)

Life Sciences Cluster

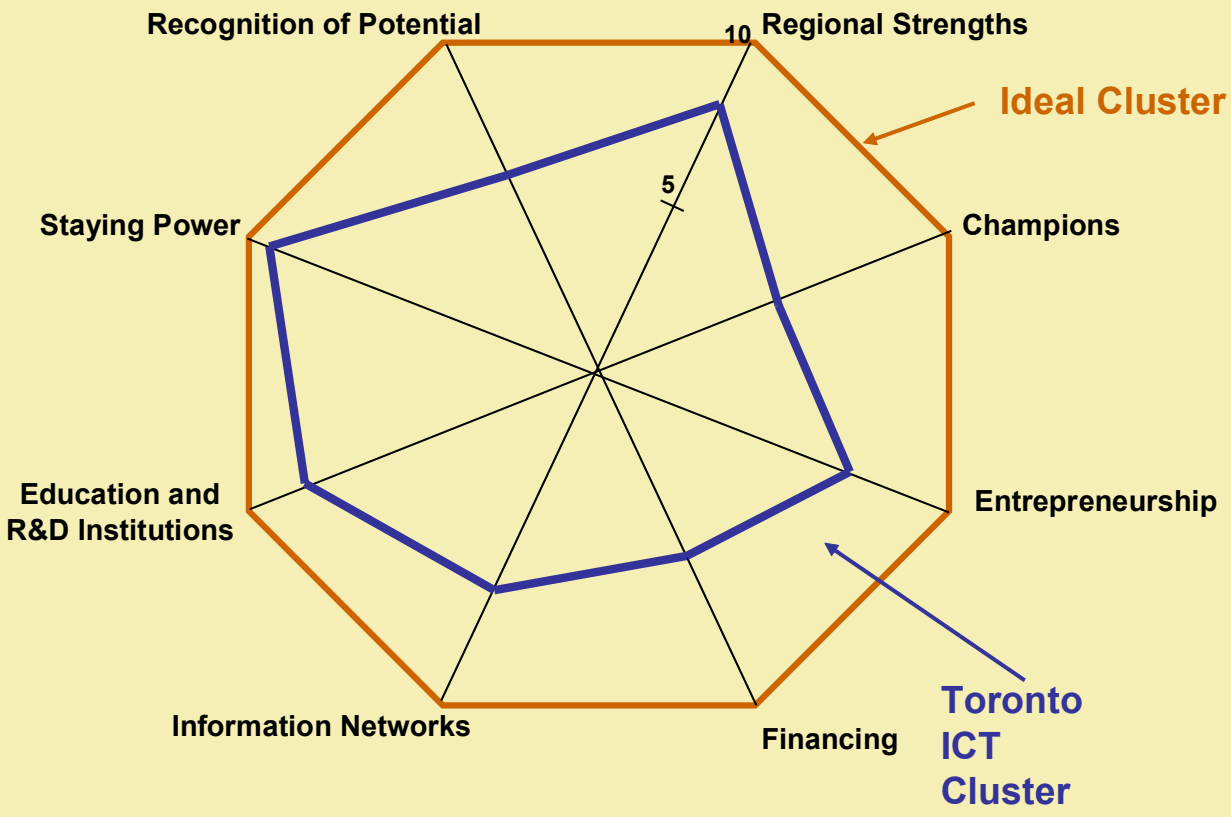
- ~400 companies, >30,000 people
- Pharma dominated by MNEs
- MNE manufacturing increasingly going off-shore
- R&D focused on emerging biotech (health) activities, mostly SMEs
- Diverse and unfocused medical device activities, mostly SMEs
- Some converging technology activities but largely unfocused

Toronto: Cluster Interviewees

- **Frank Maw** - President, Motorola Canada
- **Robert Horwood** - President, ITAC Ontario
- **Keith Lue** – President Cardian Enterprises; and Director, MTA
- **Doug McIntyre** - Chairman, York Technology Association
- **Bill McClean** - VP, Manufacturing, Development and Marketing Operations, IBM Canada
- **Karen Grant** - Managing Director, Exceler@tor (U of T)
- **David Schindler** – President and CEO, Milestone Medica
- **Ken Knox** - CEO, MaRS Discovery District (and John Cook, President and COO)
- **Dale Patterson** – Chair, BCO; and Executive VP, Canadian Medical Discoveries Funds
- **Lorne Meikle** – President, TBI, and CEO, BCY Life Sciences

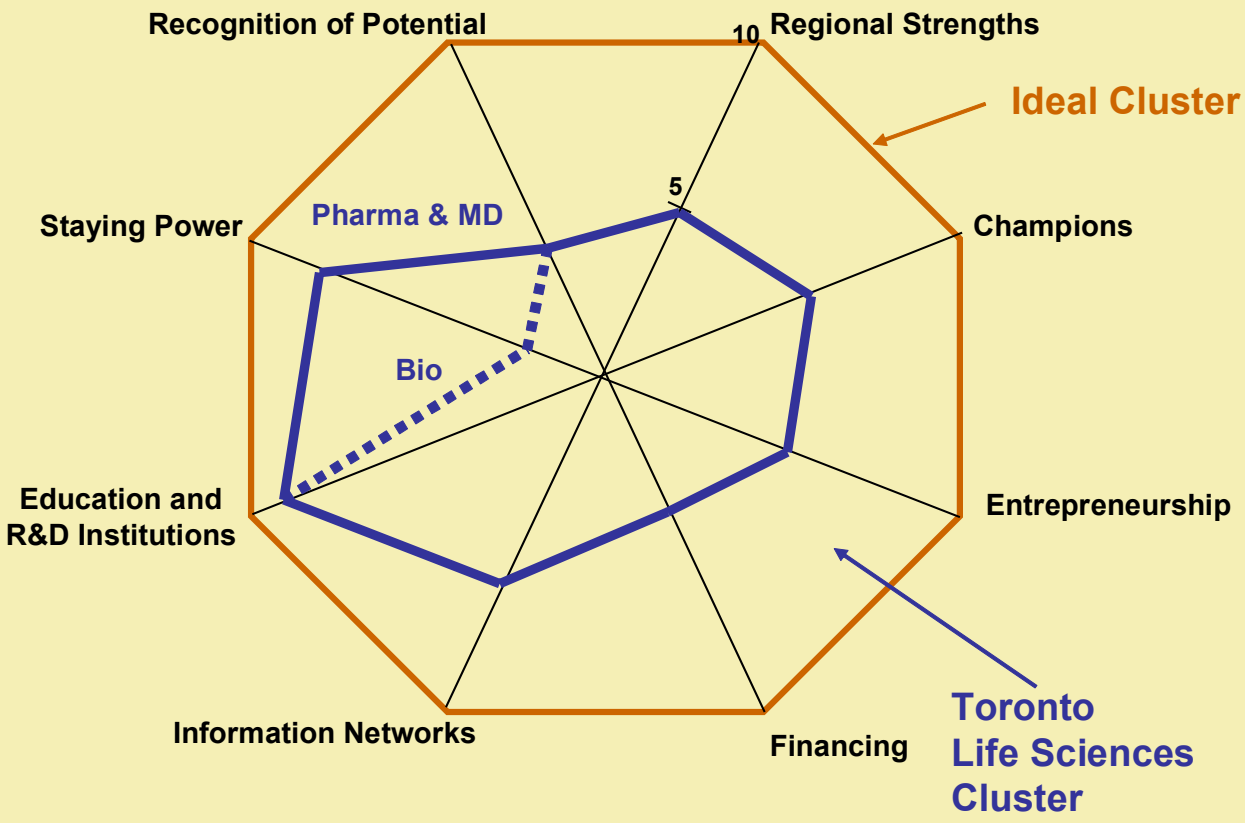
Toronto: ICT Web Diagram

Toronto ICT Cluster Analysis (Qualitative Assessment)



Toronto: Life Sciences Web Diagram

Toronto Life Sciences Cluster Analysis (Qualitative Assessment)



Toronto: ICT Key Issues and Opportunities

- Entrepreneurship (e.g. create more attractive entrepreneurial environment)
- Increase awareness of capabilities within the cluster (e.g. database of companies)
- Strengthen commitment of MNEs, particularly encourage greater R&D
- Strengthen linkages to key enabled sectors
- Help address cluster weaknesses
  - Recognition of Potential (e.g. create GTA-wide partnership)
  - Champions (e.g. help attract/grow champions)
  - Financing (e.g. commercialization support, address capital issues)
  - Information Networks (e.g. help increase coordination among associations)

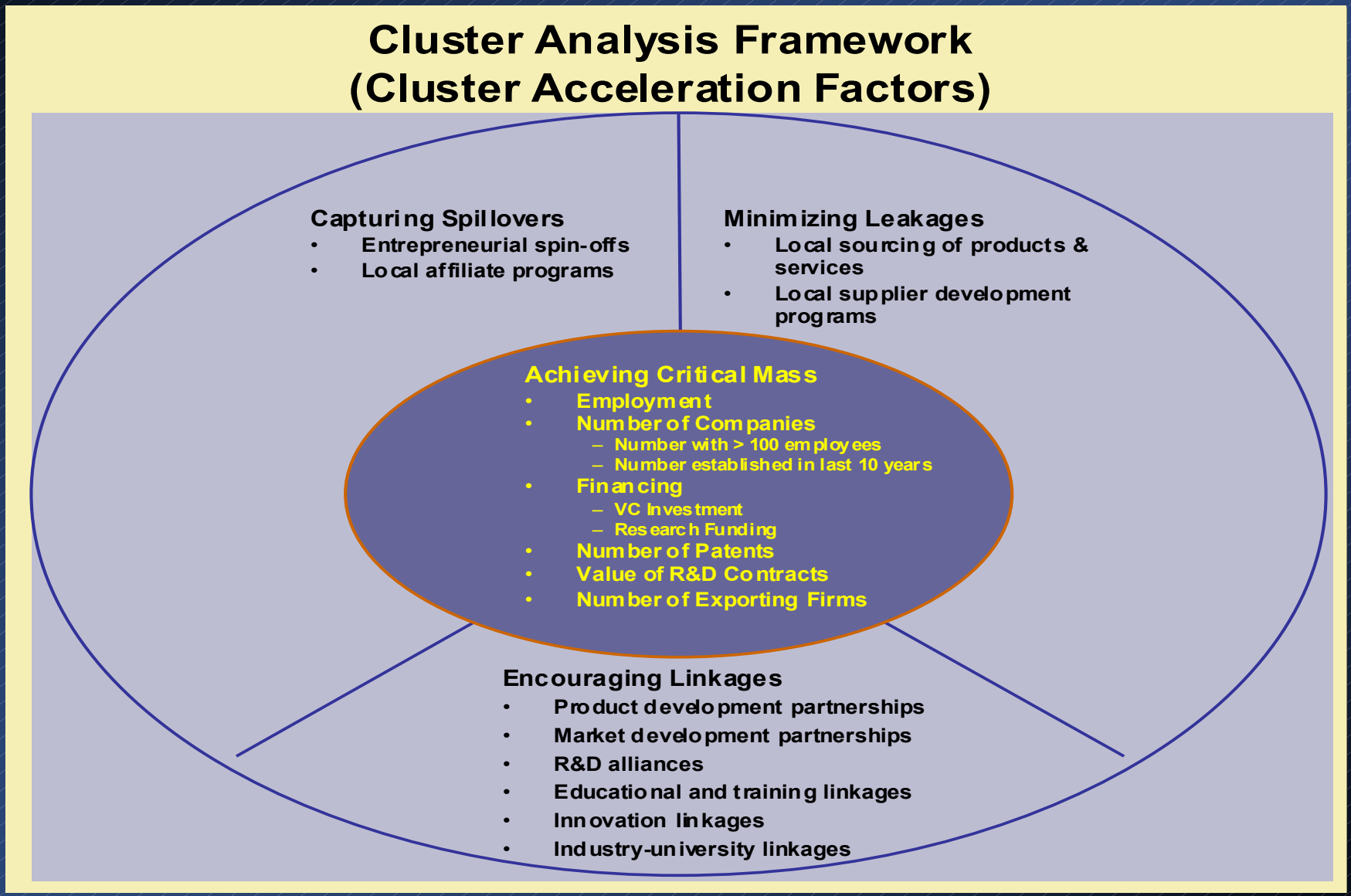
Toronto: Life Sciences Key Issues and Opportunities

- Leverage MaRS project and the Ontario Genomics Institute to strengthen genomics, proteomics, and bioinformatics activities in GTA
- Leverage existing pharma strengths (e.g. forge alliances with big pharma)
- Increase number of companies in cluster (e.g. increase emphasis on start-ups)
- Grow larger companies (e.g. provide increased commercialization support; encourage consolidation of smaller companies)
- Increase awareness of converging technology activities (R&D and companies)

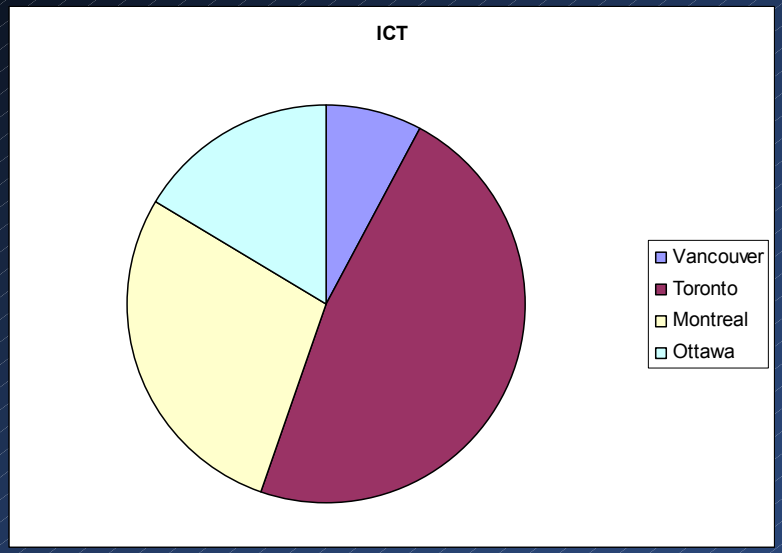
Toronto: Converging Technologies Key Issues and Opportunities

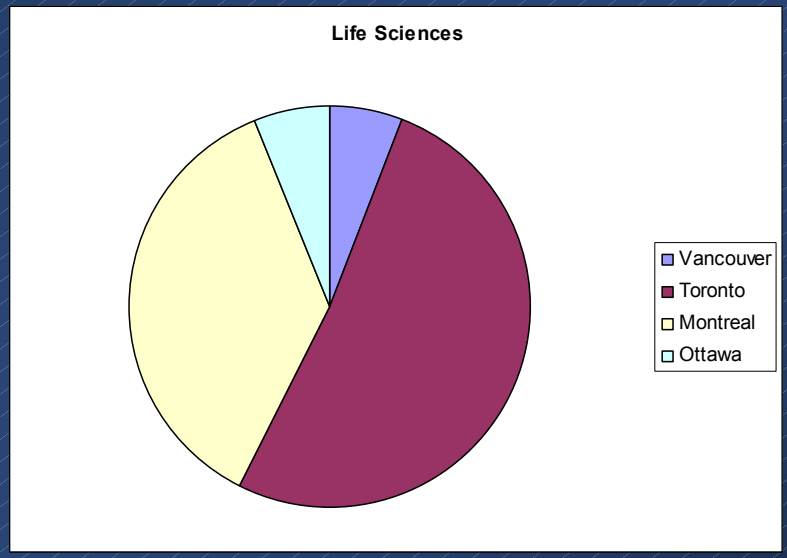
- A fair amount of research, lack of focus, little company formation
- Converging technology activity seems to be coming from the ICT side, some strengths in biosensors and biochips
- Some strengths in bioinformatics research
- Key challenges:
  - Lack of recognition of converging technology potential
  - Little interaction between ICT and LS communities
- Need to increase awareness of converging technology potential at research and company level

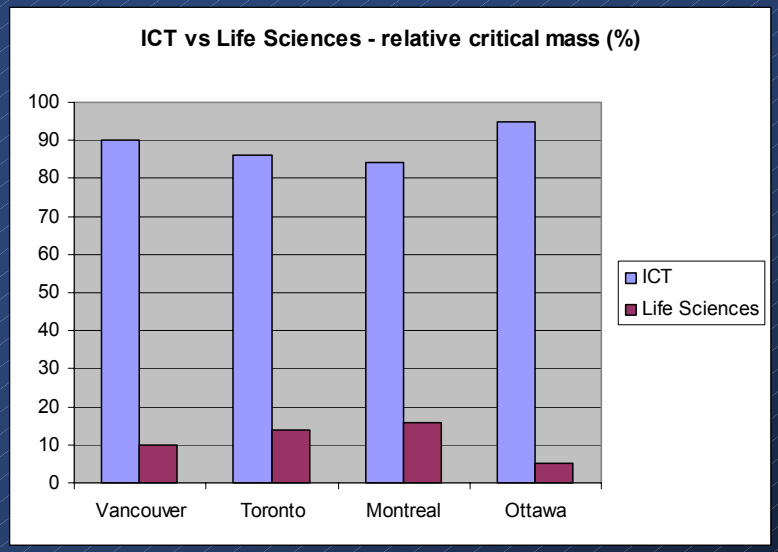
Cluster Acceleration Factors and Indicators



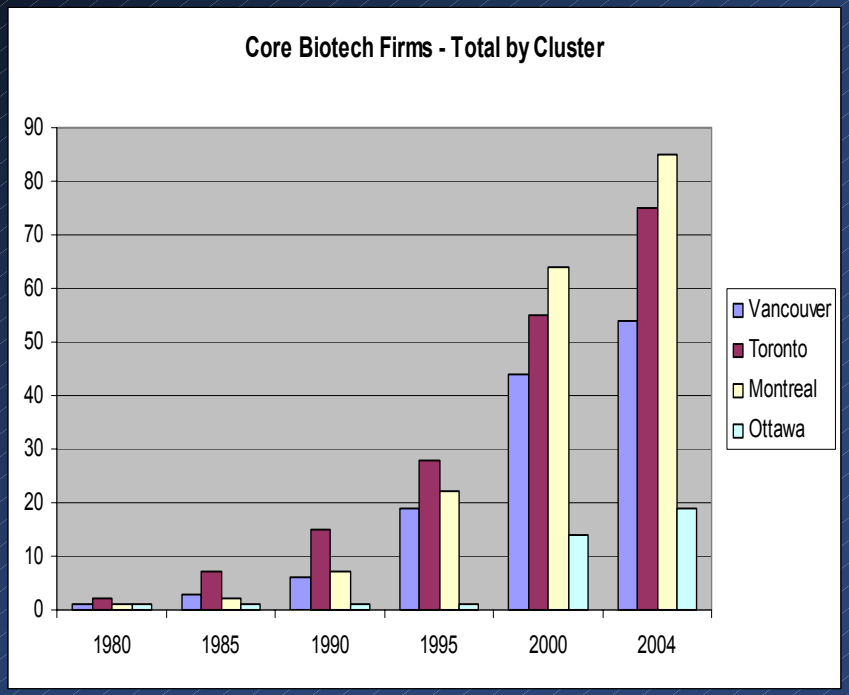
Cluster Acceleration Factors (Critical Mass)

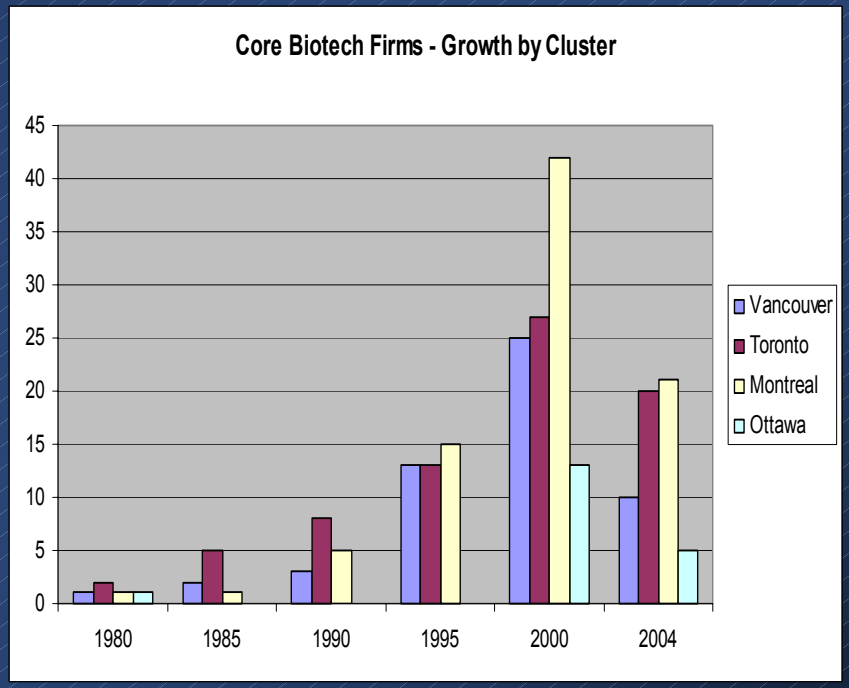






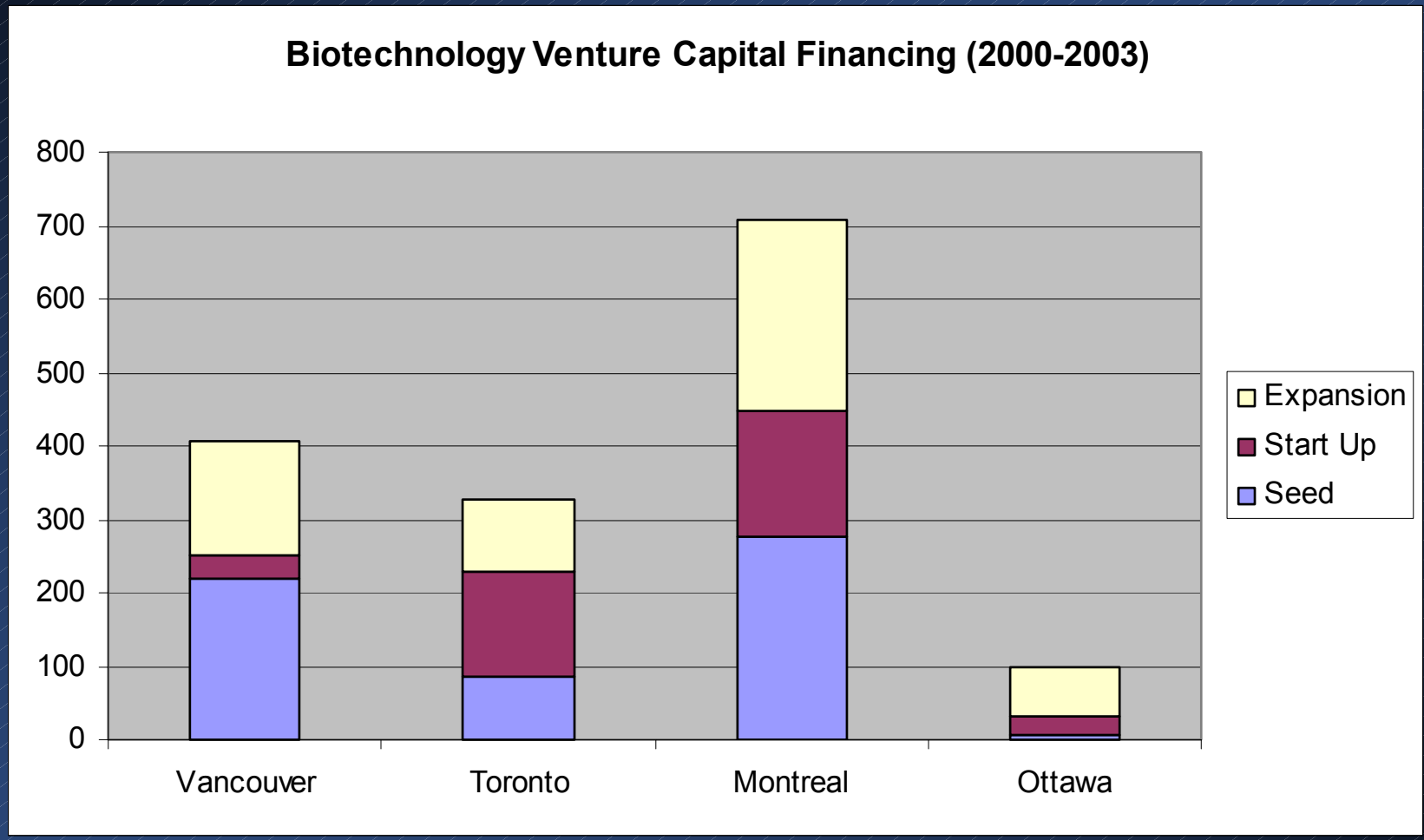
LS: Achieving Critical Mass – Core Biotech Firms





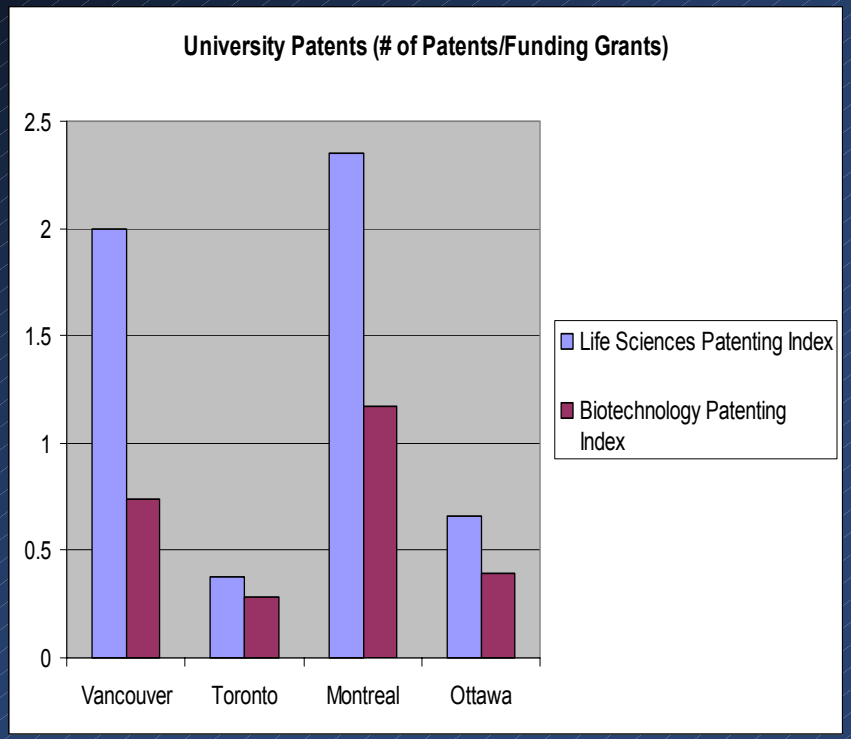
Data Source; Peter Winter

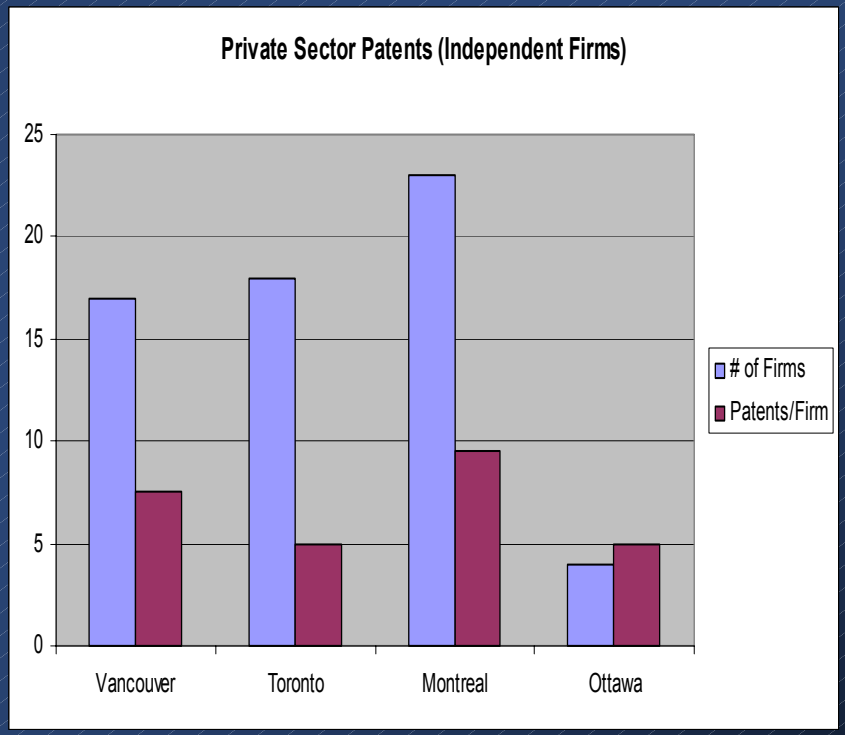
LS: Achieving Critical Mass – Venture Capital



Data Source; Mary Macdonald and Associates

LS: Achieving Critical Mass – Patents





Data Source; Jorge Niosi

LS: Achieving Critical Mass – Research Alliances

Bio-Pharma Research Alliances (1999 – 2004)

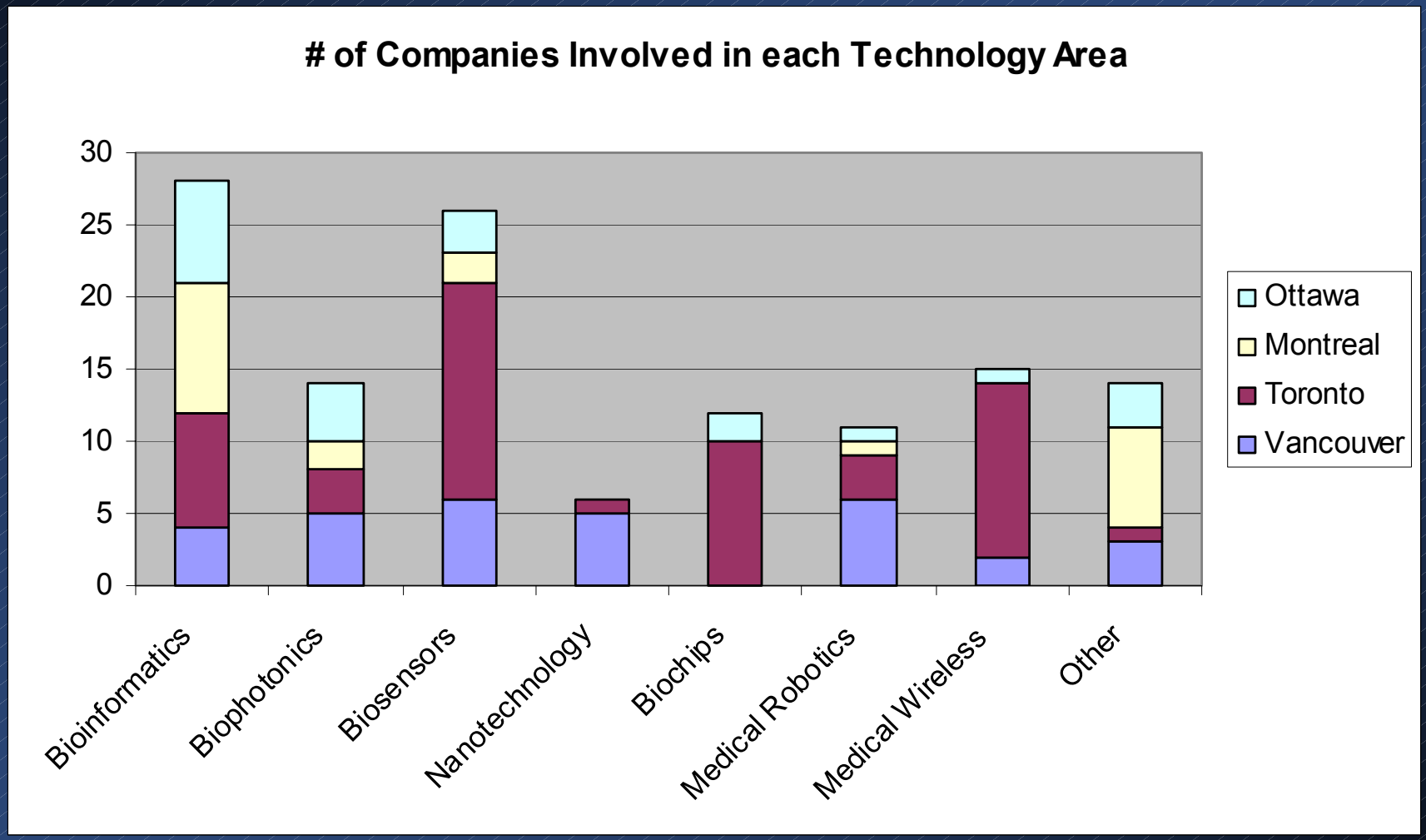
	Vancouver	Toronto	Montreal	Ottawa
Number of Alliances	14	7	10	0
Value ($M)	$511 (12)	$91 (3)	$190 (8)	$0

Data Source; Peter Winter

Cluster Acceleration Factors (Other)

- Capturing Spillovers
  - Corporate spin-offs
  - University spin-offs (LS)
- Minimizing Leakages
  - Some local sourcing
  - Diversified LS supplier base
- Encouraging Linkages
  - Some, but not generally evident
  - University/biotech firm linkages

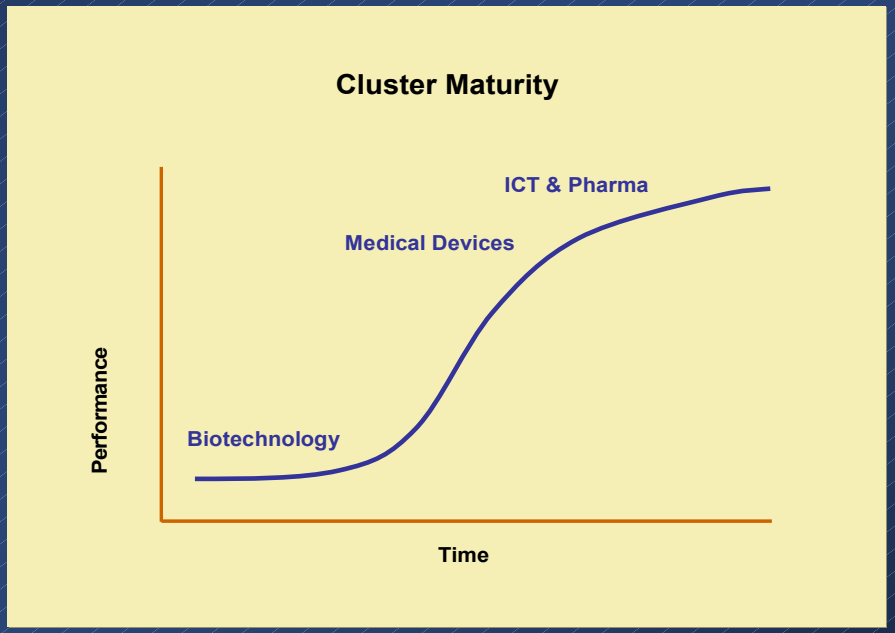
Converging Technologies Comparisons



Converging Technologies – Key Challenge/Issues and Opportunities

Challenge

- Collaboration among clusters at different stages on the performance curve



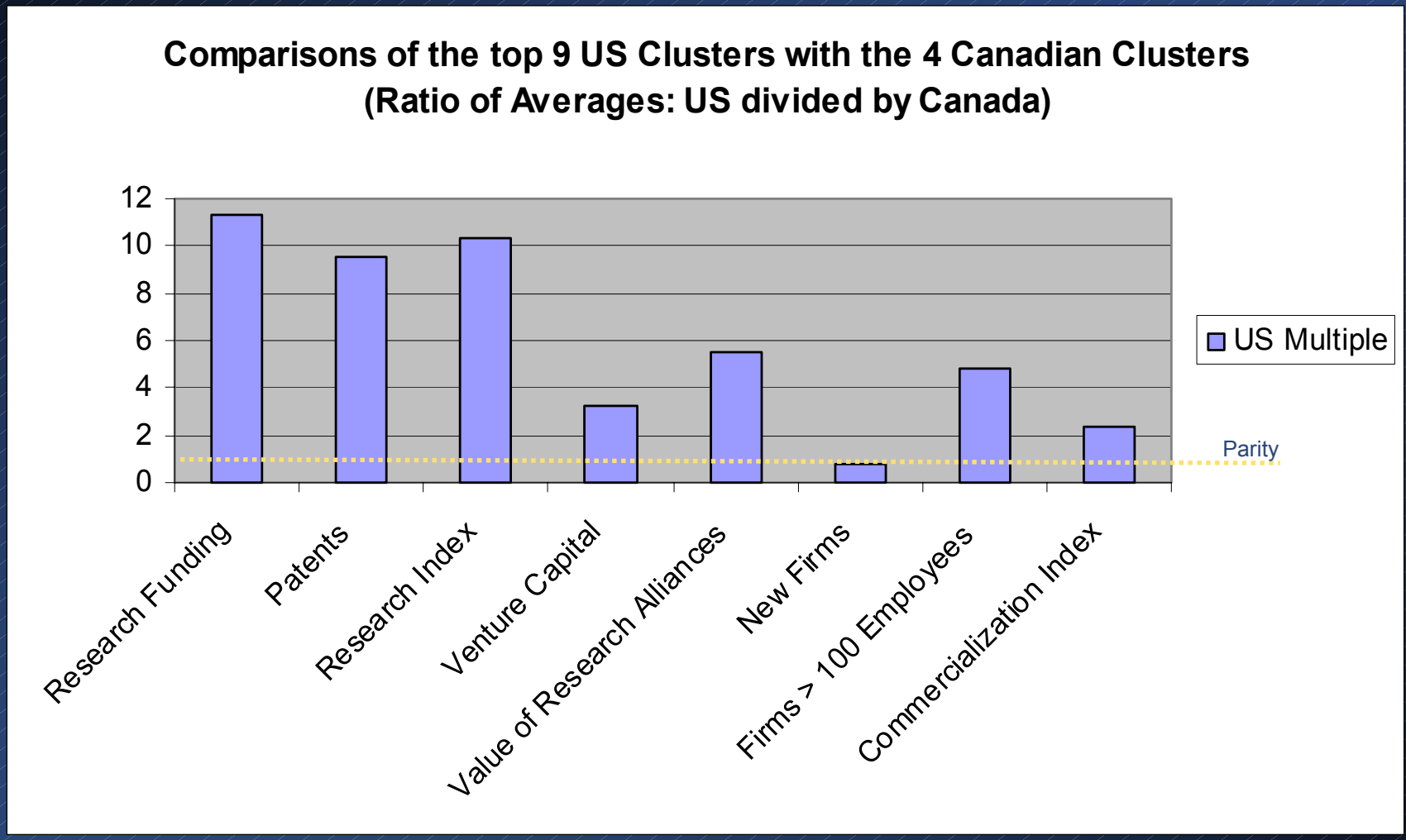
Issues and Opportunities

- Specific opportunities in bioinformatics (Vancouver) and biophotonics (Ottawa)
- Awareness of potential is high in Vancouver & somewhat in Ottawa
- Lack of concerted collaboration between the ICT and Life Sciences
- Need to increase awareness (particularly in ICT community)

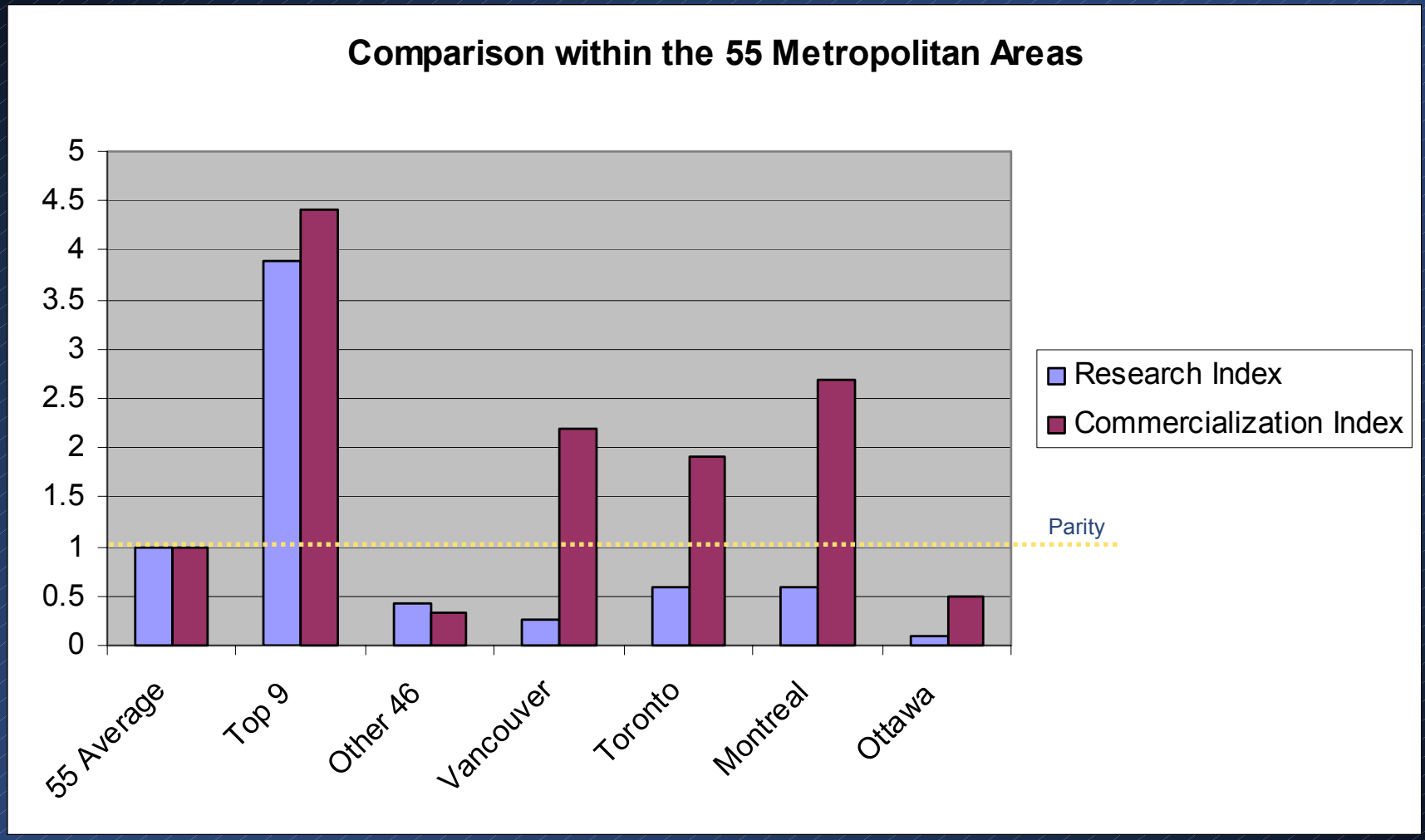
US – Canada Comparisons (Biotechnology) – Approach

- Indicative Comparison
  - Based on Brookings institute methodology
  - Six parameters (Research – 2, Commercialization – 4)
  - Compared 51 US clusters
- Canadian comparison compared Vancouver, Toronto, Montreal and Ottawa with US clusters
  - All 55 clusters (51 US & 4 Canadian)
  - Top 9 Clusters (Boston, San Francisco, San Diego, Raleigh, Seattle, New York, Philadelphia, Los Angeles and Washington)
  - Other 46 clusters (42 US & 4 Canadian)

US Comparisons (Biotechnology) – Top 9



US Comparisons (Biotechnology) – Overall



Some Key Findings

Overall

- The importance of cluster diversity
- The need for coordinated and sustained leadership and support
- The need to grow larger companies – the commercialization dimension
  - Developing the right skills mix
  - Ensuring availability of substantive and sustained financing
  - The importance of market development

ICT Specific

- Dealing with ICT as a mature sector
  - Encouraging MNEs to develop stronger local (R&D) roots
- Exploiting ICT's role as an enabler

Some Key Findings (Continued)

Life Sciences Specific

- Integrating Life Sciences components
- Focusing on key Life Sciences clusters
- Stimulating Alliances between Pharmaceutical Firms and Biotechnology Firms
- Consolidation of Biotechnology Firms
- Developing a Local Supplier Base in emerging Life Sciences clusters

Converging Technologies Specific

- The need to focus resources in the converging technologies area
- The need to consider converging technologies more broadly
- The need for policy coordination in the converging technologies area

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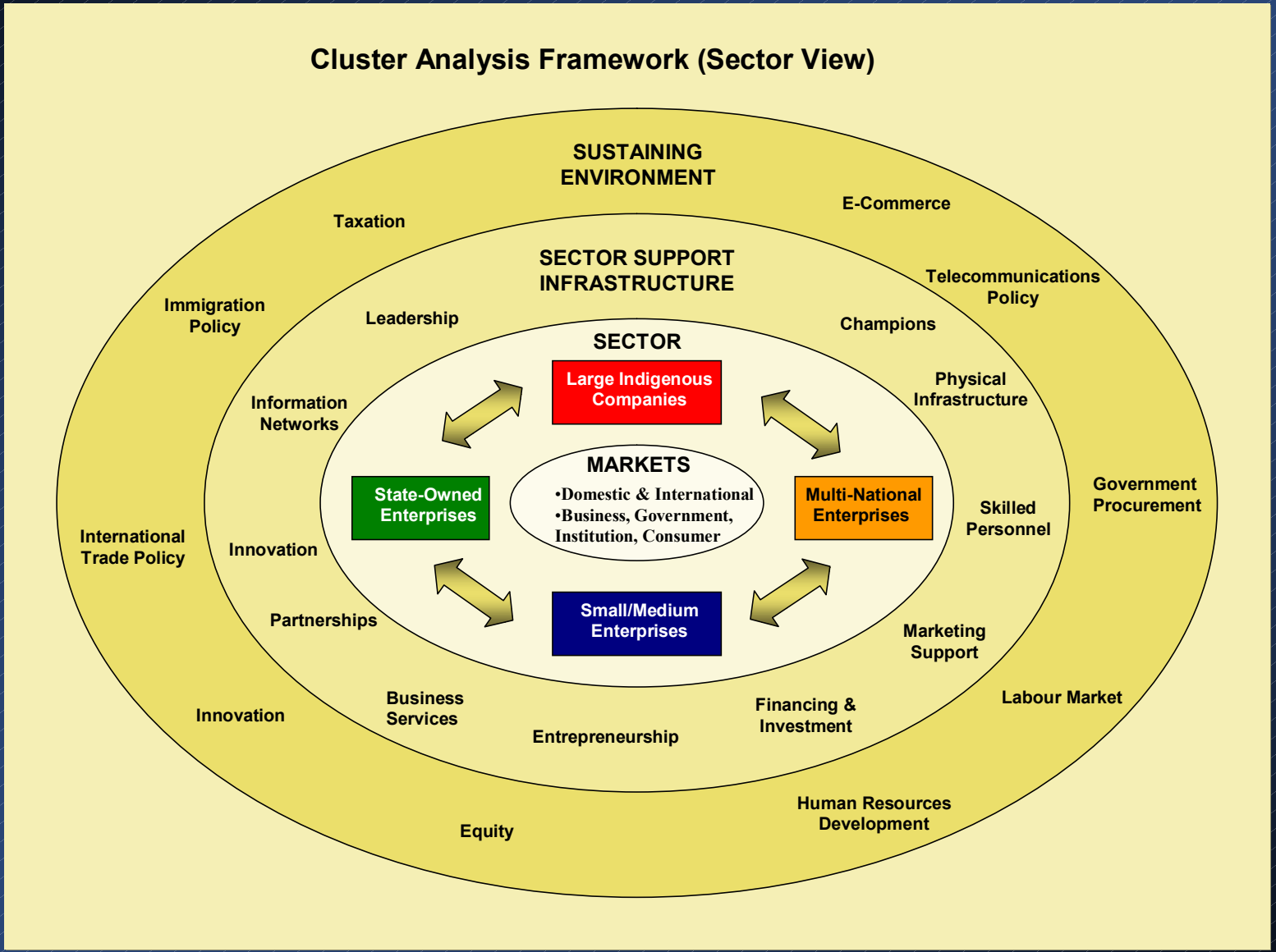
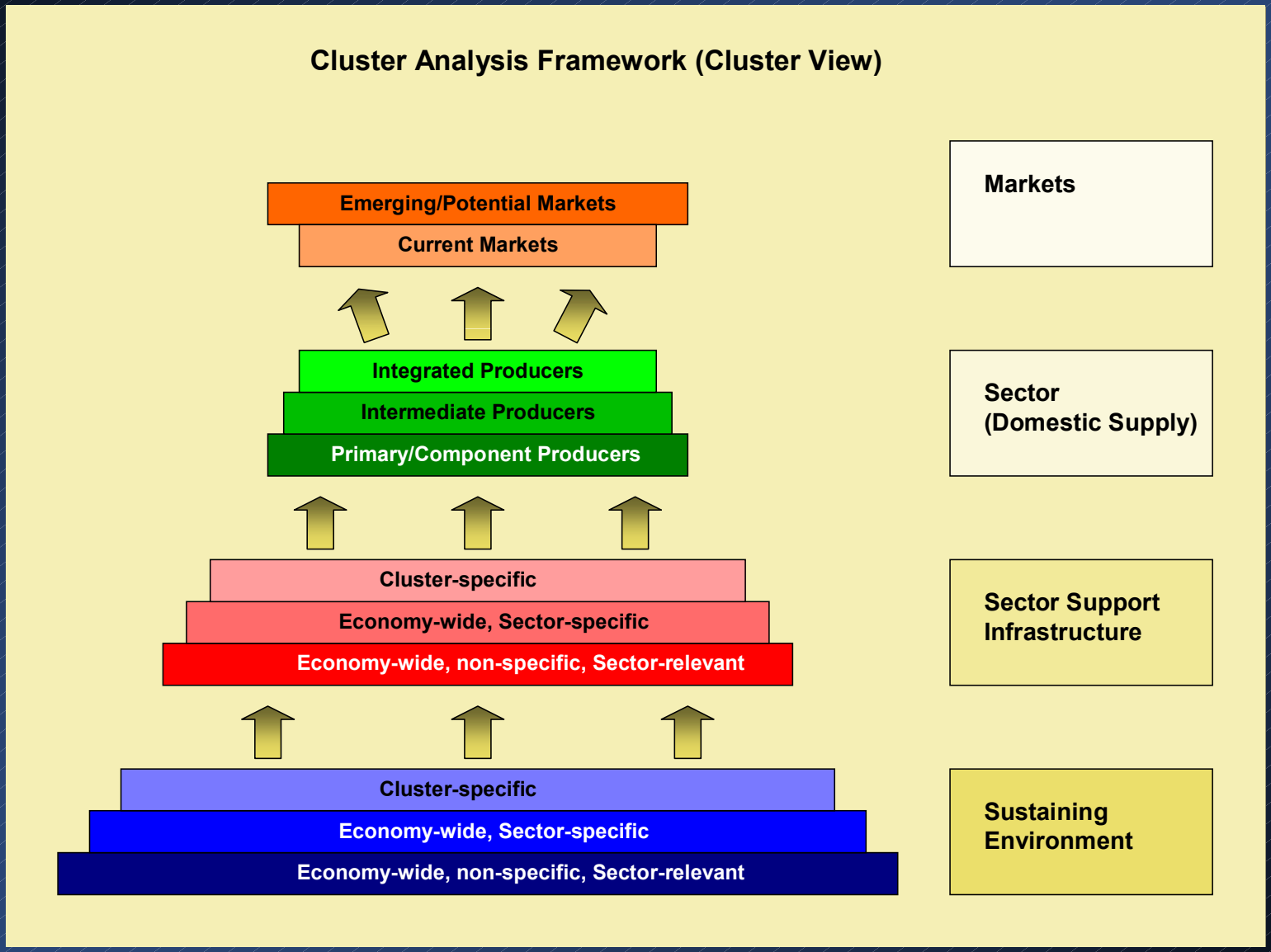
Cluster Definition

- Regional or urban concentrations of firms
  - Manufacturers, suppliers, and service providers
  - Operating in one, or more, industrial sectors
  - Supported by an infrastructure
    - educational institutions (e.g. universities and colleges)
    - research institutions
    - financing organizations
    - business incubators
    - business service providers
    - advanced physical infrastructure (e.g. telecommunications and transportation)
  - Sustained by a supporting policy regime that provides a favourable environment for long-term cluster growth

Sector View


Cluster Analysis Framework (Sector View)
SUSTAINING ENVIRONMENT
Taxation
E-Commerce
Immigration Policy
Telecommunications Policy
SECTOR SUPPORT INFRASTRUCTURE
Leadership
Champions
SECTOR
Large Indigenous Companies
Information Networks
Physical Infrastructure
MARKETS
•Domestic & International
•Business, Government, Institution, Consumer
State-Owned Enterprises
Multi-National Enterprises
Government Procurement
International Trade Policy
Innovation
Skilled Personnel
Small/Medium Enterprises
Partnerships
Marketing Support
Innovation
Business Services
Financing & Investment
Labour Market
Entrepreneurship
Human Resources Development
Equity

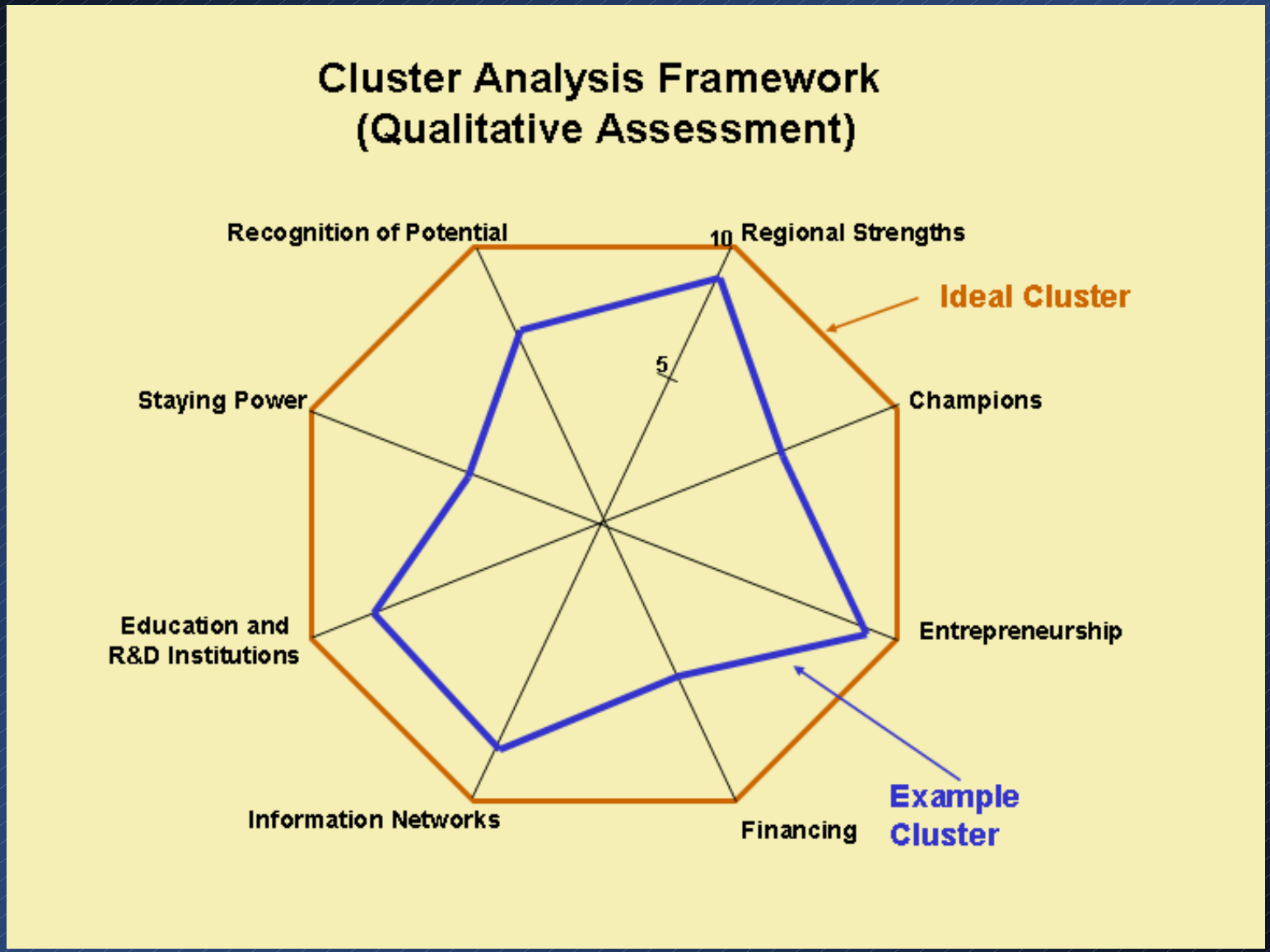
Cluster View



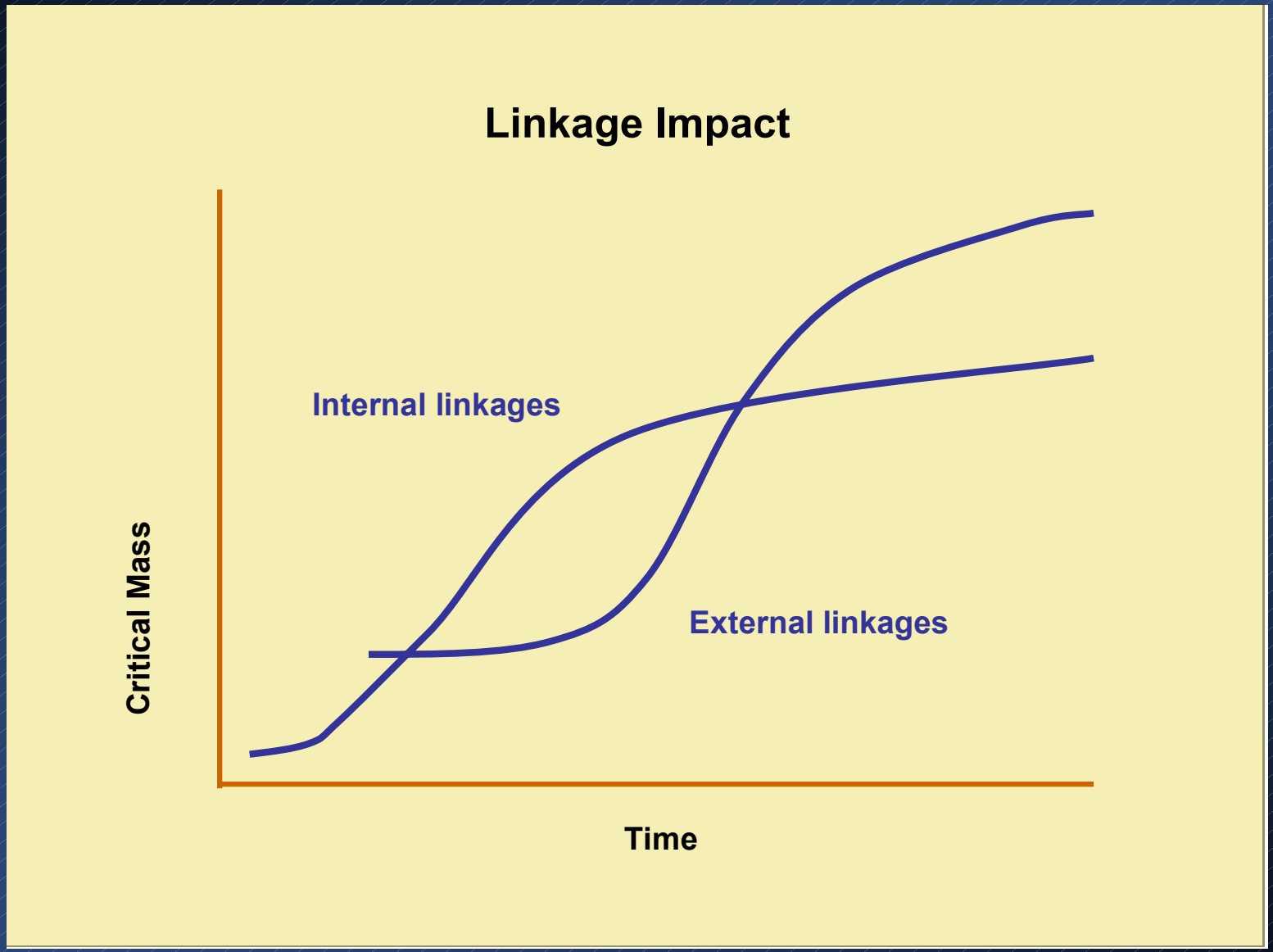
Eight Characteristics of Success

- Recognition of Potential by Local Leaders
- Regional Strengths (transportation & telecommunications infrastructure / technological / local market / social, cultural and entertainment infrastructure)
- Influence of Champions (individuals or institutions)
- Entrepreneurial Drive
- Various Sources of Financing (angel, VC, government, debt/equity)
- Information Networks (informal and formal)
- Educational & Research Institutions (with strong links to industry)
- Staying Power (it can take 30 + years to reach maturity)

Success Factors Mapped to Spider Diagramming Tool

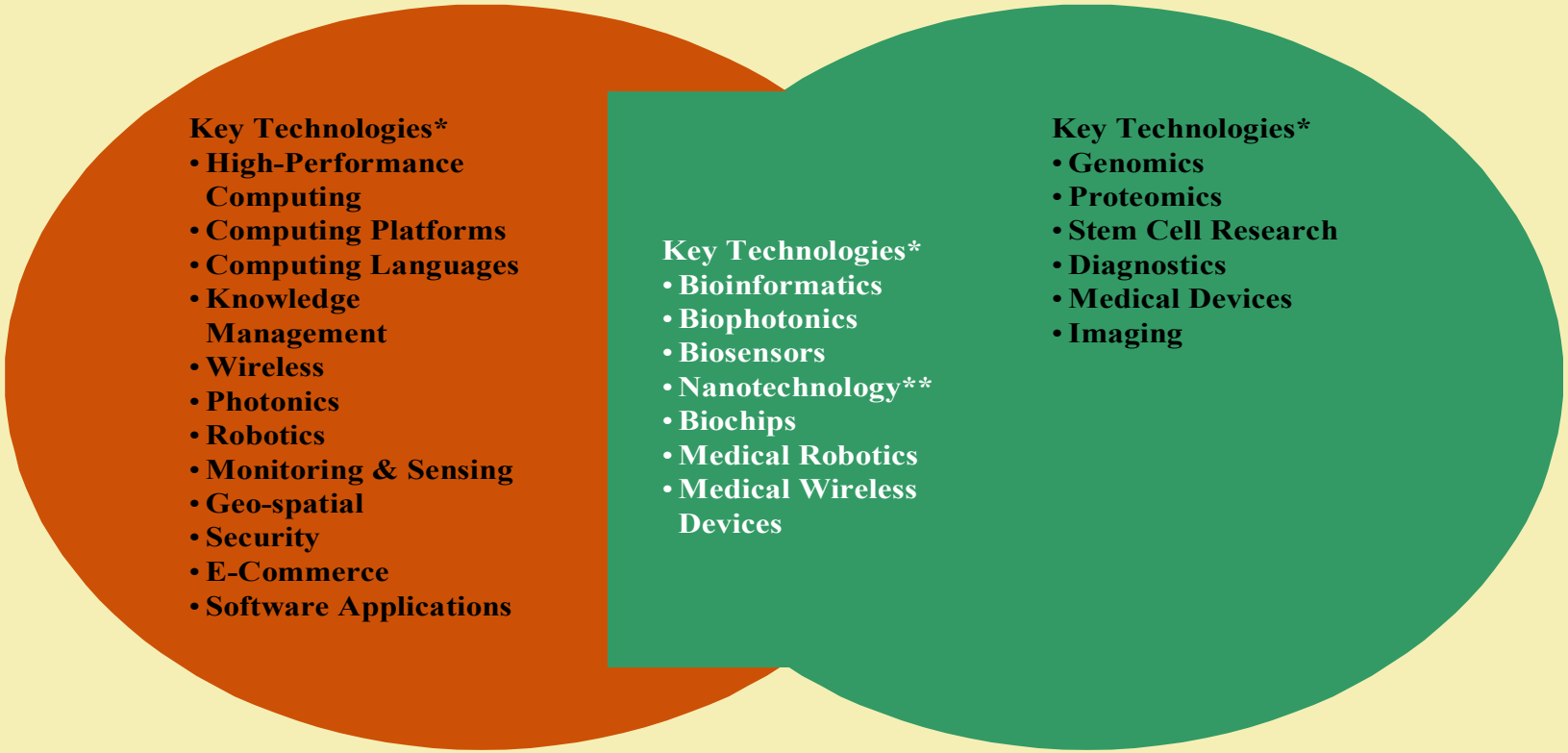


Cluster Acceleration Factors – Linkage Impact



Examples of Key Converging Technologies

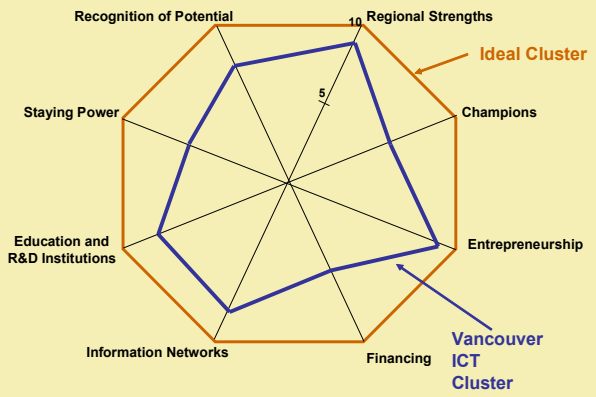
Cluster Analysis Framework (Converging Technologies View)



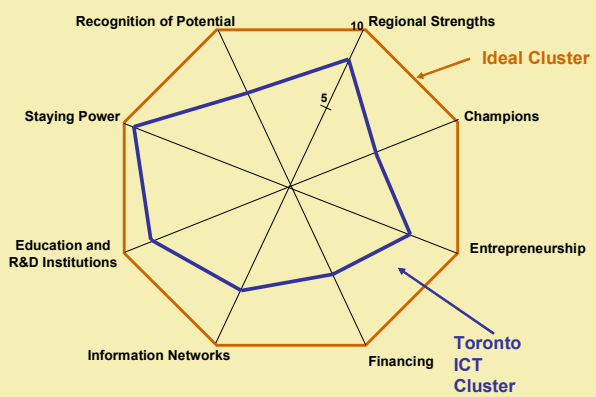
* Examples of Key Technologies
** Nanotechnology also converges with Advanced Materials

ICT Cluster Comparisons – Success Factors

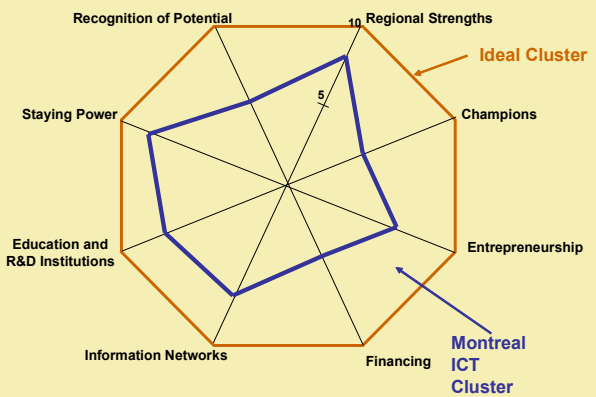
Vancouver ICT Cluster Analysis (Qualitative Assessment)



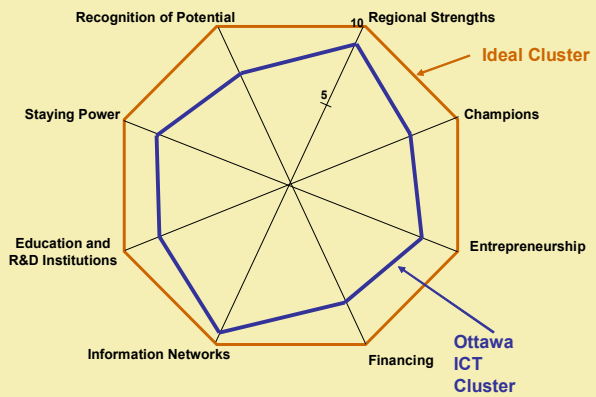
Toronto ICT Cluster Analysis (Qualitative Assessment)



Montreal ICT Cluster Analysis (Qualitative Assessment)

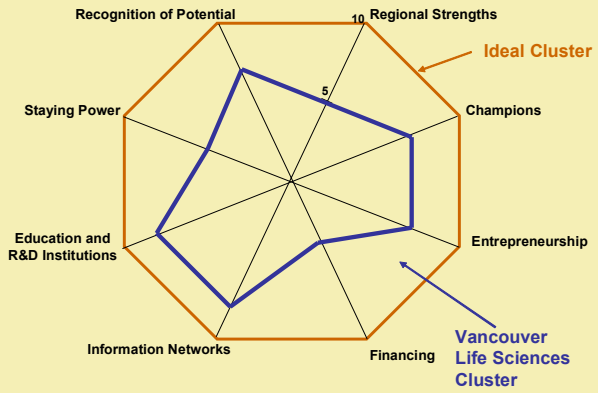


Ottawa ICT Cluster Analysis (Qualitative Assessment)

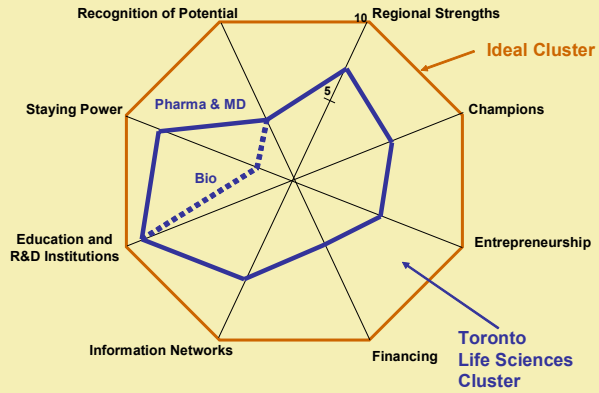


LS Cluster Comparisons – Success Factors

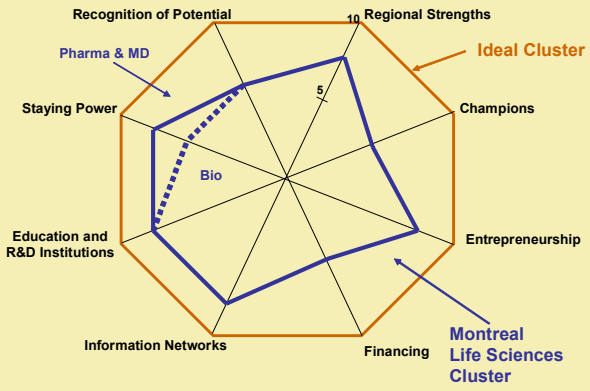
Vancouver Life Sciences Cluster Analysis (Qualitative Assessment)



Toronto Life Sciences Cluster Analysis (Qualitative Assessment)



Montreal Life Sciences Cluster Analysis (Qualitative Assessment)



Ottawa Life Sciences Cluster Analysis (Qualitative Assessment)