

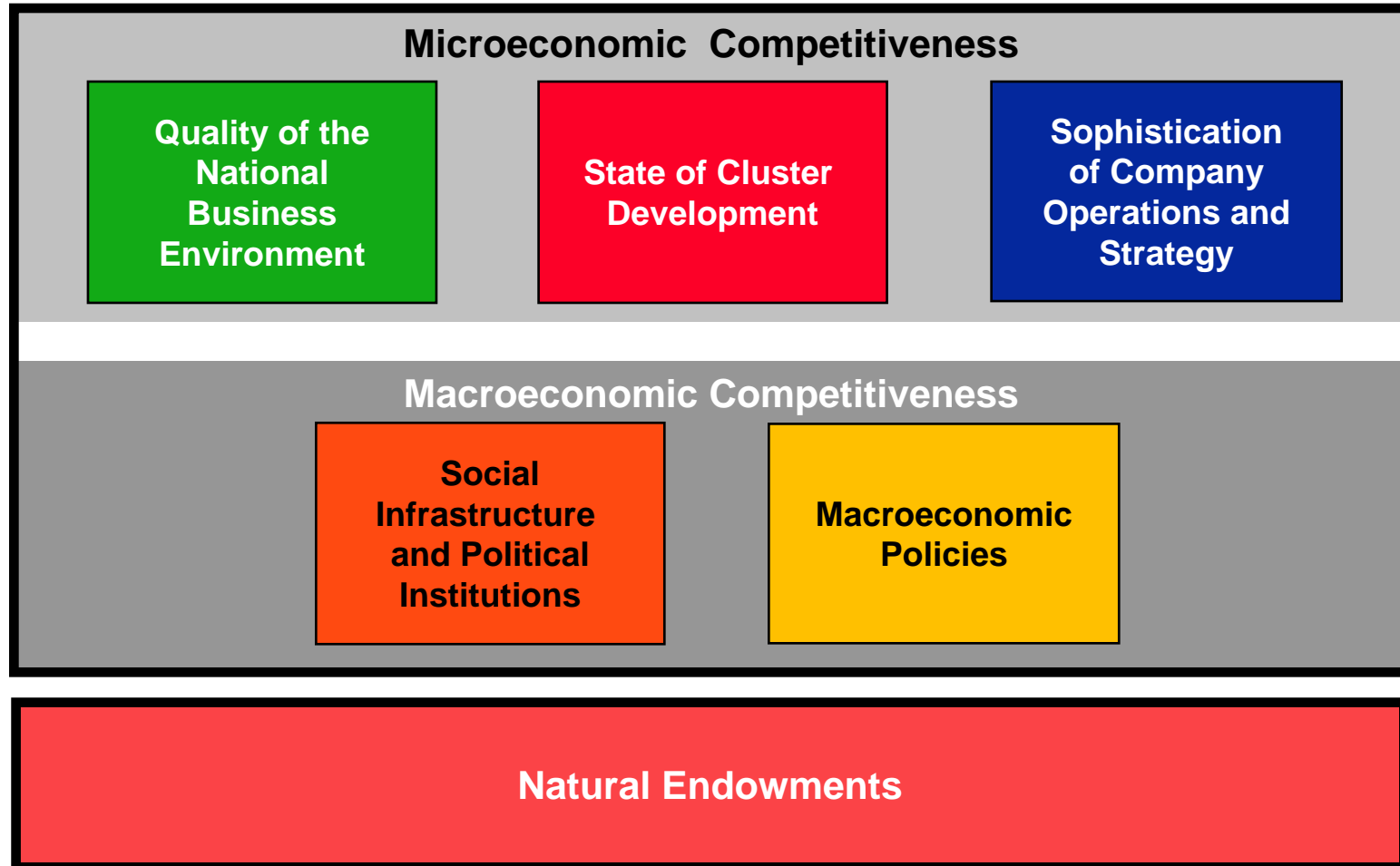
Clusters, Innovation, and Competitiveness: Implications for Stakeholders

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Nyenrode Business University, Netherlands
May 13, 2009

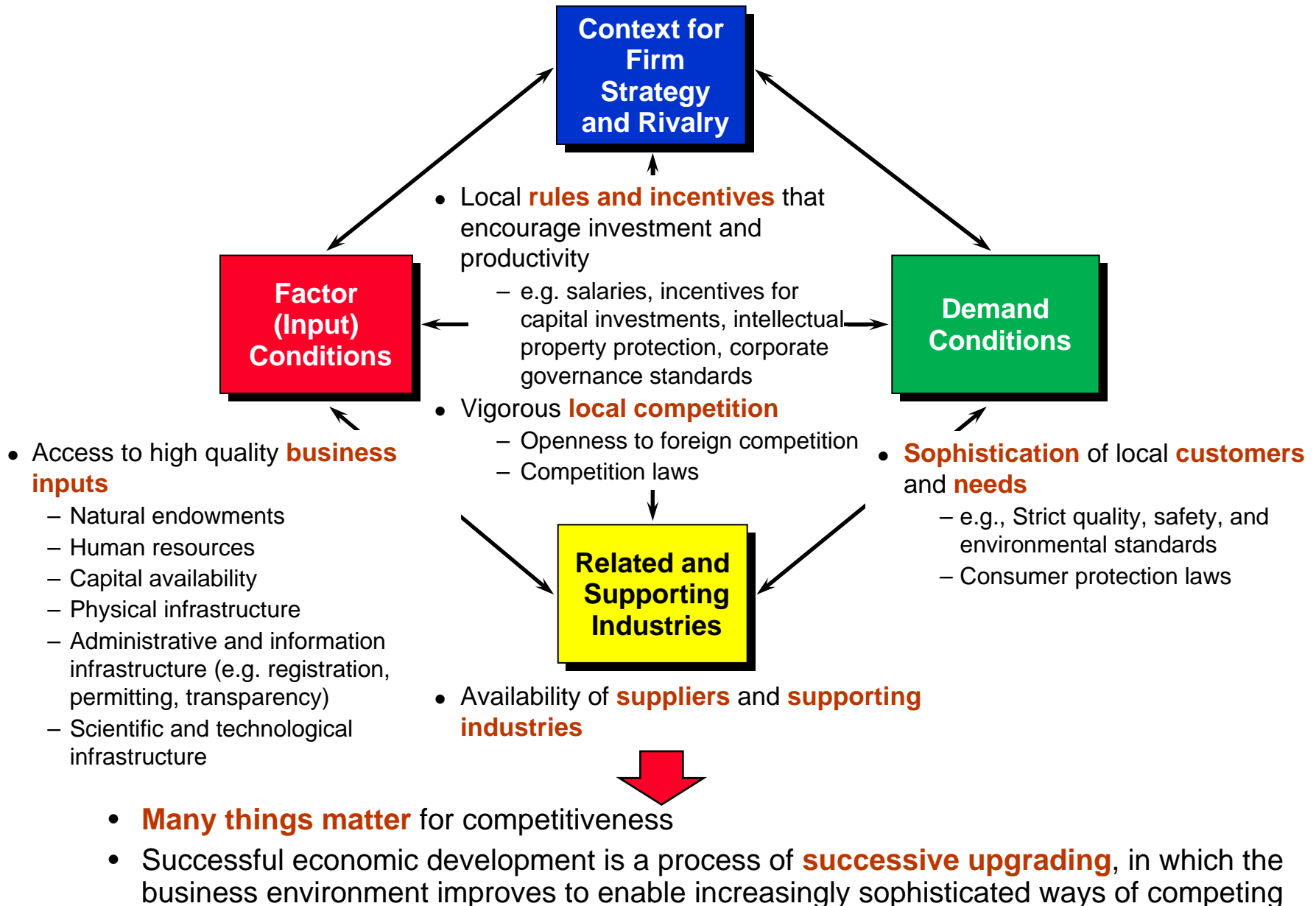
This presentation draws on ideas from Professor Porter's articles and books, including, *The Competitive Advantage of Nations* (The Free Press, 1990), "The Microeconomic Foundations of Economic Development," in *The Global Competitiveness Report*, (World Economic Forum), "Clusters and the New Competitive Agenda for Companies and Governments" in *On Competition* (Harvard Business School Press, 2008) and ongoing research at the Institute for Strategy and Competitiveness. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means - electronic, mechanical, photocopying, recording, or otherwise - without the permission of Michael E. Porter. Further information on Professor Porter's work and the Institute for Strategy and Competitiveness is available at www.isc.hbs.edu,
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Determinants of Competitiveness



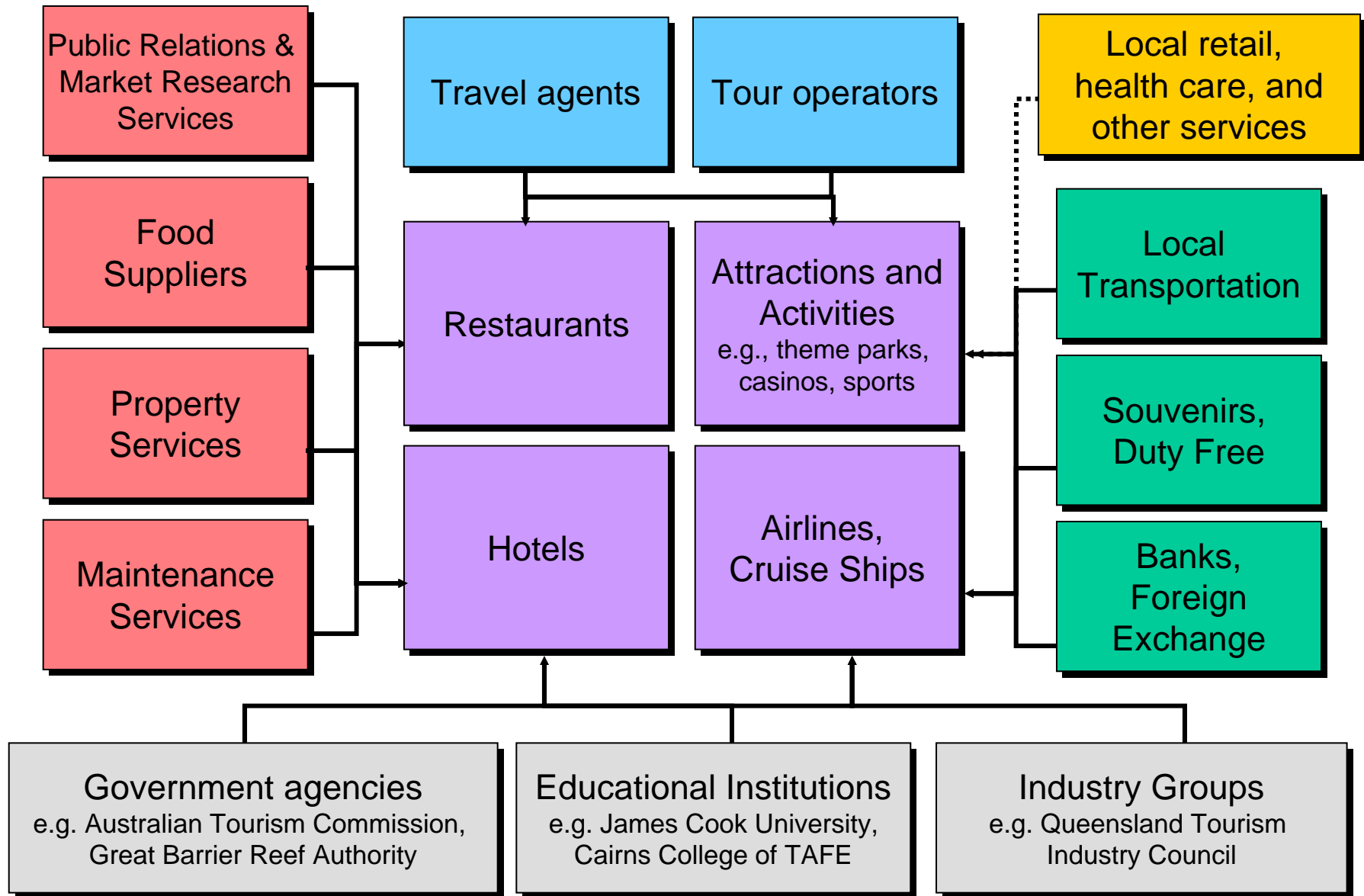
- Macroeconomic competitiveness creates the potential for high productivity, but is **not sufficient**
- Productivity ultimately depends on improving the **microeconomic capability** of the economy and the **sophistication of local competition**

Microeconomic Competitiveness: Quality of the Business Environment



What is a Cluster?

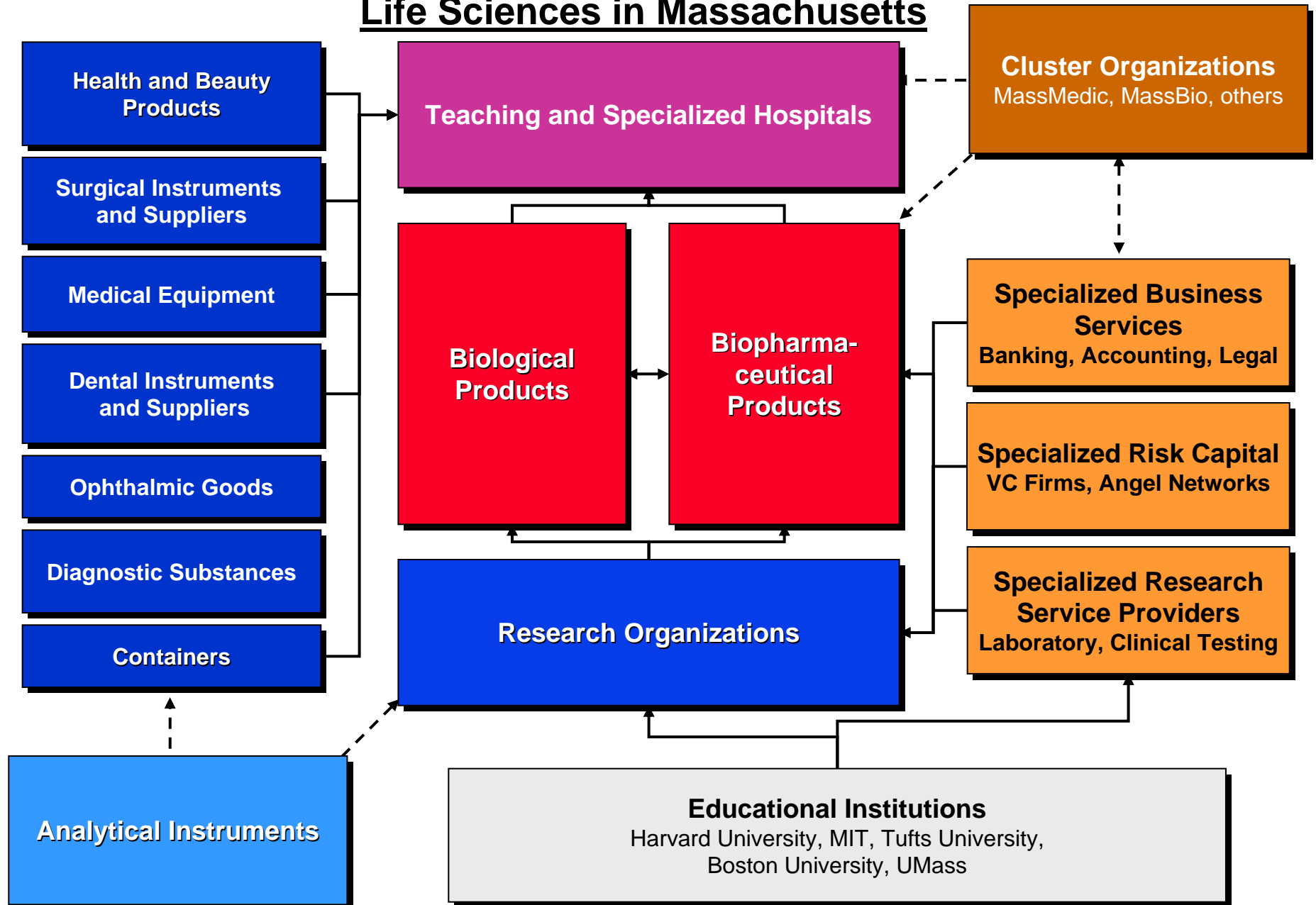
Tourism Cluster in Cairns, Australia



Sources: HBS student team research (2003) - Peter Tynan, Chai McConnell, Alexandra West, Jean Hayden

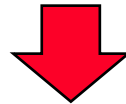
Defining the Cluster

Life Sciences in Massachusetts




Clusters and Competitiveness

- Clusters increase **productivity** and operational efficiency
- Clusters stimulate and enable **innovations**
- Clusters facilitate **commercialization** and **new business formation**



- Clusters reflect the fundamental influence of **linkages and spill-overs** across firms and associated institutions in competition

Dynamic Processes Within Healthy Clusters

- Intensive concentration of **knowledge** accumulates about the field
 - e.g., needs, technology, processes
 - Apprenticeships are common; individuals “**watch and learn**” the business
 - Co-location of companies feeds **experimentation**
 - **Trial, error**, and **observation** occurs
 - **Role models** motivate other companies
 - Rivalry is **personal** and **intense**
 - **Employees move among companies**, migrating specialized skills
 - **Spin-off firms** disperse skill and technology and foster migration into new segments
 - Specialized university programs and other institutions embedded in the cluster **grow up and disperse** skills and technology
 - Dense, overlapping **personal networks** arise, supported by enabling institutions (e.g., IFCs) facilitate exchange and collaboration
- 
- While some benefits of clusters are **automatic**, many of the most important benefits of clusters are enhanced by **organization** and **active efforts by participants**

Institutions for Collaboration

Selected Massachusetts Organizations, Life Sciences

Life Sciences Industry Associations

- Massachusetts Biotechnology Council
- Massachusetts Medical Device Industry Council
- Massachusetts Hospital Association

General Industry Associations

- Associated Industries of Massachusetts
- Greater Boston Chamber of Commerce
- High Tech Council of Massachusetts

Economic Development Initiatives

- Massachusetts Technology Collaborative
- Mass Biomedical Initiatives
- Mass Development
- Massachusetts Alliance for Economic Development

University Initiatives

- Harvard Biomedical Community
- MIT Enterprise Forum
- Biotech Club at Harvard Medical School
- Technology Transfer offices

Informal networks

- Company alumni groups
- Venture capital community
- University alumni groups

Joint Research Initiatives

- New England Healthcare Institute
- Whitehead Institute For Biomedical Research
- Center for Integration of Medicine and Innovative Technology (CIMIT)

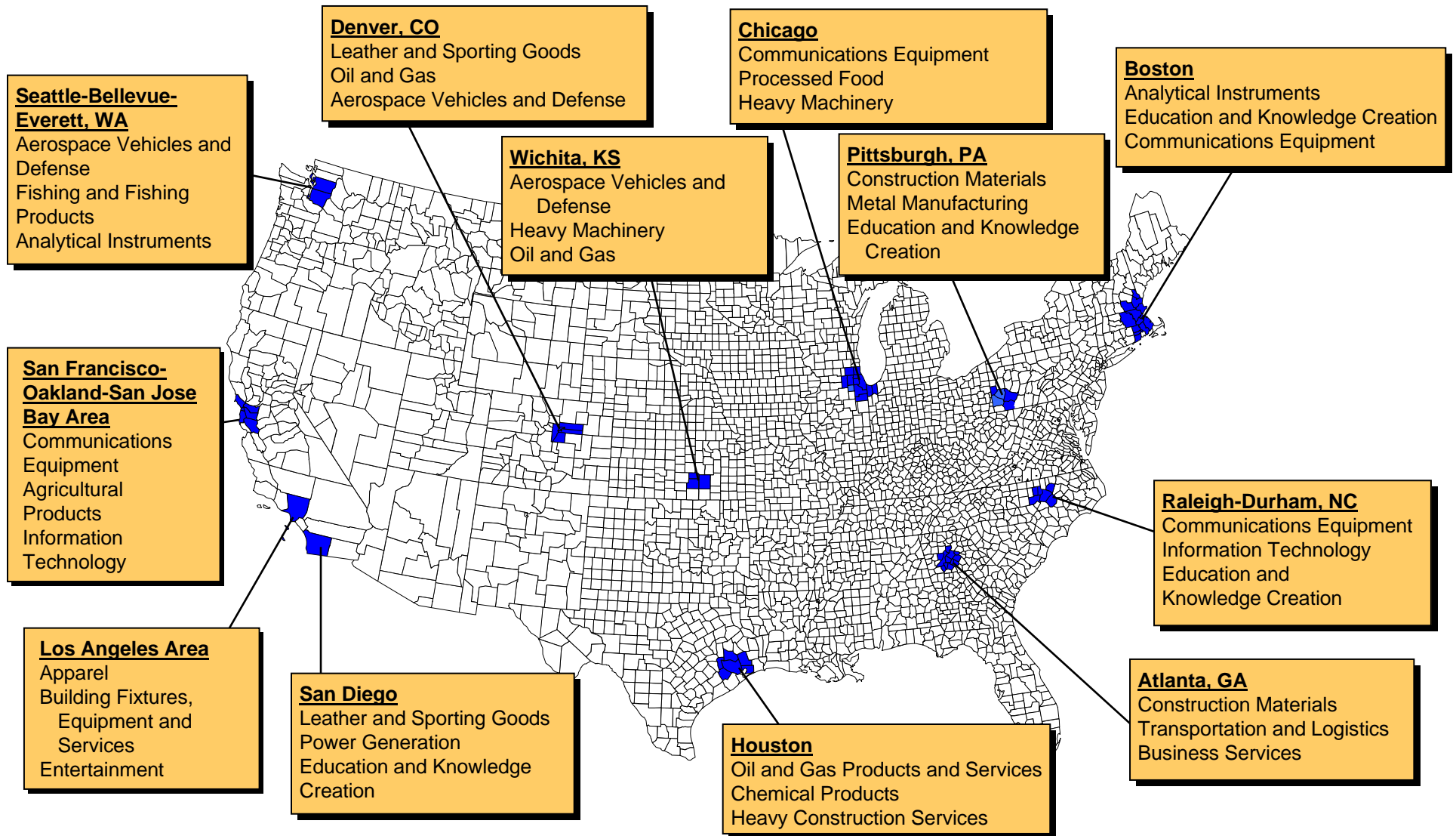
Institutions for Collaboration:

Massachusetts Medical Device Industry Council (MassMEDIC),

- MassMEDIC **facilitates collaboration** among companies, universities, medical centers, and government
- Created to address **common challenges** facing companies in the cluster
- Activities include:
 - Fund **cluster analyses** to facilitate continual upgrading and improvement
 - Engage state and federal **public policy makers** on behalf of the cluster (e.g. FDAMA, negotiating lower FDA fees for smaller businesses)
 - Work with Massachusetts Office of Business Development to **attract new firms and investment**
 - Manage a **job bank** linking employers with qualified applicants
 - **Bring cluster actors together** in monthly seminars to facilitate supplier agreements, business alliances, joint ventures, and employment searches
 - Foster specialized **education** programs
 - Support for medical technology **entrepreneurs**
 - Maintain a **directory** and other tools to link cluster members to each other and to opportunities

Specialization of Regional Economies

Selected U.S. Geographic Areas



Note: Clusters listed are the three highest ranking clusters in terms of share of national employment.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, 11/2006.

Clusters and Regional Prosperity

Recent Findings

Determinants of Regional Job Growth, Wages, and Patenting

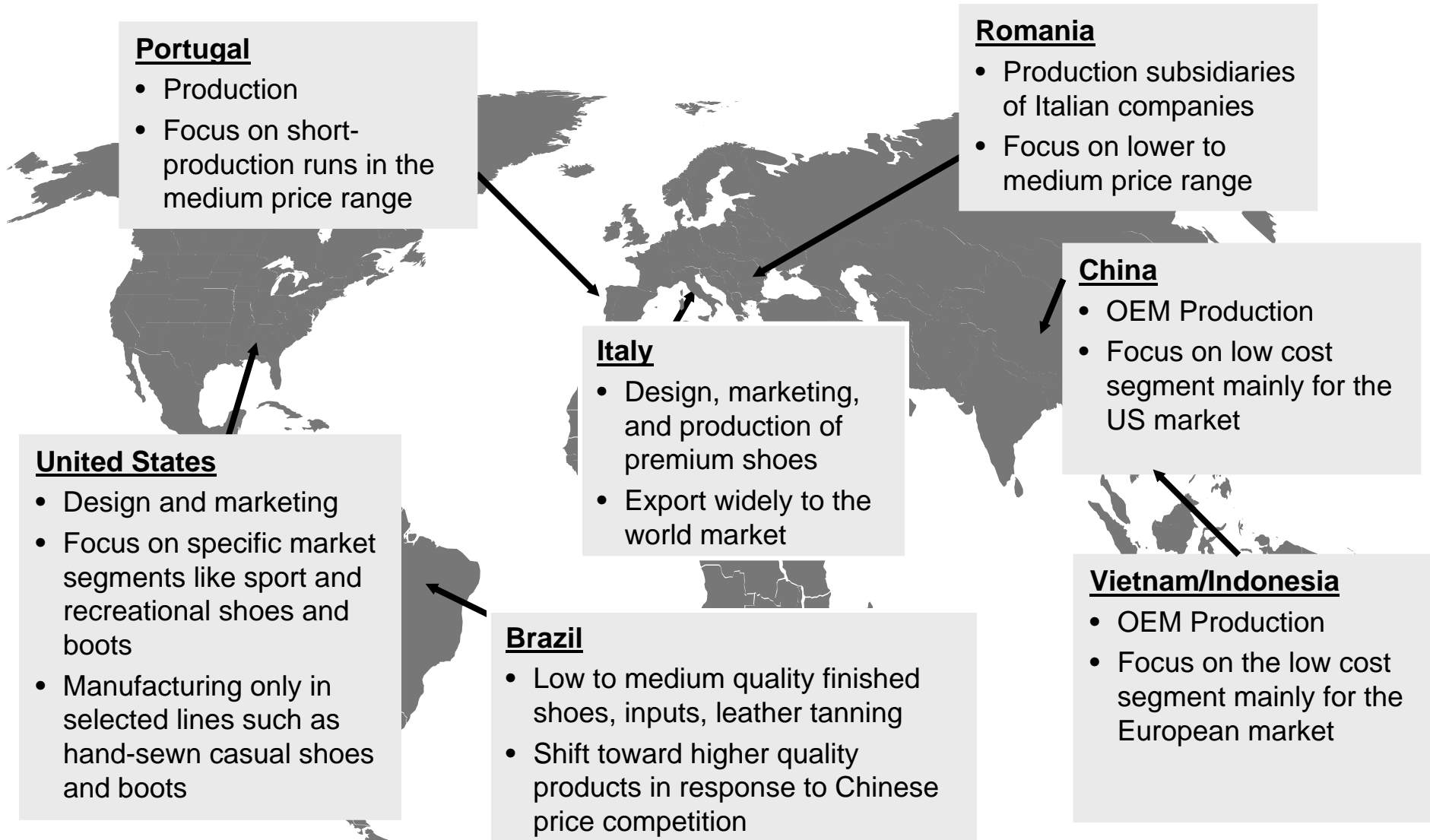
- Specialization in **strong clusters**
- **Breadth** of position within each cluster
- Positions in **related clusters**
- Presence of a region's clusters in **neighboring regions**

Not significant

- Positions in “high-tech“ versus other clusters

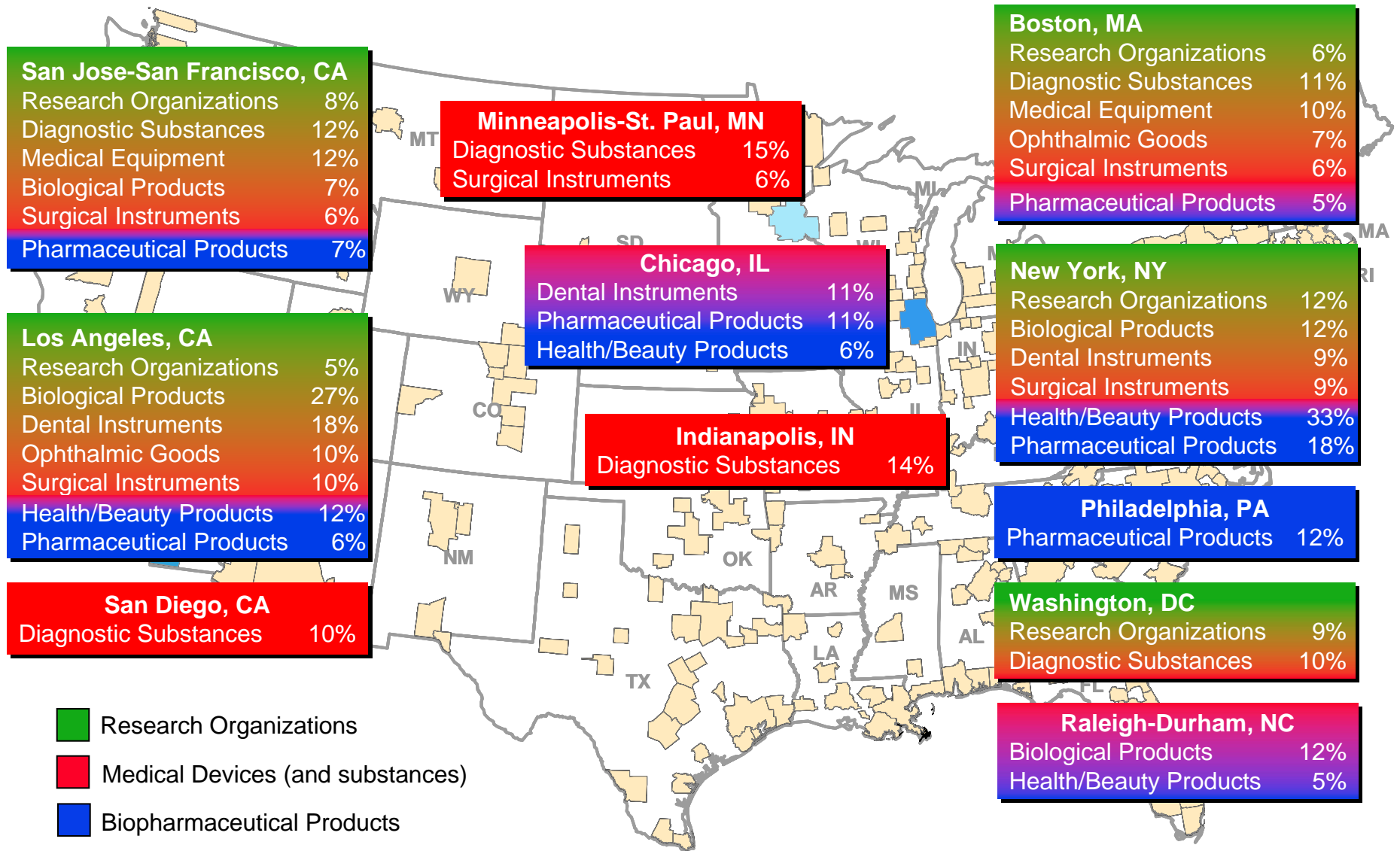
Specialization of the Same Cluster in Different Regions

Leading Footwear Clusters



Specialization of Life Science Clusters, U.S. Economic Areas, 2006

Share of U.S. Employment by Subcluster



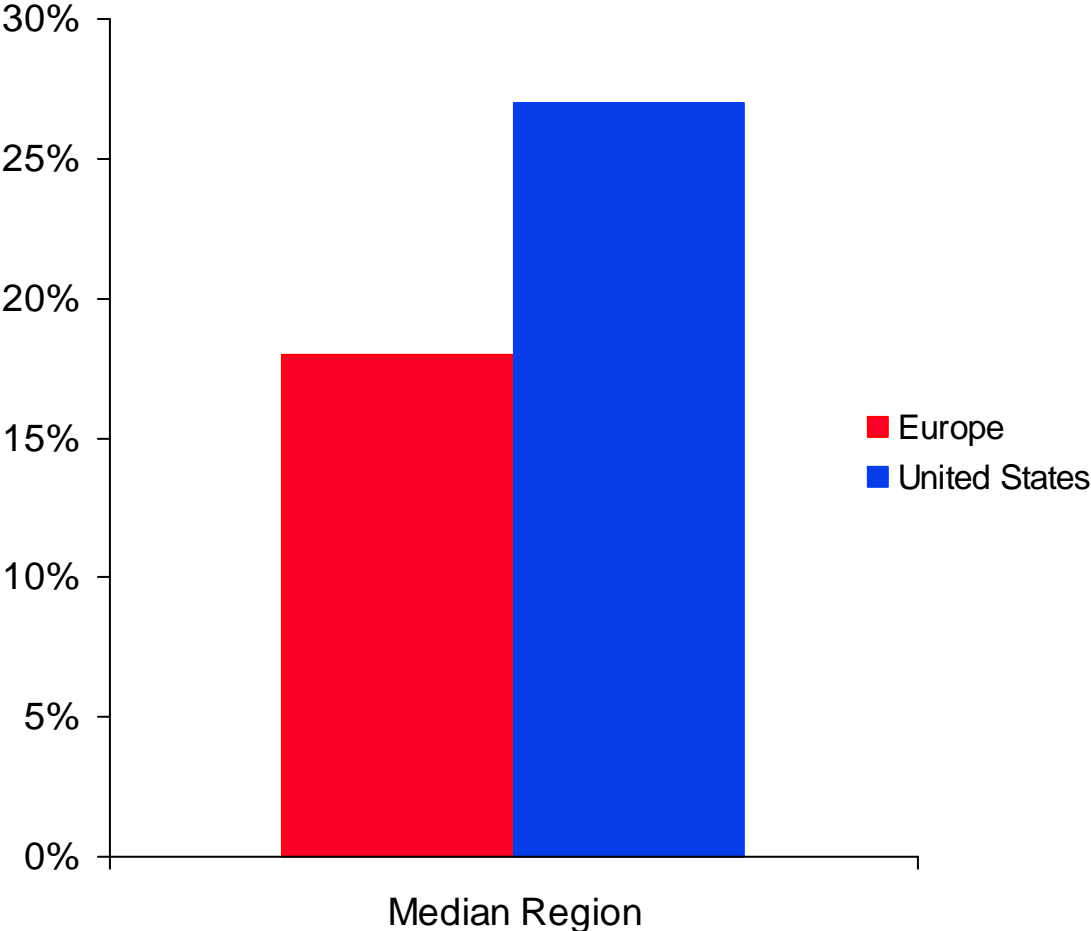
Note: Showing leading Life Sciences clusters and subclusters with top 5 rank.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

20090514 - Dutch biotech cluster (nyenrode).ppt

Cluster Strength in Europe versus the United States

Share of Employment in Strong Clusters

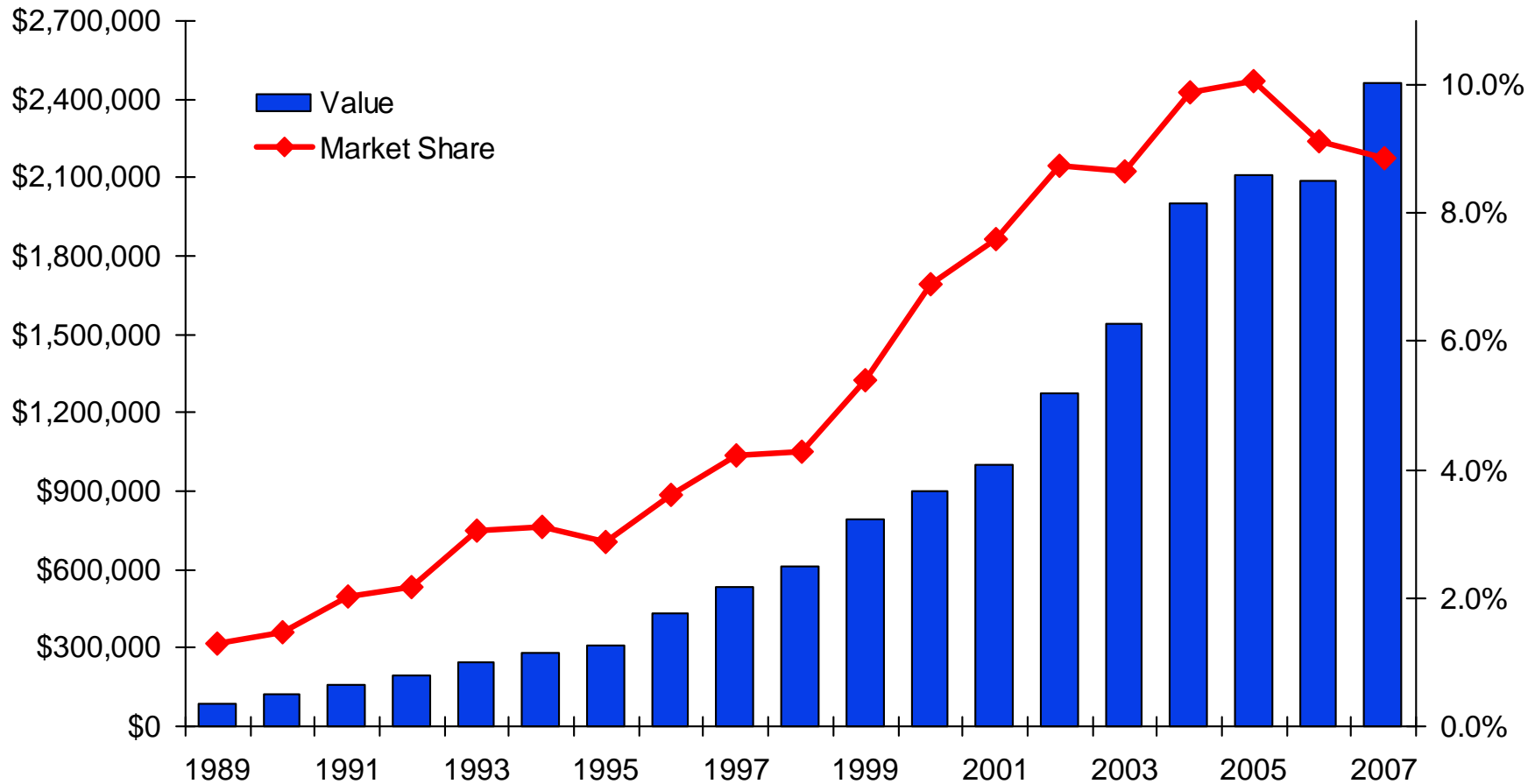


The Australian Wine Cluster

Trade Performance

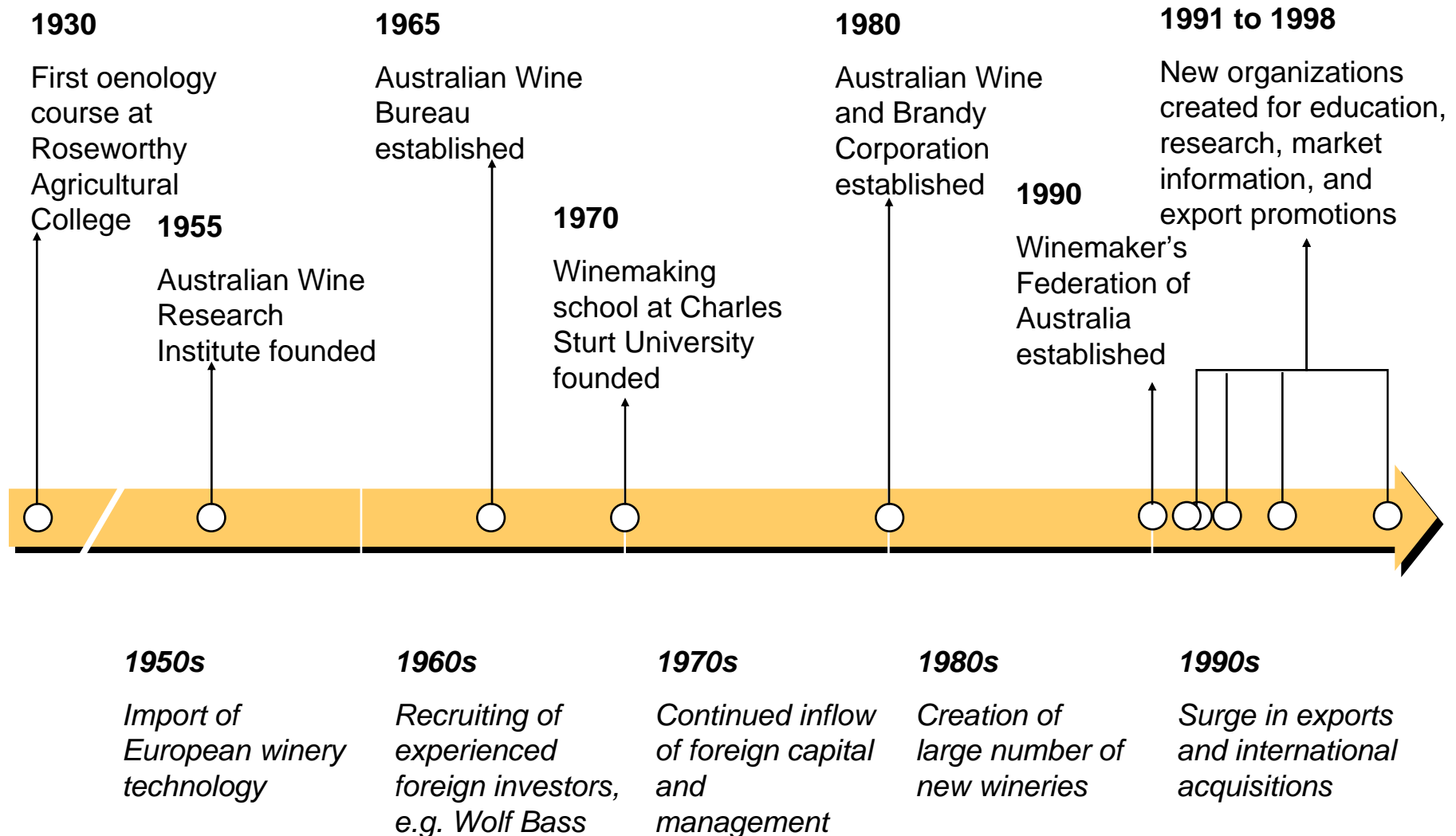
Australian Wine Exports in thousand US \$

Australian Wine World Export Market Share



Source: Prof. Michael E. Porter, International Cluster Competitiveness Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director. Underlying data drawn from the UN Commodity Trade Statistics Database.

The Australian Wine Cluster History



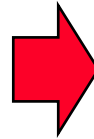
Source: Michael E. Porter and Örjan Sölvell, The Australian Wine Cluster – Supplement, Harvard Business School Case Study, 2002

The Process of Economic Development

Shifting Roles and Responsibilities

Old Model

- **Government** drives economic development through policy decisions and incentives



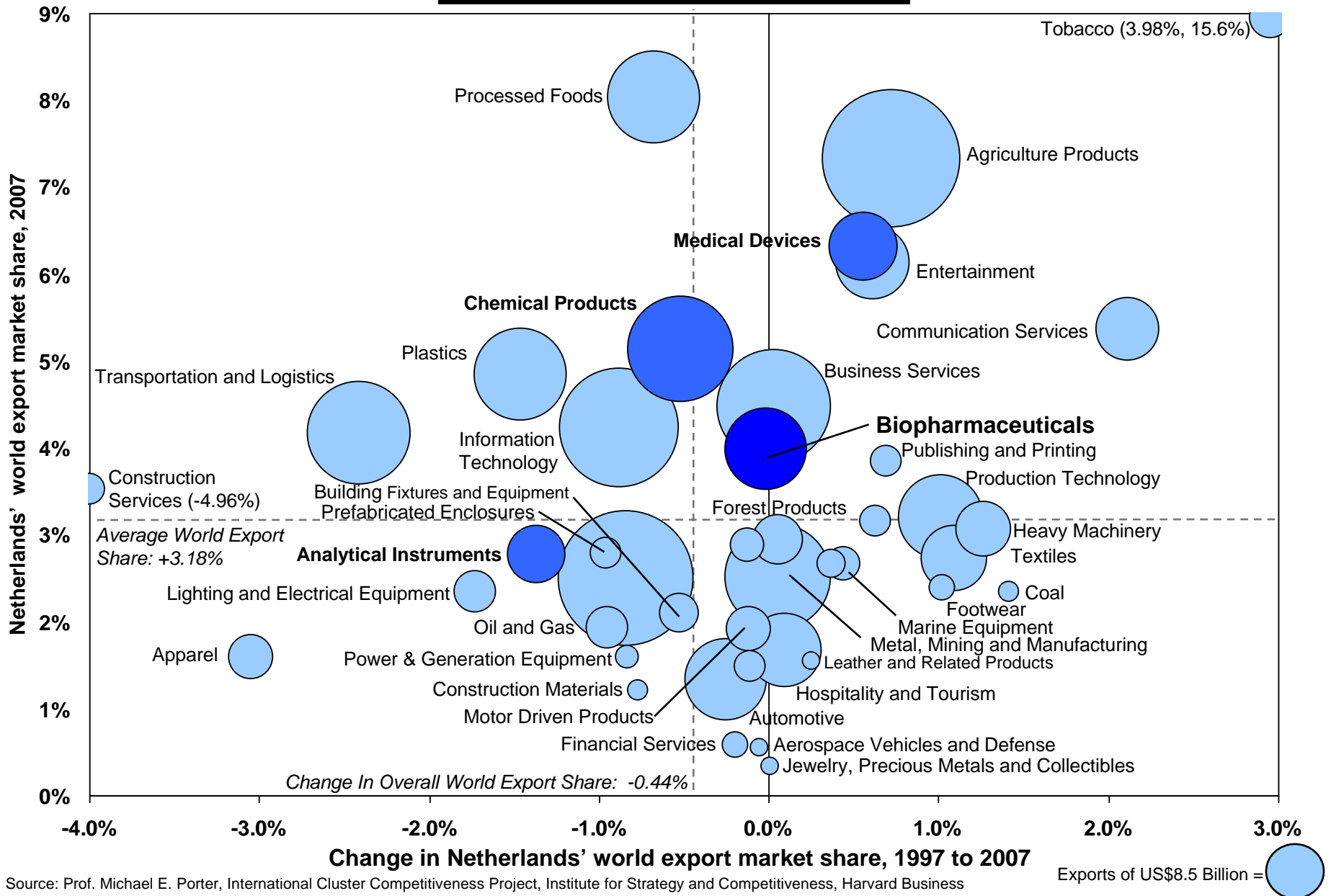
New Model

- Economic development is a **collaborative process** involving government at multiple levels, companies, teaching and research institutions, and private sector organizations

- Competitiveness must become a **bottom-up process** in which many individuals, companies, and institutions take responsibility
- **Private sector** engagement is necessary for rapid competitiveness improvement
- **Every** community and cluster can take steps to enhance competitiveness

National Cluster Export Portfolio

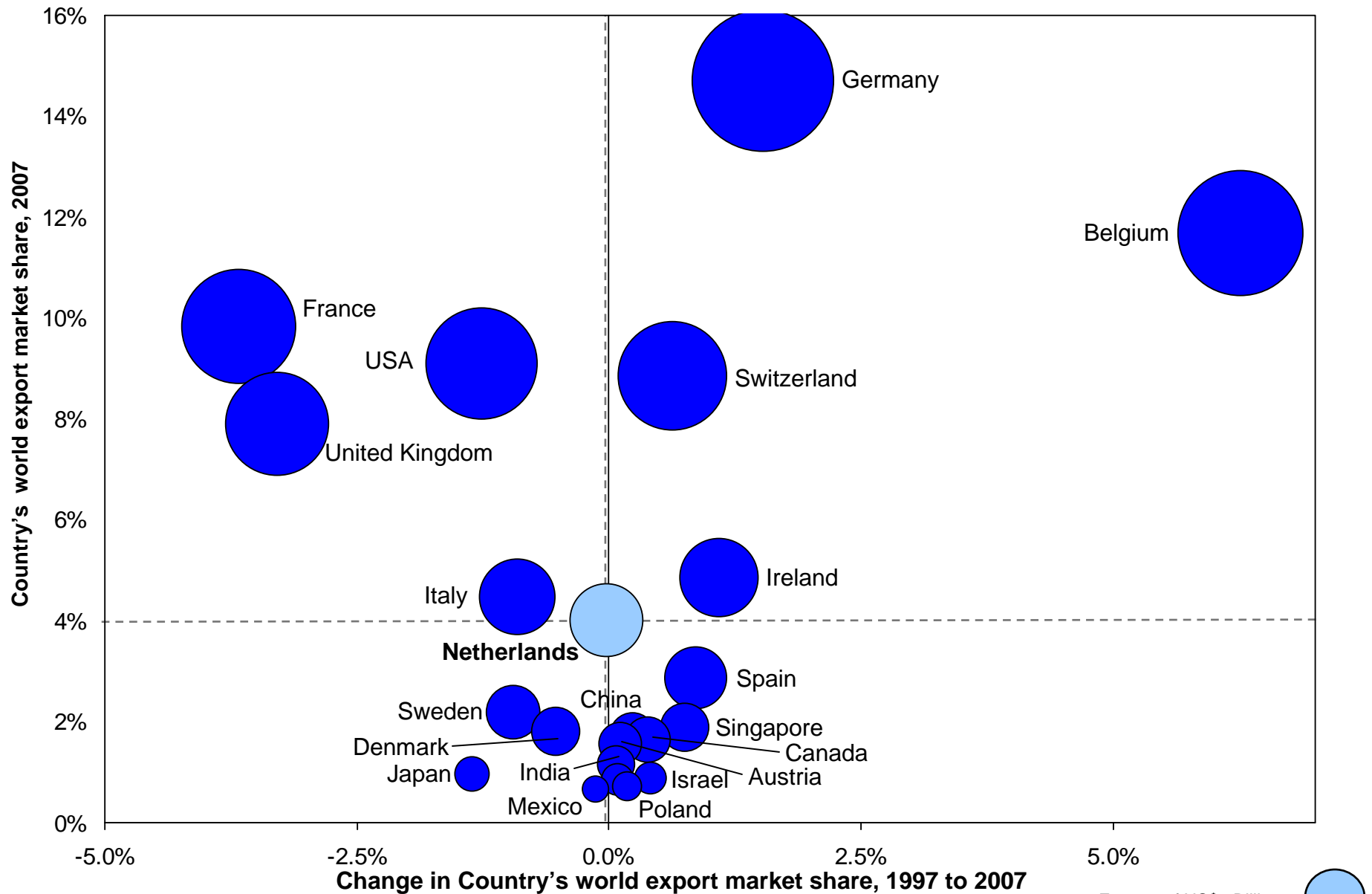
Netherlands, 1997 to 2007




Source: Prof. Michael E. Porter, International Cluster Competitiveness Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director. Underlying data drawn from the UN Commodity Trade Statistics Database and the IMF BOP statistics.

Biopharmaceutical Clusters by Country

Top 20 Exporters, 1997 to 2007

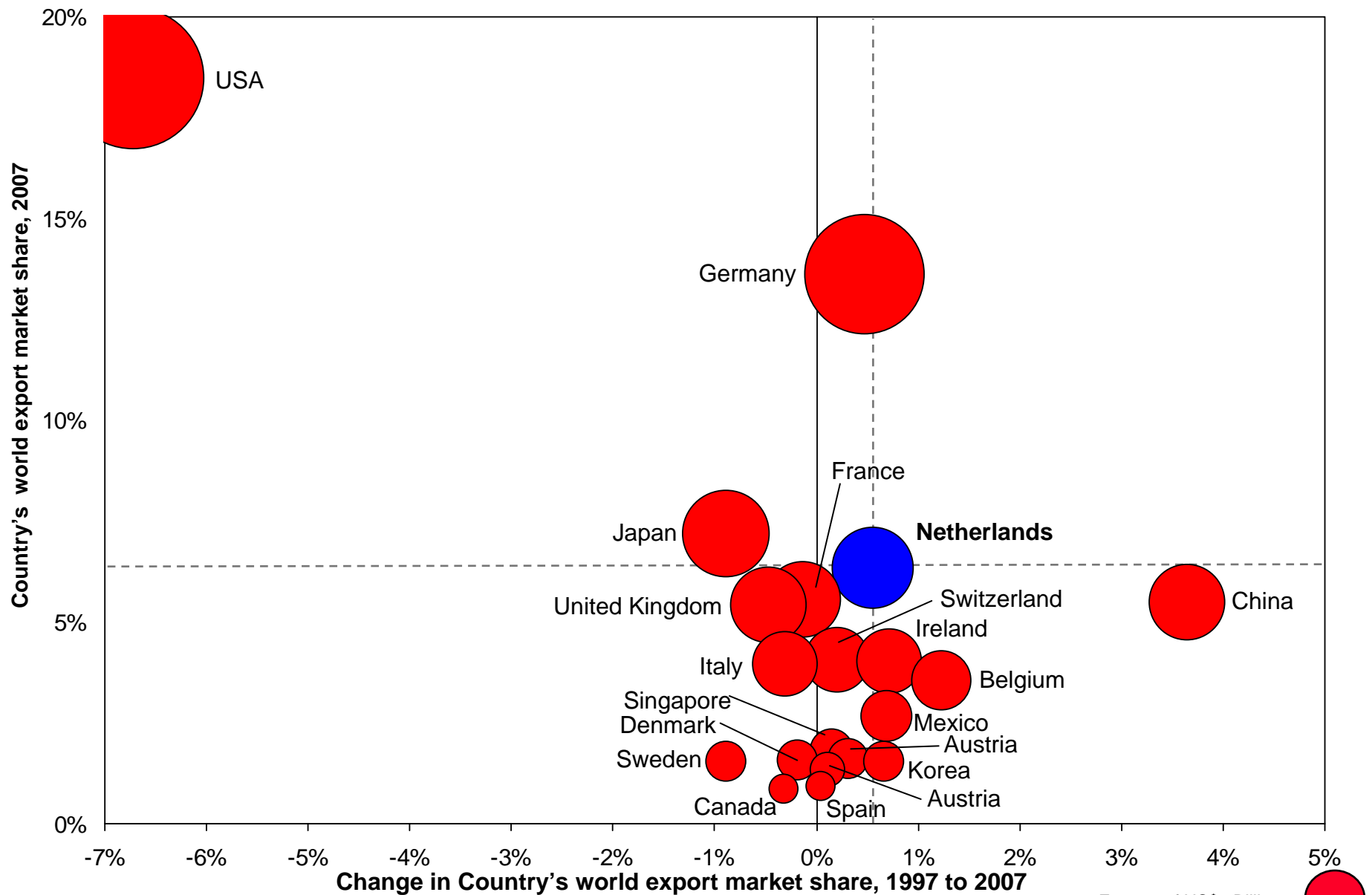


Source: Prof. Michael E. Porter, International Cluster Competitiveness Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director. Underlying data drawn from the UN Commodity Trade Statistics Database and the IMF BOP statistics.
20090514 – Dutch biotech cluster (nyenrode).ppt

Exports of US\$8 Billion = 

Medical Devices Clusters by Country

Top 20 Exporters, 1997 to 2007

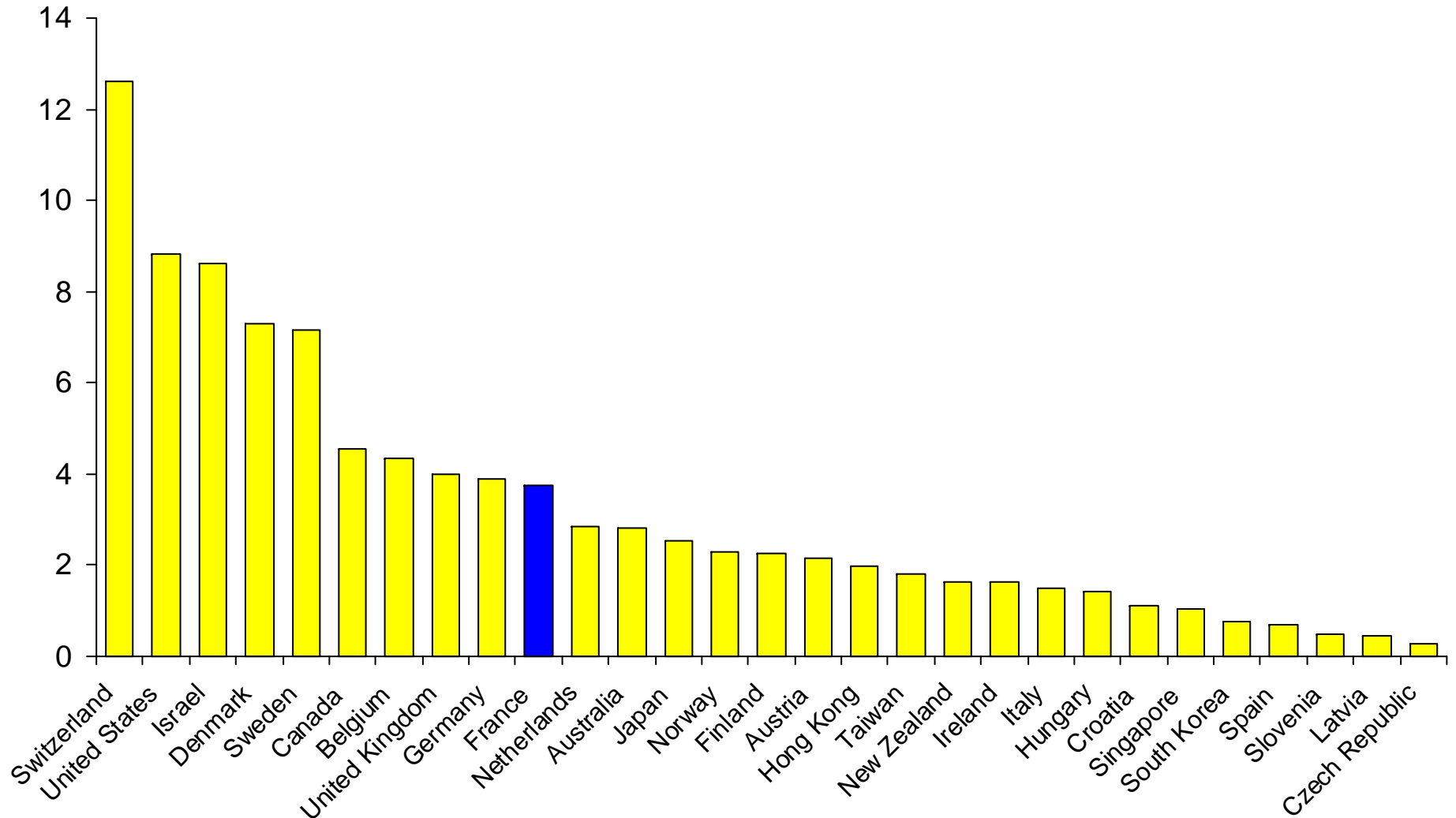


Source: Prof. Michael E. Porter, International Cluster Competitiveness Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director. Underlying data drawn from the UN Commodity Trade Statistics Database and the IMF BOP statistics.
20090514 – Dutch biotech cluster (nyenrode).ppt

Biotech Innovation Performance

Biological / Drug Patenting Intensity, Selected Countries

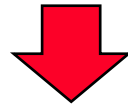
Patents* per million
Inhabitants, 2008



*Patents are Class 424, Drug, Bio-Affecting and Body Treating Compositions
Source: U.S. Patent and Trademark Office, 2009

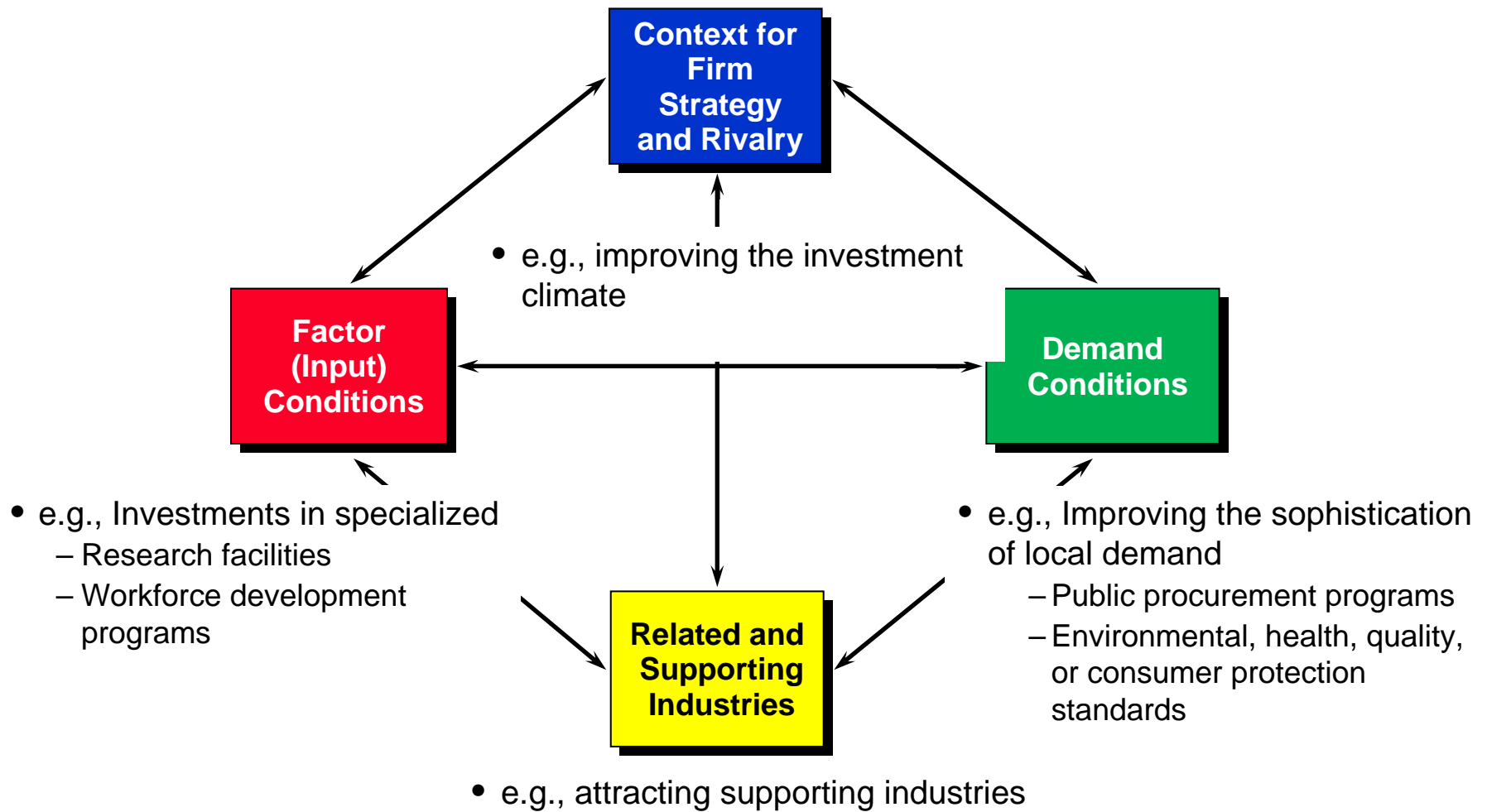
Cluster Initiatives

- Cluster initiatives are **collaborative programs** by companies, public sector entities, and other related institutions with the objective to improve the competitiveness



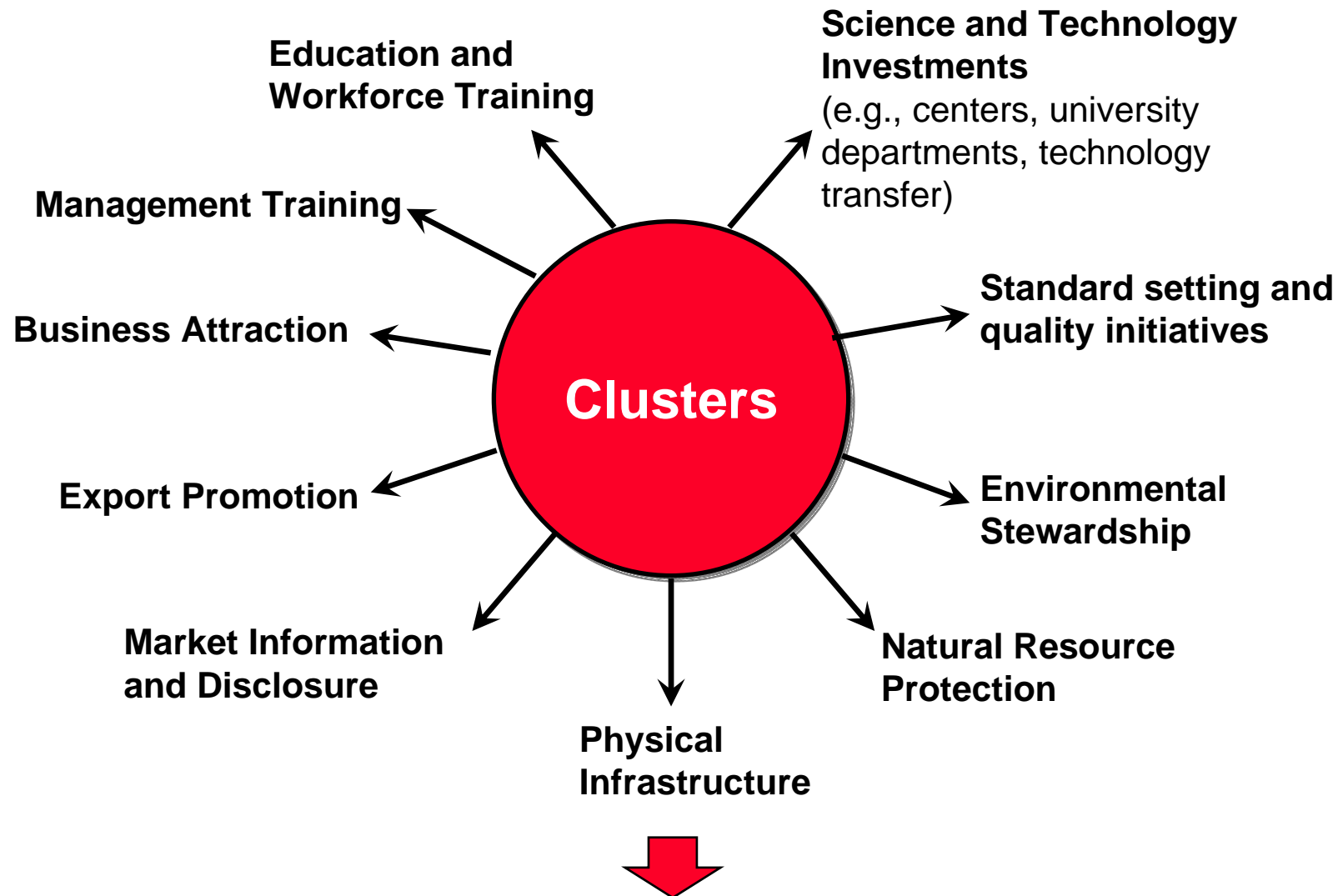
- Collaboration to upgrade **company operations and strategies**
 - e.g., environmental practices
- Upgrading of **cluster-specific business environment** conditions
 - e.g., supplier density, regulatory environment
- Strengthening of **networks** to enhance spill-overs linkages within the cluster
 - e.g., joint procurement, training programs

Improving the Cluster-Specific Business Environment



- Policies need to have an **impact on productivity and innovation**, not just transfer money
- Policies need to change the environment for **many companies in the cluster**, not just a few

Clusters and the Implementation of Public Policy



- Clusters provide a framework for **implementing public policy** and **organizing public-private collaboration** to enhance competitiveness

Redefining Health Care Delivery

- The core issue in health care is the **value of health care delivered**

Value: Patient health outcomes per dollar spent



- How to design a health care system that **dramatically improves value**
 - Ownership of entities is secondary (e.g. non-profit vs. for profit vs. government)
- How to create a **dynamic system** that keeps rapidly improving

Creating a Value-Based Health Care System

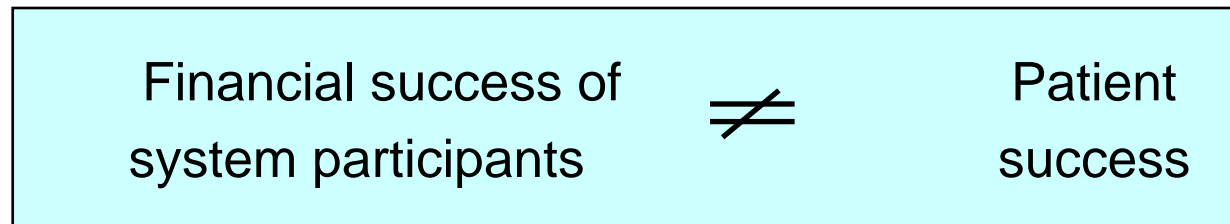
- Significant improvement in value will require **fundamental restructuring of health care delivery**, not incremental improvements

Today, 21st century medical technology is delivered with 19th century organization structures, management practices, and pricing models

- TQM, process improvements, safety initiatives, PBM, disease management and other overlays are beneficial but **not sufficient** to substantially improve value

Aligning Competition with Value

- Competition is a powerful force to encourage **restructuring of care** and **continuous improvement in value**
 - Competition for patients
 - Competition for health plan subscribers
- Today's competition in health care **is not aligned with value**

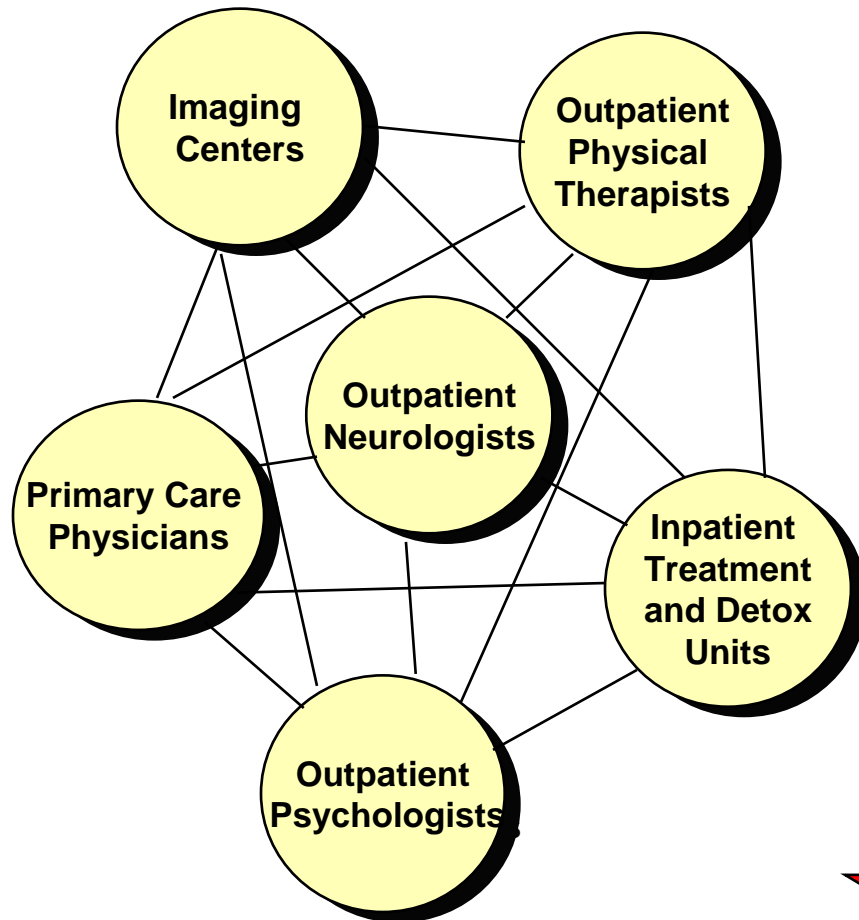


- Creating **competition on value** is a central challenge in health care reform

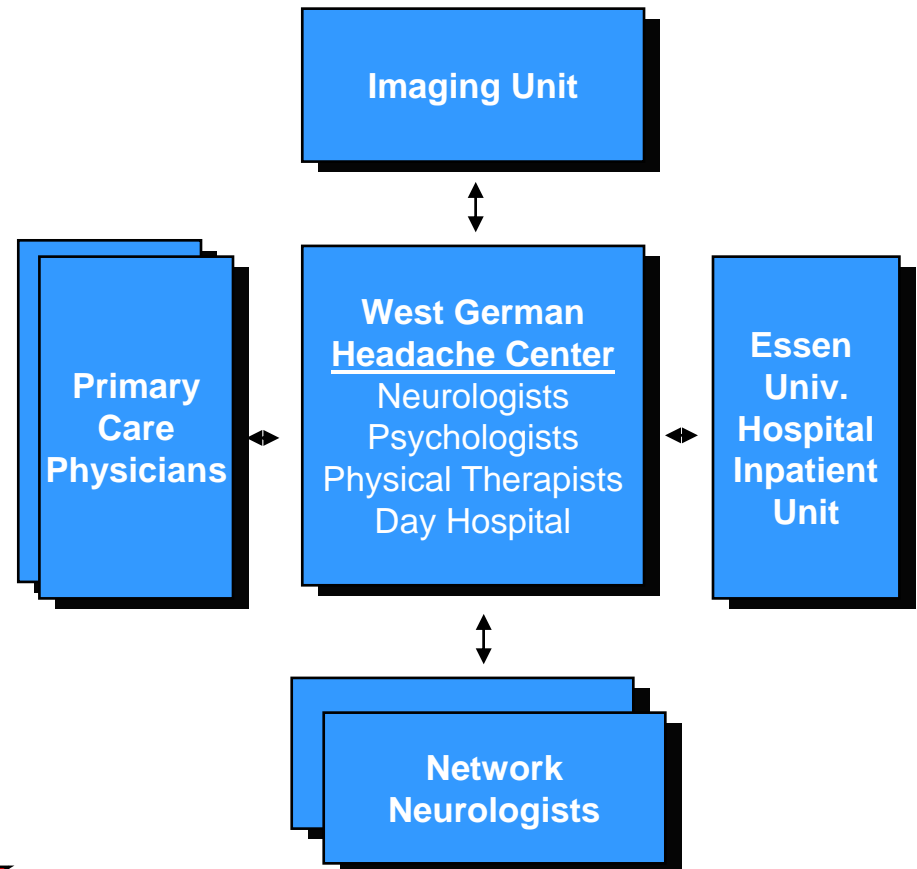
Restructuring Care Delivery

Migraine Care in Germany

Existing Model:
Organize by Specialty and Discrete Services



New Model:
Organize into Integrated Practice Units (IPUs)



- The health plan was crucial to this transformation

The Cycle of Care

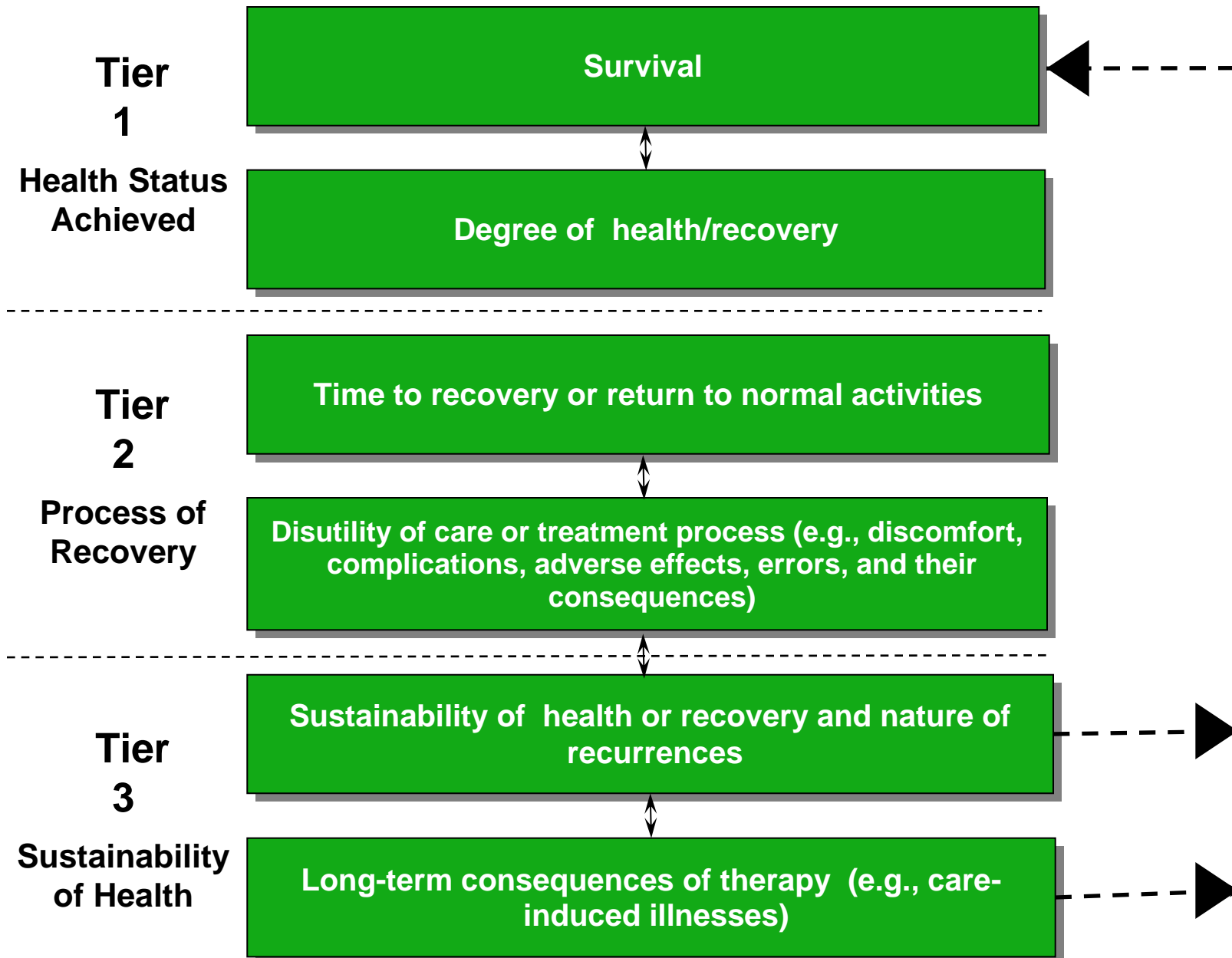
Breast Cancer

| | | | | | | |
|------------------|--|--|--|--|---|--|
| ENGAGING | Advice on Self screening Consultations on risk factors | Counseling patient and family on the diagnostic process and the diagnosis | Explaining patient choices of treatment | Counseling on the treatment process Achieving compliance | Counseling on rehabilitation options, process Achieving compliance | Counseling on long term risk management Achieving Compliance |
| | | | Patient and family psychological counseling | | Psychological counseling | |
| MEASURING | Self exams Mammograms | Mammograms Ultrasound MRI | | Procedure-specific measurements | Range of movement Side effects measurement | Recurring mammograms (every six months for the first 3 years) |
| | | Biopsy BRACA 1, 2... | | | | |
| ACCESSING | Office visits Mammography lab visits | Office visits | Office visits | Hospital stays | Office visits | Office visits |
| | | Lab visits | Hospital visits | Visits to outpatient or radiation chemotherapy units | Rehabilitation facility visits | Lab visits Mammographic labs and imaging center visits |
| | | High risk clinic visits | | | | |
| | MONITORING/ PREVENTING | DIAGNOSING | PREPARING | INTERVENING | RECOVERING/ REHABING | MONITORING/ MANAGING |
| | Medical history Control of risk factors (obesity, high fat diet) Genetic screening Clinical exams Monitoring for lumps | Medical history Determining the specific nature of the disease Genetic evaluation Choosing a treatment plan | Surgery prep (anesthetic risk assessment, EKG) | Surgery (breast preservation or mastectomy, oncoplastic alternative) | In-hospital and outpatient wound healing Treatment of side effects (e.g. skin damage, cardiac complications, nausea, lymphodema and chronic fatigue) | Periodic mammography Other imaging |
| | | | Plastic or onco-plastic surgery evaluation | Adjuvant therapies (hormonal medication, radiation, and/or chemotherapy) | | Follow-up clinical exams Treatment for any continued side effects |
| | | | | | Physical therapy | |

PROVIDER MARGIN

■ Breast Cancer Specialist
□ Other Provider Entities

The Outcome Measures Hierarchy



Swedish Obesity Registry Indicators

Initial Conditions

- Demographics (age, sex, height, weight, BMI, waist circumference etc)
- Baseline labs – HbA1c (a measure of long-term blood glucose control), Triglycerides, Low Density Lipoprotein (bad cholesterol), High Density Lipoprotein (good cholesterol) Comorbidities (sleep apnea, diabetes, depression, etc)
- SF-36/OP-9 (validated quality of life measures)

Surgery

- Background (Previous surgeries, anesthesia risk class)
- Operation type and concurrent operations (gall bladder removal, appendix removal, etc)
- Perioperative complications
- Surgery data (surgery/anesthesia times, blood loss, etc)
- 6 week follow-up

Source: SOReg: Swedish National Obesity Registry

6-week follow-up

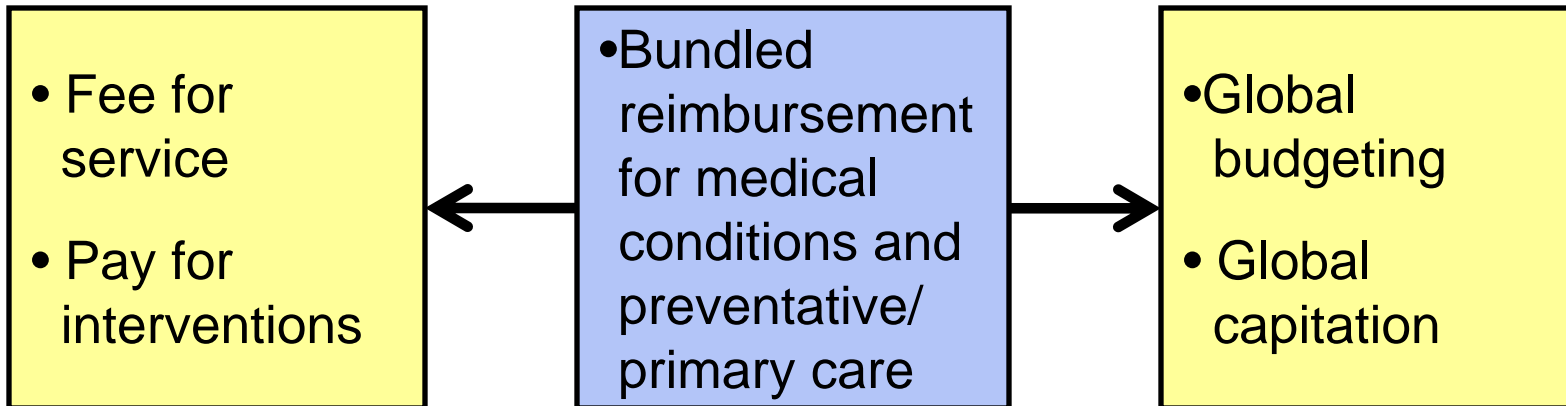
- Length of stay
- <30d surgical complications (bleeding, leakage, infection, technical complications, etc)
- <30d general complications (blood clot, urinary infection, etc)
- Other operations required (gall bladder, plastic surgery, etc)
- Repetition of anthropometric measurements (height, weight, waist, BMI, and change from initial)
- Diabetes labs (HbA1c)


1,2 & 5-year follow-up

- Anthropometrics and change from initial
- Labs (diabetes, triglycerides & cholesterol)
- Comorbidities, and ongoing treatments
- Delayed complications of operation (hernia, ulcer, treatment related malnutrition or anemia, etc)
- Other surgeries since registration
- SF-36/OP-9 (validated quality of life measures)

Source: SOReg: Swedish National Obesity Registry

New Reimbursement Model



- Bundled reimbursement for care cycles motivates value improvement, care cycle optimization, and spending to save
- 
- **Price caps**, instead of fixed prices, will enhance value by encouraging value based competition
 - **Outcome measurement and reporting** at the medical condition level is needed for any reimbursement system to ultimately succeed

Value-Based Health Care Delivery: Implications for Suppliers

- Compete on delivering **unique value** measured over the **full care cycle** for the medical condition
- **Demonstrate value** based on careful study of long term outcomes and costs versus alternative approaches
- Ensure that the products are **used by the right patients**
- Ensure that drugs/devices are embedded in the **right care delivery processes**
- Market based on **value, information, provider** support and **patient** support
- Offer services that **contribute to value** rather than reinforce cost shifting
- Move to **value-based pricing** approaches
 - e.g. price for success, guarantees