

Competitiveness and the Role of Regions

Professor Michael E. Porter
Institute for Strategy and Competitiveness
Harvard Business School

The Center For Houston's Future
Houston, Texas
November 22, 2002

This presentation draws on ideas from Professor Porter's articles and books, in particular, The Competitive Advantage of Nations (The Free Press, 1990), "Building the Microeconomic Foundations of Competitiveness," in The Global Competitiveness Report 2002, (World Economic Forum, 2002), "Clusters and the New Competitive Agenda for Companies and Governments" in On Competition (Harvard Business School Press, 1998), and the *Clusters of Innovation Initiative* (www.compete.org), a joint effort of the Council on Competitiveness, Monitor Group, and Professor Porter 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.

Additional information may be found at the website of the Institute for Strategy and Competitiveness, www.isc.hbs.edu

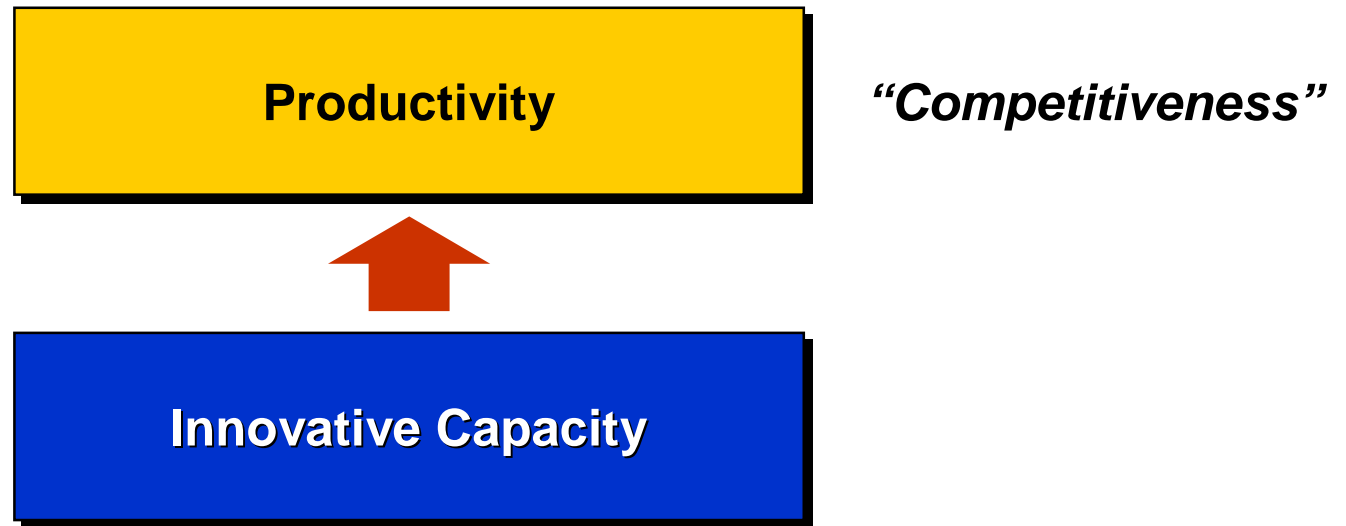
Sources of Regional Competitiveness

- A region's competitiveness and standard of living (wealth) is determined by the **productivity** with which it uses its human, capital, and natural resources. The appropriate definition of competitiveness is productivity.
 - Productivity depends both on the **value** of products and services (e.g. uniqueness, quality) as well as the **efficiency** with which they are produced.
 - It is not **what** industries a region competes in that matters for prosperity, but **how** firms compete in those industries
 - Productivity in a region is a reflection of what both domestic and foreign firms **choose to do in that location**. The location of ownership is secondary for regional prosperity.
 - The productivity of **“local”** industries is of fundamental importance to competitiveness, not just that of traded industries



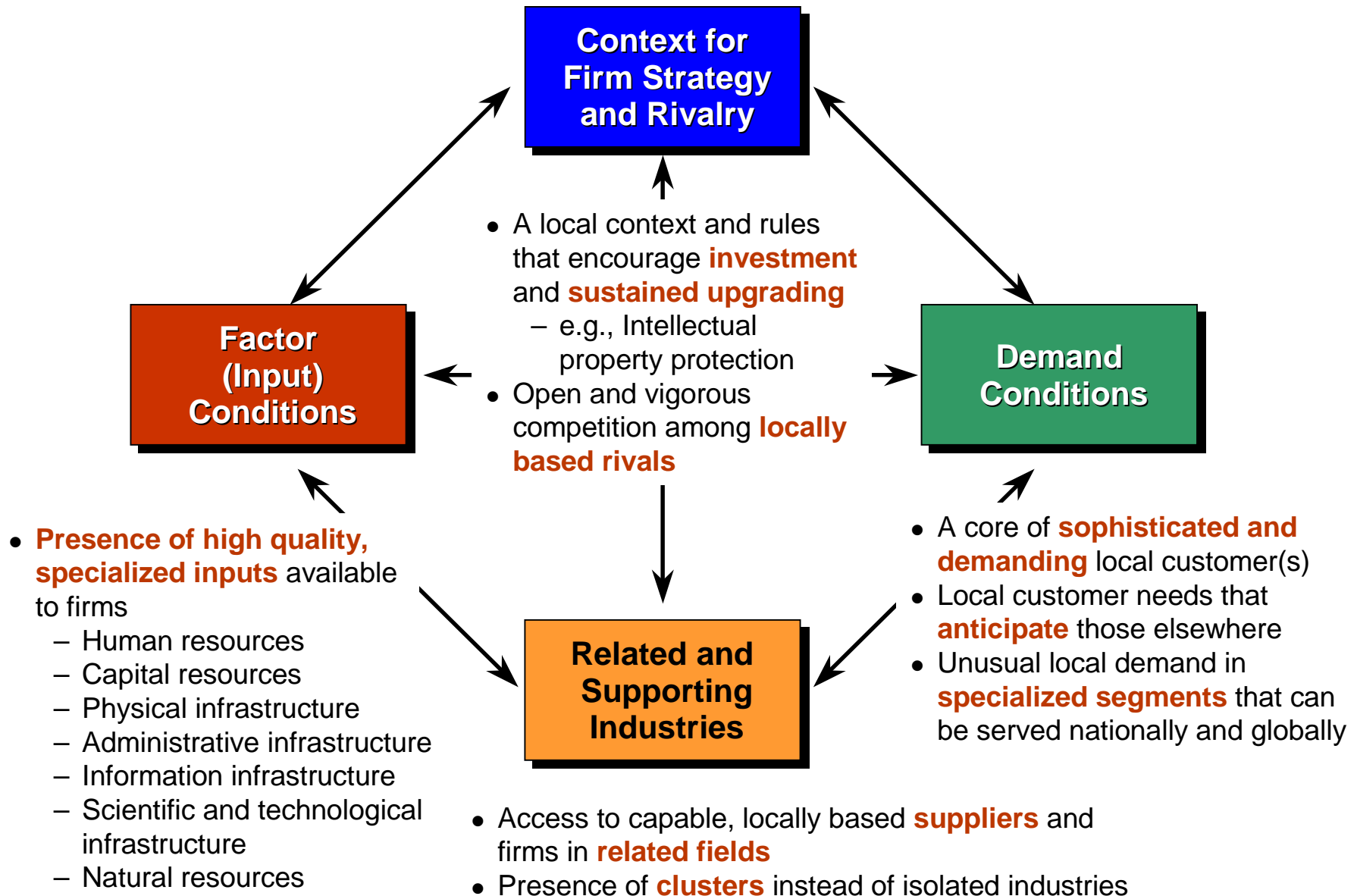
- Regions compete in offering the **most productive environment** for business
- The public and private sectors play **different but interrelated roles** in creating a productive economy

Innovation and Competitiveness



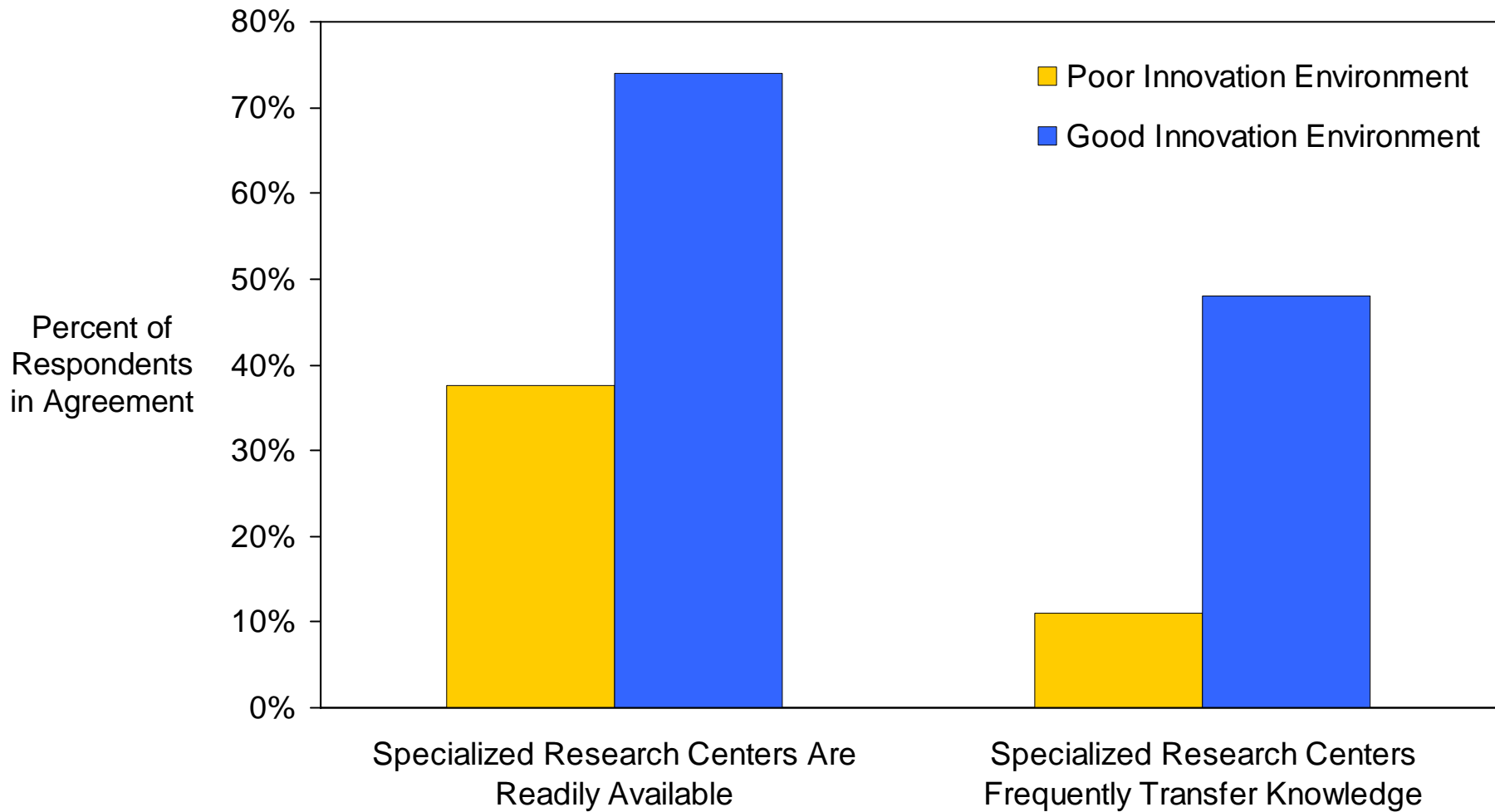
- Innovation is **more than just scientific discovery**
- There are **no low-tech industries**, only low-tech firms

Productivity and the Business Environment



Role of Specialized Research Centers

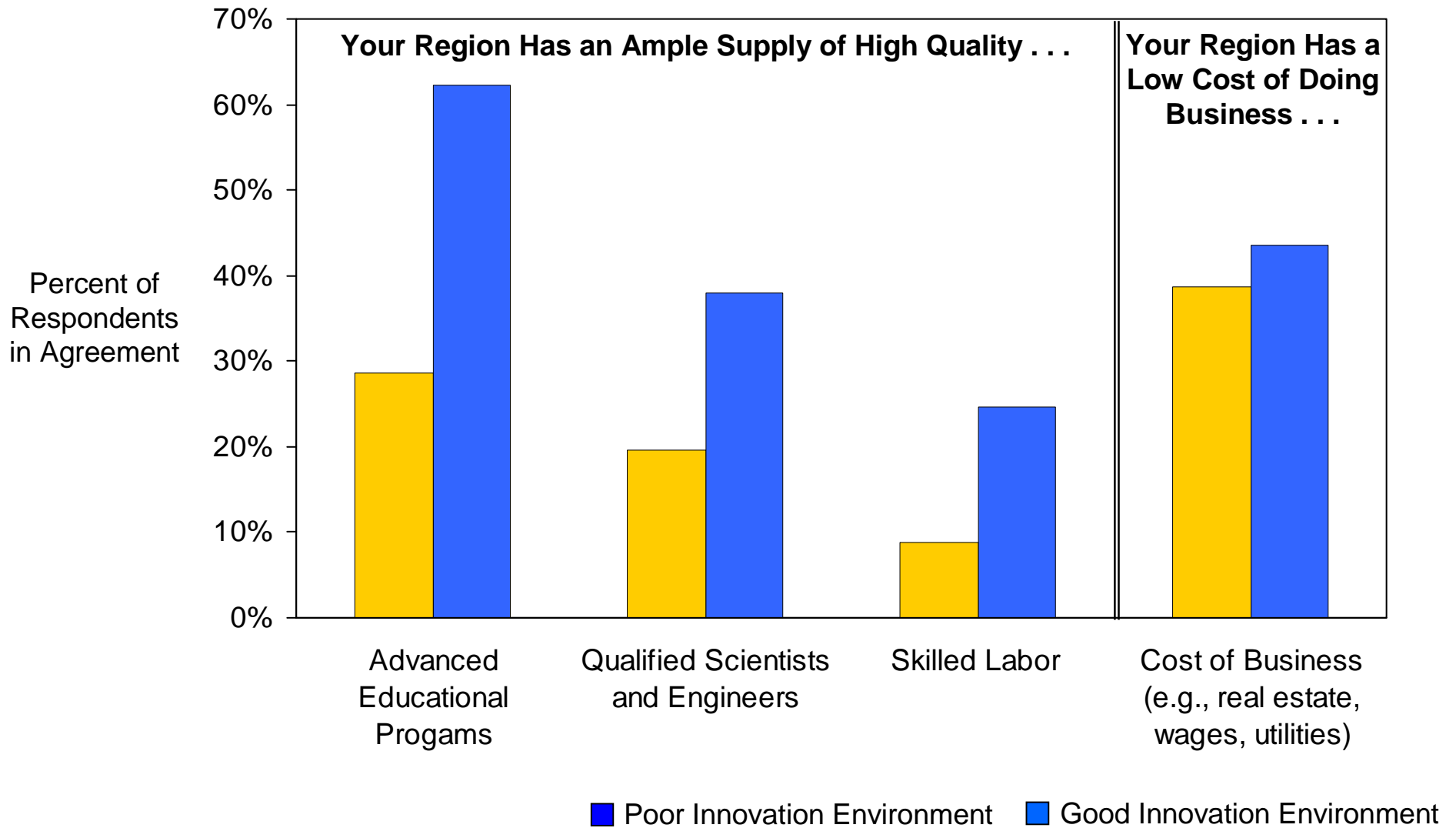
Good vs. Poor Innovation Environments



Source: Clusters of Innovation Initiative Regional Survey

Role of Specialized Talent and Training

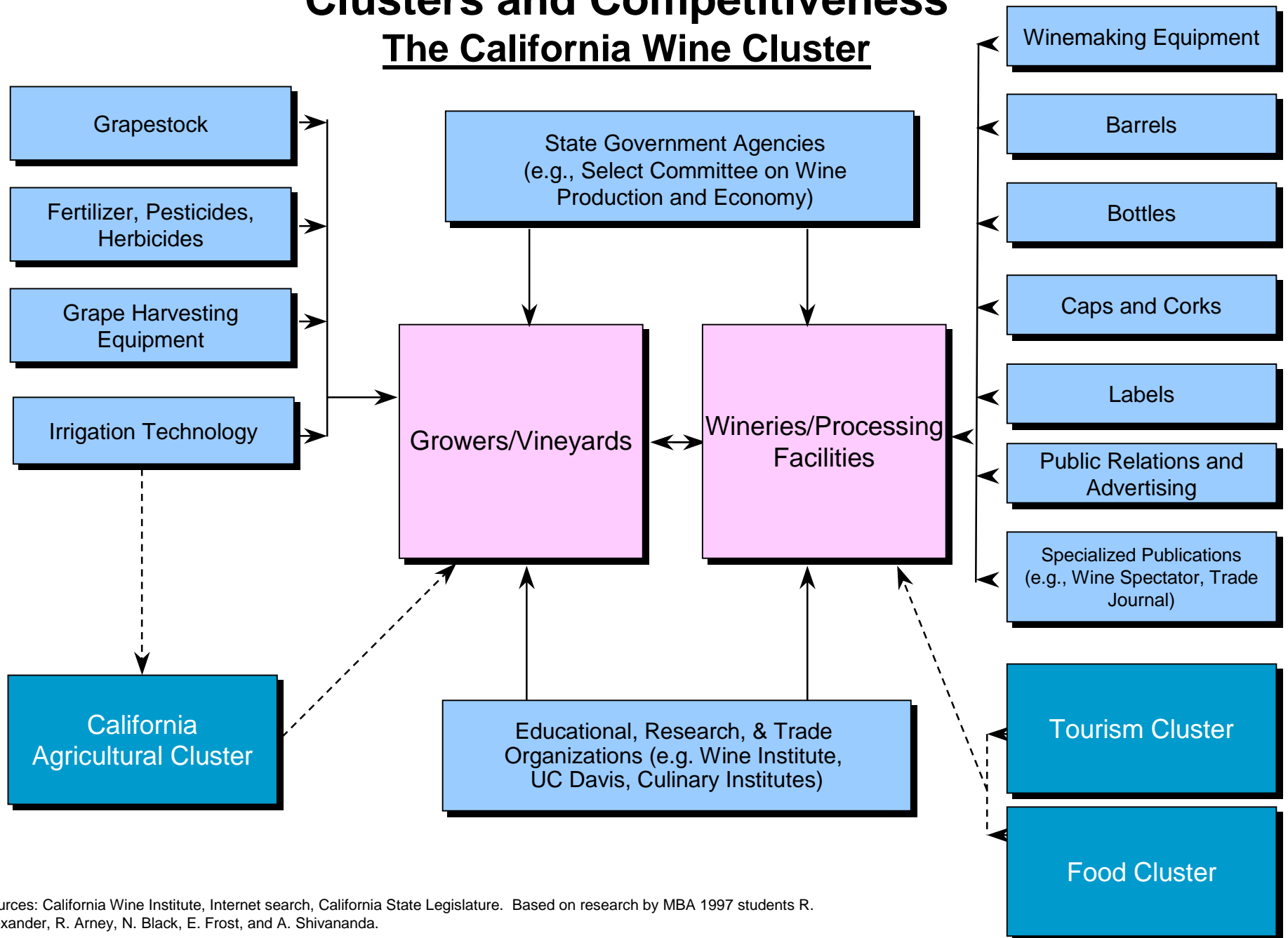
Good vs. Poor Innovation Environments



Source: Clusters of Innovation Initiative Regional Survey

Clusters and Competitiveness

The California Wine Cluster



Sources: California Wine Institute, Internet search, California State Legislature. Based on research by MBA 1997 students R. Alexander, R. Arney, N. Black, E. Frost, and A. Shivananda.

Institutions for Collaboration

Selected Institutions for Collaboration, San Diego

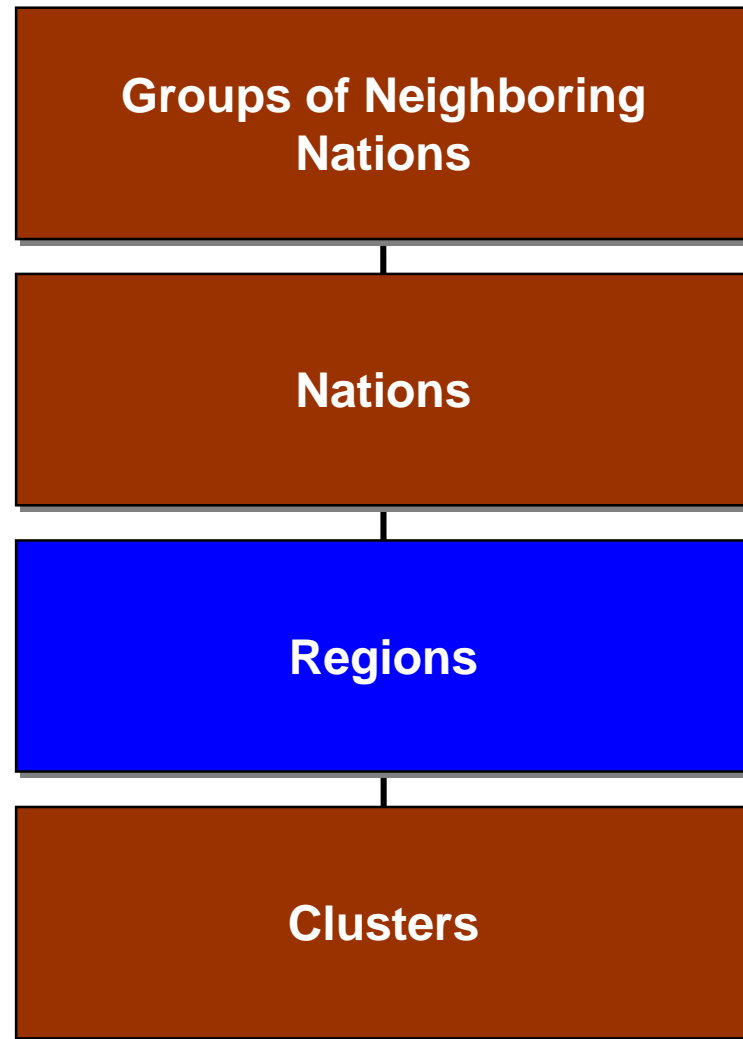
General

- San Diego Chamber of Commerce
- San Diego MIT Enterprise Forum
- Corporate Director's Forum
- San Diego Dialogue
- Service Corps of Retired Executives, San Diego
- San Diego Regional Economic Development Corporation
- Center for Applied Competitive Technologies
- San Diego World Trade Center
- UCSD Alumni
- San Diego Regional Technology Alliance
- San Diego Science and Technology Council
- Office of Trade and Business Development

Cluster-Specific

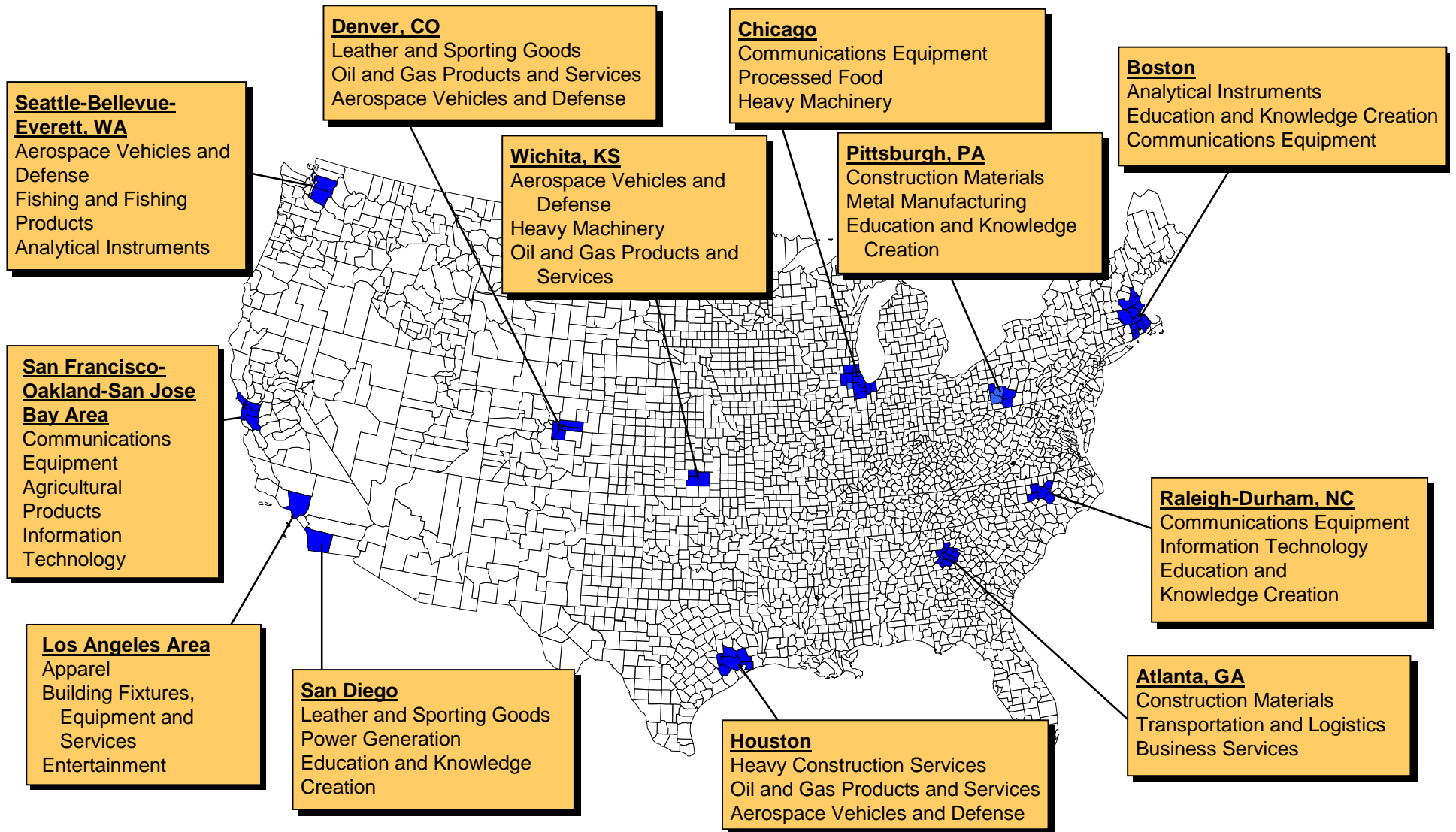
- Linkabit Alumni
- Hybritech Alumni
- Scripps Research Institute Alumni
- BIOCOMM
- UCSD Connect

Influences on Competitiveness



Specialization of Regional Economies

Select U.S. Metropolitan Areas

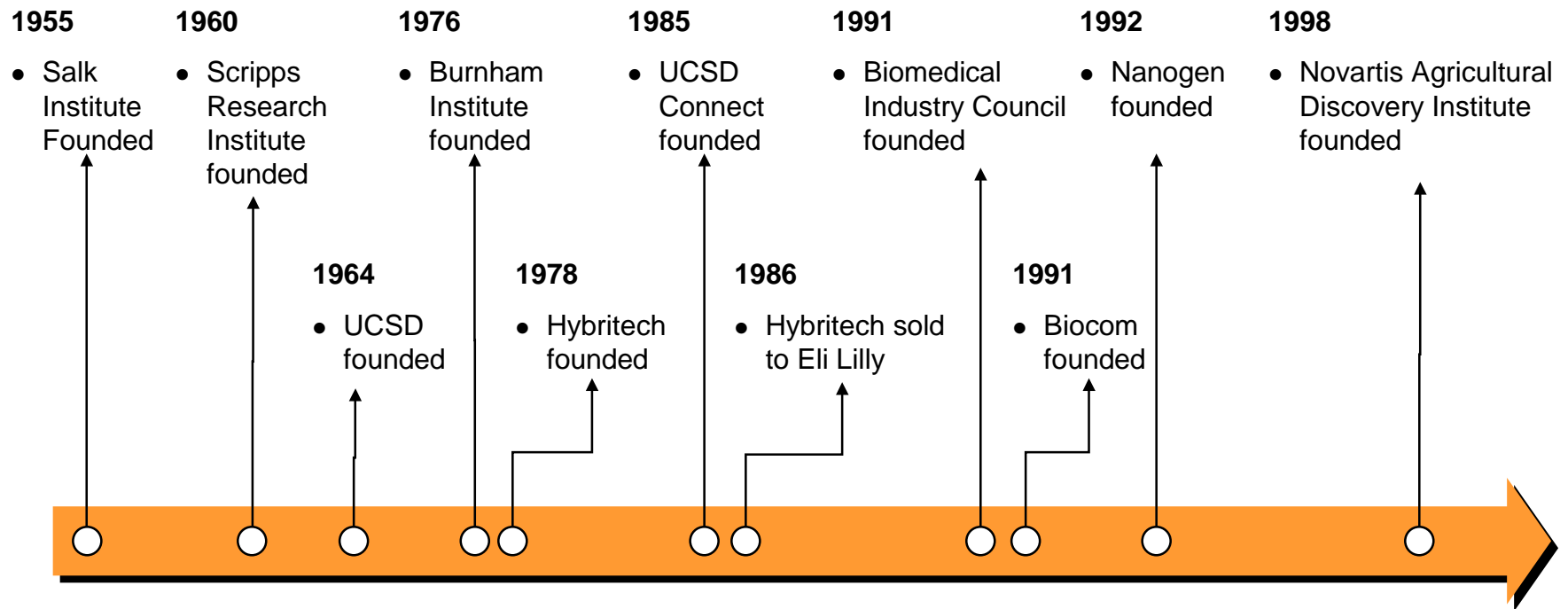


Note: Clusters listed are the three highest ranking clusters in terms of share of national employment

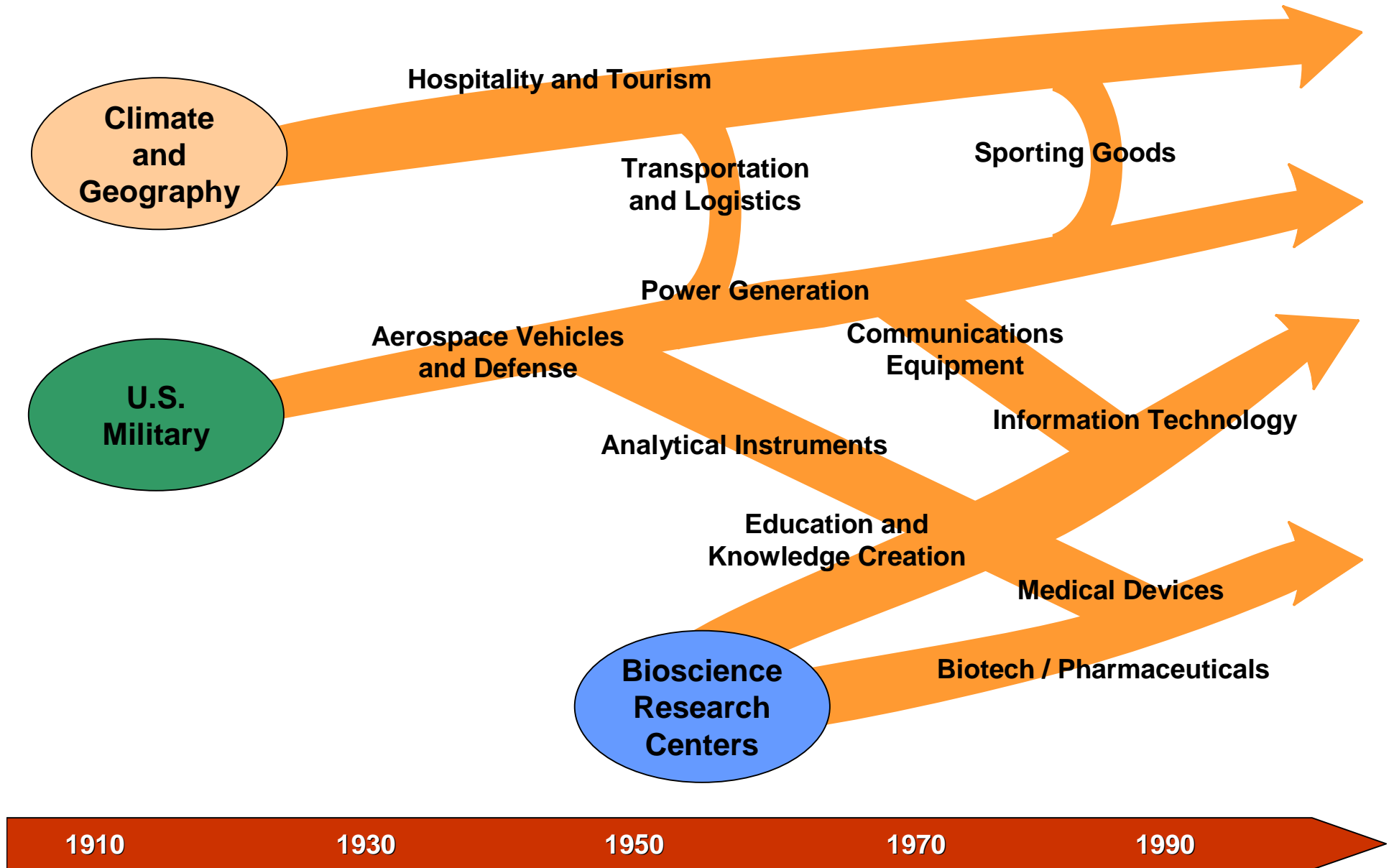
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

The Process of Cluster Development

History of the San Diego Biotech / Pharma Cluster



The Military, Climate, and Research in San Diego



Regional Economic and Innovation Performance

Houston Metro Area

Economic Performance

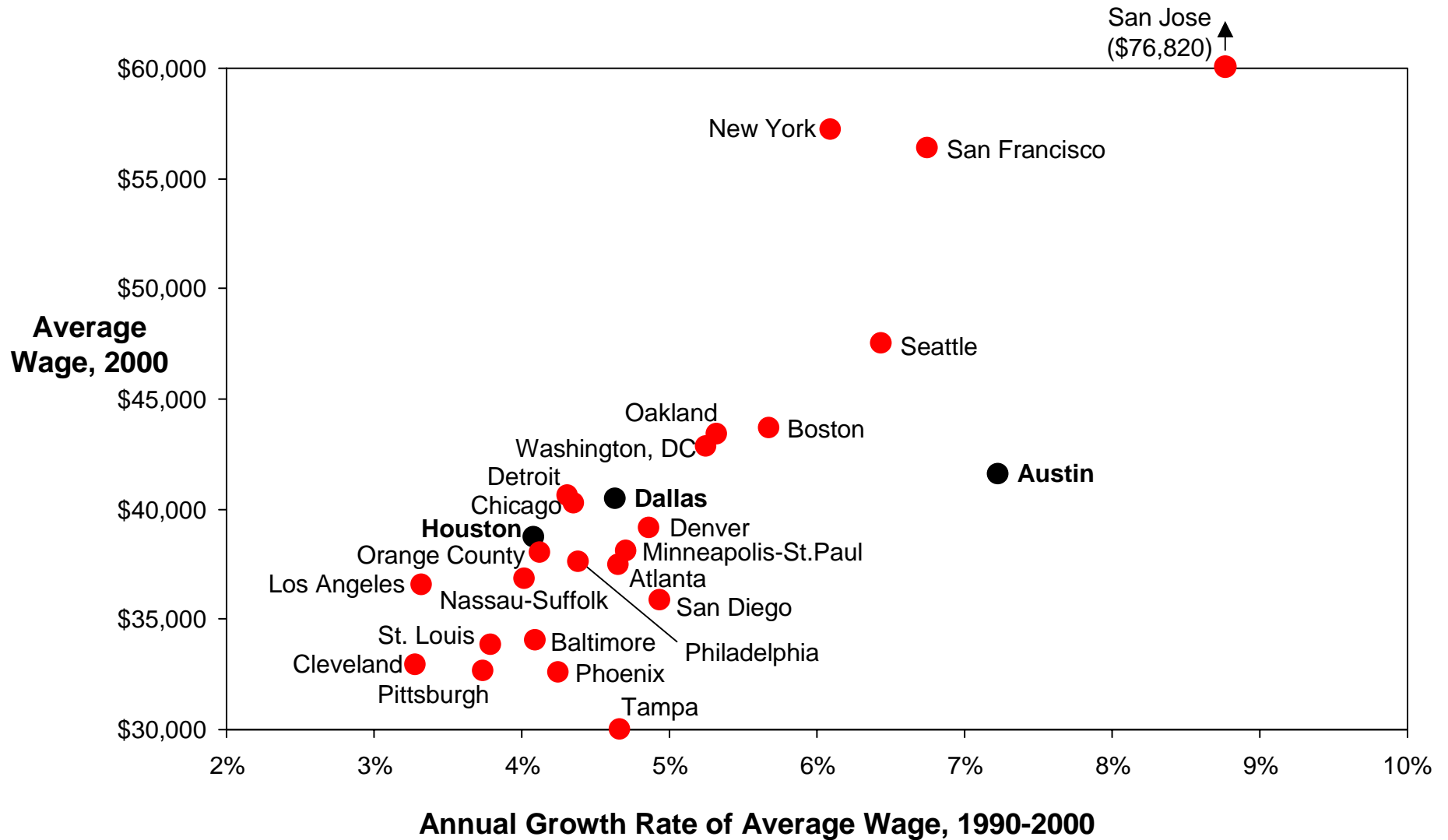
- **Employment**
 - Total 2000 employment in Houston, TX was 1,830,625, which was 1.6% of national employment.
- **Employment Growth**
 - Employment growth per year from 1990-2000 in Houston, TX was 2.59% vs. 2.01% for the US.
- **Average Wages**
 - Houston, TX average wages in 2000 were \$38,730 vs. \$34,011 for the US, or 12.18% above the national average.
- **Average Wage Growth**
 - Average wage growth per year in Houston, TX was 4.08% from 1990-2000 vs. 4.21% for the US.

Innovation Output

- **Patents**
 - There were 8.75 patents per 10,000 employees in Houston, TX vs. 7.53 for the US in 2000.
- **Patenting Growth**
 - Patenting growth per year from 1990-2000 in Houston, TX was 2.14% vs. 4.07% for the US.
- **Establishment Growth**
 - The number of establishments in traded industries in Houston, TX grew 2.07% per year from 1990-2000 vs. 1.36% per year in the US.

Economic Performance of Top 25 Metropolitan Areas

Wage Level and Wage Growth



Note: Top 25 Metropolitan Areas by Employment

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

Patents by Organization

Houston Metropolitan Area

	Organization	Patents Issued from 1996 to 2000
1	COMPAQ COMPUTER CORPORATION, INC.	817
2	SHELL OIL COMPANY	350
3	TEXAS INSTRUMENTS, INCORPORATED	305
4	BAKER HUGHES INCORPORATED	252
5	EXXON CHEMICALS PATENTS INC.	185
6	WESTERN ATLAS INTERNATIONAL, INC.	179
7	SCHLUMBERGER TECHNOLOGY CORPORATION	142
8	UNIVERSITY OF TEXAS	85
9	BAYLOR COLLEGE OF MEDICINE	81
10	TEXACO INC.	70
11	EXXON PRODUCTION RESEARCH COMPANY	60
12	SMITH INTERNATIONAL INC.	59
13	FMC CORPORATION	58
14	BETZDEARBORN INC.	51
15	CAMCO INTERNATIONAL INC.	50
16	DOW CHEMICAL COMPANY	48
16	FINA TECHNOLOGY, INC.	48
18	NALCO/EXXON ENERGY CHEMICALS, L.P	40
19	NASA	39
20	WEATHERFORD/LAMB, INC.	34
21	ABB VETCOGRAY INC.	33
21	HALLIBURTON ENERGY SERVICES	33
23	DRESSER INDUSTRIES, INC.	31
23	HALLIBURTON CO.	31
25	BJ SERVICES CO	28

Note: Includes only patents assigned from innovators in the Houston MA to the organization;
in total, the MA reports 5,411 patents assigned to organizations

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

Patents by Organization

Boston Metropolitan Area

	Organization	Patents Issued from 1996 to 2000
1	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	515
2	DIGITAL EQUIPMENT CORPORATION	445
3	GENERAL HOSPITAL CORPORATION	260
4	POLAROID CORPORATION	253
5	EMC CORPORATION	208
6	ANALOG DEVICES, INC.	181
7	HARVARD COLLEGE	150
8	BOSTON SCIENTIFIC CORPORATION	129
9	GENETICS INSTITUTE, INC.	118
10	HEWLETT-PACKARD COMPANY	116
10	SUN MICROSYSTEMS, INC.	116
12	CABLETRON SYSTEMS, INC.	97
13	HEIDELBERGER DRUCKMASCHINEN AG	95
13	MILLENNIUM PHARMACEUTICALS, INC.	95
15	QUANTUM CORP. (CA)	94
16	GILLETTE COMPANY	93
17	BRIGHAM AND WOMEN'S HOSPITAL	92
18	OSRAM SYLVANIA INC.	91
19	ACUSHNET COMPANY	89
19	JOHNSON & JOHNSON PROFESSIONAL INC.	89
21	DANA-FARBER CANCER INSTITUTE, INC.	86
22	CHILDREN'S MEDICAL CENTER CORPORATION	84
23	BOSTON UNIVERSITY	83
24	GENERAL ELECTRIC COMPANY	82
25	MOTOROLA, INC.	80

Note: Includes only patents assigned from innovators in the Boston-Worcester-Lawrence-Lowell-Brockton MA to the organization;
in total, the MA reports 14,439 patents assigned to organizations

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

Patents by Organization

Dallas Metropolitan Area

	Organization	Patents Issued from 1996 to 2000
1	TEXAS INSTRUMENTS, INCORPORATED	1996
2	LUCENT TECHNOLOGIES INC.	213
3	SGS-THOMSON MICROELECTRONICS, INC.	174
4	MCI COMMUNICATIONS CORP.	168
5	ERICSSON, INC.	151
6	STMICROELECTRONICS, INC.	148
7	DALLAS SEMICONDUCTOR CORPORATION	144
8	UNIVERSITY OF TEXAS	110
9	NORTHERN TELECOM LIMITED	108
10	ATLANTIC RICHFIELD COMPANY	100
11	ALCATEL USA SOURCING, L.P.	87
12	INTERNATIONAL BUSINESS MACHINES CORP.	77
13	HALLIBURTON ENERGY SERVICES	74
13	NORTEL NETWORKS CORPORATION	74
15	CIRRUS LOGIC, INC.	72
16	HALLIBURTON ENERGY SERVICES, INC.	67
17	RAYTHEON COMPANY	63
18	ELECTRONIC DATA SYSTEMS CORPORATION	58
19	MOBIL OIL CORP.	48
20	CYRIX CORPORATION	46
21	HEWLETT-PACKARD COMPANY	40
22	MOTOROLA, INC.	37
23	E-SYSTEMS, INC.	35
24	DSC COMMUNICATIONS CORPORATION	34
24	INTERVOICE LIMITED PARTNERSHIP	34

Note: Includes only patents assigned from innovators in the Dallas MA to the organization;
in total, the MA reports 6,177 patents assigned to organizations
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Patents by Organization

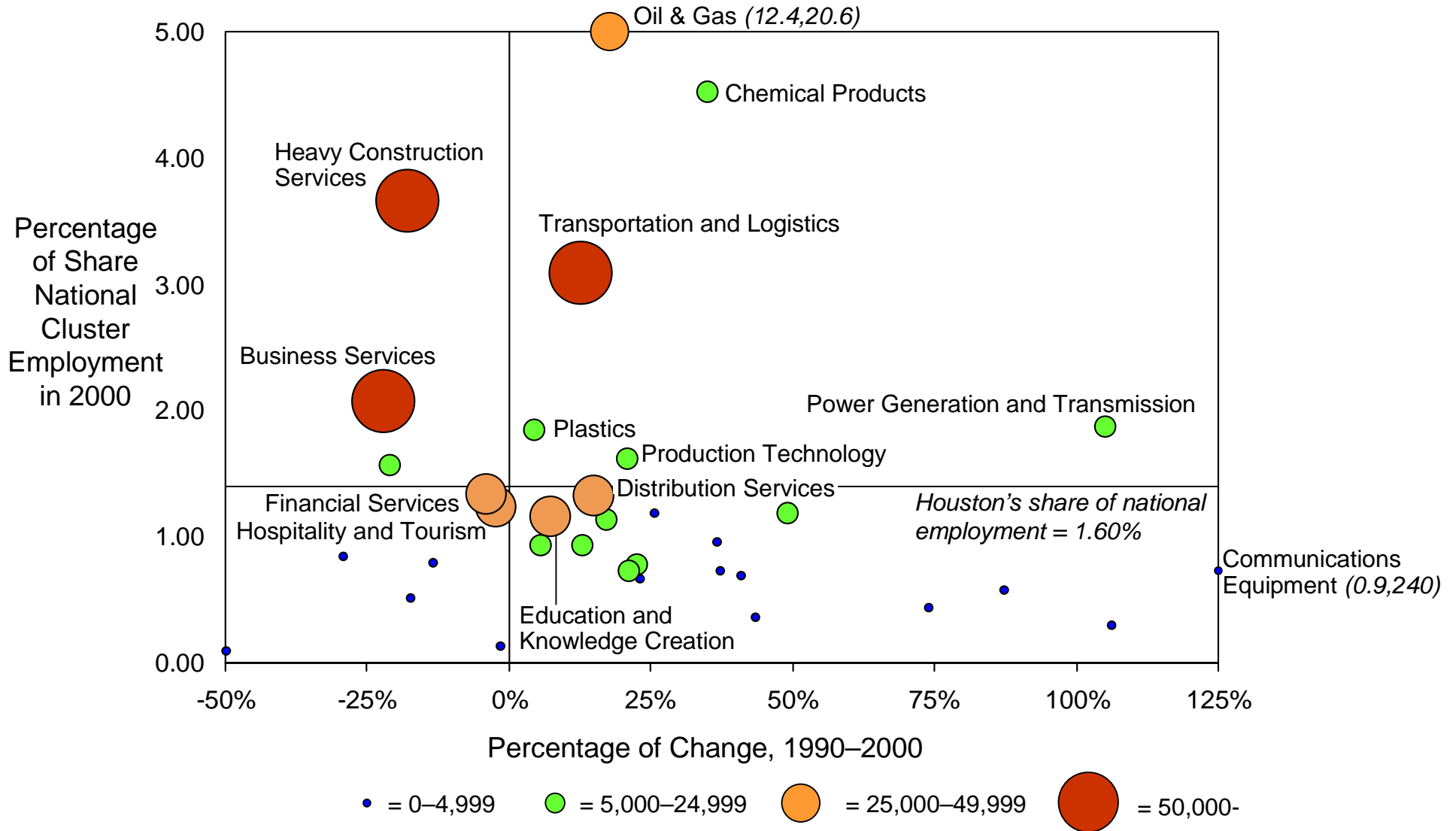
Austin Metropolitan Area

	Organization	Patents Issued from 1996 to 2000
1	INTERNATIONAL BUSINESS MACHINES CORP	1576
2	ADVANCED MICRO DEVICES, INC.	1510
3	MOTOROLA, INC.	864
4	DELL USA, L.P.	454
5	NATIONAL INSTRUMENTS CORPORATION	103
6	MINNESOTA MINING AND MANUFACTURING CO.	97
7	CIRRUS LOGIC, INC.	83
8	UNIVERSITY OF TEXAS	73
9	CRYSTAL SEMICONDUCTOR CORPORATION	47
10	HUNTSMAN PETROCHEMICAL CORPORATION	41
11	TEXAS INSTRUMENTS, INCORPORATED	39
12	3M INNOVATIVE PROPERTIES COMPANY	37
13	STAKTEK CORPORATION	35
14	CYPRESS SEMICONDUCTOR CORP.	30
15	TANDEM COMPUTERS INCORPORATED	29
16	INTEGRATED DEVICE TECHNOLOGY, INC.	26
17	FISHER-ROSEMOUNT SYSTEMS, INC.	23
18	SULZER ORTHOPEDICS INC.	22
18	COMPAQ COMPUTER CORPORATION, INC.	22
20	MICROELECTRONICS & COMPUTER TECH. CORP.	19
21	APPLIED MATERIALS, INC.	18
21	SULZER CARBOMEDICS INC.	18
23	TAMARACK STORAGE DEVICES, INC.	17
24	DRESSER INDUSTRIES, INC.	16
24	PAVILION TECHNOLOGIES, INC.	16

Note: Includes only patents assigned from innovators in the Austin-San Marcos MA to the organization;
in total, the MA reports 6,163 patents assigned to organizations
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Houston

Specialization By Traded Cluster

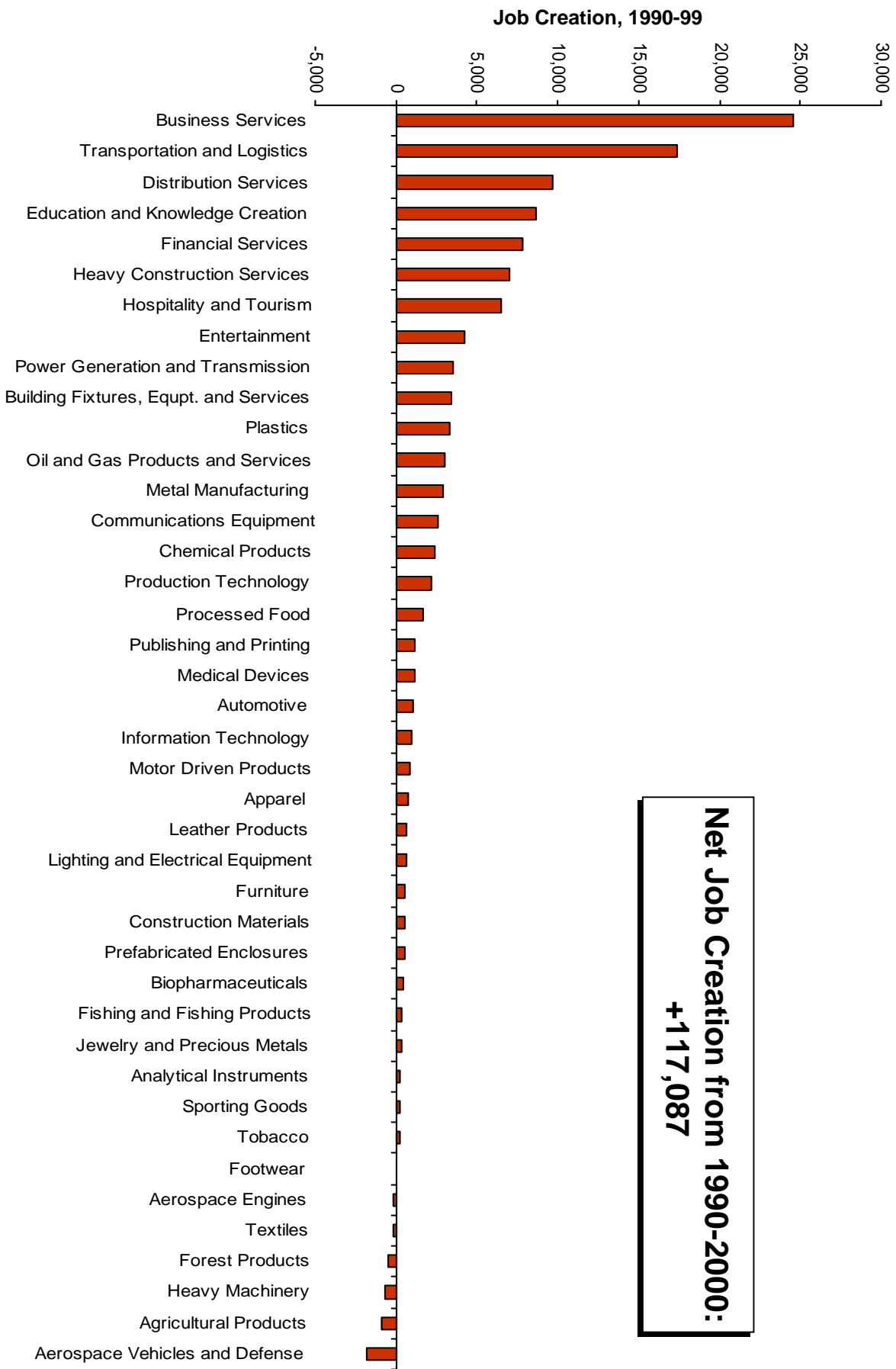


Note: Graph utilizes narrow cluster definitions to eliminate overlapping employment across clusters.

Data points too large to fit on the graph are placed on the borders and the values are given as: (y-axis, x-axis).

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

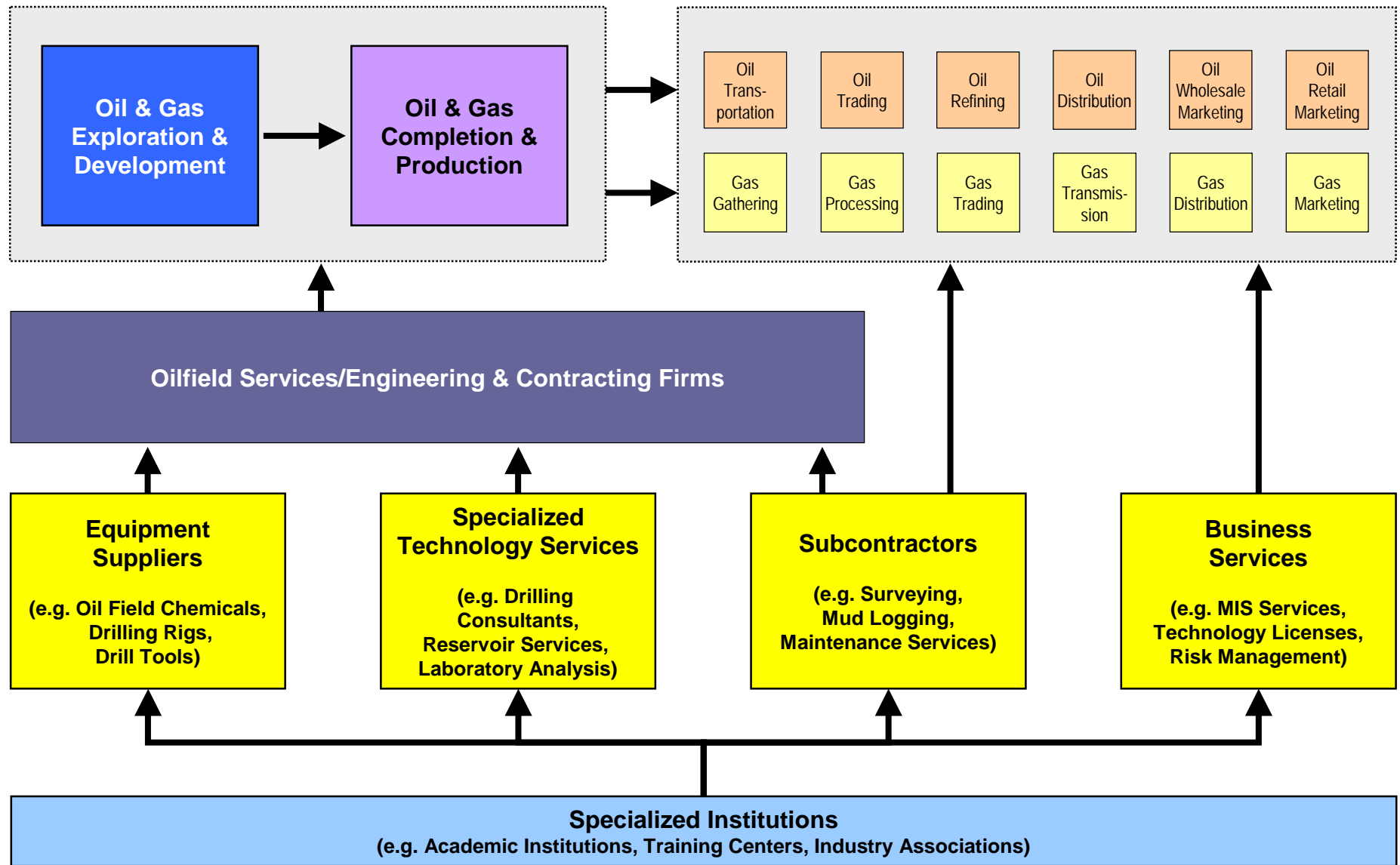
Job Creation By Traded Cluster Houston, 1990-2000



Note: Chart utilizes narrow cluster definitions to eliminate overlapping job creation across clusters.

Clusters and Competitiveness

Houston Oil and Gas Products and Services Cluster



Shifting Responsibilities for Economic Development

Old Model

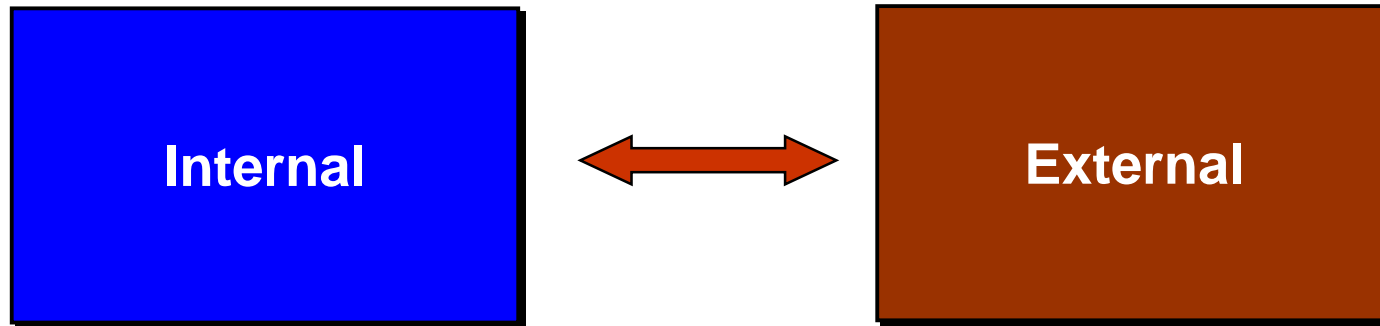
- **Government** drives economic development through policy decisions and incentives



New Model

- Economic development is a **collaborative process** involving government at multiple levels, companies, teaching and research institutions, and institutions for collaboration

Perspectives on Firm Success



- Competitive advantage resides **inside** a company
- Competitive success depends primarily on **company choices**
- Competitive advantage (or disadvantage) resides partly in the **locations** at which a company's business units are based
- **Cluster participation** is an important contributor to competitiveness

New Role of the Private Sector in Economic Development

- A company's competitive advantage is partly the result of the **local environment**
- Company membership in a cluster offers **collective benefits**
- Private investment in "**public goods**" is justified



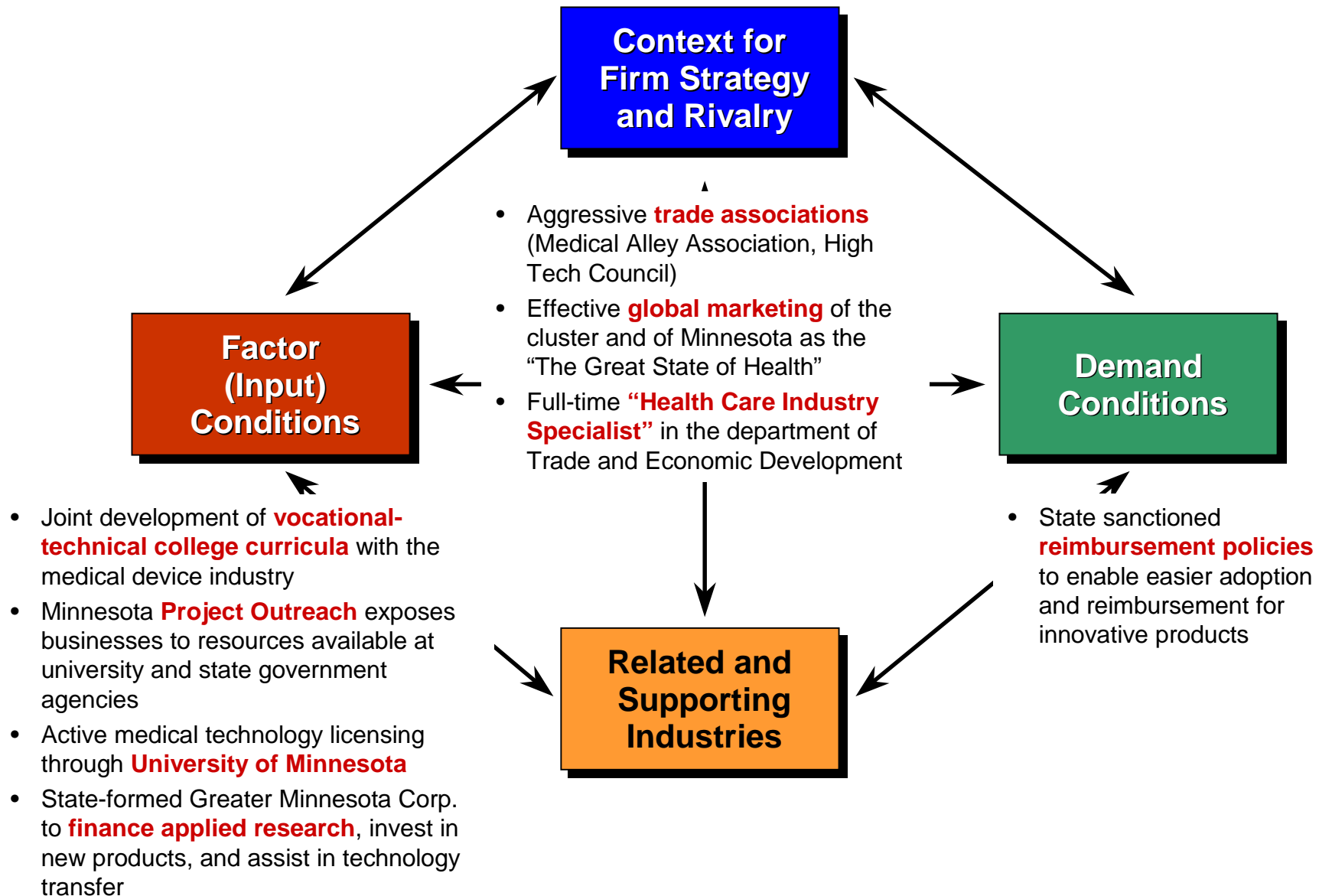
- Take an **active role** in upgrading the local infrastructure
- Nurture **local suppliers** and attract new supplier investments
- Work closely with local **educational and research institutions**
- Provide government with **information** and substantive input on regulatory issues and constraints to cluster development



- An important role for **trade associations**
 - Influence and cost sharing

Public / Private Cooperation in Cluster Upgrading

Minnesota's Medical Device Cluster



Connecticut's Cluster Development Initiative

Timeline

1996

- State Department of Economic and Community Development (DECD) reorganized to include **Industry Cluster and International Division**

1997

- Industry Cluster Initiative
- **Call to Action** — 120 Connecticut business leaders are engaged by the Governor
- **5 Industry Cluster Advisory boards** created:
 - Manufacturing
 - Financial Services
 - Telecommunications & Information
 - Health Care Services
 - High Technology
- Cluster advisory boards **finalize and prioritize recommendations** for the legislative session
- Recommendations and presentation to **Governor and legislative leadership**

1998

- **“Partnership for Growth” legislation** submitted to Governor and legislature
- Governor and legislature **unanimously approve first Cluster Bill:**
 - \$7 million for cluster activation and projects
 - 6% R&D tax credit now available for smaller firms
 - Lengthen R&D tax credit carry forward from 5 to 15 years
- **Implementation** of cluster initiatives begin
- Establishment and first meeting of **Governor's Council on Economic Competitiveness and Technology**
- **Bioscience cluster** activated

Connecticut's Cluster Development Initiative

Timeline

1999

- The quasi-public **Connecticut Economic Resource Center (CERC)** becomes the implementation arm for the cluster initiatives outside of government
- **Second Cluster Bill submitted and unanimously approved** by Governor and legislature:
 - Net operating loss (NOL) carry forward -- from 5 to 20 years
 - Tax credit exchange established to help smaller firms capitalize tax credits
 - \$4.5 million for cluster initiative over the next 2 years
- **Aerospace Component Manufacturers cluster** activated

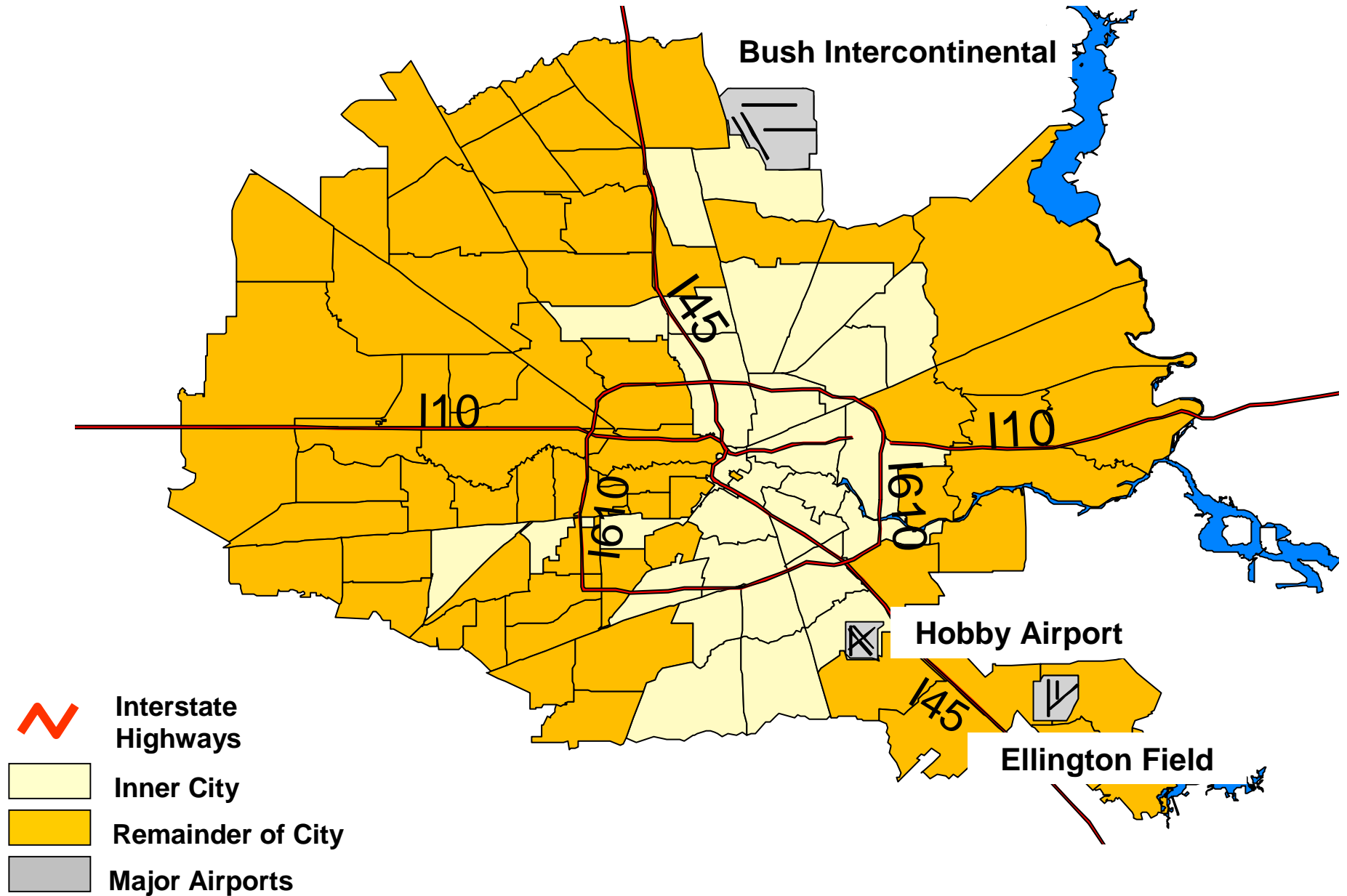
2000

- **Software / IT cluster** activated
- **Metals Manufacturing cluster** activated

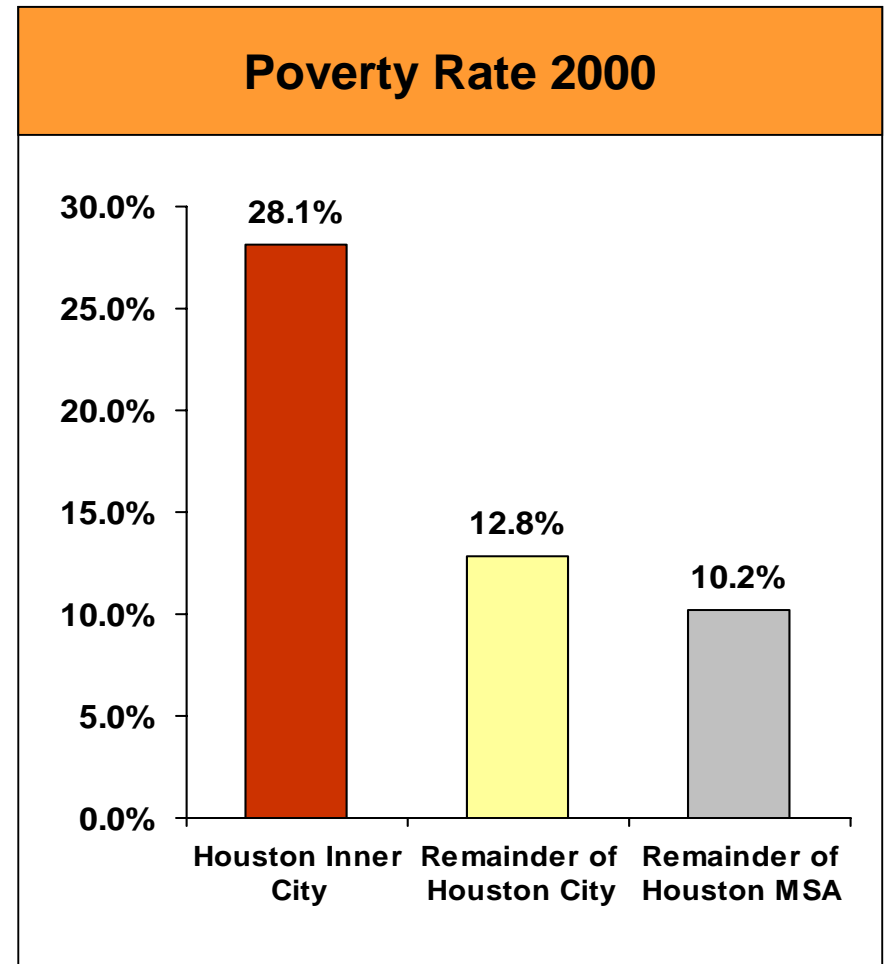
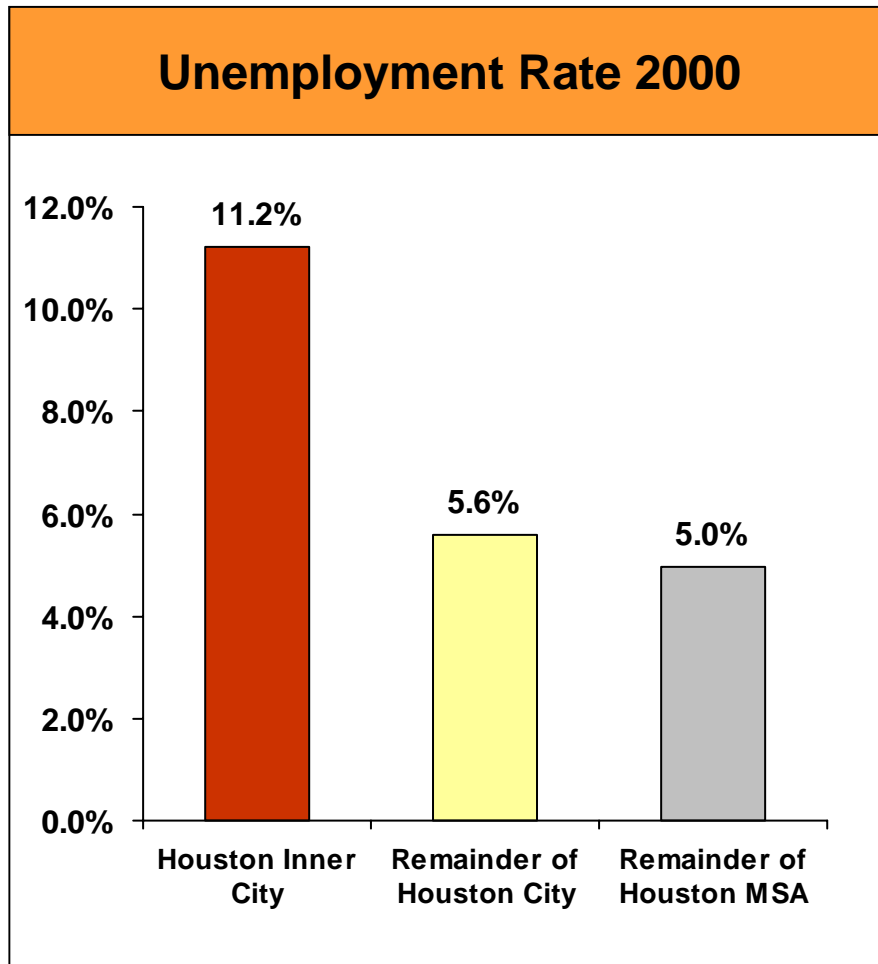
2001

- **Maritime cluster** activated
- **Plastics cluster** activated

Houston's Inner City



Houston Inner City and Metropolitan Area Performance Indicators



Economic Development in Inner Cities

Premises of the New Model

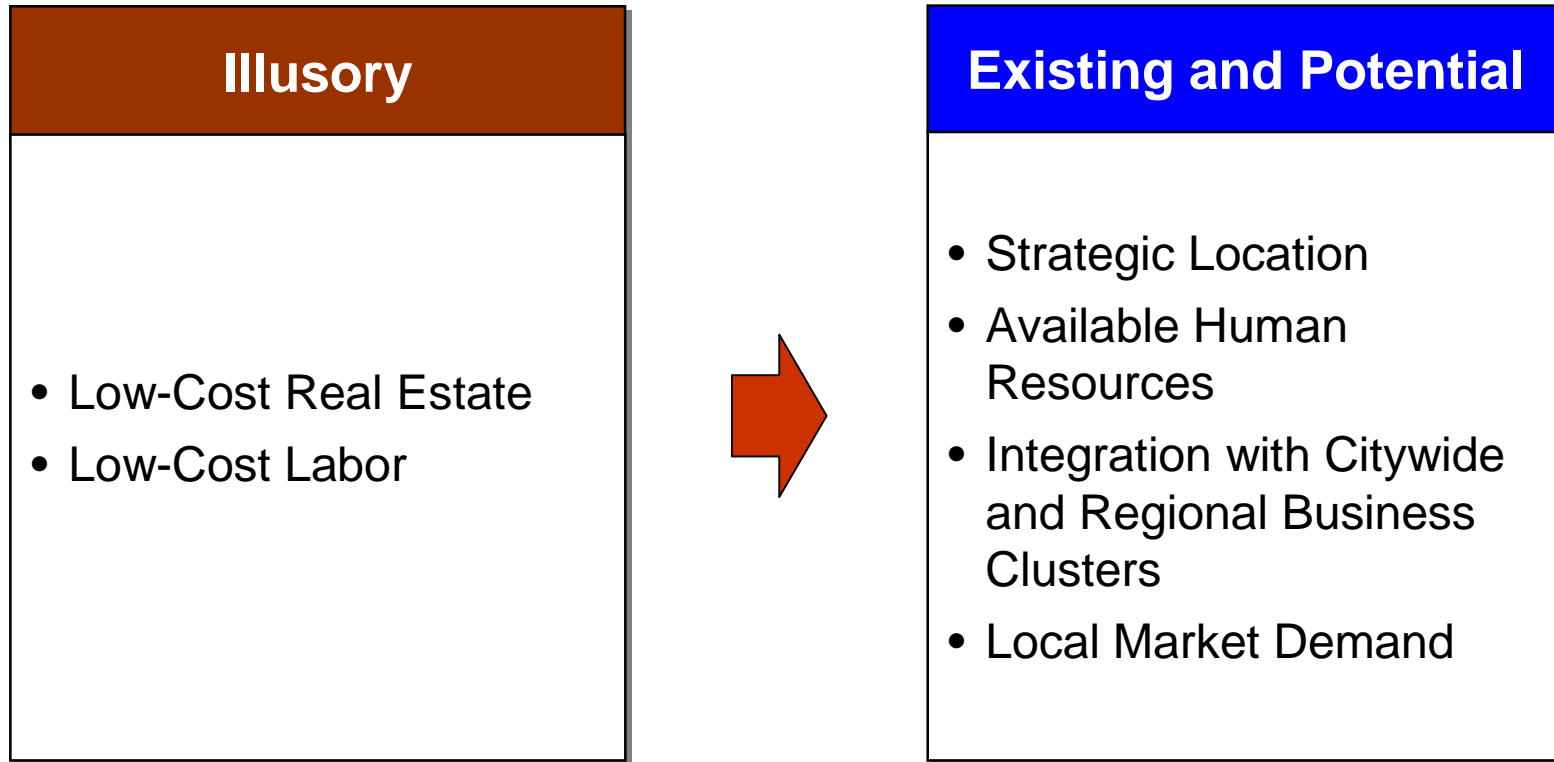
- Inner-city distress is as much an **economic** as a social problem
- A healthy business and jobs base must be created **in or near inner-city communities**, rather than depending on jobs in the suburbs
- Economic development in inner cities must be approached from a **competitiveness** perspective, and be based on business opportunities in the inner city that are **genuinely profitable**
- There are existing and potential **competitive advantages** of inner cities that can support viable businesses and jobs

Economic Development in Inner Cities

Premises of the New Model (2)

- The **disadvantages** of inner cities as business locations must be **addressed directly**, not offset by subsidies
- The inner city can only prosper if it is **integrated into the regional and national economy**
- The **private sector** must play the leading role in business development motivated by **self interest** instead of charity
- The paradigm must shift from:
 - reducing poverty to **creating income, jobs, and wealth**
 - community deficiencies to **market opportunities**

The Competitive Advantages of Inner Cities



Competitive Assessment of the Houston Inner City

Advantages

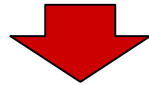
- **Two major airports located within or proximate to the inner city**
 - Bush Intercontinental Airport
 - William P. Hobby Airport
- **Houston Channel connecting Houston and the Gulf through the inner city**
 - Port of Houston
 - 2nd largest in country in terms of total tonnage
 - 6th largest in world
- **Proximity to freeways**
- **Texas Medical Center (partially in the inner city)**
 - Largest in the world
 - 42 member institutions including 13 hospitals

Disadvantages

- **Air Quality**
 - Houston is included in an 8-county non-attainment designated area that has until 2007 to meet Clean Air Act requirements or risk losing federal aid
- **Education**
 - More than 40% of inner city residents over the age of 25 have less than a high school education
- **Crime and perception of crime**
- **Irrigation problem leads to flooding and contamination of vacant sites**
- **Brownfields**

The Role of the Inner City in Regional Prosperity

- **Equity** of opportunity



- Inner-City vitality **frees up resources** now required to address social and economic disadvantage
- Enhances the **return to public investment in transportation infrastructure**, expands the **housing stock**, and **mitigates urban sprawl**
- More **efficient spatial organization** of regional industry
- Ease constraints to **regional** economic growth through utilizing the inner-city's labor force, land, and infrastructure more fully
- **Substantial growth and profit opportunities** in the inner city itself