

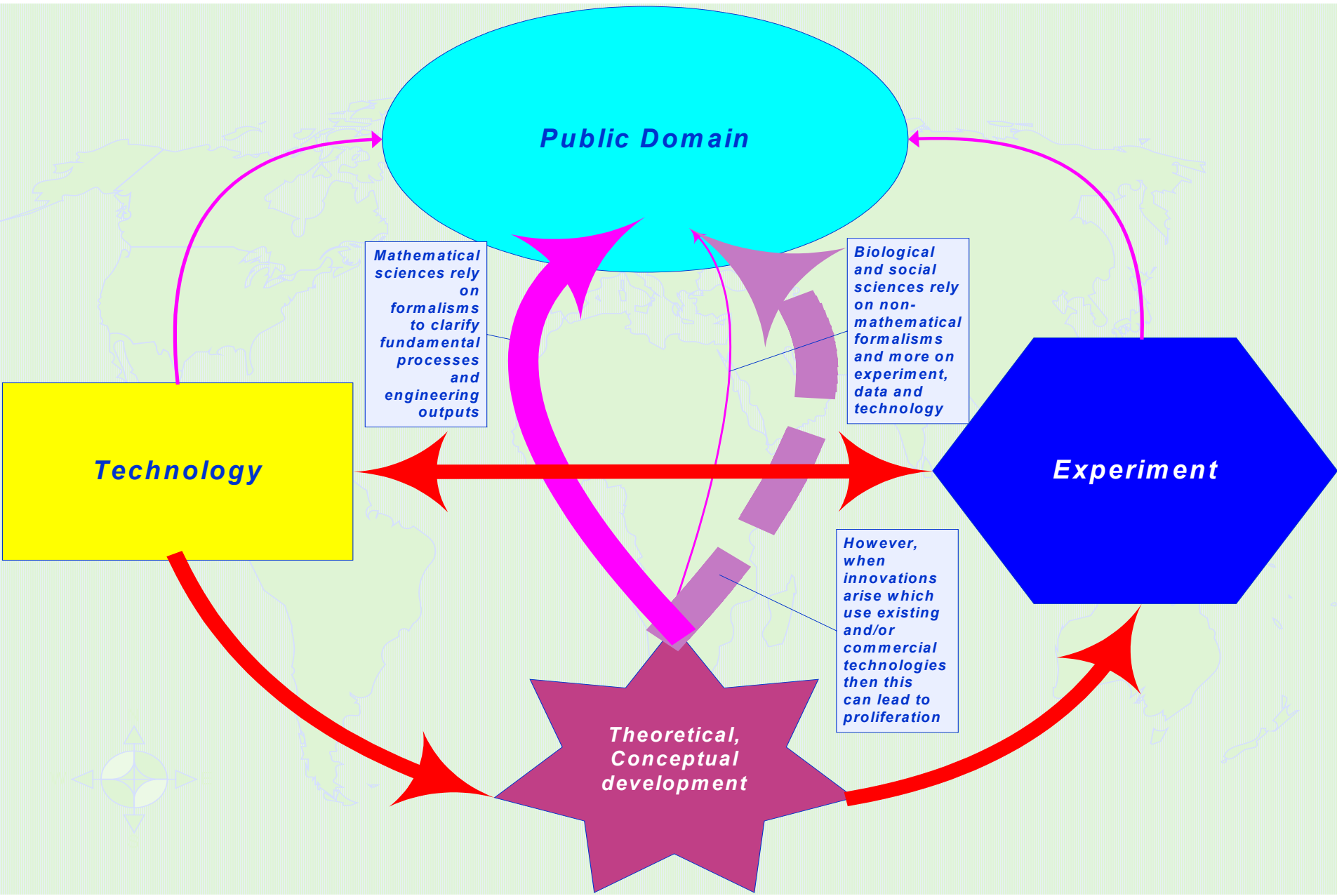
Innovation and the Wealth of Nations

“No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable.”

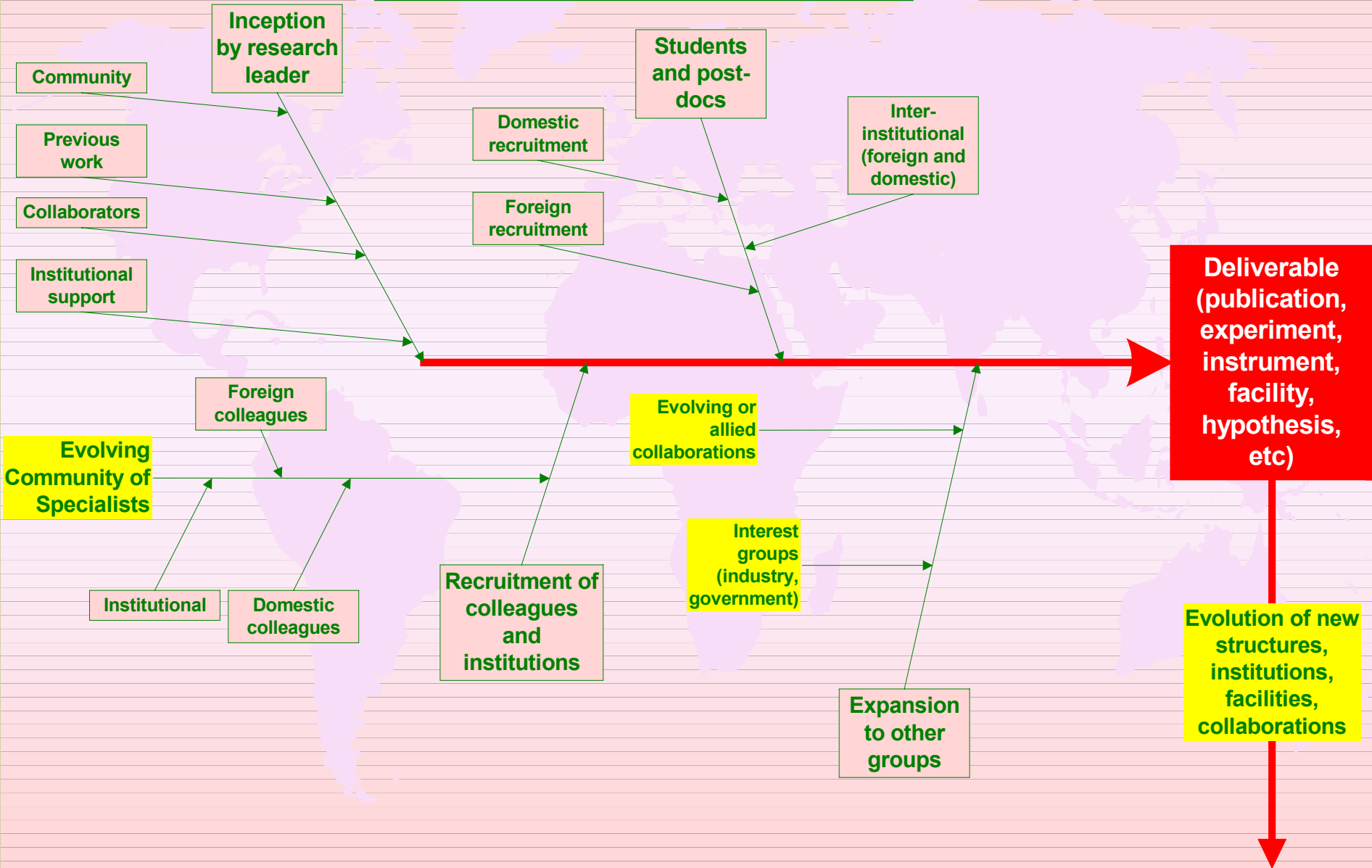
“ ... and lastly, to the invention of a great number of machines which facilitate and abridge labour, and enable one man to do the work of many.”

- Adam Smith. An Inquiry into the Nature and Causes of the Wealth of Nations (1776)

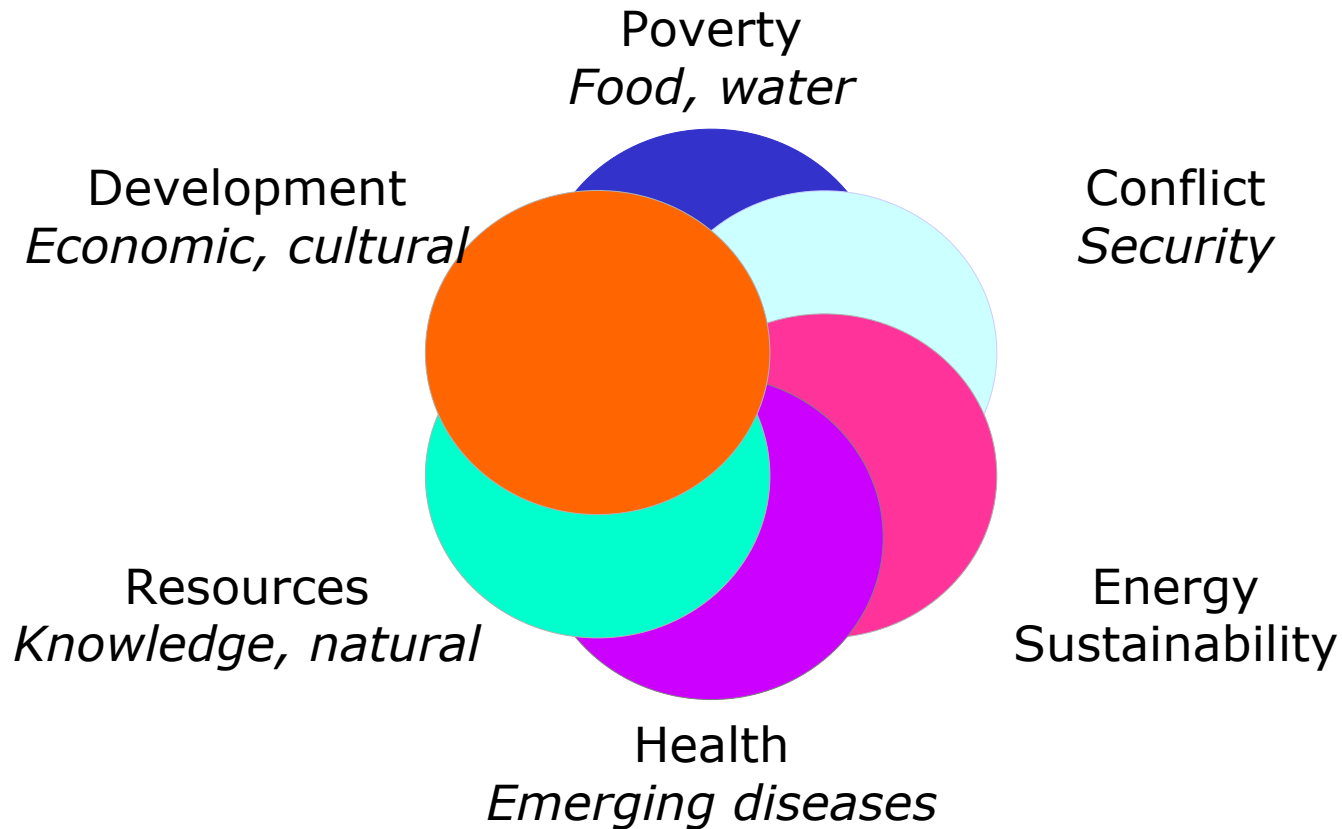
The Innovation System or “Web”



Evolution of International Collaborations



The great cross-cutting needs



a handful of critical factors are highly and positively correlated with the success of a nation's innovation system, including:

- *the amount of investment directed at R&D*
- *the size of the labor force dedicated to R&D and other technically oriented work*
- *the resources devoted to higher education*
- *the degree to which national policy encourages investment in innovation and commercialization*

The New Challenge to America's Prosperity: Findings from the Innovation Index--1999

International R&D expenditures and R&D as a percentage of GDP: 1981–98

United

<i>Year</i>	<i>States</i>	<i>Japan</i>	<i>Germany</i>	<i>France</i>	<i>Kingdom</i>	<i>Italy</i>	<i>Canada</i>
<i>1981</i>	<i>109.5</i>	<i>NA</i>	<i>23.4</i>	<i>16.6</i>	<i>17.3</i>	<i>6.9</i>	<i>5.3</i>
<i>1985</i>	<i>146.1</i>	<i>48.3</i>	<i>28.3</i>	<i>20.3</i>	<i>18.4</i>	<i>9.6</i>	<i>6.9</i>
<i>1990</i>	<i>162.4</i>	<i>67.3</i>	<i>34.1</i>	<i>25.4</i>	<i>21.3</i>	<i>12.8</i>	<i>8.0</i>
<i>1995</i>	<i>170.4</i>	<i>73.6</i>	<i>36.6</i>	<i>25.7</i>	<i>20.1</i>	<i>10.7</i>	<i>9.7</i>
<i>1998</i>	<i>201.6</i>	<i>NA</i>	<i>38.6</i>	<i>NA</i>	<i>NA</i>	<i>12.3</i>	<i>10.6</i>

Total R&D expenditures in billions of constant 1992 U.S. dollars

R&D as a percentage of gross domestic product

<i>Sweden</i>	3.85	<i>Russian Federation</i>	0.95	<i>Canada</i>	1.60	<i>Colombia</i>	0.41
<i>Japan</i>	2.92	<i>Venezuela</i>	0.89	<i>Belgium</i>	1.58	<i>Argentina</i>	0.38
<i>South Korea</i>	2.89	<i>Spain</i>	0.86	<i>Iceland</i>	1.56	<i>Panama</i>	0.38
<i>Finland</i>	2.78	<i>Brazil (1996)</i>	0.76	<i>Austria</i>	1.52	<i>Malaysia</i>	0.34
<i>Switzerland (1996)</i>	2.74	<i>Poland</i>	0.76	<i>Singapore</i>	1.47	<i>Bolivia</i>	0.33
<i>United States 2.60</i>	<i>Hungary</i>	0.73	<i>Ireland</i>	1.43	<i>Mexico</i>	0.42	
<i>Germany</i>	2.31	<i>Cuba</i>	0.70	<i>Czech Rep.</i>	1.19	<i>Philippines</i>	0.21
<i>Israel</i>	2.30	<i>South Africa</i>	0.69	<i>Slovak Rep.</i>	1.18	<i>Thailand</i>	0.12
<i>France</i>	2.23	<i>China</i>	0.65	<i>Costa Rica</i>	1.13	<i>Hong Kong</i>	0.10
<i>Netherlands (1996)</i>	2.09	<i>Portugal</i>	0.65	<i>New Zealand</i>	1.10	<i>Ecuador</i>	0.08
<i>Denmark</i>	2.03	<i>Chile</i>	0.64	<i>Italy</i>	1.08	<i>Uruguay</i>	0.42
<i>China (Taipei)</i>	1.92	<i>Indonesia (1995)</i>	0.50	<i>Norway</i>	1.68	<i>Turkey</i>	0.45
<i>United Kingdom</i>	1.87	<i>Greece (1993)</i>	0.48	<i>Australia</i>	1.68		

The Least Developed Countries Report 2002

Prepared by the United Nations Conference on Trade and Development
(<http://www.unctad.org>)

Promote rapid and sustained economic growth

Double average household living standards

Establish a dynamic investment-export nexus

Sectorally focused productive development policies

Build productive capacities, increase productivity and accelerate learning

- Financial policy
- Technology policy (national innovation systems)
- Human resource development
- Physical infrastructure development
- Competition policy and promotion of clusters

Trade policy

Formulate and implement an export-push strategy

- Trade finance
- Export credit insurance
- Trade information
- Tax exemptions for exporters
- Tariff rebates for exporters
- Transport and business support services

Policies to prevent intra-country marginalization as economic growth occurs

Generate sustainable livelihoods

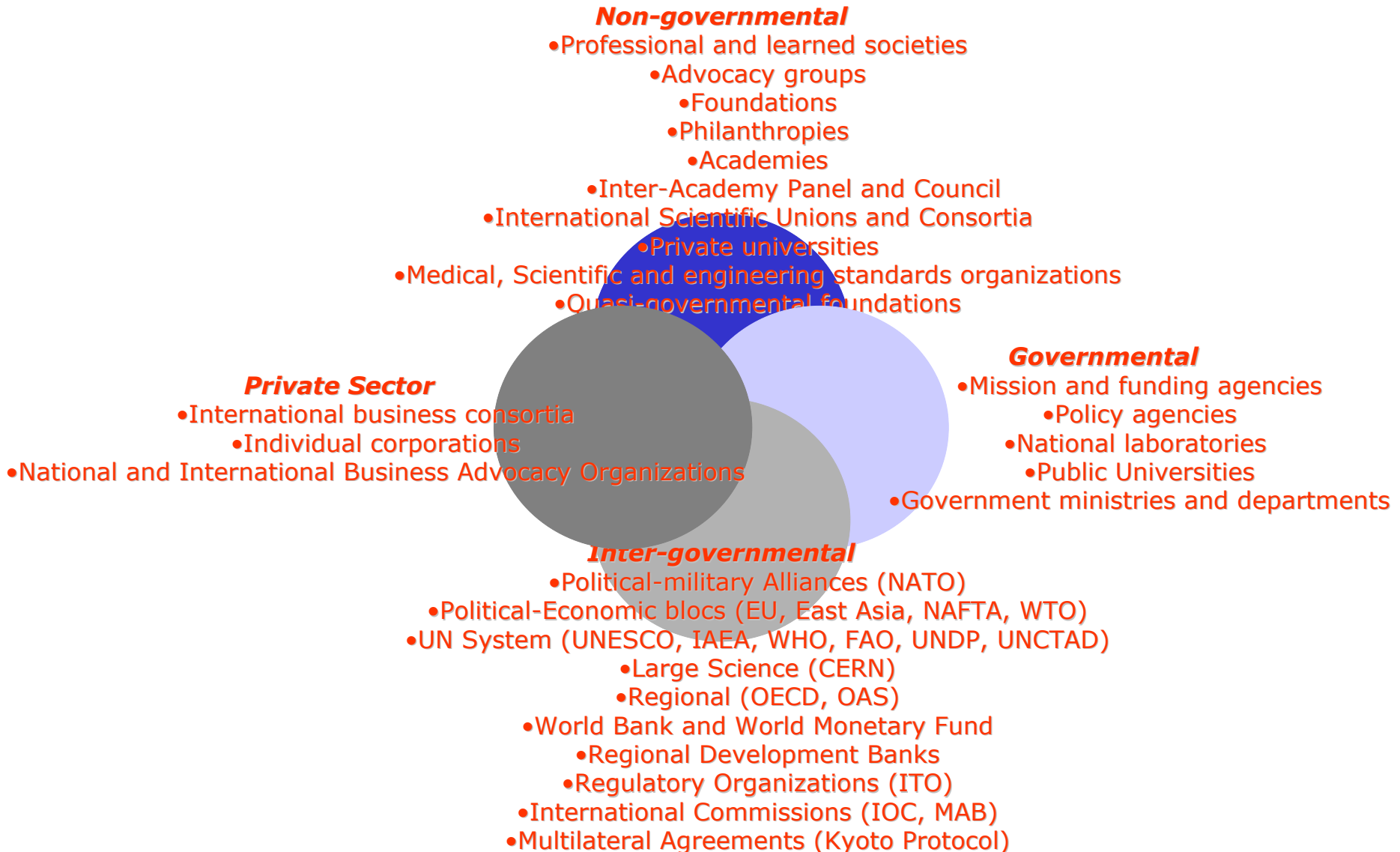
- Agricultural reform
- Education and health
- Labor and market policies
- SMEs and linkages
- Profit-related pay systems
- Import substitution linked to export activity
- Decentralization

Growth-oriented macroeconomic policies

Accelerate rate of capital accumulation in a sustainable way

- Monetary policy
- Fiscal policy
- Exchange rate policy

The Social Structure of Science



UN Organizations and Programs

UNESCO

- The thematic or disciplinary divisions
Fresh Water; People, Biodiversity and Ecology; Oceans; Earth Sciences;
Basic & Engineering Sciences; Coastal Regions & Small Islands; Science Policy and Analysis
- The Intergovernmental and International Programs
International Geosciences Program; International Hydrological Program;
Intergovernmental Oceanographic Commission (IOC); Man and the Biosphere (MAB);
the United Nations World Water Assessment Program (WWAP)
- The 12 UNESCO Institutes and Centers
UNESCO Institute for Statistics; Abdus Salam International Center for Theoretical Physics;
UNESCO International Institute for Capacity-Building in Africa

IAEA

- Department of Safeguards
Non-proliferation
- Department of Nuclear Safety
- Department of Science and Technology
- Technical cooperation and Development

Other UN Bodies

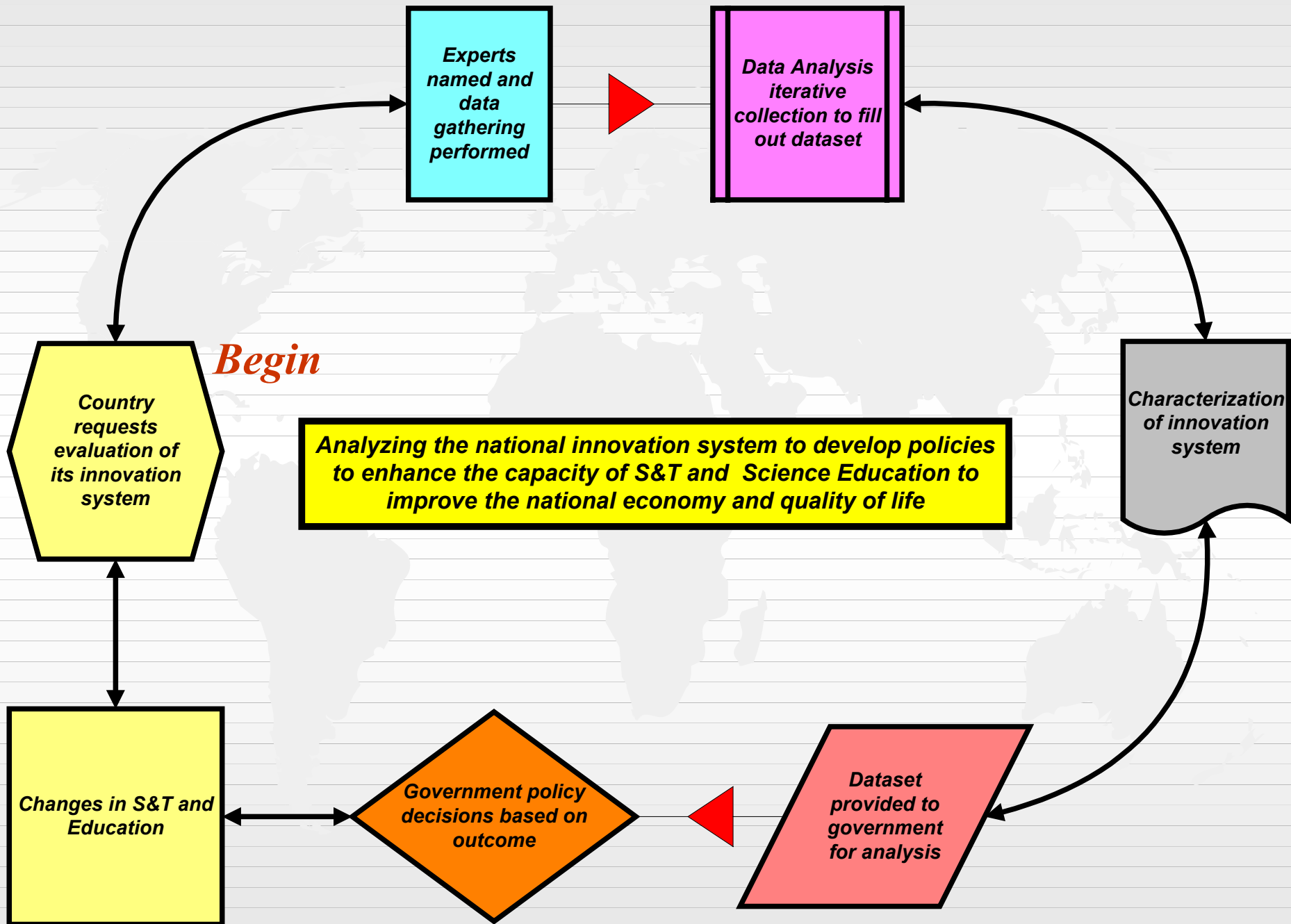
- WHO
- FAO
- UNDP
- UNCTAD

Kyoto Protocols

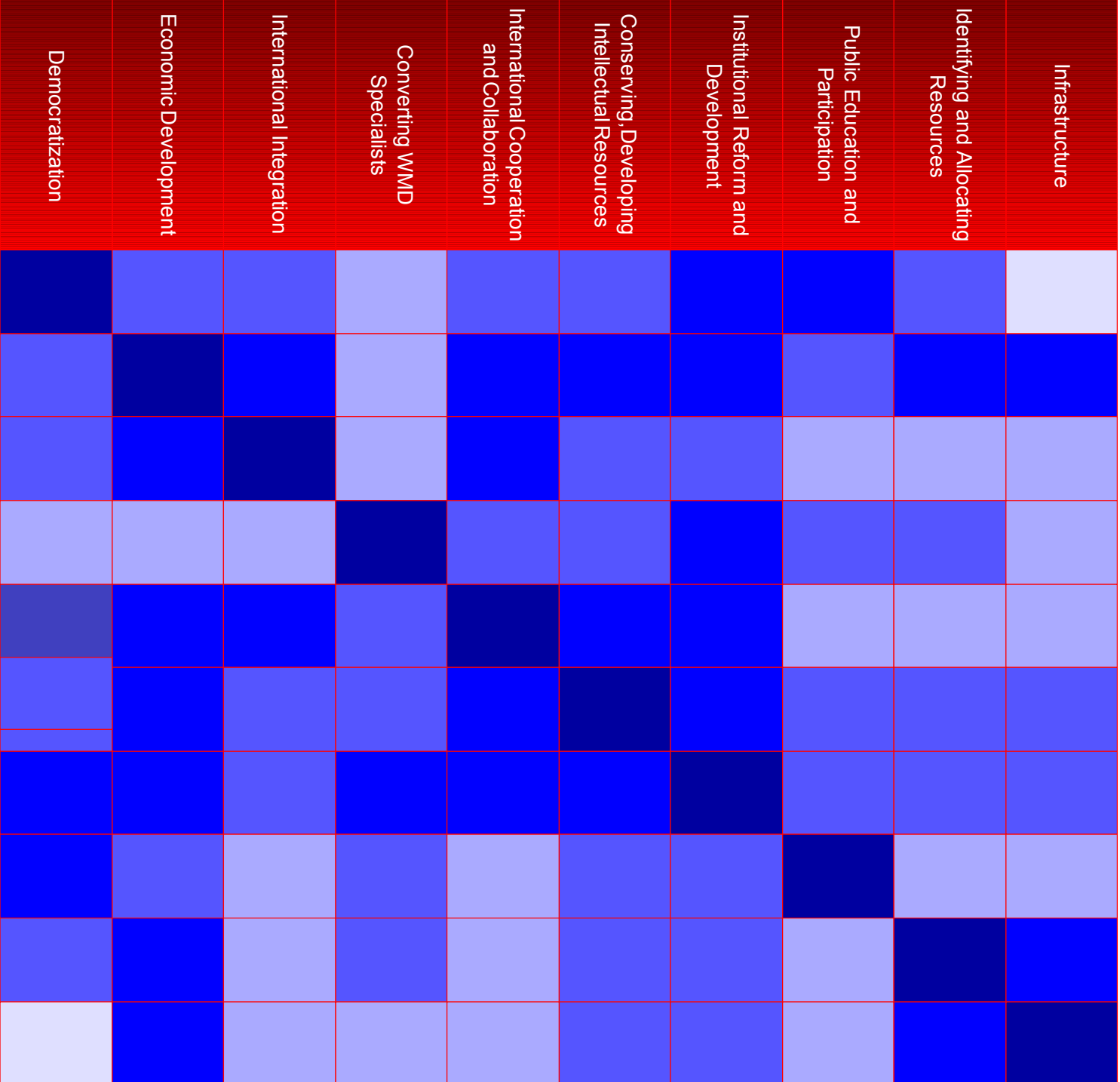
- Conference of the Parties
189 Signatories
- Subsidiary Body for Scientific and Technological Advice
 - Subsidiary Body for Implementation (SBI)
 - Observer organizations (NGOs)

The Need for a Global Policy to Promote Investment in S&T and Science Education for Development

- Promote an “Innovation System” to exploit intellectual talent for economic growth
- Integrate scientists and teachers in the global enterprise without causing a “brain drain”
- Promote industrial investment
- Coordinate national investment, aid programs and international investment
- Partners! Aid programs, development banks, WBG, Industry, governments, institutions, individuals



Goals, Priorities Relationships



Objectives

❖ Capacity building

- Student programs
- Exchanges
- Literature and telecommunications access
- Special programs (access to emergency resources, etc)

❖ Promote collaborations

- Improve research capacity
- Widen participation and exchanges

❖ Promote partnerships

- Emergency support
- Resource sharing

PARTNERS (Resources)

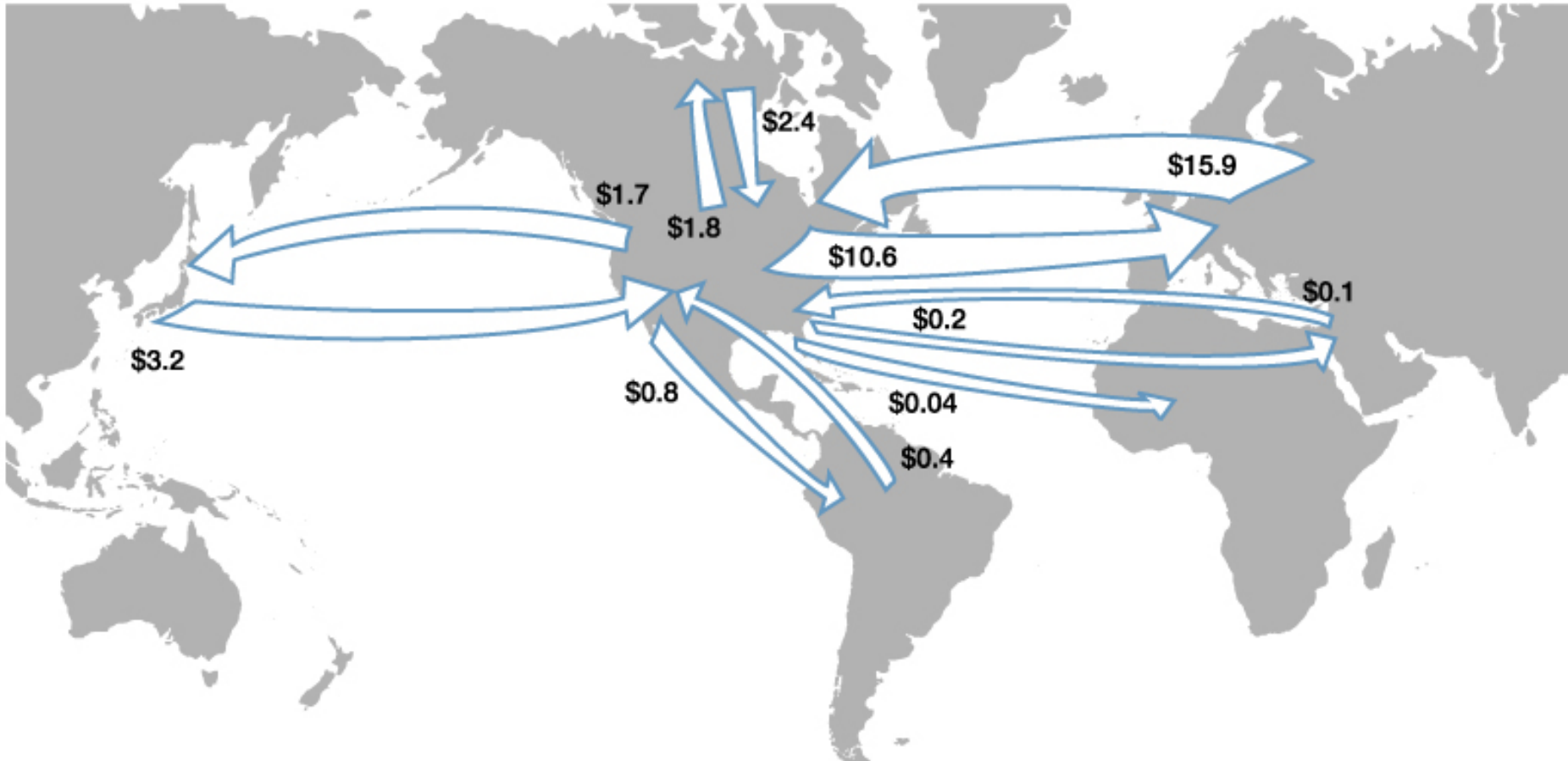
- ❖ US AID
- ❖ NSF and Mission Agencies
- ❖ Regional Development Banks
- ❖ Human Development Network, World Bank Group
- ❖ UNESCO
 - ICTP
- ❖ UN system (IAEA, UNDP, UNCTAD, etc)
- ❖ Industrial States, Organizations
- ❖ Regional States

Partnerships: building on current projects and programs

- ❖ ICTP Laser Science Centers
 - Regional and International Workshops and Conferences
- ❖ Models
 - Pan American Advanced Study Institutes
 - NATO Advanced Study Institutes
- ❖ Identifying centers of excellence for International Basic Science Program of UNESCO
 - Collaborative efforts with ICTP
 - Role of Regional Institutions
- ❖ The role of science education

Industrial R&D spending flows of U.S. and foreign affiliates, by world region: 1998

Billions of current dollars

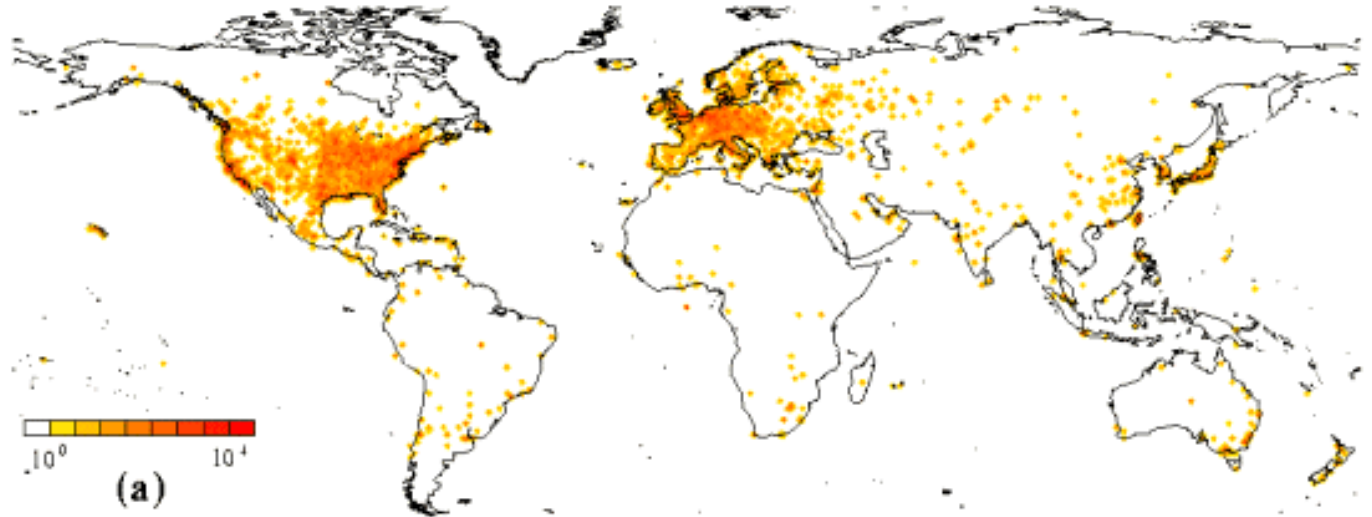


Modeling the Internet's Large-Scale Topology

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Router
density



Population
density

