

The Global Innovation Ecosystem
continuously fostering science
development and sustainable

GIES is conceptualizing
regional, global sectors
compete with one another

As the name "ecosystem"
diverse, evolution



GIES 2008
TOKYO

SYMPOSIUM

March

13

WORKSHOP

March

14

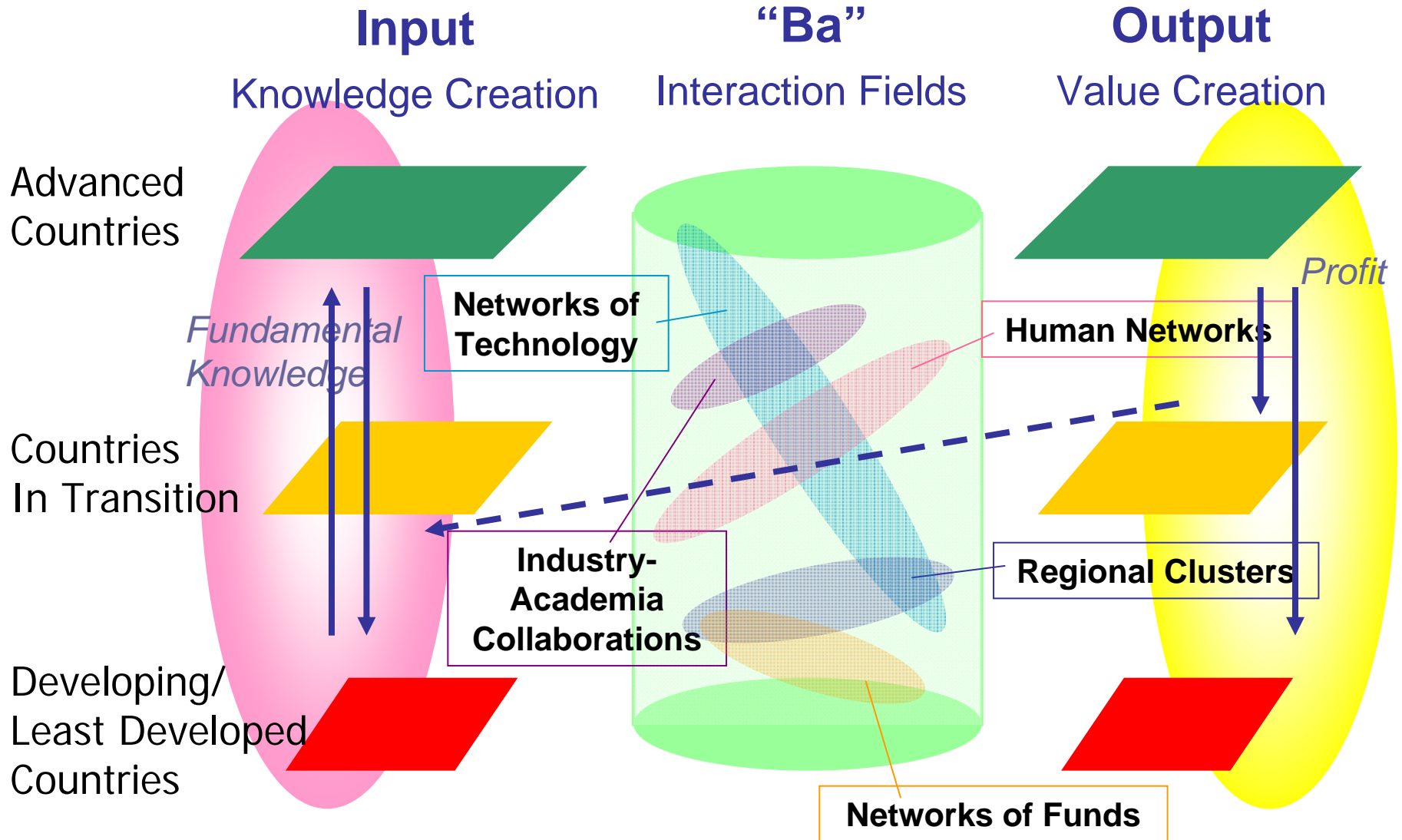
Concept of the GIES

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3D Model of Innovation Ecosystem



Concept of the GIES

Sustainable Development: Resolution of Global Problems

Social values

Economic values

Global Innovation Ecosystem

Regional Innovation Ecosystem

National Innovation Ecosystem

Science &
Technology

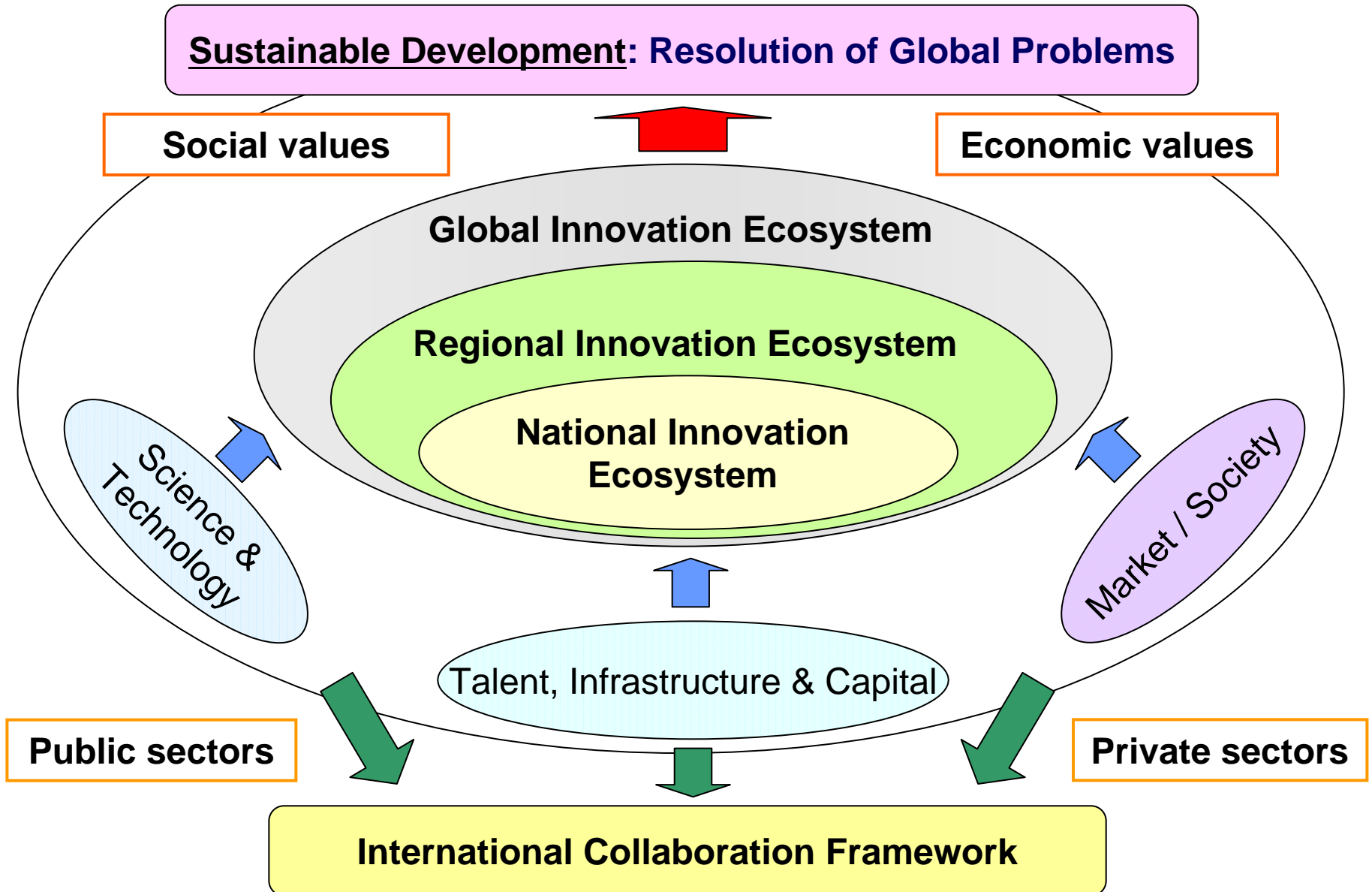
Market / Society

Talent, Infrastructure & Capital

Public sectors

Private sectors

International Collaboration Framework

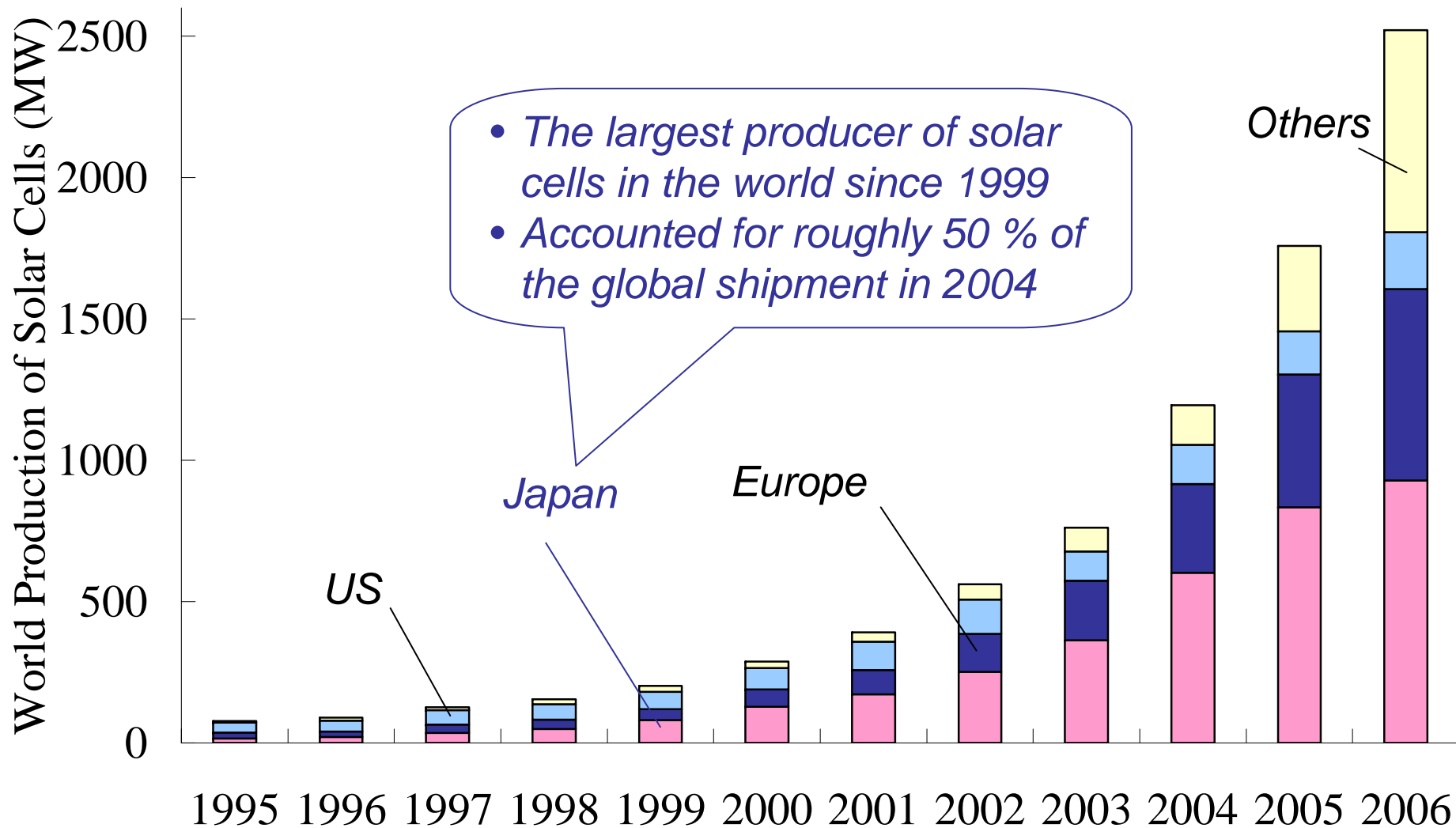


Case Study:

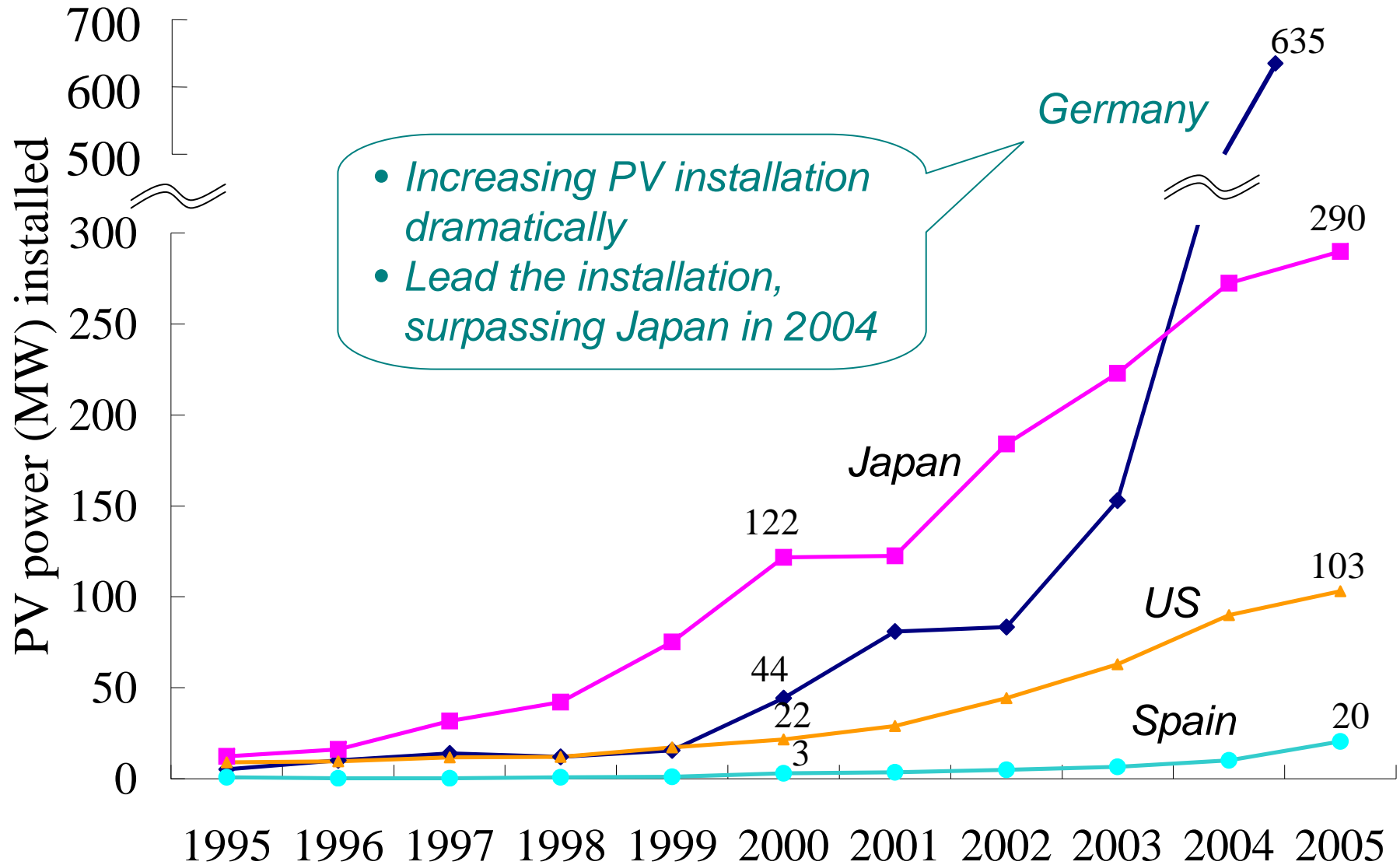
Global Photovoltaic Industry

Japan, Germany, and China

World Production of Solar Cells

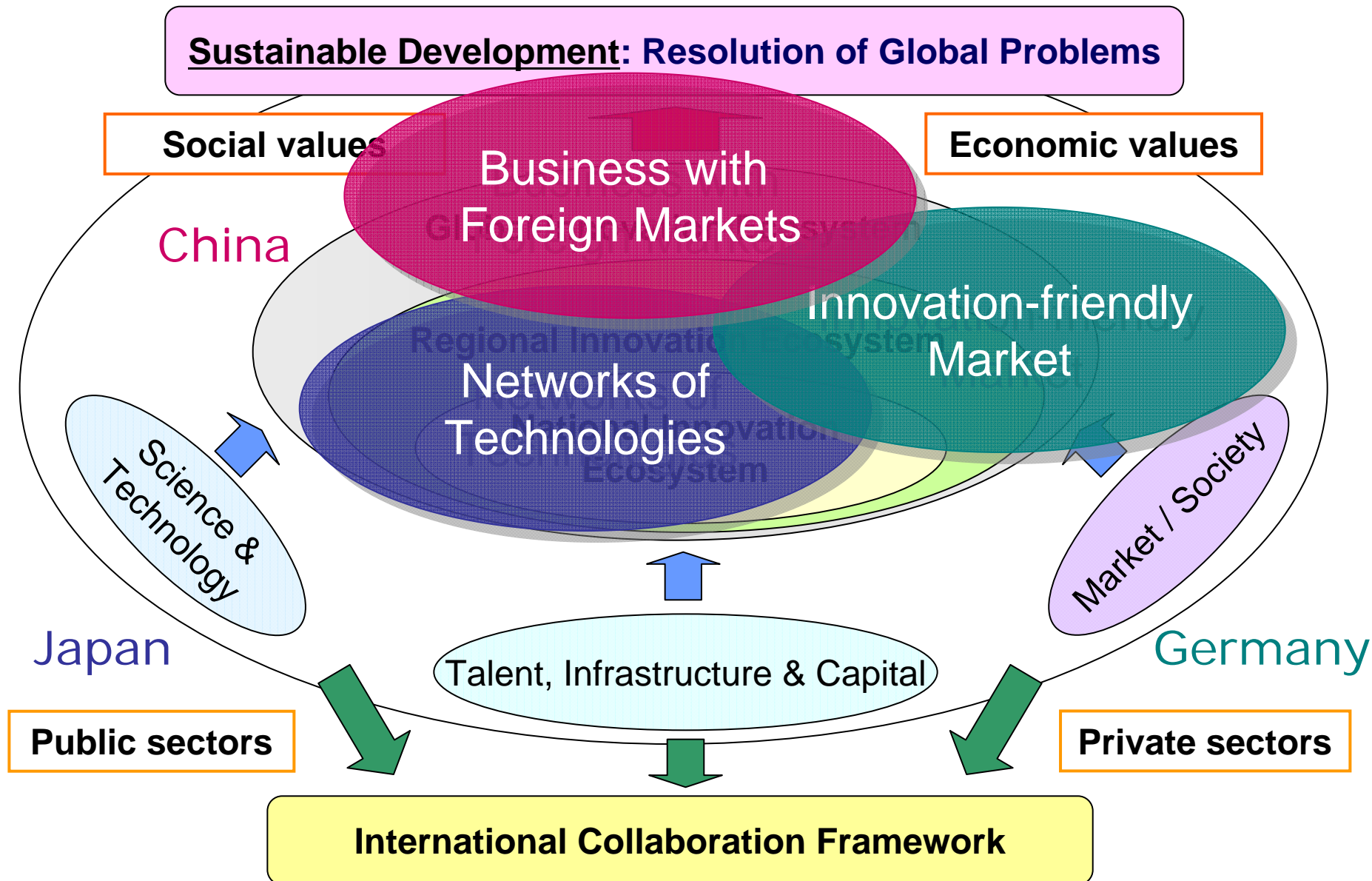


Installed PV Power



Source: IEA Photovoltaic Power Systems Programme

GIES in the PV industry



Japan Initiated the Science based Innovation

Sustainable Development: Resolution of Global Problems

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Global Innovation Ecosystem

National Projects on
Alternative Energy to Oil
(1974-2000)

Japan Solar Energy
Corporation (1975)

Incentives for Installation of
PV systems (1994-)

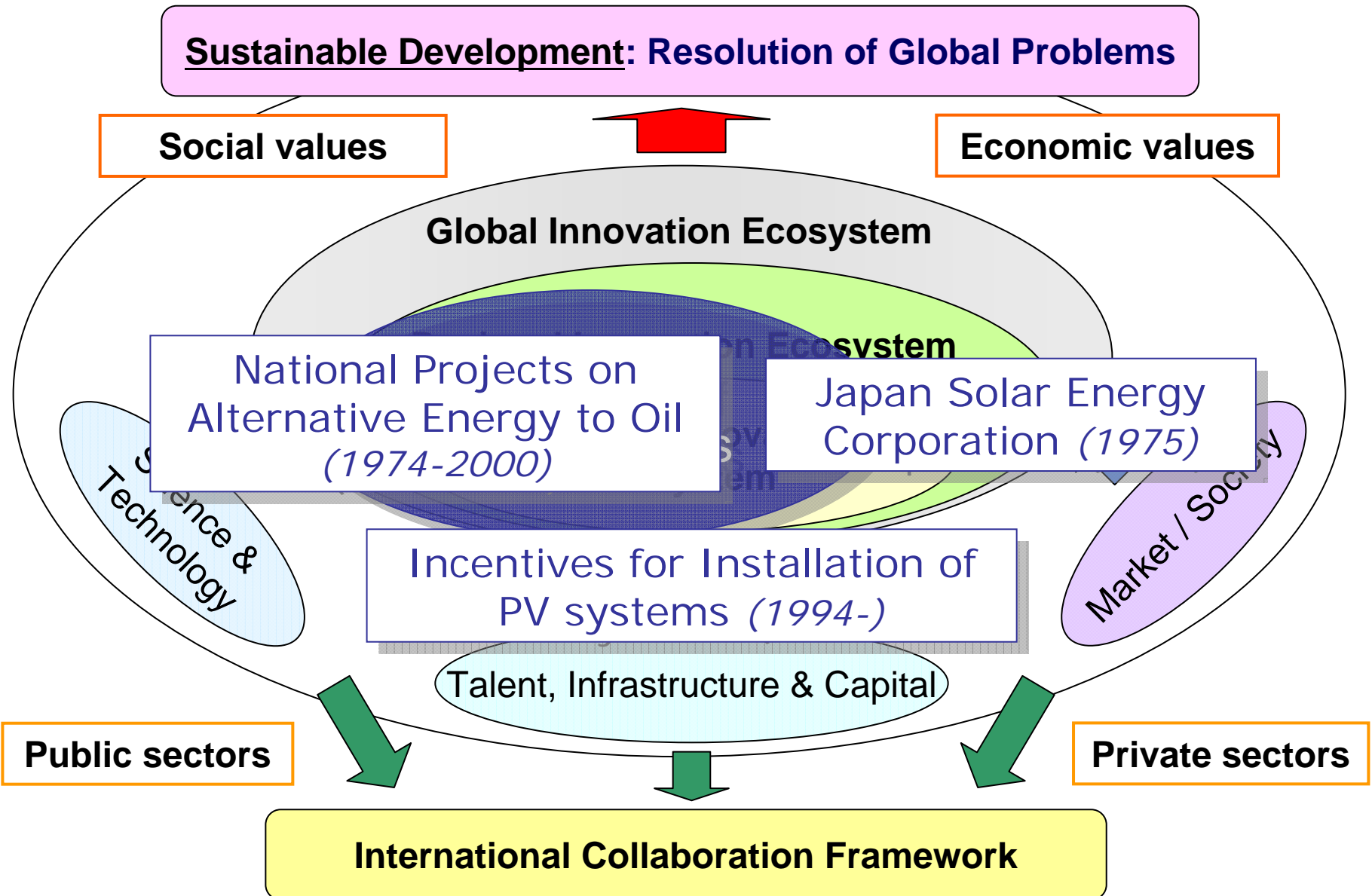
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National Projects in Japan (1974-2000)

Three Major Projects

- Sunshine Project (1974-1992)
- Moonlight Project (1978-1992)
- New Sunshine Project (1993-2000)

Total: 23 R&D projects, ¥1.3 Trillion (1974-2002)

- Photovoltaic Power Generation (crystal or amorphous silicon solar cells etc.) : ¥0.3 Trillion
- Geothermal Power Generation: ¥0.2 Trillion
- Fuel Cells: ¥0.1 Trillion

Japan Solar Energy Corporation (1975)

A Joint Venture for R&D on Solar Cells

- Japanese Firms
 - Kyocera, Sharp, Matsushita
- US Firms
 - Mobil Oil Corp., Tyco Laboratories Inc.
- Kyocera acquired JSEC (1978), joined the Sunshine Project (1980)

Industry-Academia Collaborations

- New Energy and Industrial Technology Development Organization (*NEDO*; 1980)
- Photovoltaic Power Generation Technology Research Association (*PVTEC*; 1990)

Incentives for PV Installation (1994-)

For Residence

- Residential PV Power Subsidy (1994-2005)
 - 595 MW / 860 MW in total (2003)

For Public and Business

- Debt Guarantee System for Promoting Efficient Use of Energy (*by NEDO; 1997-*)
- Field Test Project on New Photovoltaic Power Generation Technology (*by NEDO; 2003-*)
- Environmentally Symbiotic Housings Model Project (*by MLIT; 1993-*)

Germany Created the PV Market

Sustainable Development: Resolution of Global Problems

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Global Innovation Ecosystem

Regional Innovation Ecosystem

Innovation-friendly Market

Priority Federal Funding

Venture Business (1990s-)

Incentives for Installation of PV systems (1999-)

Talent, Infrastructure & Capital

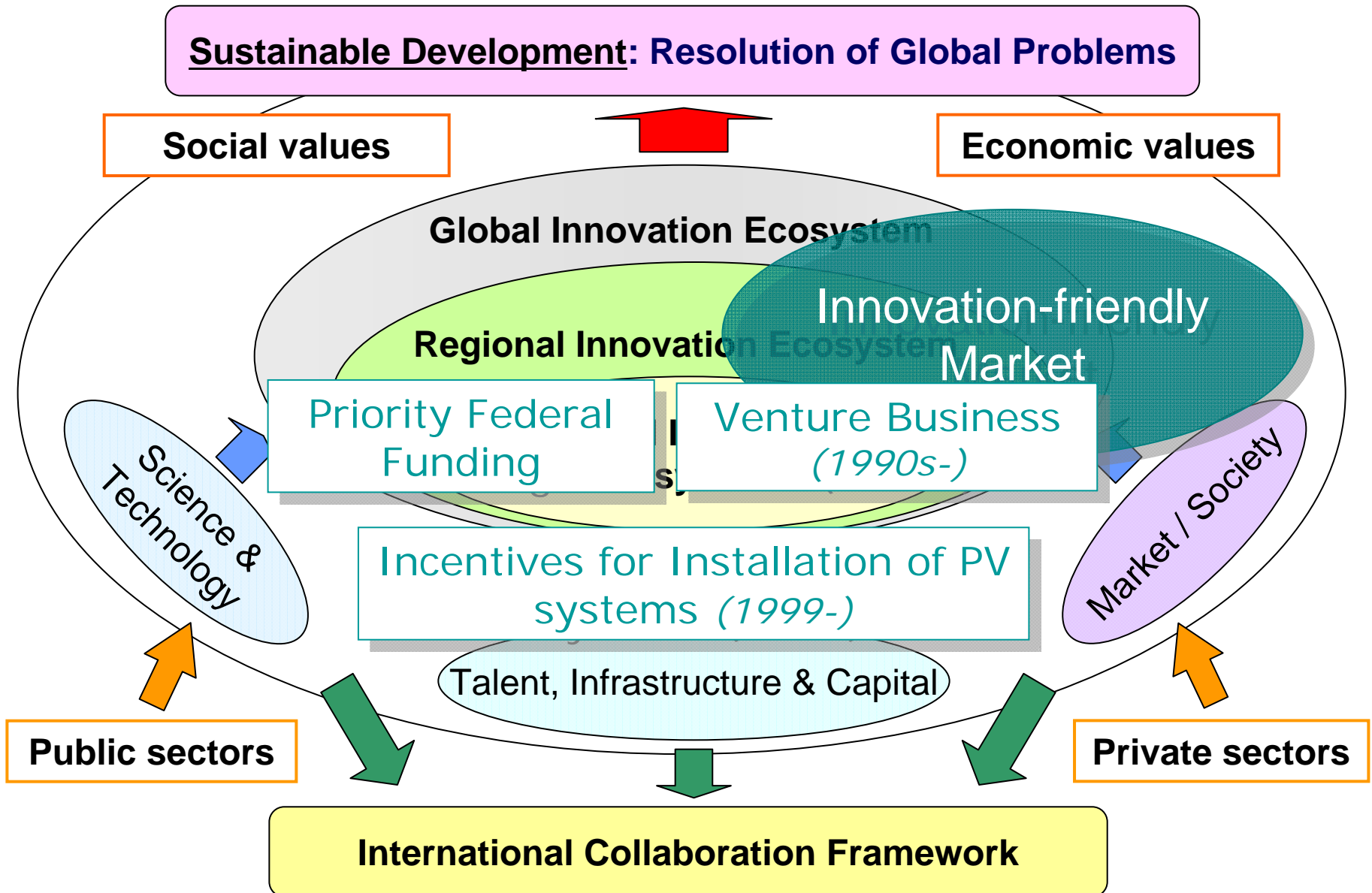
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Venture Business (1990s-)

Leading Firms

- Q-Cells AG (*Solar Cells; 1999-*)
- Schott Solar GmbH (*Wafer, Solar Cells; 1994-*)
- Deutsche Solar AG (*Wafer; 1994-*)

Supports for Venture Business

- Attraction by Local Governments in the Area of Former East Germany
- Venture Capital Investments
- Cooperation with Foreign Talents and Firms

Incentives for PV Installation (1999-)

For Residence and Business

- 1000,000 PV Rooftop Project
(by German Development Bank (KfW); 1999-2003)
 - Low Interest Loans
 - Total: 66,124 cases, €1,741 Million, 360MW
- Energy Efficient Housing Promotion
 - Long-Term and Low Interest Loans
- Priority Purchase of Electricity From Renewable Energy Sources (2004-)
 - Based on Minimum Prices and Duration Guaranteed by the Renewable Energy Sources Act (EEG) *(Enacted in 2000, Revised in 2004)*

Priority Federal Funding

Funding for R&D on Renewable Energy

(% of €60.2 Million in 2004)

- Photovoltaic Power Generation (30%)
- Wind Power Generation (21%)
- Geotherm Power Generation (20%)
- Low Temperature Solar Thermal Technology (8%)
- Solar Thermal Power Plants (17%)

Industry-Academia Collaborations

- Fraunhofer Institute for Solar Energy System (1981)
 - in collaboration with Universities and Private Firms

China Entered the Global PV Market

Sustainable Development: Resolution of Global Problems

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**Business with
Foreign Markets**

Regional Innovation Ecosystem

**Priority Government
Funding**

**Science &
Technology**

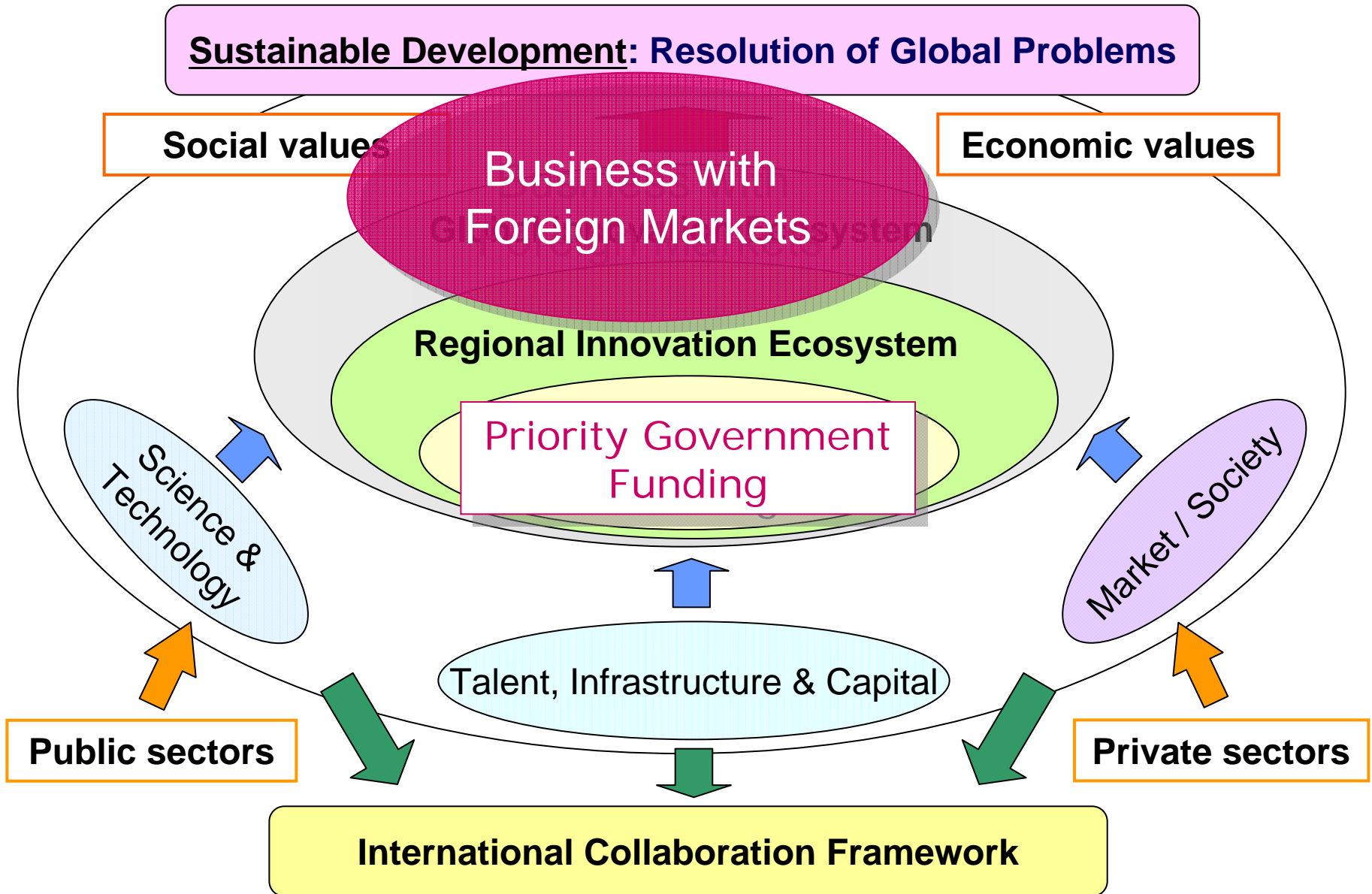
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Priority Government Funding

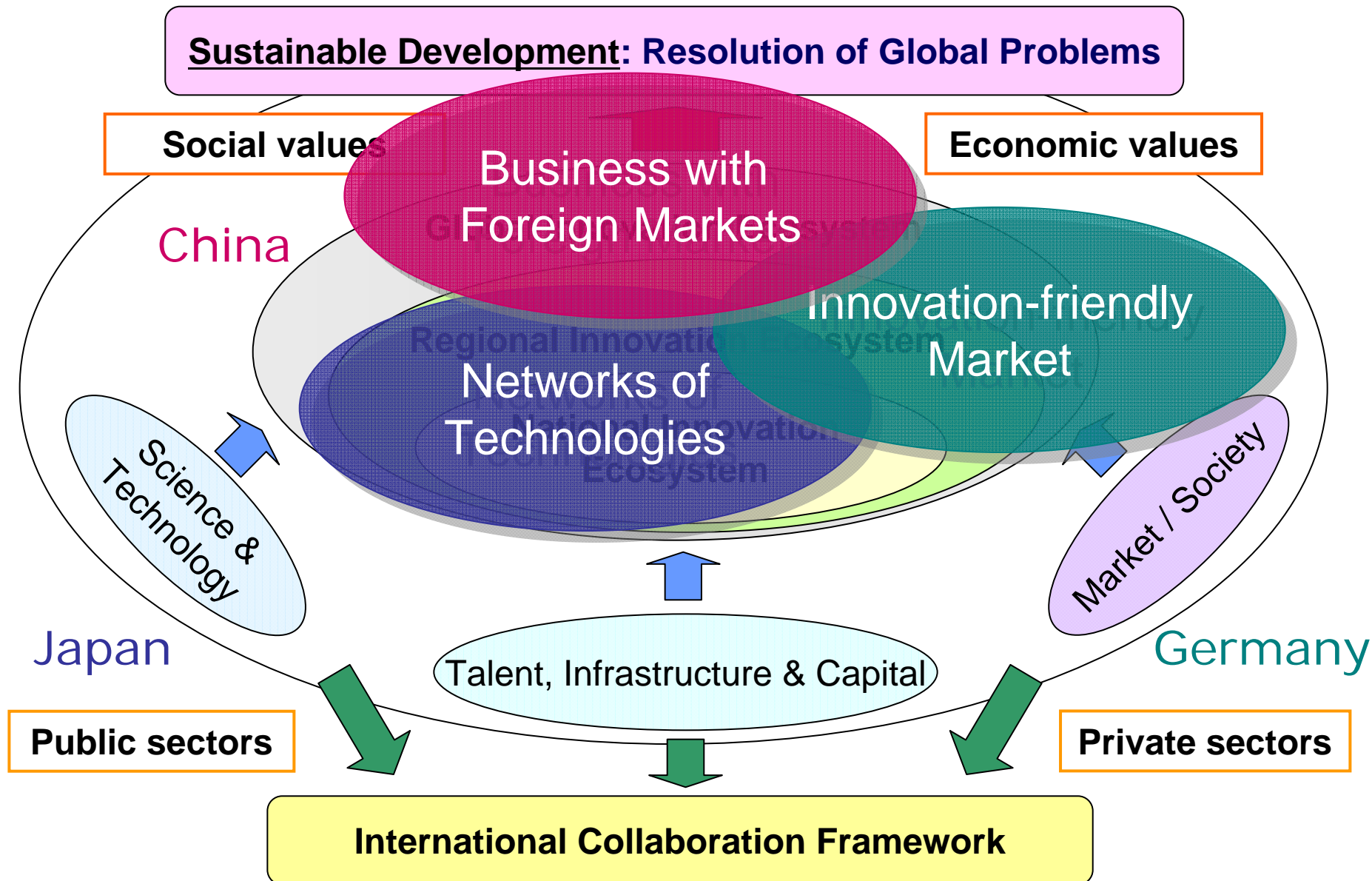
Concentrated Investment to Production Technology

- Poly-crystalline Silicon
 - Import Silicon Materials from Japan, the US, and European Countries
- PV Production Process
 - Low Environmental Impact

Expansion of the Domestic Market

- Big Project Plans
 - Large Scale PV Systems in Desert and Inland Areas
 - Tibet, Nei Mongol etc.

GIES in the PV industry



References

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- Agency for Natural Resources and Energy
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- Invest in Germany magazine (2006)