

Innovation systems and policies

- **What is an innovation system ?**
- **How to analyse national and regional innovation systems and policies?**

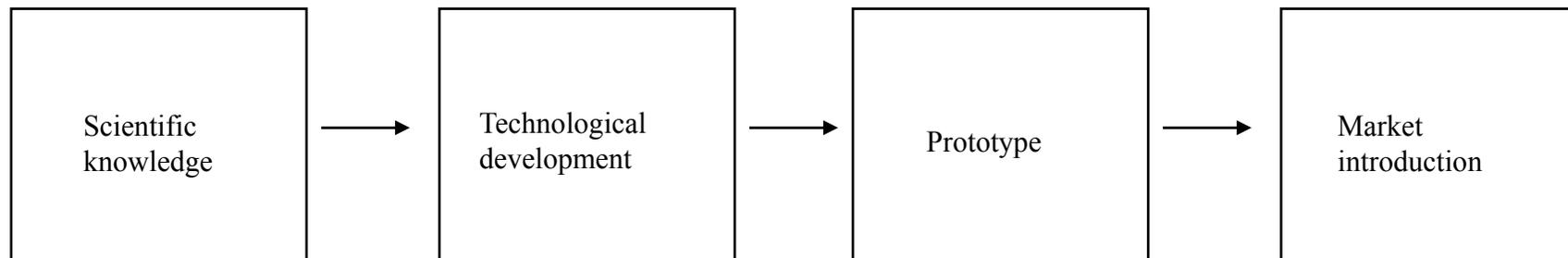
Joseph Schumpeter (1883-1950): the father of innovation theories



- Principle of “creative destruction” (*kreative Zerstörung*)
- Main works: *Business Cycles: A theoretical, historical and statistical analysis of the Capitalist process* (1939); *Capitalism, Socialism and Democracy* (1942)
- Innovations according to Schumpeter:
 - New markets or products
 - New equipment
 - New sources of labor and raw materials
 - New methods of organization or management
 - New methods of transportation or communication
 - New methods of advertising and marketing
 - ...

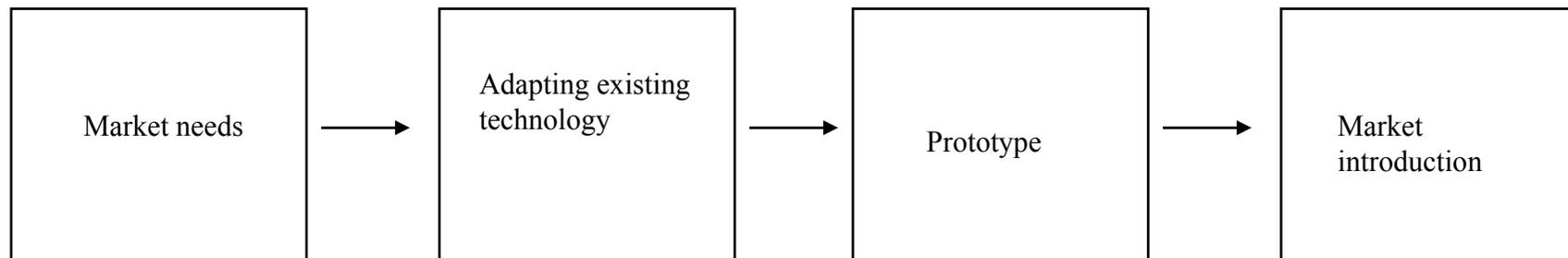
Technology push *versus* demand pull

- “Technology push“ (Schumpeter I)

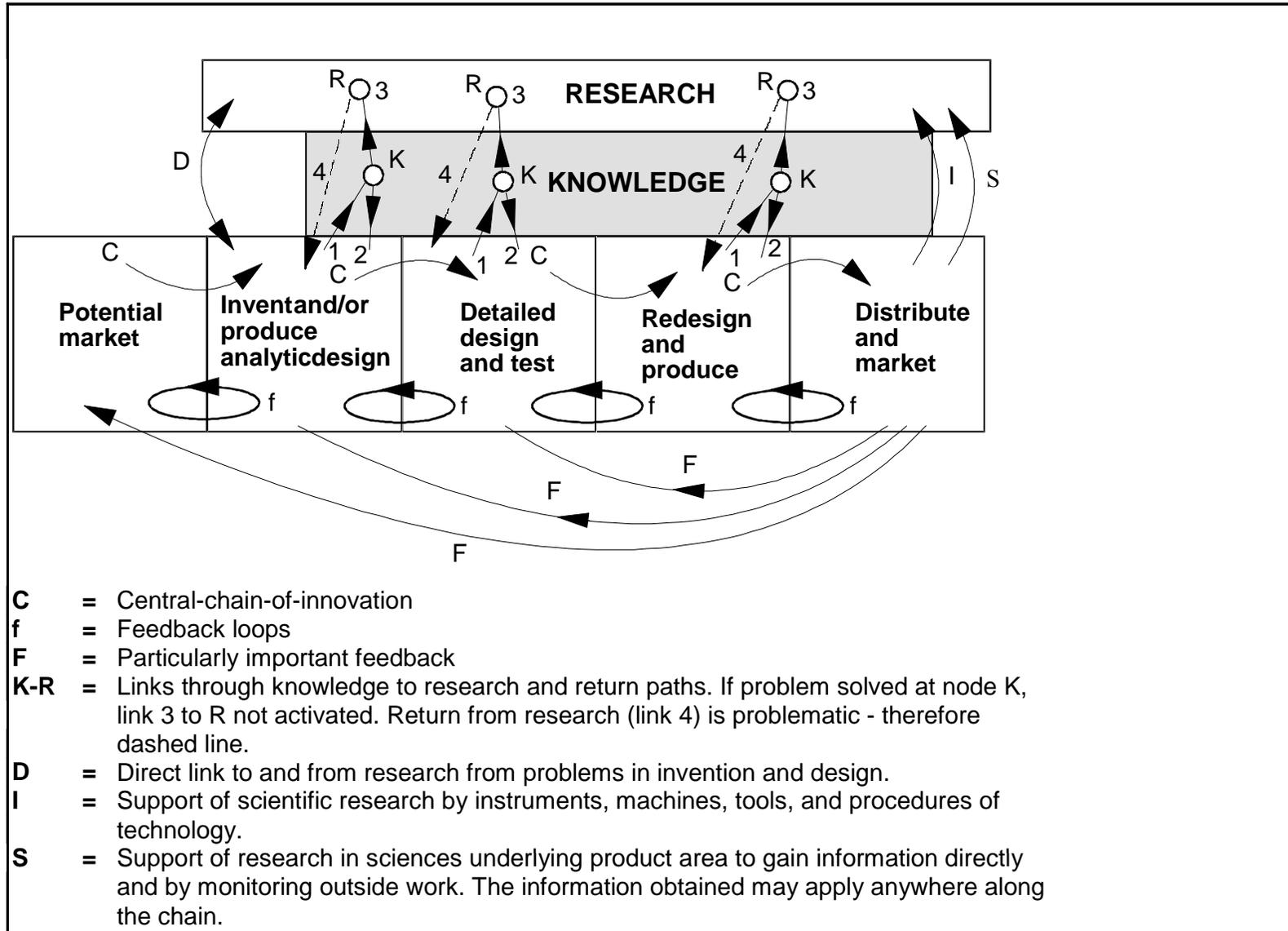


Technology push *versus* demand pull

- “Demand pull” (Schmookler):



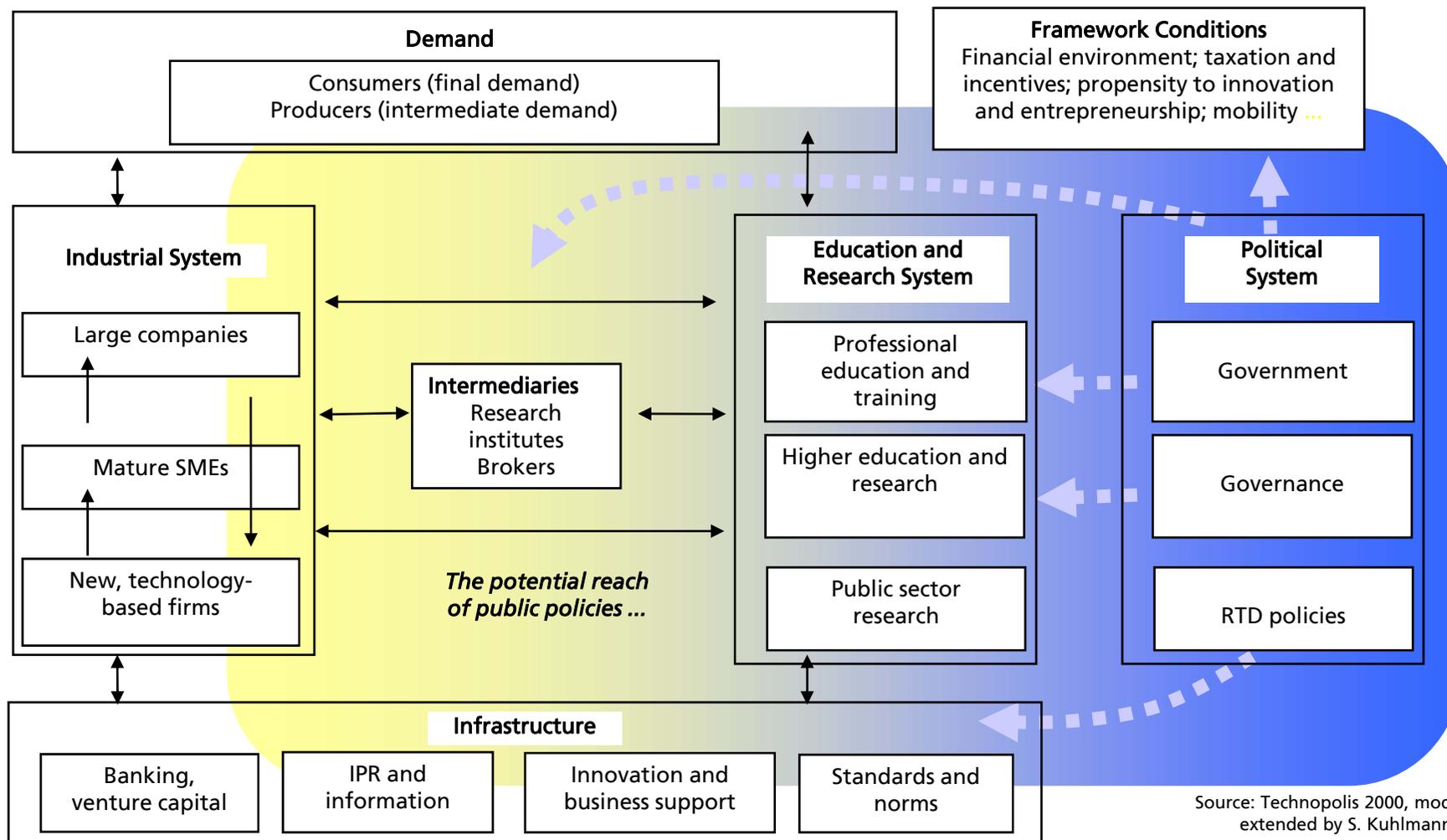
Innovation models: The chain-linked model by Kline and Rosenberg (1986)



Innovation systems: some definitions

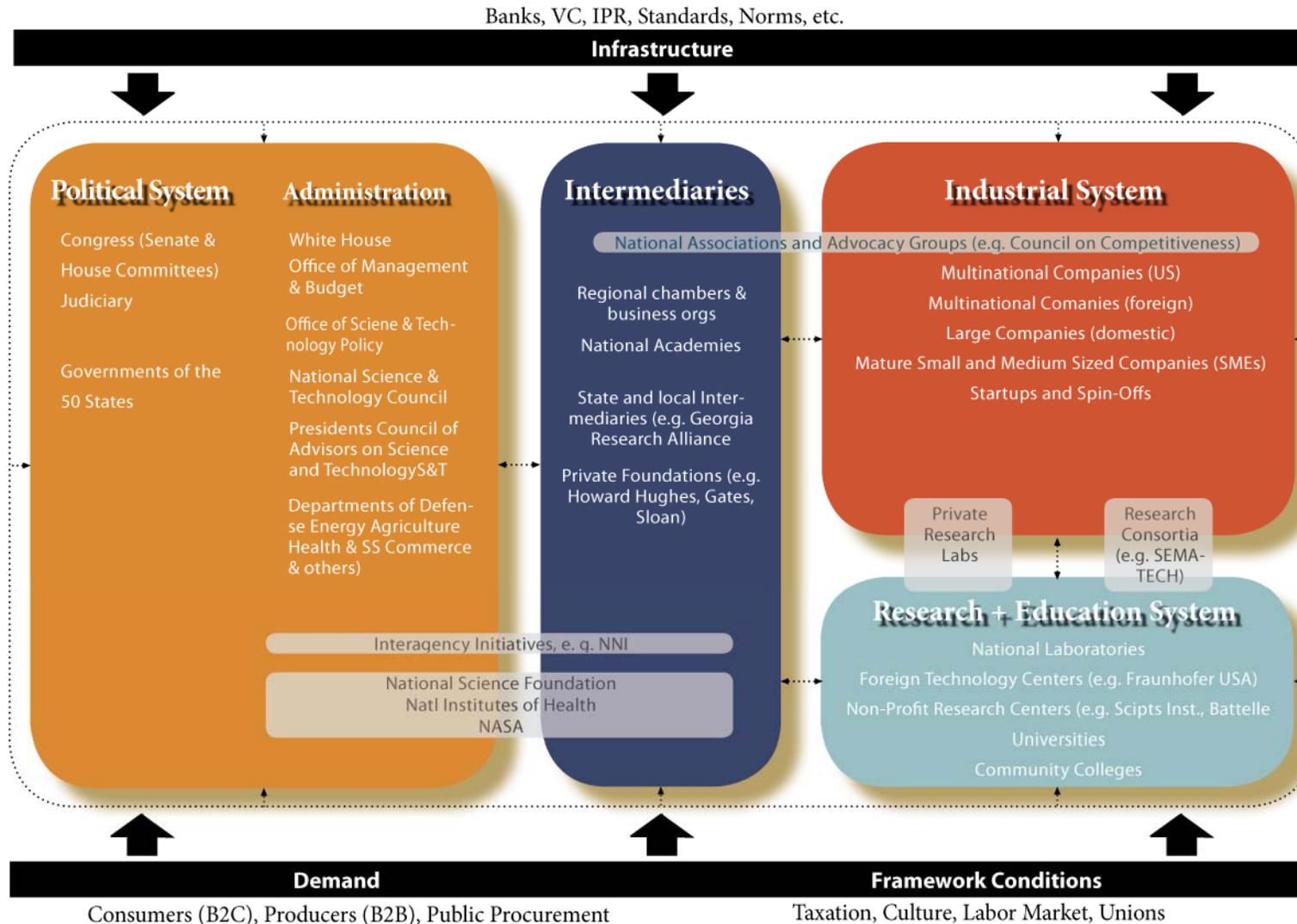
- “(...) the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.” (Freeman, 1987)
- “(...) the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge (...) and are either located within or rooted inside the borders of a nation state .” (Lundvall, 1992)
- “(...) the national institutions, their incentive structures and their competencies, that determine the rate and direction of technological learning (...) in a country .” (Patel and Pavitt, 1994)

The research and innovation system model: a heuristic tool

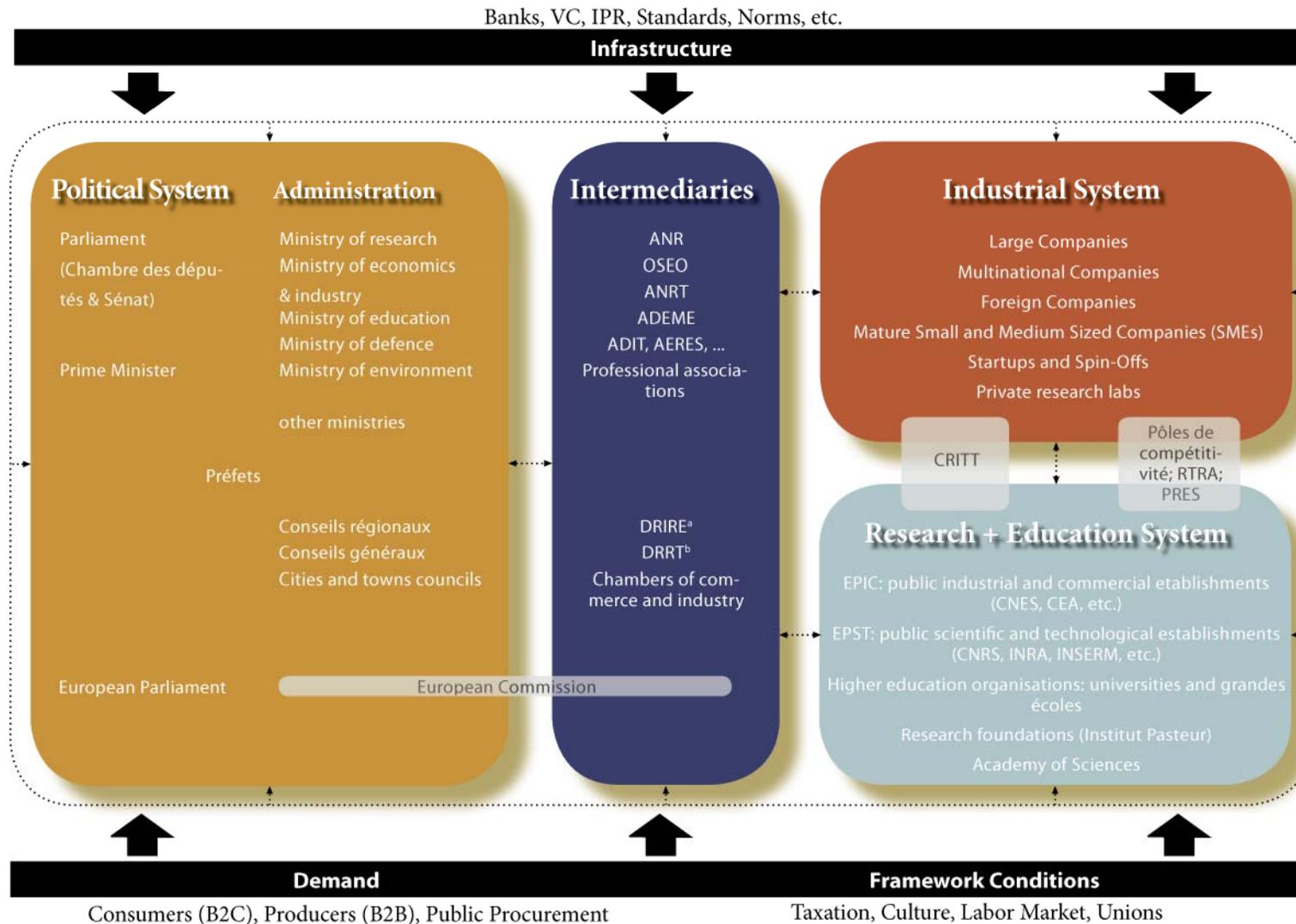


Source: Technopolis 2000, modified and extended by S. Kuhlmann, ISI

A schematic representation of a national innovation system : the case of the US

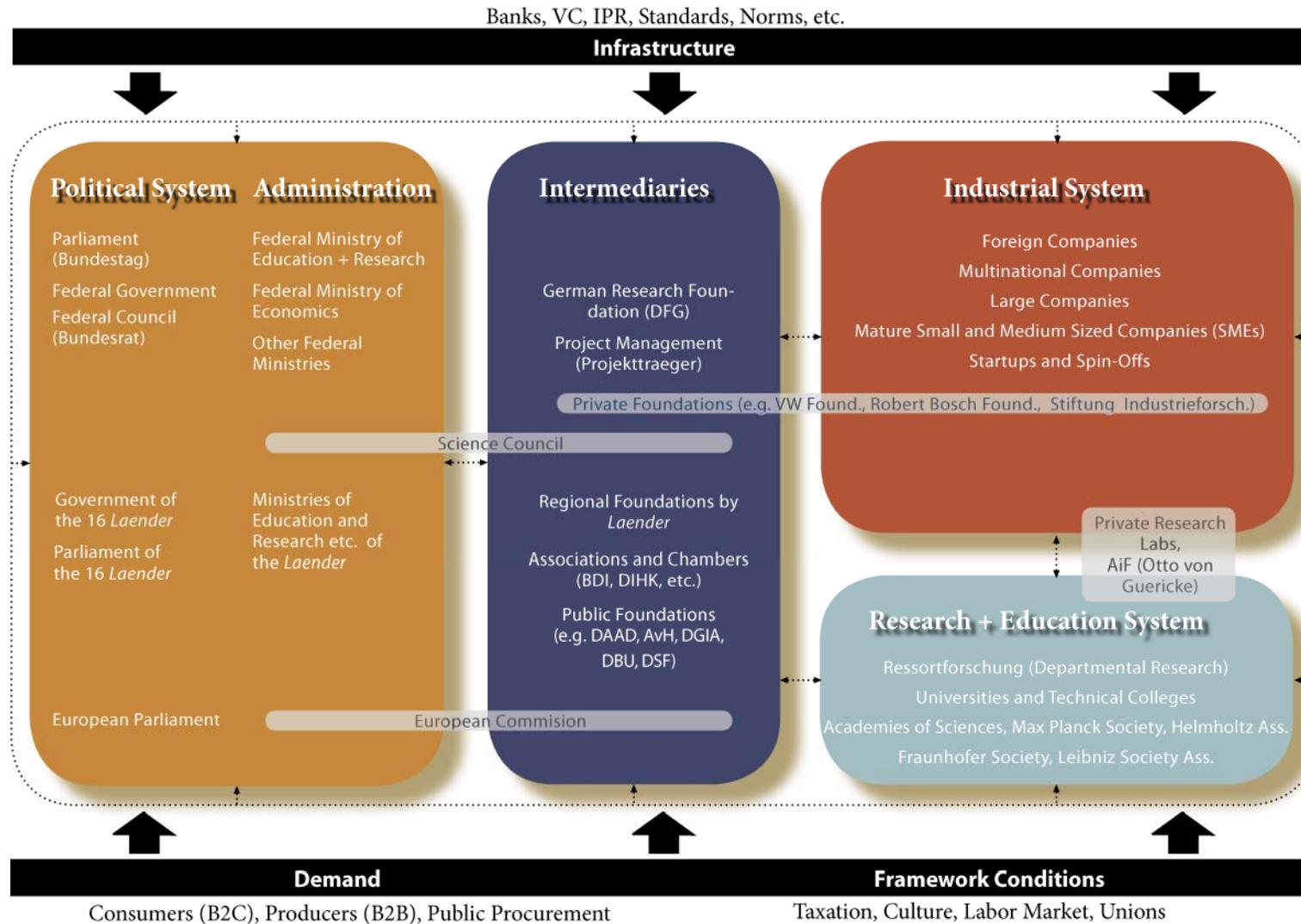


A schematic representation of a national innovation system : the case of France

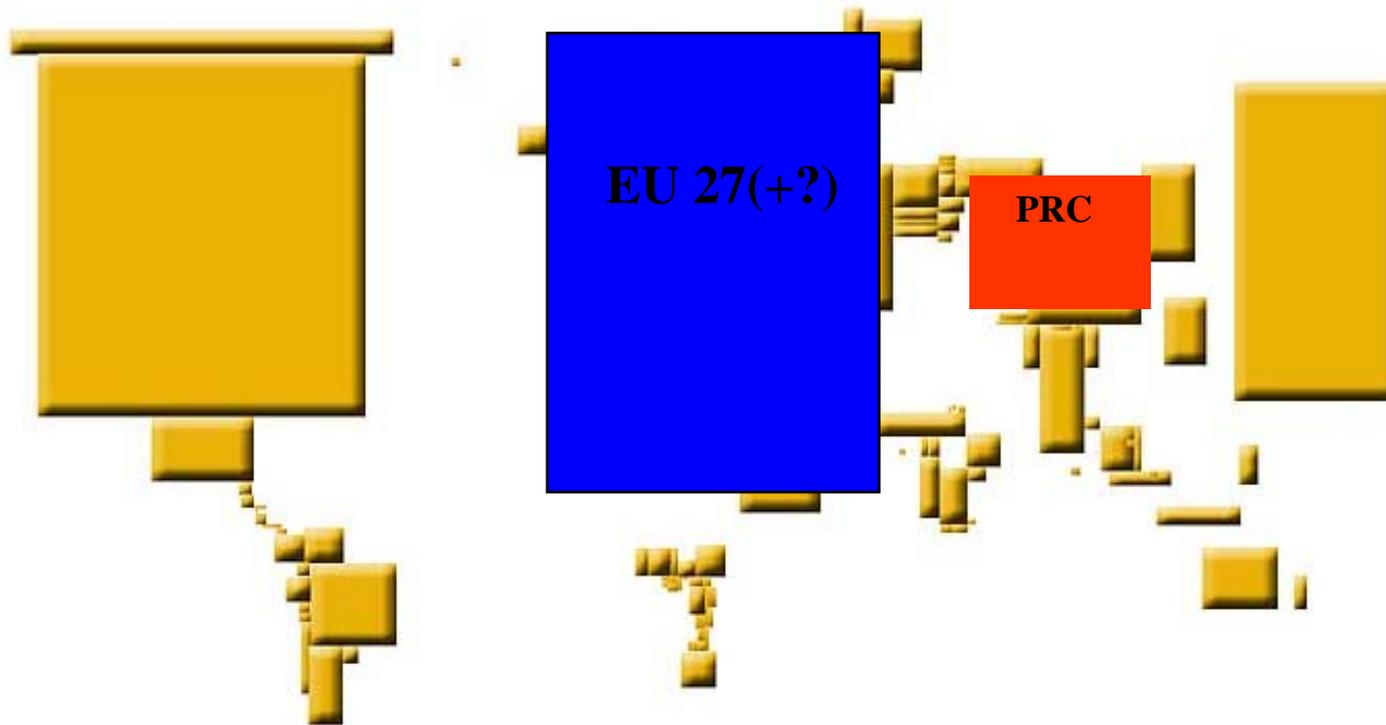


^a Regional representations of the ministry of industry
^b Regional representations of the ministry of research

A schematic representation of a national innovation system : the case of Germany



Innovation systems, national economies & globalisation:
an anamorphic map of the economic world



Innovation systems, national economies & globalisation: international patent applications

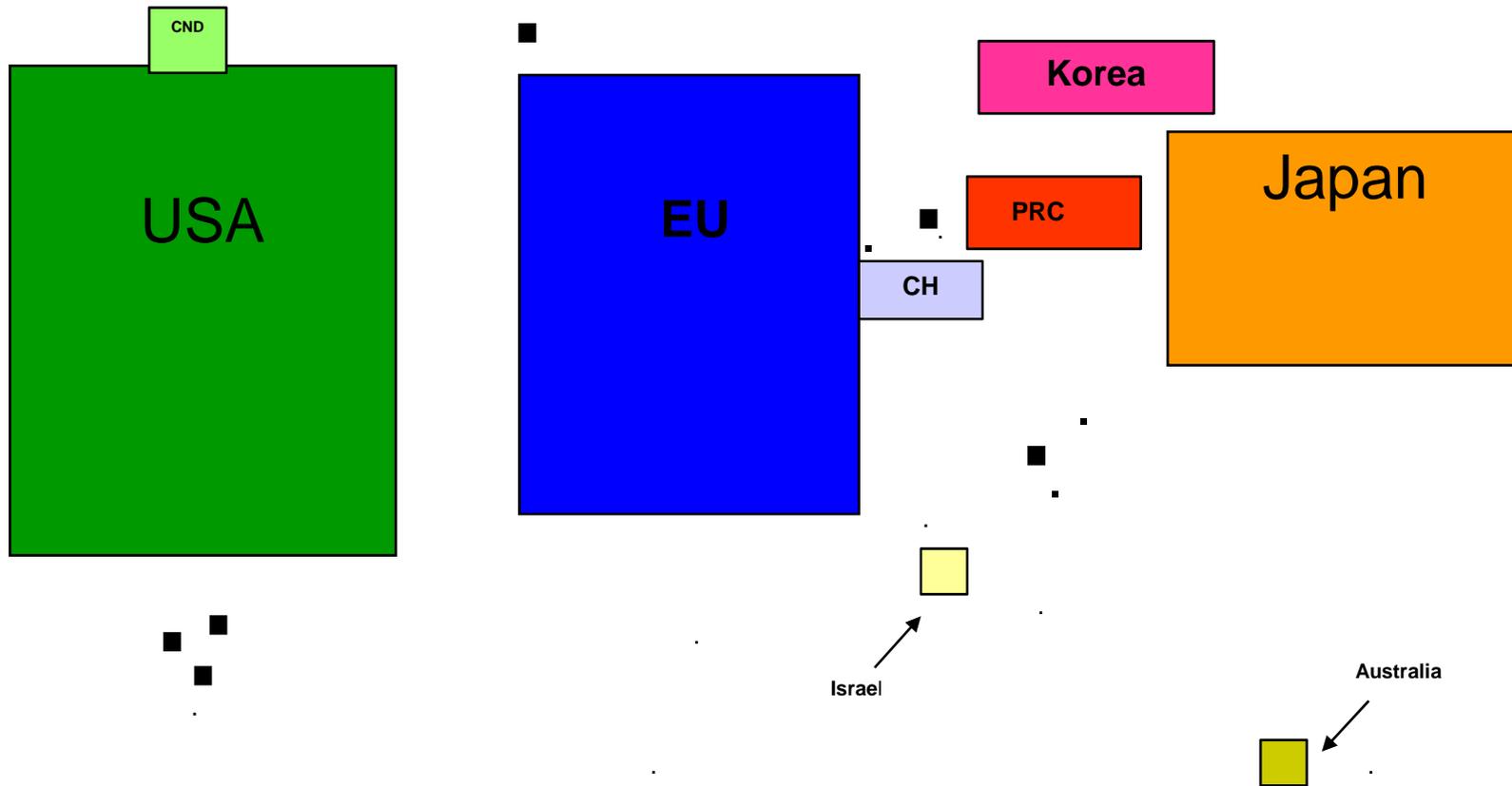
Country	2003	2004	2005	2006	2007 (est.)	Growth (06-07)
1. USA	41,030	43,350	46,804	50,941	52,280	2.63 %
2. Japan	17,414	20,264	24,869	27,033	27,731	2.58 %
3. Germany	14,662	15,214	15,984	16,732	18,134	8.38 %
4. South Korea	2,949	3,558	4,688	5,944	7,061	18.79 %
5. France	5,171	5,184	5,748	6,242	6,370	2.05 %
6. UK	5,206	5,027	5,084	5,090	5,553	9.10 %
7. China	1,295	1,706	2,503	3,951	5,456	38.09 %
8. Netherlands	4,479	4,284	4,500	4,529	4,186	-7.57 %
9. Switzerland	2,861	2,898	3,290	3,577	3,674	2.71 %
10. Sweden	2,612	2,851	2,883	3,316	3,553	7.15 %

The US accounted for 33.5 per cent of all applications made in 2007

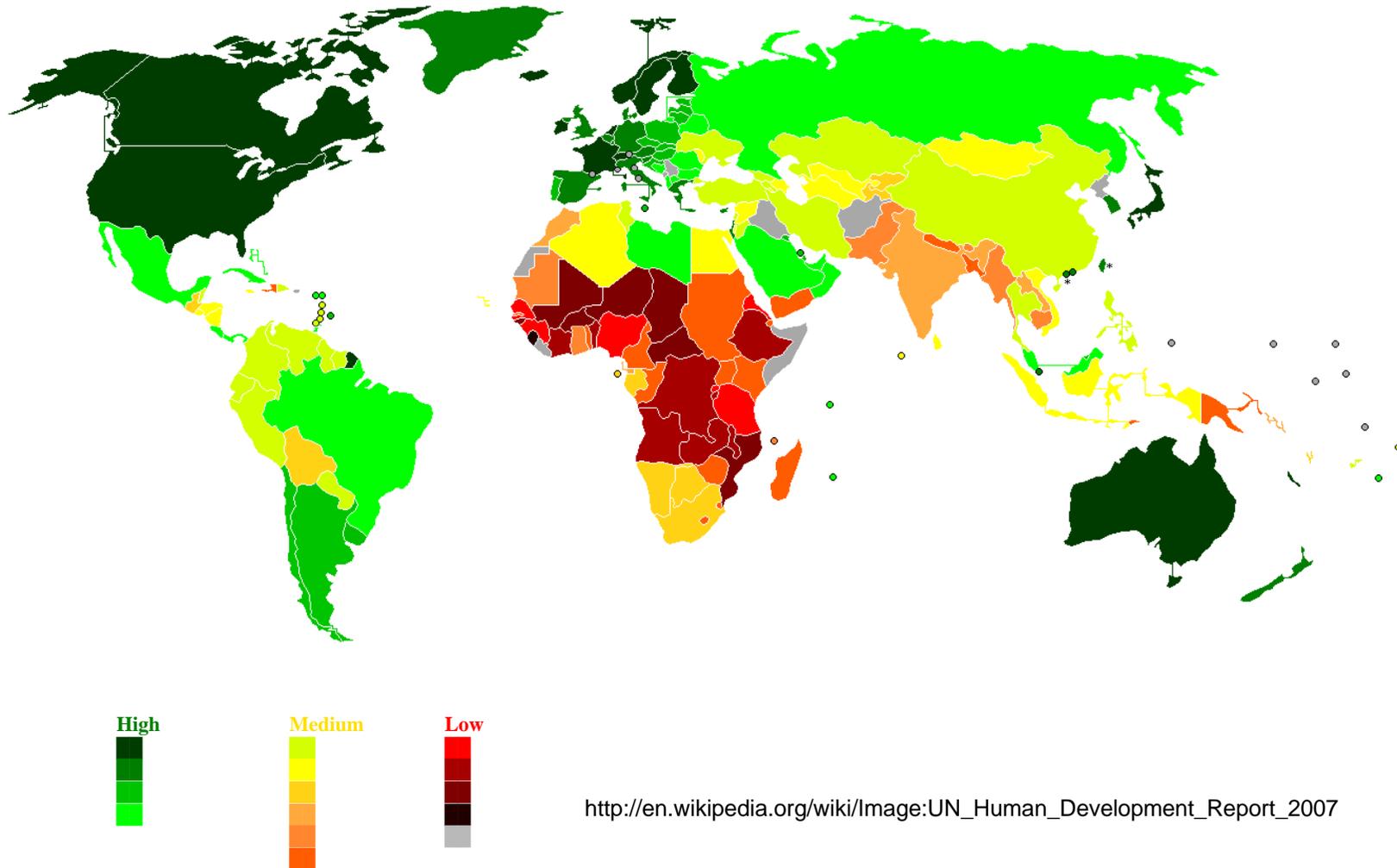
EU (27) > 47,000 applications in 2007 (approx. 30 per cent of all applications)

Source: World Intellectual Property Organisation (WIPO) Patent Cooperation Treaty (PCT); applications by residence of first applicant

Innovation systems, national economies & globalisation: an anamorphic map of patenting



Innovation systems, national economies & globalisation: the human development index (HDI) perspective



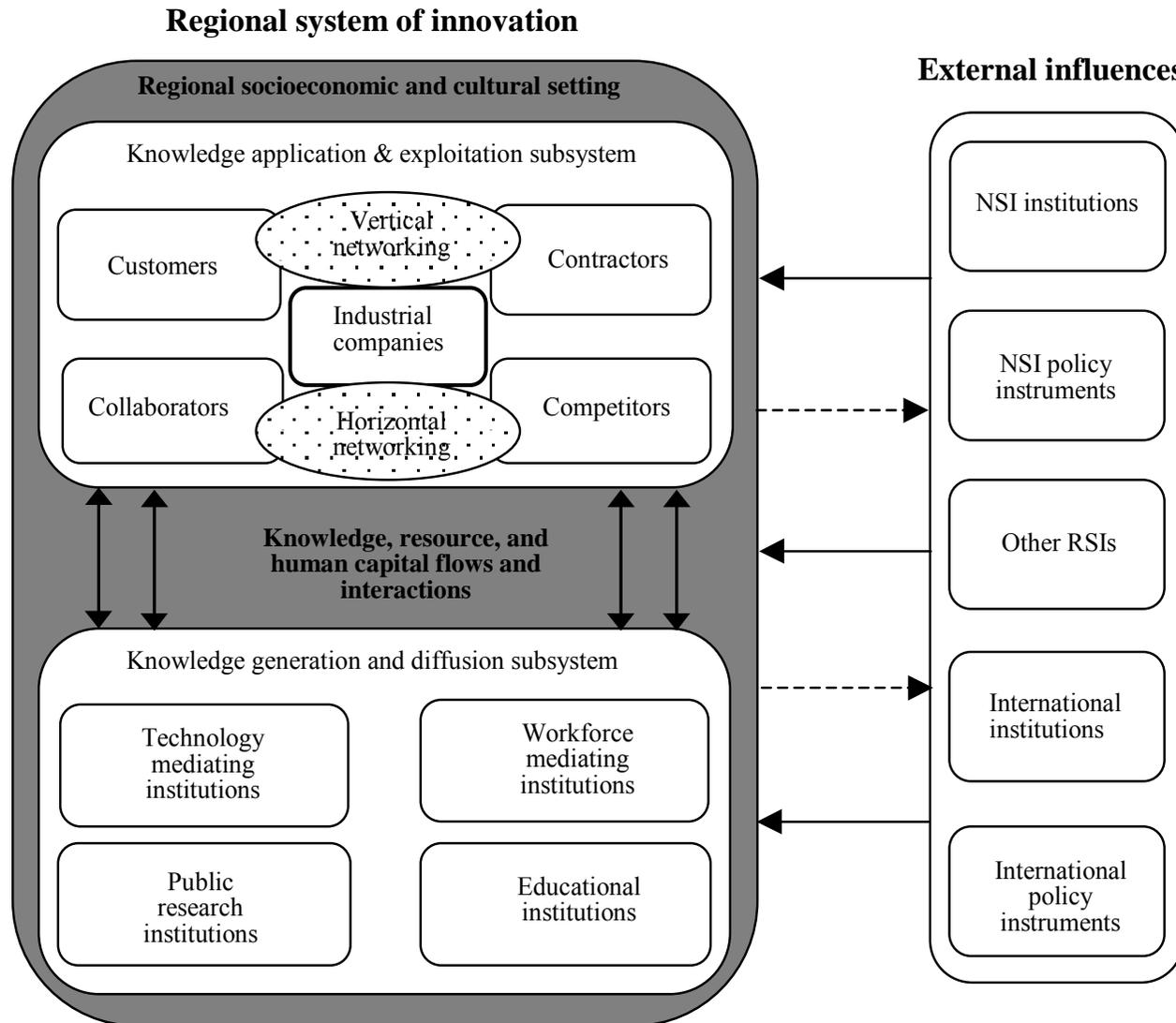
Innovation policies: the mutation factors explaining paradoxical and sometimes contradictory relations between science and society

- Science and technology are at the core of modern societies which requires open minds and readiness to learn, but...
- ... growing scepticism concerning the social, health and ethic consequences of “progress”
- Sustainable development principles along three main dimensions:
 - environmental dimension
 - economic dimension
 - social dimension

Innovation policies: The Lisbon strategy

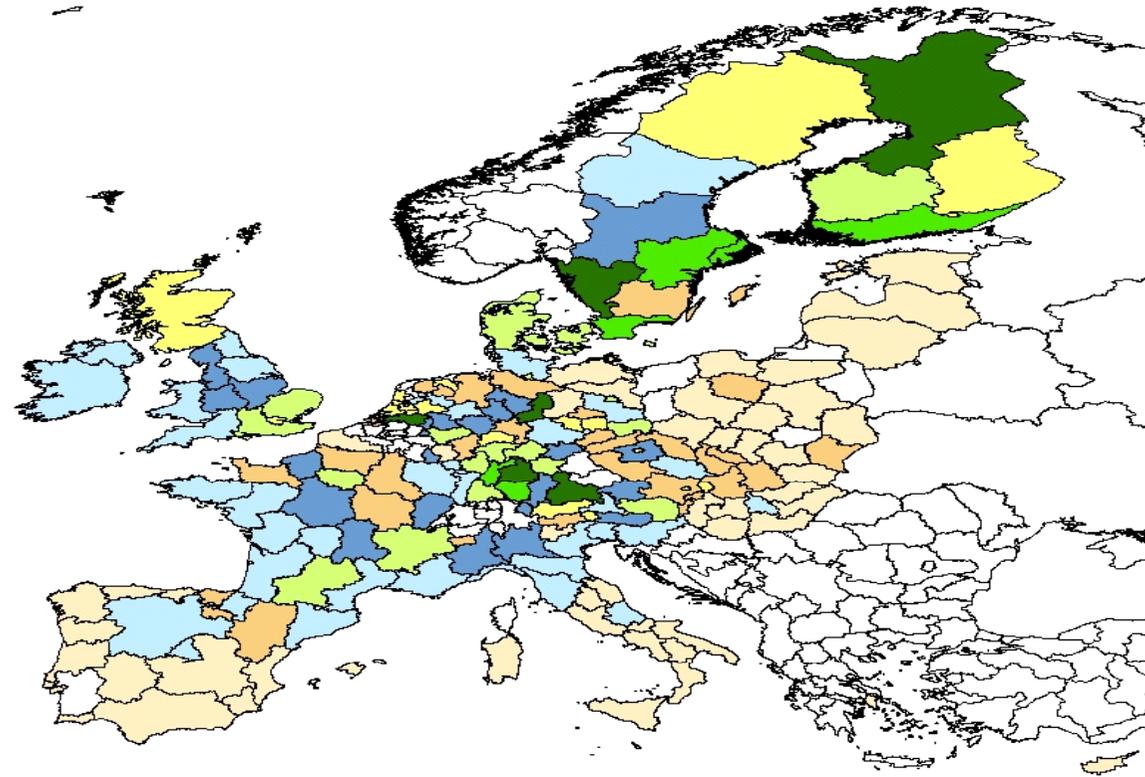
- The Lisbon European Council set in March 2000 the goal of Europe becoming in 2010 the "*most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion*".
- The creation of an European Research Area (ERA) is the core element of this strategy (e.g. the so called 3% goal).
- Nevertheless, and until now, several questions are raised by the ERA that may profoundly affect the future of Europe:
 - selection criteria et justification of the action of the European Union ?
 - definition of scientific priorities ?
 - Picking up the winners ?

A schematic representation of a regional innovation system



Source: Autio, E. (1998):
Evaluation of RTD
in Regional Systems of Innovation.
In: *European Planning Studies*, Vol. 6,
No. 2, pp. 134.

An example of regional typology

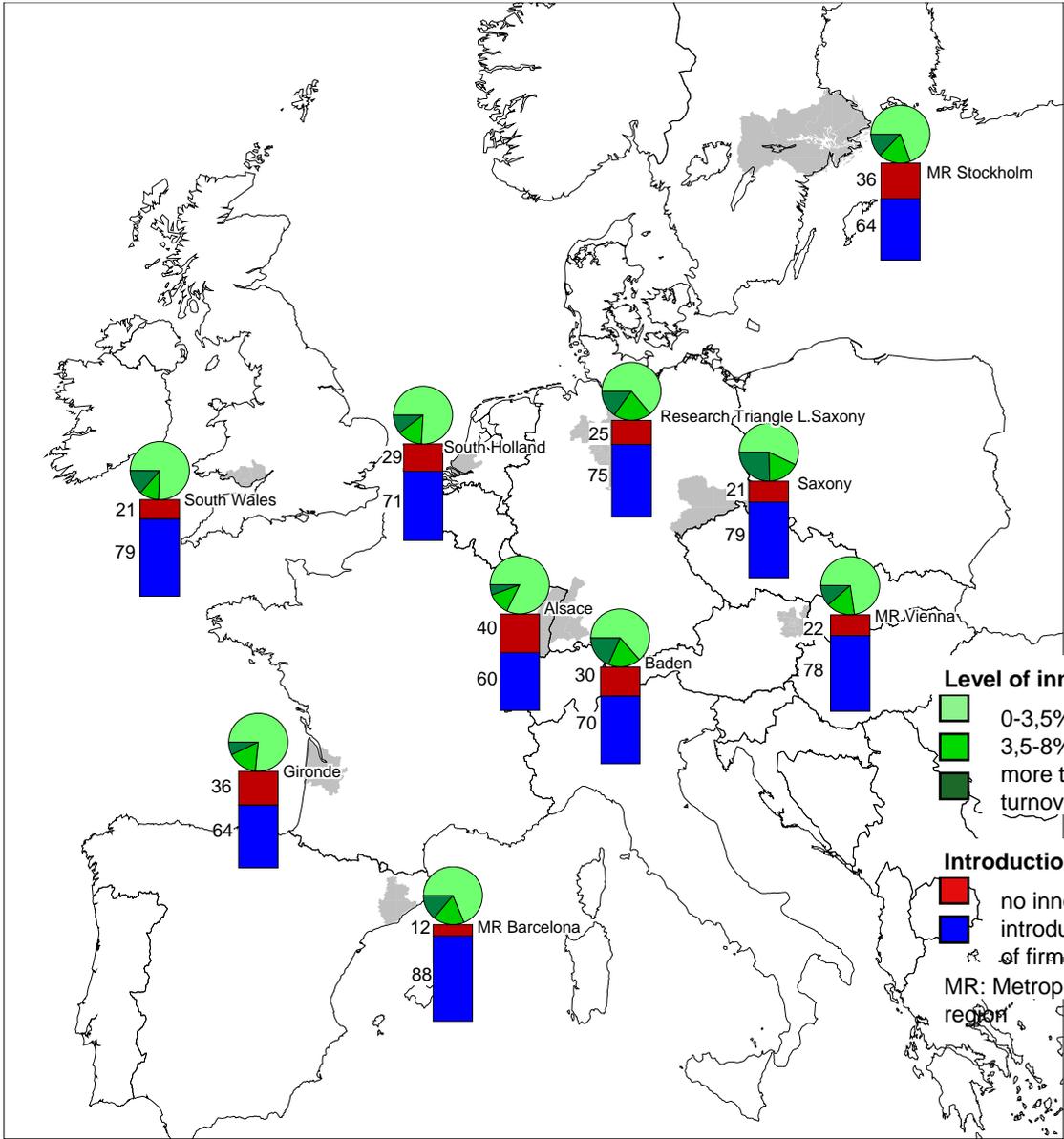


- outlier = Regions with far above average business R&D activities
- 1a = R&D-driven Regions (broad based)
- 1b = R&D-driven Regions (business centred)
- 2 = R&D-supported Regions (public sector centred)
- 3a = R&D-supported Regions (broad based, public sector oriented)
- 3b = R&D-supported Regions (broad based, business oriented)
- 4a = Regions with Complementary R&D Efforts (public sector oriented)
- 4b = Regions with Complementary R&D Efforts (business oriented)
- n.a.

0 250 500 1,000 km

Source: DG Research Regional Key Figures Database

Characterisation of innovation activities



Level of innovation expenses

- 0-3,5% of turnover
- 3,5-8% of turnover
- more than 8% of turnover

Introduction of innovation within a three-year-period

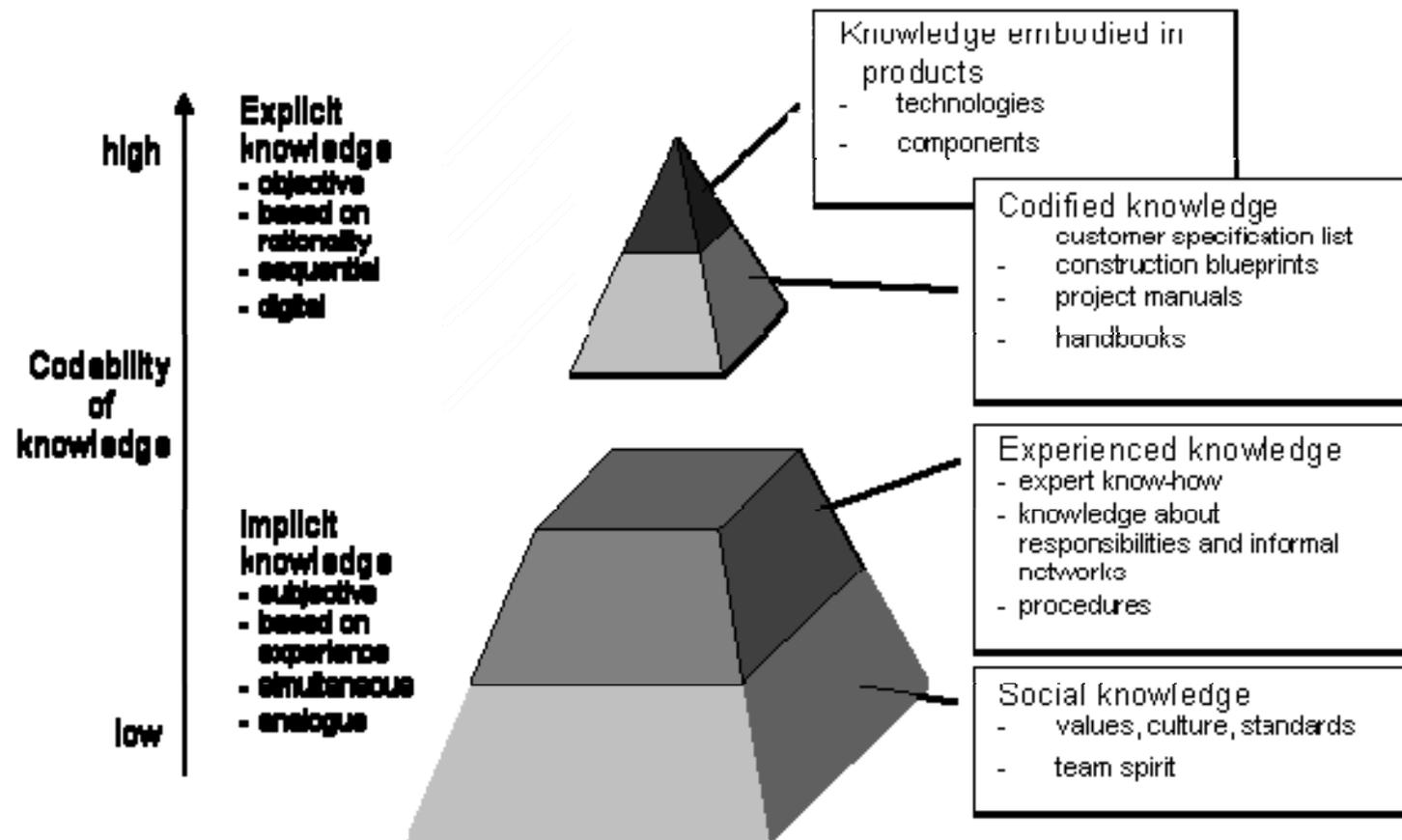
- no innovation (share of firms, %)
 - introduction of innovation (share of firms, %)
- MR: Metropolitan region

Data source: ERIS (European Regional Innovation Survey), performed by University of Hanover, University of Cologne, Technical University Bergakademie Freiberg, Fraunhofer Institute for Systems and Innovation Research Karlsruhe.

Software: MapInfo 4.1

Source: Muller, F. et al (2001) RETINE [REgional Typology of Innovation NEeds]. Report prepared for the European Commission, DG Research.

The knowledge pyramid



Adapted from: Gassmann (1997, p. 152)

The 3T's of economic development (R. Florida)

The 3T's approach represents a comprehensive strategy for organizations, cities, regions and countries to compete and prosper in the creative age :

Talent: People, especially top creative talent, move around a lot. A community's ability to attract and retain top talent is the defining issue of the creative age.

Technology: Technology and innovation are critical components of a community or organization's ability to drive economic growth. (...) Universities are paramount to this, and provide a key hub institution of the creative age.

Tolerance: Economic prosperity relies on cultural, entrepreneurial, civic, scientific, and artistic creativity. Creative workers with these talents need communities, organizations, and peers that are open to new ideas and different people. Places receptive to immigration, alternative lifestyles, and new views on social status and power structures will benefit significantly in the creative age.

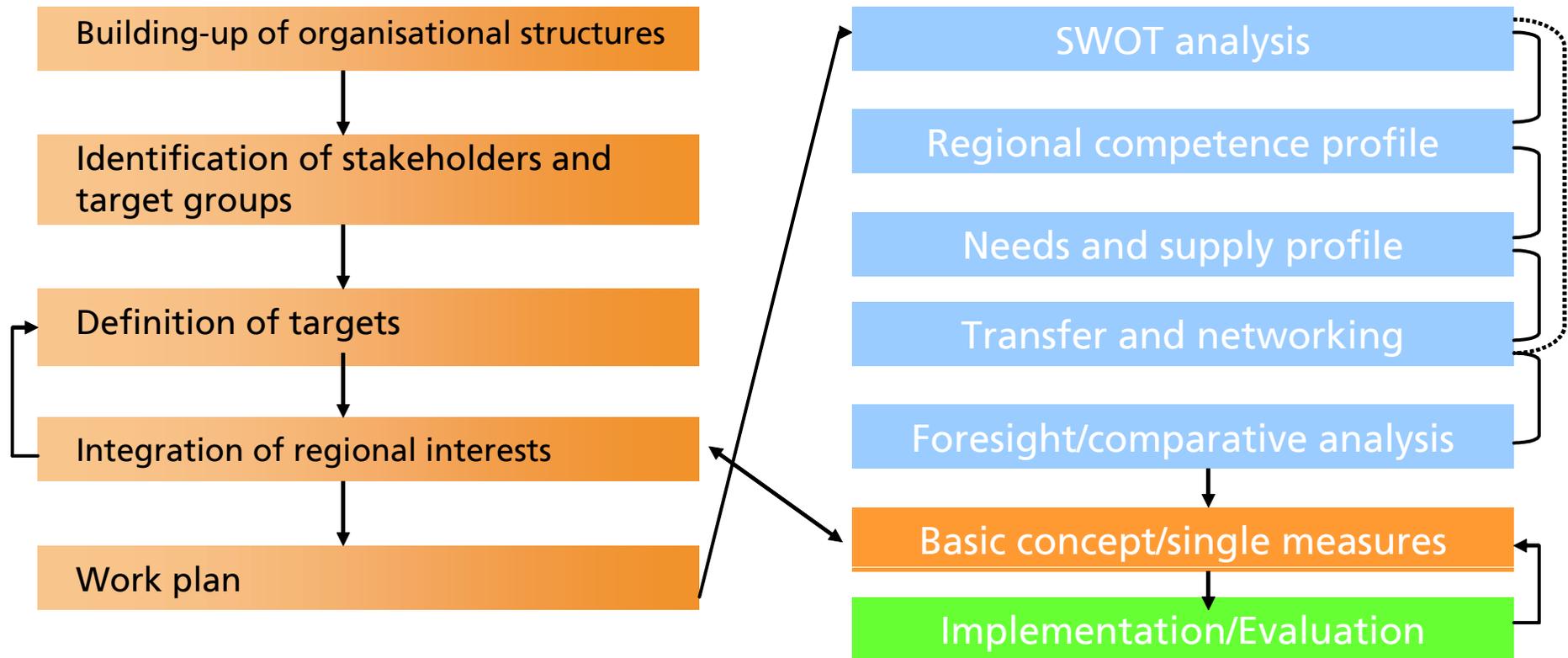
Clusters as a Policy Approach

Cluster = spatial concentration of firms, research organisations, intermediaries in a branch or related branches, linked by value added chains (Porter 1998)

Main question: How can clusters be designed and set up?

- Clusters develop spontaneously, but can also be selected and supported by policy
- Necessary precondition: a critical mass
- Stimulation of bottom-up activities by contests as selection approach
- National initiative stimulates self-organization processes at regional level
- This is a new paradigm of innovation policy and an example of multi-level governance arrangements

An example of a regional innovation strategy elaboration

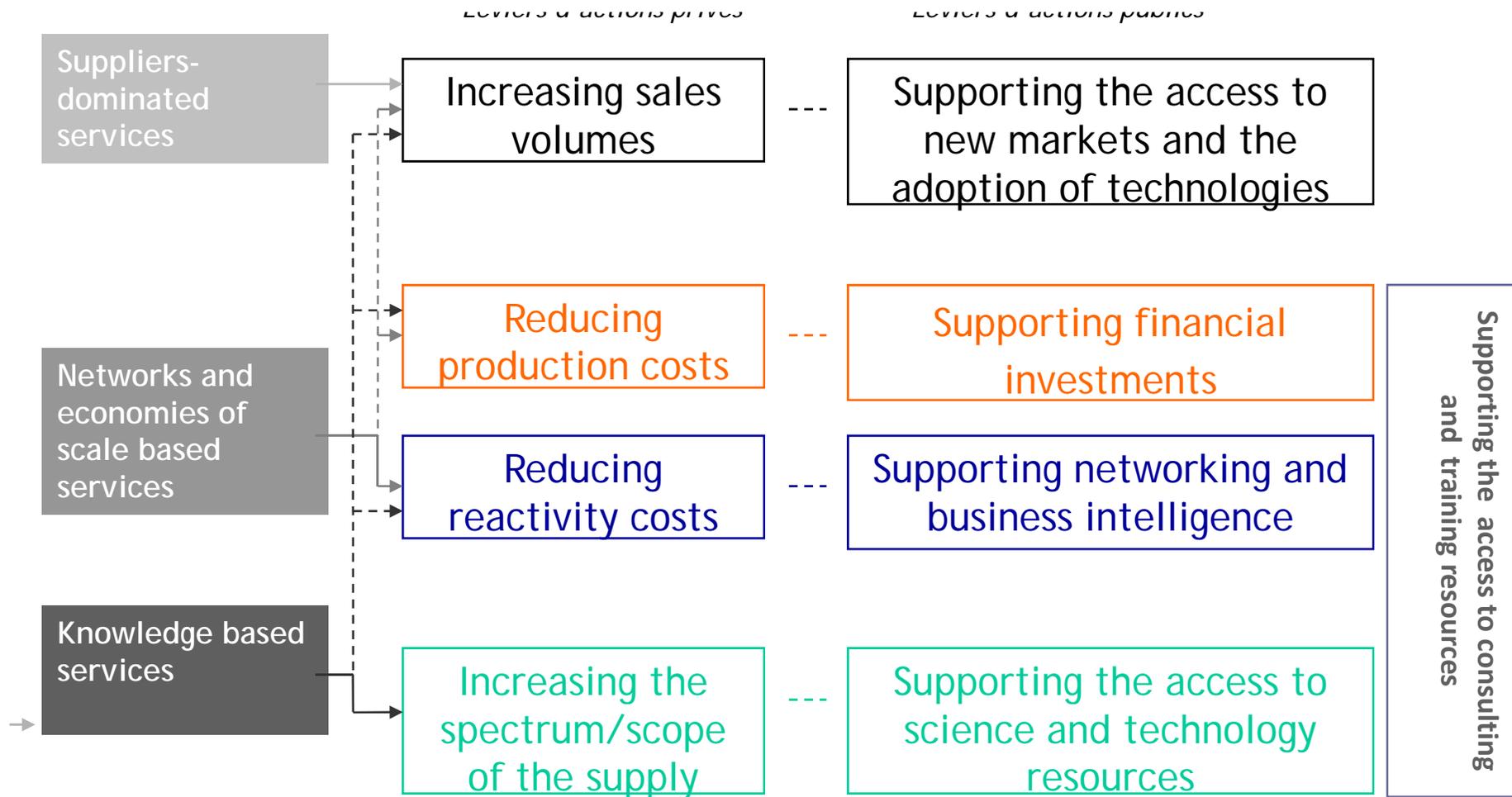


Thinking about policies - stage # 1 :

An explorative categorisation of service firms in terms of innovation characteristics

Type of service firms	Innovation forms	Co-ordination modes	Impact on competencies	Main groups of customers
Suppliers-dominated services (main goal : access to clients and markets)	Rather market innovations than product and process innovation	Market relations	Weaker evolution of own competencies - absorption of external capacities - adoption of new technologies	Households
Networks and economies of scale based services (cost minimising strategy)	Mainly process and organisational innovation oriented	Integration - co-opetition	Focused and autonomous evolution of competencies	Manufacturing and service firms
Knowledge based services (specialisation strategy)	Product and process innovations (including technology-based innovations)	Co-operation and co-innovation	Shared evolution of competencies (innovation networks + internal R&D)	Manufacturing and service firms, public administration

Thinking about policies - stage # 2 : A possible convergence between private and public actions means



Thinking about policies - stage # 3 :

Possible innovation policy instruments fostering the service industry in Ile-de-France

Public actions means	Possible innovation policy instruments aims
Supporting the access to new markets and the adoption of technologies	Technology diffusion Technology watch Promotion & exploitation of immaterial resources towards potential users (notably less innovative service firms)
Supporting financial investments	Seed and risk money instruments
Supporting networking and business intelligence	Supportive environment favouring cooperation and the development of common services (economic intelligence, training, etc.) Partnership and network promotion
Supporting the access to science and technology resources	Favouring links with academic partners (in the fields of natural AND social sciences), spillovers effects as well as PPP and collaborative R&D
	
Supporting the access to consulting and training resources	Increased use of training and consultancy by (small and less innovative) service firms

Innovation systems and policies from an other perspective . . .

