

Innovation, Systems of Innovation and Competitiveness in the UNECE Countries:

Towards a Review of Key Policy Issues

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Topics of the presentation

1. **Key concepts that underpin this exercise**
2. **Factors driving the (re)emergence of innovation policy and changing rationales for innovation policy**
3. **National innovation capacity: elements, framework conditions and complementarities**
4. **Assessing institutional structures for supporting innovation: key issues**
5. **Selected dimensions of NIS and innovation governance**
6. **Towards good practice in innovation policy?**

1. Key concepts that underpin this exercise

Technology is systemic phenomenon

- Current wisdom: linkages and complementarities between different organizations are key drivers of innovation processes.
- Innovations are clustered not only in certain sectors but also in certain areas and time periods.
- Innovation as systemic and economic (entrepreneurial) process
- > the importance of systems of innovation (national, regional, sectoral, global) in inducing and supporting growth based on technical change.

National systems of innovation

- 'The network of institutions in the public and private sectors whose activities and interactions initiate, import and diffuse new technologies'
 - Freeman, Chris (1987) *Technology Policy and Economic Performance - Lessons from Japan*, Pinter Publishers, London.
- The *narrow* NSI = organisations and institutions involved in searching and exploring - such as R&D departments, technological institutes and universities.
- Narrow NSI: public support system to innovation

The *broad* NSI = Framework conditions

- all parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring - the production system, the marketing system and the system of finance present themselves as sub-system in which learning takes place (p.2).
 - Lundvall, Bengt-Ake (ed.) (1992) *National Systems of Innovation - Towards a Theory of Innovation and Interactive Learning*, Pinter Publishers, London

NIS and globalisation

- The challenge facing countries is the how to connect in the most effective way with global R&D networks of TNCs
- The ability of a country to benefit from R&D internationalization depends first and foremost on the strength of its NIS
- International Production Networks lead to structural changes in the host country NIS: compositional and spillovers effects ...
- ... which are shaped by national policies....
- 'In fact, contrary to general belief, the last two decades have seen a tremendous amount of industrial policy. (...) Incentives and subsidies have been refocused on exports and direct foreign investment'.
(Rodrik, 2004)

Innovation policy

- Any policy measure and policy mechanism that affects the innovation process
- **Explicit** innovation policy measures are all those measures that explicitly state enhancement of innovation process or its elements as their objective;
- **Implicit** innovation policy measures are all those measures that affect innovation process indirectly i.e. are not designed with innovation objectives in mind but do have unintended and significant
- Issues:
 - The limits of explicit IP measures
 - The scope of implicit IP

Innovation policy as generic (horizontal) vs. specific policy

■ Generic vs. specific policies

- growth constraints are never general and generic (proximate causes) but most often specific (ultimate causes) .
- WEF and World Bank types of exercises which identify micro obstacles to growth focus on the generic answers to broad classes of questions

■ Horizontal vs. vertical policies

- Vertical policies: proscribed (?)
- IP as a horizontal policy: in vogue (?)
- ... but also slow, poor targeting ... solution
- highly focused horizontal policies (EU Technology platforms as an example)

Three generations of innovation policy (EU, 2002)

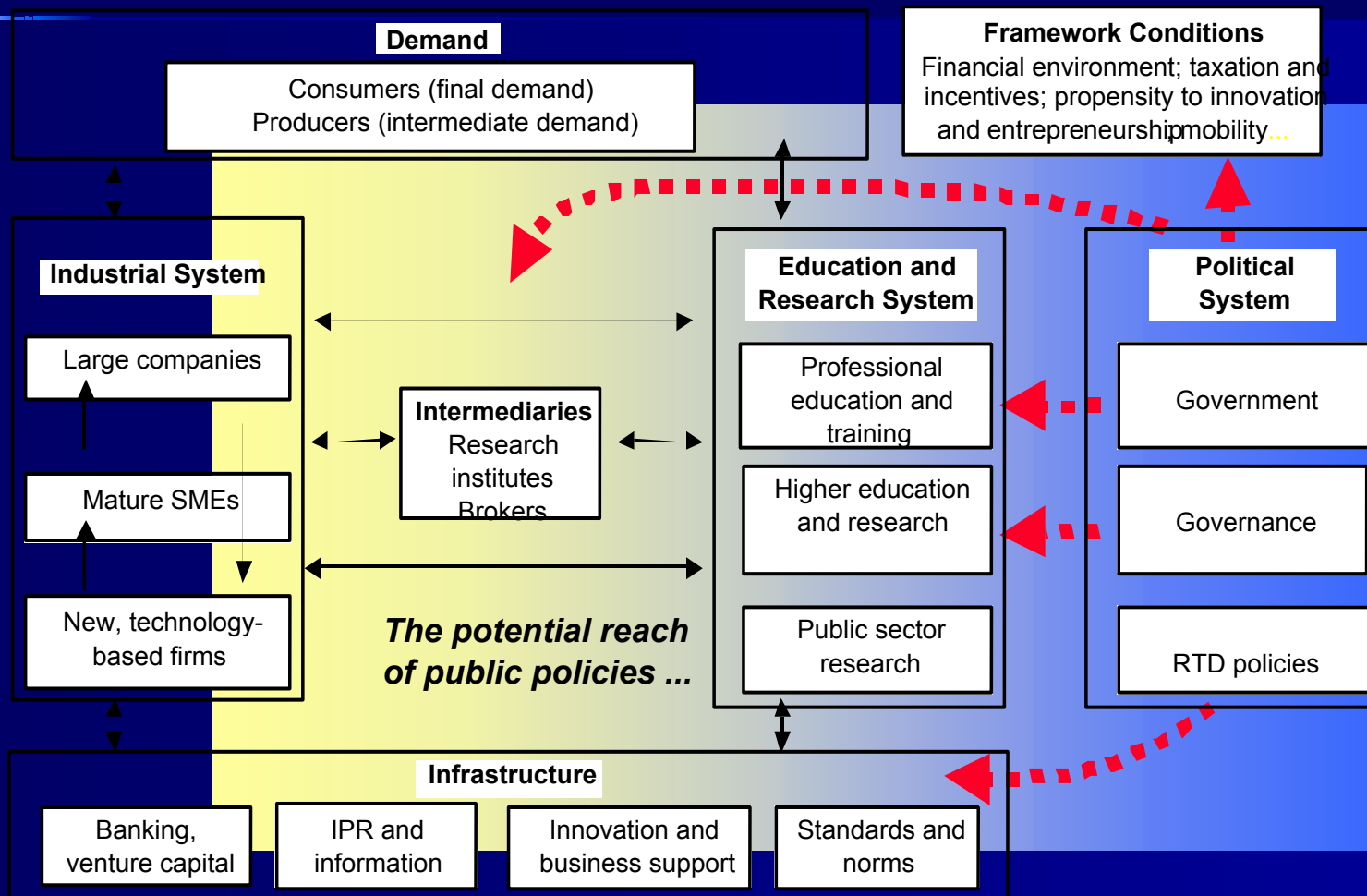
- R&D focused: traditional
- Systems/clusters focused: has become mainstream and is spreading to latecomers
- Innovation at the heart of each policy area – in exploratory stage

2. Factors driving the re-emergence of innovation policy and changing rationale for innovation policy

Innovation policy push factors

- EU Lisbon agenda and issues of EU competitiveness
 - EU - US productivity gap
- Europeanization of RTD policies in NMS
 - Extensive transnational learning
- Economic recovery and growth in NMS/CIS
 - Innovation policy re-emerges with growth and recovery

But.... in a systems world, one has to be realistic about the scope of innovation policy



Source: **Arnold and Kuhlmann**

Changing rationale for innovation policy

- Classic argument for 'research policy' is a market failure or "public good" issue.
- But the rationale for innovation policy is wider
 - **Government failure**
 - **Failures in 'institutions':**
 - other institutions in the national innovation system: universities, patent offices, financial system, etc.
 - **Capability failures in business sector:**
 - managerial deficits, lack of technological understanding
 - **Network or system failures:**
 - Lack of the interaction among actors in the 'innovation system', etc.
 - **Framework failures :**
 - regulatory framework, health & safety rules, etc. As well as consumer demand, cultural and social barriers to innovation.

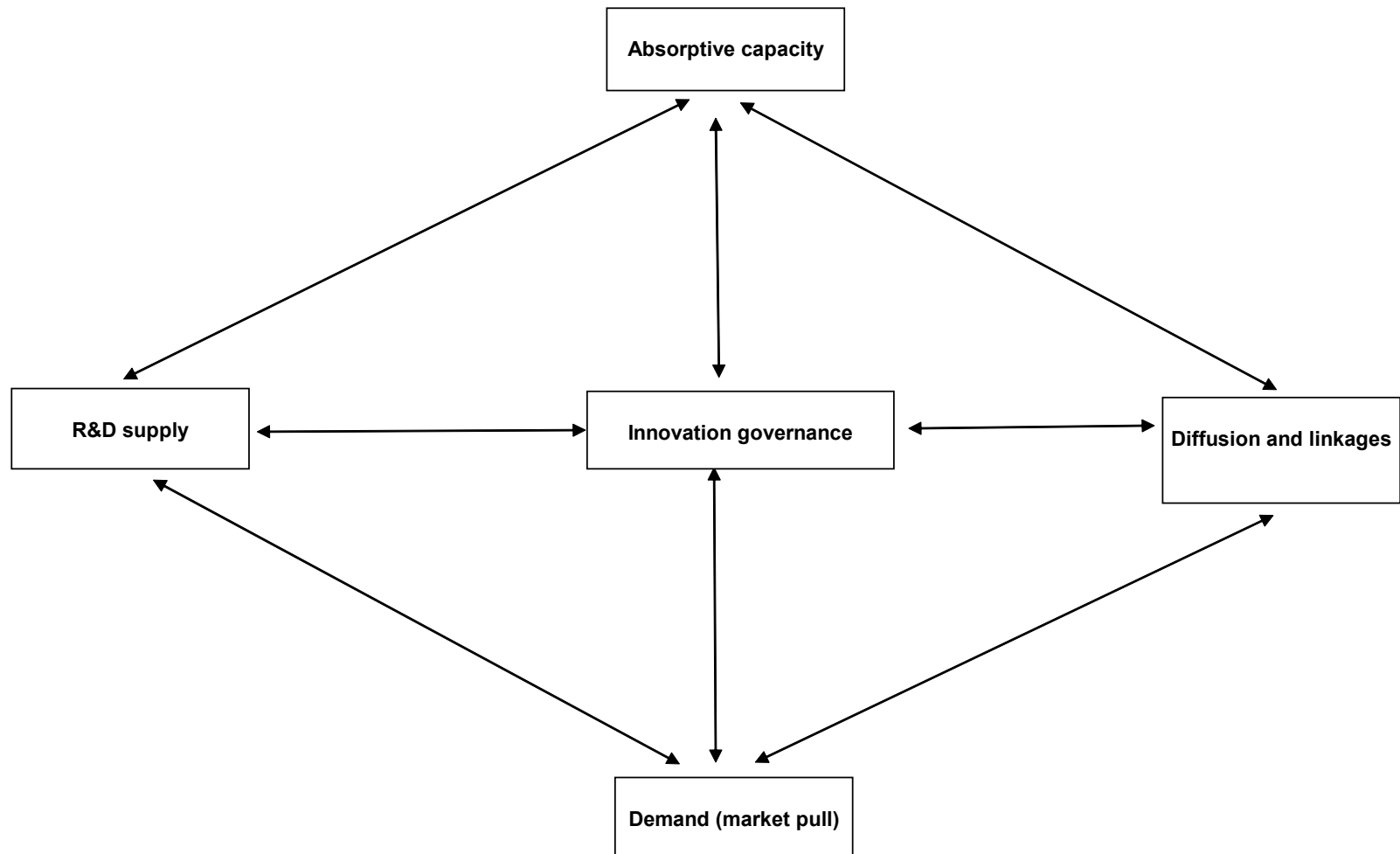
**... but broader scope for
innovation policy
increases also scope for
policy failures !**

3. National innovation capacity: elements, framework conditions and complementarities

Why NIC framework?

- Knowledge generation is important but not sufficient condition for innovation based growth.
- Innovation based growth is an outcome of complementarities between framework conditions and developed elements of NIC.
- Framework conditions are shaping each of elements of NIC > transversal (horizontal) aspect

National innovation capacity



National innovation capacity: elements

- **Absorptive capacity**
 - Education, training and skills
 - Labour market
- **Knowledge generation (R&D)**
 - Enterprise as a source of supply and demand for innovation
 - R&D system and its links to economy
 - Intra-mural vs. extra-mural R&D
- **Diffusion and linkages**
 - Public - private linkages (RTO – industry linkages)
 - Small firms' linkages (clusters)
 - Large – small firms linkages
 - Linkages: foreign and local firms (direct, vertical and horizontal spillovers)
- **Demand (market pull)**
 - Macroeconomic policy
 - Financial system
 - Competition policy
 - Demand for technology
- **Innovation governance**

National innovation capacity: elements II

■ Innovation governance

- Broader view: capacity to coordinate large number of explicit and implicit policy measures that affect innovation process
 - How the broader governance system is organised to facilitate interaction and “co-management” of different dimensions of innovation capacity.
- Narrow view: capacity of public services (ministry, agency, etc.) to manage cycle of policy development and implementation;
 - How well equipped (financial, intellectual resources) are these agencies to manage cycle

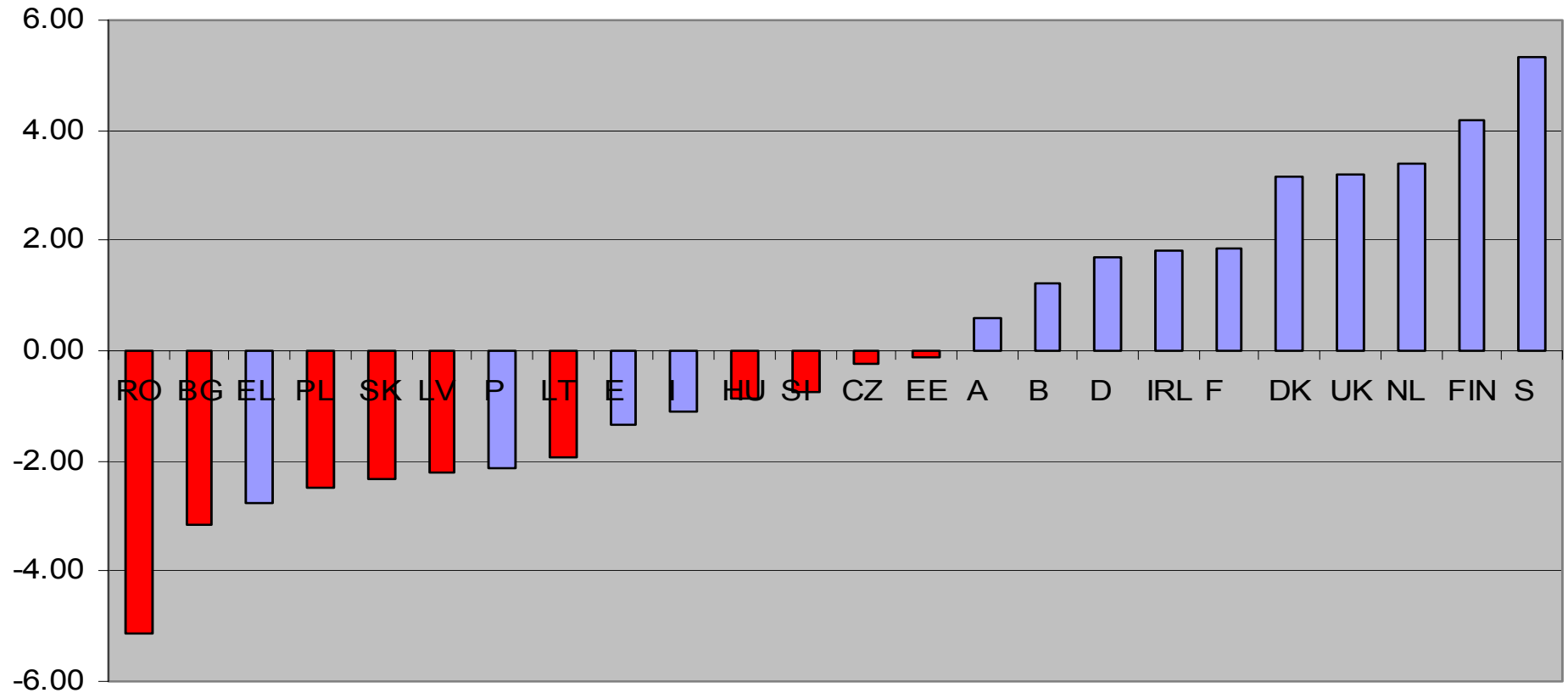
An example of application of NIC framework

Table 1: Data and sources

Indicator		Abbreviation	Year	Source
Absorptive capacity				
1	Expenditures in education in % of GDP	eductgdp	1999	Eurostat
2	S&E graduates (‰ 20-29 population)	segrdpop	1999	Eurostat
3	Population with 3rd level education	pop3educ	2001	Eurostat
4	Participation in life-long learning (% of working age pop)	llearnng	2001	Eurostat
5	Employment high-tech manufacturing	emplhtec	1999	Eurostat
6	Employment high-tech services	emphsrvc	1999	Eurostat
R&D supply				
1	Public R&D expenditures. (% GDP)	pubrd	2000	Eurostat
2	Business R&D expenditures (% GDP)	besrd	2000	Eurostat
3	R&D personnel per labour force	rdpsnlab	2000	Eurostat
4	EPO high-tech patents (per mln pop)	epopc	2000	Eurostat
5	USPTO high-tech patens (per mln pop)	usptopc	2000	USPTO
6	Resident patents per capita	respat	2000	WIPO
Diffusion				
1	training enterprises as % of all enterprises	trainent	2000	Eurostat
2	CVT in % of labour costs of all enterprises	cvtlabct	2000	Eurostat
3	ISO 900 certifications per per capita	iso9kpc	2000	ISO
4	Internet users per 10,000 inhabitants 2001	internet	2000	ITU
5	PC per 100 inhabitants 2001	ppcpc	2000	ITU
6	ICT expenditures (% GDP)	ictgdp	2000	Eurostat
Demand (Finance/Competition/Macroeconomic stability)				
1	Stock market capitalisation in % GDP	stockmkt	1999	World Bank
2	Domestic credit provided by banking sector (%GDP)	domcredi	1999	World Bank
3	Share of FDI in GDP, 1999	fdigdp	1999	UNCTAD
4	Share of trade in GDP, 1999	tradegdp	1999	World Bank
5	Index of patent rights	iprindex	1999	Ginarte and Pack (1997) and Smarzynska (2002)
6	Registered unemployment	unempl	2000	UNECE
7	Consumer price index	cpi	2000	UNECE

Where CEE stands within the enlarged EU ?

National Innovation capacities



Ranking does not follow simple East - West divide

AN EXAMPLE OF INNOVATION POLICY MEASURES CLASSIFIED BASED ON COMPONENTS OF NIC FRAMEWORK:

CEECs as of end 2003

	Absorptive capacity and human capital	Generation of new knowledge (R&D)	Diffusion of knowledge and networking	Demand for innovation
Bulgaria		National R&D programme; National Council for applied studies funding	Support for 6 incubators	Profit tax rate reduced
Czech Republic		National R&D Programme; Programmes <i>Technos; Pokrok; Impulse; Tandem</i>	Programmes : Park ; Transfer, Counselling, Konsorcia	Programmes <i>Credit, Start, Guarantee</i>
Hungary		National R&D Programme; Program <i>TechStart</i> ; Support for R&D job creation in SMEs	Network of Cooperative Research Centres; Programme <i>Integrator</i> ; Support for patenting abroad	Several R&D and ICT tax credit schemes (4)
Estonia	(Action Plan for Vocational Training System; 20010-04)	R&D Programme of Estonian Science Foundation; ESTAG financing scheme for innovative enterprises and R&D institutes ; Co-funding of Eureka projects	<i>Spinno</i> programme; Competence Centres programme; <i>Tiger's Leap</i> programme and <i>Village Road</i> project; Estonian Quality Award project.	Zero profit tax if profit reinvested
Latvia		R&D Programme of Latvian S&T Council	Funding of Latvian Technology Centre and of Electronics Industry Business Centre	Gradual reduction in corporate income tax
Lithuania	Training of entrepreneurs linked to innovation	National R&D programme; Subsidised participation in Eureka program	Support to Lithuanian Innovation centres, Business Innovation centres and Innovation centre of Kaunas Technology University	Reduced profit tax rate
Poland	National systems of support for life long learning	R&D Programme of Ministry for Scientific Research and IT; Funding of Centres of Excellence; FIRE Foundation support for support to commercialisation of R&D	ISO subsidies to SMEs	Financial Support to Investments; Loans for investment and implementation of new technologies by Technology Agency; Reduction of corporate income tax
Romania		National plan for R&D – <i>Relansin</i> ; National Fund for technology development for R&D in SMEs	Support for business incubators and SW parks	R&D organisations exempt from VAT; Tax support for innovation – import duties, VAT postponement. Salaries of IT specialists are exempt from taxation; Grant support for SME start-ups
Slovakia		Innovation Fund for applied R&D	Support for establishing industrial zones	Corporate income tax rate

Summary of innovation policy mechanisms of the CEECs (end of 2003)

	Absorptive capacity and human capital	Generation of new knowledge (R&D)	Diffusion of knowledge and networking	Demand for innovation	Total
Bulgaria		1		1	3
Czech R		4		3	11
Hungary		3		4	10
Estonia	1	3		5	10
Latvia		1		2	4
Lithuania	1	2		1	5
Poland	1	3		1	8
Romania		2		2	8
Slovakia		2		2	5
Slovenia	3	4		5	14
Total	6	25		26	78

Analytical issues that follow from the NIC framework?

- Where the UNECE countries stand in terms of individual elements of NICs (absorptive capacity, R&D, diffusion, demand)?
- What is the relationship between framework conditions and 'narrow' NIS? Could framework conditions compensate for weaknesses in narrow NIS and vice versa?
- What are the key innovation governance issues in generating complementarities between different elements of NIC (cf. 2nd and 3rd generation innovation policies issues)?

4. Assessing institutional structures for supporting innovation: key issues

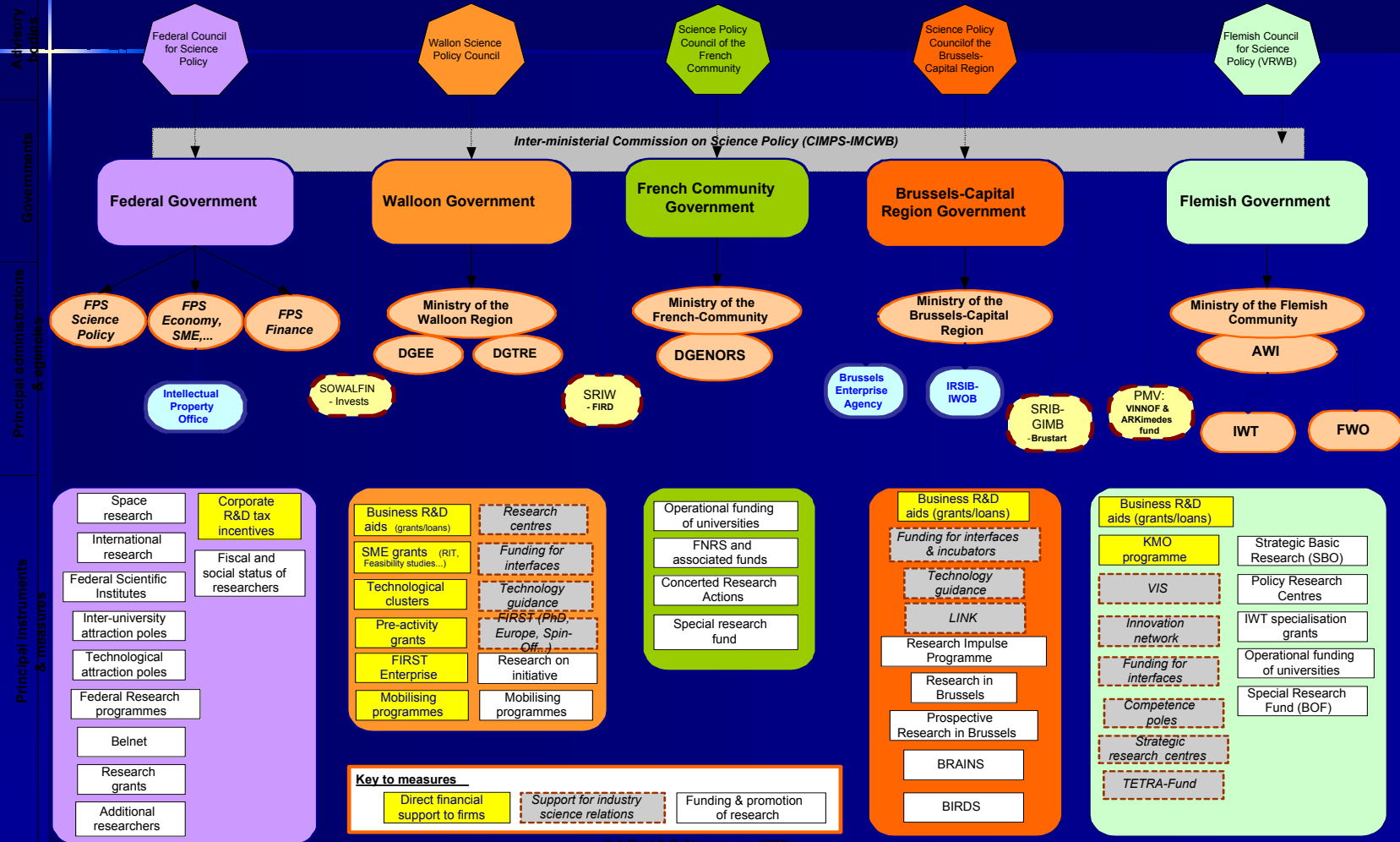
NIS institutions - five main categories

- **Governments** (regional, national...) that play a key role in setting broad policy directions
- **Bridging institutions** (public laboratories, technology transfer organizations, clusters, contract research institutes; high-level councils which act as intermediaries between governments and the rest of the innovation system)
- **Private enterprises**, clusters and business federations;
- **Universities** and related institutions that provide key knowledge and skills;
- **Other** public and private organizations that play a role in the national innovation system (patent offices, financial intermediaries, training organizations, standards, quality and metrology institutions and so on).

Simplified typology of governance structures of EU25 (Trendchart AR2005)

- A more modern and dynamic approach dealing with innovation as a **transversal component** of public policy, for which coordination (and even better, cooperation) is required to streamline initiatives of individual ministries services.
 - e.g. Ireland, Finland, Sweden, and Denmark
- A more traditional **dual approach**:
 - a distinct role for research/education ministries viewing innovation as expected output of the RTD process; and
 - economy/industry ministries viewing innovation as a tool for encouraging investment and modernising SMEs.
 - Latin countries, such as Italy and Spain, but also the new Member States.
- Additionally, some '**special cases**' which do not entirely conform to the above categorisations.
 - UK, French and Greek systems, more federal approaches adopted by Belgium and Switzerland, plus very small countries.

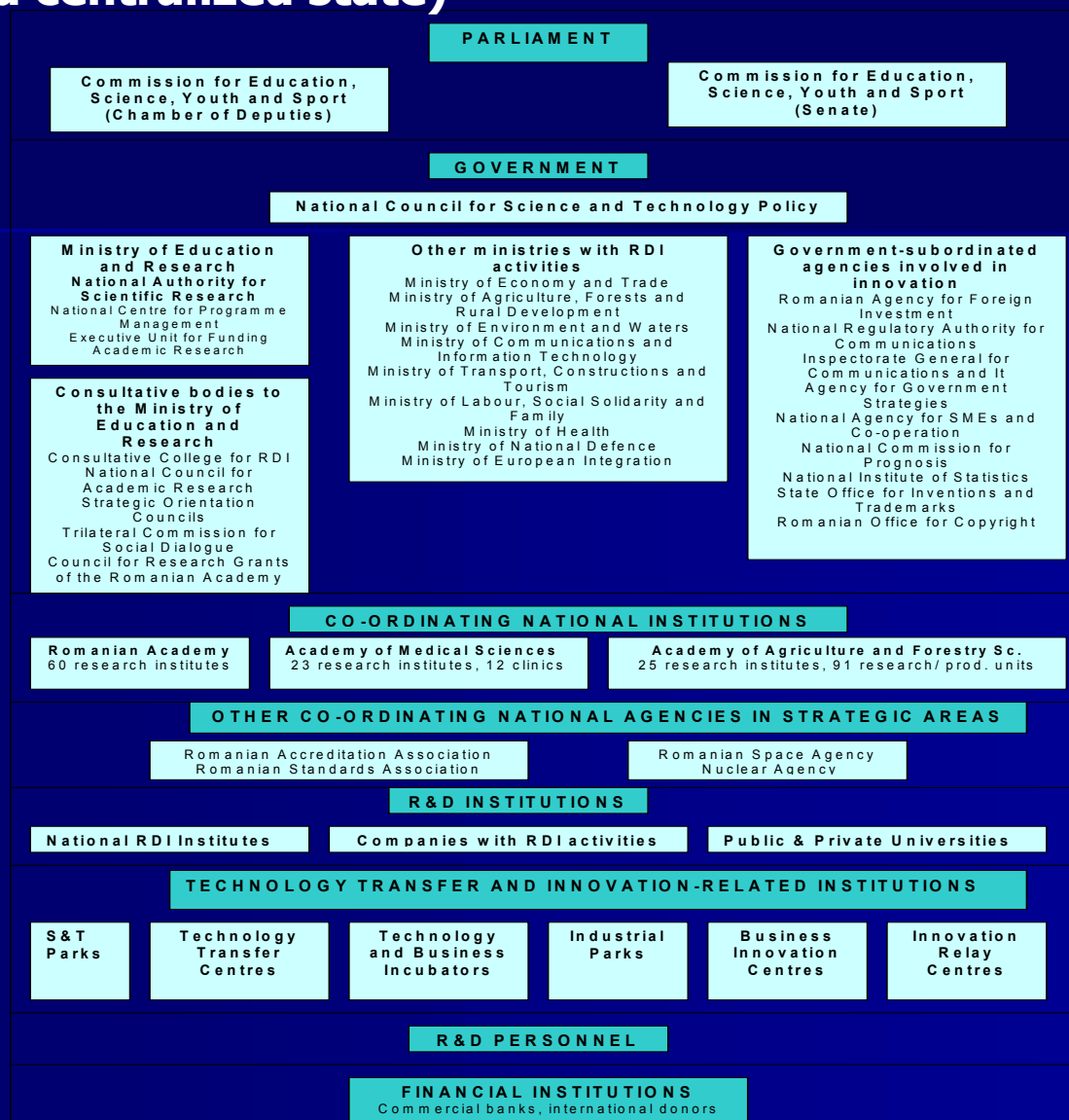
Example organisational chart Belgium (smaller Federal state)



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Source: Trendchart Country Report, 2005

Organisational chart of the innovation governance system: Romania (medium sized centralized state)



Governance of innovation policy: European practice (Trendchart AR, 2005)

- A diversity of ways of managing innovation policy :

Country	Policy Design	Programme design	Programme management	Programme administration tasks
Latvia	Full Responsibility Ministry		Shared responsibility	Full responsibility Agency
France	Full Responsibility Ministry	Full responsibility Agency		
Portugal	Full Responsibility Ministry	Shared responsibility	Full responsibility Agency	
Ireland	Full Responsibility Ministry	Shared responsibility	Full responsibility Agency	
The Netherlands	Full Responsibility Ministry	Shared responsibility	Full responsibility Agency	
Luxembourg	Full Responsibility Ministry	Shared responsibility	Full responsibility Agency	
Finland	Shared responsibility	Full responsibility Agency		
Flanders	Shared responsibility	Full responsibility Agency		
Estonia	Shared responsibility	Full responsibility Agency		
Austria	Shared responsibility	Full responsibility Agency		
Slovenia	Shared responsibility	Full responsibility Agency		
Slovakia	Shared responsibility	Full responsibility Agency		

- No "optimal model"...but some guiding principles

Going beyond boxes and organograms

- There is need to go beyond national innovation policy making and delivery structures...
- and appraise portfolio of policy measures
- and quality of policy process

Appraisal of innovation policy: analysing policy mix

- Appraise comprehensiveness, relevance and effectiveness of current innovation policy mix.
 - Comprehensiveness of policy mix:
 - number of areas addressed, stages of innovation process
 - Relevance of policy mix:
 - Not all countries can be expected to be implementing an “ideal” policy mix
 - Orientation of policy mix
 - Main focus of IP instruments (absorption, R&D, diffusion, demand)
 - Research vs. innovation orientation
 - Types of instruments (systemic, individual)
 - Importance of funding agencies
 - IP oriented towards active (clusters, R&D programs) or passive instruments (taxes, subsidies)

Appraisal of the governance system

- How effective is policy making process?
 - What are information sources ?
 - How are priorities identified ?
 - Evidence based, consultation or lobby groups...
 - Who designs policy measures:
 - “2 people in a room”, consultation process,...
- How engrained is an “evaluation culture”:
 - Who’s doing appraisals (ministries, composition of steering committees, etc.)?
 - What sort of appraisal : internal reports vs external evaluation, opinions by consultative bodies, own initiative reviews, etc.
 - Are they published, debated, etc.

Trends in innovation policy in EU

- A significant effort to **strengthen linkages and knowledge flows** both nationally and internationally;
- A **growing regional role** in the implementation of many recent initiatives, fuelled by the Structural Funds in the new Member States
 - corresponding need for coordination with national targets and initiatives;
- A push to **increase the overall intensity of innovation activity** through stimulating private enterprises to invest more in R&D, specifically, and other forms of innovation more generally.
- **Partnership based initiatives** to create linkages aimed at improving the functioning of innovation systems
 - “triple-helix”, clusters, competitiveness poles, etc.
 - new platforms for policy design and delivery.
- An emerging emphasis on the **role of regulations, public procurement** and other ‘business’ environment factors influencing the performance of the innovation systems of the Member States.

**..... but, what are trends in
innovation policy in the
UNECE countries?**

5. Selected dimensions of NIS and innovation governance

Selected dimensions of NIS and innovation governance

- **National R&D programs**
- **Innovation agencies**
- **FDI and innovation**
- **Regional innovation policy issues**
- **Technology (sector) specific support measures**

Selected dimensions of NIS and innovation governance I

■ National R&D programs

- Process of formulation of R&D priorities
- Fundors and funding mechanisms
- Co-funding and stakeholders
- Research and innovation orientation
- Evaluation of programmes

■ Innovation agencies

- Assessing role of innovation agencies (existence, scope, functions)

Selected dimensions of NIS and innovation governance II

■ **FDI and innovation**

- Coupling between FDI and innovation policies
- Value chain vs. NSI: how to reconcile and integrate two policies?
 - FDI: marketing country for FDI
 - Innovation policy: exclusively R&D/high tech focus
- Role of FDI agencies in innovation process
- Programs for fostering innovation based FDI and local linkages

■ **Regional innovation policy issues**

- Is there a regional innovation policy or regional approach (component) to innovation policy?
- Role of regional agencies, funds, etc. in innovation policy
- Issues of coordination of innovation policy between the national level and regions

■ **Technology (sector) specific support measures**

- Generic vs. technology (sector) specific measures: advantages and disadvantages

6. Towards good practice in innovation policy?

What is good (best) practice in innovation policy: controversial issues

- Identical functions but different institutions in systems of innovation
 - What is relevant institutional variety ? vs. functional variety?
- Is there a single 'optimal' pattern of research and innovation governance?
- Country specific relations between framework conditions and public support for innovation
- Good practice instruments: what makes specific policy instruments effective?
 - A shift towards systemic instruments?
- Good practice support systems: enhancing synergies and weak links
 - Differing national needs and differences in national innovation governance systems

.... Whatever it is good practice rests on:

- **“Strategic intelligence”**
 - In a systems world, policy makers increasingly need “strategic intelligence”
 - Tools of strategic intelligence (foresight, innovation indicators, systematic evaluation cycle, transnational policy learning)
- **Developed culture of evaluation**
 - The culture of evaluation is developed to a very uneven extent around Europe
 - in the more advanced countries, evaluation is becoming an integral part of a learning-based approach to policymaking and programme formation.
- **Benchmarking**
 - benchmarking exercises to assess comparative innovation performance (scoreboards, etc.)
 - Trendchart and ERAwatch networks as tools of policy benchmarking
- **Transnational learning**
 - cultural affinity and geographical proximity drive initial transnational policy learning.
 - latecomers tend to learn more from others

Innovation governance: strategic intelligence & evaluation (Trendchart Annual Report 2004)

- Countries where there is a conscientious and systematic effort to apply policy studies and evaluations:
 - Belgium, Finland, the Netherlands, Switzerland and the UK.
- Countries where there are many appraisal and evaluation activities but this process is not yet culturally embedded
 - Most highly-developed EU economies belong to this group: Austria, Denmark, France, Germany, Ireland, Luxembourg, Norway and Sweden + Estonia
- Countries with marginal evaluation activities:
 - The rest or 19 out 33...