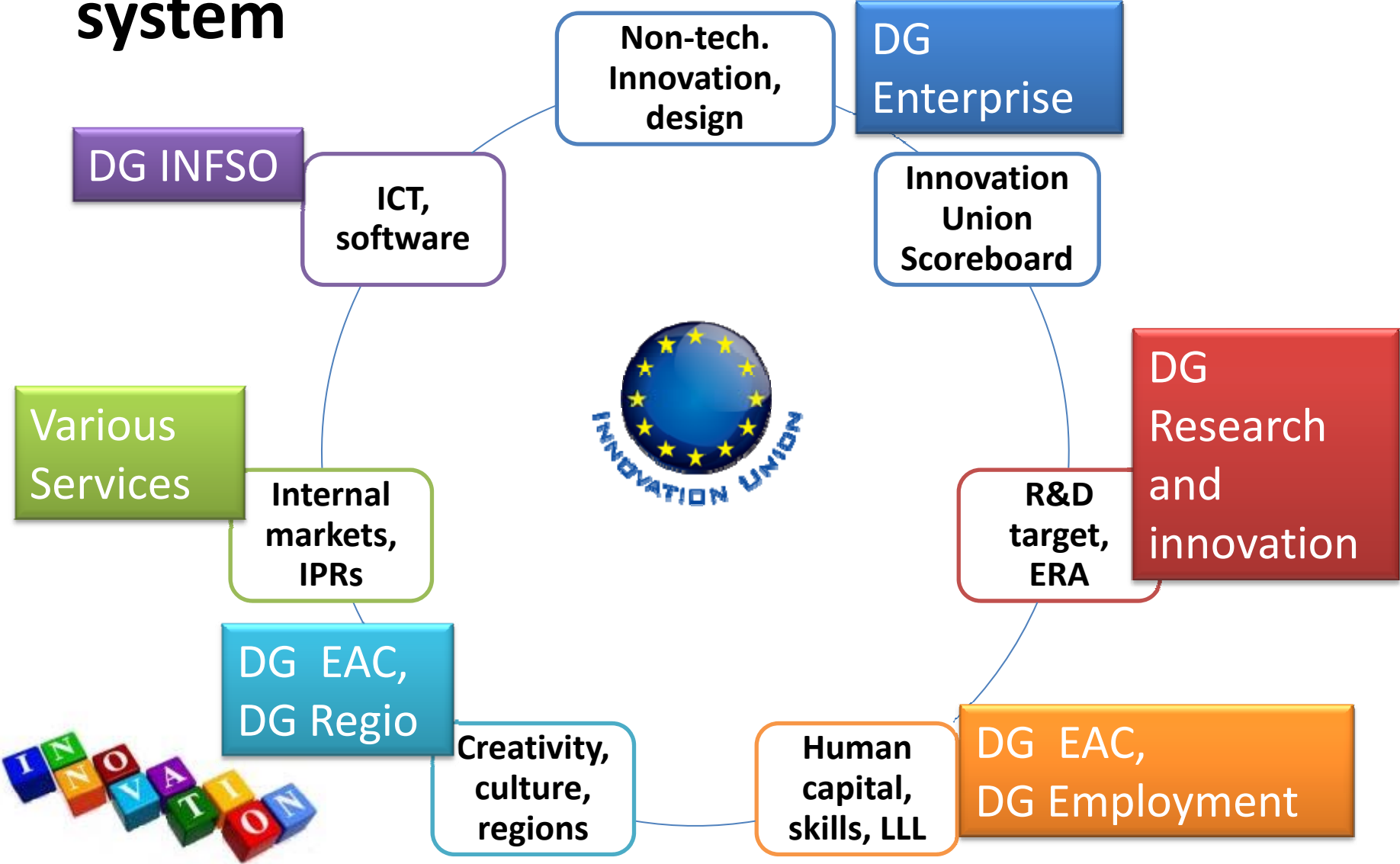


# STATISTICAL MEASUREMENT OF INNOVATION IN THE EU

G. PERANI



# The EU innovation policy: a complex system



# Short glossary of the EU innovation policy

**Europe 2020** is the EU's growth strategy for the coming decade. In a changing world, we want the EU to become a smart, sustainable and inclusive economy. The structure is based on flagship actions and targets. It replaces the 2000-2010 “Lisbon strategy”

**Innovation Union** is one of the seven flagship initiatives of the Europe 2020 strategy for a smart, sustainable and inclusive economy. This plan contains over thirty actions points.

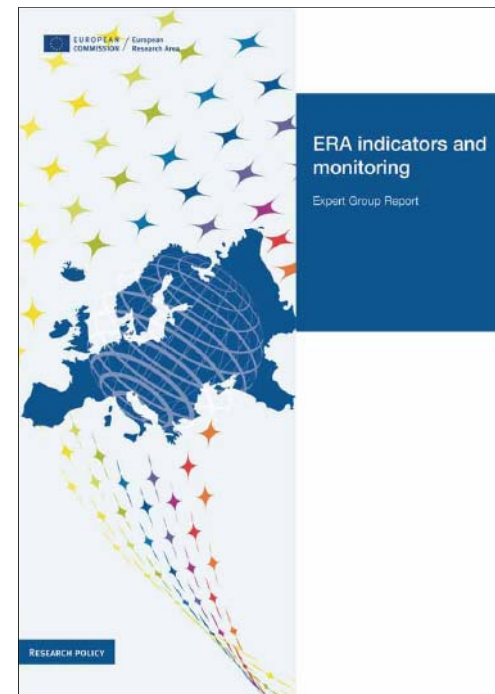
**Innovation Union Scoreboard** is the new tool to monitor the implementation of the Europe 2020 Innovation Union flagship by providing a comparative assessment of the innovation performance of the EU27 Member States.



**European Research Area (ERA)** is composed of all research and development activities, programmes and policies in Europe with a transnational perspective.

# The European Research Area and its measurement

In the R&D area, as well, the EC has developed new initiatives on statistics and indicators. In October 2009 an Expert Group Report was published, proposing a set of indicators to be integrated in a system with all the indicators on R&D and innovation available at EU level



# The framework for R&D and innovation measurement in the EU

Headline indicators

EUROPE 2020

EU Council level

Core indicators

Innovation Union Scoreboard

Competitiveness Council level

Comprehensive Set of Indicators &  
Analysis

Science, Technology and  
Competitiveness report



# ERA indicators and monitoring

## Lisbon-oriented indicators

### Target indicators

Public investments in knowledge

European integration of research Systems

Strength of the business research base of Europe

Transition towards a knowledge-based economy – struct. change

Productivity of the economy

Contribution of research to address grand societal challenges

ERA Headline  
Comprehens  
indicators      ive set

Idem

Idem

Idem

Idem

Idem

Idem

Idem

Idem

Idem

Idem

Idem

Idem

## ERA research actors cooperation and cohesion

International coop.in S&T and opening up to the world

Idem

Idem

Mobility of researchers and research careers

Idem

Idem

Knowledge transfer between public and private sector

Idem

Pan-European research Infrastructures

Idem

Excellence of the S&T base

Idem

Human resource base of the ERA

Idem

Knowledge-based innovation

Idem

Firm dynamics – structural change

Idem

International attractiveness of Europe

for Business innovation and investment

Idem

Confidence of society in science and S&T community

+43 ERA ind.



# New ERA indicators

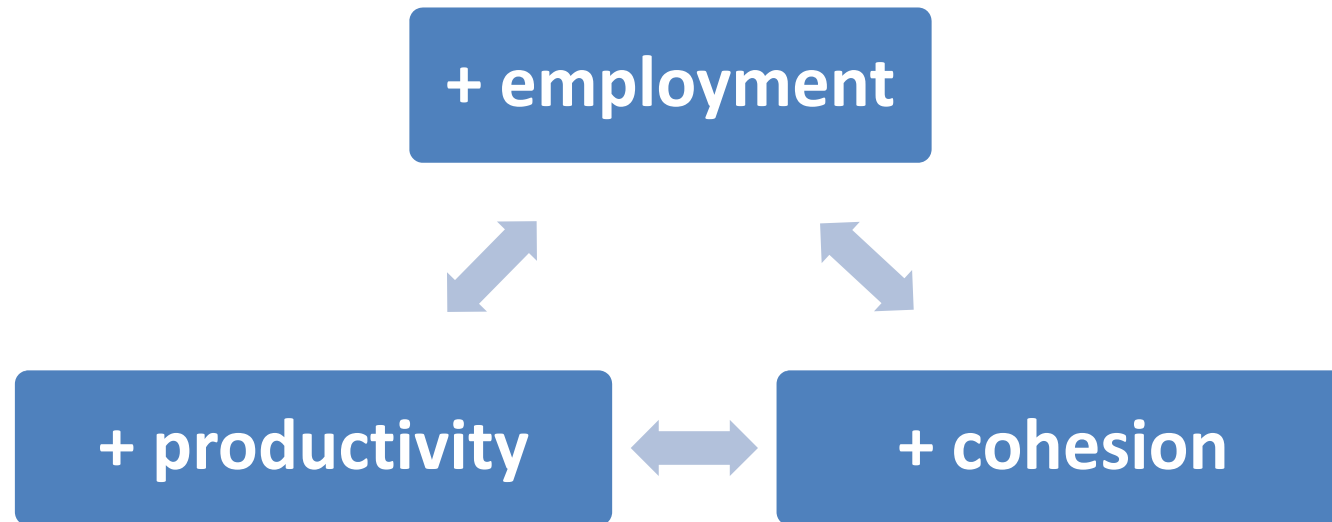
- National funds to trans-nationally coordinated research
- Patents by SMEs
- R&D tax incentives
- National funding to open R&D programmes
- Research infrastructures
- more.....





# EUROPE 2020

A European strategy for smart, sustainable and inclusive growth



**EUROPE 2020 is aimed at catalysing growth through several flagship actions.**





# EUROPE 2020

A European strategy for smart, sustainable and inclusive growth

## Smart growth

- Innovation Union
- A Digital Agenda for Europe
- Youth on the move

## Sustainable growth

- Resource efficient Europe
- An industrial policy for the globalisation era

## Inclusive growth

- An agenda for skills and jobs
- European Platform against Poverty



# Innovation Union

*More jobs, improved lives, better society*



- Make Europe into a **world-class science performer**
- **Remove obstacles to innovation** – like expensive patenting, market fragmentation, slow standard-setting and skills shortages
- **Revolutionize the way public and private sectors work together**
- **30 specific actions.** E.g. establishing the European Design Leadership Board



Innovation Union (Act 2)



# The TAG CLOUD of the "Innovation Union" Communication



# Innovation Union: monitoring

*More jobs, improved lives, better society*



## A new tool for monitoring the Innovation Union:

- **Innovation Union Scoreboard**

### In addition to:

- The EU Industrial R&D Investment Scoreboard
- Inno-barometer
- INNO-Policy TrendChart
- Sectoral Innovation Watch European Cluster Observatory
- Science, technology and innovation in Europe (Estat)



# Innovation Union Scoreboard

*More jobs, improved lives, better society*



Indicators Scoreboard 2009	Indicators Scoreboard 2010	Comments
S&E and SSH graduates (1st stage) per 1000 population aged 20-29		Dropped
S&E and SSH doctorate graduates (2 <sup>nd</sup> stage) per 1000 population aged 25-34	New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Broader
Population with tertiary education per 100 population <i>aged 25-64</i>	Percentage population <i>aged 30-34 having completed tertiary education</i>	More specific
Participation in life-long learning per 100 population aged 25-64		Dropped
Youth education attainment level	Percentage youth aged 20-24 having attained at least upper secondary level education	Not changed

# Innovation Union Scoreboard

*More jobs, improved lives, better society*



Indicators Scoreboard 2009	Indicators Scoreboard 2010	Comments
	International scientific co-publications per million population	New
	Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	New
	Non-EU doctorate students as % of all doctorate students	New
Public R&D expend. as % of GDP	Public R&D expenditures as % of GDP	Same
Venture capital as % of GDP	Venture capital (early stage, expansion and replacement) as % of GDP	Same
Private credit as a % of GDP		Dropped
Broadband access by firms		Dropped



# Innovation Union Scoreboard

*More jobs, improved lives, better society*



Indicators Scoreboard 2009	Indicators Scoreboard 2010	Comments
Business R&D expenditures as % of GDP	Business R&D expenditures as % of GDP	Same
IT expenditures as a % of GDP		Dropped
Non-R&D innovation expenditures as % of turnover	Non-R&D innovation expenditures as % of turnover	Same
SMEs innovating in-house as % of SMEs	SMEs innovating in-house as % of SMEs	Same
Innovative SMEs collaborating with others as % of SMEs	Innovative SMEs collaborating with others as % of SMEs	Same
Firm renewal rate (SMEs entries and exits as a % of all SMEs)		Dropped
Public-private co-publications per million population	Public-private co-publications per million population	Same

# Innovation Union Scoreboard

*More jobs, improved lives, better society*



Indicators Scoreboard 2009	Indicators Scoreboard 2010	Comments
EPO patent applications million population		Dropped
	PCT patent applications per billion GDP (in PPS€)	New
	PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	New
Community trademarks <i>per million population</i>	Community trademarks <i>per billion GDP (in PPS€)</i>	Different denominator
Community designs <i>per million population</i>	Community designs <i>per billion GDP (in PPS€)</i>	Different denominator
Technology Balance of Payments flows as % of GDP		Replaced

# Innovation Union Scoreboard

*More jobs, improved lives, better society*



Indicators Scoreboard 2009	Indicators Scoreboard 2010	Comments
SMEs introducing product or process innovations as % of SMEs	SMEs introducing product or process innovations as % of SMEs	Same
SMEs introducing marketing or organisational innovations as % of SMEs	SMEs introducing marketing or organisational innovations as % of SMEs	Same
Resource efficiency innovators as % of all firms		Dropped
	High-growth innovative enterprises	New
Employment in medium-high & high-tech manufacturing as % of workforce		Dropped
Employment in knowledge-intensive services as % of workforce		Dropped

# Innovation Union Scoreboard

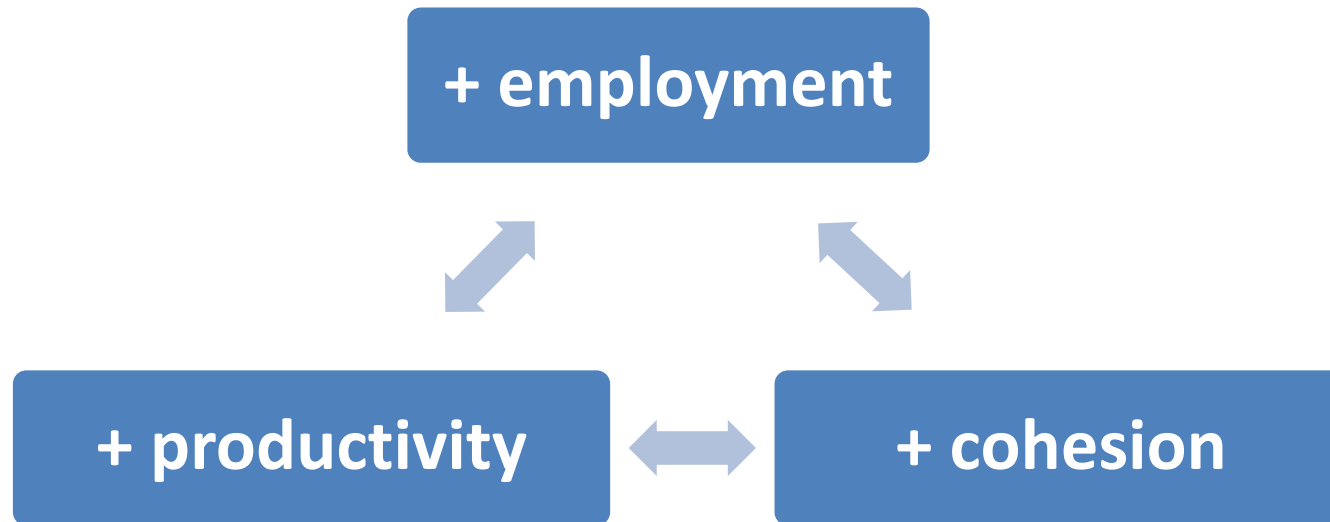
*More jobs, improved lives, better society*



Indicators Scoreboard 2009	Indicators Scoreboard 2010	Comments
	Employment in knowledge-intensive activities (manufacturing and services) as % of workforce	New
Medium and high-tech product exports as % of total product exports	Medium and high-tech product exports as % of total product exports	Same
Knowledge-intensive services exports as % of total services exports	Knowledge-intensive services exports as % of total services exports	Same
Sales of new to market innovations as % of turnover	Sales of new to market and new to firm innovations as % of turnover	Combined
Sales of new to firm innovations as % of turnover		
	Licence and patent revenues from abroad as % of GDP	Replace

# EUROPE 2020

A European strategy for smart, sustainable and inclusive growth



**The EU has set five ambitious objectives - on employment, innovation, education, social inclusion and climate/energy - to be reached by 2020. each Member State will adopt its own national targets in each of these areas.**



# EUROPE 2020

A European strategy for smart, sustainable and inclusive growth

Reducing school drop-out rates below 10% at least 40%

at least 20 million fewer

75% of the 20-64 year-olds to be

rel

greenhouse gas even 30%, if the right) lower than 20% of energy from renewables 20% increase in energy efficiency

3% of the EU's GDP (public and private combined) to be invested in R&D/innovation

# The 3% R&D/GDP dilemma

In the Lisbon agenda R&D intensity (investment in R&D as a % of GDP) served as a proxy of “innovation”.

There is correlation, and causation, between innovation and this well tested and widely available input measure of the knowledge generation, so the **3% R&D intensity target is still in the Europe 2020 strategy.**

But innovation is not only R&D.

**A new indicator is needed**





In Spring 2010, the EU Commissioner for R&I established a High Level Panel (HLP) to propose a new “innovation” flagship indicator for Europe 2020.



#### **Chair/Coordinator**

- Professor Andreu Mas-Collell (Spain)

#### **Members**

- Dr Martin Curley (Ireland)
- Professor Dominique Foray (France/Switzerland)
- Professor Bronwyn Hall (Netherlands/USA)
- Dr Hugo Hollanders (Netherlands)
- Dr Branko Huč (Slovenia)
- Professor Henning Kagermann (Germany)
- Professor Franco Malerba (Italy)
- Dr Erkki Ormala (Finland)
- Dr Helmar Rendez (Germany)
- Dr Ammon Salter (United Kingdom)
- Mr Marek Serafin (Poland)
- Mr Diogo Vasconcelos (Portugal)

## Mandate of the HLP

“... the awareness that the input R&D intensity indicator needs to be complemented by some additional output-oriented indicators”.

“... formulate some headline output-oriented innovation indicator(s) which is (are) adequate, in the context of the Europe 2020 strategy, for policy guidance purposes.”



RESTRICTED

## “Covered” mandate of the HLP

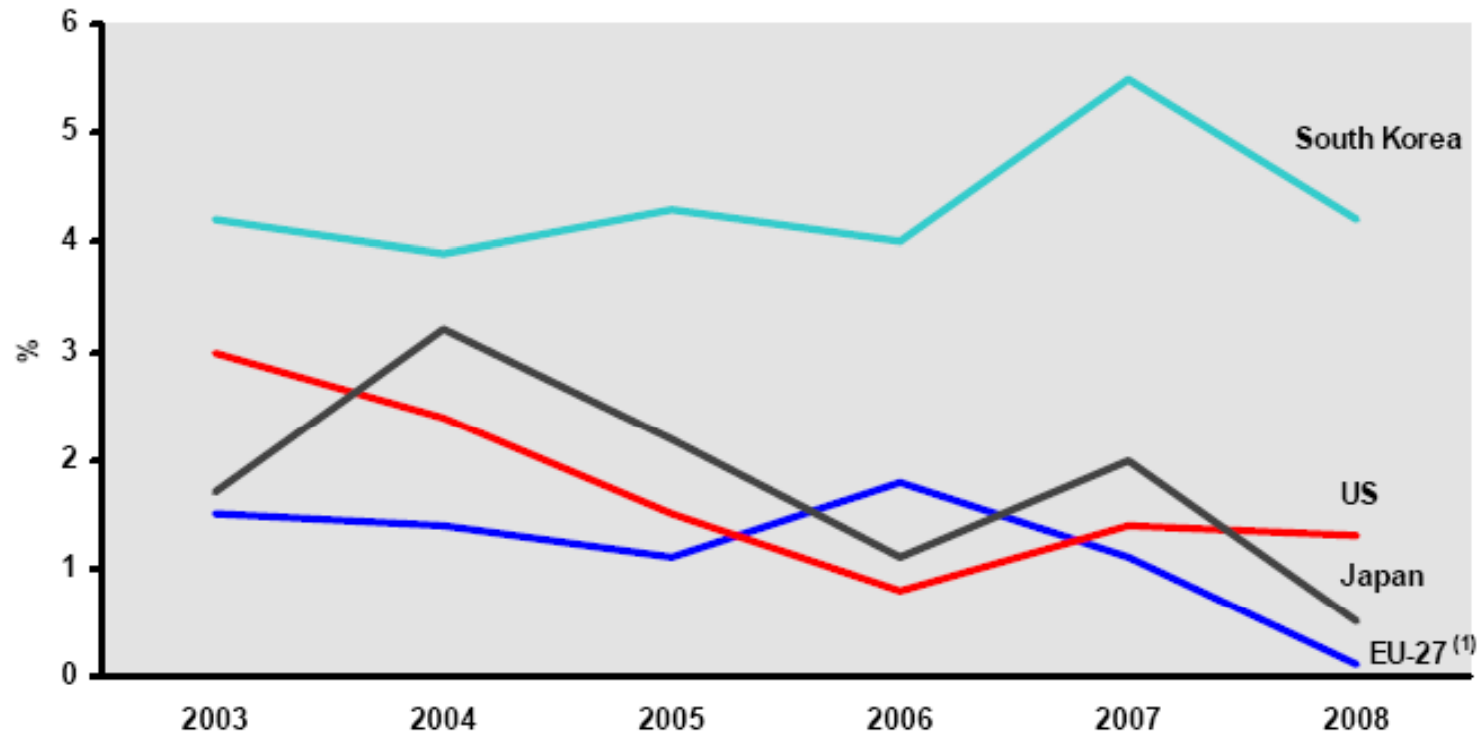
1. Not using CIS indicators (some countries don't like them)
2. No composite indicators
3. Not considering indicators already available (the flagship indicator has to be approved before being produced!)
4. Aim at reducing, rather than emphasizing, the differences among countries.



# The proposals of the HLP (1)

## Hourly labour productivity

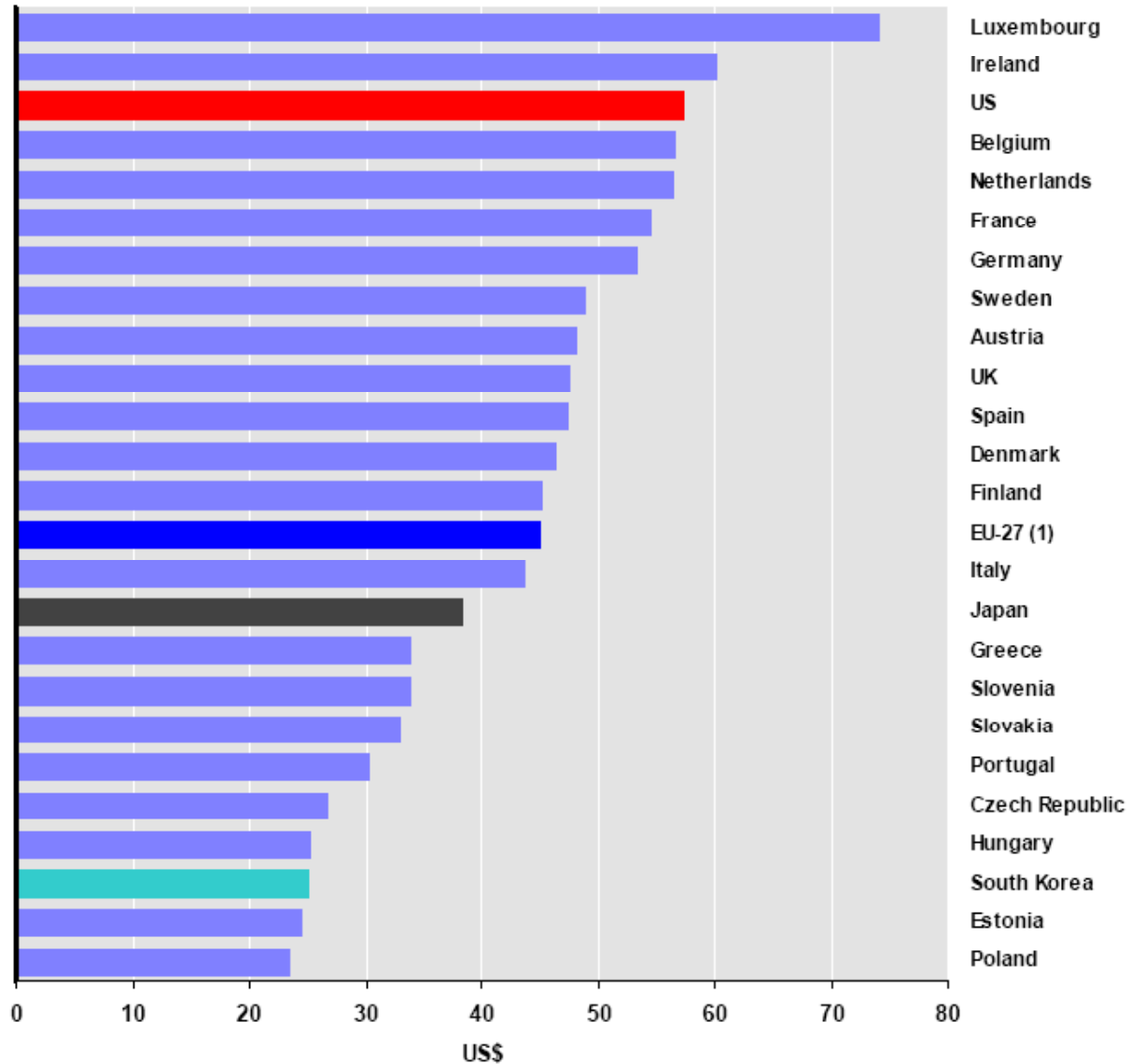
Figure 1 Labour Productivity - annual growth rate



# The proposals of the HLP (1)

Hourly labour productivity

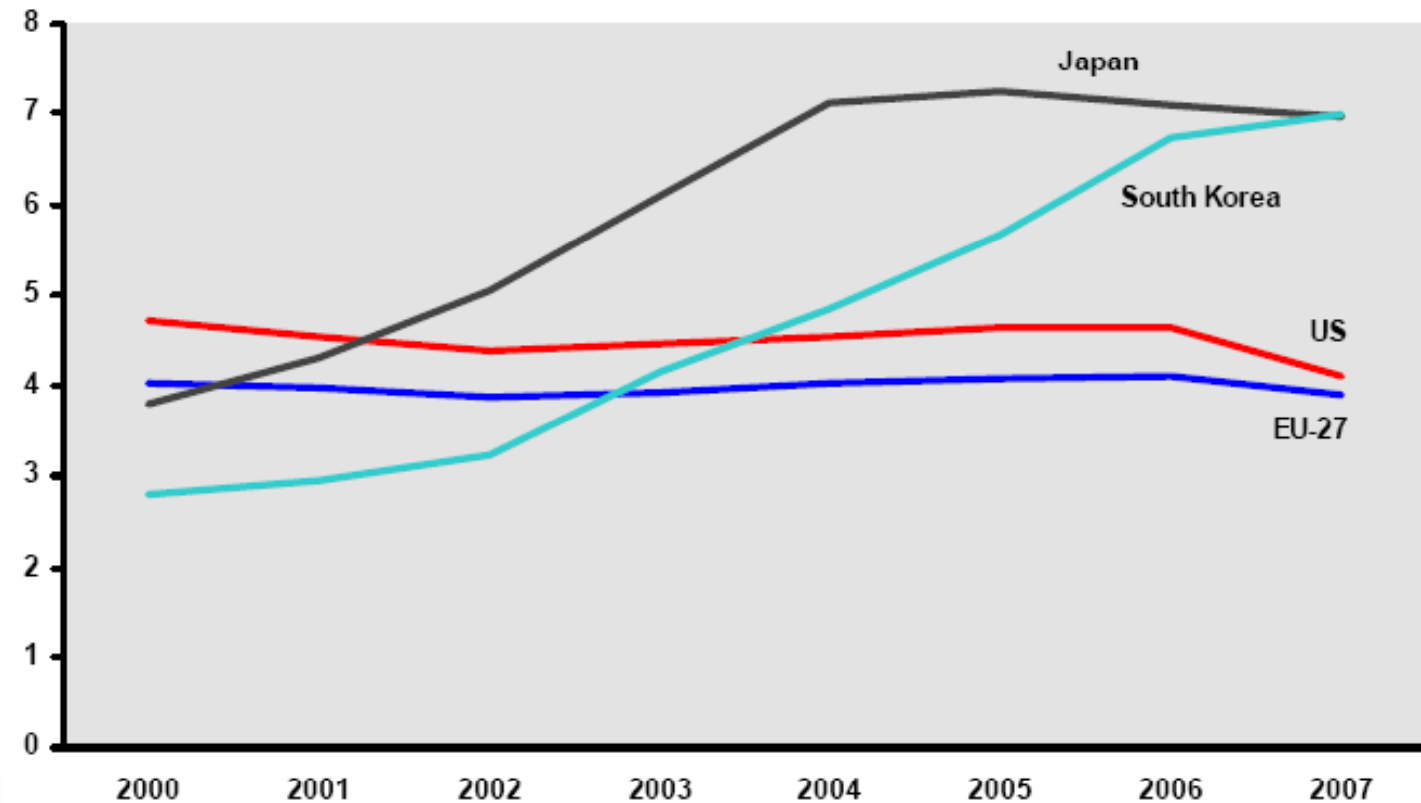
Figure 2 Labour Productivity - GDP per hour worked in US\$, 2009



# The proposals of the HLP (2)

## Patent applications weighted by GDP

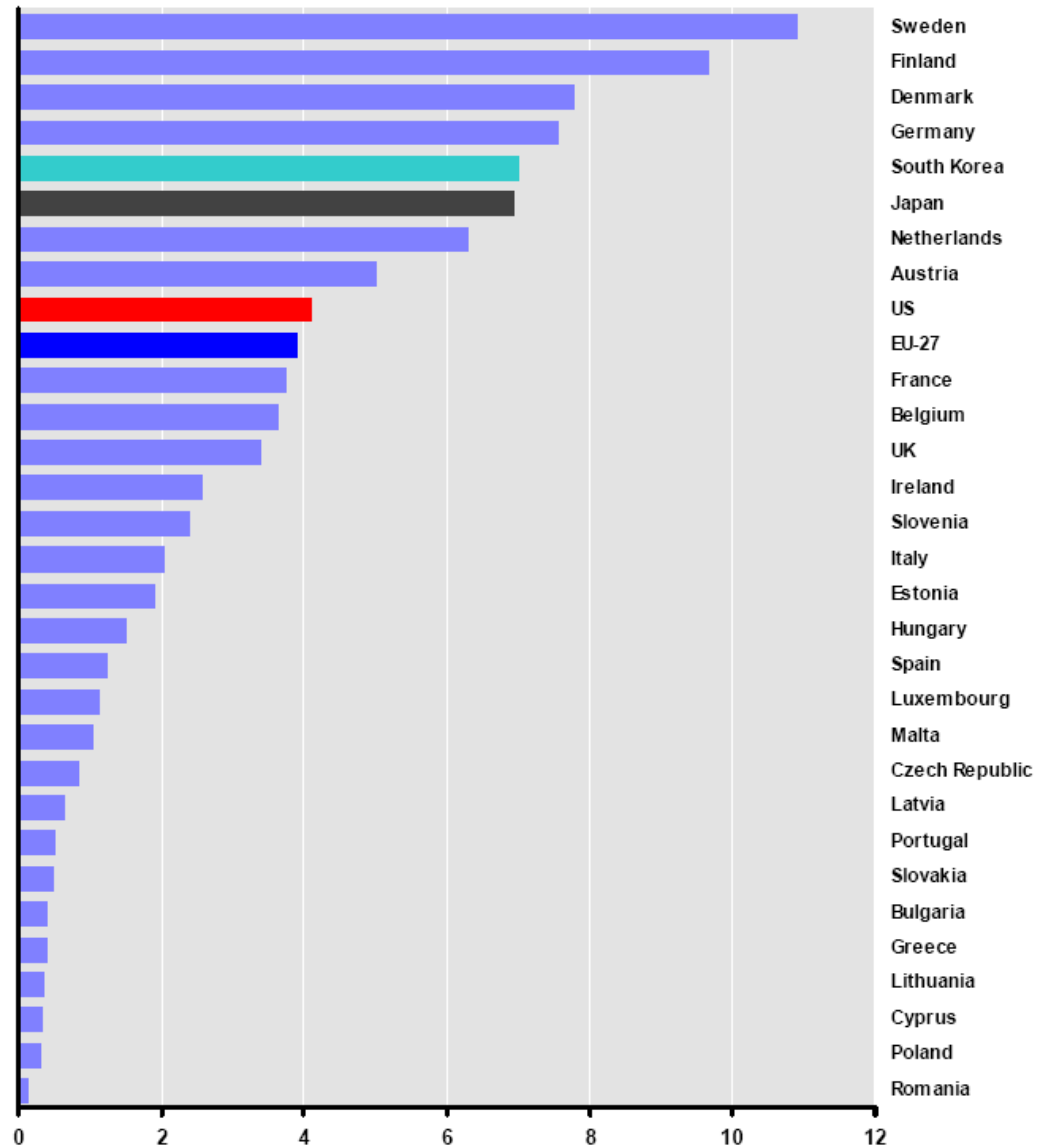
Figure 3 Evolution of PCT patent Intensity<sup>(1)</sup>



# The proposals of the HLP (2)

Figure 4 PCT Patent Intensity<sup>(1)</sup>, 2007

Patent applications  
weighted by GDP

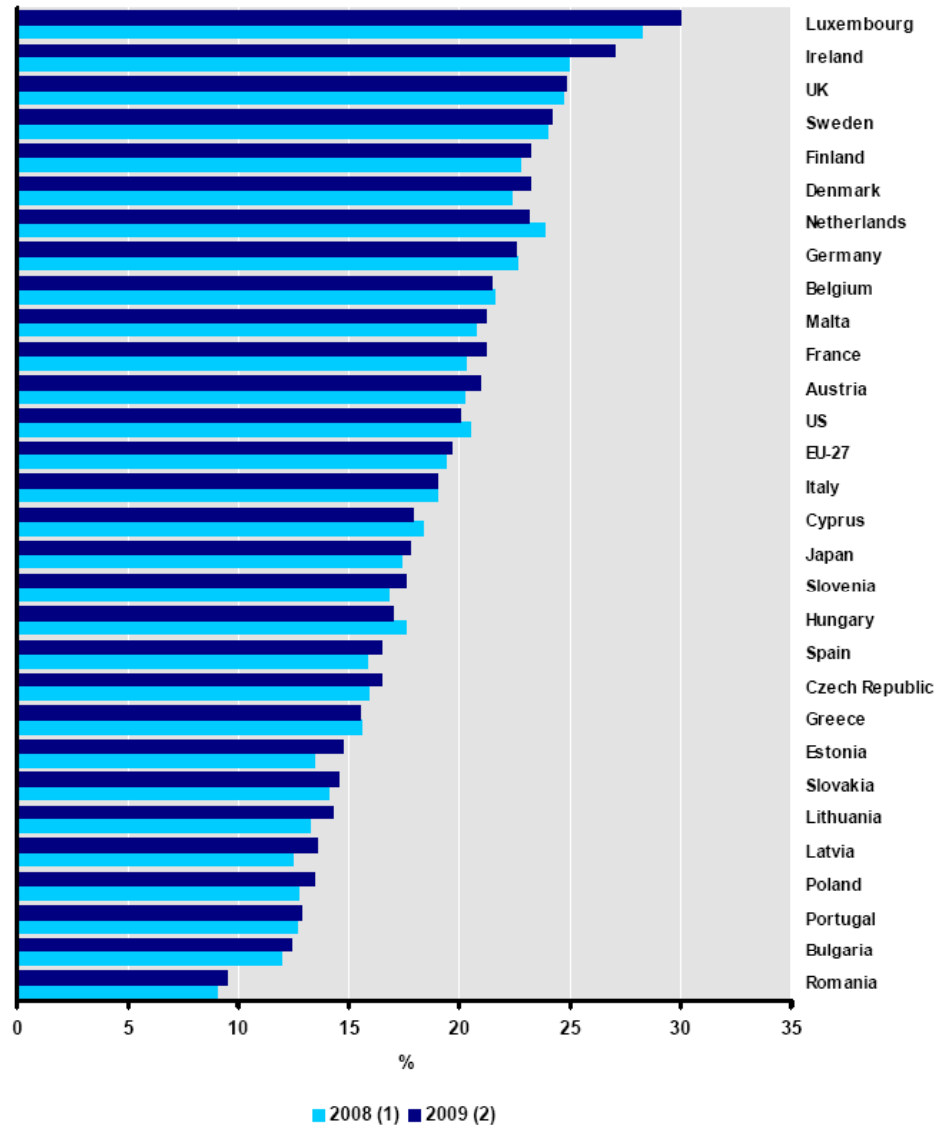




# The proposals of the HLP (3)

Figure 5 Share of employment in Knowledge Intensive Activities (KIA) (excluding the public sector) in total employment, 2008 and 2009

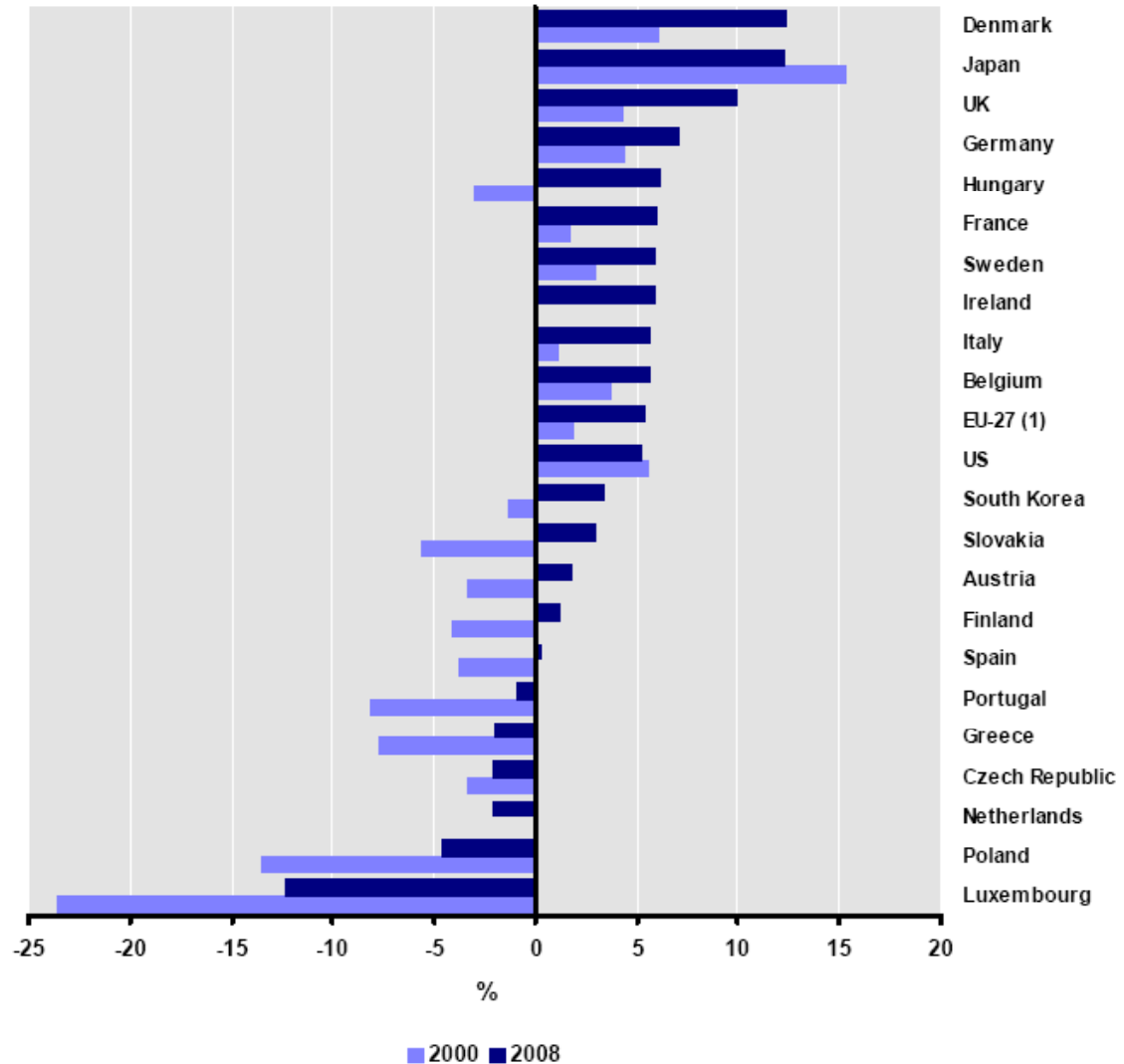
Percentage of employment in knowledge intensive activities



# The proposals of the HLP (5)

Figure 6 Contribution of high-tech and medium-high-tech manufactured goods to the trade balance, 2000 and 2008

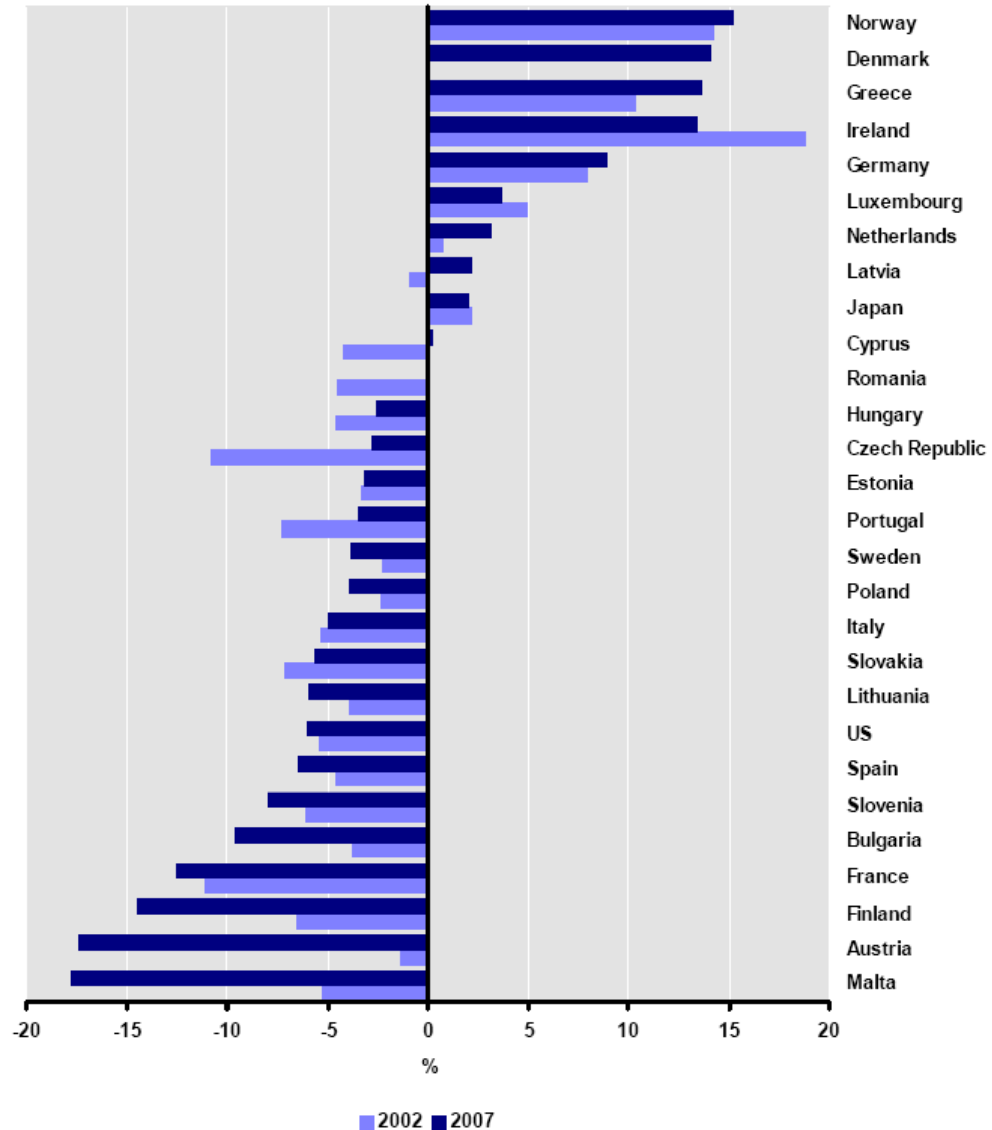
Contribution of innovative-related trade in manufactured goods to the balance of trade of goods



# The proposals of the HLP (5)

Figure 7 Contribution of KIS to the trade balance, 2002 and 2007

**Contribution of innovative-related trade in manufactured goods to the balance of trade of goods**



# The proposals of the HLP: further work

## Enhancing the coverage, quality and informative value of proposed indicators

- *Knowledge intensive activities*
- *Knowledge intensive services and innovation*

## Improving current systems for measuring innovation

- *Community Innovation Survey (CIS)*
- *European Research and Innovation scoreboard*



# The proposals of the HLP: further work

## Medium term issues a): Measurement of new forms of innovation

- *Open, distributed and user-driven innovation*
- *Innovation in the public sector*
- *Creative industries*
- *Inclusive, sustainable and smart growth including Green or Eco-innovation*
- *Intangibles and Innovation*

## Medium term issues b): Further work on the understanding of innovation

- *Taxonomy of Innovation*



# The operational scenario of the HLP

By using the proposed indicators, the HLP recommended:

A. Focus on three indicators

- 1) patent applications weighted by GDP  
(**technological output**)
- 2) percentage of employment in knowledge intensive activities (**extent of knowledge intensive activities**)
- 3) contribution of innovative-related trade in manufactured goods to the balance of trade of goods (**competitive performance of innovation**)



B. Adopt a composite indicator

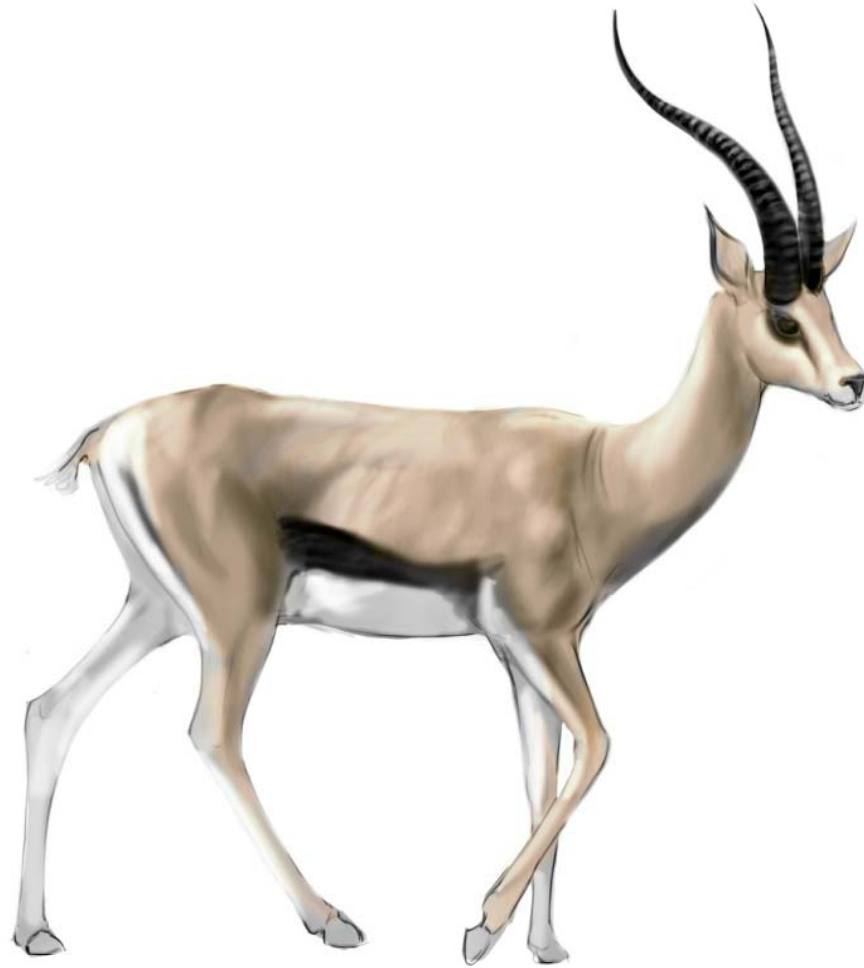
# The reaction by the Council

- patent applications weighted by GDP
- contribution of innovative-related trade in manufactured goods to the balance of trade of goods
- percentage of employment in knowledge intensive activities
- ~~hourly productivity~~

*Only R&D based innovations...*

*productivity ~ job cuts: politically impossible for "jobs and growth" program*





Thomson's Gazelle (*Eudorcas thomsoni*)  
Swahili: swala tomi



# The proposals of the HLG (4)

Share of fast growing (or young?) and innovative firms in the economy

**No data actually exist!**



# The availability of HLG indicators

## 1) Hourly labour productivity

19 EU countries (OECD), available now, 2 years lag

## 2) Patent applications weighted by GDP

Large coverage, available now, 2 years lag

## 3) Percentage of employment in KIA

Large coverage (ESTAT) available now, 4 months lag

## 4) Share of fast growing (or young?) and innovative firms in the economy

Not available – to be developed

## 5) Contribution of innovative-related trade in manufactured goods to the balance of trade

19 EU countries (OECD), available now, 2/3 years lag



# Gazelle Hunting

Not just “gazelles” are to be considered, as they are a subgroup of the so-called “high growth enterprises”.

Eurostat and OECD have agreed on a single definition

## High-growth enterprises

All enterprises with average annualised growth greater than 20% per annum, over a three year period should be considered as high-growth enterprises. Growth can be measured by the number of employees or by turnover.

## Gazelles

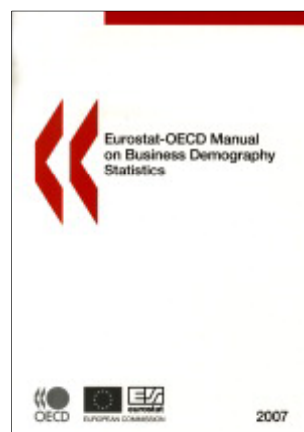
All enterprises up to 5 years old with average annualised growth greater than 20% per annum, over a three year period, should be considered as gazelles.



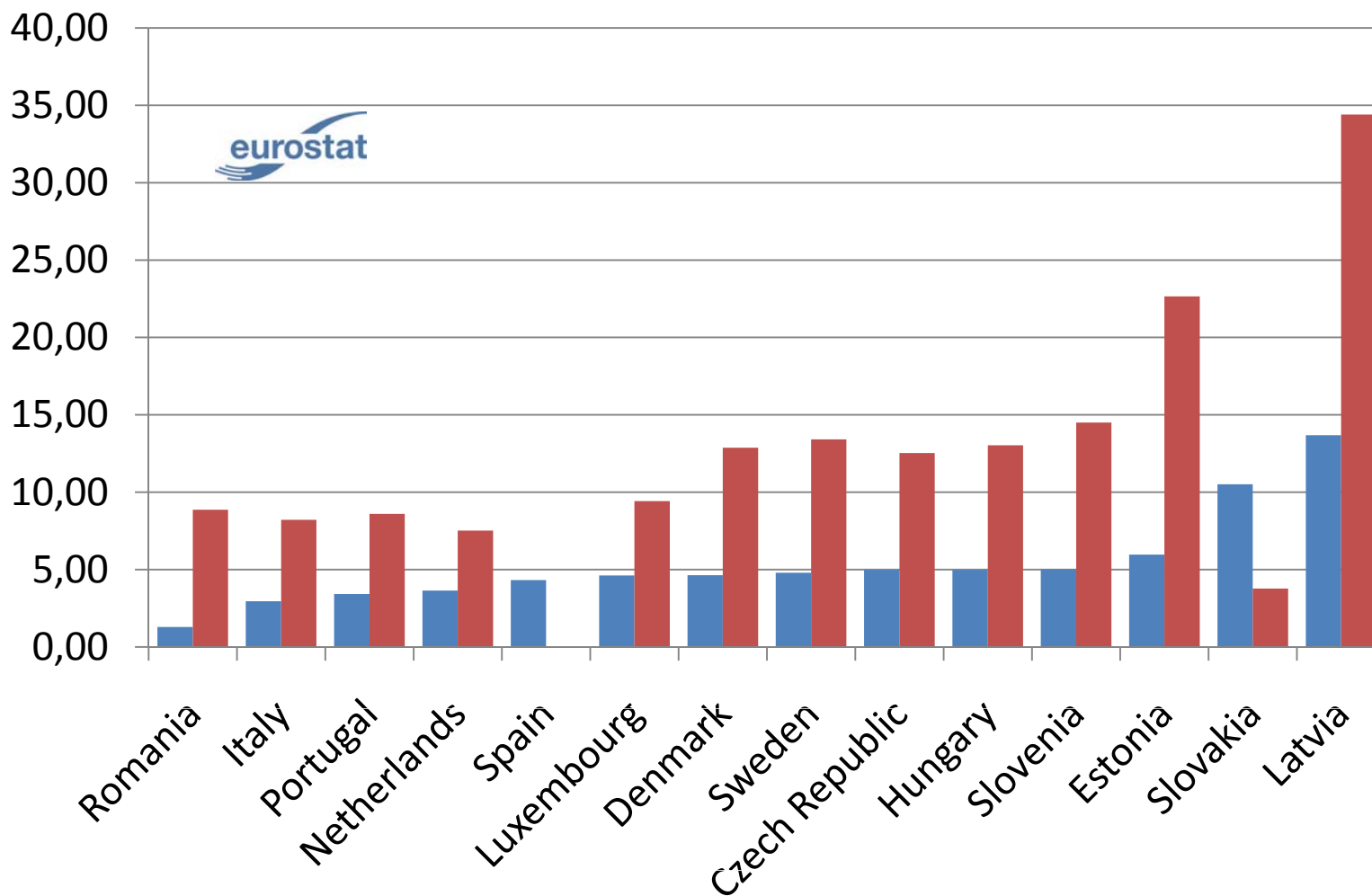
# High-growth enterprises

An extensive work has been carried both at Eurostat and the OECD (as part of the Entrepreneurship Indicators Programme).

Recent publications include the Eurostat-OECD “Manual on Business Demography Statistics” and the OECD “Measuring Entrepreneurship: A Digest of Indicators, 2009 edition” Report.

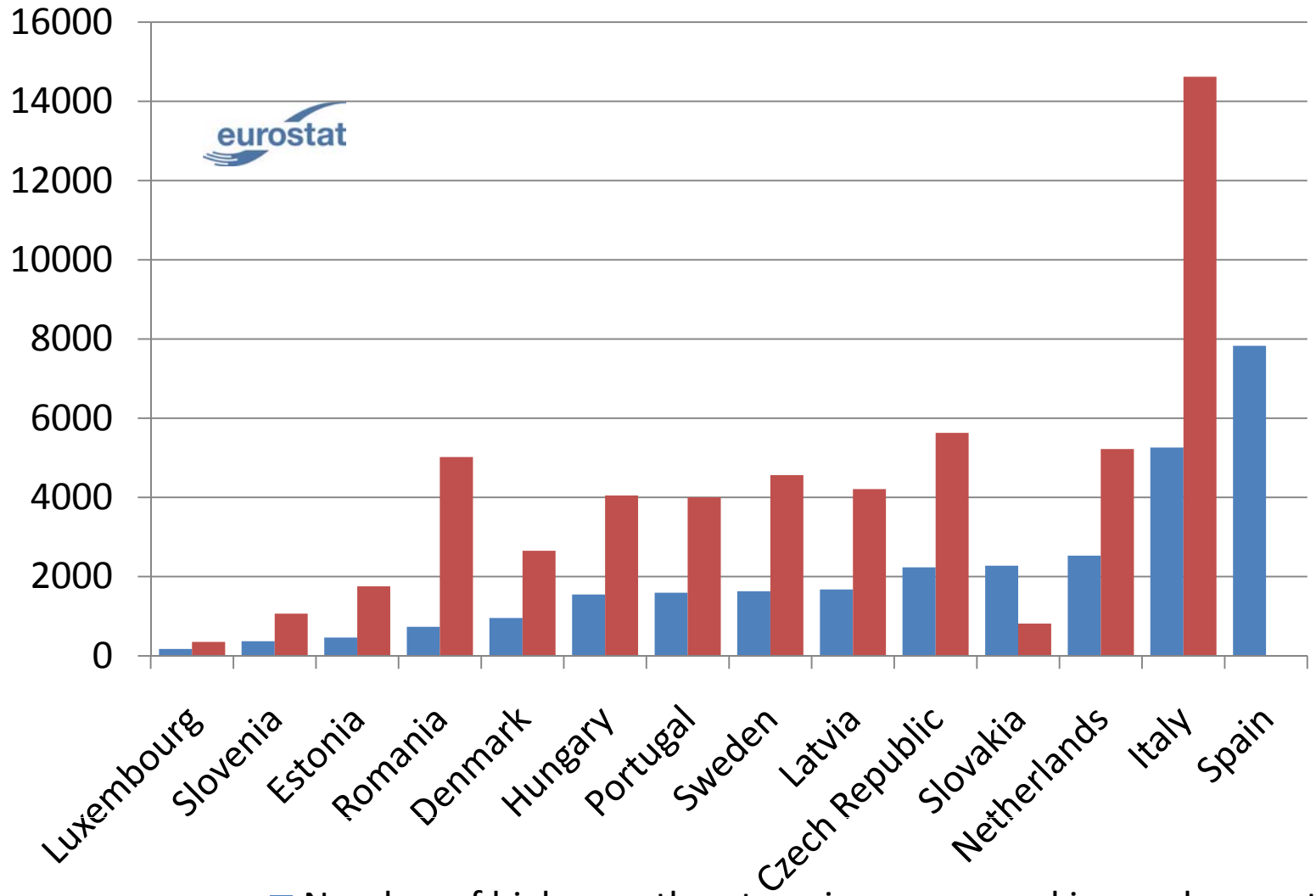


# Percentage of “high-growth”, 2007



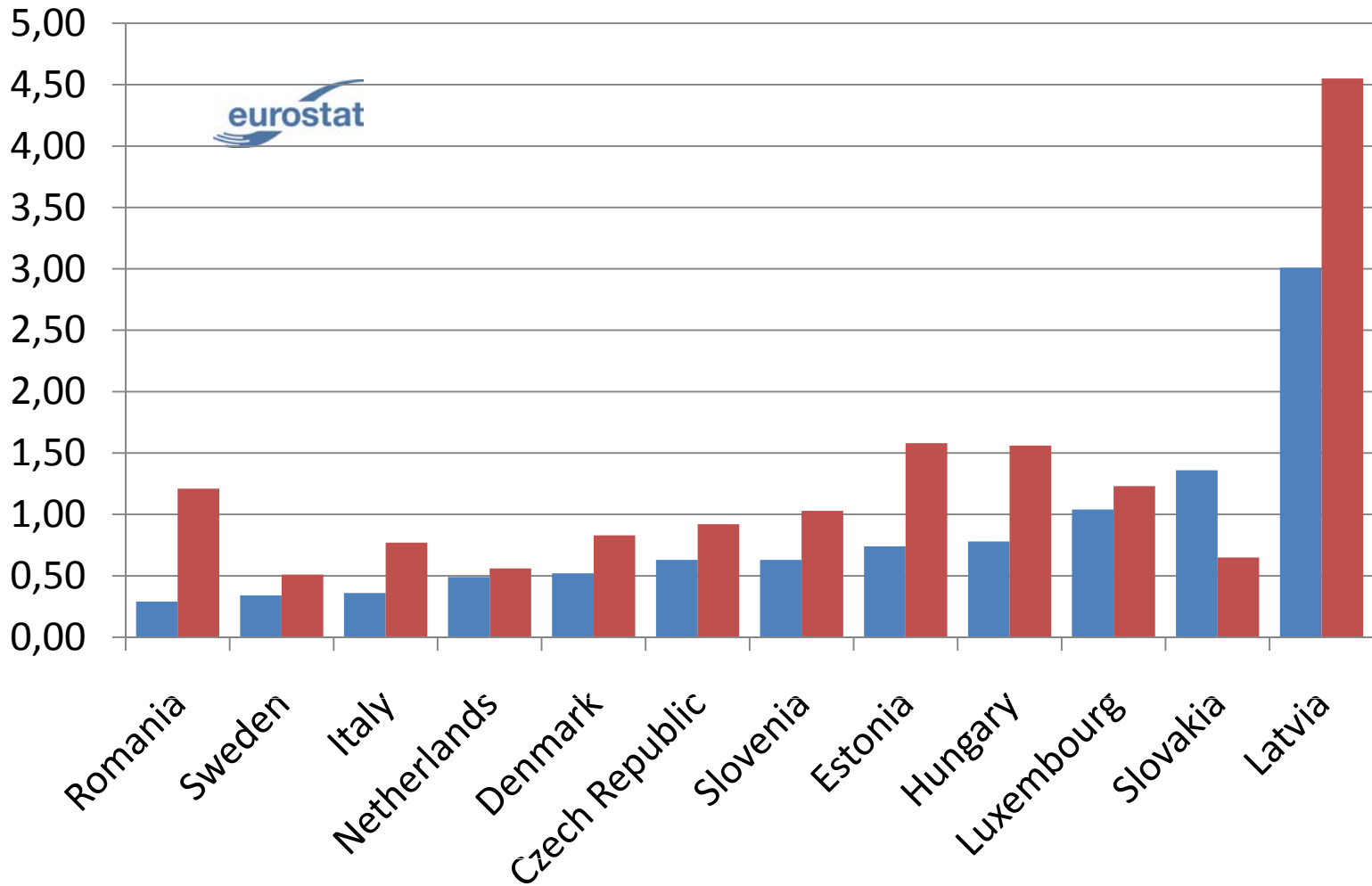
- Share of high growth enterprises in the population of active enterprises, measured in employment
- Share of high growth enterprises in the population of active enterprises, measured in turnover

# Number of “high-growth”, 2007



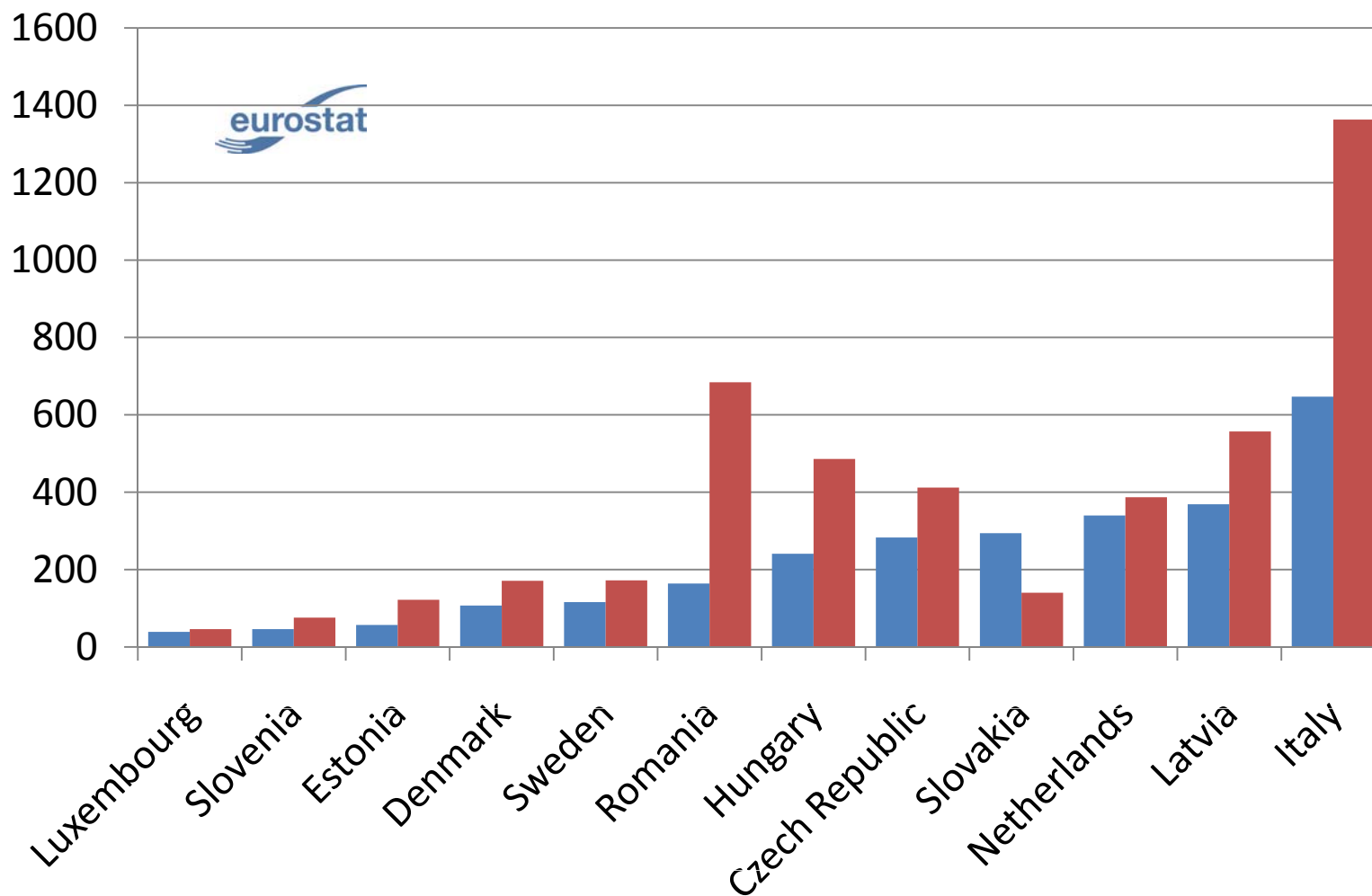
- Number of high growth enterprises measured in employment
- Number of high growth enterprises measured in turnover

# Percentage of “gazelles”, 2007



- Share of young high growth enterprises (gazelles) in the population of active enterprises, measured in employment
- Share of young high growth enterprises (gazelles) in the population of active enterprises, measured in turnover

# Number of “gazelles”, 2007



- Number of young high growth enterprises (gazelles) measured in employment
- Number of young high growth enterprises (gazelles) measured in turnover



# The EU Council's needs

After having taken the decision to have a EUROPE 2020 flagship indicator based on “high growth enterprises” the Council requested the Commission to make available, **within two years**, an indicator measuring **“the share of fast growing innovative companies in the economy”** .

Providing that data on “high growth enterprises” are available for those countries implementing a business register, what is meant by **“innovative”**?



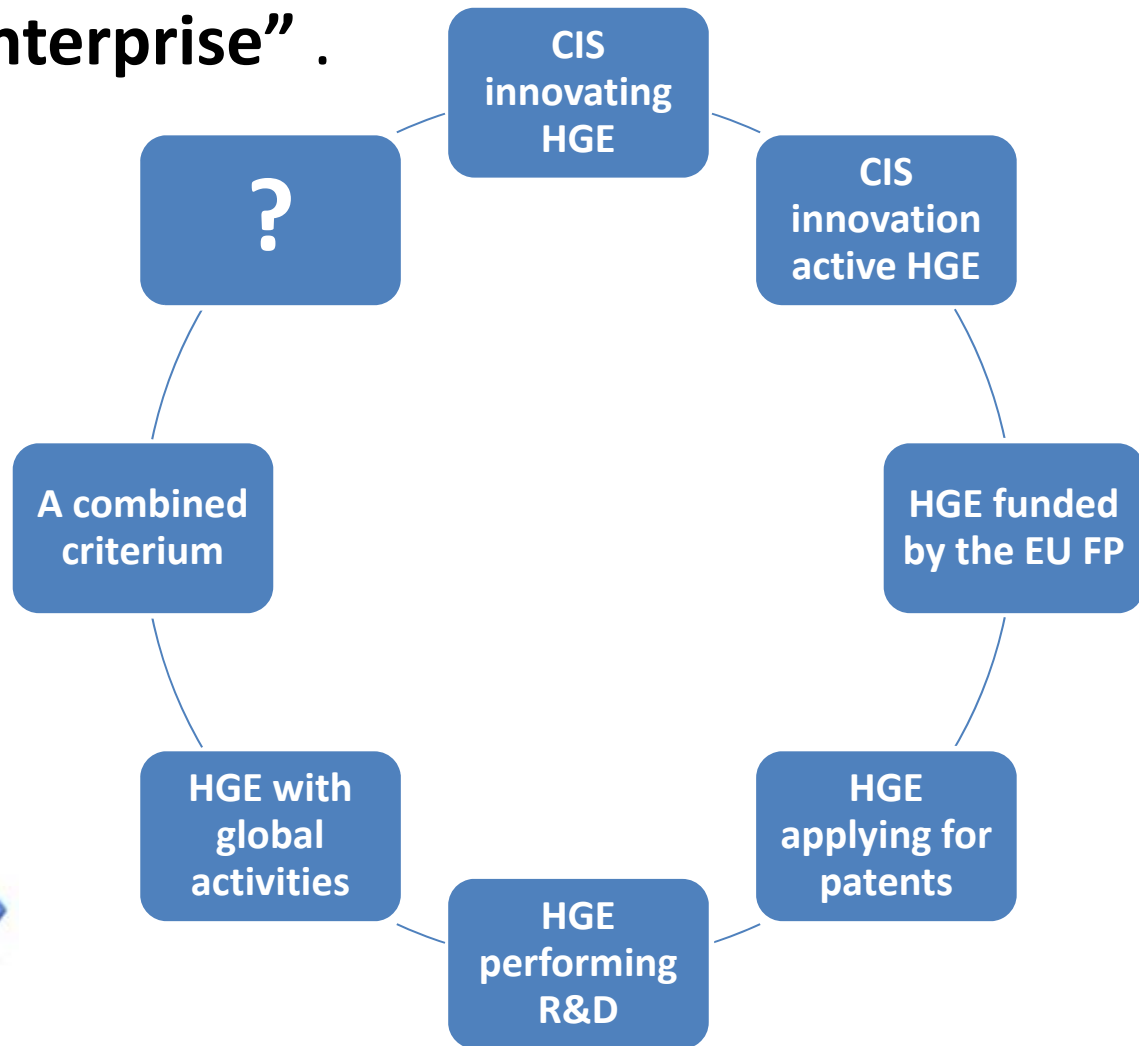
# The EU Council's needs: the rationale

“A **dynamic business sector** is at the heart of growth, creativity and innovation. In this respect the suggested indicator would be forward looking and compelling (young innovative firms need to grow to create employment), mobilizing (if stresses the **role of business in innovation**), analytically very relevant, and with strong links to policy. In addition, it would be an integrative indicator; without being a composite, it would summarize many of the relevant dimensions of an innovation system including framework economic conditions (**financial markets and access to credit**, education, orientation of economic institutions towards **entrepreneurship and dynamism**)”



# The current developments

As a follow-on of the HLP, several study groups are exploring different definitions for “**innovative high growth enterprise**” .



# Web resources

- EUROPE 2020 website and documentation,  
[http://ec.europa.eu/europe2020/index\\_en.htm](http://ec.europa.eu/europe2020/index_en.htm)
- Innovation Union website and documentation,  
[http://ec.europa.eu/research/innovation-union/index\\_en.cfm](http://ec.europa.eu/research/innovation-union/index_en.cfm)
- Innovation Union Scoreboard  
[http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/index\\_en.htm](http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/index_en.htm)
- Report of the High Level Panel on the Measurement of Innovation, 30/9/2010, [http://ec.europa.eu/commission\\_2010-2014/geoghegan-quinn/hlp/documents/20101006-hlp-report\\_en.pdf](http://ec.europa.eu/commission_2010-2014/geoghegan-quinn/hlp/documents/20101006-hlp-report_en.pdf)
- Eurostat database: high-growth enterprises
- [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=bd\\_9n&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=bd_9n&lang=en)
- OECD EIP - The Entrepreneurship Indicators Programme  
[http://www.oecd.org/document/58/0,3746,en\\_2649\\_44392116\\_44441658\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/58/0,3746,en_2649_44392116_44441658_1_1_1_1,00.html)



# Issues for discussion

- The development of innovation/research policies in a context where a range of authorities interact or a number of regional/national governments have to agree on. *Comparison between the EU, the former USSR and the Russian Federation.*
- A measurement of innovation relevant for policy monitoring: statistics, scoreboards, composite indicators, foresight analysis. *How appropriate tools can be selected.*
- Entrepreneurship as an indicator of innovation. *Which other dimensions are being neglected?*



**Thank you!**



The tags "Innovation" and "European" have not been included in the chart because of their excessive frequency in the document

