EUROPEAN INNOVATION SCOREBOARD 2006

COMPARATIVE ANALYSIS OF INNOVATION PERFORMANCE

This report has been prepared by the Maastricht Economic Research Institute on Innovation and Technology (MERIT) and the Joint Research Centre (Institute for the Protection and Security of the Citizen) of the European Commission.

2006 EUROPEAN INNOVATION SCOREBOARD

1. INTRODUCTION

1.1. Executive summary

This is the sixth edition of the *European Innovation Scoreboard* (EIS). The EIS is the instrument developed at the initiative of the European Commission, under the Lisbon Strategy, to evaluate and compare the innovation performance of the EU Member States. The EIS 2006 includes innovation indicators and trend analyses for the EU25[1] Member States, plus the two new Member States: Bulgaria and Romania, as well as for Croatia, Turkey, Iceland, Norway, Switzerland, the US and Japan. The Annex includes tables with definitions as well as comprehensive data sheets for every country. The EIS report and its annexes, accompanying thematic papers and the indicators' database are available at http://www.proinno-europe.eu/inno-metrics.html.

Development of national innovation performance

With respect to the situation in Europe, significant national differences are still observed. Figure I shows the Summary Innovation Index (SII) on the vertical axis and the average growth rate of the SII on the horizontal axis. Countries above the horizontal dotted line currently have an innovation performance above that of the EU25. Countries to the right of the vertical dotted line had a faster average increase in the SII than the EU25.

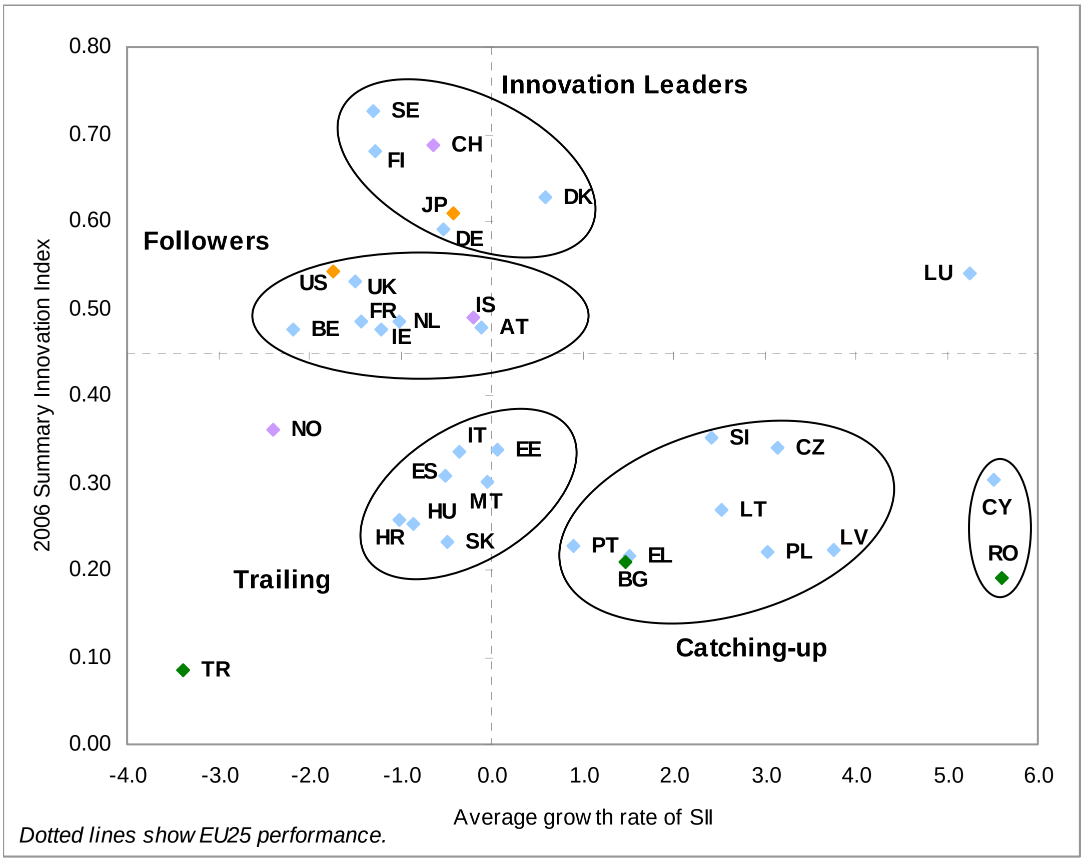
Based on their SII score and the growth rate of the SII, the countries included in the analysis can be divided into four groups or clusters:

- Sweden, Switzerland, Finland, Denmark, Japan and Germany are the *innovation leaders*, with SII scores well above that of the EU25 and the other countries. The lead of the innovation leaders has been declining compared to the average of the EU25, with the exception of Denmark.
- The US, UK, Iceland, France, Netherlands, Belgium, Austria and Ireland are the *innovation followers*, with SII scores below those of the innovation leaders but above that of the EU25 and the other countries. The above EU25 average innovation performance of the innovation followers has been declining. Also, the gap of the innovation followers with the innovation leaders has on average slightly increased.
- Slovenia, Czech Republic, Lithuania, Portugal, Poland, Latvia, Greece and Bulgaria make up the group of *catching-up countries*, with SII scores well below that of the EU25 and the innovation leaders, but with faster than average innovation performance improvement.
- Estonia, Spain, Italy, Malta, Hungary, Croatia and Slovakia seem to be *trailing*, with SII scores well below that of the EU25 and the innovation leaders, and innovation performance growth which is either below or only just above that of the EU25.

[1] At the time of data compilation and writing this report, Bulgaria and Romania were still not Members of the European Union.

Cyprus and Romania form a separate fifth cluster of fast growing, catching-up countries. Cyprus being one of the smallest EU countries and Romania starting from very low levels of innovation performance, this cluster is less robust than the other clusters, and is therefore not considered to be a real cluster. Luxembourg, Norway and Turkey do not fit into any of these groups.

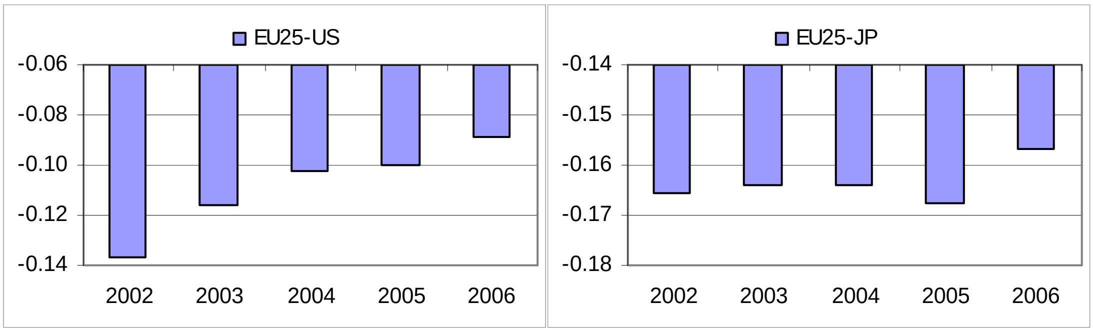
FIGURE I: SII AND TRENDS



The gap between the US and the EU has decreased

The US and Japan are still ahead of the EU25 in terms of innovation performance, but the innovation gap between the EU25 and Japan, and in particular with the US is decreasing (see Figure II). The EU25 has improved its relative performance compared to the US in S&E graduates, tertiary education, business R&D, early-stage venture capital, medium-high and high-tech manufacturing employment, EPO patents, USPTO patents and community trademarks. The EU has improved its relative performance compared to Japan mostly in S&E graduates and broadband penetration rate. For business R&D, the share of medium/high-tech R&D and the employment share in medium/high-tech manufacturing, the EU has experienced a decline of its relative performance.

FIGURE II: EU25 INNOVATION GAP TOWARDS US AND JAPAN



The vertical axis represents the difference between SII scores of EU25 and US & Japan respectively.

New indicators

The goal of the 2006 Methodology report was to further explore the different dimensions of innovation and to identify areas that are not covered in the EIS. The report has identified possible indicators of relevance to EU policy for measuring national innovative capabilities. The indicators could come from three sources: 1) existing data sources, including the CIS, 2) by making modifications to future versions of the CIS, and 3) by conducting new surveys to gather the necessary data. Table 3 in section 3.2 summarizes these indicators.

International comparison

The Global Innovation Scoreboard (GIS) report compares the innovation performance of the EU25 to that of other major R&D performing countries in the world: Argentina, Australia, Brazil, Canada, China, Hong Kong, India, Israel, Japan, New Zealand, Republic of Korea, Mexico, Russian Federation, Singapore, South Africa and the US. This comparison is based on a more limited set of 12 indicators rather than the set of 25 indicators of the EIS. The countries are classified first on the basis of their Global Summary Innovation Index (GSII) and then on the cluster results using multidimensional scaling. Based on the latter approach, one can identify 3 clusters including 6 or more countries and 5 mini-clusters including only 2 or 3 countries.

Innovation at the regional level

The Regional Innovation Scoreboard provides an update of the 2002 and 2003 regional innovation scoreboards. The Top-10 performing regions are Stockholm in Sweden, followed by Västsverige (SE), Oberbayern (DE), Etelä-Suomi (FI), Karlsruhe (DE), Stuttgart (DE), Braunschweig (DE), Sydsverige (SE), Île de France (FR) and Östra Mellansverige (SE). The Commission is planning a bi-annual Regional Innovation Scoreboard starting in 2007. Future updates of the RIS will focus on two main possibilities for improvement: improved data availability, in particular from the CIS-4 and an improved methodology.

1.2. Revised indicators and methodology

The European Innovation Scoreboard (EIS) covers the 27 EU Member States[2], Croatia and Turkey, the associate countries Iceland, Norway and Switzerland, as well as the US and Japan. The indicators of the EIS summarise the main elements of innovation performance.

In 2005, the EIS has been revised in collaboration with the Joint Research Centre (JRC)[3]. The number of categories of indicators was increased from four to five and the set of innovation indicators was modified and increased to 26. The EIS 2005 Methodology Report (MR) (available on the Trend Chart website[4]) describes and explains all changes in full detail. The EIS 2006 almost fully adopts the 2005 methodology with the exception of the following three changes:

- Removal of the indicator measuring the share of university R&D expenditures financed by the business sector;
- The indicator on public R&D expenditures is now defined as the sum of government R&D expenditures (or GOVERD) and university R&D expenditures (or HERD) only;
- The EIS 2005 indicator on the share of SMEs using non-technological change had to be changed into the share of SMEs using organisational innovation following the improvement of the survey questions on non-technological change from the third Community Innovation Survey (CIS3) to the fourth Community Innovation Survey (CIS4).

The innovation indicators are assigned to five dimensions and grouped in two main themes: inputs and outputs. Innovation inputs include three dimensions:

- *Innovation drivers* (5 indicators), which measure the structural conditions required for innovation potential;
- *Knowledge creation* (4 indicators), which measure the investments in R&D activities, considered as key elements for a successful knowledge-based economy;
- *Innovation & entrepreneurship* (6 indicators), which measure the efforts towards innovation at firm level.

Innovation outputs include two dimensions:

- *Applications* (5 indicators), which measure the performance, expressed in terms of labour and business activities, and their value added in innovative sectors;
- *Intellectual property* (5 indicators), which measure the achieved results in terms of successful know-how.

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[2] Bulgaria and Romania joined the EU on 1 January 2007. However, the EU25 mean is used throughout this report to reflect average EU performance as all of the underlying statistical analyses were performed in 2006 when only EU25 mean data was available from Eurostat and other data sources.

[3] Joint Research Centre (JRC), Unit of Econometrics and Statistical Support to Antifraud (ESAF) of the Institute for the Protection and Security of the Citizen (IPSC).

[4] see http://www.proinno-europe.eu/inno-metrics.html

Table 1[5] shows the 5 main categories, the 25 indicators, and the primary data sources for each indicator[6].

TABLE 1: EIS 2006 INDICATORS

	INPUT – INNOVATION DRIVERS	
1.1	S&E graduates per 1000 population aged 20-29	EUROSTAT
1.2	Population with tertiary education per 100 population aged 25-64	EUROSTAT, OECD
1.3	Broadband penetration rate (number of broadband lines per 100 population)	EUROSTAT
1.4	Participation in life-long learning per 100 population aged 25-64	EUROSTAT
1.5	Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	EUROSTAT
	INPUT – KNOWLEDGE CREATION	
2.1	Public R&D expenditures (% of GDP)	EUROSTAT, OECD
2.2	Business R&D expenditures (% of GDP)	EUROSTAT, OECD
2.3	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	EUROSTAT, OECD
2.4	Share of enterprises receiving public funding for innovation	EUROSTAT (CIS4)
	INPUT – INNOVATION & ENTREPRENEURSHIP	
3.1	SMEs innovating in-house (% of all SMEs)	EUROSTAT (CIS3)[7]
3.2	Innovative SMEs co-operating with others (% of all SMEs)	EUROSTAT (CIS4)
3.3	Innovation expenditures (% of total turnover)	EUROSTAT (CIS4)
3.4	Early-stage venture capital (% of GDP)	EUROSTAT
3.5	ICT expenditures (% of GDP)	EUROSTAT
3.6	SMEs using organisational innovation (% of all SMEs)	EUROSTAT (CIS4)
	OUTPUT – APPLICATIONS	
4.1	Employment in high-tech services (% of total workforce)	EUROSTAT
4.2	Exports of high technology products as a share of total exports	EUROSTAT
4.3	Sales of new-to-market products (% of total turnover)	EUROSTAT (CIS4)
4.4	Sales of new-to-firm products (% of total turnover)	EUROSTAT (CIS4)
4.5	Employment in medium-high and high-tech manufacturing (% of total workforce)	EUROSTAT
	OUTPUT – INTELLECTUAL PROPERTY	
5.1	EPO patents per million population	EUROSTAT
5.2	USPTO patents per million population	EUROSTAT, OECD
5.3	Triadic patent families per million population	EUROSTAT, OECD
5.4	New community trademarks per million population	OHIM[8]
5.5	New community designs per million population	OHIM[7]

[5] Annex C gives full definitions for all indicators and also provides brief explanations why each indicator was included.

[6] National data sources were used for several indicators where Eurostat or OECD data were not available. In particular, the statistical offices from Malta and Switzerland provided valuable support.

[7] CIS4 data for the indicator on the share of SMEs innovating in-house were not available in the data released by Eurostat (NewCronos website).

[8] Office for Harmonization in the Internal Market (Trade Marks and Designs).

2. EUROPEAN INNOVATION SCOREBOARD: BASE FINDINGS

2.1. Overall innovation performance in Europe

The Summary Innovation Index (SII) gives an “at a glance” overview of aggregate national innovation performance. Figure 1 shows the results for the 2006 SII. For Croatia, Turkey, the US and Japan the SII is an estimate based on a more limited set of indicators. The relative position of these countries in Figure 1 should thus be interpreted with care[9].

Sweden, Finland, Switzerland and Denmark are the European innovation leaders. Slovenia, Estonia and Czech Republic are the best performing new Member States, outperforming as many as four EU15 countries.

FIGURE 1: THE 2006 SUMMARY INNOVATION INDEX (SII)

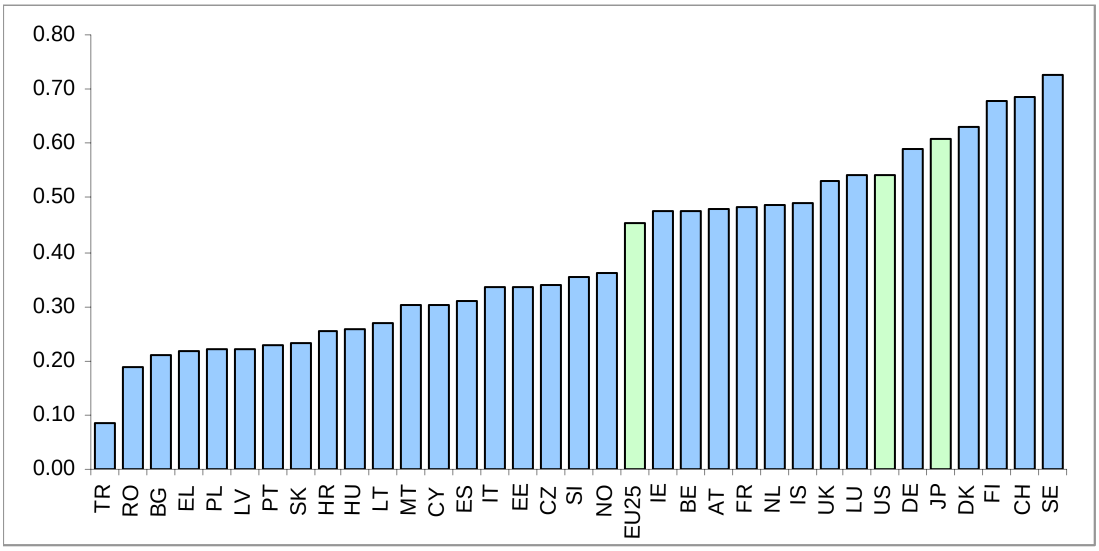

Figure 2 shows current performance as measured by the SII on the vertical axis against short-run trend performance of the SII on the horizontal axis. Based on their SII score and the growth rate of the SII, the countries included in the analysis can be divided in four groups or clusters[10]:

- Sweden, Switzerland, Finland, Denmark, Japan and Germany are the *innovation leaders*, with SII scores well above that of the EU25 and the other countries. The lead of the innovation leaders has been declining compared to the average of the EU25, with the exception of Denmark.
- The US, UK, Iceland, France, Netherlands, Belgium, Austria and Ireland are the *innovation followers*, with SII scores below those of the innovation leaders but above that of the EU25 and the other countries. The above EU25 average innovation performance of the followers has been declining. Also, the gap of the

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[9] The Technical Annex provides more details.

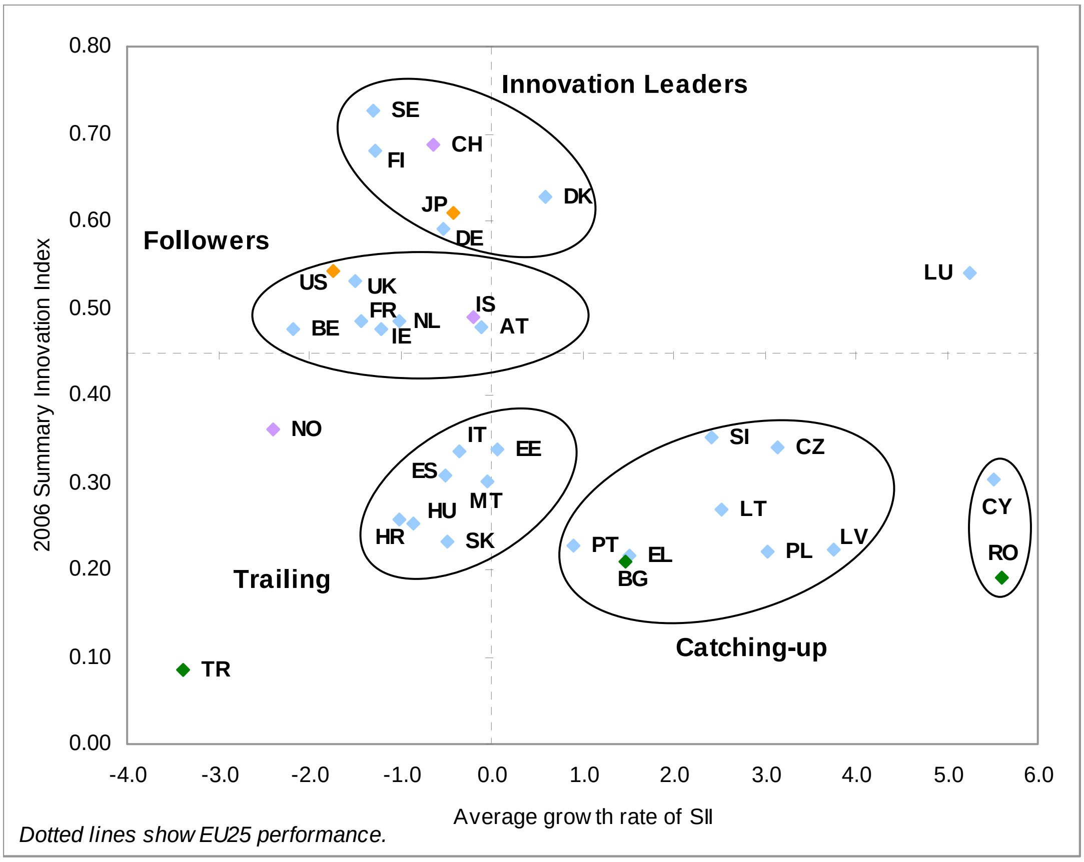
[10] These groups were determined using hierarchical clustering techniques.

innovation followers with the innovation leaders has on average slightly increased.

- Slovenia, Czech Republic, Lithuania, Portugal, Poland, Latvia, Greece and Bulgaria make up the group of *catching-up countries*, with SII scores well below that of the EU25 and the innovation leaders, but with faster than average innovation performance improvement.
- Estonia, Spain, Italy, Malta, Hungary, Croatia and Slovakia are *trailing*, with SII scores well below that of the EU25 and the innovation leaders and innovation performance growth which is either below or only just above that of the EU25.

Cyprus and Romania form a separate fifth cluster of fast growing catching-up countries. Cyprus being one of the smallest EU countries and Romania starting from very low levels of innovation performance, this cluster is less robust than the other clusters and is therefore not seen as a real cluster. Luxembourg, Norway and Turkey do not fit into any of these groups.

FIGURE 2: SII AND TRENDS



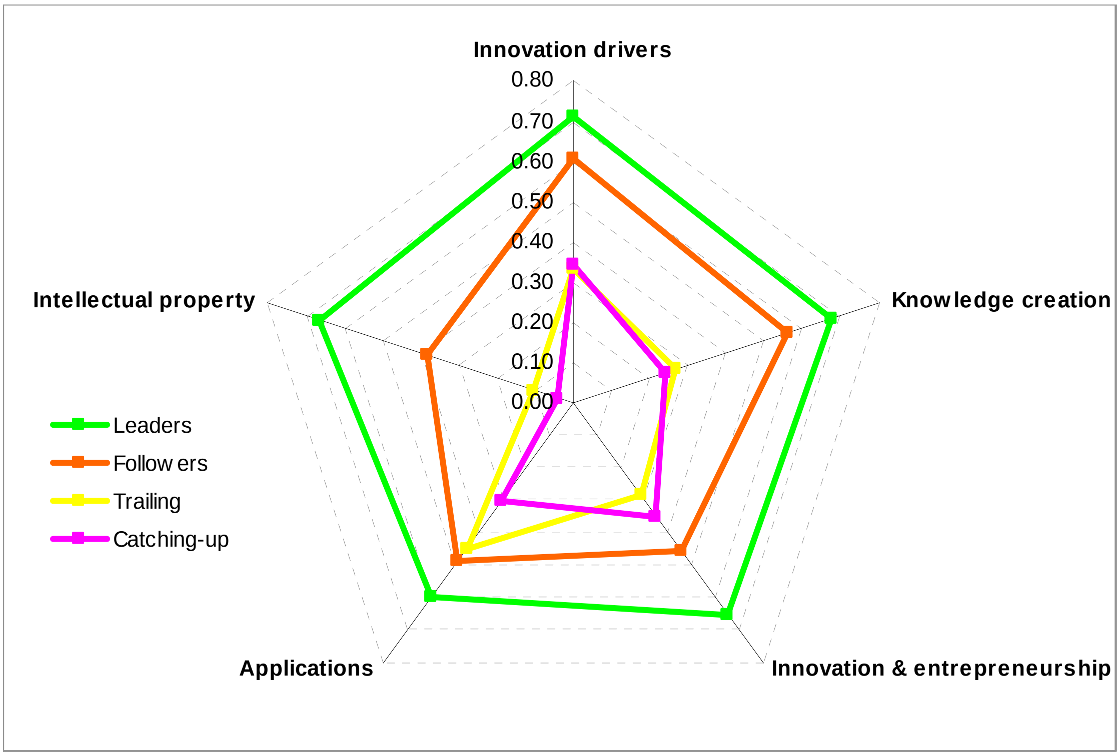
Current performance as measured by the SII is shown on the vertical axis. Relative to EU25 growth performance of the SII is shown on the horizontal axis. This creates four quadrants: countries above both the average EU25 trend and the average EU25 SII are forging ahead from the EU25, countries below the average SII but with an above average trend performance are catching up, countries with a below average SII and a below average trend are falling behind, and countries with an above average SII and a below average trend maintain their lead but are growing at a slower rate.

Figure 2 suggests that there is a *process of convergence* in innovation performance in Europe: the catching-up countries are closing the gap with the EU25 and both the innovation leaders and followers are experiencing a relative decline in their innovation lead with the EU25. This relative decline is a straightforward result of the rapid increases in innovation performance in the new member states.

2.2. Five key dimensions of innovation performance

Innovation is a non-linear process. The 25 EIS innovation indicators have been classified into five dimensions to better capture the various aspects of the innovation process[11]. *Innovation drivers* measure the structural conditions required for innovation potential, *Knowledge creation* measures the investments in R&D activities, *Innovation & entrepreneurship* measures the efforts towards innovation at the firm level, *Applications* measures the performance expressed in terms of labour and business activities and their value added in innovative sectors, and *Intellectual property* measures the achieved results in terms of successful know-how.

FIGURE 3: INNOVATION PERFORMANCE PER COUNTRY GROUP AND INNOVATION DIMENSION



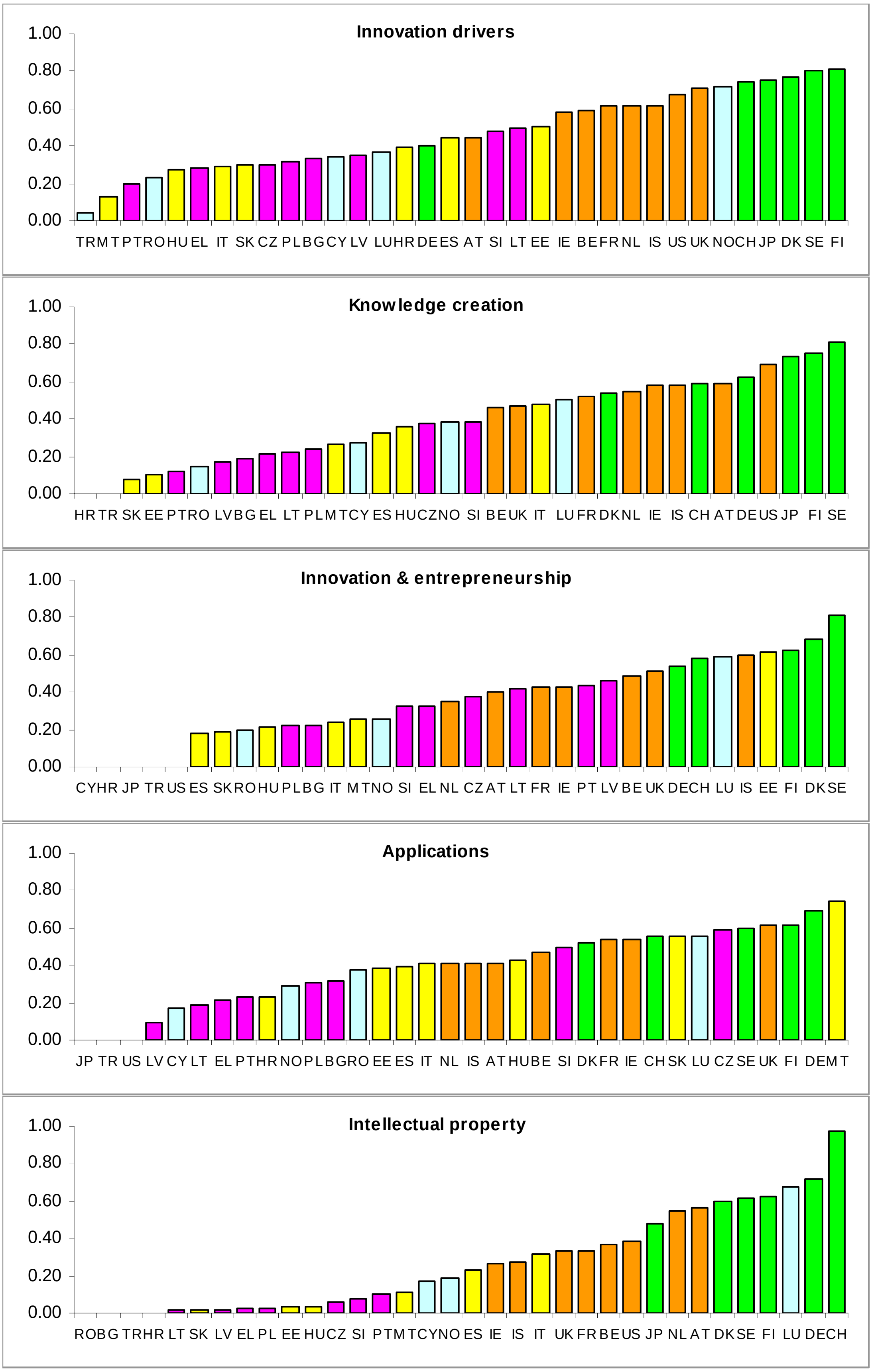
In terms of this year's composite indicator scores, the innovation leaders perform best on all innovation dimensions (see Figure 3). The innovation followers score second

[11] These dimensions were introduced in the EIS 2005. More details can be found in the 2005 methodology report http://www.proinno-europe.eu/inno-metrics.html

on every innovation dimension. Of the countries showing a below EU25 innovation performance, the trailing countries perform better than the catching-up countries on Knowledge creation, Applications and Intellectual property but worse on Innovation drivers and Innovation & entrepreneurship.

Figure 4 shows the ranking of countries for each of the 5 dimensions, from worst to best performer. Countries generally perform at a comparable level in each of these dimensions. However, there are some noteworthy exceptions. Germany and Austria are performing relatively worse in Innovation drivers, the Netherlands in Innovation & entrepreneurship, and the Netherlands, Austria and Iceland in Applications. Of the stagnating countries, Estonia is among the best performers in Innovation & entrepreneurship and Malta in Applications.

FIGURE 4: INNOVATION PERFORMANCE PER GROUP OF INDICATORS



2.3. Innovation performance by country

Table 2 identifies for each indicator the three European countries with the highest scores[12] and the results for the EU25, EU15, US and Japan. The innovation leaders take up more than 50% of the leading slots, the innovation followers take up 20% and the trailing countries and catching-up countries each 10% of the leading slots. The innovation leaders are particularly dominant in knowledge creation, innovation & entrepreneurship and intellectual property. The innovation followers are most dominant in innovation drivers.

TABLE 2: INNOVATION PERFORMANCE LEADERS

	EU25	EU15	European 'innovation leaders'			US	JP
INNOVATION DRIVERS							
1.1 S&E graduates	12.7	13.6	IE (23.1)	FR (22.0)	UK (18.1)	10.2	13.4
1.2 Tertiary education	22.8	24.0	FI (34.6)	DK (33.5)	EE (33.3)	38.4	37.4
1.3 Broadband penetration rate	10.6	12.0	IS (22.5)	NL (22.4)	DK (22.0)	14.9	16.3
1.4 Life-long learning	11.0	12.1	SE (34.7)	UK (29.1)	DK (27.6)	--	--
1.5 Youth education	76.9	74.1	NO (96.3)	SK (91.5)	SI (90.6)	--	--
KNOWLEDGE CREATION							
2.1 Public R&D expenditures	0.65	0.66	IS (1.17)	FI (0.99)	SE (0.92)	0.68	0.74
2.2 Business R&D expenditures	1.20	1.24	SE (2.92)	FI (2.46)	CH (2.16)	1.87	2.39
2.3 Share of medium-high/high-tech R&D	--	89.2	SE (92.7)	DE (92.3)	CH (92.0)	89.9	86.7
2.4 Share of firms receiving public funding	--	--	LU (39.3)	IE (27.8)	AT (17.8)	--	--
INNOVATION & ENTREPRENEURSHIP							
3.1 SMEs innovating in-house	--	--	IE (47.2)	IS (46.5)	DE (46.2)	--	15.3
3.2 Innovative SMEs co-operating with others	--	--	DK (20.8)	SE (20.0)	FI (17.3)	--	6.9
3.3 Innovation expenditures	--	--	SE (3.47)	EL (3.08)	DE (2.93)	--	--
3.4 Early-stage venture capital	--	0.023	DK (0.068)	SE (0.067)	UK (0.048)	0.072	--
3.5 ICT expenditures	6.4	6.4	EE (9.8)	LV (9.6)	SE (8.6)	6.7	7.6
3.6 SMEs using organisational innovation	--	--	CH (63.0)	LU (58.4)	DK (57.1)	--	--
APPLICATIONS							
4.1 Employment in high-tech services	3.35	3.49	SE (5.13)	IS (4.97))	DK (4.69)	--	--
4.2 High-tech exports	18.4	17.7	MT (55.9)	LU (29.5)	IE (29.1)	26.8	22.4
4.3 Sales share of new-to-market products	--	--	MT (13.6)	SK (12.8)	PT (10.8)	--	--
4.4 Sales share of new-to-firm products	--	--	PT (15.1)	DE (10.0)	ES (10.0)	--	--
4.5 Employment in medium-high/high-tech manufacturing	6.66	6.71	DE (10.43)	SI (9.63)	CZ (9.42)	3.84	7.30
INTELLECTUAL PROPERTY							
5.1 EPO patents	136.7	161.4	CH (425.6)	DE (311.7)	FI (305.6)	142.6	174.2
5.2 USPTO patents	50.9	60.2	CH (168.4)	DE (123.0)	SE (109.7)	277.1	304.6
5.3 Triad patents	32.7	38.9	CH (108.9)	FI (101.7)	DE (85.2)	47.9	102.1
5.4 Community trademarks	100.7	115.7	LU (782.7)	CH (225.2)	AT (187.0)	33.8	11.7
5.5 Community designs	110.9	127.6	LU (377.6)	DK (243.2)	CH (210.0)	17.5	13.2

[12] European countries are defined as the group of EU25 countries, Iceland, Norway and Switzerland.

Best performance across the indicators is scattered across Europe, with as much as 22 countries being among the best 3 performing countries in at least one indicator. Sweden does best being among the best 3 performing countries in 10 indicators, followed by Denmark and Germany each taking up 8 of the leading slots. For many indicators, differences among the best performers are too small to identify an overall best performing country. Only for the share of firms receiving public funding (LU), high-tech exports (MT), the sales share of new-to-firm products (PT), EPO patents (CH) and community trademarks and designs (LU) one can identify an overall 'innovation leader'. The indicators of innovation performance suggest that a country can be an innovation leader only if it has a well established innovation system with all elements in place. While practically all EU member states excel in one or the other innovation dimension, only some of them have achieved the overall performance to become world innovation leaders.

The US performs better than the EU in 11 indicators, while the EU only scores above the US in 4 indicators (S&E graduates, employment in medium-high and high-tech manufacturing, community trademarks and community designs). Japan performs better than the EU in 11 indicators, while the EU only scores above Japan in 3 indicators (share of medium-high and high-tech R&D, community trademarks and community designs). Indeed, performance in intellectual property is biased due to the home advantage that local companies have in their local market. This home advantage explains the very high patent score for the US on USPTO patents and the poor performance for the US and Japan on both *community* trademarks and *community* designs within the EU. However, while the US and Japan both outperform Europe in USPTO patents, the opposite is not the case for EPO patents.

2.4. Innovation input and innovation output

The concept of innovation efficiency is a key dimension of innovation policy. Innovation efficiency can be measured as the ability of firms to translate innovation inputs into innovation outputs. The ratio between the EIS composite index for inputs (education, investment in innovation, etc) and outputs (firm turnover coming from new products, employment in high tech sectors, patents, etc) provides a simple measure of this relationship for national innovation systems by assuming a linear relationship between inputs and outputs[13].

The composite indicator for Inputs is computed as the average of the 14 indicators covered in Innovation drivers, Knowledge creation and Innovation & Entrepreneurship. The composite indicator for Outputs is computed as the average of the 10 indicators covered in Applications and Intellectual Property.

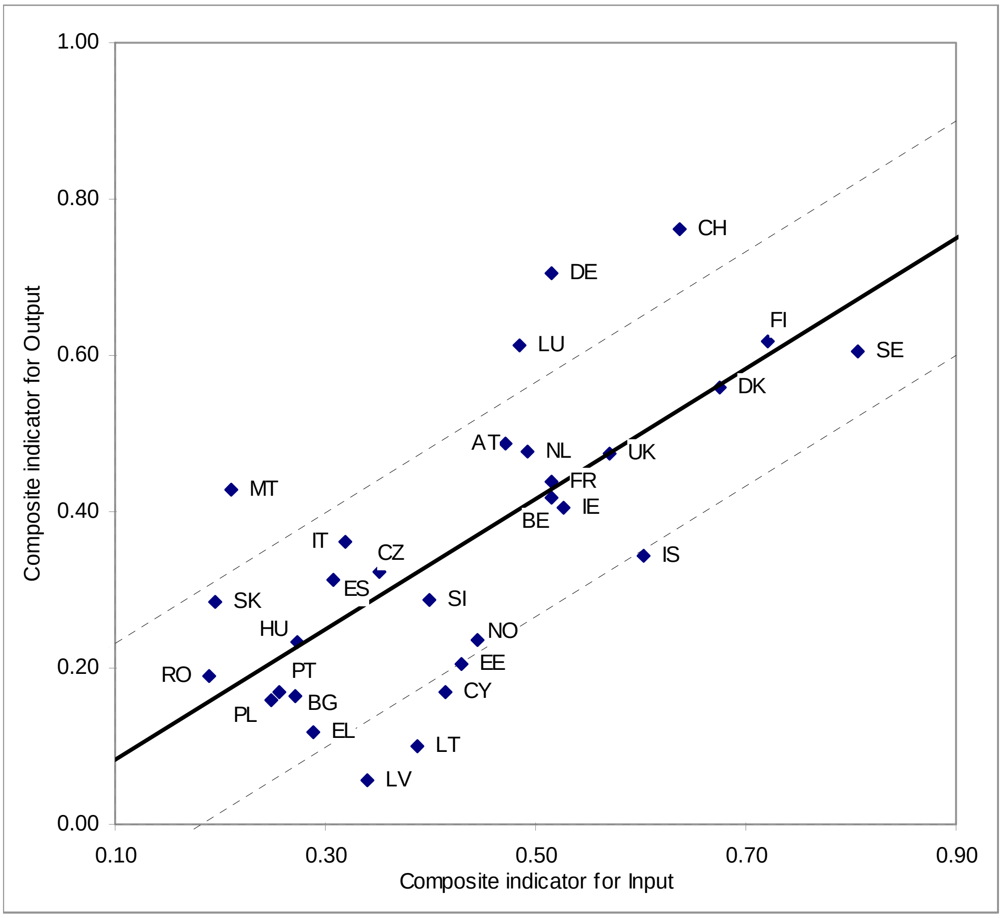
Figure 5 shows graphs of the composite index scores for Inputs against the scores for Outputs. The results give an indication of the efficiency with which a country transforms its innovation inputs (education, investment in innovation) into innovation outputs (turnover coming from new products, employment in high-tech sectors, and patents).

Countries above the diagonal line perform better on outputs than on inputs, suggesting that they are more efficient at transforming inputs into outputs than countries below

[13] It should be noted that as such there is no theoretical foundation for this linear assumption.

the diagonal line. The picture is very diverse, with both highly innovative countries, such as Germany and Switzerland, and average performing countries such as Italy falling above the diagonal line. Most of the new Member States fall on the other side of the diagonal, with relatively large investments but poor performance on outputs. However, innovation is a long-term process and the evolution of the output performance of these countries will probably improve in the years to come based on current investment in inputs. Among the more advanced countries, Iceland is an example of a country that is a poor performer on applications despite a favourable general business environment with high investments in R&D and a good education level.

FIGURE 5: INNOVATION INPUT AND OUTPUT



The solid line shows the trend line between both the input and output composite indices.

2.5. The EU innovation gap with the US and Japan

The US and Japan are still ahead of the EU25 as shown in Figure 6, but the innovation gap between the EU25 and Japan, and in particular with the US is decreasing.

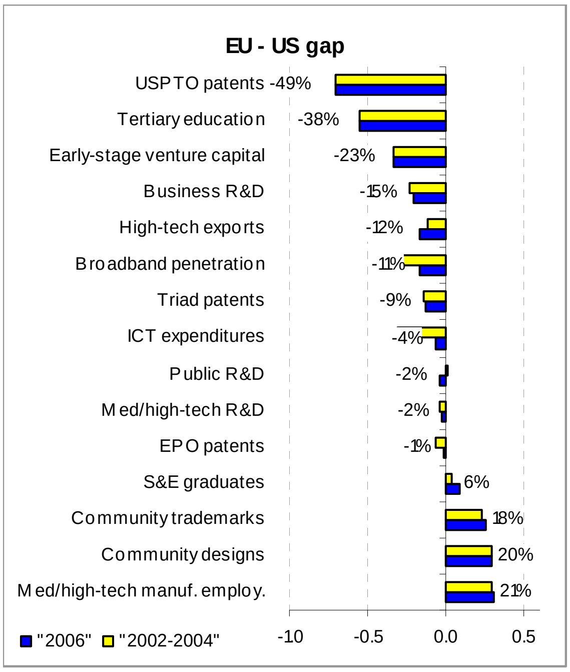
FIGURE 6: EU25 INNOVATION GAP TOWARDS US AND JAPAN

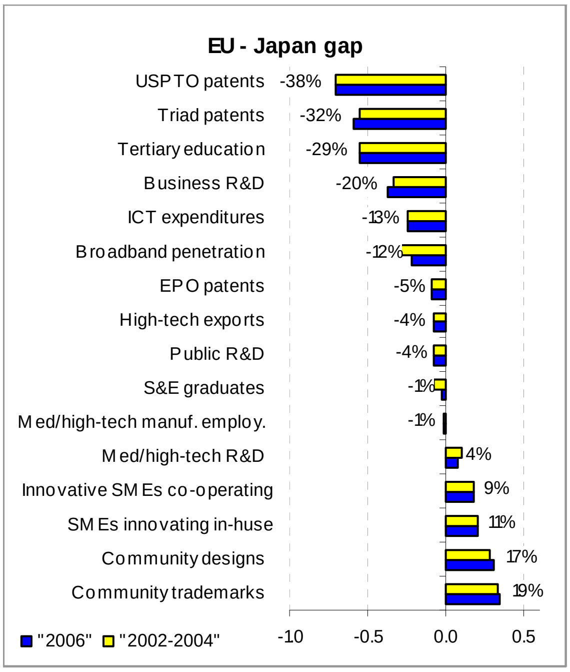
An analysis by innovation category shows that Europe is lagging behind the US and Japan with regard to innovation drivers, knowledge creation and intellectual property. For the remaining two innovation categories (i.e. innovation & entrepreneurship and applications) the available evidence does not allow to draw any firm conclusion.

A more detailed look at the five innovation groups highlights some peculiar differences between Europe and its competitors. Europe is ahead in the following areas (cf. also Figure 7):

- New graduates in science and engineering are 13‰ of population aged 20-29 in Europe and in Japan (2004 data), but only 10‰ in US (2004 data).
- In Europe and Japan, employment in manufacturing industries that produce medium/high and high-tech goods (7% of total workforce in 2003) is almost twice than that in the US (4% in 2003). A negative signal for Europe is that this indicator has declined by a few decimal points in 2005.
- European trading companies (101 trademarks per million population in 2005) have obtained a much larger number of new Community Trademarks than US companies (34 trademarks in 2005) and Japanese companies (only 12 trademarks in 2005). These figures reflect the fact that Community trademarks are intended to facilitate trade activities in the Member States of the European Union.
- The number of Community designs is also very high in Europe (111 new designs per million population in 2005) with respect to US and Japan (18 and 13 new designs, respectively, in 2005). These results are also consistent with the fact that Community designs are intended to facilitate the protection of the outward appearance of products that are sold in the European market.

FIGURE 7: INNOVATION GAP BY INDICATOR





On the other hand, Europe is lagging behind its competitors in a number of important aspects:

- In 2004, the expenditure of Japanese business in R&D (2.4% of GDP) amounted to twice the expenditures in Europe (1.2% of GDP). In the United States such expenditures stabilised around 1.9% of GDP.
- ICT expenditure in 2005 (6.7% of GDP in US, 7.6% in Japan, and only 6.4% in Europe).
- Broadband penetration rates for 2005 were 11% for EU25 and almost 15% for the US, whilst Japan was above 16%. The range within European countries varies from 1% to 22%.
- In 2003, the population with tertiary education was 38% in the US and 37% in Japan, whilst – in 2005 – it was still only 23% in Europe. The figures for the Scandinavian countries are around 30%.
- In the United States, venture capital investments at the early stage of activity of a company (0.072% of GDP) were in 2002 more than three times larger than the investments in Europe in 2005 (0.023% of GDP). No data are available for Japan.
- In 2004, 26.8% of total exports of goods in US was in high-tech products, while these represented 22.4% in Japan, and only 18.4% in Europe;
- The patents granted by the US patent office and the triadic patent families (those for which there is evidence of patenting activity in all blocks, i.e. EPO, USPTO and JPO), are a stronghold of the US and Japan. The number of patent applications filed at the European patent office (for which Europe as a home advantage) is again slightly in favour of our competitors (data of 2003).

Some indicators show a remarkable trend, although further progress in other indicators is still needed to close the remaining gap. In the group innovation drivers, the indicator for broadband penetration rate has increased its score by 60% since 2004, going from 6.5 to 10.6 broadband lines per 100 population in 2005. Three indicators in the group of intellectual property have also increased significantly. These are:

- New applications to the European patent office, which have shown an annual average growth rate of 3.7% (increasing from 114 per million population in 1998, to 137 in 2003);
- New Community trademarks, which have had an annual average growth rate of 11%, increasing from 66 to 101 new trademarks per million population between 2001 and 2005;
- New Community designs, which have shown an annual average growth rate of 18% from 2003 to 2005, increasing from 79.6 to 110.9 new designs per million population.

On the other hand, the areas for concern relate to early stage venture capital (in the group innovation & entrepreneurship) and new-to-firms sales (in the group applications), where both indicators halved their performance from 2000 to 2004 and show a disappointing average level for EU25.

Determining the common drivers of the European innovation process is not a univocal process; in fact, the innovation patterns depend strongly on a heterogeneous mix of variables. The *2006 EIS Innovation Strengths and Weaknesses report*[14] provides additional details on levels and trends at country level.

[14] The *2006 EIS Innovation Strengths and Weaknesses report* is available at: http://www.proinno-europe.eu/inno-metrics.html

3. THEMATICS

3.1. New indicators (Methodology report)

Each Trend Chart Methodology Report has a specific focus, for example the 2005 Report evaluated the methodology of constructing composite indicators and provided a re-assessment of the indicators included in the EIS. The assessment was linked to the composite indicator analysis and sought to determine if there were redundancies in the EIS indicators or areas within each of the main themes that were not fully captured. The 2006 Methodology Report[15] builds on the latter aspect of the 2005 Report. The goal of the 2006 Report has been to further explore the different dimensions of innovation and to identify areas that are not well covered in the current EIS.

The difficulties in measuring innovation in the services sector and in comparing performance with manufacturing sectors have been discussed in the 2006 thematic report *Can we Measure and Compare Innovation in Services?*[16]. In 2007 the EIS will re-visit the fields of innovation in services and organizational innovation by studying the recently released CIS-4 data.

The 2006 Methodology Report has also identified possible indicators of relevance to EU policy for measuring national innovative capabilities. The indicators could come from three sources: 1) existing data sources, including the Community Innovation Survey (CIS), 2) by making modifications to future versions of the CIS, and 3) by conducting new surveys to gather the necessary data. Table 3 summarises these indicators.

The first group of indicators only lists existing indicators that could be obtained from the CIS. These indicators would require access to the CIS micro-data because they require analyzing the CIS data in new ways. Other existing indicators can be drawn directly from Eurostat, OECD or US National Science Foundation (NSF) sources.

The proposed new CIS indicators are based on CIS-4. It is important to note that all proposed new indicators would need to be thoroughly field tested to ensure that they are feasible to construct, that they measure what they are intended to measure, and that they are reliable. For these reasons, several of these indicators cannot be precisely defined at this stage, such as for market demand.

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[15] The 2006 Methodology report *Searching the forest for the trees: "Missing" indicators of innovation* is available at: http://www.proinno-europe.eu/inno-metrics.html

[16] The thematic report *Can We Measure and Compare Innovation in Services?* is available at: http://www.proinno-europe.eu/inno-metrics.html

TABLE 3: NEW INDICATORS

New indicators that can be constructed from existing CIS data		
Indicator	**Relevant CIS-4 questions**	**Relevance**
Knowledge diffusion	Q2.2 & Q3.2: Product/process innovation developed together with other firms/institutes Q6.2 Any innovation cooperation	Measures the prevalence among firms of all types of knowledge diffusion (with any partner) in innovation processes.
Technology diffusion	Q2.2 & Q3.2: item 3 (mainly other enterprises developed the innovation)	Firms that *only* innovate through technology adoption.
Effective technology diffusion	Q2.2 & Q3.2: item 3 (mainly other enterprises developed the innovation) Q7.1: 'high' score for either items 2 and 3 for product innovations, 'high score' for either items 1 – 4 for process innovations	Measures the ability of technology adopters to effectively implement technology acquired from other firms/institutes.
Fast growing gazelles	Q11.1 or Q11.2 on sales or employment (in top quintile for growth) Measure of innovative status: Either Q5.1/5.2, item 1 on R&D expenditures, or Q2.3 on innovation sales share (new to market), Q2.2/3.2 item 3 on technology adoption, or Q10.1 on organizational innovation.	General measure of success of EU policies in promoting innovation. Best to develop indicators for several different types of innovative gazelles, as these could be more appropriate for EU differences in national innovation systems. For instance, fast growing technology adopters could be more prevalent in the new member states.
Organizational innovation	Section 10: all questions. There are many options here for better indicators; can also be combined with Q3.1 on process innovation, particularly item Q3.2 on logistics.	Organizational innovation could be a key component in productivity improvements.
Innovation demand	Q1.2 on markets, Q8.2 item 9 on uncertain demand as a hampering factor, Q8.2 item 11 on no demand for innovations. Identify most pro-innovation market and determine percent of firms active in the market.	Demand is a central driver of innovation investments.
Technology demand (also diffusion indicator)	Q5.1/5.2 item 3. Note that the use of this indicator depends on a substantial improvement in data quality compared to previous CIS surveys.	Extent of demand for new production equipment, plus a measure of the diffusion of these technologies.
New indicators that could be constructed from modified or new CIS questions		
Indicator	**Required change or addition to CIS**	**Relevance**
Knowledge diffusion	CHANGE Q2.2 & Q3.2: Product/process innovation developed together with other firms/institutes; change option to *any* innovations introduced 'together with other enterprises or institutions"	Current format of question, which forces respondents to choose their main approach to innovation, will miss many firms that also partly depend on the diffusion of ideas and/or technology from other firms or organizations.
Technology diffusion	ADDITION: Develop a firm-specific question that asks about the importance to the firm of obtaining new product and process technology from external sources. We do not suggest disaggregating the question by region (home country, Europe, US, etc) as used in CIS-1, as this would dramatically increase the question length.	Direct measure of inward technology diffusion and would be particularly valuable information at the sector and national levels. CIS-1 also asked about outward diffusion, but there is no need to obtain outward diffusion data.
Technology diffusion / demand	CHANGE: Q5.1 and Q5.2 on acquisition of machinery: Change question to "produce new or significantly improved products *or for use in* new or significantly improved processes".	Both adoption of new technology and a measure of investment in its purchase, which is a demand indicator.

TABLE 3: NEW INDICATORS - CONTINUED

New indicators that could be constructed from modified or new CIS questions - continued		
Indicator	**Required change or addition to CIS**	**Relevance**
Organizational innovation	ADDITION: Percent employees affected by organizational innovation. ADDITION: No need for an organizational innovation ADDITION: Direction of change in workforce responsibilities Improve international comparability by listing organizational practices and their date of implementation.	Measure of 'size' or impact of organizational innovation. Improve international comparability. Increase in employee responsibility should improve innovative capabilities.
Government procurement	ADDITION: First, if the firm sells to the government, if yes, relative influence of cost versus innovative characteristics on procurement decision	Role of government procurement in demand for innovation.
Human resources	ADDITION: Would require a complete module on questions such as mobility, quality, shortages, training, etc.	Relevant to both innovation and policy on HRST, but this would notably increase the length of the CIS. It would be better to first explore alternative methods of gathering HRST data.
New indicators that would require new survey work		
Indicator	**Target population**	**Relevance**
Family of indicators for the outputs of the public research sector, measured in units per 1000 researchers or million Euros R&D expenditures: 1. Spin-offs 2. Patents (applications & grants) 3. Licensing agreements 4. Licensing income	Universities and publicly funded research organizations. The questionnaire could be sent to Technology Transfer Offices, who should be able to provide this information.	Directly relevant for measuring the commercialization of publicly-funded research, but must be combined with measures of the importance to firms of 'open science' through scientific publications.
Venture capital availability	Venture capital firms, other organizations that provide early-stage capital	Availability of capital for risky projects is a better indicator of the ability of entrepreneurs to obtain capital than a measure of the supply. Can also be limited to project ideas based on a new invention.
Supply of entrepreneurial managers	Venture capital firms Technology Transfer Offices	A lack of skilled management could be a serious constraint to the success of new start-up firms.
Percent of S&E students that take classes on entrepreneurship; could also ask about the content of the classes, such as on management, IPR, etc	Students – to reduce costs could be limited to a survey of MSc and PhD level students. Could be a suitable topic for a Eurobarometer survey.	Development of entrepreneurial capabilities and knowledge among S&Es.
Mobility of research staff between the public research sector and the business sector	Scientists and engineers in the public research sector, or firms using Innobarometer.	Of interest to mobility policy, but little information on the relevance of this method of knowledge diffusion versus other methods such as open science.

The proposed new indicators that would require new surveys all cover specialised or infrequent activities. The target population in many cases is comparatively small, such as University Technology Transfer Offices or venture capital firms. Consequently, the most economically efficient method of surveying these populations is to conduct a single EU-wide survey. This suggests a role for the European Commission in funding such surveys, as it does already through the Innobarometer.

3.2. International comparison – Global Innovation Scoreboard

The "Global Innovation Scoreboard" report (GIS)[17] compares the innovation performance of the EU25 to that of the other major R&D spenders and emerging economies in the world: Argentina, Australia, Brazil, Canada, China, Hong Kong, India, Israel, Japan, New Zealand, Republic of Korea, Mexico, Russian Federation, Singapore, South Africa and the US.

Of the 25 indicators used to measure innovation performance in the European Innovation Scoreboard (EIS), GIS data were available for 12 of them. Innovation performance is measured by use of a composite indicator, the Global Summary Innovation Index (GSII) decomposed into 5 composite indices measuring 5 key innovation dimensions: Innovation drivers, Knowledge creation, Diffusion, Applications and Intellectual property. Overall data availability for all countries is as high as 97% in the reference year and 90% in the base year. For South Africa, India, Malta and Croatia data availability was poorest.

Based on the ranking of their GSII scores, the countries analysed can be divided into four groups:

- Finland, Sweden, Switzerland, Japan, the US, Singapore and Israel are the *global innovation leaders*.
- The group of *next-best performers* includes Germany, Denmark, Netherlands, Canada, the UK, Republic of Korea, France, Iceland, Norway, Belgium, Australia, Austria, Ireland, Luxembourg and New Zealand.
- The group of *follower countries* includes the Hong Kong, Russian Federation, Slovenia, Italy, Spain, Czech Republic, Croatia, Estonia, Hungary and Malta.
- The group of *lagging countries* includes Lithuania, Greece, China, Slovakia, South Africa, Portugal, Bulgaria, Turkey, Brazil, Latvia, Mexico, Poland, Argentina, India, Cyprus and Romania.

Cluster analysis using the composite indices for the 5 key innovation dimensions is a more powerful tool for identifying countries with similar performance than the ranking based on the Global Summary Innovation Index (GSII). The GSII can give two countries identical global ratings even if their behaviour in the five composite indices is very different. Based on their absolute scores on the 5 innovation dimensions, the countries can be clustered into 5 *performance clusters*.

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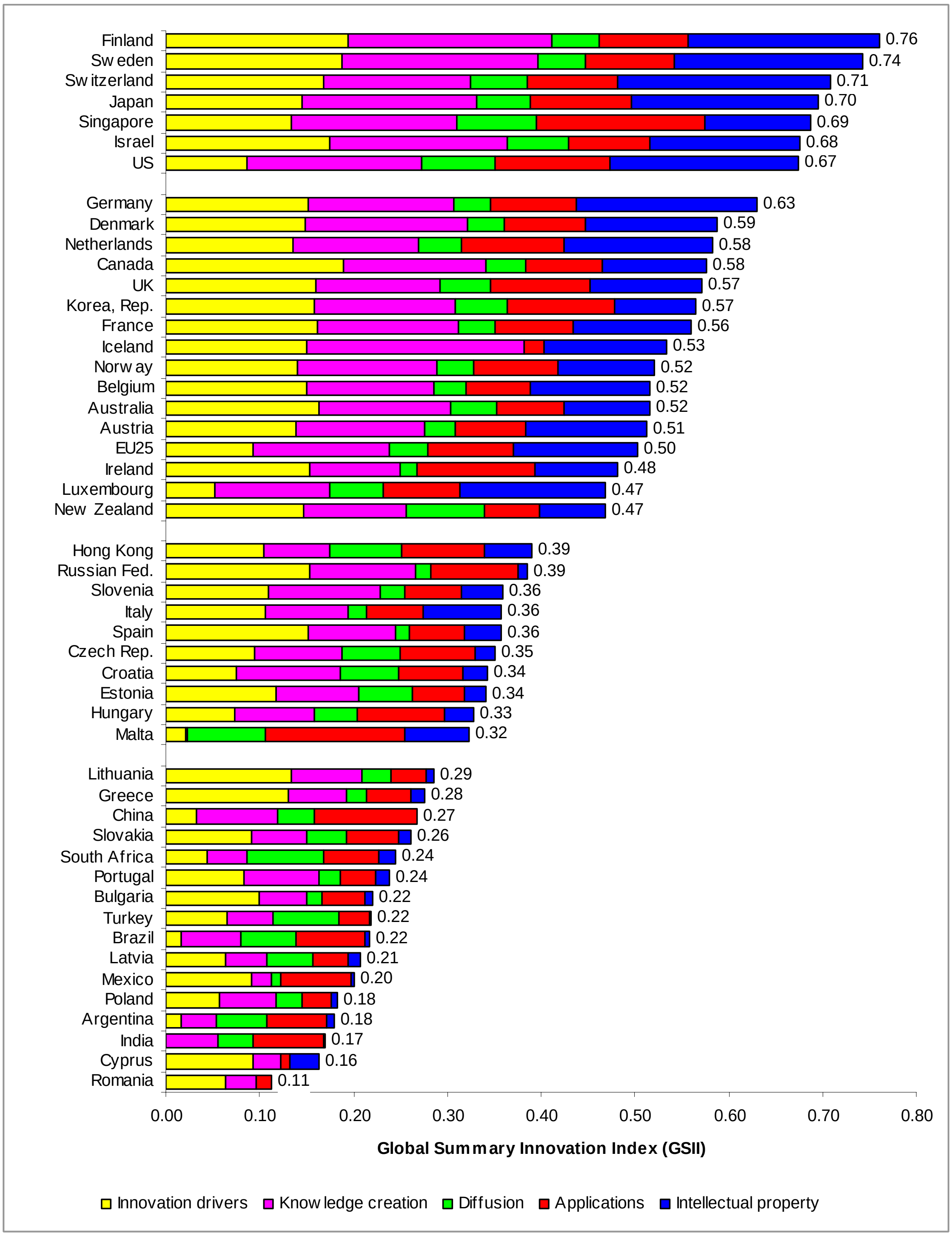
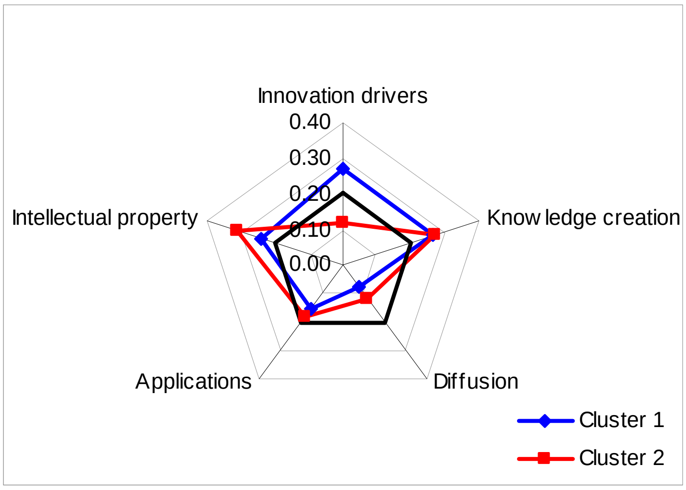
[17] The thematic report *2006 "Global Innovation Scoreboard" (GIS) report* is available at: http://www.proinno-europe.eu/inno-metrics.html

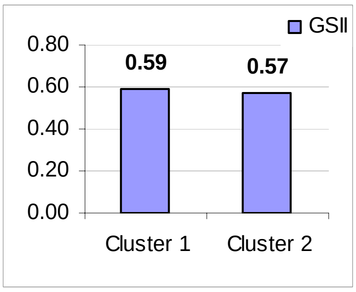
FIGURE 8: GLOBAL INNOVATION PERFORMANCE



Another option for clustering is to compare relative performance across the five dimensions, so as to identify countries with similar *patterns* of innovation performance. Absolute differences in performance between countries are excluded and inter-country differences are entirely due to the relative differences in strengths and weaknesses across each dimension. The purpose of a clustering on relative performance is to identify countries that share similar patterns of innovation strengths and weaknesses. This information could assist the policy community in identifying better performing countries with similar patterns. Based on their relative or normalised scores on the 5 innovation dimensions, the countries can be clustered into 6 *pattern clusters* where countries are comparable in their relative performance structure.

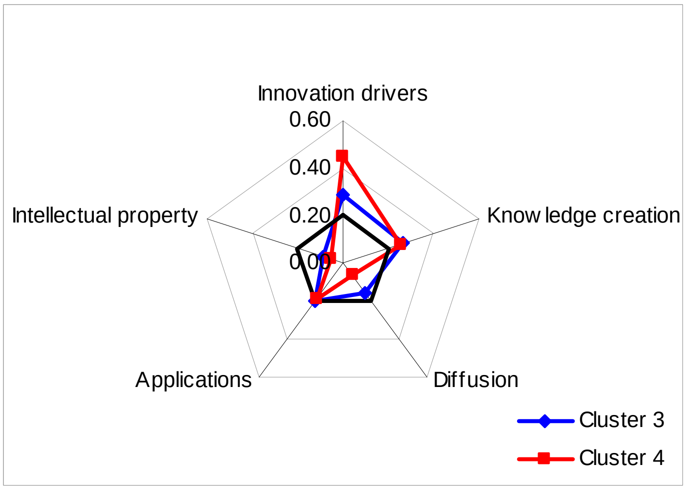
FIGURE 9: CLUSTER GROUPINGS





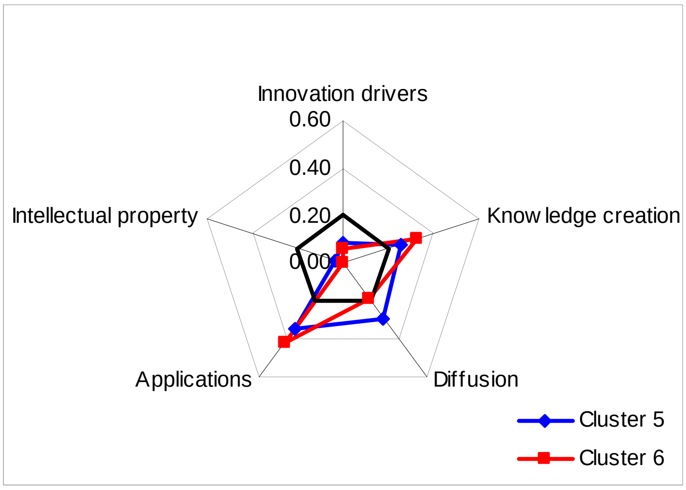
Cluster 1: Finland, Sweden, Denmark, Israel, Austria, France, Belgium, Italy, Norway, Japan, Germany, Switzerland, Netherlands, Australia, Canada, Republic of Korea and UK

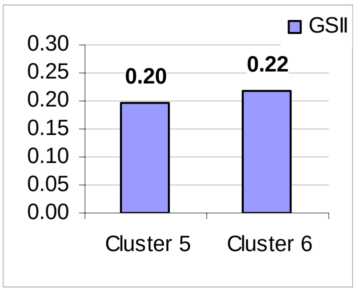
Cluster 2: US and Luxembourg



Cluster 3: Portugal, Slovenia, Poland, Singapore, Hungary, Czech Republic, Croatia, Estonia, Slovakia, Latvia, Hong Kong and New Zealand

Cluster 4: Greece, Bulgaria, Lithuania, Spain and Russian Federation





Cluster 5: Argentina and Brazil

Cluster 6: China and India

By combining cluster membership based on both absolute and relative performance we can identify 3 clusters including 6 or more countries and 5 mini-clusters including only 2 or 3 countries:

- Japan, Germany, Switzerland, Finland, Sweden and Israel are alike both in their absolute performance and relative performance levels. These countries can be classified as the absolute innovation leaders from which all other countries can learn to improve their innovation performance.
- Austria, Belgium, France, Denmark, Republic of Korea, Norway, Australia, UK, Canada and Netherlands are alike in relative performance to the innovation leaders, but they lag behind in absolute performance.

- Estonia, Slovenia, Czech Republic, Hungary, Croatia and Hong Kong attain similar levels in their absolute and relative innovation performance. These countries are far behind the innovation leaders, their different relative performance structure might be one explanation for this performance lag.

The mini-clusters combine either different groups of European countries (Slovakia, Poland and Portugal; Greece, Lithuania and Bulgaria; Spain and Russian Federation) or Latin American (Argentina and Brazil) or Asian countries (India and China).

Of the non-EIS countries, Israel, Republic of Korea, Australia and Canada are similar to the average performing EU countries. Hong Kong is classified with the better performing new Eastern European Member States and the Russian Federation is classified together with Spain. Neither Argentina and Brazil nor India and China are comparable to any of the better performing EU countries in either absolute or relative performance levels. It would seem that in these countries a substantial improvement in their innovation systems is still necessary to catch-up with the best performing countries.

By comparing the GSII in the most recent reference year and that in the base year, trend performance of the GSII can be compared with current performance. Of the non-EU countries, 11 countries are catching up towards the average EU level of innovation performance, 7 countries are forging ahead (Switzerland, Singapore, Canada, Republic of Korea, Iceland, Norway and Australia), 3 countries are losing momentum (Israel, Japan and the US) and Brazil is falling behind. The EU's average innovation performance is improving at a slower rate than that of the 18 non-EU countries. Although the average innovation performance of the EU is growing faster than that of three non-European leading countries: Israel, Japan and the US, the EU is still facing a gap in innovation performance with these countries.

The cluster analysis performed suggests that for most of the EU countries there are only limited learning possibilities to improve their innovation performance from countries such as Argentina, Brazil, India and China. For several of the better performing new Member States it might be worth studying the innovation system of Hong Kong. For some of the better performing EU countries the Republic of Korea, Australia and Canada could be relevant peer countries to learn from. For the best performing EU countries, Japan, Switzerland, (the US) and to a lesser extent also Israel are the relevant peer countries[18].

3.3. IPR and innovation

Since the 1995 Green Paper on Innovation, the European Commission and the Governments of several Member States have emphasized the role of Intellectual Property Rights (IPR) as an incentive to firms to invest in innovation and as a means of appropriating their investments in innovation. One of the main concerns over time has been a lower rate of patenting by European firms compared to American firms, as identified in several editions of the EIS[19].

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[18] Due to the high focus on military research, it is deemed that Israel is less of an example than Japan and Switzerland, which are more similar in their research focus to the best performing EU25 countries.

[19] See http://www.proinno-europe.eu/inno-metrics.html for the 2005 edition.

The difference in patenting rates between the US and Europe is partly due to a difference in industrial structures. For example, compared to the US, a higher percentage of European value added and employment is from manufacturing sectors with low to moderate background patent rates[20], such as transportation equipment. The US, conversely, has a higher concentration of firms active in high-technology sectors with high background patent rates such as pharmaceuticals, biotechnology and IT equipment.

Another possibility is that European firms are less likely to patent an equivalent invention than American firms, due to possible differences in attitudes to Intellectual Property (IP), the cost of IP or knowledge about how to apply for IP. In this case, there could be a policy case to promote greater use of IP by European firms. The argument for policy intervention is strongest for small and medium sized firms (SMEs) with less than 250 employees, since larger firms with 250 plus employees are more likely to have the financial resources to exploit IP. A high percentage of Europe's largest firms also have expert IP services in-house and have experience applying for a patent.

In order to evaluate whether or not policy actions are likely to have beneficial effects, one first needs to know current background rates for the use of IP by SMEs and the possible effect of an increase in IP use by SMEs on total IP. For example, a concerted effort to increase patenting by SMEs would only have minor economic impacts if the background rate of IP use by SMEs is very low, with most IP use concentrated among large firms. The thematic IPR report[21] presents estimates of the responses to the following questions[22]:

1. What percentage of SMEs and large firms use IP?
2. How would an increase in IP by SMEs affect total IP applications?

In all countries a larger percentage of large firms with 250 or more firms applied for a patent than SMEs. The difference between large firms and SMEs ranges from 1.9 times higher in large firms in Belgium to 11.4 times higher in Latvia, with an average of 5.2 times higher. The average ratio between the use rate for large firms and for SMEs is lowest for non-formal protection methods such as secrecy (3.0), design complexity (2.5) and lead times (3.2) than it is for the formal protection methods of design registration (3.9), trademarks (3.5) and copyright (2.9). A large fraction of these differences is probably due to lower rates of innovative activity among SMEs compared to large firms, but these results also stand when limited to the innovative firms.

Assuming that a policy intervention leads to an increase of the number of SMEs that apply for a patent by 25%, simulation results show that patent application rates would increase by 4% in both the innovative (Belgium, Germany, Spain, Iceland, Norway and UK) and the less innovative (Czech Republic, Estonia, Greece, Hungary,

[20] The background patent rate is defined as the number of patents per employee or unit of value added or sales

[21] The thematic report *Patent applications by SMEs: An analysis of CIS-3 data for 15 countries* is available at: http://www.proinno-europe.eu/inno-metrics.html

[22] The analysis used CIS3 data for Belgium, Czech Republic, Germany, Estonia, Spain, Greece, Hungary, Iceland, Latvia, Lithuania, Norway, Portugal, Romania, Slovakia and the UK.

Lithuania, Latvia, Portugal, Romania and Slovakia) group of countries. However, in relative percentage terms, the increase is greater in the innovative countries (21%) than in the less innovative countries (5%).

3.4. Innovation at the regional level – Regional Innovation Scoreboard

In 2002 and 2003 two Regional Innovation Scoreboards have been published[23]. Both reports focused on the regional innovation performance of the EU15 Member States using a more limited number of indicators as compared to the EIS. The 2006 Report[24] provides an update of both reports by using more recent data and provides an extension by also including the regions of the new Member States. As compared to the 2003 RIS, the number of regions has increased from 173 to 208, but the number of indicators decreased from 13 to 7. The 2003 regional indicators using CIS data could not be included as regional CIS2 data are too outdated referring back to 1996. Regional CIS3 data are not available and regional CIS4 data will only become available in 2007.

TABLE 4: REGIONAL INNOVATION SCOREBOARD INDICATORS

Human Resources in Science and Technology – Core (% of population)
Participation in life-long learning per 100 population aged 25-64)
Public R&D expenditures (% of GDP)
Business R&D expenditures (% of GDP)
Employment in medium-high and high-tech manufacturing (% of total workforce)
Employment in high-tech services (% of total workforce)
EPO patents per million population

The 2003 RIS used a composite indicator - the Revealed Regional Summary Innovation Index (RRSII) - to locate *local* leaders by taking into account both the region's relative performance within the EU and the region's relative performance within the country[25]. Building upon the methodology used in the 2003 RIS, two indexes are calculated of which a weighted mean is taken for the Revealed Regional Summary Innovation Index (RRSII): the RNSII or Regional National Summary Innovation Index which takes the average of the re-scaled relative to the country mean indicator values and the REUSII or the Regional European Summary Innovation Index which takes the average of the re-scaled relative to the EU25 mean indicator values. In the re-scaling process a power-root transformation has been applied to

[23] The 2002 and 2003 reports are available at http://www.proinno-europe.eu/inno-metrics.html

[24] The thematic report *2006 Regional Innovation Scoreboard (2006 RIS)* is available at http://www.proinno-europe.eu/inno-metrics.html

[25] The RRSII was designed to pinpoint 'local leaders'. Regions in highly performing countries will always look more favourable when compared directly to regions from less performing countries.

correct possible problems of outliers and skewed data distributions[26]. For Human Resources, public R&D, business R&D, medium-high/high-tech manufacturing employment and high-tech services employment, a square-root transformation has been used. For life-long learning and EPO patents a double-square-root transformation has been used. Both composite indicators are only calculated when data are available for at least 6 indicators.

The RRSII is then calculated as the weighted average of the re-scaled values for RNSII and REUSII as follows:

$$RRSII_{jk} = \frac{3}{4} * REUSII_{jk} + \frac{1}{4} * RNSII_{jk}$$

Identifying local leaders reduces the influence of those indicators for which a country has an above average performance. Peaks for indicators for which the country performs well above the EU mean are thus adjusted downwards. Peaks for indicators for which the country performs well below the EU mean are thus adjusted upwards. The RRSII thus increases the composite indicator value for leading regions in lagging countries and so local leaders become more visible.

Between 2002 and 2006, the methodology of calculating the RRSII has changed. The 2002 RIS used the most 'simple' methodology, data was neither transformed nor re-scaled and both the national and European component received an equal weight. The 2003 RIS introduced the re-scaling of the indicators and also included 5 indicators from the 2nd Community Innovation Survey (CIS). The 2006 RIS introduces the transformation of the data, with a square root transformation for 5 indicators and a double-square root transformation for 2 indicators. The 2006 RIS uses a smaller weight for the national component of ¼ only. Another change has been that the indicator data for each region has first been divided by the country average respectively, the EU25 average before entering the calculation of the RNSII respectively REUSII.

Due to these changes in the methodology of calculating the RRSII, one needs to be careful comparing the results between the 2002, 2003 and 2006 RIS. Two cases are highlighted in the 2006 RIS report: Noord-Brabant and Comunidad De Madrid. Noord-Brabant is showing a large drop in its rank, from 3 in 2002 and 4 in 2003 to 20 in 2006. Comunidad de Madrid shows a drop from the 9th place in 2002, to the 13th in 2003 and 31st in 2006. For Noord-Brabant, it is both the introduction of the re-scaling of data and the transformation of the data that causes a severe drop of about 16 places in the region's rank between 2002 and 2006. Changes in the weighting of the national component have almost no impact on the rank of this region. For Comunidad De Madrid, transforming the data has almost no impact on the ranking of the region once the data have been re-scaled. Re-scaling the data leads to a drop of 5 places once the data have been transformed. For Comunidad De Madrid it is primarily the change in the weight of the national component which has the biggest impact on the rank of the region. Decreasing this weight from 50% to 25% will lead to a drop of about 19 places in 2006.

[26] Nardo, M. M. Saisana, A. Saltelli and S. Tarantola (EC/JRC), A. Hoffman and E. Giovannini (OECD), Handbook On Constructing Composite Indicators: Methodology And User Guide, OECD Statistics Working Paper (http://www.olis.oecd.org/olis/2005doc.nsf/LinkTo/std-doc(2005)3).

Regions can be classified into different groups using hierarchical clustering. These groups are indicated in Table 5 by alternating white and grey backgrounds. The Top-10 performing regions are Stockholm in Sweden, followed by Västsverige (SE), Oberbayern (DE), Etelä-Suomi (FI), Karlsruhe (DE), Stuttgart (DE), Braunschweig (DE), Sydsverige (SE), Île de France (FR) and Östra Mellansverige (SE). As expected from the *European Innovation Scoreboard* country performance, regions from EU15 countries dominate the best performing regions with 47 regions in the Top-50 and 94 regions in the Top-100. From the new Member States regions, we find Praha (CZ) in place 15, Bratislavský kraj (SK) in place 27, Közép-Magyarország (HU) in place 34, Slovenia in place 63, Mazowieckie (PL) in place 65 and Jihovýchod (CZ) in place 100.

Future updates of the RIS

The Commission is planning to publish a bi-annual Regional Innovation Scoreboard from 2007. Future updates of the RIS will focus on two main possibilities for improvement: improved data availability, in particular from the Community Innovation Survey and an improved methodology. CIS4 is expected to provide regional data for more countries. Regional CIS4 data are expected to become available in 2007 for 9 countries plus all smaller countries being a NUTS II region.

Future research to improve the methodology of the Regional Innovation Scoreboard will focus on the following research questions:

- With improved data availability, is the RIS able to duplicate the EIS innovation dimensions? Will it be possible to calculate a composite indicator for each innovation dimension?
- Should the indicators be weighted? E.g. either directly or indirectly through the use of the composite indicators for each innovation dimension.
- Should the data be transformed when data are distributed asymmetrical and which transformation scheme should be applied?
- What is the most appropriate technique to re-scale the indicator data so that all re-scaled indicators will use the same unit of measurement?
- Could one apply the “benefit of the doubt” method where, simply said, each region receives its “best” composite indicator score?

TABLE 5: REGIONAL INNOVATION PERFORMANCE

1	Stockholm (SE)	0.90
2	Västsverige (SE)	0.83
3	Oberbayern (DE)	0.79
4	Etelä-Suomi (FI)	0.78
5	Karlsruhe (DE)	0.77
6	Stuttgart (DE)	0.77
7	Braunschweig (DE)	0.76
8	Sydsverige (SE)	0.76
9	Île de France (FR)	0.75
10	Östra Mellansverige (SE)	0.74
11	Berlin (DE)	0.74
12	South East (UK)	0.72
13	Tübingen (DE)	0.72
14	Manner-Suomi (FI)	0.71
15	Praha (CZ)	0.70
16	Darmstadt (DE)	0.69
17	Eastern (UK)	0.69
18	Dresden (DE)	0.69
19	Köln (DE)	0.69
20	Noord-Brabant (NL)	0.68
21	Denmark (DK)	0.68
22	Pohjois-Suomi (FI)	0.68
23	Mittelfranken (DE)	0.68
24	Wien (AT)	0.68
25	Utrecht (NL)	0.66
26	Rheinhessen-Pfalz (DE)	0.66
27	Bratislavský kraj (SK)	0.66
28	Länsi-Suomi (FI)	0.65
29	Freiburg (DE)	0.63
30	Midi-Pyrénées (FR)	0.61
31	Comunidad de Madrid (ES)	0.61
32	Vlaams Gewest (BE)	0.61
33	Rhône-Alpes (FR)	0.60
34	Közép-Magyarország (HU)	0.60
35	London (UK)	0.59
36	Flevoland (NL)	0.59
37	South West (UK)	0.58
38	Zuid-Holland (NL)	0.58
39	Gelderland (NL)	0.58
40	Noord-Holland (NL)	0.58
41	Steiermark (AT)	0.58
42	West Midlands (UK)	0.57
43	Leipzig (DE)	0.57
44	Lazio (IT)	0.57
45	Norra Mellansverige (SE)	0.57
46	Övre Norrland (SE)	0.57
47	East Midlands (UK)	0.57
48	Schwaben (DE)	0.56
49	Gießen (DE)	0.56
50	Hannover (DE)	0.56
51	Alsace (FR)	0.55
52	Unterfranken (DE)	0.55
53	Hamburg (DE)	0.55
54	Oberpfalz (DE)	0.55
55	Pais Vasco (ES)	0.55
56	North West (UK)	0.54
57	Småland med öarna (SE)	0.54
58	Limburg (NL) (NL)	0.53
59	Thüringen (DE)	0.53
60	Bremen (DE)	0.53
61	Groningen (NL)	0.52
62	Région de Bruxelles-Capitale (BE)	0.52
63	Slovenia (SI)	0.52
64	Overijssel (NL)	0.52
65	Mazowieckie (PL)	0.51
66	Bretagne (FR)	0.51
67	Franche-Comté (FR)	0.51
68	Mellersta Norrland (SE)	0.50
69	Région Wallonne (BE)	0.49
70	Itä-Suomi (FI)	0.49
71	Lombardia (IT)	0.49
72	Yorkshire and The Humber (UK)	0.49
73	Piemonte (IT)	0.49
74	Düsseldorf (DE)	0.49
75	Provence-Alpes-Côte d'Azur (FR)	0.49
76	Comunidad Foral de Navarra (ES)	0.48
77	Southern and Eastern (IE)	0.48
78	North East (UK)	0.48
79	Luxembourg (Grand-Duché) (LU)	0.48
80	Wales (UK)	0.48
81	Emilia-Romagna (IT)	0.47
82	Cataluña (ES)	0.47
83	Tirol (AT)	0.47
84	Brandenburg (DE)	0.47
85	Centre (FR)	0.46
86	Attiki (GR)	0.46
87	Picardie (FR)	0.46
88	Chemnitz (DE)	0.46
89	Scotland (UK)	0.45
90	Aragón (ES)	0.45
91	Schleswig-Holstein (DE)	0.45
92	Oberösterreich (AT)	0.45
93	Languedoc-Roussillon (FR)	0.44
94	Liguria (IT)	0.44
95	Friuli-Venezia Giulia (IT)	0.44
96	Saarland (DE)	0.44
97	Oberfranken (DE)	0.44
98	Aquitaine (FR)	0.44
99	Vorarlberg (AT)	0.43
100	Jihovýchod (CZ)	0.43
101	Strední Cechy (CZ)	0.43
102	Kärnten (AT)	0.43
103	Arnsberg (DE)	0.43
104	Toscana (IT)	0.43
105	Detmold (DE)	0.43
106	Pays de la Loire (FR)	0.42
107	Umbria (IT)	0.42
108	Lisboa (PT)	0.42
109	Abruzzo (IT)	0.42
110	Halle (DE)	0.42
111	Auvergne (FR)	0.42
112	Limousin (FR)	0.42
113	Northern Ireland (UK)	0.41
114	Niederbayern (DE)	0.41
115	Trier (DE)	0.41
116	Salzburg (AT)	0.41
117	Münster (DE)	0.41
118	Haute-Normandie (FR)	0.41
119	Kassel (DE)	0.41
120	Basse-Normandie (FR)	0.41
121	Lorraine (FR)	0.40
122	Veneto (IT)	0.40
123	Drenthe (NL)	0.38
124	Estonia (EE)	0.38
125	Koblenz (DE)	0.38
126	Lüneburg (DE)	0.38
127	Mecklenburg-Vorpommern (DE)	0.37
128	Niederösterreich (AT)	0.37
129	Bourgogne (FR)	0.36
130	Comunidad Valenciana (ES)	0.36
131	Zeeland (NL)	0.36
132	Marche (IT)	0.35
133	Border, Midlands and Western (IE)	0.35
134	Malopolskie (PL)	0.35
135	Castilla y León (ES)	0.35
136	Friesland (NL)	0.35
137	Magdeburg (DE)	0.35
138	Jihozápad (CZ)	0.34
139	Severovýchod (CZ)	0.34
140	Nord - Pas-de-Calais (FR)	0.34
141	Poitou-Charentes (FR)	0.34
142	Galicia (ES)	0.34
143	Lithuania (LT)	0.33
144	Közép-Dunántúl (HU)	0.33
145	Cyprus (CY)	0.32
146	Champagne-Ardenne (FR)	0.32
147	Weser-Ems (DE)	0.32
148	Latvia (LV)	0.32
149	Malta (MT)	0.31
150	Strední Morava (CZ)	0.31
151	Poludniowo-Zachodni (PL)	0.31
152	Campania (IT)	0.31
153	Centro (PT) (PT)	0.31
154	Åland (FI)	0.30
155	Lódzkie (PL)	0.29
156	Slaskie (PL)	0.29
157	Burgenland (AT)	0.29
158	Región de Murcia (ES)	0.29
159	Basilicata (IT)	0.29
160	Dessau (DE)	0.29
161	Lubelskie (PL)	0.27
162	Pólnocny (PL)	0.27
163	Cantabria (ES)	0.27
164	Kentriki Makedonia (GR)	0.27
165	Molise (IT)	0.27
166	Principado de Asturias (ES)	0.27
167	Stredné Slovensko (SK)	0.27
168	Corse (FR)	0.26
169	Andalucia (ES)	0.26
170	Valle d'Aosta/Vallée d'Aoste (IT)	0.26
171	Západné Slovensko (SK)	0.26
172	Pólnocno-Zachodni (PL)	0.26
173	Észak-Alföld (HU)	0.26
174	Kriti (GR)	0.26
175	Dél-Dunántúl (HU)	0.26
176	Nyugat-Dunántúl (HU)	0.25
177	Sicilia (IT)	0.25
178	Észak-Magyarország (HU)	0.25
179	Dél-Alföld (HU)	0.24
180	Moravskoslezko (CZ)	0.24
181	La Rioja (ES)	0.23
182	Dytiki Ellada (GR)	0.23
183	Canarias (ES) (ES)	0.23
184	Sardegna (IT)	0.23
185	Puglia (IT)	0.22
186	Norte (PT)	0.22
187	Podkarpackie (PL)	0.21
188	Calabria (IT)	0.20
189	Východné Slovensko (SK)	0.19
190	Algarve (PT)	0.19
191	Ipeiros (GR)	0.19
192	Sterea Ellada (GR)	0.17
193	Extremadura (ES)	0.17
194	Castilla-la Mancha (ES)	0.17
195	Illes Balears (ES)	0.16
196	Alentejo (PT)	0.13
197	Anatoliki Makedonia, Thraki (GR)	0.13
198	Severozápad (CZ)	0.12
199	Peloponnisos (GR)	0.10
200	Thessalia (GR)	0.10
201	Dytiki Makedonia (GR)	0.07
202	Voreio Aigaio (GR)	0.04
203	Notio Aigaio (GR)	0.01

For Ionia Nisia (GR), Provincia Autonoma Bolzano-Bozen (IT), Provincia Autonoma Trento (IT), Swietokrzyskie (PL), Podlaskie (PL) insufficient data were available to calculate the RRSII.

4. TECHNICAL ANNEX

Summary Innovation Index

The SII is calculated using re-scaled values of the indicator data, where the highest value within the group of EU25 countries, Iceland, Norway and Switzerland is set to 1 and the lowest value within the group of EU25 countries to 0. For Bulgaria, Croatia, Romania, Turkey, the US and Japan for those cases where the value of an indicator is above the maximum or below the minimum the re-scaled value is set equal to 1 respectively 0. The SII is then calculated as the average value of all re-scaled values and is by definition between 0 and 1 for the EU25 countries. The 2005 Methodology report provides a more detailed explanation.

The SII values for HR, TR, US and JP are estimated as for these countries available data was insufficient to calculate the SII directly. For the US, data are available for only 15 indicators, Japan for 16 indicators, Turkey for 14 indicators and Croatia for 13 indicators. The SII for these countries was computed as follows:

- Step 1) For all countries an SII is calculated using only data for the 18 non-CIS indicators ("non-CIS SII).
- Step 2) An OLS regression for the EU countries, Iceland, Norway and Switzerland was run with the non-CIS SII from Step 1 as the dependent variable and the 2006 SII as the independent variable. The estimated regression coefficient equals 1.1204 and the estimated constant -0.0054.
- Step 3) The parameter values from Step 2 were then used to compute a 2006 SII estimate for HR, TR, US and JP by substituting the value as computed in Step 2 in the regression equation as follows: SII = (non-CIS SII + 0.0554)/1.1204.

SII growth rate

The growth rate of the SII is calculated differently than in previous years. First, hypothetical composite innovation indices have been calculated for the 4 years prior to the SII. The growth rate of the SII is then calculated as the annual percentage change between the SII and the average over the preceding three years, after a one-year lag. The three-year average is used to reduce year-to-year variability; the one-year lag is used to increase the difference between the average for the three base years and the final year and to minimize the problem of statistical/sampling variability.

In previous scoreboards, changes in the value of the CIS indicators over time were not included in the calculation of the growth rates. This year all CIS indicators are included, but for 5 of these indicators stationary time series have been used for various reasons. For the share of SMEs innovating in-house CIS4 data are not available so, if available, CIS3 data have been imputed for all 5 years. For the share of SMEs having introduced an organisational innovation, we impute CIS4 data for all 5 years when available. If CIS4 data are not available, we impute, if available, CIS3 data from last year's indicator for the share of SMEs having used non-technological change. For three indicators (the share of innovative SMEs co-operating with others and the sales shares due to both new-to-market and new-to-firm products) for several countries differences between CIS3 and CIS4 results are unexpectedly large and for these indicators stationary CIS data are used, either CIS4 results if available or CIS3 results if CIS4 results are not available. For the share of enterprises receiving public funding for innovation and the turnover share of innovation expenditures, CIS3 and CIS4 results are both included in the calculation of the SII values over the 5-year time period and thus the SII growth rate, except for Portugal for both indicators and for Slovakia for innovation expenditures due to unexpected relatively large changes between CIS3 and CIS4 results.

5. ANNEXES

ANNEX A: EUROPEAN INNOVATION SCOREBOARD 2006 – CURRENT PERFORMANCE

		EU25	EU15	BE	CZ	DK	DE	EE	EL	ES	FR	IE	IT	CY	LV	LT	LU	HU	MT	NL
1.1	New S&E graduates	12.7	13.6	11.2	7.4	13.8	9.0	8.9	8.0	12.5	22.0	23.1	10.1	4.2	9.4	17.5	1.8	5.1	3.6	7.9
1.2	Population with tertiary education	22.8	24.0	31.0	13.1	33.5	24.6	33.3	20.6	28.2	24.9	29.1	12.2	28.8	20.5	26.3	26.6	17.1	11.4	30.1
1.3	Broadband penetration rate	10.6	12.0	17.4	4.3	22.0	10.2	11.1	0.8	10.0	13.9	4.4	9.5	2.7	3.7	5.0	11.7	4.5	10.4	22.4
1.4	Participation in life-long learning	11.0	12.1	10.0	5.9	27.6	8.2	5.9	1.8	12.1	7.6	8.0	6.2	5.6	7.6	6.3	8.5	4.2	5.8	16.6
1.5	Youth education attainment level	76.9	74.1	80.3	90.3	76.0	71.0	80.9	84.0	61.3	82.8	86.1	72.9	80.7	81.8	85.2	71.1	83.3	48.1	74.6
2.1	Public R&D expenditures	0.65	0.66	0.57	0.50	0.76	0.76	0.50	0.42	0.51	0.79	0.43	0.56	0.28	0.34	0.61	0.21	0.50	0.19	0.76
2.2	Business R&D expenditures	1.20	1.24	1.29	0.92	1.67	1.76	0.42	0.20	0.61	1.32	0.82	0.55	0.09	0.23	0.16	1.34	0.41	0.45	1.03
2.3	Share of medium-high/high-tech R&D	--	89.2	79.5	85.4	84.7	92.3	62.0	--	77.0	86.8	85.0	87.8	70.6	77.8	70.8	--	87.8	86.7	87.9
2.4	Enterprises receiving public funding for innovation	n/a	n/a	11.7	6.1	7.8	9.2	0.3	10.4	9.0	6.6	27.8	14.0	16.3	2.0	3.6	39.3	5.7	3.5	12.9
3.1	SMEs innovating in-house	n/a	n/a	38.3	25.2	16.1	46.2	29.8	17.5	24.3	29.2	47.2	31.0	--	15.2	22.1	39.2	17.0	2.9	34.2
3.2	Innovative SMEs co-operating with others	n/a	n/a	16.6	12.9	20.8	8.6	16.0	8.4	5.7	11.5	15.6	4.3	16.5	6.1	14.8	14.8	6.6	5.3	12.3
3.3	Innovation expenditures	n/a	n/a	1.96	2.15	2.40	2.93	1.59	3.08	0.94	2.23	1.68	1.81	2.92	2.26	1.57	1.62	1.16	1.08	1.25
3.4	Early-stage venture capital	--	0.023	0.019	0.000	0.068	0.015	--	0.001	0.011	0.026	0.021	0.002	--	--	--	--	0.002	--	0.005
3.5	ICT expenditures	6.4	6.4	6.3	6.6	6.5	6.2	9.8	4.9	5.5	6.0	5.2	5.3	--	9.6	7.8	6.8	8.1	8.5	7.6
3.6	SMEs using organizational innovation	n/a	n/a	38.1	35.0	57.1	53.2	39.2	39.6	27.6	35.9	49.6	32.2	42.8	35.7	23.6	58.4	19.1	32.5	26.2
4.1	Employment in high-tech services	3.35	3.49	3.73	3.10	4.69	3.36	2.82	1.74	2.75	3.92	3.55	2.89	2.04	2.65	2.12	3.32	3.02	2.69	4.05
4.2	Exports of high technology products	18.4	17.7	7.1	13.7	13.3	15.4	10.1	7.1	5.7	20.1	29.1	7.1	15.9	3.2	2.7	29.5	21.7	55.9	19.1
4.3	Sales of new-to-market products	n/a	n/a	4.8	7.7	5.2	7.5	4.4	4.8	3.8	6.2	5.6	6.3	1.9	3.5	4.4	6.4	4.2	13.6	4.0
4.4	Sales of new-to-firm products	n/a	n/a	8.2	7.8	5.8	10.0	7.6	6.2	10.0	5.6	4.5	5.6	3.7	1.6	5.3	9.1	2.5	8.7	4.3
4.5	Employment in medium-high/high-tech manufacturing	6.66	6.71	6.51	9.42	6.29	10.43	4.75	2.13	4.68	6.34	5.99	7.37	1.19	1.52	2.57	1.38	8.19	6.63	3.30
5.1	EPO patents per million population	136.7	161.4	144.5	15.9	235.8	311.7	15.5	11.2	30.6	153.7	77.3	87.3	16.4	5.9	5.8	200.5	18.9	8.8	244.3
5.2	USPTO patents per million population	50.9	60.2	52.4	4.3	72.9	123.0	1.2	1.8	7.7	56.8	37.4	31.2	1.5	2.2	1.0	85.9	5.3	4.6	78.3
5.3	Triad patents per million population	32.7	38.9	32.0	1.5	32.4	85.2	0.0	0.8	2.7	36.5	14.8	11.6	2.6	0.3	0.6	41.8	1.9	2.6	59.6
5.4	Community trademarks per million population	100.7	115.7	92.2	25.7	159.8	140.5	31.7	27.7	140.9	76.0	143.0	92.7	152.6	12.2	14.7	782.7	18.8	118.9	141.0
5.5	Community industrial designs per million population	110.9	127.6	124.6	40.9	243.2	186.5	9.2	2.8	106.2	88.1	49.0	176.3	39.1	20.3	5.4	377.6	15.2	12.1	132.8

ANNEX A: EUROPEAN INNOVATION SCOREBOARD 2006 – CURRENT PERFORMANCE (CONTINUED)

		EU25	EU15	AT	PL	PT	SI	SK	FI	SE	UK	BG	HR	RO	TR	CH	IS	NO	US	JP
1.1	New S&E graduates	12.7	13.6	8.7	9.4	11.0	9.3	9.2	17.4	15.9	18.1	8.5	--	9.8	5.6	14.6	10.8	9.0	10.2	13.4
1.2	Population with tertiary education	22.8	24.0	17.8	16.8	12.8	20.2	14.0	34.6	29.2	29.6	21.6	21.6	11.1	9.7	28.8	30.6	32.6	38.4	37.4
1.3	Broadband penetration rate	10.6	12.0	11.6	1.9	10.1	7.8	1.5	18.7	17.1	13.5	--	--	--	1.4	20.3	22.5	18.4	14.9	16.3
1.4	Participation in life-long learning	11.0	12.1	13.8	5.0	4.6	17.8	5.0	24.8	34.7	29.1	1.1	2.3	1.6	2.0	26.9	26.6	19.4	--	--
1.5	Youth education attainment level	76.9	74.1	85.9	90.0	48.4	90.6	91.5	84.8	87.8	77.1	76.8	93.9	75.2	43.9	82.5	53.0	96.3	--	--
2.1	Public R&D expenditures	0.65	0.66	0.70	0.39	0.43	0.48	0.25	0.99	0.92	0.57	0.38	0.70	0.17	0.48	0.70	1.17	0.69	0.69	0.74
2.2	Business R&D expenditures	1.20	1.24	1.51	0.18	0.29	0.97	0.25	2.46	2.92	1.15	0.11	0.51	0.21	0.19	2.16	1.59	0.82	1.87	2.39
2.3	Share of medium-high/high-tech R&D	--	89.2	83.0	80.0	61.1	85.0	63.4	86.4	92.7	91.7	77.6	--	75.8	--	92.0	--	69.7	89.9	86.7
2.4	Enterprises receiving public funding for innovation	n/a	n/a	17.8	3.1	13.7	4.1	2.8	15.2	9.1	3.8	0.8	--	2.1	--	4.7	4.8	16.1	--	--
3.1	SMEs innovating in-house	n/a	n/a	42.5	12.5	36.2	16.3	13.1	37.6	35.2	22.4	9.4	--	13.9	--	34.4	46.5	28.8	--	15.3
3.2	Innovative SMEs co-operating with others	n/a	n/a	7.7	9.1	7.0	10.5	6.8	17.3	20.0	12.6	3.1	--	2.8	--	12.1	14.0	11.3	--	6.9
3.3	Innovation expenditures	n/a	n/a	--	1.56	2.62	1.28	1.90	2.50	3.47	1.61	0.73	--	1.52	--	1.35	1.70	1.01	--	--
3.4	Early-stage venture capital	--	0.023	0.009	0.000	0.033	--	0.004	0.036	0.067	0.048	--	--	0.000	--	0.024	0.048	0.022	0.072	--
3.5	ICT expenditures	6.4	6.4	6.3	7.2	7.4	5.4	6.7	7.0	8.6	8.0	9.9	--	8.2	3.2	7.7	--	5.2	6.7	7.6
3.6	SMEs using organizational innovation	n/a	n/a	48.1	19.3	40.7	50.8	13.4	47.0	44.0	--	11.0	--	15.5	--	63.0	54.0	23.2	--	--
4.1	Employment in high-tech services	3.35	3.49	2.71	2.15	1.84	2.94	2.74	4.51	5.13	4.28	2.87	2.02	1.37	--	3.81	4.97	3.99	--	--
4.2	Exports of high technology products	18.4	17.7	14.7	2.7	7.5	5.2	4.6	17.8	14.1	22.8	2.9	10.8	3.8	2.3	22.3	2.4	3.5	26.8	22.4
4.3	Sales of new-to-market products	n/a	n/a	5.2	8.1	10.8	7.4	12.8	9.7	8.3	6.4	8.5	--	7.1	--	4.9	4.9	2.1	--	--
4.4	Sales of new-to-firm products	n/a	n/a	5.4	5.4	15.1	6.9	6.4	5.1	5.1	7.6	4.1	--	9.5	--	5.8	7.8	5.1	--	--
4.5	Employment in medium-high/high-tech manufacturing	6.66	6.71	6.45	5.08	3.25	9.63	9.37	6.76	6.53	5.61	4.65	3.89	5.40	--	7.25	2.12	3.93	3.84	7.30
5.1	EPO patents per million population	136.7	161.4	195.1	4.2	7.5	50.4	8.1	305.6	284.9	121.4	4.3	18.2	1.2	1.9	425.6	153.6	117.1	142.6	174.2
5.2	USPTO patents per million population	50.9	60.2	74.7	1.2	1.9	15.4	3.3	104.6	109.7	44.6	0.5	3.1	0.3	1.0	168.4	57.4	34.9	277.1	304.6
5.3	Triad patents per million population	32.7	38.9	33.7	0.3	0.6	2.8	0.3	101.7	66.3	33.0	0.1	0.7	0.0	0.1	108.9	28.5	24.8	47.9	102.1
5.4	Community trademarks per million population	100.7	115.7	187.0	22.2	73.8	21.7	10.8	106.8	136.7	125.2	4.7	3.0	3.7	1.5	225.2	79.1	29.2	33.8	11.7
5.5	Community industrial designs per million population	110.9	127.6	195.8	25.0	49.8	33.9	17.3	95.5	136.9	76.1	1.7	1.4	0.8	3.5	210.0	29.6	37.7	17.5	13.2

ANNEX B: EUROPEAN INNOVATION SCOREBOARD 2006 – YEARS USED FOR CURRENT PERFORMANCE

		EU25	EU15	BE	CZ	DK	DE	EE	EL	ES	FR	IE	IT	CY	LV	LT	LU	HU	MT	NL
1.1	New S&E graduates	2004	2004	2004	2004	2004	2004	2004	2004	2004	2003	2004	2004	2004	2004	2004	2000	2004	2003	2004
1.2	Population w ith tertiary education	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
1.3	Broadband penetration rate	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
1.4	Participation in life-long learning	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
1.5	Youth education attainment level	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
2.1	Public R&D expenditures	2004	2004	2004	2005	2005	2005	2005	2003	2005	2005	2005	2003	2005	2005	2005	2005	2005	2005	2004
2.2	Business R&D expenditures	2004	2004	2004	2005	2005	2005	2005	2003	2005	2005	2005	2005	2005	2005	2005	2005	2005	2004	2004
2.3	Share of medium-high-tech and high-tech R&D	--	2003	2004	2004	2004	2004	2003	--	2004	2003	2004	2004	2004	2002	2003	--	2002	2002	2004
2.4	Enterprises receiving public funding for innovation	n/a	n/a	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS3	CIS4	CIS4	CIS4	CIS4	CIS4
3.1	SMEs innovating in-house	n/a	n/a	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS4	CIS3	--	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3
3.2	Innovative SMEs co-operating w ith others	n/a	n/a	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4
3.3	Innovation expenditures	n/a	n/a	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS3	CIS4	CIS4	CIS4	CIS4	CIS4
3.4	Early-stage venture capital **	--	2005	2005	2005	2005	2005	--	2005	2005	2005	2005	2005	--	--	--	--	2005	--	2005
3.5	ICT expenditures	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	--	2005	2005	2002	2005	2004	2005
3.6	SMEs using organizational innovation	n/a	n/a	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS3	CIS4	CIS4	CIS4	CIS4	CIS4
4.1	Employment in high-tech services	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
4.2	Exports of high technology products	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
4.3	Sales of new -to-market products	n/a	n/a	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	--	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4
4.4	Sales of new -to-firm not new -to-market products	n/a	n/a	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4
4.5	Employment in medium-high/high-tech manufacturing	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
5.1	EPO patents per million population	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
5.2	USPTO patents per million population	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2002	2002	2002	2003	2003	2002	2003
5.3	Triad patents per million population	2003	2003	2003	2003	2003	2003	2002	2003	2003	2003	2003	2003	2000	2003	2003	2003	2003	2000	2003
5.4	Community trademarks per million population	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
5.5	Community industrial designs per million population	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006

ANNEX B: EUROPEAN INNOVATION SCOREBOARD 2006 – YEARS USED FOR CURRENT PERFORMANCE (CONTINUED)

		EU25	EU15	AT	PL	PT	SI	SK	FI	SE	UK	BG	HR	RO	TR	CH	IS	NO	US	JP
1.1	New S&E graduates	2004	2004	2004	2004	2004	2004	2004	2003	2004	2004	2004	--	2004	2004	2004	2004	2004	2004	2004
1.2	Population with tertiary education	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2003	2005	2005	2005	2003	2003
1.3	Broadband penetration rate	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	--	--	--	2005	2005	2005	2005	2005	2005
1.4	Participation in life-long learning	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	--	--
1.5	Youth education attainment level	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	--	--
2.1	Public R&D expenditures	2004	2004	2004	2005	2005	2004	2005	2005	2005	2004	2005	2004	2004	2002	2004	2004	2005	2004	2004
2.2	Business R&D expenditures	2004	2004	2004	2005	2005	2004	2005	2005	2005	2004	2005	2004	2004	2002	2004	2004	2005	2004	2004
2.3	Share of medium-high-tech and high-tech R&D	--	2003	2004	2004	2003	2002	2003	2004	2003	2004	2003	--	2003	--	2004	--	2004	2003	2003
2.4	Enterprises receiving public funding for innovation	n/a	n/a	CIS4	CIS4	CIS3	CIS3	CIS4	CIS4	CIS3	CIS3	CIS4	--	CIS4	--	CIS4	CIS3	CIS4	--	--
3.1	SMEs innovating in-house	n/a	n/a	CIS4	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	CIS3	--	CIS3	--	CIS4	CIS3	CIS3	--	CIS3
3.2	Innovative SMEs co-operating with others	n/a	n/a	CIS4	CIS4	CIS3	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	--	CIS4	--	CIS4	CIS4	CIS4	--	CIS3
3.3	Innovation expenditures	n/a	n/a	--	CIS4	CIS3	CIS3	CIS4	CIS3	CIS4	CIS3	CIS4	--	CIS4	--	CIS4	CIS3	CIS4	--	--
3.4	Early-stage venture capital **	--	2005	2005	2005	2005	--	2005	2005	2005	2005	--	--	2004	--	2005	2002	2005	2002	--
3.5	ICT expenditures	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	--	2005	2003	2005	--	2005	2005	2005
3.6	SMEs using organizational innovation	n/a	n/a	CIS4	CIS4	CIS4	CIS3	CIS4	CIS3	CIS3	--	CIS4	--	CIS4	--	CIS3	CIS3	CIS4	--	--
4.1	Employment in high-tech services	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	--	2005	2005	2005	--	--
4.2	Exports of high technology products	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
4.3	Sales of new-to-market products	n/a	n/a	CIS4	--	CIS3	CIS4	CIS4	CIS4	--	CIS4	CIS4	--	CIS4	--	--	CIS4	CIS4	--	--
4.4	Sales of new-to-firm not new-to-market products	n/a	n/a	CIS4	CIS4	CIS3	CIS4	CIS4	CIS4	CIS4	CIS4	CIS4	--	CIS4	--	CIS4	CIS4	CIS4	--	--
4.5	Employment in medium-high/high-tech manufacturing	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	--	2005	2005	2005	2003	2003
5.1	EPO patents per million population	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
5.2	USPTO patents per million population	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2000	2000	2003	2003	2003	2003	2003	2003	2003
5.3	Triad patents per million population	2003	2003	2003	2003	2003	2002	2003	2003	2003	2003	2000	2000	2003	2003	2003	2003	2003	2003	2003
5.4	Community trademarks per million population	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
5.5	Community industrial designs per million population	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006

ANNEX C: EUROPEAN INNOVATION SCOREBOARD 2006 – DEFINITIONS AND INTERPRETATION

#	EIS 2006 indicators	Numerator	Denominator	Interpretation
1.1	New S&E graduates per 1000 population aged 20-29	Number of S&E (science and engineering) graduates. S&E graduates are defined as all post-secondary education graduates (ISCED classes 5a and above) in life sciences (ISC42), physical sciences (ISC44), mathematics and statistics (ISC46), computing (ISC48), engineering and engineering trades (ISC52), manufacturing and processing (ISC54) and architecture and building (ISC58).	The reference population is all age classes between 20 and 29 years inclusive.	The indicator is a measure of the supply of new graduates with training in Science & Engineering (S&E). Due to problems of comparability for educational qualifications across countries, this indicator uses broad educational categories. This means that it covers everything from graduates of one-year diploma programmes to PhDs. A broad coverage can also be an advantage, since graduates of one-year programmes are of value to incremental innovation in manufacturing and in the service sector.
1.2	Population with tertiary education per 100 population aged 25-64	Number of persons in age class with some form of post-secondary education (ISCED 5 and 6).	The reference population is all age classes between 25 and 64 years inclusive.	This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields because the adoption of innovations in many areas, in particular in the service sectors, depends on a wide range of skills. Furthermore, it includes the entire working age population, because future economic growth could require drawing on the non-active fraction of the population. International comparisons of educational levels however are difficult due to large discrepancies in educational systems, access, and the level of attainment that is required to receive a tertiary degree. Differences among countries should be interpreted with caution.
1.3	Broadband penetration rate (number of broadband lines per 100 population)	Number of broadband lines. Broadband lines are defined as those with a capacity equal to or higher than 144 Kbit/s.	Total population as defined in the European System of Accounts (ESA 1995).	Realising Europe's full e-potential depends on creating the conditions for electronic commerce and the Internet to flourish, so that the Union can catch up with its competitors by hooking up many more businesses and homes to the Internet via fast connections. The Community and the Member States are to make available in all European countries low cost, high-speed interconnected networks for Internet access and foster the development of state-of-the-art information technology and other telecom networks as well as the content for those networks (Lisbon European Council, 2000). The Barcelona European Council (2002) attached priority to the widespread availability and use of broadband networks throughout the Union by 2005 and the development of Internet protocol IPv6. Further development in this area requires accelerated broadband deployment; in this respect the Brussels European Council (2003) called on Member States to put in place national broadband / high speed Internet strategies by end 2003 and aim for a substantial increase in high speed Internet connections by 2005.

#	EIS 2006 indicators	Numerator	Denominator	Interpretation
1.4	Participation in life-long learning per 100 population aged 25-64)	Number of persons involved in life-long learning. Life-long learning is defined as participation in any type of education or training course during the four weeks prior to the survey. Education includes both courses of relevance to the respondent's employment and general interest courses, such as in languages or arts. It includes initial education, further education, continuing or further training, training within the company, apprenticeship, on-the-job training, seminars, distance learning, and evening classes.	The reference population is all age classes between 25 and 64 years inclusive	A central characteristic of a knowledge economy is continual technical development and innovation. Individuals need to continually learn new ideas and skills or to participate in life-long learning. All types of learning are valuable, since it prepares people for “learning to learn”. The ability to learn can then be applied to new tasks with social and economic benefits.
1.5	Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	Number of persons aged 20-24 having completed at least upper secondary education, i.e. with an education level ISCED 3-4 minimum.	The reference population is all age classes between 20 and 24 years inclusive	The indicator measures the qualification level of the population aged 20-24 years in terms of formal educational degrees. So far it provides a measure for the “supply” of human capital of that age group and for the output of education systems in terms of graduates. A study for OECD countries suggests a positive link between education and economic growth. According to this study an additional year of average school attainment is estimated to increase economic growth by around 5% immediately and by further 2.5% in the long run (De la Fuente and Ciccone, “Human capital in a global and knowledge-based economy”, Final report for DG Employment and Social Affairs, 2002). Completed upper secondary education is generally considered to be the minimum level required for successful participation in a knowledge-based society. It is increasingly important not just for successful entry into the labour market, but also to allow students access to learning and training opportunities offered by higher education. School attainment is a primary determinant of individual income and labour market status. Persons who have completed at least upper secondary education have access to jobs with higher salaries and better working conditions. They also have a markedly higher employment rate than persons with at most lower secondary education (Employment in Europe 2004).

#	EIS 2006 indicators	Numerator	Denominator	Interpretation
2.1	Public R&D expenditures (% of GDP)	Difference between GERD (Gross domestic expenditure on R&D) and BERD (Business enterprise expenditure on R&D). Both GERD and BERD according to the Frascati-manual definitions, in national currency and current prices.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	R&D expenditure represents one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. Research and development spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth. Recognising the benefits of R&D for growth and being aware of the rapidly widening gap between Europe's R&D effort and that of the principal partners of the EU in the world, the Barcelona European Council (March 2003) set the EU a target of increasing R&D expenditure to 3 per cent of GDP by 2010, two thirds of which should come from the business enterprise sector.
2.2	Business R&D expenditures (% of GDP)	All R&D expenditures in the business sector (BERD), according to the Frascati-manual definitions, in national currency and current prices.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sector (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.
2.3	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	R&D expenditures in medium-high and high-tech manufacturing, in national currency and current prices. These include chemicals (NACE24), machinery (NACE29), office equipment (NACE30), electrical equipment (NACE31), telecommunications and related equipment (NACE32), precision instruments (NACE33), automobiles (NACE34) and aerospace and other transport (NACE35).	R&D expenditures in total manufacturing, in national currency and current prices.	This indicator captures whether a country invests in future technologies (medium-high and high-tech manufacturing industries) or rather in historical industries (medium-low and low-tech manufacturing industries). This follows a recent report published by the JRC (R&D expenditure scoreboard), which highlights that the R&D problem observed in Europe is more a business structure problem. In most sectors R&D intensity is as high in the EU as in the rest of the world, however the relative importance of R&D intensive sectors in the total business is relatively low in Europe.
2.4	Share of enterprises receiving public funding for innovation	Number of innovative enterprises that have received public funding. Public funding includes financial support in terms of grants and loans, including a subsidy element, and loan guarantees. Ordinary payments for orders of public customers are not included. (*Community Innovation Survey*)	Total number of enterprises, thus both innovating and non-innovating enterprises. (*Community Innovation Survey*)	This indicator measures the degree of government support to innovation. The indicator gives the percentage of all firms (innovators and non-innovators combined) that received any public financial support for innovation from at least one of three levels of government (local, national and the European Union).
3.1	SMEs innovating in-house (% of SMEs)	Sum of SMEs with in-house innovation activities. Innovative firms are defined as those who introduced new products or processes either 1) in-house or 2) in combination with other firms. This indicator does not include new products or processes developed by other firms. (*Community Innovation Survey*)	Total number of SMEs. (*Community Innovation Survey*)	This indicator measures the degree to which SMEs, that have introduced any new or significantly improved products or production processes during the period 1998-2000, have innovated in-house. The indicator is limited to SMEs because almost all large firms innovate and because countries with an industrial structure weighted to larger firms would tend to do better.

#	EIS 2006 indicators	Numerator	Denominator	Interpretation
3.2	Innovative SMEs co-operating with others (% of SMEs)	Sum of SMEs with innovation co-operation activities. Firms with co-operation activities are those that had any co-operation agreements on innovation activities with other enterprises or institutions in the three years of the survey period. (*Community Innovation Survey*)	Total number of SMEs. (*Community Innovation Survey*)	This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations, in particular in ICT, often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate on the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms and between firms and other firms. The indicator is limited to SMEs because almost all large firms are involved in innovation co-operation.
3.3	Innovation expenditures (% of turnover)	Sum of total innovation expenditure for enterprises, in national currency and current prices. Innovation expenditures includes the full range of innovation activities: in-house R&D, extramural R&D, machinery and equipment linked to product and process innovation, spending to acquire patents and licenses, industrial design, training, and the marketing of innovations. (*Community Innovation Survey*)	Total turnover for all enterprises, in national currency and current prices. (*Community Innovation Survey*)	This indicator measures total innovation expenditure as percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas. Overall, the indicator measures total expenditures on many activities of relevance to innovation. The indicator partly overlaps with the indicator on business R&D expenditures.
3.4	Early-stage venture capital (% of GDP)	Venture capital investment is defined as private equity raised for investment in companies. Management buyouts, management buyins, and venture purchase of quoted shares are excluded. Early-stage capital includes seed and start-up capital. *Seed* is defined as financing provided to research, assess and develop an initial concept before a business has reached the start-up phase. *Start-up* is defined as financing provided for product development and initial marketing, manufacturing, and sales. Companies may be in the process of being set up or may have been in business for a short time, but have not yet sold their product commercially.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	The amount of early-stage venture capital is a proxy for the relative dynamism of new business creation. In particular, for enterprises using or developing new (risky) technologies venture capital is often the only available means of financing their (expanding) business. *Note: in order to reduce volatility, the indicator is based on a two-year average.*

#	EIS 2006 indicators	Numerator	Denominator	Interpretation
3.5	ICT expenditures (% of GDP)	Total expenditures on information and communication technology (ICT), in national currency and current prices. ICT includes office machines, data processing equipment, data communication equipment, and telecommunications equipment, plus related software and telecom services.	Gross domestic product as defined in the European System of Accounts (ESA 1995), in national currency and current prices.	ICT is a fundamental feature of knowledge-based economies and the driver of current and future productivity improvements. An indicator of ICT investment is crucial for capturing innovation in knowledge-based economies, particularly due to the diffusion of new IT equipment, services and software. One disadvantage of this indicator is that it is ultimately obtained from private sources, with a lack of good information on the reliability of the data. Another disadvantage is that part of the expenditures is for final consumption and may have few productivity or innovation benefits.
3.6	SMEs who introduced an organizational innovation (% of SMEs)	Number of SMEs who have either introduced "new or significantly improved knowledge management systems", "a major change to the organisation of work within their enterprise" or "new or significant changes in their relations with other firms or public institutions". A 'Yes' response to at least one of these categories would identify a SME as having introduced an organisational innovation.. (*Community Innovation Survey*)	Total number of SMEs. (*Community Innovation Survey*)	The Community Innovation Survey mainly asks firms about their technical innovation, Many firms, in particular in the services sectors, innovate through other non-technical forms of innovation. Examples of these are organisational innovations. This indicator tries to capture the extent that SMEs innovate through non-technical innovation.
4.1	Employment in high-tech services (% of total workforce)	Number of employed persons in the high-tech services sectors. These include post and telecommunications (NACE64), information technology including software development (NACE72) and R&D services (NACE73).	The total workforce includes all manufacturing and service sectors.	The high technology services provide services directly to consumers, such as telecommunications, and provide inputs to the innovative activities of other firms in all sectors of the economy. The latter can increase productivity throughout the economy and support the diffusion of a range of innovations, in particular those based on ICT.
4.2	Exports of high technology products as a share of total exports	Value of high-tech exports, in national currency and current prices. High-tech exports include exports of the following products: aerospace; computers and office machinery; electronics-telecommunications; pharmaceuticals; scientific instruments; electrical machinery; chemistry; non-electrical machinery and armament (cf. OECD STI Working Paper 1997/2 for the SITC Revision 3 codes).	Value of total exports, in national currency and current prices.	The indicator measures the technological competitiveness of the EU i.e. the ability to commercialise the results of research and development (R&D) and innovation in the international markets. It also reflects product specialisation by country. Creating, exploiting and commercialising new technologies is vital for the competitiveness of a country in the modern economy. This is because high technology sectors are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment. The Brussels European Council (2003) stressed the role of public-private partnerships in the research area as a key factor in developing new technologies and enabling the European high-tech industry to compete at the global level.

#	EIS 2006 indicators	Numerator	Denominator	Interpretation
4.3	Sales of new-to-market products (% of turnover)	Sum of total turnover of new or significantly improved products for all enterprises. (*Community Innovation Survey*)	Total turnover for all enterprises, in national currency and current prices. (*Community Innovation Survey*)	This indicator measures the turnover of new or significantly improved products, which are also new to the market, as a percentage of total turnover. The product must be new to the firm, which in many cases will also include innovations that are world-firsts. The main disadvantage is that there is some ambiguity in what constitutes a 'new to market' innovation. Smaller firms or firms from less developed countries could be more likely to include innovations that have already been introduced onto the market elsewhere.
4.4	Sales of new-to-firm products (% of turnover)	Sum of total turnover of new or significantly improved products to the firm but not to the market for all enterprises. (*Community Innovation Survey*)	Total turnover for all enterprises, in national currency and current prices. (*Community Innovation Survey*)	This indicator measures the turnover of new or significantly improved products to the firm as a percentage of total turnover. These products are not new to the market. Sales of new to the firm but not new to the market products are a proxy of the use or implementation of elsewhere already introduced products (or technologies). This indicator is thus a proxy for the degree of diffusion of state-of-the-art technologies.
4.5	Employment in medium-high and high-tech manufacturing (% of total workforce)	Number of employed persons in the medium-high and high-tech manufacturing sectors. These include chemicals (NACE24), machinery (NACE29), office equipment (NACE30), electrical equipment (NACE31), telecommunications and related equipment (NACE32), precision instruments (NACE33), automobiles (NACE34) and aerospace and other transport (NACE35).	The total workforce includes all manufacturing and service sectors.	The share of employment in medium-high and high technology manufacturing sectors is an indicator of the manufacturing economy that is based on continual innovation through creative, inventive activity. The use of total employment gives a better indicator than using the share of manufacturing employment alone, since the latter will be affected by the hollowing out of manufacturing in some countries.
5.1	EPO patents per million population	Number of patents applied for at the European Patent Office (EPO), by year of filing. The national distribution of the patent applications is assigned according to the address of the inventor.	Total population as defined in the European System of Accounts (ESA 1995).	The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patents. This indicator measures the number of patent applications at the European Patent Office.
5.2	USPTO patents per million population	Number of patents granted by the US Patent and Trademark Office (USPTO), by year of grant. Patents are allocated to the country of the inventor, using fractional counting in the case of multiple inventor countries.	Total population as defined in the European System of Accounts (ESA 1995).	The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patents. This indicator measures the number of patents granted by the US Patent and Trademark Office.

#	EIS 2006 indicators	Numerator	Denominator	Interpretation
5.3	Triadic patent families per million population	Number of triad patents. A patent is a triad patent if, and only if, it is filed at the European Patent Office (EPO), the Japanese Patent Office (JPO) and is granted by the US Patent & Trademark Office (USPTO).	Total population as defined in the European System of Accounts (ESA 1995).	The disadvantage of both the EPO and USPTO patent indicator is that European countries and the US respectively have a 'home advantage' as patent rights differ among countries. A patent family is a group of patent filings that claim the priority of a single filing, including the original priority filing itself, and any subsequent filings made throughout the world. Trilateral patent families are a filtered subset of patent families for which there is evidence of patenting activity in all trilateral blocks (USPTO, EPO, JPO). No country will thus have a clear 'home advantage'.
5.4	Number of new community trademarks per million population	Number of new community trademarks. A trademark is a distinctive sign, which identifies certain goods or services as those produced or provided by a specific person or enterprise. The Community trademark offers the advantage of uniform protection in all countries of the European Union on the strength of a single registration procedure with the Office for Harmonization.	Total population as defined in the European System of Accounts (ESA 1995).	The Community trade mark gives its proprietor a uniform right applicable in all Member States of the European Union on the strength of a single procedure which simplifies trade mark policies at European level. It fulfils the three essential functions of a trade mark at European level: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and is a form of communication, a basis for publicity and advertising. The Community trade mark may be used as a manufacturer's mark, a mark for goods of a trading company, or service mark. It may also take the form of a collective trade mark: properly applied, the regulation governing the use of the collective trade mark guarantees the origin, the nature and the quality of goods and services by making them distinguishable, which is beneficial to members of the association or body owning the trade mark. *Note: in order to reduce volatility, the indicator is based on a two-year average.*
5.5	Number of new community designs per million population	Number of new community designs. A registered Community design is an exclusive right for the outward appearance of a product or part of it, resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation.	Total population as defined in the European System of Accounts (ESA 1995).	A design is the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programs. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States. *Note: in order to reduce volatility, the indicator is based on a two-year average.*

ANNEX D: EUROPEAN INNOVATION SCOREBOARD 2006 – SII SCORES OVER A 5 YEAR PERIOD

	T-4	T-3	T-2	T-1	SII
EU25	0.45	0.45	0.45	0.45	0.45
EU15	0.50	0.50	0.50	0.50	0.50
BE	0.51	0.51	0.51	0.49	0.48
CZ	0.31	0.31	0.31	0.33	0.34
DK	0.62	0.61	0.61	0.63	0.63
DE	0.60	0.60	0.60	0.60	0.59
EE	0.35	0.34	0.33	0.34	0.34
EL	0.21	0.21	0.21	0.22	0.22
ES	0.31	0.31	0.31	0.31	0.31
FR	0.51	0.50	0.50	0.48	0.48
IE	0.50	0.49	0.48	0.48	0.48
IT	0.34	0.34	0.34	0.34	0.34
CY	0.25	0.27	0.26	0.30	0.30
LV	0.19	0.20	0.20	0.22	0.22
LT	0.25	0.25	0.25	0.24	0.27
LU	0.46	0.46	0.47	0.53	0.54
HU	0.26	0.26	0.27	0.25	0.26
MT	0.29	0.30	0.31	0.29	0.30
NL	0.49	0.50	0.51	0.49	0.49
AT	0.47	0.48	0.48	0.48	0.48
PL	0.20	0.20	0.21	0.21	0.22
PT	0.22	0.23	0.22	0.23	0.23
SI	0.32	0.33	0.34	0.34	0.35
SK	0.24	0.24	0.23	0.22	0.23
FI	0.71	0.70	0.70	0.68	0.68
SE	0.76	0.76	0.75	0.73	0.73
UK	0.56	0.56	0.55	0.54	0.53
BG	0.20	0.20	0.20	0.21	0.21
RO	0.15	0.16	0.17	0.18	0.19
TR	0.10	0.09	0.09	0.08	0.08
IS	0.49	0.50	0.49	0.50	0.49
NO	0.39	0.39	0.38	0.38	0.36
US	0.59	0.57	0.56	0.55	0.54
JP	0.62	0.62	0.62	0.62	0.61
CH	0.69	0.70	0.71	0.69	0.69
HR	0.26	0.26	0.26	0.26	0.25

ANNEX E: EUROPEAN INNOVATION SCOREBOARD 2006 – STRENGTHS AND WEAKNESSES REPORT

See http://www.proinno-europe.eu/inno-metrics.html