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# ANALYSE VAN HET EUROPEES EN REGIONAAL INNOVATIE SCOREBORD 2021 VAN DE EUROPESE COMMISSIE

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## Colofon

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Regionaal Scorebord 2021 van  
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## Analyse van het Europees en Regionaal Innovatie Scorebord 2021<sup>1</sup>, opgesteld door de Europese Commissie

### Inleiding | De analyse samengevat

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- België op de 4<sup>de</sup> plaats binnen de EU-27, voor het eerst in de 1<sup>ste</sup> groep 'innovatieleiders'
- Vlaanderen als regio in EU-27 in de 1<sup>ste</sup> groep 'innovatieleiders', 27<sup>ste</sup> plaats op 240 regio's

De Europese Commissie publiceerde op 21 juni 2021 zowel haar **Europees Innovatie Scorebord (EIS)** als het **Regionaal Innovatie Scorebord (RIS)**.

De EIS rangschikt de 27 EU-lidstaten en een aantal niet-EU landen evenals hun regio's, volgens hun **onderzoeks- en innovatieve sterkte** in vier 'prestatiegroepen' op basis van hun prestatie t.o.v. het **Europees gemiddelde**: *innovatieleiders* (groep landen met performantie >125% van het Europees gemiddelde), *sterke innovatoren* (tussen 100% en 125% van het Europees gemiddelde), *gematigde innovatoren* (tussen 70% en 100%) en *ontluikende innovatoren* (<70% van het EU-gemiddelde).

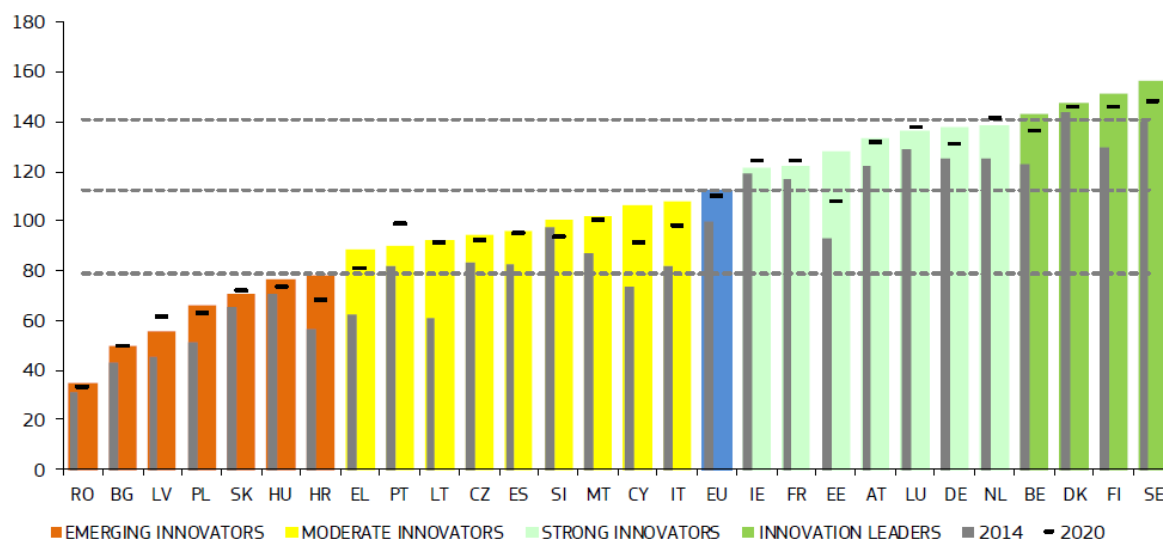
België komt – op basis van de methodologie gehanteerd in deze editie 2021 - voor het eerst sinds het bestaan van het scorebord in de eerste groep 'innovatieleiders', op de vierde plaats in de EU-27.

Vergelijking met voorgaande edities van het EIS en het RIS zijn niet mogelijk wegens gewijzigde methodologie in de 2021 editie.

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<sup>1</sup> De meeste gegevens die gebruikt worden in dit rapport zijn niet recent genoeg om de impact van COVID-19 pandemie in beeld te brengen.

Figure 1: Global performance



Coloured columns show countries' performance in 2021, using the most recent data for 32 indicators, relative to that of the EU in 2014. The horizontal hyphers show performance in 2020, using the next most recent data, relative to that of the EU in 2014. Grey columns show countries' performance in 2014 relative to that of the EU 2014. For all years, the same measurement methodology has been used. The dashed lines show the threshold values between the performance groups, where the threshold values of 70%, 100%, and 125% have been adjusted upward to reflect the performance increase of the EU between 2014 and 2021.

Vanuit dit Europees Innovatie Scorebord werd ook een **Regionaal Innovatie Scorebord** ontwikkeld dat 240 Europese regio's analyseert binnen 22 EU-27 lidstaten<sup>2</sup> én Noorwegen, Servië, Zwitserland en de UK. Vlaanderen als regio prijkt daar op de 27<sup>ste</sup> plaats en behoort tot de **eerste groep** van 'innovatieleiders'.

<sup>2</sup> Cyprus, Estland, Letland, Luxemburg en Malta worden op landniveau meegenomen aangezien in die landen NUTS1 en NUTS2 niveau samenvallen.

**Table 8: Top-25 Regional Innovation Leaders**

	2021	2019	2017	2015	RII2021
1	Stockholm (SE11)	Zürich (CH04)	Zürich (CH04)	Hovedstaden (DK01)	154.5
2	Etela-Suomi (FI1B)	Stockholm (SE11)	Hovedstaden (DK01)	Zürich (CH04)	151.7
3	Oberbayern (DE21)	Hovedstaden (DK01)	Stockholm (SE11)	Stockholm (SE11)	151.1
4	Hovedstaden (DK01)	Etela-Suomi (FI1B)	Nordwestschweiz (CH05)	Nordwestschweiz (CH05)	149.0
5	Zürich (CH04)	Ticino (CH07)	Région lémanique (CH01)	Oberbayern (DE21)	146.4
6	Karlsruhe (DE12)	Berlin (DE3)	Oberbayern (DE21)	Karlsruhe (DE12)	144.0
7	Berlin (DE3)	Oberbayern (DE21)	Etela-Suomi (FI1B)	Etela-Suomi (FI1B)	143.8
8	Ticino (CH07)	Karlsruhe (DE12)	Ticino (CH07)	Région lémanique (CH01)	142.7
9	Sydsverige (SE22)	Nordwestschweiz (CH03)	Île de France (FR1)	Berlin (DE3)	141.8
10	Nordwestschweiz (CH05)	Zentralschweiz (CH06)	South East (UKJ)	Sydsverige (SE22)	138.1
11	Västverige (SE23)	Région lémanique (CH01)	Sydsverige (SE22)	Midtjylland (DK04)	137.8
12	South East (UKJ)	South East (UKJ)	Karlsruhe (DE12)	Ostschweiz (CH05)	137.6
13	Zentralschweiz (CH06)	Ostschweiz (CH05)	London (UKI)	Ticino (CH07)	136.0
14	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest (BE1)	London (UKI)	Berlin (DE3)	Île de France (FR1)	135.1
15	Tübingen (DE14)	Utrecht (NL31)	Zentralschweiz (CH06)	Zentralschweiz (CH06)	134.7
16	Braunschweig (DE91)	Espace Mittelland (CH02)	Ostschweiz (CH05)	Västverige (SE23)	134.6
17	Oslo og Akershus (NO01)	Sydsverige (SE22)	Tübingen (DE14)	Tübingen (DE14)	134.3
18	Ostschweiz (CH05)	Västverige (SE23)	Västverige (SE23)	London (UKI)	133.8
19	Rheinessen-Pfalz (DEB3)	Noord-Holland (NL32)	Utrecht (NL31)	Hamburg (DE6)	133.8
20	Région lémanique (CH01)	Oslo og Akershus (NO01)	East of England (UKH)	Utrecht (NL31)	133.6
21	Hamburg (DE6)	Tübingen (DE14)	Noord-Holland (NL32)	Östra Mellansverige (SE12)	133.3
22	London (UKI)	Île de France (FR1)	Midtjylland (DK04)	Stuttgart (DE11)	133.0
23	Östra Mellansverige (SE12)	Östra Mellansverige (SE12)	Trøndelag (NO06)	Braunschweig (DE91)	132.8
24	Midtjylland (DK04)	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest (BE1)	Östra Mellansverige (SE12)	South East (UKJ)	132.2
25	Itä-Suomi (FI19)	Midtjylland (DK04)	Oslo og Akershus (NO01)	Freiburg (DE13)	130.7

26 East of England

27 Vlaanderen

28 Noord-Holland

29 Utrecht

...

67 Wallonië

## Rangschikking op basis van een samengestelde indicator

De performantie-meting gebeurt op basis van een door de Commissie (nieuwe) samengestelde indicator ('Summary Innovation Index'):

- met een indeling in **4 hoofdcategorieën** (in oranje weergegeven):
  - 'kadervoorwaarden voor onderzoek en innovatie'
  - 'investerings'
  - 'innovatieactiviteiten'
  - 'impact'
- **12 innovatiedimensies** (in blauw weergegeven)
- die in totaal **32 indicatoren** in kaart brengen (voor omschrijving van de indicatoren zie bijlage).

*Table 1: Measurement framework of the European Innovation Scoreboard*

<b>FRAMEWORK CONDITIONS</b>	<b>INNOVATION ACTIVITIES</b>
<b>Human resources</b>	<b>Innovators</b>
1.1.1 New doctorate graduates (in STEM)	3.1.1 SMEs with product innovations
1.1.2 Population aged 25-34 with tertiary education	3.1.2 SMEs with business process innovations
1.1.3 Lifelong learning	<b>Linkages</b>
<b>Attractive research systems</b>	3.2.1 Innovative SMEs collaborating with others
1.2.1 International scientific co-publications	3.2.2 Public-private co-publications
1.2.2 Top 10% most cited publications	3.2.3 Job-to-job mobility of Human Resources in Science & Technology
1.2.3 Foreign doctorate students	<b>Intellectual assets</b>
<b>Digitalisation</b>	3.3.1 PCT patent applications
1.3.1 Broadband penetration	3.3.2 Trademark applications
1.3.2 Individuals who have above basic overall digital skills	3.3.3 Design applications
<b>INVESTMENTS</b>	<b>IMPACTS</b>
<b>Finance and support</b>	<b>Employment impacts</b>
2.1.1 R&D expenditure in the public sector	4.1.1 Employment in knowledge-intensive activities
2.1.2 Venture capital expenditures	4.1.2 Employment in innovative enterprises
2.1.3 Direct government funding and government tax support for business R&D	<b>Sales impacts</b>
<b>Firm investments</b>	4.2.1 Medium and high-tech product exports
2.2.1 R&D expenditure in the business sector	4.2.2 Knowledge-intensive services exports
2.2.2 Non-R&D innovation expenditures	4.2.3 Sales of product innovations
2.2.3 Innovation expenditures per person employed in innovation-active enterprises	<b>Environmental sustainability</b>
<b>Use of information technologies</b>	4.3.1 Resource productivity
2.3.1 Enterprises providing training to develop or upgrade ICT skills of their personnel	4.3.2 Air emissions by fine particulates PM2.5 in Industry
2.3.2 Employed ICT specialists	4.3.3 Development of environment-related technologies

## Welke indicatoren zitten in de samengestelde index en hoe worden ze gemeten?

De vier hoofdcategorieën werden aangebracht om een beter onderscheid te kunnen maken tussen:

- kadervoorwaarden die extern aan de onderneming zijn
- publieke en private financiering van O&O in het land
- de innovatieactiviteiten van de onderneming zelf
- de impact die innovatie genereert op werkgelegenheid, verkoop en duurzaamheid.

In de editie 2021 van het EIS en het RIS zijn evenwel **een aantal belangrijke methodologische wijzigingen** aangebracht.

- Van sommige indicatoren werd de **definitie aangepast** (5 indicatoren).
- Andere indicatoren werden als **nieuwe indicatoren** toegevoegd ten einde recente tendensen – **digitalisering en verduurzaming** - in het O&O-landschap beter capteren (11 indicatoren).
- Tevens werden een aantal vroegere indicatoren geschrapt (4 indicatoren).

In de volgende tabel worden de wijzigingen aan bestaande indicatoren evenals de nieuwe indicatoren weergegeven.

Voor de definities van de 32 indicatoren wordt verwezen naar de bijlage bij dit rapport.

EIS 2021 measurement framework (herziene indicatoren in [blauw](#), nieuwe indicatoren in [groen](#))

#### FRAMEWORK CONDITIONS

- Human resources
  - [1.1.1 New doctorate graduates](#)
  - 1.1.2 Population aged 25-34 with tertiary education
  - 1.1.3 Lifelong learning
- Attractive research systems
  - 1.2.1 International scientific co-publications
  - 1.2.2 Top 10% most cited publications
  - 1.2.3 Foreign doctorate students
- [Digitalisation](#)
  - [1.3.1 Broadband penetration](#)
  - [1.3.2 Individuals who have above basic overall digital skills](#)

#### INVESTMENTS

- Finance and support
  - 2.1.1 R&D expenditure in the public sector (universities and government research org)
  - 2.1.2 Venture capital expenditures
  - [2.1.3. Direct government funding and government tax support for business R&D](#)
- Firm investments
  - 2.2.1 R&D expenditure in the business sector
  - 2.2.2 Non-R&D innovation expenditures
  - [2.2.3 Innovation expenditures per person employed in innovation active enterprises](#)
- [Use of information technologies](#)
  - [2.3.1. Enterprises providing training to develop or upgrade ICT skills of their personnel](#)
  - [2.3.2. Employed ICT specialists](#)

#### INNOVATION ACTIVITIES

- Innovators
  - [3.1.1 SMEs with product innovations](#)
  - [3.1.2 SMEs with business process innovations](#)
- Linkages
  - 3.2.1 Innovative SMEs collaborating with others
  - [3.2.2 Public-private co-publications](#)
  - [3.2.3 Job-to-job mobility of Human Resources in Science and Technology](#)
- Intellectual assets
  - 3.3.1 PCT patent applications
  - [3.3.2 Trademark applications](#)
  - 3.3.3 Design applications

#### IMPACTS

- Employment impacts
  - 4.1.1 Employment in knowledge-intensive activities
  - [4.1.2 Employment in innovative enterprises](#)
- Sales impacts
  - 4.2.1 Medium and high tech product exports
  - 4.2.2 Knowledge-intensive services exports
  - 4.2.3 Sales of product innovations
- [Environmental sustainability](#)
  - [Resource productivity](#)
  - [Air emissions by fine particulates PM2.5 in industry](#)
  - [Development of environment-relates technologies](#)



Deze indicatoren werden **als volgt gedefinieerd** (voor details zie bijlage):

EIS 2021	
<b>FRAMEWORK CONDITIONS</b>	
Human resources	<i>Doctorate graduates per 1,000 population aged 25-34</i>
	Percentage of population aged 25-34 having completed tertiary education
	Lifelong learning, the share of population aged 25-64 enrolled in education or training aimed at improving knowledge, skills and competences
Attractive research systems	International scientific co-publications per million population
	Scientific publications among the top-10% most cited publications worldwide as percentage of total scientific publications of the country
	<i>Foreign doctorate students as percentage of all doctorate students</i>
Digitalisation	<i>Broadband penetration (Share of enterprises with a maximum contracted download speed of the fastest fixed internet connection of at least 100 Mb/s)</i>
	Individuals who have above basic overall digital skills
<b>INVESTMENTS</b>	
Finance and support	R&D expenditure in the public sector as percentage of GDP
	<i>Venture capital expenditure as percentage of GDP</i>
	<i>Direct government funding and government tax support for business R&amp;D</i>
Firm investments	R&D expenditure in the business sector as percentage of GDP
	Non-R&D innovation expenditures as percentage of total turnover
	Innovation expenditures per person employed in innovation-active enterprises
Use of information technologies	<i>Enterprises providing training to develop or upgrade ICT skills of their personnel</i>
	Employed ICT specialists
<b>INNOVATION ACTIVITIES</b>	
Innovators	SMEs introducing product innovations as percentage of SMEs
	SMEs introducing business process innovations as percentage of SMEs
Linkages	Innovative SMEs collaborating with others as percentage of SMEs
	Public-private co-publications per million population
	<i>Job-to-job mobility of Human Resources in Science &amp; Technology</i>
Intellectual assets	PCT patent applications per billion GDP (in Purchasing Power standards)
	Trademark applications per billion GDP (in Purchasing Power standards)
	Individual design applications per billion GDP (in Purchasing Power standards)
<b>IMPACTS</b>	
Employment impacts	Employment in knowledge-intensive activities as percentage of total employment
	Employment in innovative enterprises
Sales impacts	<i>Medium and high-tech product exports as percentage of total product exports</i>
	<i>Knowledge-intensive services exports as percentage of total service exports</i>
	Sales of new-to-market and new-to-enterprise innovations as percentage of total turnover
Environmental sustainability	<i>Resource productivity</i>
	Air emissions in fine particulates (PM2.5) in Industry
	<i>Development of environment-related technologies</i>

# 1. Resultaten Europese Unie: Zweden, Finland, Denemarken en België vormen de top-4 binnen de EU-27

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## 1.1. Prestaties van de individuele lidstaten

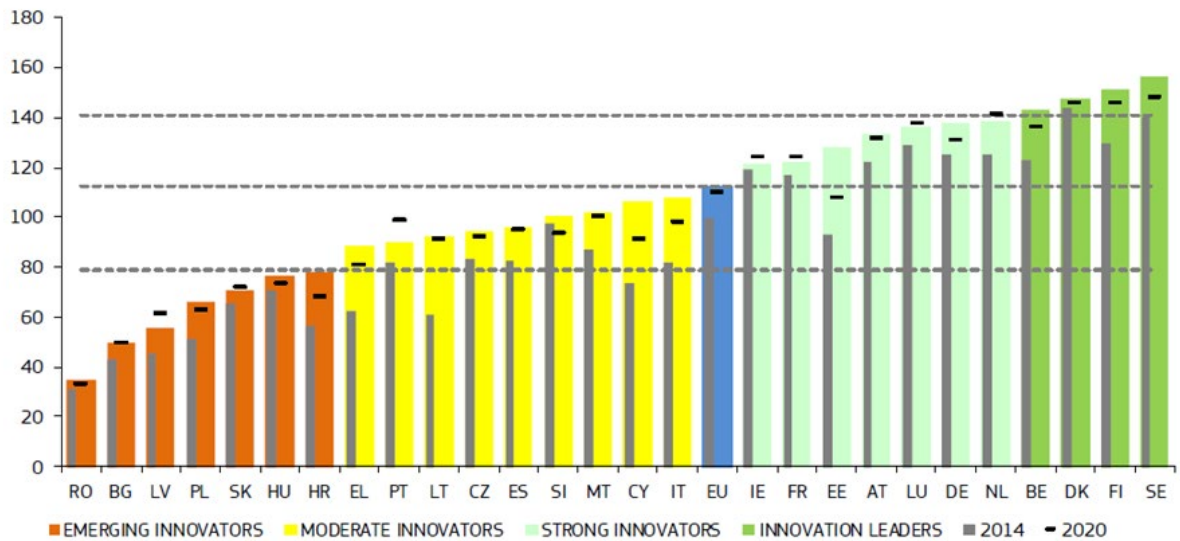
Zweden is in de EU opnieuw de beste van de kopgroep van innovatieleiders, gevolgd door Finland, Denemarken en nu dus België (deze laatste voor het eerst in de groep van innovatieleiders).

Dan volgt een groep 'sterke innovatoren', aangevoerd door Nederland en gevolgd door Duitsland, Luxemburg, Oostenrijk, Estland, Frankrijk en Ierland.

Tussen 2021 en 2020 verbeterde de performantie voor 20 lidstaten en verslechterde ze voor 7.

Landenrangorde van het Europees innovatiescorebord 2021:

Figure 1: Global performance



Coloured columns show countries' performance in 2021, using the most recent data for 32 indicators, relative to that of the EU in 2014. The horizontal hyphens show performance in 2020, using the next most recent data, relative to that of the EU in 2014. Grey columns show countries' performance in 2014 relative to that of the EU 2014. For all years, the same measurement methodology has been used. The dashed lines show the threshold values between the performance groups, where the threshold values of 70%, 100%, and 125% have been adjusted upward to reflect the performance increase of the EU between 2014 and 2021.

Bron: European Innovation Scoreboard 2021

De bovenstaande figuur is als volgt te lezen.

Y-as: gekleurde balkjes (innovatieprestaties in 2021 t.o.v. EU in 2014), horizontale streepjes (innovatieprestaties in 2020 t.o.v. 2014) en grijze balkjes (innovatieprestaties 2014 t.o.v. EU in 2014) – totaal voor 32 indicatoren.

X-as: EU-landen

Geografisch blijft de **innovatie-kloof** in de EU bestaan, tussen enerzijds de *Noord- en West-Europese* en anderzijds de *Zuid- en Oost-Europese* landen.

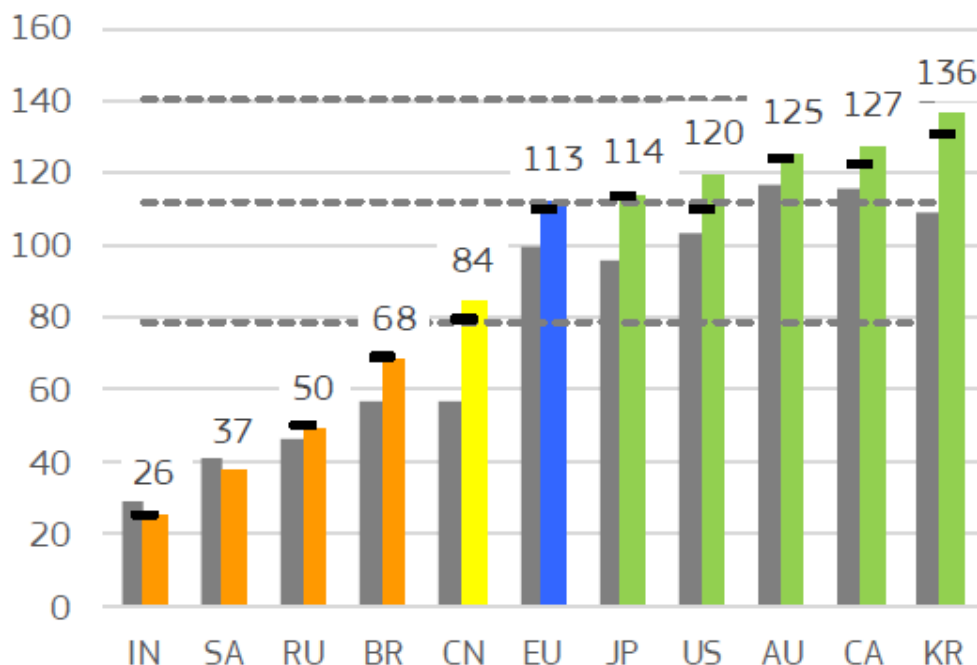
## 1.2. Vergelijking van de EU-prestaties als geheel met de wereldwijde concurrenten

Wereldwijd gezien vertoont – t.o.v. 2014 - de **EU als geheel** een **performance achterstand** t.o.v. Zuid-Korea, Canada, Australië, de Verenigde Staten en Japan.

Tussen 2014 en 2021 verminderde de performance-gap van de EU met **Australië en Canada**.

Maar die met **Japan, Zuid-Korea en de Verenigde Staten** nam toe en de performantievoorsprong van de EU t.o.v. **China** verminderde.

**Figure 2: Global performance**



Coloured columns show performance in 2021 relative to that of the EU in 2014. The horizontal hyphens show performance in 2020 relative to that of the EU in 2014. Grey columns show performance in 2014 relative to that of the EU in 2014. For all years, the same measurement methodology has been used. The dashed lines show the threshold values between the performance groups, where the threshold values of 70%, 100%, and 125% have been adjusted upward to reflect the performance increase of the EU between 2014 and 2021.

Ter info: KR= Zuid-Korea / CA = Canada / AU = Australië / US = Verenigde Staten / JP = Japan / CN = China / BR = Brazilië / RU = Rusland / SA = Zuid-Afrika / IN = Indië

Het volledige rapport van de EIS 2021 vindt u op:

[https://ec.europa.eu/growth/industry/policy/innovation/scoreboards\\_en](https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en).

Een interactieve online tool waarop de prestaties per criterium per land kunnen worden vergeleken staat op URL: [https://interactivetool.eu/EIS/EIS\\_2.html](https://interactivetool.eu/EIS/EIS_2.html).

## 2. Resultaten België: 4de plaats binnen EU-27, in de kopgroep van 'innovatieleiders'

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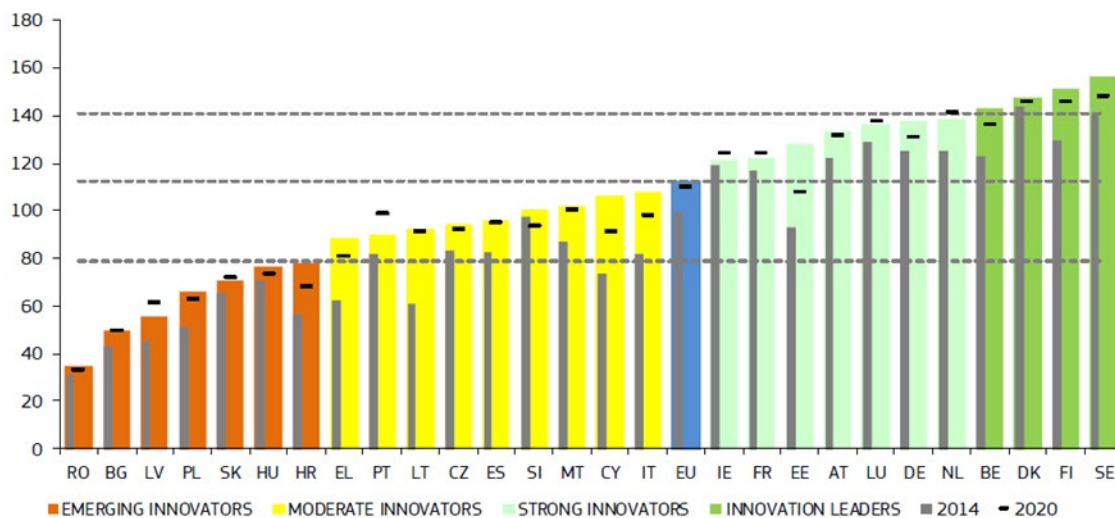
### 2.1. De Belgische positie binnen de EU-27

België komt in de editie 2021 van het European Innovation Scoreboard **voor het eerst in de kopgroep van de EU-lidstaten wiens performantie meer dan 125% van het EU-27 gemiddelde bedraagt.** Deze groep worden de 'innovatieleiders' binnen de EU genoemd.

België haalt een score van **143,5%** t.o.v. het EU-27 gemiddelde in 2014.

Zweden, het best presterende land, scoort 156,5 %.


Figure 1: Global performance



Coloured columns show countries' performance in 2021, using the most recent data for 32 indicators, relative to that of the EU in 2014. The horizontal hypthens show performance in 2020, using the next most recent data, relative to that of the EU in 2014. Grey columns show countries' performance in 2014 relative to that of the EU 2014. For all years, the same measurement methodology has been used. The dashed lines show the threshold values between the performance groups, where the threshold values of 70%, 100%, and 125% have been adjusted upward to reflect the performance increase of the EU between 2014 and 2021.

Bron: European Innovation Scoreboard 2021

Over de jaren heen, verbeterde de positie van België gestaag zoals te zien op onderstaande figuren.

 **Belgium is an Innovation Leader.**  
Over time, performance relative to the EU has increased.

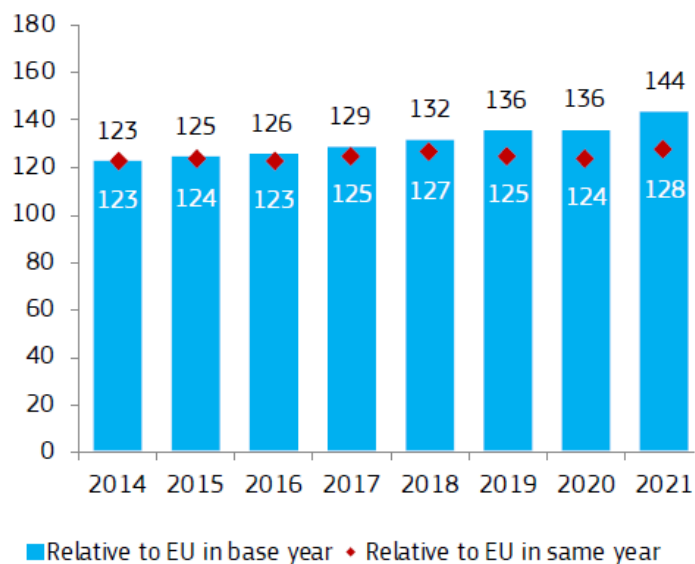
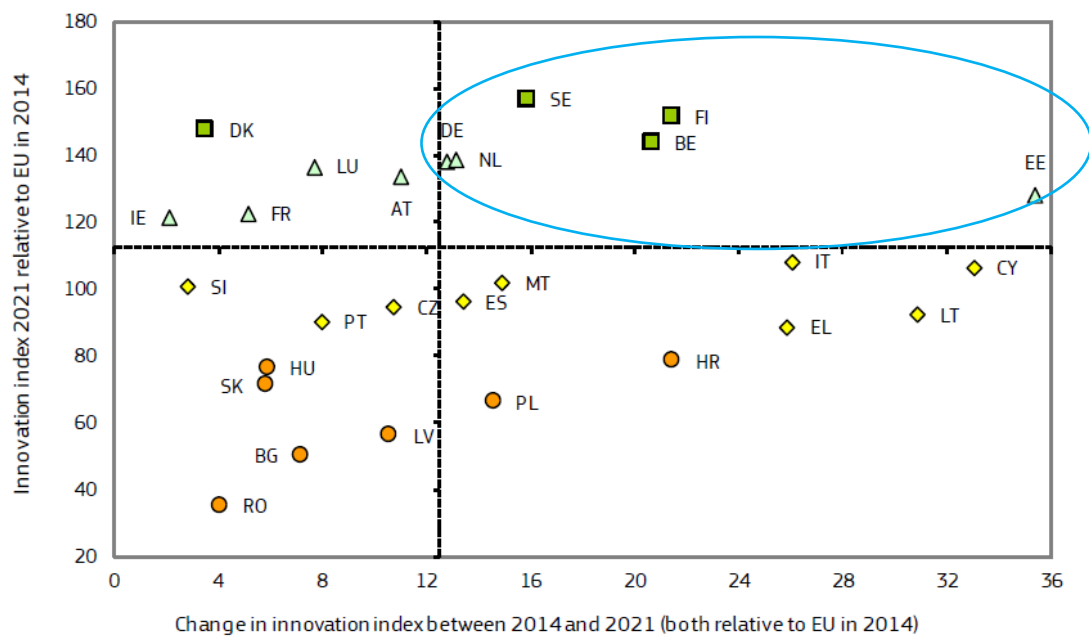


Figure 6: Performance and performance change of EU Member States' innovation systems



The vertical axis shows Member States' performance in 2021 relative to that of the EU in 2014. The horizontal axis shows the change in performance between 2014 and 2021 relative to that of the EU in 2014. The dashed lines show the respective scores for the EU.

Belgium	Relative to	Relative to EU	
	EU 2021 in	2014	2021
	2021		
<b>SUMMARY INNOVATION INDEX</b>	<b>127.5</b>	<b>122.8</b>	<b>143.5</b>
<b>Human resources</b>	<b>115.7</b>	<b>114.5</b>	<b>122.6</b>
Doctorate graduates	113.0	88.5	100.0
Population with tertiary education	150.6	181.0	194.2
Lifelong learning	73.7	84.4	81.1
<b>Attractive research systems</b>	<b>153.4</b>	<b>156.6</b>	<b>172.7</b>
International scientific co-publications	134.8	147.6	176.8
Most cited publications	128.4	133.2	126.2
Foreign doctorate students	223.0	217.1	264.8
<b>Digitalisation</b>	<b>115.1</b>	<b>126.7</b>	<b>159.2</b>
Broadband penetration	116.1	130.4	176.1
People with above basic overall digital skills	113.6	122.2	138.9
<b>Finance and support</b>	<b>126.9</b>	<b>113.1</b>	<b>151.2</b>
R&D expenditures in the public sector	120.0	87.7	115.8
Venture capital expenditures	115.4	109.2	194.0
Government support for business R&D	146.6	150.5	169.6
<b>Firm investments</b>	<b>120.2</b>	<b>114.7</b>	<b>145.3</b>
R&D expenditure in the business sector	141.1	121.3	156.7
Non-R&D Innovation expenditures	94.1	82.7	106.9
Innovation expenditures per employee	141.3	133.8	186.5
<b>Use of information technologies</b>	<b>161.2</b>	<b>184.0</b>	<b>186.2</b>
Enterprises providing ICT training	186.7	186.7	186.7
Employed ICT specialists	139.3	181.0	185.7
<b>Innovators</b>	<b>129.8</b>	<b>142.0</b>	<b>177.5</b>
Product innovators (SMEs)	99.4	154.2	140.2
Business process innovators (SMEs)	158.1	131.3	210.4
<b>Linkages</b>	<b>157.5</b>	<b>194.1</b>	<b>212.4</b>
Innovative SMEs collaborating with others	226.6	304.4	332.1
Public-private co-publications	184.7	180.5	207.2
Job-to-job mobility of HRST	91.1	125.6	130.8
<b>Intellectual assets</b>	<b>94.6</b>	<b>90.6</b>	<b>82.0</b>
PCT patent applications	102.1	110.7	88.6
Trademark applications	101.0	93.7	106.0
Design applications	76.6	69.8	52.5
<b>Employment impacts</b>	<b>142.8</b>	<b>123.8</b>	<b>145.5</b>
Employment in knowledge-intensive activities	125.6	132.0	137.3
Employment in innovative enterprises	156.7	118.0	151.3
<b>Sales impacts</b>	<b>106.3</b>	<b>89.0</b>	<b>108.3</b>
Medium and high tech goods exports	84.0	78.9	92.0
Knowledge-intensive services exports	108.7	103.3	115.1
Sales of innovative products	139.9	85.4	121.6
<b>Environmental sustainability</b>	<b>118.5</b>	<b>98.0</b>	<b>123.4</b>
Resource productivity	178.8	130.9	264.9
Air emissions by fine particulate matter	102.7	100.5	109.3
Environment-related technologies	76.4	75.3	57.4

The colours show normalised performance in 2021 relative to that of the EU in 2021: dark green: above 125%; light green: between 100% and 125%; yellow: between 70% and 100%; orange: below 70%. Normalised performance uses the data after a possible imputation of missing data and transformation of the data.

Kijken we in detail naar de innovatiedimensies en de indicatoren waarop België de hoogste relatieve score haalt t.o.v. het EU-27 gemiddelde (zie kolom 'relative to EU 2021 in 2021') dan zien we dat de **dimensies** met hoogste relatieve score 'use of information technologies', 'linkages' 'attractive research systems', en 'employment impacts' zijn.

We scoren goed voor de volgende indicatoren (zie donkergroen gekleurd in de tabel; opm. EU-27 gemiddelde = 100%)

- Population with tertiary education (150,6%)
- International scientific co-publications (134,8%)
- Most cited publications (128,4%)
- Foreign doctorate students (223%)
- Government support for business R&D (146,6)
- R&D expenditures in the business sector (141,1%)
- Innovation expenditures per employee (141,3%)
- Enterprises providing ICT training (186,7%)
- Employed ICT specialists (139,3%)
- Business process innovators (158,1%)
- Innovative SMEs collaborating with others (226,6%)
- Public-private co-publications (184,7%)
- Employment in knowledge-intensive activities (125,6%)
- Employment in innovative enterprises (156,7%)
- Sales of innovative products (139,9%)
- Resource productivity (178,8%)

Bovenstaande tabel leert ook dat België **relatief zwakker scoort** op de **dimensie** 'intellectual assets' en op de **indicatoren** (zie geel gekleurd in de tabel; opm. EU-27 gemiddelde = 100%):

- Lifelong learning (73,7%)
- Non R&D innovation expenditures (94,1%)
- Product innovators SME's (99,4%)
- Job-to-job mobility of Human Resources in Science and Technology (91,1%)
- Design applications (76,6%)
- Medium and high tech goods exports (84%)
- Environment-related technologies (76,4%)

Vergelijken we de Belgische positie op de **12 dimensies**, telkens met het **EU-27 gemiddelde** en met de **EU-27 landen top-3**, dan krijgen we volgend beeld.

Kadervoorwaarden en dimensies	Positie België	Positie EU-27	Top 3 landen EU-27
<b>Framework conditions</b>			
Human resources	11	15	Zweden, Denemarken en Luxemburg
Attractive research systems	5	13	Luxemburg, Nederland en Denemarken
Digitalisation	9	15	Denemarken, Finland en Nederland
<b>Investments</b>			
Finance and support	2	8	Frankrijk, België en Finland
Firm investments	3	6	Duitsland, Zweden en België
Use of information technologies	3	15	Finland, Zweden en België
<b>Innovation activities</b>			
Innovators	9	16	Cyprus, Griekenland en Estland
Linkages	5	17	Cyprus, Estland en Finland
Intellectual assets	12	11	Denemarken, Finland en Zweden
<b>Impacts</b>			
Employment impacts	6	16	Zweden, Estland en Cyprus
Sales impacts	4	7	Duitsland, Ierland en Zweden
Environmental sustainability	6	13	Malta, Denemarken en Nederland

Op drie dimensies zitten we in de EU-top 3 (finance and support / firm investments / use of information technologies) en op 6 dimensies in de EU-top 5.



## 2.2. Aanvullende 'contextuele analyse' in het scorebord

Naast de samengestelde indicator (32 indicatoren binnen 12 dimensies en 4 hoofdcategorieën) wordt door de diensten van de Europese Commissie per land (en regio) ook een 'contextuele analyse' gegeven.

Die contextuele analyse moet toelaten **de invloed van**

- **structurele verschillen in de economie** van de landen (en regio's)
- verschillen in de **bedrijfsomgeving en ondernemerschapkenmerken**
- **verschillen in innovatieprofielen van de bedrijven**
- **de duurzaamheidsuitdaging**
- **socio-demografische verschillen**

**op de onderzoeks- en innovatie-prestaties** te duiden.

Zo worden zes relevante structurele verschillen onderscheiden:

- **Structuur van de economie.** Landen met een hoog aandeel industrie en daarbinnen landen met een hoog aandeel hoogtechnologische industrie<sup>3</sup> doen meer aan innovatie dan andere landen en zullen dus hoger scoren in de rankings op indicatoren zoals O&O-bedrijfsuitgaven, patenten, aandeel innovatieve bedrijven, .... Ook landen met een hoog aandeel buitenlands aandeelhouderschap (van EU en/of niet-EU landen) kennen hogere O&O-uitgaven<sup>4</sup>.
- **Bedrijfskenmerken en ondernemerschap.** Ondernemerschap is belangrijk om innovaties naar de markt te brengen. Daarom spelen context indicatoren zoals geboortegraad nieuwe ondernemingen en ondernemerschapsactiviteiten een rol. Ook invoer van buitenlands kapitaal is belangrijk, gezien dat vaak gepaard gaat met invoer van technologie. Ook bedrijfskenmerken spelen een rol: ondernemingen met > 250 werknemers staan voor 80% van de O&O-bedrijfsuitgaven in de EU, daar waar kmo's (tss 10 en 250 werknemers) voor 20% staan. Ook de vraagkant in de economie speelt een rol: vraag naar nieuwe producten en diensten lokt innovatie. Dit wordt gevat met de indicator 'buyer sophistication'.

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<sup>3</sup> Zo is binnen de EU-27 gemiddeld 85% van de O&O-uitgaven in de industrie afkomstig van O&O-uitgaven binnen medium high en high-tech industrietakken.

<sup>4</sup> Zo is 30% van de O&O-bedrijfsuitgaven in de Europese Unie afkomstig van O&O-uitgaven in zogenaamde 'foreign affiliates'.

- **Innovatieprofielen.** Volgende taxonomie van 7 types van innoverende en niet-innoverende bedrijven wordt gehanteerd, gebaseerd op de 2018 Community Innovation Survey (CIS-survey). De al dan niet aanwezigheid van veel of weinig van een bepaald type speelt een rol. Onderstaand worden deze 7 typologieën van bedrijven weergegeven, evenals hun relatieve aandelen in de totaliteit van bedrijven en in de werkgelegenheid.

*Table 3: Distribution of enterprises and employment for seven Innovation profiles in the EU*

	Share of enterprises				Share of employment			
	Small	Medium	Large	Total	Small	Medium	Large	Total
In-house product innovators with market novelties	8.5%	16.1%	29.4%	10.7%	9.2%	17.2%	44.8%	29.6%
In-house product innovators without market novelties	11.2%	15.2%	19.4%	12.3%	11.4%	15.6%	19.7%	16.8%
In-house business process innovators	10.7%	12.2%	11.0%	11.0%	11.1%	12.2%	8.6%	10.1%
Innovators that do not develop innovations themselves	11.1%	13.8%	12.0%	11.6%	11.7%	14.0%	7.7%	10.2%
Innovation active non-innovators	3.0%	4.5%	4.3%	3.3%	3.2%	4.6%	2.9%	3.4%
Non-innovators with potential to innovate	21.5%	15.3%	9.3%	19.9%	21.1%	14.4%	5.9%	11.5%
Non-innovators without disposition to innovate	34.0%	22.9%	14.5%	31.3%	32.4%	22.0%	10.4%	18.4%

- **Governance and policy framework.** Ook verschillen in regelgevende kaders spelen een rol in de context waarbinnen dient geïnnoveerd te worden. Zo is er het belang van snel een onderneming te kunnen oprichten ('ease of starting a business') evenals van ondernemersvaardigheden. Ook systemen van innovatieve overheidsopdrachten kunnen innovatie bevorderen. Tenslotte speelt al dan niet rechtszekerheid ('rule of law') in het land een sleutelrol.
- **Climate change.** Gegeven het belang van de duurzaamheidstransitie worden in de contextuele analyse voortaan ook indicatoren opgenomen die relevant zijn voor het verband tussen klimaatverandering en innovatie. Het betreft contextuele informatie over circulair gebruik van materialen, CO2-intensiteit van de energie-consumptie en informatie over eco-innovatie.
- **Socio-demografisch.** Landen met een hoge bevolkingsdichtheid hebben eveneens een hogere innovatiegraad: hoge dichtheden zijn bevorderlijk voor kennisdiffusie, meer opleidingsmogelijkheden, ...

Voor ons land geeft dit het volgende onderstaand 'Structural difference' – beeld.

**Structural differences** with the EU are shown in the table below including, compared to the EIS 2020, new information on different types of (innovating) enterprises (Innovation profiles) and environmental indicators.

	BE	EU
<b>Performance and structure of the economy</b>		
GDP per capita (PPS)	36,400	30,800
Average annual GDP growth (%)	-2.8	-2.5
Employment share Manufacturing (NACE C) (%)	12.5	16.5
of which High and Medium high-tech (%)	36.9	37.9
Employment share Services (NACE G-N) (%)	40.8	41.2
of which Knowledge-intensive services (%)	37.1	35.1
Turnover share SMEs (%)	39.6	36.5
Turnover share large enterprises (%)	36.6	45.7
Foreign-controlled enterprises – share of value added (%)	12.6	11.8
<b>Business and entrepreneurship</b>		
Enterprise births (10+ employees) (%)	0.6	1.0
Total Entrepreneurial Activity (TEA) (%)	6.2	6.7
FDI net inflows (% GDP)	-7.5	2.0
Top R&D spending enterprises per 10 million population	28.8	16.2
Buyer sophistication (1 to 7 best)	4.4	3.7
<b>Innovation profiles</b>		
In-house product innovators with market novelties	n/a	10.7
In-house product innovators without market novelties	n/a	12.3
In-house business process innovators	n/a	11.0
Innovators that do not develop innovations themselves	n/a	11.6
Innovation active non-innovators	n/a	3.3
Non-innovators with potential to innovate	n/a	19.9
Non-innovators without disposition to innovate	n/a	31.3
<b>Governance and policy framework</b>		
Ease of starting a business (0 to 100 best)	74.0	76.5
Basic school entrepreneurial education and training	2.0	2.0
Govt. procurement of advanced tech. products	3.5	3.5
Rule of law (-2.5 to 2.5 best)	1.4	1.1
<b>Climate change indicators</b>		
Circular material use rate	22.1	11.7
Greenhouse gas emissions intensity of energy consumption	84.7	86.6
Eco-Innovation Index	85.0	100.0
<b>Demography</b>		
Population size	11.5	446.7
Average annual population growth (%)	0.5	0.1
Population density	375.4	108.8

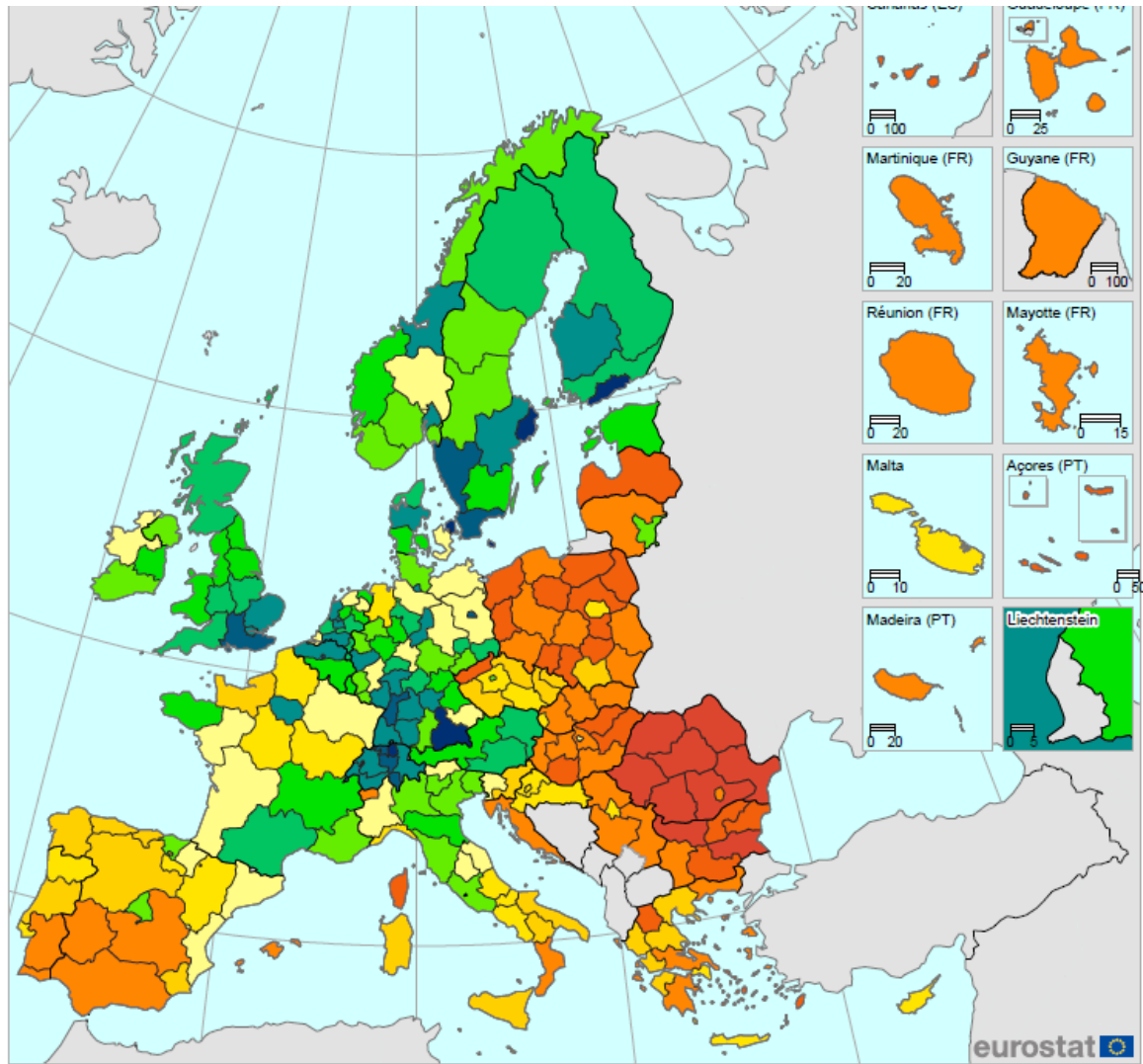
Aldus zijn de **merkbare verschillen** in ons land t.o.v. het EU-gemiddelde de volgende:

- een hoger bbp per capita
- een kleiner aandeel industrie
- hoger omzetaandeel kmo's en lager omzetaandeel grote ondernemingen
- lagere geboortegraad ondernemingen
- hoog aandeel O&O-bedrijfsuitgaven per 10 miljoen inwoners

- hogere 'circular material use' ratio (circulair gebruik van materialen t.o.v. totaal materiaalgebruik)
- lagere eco-innovation index (samengestelde indicator bestaande uit 16 sub-indicatoren)
- een hogere groei van de bevolking;
- een hogere bevolkingsdichtheid.



Het Regionaal Innovatie Scorebord 2021 geeft volgend geografisch beeld:



0 200 400 600 800 km

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat  
Cartography: Eurostat — GISCO, 05/2021

- |  |   |
|--|---|
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #C43A3A; border: 1px solid black;"></span> Emerging Innovator - | <span style="display: inline-block; width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black;"></span> Strong Innovator -  |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #FF8C00; border: 1px solid black;"></span> Emerging Innovator   | <span style="display: inline-block; width: 15px; height: 15px; background-color: #32CD32; border: 1px solid black;"></span> Strong Innovator +  |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #FFC300; border: 1px solid black;"></span> Emerging Innovator + | <span style="display: inline-block; width: 15px; height: 15px; background-color: #008080; border: 1px solid black;"></span> Innovation Leader - |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #FFD700; border: 1px solid black;"></span> Moderate Innovator - | <span style="display: inline-block; width: 15px; height: 15px; background-color: #003366; border: 1px solid black;"></span> Innovation Leader   |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #FFA500; border: 1px solid black;"></span> Moderate Innovator   | <span style="display: inline-block; width: 15px; height: 15px; background-color: #000080; border: 1px solid black;"></span> Innovation Leader + |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #FFFACD; border: 1px solid black;"></span> Moderate Innovator + |   |

## 3.2 Resultaten

Het nieuwe scorebord bevestigt dat Europa's meest innovatieve regio's zich ook in de meest innovatieve landen bevinden.

De meest innovatieve regio in de EU is **Stockholm in Zweden**, gevolgd door **Etelä-Suomi** in Finland, **Oberbayern** in Duitsland, **Hovedstaden** (Kopenhagen) in Denemarken en **Zurich** in Zwitserland.

In België staat het **Brussels Hoofdstedelijk Gewest** op een 14<sup>de</sup> plaats in Europa. **Vlaanderen** op 27 en **Wallonië** op plaats 67.

**Table 8: Top-25 Regional Innovation Leaders**

	2021	2019	2017	2015	RII2021
1	Stockholm (SE11)	Zürich (CH04)	Zürich (CH04)	Hovedstaden (DK01)	154.5
2	Etelä-Suomi (FI1B)	Stockholm (SE11)	Hovedstaden (DK01)	Zürich (CH04)	151.7
3	Oberbayern (DE21)	Hovedstaden (DK01)	Stockholm (SE11)	Stockholm (SE11)	151.1
4	Hovedstaden (DK01)	Etelä-Suomi (FI1B)	Nordwestschweiz (CH05)	Nordwestschweiz (CH05)	149.0
5	Zürich (CH04)	Ticino (CH07)	Région lémanique (CH01)	Oberbayern (DE21)	146.4
6	Karlsruhe (DE12)	Berlin (DE3)	Oberbayern (DE21)	Karlsruhe (DE12)	144.0
7	Berlin (DE3)	Oberbayern (DE21)	Etelä-Suomi (FI1B)	Etelä-Suomi (FI1B)	143.8
8	Ticino (CH07)	Karlsruhe (DE12)	Ticino (CH07)	Région lémanique (CH01)	142.7
9	Sydsverige (SE22)	Nordwestschweiz (CH05)	Île de France (FR1)	Berlin (DE3)	141.8
10	Nordwestschweiz (CH05)	Zentralschweiz (CH06)	South East (UKJ)	Sydsverige (SE22)	138.1
11	Västsvrige (SE23)	Région lémanique (CH01)	Sydsverige (SE22)	Midtjylland (DK04)	137.8
12	South East (UKJ)	South East (UKJ)	Karlsruhe (DE12)	Ostschweiz (CH05)	137.6
13	Zentralschweiz (CH06)	Ostschweiz (CH05)	London (UKI)	Ticino (CH07)	136.0
14	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest (BE1)	London (UKI)	Berlin (DE3)	Île de France (FR1)	135.1
15	Tübingen (DE14)	Utrecht (NL31)	Zentralschweiz (CH06)	Zentralschweiz (CH06)	134.7
16	Braunschweig (DE91)	Espace Mittelland (CH02)	Ostschweiz (CH05)	Västsvrige (SE23)	134.6
17	Oslo og Akershus (NO01)	Sydsverige (SE22)	Tübingen (DE14)	Tübingen (DE14)	134.3
18	Ostschweiz (CH05)	Västsvrige (SE23)	Västsvrige (SE23)	London (UKI)	133.8
19	Rheinessen-Pfalz (DEB3)	Noord-Holland (NL32)	Utrecht (NL31)	Hamburg (DE6)	133.8
20	Région lémanique (CH01)	Oslo og Akershus (NO01)	East of England (UKH)	Utrecht (NL31)	133.6
21	Hamburg (DE6)	Tübingen (DE14)	Noord-Holland (NL32)	Östra Mellansverige (SE12)	133.3
22	London (UKI)	Île de France (FR1)	Midtjylland (DK04)	Stuttgart (DE11)	133.0
23	Östra Mellansverige (SE12)	Östra Mellansverige (SE12)	Trøndelag (NO06)	Braunschweig (DE91)	132.8
24	Midtjylland (DK04)	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest (BE1)	Östra Mellansverige (SE12)	South East (UKJ)	132.2
25	Itä-Suomi (FI19)	Midtjylland (DK04)	Oslo og Akershus (NO01)	Freiburg (DE13)	130.7

Plaats 26 is voor East of England, **plaats 27 is voor Vlaanderen**, gevolgd door Noord-Holland (28) en Utrecht (29) en Île de France (30).

Volgende 21 indicatoren werden dus in de **samengestelde indicator** opgenomen.

RIS 2021 measurement framework (herziene indicatoren in [blauw](#), nieuwe indicatoren in [groen](#), indicatoren die verschillend zijn van EIS 2021 met een (\*))

#### FRAMEWORK CONDITIONS

- Human resources
  - Population aged 25-34 with tertiary education
  - Lifelong learning
- Attractive research systems
  - International scientific co-publications
  - Top 10% most cited publications
- [Digitalisation](#)
  - [Individuals who have above basic overall digital skills \(\\*\)](#) (Own estimates using Households with broadband access)

#### INVESTMENTS

- Finance and support
  - R&D expenditure in the public sector (universities and government research org)
- Firm investments
  - R&D expenditure in the business sector
  - Non-R&D innovation expenditures (\*) (for SME's)
  - [Innovation expenditures per person employed in innovation active enterprises \(\\*\)](#) (for SME's)
- [Use of information technologies](#)
  - [Employed ICT specialists \(\\*\)](#) (Estimates using employment in information and communication)

#### INNOVATION ACTIVITIES

- Innovators
  - [SMEs with product innovations](#)
  - [SMEs with business process innovations](#)
- Linkages
  - Innovative SMEs collaborating with others
  - [Public-private co-publications](#)
- Intellectual assets
  - PCT patent applications
  - [Trademark applications](#)
  - Design applications (\*)

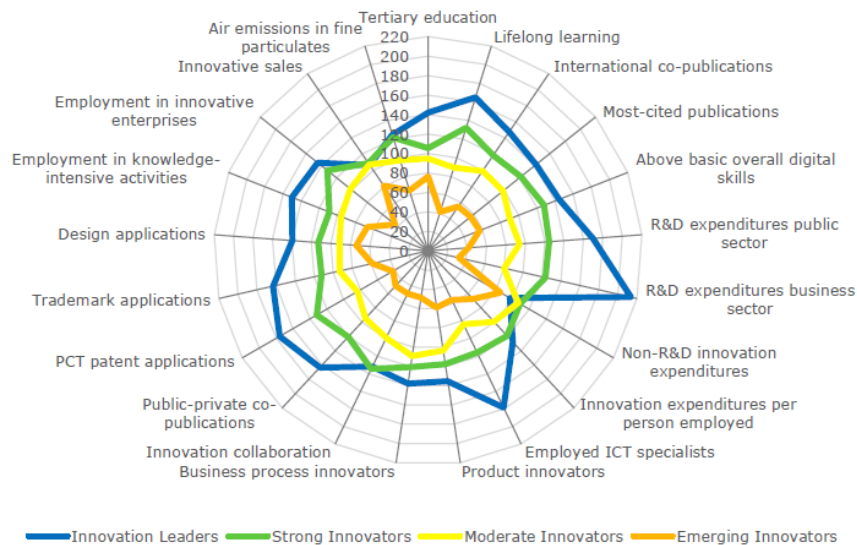
#### IMPACTS

- Employment impacts
  - Employment in knowledge-intensive activities (\*) (Employment in medium-high and high-tech manufacturing and knowledge-intensive services)
  - [Employment in innovative enterprises \(\\*\)](#) (for SME's)
- Sales impacts
  - Sales of new-to-market and new-to-enterprise innovations (\*) (for SME's)
- [Environmental sustainability](#)
  - [Air emissions by fine particulates PM2.5 in industry](#)



De gemiddelde indicator score per prestatiegroep wordt onderstaand weergegeven.

Figure 1: Average indicator scores by regional performance group



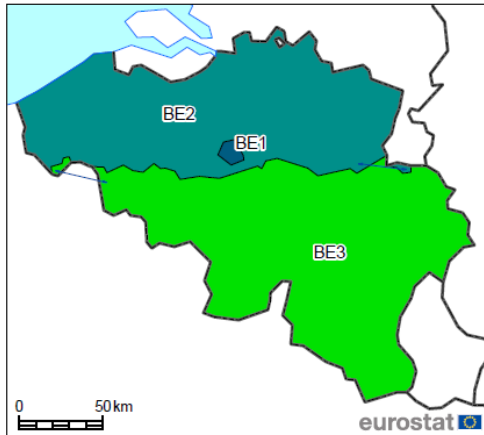
Average scores for each performance group relative to the EU average (=100). Scores calculated excluding countries for which statistical regions at NUTS 1 and NUTS 2 do not exist (Cyprus, Estonia, Latvia, Luxembourg and Malta). Scores have been corrected, since the average of the unweighted group averages is either above or below 100 for all indicators.<sup>6</sup> The correction makes sure that this average is equal to the EU average of 100. Full details are provided in the RIS 2021 Methodology Report.

### 3.3 Prestaties van Vlaanderen: ‘innovatieleider’

België behoort als land tot de 1<sup>de</sup> groep van ‘innovatieleiders’ in het Europese Innovatie Scorebord 2021, op een 4<sup>de</sup> plaats binnen de EU-27.

De ranking van de drie regio’s binnen België is als volgt:

This section summarizes for each country the performance of the regions within that country. For each country, a map is included showing the location of the regions in that country. Regions that include the country's capital city are highlighted in bold.



Map administrative boundaries: ©EuroGeographics ©UN-FAO ©Turkstat

NUTS	Region	RII	Rank	Group
<b>BE1</b>	<b>Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest</b>	<b>135.1</b>	14	Leader
BE2	Vlaams Gewest	130.5	27	Leader -
BE3	Région wallonne	114.0	67	Strong

*RII*: performance in 2021 relative to that of the EU in 2021. *Rank*: rank performance in 2021 across all regions. *Group*: respective sub-group. *Change*: performance change calculated as the difference between the performance in 2021 and 2014 relative to that of the EU in 2014.

Belgium is an Innovation Leader and includes three regions.

*Région de Bruxelles-Capitale* (BE1) is an Innovation Leader, *Vlaams Gewest* (BE2) is an Innovation Leader -, and *Région wallonne* (BE3) is a Strong Innovator. For all three regions, performance relative to the EU in 2014 has increased over time, and most strongly for *Région de Bruxelles-Capitale* (BE1).

Het **Brussels Hoofdstedelijk Gewest** staat op plaats 14 en behoort tot de categorie ‘**innovatieleider**’ (prestaties tussen 134,9% en 144,8% van het EU-gemiddelde).

Het **Vlaams Gewest** staat op plaats 27 en behoort tot de categorie ‘**innovatieleider -**’ (prestaties tussen 125% en 134,9% van het EU-gemiddelde).

Het **WaaIs Gewest** staat op plaats 67 en behoort tot de groep ‘sterke innovator’ (prestaties tussen de

Vlaanderen scoort in de **EU-top 40 regio’s** op volgende **6** van de 21 indicatoren:

- SME’s with business process innovations (**6de**)
- Innovation expenditures per person employed (**9de**)
- Innovative SME’s collaborating with others (**13de**)
- Employment in innovative SME’s (**24ste**)
- Most cited scientific publications (**31ste**)
- Population aged 25-34 having completed tertiary education (**37ste**)

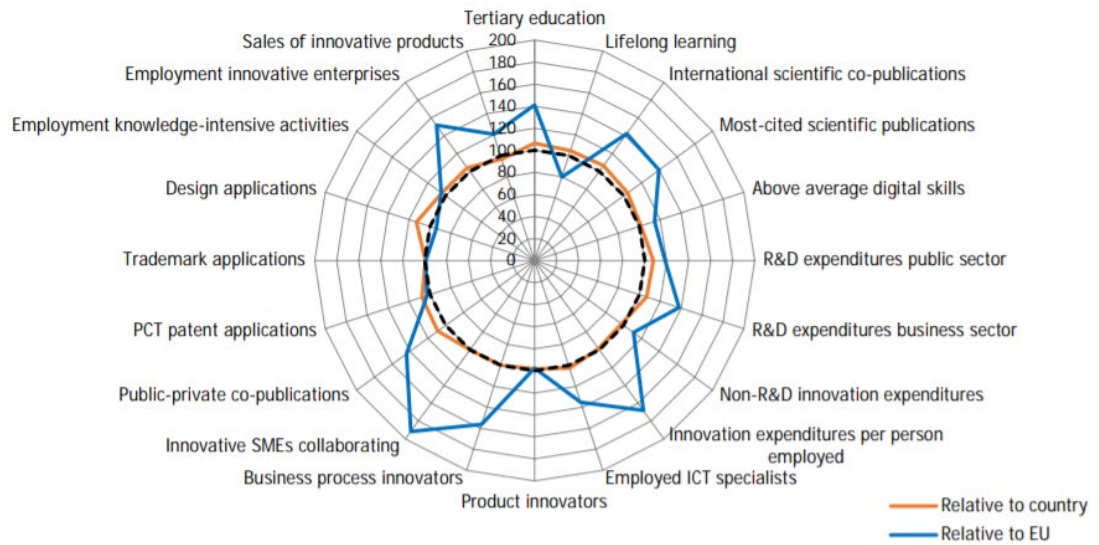
Vlaanderen vergeleken met het EU en Belgische gemiddelde geeft volgend beeld

### Vlaams Gewest (BE2)

	Data	Normalised score	Relative to	
			BE	EU
Tertiary education	49.3	0.809	106	141
Lifelong learning	8.6	0.320	105	80
International scientific co-publications	2,436	0.800	106	142
Most-cited scientific publications	13.3	0.759	104	140
Above average digital skills	34.4	0.603	101	115
R&D expenditures public sector	0.85	0.573	108	119
R&D expenditures business sector	2.00	0.718	107	138
Non-R&D innovation expenditures	±	0.477	±	±
Innovation expenditures per person employed	±	0.986	±	±
Employed ICT specialists	5.1	0.674	103	135
Product innovators	±	0.600	±	±
Business process innovators	±	1.000	±	±
Innovative SMEs collaborating	±	1.000	±	±
Public-private co-publications	404.3	0.714	109	144
PCT patent applications	3.62	0.637	108	103
Trademark applications	6.15	0.452	99	99
Design applications	3.52	0.539	113	94
Employment knowledge-intensive activities	16.1	0.626	104	105
Employment innovative enterprises	±	0.909	±	±
Sales of innovative products	±	0.763	±	±
Air emissions by fine particulates	13.5	0.501	93	102
Average score	--	0.689	--	--
Country EIS-RIS correction factor	--	1.018	--	--
Regional Innovation Index 2021	--	0.701	--	--
RII 2021 (same year)	--	--	102.7	130.5
RII 2021 (cf. to EU 2014)	--	--	--	149.8
Regional Innovation Index 2014	--	0.603	--	--
RII 2014 (same year)	--	--	103.2	128.9
RII - change between 2014 and 2021	--	21.0	--	--

± Relative-to-EU scores are not shown as these would allow recalculating confidential regional CIS data.

## In een spindiagram voorgesteld



Vlaanderen sluit nauw aan bij de Belgisch positionering. Gezien het gewicht van Vlaanderen in het Belgische O&O-landschap is dit niet verwonderlijk.

Indien interesse in meer informatie m.b.t. de benchmarking van Vlaanderen t.o.v. andere landen en regio's dan kan u de volgende VARIO-adviezen uit 2020 consulteren; VARIO-advies 10 '[Innovatieve benchmarklanden en -regio's voor Vlaanderen](#)' en VARIO-advies 14 '[Naar de Top van kennis- en innovatieregio's in 2030](#)'.

# BIJLAGE:

## Definities van de 32 indicatoren

INDICATOR	DEFINITION NUMERATOR Source	DEFINITION DENOMINATOR Source	MOST RECENT YEAR FOR WHICH DATA ARE AVAILABLE INTERPRETATION
1.1.1 New doctorate graduates in science, technology, engineering, and mathematics (STEM) per 1,000 population aged 25-34	Number of doctorate graduates in science, technology, engineering, and mathematics (STEM) Eurostat	Population between and including 25 and 34 years Eurostat	2018 The indicator is a measure of the supply of new second-stage tertiary graduates in all fields of training (ISCED 8). For most countries, ISCED 8 captures PhD graduates.  There is a complex relation between STEM-graduates and innovation in the private sector. STEM-graduates do well as an employee within firms with many of them taking up managerial positions. However, non-STEM graduates are more likely to be involved in entrepreneurial activities. Graduates with a STEM-background who have completed a non-STEM study next to their core curriculum, show as much entrepreneurial activity as non-STEM graduates.
1.1.2 Percentage population aged 25-34 having completed tertiary education	Number of persons in age class with some form of post-secondary education Eurostat	Population between and including 25 and 34 years Eurostat	2019 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. The indicator focuses on a younger age cohort of the population, aged 25 to 34, and will therefore easily and quickly reflect changes in educational policies leading to more tertiary graduates.
1.1.3. Lifelong learning	The target population for lifelong learning statistics refers to all persons in private households aged between 25 and 64 years. The information collected relates to all education or training, whether or not relevant to the respondent's current or possible future job. Data are collected through the EU labour force survey (LFS) Eurostat	Total population of the same age group, excluding those who did not answer the question concerning participation in (formal and non-formal) education and training Eurostat	2019 Lifelong learning encompasses all purposeful learning activity, whether formal, non-formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence. The intention or aim to learn is the critical point that distinguishes these activities from non-learning activities, such as cultural or sporting activities.
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1.2.1 International scientific co-publications per million population	Number of scientific publications with at least one co-author based abroad (where abroad is non-EU for the EU27) Scopus *	Total population Eurostat	2020 International scientific co-publications are a proxy for the quality of scientific research as collaboration increases scientific productivity
1.2.2 Scientific publications among the top-10% most cited publications worldwide as percentage of total scientific publications of the country	Number of scientific publications among the top-10% most cited publications worldwide Scopus *	Total number of scientific publications Scopus *	2018 The indicator is a measure for the efficiency of the research system, as highly cited publications are assumed to be of higher quality. There could be a bias towards small or English-speaking countries given the coverage of Scopus' publication data.
1.2.3 Foreign doctorate students as a percentage of all doctorate students	Number of doctorate students from foreign countries Eurostat	Total number of doctorate students Eurostat	2018 The share of foreign doctorate students reflects the mobility of students as an effective way of diffusing knowledge. Attracting high-skilled foreign doctorate students will secure a continuous supply of researchers.

INDICATOR	DEFINITION NUMERATOR Source	DEFINITION DENOMINATOR Source	MOST RECENT YEAR FOR WHICH DATA ARE AVAILABLE INTERPRETATION
1.3.1. Broadband penetration	Number of enterprises with a maximum contracted download speed of the fastest fixed internet connection of at least 100 Mb/s Eurostat, Community Survey of ICT Usage and E-commerce in Enterprises	All enterprises Eurostat, Community Survey of ICT Usage and E-commerce in Enterprises	2019 Realising Europe's full e-potential depends on creating the conditions for electronic commerce and the Internet to flourish. This indicator captures the relative use of this e-potential by the share of enterprises that have access to fast broadband.
1.3.2 Individuals who have above basic overall digital skills (% share)	Number of individuals with above basic overall digital skills Eurostat: EU survey on the ICT usage in households and by individuals	Total number of individuals aged 16 to 74 Eurostat	2019 Above basic overall digital skills represents the highest level of the overall digital skills indicator, which is a composite indicator based on selected activities performed by individuals aged 16-74 on the internet in four specific areas (information, communication, problem solving, content creation) during the previous 3 months.
2.1.1 R&D expenditure in the public sector (percentage of GDP)	All R&D expenditures in the government sector (GOVERD) and the higher education sector (HERD) Eurostat	Gross Domestic Product Eurostat	2019 Research and development (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. R&D spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth.
2.1.2 Venture capital (percentage of GDP)	Venture capital expenditures is defined as private equity being raised for investment in companies. Management buyouts, management buy-ins, and venture purchase of quoted shares are excluded. Venture capital includes early stage (seed + start-up) and expansion and replacement capital Invest Europe Comment: Three-year averages have been used	Gross Domestic Product Eurostat	2020 The amount of venture capital is a proxy for the relative dynamism of new business creation. For enterprises using or developing new (risky) technologies, venture capital is often the only available means of financing their (expanding) business.
2.1.3 Direct government funding and government tax support for business R&D (percentage of GDP)	Sum of GTARD as a percentage of GDP and Direct funding of BERD as a percentage of GDP OECD R&D Tax Incentive Database, <a href="http://oe.cd/rdtax">http://oe.cd/rdtax</a> , December 2020.		2018 Public financing of R&D can take two forms: Direct funding for R&D through instruments such as grants and public procurement, and Indirect support through the tax system. Direct funding is well captured in the official data on R&D expenditure by source of fund, differentiating between the following sources: Business enterprise sector, Government sector, Higher education sector, Private non-profit sector, and Abroad. Data on R&D funded by the Government sector are available from Eurostat (EU Member States and other European countries), OECD (OECD member states) and UIS (global coverage). Over time, more and more countries have introduced R&D tax incentives. The OECD has started to collect data on such systematically since 2017 and with the support of the EC data are currently being collected on an annual basis and made available in the 'OECD R&D Tax Incentives database'. In the EU, 21 countries were offering R&D tax relief in 2018, a significant increase compared to only 12 countries offering R&D tax relief in 2000.

INDICATOR	DEFINITION NUMERATOR Source	DEFINITION DENOMINATOR Source	MOST RECENT YEAR FOR WHICH DATA ARE AVAILABLE INTERPRETATION
2.2.1 R&D expenditure in the business sector (percentage of GDP)	All R&D expenditures in the business sector (BERD) Eurostat	Gross Domestic Product Eurostat	2019 Indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sectors (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.
2.2.2 Non-R&D innovation expenditures (percentage of turnover)	Sum of total innovation expenditure by enterprises in all size classes, excluding intramural and extramural R&D expenditures Eurostat (Community Innovation Survey)	Total turnover for all enterprises Eurostat (Community Innovation Survey)	2018 This indicator measures non-R&D innovation expenditure as a 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.
2.2.3 Innovation expenditures per person employed	Sum of total innovation expenditure by enterprises in all size classes in Purchasing Power Standards (PPS) Eurostat (Community Innovation Survey)	Total employment in innovative enterprises in all size classes Eurostat (Community Innovation Survey)	2018 The indicator measures the monetary input directly related to innovation activities.
2.3.1 Enterprises providing training to develop or upgrade ICT skills of their personnel	Number of enterprises that provided any type of training to develop ICT related skills of their personnel Eurostat, Community Survey of ICT Usage and E-commerce in Enterprises	All enterprises Eurostat, Community Survey of ICT Usage and E-commerce in Enterprises	2020 ICT skills are particularly important for innovation in an increasingly digital economy. The share of enterprises providing training in that respect is a proxy for the overall skills development of employees.
2.3.2 ICT specialists (as a percentage of total employment)	Number of employed ICT specialists Eurostat	Total employment Eurostat	2019 Eurostat defines ICT specialists as 'workers who have the ability to develop, operate and maintain ICT systems, and for whom ICT constitute the main part of their job'. Operationalised in terms of ISCO codes, this definition converts into a statistical definition of ICT specialists as follow: from 2011 onwards - corresponding to the application of the ISCO-08, Eurostat and OECD adopted a joint approach to define the occupations to be treated as ICT specialists (OECD, 2015 <sup>2</sup> ).
3.1.1 SMEs introducing product innovations (percentage of SMEs)	Number of Small and medium-sized enterprises (SMEs) who introduced at least one product innovation. A product innovation is the market introduction of a new or significantly improved good or service with respect to its capabilities, user friendliness, components, or sub-systems Eurostat (Community Innovation Survey)	Total number of Small and medium-sized enterprises Eurostat (Community Innovation Survey)	2018 Product innovation is a key ingredient to innovation as they can create new markets and improve competitiveness. Higher shares of product innovators reflect a higher level of innovation activities.
3.1.2 SMEs introducing business process innovations (percentage of SMEs)	Number of Small and medium-sized enterprises (SMEs) who introduced at least one business process innovation either new to the enterprise or new to their market Eurostat (Community Innovation Survey)	Total number of Small and medium-sized enterprises Eurostat (Community Innovation Survey)	2018 Many firms innovate not by improving new products but by improving their business processes. Business process innovations include process, marketing and organisational innovations.



INDICATOR	DEFINITION NUMERATOR Source	DEFINITION DENOMINATOR Source	MOST RECENT YEAR FOR WHICH DATA ARE AVAILABLE INTERPRETATION
3.2.1 Innovative SMEs collaborating with others (percentage of SMEs)	Number of Small and medium-sized enterprises with innovation co-operation activities, i.e. those firms that had any co-operation agreements on innovation activities with other enterprises or institutions in the three years of the survey period Eurostat (Community Innovation Survey)	Total number of Small and medium-sized enterprises Eurostat (Community Innovation Survey)	2018 This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate in 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.
3.2.2 Public-private co-publications per million population	Number of public-private co-authored research publications. The definition of the 'private sector' excludes the private medical and health sector. Scopus *	Total population Eurostat	2020 This indicator captures public-private research linkages and active collaboration activities between business sector researchers and public sector researchers resulting in academic publications.
3.2.3 Job-to-job mobility of Human Resources in Science & Technology	Job-to-job mobility of Human Resources in Science & Technology Eurostat: Job-to-job mobility of HRST by sex [hrst_fl_mobsex]	Working age population aged 25-64 Eurostat	2019 Human Resources in Science & Technology (HRST) are people who fulfil one or other of the following conditions: 1) have successfully completed a tertiary level education; 2) not formally qualified as above but employed in a S&T occupation where the above qualifications are normally required. Job-to-job mobility in this context is defined as the movement of individuals between one job and another from one year to the next. It does not include inflows into the labour market from a situation of unemployment or inactivity.
3.3.1 PCT patent applications per billion GDP (in PPS)	Number of patent applications filed under the PCT, at international phase, designating the European Patent Office (EPO). Patent counts are based on the priority date, the inventor's country of residence and fractional counts. OECD Comment: Two-year averages have been used	Gross Domestic Product in Purchasing Power Standard Eurostat	2017 The capacity of firms to develop new products will determine their competitive advantage. One measure of the rate of new product innovation is the number of patents. This indicator measures the number of PCT patent applications.
3.3.2 Trademark applications per billion GDP (in PPS)	Number of trademarks applied for at EUIPO European Union Intellectual Property Office (EUIPO) Comment: Two-year averages have been used	Gross Domestic Product in Purchasing Power Standard Eurostat	2020 Trademarks are an important innovation indicator, especially for the service sector. The Community trademark gives its proprietor a uniform right applicable in all Member States of the European Union through a single procedure which simplifies trademark policies at European level. It fulfils the three essential functions of a trademark: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and it is a form of communication, a basis for publicity and advertising.
3.3.3 Design applications per billion GDP (in PPS)	Number of individual designs applied for at EUIPO European Union Intellectual Property Office (EUIPO) Comment: Two-year averages have been used	Gross Domestic Product in Purchasing Power Standard Eurostat	2020 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 programmes. 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.

INDICATOR	DEFINITION NUMERATOR Source	DEFINITION DENOMINATOR Source	MOST RECENT YEAR FOR WHICH DATA ARE AVAILABLE INTERPRETATION
4.1.1 Employment in knowledge-intensive activities (percentage of total employment)	Number of employed persons in knowledge-intensive activities in business industries. Knowledge-intensive activities are defined, based on EU Labour Force Survey data, as all NACE Rev.2 industries at 2-digit level where at least 33% of employment has a higher education degree (ISCED 5-8). Eurostat	Total employment Eurostat	2019 Knowledge-intensive activities provide services directly to consumers, such as telecommunications, and provide inputs to the innovative activities of other firms in all sectors of the economy.
4.1.2 Employment in innovative enterprises	Number of employed persons in innovative enterprises ('Enterprises that have either introduced an innovation or have any kind of innovation activity (including enterprises with abandoned/suspended or on-going innovation activities)) Eurostat (Community Innovation Survey)	Total employment for enterprises with 10 or more employees Eurostat (Community Innovation Survey)	2018 Innovation in enterprises has a profound impact on the employability of workers, but its effect in product- and process-innovation oriented firms varies across countries. Firm innovation proves to be specifically important during a time of economic recession. Although high-skilled employees are less affected by a recession than low-skilled employees, a notable positive effect is observed for low-skilled employees in innovative firms as well.
4.2.1 Exports of medium and high technology products as a share of total product exports	Value of medium and high-tech exports, in national currency and current prices, including exports of the following SITC Rev.3 products: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891 Eurostat (ComExt) for Member States, UN ComTrade for non-EU countries	Value of total product exports Eurostat (ComExt) for Member States, UN ComTrade for non-EU countries	2020 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 international markets. It also reflects product specialisation by country. Creating, exploiting and commercialising new technologies are vital for the competitiveness of a country in the modern economy. Medium and high technology products are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment.
4.2.2 Knowledge-intensive services exports as percentage of total services exports	Exports of knowledge-intensive services is defined as the sum of credits in EBOP5 2010 (Extended Balance of Payments Services Classification) items SC1, SC2, SC3A, SF, SG, SH, SI, SJ and SK1 <sup>2</sup> Eurostat	Total value of services exports Eurostat	2019 The indicator measures the competitiveness of the knowledge-intensive services sector. Competitiveness-enhancing measures and innovation strategies can be mutually reinforcing for the growth of employment, export shares and turnover at the firm level. It reflects the ability of an economy, notably resulting from innovation, to export services with high levels of value added, and successfully take part in knowledge-intensive global value chains.
4.2.3 Sales of new-to-market and new-to-enterprise innovations as percentage of turnover	Sum of total turnover of new or significantly improved products, either new-to-the-enterprise or new-to-the-market, for all enterprises Eurostat (Community Innovation Survey)	Total turnover for all enterprises Eurostat (Community Innovation Survey)	2018 This indicator measures the turnover of new or significantly improved products and includes both products which are only new to the enterprise and products which are also new to the market. The indicator thus captures both the creation of state-of-the-art technologies (new-to-market products) and the diffusion of these technologies (new-to-enterprise products).

INDICATOR	DEFINITION NUMERATOR Source	DEFINITION DENOMINATOR Source	MOST RECENT YEAR FOR WHICH DATA ARE AVAILABLE INTERPRETATION
4.3.1 Resource productivity	Resource productivity is expressed by the amount of GDP generated per unit of direct material consumed, i.e. GDP / DMC in euros per kg Eurostat: Resource productivity [env_ac_rp]		2019 Resource productivity is a measure of the total amount of materials directly used by an economy (measured as domestic material consumption (DMC)) in relation to GDP. It provides insights into whether decoupling between the use of natural resources and economic growth is taking place. Resource productivity (GDP/DMC) is the EU sustainable development indicator for policy evaluation. Domestic material consumption (DMC) measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports.
4.3.2 Air emissions by fine particulate matter (PM2.5) in Industry	Air emissions by fine particulate matter (PM2.5) in the Manufacturing sector in Tonnes Eurostat, Air emissions accounts by NACE Rev. 2 activity [env_ac_ainah_r2]	Value added in the Manufacturing sector - Chain linked volumes (2010), million euro Eurostat	2018 Air pollution may be anthropogenic (human-induced) or of natural origin. Air pollution has the potential to harm both human health and the environment: particulate matter (PM), nitrogen dioxide and ground-level ozone are known to pose particular health risks. Long-term and peak exposures to these pollutants may be associated, among other impacts, with cardiovascular and respiratory diseases or an increased incidence of cancer. This indicator captures average concentration levels of fine particulate matter (PM2.5 – particles with a diameter of 2.5 micrometres or less) to which the population is exposed. The EU set an annual limit of 25 µg/m³ for fine particulate matter in Directive 2008/50/EC <sup>3</sup> on ambient air quality and cleaner air, while the World Health Organisation (WHO) <sup>4</sup> set a more stringent, but non-binding guideline value, whereby annual mean concentrations should not exceed 10 µg/m³ in order to protect human health. PM2.5 is considered by the WHO as the pollutant with the highest impact on human health.
4.3.3 Development of environment-related technologies, percentage of all technologies	Number of environment-related inventions OECD Green Growth database	Total number of patents	2016 The number of environment-related inventions is expressed as a percentage of all domestic inventions (in all technologies). Indicators of technology development are constructed by measuring inventive activity using patent data across a wide range of environment-related technological domains (ENVTECH <sup>5</sup> ), including environmental management, water-related adaptation, and climate change mitigation technologies. The counts used include only higher-value inventions (with patent family size ≥ 2). Data are obtained from the Patents: Technology development dataset of the OECD Environment Database <sup>6</sup> .

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