



**Flanders**  
State of the Art

# **RDI in Flanders**

*Organisational setup,  
key figures, main institutes*

*Prague, April 2016*





# Key data

**GDP:** € 230 billion (2013) (= 58% of Belgian GDP: € 395 billion). This is more than 17 EU Member States. Czech Republic: € 155 billion (Eurostat, 2016)

**Global Expenditure on R&D (GERD):** € 5.8 billion (2013) (GERD BE: € 9.6 bn)

**R&D intensity (% GERD / GDP):** 2.54% of which 69% by private sector

**GDP per capita:** € 32,800 (€ 35,200 including the Flemish commuters to Brussels)

**R&D personnel:** 41,806 FTE

**Degree of innovative companies** (4 categories of innovation): 56%

**Patents per million inhabitants:** 230.50

**Employment in high-technology sectors:** 8.9%

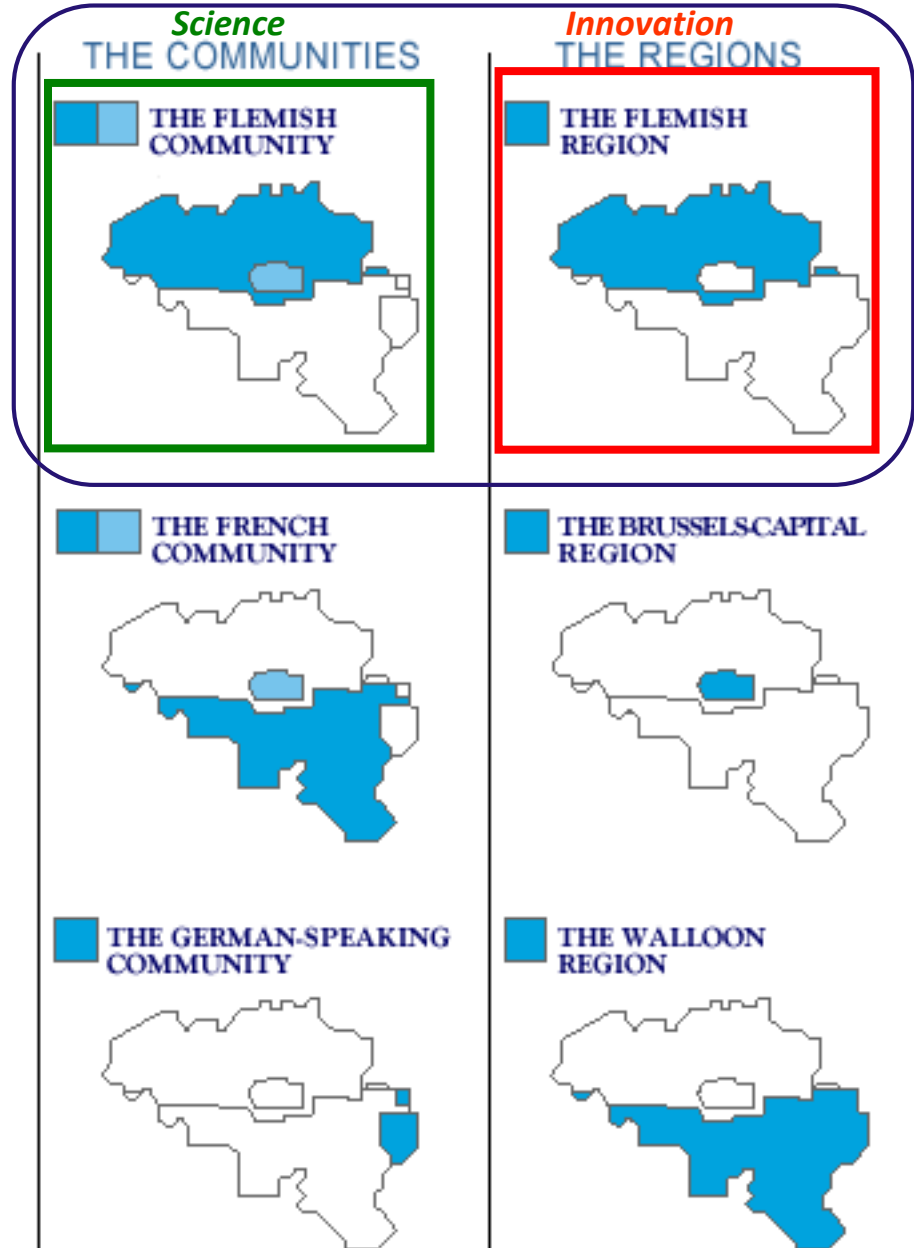
**Scientific output** (publications, citations, co-publication, technological strength of EPO patent applications): strong performance

# Flanders: an open economy

A globally embedded economy with a high number of foreign companies => ratio of trade to GDP exceeds 100%

- multinational enterprises: 56% of added value and 70% of all jobs in industry
- Industry & services: multinationals provide 4 out of 10 jobs
- Foreign investment in Flanders: € 2.8 billion (2014 data)
- Important spill-over effects: knowledge-intensive economy; high productivity; fast internationalisation
- Foreign companies are over-represented in the top of the R&D-performing companies, in particular in the chemical industry and pharmaceuticals
- Some examples: Gevaert, Barco, Bekaert, Solvay, Janssen Pharmaceutica (Johnson & Johnson), Kuraray, UCB, BASF Antwerpen, Cargill, Bayer Antwerpen, ExxonMobile, Siemens...

# Institutional set-up of Belgium (a)



BELGIUM's federal system:

- Federal Government
- 3 Communities
- 3 Regions

- (a) no *hierarchy of norms* between various levels of governance
- (b) no national political parties
- (c) the various public authorities execute their powers in full autonomy, incl. their external relations

# Institutional set-up of Belgium (b)

## ▶ Federal Government

- General framework conditions (macro-economic, pricing policy, internal market, general business environment, normalisation, standardisation, IPR, fiscal policy including researchers' salaries, etc)
- Limited specific topics (space research in international context, polar research), (a few) federal research institutes and their data transfer networks, federal scientific institutes

## ▶ Community Governments: person-bound policies

- Higher education, fundamental and strategic basic research (mandates, fellowships, PhD, grants...), large research infrastructure, scientific institutes of the Communities
- mobility of researchers, promotion of science and STEM

## ▶ Regions: territorially-bound policies

**All direct support** (subsidies, grants, fees, mandates for research on behalf of firms...) and most **indirect support** (loans, participations, certain permits, access to finance for start-ups and spin-offs, guarantees, business angels...). E.g.:

- applied research, clustering, innovative business networks
- science parks, innovation incubators, development zones
- advice and networking for innovation and entrepreneurship, research valorisation, technology transfer, feasibility studies, dissemination of various forms of knowledge
- public research organisations (PROs), various knowledge or data-collection institutes

# RDI policy priorities (a)

## Flemish Coalition Agreement 2014-2019

- 1) Improving overall **human resources, skills** and **capacity building** through a **demand-driven and market-oriented** public policy in the field of economy and innovation
- 2) Improving **returns and impact of science** through a **simplification and rationalization of structures and instruments** with faster and easier procedures, more transparency, and a clear one-stop-shop function
- 3) Addressing challenges of globalisation and increasing international cooperation through a higher focus on **business-oriented innovation and valorisation, research excellence**, and **a growth path for tR&D expenditure of 3% of GDP**, whereby public outlays strive towards 1% by 2020.

# RDI policy priorities (b)

## Annual policy letters

### *Invest in an excellent knowledge base*

- (a) strive towards a qualitative implementation of the 3% RDI target through research at universities & strategic research centres
- (b) stimulate knowledge centres for European & International cooperation
- (c) strategy for research careers
- (d) invest in state-of-the-art research infrastructure
- (e) develop a policy for open data and open access

Invest in interregional, European, and international networks

Activate innovation potential of SMEs and large companies

Innovative procurement

# RDI policy priorities (c)

## VISION 2050

Long-term tendencies and challenges defined from a broad societal point of view

### *Seven priorities for transition*

Transition towards the circular economy

Smart living

*Leap into industry 4.0*

Lifelong learning and employment for everybody

Activating care and well-being 4.0

Working on a smooth and safe mobility system

Ensuring an energy transition



# RDI annual budget: € 2.7b

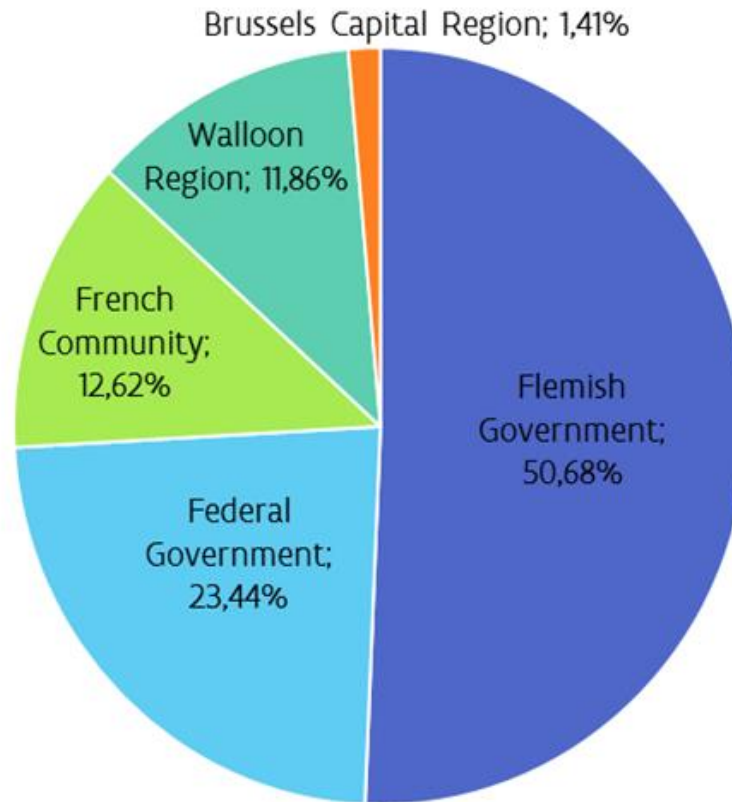
authority	€ mln	% tot	
<b>Flanders (→ all domains)</b>	<b>2,189</b>	<b>81.9</b>	Initial 2015 budget (= 43% stemming from EWI, 51% OV);
<i>of which R&amp;D strict sense</i>	<i>1,308</i>		<i>Initial 2015 budget (= 70% from EWI, 25% OV, 5% rest)</i>
Federal	+ - 300	11.1	Avg p.a. contribution from FED towards VLA institutes
FP7/H2020	+ - 160	6.0	Avg p.a. contribution from FP7 RTD towards VLA instit.
ERDF Flanders	11.6	0.5	Avg p.a. = $1/6 \times 173,5 \text{ mln} \times 40\%$ of ERDF aimed at R&D&I
ERDF Interreg	11.5	0.5	Avg p.a. = $1/6 \times 172 \text{ mln} \times 40\%$ of ERDF aimed at R&D&I
<b>Total</b>	<b>2,672</b>	<b>100.0</b>	→ GBAORD ( $\cong \text{€}1.7 \text{ billion}$ ) / $BBP(R) = 0.75\%$

a) EWI = Economy, Science and Innovation policy domain; OV = Education and Training policy domain

b) budget from Federal authority & EU FP7/H2020: based on past average annual expenditure

c) budget from ERDF: based on an estimated 40% that is allocated for RDI in the total ERDF budget that Flanders is entitled to receive from the 2014-2020 EU Regional Policy budget

# Belgian public RDI budgets Allocation by authority (2015)



*Belgian total public budget for RDI: initial allocation for 2015: € 2.569,91 billion  
(EU or international funding is not included)*

source: Programmatory Public Service for Science Policy (federal government)

# RDI system: main actors (1)

- ▶ **5 university associations:** Antwerpen, Brussel, Gent, Leuven, Limburg  
*a university association = institutionalised grouping that each has one university (5 in total) and one or more university colleges (17 in total)  
these produce jointly > 90% of total scientific output*
- ▶ **4 strategic research centres (SRC):** Imec & iMinds, VIB, VITO, Flanders Make
- ▶ **5 scientific institutes:** AOE (heritage), Botanic Garden Meise, ILVO (agriculture research), INBO (nature), KMSKA (arts))
- ▶ **other knowledge institutes:** ITM Antwerp (tropical medicine), VLIZ (marine sciences), Energyville, Digital Signal Processing, living labs...

# RDI system: main actors (2)

- ▶ **innovation platforms:** FISCH (chemistry), Flanders' FOOD, SIM (materials), VIL (logistics), VIM (mobility), MIP (environment)... These are to become innovative business networks & spearhead clusters during 2016
- ▶ **Federal scientific institutes & federal research centres:** meteorology, nuclear energy, space, public health, natural sciences...
- ▶ **Collective research centres:** textiles, building, technology industry...)
- ▶ **Techtransfer:** TTO at universities & SRC, Flanders Innovation Network (VIN), provincial innovation centres, venture capital funds...
- ▶ **Infrastructure:** science & technology parks, innovation & incubator centres (Ghent, Leuven, Hasselt, Antwerp, Ostend, Mol,...), Flanders Super Computer, infrastructure at various research centres....
- ▶ International institutes in Flanders: Von Karman, IODE, EMODnet, IRMM

# RDI system: main actors (3)

## ▶ strategic research centres

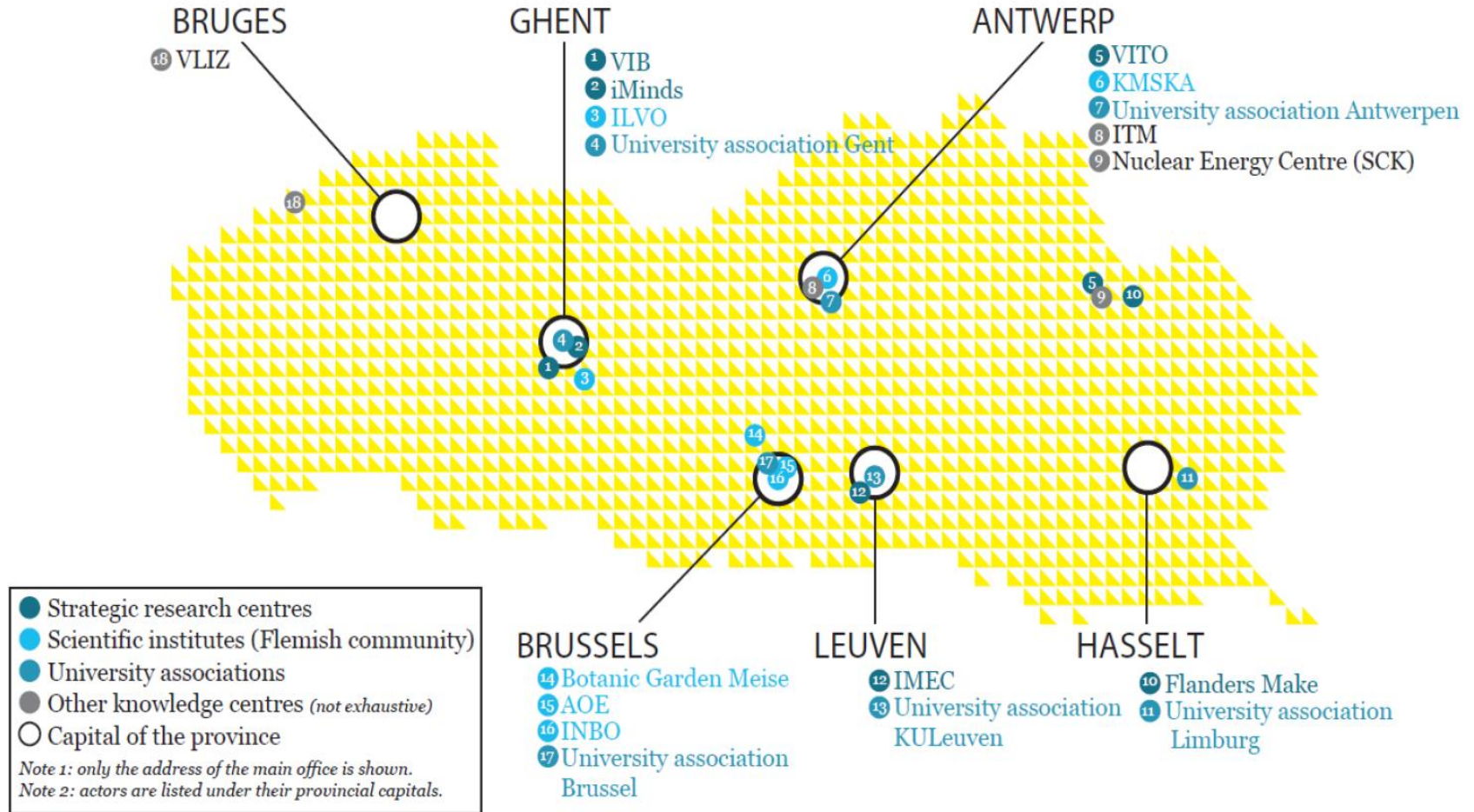
- **Imec** – nanotechnology and nanoelectronics –1984
- **iMinds** – ICT – is to be merged with Imec
- **VITO** – remote sensing, environment, materials –1991
- **VIB** – biotechnology & life sciences - 1996
- **Flanders Make** – Smart Manufacturing Industry – 2014

▶ Goal: achieve research excellence & innovative economic and societal valorisation (creation of spin-off companies: 107)

▶ The EWI Department concludes multi-annual management agreement for a period of 5 years, including performance indicators. Each SRC receives an annual grant (total 2016: €182 mln). At the end of each period, each SRC is evaluated through an international peer review mechanism.

▶ Some of these institutes score high in EU and international rankings (Imec is the world's most modern chip laboratory).

# Main actors: location in Flanders



# Innovative networks and valorisation

*Innovation Platforms*: FISCH (sustainable chemistry), Flanders' FOOD, Flanders Inshape (product development and industrial design), MIP (environmental innovation), SIM (materials). To be replaced with:

New *Cluster Policy* with a maximum of 50% of public funding:

- a) Innovative business networks: public support for 3 years in 15 emerging domains based on bottom-up selection (annually €150.000; call in 2015)
- b) Spearhead clusters: public support in 4 to 5 strategic domains for 10 years (annually €500.000 per case; proposals under elaboration)

Other market-driven initiatives: DSP Valley, FlanSea (electricity from the sea), living labs (house renovation, care innovation), I-Cleantech, Smart Grids...

**Collective research centres** were established after 1948 and are now mainly funded by the regional governments and business associations to conduct on-demand contract research. E.g., Scientific and Technical Service Centre for the Belgian Textile Industry (Centexbel); the Belgian Building Research Institute (BBRI); the Collective Centre for the Belgian Technology Industry (SIRRIIS); the Belgian Road Research Centre (BRRC).

# RDI internationalization (1)

## Participation in EU or international RDI policy making

- Flanders Delegation in the Belgian Permanent Representation to the EU
- ERAC Advisory Commission and EPG Committee (committees for RDI and Industrial Policy composed by representatives of EU member states)
- OECD: RDI policy groups, thematic committees (ICT, biotechnology); UNESCO Science Trust Fund; UNIDO (biotechnology), support for IODE project office
- The EWI Department participates in the “programme committees” (policy preparation) for Horizon 2020 and COSME
- FWO & AIO act as national contact point (NCP) for Horizon 2020
- FWO & AIO cooperate with international counterparts such as European Science Foundation (ESF), Science Europe, CECAM, the TAFTIE network of innovation funders...
- bilateral treaties including a chapter on RDI (Catalonia, Russia, Croatia, NRW...) as well as specific RDI treaties (Slovenia, China)
- technology attachés covering various technological domains stationed in China, India, Japan and the US



# RDI internationalization (2)

## Support to researchers by the Flanders Research Foundation(FWO)

- international mobility: research grants, fellowships, Odysseus (brain gain programme), Pegasus Marie Curie...
- international scientific collaboration:
  - exchange agreements: China, Czech Republic, Slovakia, Slovenia...
  - agreements for scientific cooperation: Brazil, Bulgaria, China, France, Hungary, Japan, Mexico, South-Korea...
  - Lead Agency Procedure: Austria, Slovenia...
  - FWO supports access to international research facilities: EMBL (biotech), ESO), or to “Big Science” projects (e.g. CERN-ISOLDE (Genève), ESRF-DUBBLE (Grenoble), Mercator telescope (La Palma), Spiral (Caen), Ice Cube (Arctic area)...

# RDI internationalization (3)

- initiatives of Flemish RDI actors

- agreements between foreign and Flemish actors: the Catholic University of Leuven with partners in the Netherlands, Poland, the US, Japan, South Africa; VITO with partners in China, Hong Kong, India, Vietnam)...
- participation in international networks and cooperation agreements with counterparts abroad: KU Leuven in LERU, IAUP, EUA, Coimbra Group
- establishments abroad: Imec (Taiwan, China, US, Japan), Ghent University (Peking, South Korea), VITO (Hong Kong, Qatar)...

- participation in international programmes

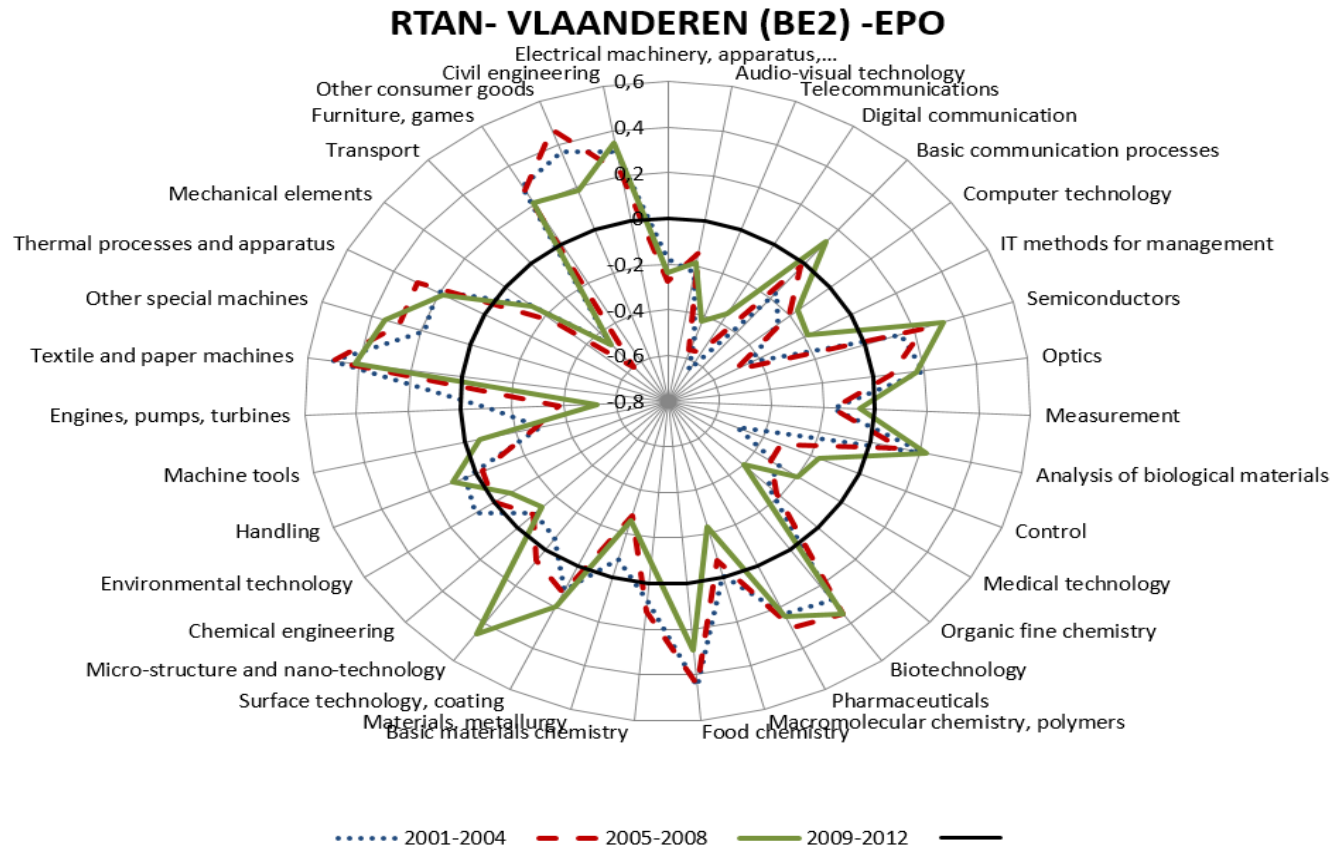
- large participation in Framework Programmes and **Horizon 2020** (see annexes 5 and 6 for data on FP7 participation)
- related EU initiatives: Joint Technology Initiatives (JTI), Joint Programming, Joint Undertakings, European Institute for Technology (EIT), ESFRI (large research infrastructure), EIP (European Innovation partnerships), Future and Emerging Technology Flagships (FET), COST, Eureka...
- Vanguard Initiative (innovative industry): pilot line “High Performance Production with 3D Printing” (demonstration and piloting network)

# Annex1: technological specialisation (based on EPO patents)

VLA represents 67% of total Belgian patent portfolio;

patent share of universities and knowledge institutes > 10%, which puts Flanders at the top world-wide technology activity is very internationally embedded because:

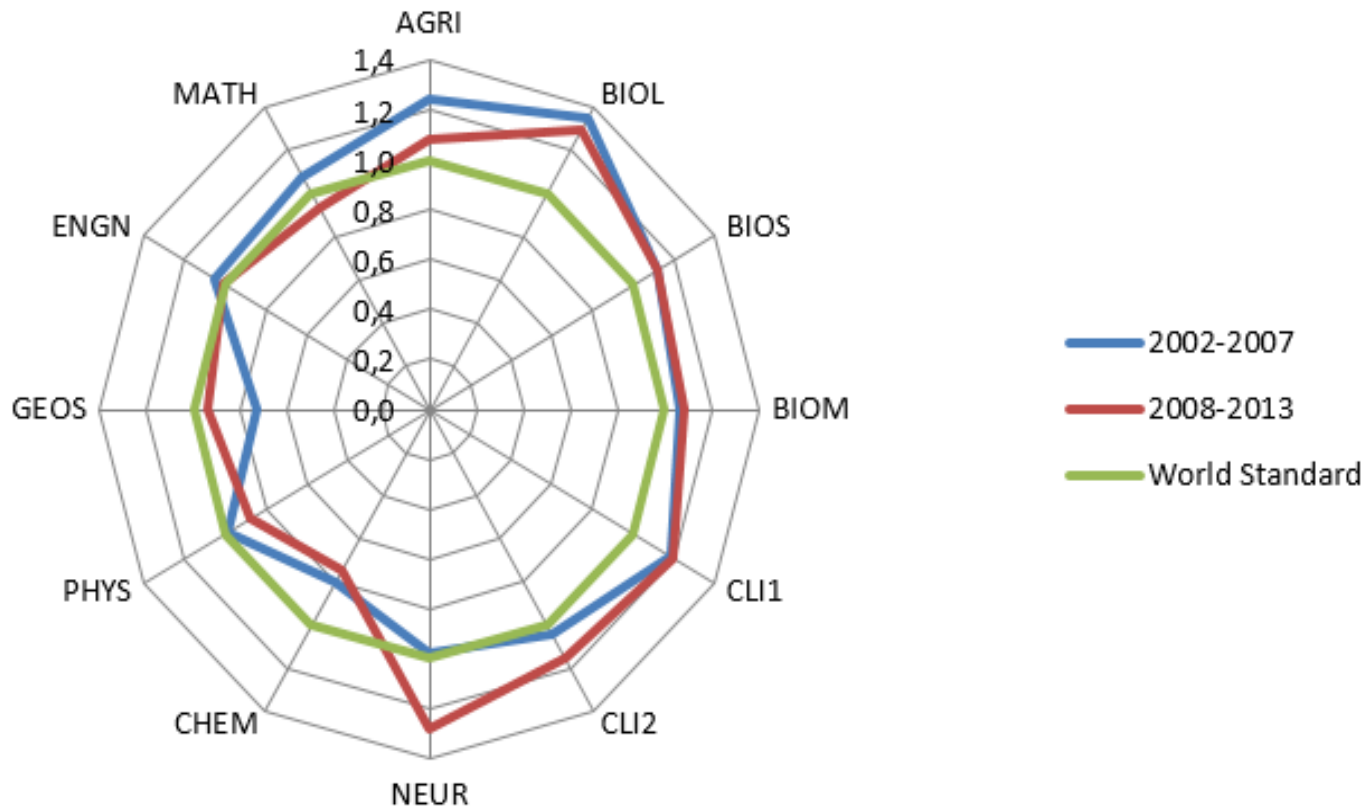
- (a) 34% of all EPO applications with Flemish inventor(s) in the last decade imply foreign applicants (26% US, 16% German, 15% French),
- (b) 45% of Flemish patents have at least 1 Flemish inventor & at least 1 foreign inventor



# Annex2: scientific publications, by discipline

## Scientific publication profile of VLA based on activity index (AI)

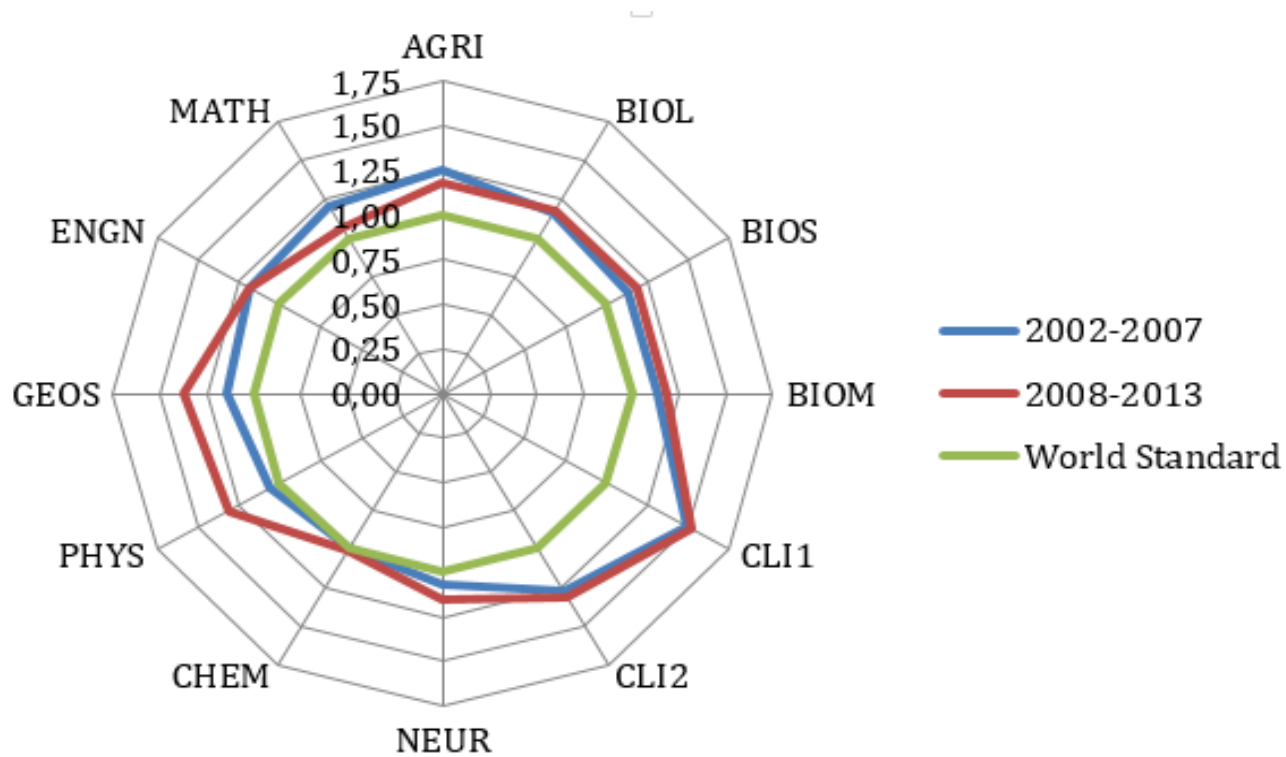
The Flemish publication profile shows that Flemish output is significantly above the world standard in terms of biology (BIOL), clinical and experimental medicine I (CLI1), experimental medicine ii (non-internal) (CLI2) and neurosciences (NEUR)



# Annex3: co-publications

## Scientific co-publication profile of VLA based on activity index (AI)

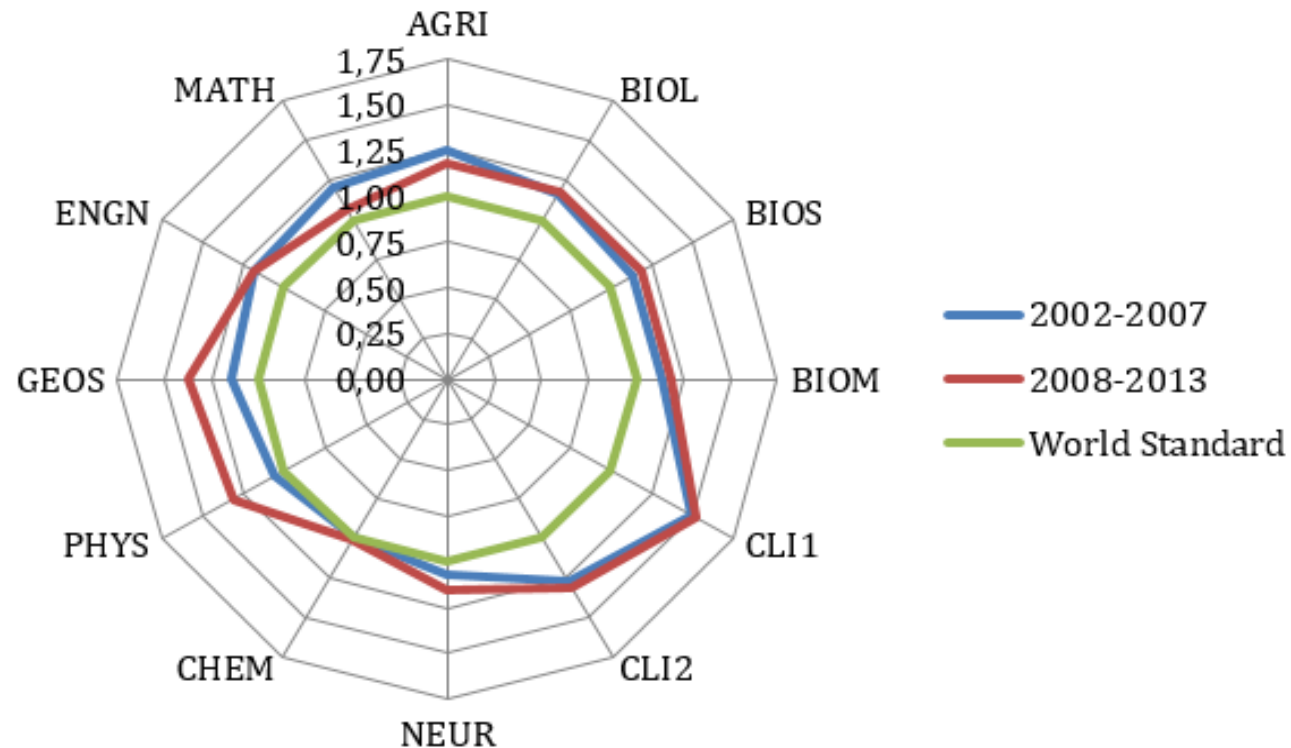
In 2013, almost 65% of the publications were written with at least 1 foreign co-author. Flanders occupies a leading position with Denmark (62.7%) and Sweden (62.4%) in the ranking of countries involved in co-authorship.



# Annex4: citations

## Scientific citation profile of VLA based on activity index (AI)

in terms of relative citation frequency, Flanders is above or at least equal to the world standard in all fields of science. In particular, a very high score can be noted for the life sciences.



# Annex5: Participation in EU FP7 on RTD

	Number of participations	%	Number of participants	Number of projects	Number of coordinators	%	Funding (€ million)	%	Return (%)
<b>Flanders</b>	2,884	53%	490	2,232	518	18%	<b>1,125</b>	<b>62%</b>	<b>2.50%</b>
<i>Brussels</i>	1,640	30%	479	1,235	196	12%	353.2	19%	0.79%
<i>Wallonia</i>	908	17%	163	765	151	16.6%	327.4	18%	0.73%
<i>Unassigned</i>	26	0%	12	26	0	0%	9.3	1%	0.02%
<b>TOTAL (Belgium)</b>	<b>5,458</b>	<b>100%</b>	<b>1,144</b>	<b>3,652</b>	<b>865</b>	<b>15.8%</b>	<b>1,814.9</b>	<b>100%</b>	<b>4.04%</b>

<i>Top-10 participants Flanders</i>	<i>Number of participations</i>	<i>Funding (€ million)</i>
<b>Catholic University of Leuven, KU Leuven</b>	545	263.0
<b>Ghent University, UGent</b>	261	112.6
<b>Interuniversity micro-electronics centre, Imec</b>	182	107.4
<b>Flanders Institute for Biotechnology, VIB</b>	108	67.2
<b>University of Antwerp, UA</b>	124	65.0
<b>Vrije Universiteit Brussel, VUB</b>	117	51.4
<b>Flemish institute for technological research, VITO</b>	119	47.6
<b>iMinds</b>	71	32.8
<b>Belgian nuclear research centre, SCK</b>	61	21.2
<b>Von Karman Institute for Fluid Dynamics (VKI)</b>	41	16.1

# Annex6: FP7 RTD: budget / domain for Flemish inst.

