Mid-term report Belgium

ECFA meeting at DESY, July 2014

Belgian ECFA members:
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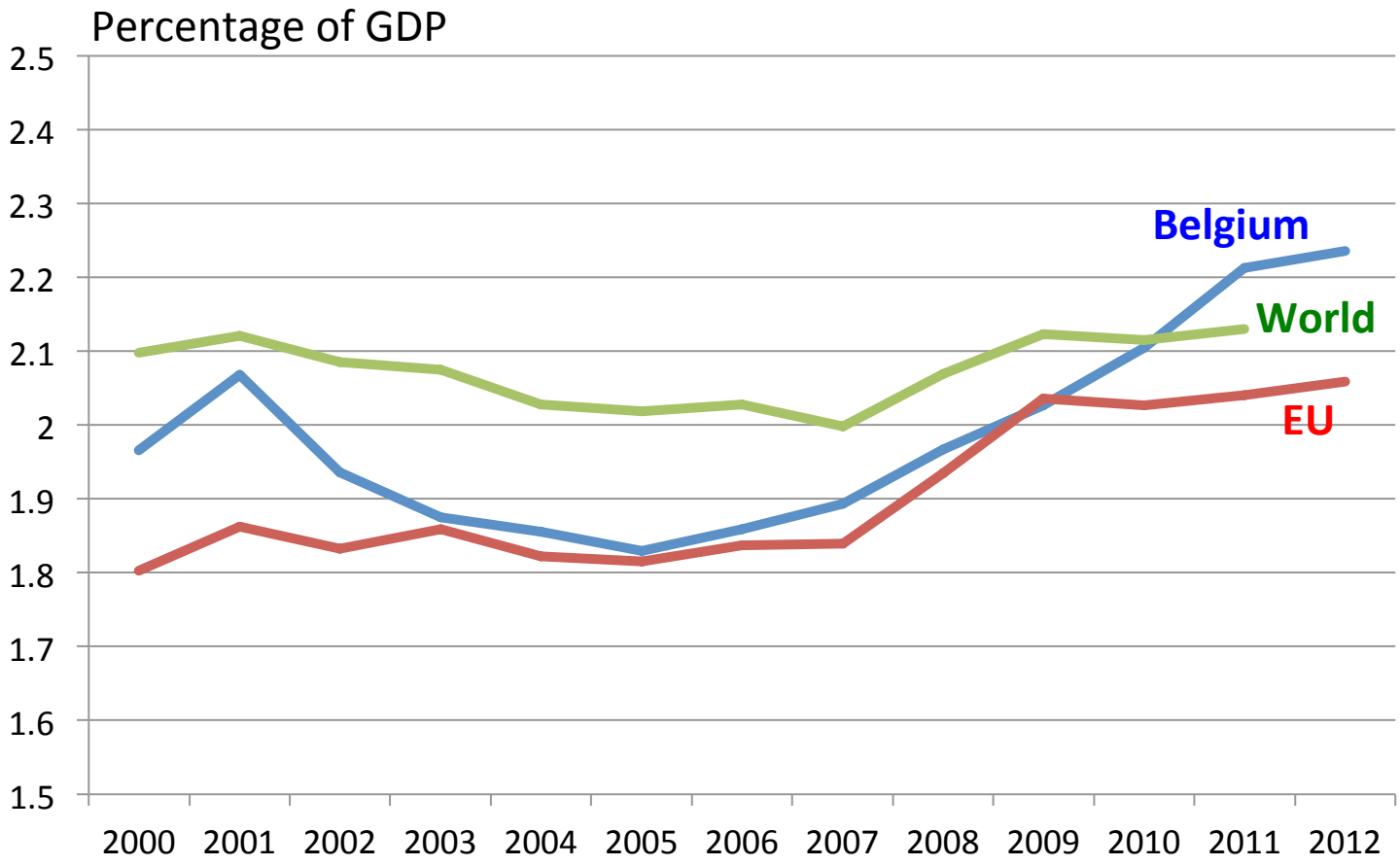
Belgium (www.belgium.be)

- 11,1 million inhabitants (anno 2013)
- 30528 km^2 (maximum distance between two points 280 km)
- Languages: Dutch, French, German
- GDP: 314 billions of EUR & 6.5% to education
- 6 governments, 589 municipalities
- Highest point: 694m
- One football team

GDP Annual Growth Rate

Science & Development fraction of GDP



Source: World Bank

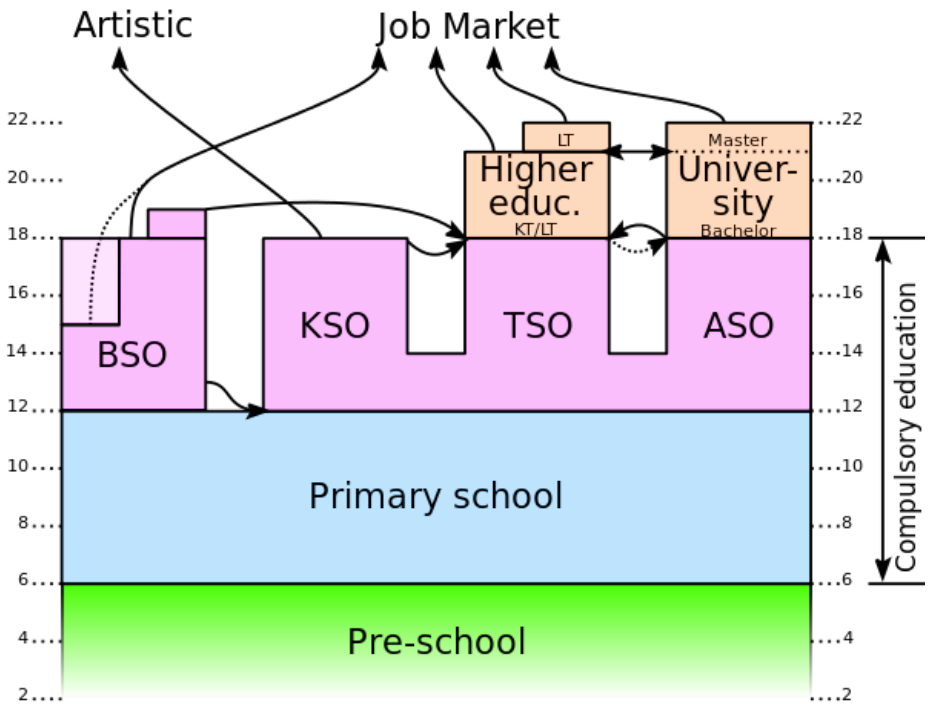
Governments in Belgium

- Federal state with regions (Flanders, Wallonia, Brussels-capital) and communities (Flemish, French, German speaking)

- Regions deal with infrastructure
- Communities with matters related to people and culture (incl. teaching and research)
- Tendency: more responsibilities from the Federal government towards the regions

Education

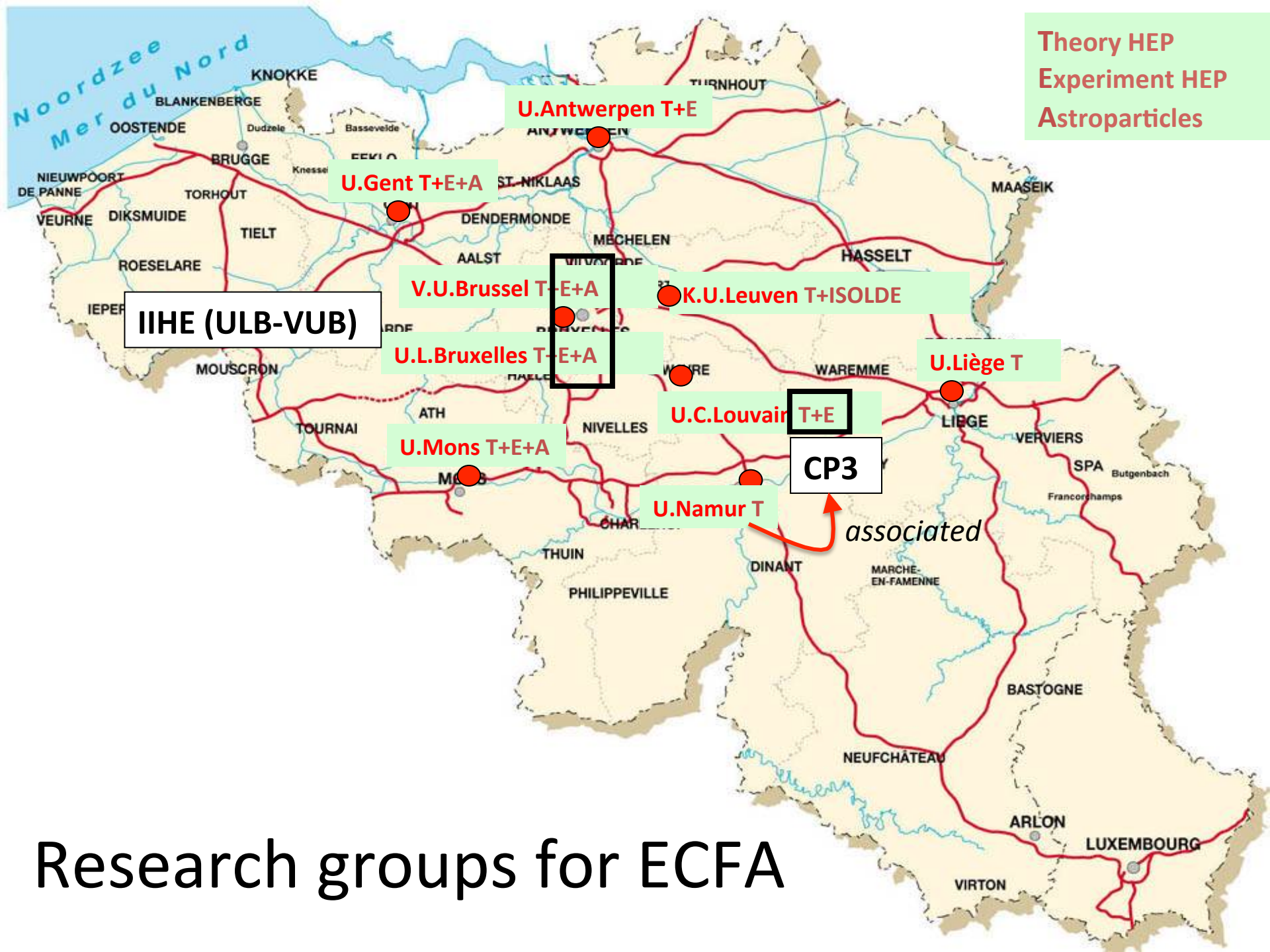
- Annual registration at universities 500-850 EUR
- 3 years for Bachelor degree, 1 or 2 years for Master
- Overall ~2% increase in students every year
- Strong increase in number of PhD students due to financing system with budget allocation relative to number of graduating PhD's



Universities for ECFA

- In total 14 universities (of which 7 appear on a top-200 list): from them 8 relevant for ECFA physics

- Universiteit Gent
- Vrije Universiteit Brussel
- Universiteit Antwerpen
- Universite de Mons
- Universite Catholique de Louvain
- Universite Libre de Bruxelles
- Universite de Liege
- Katholieke Universiteit Leuven



Research groups for ECFA

Past/Present experiments

- Past contribution: DELPHI, H1, OPERA
- Present*: CMS, IceCube, ISOLDE, GANIL/SPIRAL2, HIE-ISOLDE, PSI UCN, CALICE, RD57, Telescope Array, SoLid, Planck, ARA, NA62,…
- Key contributions in CMS:
  - Detectors: Tracker, Muons (RPC and GEM), CASTOR
  - Objects: Jets, b-tagging, tracking, tau's, e/gamma, muons
  - Analyses: H-boson, SUSY, Top, Exotica, B2G, Forward, SM
  - Two TIER-2's
- The disappearance of spin-off activities is still a worry

* More diversity was stimulated during the RECFA visit of 2010.

Human resources

Average:

- #PhD's since 2010 (incl 2010) = 76 (i.e. 17/year)
- On average between 4 and 4,5 years to complete the PhD
- #post-doc-years since 2010 (incl 2010) = 306 (i.e. 68/year)

Snapshot January 1st, 2014:

- #engineers = 10
- #technicians = 12,5
- #logistics/administration = 9
- #IT persons = 7
- Still a decreasing trend since RECFA visit to Belgium in 2010

Human resources

Snapshot January 1st, 2014:

		#professor-level	# post-docs	#PhD students
accelerator based	NA62	1	1	3
	CMS	15,6	38,9	41
	ISOLDE	6	11	13
	dosimetry	0,2	-	2
neutrino/astro-particle	IceCube	2,9	3,9	12
	SoLid	1	0,2	-
	ARA	0,5	1	1
	VLT	0,2	-	-
Pheno		3	11	7
Theory		20,2	35	38
Total		50,6	102	119

Many younger people

RECFA visit to Belgium 2010: 108 FTE in theory and 105 FTE in experiment
Mid-term report 2007: 89 FTE in theory and 87 FTE in experiment
Situation in 1995: 53 FTE in theory and 74 FTE in experiment

Financial resources – FWO

Flemish part

- Funding for fundamental research in Flanders
- PhD and post-docs mandates (competitive)
- No permanent research staff, but absorbed by universities as research professor mandates
- Projects (very competitive)
- Big Science program (selective): CMS & ISOLDE

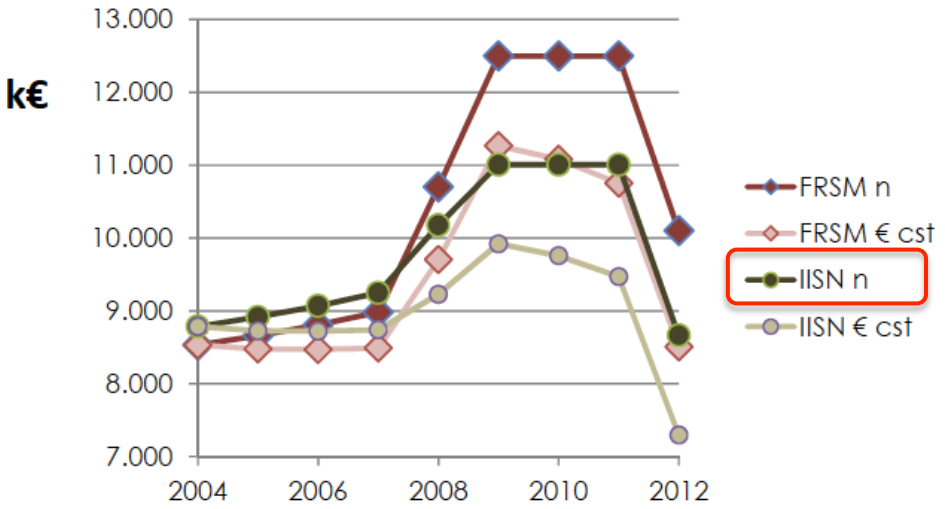
FWO-financing research at CERN (2005-2014)				
	CMS	ISOLDE	Total amount	Total budget
FWO-PhD (4y)	5	9	14	2,24 M EUR
FWO-postdocs (3-6y)	8	11	19	4,84 M EUR
Projects	23,66 M EUR	18,84 M EUR		42,50 M EUR
Total				***49,58 M EUR***

including ~4,9 M EUR competitive personal grants (ERC-like) to setup new teams

Financial resources – FNRS

French part

- IISN (*Institut Interuniversitaire des Sciences Nucleaires*)
- Important budget cuts last years (success rate for project application is reduced from ~45% to ~23%)
- The creation of a Big Science program for sustainable research at large infrastructures becomes very relevant



Source: conseil d'administration FNRS du 21 mai 2012

Financial resources – others

- University funding is competitive and selective, but we tend to be successful to obtain some (personal, scholarships, research professor mandates, project grants, concerted projects)
- EU COST, ERC, fellowships
- Hercules fund (Flanders) for local equipment
- International Solvay Institutes (for theory)

Financial resources – IUAP

- Funded by the federal government
- IUAP on Fundamental Interactions: a nation wide HEP collaboration between experiment and theory
  - 5,8 M EUR budget for 2007-2011 mainly to hire post-docs and PhD students
  - was successfully extended for 2013-2017 (5,1 M EUR)
- IUAP on BRIX (the Belgian Research Initiative on eXotic nuclei for atomic, nuclear and astrophysics studies)
  - 2,6 M EUR budget (2007-2011) and 3,1 M EUR (2012-2017)
- Beyond 2017 this responsibility will be in the hands of the regional governments

Some recent key positions in the field

- Vice-president of “CERN Council”
- Deputy spokesperson of CMS
- Chairperson of “CMS Collaboration Board”
- Chairperson of “CERN HIE Isolde Steering Committee”
- One member of CERN’s SPC
- MINIBALL Collaboration spokesperson
- Spokesperson of Crystal Clear Collaboration
- Several conveners of Physics groups in CMS and IceCube

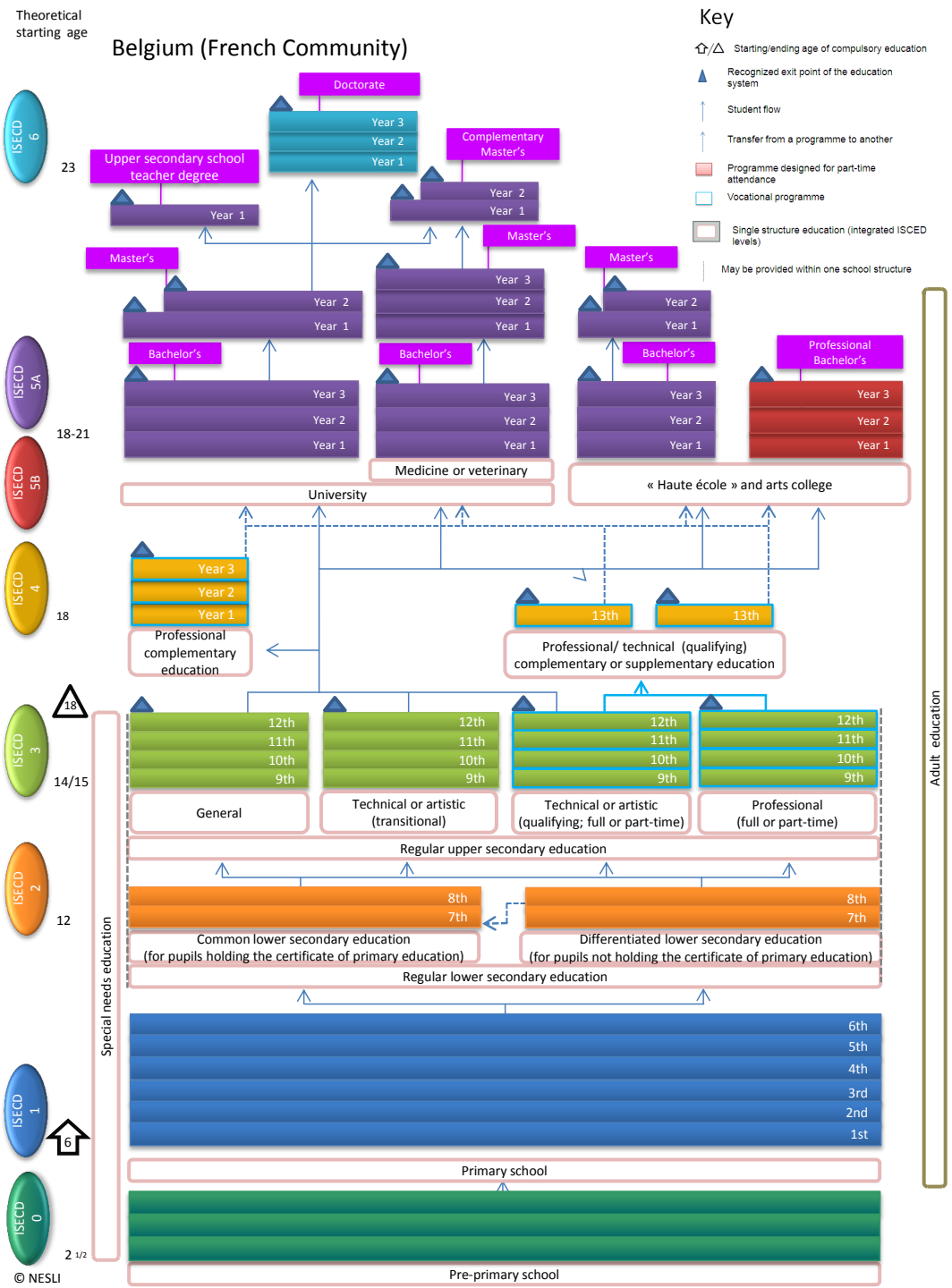
Nobel Prize – Francois Englert

Conclusion

- Per million inhabitants in Belgium (11M) we have:
  - ✓ 10,9 PhD students in ECFA-like physics
  - ✓ 9,3 post-docs in ECFA-like physics
  - ✓ 4,5 professors in ECFA-like physics
  - ✓ 0,1 alive Nobel Prize winners in High-Energy Physics
- In order to follow the European Strategy for Particle Physics, it is important to create and secure funding for Big Science programs in both the Flemish and French region

Extra’s

- Diagrams of education system (ref. OECD)


Theoretical starting age
Belgium (French Community)
Key
Starting/ending age of compulsory education
Recognized exit point of the education system
Student flow
Transfer from a programme to another
Programme designed for part-time attendance
Vocational programme
Single structure education (integrated ISCED levels)
May be provided within one school structure
ISECD 6
23
Doctorate
Year 3
Year 2
Year 1
Upper secondary school teacher degree
Year 1
Complementary Master's
Year 2
Year 1
Master's
Year 2
Year 1
Master's
Year 3
Year 2
Year 1
Master's
Year 2
Year 1
ISECD 5A
18-21
Bachelor's
Year 3
Year 2
Year 1
Bachelor's
Year 3
Year 2
Year 1
Bachelor's
Year 3
Year 2
Year 1
Professional Bachelor's
Year 3
Year 2
Year 1
ISECD 5B
Medicine or veterinary
University
« Haute école » and arts college
ISECD 4
18
Year 3
Year 2
Year 1
Professional complementary education
13th
13th
Professional/ technical (qualifying) complementary or supplementary education
18
ISECD 3
14/15
12th
11th
10th
9th
General
12th
11th
10th
9th
Technical or artistic (transitional)
12th
11th
10th
9th
Technical or artistic (qualifying; full or part-time)
12th
11th
10th
9th
Professional (full or part-time)
Regular upper secondary education
ISECD 2
12
8th
7th
Common lower secondary education (for pupils holding the certificate of primary education)
8th
7th
Differentiated lower secondary education (for pupils not holding the certificate of primary education)
Regular lower secondary education
Special needs education
ISECD 1
6
6th
5th
4th
3rd
2nd
1st
Primary school
ISECD 0
2 1/2
Pre-primary school
Adult education
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