TOWARDS 2030 ENGINEERING CAPABILITY BUILDING IN EUROPE

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SEFI

Bologna Process milestone

1998

The Sorbonne Declaration: 4 ministers of 4 countries (800 anniversary Sorbonne)

Bologna Process: http://ec.europa.eu/eurydice

1999 Bologna: 29 countries ---> 2015: 48 countries

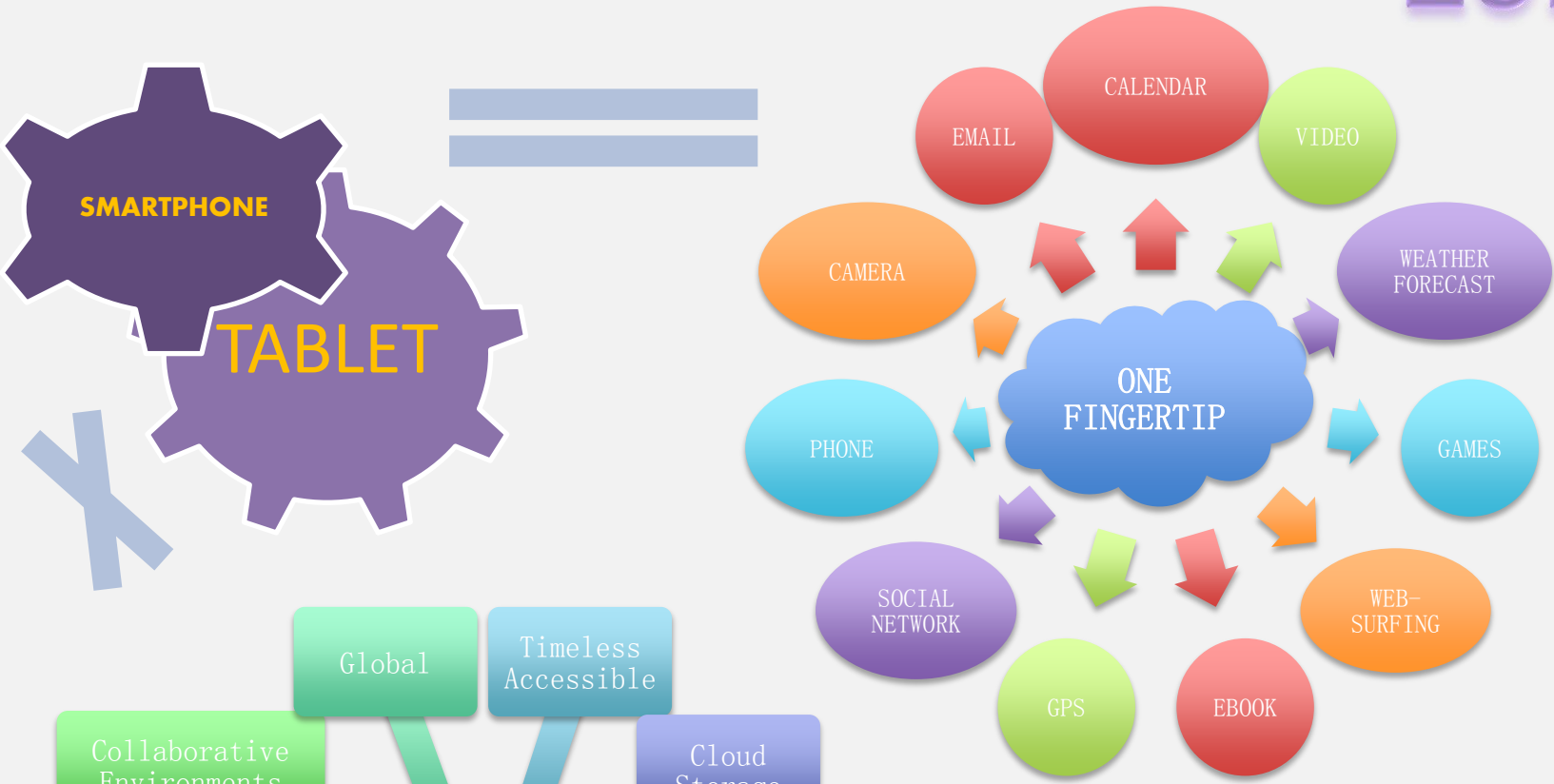
1998 Sorbonne Declaration	1999 Bologna Declaration	2001 Prague Communiqué	2003 Berlin Communiqué	2005 Bergen Communiqué	2007 London Communiqué	2009 Leuven/ Louvain-la-Neuve Communiqué	2012 Bucharest Communiqué	2015 Yerevan Communiqué
Mobility of students and teachers	Mobility also for researchers and administrative staff	Social dimension of mobility	Portability of loans and grants	Attention to visa and work permits	Attention also to pension systems and recognition	Benchmark of 20 % by 2020 for student mobility	Explore path to automatic recognition of academic qualifications	Implementation of key commitments
A common two-cycle degree system	Easily readable and comparable degrees	Fair recognition Development of joint degrees	Inclusion of doctoral level as third cycle	QF-EHEA adopted National Qualifications Frameworks (NQFs) launched	NQFs by 2010	NQFs by 2012	Roadmaps for countries without NQF	Implementation of key commitments
		Social dimension	Equal access	Reinforcement of the social dimension	Commitment to national action plans	National targets for the social dimension to be measured by 2020	Widening access and completion rates	Social inclusion
		Lifelong learning (LLL)	Alignment of national LLL policies Recognition of Prior Learning (RPL)	Flexible learning paths	Partnerships to improve employability	LLL as a public responsibility Focus on employability	Enhance employability, LLL and entrepreneurial skills through cooperation with employers	Employability
Use of credits	A system of credits (ECTS)	ECTS and Diploma Supplement (DS)	ECTS for credit accumulation		Coherent use of tools and recognition practices	Implementation of Bologna tools	Ensure that Bologna tools are based on learning outcomes	Adoption of ECTS Users Guide
	European cooperation in quality assurance (QA)	Cooperation between QA and recognition professionals	QA at institutional, national and European level	European Standards and Guidelines for quality assurance (ESG) adopted	Creation of the European Quality Assurance Register (EQAR)	Quality as an overarching focus for EHEA	Allow EQAR registered agencies to perform their activities across the EHEA	Adoption of revised ESG and European Approach to QA of joint programmes
Europe of Knowledge	European dimensions in higher education	Attractiveness of the EHEA	Links between higher education and research areas	International cooperation on the basis of values and sustainable development	Strategy to improve the global dimension of the Bologna Process adopted	Enhance global policy dialogue through Bologna Policy Fora	Evaluate implementation of 2007 global dimension strategy	
								Learning and Teaching: Relevance and quality

European Higher Education Area EHEA

- Transparent degree system (3-cycle)
- Use of transparent and transferrable credit point system (ECTS)
- Diploma Supplement to provide more information about qualifications
- Quality assurance procedures
- Provision of national qualification frameworks to contextualise qualifications
- Recognition of lifelong learning for equal opportunities and social cohesion

DIGITAL FRAMEWORK

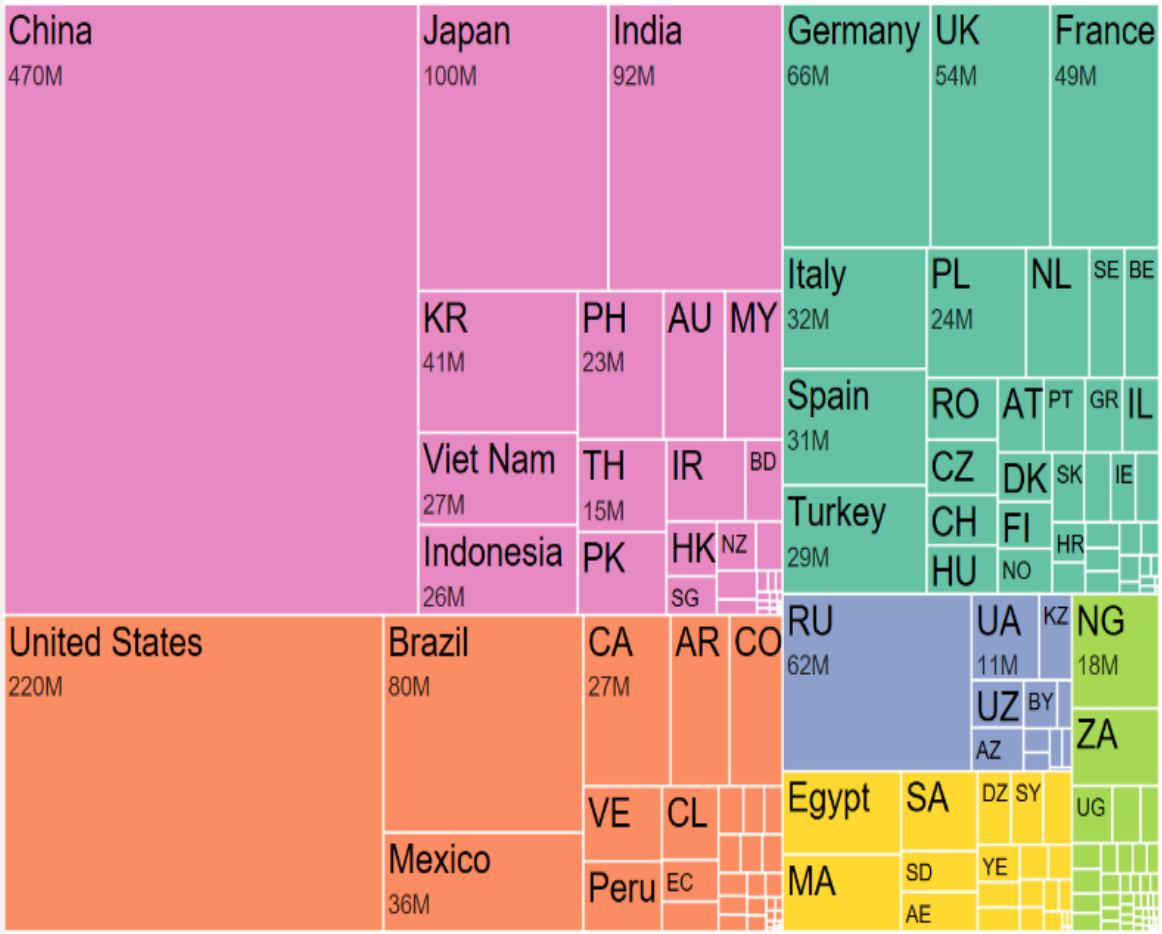
2010



2018

2010 2016

Total Internet users: 1,991 million



Asia & Pacific

The Americas

Europe

CIS

Arab States

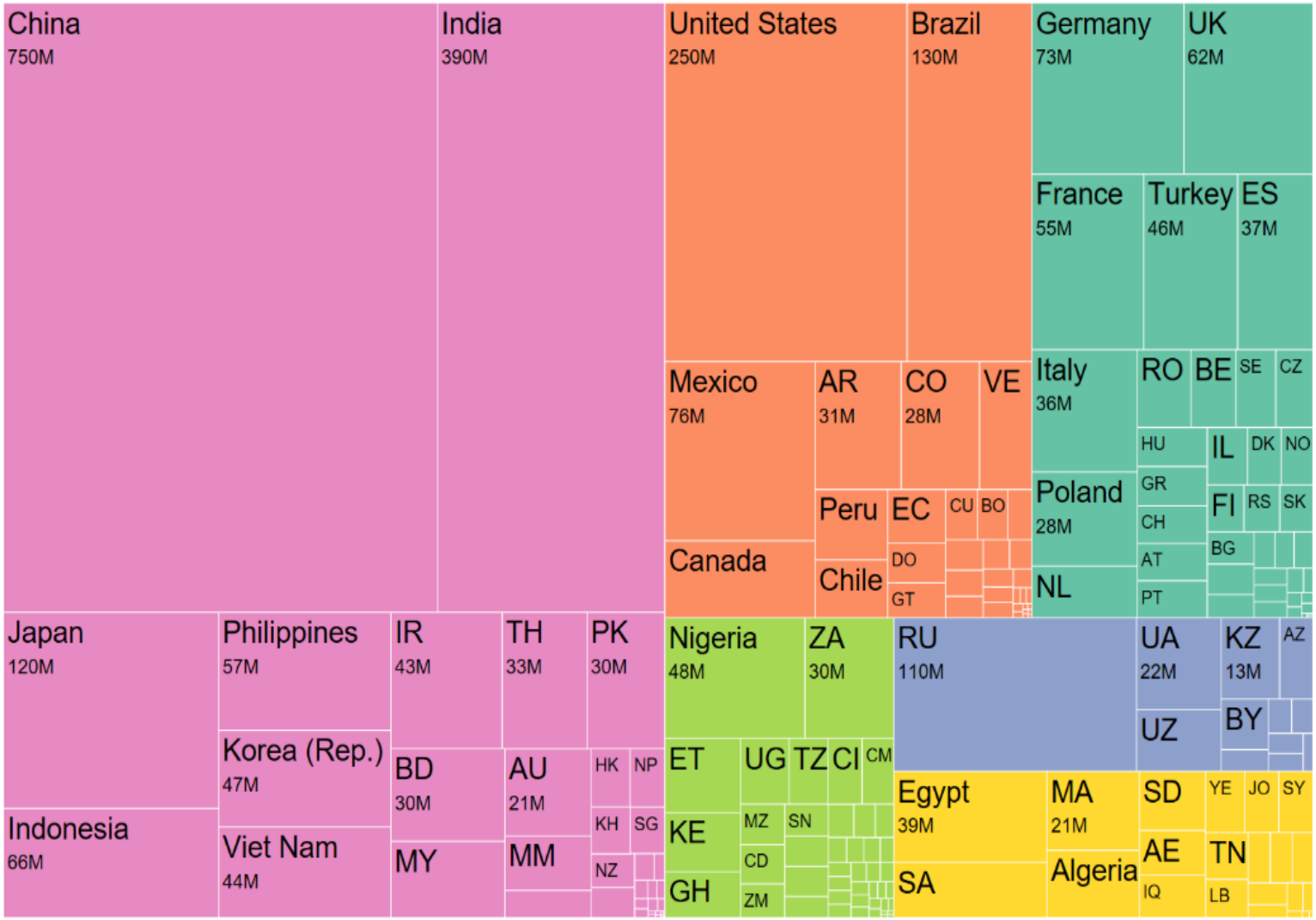
Africa

https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

2010 2016

Total Internet users: 3,385 million

https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx



Student of 2030

Toddler 24 months old. ©nllobre

The inclusion in our households of tactic devices has given birth to a new type of native digital: **the iScholar**, who belongs to a new generation, the **Haptic Generation.**

A - active
R - research
O - open minded
Ha- haptic device

The iScholar (Llobregat-Gomez & Sánchez Ruiz (2015)

- Digital native born after 2010,
- Its birth is instant messaged, broadcasted, photo-selfied, geo-located, social-network introduced, snap-shots cloud stored, …
- Immediacy is given by just one small touch-screen interface, essential item in the pocket of any proud parent.
- At home, in the toy basket, a haptic device is always in sight to interact with it.
- Grown up into a kid who decides to become a university student.

Haptic Device

Tactile, Auditory, visual senses

Whatever place, age, level of education or, income

New Habits and skills

New ways of understanding and expressing

New approach to Knowledge

N. Llobregat-Gomez & L.M. Sánchez Ruiz, "Defining the engineering student of 2030". Proceedings of the SEFI Annual Conference, Orleans 2015

The EE student of 2030

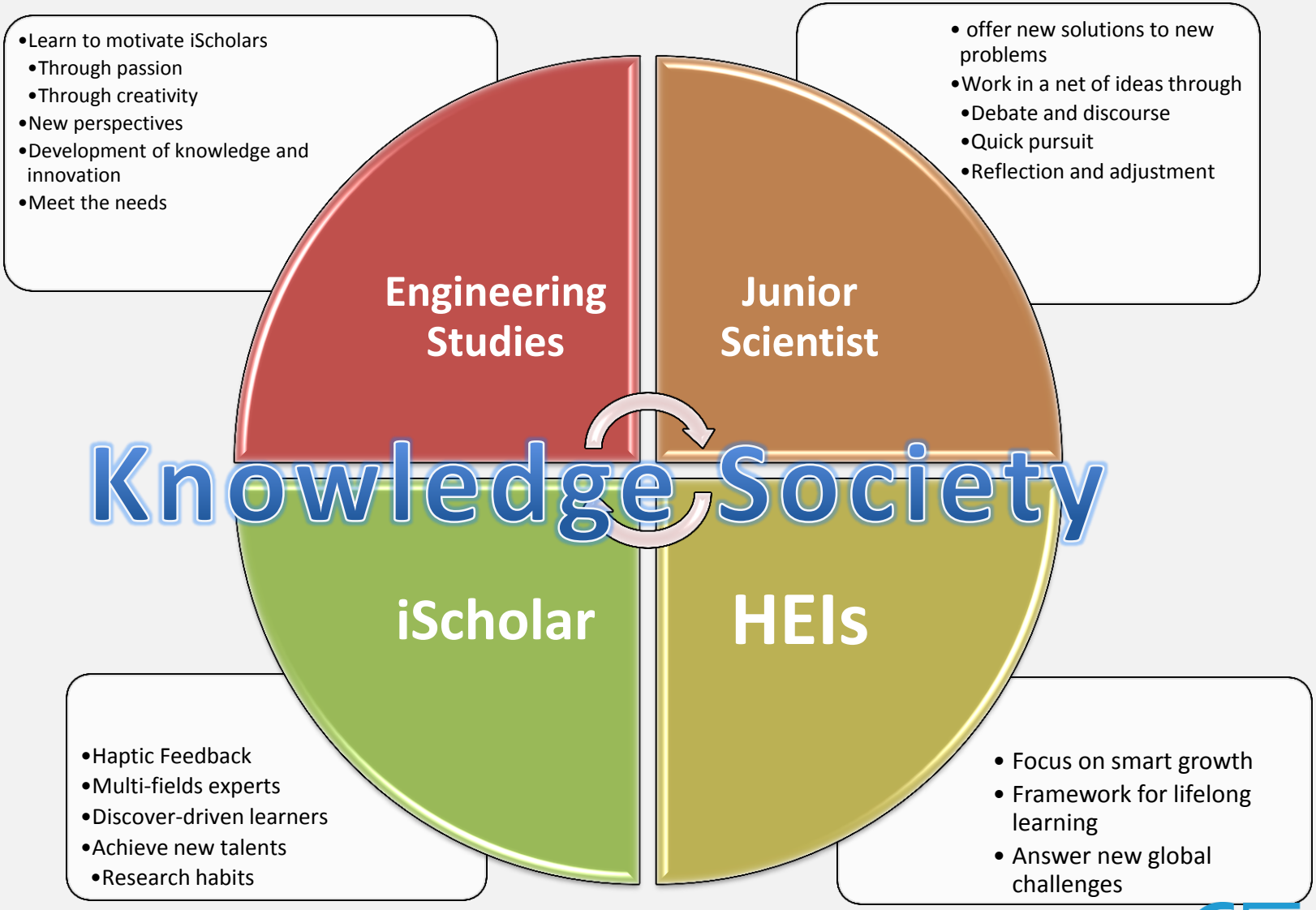
iScholar

Haptic Feedback

Brain's Level

- Multi-fields experts
- Discover-driven learners
- Research habits

2030 Engineering Studies



Top four C's employers are looking for in Engineering Students:

- communication,
- collaboration,
- critical thinking,
- creativity

Strategies must be developed and implemented in order to facilitate our students achieving these competencies:

- Teaching Innovation
  - PBL
  - Flipped learning
- University-Industry collaboration
- Internationalization, Mobility, Home Internationalization

Flipped learning is a natural way to facilitate soft skills acquisition:

A mobility case: European Project Semester (EPS)

Programme created in 1995

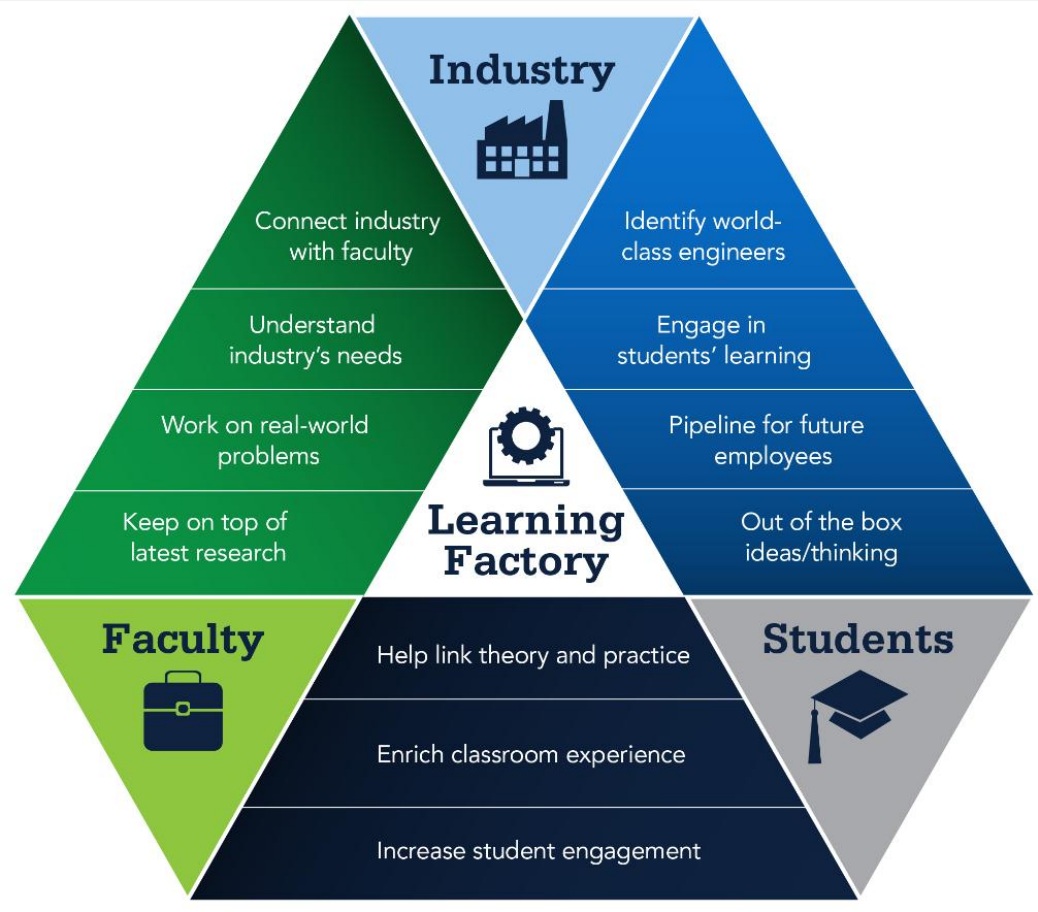
Offered by several European universities to students who have completed at least two years of study.

EPS is created with engineering students in mind, but other students who can participate in an engineering project are also welcome.

In 2018, 18 providers in 12 European countris

Students, 2000 from 40 countries since 1995

2030: 2 vertices are evolving fast



https://www.lf.psu.edu/

Should all Higher Education Institutions react in the same way?

Triple Helix of university-industry-government

- Explained in the 1990s by Etzkowitz (1993) and Etzkowitz and Leydesdorff (1995), encompassing elements of precursor works by Lowe (1982) and Sábato and Mackenzi (1982), interprets the shift from a dominating industry-government dyad in the Industrial Society to a growing triadic relationship between university-industry-government in the Knowledge Society.

- Reborn in Europe with RIS3:

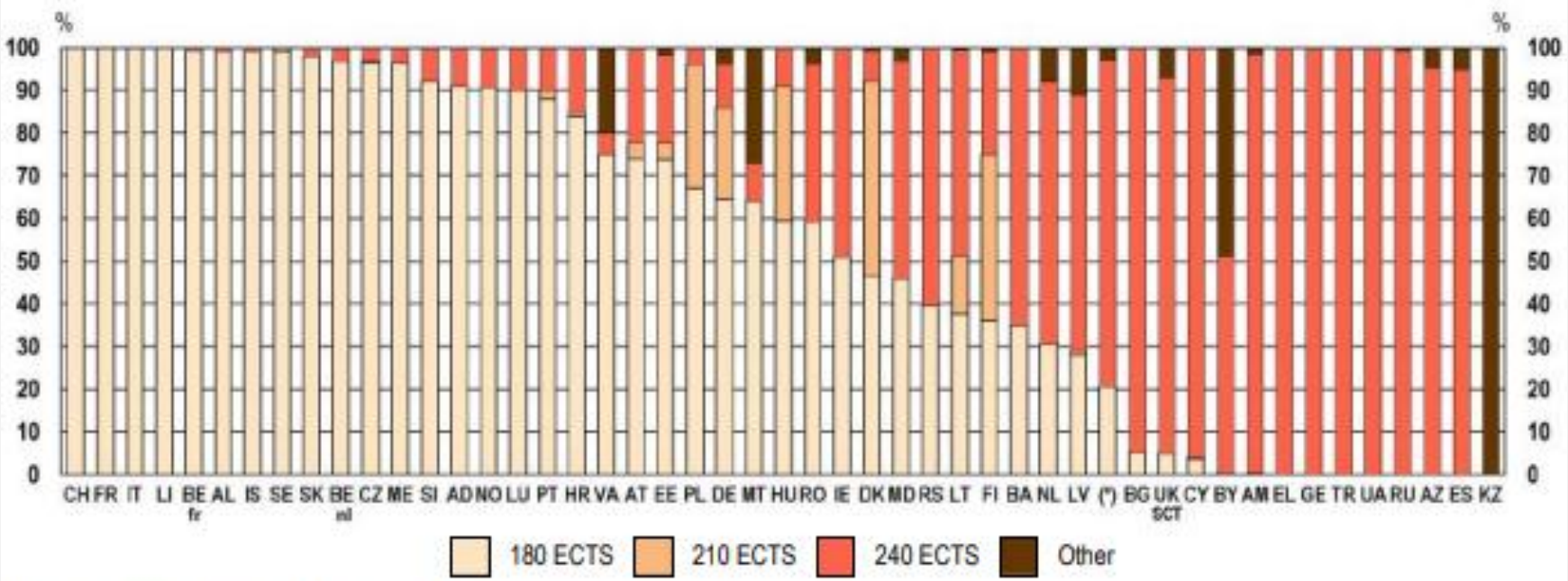
Research Innovative Smart Strategic Specialization

Europe's Research Innovative Smart Strategic Specialization

- **Place-based approach**: Based upon assets and resources available to regions and on their specific socio-economic challenges in order to identify unique opportunities for development and growth.
- **Make choices for investment**: Support a limited number of priorities for knowledge-based investments. Focus on competitive strengths and realistic growth potentials supported by a critical mass of activity and entrepreneurial resources.
- **Inclusive process of stakeholders' involvement:** Environment, region, existing industry, market forces. Information about new activities and the government assesses the outcomes and empowers those actors most capable of realizing this potential.
- **Broad view of innovation**, supporting technological as well as practice-based and social innovation. This would allow each region to shape choices according to their unique socio-economic conditions.
- **Sound monitoring and evaluation system** as well as a revision mechanism for updating the strategic choices.

European Higher Education Area EHEA

Share of first cycle-programmes with a workload of 180, 210, 240 or another number of ECTS credits, 2016-17 (No data for the United Kingdom (England, Wales and Northern Ireland)

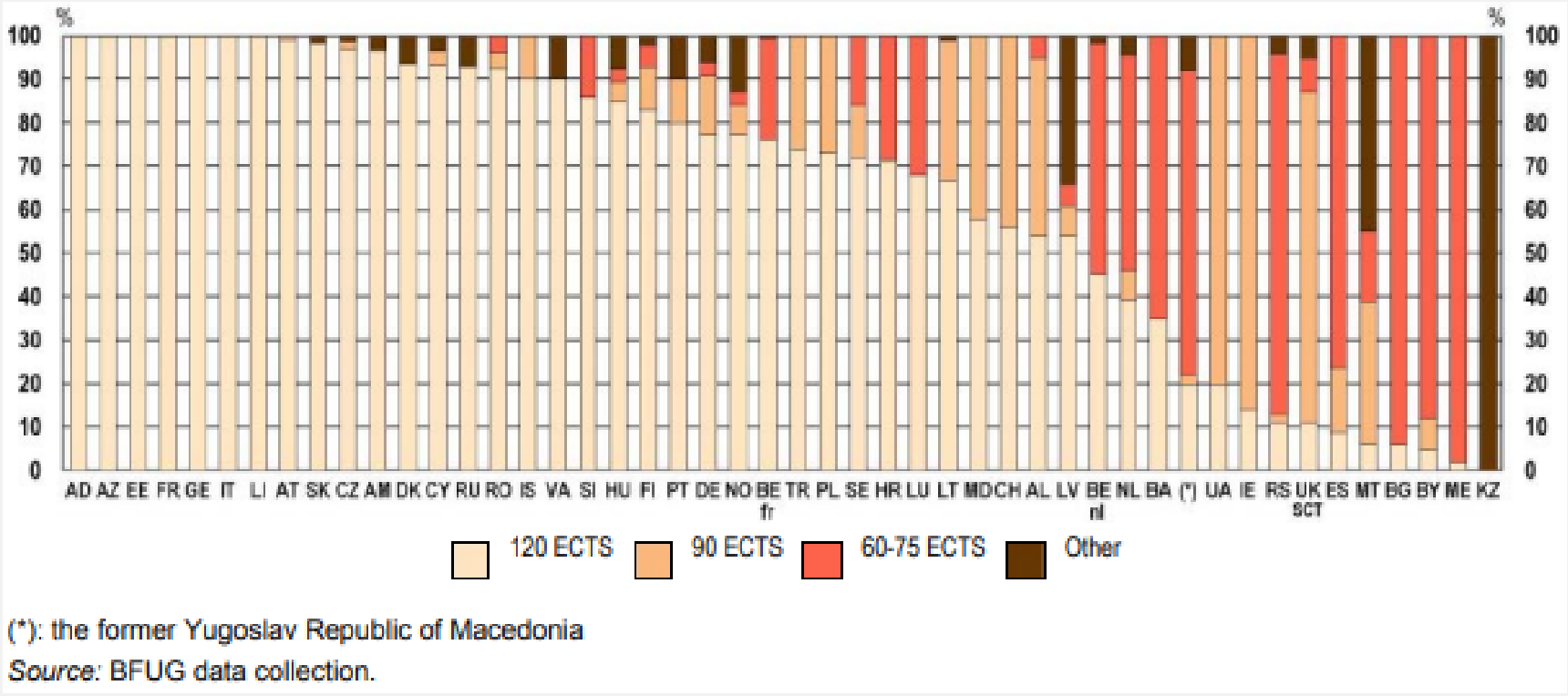


(*): the former Yugoslav Republic of Macedonia

Source: BFUG data collection.

European Higher Education Area EHEA

Share of second cycle-programmes with a workload of 60-75, 90, 120 or another number of ECTS credits, 2016-17 (No data for the United Kingdom (England, Wales and Northern Ireland)



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Engineering Education societies keystone for teaching innovation

SEFI Working Groups

- **Attractiveness**

  Enhancing the attractiveness of engineering education to potential students - academics, industrialists

- **Ethics**

  Indicating skills needed for ethical decision making and action.

- **Gender and Diversity**

  Identifying best practices to attract and retain female students and increasing gender awareness among academic staff

- **Engineering Education Research**

  European community of researchers of engineering education, work on European research projects

- **Engineering Skills**

  Updating a set of skills needed for successful integration into professional environment.

- **Open and Online Education**

  new technologies that provide more students with access to engineering education; new possible educational formats

Engineering Education societies keystone for teaching innovation

SEFI Working Groups

- Continuing Education and Lifelong Learning

Development and research into both theory and practice about CEE and lifelong learning

- Curriculum Development

Becoming aware of the interests of students from different countries as well as those of a dynamic society

- Sustainability

Investigating the field of sustainability with respect to impact on engineering education.

- Mathematics

Role of Mathematics in EE and its practical application in professional life, use of technology, the ways of teaching, learning.

- Physics

It is a forum of sharing challenges and solutions and it organizes a PTEE conference on every two years.

- Quality Assurance & Accreditation

Student and teacher mobility, qualifications frameworks as well as the increase of the cooperation between institutions in EHEA

Upcoming events

2019 European Convention for Engineering Deans (ECED) : Challenges in University Business Cooperation in Engineering education: Crossing borders

26 – 28 May 2019 Leuven I Belgium

KU LEUVEN

Annual Conference 16 – 20 September 2019 BUDAPEST I HUNGARY

COMPLEXITY IS THE NEW NORMALITY

Varietas delactat… Complexity as new normality *Industry 4.0 and Diversity in Engineering Education*

- Budapest University of Technology and Economics (BME)
- Abstract submission – 5 March 2019
- sefi2019.eu

HAPTIC GENERATION WELCOME

Thanks for your attention

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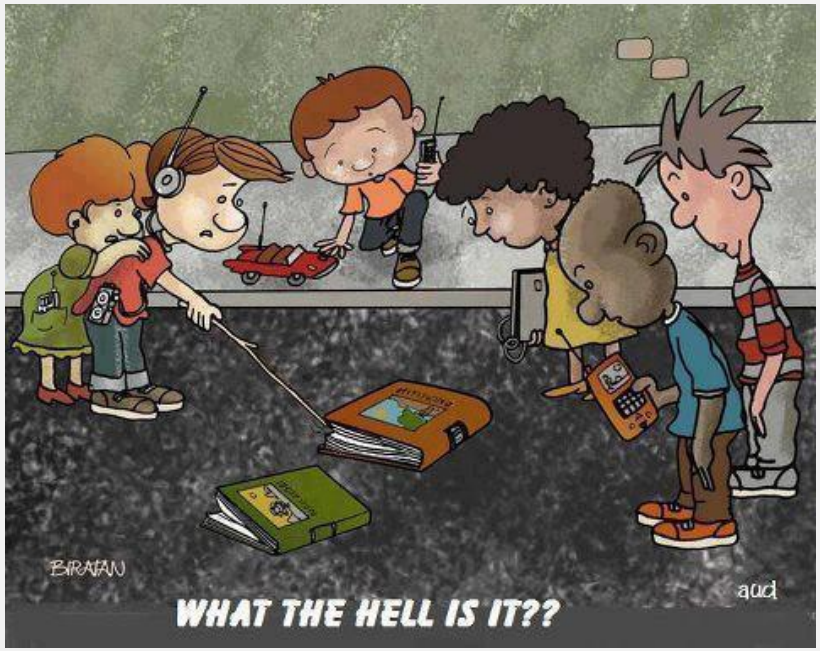

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