Universiteit Utrecht

# The Impact of Europeanisation and Globalisation on Higher Education

**Marijk van der Wende**
Dean of Graduate Studies
Professor of Higher Education
Utrecht University

**34th Conference of Rectors and Presidents of European Universities of Technology**
**September 18-19, 2015**
**Aalto, Finland**

# Boston


HARVARD
John A. Paulson
School of Engineering
and Applied Sciences

# Shanghai

ACADEMIC RANKING OF WORLD UNIVERSITIES SINCE 2003

Home | About | Rankings | Universities | GRUP | Initiative | Conference | Resources

Home>> ARWU 2015

2015 2014 2013 2012 2011 2010 2009 2008 2007 2006 2005 2004 2003

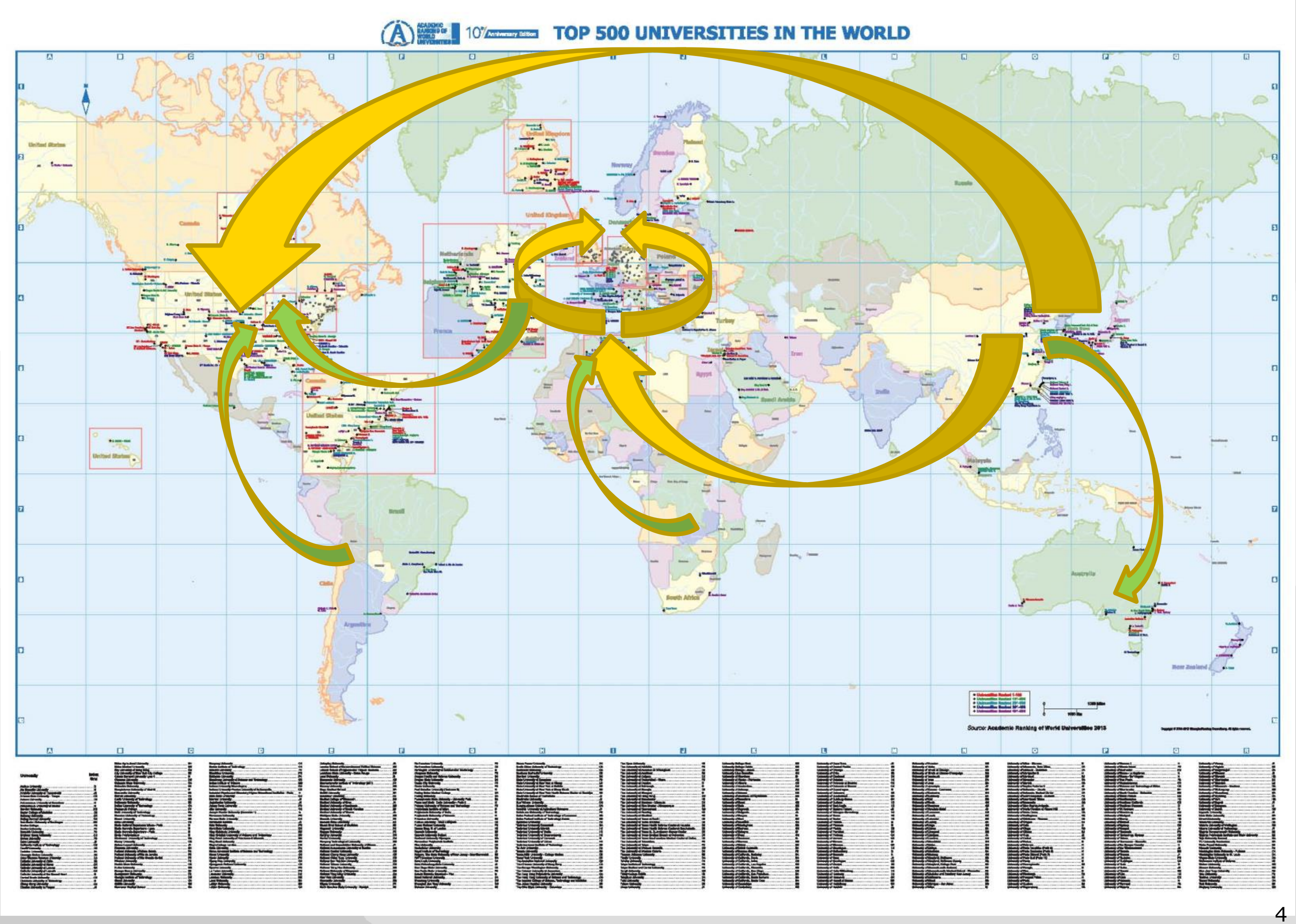
## Academic Ranking of World Universities 2015

Ranking | Methodology | Statistics

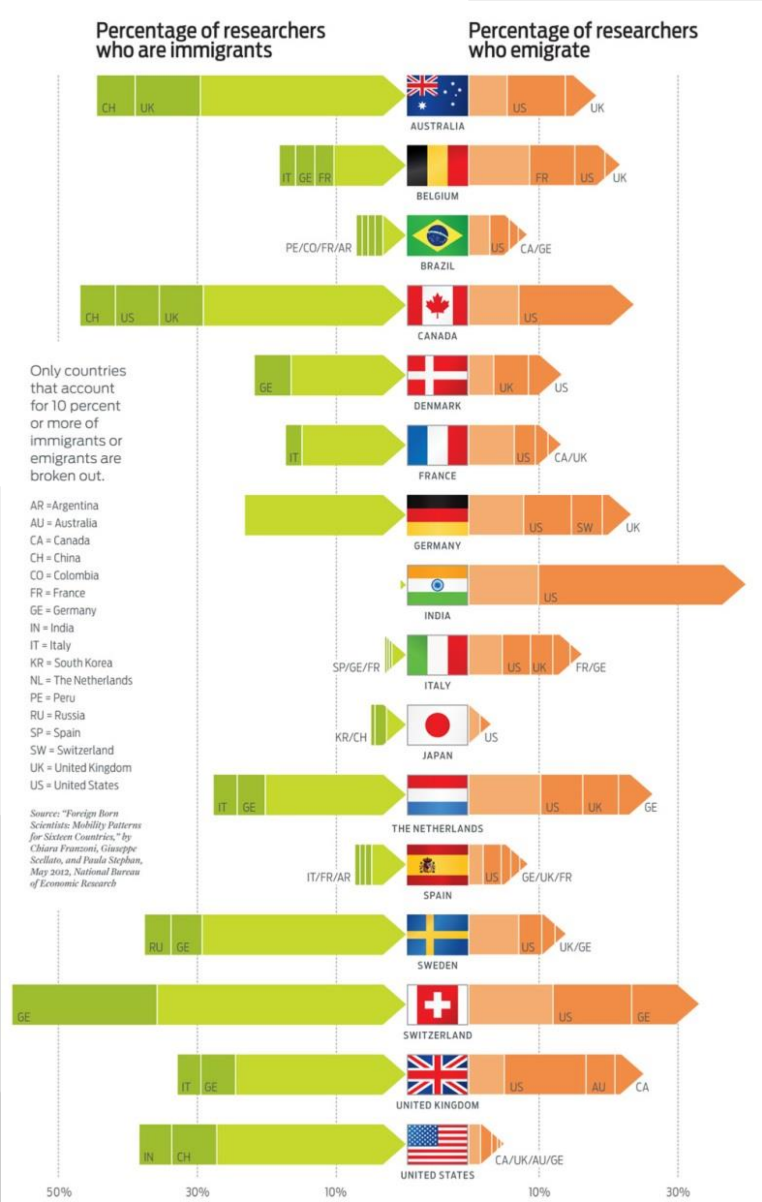
| World Rank | Institution* | Country /Region | National Rank | Total Score | Score on Alumni |
|---|---|---|---|---|---|
| 1 | Harvard University | | 1 | 100.0 | 100.0 |
| 2 | Stanford University | | 2 | 73.3 | 40.7 |
| 3 | Massachusetts Institute of Technology (MIT) | | 3 | 70.4 | 68.2 |
| 4 | University of California, Berkeley | | 4 | 69.6 | 65.1 |
| 5 | University of Cambridge | | 1 | 68.8 | 77.1 |
| 6 | Princeton University | | 5 | 61.0 | 53.3 |
| 7 | California Institute of Technology | | 6 | 59.6 | 49.5 |
| 8 | Columbia University | | 7 | 58.8 | 63.5 |
| 9 | University of Chicago | | 8 | 57.1 | 59.8 |
| 10 | University of Oxford | | 2 | 56.6 | 49.7 |
| 11 | Yale University | | 9 | 54.5 | 47.6 |
| 12 | University of California, Los Angeles | | 10 | 50.7 | 29.5 |
| 13 | Cornell University | | 11 | 50.5 | 42.0 |
| 14 | University of California, San Diego | | 12 | 48.7 | 19.2 |
| 15 | University of Washington | | 13 | 47.8 | 21.2 |
| 16 | Johns Hopkins University | | 14 | 46.3 | 37.7 |


Universiteit Utrecht

# Global Flows



Universiteit Utrecht




# Global Flows:

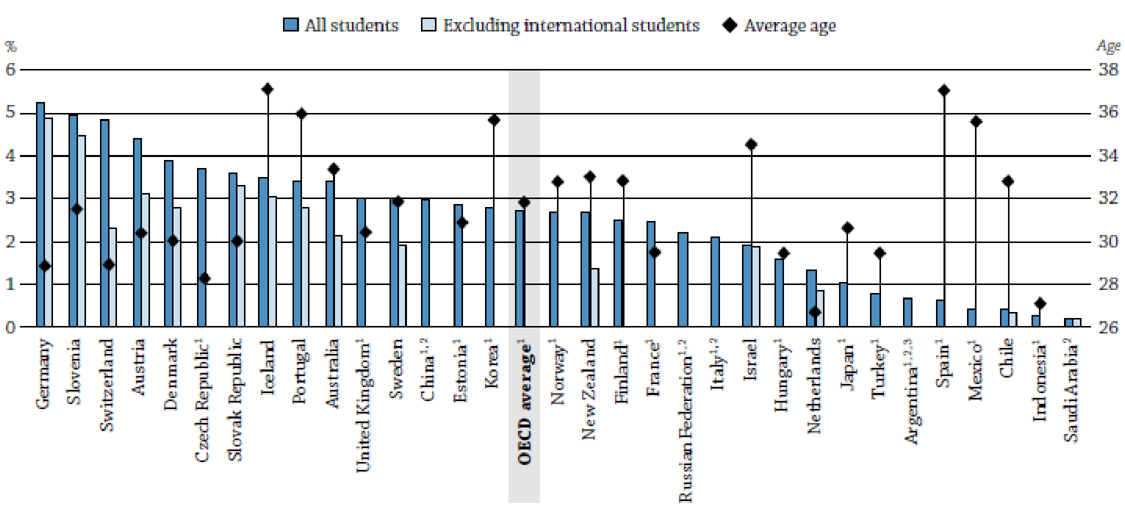
## immigration
## emigration
## balances

(Source: IEEE, 2012)

Universiteit Utrecht

# Mobile PhD’s: Brain Gain for OECD

Chart C3.4. Entry rates into advanced research programmes and average age of new entrants (2011)




(Education at a Glance, 2013)

International doctoral students

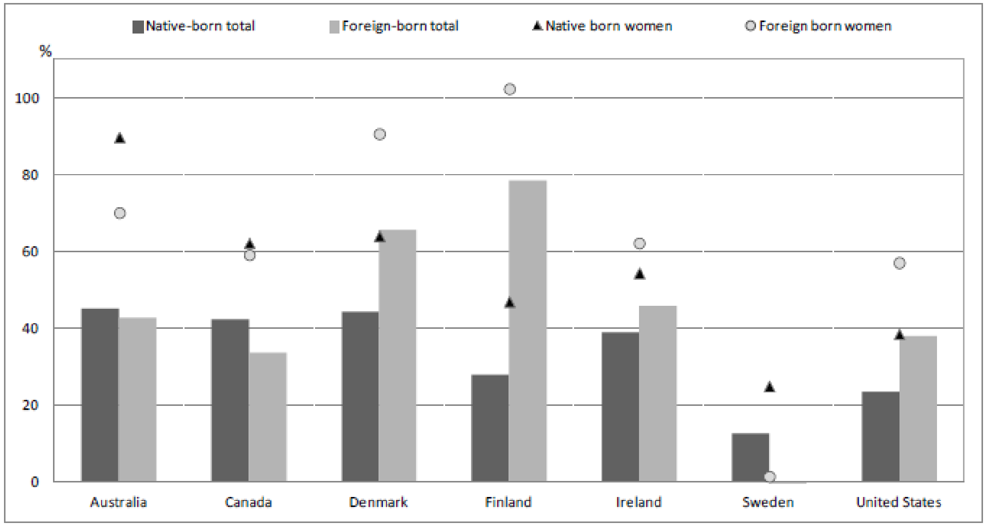
> 20% of enrolments in Australia, Belgium, Nordic countries, Canada, New Zealand, and the United States.

> 40% in Switzerland. the UK, and the Netherlands

A large proportion of these students are from non-OECD economies.

# Growth in (inter)national PhDs

Figure 32. Percent change in the number of native-born and foreign-born doctorate holders in seven OECD countries between 2000 and 2005/06




*Source*: OECD, Database on immigrants in the OECD countries, 2012.

OECD: 40% overall growth (1998-2008)

China: 40% overall growth, each year.

USA: international PhDs accounted for the bulk of the growth in STEM (1985-2005).
Majority from China

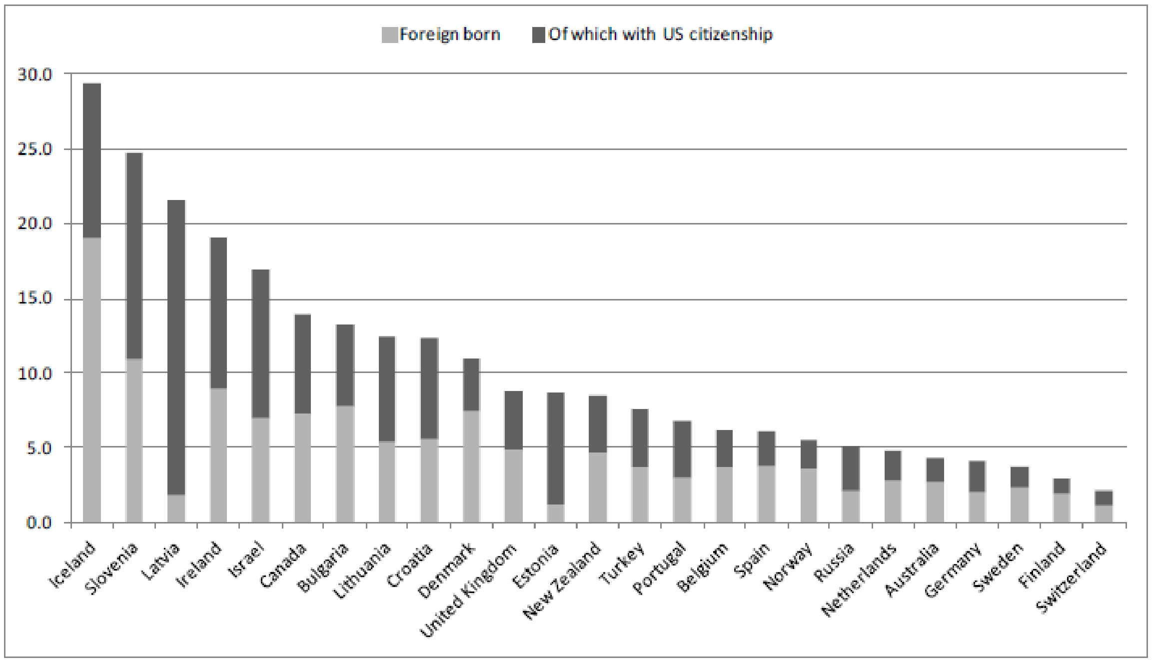
Scandinavia:

- Overall growth 32% (2002-2011)
- Growth in international PhDs: 121% (same period).

Universiteit Utrecht

# International Doctorate holders in the USA

**Figure 34. Number of foreign born doctorate holders residing in the United States as a percentage of total doctorate holders in the country of birth, 2005-2009**




*Source:* OECD estimates based on the database on immigrants in the OECD countries 2012 and the OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010.

610 000 in total
27% of the population
+ 38% since 2000.

100 000 born in China (40% US citizenship)

64.000 from India (54% US citizenship).

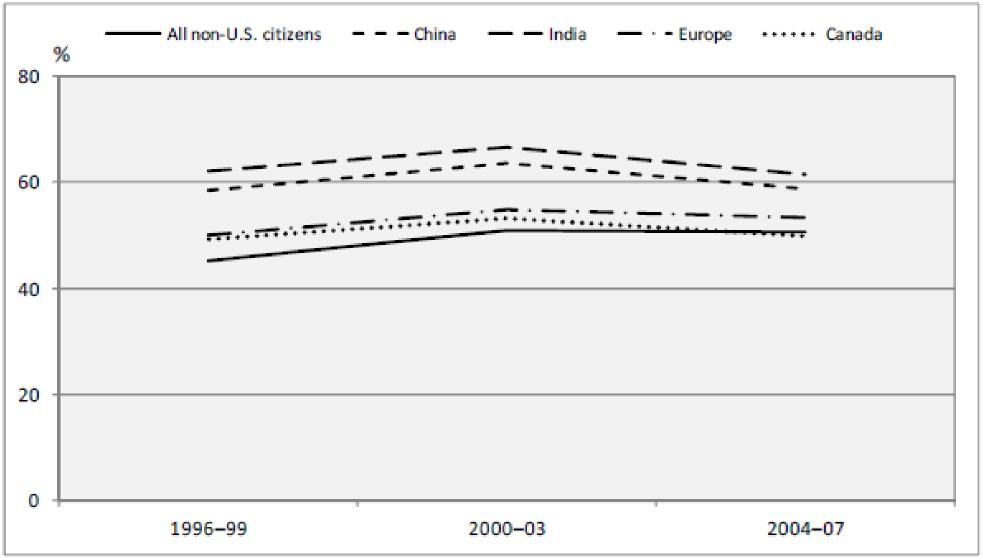
A decline in the immigration of foreign scientists and engineers during the recent economic downturn?

Or a need to “rebalance China”?

South Korea, the UK, Germany, Canada, Chinese Taipei each have between 20.000 and 30.000 native born doctoral graduates residing in the US

# Will they stay or will they go?

Figure 20. Share of foreign recipients of U.S. S&E doctorates with definite plans to stay in the United States




STEM doctoral degrees have higher stay rates

Doctoral graduates originating from China, India, Iran, Romania, Russia and the Ukraine also had above-average stay rates.

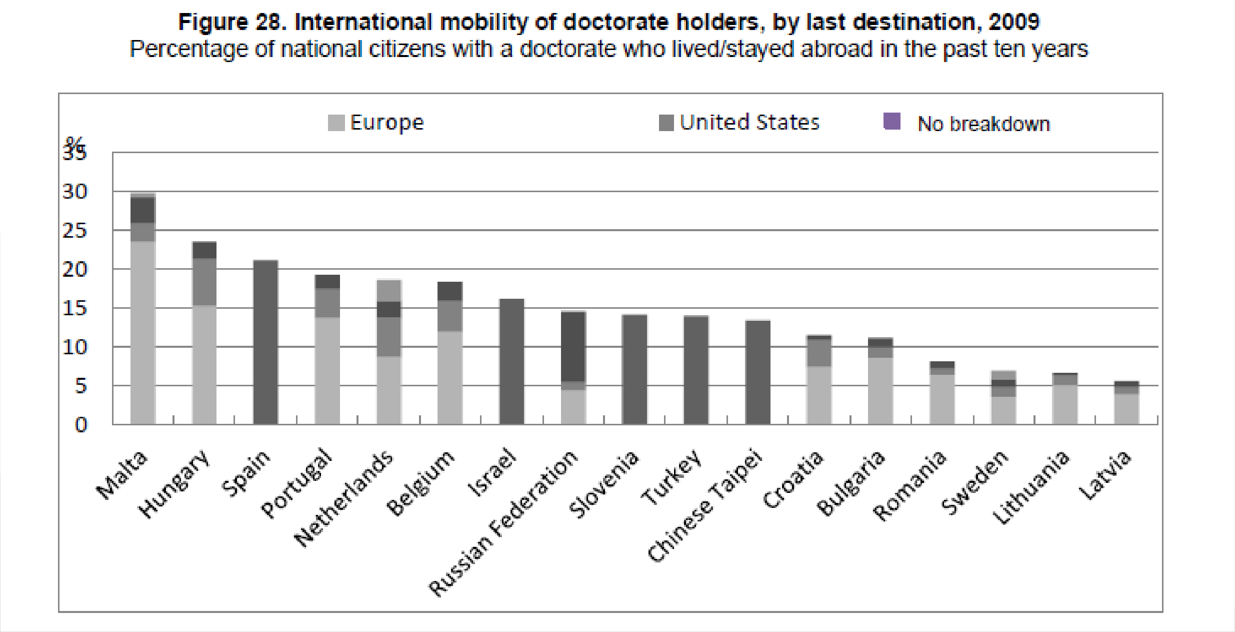
Efforts to improve "stay rates"

Immigrants in US R&D:

- 25% of Nobel prizes
- 60% of PhDs in STEM fields
- 76% of patents had one immigrant as a holder

Universiteit Utrecht

# Mobility of doctorate holders (post-docs) in Europe




Europe: 15-30% of doctorate holders worked abroad in the previous ten years.

The percentage is higher among more recent graduates (from 1990-2006).

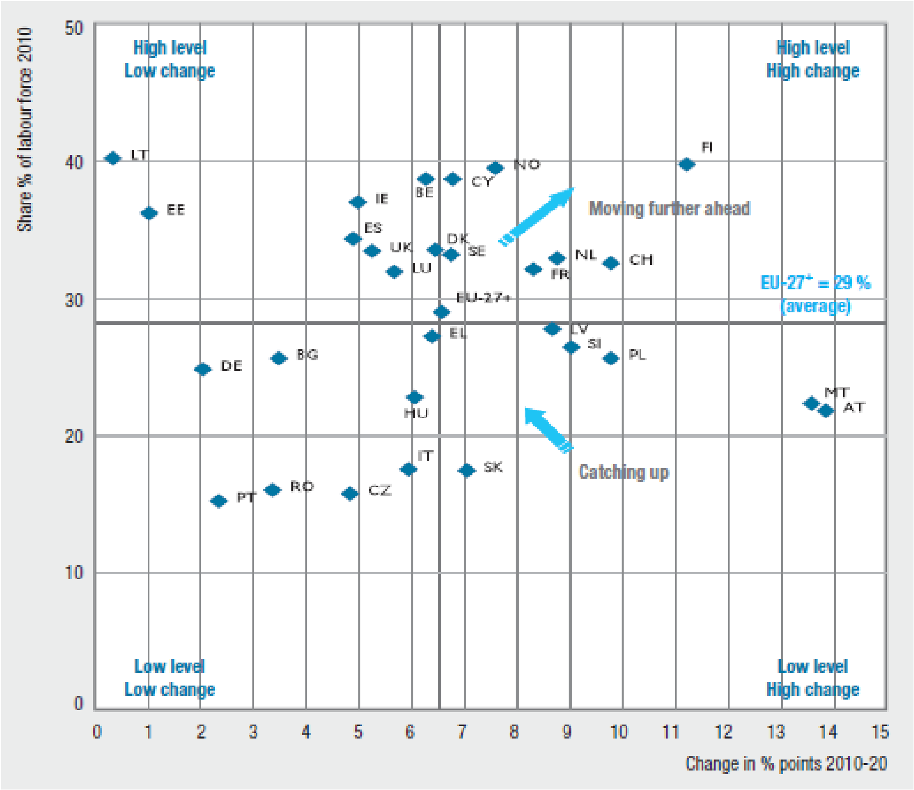
Mobility is increasing.

(Auriol et al, 2013)

Universiteit Utrecht

# Increasing disparities - increasing mobility

Figure 16. Incidence of high qualification in the labour force by country. Projected level 2010 (%) and change in %-points 2010-20




*Source:* Cedefop (IER estimates based on E3ME and StockMOD).

**Vertical mismatch may emerge more in certain countries than in others.**

**Mobility of the highly skilled towards countries with high R&D investment**

**Circular mobility or brain drain?**

**Concentration of minds in particular countries / regions**

**While other countries may be harmed by losing graduates**

**Increasing disparities among European countries**

# Southern Europe: loss of talent (data gathered in 2014!)

**Greece:**
•73% of those leaving Greece now have a postgraduate degree
•51% a PhD
•Most have studied abroad in some of the world's best universities.
•Destinations of current emigrants: UK 31%, US 28%, Germany

**Italy**:
•Main destinations US 34%, UK 26%, France 11%
•Top 3 reasons: lack of research funding, better economic conditions abroad, and better career opportunities abroad.

**Spain**:
•Many foreign PhD holders may move on
•Difficult to integrate into the academic working force.
•Inbreeding, job advertisement in Spanish etc.
•Maybe "in transition"?

## Increasing disparities: The ERC effect

The generous and highly competitive ERC grants seem to enhance the pattern of winners and loosers.

Relatively few researchers from central and eastern Europe and from southern Europe gain these grants

Those who win are free to take the grants to a location of their choice

Strong countries like the UK, Germany, Switzerland are boosted further

(Teixeira, 2012)

# Increasing disparities: The ERC effect

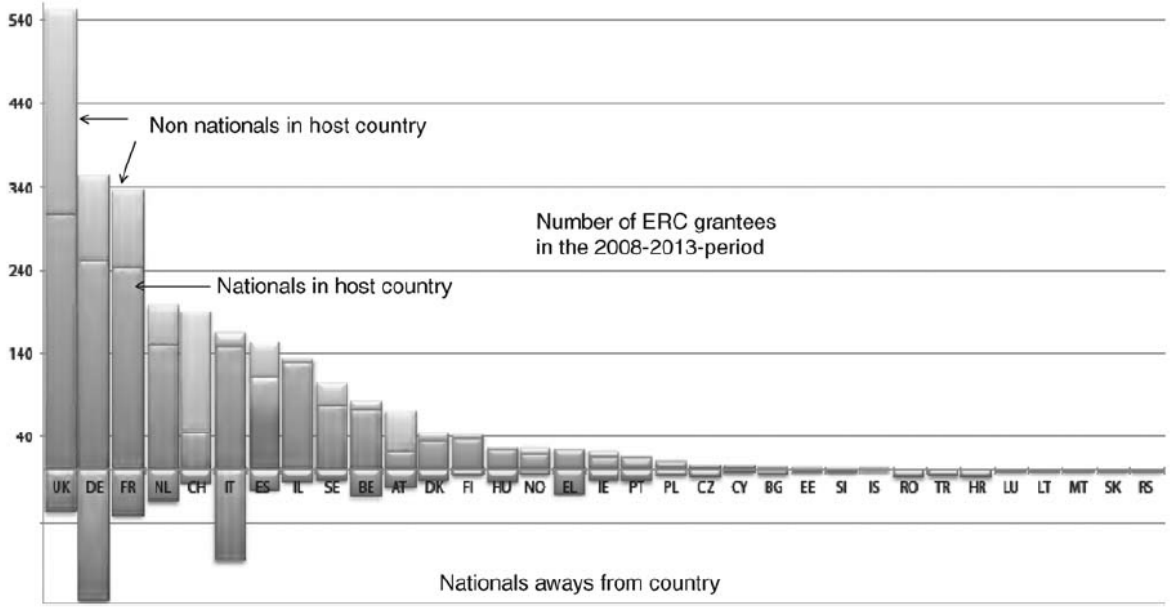



**Figure 3.** Nationality and national location of grantees of Starting grants and Advanced grants (source: ERC Facts and Figures)

(In: Zeccina & Anfossi, 2015)

# Factors explaining mobility: push and pull factors

Deliberate policies to stimulate such mobility

Based on the general belief that attracting international talents helps to ensure that a country plays a leading role in research and innovation

Many countries attract international students to doctoral programmes

Tertiary-level graduates as knowledge workers (e.g. EU Blue Card)

To compensate for domestic shortages

Attract researchers who emigrated back to the country of origin (India and China)

# Factors explaining mobility: push and pull factors

Why scientists migrate

- Growing unbalances in academic career opportunities
- Better science infrastructure and funding,
- Better working conditions and higher salaries.
- Potential increases in earnings one of the most important reasons for migrating to OECD countries
- The desire to go where ‘good science’ can be achieved.
- The desire to work with ‘leading edge researchers’, ‘state of the art equipment’, and in a ‘meritocratic system’.
- Common language and geographical proximity drive international migration more strongly than co-authorships.
- The effect of political tensions seems smaller on migration than it is on co-authorship

# Impact of Mobility on Performance

Diversity in the labour force generally contributes to entrepreneurship and innovation

Over 50% of start ups in Silicon Valley established by immigrants

Higher productivity in companies hiring knowledge immigrants

The most productive academics, in terms of referred publications, are those with the most international collaboration, including co-publication of articles and publishing in a foreign country.

# The Mover's advantage: The superior performance of migrant scientists

Migrant scientists on average perform at higher level than domestic scientists

Implications:

Policies that facilitate immigration for high-skilled human capital and policies aimed at harmonizing the international job market for research can be beneficial to science

Findings also suggest POSITIVE EXTERNALITIES FROM MIGRATION: Benefits that accrue to the destination country do not necessarily come at expense of sending country, and that there are conversely positive externalities to be gained. Brain migration is not a zero-sum gain.

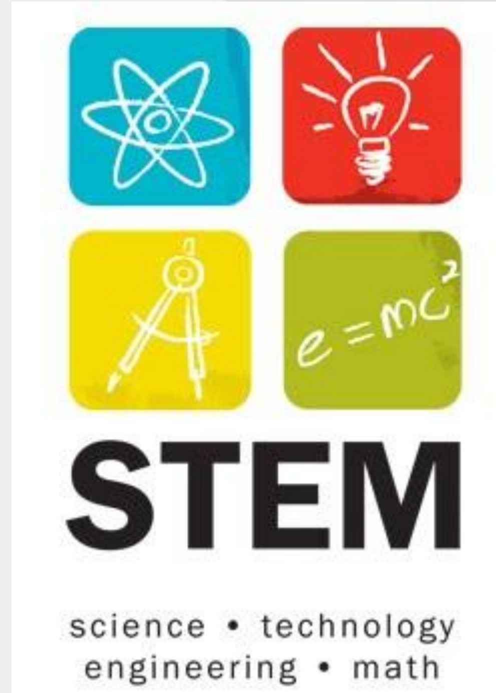
(Franzoni, Scellato & Stephan, 2014)

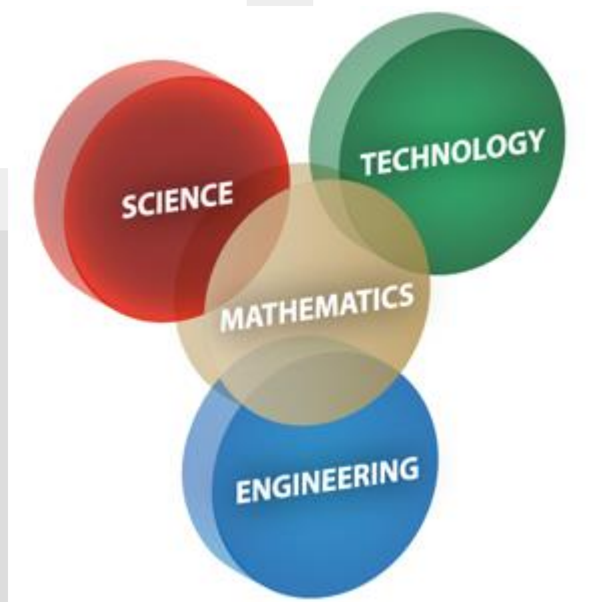
**S**CIENCE

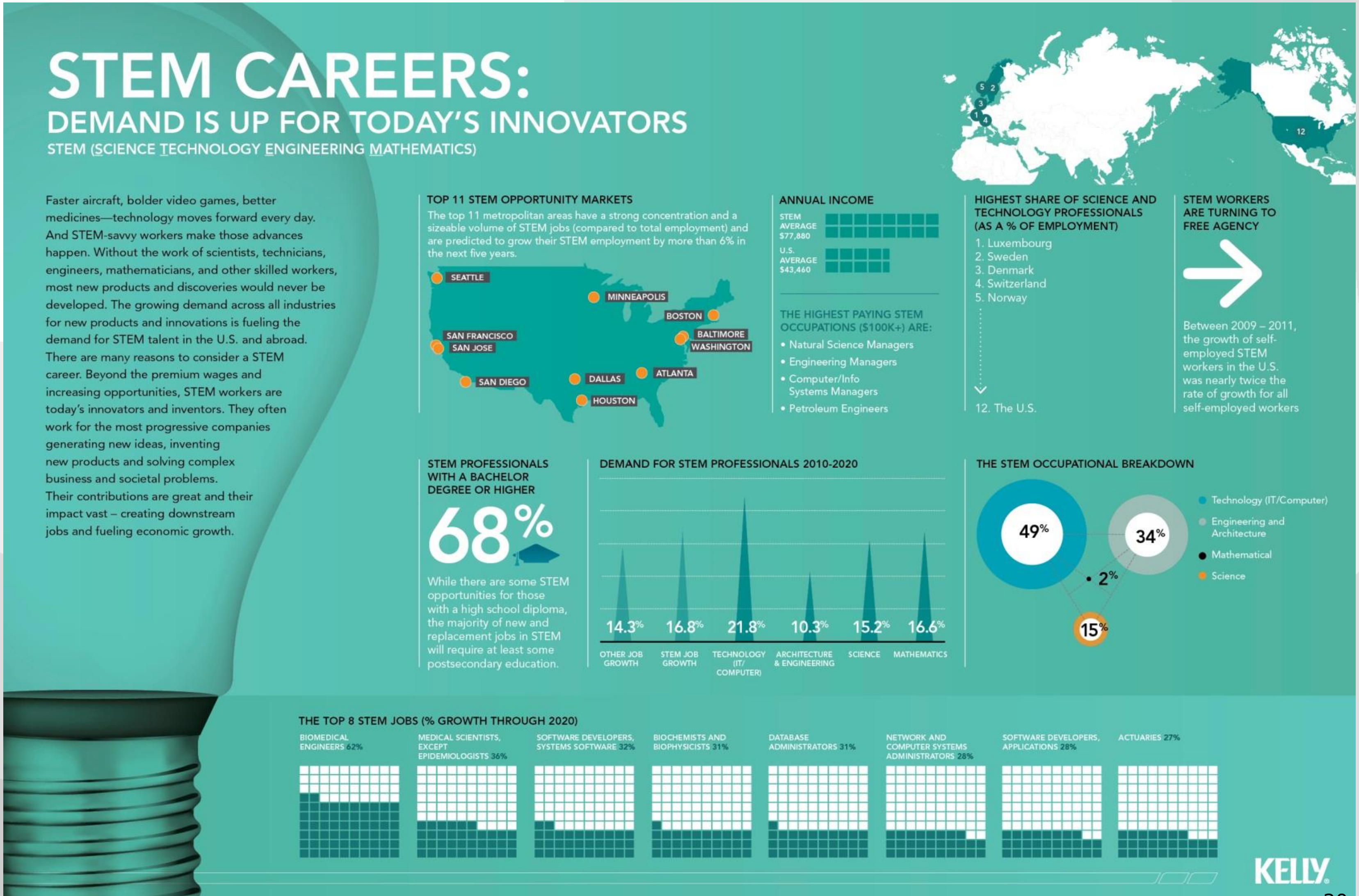
**T**ECHNOLOGY

**E**NGINEERING

**M**ATH

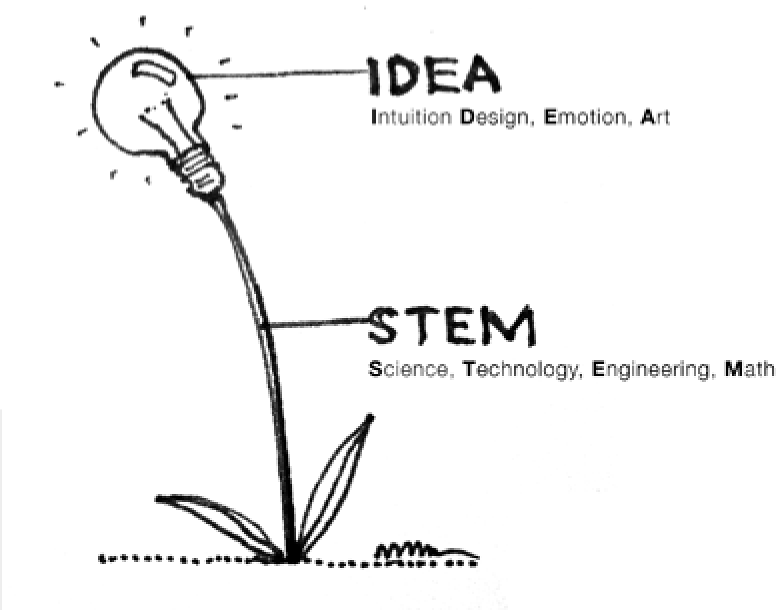



STEM CAREERS:
DEMAND IS UP FOR TODAY'S INNOVATORS
STEM (SCIENCE TECHNOLOGY ENGINEERING MATHEMATICS)
Faster aircraft, bolder video games, better medicines—technology moves forward every day. And STEM-savvy workers make those advances happen. Without the work of scientists, technicians, engineers, mathematicians, and other skilled workers, most new products and discoveries would never be developed. The growing demand across all industries for new products and innovations is fueling the demand for STEM talent in the U.S. and abroad. There are many reasons to consider a STEM career. Beyond the premium wages and increasing opportunities, STEM workers are today's innovators and inventors. They often work for the most progressive companies generating new ideas, inventing new products and solving complex business and societal problems. Their contributions are great and their impact vast – creating downstream jobs and fueling economic growth.
TOP 11 STEM OPPORTUNITY MARKETS
The top 11 metropolitan areas have a strong concentration and a sizeable volume of STEM jobs (compared to total employment) and are predicted to grow their STEM employment by more than 6% in the next five years.
SEATTLE
MINNEAPOLIS
BOSTON
SAN FRANCISCO
SAN JOSE
BALTIMORE
WASHINGTON
SAN DIEGO
DALLAS
ATLANTA
HOUSTON
ANNUAL INCOME
STEM AVERAGE $77,880
U.S. AVERAGE $43,460
THE HIGHEST PAYING STEM OCCUPATIONS ($100K+) ARE:
• Natural Science Managers
• Engineering Managers
• Computer/Info Systems Managers
• Petroleum Engineers
HIGHEST SHARE OF SCIENCE AND TECHNOLOGY PROFESSIONALS (AS A % OF EMPLOYMENT)
1. Luxembourg
2. Sweden
3. Denmark
4. Switzerland
5. Norway
12. The U.S.
STEM WORKERS ARE TURNING TO FREE AGENCY
Between 2009 – 2011, the growth of self-employed STEM workers in the U.S. was nearly twice the rate of growth for all self-employed workers
STEM PROFESSIONALS WITH A BACHELOR DEGREE OR HIGHER
68%
While there are some STEM opportunities for those with a high school diploma, the majority of new and replacement jobs in STEM will require at least some postsecondary education.
DEMAND FOR STEM PROFESSIONALS 2010-2020
14.3% OTHER JOB GROWTH
16.8% STEM JOB GROWTH
21.8% TECHNOLOGY (IT/ COMPUTER)
10.3% ARCHITECTURE & ENGINEERING
15.2% SCIENCE
16.6% MATHEMATICS
THE STEM OCCUPATIONAL BREAKDOWN
49%
34%
2%
15%
Technology (IT/Computer)
Engineering and Architecture
Mathematical
Science
THE TOP 8 STEM JOBS (% GROWTH THROUGH 2020)
BIOMEDICAL ENGINEERS 62%
MEDICAL SCIENTISTS, EXCEPT EPIDEMIOLOGISTS 36%
SOFTWARE DEVELOPERS, SYSTEMS SOFTWARE 32%
BIOCHEMISTS AND BIOPHYSICISTS 31%
DATABASE ADMINISTRATORS 31%
NETWORK AND COMPUTER SYSTEMS ADMINISTRATORS 28%
SOFTWARE DEVELOPERS, APPLICATIONS 28%
ACTUARIES 27%
KELLY

**Societal Challenges**

- Health, demographic change and wellbeing;
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bio-economy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, environment, resource efficiency and raw materials;
- Europe in a changing world - inclusive, innovative and reflective societies;
- Secure societies - protecting freedom and security of Europe and its citizens.






Interdisciplinarity

Innovation - creativity

International & intercultural

Imagination

Integrity

Universiteit Utrecht

# Traditional and 21st Century skills

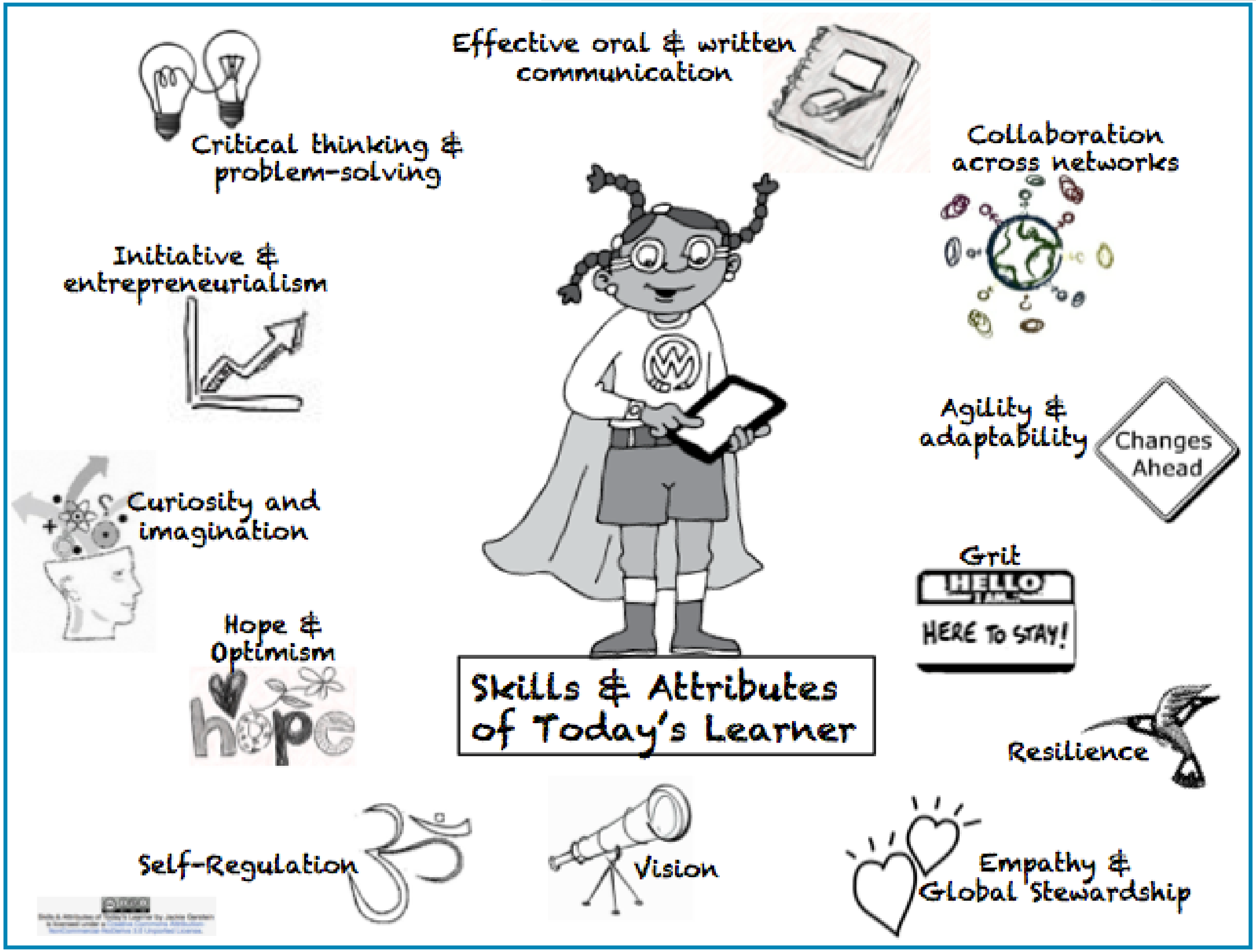
| Type | Skills |
|---|---|
| Basic skills | Literacy (reading, writing) and numeracy; "digital-age literacy" skills - ICT literacy |
| Academic skills | Associated with subject matter areas such as English, mathematics, history, law and science. |
| Technical skills | Specific for an occupation, may include academic skills and knowledge of certain tools or processes. |
| Generic skills | Problem solving, thinking critically and creatively, ability to learn and to manage complexity |
| "Soft" skills | Work in multidisciplinary teams, communicating across cultures , foreign languages, multicultural skills.<br><br>Leadership: managerial & enterpreneurial skills, team building and steering, coaching and mentoring, lobbying and negotiating, co-ordination, ethics, and charisma.<br><br>Creativity & design skills |

Traditional

21st Century skills

(Avvisati et al 2013, OECD, 2011; Trilling & Fadel, 2009)

Universiteit Utrecht



Universiteit Utrecht

# From a Broad Range to the Right Mix

Soft skills may be increasingly important

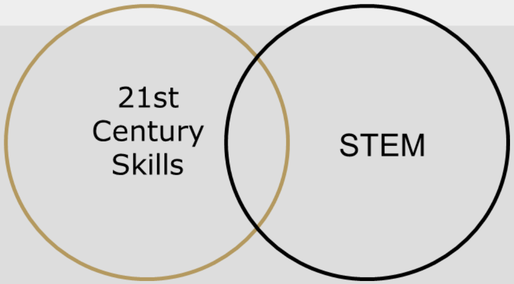
Nevertheless, technical skills will remain essential

And often require training in academic subjects

Especially in STEM

Those still most likely to have a highly innovative job

## The right mix



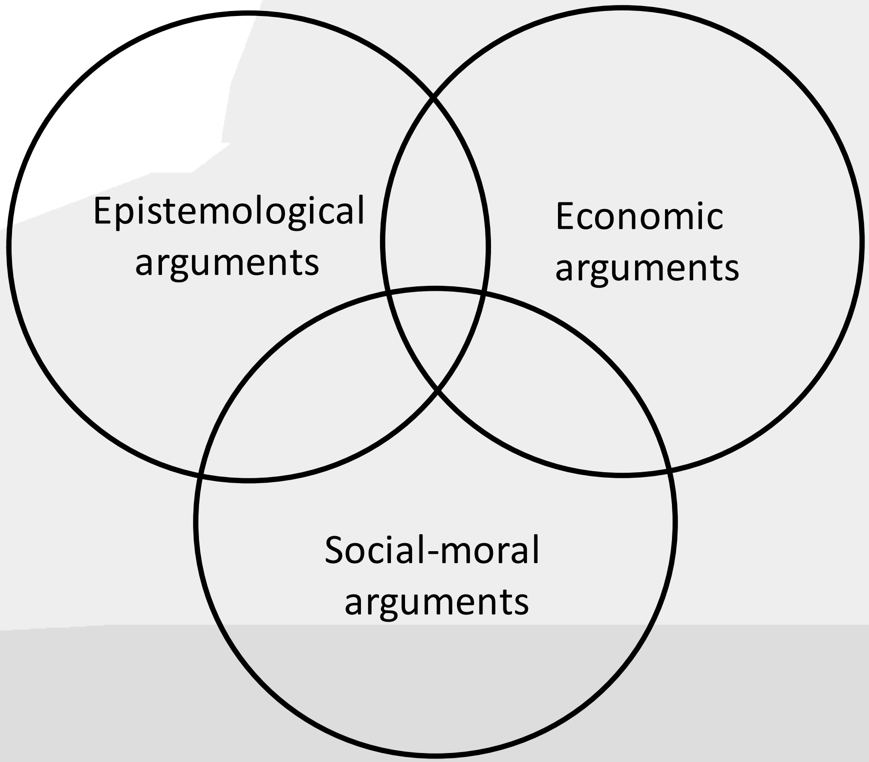
Universiteit Utrecht

# Taking the Liberal Arts and Sciences into the 21st Century

**Interdisciplinarity**

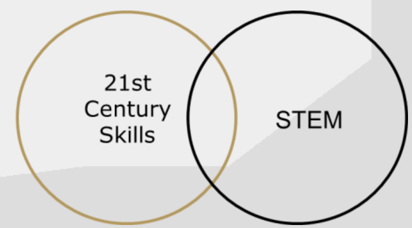
Broad themes and
"Big Questions"

Humanities & sciences




**Humanistic & Ethical values,**
Citizenship, Global Perspective

**Generic /**
**21st century skills**:
creativity and innovation, critical thinking, problem solving, communication, collaboration, information, IT, and media literacy, social and cross-cultural skills, leadership and responsibility




(Van der Wende, 2011)

# Why does MIT have a liberal arts and science undergraduate curriculum?

1. Because it is central to MIT's core mission and educational principles

2. Because our alumni value and recommend it.

3. Because of the important relationship between a liberal arts and science curriculum and the formation of an entrepreneurial mindset.

(Bernd Widdig, MIT, Shanghai 21 May 2015)

# Why does MIT have a liberal arts and science undergraduate curriculum?

**Preparation for a lifetime of intellectual development**

- **value of creative thinking and "hands-on" learning**
- **Exposure to different modes of inquiry is crucial**
- **The value of fundamentals & the information revolution**

**Responsible leadership**

- **Develop a personal code of ethics to guide students' future actions**
- **Reflect on the impact of science and technology on modern society**

**Collaborative learning**

- **Curriculum stresses team-based learning with an emphasis on collaborative research and design**
- **Importance of developing diverse perspectives on important problems**
- **to generate practical solutions to the world's great challenges."**

**Engineering and science is always embedded in broader human realities**

- **Therefore: Combine technical and scientific creativity with an understanding of the world's political, cultural, and economic complexities**

(Bernd Widdig, MIT, Shanghai 21 May 2015)

# The Two Cultures and the Scientific Revolution

The ever-increasing gap between the humanities and the sciences is an obstacle to solving the world's great problems.

We are increasingly dependent on and driven by science and technology, the silent forces of history, and ignorance of the working and ideas of science is dangerous.

(C.P. Snow, 1961)

# “Snow was right”

There are many great crises or challenges facing the world: food, energy, climate, pandemics, all driven by globalisation.

Science and technology might have been part of the cause of these problems, they are also absolutely key to the solutions.

**A complete education should be a multidimensional experience**, since students, teachers, schools, and research are all multidimensional.

**It is a challenge for universities to offer such an environment** and be a proper reflection of the talents of its inhabitants.


Robbert Dijkgraaf

Director, IAS Princeton

(At the Opening of Amsterdam University College, 2009)

Universiteit Utrecht

# The University as an Organisation

**The ideal:**

A protected space in which various forms of useful preparation for life are undertaken in a setting and manner which encourages the students to understand the contingency of any particular packet of knowledge and its interrelations with other, different forms of knowledge

**But in reality:**

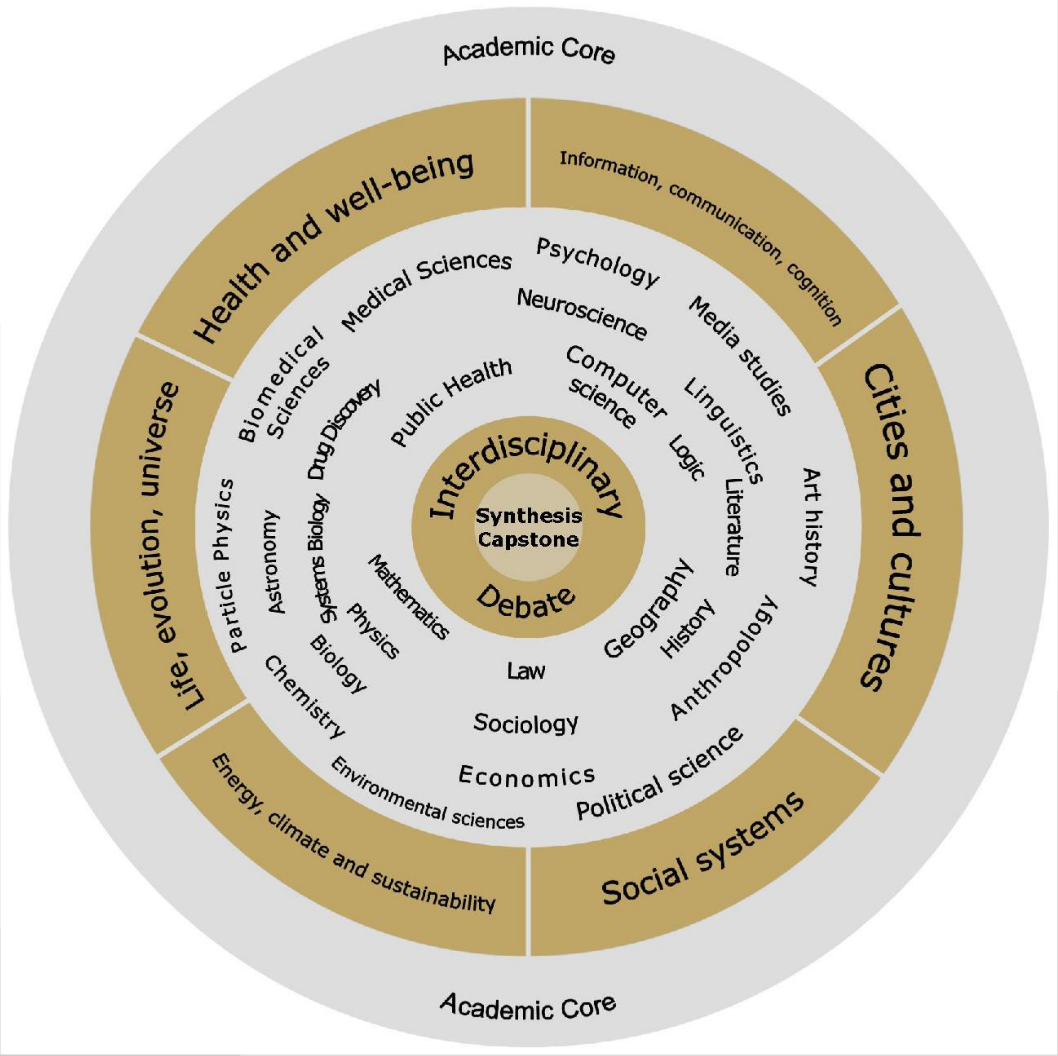
A series of schools and departments held together by a central heating system.

A series of individual faculty entrepreneurs held together by a common grievance over parking.

(Collini, 2012)

Universiteit Utrecht

# Amsterdam University College Curriculum Circle



September 2012

## Helga Nowotny

*(Em. President of the European Research Council, Member of the AUC International Advisory Board)*

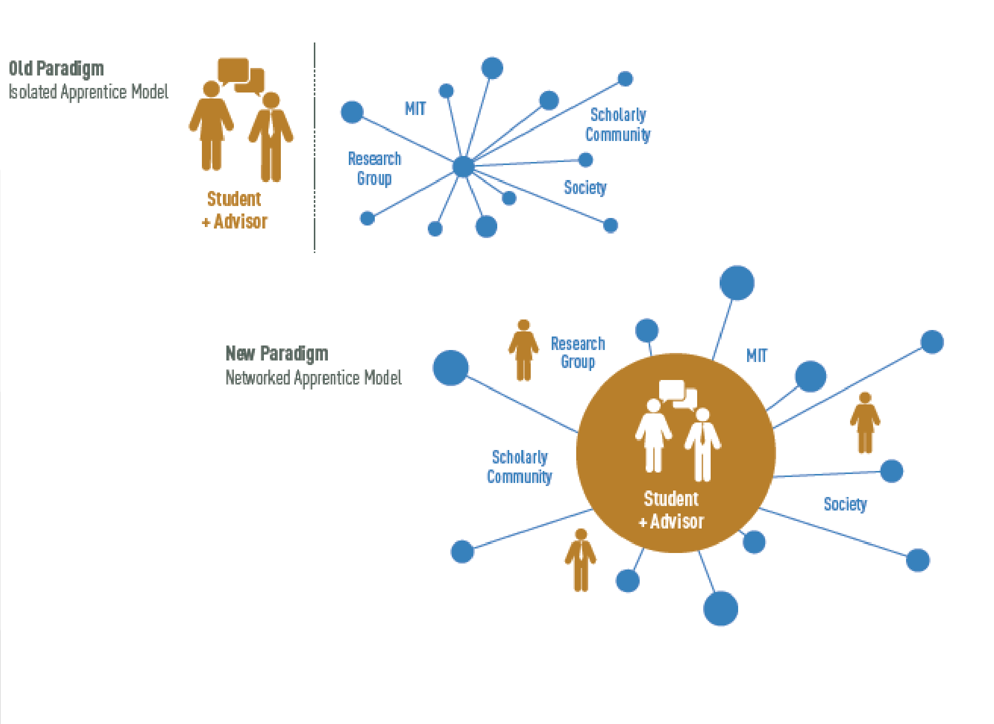
**“The two innovative features of the AUC curriculum which impressed me most are its unique emphasis on “big questions” and how to approach them, namely through a research-oriented style of inquiry.**

**AUC seeks to link the parts of our *globus intellectualis* that seem to have become separated, much like oceans dividing the continents.**

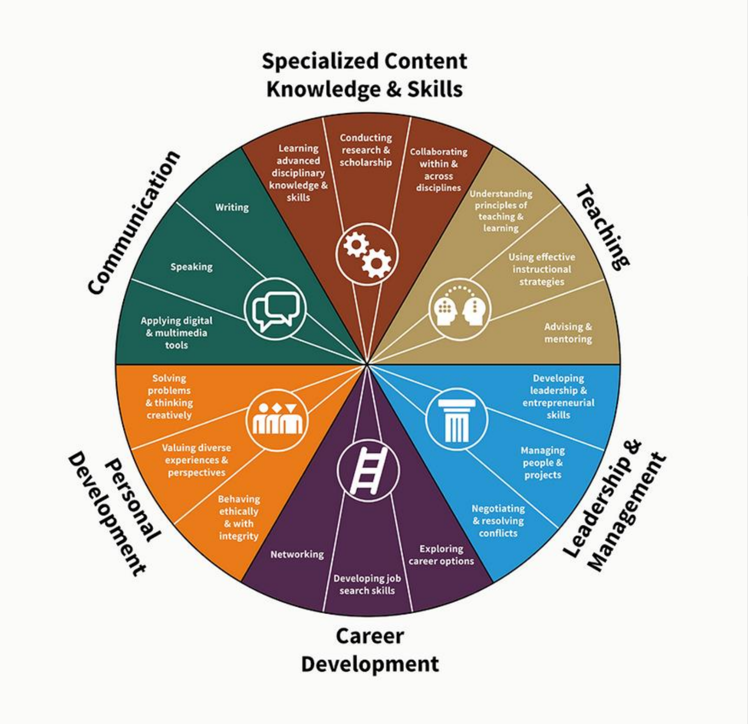
**Reconnecting the natural sciences – physics, chemistry, and the life sciences – with the humanities and social sciences”.**

Universiteit Utrecht

## MIT's Networked Apprentice Model for Graduate Education




## Stanford's Graduate Professional Development Framework




O. P. JINDAL GLOBAL UNIVERSITY


山梨学院大学
山梨学院短期大学
YAMANASHI GAKUIN UNIVERSITY


NYU
上海纽约大学奠基仪式


Yale
NUS
College

**China's New Silk Road Policy**

**(OBOR)**

**A New Epistemic Road Between China and Europe?**

# To conclude

**Europe: towards a concentration of the minds**

**Mostly in STEM**

**Due to:**

- **Flows of researchers & grant funding**
- **Concentration of investment in large scale research infrastructure**
- **Steering on performance indicators that mostly work in STEM fields (but much less so in HUM/SSC )**
- **Rankings that boost S&T- Life&Medical science heavy universities**

**The future of the comprehensive research university?**

**The future of the “narrow” technological university?**

# Further reading

**Marijk Van Der Wende (2015). International Academic Mobility: Towards a Concentration of the Minds in Europe. European Review, 23, pp S70-S88 doi:10.1017/S1062798714000799**

**Marijk van der Wende & Jiabin Zhu (2015). China's Higher Education in Global Perspective: Leader or Follower in the "World-Class" Movement? Proceedings of the WCU6 Conference, 1-4 November 2015, Shanghai**

**Wende, M.C. van der (2012). *Trends towards global excellence in undergraduate education: taking the liberal arts experience into the 21st century*. Research & Occasional Paper Series: CSHE.18.12 University of California Berkeley: Centre for Studies in Higher Education.**

**Wende, M. C. van der (2014). On Mergers and Missions:
Implications for Institutional Governance and Governmental Steering. In: Q. Wang, Y. Cheng, & N. Cai Liu (Eds.). *Global Outreach of World-Class Universities: How It is Affecting Higher Education Systems*. Centre for World-Class Universities. Jiao Tong University, Shanghai. Sense Publishers. Pp. 137-153.**