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RESPONSIBLE EDUCATION, RESEARCH AND INNOVATION - ANY BENEFITS BEYOND JUST BEING FAIR?

ALEKSANDRA DRECUN

Future Education Belgrade

Belgrade, November 13, 2018.

The Boston Symphony Orchestra case

- As late as 1970, only 5 percent of musicians performing in the top five orchestras in the US were women.
- Today, women are 35% of the most acclaimed orchestra.
It did not happen by chance!

- Goldin, Claudia and Cecilia Rouse. "Orchestrating Impartiality: The Impact Of 'Blind' Auditions On Female Musicians," American Economic Review, 2000, v90(4, Sep), 715-741.

- Chia-Jung Tsay, "Sight over sound in the judgment of music performance", PNAS 2013 110 (36) 14580-14585

What works?

- Not a great technological feat was required for that change, just awareness, a curtain, and a decision.
- **Nudge – Behavioral Design**

GCED and ESD

Target 4.7 of Sustainable Development **Goal 4 on Education** focuses on [Global Citizenship Education](#) (GCED) and [Education for Sustainable Development](#) (ESD):

“By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development.”

The global indicator for Target 4.7 measures the extent to which GCED and ESD, including gender equality and human rights, are mainstreamed in national education policies, curricula, teacher education and, student assessments.

What Works - examples

- Howard v. Heidi – IAT (Implicit Association Test, Harvard)
- OECD – Business case for GE (Japan)
- Lean in – Lean Out (negotiations, guessing, taking risk ...)
- Collective Intelligence – diversity increases productivity (Carnegie Mellon team)
- Seeing is believing

- **NOT ONLY RIGHT, BUT ALSO SMART THING TO DO!**

Gender equality is a moral and a business imperative.

But, **unconscious bias holds us back.**

De-biasing minds has proven to be difficult and expensive.

Useful resources on unconscious bias

- Harvard Implicit Association Test

<https://implicit.harvard.edu/implicit/takeatest.html>

- Google's Unbiasing

<https://rework.withgoogle.com/subjects/unbiasing/>

- SFI: <https://youtu.be/w2eASbvmquw>

INTERSECTION and Intersectionality

Intersection's experience in RERI topics

- DG R&D H2020 Program Committees:
 - PC for Strategic Configuration with SwafS
 - PC for Societal Challenge 6 – Europe in a Changing World – inclusive, innovative and reflective societies
- Helsinki Group on Gender in Research (EC advisory body)
- EUSEA Board
- Cost GenderSTE Action
- SFI and NSF cooperation
- MISTRA URBAN FUTURES

Participation in RERI related projects (exempli causa)



Debate science!

AGENDA

1. RERI Framework
2. Gender as one of key components of RERI
3. Examples and promising practices

What is RERI?

- Education, research and innovation aimed at sustainability
 - Sensitive to Grand Challenges
 - Diversity as a key to creativity and quality (= excellence)
- Engaging society at large
 - Sensitive to social values
 - **Shared responsibility** amongst variety of stakeholders

Why RERI?



Health and wellbeing



Inclusive and secure societies

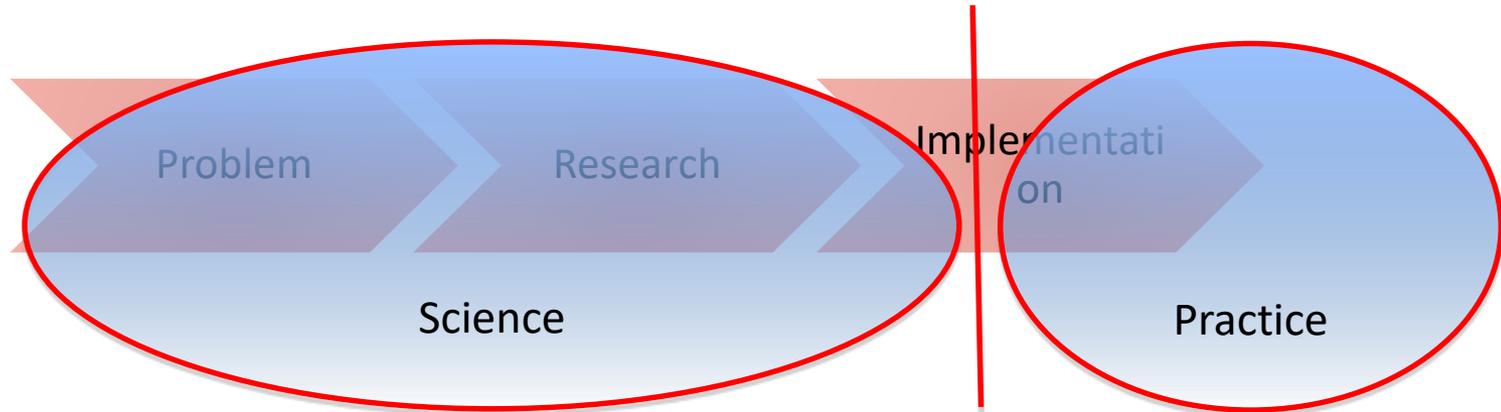


Clean energy



Climate action and resource efficiency

Need for RERI



RERI Approach

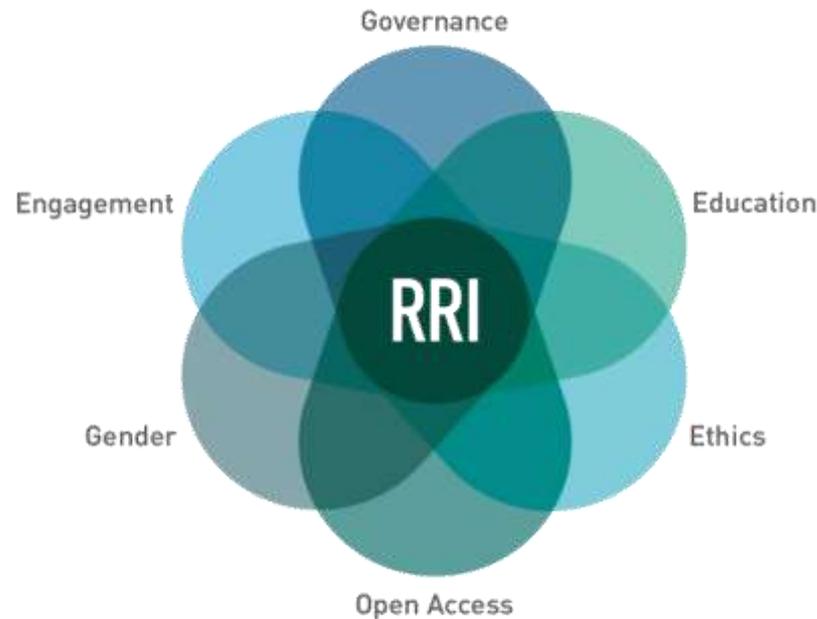


When RERI?

- Ongoing, iterative process
- Early engagement is key to fitting solutions

RERI Framework

- Science and technology do not merely happen to us.
- How do we shape research and innovation as process?



Source: <http://www.rri-tools.eu/>

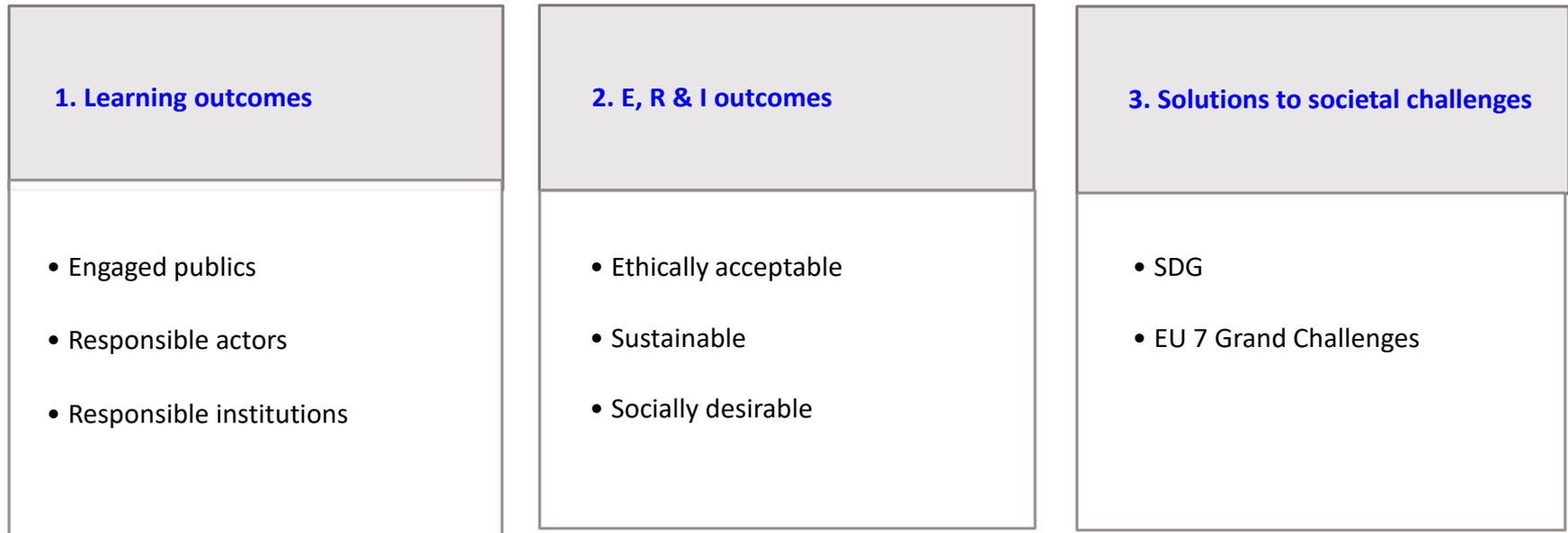
Who?

- Emphasis on **collective, shared responsibility**:
Anticipatory governance, not only educators, researchers and innovators

- **As inclusive as possible: Aligning wide range of actors and activities in the deliberation of values and purposes**
 - Researchers
 - Policymakers
 - Educators
 - Industry
 - CSOs

How exactly?

- **Better align both the process and outcomes of Education, Research & Innovation, with the values, needs and expectations of society.**



Source: <http://www.rri-tools.eu/>

The questions to be reflected on

1. What are the opportunities and challenges deriving from the adoption of the principle of Gender Equality (GE)?
2. Are there common models for the implementation of GE?

Three analytical approaches to GENDER issues of education, science and technology:

1. **‘Fix the Numbers of Women’**

focuses on increasing women's participation.

2. **‘Fix the Institutions’**

promotes gender equality in careers through structural change in research and education organizations.

3. **‘Fix the Knowledge’ or ‘gendered innovations’**

stimulate excellence in education, science and technology by integrating gender-based analysis into research.



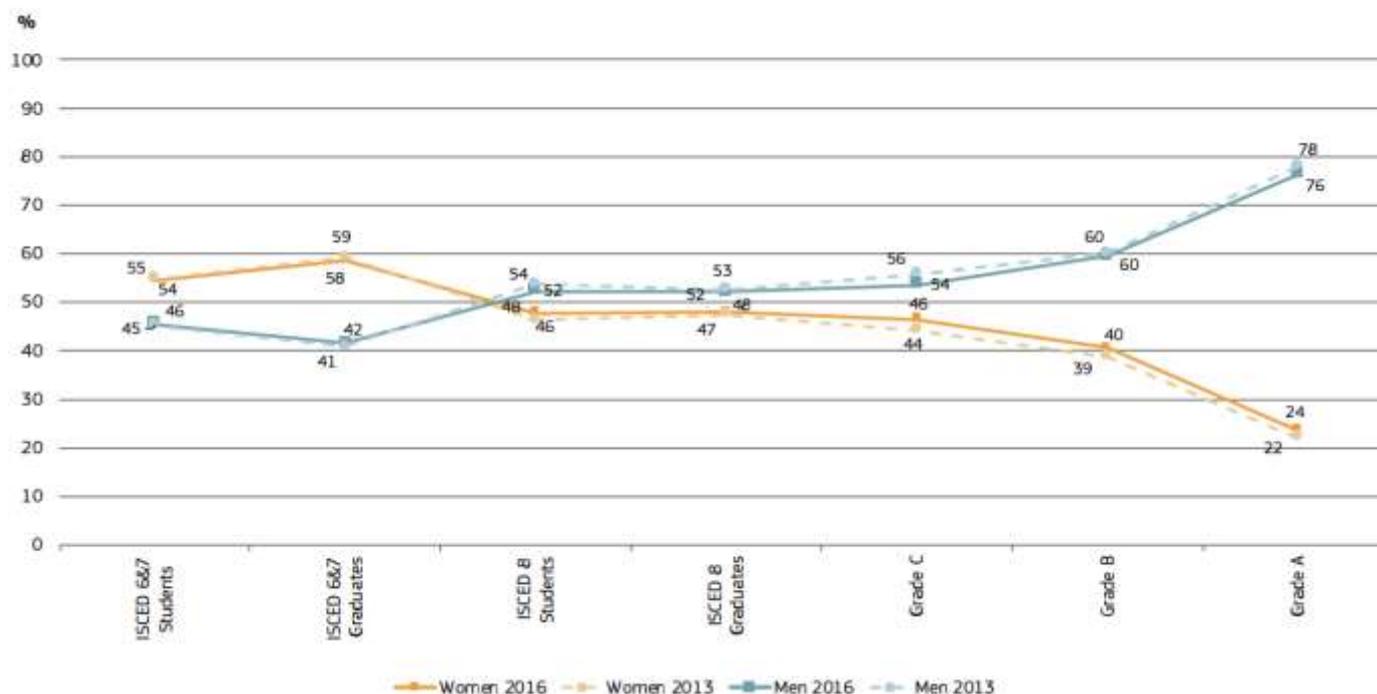
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GE in Research and Innovation in Europe





Figure 6.1 Proportion (%) of men and women in a typical academic career, students and academic staff, EU-28, 2013-2016

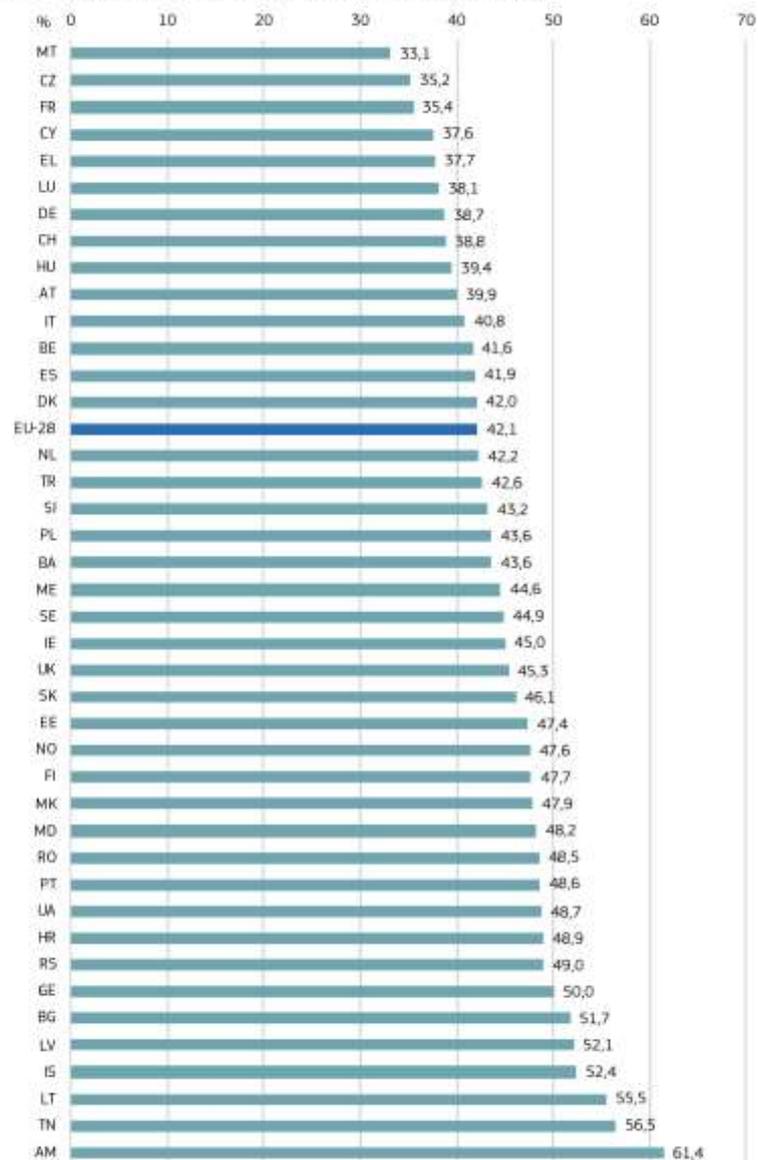


Notes: Reference years for Eurostat data: 2012-2016; Exceptions to the reference year for WIS data: CZ (Grade A), EE (Grade A): 2014-2015; FR: 2012-2015; HR: 2014-2017; LU: 2015-2016; RO, UK: 2014-2016; IE, CY, HU, AT, SI, SE: 2013-2015; BG: 2013-2017; MT (Malta College for Arts, Science and Technology): 2017; Eurostat data unavailable for: NL (ISCED 8 graduates): 2016; WIS data unavailable for: LT (2013), MT (2013), IE (Grade D); Eurostat data for 2013: ISCED 6&7 corresponds to ISCED 5A of ISCED-97; ISCED 8 corresponds to ISCED 6 of ISCED-97. Others: Data are in headcounts (HC); Break in time series: DE (Grades B - C): 2016; ES: 2015; UK: 2014; Data rounded to nearest multiple of 5; UK: The same person may be counted in several grades: BE (French speaking community), SE; Data do not include persons of unknown sex: PL; Private colleges and other smaller institutions are not included; IE; Grade C data include some persons with M.Sc. only: LT, SK; The base reference population of WIS data is that of 'Researchers' as defined in the Frascati Manual (OECD, 2015), with the exception of the following countries which used 'Academic staff' based on the UOE Manual (UNESCO/OECD/Eurostat, 2017): BG, DE, IE, EL, IT, LV, LT, NL, SI, SK, SE.

Source: Women in Science database, DG Research and Innovation; Eurostat – Education Statistics (online data codes: educ_enr15, educ_grad5, educ_uoe_enrt03, educ_uoe_grad02).

Women make up less than 50 % of doctoral students, doctoral graduates and academic staff. In the top academic grade in particular, women are a clear minority and their position since 2013 has improved only slightly.

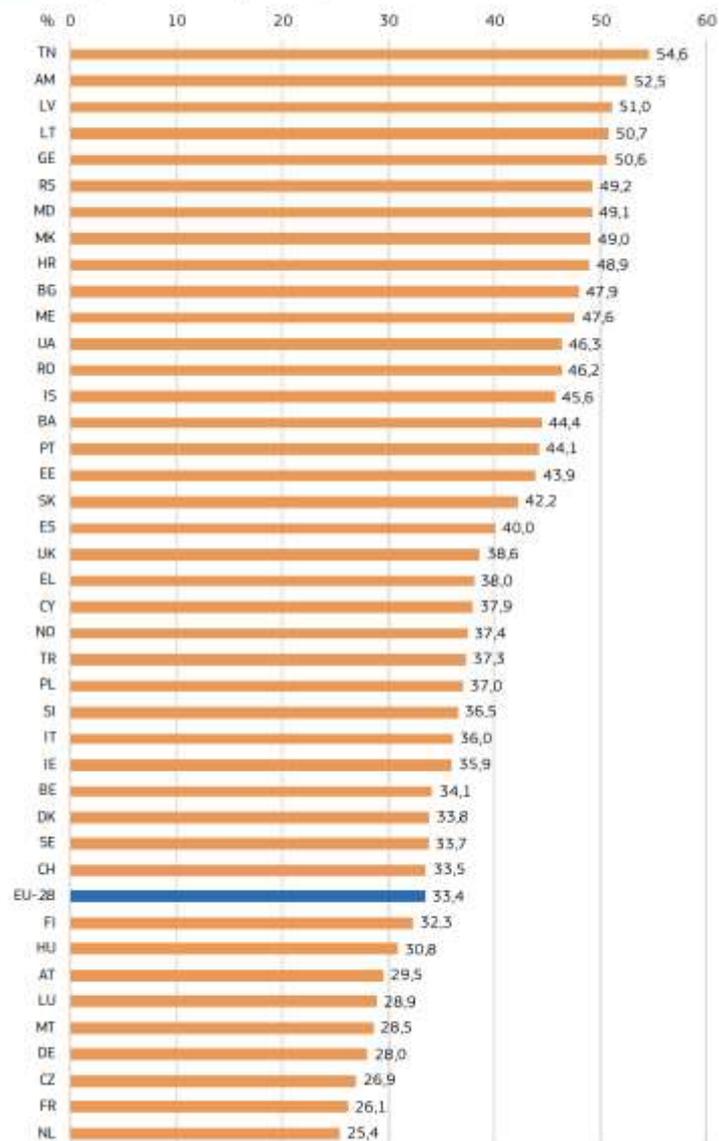
Figure 4.5 Proportion of women among researchers in the higher education sector, 2015



Notes: Exception to reference year: FR, 2014. Data unavailable for AL, IL, FO. Break in time series FR. Definition differs for ME (data estimated for EU-28, FR, IT, UK). Other: Proportions computed from data in head count (HC).

Source: Eurostat - Statistics on research and development (online data code: rd_g_percent); UNESCO Institute of Statistics (Researchers by sector of employment).

Figure 4.1 Proportion of women among researchers, 2015



Notes: Countries to the reference year TR: 2014. Data unavailable for: AL, L, TO. Break in time series for TR. Definition differs for ME. Data estimated for EU-28, FR, SE, UK. Other Proportions computed from data in head count (HC). Total number (HC) of researchers in AM and GE include only the sectors of higher education and government.

Sources: Eurostat - Statistics on research and development (table data code: rd_p_person); UNESCO Institute of Statistics (Researchers by sector of employment).

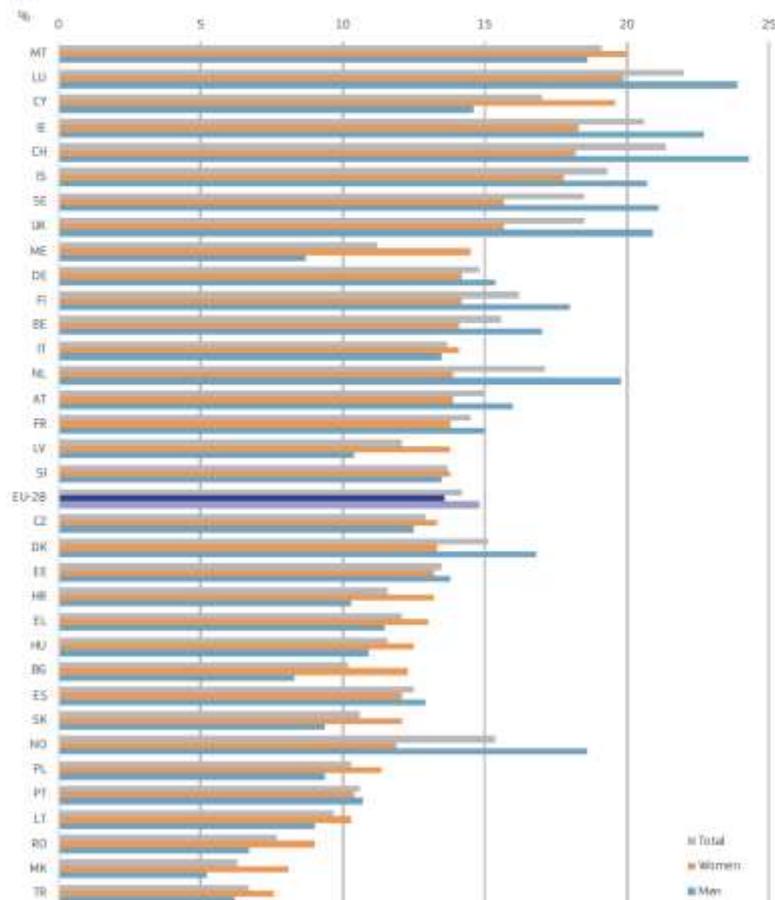


Across all countries, women are more likely than men to work in knowledge-intensive activities.

An alternative view on women in S&T occupations is provided in Figure 3.4. It shows the proportions of women and men employed in knowledge-intensive activities (KIA) out of the total number of women and men, respectively, employed in all sectors of economy. At both the EU-28 level and country level, the proportion of women in KIA is higher than that of men. The difference at the EU-28 level is 15.5 percentage points while at country-level it varies from 4.7 percentage points in Luxembourg to 22.4 percentage points in Iceland. Other countries with large differences were Latvia, Lithuania, Slovakia and Poland.

The relative over-representation of women in KIA can be partly explained by the fact that public sector jobs are included, such as in healthcare, education and social work where women have traditionally had greater shares than men.

Figure 3.5 Employment in knowledge-intensive activities – business industries (KIABI), 2017



Notes: Data unavailable for AL, BH, BA, FO, GE, IL, MD, RS, TR, UK. Break in row series for BG, DK, EL, MT.

Source: Eurostat - Human resources in science and technology (online data code hhr_kia_smp2)

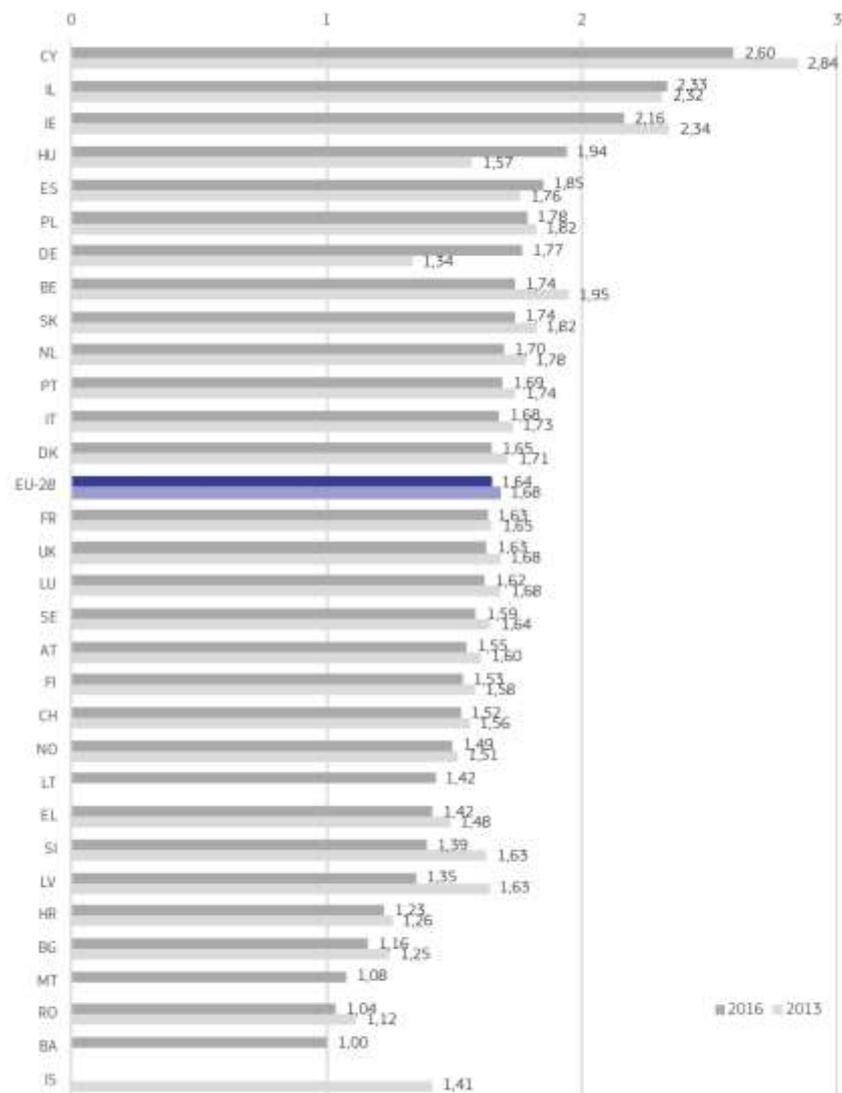
The Glass Ceiling Index

The Glass Ceiling Index (GCI) is a relative index comparing the proportion of women in academia (grades A, B, and C) with the proportion of women in top academic positions (grade A positions; equivalent to full professors in most countries) in a given year. The GCI can range from 0 to infinity. A GCI of 1 indicates that there is no difference between women and men in terms of their chances of being promoted. A score of less than 1 means that women are more represented at the grade A level than in academia generally (grades A, B, and C) and a GCI score of more than 1 indicates the presence of a glass ceiling effect, meaning that women are less represented in grade A positions than in academia generally (grades A, B, and C). In other words, the interpretation of the GCI is that the higher the value, the stronger the glass ceiling effect and the more difficult it is for women to move into a higher position.

Women face greater difficulties than men in advancing to the highest academic positions in all the countries examined. Nevertheless, the situation for women has improved, albeit slightly, since 2013 in most countries.



Figure 6.6 Glass Ceiling Index, 2013-2016



Notes: Exceptions to the reference years: FR 2012-2015, IE, CY, HU, AT, SI, SE, 2013-2015, BG, 2013-2017, CZ, EE, 2016-2015, RO, UK, 2014-2016, HR, 2016-2017, LU, B, 2015-2016, IS, 2012; MT (Mediterranean College for Arts, Science and Technology, 2017; Data unavailable for: CZ, EE, LT (2013), MT (2013), IS (2016), MC, AL, RS, TR, AM, FO, GE, MK, MD, TN, UA. Others: Data are in Franciscans (FR), Break in time series: DE (2016-2015), ES (2016), UK (2014), Extended data: RO (2016), 2014. The same person may be counted in several grades and fields of study. BE (French speaking community), SE, topics subjected to avoid double-counting. SE, Data rounded to nearest multiple of 5. UK, Data do not include persons of unknown sex. PL, Private colleges and other smaller institutions are not included. IE, Grade C data include some persons with MSc, only. LT, SE, The base reference population is that of 'Researchers' as defined in the Frascati Manual (OECD, 2015), with the exception of the following countries which used Academic staff based on the ICRS Manual (UNESCO/OECD/Eurostat, 2007): BG, DE, B, EL, IT, LV, LT, NL, SI, SK, SE, IS, A.



Main findings:

- ▶ There is a diminishing representation of women as a standard academic career progresses. In the EU-28 in 2016, women constituted 54 % of students and 58 % of graduates at the B.Sc. and M.Sc. levels (or their equivalent - ISCED 6 and 7). However, women made up 48 % of students and graduates at doctoral level (ISCED 8), 46 % of grade C academic staff, 40 % of grade B and 24 % of grade A academic staff.
- ▶ The share of women was even smaller in STEM. There, women made up 32 % of students and 36 % of graduates at the B.Sc. and M.Sc. levels, 37 % of students and 39 % of graduates at doctoral level and 35 % of grade C, 28 % of grade B and 15 % of grade A academic staff.
- ▶ At the national level, the proportion of women among grade A staff ranged from 13 % to 54.3 %, exceeding 50 % in only one country. It is however encouraging that since 2013 the proportion of grade A women had increased in almost all countries examined.
- ▶ While 7.4 % of women academic staff were at grade A, the corresponding proportion for men was 16.7 %.
- ▶ The highest proportions of women among grade A staff were observed in the humanities (32.1 %), the social (28.1 %) and the medical sciences (27.5 %). The smallest proportions were observed in engineering and technology (12.0 %) and in natural sciences (18.1 %).
- ▶ Women were better represented among grade A staff of a younger age. Among grade A academic staff, women made up 36.2 % of staff less than 35 years old, 27.5 % of staff aged 35 to 44, 25.8 % of staff aged 45 to 54 and just 22.6 % of staff aged 55 or older.
- ▶ The proportion of women among heads of institutions in the higher education sector in the EU increased from 20.1 % in 2014 to 21.7 % in 2017. The respective proportion among the heads of universities or assimilated institutions accredited to deliver PhDs increased slightly over the same period from 14.1 % to 14.3 %.
- ▶ Women made up 27 % of board members (including leaders) in the EU in 2017. This proportion ranged from 12 % to 54 % at the national level, while in nine of the countries examined it was 40 % or higher.

FIX THE KNOWLEDGE

Is scientific knowledge objective?

- Gender theory has done much to transform the humanities and social sciences, yet it has had little success in the natural sciences and engineering.
- **Efforts to increase women's participation will not succeed without mainstreaming the methods of sex and gender analysis into knowledge production.**
- Taken together these objectives support the **twin goals of diversity and excellence in science.**
- **Gendered Innovations** have developed practical methods of sex and gender analysis specifically for science and engineering in collaboration with scientists and engineers.

Sex analysis in research is still new?

nature

Vol 465 | Issue no. 7299 | 10 June 2010

Journals can insist that authors **document the sex of animals in published papers** — the Nature journals are at present considering whether to require the inclusion of such information. Funding agencies should demand that researchers justify sex inequities in grant proposals and, other factors being equal, should favour studies that are more equitable“. ...*Nature*, vol. 465, p. 665

THE LANCET

Volume 373 - Number 9204 - Pages 1820-1826 - November 18-December 2, 2010 www.thelancet.com

“The Lancet encourages researchers...to plan to analyse data by sex, not only when known to be scientifically appropriate, but also as a matter of routine.”

See Editorial page 1826



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Technical products for women – shrink it and pink it?



Source: www.femaleinteraction.com



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Serbia ...



Women Respond Better Than Men to Competitive Pressure

by [Alison Beard](#)

FROM THE NOVEMBER–DECEMBER 2017 ISSUE

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In analyzing more than 8,200 games from Grand Slam tennis matches, Alex Krumer of the University of St. Gallen and his colleagues found that the male players' performance showed a larger drop in high-stakes games (relative to low-stakes games) than the female players' performance did. Their conclusion: Women respond better than men to competitive pressure.

Women respond better than men to competitive pressure.

Krumer:

“We looked at the performance of servers in every first set played at the 2010 French, U.S., and Australian Opens and at Wimbledon, and **we found that the men’s performance deteriorated more than the women’s when the game was at a critical juncture.**

For example, in sets that went to 4–4, the number of men’s serves that were broken rose more than seven percentage points after the players had reached the tie. Among women, we saw barely any difference between pre- and post-tie performance.

We can confidently say that in the world of elite tennis, women are better under pressure than men are. They choke less. Whether that translates to other competitive settings remains to be seen.”

How do you explain it?

“We don’t know, but it could be biological. If you look at the literature on cortisol, the stress hormone, you’ll find that levels of it increase more rapidly in men than in women - in scenarios from golf rounds to public speaking - and that those spikes can hurt performance.

.. men are more affected by psychological momentum than women are. We looked at bronze medal judo fights from 2009 to 2013 and found that men who had prevailed in their previous contests were more likely to win in bronze medal rounds than men who had just lost, whereas female competitors’ prior-fight record had no effect on their probability of victory.

Testosterone, a proven performance enhancer, spikes after triumph and ebbs after defeat in men, but not in women. While winners who keep winning might sound like a good thing to you, outside the athletic world, there’s a risk it leads to overconfidence.

Physically speaking, men are still stronger than women, on average.

But if you’re talking about mental toughness, maybe in certain circumstances it’s women who have the edge.”

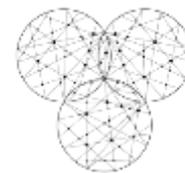


Gendered Innovations

How Gender Analysis Contributes to Research

Research and Innovation

EUR 25848



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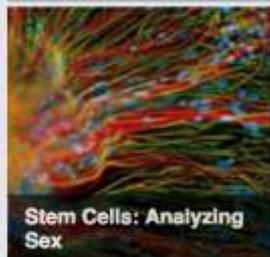


HEALTH & MEDICINE

Sex and Gender Methods for Research | [Gendered Innovations](#)

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FEATURED CASE STUDIES



Stem Cells: Analyzing Sex



Osteoporosis Research in Men: Breaking the Gender Paradigm



HIV Microbicides: Formulating Research Questions & Analyzing Academic Disciplines

Why Gendered Innovations?

"Gendered Innovations" employs methods of sex and gender analysis to create new knowledge.



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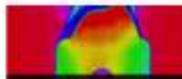
Health & Medicine Case Studies

Demonstrate Gender Methods In Basic And Applied Research

This page provides practical examples of how sex and gender analysis leads to gendered innovations.



Colorectal Cancer:
Analyzing How Sex and Gender Interact



De-Gendering the H1N1: Overemphasizing Sex Differences as a Problem



Dietary Assessment Method: Analyzing How Sex and Gender Interact



Heart Disease in Women: Formulating Research Questions



Nanotechnology-Based Screening for HPV: Rethinking Research Priorities



Nutrigenomics



Osteoporosis Research in Men: Rethinking Standards and Reference Models

Gender differences in coronary heart disease

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This article has been [cited by](#) other articles in PMC.

Abstract

Go to:

Cardiovascular disease develops 7 to 10 years later in women than in men and is still the major cause of death in women. The risk of heart disease in women is often underestimated due to the misperception that females are ‘protected’ against cardiovascular disease. The under-recognition of heart disease and differences in clinical presentation in women lead to less aggressive treatment strategies and a lower representation of women in clinical trials. Furthermore, self-awareness in women and identification of their cardiovascular risk factors needs more attention, which should result in a better prevention of cardiovascular events. In this review we summarise the major issues that are important in the diagnosis and treatment of coronary heart disease in women. (Neth Heart J 2010;18:598–603.)

Keywords: Coronary Heart Disease, Gender Differences, Menopause, Women, Risk Factors



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Osteoporosis Research in Men: Rethinking Standards and Reference Models

ABSTRACT

FULL CASE STUDY

IN A NUTSHELL

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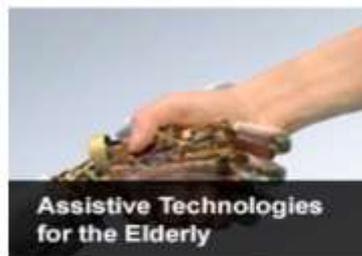


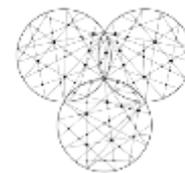
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Engineering & Technology Case Studies

Demonstrate Gender Methods In Design

This page provides practical examples of how sex and gender analysis leads to gendered innovations.





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Demonstrate Methods Of Sex And Gender Analysis

This page provides practical examples of how sex and gender analysis leads to gendered innovations.



Climate Change



Gender Mainstreaming
in Decision-Making



Environmental
Chemicals: Designing
Health & Biomedical
Research



Urban Design:
Analyzing Gender



Public Transportation:
Rethinking Concepts
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Water: Participatory
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Housing and Neighborhood Design: Analyzing Gender

ABSTRACT

FULL CASE STUDY

IN A NUTSHELL

The Challenge

Integrating gender analysis into architectural design and urban planning processes can ensure that buildings and cities serve well the needs of all inhabitants: women and men of different ages, with different family configurations, employment patterns, socioeconomic status and burdens of caring labor (Sánchez de Madariaga et al., 2013).

Method: Analyzing Gender

Analyzing gender in architectural and urban design can contribute to constructing housing and neighborhoods that better address people's everyday needs, by fully integrating caring issues—caring for children, the elderly, and disabled—into research design.

Gendered Innovations:

1. **Integrating gender expertise into housing and neighborhood design and evaluation** is well underway, especially in Europe, and will improve living conditions for its residents, particularly parents, children, and the elderly.
2. **Gender-aware housing and neighborhood design** will improve pedestrian mobility and use of space for women and men of different ages, care duties, and physical abilities.

[Go to Full Case Study](#)





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Gendered Innovation 2: Gender-Aware Housing and Neighborhood Design

Urban designers applying gender analysis have undertaken projects that coordinate design for housing, parks, and transportation to improve the quality of “everyday life.” Innovations in this field include:

A. Housing to Support Child- and Eldercare: Designers recognized that traditional urban design separated living spaces and commercial spaces into separate zones, resulting in large distances between homes, markets, schools, etc. These distances placed significant stress on people combining employment with care responsibilities (Sánchez de Madariaga, 2013). In addition, such design practices often make cars the most practical means of transportation, creating environmental challenges (Blumenberg, 2004)—see Case Study: [Climate Change](#). In response, urban designers have created housing and neighborhoods with on-site child- and elderly-care facilities, shops for basic everyday needs, and often primary-care medical facilities.

Vienna’s *Frauen-Werk-Stadt I (FWS-I)*, created by architect and professor Franziska Ullmann, includes 359 housing units with childcare facilities in order to minimize the distance parents travel to take their children to daycare. This supports working parents as well as the environment by minimizing travel.





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Public Transportation: Rethinking Concepts and Theories

ABSTRACT

FULL CASE STUDY

IN A NUTSHELL

The Challenge

Categories used in transportation surveys—and, hence, the way statistics are gathered and analyzed—may not properly account for caring work—that is unpaid labor performed by adults for children or other dependents, including labor related to the upkeep of a household. Public transport systems are typically designed around the needs of commuters (people traveling between their homes and places of paid employment). The mobility associated with caring work, including childcare and elder care, has typically not figured into transportation design.

Method: Rethinking Concepts and Theories

The innovative concept "mobility of care" provides a perspective for "recognizing and revaluing care work" (Sánchez de Madariaga, 2009). Incorporating "caring work" into user surveys helps to identify the significant number of trips that women and men make for this purpose. Understanding gender differences in public transportation is important for understanding [climate change](#) and planning efficient [housing and neighborhoods](#).

Gendered Innovations:

1. Adding the concept, "mobility of care", to data collection variables may render public transportation more responsive to users' needs.
2. Understanding gender differences in travel has led to the concept of "trip chaining" with ramifications for the design of public transport systems.
3. Gathering data disaggregated by sex and other [factors](#) intersecting with sex and gender (such as income, family status, etc.) improves transportation research and policy.



Sex and Gender Analysis

Enhances all phases of research

Sex and Gender Analysis

- Setting Research Priorities
- Making Funding Decisions
- Establishing Project Objectives
- Developing Methodologies
- Gathering & Analyzing Data
- Evaluating Results
- Developing Patents
- Transferring Ideas to Markets
- Drafting Policies



ances can improve almost everything. In safety engineering, ergonomic differences between men and women are important. Conventional seatbelts do not fit pregnant women properly, and motor vehicle crashes are the leading cause of fetal death related to maternal trauma. Analyses of sex differences have led to the development of pregnant crash test dummies that enhance safety in automobile testing and design.

In medicine, osteoporosis has been conceptualized primarily as a woman's disease, yet after a certain age men account for nearly a third of osteoporosis-related hip fractures. Tragically, when men break their hips, they tend to die. We don't know why. Analyzing the interaction between sex and gender in osteoporosis research has developed new diagnostics for men, and the search for better treatments is underway.

Let's take another example where gender analysis has a potential for innovation in machine learning, natural language processing and algorithms. Ever use Google Translate? What if you are a woman and the article is about you? The machine

defaults to "he," for example: Londa Schiebinger, "he" wrote, "he" thought, occasionally, "it" said. How can such a forward-thinking company as Google—that explicitly supports gender equality—make such a fundamental error?

Google Translate defaults to the masculine pronoun because "he said" is more commonly found on the web than "she said." This is where gender analysis kicks in. We know from Ngram (another Google product) that the ratio of "he said" to "she said" has fallen dramatically from a peak of 4:1 in the 1960s to 2:1 since 2000. This exactly parallels

Gendered Innovations have developed practical methods of sex and gender analysis specifically for science and engineering in collaboration with scientists and engineers (Schiebinger et al.).

Gender Equality Plans – An example for Physics Institutions



Grant Agreement No. 665637

**Gender Equality Network in the European Research Area
performing in Physics**

GENERA Toolbox
- developed by and for physicists -
2017



Fields of Action⁰ and sub-fields





Structural Integration of Gender Equality

Title: Advice by international gender experts¹⁰



Field of Action:

- Structural Integration of Gender Equality
- Gender-inclusive/Gender-sensitive Organisational Culture

Objectives:

- Addressing gender equality issues regularly in the organization
- Raising awareness on bias and stereotypes and their impact

Target group(s):

Management and Leadership

Description:

The Swiss National Science Fund has an international advisory board for gender equality. The members are internationally known gender experts and distinguished researchers. This committee meets twice a year at SNSF and makes sure that gender equality issues are addressed in the organisation on a regular basis. Committee members have given presentations on biases and stereotypes and their impact on the evaluation process to the SNSF Research Council members in 2015 and 2016.

More

information:

Swiss National Science Fund (SNSF) (Swiss)
Website: <http://www.snf.ch/en/Pages/default.aspx>

How to make use of different perspectives?

1. Link Gender to Excellence
2. Make women visible
3. Secure top level support
4. Increase the number of women in decision making bodies
5. Unconscious bias education and training

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