Istituto Nazionale di Fisica Nucleare

The gender gap in academia and research: analysis and perspectives

Webinar CATALISI project
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INFN - Roma

An international overview

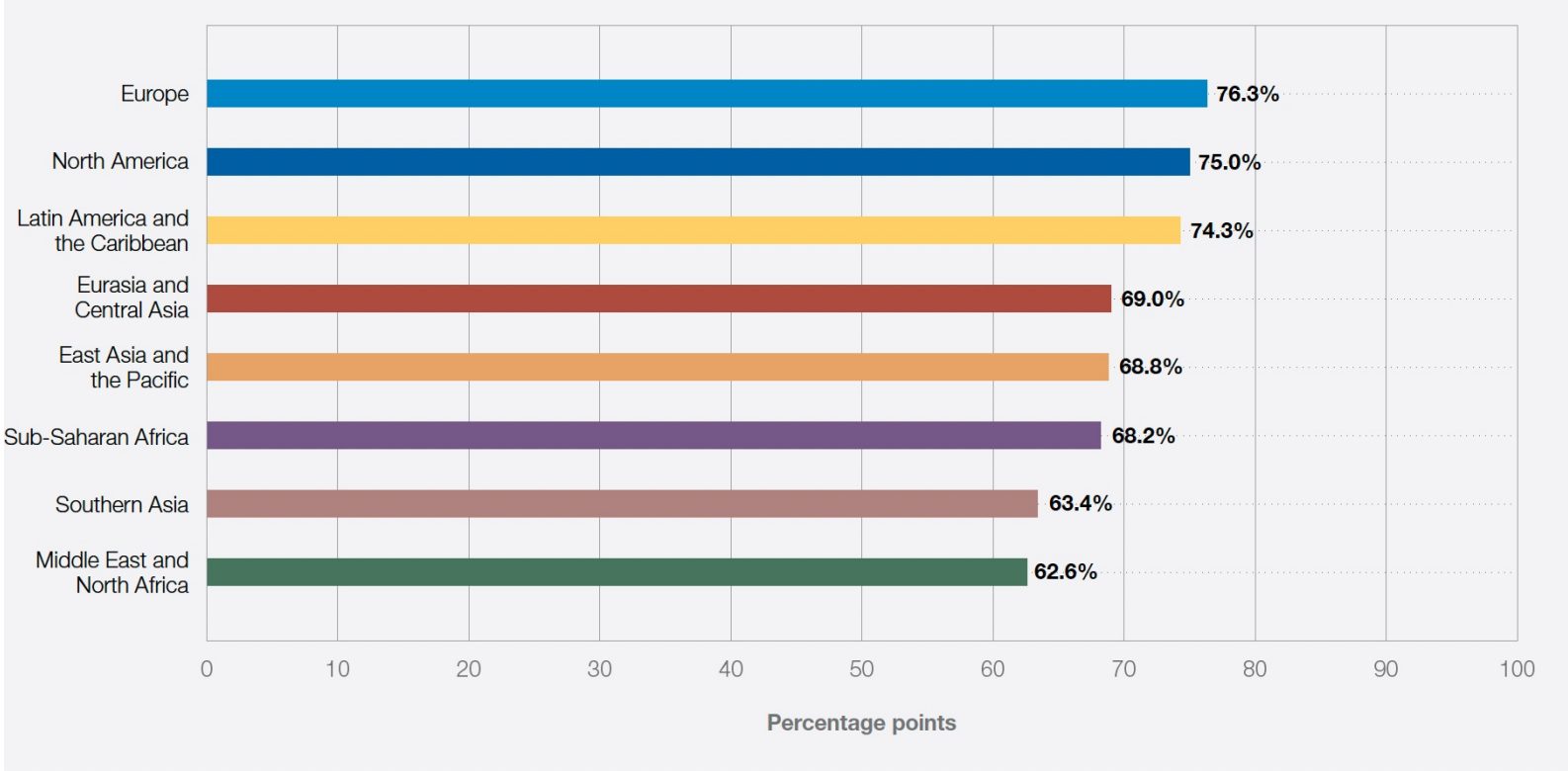
The report covers 146 countries

"*In 2023, the global gender gap has been closed by 68.4%. At the current rate of progress,* ***it will take 131 years to reach full parity***"

Italy ranks 79th out of 146 countries!

Regional performance

Gender gap close to date



The *Global Gender Gap Report* categorizes countries into eight regions

Europe (76.3%) surpasses the parity level in North America (75%) this year to rank first among regions.

Sub- indexes

The Global Gender Gap Index Framework

Regional performance

by sub-indexes

	Overall Index	Subindexes: Economic Participation and Opportunity	Subindexes: Educational Attainment	Subindexes: Health and Survival	Subindexes: Political Empowerment
Eurasia and Central Asia	69.0%	68.8%	98.9%	97.4%	10.9%
East Asia and the Pacific	68.8%	71.0%	95.5%	94.9%	14.0%
Europe	76.3%	69.7%	99.6%	97.0%	39.1%
Latin America and the Caribbean	74.3%	65.2%	99.2%	97.6%	35.0%
Middle East and North Africa	62.6%	44.0%	95.9%	96.4%	14.0%
North America	75.0%	77.6%	99.5%	96.9%	26.1%
Southern Asia	63.4%	37.2%	96.0%	95.3%	25.1%
Sub-Saharan Africa	68.2%	67.2%	86.0%	97.2%	22.6%
Global average	68.4%	60.1%	95.2%	96.0%	22.1%

Parity

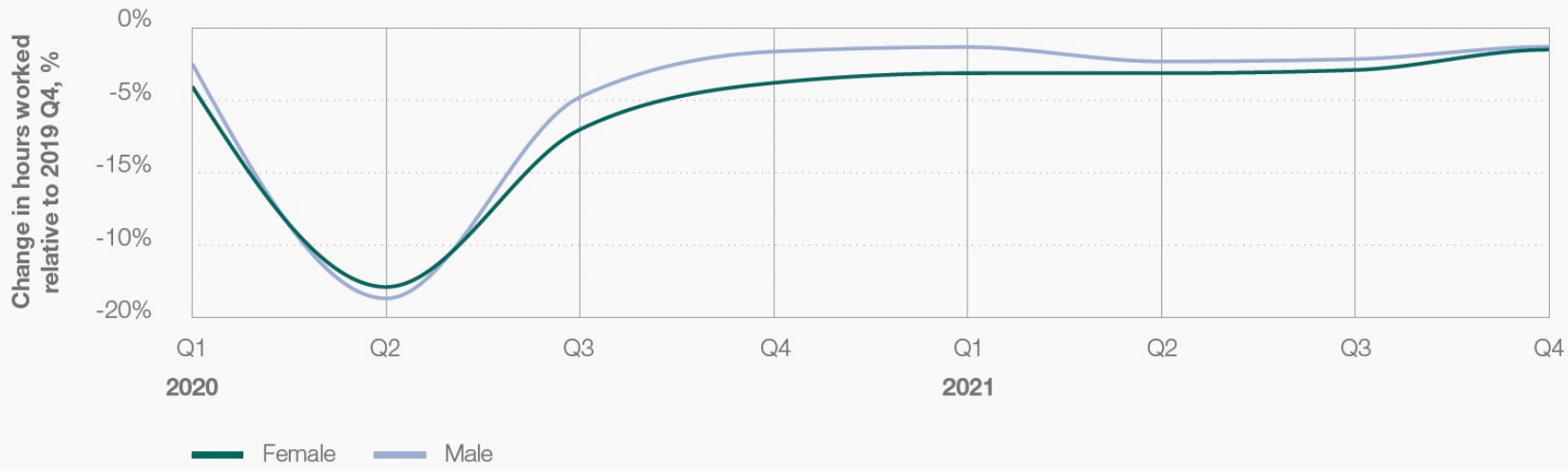
0% 50% 100%

Gender gap in post-pandemic recovery Covid-19

Employment losses due to the COVID-19 pandemic were significantly more severe for women than for men

FIGURE 2.1 **Working hours lost globally, 2020-2022, by gender**

Change relative to Q4 2019



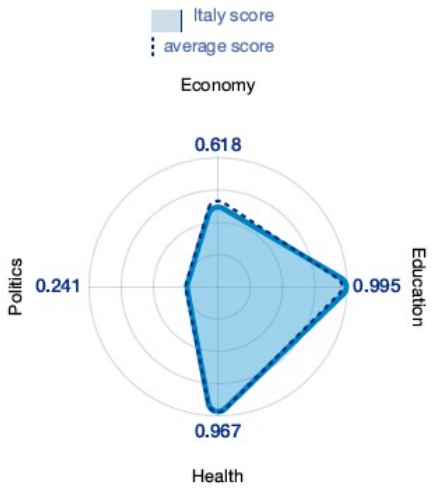
Decisive factors:

- **the burden of care fell disproportionately on women (closed schools)**
- **closure of jobs in the female-dominated service sector (retail, accomodation and catering...)**

Gender gap Italy

Economy Profile	Score (imparity = 0, parity = 1)	Rank (out of 146 countries)	Index Edition
Italy	**0.705**	**79th**	**2023**

Global Gender Gap Index 2023 Edition



Overview

Index and Subindex	2023 Score	2023 Rank	2022 Score	2022 Rank
Global Gender Gap Index	0.705	79th	0.720	63rd
Economic Participation and Opportunity	0.618	104th	0.603	110th
Educational Attainment	0.995	60th	0.995	59th
Health and Survival	0.967	95th	0.965	108th
Political Empowerment	0.241	64th	0.319	40th

Global Gender Gap Index Indicators 2023

Indicator	Rank	Score*	Compare with Global average (0–1)	Difference F-M	Female vs Male (Min – Max)	Min Max
Economic Participation and Opportunity	104th	0.618		-	-	-
Labour-force participation rate %	93rd	0.696		-17.53	40.11 – 57.64	0-100
Wage equality for similar work 1-7 (best)	80th	0.616		-	-	-
Estimated earned income int'l $ 1,000	107th	0.550		-24.49	29.99 – 54.48	0-150
Legislators, senior officials and managers %	100th	0.401		-42.78	28.61 – 71.39	0-100
Professional and technical workers %	86th	0.885		-6.08	46.96 – 53.04	0-100

Gender gap Italy

Educational Attainment	60th	0.995	-	-	-	
Literacy rate %	65th	0.997	-	-	-	
Enrolment in primary education %	77th	0.997	-0.28	95.65	95.94	0-100
Enrolment in secondary education %	95th	0.985	-1.50	100.14	101.64	0-200
Enrolment in tertiary education %	1st	1.000	21.43	59.16	80.59	0-200
Health and Survival	95th	0.967	-	-	-	
Sex ratio at birth** %	1st	0.944	-	-	-	
Healthy life expectancy** years	105th	1.020	-	-	-	
Political Empowerment	64th	0.241	-	-	-	
Women in parliament %	48th	0.477	-35.40	32.30	67.70	0-100
Women in ministerial positions %	53rd	0.364	-46.67	26.67	73.33	0-100
Years with female/male head of state (last 50)	72nd	0.007	-49.29	0.36	49.64	0-50

Gender gap Italy

Economy Profile
Italy

Score **0.705** Rank **79th** Page 2 of 2

Complementary Targets and Contextual Indicators 2023

General indicators

Indicator	Unit	Value
GDP	US$ billions	2,107.7
GDP per capita	constant '17, intl. $ 1000	41.93
Population sex ratio	female/male	1.05
Population growth rate	%	-0.56

Indicator	Million people	Female	Male	Value
Total population		30.25	28.79	59.04

Work participation and leadership

Indicator	Unit	Value
Gender pay gap	% (OECD countries only)	7.64
Share of women's membership in boards	% (OECD countries only)	38.80
Firms with female majority ownership	% firms	11.50
Firms with female top managers	% firms	15.30
Share of workers in informal sector	% workers	11.20

Indicator	1-7 (best)	Value
Advancement of women to leadership roles		4.38

Indicator	Unit	Female	Male	Value
Unemployed adults	% of labour force (15-64)	9.50	7.30	8.20
Workers employed part-time	% of employed people	50.67	24.67	35.64
Proportion of time spent on unpaid domestic and care work	%	20.40	8.40	n. a.

Indicator	Million people	Female	Male	Value
Labour-force		10.15	13.47	23.63

Family and care

Indicator	Unit	Value
Public spending on family benefits	% GPD	1.42
Unmet family planning	% women 15-49	n. a.
Early marriage	%	0.20
Mean age of women at birth of first child	years	31.40

Indicator	0-1 (Equal rights)	Value
Right to divorce		Equal rights

Indicator	Days	Female	Male	Value
Length of parental leave		150.00	14.00	0

Education and skills

Graduates	Attainment %	Female	Male	Parity
STEM Graduates		n. a.	n. a.	n. a.
Agri., Forestry, Fisheries & Veterinary		50.36	49.64	1.01
Arts & Humanities		71.17	28.83	2.47
Business, Admin. & Law		n. a.	n. a.	n. a.
Education		93.34	6.66	14.01
Engineering, Manuf. & Construction		n. a.	n. a.	n. a.
Health & Welfare		n. a.	n. a.	n. a.
Information & Comm. Technologies		n. a.	n. a.	n. a.
Natural Sci., Mathematics & Statistics		57.95	42.05	1.38

Complementary

targets

Gender pay gap % (OECD countries only) 7.64
Share of women's membership in boards % (OECD countries only) 38.80
Firms with female majority ownership % firms 11.50
Firms with female top managers % firms 15.30
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Proportion of time spent on unpaid domestic and care work % 20.40 8.40 n. a.

Indicator Million people Female Male Value
Labour-force 10.15 13.47 23.63

Access to finance

Indicator	0-1 (Equal rights)	Value
Access to financial services		Near-equal rights
Inheritance rights for widows and daughters		Equal rights
Access to land assets		Equal rights
Access to non-land assets		Equal rights

Civil and political freedom

Indicator	Unit	Value
Year women received right to vote	year	1945
Number of female heads of state to date	number	0
Seats held in upper house	% total seats	34.50

Education and skills
Graduates Attainment % Female Male Parity
STEM Graduates n. a. n. a. n. a.
Agri., Forestry, Fisheries & Veterinary 50.36 49.64 1.01
Arts & Humanities 71.17 28.83 2.47
Business, Admin. & Law n. a. n. a. n. a.
Education 93.34 6.66 14.01
Engineering, Manuf. & Construction n. a. n. a. n. a.
Health & Welfare n. a. n. a. n. a.
Information & Comm. Technologies n. a. n. a. n. a.
Natural Sci., Mathematics & Statistics 57.95 42.05 1.38

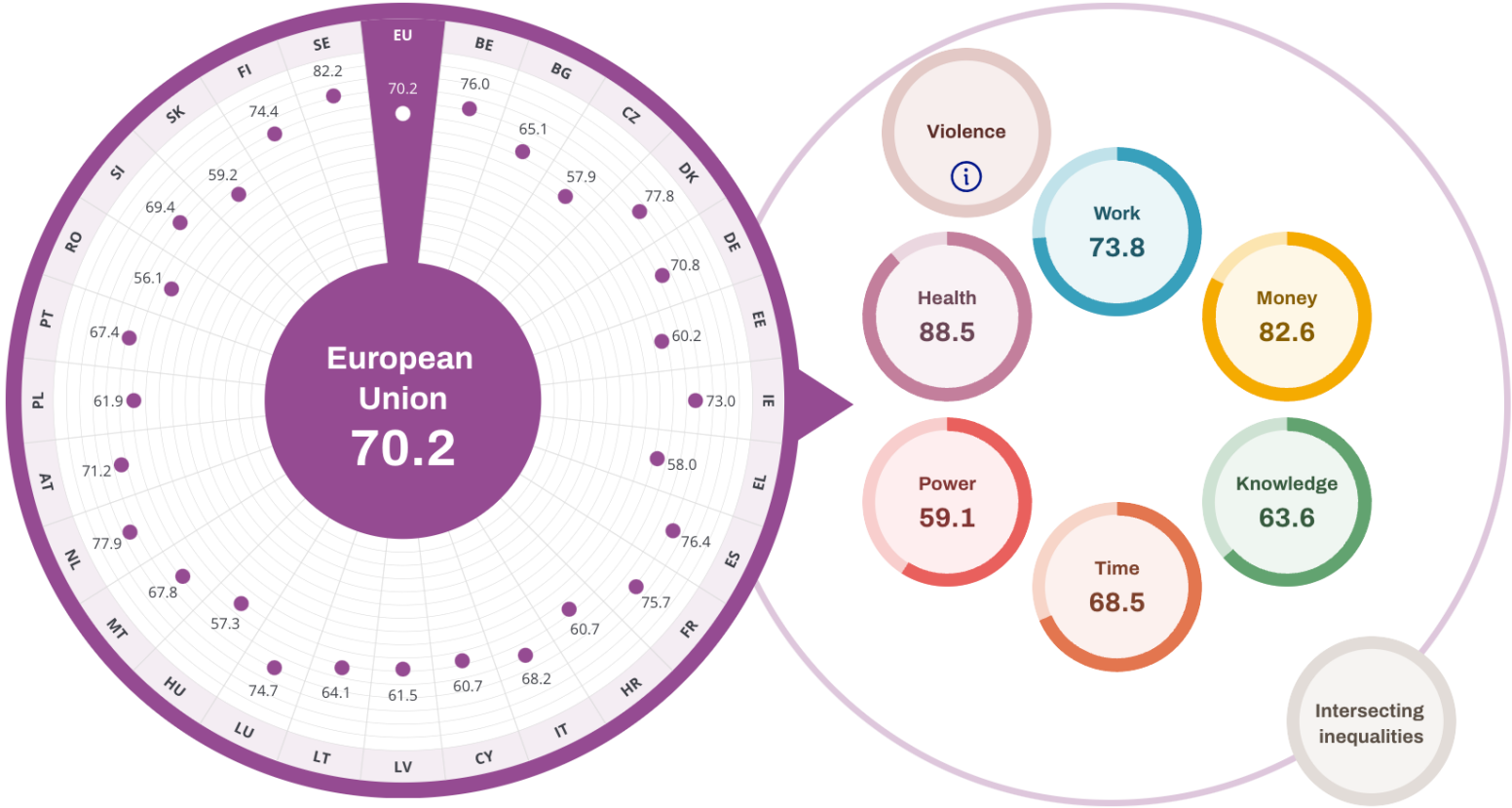
Graduates	%	Female	Male	Value
Social Sci., Journalism & Information		71.43	28.57	2.50
Vocational training		15.67	25.59	0.61
PhD graduates		0.38	0.43	0.40

Graduates	%	Female	Male	Value
Graduates from tertiary education		50.96	34.38	42.35

Health

Il gender equality index EU

Since 2010, the EU's score has increased by 7.1 points



With 70.2 points out of 100, the European Union still has much to do to reach gender equality!

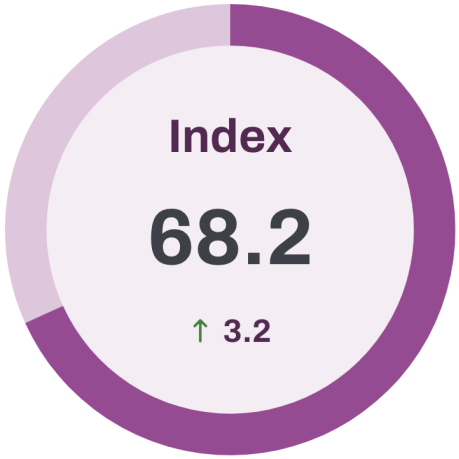
Source: The European Institute for Gender Equality (EIGE)

Istituto Nazionale di Fisica Nucleare

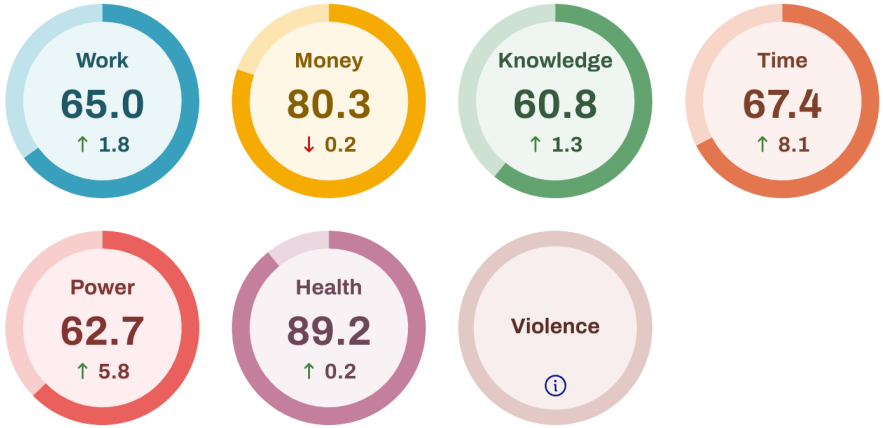
GEI Italy

Italy ranks 14th in the EU with a score of 68.2
(2 points below the European average)

The data for 2023 Index is mostly from 2021 and 2022.



Progress in gender equality



[1] The Gender Equality Index 2023 has been affected by certain changes in EU-wide surveys and through the use of the most up-to-date sources. For the first time, it benefits from EIGE's survey data on gender gaps in care, individual and social activities carried out across the EU in 2022, and from new data from the 2021 EWCTS survey (Eurofound). Regulation (EU) 2019/1700, which came into force from 1 January 2021, also introduced some changes into the EU-LFS. These methodological changes will affect nine indicators included in the domains of work, knowledge and time, together with their respective scores, as well as the overall Index and the analysis of intersecting inequalities using the respective indicators.

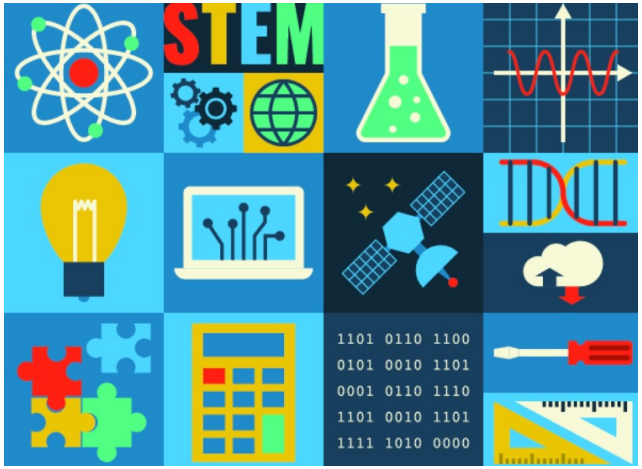
An analysis has been carried out of the possible impact that these changes may have had on the Index and on the interpretation of the corresponding time series. Despite the break in time series that the changes entail, the time series analysis can be considered adequate (see Index 2023 report).

		Change since 2010	Change since 2020
SE	82.2	2.1	-1.7
NL	77.9	3.9	0.6
DK	77.8	2.6	0.0
ES	76.4	10.0	1.8
BE	76.0	6.7	1.8
FR	75.7	8.2	0.6
LU	74.7	13.5	1.2
FI	74.4	1.3	-1.0
IE	73.0	7.6	-1.3
	71.2	12.5	2.4
	70.8	8.2	2.1
	70.2	7.1	1.6
	69.4	6.7	1.9
	68.2	14.9	3.2
	67.8	13.4	2.2
	67.4	13.7	4.6
	65.1	10.1	4.4
	64.1	9.2	3.5
	61.9	6.4	4.2
	61.5	6.3	0.1
	60.7	8.4	0.0
CY	60.7	11.7	3.4
EE	60.2	6.8	-0.8
SK	59.2	6.2	3.2
EL	58.0	9.4	4.6
CZ	57.9	2.3	0.7
HU	57.3	4.9	3.1
RO	56.1	5.3	2.4

Gender gap in R&I

Since its first publication in 2003, 'She Figures' provides comparable, pan-European data on gender equality in Research and Innovation

Segregation persists especially in research careers!



Gender gap in R&I

- At EU* level, women accounted on average for more than 40% of academic staff in 2018.
- Moving up the ladder, the proportion of women in top academic positions was only a quarter (26.2%) of grade A positions.
- Women represent less than 25% of the heads higher education sectors.
- In 2019, just over 3 of 10 council components (31.1 %) and less than a quarter of the councils' heads (24.5%) were women.

*European Commission, Directorate-General for Research and Innovation, She figures 2021: tracking progress on the path towards gender equality in research and innovation, Publications Office, 2021, https://data.europa.eu/doi/10.2777/602295

Gender gap in STEM

- European research still shows marked under-representation of women, 32.8% of the total researchers, particularly in STEM* disciplines and leadership positions.

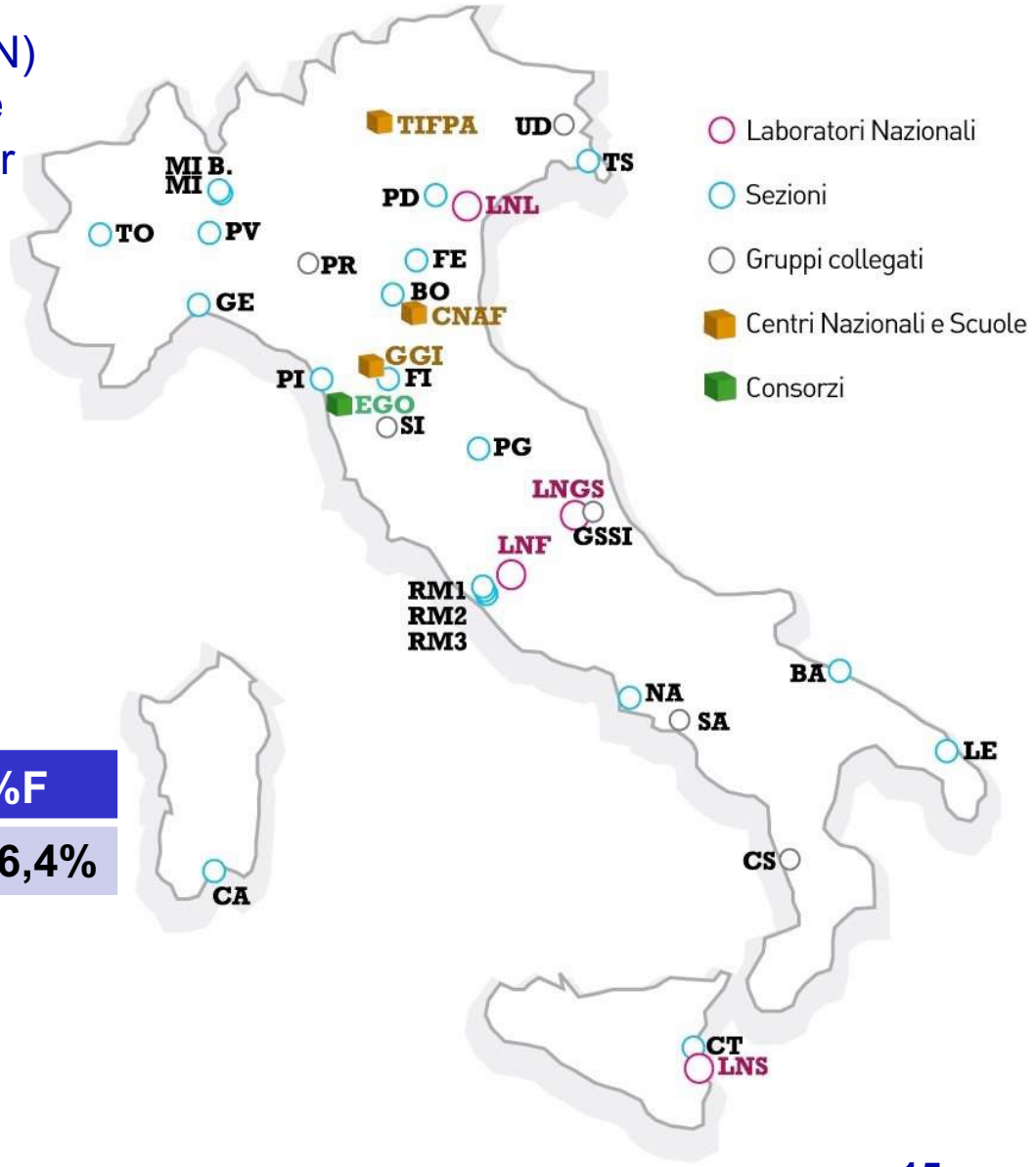
- The annual increase in woman researchers is less than a half of the annual number of women PhD students:
  - **less than a half of women completing a PhD will become professional researchers!**

- Gender differences also exist in access to EU funding for research:
  - men had 3.9% more chances in accessing research funding than women.

*Science, Technology, Engineering and Mathematics

INFN

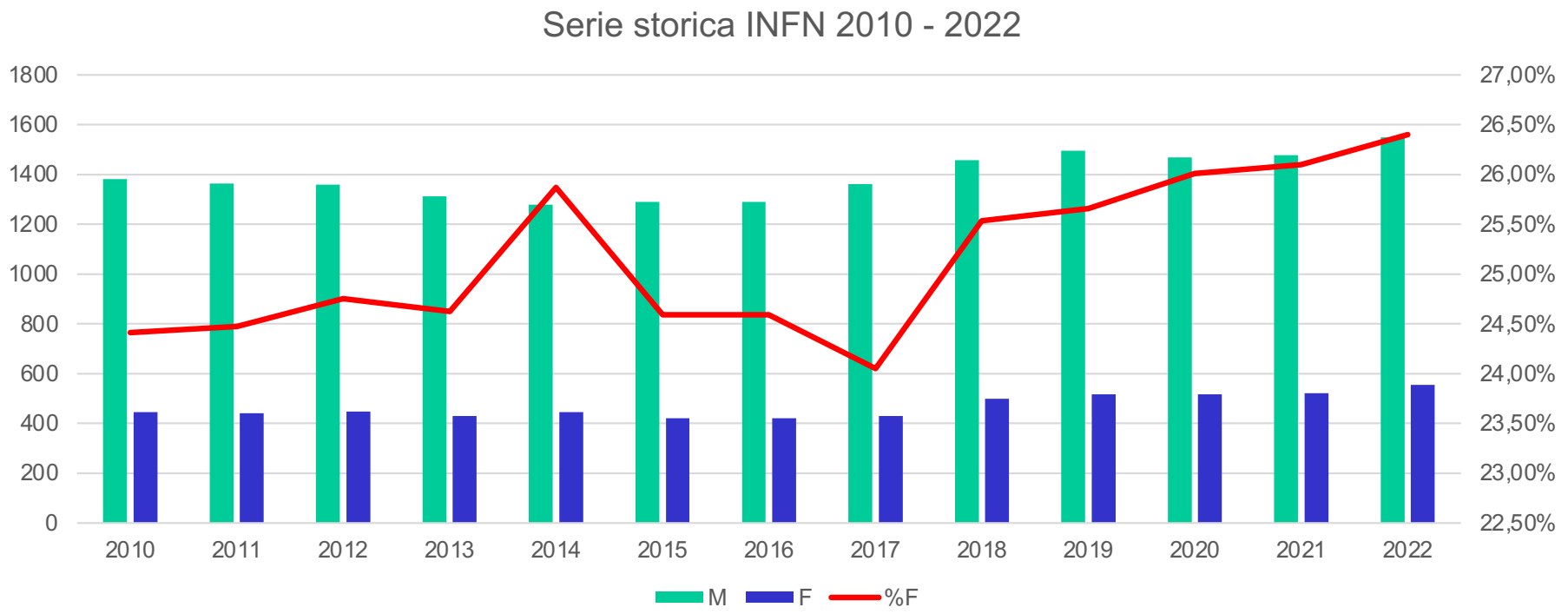
The National Institute of Nuclear Physics (INFN) is the public research institute dedicated to the study of the fundamental constituents of matter and their interactions.
Its research activity, both theoretical and experimental, extends to the fields of physics subnuclear, nuclear and astro-particle physics.
The institution also gives great attention to all applications arising from this research



Personell*	F	M	Total	%F
TI	556	1550	2106	26,4%

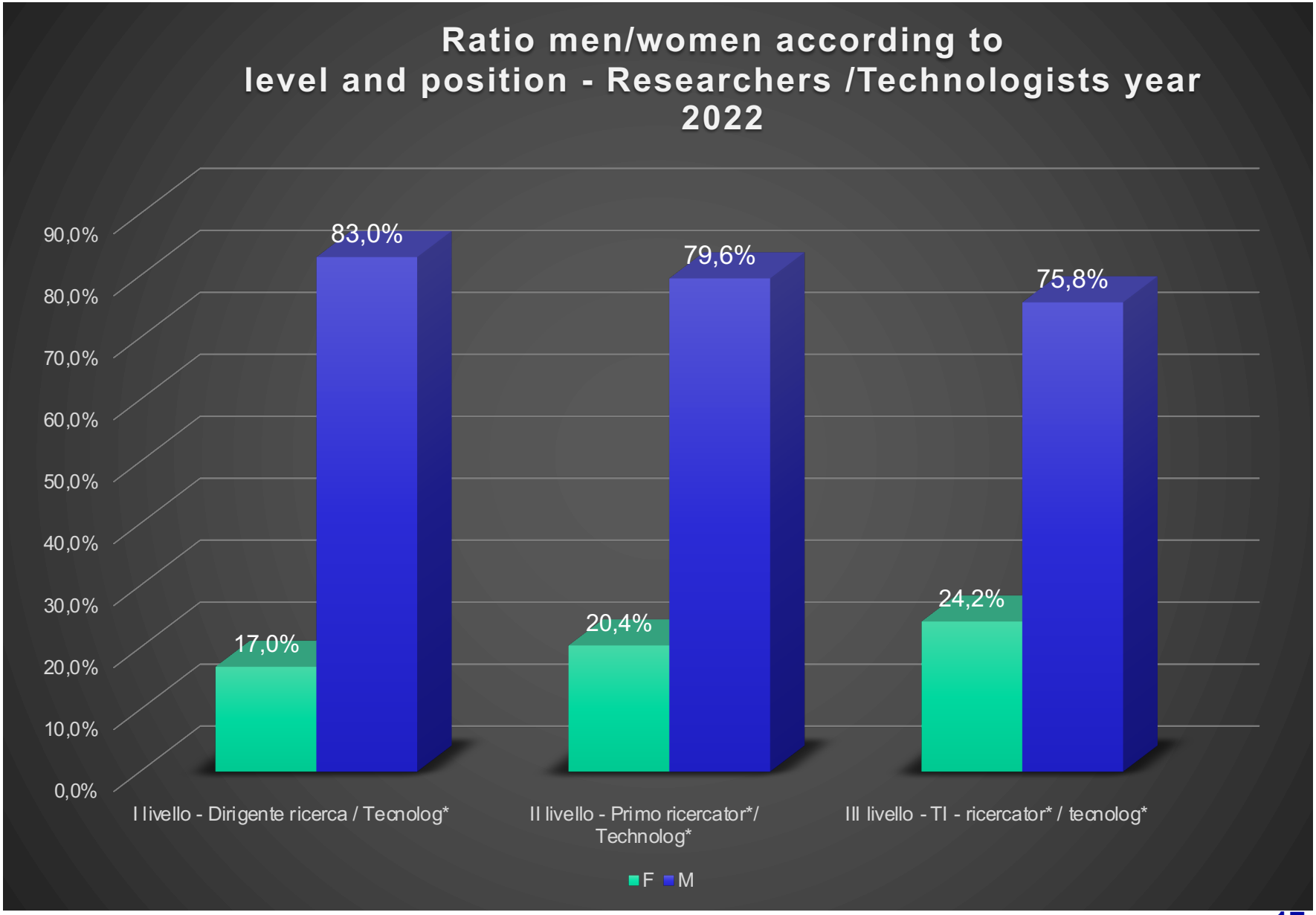
*in service at 31.12.2022

INFN Statistics



The percentage of female staff in the INFN increased from 24.4 per cent in 2010 to 26.4 per cent in 2022.

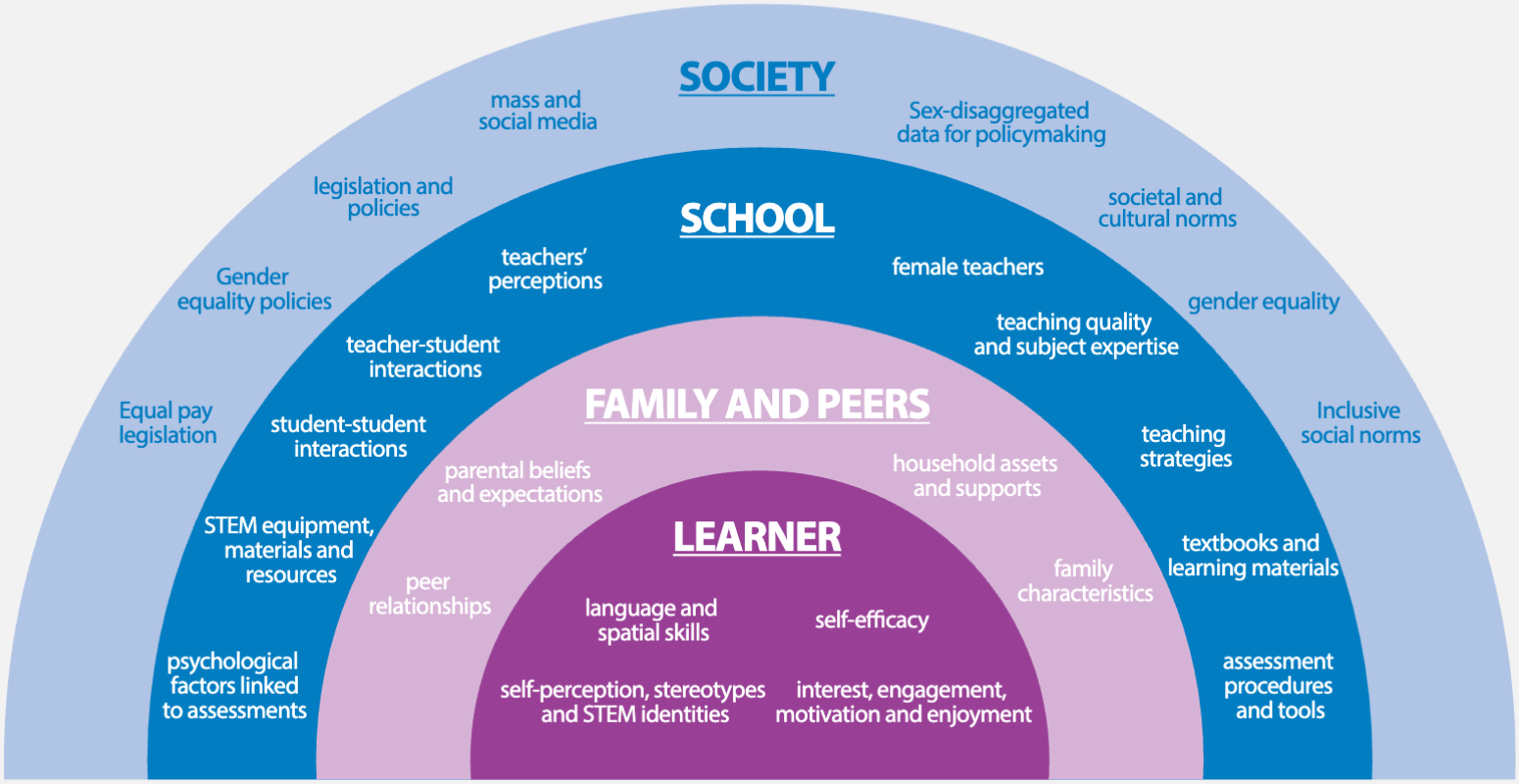
INFN Statistics



Unesco report

The **factors** influencing girls' and women's participation, achievement and progression in STEM studies and careers are **multiple** and overlapping and interact in complex ways at **individual, family, institutional and societal levels**.* The same is mirrored for boys.

Figure 36: Ecological framework of factors influencing girls' and women's participation, achievement and progression in STEM studies



*Unesco Report - Cracking the code - girls' and women's education in science, technology, engineering and mathematics (STEM), Parigi, p. 40. 2017

No data no policies!

- It is crucial to start with the statistical evidence to raise awareness of the gender gap.
- Beware of believing that the solution is only to increase the numerical presence of women (fixing the woman).
- A transformation of gender processes and practices in institutions is needed.

> *«Stereotypes are like water for fish: precisely because they surround us and are everywhere, we no longer see them»*
>
> Foster Wallace

Persisting gender inequality

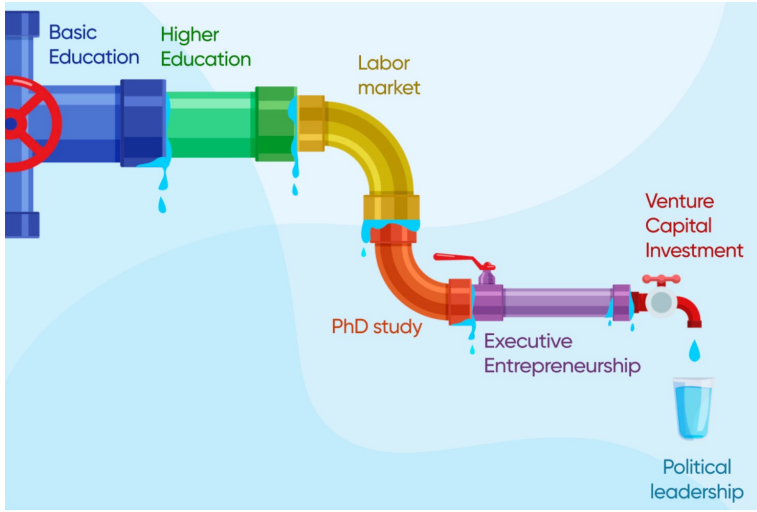
The starting point is that despite some progresses gender imbalance is still there!

We need to rethink evaluation mechanisms within institutions, including measures to counter segregation, both horizontal and vertical.

Persisting gender inequality

Main obstacles well known in literature:

Leaky pipeline:
more likely for women to leave academic & research carrer



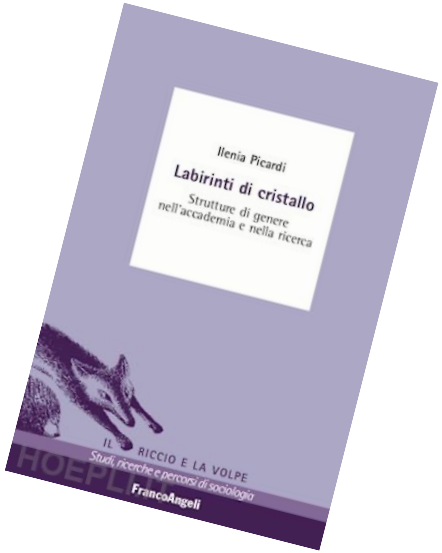
Glass ceiling effect:
«invisible» barriers that prevent women from reaching top positions

Glass door and labyrinths

better metaphors

Labyrinths

Ilenia Picardi shifts the focus of analysis and problematization of gender inequality from the simple "glass ceiling" to the crystal door and labyrinths: identifying the multiple mechanisms that regulate and hinder women's entry, retention and exit from the scientific and academic path.



Glass door Index

to measure the gender asymmetry in access to tenured positions in academia

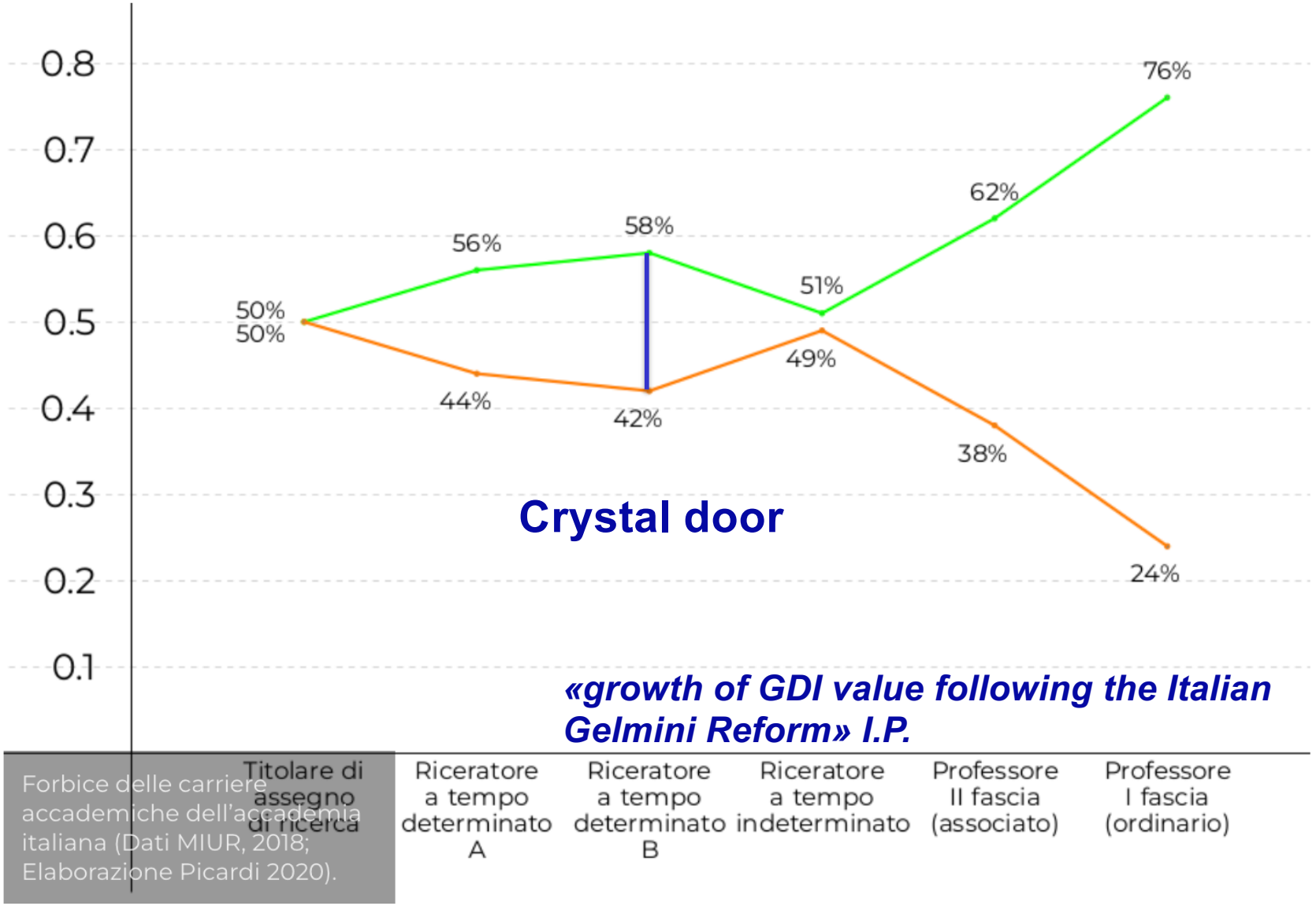
$$Glass\ Door\ Index = \frac{\mathrm{PW}_{\leq D,Y}}{\mathrm{PW}_{DY}}$$

"New segregation processes at work today in academic recruitment and research".” I. Picardi

Precariousness threatens academic freedom!

References:*Picardi I.: Labirinti di cristallo Strutture di genere nell'accademia e nella ricerca - 2020

Accademic carrers in Italy



Crystal door

«growth of GDI value following the Italian Gelmini Reform» I.P.

Forbice delle carriere accademiche dell'accademia italiana (Dati MIUR, 2018; Elaborazione Picardi 2020).

Reference: Picardi I. « La porta di cristallo: un nuovo indice per rilevare l'impatto di genere della riforma Gelmini sull'accesso alla professione accademica », Quaderni di Sociologia, 80 | 2019, 87-111.

The bias in R&I

- There is an inclination to deny the relevance of gender in social, cultural, economic and political contexts (gender blindness), believing that science is neutral and so is merit.

- Underestimation of the effects for female researchers of working in male-dominated environments

- Is the concept of a career really neutral? Male role models, solitary heroes, sacrificing everything...
- CV evaluation often ignores career path (give space for stories, taking into account parental leaves break…)

Cognitive and systemic biases in research

Effects:

Individual level

- negative impact in evaluations and career path
- threat to meritocracy

Group level

- micro-aggressions
- «non events»

Istitutional level

- gender inequality is systemic and intertwined with organisational cultures and practices
- organisations can perpetuate gender inequality through direct or indirect discrimination in recruitment, promotion and remuneration processes

Hierarchies, Jobs, Bodies: A Theory of Gendered Organizations Author(s): Joan Acker Source: Gender and Society, Vol. 4, No. 2 (Jun., 1990), pp. 139-158

Cognitive biases

- **Affinity bias**

  Tendency to favour people similar to ourselves

- **Attribution bias**

  Explaining behaviour

  /success/failure in different ways based on belonging to certain groups

- **Confirmation bias**

  Tendency to see or hear what confirms our pre-existing expectations

- **Conformity bias**

  Tendency to 'follow' the majority to conform to their opinions or behaviour

- **False consensus bias**

  Overestimation of the sharing of our beliefs/opinions believing them to be more widespread than they really are.

  «bubble effect/social world»

- Valian, V. (1998). Why so slow? The advancement of women. The MIT Press
- Aly, M., Colunga, E., Crockett, M. J., Goldrick, M., Gomez, P., Kung, F. Y. H., McKee, P. C., Pérez, M., Stilwell, S. M., & Diekman, A. B. (2023). Changing the culture of peer review for a more inclusive and equitable psychological science. Journal of Experimental Psychology: General

Systemic biases

The main obstacles to achieve gender equality depend on organisational structures and evaluation

Gendered organization: science and merit are not neutral!

«*Gender blindness*»: the idea that organisational structures and work relations especially in the field of science and research are gender-neutral only perpetuates an androcentric approach and contributes to the maintenance of gender segregation in organisations

A problem with evaluation and merit:

- Many studies demonstrate gender bias in evaluations of career advancement paths, resulting in disadvantages for women and privileges for men that produce significant inequalities in building excellence

- Women very often play service roles that are not evaluated in selection processes

- Gendered construction of quality/excellence (Van den Brink & Benschop 2012; Herschberg 2019; Nielsen 2016; Śliwa & Johansson 2014)
- Guarino, C. M., & Borden, V. M. H. (2017). Faculty service loads and gender: Are women taking care of the academic family? Research in Higher Education, 58(6), 672–694
- Van den Brink, M., Benschop, Y., & Jansen, W. (2010). Transparency in Academic Recruitment: A Problematic Tool for Gender Equality? Organization Studies, 31(11), 1459-1483
- Castilla, E. J., & Benard, S. (2010). The paradox of meritocracy in organizations. Administrative science quarterly, 55(4), 543-676.

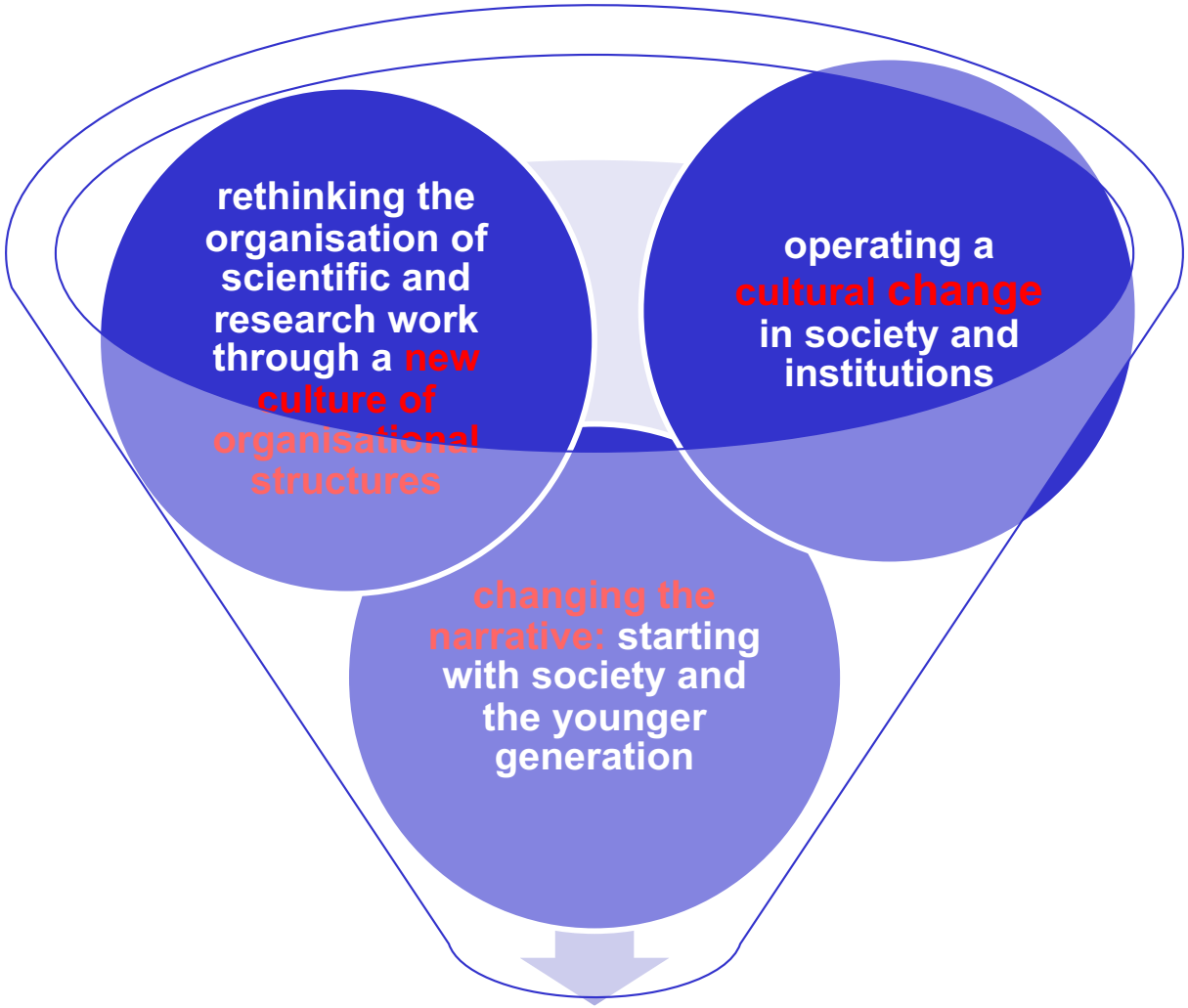
What we figured out

- **Society doesn't evolve spontaneously towards increasing forms of equality**
- **There are cultural and social stereotypes that perpetuate bias and unconscious discrimination**
- **Prejudices and stereotypes, which are related to our ways of thinking and our reference cultures are consolidated since childhood**
- **Gender creates role expectations not only in our society but also in any organisation structure: this «*traditionally assigned*» role creates discrimination and disparity of treatment**

Implicit social cognition: Attitudes, self-esteem, and stereotypes. (Greenwald et al.)

Perspectives

How to promote gender equity?



Both structural and cultural actions

Structural actions

- **Multiplying gender observatories**
- **Promoting:**
  - **Gender Equality Plans(GEPs):**

    now mandatory in order to receive funding from the EC
  - **Worklife balance policies:**

    i.e. extra funds support for women back from maternity leave, care service to support parenthood, parental leave for fathers…

Structural actions

- **New career and grant evaluation indicators:**
  - defining new "gender & diversity indexes"
  - guidelines and "mandatory" training on gender inequality/bias for applicants, evaluators and staff
- **Evaluation of implementation policies:**
  - monitoring of both processes and actions
  - promotion of gender reporting and statistics

Sharing the measures with the decision makers!

Cultural actions

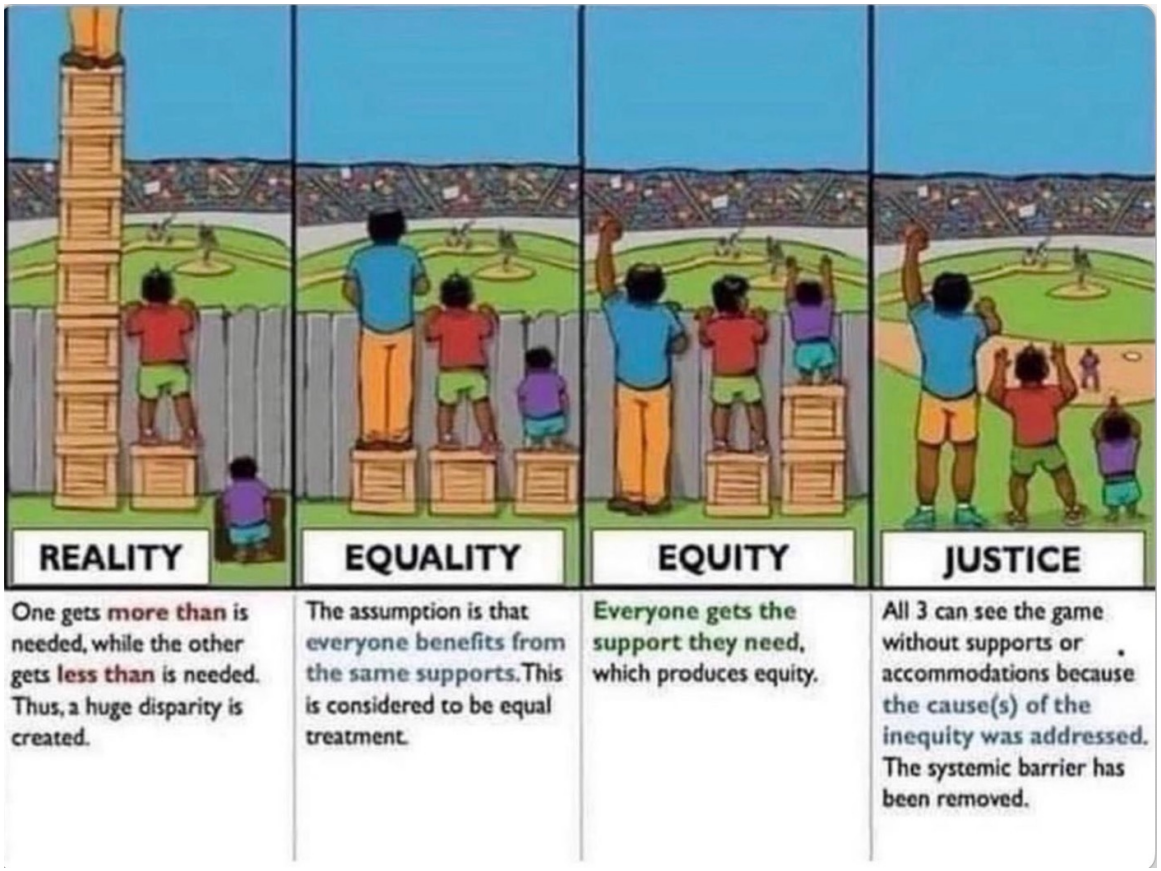
- **Promoting:**
  - **New leadership models**
    - more participative and dialogic, capable of exercising leadership by 'attraction' rather than through the exercise of power, force and arrogance.
  - **New role models**
    - rethinking the concept of care
    - excellence no longer synonymous with extreme competitiveness, or incompatibility with personal life (**plurality of models**)
    - new ways of working in teams, in labs...

- **Sharing best practices:**
  - strengthening networks of women
  - gendered innovation award/prize
  - the Gender mentoring programme INFN*: an example of transformative action

* https://mentoring.infn.it/

Our goal

Individual, cultural and institutional transformation!



Thanks!

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Glass door index

Ilenia Picardi, Università di Napoli Federico II

Glass door

Nuovi processi di segregazione che agiscono oggi nella fase di reclutamento accademico e nella ricerca

$$\textit{Glass Door Index} = \frac{\mathrm{PW}_{\leq D,Y}}{\mathrm{PW}_{DY}} = \left(\frac{\frac{F_{\leq D,Y}}{F_{\leq D,Y} + M_{\leq D,Y}}}{\frac{F_{DY}}{F_{DY} + M_{DY}}} \right)$$

$F_{DY}(M_{DY})$ = numero delle donne (uomini) in fase di reclutamento accademico

GDI = 1 → Assenza di pratiche di segregazione genere nel reclutamento accademico

GDI < 1 → Sovra-rappresentazione delle donne nelle posizioni di accesso accademico

GDI > 1 → Sotto-rappresentazione delle donne nelle posizioni di accesso accademico

GDI	
2010	**2018**
1.04	1.16

Picardi I. « La porta di cristallo: un nuovo indice per rilevare l'impatto di genere della riforma Gelmini sull'accesso alla professione accademica », *Quaderni di Sociologia*, 80 | 2019, 87-111.

	GDI	AR
01 - Scienze matematiche e informatiche	0,97	0,26
02 - Scienze fisiche	1,32	0,30
03 - Scienze chimiche	1,06	0,55
04 - Scienze della terra	1,38	0,40
05 - Scienze biologiche	1,20	0,67
06 - Scienze mediche	1,59	0,73
07 - Scienze agrarie e veterinarie	1,16	0,56
08 - Ingegneria civile e Architettura	1,00	0,46
09 - Ingegneria industriale e dell'informazione	1,22	0,29
10 - Scienze dell'antichità, filologico-letterarie e storico-artistiche	1,09	0,61
11 - Scienze storiche, filosofiche, pedagogiche e psicologiche	1,16	0,59
12 - Scienze giuridiche	1,01	0,50
13 - Scienze economiche e statistiche	1,18	0,52
14 - Scienze politiche e sociali	1,18	0,54