

Software Engineering and gender a tutorial

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February 2025

FORTH



Norwegian University of
Science and Technology

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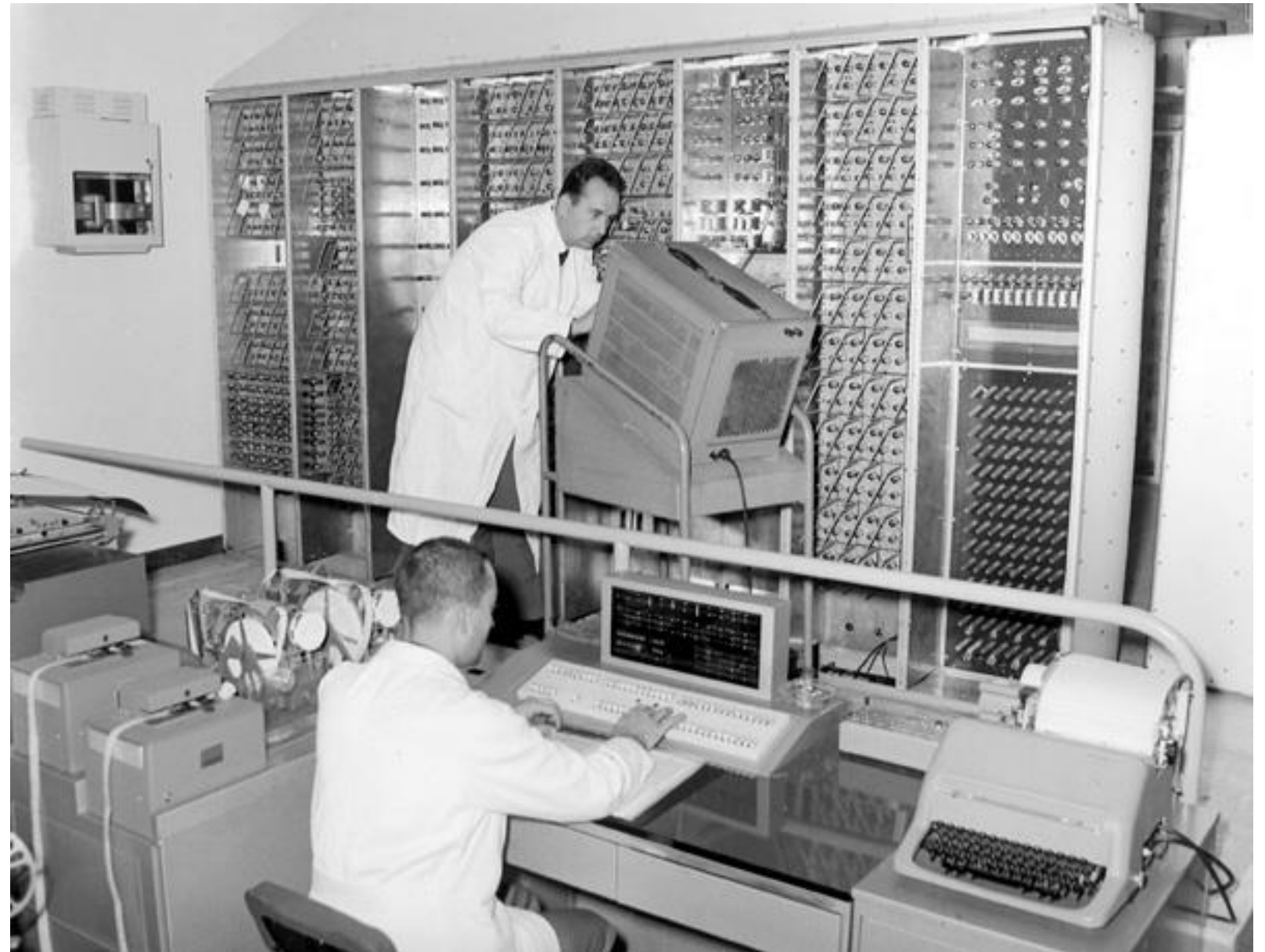


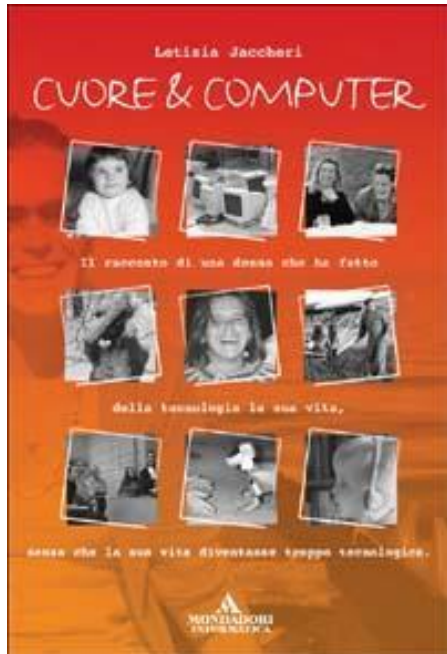
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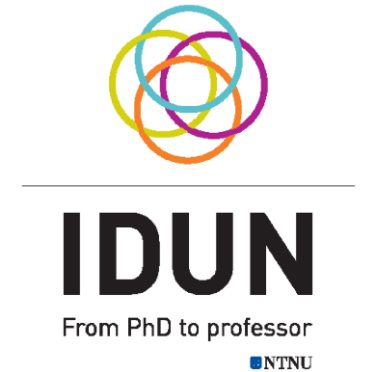
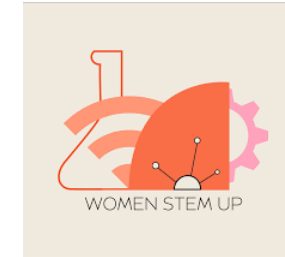


letiziajaccheri.org

Understand the relationship between art and software

Norwegian and European best Practices

- [ADA](#) – 1997 - ongoing
- [Kodeløypa](#) – 14 - ongoing
- [IDUN](#) – 19 - 22
- [EUGAIN](#) – 20 – 24
- [Horizon CRAFT](#) – 21 – 25
- [Erasmus + Women Stem Up](#) 22-25
- [ACM WomENcourage](#) 23
- [Abelia Tech Kvinner](#) 17 – ongoing
- Erasmus + [TECHLARP](#) 25-27
- ACM Trondheim Chapter





Key learning objectives

1. Main concepts of the intersection between software engineering and gender
2. Existing research studies about gender and software engineering
3. How to set up a research study about gender and software engineering
4. How to set up an intervention
5. Existing research about gender bias in modern AI
6. Intersectionality (feminism)-a theory to understand the interplay between gender, technology, biases

5. Group Work

- Plan your investigation
- Plan your own intervention



Research question



Research method



Data collection



Data analysis



Where to publish

Plan your own Research Study

Letizia Jaccheri, NTNU, February 2025



Norwegian University of
Science and Technology



Stakeholders



Status quo



Goal



Type of Intervention



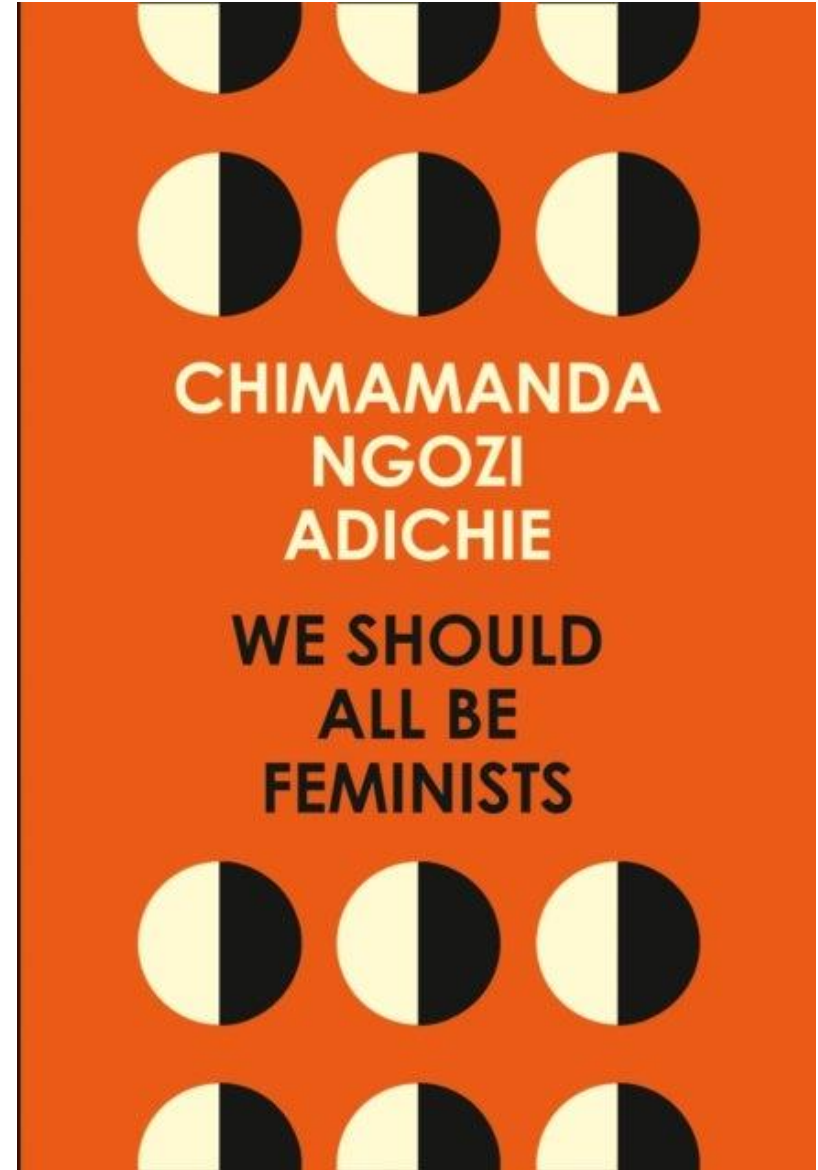
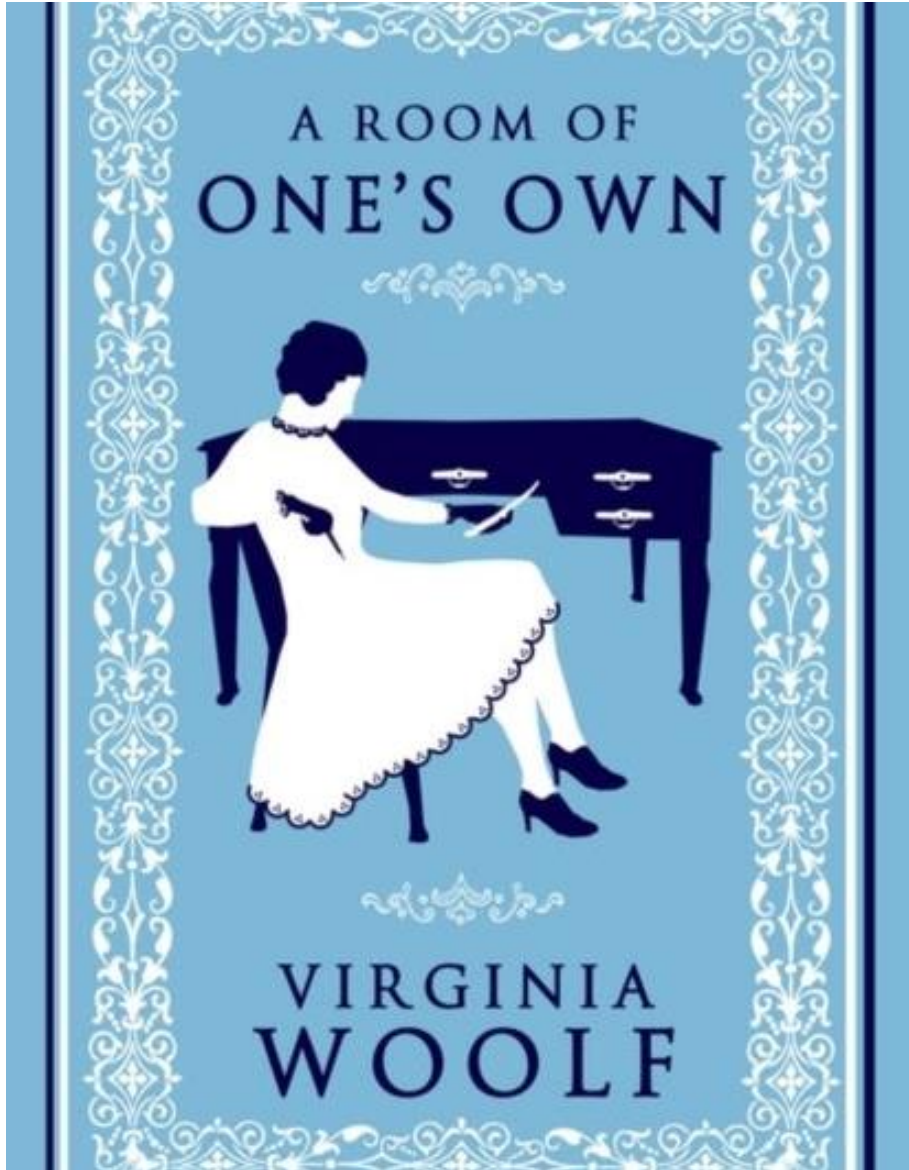
Risks

1. Main concepts of the intersection between software engineering and gender



-
- The Software Engineering (SE) concept was coined by a woman, Margaret Hamilton. Born 1936, she is an American computer scientist who directed the development of the onboard flight software for NASA's Apollo program







Kent Beck
Software Engineer



Mike Beedle
Computer Scientist



Arie Van Bennekum
Project Manager



Alistair Cockburn
Computer Scientist



Ward Cunningham
Software Developer



Jon Kern
Program Manager



Martin Fowler
Software Developer



James Grenning
Software Engineer



Jim Highsmith
Software Developer



Andy Hunt
Software Developer



Ron Jeffries
Software Developer



Brian Marick
Computer Scientist



Bob Martin
Software Engineer



Stephen J. Miller
Computer Scientist



Jeff Sutherland
Software Developer



Ken Schwaber
Software Developer



Dana Thomas
Computer Programmer

17 MEN

CREATED

**THE AGILE
MANIFESTO**

Software Engineering

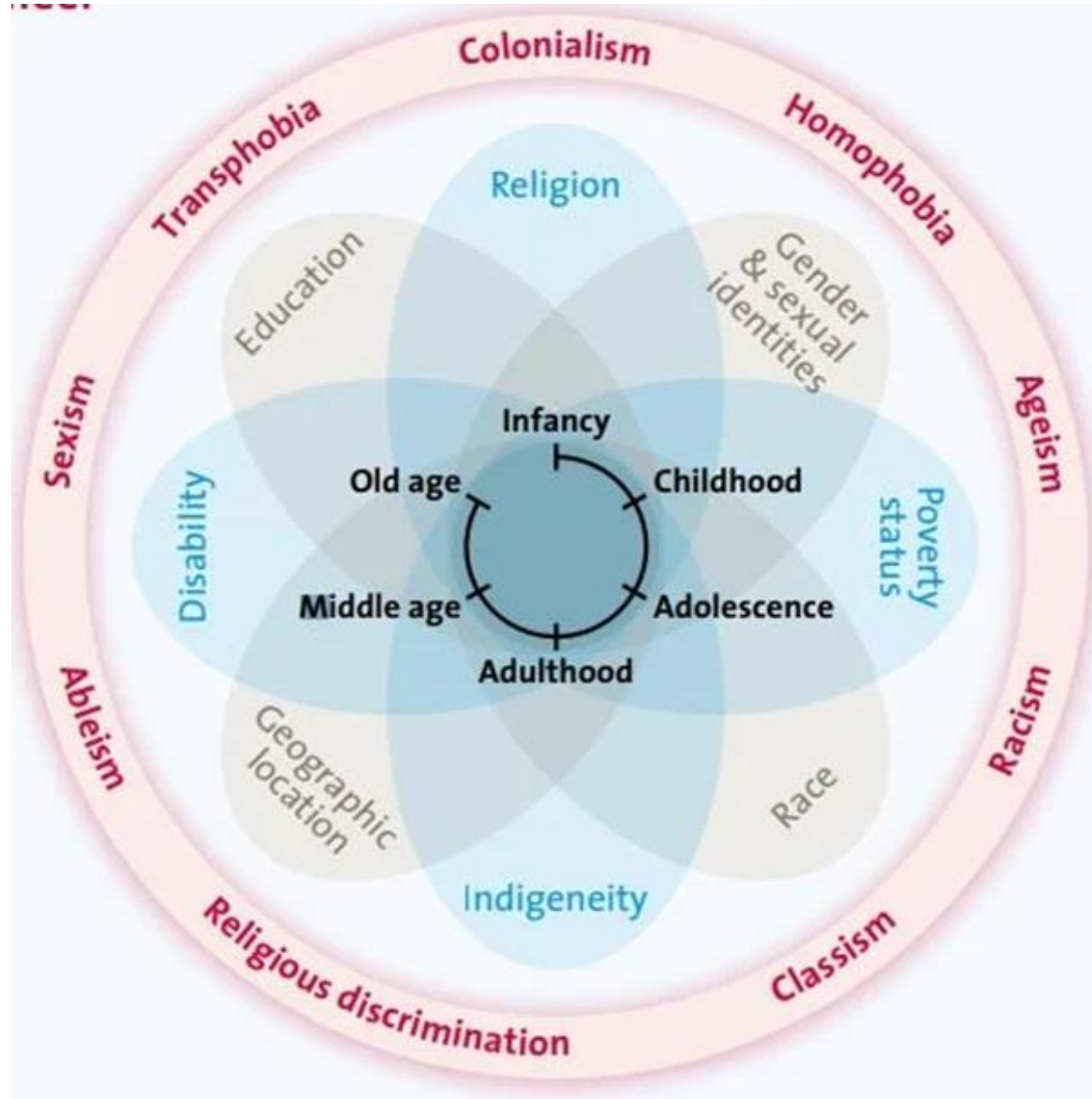
Analysis and Design | Empirical software
engineering | Software quality | Architecture |
Processes | AI and SE | Human factors in SE

Gender

Gender and sex | Non-binary | LGBT+ rights |
#metoo 2017 | Same-sex marriage 2001 |
Intersectionality – triply | feminism

2. Intersectionality (feminism)-a theory to understand the interplay between gender, technology, biases





Bias


(bug, error)

Kimberlé Crenshaw

Feminism is a movement advocating for women's rights and gender equality and it is a field of study. It began in the late 18th century calling for women's education and equal rights.

1. in the 19th and early 20th centuries, focused on legal issues like suffrage, culminating in women gaining the right to vote in many countries
Norway 1913 – Italy 1945 - Switzerland 1971 (1991) - **Afghanistan** under Taliban control – Tuscany ++
2. from the 1960s to the 1980s, addressed broader social issues like reproductive rights, workplace discrimination, and sexuality.
3. The third wave, starting in the 1990s, challenged gender norms and embraced diversity, addressing issues of race, class, and LGBTQ+ rights.
4. Today, feminism continues to evolve, focusing on **intersectionality** and global gender inequalities.

3. How to set up an intervention

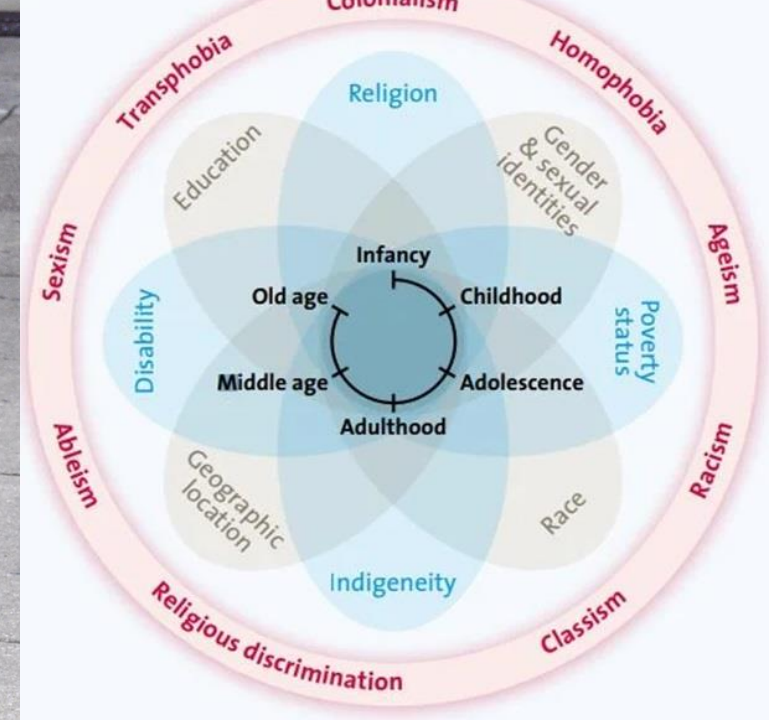


What do we
want?

- Equal rights
- Diversity of thoughts
- Economic reasons

The European Commission report Women active in the ICT sector concludes that including more women in the digital economy could create an annual GDP boost in the EU of **EUR 9 billion**.

https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Girls-in-ICT-Portal/Documents/women_active_in_ict.pdf



curb cut

Define the situation

2012: 17%

2023: 19,4%



Why?

Stereotypes

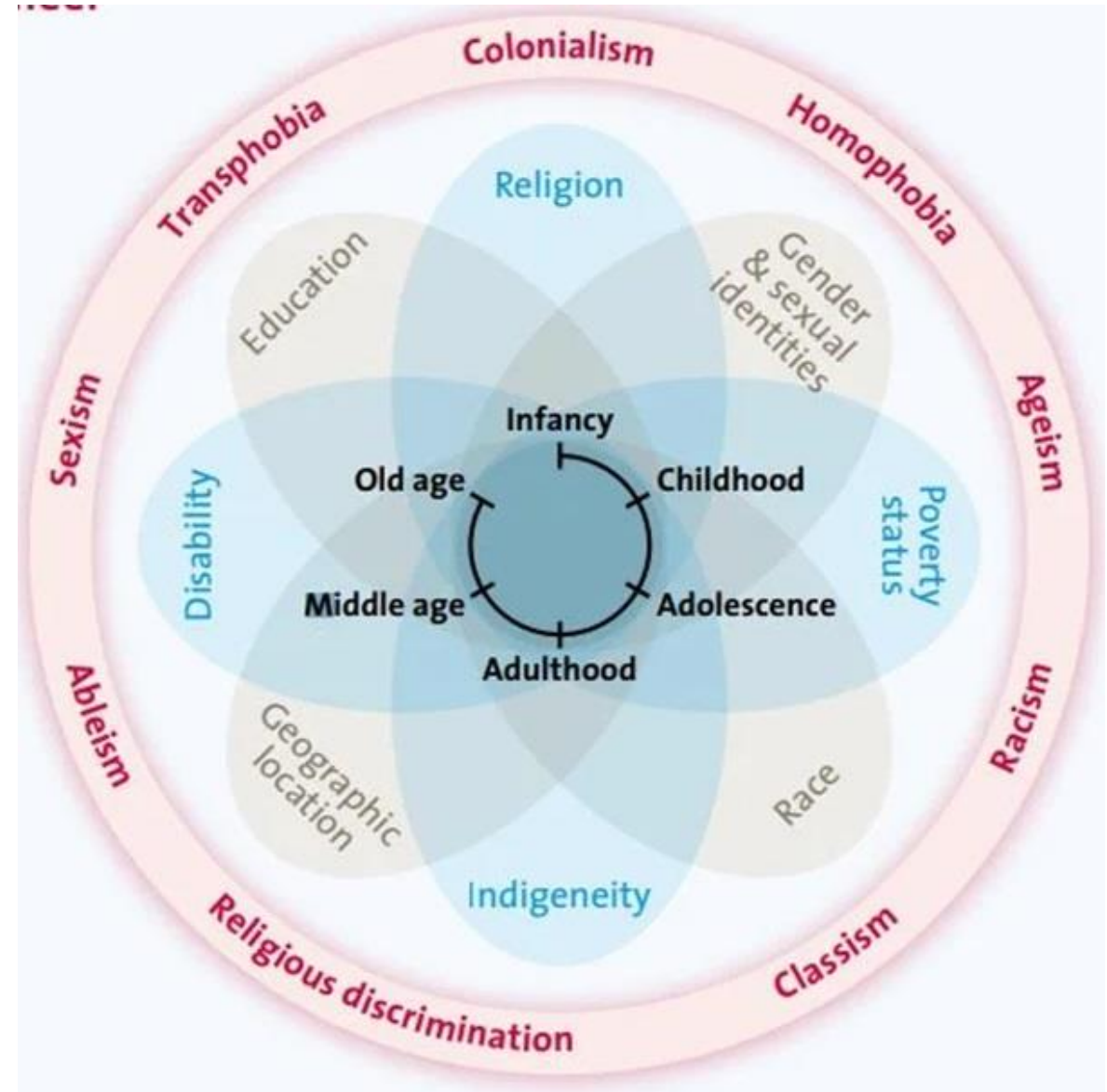
Social
expectations

Insufficient
Knowledge of jobs

Job adv oriented
towards men

Define the problem

- How do you say bias in your language?
- Discuss one example of bias that intersect with SE



Interventions

Information
n

Network

Mentoring

Anti bias
training



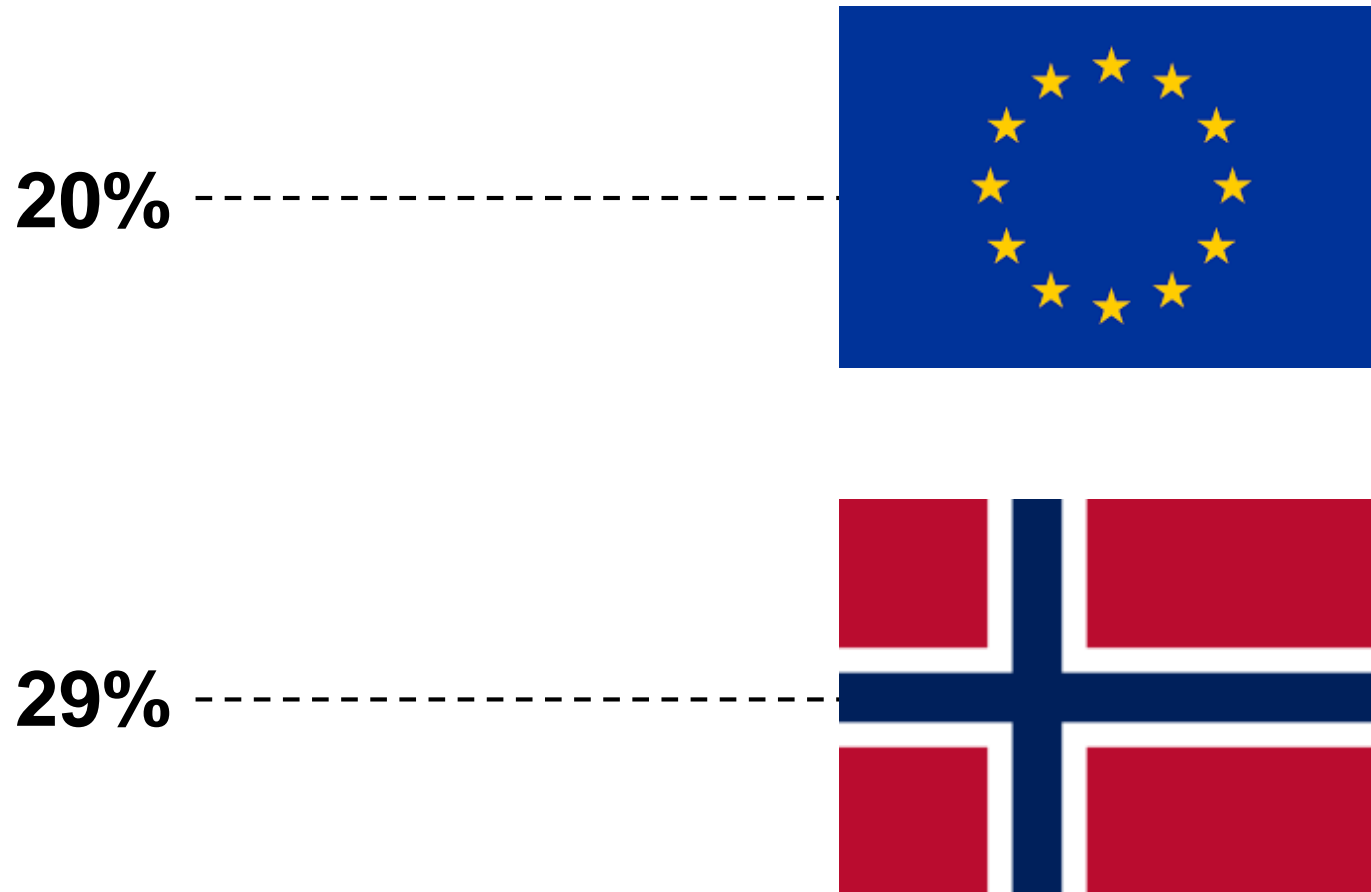
Solution?

The Girl Project Ada!

Intervention



Female ICT students in 2021



IDUN – from PhD to Professor

1 Mio. Euro 2019 – 2022

Background:

581 employees in scientific positions – 22% female

125 professors – 13,8% female

Challenge:

- Too few women at master level
- Dropout from phd to professor



Idun Reiten

IDUN Scientific Mentor program

9 International professors as IDUN mentors



Nirmalie Wiratunga
(IDI team)
<http://www.rgu.ac.uk/dms/taff/wiratunga-nirmalie/>



Anne Håkansson (ITK team)
https://en.uit.no/ansatte/person?p_document_id=584195



Jana Jagerska (IES team)
https://en.uit.no/ansatte/person?p_document_id=407454

Co-mentor

Professor Astrid Aksnes
UiT - The Arctic University of Norway



Radboud University 

Martha Larson
(IDI team)
<https://www.ru.nl/english/people/larson-m/>



TrønderEnergi 

Gro Klæboe (IEL team)
<https://no.linkedin.com/in/gro-kl%C3%A6boe-7b87741a>



Sibylle Schroll (IMF team)
University of Cologne
<https://sites.google.com/site/sibylleschroll/>



Darja Smite
(IDI team)
<https://darjasmite.net/>



Laura Giarre
(IIR Ålesund - IDI Gjøvik team)
<https://giarre.wordpress.com/>



Toktam Mahmoodi
(IIK team)
<https://www.kcl.ac.uk/people/toktam-mahmoodi>

17	13,31
21	15,48
24	15,14



Start ▶ Universiteter ▶ Norges teknisk-naturvitenskapelige universitet ▶ Fakultet for informasjonsteknologi og elektroteknikk

Avdelingsnavn	2020			2021			2022			2023			2024		
	Årsverk	Årsverk kvinner (%)	% midlertidige (alle)	Årsverk	Årsverk kvinner (%)	% midlertidige (alle)	Årsverk	Årsverk kvinner (%)	% midlertidige (alle)	Årsverk	Årsverk kvinner (%)	% midlertidige (alle)	Årsverk	Årsverk kvinner (%)	% midlertidige (alle)
Institutt for datateknologi og informatikk	32,3	11,46	0	34,1	16,42	0	40,6	16,75	0	42,7	16,39	0,94	41,52	16,18	0,96
Institutt for elektroniske systemer	23,75	12,63	4,21	24,5	12,24	0	23,35	12,85	0	23,75	12,63	0	24,35	12,32	0
Institutt for elkraftteknikk	10,5	14,29	0	11,1	13,51	0	13,1	11,45	0	13,5	11,11	2,96	13,9	10,79	2,88
Institutt for IKT og realfag	3	0	0	4,2	0	0	4,2	0	0	4,2	0	0	3,2	0	0
Institutt for informasjonssikkerhet og kommunikasjonsteknologi	18,4	5,43	0	19,6	10,2	0	18,6	10,75	0	18,6	10,75	0	18,7	5,35	0
Institutt for matematiske fag	36	19,44	0,56	34,8	20,11	0	31	22,58	0	33,2	21,08	1,2	33,94	20,63	0
Institutt for teknisk kybernetikk	15	20	0	14,5	20,69	0	15,1	17,22	0	15,5	19,35	0	17,8	22,47	0
Sum	138,95	13,82	0,86	142,8	15,48	0	145,95	15,69	0	151,45	15,52	0,79	153,41	15,14	0,52



4. Research

- Existing research studies about gender and software engineering
- How to set up a research study about gender and software engineering
- Existing research about gender bias in modern AI

Research

- I have never tried that before so I think i should definitely be able to do that.
- *Swedish author Astrid Lindgren*



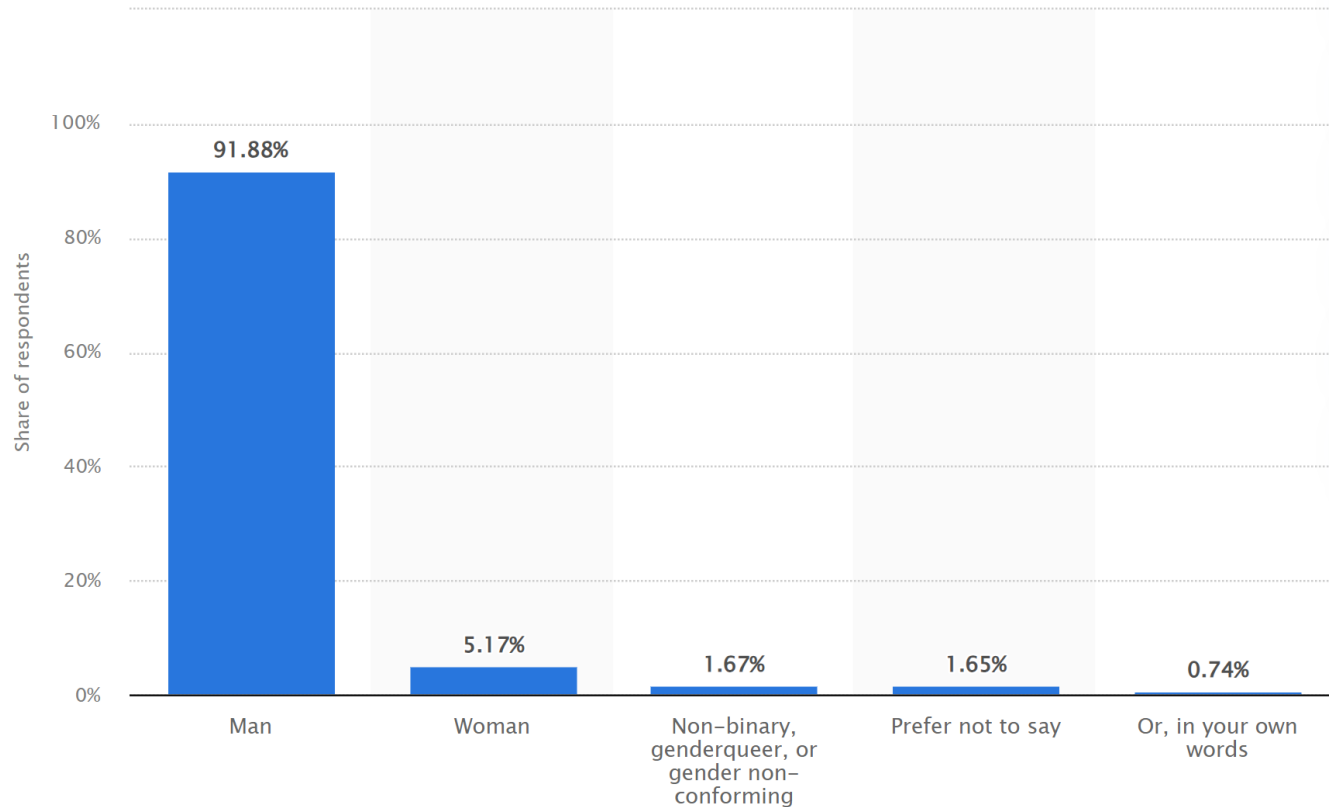
During Autumn 2023, I asked OpenArt to draw four software engineers



-
- I asked again in 2025



Software developer gender distribution worldwide as of 2022



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Release date

July 2022

Region

Worldwide

Survey time period

May 11, 2022 to June 1, 2022

Number of respondents

70,853 respondents

Special properties

Software developers

EUGAIN Cost Action 19122

WG1: FROM SCHOOL TO UNIVERSITY

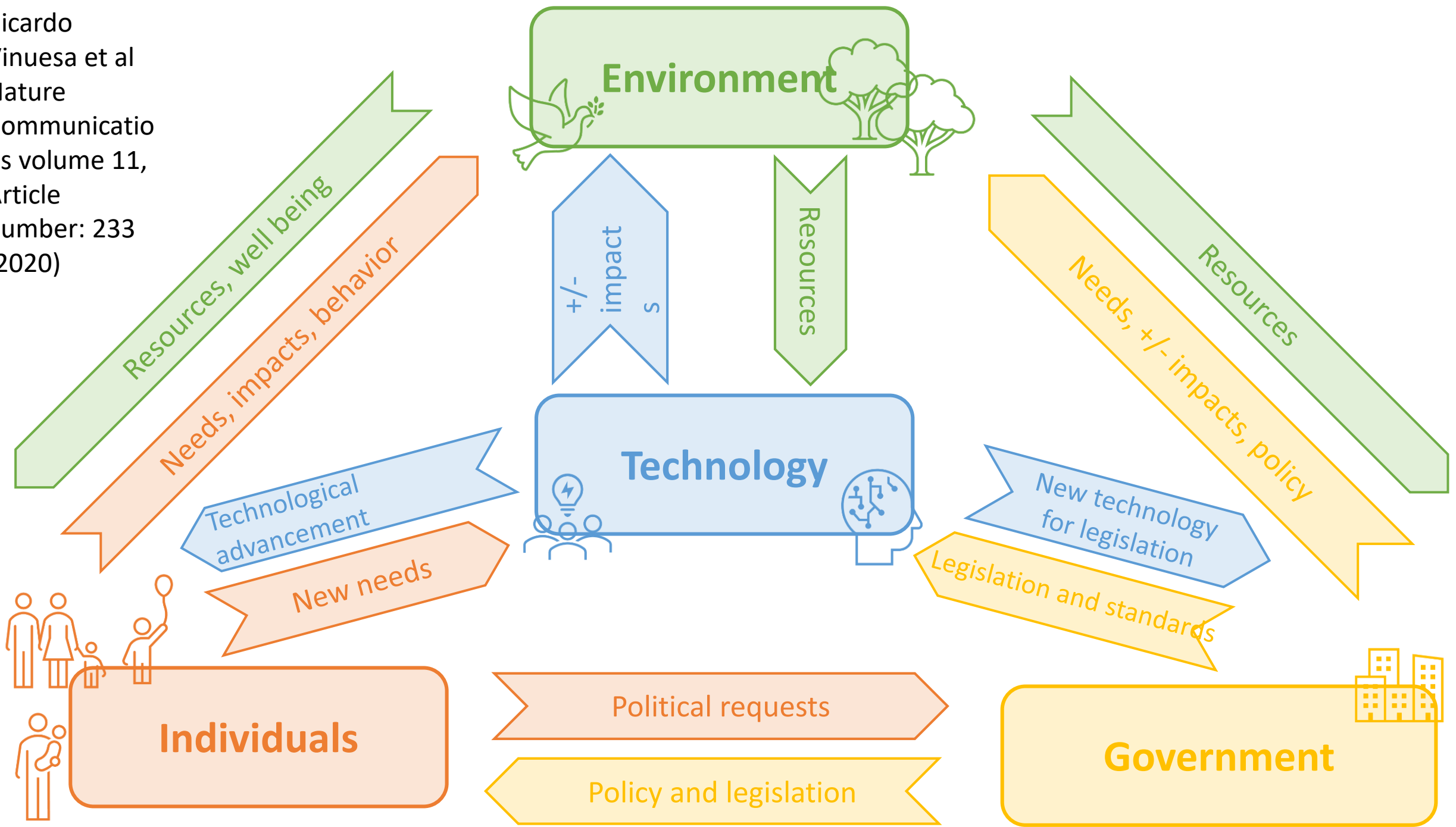
**WG2: FROM BACHELOR/MASTER
STUDIES TO PH.D.**

WG3: FROM PH.D. TO PROFESSOR

**WG4: COOPERATION WITH INDUSTRY
AND SOCIETY**

WG5: STRATEGY & DISSEMINATION

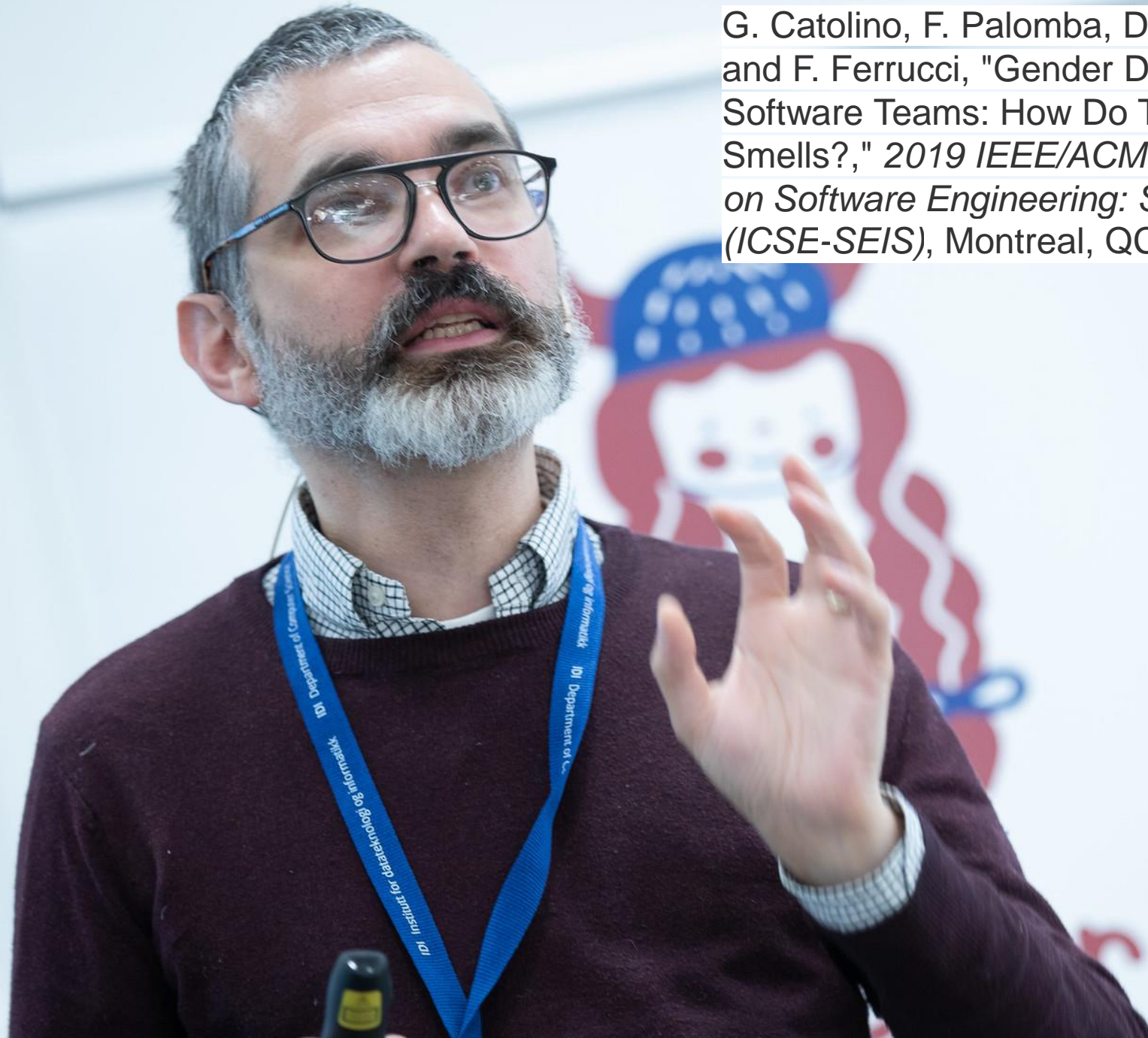
Ricardo
Vinuesa et al
Nature
Communications volume 11,
Article
number: 233
(2020)



Burnett, M., Stumpf, S., Macbeth, J., Makri, S., Beckwith, L., Kwan, I., Peters, A. and Jernigan, W., 2016. GenderMag: A method for evaluating software's gender inclusiveness. *Interacting with computers*, 28(6), pp.760-787.



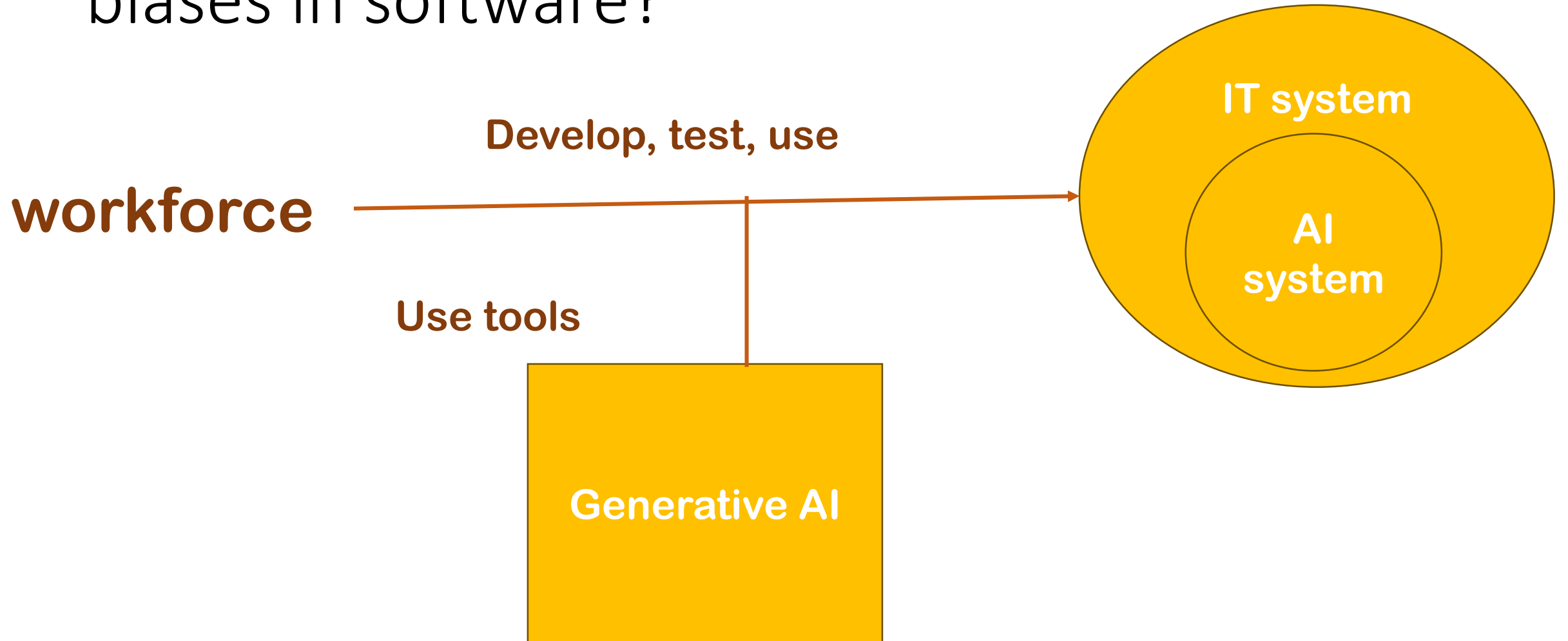
G. Catolino, F. Palomba, D. A. Tamburri, A. Serebrenik and F. Ferrucci, "Gender Diversity and Women in Software Teams: How Do They Affect Community Smells?," *2019 IEEE/ACM 41st International Conference on Software Engineering: Software Engineering in Society (ICSE-SEIS)*, Montreal, QC, Canada, 2019, pp. 11-20





Draw a Software Engineer Test -
An Investigation into Children's
Perception of Software
Engineering Profession, Claudia
Maria Cutrupi, Irene Zanardi,
Letizia Jaccheri, Monica Landoni
SEIS - Software Engineering in
Society, 2023

RQ How do biases in the workforce impact biases in software?



Threats

- False statements, false faces, false messages. There will be more of all this.
- Old systems, old stereotypes are magnified - if we don't take action
- Automatic processing of CVs
- The training data

Musk's post came a day after he shared another post with a screenshot suggesting that only "high status males" should be able to participate in government because women (and men with "low testosterone") are not capable of critical thought. Musk posted it to his 196 million followers with the comment, "interesting observation."



An AI-generated image of Kamala Harris posted by Elon Musk on his social media platform, X. From X



5. Group Work

- Plan your investigation
- Plan your own intervention



Research question



Research method



Data collection



Data analysis



Where to publish

Plan your own Research Study

Letizia Jaccheri, NTNU, February 2025



Norwegian University of
Science and Technology



Stakeholders



Status quo



Goal



Type of Intervention



Risks

Resources to go more in depth

- EUGAIN Eugain.eu
- ACM Celebration of Women in Computing: womENcourage <https://womencourage.acm.org> September 2025 Romania
- FSE 2025 in Trondheim Norway
- B. Trinkenreich, R. Britto, M. A. Gerosa, and I. Steinmacher, “An empirical investigation on the challenges faced by women in the software industry: A case study,” in Proceedings of the 2022 ACM/IEEE 44th International Conference on Software Engineering: Software Engineering in Society, 2022, pp. 24–35.
- K. Crawford, M. Whittaker, M. C. Elish, S. Barocas, A. Plasek, and K. Ferryman, “The AI now report,” *The Social and Economic Implications of Artificial Intelligence Technologies in the Near-Term*, vol. 2, 2016.
- J. Dastin, “Amazon scraps secret AI recruiting tool that showed bias against women,” in *Ethics of data and analytics*, Auerbach Publications, 2022, pp. 296–299.
- M. Ali, P. Sapiezynski, M. Bogen, A. Korolova, A. Mislove, and A. Rieke, “Discrimination through optimization: How facebook’s ad delivery can lead to biased outcomes,” Proceedings of the ACM on human-computer interaction, vol. 3, no. CSCW, pp. 1–30, 2019.
- Y. Wang and D. Redmiles, “Implicit gender biases in professional software development: An empirical study,” in 2019 IEEE/ACM 41st International Conference on Software Engineering: Software Engineering in Society (ICSE-SEIS), 2019, pp. 1–10.
<https://dl.acm.org/doi/10.1109/ICSE-SEIS.2019.00009>
- A. Hannak, G. Soeller, D. Lazer, A. Mislove, and C. Wilson, “Measuring price discrimination and steering on e-commerce web sites,” in Proceedings of the 2014 conference on internet measurement conference, 2014, pp. 305–318.
<https://dl.acm.org/doi/10.1145/2663716.2663744>

Ongoing work

- The data collection was made in February 2025 and we focused on information produced during 2025, as on January 21, 2025, President Trump signed an Executive Order titled “Ending Illegal Discrimination and Restoring Merit-Based Opportunity” (the “January 21 DEI Order”). Furthermore, on 20 January 2025, President Trump had signed two DEI-related executive orders titled “Defending Women From Gender Ideology Extremism and Restoring Biological Truth to the Federal Government” (the “Gender Order”) and “Ending Radical and Wasteful Government DEI Programs and Preferencing: (the “DEI Order 20 January”) [19]. This would most likely affect especially US companies, which many of our top 10 companies are.

<https://corpgov.law.harvard.edu/2025/02/10/president-trump-acts-to-roll-back-dei-initiatives/>

