Lessons on the Increasing Role of Diversity in CS/ICT

Barbora Buhnova, FI MU & Czechitas
Webinar at FI MU, 5. 4. 2023

“Bridging communities
to foster innovation.”

Barbora Bühnová

Co-founding & Gov. Board, Czechitas
Vice-Chair EUGAIN Network
Vice-dean for industrial relations, FI MU

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COST Action – CA19122

European Network For Gender Balance in Informatics

- **Duration**: 4 years, Oct 2020 – Oct 2024
- Initially **24 member countries** in the network of proposers
- Currently **40 members countries**, over 200 representatives
- Action Chair: Prof. Letizia Jaccheri, Norway
  Vice Chair: Barbora Buhnova, Czech Republic
- Grant Holder Scientific representative: Informatics Europe, Switzerland
- **Website** http://eugain.eu/
- **Follow us on Facebook and Twitter** eugain19122

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

THE GROWING ROLE OF DIVERSITY

Why do we care about diversity?

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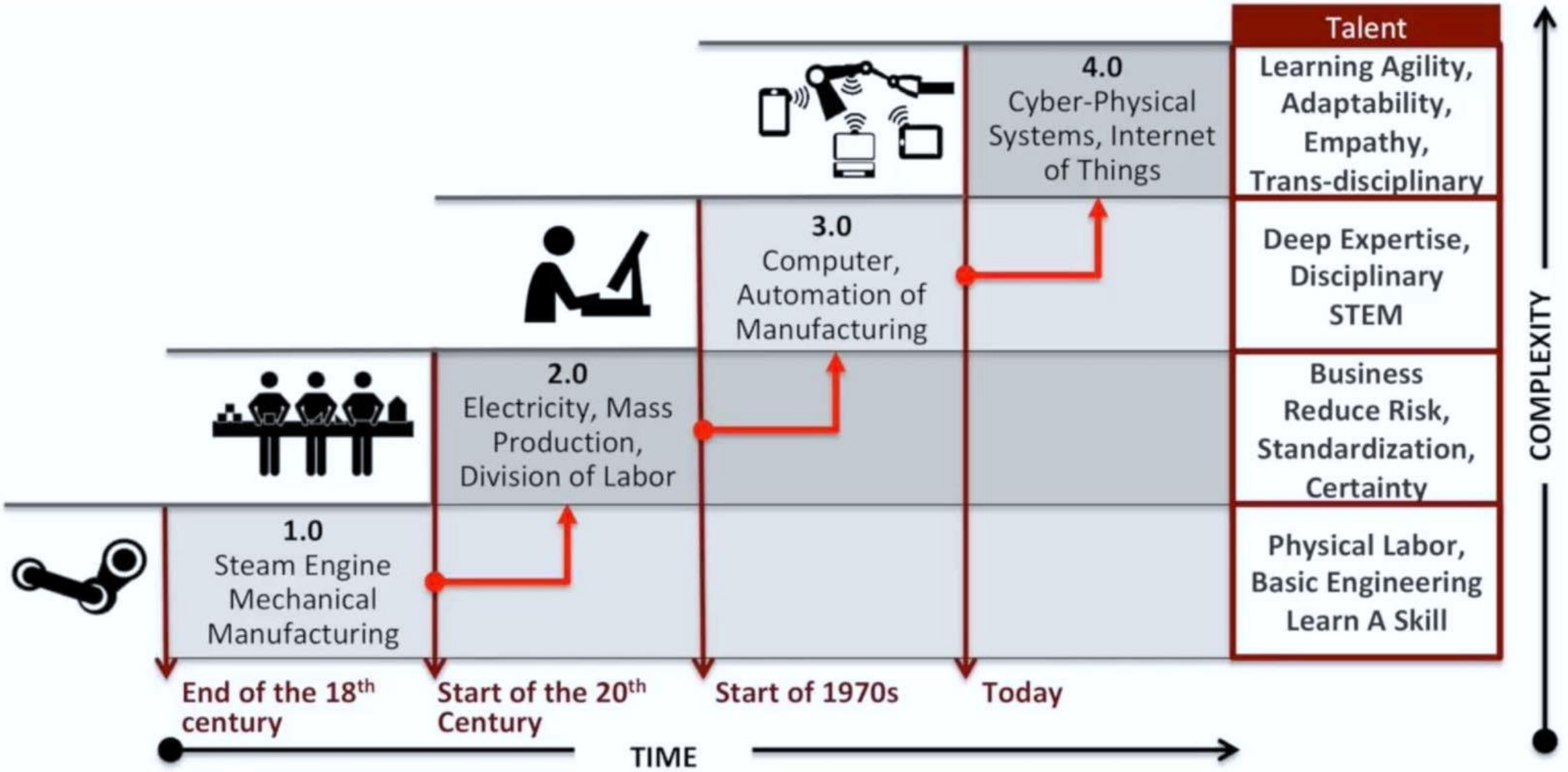
“In the Future, All Companies
Will Be Software Companies”
George Colony, CEO of Forrester Research

CONTEXT: Next Industrial Revolution (World Economic Forum 4th)



THE CONTEXT OF THE CZECH REPUBLIC

How do we stand in the international comparison in terms of gender diversity?

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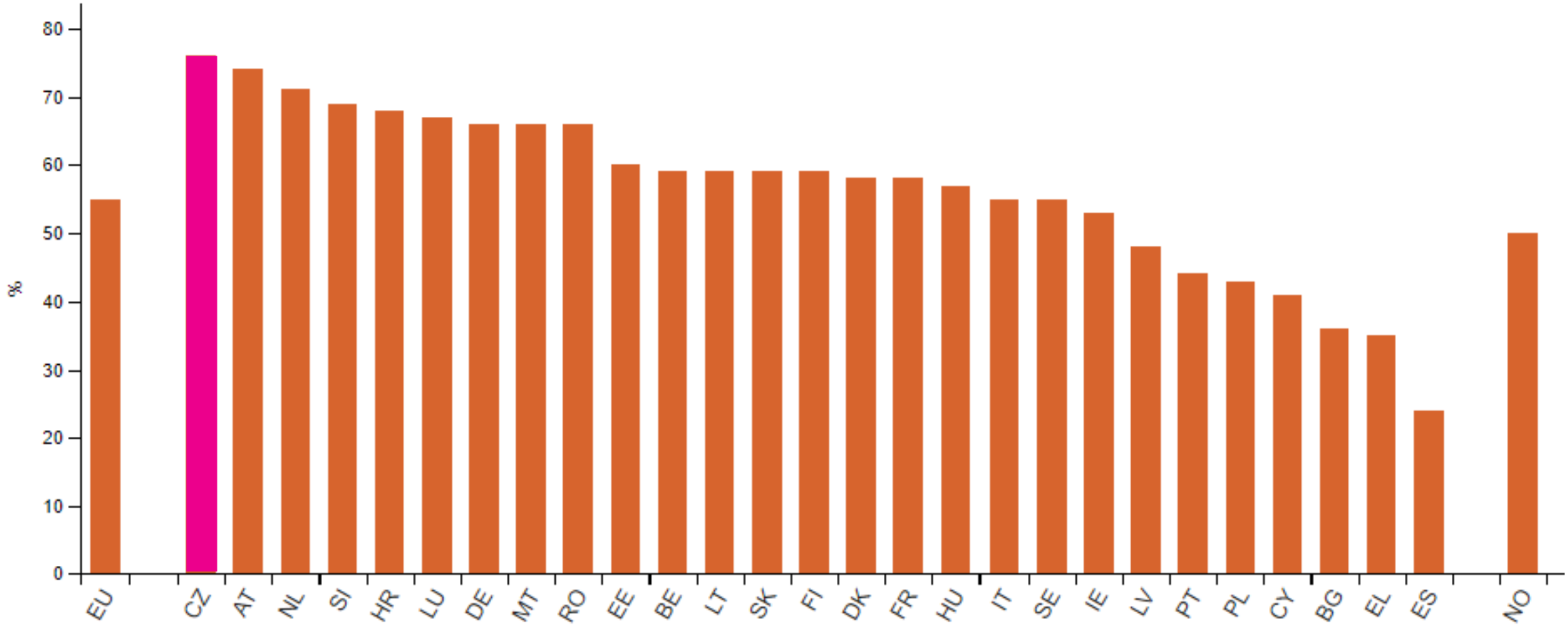
Enterprises that had hard-to-fill vacancies for ICT specialists, 2020 (% enterprises that recruited/tried to recruit)



No data for Montenegro

Source: Eurostat (online data codes: isoc_ske_itspen2 and isoc_ske_itrcrn2 and isoc_ske_ittn2)

WHY DO WE CARE ABOUT I&D?

- We cannot afford losing talented people
  - We cannot afford missing talented people on the entry either
- We are all talented, in many diverse ways
  - It is the task of the manager to recognize and direct the talent towards team success
  - For a great manager, the only thing that matters is the employee's attitude
- The environment matters
  - We need people to bring their best authentic self to the table
- This gives us access to big reservoirs of talent
  - Outside as well as inside the company, with whole new level of satisfaction at work

TALENT

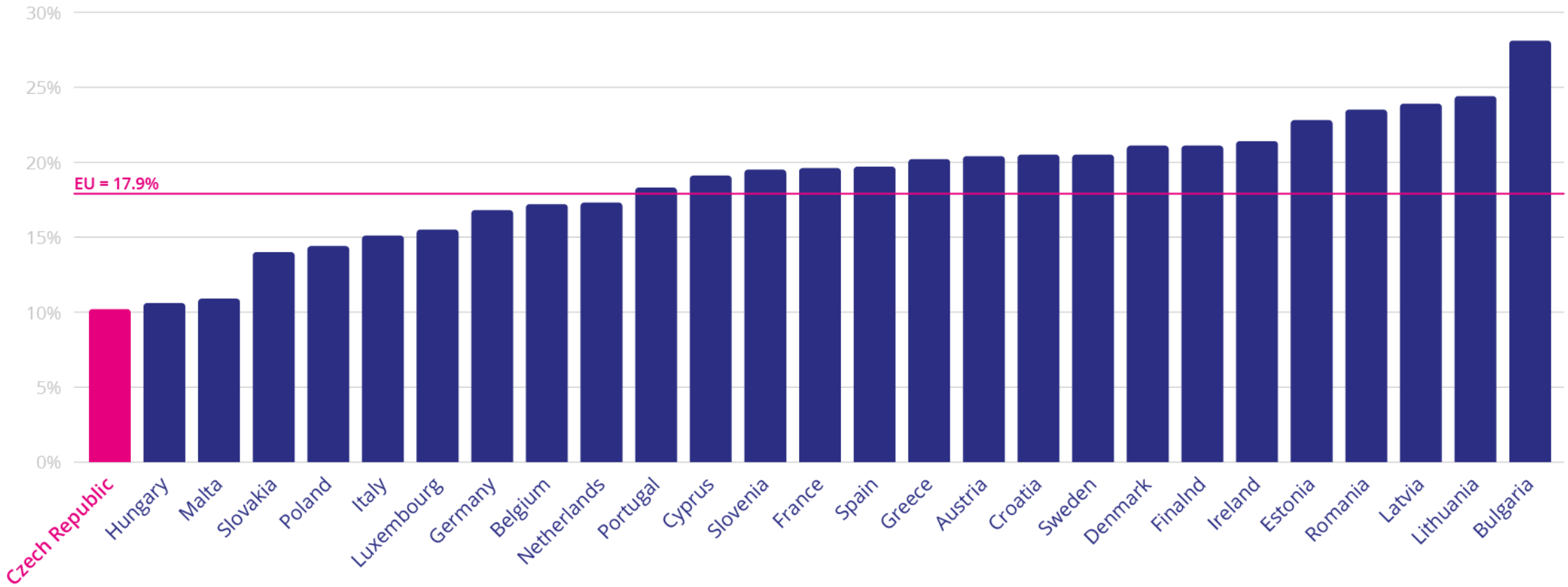
TAKEAWAY #1

We cannot afford losing talented people.

– Those we have & those we do not have yet.

– Not only losing the people but also missing their talent.

Proportion of women among ICT specialists, 2019



eurostat

EQUALITY VS. EQUITY

In the first image, it is assumed that everyone will benefit from the same supports. They are being treated equally.

In the second image, individuals are given different supports to make it possible for them to have equal access to the game. They are being treated equitably.

In the third image, all three can see the game without any supports or accommodations because the cause of the inequity was addressed. The systemic barrier has been removed.

https://www.diffen.com/difference/Equality-vs-Equity

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WHY ARE THERE SO FEW WOMEN IN TECH?

- Because they are not interested in tech?
- Because they do not want to spend their day in front of a computer?
- Because they are simply weaker in competencies needed in tech?
- Because they simply prefer other disciplines?

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WHY ARE THERE SO FEW WOMEN IN TECH?

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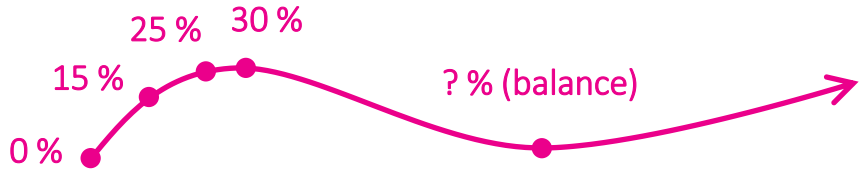
CRITICAL MASS



- Below 15% the minority faces high risk of extinction (in terms of unique values it brings)
  - As the individual who remain part of it are likely to cognitively mimic the majority group (strong perception of discrimination and marginalization)
- At around 15% the minority starts to be survivable (and be seen)
  - But we to large extent see there the individuals who enjoy the outlier status and do not engage to promote change (researched on women on boards)
- At around 25% the minority starts being heard and given voice
  - With a chance opening to reshape the community and its values if strong-enough minority members are present (researched on social influence)
- At around 30% the barriers around the minority status are diminishing
  - Described as a critical mass in the context of gender balance (researched on women in politics)

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- Similar examples apply to women in leadership. Dismantle the "right way to do it".

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THE RIGHT WAY TO DO IT

TAKEAWAY #2

The best thing you can do to promote diversity is to dismantle “the right way to do it.”

WHY ARE THERE SO FEW WOMEN IN TECH THEN?

FRUSTRATIONS STEERING WOMEN AWAY FROM TECH

- Access (to engaging education, supportive teacher, supportive family environment, guidance)
- Stereotypes (by girls about CS engineer/field, by they close environment about CS engineer/field/girls in CS)
- Confidence (self-efficacy)
- Belonging (boys club, missing networking, mentors)
- Feeling valued (defensive culture, the fact that the women feel they need to keep proving their value, flawed meritocracy)

LESSONS LEARNED FROM THE STUDY

- Girls falsely believe
  - that they and their interests do not fit and are not connected to SE,
  - that because of having other interests and not investing all their time into computing they cannot be successful in tech,
  - that their non-stereotypical skills and interests will be considered as second-class, and will not be appreciated in tech.
- Multidisciplinary lens
  - The women in the study showed to have on average 5.5 other major interests.
  - There is thus a potential in creating alternative pathways into tech by building on individual interests, to create identities that do resonate.

TAKEAWAY #3

The reason why women self-select away from technology is the very reason why we need them in.

THE KEY THING THAT MINORITIES NEED IS

- To be included = inclusive environment
  - Their **needs understood**, supported via an inclusive environment
  - No need to **hide their differences**, mimic the majority group
- and appreciated = diverse talents appreciation
  - Their **talents being recognized** and given the same credit as the majority talents
  - Being encouraged and **given credit for the journey they walked** (not destination they reached)

INCLUSIVE ENVIRONMENT

- The PAIN of social rejection
  - Over the millions years of evolution, social rejection equaled death
  - And still today, it feels like it
  - Social rejection can feel more (physically) painful than physical injury (brain scans show)
- The FEAR of social rejection
  - Might lead us to hurting others (not speak-up for somebody being excluded) not to lose that sense of belonging ourselves

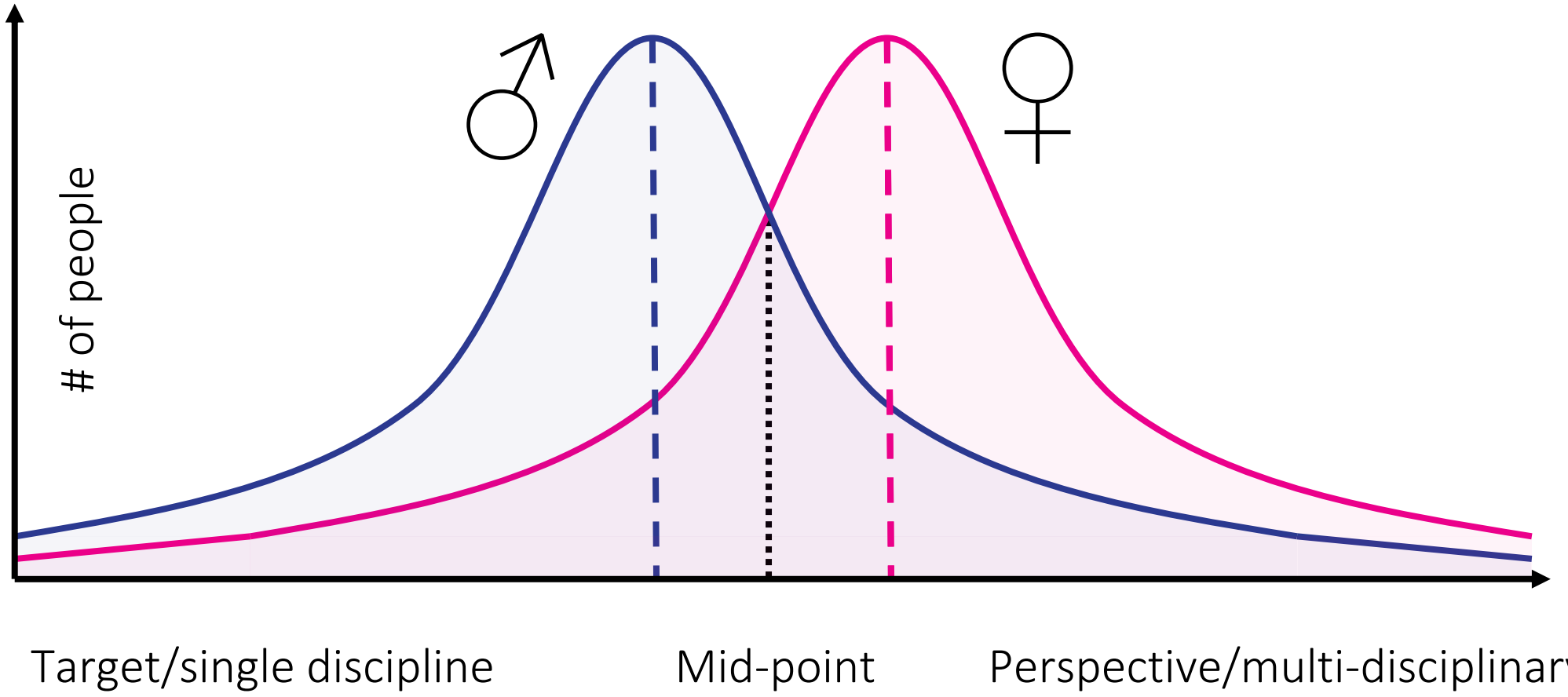
INCLUSIVNESS AND GENDER DIFFERENCES

- Differences in experience, upbringing, cognitive styles correlated with gender (not universally)
- Body of work on inclusive software design
  - By making SW more inclusive to a certain group, we are making it more inclusive to everybody
- GenderMag
  - Division of 5 cognitive styles/aspects that are empirically best implicated to have gender connection (by psychology and education research) and use them to evaluate software UI/UX
- InclusiveMag
  - Meta-method considering inclusiveness in general (ADHD, autism, dementia, vision, literacy, age)

GENDERMAG

Facet (category)	Abi facet value	Pat facet value	Tim facet value
Motivations for using technology	Wants what the technology can accomplish.	Wants what the technology can accomplish.	Technology is a source of fun.
Computer Self-Efficacy (confidence) in using unfamiliar technology	Low compared to peer group.	Medium.	High compared to peer group.
Attitude towards Risk when using technology	Risk-averse.	Risk-averse.	Risk-tolerant.
Information Processing Styles for gathering information to solve problems	Comprehensive.	Comprehensive.	Selective.
Learning Styles for learning new technology	Process-oriented learner.	Learns by tinkering; Tinkers reflectively.	Learns by tinkering (sometimes to excess).

DIVERSE TALENT APPRECIATION



[1] B. Annis and R. Nesbitt, ”Results at the Top: Using Gender Intelligence to Create Breakthrough Growth”, Wiley, 2017.

[2] Weisberg, Y.J., DeYoung, C.G., Hirsh, J.B., “Gender differences in personality across the ten aspects of the big five. Frontiers in psychology” 2, 178 (2011)

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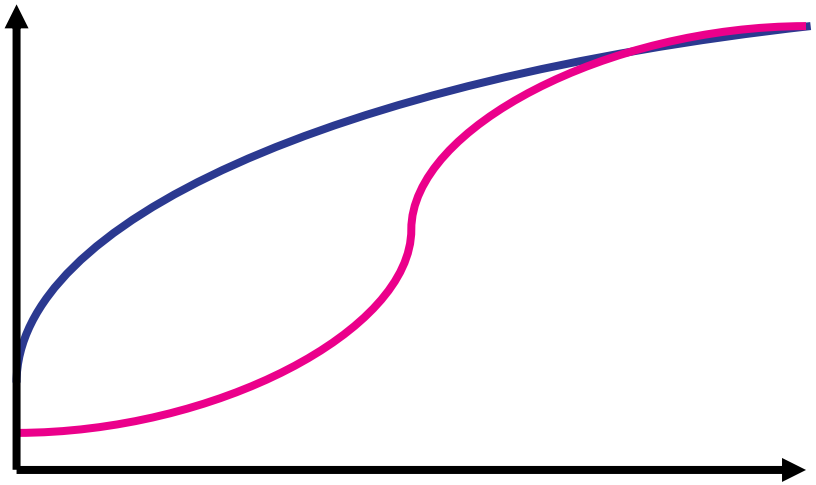
HOW WE ARE LEAVING THE PERSPECTIVE-ORIENTED INDIVIDUALS OUT

- **Differences in approaching complex problems**
  - Perspective-oriented individuals need to build their context map first
    → they are slower learners at the beginning
    → but great integrators and multitaskers later
    → they feel anxiety from their context map
    never being complete



- **They have more interests as little kids**
  - Using technology for a purpose, not to change it
    → often starting later with advanced tech tasks
- **And there are some aspects related to girls specifically**
  - Perfection vs. bravery

UNCONCIOUOS BIAS

“Thinking fast and slow” book by Daniel Kahneman

- Overall, we often make conclusion and only then we start searching for arguments to explain our conclusion

We can’t be rational even if we wanted to

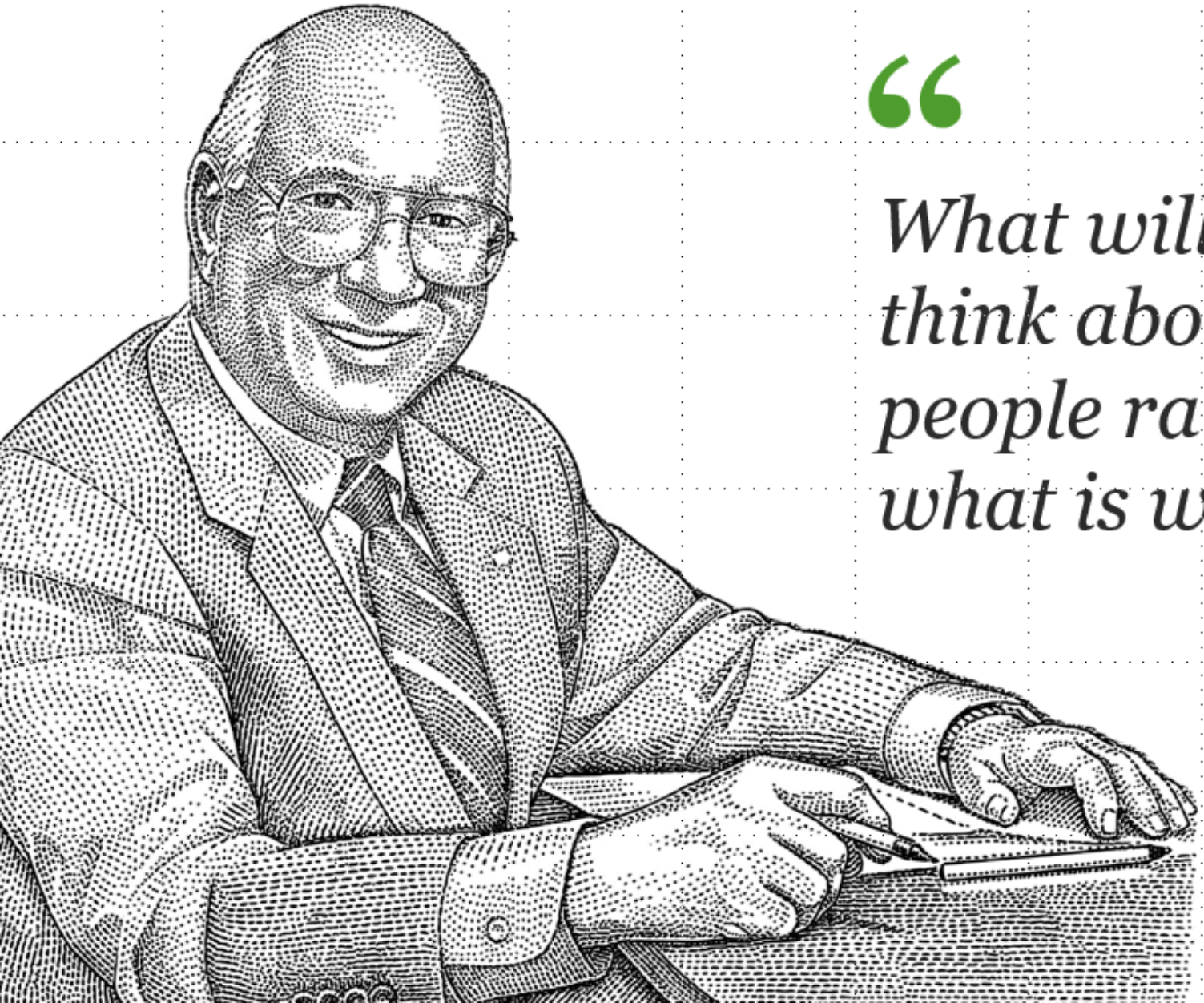
- Research has suggested that we are bombarded with 11 million pieces of information at any given time, but we can only handle 40.
- So our brain creates shortcuts, so that we can make decisions quickly without overwhelm. But this creates bias that we are unaware of, known as unconscious bias.

The point is to recognize that we are biased.

BIASES

TAKEAWAY #4

The dark side of biases is that we tend to judge people’s potential based on how their talent spectrum matches the already-successful ones.



What will happen when we think about what is right with people rather than fixating on what is wrong with them?

DON CLIFTON | *(1924-2003)*

FOUR DOMAINS OF CLIFTON STRENGTHS

- **Talents** = Naturally recurring patterns of thought, feeling, or behavior that can be productively applied.
- **Strengths** = Combination of talents, knowledge, and skills -- along with the time spent (i.e., investment) in practicing, developing your skills, and building your knowledge base.

- Domains of Clifton Strengths
  - Executing
  - Influencing
  - Relationship building
  - Strategic thinking

- We tend to mix strengths with weaknesses
  - Especially if the talents of others do not resemble ours

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EXECUTING	INFLUENCING	RELATIONSHIP BUILDING	STRATEGIC THINKING
People with dominant Executing themes know how to make things happen.	People with dominant Influencing themes know how to take charge, speak up, and make sure the team is heard.	People with dominant Relationship Building themes have the ability to build strong relationships that can hold a team together and make the team greater than the sum of its parts.	People with dominant Strategic Thinking themes help teams consider what could be. They absorb and analyze information that can inform better decisions.
Achiever **Arranger** **Belief** **Consistency** **Deliberative** **Discipline** **Focus** **Responsibility** **Restorative**	**Activator** **Command** **Communication** **Competition** **Maximizer** **Self-Assurance** **Significance** **Woo**	**Adaptability** **Connectedness** **Developer** **Empathy** **Harmony** **Includer** **Individualization** **Positivity** **Relator**	**Analytical** **Context** **Futuristic** **Ideation** **Input** **Intellection** **Learner** **Strategic**

BENEFITS OF D&I

Why shall it be a priority?

HOW I&D CONTRIBUTE TO ORGANIZATION SUCCESS

1. Better financial returns

   According to a 2015 McKinsey report called **Diversity Matters**, companies in the top quartile for both racial and ethnic diversity are 35% more likely to have financial returns that exceed their national industry medians. For companies in the top quartile for gender diversity this is 15%.

2. I&D drives innovation

   A study by Harvard Business Review found that companies with an above-average total diversity (meaning migration, industry, career path, gender, education and age diversity), had 19% higher innovation revenues and 9% higher EBIT margins.

   In its 2018 report, The Diversity and Inclusion Revolution, Deloitte found that organizations with inclusive cultures were, among other things, six times more likely to be innovative and agile: they see more angles on potential problems, imagine smarter and multi-faceted solutions and spot the biases in what they're creating.

HOW I&D CONTRIBUTE TO ORGANIZATION SUCCESS

3. Attracting and retaining talent

Organizations that embrace diversity hiring benefit from a larger talent pool than those who don't. Their vacancies will gain interest from a wider range of candidates because more people with different backgrounds can relate to the organization.

4. Better performance and greater productivity

According to an executive briefing by the Society for Human Resources, research shows that generational diversity can improve organizational performance. It also shows that HR practices that improve the age diversity climate in a company can potentially further improve that performance.

According to the same briefing, both older and younger workers are more productive in companies with mixed-age work teams.

Source: https://www.digitalhrtech.com/diversity-vs-inclusion

CASE STUDY:
THE GREAT BRITISH DIVERSITY EXPERIMENT

Author: Amanda Bennett, FairPlay Ltd

sportwales
chwaraeoncymru

WHY ARE DIVERSE TEAMS SUCCESSFUL?

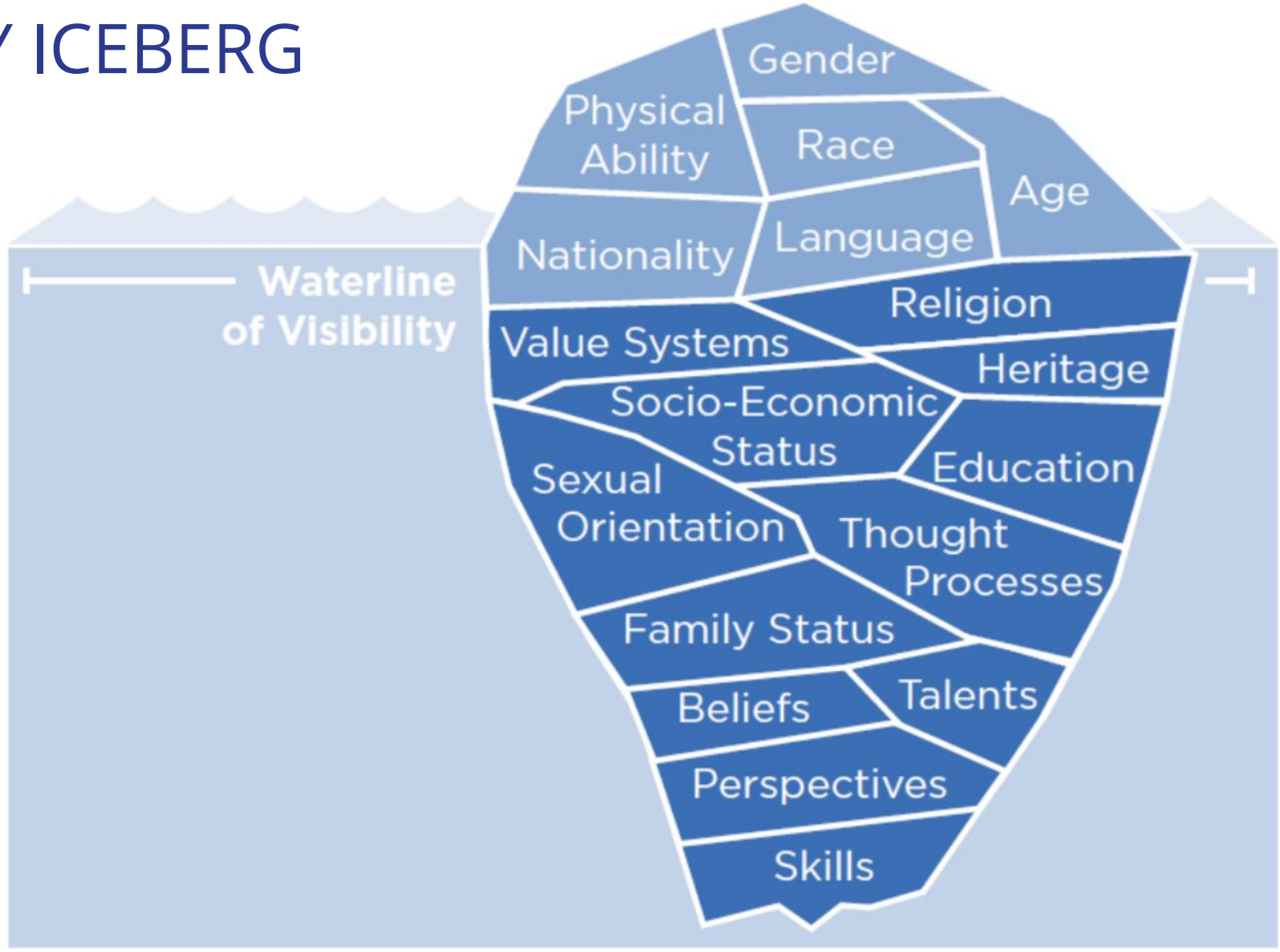
WHY DIVERSE TEAMS PERFORM BETTER?

They are more innovative and agile, but how specifically?

- They imagine smarter and **multi-faceted solutions**, spot biases
- They increase the possibility of new connections between **experiences**, **perspectives**, and insights
- They see more angles on **potential problems**
- They benefit from **larger talent pool**
- They lead people to being their **authentic self**, be happier in their job

More examples follow from the combination of target+perspective talents

DIVERSITY ICEBERG



Source: Royal Dutch Shell, " Diversity and Inclusion at Shell," https://www.snps.nl/Documents/Diversity-Inclusion.pdf.

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PERFORMANCE

TAKEAWAY #5

Diversity promotes innovation and better results via effective problem solving, risk management, achieving long-term goals, resource utilization, and many others.

CHALLENGES OF D&I

D&I is an investment

CHALLENGES IN ACHIEVING DIVERSITY

- **Challenge#1.** We prefer people who are alike
  - Neuroscience reason, predictability, safety, comfort, no need to be alert
  - We first make a decision and then find an explanation, so we will always give “rational” reasons why it is better to keep the team homogenous
- **Challenge#2.** More difficult team dynamics
  - Tuckman’s model of team dynamics
- **Challenge#3.** Unhealthy communication patterns
  - Fear of positive discrimination, rejection
  - Shaming for biases, blocking of communication across diverse groups

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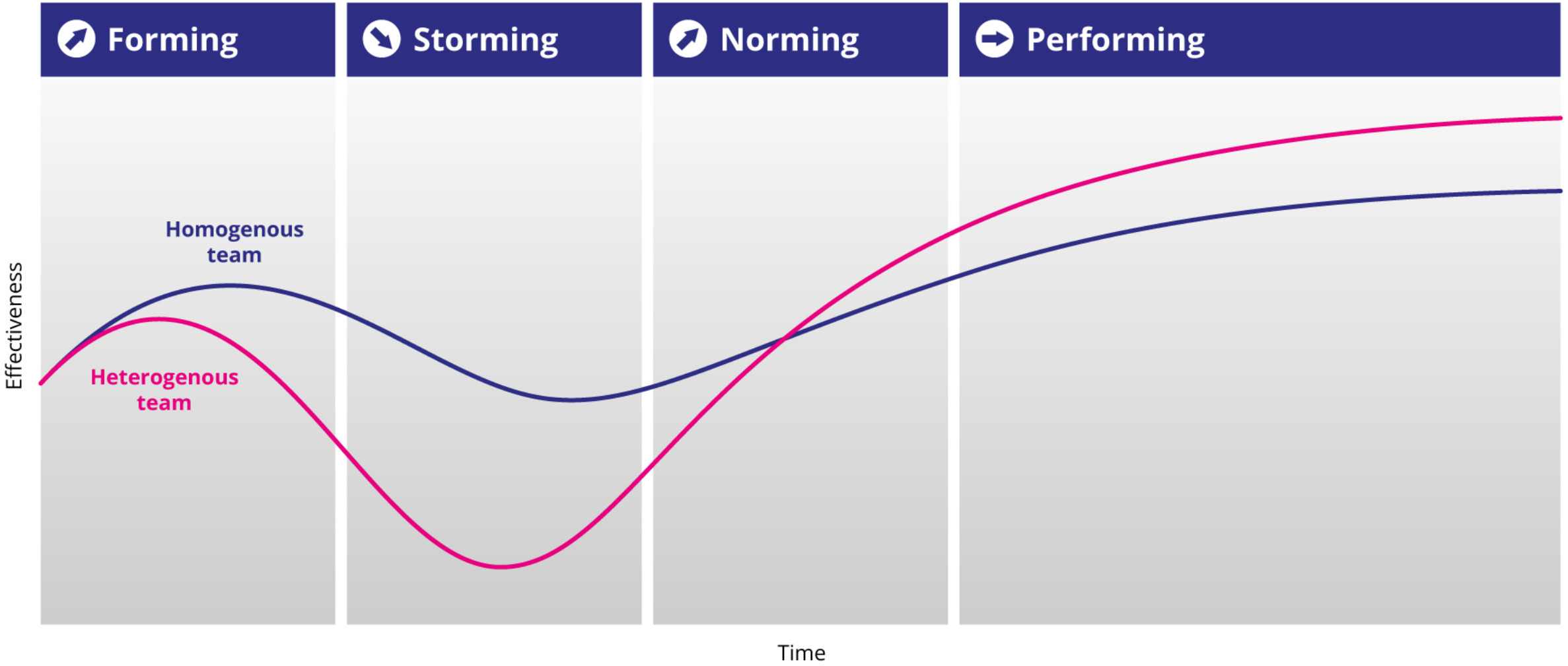
TUCKMAN'S MODEL OF TEAM DYNAMICS



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AVOIDING DIVERSITY

TAKEAWAY #6

Avoiding diversity is natural to human individuals,
but dangerous to humankind.

TAKEAWAYS AND RECOMMENDATION

And your questions

WHY IT NEEDS OUR ATTENTION

Importance of diversity is growing, in terms of

- Talents and cognitive styles
- Interconnecting disciplines

We cannot afford losing talented people

- The labor shortage pressure in tech will keep growing
- Women are a large reservoir of talent
- We often miss talented people by missing their talents

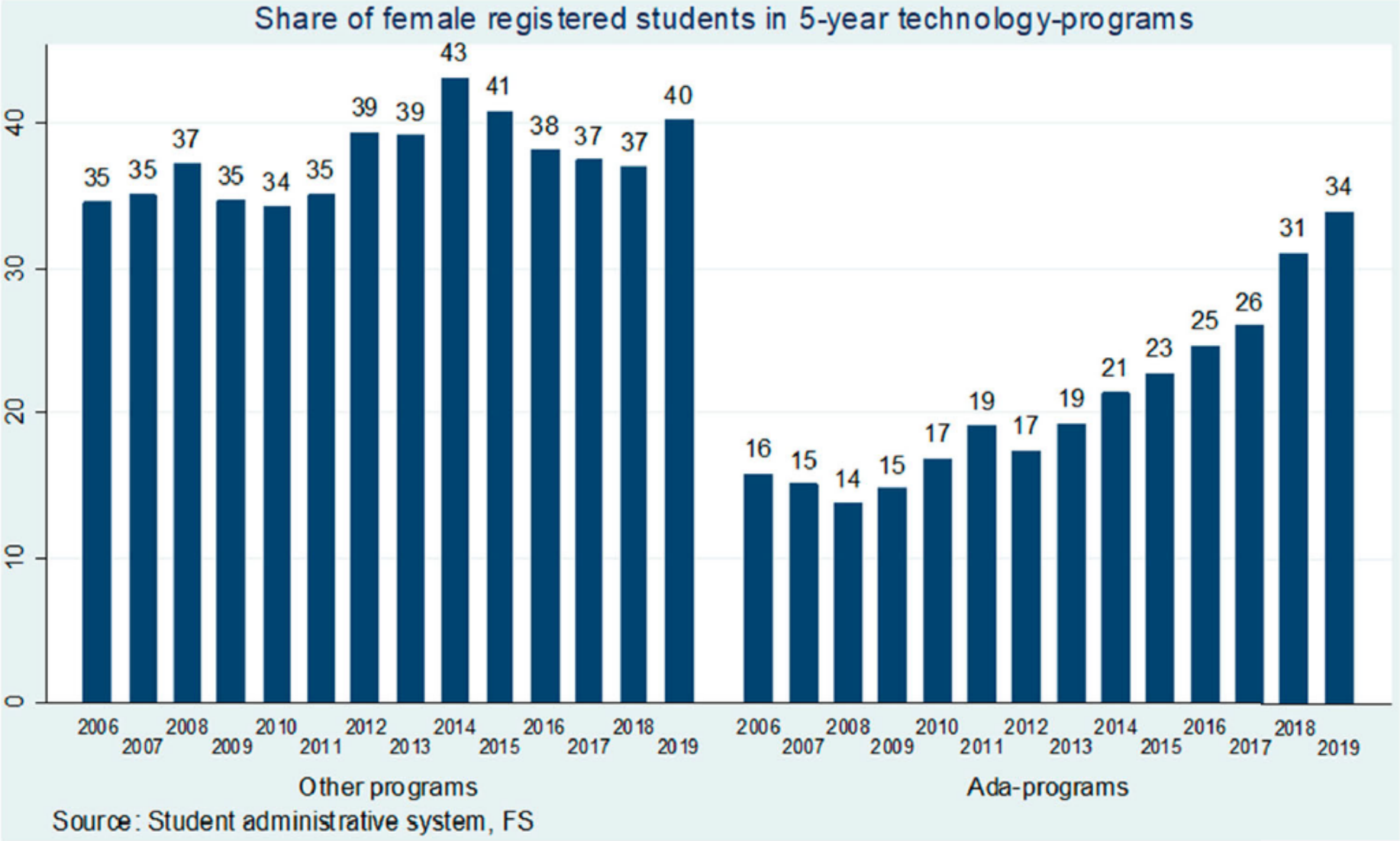
BARRIERS AND FACTORS DISCUSSED IN THE TALK

- Critical mass and sense of belonging
- Stereotypes and false beliefs
- Confidence gap, perfectionism
- Flawed meritocracy and diverse talent appreciation
- Differences in talents/cognitive styles
- Unconscious bias
- Challenges of achieving diversity

EXAMPLES OF SUCCESSFUL INITIATIVES

- Carnegie Mellon (CMU)
  - the share of women in the School of Computer Science improved from 7% in 1995 to 42% in 2000
  - change in the admission criteria to weaken preferences for highly experienced students
  - build a more diverse body of students that self-sustained itself after discontinuing some efforts
- California Polytechnic University (CPU)
  - improved the percentage of women students in the software engineering program from 4% to 19% over the course of a decade (reported in 2018)
  - an introductory computing course for all students; a student group for women to provide a community of support; outreach initiatives toward girls in high schools, incl. bringing them to the university to learn about computer science; sending students to the celebrating Grace Hopper conference; capstone project where students worked for a real customer over time and decided whom to work with

ADA PROGRAM AT NTNU (NORWAY)



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EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Minerva Informatics Equality Award

The Minerva Informatics Equality Award recognises best practices in Departments or Faculties of European Universities and Research Labs that **encourage and support the careers of women in informatics research and education**.

The steering committee for the Minerva award are the members of the Informatics Europe Working Group Women in Informatics Research and Education (WIRE), which now are part of the COST Action European Network For Gender Balance in Informatics (EUGAIN).

On a three-year cycle, the award focuses each year on a different stage of the career pipeline:

- Developing the careers of female faculty, including retention and promotion;
- Supporting the transition for PhD and postdoctoral researchers into faculty positions;
- Encouraging female students to enrol in Computer Science/Informatics programmes and retaining them.

The 2022 Award

The 2022 Award is devoted to **gender equality initiatives and policies to develop the careers of female faculty, including retention and promotion.** It celebrates successful initiatives that have had a measurable impact on the careers of women within the institution.

Access the 2022 Call for Submissions.

Submit to the 2022 Award

Deadlines

Full Submissions: 30 June 2022

Winner(s) notification: August 2022

Submissions Closed

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Past Winners & Award Committees

2021 - Recruiting and Supporting Female Students

2020 - Careers of Female PhD and Postdoc Researchers

2019 - Careers of Female Faculty

GENDER DIFFERENCES IN COLLABORATION IN R&I

- **Women as co-authors:** In a co-author pair, the probability of a woman's coauthor to be a woman in the dataset is 21.2%, the probability of a man's coauthor to be a women is 12.3%.
- **Teamwork:** Total of 232 papers had a single author, of which 18 were women, 209 were men.
- **Source:** Yamamoto, J., and Frachtenberg, E. (2022). Gender differences in collaboration patterns in computer science. Publications, 10(1), 10.

Field	Authors	Women
Human-computer interaction	4066	26.3%
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Knowledge systems	1792	16.1%
Software engineering and languages	961	13.7%
Artificial intelligence	8908	11.8%
Computer systems	9673	10.3%
Theory and algorithms	1241	8.3%
Overall	**27098**	**14.1%**

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TAKEAWAY #1

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THE RIGHT WAY TO DO IT

TAKEAWAY #2

The best thing you can do to promote diversity is to dismantle “the right way to do it.”

TAKEAWAY #3

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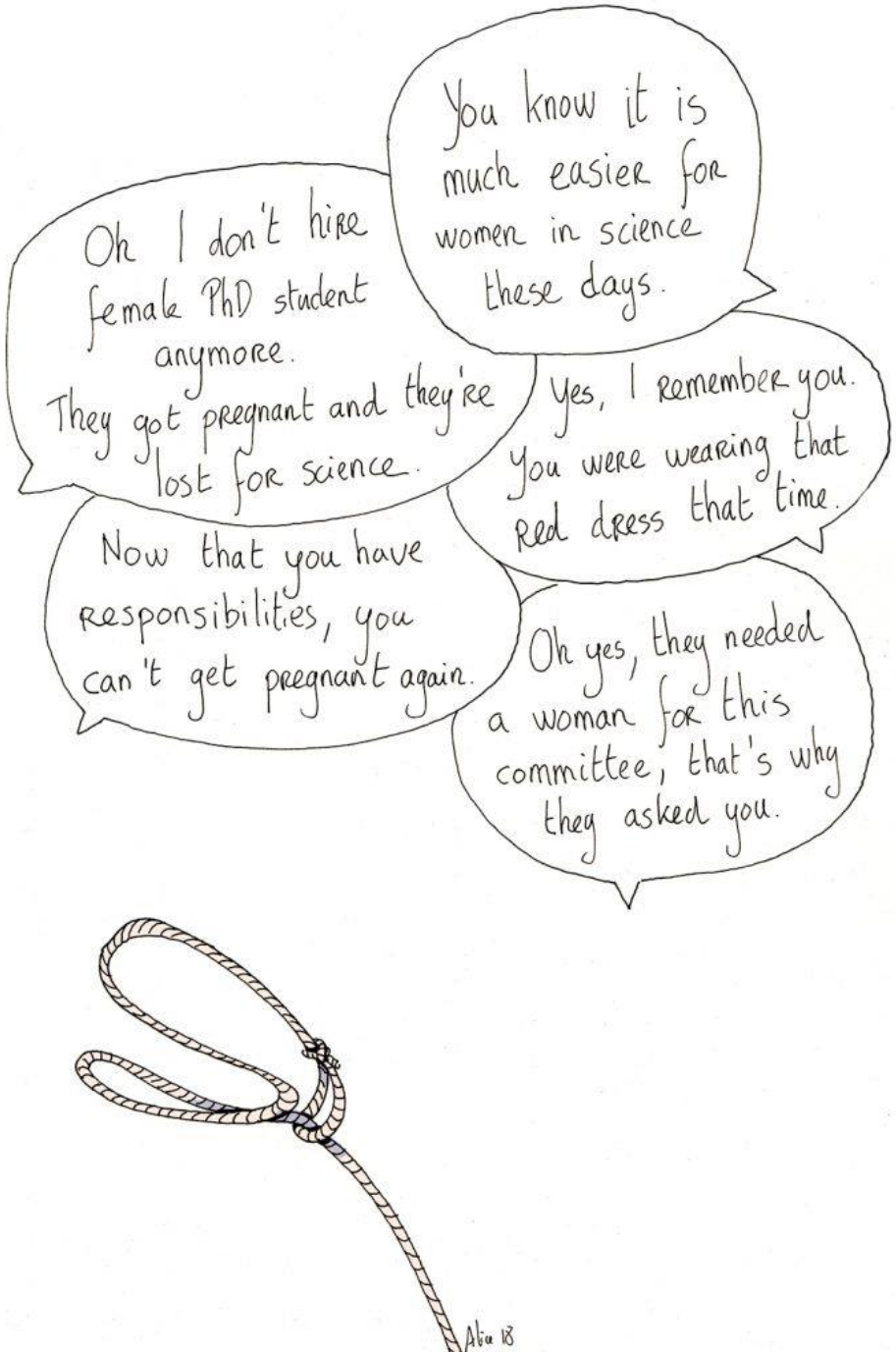
Thank you.

CASUAL SEXISM IN RESEARCH TEAMS

And the way to communicate about it

Depleting Power of Casual Sexism



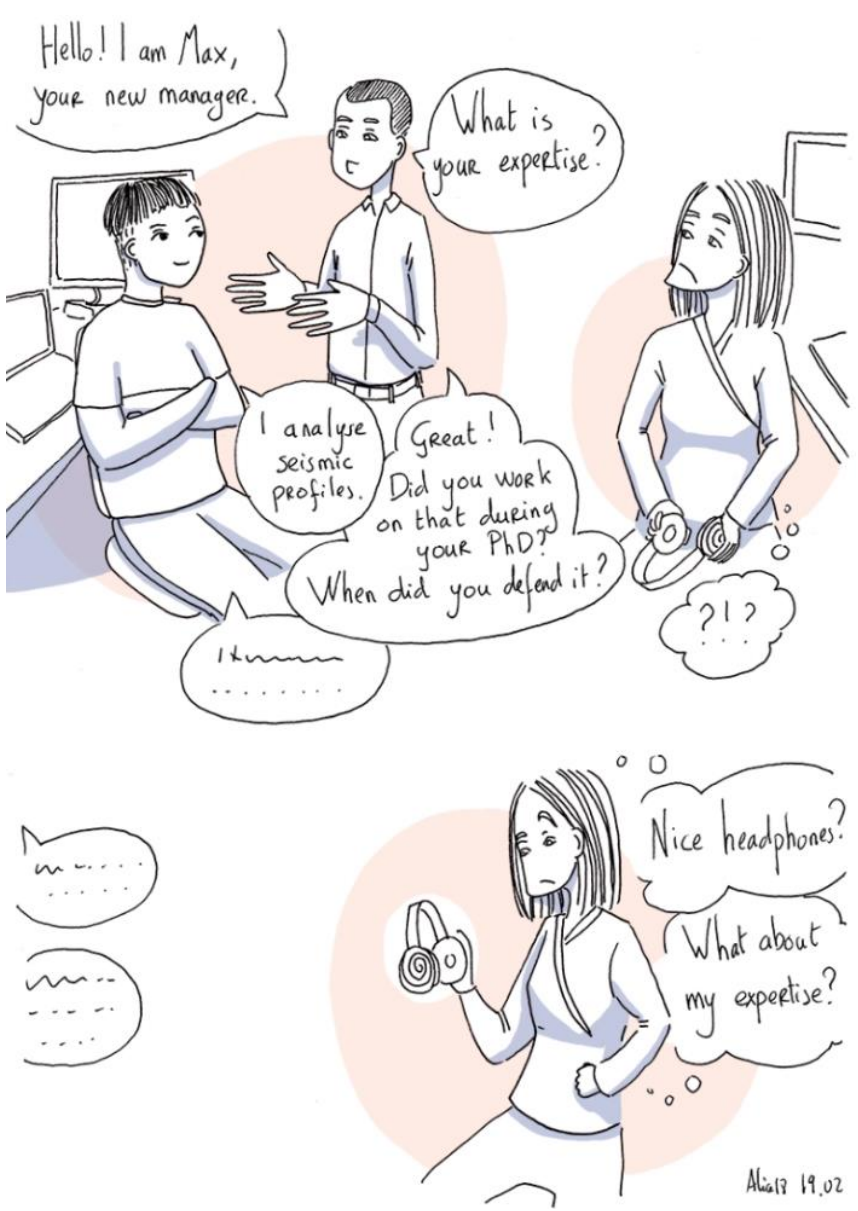
You are overreacting!
You need to learn to take a joke

Unequal distribution of of unpaid tasks is not a thing anymore. Really?

Credibility Gap

Credit: Alice Adenis / didthisreallyhappen.net, CC BY-NC-ND 4.0

I treat women and men equally



You need to learn to take a compliment

Learn to become who we want you to be

MATERNITY WALL

- Assumptions about competencies
  - In a study by Correll, Bernard and Paik (2007), mothers were rated as significantly less competent, less engaged, less suitable for promotion, received significantly lower initial salaries, 48% of mothers were recommended to be hired compared to 87% of non-mothers.
- Higher standards for mothers
  - Lower tolerance for delays, needed significantly higher scores in the management test to be considered for hiring
- Assumptions about their decisions
  - It is assumed that they will not be interested in a higher position
  - When they are not in the office, they are assumed to be at home with the children

It's easier to be a woman than man, nowadays

Dissolving Sexism and Discrimination