Chapter 1
How to Read This Book: Personas Guiding Through EUGAIN Results

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Welcome to the summary of the results of the EUGAIN project. Many researchers have poured their hearts into this COST Action project. A COST Action is a network building activity funded by the European Union. As such, the contributions in this book present a Euro-centric view from all corners of Europe—the Nordics (for example, Sweden and Norway), the South (for example, Italy and Albania), the East (for example, Turkey and Romania), and the West (for example, Portugal and France).

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From the outset, we knew that women are underrepresented in Informatics at all levels, from undergraduate and graduate studies to participation and leadership in academia and industry. The main aim and objective of EUGAIN was to improve gender equity in Informatics at all levels through the creation of a European network of colleagues working at the forefront of the efforts for gender equity in Informatics in their countries and research communities.

In the last four years, we have created a community of researchers who care about equality, equity, inclusion, diversity, and accessibility. We present our findings and insights in this book.

1.1 Origin, Scope, Purpose and Plan

The primary purpose of this book is to serve as a comprehensive guide, translating research into best practices to promote gender inclusivity in Informatics, **spanning the entire educational and professional spectrum from early schooling to advanced career stages.** The handbook seeks to empower its readers by providing them with actionable recommendations to bridge the gender gap in Informatics. This initiative aims to have an immediate impact on the Informatics community by raising awareness and interest through its practical resources, and on society by encouraging more girls and women to pursue computer science and technological studies and follow related career paths. This book presents five years of research on gender equity and improving gender equity in Informatics across Europe. It translates current research on gender inclusivity into practical strategies and intervention methods, offering recommendations for the recruitment, retention, and promotion of women in computer science at different academic and industrial levels. Additionally, it provides insights into fostering mutually beneficial cooperation between universities and industries.

We have collected data from different target audiences and across various education and career levels to provide insights into why we have low participation rates among girls and women in the sciences, why we have a leaky pipeline in academia, and why women leave the industry.

We have analyzed this data and identified four target audiences for activities and policy influence. We provide recommendations for each of these groups on

how to become active in advocacy and specific actions they can take in their daily environments to improve learning and work conditions, as well as retain women students and professionals.

We provide ample scenarios for how to apply our findings in practice and share materials both in the book and in free public access online documentation to disseminate this knowledge further.

The book serves as a joint European voice in Informatics to increase equity for women in the field. In particular:

- We provide six personas with which you, the reader, can identify, allowing you to select the most urgent actions based on your position and background.
- In each chapter, we present concrete options for applying the knowledge provided for the identified personas so that you, the reader, can put it into action immediately.
- We showcase data from many countries across Europe and thereby provide a platform for a diverse set of voices on gender equity in Informatics.

1.2 Intended Audience and Their Personas

We use personas [3] in this book to describe segments of the target audience such that the readers can identify themselves with one or several of them and get a better idea of how to use the book. Each of them has a triple-versioned name to represent different genders and cultural regions, as well as a role and a tagline:

- Kim/Kimmy/Kymi, the university professor—"Give me visuals and stories"
- Brandy/Bazyli/Bo, the industry manager—"With speed to excellence"
- Nicky/Nicole/Nicolas, the activist—"Same value deserves the same rights"
- Alex/Andrea/Anh, the school principal—"I raise the future generations"
- Des/Deniz/Derya, student about to graduate—"Life is an adventure"
- Jem/James/Jamila, school teacher—"Science rocks"

In the following, we introduce each of them:

Kim/Kimmy/Kymi, the university professor. "Give me visuals and stories"
Background:

- 44 years old, United Kingdom;
- PhD in Engineering, 3 kids;
- Runner, leadership mentor;

Work and skills:

- 12 years of teaching Computer Science;
- Lectures, assignments, exams;
- Loves service-based teaching;
- Collaborates with career office;

Needs:

- Wants to better help their students while teaching;
- Needs access to visualized data and guidelines;
- Stories to relay to the students as examples (Fig. 1.1);

Fig. 1.1 Kim/Kimmy/Kymi, the university professor

Brandy/Bazyli/Bo, the industry manager. "With speed to excellence"
Background:

- Grew up in the capital;
- Made first million at 29 years of age;
- Very ambitious team player;

Work and skills:

- Runs a team of 40 developers;
- Expert on collaborative communication style;
- Volunteer at a non-profit for pets;

Needs:

- "Overwhelmed" with the request for gender equity in his department;
- Wants to uplift their female team leads but no idea how;
- Quick solutions and easy implementation (Fig. 1.2);

Fig. 1.2 Brandy/Bazyli/Bo, the industry manager

Nicky/Nicole/Nicolas, the activist. "Same value deserves the same rights"
Background:

- Single and no kids;
- Social science background;
- Took care of younger siblings and doesn't want kids;

Work and skills:

- Organizes community gatherings;
- Works with equality office;
- Creates flyers and brochures;
- Gives talks at schools and companies;

Needs:

- Needs supportive data from research for their campaigns;
- Wants to influence communal and national politics;
- Needs Information on how others work on improving equity (Fig. 1.3);

Fig. 1.3 Nicky/Nicole/Nicolas, the activist

Alex/Andrea/Anh, the school principal. "I raise the future generations"

- 52 years old, divorced and 4 kids in patchwork family situation;
- Degree in education;
- Wanted to be a rock star;

Work and skills:

- Manages colleagues, students and their families all day long to keep peace;
- Consults with orientation officers and parents;
- Assigned advisor of local consortium on tech expertise;

Needs:

- Wants to better help their students while teaching;
- Needs visualized data and applicable guidelines;
- Wants stories to relay to the students as examples (Fig. 1.4);

Fig. 1.4 Alex/Andrea/Anh, the school principal

Des/Deniz/Derya, a student about to graduate. "Life is an adventure"
Background:

- Completing an MSc in Informatics;
- First in their family to graduate from a university;
- Excited about research and potentially about moving abroad for a while;

Work and skills:

- Research on MSc project;
- Active in student union;
- Job as a bartender at a juice bar;

Needs:

- Trying to decide between academia and industry;
- Orientation in the labor market as well as careers in research; knowing what to look for;
- Learn about opportunities for mobility grants to go abroad (Fig. 1.5);

Fig. 1.5 Des/Deniz/Derya, a student about to graduate

Fig. 1.6 Jem/James/Jamila, school teacher

Jem/James/Jamila, school teacher. "Science rocks"
Background:

- Sibling of five, parent of two;
- Inner city school;
- Avid urban gardener;

Work and skills:

- Teaches history and art, mostly in-class work;
- Experience with students from varying socio-economic and cultural backgrounds;
- Volunteers for after-school;

Needs:

- Excited about STEM and wants to support their students being open to that direction;
- Wants stories that counter exemplify cliches;
- Looks for in-class activities to inspire students (Fig. 1.6);

1.3 Usage of the Personas Through the Book

We use Personas in each chapter to explain how they (but really: You, the reader) can make use of the contents in the chapter. For example:

Alex, the school principal. Looking at the resources in this chapter, Alex, the school principal, takes the recommendations to their next school board meeting. Some teachers are enthusiastic about developing role models in the classroom; others are a bit more skeptical. So Alex starts a group activity where the teachers pair up with a partner, interview each other on what role models they have in their lives, and create role model descriptions for each other.

1.4 Gender-Forward Intersectionality

Throughout this project and during our dissemination at conferences and in talks, we were often asked why we focus solely on women, since there are also other minorities that need support in achieving equity. This section aims to clarify that our approach extends beyond gender, recognizing that gender was historically the first focus in conversations about equity. We do strongly support **reaching equity for all minorities**.

Intersectionality is the recognition that characterizations create interconnected systems of disadvantage and oppression. It is a sociological analytical framework for understanding how groups' and individuals' social and political identities result in unique combinations of discrimination and privilege. The term was coined by Crenshaw [2] in the 1980s to point out the unique experiences that black women face, as their compound marginalization, traits as being both *black* and *a woman*, create impact. In looking to the future of informatics research and gender equity, we at EUGAIN recognize the need to acknowledge that gender is more than just a binary, and gender alone cannot capture one's experiences, both in informatics and beyond. Takaoka, Cutrupi, and Jaccheri [4] introduced the concept of *Gender-Forward Intersectionality* as a way for informatics researchers, particularly in empirical software engineering, to talk about diversity and inclusion in their work. Gender-forward intersectionality is defined as a perspective that uses gender as the starting point to identify and examine inequalities and discrimination, while also considering other intersecting traits.

In gender-forward intersectionality, gender is used as the starting point to explore how other traits and their unique intersections may also impact informatics experiences, both in design and use. In a previous study, Takaoka et al. [6] explore how women interact with tools designed for an inclusive transition to climate neutrality, as well as the accessibility features and limitations that people with visual and other impairments may need. Additionally, they discuss heuristics identified by women, during early prototyping, connecting them to gamification elements that can benefit a broad range of app users [5]. This same study also identifies that the omission of women in the design process can result in the exclusion of women from released products. Tuma et al. [7] present a study that evaluates risk analysis that begins with gender but also explores how traits like education, race, nationality, ethnicity, age, and seniority impact experiences in cybersecurity education.

However, gender-forward intersectionality has a broader reach than informatics. By using gender as a starting point to explore both individual and collective experiences, it is possible to identify the gaps in technology and software products when teams lack the richness and diversity of the users they serve. These gaps are visible as biases and ethical concerns, which are inherently social and cultural issues. These concerns highlight the need for the inclusion of diverse users and test cases, as well as the formation of more diverse teams throughout the design process, from school to professional working life. We are also witnessing the negative effects of technological dependence on public, physical, and mental health [1]. The continued embeddedness of technology in our modern world is only one aspect of how gender-forward intersectionality can be applied across disciplines. Even though gender-forward intersectionality was defined in an informatics context, the applicability and exploration of experiences and marginalization using gender as a starting point is inter- and transdisciplinary. We invite researchers in all schools to investigate marginalization, gender equity, and gender issues from using gender-forward intersectionality.

1.5 Book Structure

The book is composed of 16 chapters that are all based on research conducted within the last 5 years and are related to the EUGAIN Gender Balance in Informatics initiative. In the first part of the book, we focus on creating interest in STEM subjects and the related interventions, namely recruitment initiatives for the university, student activities inside and outside the classroom, and mentoring and career programs that can be provided by the school, after-school programs, or independent non-profit organizations. In the book's second part, we focus on the support during university studies and what we have learned about the status quo (female student voices across universities), research activities to support gender equity in students, and how to create community research projects for underrepresented minorities. In the book's third part, we target the currently very leaky faculty pipeline for female processors, specifically in best practices of what works and what doesn't for recruitment and retention of female candidates and continued collaboration between management and employees at the faculty. The fourth part zooms in on the cooperation with industry and society, both in terms of best practices for collaboration between academia and industry as well as innovative ways of cooperating with public administration.Finally, the part on strategy and dissemination gives an overview of the most crucial channels for voicing the importance of and influencing the gender equity in informatics. These channels include awards, policy making, and strategic dissemination of research results and role model examples in digital media.

Instead of providing detailed summaries for each of these chapters, we are providing a sample for the chapter "Female student voices across universities." In this chapter, we focus on the challenges and opportunities for female PhD students, as perceived by them. Using a mixed-methods approach, we draw on their personal experiences to extract valuable lessons learned on how to successfully navigate

through the process of studying for a PhD. These include (1) a characterisation of the encouraging and discouraging factors on the decision to enroll in a PhD in Computer Science and how these differ by gender and other external factors, such as geographic location; (2) the factors that helped in successfully working towards a PhD, as well as the obstacles in the way, how to cope with them, and where to get help, when necessary. These first-person, relatable testimonies can help prospective and current female PhD students in Computer Science, as well as their supervisors and peers, to create more favorable conditions for these students to thrive in their PhD studies, mitigating the current lack of equity in PhD studies.

References

1. David Bakker, Nikolaos Kazantzis, Debra Rickwood, and Nikki Rickard. A randomized controlled trial of three smartphone apps for enhancing public mental health. *Behaviour Research and Therapy*, 109:75–83, 2018.
2. Kimberlé W Crenshaw. *On intersectionality: Essential writings*. The New Press, New York, NY, USA, 2017.
3. Lene Nielsen. *Personas-user focused design*, volume 15. Springer, 2013. https://link.springer.com/content/pdf/10.1007/978-1-4471-7427-1.pdf.
4. Alicia Julia Wilson Takaoka, Claudia Maria Cutrupi, and Letizia Jaccheri. Defining software engineering feminism as a field of software engineering, 2024.
5. Alicia Julia Wilson Takaoka and Letizia Jaccheri. Mapping gamification elements to heuristics and behavior change in early phase inclusive design: A case study. In *International Conference on Human-Computer Interaction*, pages 143–161. Springer, 2024.
6. Alicia JW Takaoka, Dirk Ahlers, Ferdinand Ward Ådlandsvik, Eivind Syrdalen Dovland, and Letizia Jaccheri. Towards understanding digital support contributing to climate neutral, inclusive, and beautiful cities: A systematic literature review. In *2023 IEEE/ACM 7th International Workshop on Green And Sustainable Software (GREENS)*, pages 30–37. IEEE, 2023.
7. Katja Tuma and Romy Van Der Lee. The role of diversity in cybersecurity risk analysis: An experimental plan. In *Proceedings of the Third Workshop on Gender Equality, Diversity, and Inclusion in Software Engineering*, pages 12–18, New York, NY, USA, 2022. Association for Computing Machinery.