

# Bridge the Gap! Conference

## Small group meeting

*How to attract and retain technical talent in school and work contexts?*



Program booklet academic meeting

A warm welcome on behalf of the Bridge the Gap! project team to our 1-day small group meeting. In this meeting, we will share and discuss cutting-edge research on how to attract and retain technical talent in school and work contexts among social scientists. Topics discussed will include social identity, stereotypes, gender inequality in STEM, professional development of engineers and turnover in STEM.

After this meeting, we will share all our materials on: [thecareercompass.app](https://thecareercompass.app)

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# Programme

9.30	Sign in / coffee
10.00	<b><u>Keynote Ruth van Veelen</u></b> Building a professional identity in STEM: Key insights and deliverables of 4 years Bridge the Gap! research <i>Social, Health and Organizational Psychology, Utrecht University;</i>
10.50	<b><u>Morning session</u></b> Envisioning a future in STEM: challenges of inclusion among underrepresented students
	<b>Katharina Block</b> ( <i>Social and Behavioral Science, University of Amsterdam</i> ) A complex picture – Predictor's of women's STEM interest within and between countries <b>Kezia Olive</b> ( <i>Educational Sciences, University of Helsinki</i> ) Gendered difference in motivation profiles, achievement and STEM aspiration of elementary school students
11.30	Coffee break
11.45	<b>Sofie Craps</b> ( <i>Engineering Technology, KU Leuven</i> ) Right from the start. The importance of supporting professional and self-awareness in making well informed career choices. <b>Marlon Nieuwenhuis</b> ( <i>Educational Science and Technology, University of Twente</i> ) Where do I belong?: Drop-out in first year STEM education of women, international and first-generation students. <b>Mieke Cannaeerts</b> ( <i>Engineering Technology, KU Leuven</i> ) Underrepresented groups of engineering students: role of professional awareness in inclusion
12.45	Lunch
13.45	<b><u>Keynote Francesca Manzi</u></b> Keynote on why women have a harder time than men entering and staying in STEM <i>Department of Management, London School of Economics</i>
14.45	Coffee break
15.00	<b><u>Afternoon session</u></b> Creating a diverse workforce in STEM: Workplace 'push/pull' factors for professionals
	<b>Fabiola Dorn</b> ( <i>School of Psychological Science, University of Bristol</i> ) Understanding quitting intentions of novice employees in engineering: a qualitative pilot study <b>Lianne Aarntzen</b> ( <i>Educational Science and Technology, University of Twente</i> ) Daily diary study on newcomer socialization in technical companies <b>Elena Bacchini</b> ( <i>Social, Health and Organizational Psychology, Utrecht University</i> ) At the heart of society: Majority group members' responses to social change <b>Iris Meinders</b> ( <i>Center for Social and Cultural Psychology, KU Leuven</i> ) Daily perceptions of feedback and academic certainty among junior researchers in competitive or more collaborative STEM-fields
16.30	<b>Closing session &amp; Drinks (ends at 17.30)</b>
18.00	Dinner (optional)

# Abstracts

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**Keynote Ruth van Veelen** (*Social, Health and Organizational Psychology, Utrecht University*)

**Title: Building a professional identity in STEM: Key insights and deliverables of 4 years Bridge the Gap! research**

The purpose of this talk is to introduce you to the Bridge the Gap! project, and take you through the who, what, when, why, and how of four years of Bridge the Gap! research. I will discuss the challenges that educational programs and companies in STEM face with regards to attracting and retaining diverse STEM talent. In overcoming those challenges, current Diversity & Inclusion policies that may seem fruitful on the surface, actually include certain 'blind spots' with potentially adverse effects, particularly for women and other minority groups to progress their careers in STEM work contexts. Building from my own research agenda, I will discuss empirical studies from the Bridge the Gap! program and beyond, that evidence these challenges and adversities, particularly with regards to what it is like for women (and men) to study or work in traditionally masculine contexts. Then, I invite you to take a look beneath the surface, and I will explain how the professional identity approach that we take in the Bridge the Gap! project may form a good alternative to talk about diversity and to build more inclusive school and work cultures in STEM. In closing, I introduce you to the insights & tools that Bridge the Gap! researchers have delivered, and how you can learn more during the rest of the conference program. Themes and topics addressed in this talk set the stage for further knowledge exchange with academic speakers in today's program.

**Keynote Francesca Manzi** (*Department of Management, London School of Economics*)

**Title: Why women have a harder time than men entering and staying in STEM**

This talk will focus on the social, psychological, and structural factors that help perpetuate the gender gap in STEM. Integrating research from different disciplines, I will review evidence of how the perceived lack of fit between stereotypes of women (e.g., women are sensitive) and stereotypes of STEM fields (e.g., scientists are rational, engineers are industrious) foster beliefs that women are not well-equipped to succeed in STEM-related roles and occupations. I will argue that these perceptions, in turn, lead to negative outcomes for women and positive outcomes for men: Even when women and men demonstrate equivalent performance, women are more likely to be discriminated against and to perceive themselves as not having "what it takes". In addition, I will show how recent policies intended to increase the number of women in STEM (e.g., gender quotas, diversity training) often elicit resistance among men and give rise to an additional (and unintended) barrier to gender equality. I will end with a discussion of evidence-based recommendations for bridging the gap in STEM.

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## Talks

**Katharina Block** (*Social and Behavioral Science, University of Amsterdam*)

**Title: A complex picture – Predictor's of women's STEM interest within and between countries**

Despite efforts to increase gender equality, labor markets in Western countries remain highly gender segregated. Women tend to be especially underrepresented in careers in Science, Technology, Engineering, and Math (STEM) and show relatively low interest in these careers. Several psychological models have documented obstacles to women's STEM interest, most notably external gender role norms (i.e., the perception that STEM does not fit with the female gender role) and women's internal communal values (i.e., women's strong orientation towards working with others). However, most past work has not used samples large enough to examine how several factors contribute to women's low STEM interest simultaneously. As a result, little research has examined how internal and external psychological factors independently contribute to gender differences in STEM interest and act alongside more realistic concerns (family responsibilities and salary). The current work examines the role of internal factors (communal and agentic values), external factors (perceptions of gender role norms), and realistic concerns (childcare responsibilities and perceived salary) in predicting the gender gap in interest in STEM careers. In Study 1, a large (N = 4500) sample of North American men and women is utilized to model competing internal, external, and realistic mediators for gender differences in STEM interest simultaneously. In Study 2, a cross-national sample (N = 49 countries) is used to examine whether predictors of women's STEM interest vary systematically between cultures. Data collection is complete and data analyses will be completed before the talk.

**Kezia Olive** (*Educational Sciences, University of Helsinki*)

**Title: Gendered difference in motivation profiles, achievement and STEM aspiration of elementary school students**

To understand the gender gap in STEM (Science, Technology, Engineering and Math) aspiration, the critical role of domain-specific motivation (i.e., expectancy and task values) was examined. Using longitudinal data of 5th grade (~11-year-olds) and 6th grade (~12-year-olds) students (n= 360, 55% girls), person-oriented analyses was applied to understand the gendered motivational profiles and their concurrent and longitudinal influence on STEM aspiration and achievement. Specifically, we aimed to (1) derive motivational profiles of motivational beliefs for science, mathematics, and language (Finnish), (2) analyze the stability and change of these profiles from 5th to 6th grade, (3) analyze the relationship between motivational profiles with achievement and STEM aspiration, and (4) test for gender differences. We derived four motivation profiles in both years: high-motivation in all subjects (~21%), moderate motivation paired with high mathematics motivation (~46%), low mathematics motivation (~11%), and low-motivation in all subjects (~8%). Latent transition analysis revealed that most students stayed in the same profile across the two years. We found evidence of gendered difference in motivational profile and transition. More girls are characterized by low math motivation, while boys are more likely to transition to higher math motivation in 6th grade. The motivational difference is reflected in their achievement, although not strongly coupled with STEM aspiration. The findings suggest that at this developmental stage, Finnish students have not developed the same strong association between (gendered) STEM aspiration and their domain-specific motivation, although their motivation have influenced their achievement. Interpretation and practical implications are discussed.

**Sofie Craps** (*Engineering Technology, KU Leuven*)

**Title: Right from the start. The importance of supporting professional and self-awareness in making well informed career choices.**

Research indicates that engineering students, even close to graduation, have difficulties in understanding what engineers do and in reflecting on themselves as future engineers. This lack in professional and self-awareness can hinder the education to work transition with students ending up in a job that does not correspond to their expectations. Research in this area is often focused on the so called skills mismatch, indicating that industry reports difficulties in finding engineers with the right (level) of competencies, and tend to neglect the different roles an engineer can take on. The European project PREFER (Professional Roles and Employability for Future Engineers) aimed to develop a professional roles framework for early career engineers that can serve as a reflecting instrument for engineering students and that captures the diversity in engineering roles. Two tests were developed to enhance students' professional awareness and reflection on the future self. This research talk presents the validated instruments that were developed in close collaboration with industry. Building on the PREFER outcomes, further research was conducted to better understand career development learning in engineering. To date, research on this topic has broadly defined a future career as 'an engineer', neglecting students might have difficulties in envisioning its meaning and, by consequence, making well informed career choices. In this research talk, the main results of the different studies that were set up (a survey (N=898), two case studies and interviews (N=20) with engineering students and graduates) will be discussed. For example, they showed the importance of professional awareness and career exploration in educating confident engineers that are more likely to enter the labour market with the right expectations and competencies from the start, which benefits their job satisfaction. Based on these results, a series recommendations for education and industry were drawn.

**Marlon Nieuwenhuis** (*Educational Science and Technology, University of Twente*)

**Title: Where do I belong?: Drop-out in first year STEM education of women, international and first-generation students.**

One third of students who start a STEM (Science, Technology, Engineering and Mathematics) degree in The Netherlands drop out in their first year. Minority groups in STEM, such as women and international students, are less likely to feel at home in STEM which enhances their risk of dropping out. However, first-generation students, another minority group at risk of feeling less belonging, have received relatively little attention in STEM. In this research we examine if well-known predictors of dropout – academic self-efficacy, social connectedness with peers, interest in STEM and belonging – are more important for some minority groups compared to others. In a sample of 850 first year STEM students, we use logistic regression to examine to what extent these factors predict drop-out in first-year STEM education, and how processes underlying drop-out differ for different minority groups in STEM. Based on these findings, we make recommendations how diverse talents in STEM education can best be retained.

**Mieke Cannaeerts** (*Engineering Technology, KU Leuven*)

**Title: Underrepresented groups of engineering students: role of professional awareness in inclusion**

A diverse work force leads to more productivity, innovation, and better decision-making, so in general to a smarter industry and to societal improvement. The first step to gain a diverse work force is attracting and retaining a diverse group of graduates. While women make up more than half (52.8%) of the new bachelor students at KU Leuven, only 10.2% of the new students at the

Faculty of Engineering Technology (FET) are female. The group of students with a migration background is even smaller with 8.4%, compared to 13.9% university-wide. While women have a higher retention rate than men, students with a migration background dropout more easily. That is why this project focuses on improving the recruitment of female students and the retention of students with a migration background. The project uses mixed methods, namely focus groups, a narrative study, and a quantitative study based on validated questionnaires with last-year pupils of secondary school and first year FET students. An important objective of this project is to increase sense of belonging, motivation, and persistence of underrepresented students along with creating an inclusive learning environment through the implementation of the optimized PREFER (Professional Roles and Employability for Future EngineerRs) tests, which initiate and stimulate reflection among engineering students about their professional identity. The first results of this project are presented in this talk. These results are based on focus group discussions with three groups: female first-year students, first-year students with a migration background, and study choice counsellors. The focus groups have an exploratory character and focus on the motivation to study engineering, critical incidents, and future career plans. They will give a first insight in how the students experience their study choice which can help guide the focus of the research project.

**Fabiola Dorn** (*School of Psychological Science, University of Bristol*)

**Title: Understanding quitting intentions of novice employees in engineering: a qualitative pilot study**

In many technical professions (such as engineering), employers struggle to retain workers during their initial years of full-time employment. To better understand this phenomenon, behavioural and social scientists have begun to study novice employees' intentions to quit a technical job. This work has identified a range of predictors of quitting intentions, but it remains unclear whether they apply equally to occupational quitting intentions (OCIQ) and organisational quitting intentions (ORIQ). To address this question, structured interviews were conducted with 9 novice engineers (6 male, 3 non-male) who recently started full-time employment at a large global technology company. The interview probed their OCIQs and ORIQs alongside a range of additional job-, occupation-, and organisation-related attitudes and experiences. Replies were analysed using Thematic Analysis. We found that novice engineers were less likely to report OCIQs than ORIQs. Employees with OCIQs cited a perception of traditional engineering as 'too technical', other professional interests, and/or a desire to start their own business as key motives. Employees with ORIQs cited a want to transition to a different engineering field and/or expectations of better growth and self-development opportunities at another employer as main reasons. Both groups of employees also mentioned difficult working conditions (e.g., time pressure, lack of resources) and ineffective work procedures (e.g., a lack of guidance, poor cross-team collaboration, complicated process management) as reasons for their deliberations. These findings begin to shed light on commonalities and differences in predictors of two distinct types of quitting intentions as relevant for both theory and practice.

**Lianne Aarntzen** (*Educational Science and Technology, University of Twente*)

**Title: Daily diary study on newcomer socialization in technical companies**

There is a high shortage of STEM talent on the labor market. While STEM education is gaining popularity, only 44% of STEM graduates opt for a career in the technical sector. Moreover, many STEM professionals leave the field in their first year(s). A key explanation for this huge loss of human capital is that many new professionals do not fit the stereotypical image of a STEM professional (e.g., introvert, male, interested in things). Non-prototypical newcomers may receive less social validation during their daily workplace interactions than more prototypical newcomers (i.e., they

feel less accepted and respected during such interactions). In the present study, we explored if we could identify different trajectories of how STEM newcomers feelings of acceptance and feelings competence during daily workplace interactions develop over time. Furthermore, we examined links with newcomers' prototypicality and turnover. Across, N=1,726 data points nested in 122 individuals, we find that on days that newcomers feel more accepted and respected during their daily interactions, they also feel more at home and this even spills over to the next day. In addition, latent class growth analyses revealed three different trajectories of feeling competent during daily interactions (i.e., a high stable competent, moderate stable competent and low stable competent group) and three different trajectories of feeling accepted during daily interactions (i.e., a high stable acceptance, moderate stable acceptance and moderate decreasing group). Newcomers' prototypicality (i.e., gender, nationality, and feeling prototypical) did not predict to which trajectory they belonged. However, interactional trajectories predicted some work outcomes (e.g., newcomers in the moderate-decreasing interactional acceptance group were less satisfied with the organization than newcomers in the other two acceptance groups). The current study demonstrates the importance of newcomers' daily workplace interactions in understanding how newcomers socialize successfully.

**Elena Bacchini** (*Social, Health and Organizational Psychology, Utrecht University*)

**Title: At the heart of society: Majority group members' responses to social change**

Societies across the globe undergo unprecedented changes in terms of evolving gender and racial relations. To aid societal cohesion, it is important to understand when and why members of traditionally advantaged groups respond to change in a welcoming or defensive manner. In Study 1, we examine white men's emotional and attitudinal responses to cues of social change. In Study 2 and 3, using webcam-based technology, we measure participants' engagement in issues of social change (reflecting on privileges, their own role and aim in society) by extracting heart rate from video data. Somewhat surprisingly, results indicate that majority-group members displayed less threat-related emotions under stable rather than under unstable conditions, namely a 'relief of social change effect.' Although the current samples consisted of relatively progressive participants, these effects on threat remained even when controlling for ideology. Additional self-reported and heart rate data, however, suggest that signs of instability may at the same time undermine engagement in collective action, presumably because change is already taking place. In sum, results show that social change may not always trigger threat, but that at the same time this may—ironically—undermine majority-group members' motivation to work for social change.

**Iris Meinderts** (*Center for Social and Cultural Psychology, KU Leuven*)

**Title: Daily perceptions of feedback and academic certainty among junior researchers in competitive or more collaborative STEM-fields**

Receiving feedback is a fundamental part of people's day to day working lives and is considered key for professional development and career success. However, we know from research that certain factors can restrict people from getting on board with feedback. The extent to which feedback is seen as trustworthy might explain how certain people feel about their abilities on a day to day basis. This is as of yet unexplored and will be examined in the present study. Furthermore, we propose that the ability to receive trustworthy feedback depends on the dominant work climate. We examined this with a daily diary study among postdoctoral and PhD researchers working in STEM-fields (i.e., Science, Technology, Engineering, & Mathematics). These fields are often highly competitive, something that we expected would predict feedback

trustworthiness. Across N=1,169 data points nested in 200 individuals, we find support for the idea that those who find themselves in more competitive work climates within the STEM-fields perceive the feedback they receive from others as less trustworthy (i.e., as less honest, accurate, and as more positively inflated). This finding is important, because days on which STEM researchers experienced feedback to be less trustworthy were also days on which their ability self-concept was less clear and stable and days on which they experienced higher levels of imposterism. This, in turn, helped explain key outcomes of professional success (motivation and tendency to take risks). These effects were similar among male and female STEM researchers. The current study demonstrates the importance of the dominant work climate in understanding the extent to which junior researchers in STEM feel that they can trust feedback and develop themselves professionally.