"Because we are always stuck in these classic role models."

An exploratory study on digitisation, gender stereotypes and gender-specific labour market structuring in four selected sectors.

Summary of report volume 2 of the research project "DigiTyps"

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1   Objectives and questions

The project "Digityps" ("Digityps – De-stereotyping job profiles and training concepts in the digital transformation"[1] deals with the question of whether and under what conditions the digitisation-related upheavals currently taking place in the world of work represent an opportunity to mitigate gender-specific allocation on the labour market, and whether there are risks for an intensification of related gender-specific differentiations.

In this background, different forms of possible interactions and interrelations between gender stereotypes, gender-specific labour market segregation and digitisation are taken into account and are getting assessed.

Within the framework of DigiTyps these relationships are examined within three different work packages. In work package 2, the focus is on adolescents and young adults and their perceptions in the context of processes of training and career decision-making (cf. Bergmann et al. 2022). Work package 4 addresses the practice of career guidance and job orientation, and in particular the perceptions and views of educational and vocational counsellors (Nikolatti et al. 2022).

The report on work package 3 (cf. Fink 2022), summarized in this document, deals with positions, perceptions, attitudes and experiences in institutions and companies of four selected sectors/branches, namely in (industrial) production, in information and communication technology (ICT), in school education and in the social and health sector (and thereby more specifically the field of intramural care).

The central initial question is:

☐ *What effects of digitisation can be expected on the gender-specific allocation of workers in different sectors/branches?*

Based on conceptual considerations and research results in the relevant literature, this broad initial question is further concretized along the following research questions:

1. *Which interests and skills of workers are considered central in companies or institutions of different sectors/branches in connection with increasing digitisation?*

2. *Are these interests and skills attributed to women and men to varying degrees in a stereotyped way, and if so, to what extent?*

3. *Which patterns of vertical segregation may emerge in the course of increasing digitisation?*

4. *Against the background of increasing digitisation and along the results of questions 1 to 3 – what is the explanatory power of gender stereotypes concerning the gender-specific allocation of workers in companies/institutions?*

5. *Which other explanatory factors are central in this regard from the internal point of view of companies/institutions?*

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2 Literature-based background

The DigiTyps project has three central conceptual reference points: "digitisation", "gender stereotypes", and "gender-specific labour market segregation".

Against the background of the different forms of potential interactions between these three reference points, the potentially relevant literature spans a broad and complex field of different concrete research questions, theoretical and methodological approaches and research results. For example, there is a long research tradition on labour market segregation, in which, among other explanatory factors, the effects of gendered societal role models and gender stereotypes are addressed in different ways (cf. e.g. Busch 2013; Achatz 2018; Clarke 2020). There is also a broad research literature and a long history of research on questions of the formation, content, reproduction and mode of action of gender stereotypes themselves (cf. e.g. Eckes 2010; Elsen 2018; Thébaud & Charles 2018). Since the 2010s, digitisation, its potential or probable effects on the world of work and the resulting gender relations have increasingly become the subject of scientific research (cf. e.g. Hirsch-Kreinsen 2018). In comparison, potential interactions between digitisation and gender-specific labour market segregation in the narrower sense have so far been examined less comprehensively (see, however, for an overview e.g. Pimminger & Bergmann 2020). This is also true regarding the interrelation between digitisation and gender stereotypes, as well as concerning the influence that digitisation may have on the relationship between gender stereotypes and labour market segregation.

The term stereotype can be understood as "qualities perceived to be associated with particular groups or categories of people" (Schneider 2004, 25). And: "Stereotypes reflect general expectations about members of particular social groups. However, even if there is an overall difference between these groups, not all individual exemplars in these groups will necessarily differ from each other" (Ellemers 2018, 276). "Gender stereotypes" essentially addresses the fact that certain characteristics are more likely to be attributed to women, or more to men.

Different explanatory approaches for labour market segregation are taking up this concept more or less explicitly. Thus, gender-specific differences in preferences for different jobs by labour market entrants or workers can be based on a stereotypical self-attribution of interests and abilities (cf. on the German debate on the thesis of "female working capacity": Beck-Gernsheim 1980; Ostner 1978). The concept of employer-side "statistical discrimination" explicitly takes into consideration generalizing assumptions about the characteristics of different easily distinguishable socio-demographic groups (cf. Phelps 1972; Arrow 1973). And in the context of intergenerational transmission, which is the focus of explanations of labour market segregation according to socialization theory (cf. for an overview Busch 2013, 44ff.), culturally anchored stereotypes are also expected to play a role.

Studies on gender stereotypes show that characteristics, more likely assigned to women or men, can be bundled in certain concepts. Characteristics that correspond to concepts such as "warmth", "community orientation", "expressiveness" or "communion" are more likely to be assigned to women. Characteristics that are more often associated with men can be summed up with concepts like "(task-related) competence", "instrumentality" or "agency". Concrete attributes more strongly assigned to women are, for example: being "communicative", being "caring", being "interested in other people" or "trying to appease hurt feelings". Attributes assigned more strongly to men are e.g. having "leadership qualities", being "decisive", being "self-confident" or to "defend one's own opinion" (cf. Troche & Rammsayer 2011).

Studies on so-called occupational gender stereotypes (for a review see Clarke 2020; Thébaud & Charles 2018) show that such attributes get, in turn, associated to varying degrees with different professions, and that in many cases at the same time a corresponding differentiation into "women's occupations" and "men's occupations" takes place. Studies on gender stereotypes dealing with occupations in the STEM[2] field have shown that personality traits, interests, knowledge and skills, which are especially considered to be necessary for such jobs, are at the same time typically attributed to men (cf. with comprehensive literature references: Thébaud & Charles 2018). The existing gender segregation in this area, i.e. the strong numerical overhang of men, supposedly "confirms" these stereotypical attributions and thus contributes to their reproduction, as in particular the "theory of social roles" (c.f. Eagly 1987; Eagly et al. 2000) emphasizes.

With regard to the supply side of the labour market Gottfredson (1981; 1996; 2002) in her "theory of circumscription and compromise" states that gender stereotypes get internalized at a relatively young age concerning perceived typical "female" or typically "male" interests and abilities, and also concerning typical "female" and "male" occupations, which in effect is supposed to have a strong influence on educational and career decisions.

With regard to the demand side, it can be argued that employers sort job candidates according to personality traits, interests and abilities, which are stereotypically attributed as "female" or "male", and at the same time according to their fit with – to a certain extent also more "male" or "female" connoted – perceived requirements of job profiles. Going one step further, Ridgeway (2001, 262ff.) assumes that there is a tendency for men to be regarded as generally "more competent" against the background of strongly culturally anchored "gender status beliefs", and that therefore even with regard to empirically typical "female" areas of activity, there is often the view that women are only "slightly superior".

On the question of whether increasing digitisation can contribute to a reduction of gender-specific labour market segregation, different – both rather optimistic and rather pessimistic – hypotheses can be found in the literature (cf. for an overview e.g. Dengler & Matthes 3019; 2020; Dengler et al. 2019, Kutzner 2018; 2019; 2021; Kutzner/Roski 2019). These hypotheses are based on a wide range of different considerations and arguments, which are beyond the scope of our research focus.

Thus, following the tradition of research on gender stereotypes, the present study examines which abilities and skills are considered central in the course of digitisation in different sectors/branches, and which gender-specific attributions exist regarding these abilities and skills.

3   Research concept and methodological approach

In order to operationalise and deal with the questions presented above, our study pursues a mixed exploratory quantitative and qualitative approach.

The central quantitative research tool is an online survey addressing companies and institutions in Vienna and Lower Austria, with people in management positions and employee representatives being the primary target groups. Of the sectors addressed two, namely school education/teaching and (intramural) health/care, show a clear overhang of female employees. The other two, namely (industrial) production/manufacturing and information and communication technology (ICT), have a significant overhang of male employees. The originally envisaged target sample size was n=200, with a relatively even distribution across

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the four sectors. In result, a significantly higher number of complete questionnaires could be achieved. The total number of complete questionnaires amounts to n=784, with a different willingness to cooperate along the four sectors/branches. By far the most questionnaires derive from the sector education/teaching (n=556), followed by health/care (n=110). In the two sectors production/manufacturing (n=43) and ICT (n=51) the number of complete questionnaires is largely equal to the originally planned sectoral sample size (n=50). A higher response rate could not be achieved in these two industries despite repeated reminders and the use of different dissemination channels.

The focus of the quantitative investigation is, in particular, on the perceived importance / centrality of different abilities and skills for increasingly digitised work, as well as their possibly different degrees of "male" or "female" attribution. The combined assessment of answers to these two questions allows initial conclusions to be drawn on the importance and likely impact of gender stereotypes (understood as gender-specific attributions of knowledge and skills) in connection with digitisation. Furthermore, conclusions can be drawn about possible effects regarding labour market segregation.

The central qualitative research instrument are personal interviews with representatives (company/institutional management level, members of works councils and staff representatives) of companies/institutions of the four sectors/branches mentioned above. A total of eight cases (two per sector/branch) are examined in more detail.

4   Main results

Digitisation is highly relevant across sectors, but importance of specific "technical" skills varies

Digitisation is perceived to be of a very high relevance in all sectors/branches. In all of them there is a strong perception of a substantial increase in importance of digital technologies. Furthermore, according to the vast majority of respondents, the content of activities, forms of cooperation in companies and institutions, and requirements regarding abilities, skills and qualifications of the workforce are changing to a substantial extent.

By definition, digital technologies are central to the ICT sector. In the manufacturing sector, many steps towards digitisation have been taken in the last two decades. In the health and care sector as well as in school education, a similar trend has emerged in the recent past, but in comparison it is somewhat lagging behind in terms of time. Especially in the field of school education, the Covid-19 pandemic has recently turned out to be an accelerating factor (keyword distance learning), but digitisation has also experienced a further specific boost in the other sectors due to increasingly widespread home office, etc.

Against this background, basic digital skills and advanced user skills (e.g. concerning branch-specific software and hardware) – with certain differentiations – are of great importance in all branches covered in the sense that a vast majority of employees needs these skills. For ICT-knowledge and ICT-skills above this level, there is a differentiation in the form that they are of higher importance for a larger proportion of the workforce especially in the ICT sector, and to some degree also in production/manufacturing.

In the fields of education and health/care, in line with the results of the qualitative interviews, results point in the direction that responsibilities for the planning, further development and maintenance of digital systems (which are often based on instruments from external

providers) are usually concentrated in a few people, and that the vast majority of employees primarily need user skills only.

Digitisation requires more than just "technical" knowledge and skills

According to the results of the quantitative survey, abilities and skills necessary in context of increasingly digitised workflows are not limited to ICT-skills and technical skills in the broader sense. On average, different social-communicative competencies and specific personal competencies (such as "problem-solving and optimization competence", "creativity in finding solutions" and "personal responsibility") are rated as even more important. Such a perception is evident across all branches/sectors and both for men and women.

According to the results by the qualitative interviews the functionality of digital processes, instruments and workflows requires, for example, a good interpersonal coordination between workers, skills for error detection and troubleshooting as well as productive interaction with analog work steps and forms of communication. For example, the interviewees from the ICT sector explained that social-communicative and personal competencies are vital in addition to technical skills in the context of interactions with customers, i.e. in sales and marketing, in the tailoring of systems and services according to the needs of customers, in the context of change management as well as in terms of training and maintenance. Hereby, the interviewees repeatedly emphasized that job-related activities in the ICT sector are not limited to technical tasks, but that the range of activities is much more differentiated.

Continuing trends towards "traditional" gender attributions of competences and skills

According to the results of the quantitative survey, different types of abilities and skills are still to a substantial degree attributed according to gender-specific differentiations. Despite variations, this is largely true regardless of the respective sector/branch or of the individual characteristics of the respondents, including gender. Social-communicative competencies (with the exception of "leadership competence") and a number of personal competencies (such as "creativity in finding solutions", "personal responsibility", "interdisciplinary thinking" and "acting") are more likely to be ascribed to women. The attribution to men, on the other hand, predominates regarding ICT-skills and, more broadly, other technical knowledge and skills ("comprehensive knowledge of information and communication technology (ICT)"; "ability to handle technical equipment/machines"; "general knowledge of technology". In addition, men are overall considered to have a slightly higher general interest in digital technologies.

The results on the perceived importance of different abilities and skills in combination with gender-specific attributions of abilities and skills points in the direction that it is precisely those abilities and skills, which are more strongly attributed to women, that are at the same time considered particularly important in connection with increasingly digitised workflows. This applies for all the four sectors examined.

This could be interpreted as pointing towards the direction that increasing digitisation comes with opportunities to reduce gender-specific segregation in the labour market by providing an advantage for women against the background of the perceived importance and gender-specific attribution of competences and skills. However, this possible effect is likely to be mitigated to a large extent by the fact that ICT-skills and technical knowledge and skills, which – according to our findings – are also of substantial importance, are much more strongly attributed to men than to women.

(Re)production of intra-firm/intra-institutional gender roles

The persistently high male attribution of ICT-skills and technical knowledge could, among other causes, result in the fact that increasing digitisation is accompanied by a continued or possibly even growing gender-specific vertical division of labour, where women e.g. use digital instruments to the same extent as men, but where they are less likely to participate in e.g. planning, development and maintenance of digital instruments and processes.

Both the results of the quantitative survey and of the qualitative interviews suggest such an effect. The item "usage of digital technologies" is almost not perceived as a male domain. The same applies, to a slightly lesser extent, to "supporting other employees with problems with digital technologies". On the other hand, the "maintenance of digital technologies" is to a substantial degree perceived as an activity that is more often carried out by men and to a lesser extent by women. The same applies (to a somewhat lower degree) to participation in the "development of new digital processes and instruments", to "training employees in the use of digital technologies" and to "planning the use of digital technologies". Tendencies pointing towards this type of structuring can be found in all sectors, but the perception of male dominance in the ICT sector (and also in the education sector) regarding "maintenance", "development", "training" and "planning" is lower than in the health/care sector and in production.

One of the problems with this ongoing structuring in form of gender-specific fields of activity is that it reproduces gender-specific occupational roles and, in doing so, also gender stereotypes in a broader sense.

Reduction of horizontal segregation through digitisation?

With regard to the question of whether increasing digitisation is expected to contribute to a reduction in horizontal gender-specific labour market segregation, answers in the quantitative survey show a bipolar distribution, where both a large number of optimists and pessimists exists. Overall, pessimistic expectations slightly outweigh optimistic ones, with the assessment of women being somewhat more sceptical than that of men. When comparing results across sectors/branches, expectations are most optimistic in the ICT sector, but also here a bipolar distribution of opinion exists. The most pessimistic assessments are in the area of health and care.

Expectations regarding the likely effects of digitisation on income disparities between women and men are even more sceptical than with regard to horizontal occupational segregation. Pessimistic expectations clearly dominate over optimistic ones. Again, men are generally somewhat more optimistic than women. Comparing the different branches/sectors, pessimistic assessments are again least widespread in ICT, and strongest in health/care.

Also the qualitative interviews provide hardly any clear picture on whether and to what extent a reduction in gender-specific horizontal labour market segregation is to be expected in the course of increasing digitisation (or vice versa). In this context, the interviewees regard training and career decisions of adolescents or young adults as constitutive, whereby the perception prevails that these decisions are still strongly based on traditional gender-specific occupational roles. As a result, in the manufacturing and ICT sectors there is only a small female labour supply with relevant "technical" training.

The assessments of the interview partners from the ICT sector point in the direction that women employed there are more often than men lateral entrants, who originally completed a different training. With regard to the manufacturing sector, it has been reported that women are successfully working there after vocational retraining (specifically within the framework of

intensive skilled worker training within the framework of the FIT-programme of the Public Employment Service).

In the health and care sector, there is a perception that digitisation can contribute to making these activities and professions more attractive (also for men). However, a general improvement in working conditions and an increase in incomes in this sector are seen as further necessary steps.

The need to address structural conditions and gender (occupational) stereotypes

Overall, the results of this study point in the direction that there are no strong signs that increasing digitisation can be expected to bring about a substantial reduction in horizontal and vertical gender segregation. Conversely, however, there is no strong evidence that it *per se* is likely to cause a substantial increase in labour market segregation.

Therefore, the actual medium- to longer-term effects predictably depend on a number of structural framework conditions and on the degree of the persistence of gender and occupational stereotypes.

With regard to the first point, interviewees repeatedly mentioned the problem of an unequal distribution of reproductive/care work between men and women, and associated time restrictions for women (more frequent part-time employment). This may to some degree explain the vertical structuring of activities in connection with digitisation outlined above. Against this background, a further expansion of affordable and high-quality institutional childcare and an equal distribution of reproductive and care work between men and women appears to be necessary. In addition, interview partners from the ICT sector argued that education in schools should give much more emphasis on digital technologies and their application, by this increasing related skills and knowledge of all pupils. According to the idea, this could mitigate the unequal distribution of girls and boys in later further education and job decisions.

With regard to gender and occupational stereotypes, a vital starting point obviously lies in a gender-sensitive career orientation and counselling. The latter should consciously also address the problem of gender stereotypes, present job profiles in a differentiated way (i.e. taking into account the full range of different fields of activity associated with professions), and it should to the highest possible degree apply measures which allow for and strengthen practical insights into different occupational areas. Another important instrument in this context are "role models", already working in "gender-atypical" professions. If it is possible to contribute to a higher gender-specific occupational parity in this way, then – from a more long-term perspective – also a dampening effect on the perpetuation of traditional gender stereotypes can be expected.

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