3.
The bees and the honey
Women in scientific professions in the Enwise countries

Introduction

One of the first and major achievements of the Helsinki Group on Women and Science, and in particular of its sub-group of Statistical Correspondents[1] established in 2000, has been the collection, compilation and analysis of sex-disaggregated data at national level. This followed recommendations of the ETAN report (Osborn et al., 2000), which highlighted the lack of data to support the arguments concerning discrimination facing women in scientific careers. This resulted in the first publication of statistical profiles for 30 countries in the Helsinki Group report on "*National Policies on Women and Science in Europe*" (European Commission, 2002). This strong partnership between the Statistical Correspondents and the Commission was further deepened and has produced a wide range of qualitative and quantitative information on the different national situations of women scientists, which resulted in the "*She Figures 2003*" (European Commission, 2003b), the broadest collection of statistical information currently available[2].

It should be noted that both the availability and the quality of sex-disaggregated data in the Enwise countries are largely superior to that of the EU-15 Member States. This can be explained by the fact that, in the perspective of the EU enlargement, the Enwise countries had to adapt their national statistical systems to Eurostat standards and requirements.

The data analysed in the first part of this Chapter are mostly concentrated on **researchers**[3] (OECD, 2002: §301), as a proxy for scientists for two reasons. Firstly, there are good data on researchers obtained via national R&D surveys with common coverage and definitions and reported supranationally to Eurostat and to the OECD. Secondly, by identifying researchers, we are targeting the core of scientists[4] who represent the innovation, technological and economic potential of European research.

There are around 214 000 people working as researchers in the Enwise countries, almost 81 000 of whom are women. In this Chapter, a closer look will be given to what dynamics lie behind the relatively elevated presence of women researchers in these countries and what it means both for women and for R&D.

1. A list of the Helsinki Group Statistical correspondents from the Enwise countries can be found in Annex 11 of this report.
2. And http://europa.eu.int/comm/research/science-society/women/wssi/index_en.html.
3. "Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned".
4. Scientific practitioners, such as doctors or economists are also of interest, but it is not possible to capture them specifically through the available statistics.

Women as employees of the National Statistical Institutes of the Baltic countries

The National Statistical Institutes of the Baltic countries employ mainly women. For example, at the end of 2002 in Lithuania, 89% of the total employees were women (476 out of 533), in Latvia, 84% (496 out of 591) and in Estonia, 83% (361 out of 300). It should be mentioned that the president of the Central Statistical Bureau of Latvia is a woman (a normal phenomenon for Latvia, but still a rarity in the EU Member States). Why are statistics largely a feminine domain in the Baltic countries? Probably for two main reasons – salaries are comparably low and, during the soviet period, there was a gender bias in the image of statistics in higher education. At this time it was possible to acquire the speciality of a statistician in the faculty of economics of the university, which was regarded as a *feminine* faculty. Now the situation in the field of education has changed somewhat - the speciality of a mathematician-statistician can be acquired at the faculty of mathematics where more young men are studying. But newly qualified specialists rarely start their careers in the statistical offices because salaries in the private firms are considerably higher.

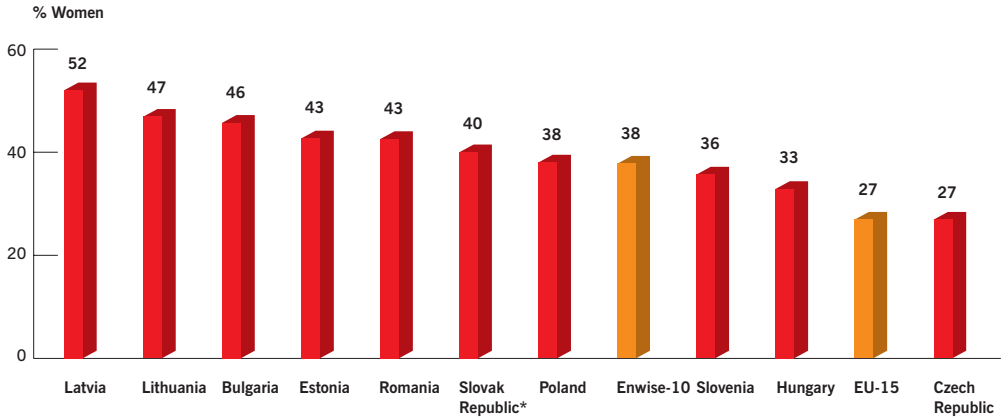
Source: Maranda Behmane, Latvian Statistical Correspondent of the Helsinki Group on Women and Science.

By building upon the existing knowledge that has been generated at EU level, this Chapter peels back the layers to examine whether these higher levels of participation are such good news for women scientists of the Enwise countries. It addresses their current situation and attempts to describe what the implications are for women from these countries and for R&D in the changing social, economic and political context as described in previous two Chapters. Drawing on the historical dimension presented there, the objective here is to describe the various ways, in which gender has an impact on the careers of women scientists and to identify the current influences and dynamics that need to be addressed in order to meet the European Research Area's objective to enhance the role and place of women in scientific research, which should apply to women from the Enwise countries too.

Optimistic statistics for women researchers?

Since 2002, starting with the Helsinki Group report mentioned above, a strong focus has been put on the high proportion of women researchers in the Enwise countries as compared to the EU Members States (EU-15). As shown in Figure 3.1 below, if one looks to the presence of women among researchers (expressed in percentages) in each of the Enwise countries, this representation gives the impression that all Enwise countries, except the Czech Republic, are performing better than the average EU-15 figure. On average **women** represent **38%** of the **total researchers** of the Enwise-10 compared to 27% for the EU-15, with a high 52% of women among the Latvian researchers down to 33% for Hungary and 27% for the Czech Republic.

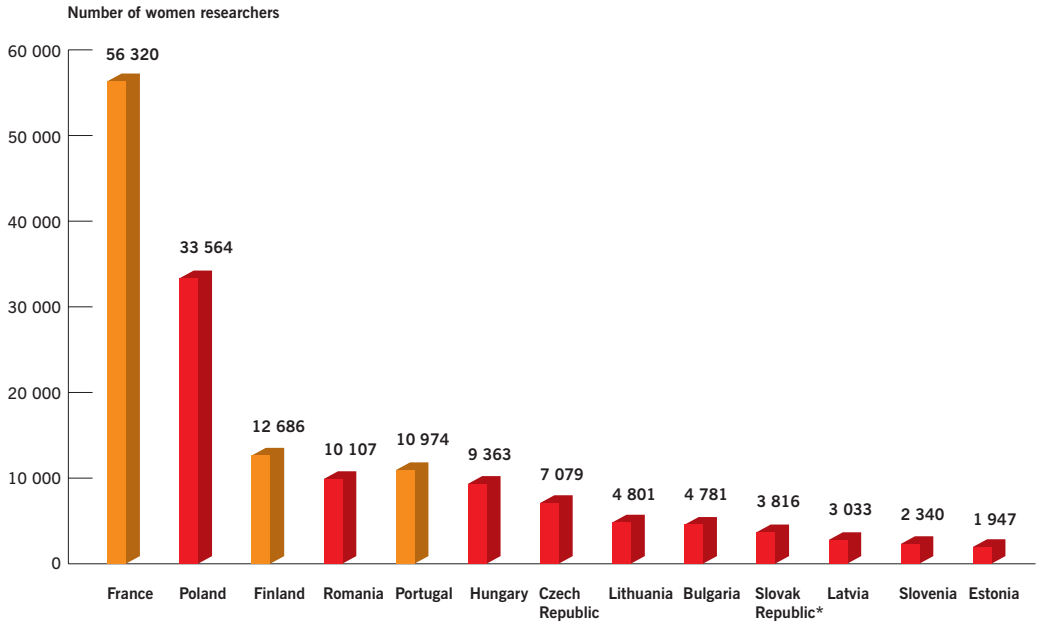
Figure 3.1
Women among researchers in the Enwise countries in 2001 (in percentages)



Source: *European Commission, 2003b.*
Notes: Unit: head count, except for * where full-time equivalent
Exceptions to the reference year: BG, EE, LV (HES+GOV), PL, SI - 2000
PNP missing for HU, PL, RO + SK and for these countries in Enwise-10 average

However by only focusing on these percentages, one gives more prominence to the proportion of women among researchers in each country, but fails to put into context the size of the research communities in each country. It thus gives a **false impression** of the situation, which might consequently convey the **wrong message** that women scientists in the Enwise countries need no special support, since they are apparently performing on average better than their counterparts in the EU-15!
One way of eliciting the **right picture** is to look at the absolute numbers of researchers as presented in Figure 3.2 below.

Figure 3.2
Women researchers in the Enwise countries and in three Member States in 2001 (headcount)



Source: *European Commission, 2003b.*
Notes: Unit: head count, except for * where full-time equivalent
Exceptions to the reference year: BG, EE, LV (HES+GOV), PL and SI: 2000
PNP missing for HU, PL, RO + SK

Looking at this new picture, Poland and Romania are now at the top of the ranking, since they both have the largest female scientific communities. The four Enwise countries (Latvia, Lithuania, Bulgaria, Estonia), which stood out in Figure 3.1, are now among the six countries with the smallest[5] female research populations. To complete this picture, and in order to avoid any distortion that would be created by inserting too many large numbers, the total numbers of women researchers of the Enwise-10 as well as of the EU-15 are not reported here, instead some EU Member States, such as France[6], Finland and Portugal have been inserted in this graph, which enables one to locate and contextualise the various female scientific communities of the Enwise-10 among some of the EU-15. To close up the circle of comparisons, it has to be noted that the proportion of women among researchers for France, Finland and Portugal are respectively 27%, 28% and 44%.

5. A more complete appraisal of the situation could be given by comparing the numbers of researchers per 1000 population in each country.
6. This latter country with the largest number of women researchers among the EU-15 has been put into the picture as a parallel to Poland, which holds the same position among the Enwise-10.

With the enlargement in 2004, researchers from the eight concerned Enwise countries will bring an additional research population of around 180 000 individuals, of whom 66 000 will be women (representing around 37% of this total). Based on data from 2000, Bulgaria and Romania, which should join the EU in 2007, would bring slightly more than 34 000 individual researchers, of whom almost 15 000 women (representing here 44% of this total). These influxes will represent an increase of around 16% in the overall ranks of researchers in Member States from 1 May 2004 – and an increase of 22% among women researchers. Nevertheless, the impact of these 66 000 women researchers will have a limited impact on the average percentages of women among researchers for the (15+8) Member States. There will be a slightly higher increase in the Government (GOV) research institutions (OECD, 2002: §184)[7], where around 33 000 individuals, of whom more than 13 000 are women, will raise the percentage of women among researchers in this sector from 31% to 33%. In the Higher Education (HES) sector (OECD, 2002: §206)[8], this percentage will only increase from 33% to 34% and from 15% to slightly less than 16% in the Business Enterprise (BES) sector (OECD, 2002: §163)[9].
The distribution of women researchers from the Enwise countries inside each sector mentioned above - excluding a negligible Private Non-Profit sector (OECD, 2002: §194)[10] - can be observed in Table 3.1 below.

Table 3.1
Distribution of women researchers from the Enwise countries within each R&D sector in 2001 (head count and percentages)

R&D Sector	Business Enterprise		Higher Education		Government		All Sectors[(1)]	
Country								
Bulgaria	605	4.5 %	875	1.8 %	3 301	17.1 %	4 781	5.9 %
Czech Republic	341	10.0 %	3 504	7.3 %	2 234	11.6 %	7 079	8.8 %
Estonia	164	1.2 %	1 434	3.0 %	349	1.8 %	1 947	2.4 %
Hungary	1 208	9.0 %	6 313	13.1 %	1 842	9.5 %	9 363	11.6 %
Latvia	518	3.9 %	2 059	4.3 %	419	2.2 %	2 996	3.7 %
Lithuania	248	1.9 %	3 439	7.1 %	1 114	5.8 %	4 801	5.9 %
Poland	3 332	4.9 %	24 925	51.8 %	5 307	27.5 %	33 564	41.5 %
Romania	4 835	6.2 %	2 470	5.1 %	2 802	4.5 %	10 107	12.5 %
Slovak Republic [(2)]	644	4.8 %	2 089	4.3 %	1 083	5.6 %	3 816	4.7 %
Slovenia	471	3.5 %	1 007	2.1 %	862	4.5 %	2 340	2.9 %
Enwise-10	**13 366**	**100 %**	**48 115**	**100 %**	**19 313**	**100 %**	**80 794**	**100 %**

Source: *European Commission, 2003b.*
Notes: Unit: head count, except for (2) where full-time equivalent
Exceptions to the reference year: BG, EE, LV (HES+GOV), PL and SI: 2000
(1) PNP not included

42% of the 80 000-plus women researchers employed in these 3 sectors are to be found in Poland, while women from Hungary or Romania represent together another 25% of them (the remaining 33% are distributed throughout the other seven Enwise countries).
The distributions of researchers across the countries vary according to each sector. In the GOV sector, women researchers from five countries provide 81% of around 19 000 women researchers employed, which are Bulgaria (with 17% of them), the Czech Republic (12%), Hungary (10%), Poland (27%) and Romania (15%). Two countries alone, Poland (with 52%) and Hungary (13%), amount to 65% of around 48 000

7. The Government sector is composed of all departments, offices and other bodies which furnish but normally do not sell, to the community, those common services, other than higher education, which otherwise cannot be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. It also includes non-profit institutions controlled and mainly financed by Government, but not administered by the Higher Education sector.
8. The Higher Education sector is composed of all Universities, colleges of technology and other institutions of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of or administered by or associated with higher education institutions.
9. The Business Enterprise sector includes all firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price.
10. The Private Non-Profit sector includes non-market private non-profit institutions serving households (i.e. the general public) and private individuals or households.

women researchers employed in the HES. Finally, four countries can be highlighted for their participation in the pool of 13 366 women researchers employed in the BES, which are Romania (with 36%), Poland (with 25%) and to a lesser extent the Czech Republic (with 10%) and Hungary (with 9%).

However to get a full and more complete picture, one should also look[11] at the presence of **men and women researchers** of each Enwise country **across the sectors** and at that of **men and women researchers** of each Enwise country **inside each of the sectors**. While the proportion of women researchers in the PNP sector never exceeds 1% for any of the Enwise countries and thus can be seen as negligible, some additional remarks should be made for the three other sectors.

On average the 19 000-plus women researchers of the **Enwise-10** countries represent **24%** of the **GOV** sector (in the EU-15, the GOV accounts for an average of 15% of women researchers). The Bulgarian GOV sector represents 69% of all Bulgarian women researchers and in Slovenia 36% of women researchers are employed in this sector. **Just over 59%** of all women researchers in the **Enwise-10** countries are working in the HES (for the EU-15, this amounts to 68% of all women researchers). In the three Baltic countries the corresponding figures are even higher, 73% for Estonia, 72% for Lithuania and 69% for Latvia, as well as in Hungary with 67%. Finally, in the **BES** (which is discussed in more details at the end of this Chapter), the **Enwise-10** countries employ just over 13 000 women in this sector, which represents an average of **17%** of all the BES researchers. This is broadly comparable with the 15% of BES researchers who are women for ten[12] of the EU Member States. In the Czech Republic, Hungary, Poland and Romania, where 80% of the women researchers in the BES are working, only Romania (47%) has a significant share of its national women researchers employed here. In Hungary and Poland only 13% and 10% respectively of all women researchers can be found in the BES. This cannot be considered as good news for the employment of women researchers in the industrial sector, where there is a strong political drive to boost investment and employment by 2010 (see the *3% Barcelona Objective* in the concluding remarks). The above-mentioned variation from the averages and between countries for the three main R&D sectors in the Enwise countries are probably caused by the various patterns inherited from the communist times and their specific transformations in the transitional period, as described in Chapter 2. Further studies are needed to enable sound and relevant explanations, within and between countries.

11. To this end, two extensive tables presenting the distribution of researchers (women and men), in head count numbers and percentages, for all the Enwise countries across R&D sectors and inside each R&D sector can be found respectively in Annexes 6 and 7 of this report.

12. BES data for the EU exclude Belgium, Luxembourg, The Netherlands, Sweden and the UK, for which no sex-disaggregated data are available.

Coming back to the gender distribution of researchers within each sector, and as shown previously in Figure 3.1, most Enwise countries have a higher than average proportion (38%) of women among all researchers. This average is brought down by the relative absence of women in three of the four countries with the largest female researcher populations, i.e. the Czech Republic (with 27%), Poland (with 33%) and Slovenia (with 36%). Looking at the average presence of women in each sector, women represent 43% of all GOV researchers, 39% of all HES researchers and 31% of all BES researchers for the Enwise-10. These averages hide some striking variation in the proportions of women employed in public sector research. In the GOV, as many as 52% of researchers are women in Estonia, whereas, in the Czech Republic, only 32% of such researchers are women. In the HES, 51% of GOV researchers are women in Latvia and 32% again in the Czech Republic.
Romania is a special case where the BES employs around half of all researchers (both women and men) and women are well *represented* (41%). Things do not look so promising for the Czech Republic, Hungary and Poland, where women employed in the BES represent 17%, 25% and 28% respectively of all researchers. Reasons for this variability again can be found in Chapter 2 and linked to the suggestion that, during the transitional period, significant numbers of men left R&D for more lucrative positions in business or in politics.

Women researchers in a wider employment perspective

In the Enwise countries, there are higher rates of female participation in the labour force than in the EU-15. This may also form part of the explanation for a higher presence of women as researchers in the Enwise countries, as seen in Table 3.2 below.

Table 3.2
Proportion of women from the Enwise countries among Professionals, Employment and Researchers in 2002 (in percentages)

Women	Professionals	Employment	Researchers
Country			
Bulgaria	64.9 %	47.5 %	45.6 %
Czech Republic	52.7 %	43.7 %	26.8 %
Estonia	64.3 %	49.2 %	43.1 %
Hungary	57.9 %	45.0 %	33.0 %
Latvia	68.4 %	49,5 %	52.1 %
Lithuania	71.4 %	49.1 %	47.0 %
Poland	62.7 %	45.6 %	38.1 %
Romania	48.3 %	46.3 %	42.8 %
Slovak Republic	63.6 %	45.8 %	39.8 %
Slovenia	61.8 %	45.9 %	35.9 %
Enwise-10	**59.2 %**	**45.9 %**	**37.8 %**
EU-15	46.5 %	43.1 %	27.2 %

Sources: Professionals (ISCO-2) & Employment data: Eurostat - Community Labour Force Survey - RSEs data: European Commission, 2003b.
Notes: Professionals (ISCO-2) & Employment Enwise-10 averages: DG RTD estimate
RSEs: Reference year is 2001 except for BG, EE, LV (HES+GOV), PL, SI: 2000
Data are in head count, except for SK (full-time equivalent)
Enwise-10 average: DG RTD estimate
Private Non-Profit sector not included

45.9% of the 41 million people in total employment[13] in the Enwise countries were women in 2002 (Franco & Blöndal, 2003), which makes the overall proportion of women researchers (37.8%) relatively low. Table 3.2 above shows that, in each Enwise country, about half of the people in the labour force are women.

Researchers are included in the major occupational group known as Professionals[14],who are characterised by high educational attainment and professional experience. From Table 3.2, it is clear that the proportion of women among these Professionals is higher (59.2%) than for both the labour force (45.9%) and for researchers (37.8%). This is the case for each and every Enwise country, except in Latvia where women are slightly better represented as researchers (52.1%) than in the labour force (49.5%). Since researchers are part of the Professionals, these data indicate that highly qualified women in the Enwise countries are more likely to be concentrated in non-research occupations. One could assume, based on the high percentages of women among professionals, that women would form a larger share of the research population. Again further studies are necessary to obtain a better understanding of what this phenomenon means for each Enwise country.

13. Employed persons were those who during the reference week did any work for pay or profit for at least one hour, or were not working, but had jobs from which they were temporarily absent. Family workers are included.
14. Major group 2 of the International Standard Classification of Occupations (ISCO-88), also known as ISCO-2. "This major group includes occupations whose main tasks require a high level of professional knowledge and experience in the fields of physical and life sciences, or social sciences and humanities. The main tasks consist of increasing the existing stock of knowledge, applying scientific and artistic concepts and theories to the solution of problems, and teaching about the foregoing in a systematic manner".

Gender in learning and teaching

The level of qualification may also provide an explanation for these patterns. The published data (Dunne, 2003; European Commission, 2003b; Strack, 2004) on the flows of graduates and the national contributions (Enwise working documents, 2003) show that in most Enwise countries

Parental and paternity leave in Slovenia

Despite the possibility to share a larger part of parental leave, in the 1990s in Slovenia only 1% - 2% of fathers have shared this opportunity with their partner. The one-year paid parental leave was split into 105 days of maternity leave (to be taken exclusively by mother, starting 44 or 28 days before the delivery date) and the remaining parental leave (to be freely split between the parents - either sequentially or with both parents working part time). Starting with 2003, fathers in Slovenia became entitled to an additional 15 days paternity leave (to be used during the first 105 days of maternity leave) on the top of the already established one year parental leave. These 15 days are to be gradually extended in the forthcoming years to 90 days in total (with partial coverage of income).

Source: Mladenič, 2003.

Work-life *double burden* in Lithuania

In Lithuania, where the services of pre-school establishments are only available to 53.7% of children in the appropriate age-group, just 179 (1%) of all persons taking parental leave were men in 2002 (Data of the State Social Insurance Fund). This is due to stereotyped attitudes, whereby childcare is not regarded as a *masculine* job: according to a survey undertaken by Baltijos tyrimai, 57.2% of men think that it is their sole duty to earn money for the maintenance of the family. Equally, persons responsible for the care of pre-school children, elderly and disabled are able to work shorter hours according to the labour code, but no surveys are carried out to monitor the implementation of this legislation at micro-level. There are even provisions concerning the equal family duties of parents in the Constitution of the Republic of Lithuania, which state that the rights of spouses are equal, but the gendered roles persist nonetheless.

Source: from the Commission's working document "Single Programming Document for the EQUAL Community Initiative in Lithuania", 2003.

women are more likely than their male counterparts to remain in education after the age of 18, that they constitute the majority of HE graduates (Dunne, 2003) and that they generally enjoy higher growth rates than men for advanced level graduates.

Table 3.3
Higher Education and PhD graduates in the Enwise countries in 2001

Country	Total HE graduates	Of which Women HC	Of which Women in %	Total PhD graduates	Of wich Women HC	of which Women in %
Bulgaria	47 500	29 700	62.5 %	376	158	42.0 %
Czech Republic	43 600	24 100	55.3 %	1 066	370	34.7 %
Estonia	7 600	5 000	65.8 %	149	77	51.7 %
Hungary	57 900	35 600	61.5 %	793	301	38.0 %
Latvia	20 300	11 300	55.7 %	37	18	48.6 %
Lithuania	27 500	17 500	63.6 %	261	137	52.5 %
Poland	431 100	284 100	65.9 %	4 400	1 832	41.6 %
Romania	76 200	41 800	54.9 %	:	:	:
Slovak Republic	26 300	14 200	54.0 %	532	212	39.8 %
Slovenia	12 000	7 100	59.2 %	298	146	49.0 %
Enwise-10	**750 000**	**470 400**	**62.7 %**	**7 912**	**3 251**	**41.1 %**

Source: *Eurostat, Education statistics.*
Notes: Unit: head count (HC) and " : " = not available
Romania not included in Enwise-10 estimate
Higher Education is equivalent to ISCED 5+6; PhD is equivalent to ISCED 6 (Unesco, 1997)

Poland, Estonia and Lithuania have the highest proportions of women graduates from HE programmes and Estonia and Lithuania also have the highest representation of women among PhD graduates. However, the proportion of women graduates declines between the first stage of HE and the doctoral level. This loss of women in the progression from under-

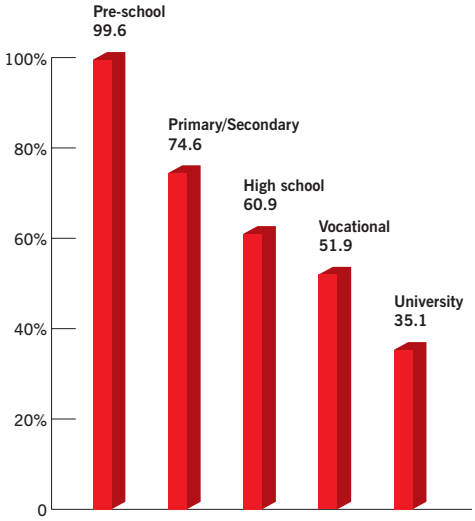
Gender perceptions on career opportunities in Hungary

The divergence between women and men in the perceptions of gender as a determining factor in career outcomes is neatly summed up in the results obtained from a survey undertaken in 2000 by the Hungarian Central Statistical Office. The figures in the table below represent the percentages of women and men who agreed with the sentence: "*Being a man or a woman influences career opportunities strongly in Hungary*" by educational level. Although both sexes are increasingly inclined to agree with this statement as the level of qualification becomes higher, the gender differences in perceptions also widen.

Educational level	Women	Men
Primary school	32 %	29 %
Skilled worker	37 %	30 %
Secondary school graduate	40 %	30 %
Higher education degree	50 %	22 %

Source: Hungarian Central Statistical Office, Budapest in Groó and Papp, 2003.

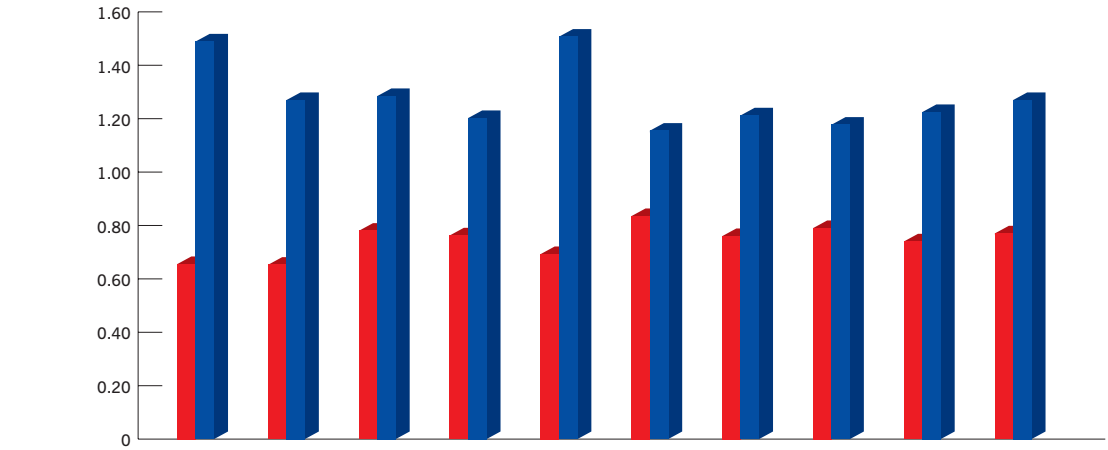
Share of female teaching staff by educational level in Romania (1997-1998)



Source: NCS, Education Statistic, Bucharest in Tripsa, 2003.

graduate to post-graduate achievement can be standardised and compared across countries with the *Higher Education Gender Progression Ratio* (HEGPR). This consists of expressing the percentage of women graduates at PhD level as a ratio of the percentage of women graduates at undergraduate level. In this way, it reveals something about the relationship between the proportions of women at each level and provides an indication of whether women are continuing to the next stage of their education in proportion to men. It is basically a measure of the short-fall of women pro rata from one stage to the next.

Figure 3.3
Higher Education Gender Progression Ratio for the Enwise countries in 2001



	BG	CZ	EE	HU	LV	LT	PL	RO	SK	SI
HEGPR women	0.68	0.69	0.81	0.79	0.72	0.87	0.79	0.82	0.77	0.80
HEGPR men	1.51	1.32	1.33	1.24	1.56	1.20	1.26	1.22	1.27	1.32

Source: UNECE gender statistics database at http://www.unece.org/stats/gender/web/database.htm

In addition to the HEGPR presented here, it is possible to standardise, between countries and over time, the success rates for female and male PhDs by looking at the *Odds Ratio* of the men's HEGPR/women's HEGPR. This indicates how much more likely men are than women to complete their PhDs.

Gender stereotyped illustrations of Slovak reading books for 1st class pupils

Source: Lýdia Virgovičová (1999) - Reading book for the 1st year pupils in primary schools - Media Trade - Slovak Pedagogical Publishing House, Bratislava, 9th edition, ISBN 80-08-03018-6, in Velichová, 2003.

Table 3.4
Higher Education Gender *Odds Ratio* in 2000 & 2001

Country	2000	2001
Bulgaria	2.48	2.22
Czech Republic	3.30	1.93
Estonia	1.26	1.65
Hungary	1.68	1.57
Latvia	2.04	2.16
Lithuania	1.58	1.38
Poland	1.74	1.59
Romania	1.81	1.48
Slovak Republic	1.76	1.65
Slovenia	2.38	1.65

Source: UNECE gender statistics database at http://www.unece.org/stats/gender/web/database.htm

For example, in Bulgaria in 2001, the HEGPR for men was 1.51% and for women 0.68%. The resulting *Odds Ratio* is 2.22, signifying that Bulgarian men HE graduates are 2.22 times more likely to successfully complete their PhD programme than Bulgarian women HE graduates. Looking at Table 3.4, one can see signs of a very slight improvement in favour of women's achievement since in all countries, except Estonia and Latvia, the values of this indicator decreased between 2000 and 2001.
These figures represent a serious loss of investment to countries if there are factors that are blocking educated women from reaching and completing the most advanced stages of education. Furthermore, one still does not know to what extent women and men capitalise upon their educational qualifications when competing for employment. In order to undertake a thorough analysis of equal opportunities experienced by colleagues in R&D and based upon educational attainment, it is necessary to obtain complete and harmonised data on R&D personnel by occupation and by level of qualification. Eurostat will start collecting data on researchers by qualification in the European R&D survey in 2004, which will allow for an improved monitoring of this situation.

Birds of a feather flock together

The different distributions of women and men across research sectors and fields of science[15] are referred to in technical terms as *horizontal segregation*. To understand the participation of women in science in the Enwise countries, it is necessary to bear in mind that *science* and *research* encompass a broad range of activities, which are undertaken not only in the labour market context, but with important differences between sectors – as has already been seen – and between the fields of science. If only 20% of researchers are working in the BES in the Enwise countries, where 47% of R&D expenditure is performed, then it is likely to be a more attractive working environment than the HES, where 58% of all researchers account for just 23% of all R&D expenditure[16]. Of course the disciplinary profile of graduates has an impact on the availability of suitably qualified researchers. Women are less likely than men to graduate from engineering

15. The main fields of Science referred to in this Chapter are drawn from the Frascati Manual (OECD, 2002) and are: Natural Sciences (NS); Engineering and Technology (ET); Medical Sciences (MS); Agricultural Sciences (AS); Social Sciences (SS) and Humanities (H).
16. For more details, see Annex 6 of this report and Table 3.6 in the section "All that Glitters is not Gold" of this Chapter.

disciplines both at undergraduate and at post-graduate level (European Commission, 2003b; Strack, 2004). Apart from the difference for this field of science, one would not expect to find any other major gender differences in the presence of women as researchers.

Table 3.5
Numbers of researchers (and % of women among them) by main field of science of HES + GOV in the Enwise countries in 2000

Field	Natural Sciences	Engineering & Technology	Medical Sciences	Agricultural Sciences	Social Sciences	Humanities
Country						
Bulgaria	2 720 (*51* %)	2 122 (*28* %)	1 063 (*50* %)	965 (*50* %)	504 (*47* %)	934 (*57* %)
Czech Republic	3 542 (*31* %)	2 202 (*22* %)	516 (*42* %)	640 (*45* %)	279 (*40* %)	1 012 (*42* %)
Estonia	848 (*32* %)	429 (*25* %)	213 (*62* %)	193 (*46* %)	334 (*52* %)	348 (*66* %)
Latvia	1 082 (*47* %)	380 (*38* %)	139 (*71* %)	240 (*57* %)	342 (*37* %)	251 (*78* %)
Lithuania	2 025 (*40* %)	1 540 (*26* %)	847 (*55* %)	462 (*45* %)	146 (*58* %)	1 318 (*65* %)
Poland(1)	10 282 (*34* %)	10 726 (*16* %)	7 801 (*43* %)	2 523 (*33* %)	898 (*38* %)	8 677 (*33* %)
Romania	2 687 (*46* %)	2 667 (*38* %)	583 (*64* %)	211 (*31* %)	101 (*47* %)	623 (*46* %)
Slovak Republic	2 348 (*37* %)	1 883 (*33* %)	1 040 (*53* %)	249 (*49* %)	154 (*52* %)	474 (*48* %)
Slovenia	719 (*34* %)	671 (*22* %)	302 (*58* %)	252 (*47* %)	727 (*47* %)	164 (*48* %)
Enwise-10	**26 253 (*38* %)**	**22 620 (*23* %)**	**12 504 (*47* %)**	**5 735 (*41* %)**	**15 191 (*43* %)**	**13 801 (*41* %)**

Source: *European Commission, 2003b.*
Notes: Unit: full-time equivalent
Exceptions to the reference year: LT, PL (HES): 2001; LV: 1999
(1) HES only. Field of science unknown for 793 women & 2 396 men

There are also connections between the *hard* (Engineering, Natural Sciences) and *soft* (Social Sciences & Humanities) fields of science and the sectors. For example, many *hard* scientists are recruited by the **BES**, because this is the sector where engineering and technological research are undertaken. On the other hand, social scientists are more likely to be found in the HES and GOV research institutions than in enterprise (Rübsamen-Waigmann H. et al., 2003).

In the Enwise countries, 31% of the 43 565 researchers in the BES are women. This could be fleetingly interpreted as a sign that the Enwise countries are providing a better framework than the EU-15 for women researchers in business enterprises. However, the analysis in the earlier part of this Chapter served as a warning against hasty assumptions. As a matter of fact, the BES is still in its infancy in most Enwise countries, and there are other factors behind the increased presence of women. The principal reason is the small demographic size of this sector, which employs less than 14 000[17] women across the **Enwise-10** countries, more than half of whom are to be found in either Romania (4 835 women) and Poland (3 332 women) - less than in either France or Germany on their own. In view of the rapidly-evolving nature of research in these countries, of the market opportunities that enlargement will bring, and of the impact that commercialisation will have on science and innovation in the Enwise countries, it is necessary to undertake further analysis into the interface between women, research and enterprises in these countries.

It is also important to bear the differences between the **various fields and sectors of science** in mind, when planning for the future. At present, using the European data, it is not possible to identify detailed fields of science and examine whether sufficient numbers of people are being trained in core disciplines. This is because the Frascati classification of main fields of

17. See Annex 7of this report.

science (OECD, 2002)[18] fails to identify specifically the predominant domains in contemporary R&D or the domains where researchers are most likely to be concentrated: ICTs, biotechnology, nanotechnology, pharmaceuticals etc.

All that glitters is not gold

In the patriarchal value system, high R&D expenditure, often concentrated in the *hard* science domains, equates with high prestige and investment. There is therefore a triangular relationship between gold, glory and gender, in which high-expenditure areas dominate and social and low-cost sciences are under-valued. The gender bias in the *hard-soft* divide compounds the negative perceptions of the soft sciences and they risk as a consequence becoming further under-resourced. In terms of R&D investment, a total of 3.15 billion Euros – equivalent to 18% of the budget for the 6th Framework Programme – was concentrated in the BES in 2000 (see Table 3.6 below). 29% of total R&D expenditure is performed by GOV research institutions, even though they only employ 21% of researchers. Again, the contribution of the PNP is negligible compared to that of the other sectors.

18. Moreover, making the links between the Frascati classification and the international classifications of education (ISCED, see Unesco, 1997) and occupation (ISCO, see ILO, 1990) is subject to error because the fields are grouped differently.

"If I had my time again…"

I have been an excellent mathematician and I loved natural sciences. As a girl of 10-11 years old, I was buying a mathematical journal for young talents to solve the maths problems before going to sleep. I was preparing myself for mathematical competitions on my own, did not have any additional exercise organised by the school or my parents. I used to say that I love maths as much I love poetry. However, nobody in my surroundings paid any attention to my obvious talent. When I look back, I see that this was simply treated as unimportant, as some kind of an extra quality, not really needed. My parents were in literature and expected me to become a writer, or a university professor, but in Humanities, even ultimately philosophy. Teachers and professors did not take me seriously because I was a girl, and my maths skills were coming in a package among many other skills, considered as more *girlish*. In the secondary school, I also studied natural sciences and maths, but when it came to tertiary level I turned to social sciences. Among other things, I was very much aware that my country was in bad shape and that laboratories for serious research were not available. We had a cousin, professor of physics, who had made some important discoveries in his field, and who simply could not provide experimental proof because his university lab was in terrible shape and lacking some important equipment. He then published a theoretical work in an international journal. Ultimately, Japanese scientists made an experiment based on his article and he was left out of what was supposed to be the discovery of his life. After this he fell into a serious depression. My reading of this episode was that in my country if one wants to be a scientist, it is much safer to stay in the field of social sciences where you can be more independent from material conditions. In fact, I was living in a social laboratory most of my life, with my country going through so many intense changes and I still do. Today, if I would make a choice, I would make it in favour of natural sciences and leave the country. I would never even consider the possibility of staying.

Biographical statement by Marina Blagojević, member of the Enwise Expert Group for the Balkan region.

Table 3.6
R&D expenditure by sector in thousands Euros
(*and percentage distribution of R&D expenditure across sectors*) in 2000

Sector	Business Enterprise	Higher Education	Government	Private Non-profit	Total
Country					
Bulgaria	15 276 (*21* %)	7 043 (*10* %)	49 060 (69 %)	116 (*0* %)	71 494 (100 %)
Czech Republic	446 127 (*60* %)	105 732 (*14* %)	188 402 (*25* %)	3 773 (*1* %)	744 033 (100 %)
Estonia	8 334 (*23* %)	19 410 (*52* %)	8 564 (*23* %)	722 (*2* %)	37 030 (100 %)
Hungary (1)	179 596 (*44* %)	97 331 (*24* %)	105 728 (*26* %)	:	405 267 (100 %)
Latvia	15 117 (*40* %)	14 121 (*38* %)	8 299 (*22* %)	4 (*0* %)	37 541 (100 %)
Lithuania	15 706 (*22* %)	26 698 (*37* %)	30 646 (*42* %)	:	73 051 (100 %)
Poland	431 793 (*36* %)	377 329 (*32* %)	385 862 (*32* %)	1 597 (*0* %)	1 196 581 (100 %)
Romania	103 203 (69 %)	17 498 (*12* %)	27 977 (*19* %)	:	148 684 (100 %)
Slovak Republic[1]	94 010 (66 %)	13 591 (*10* %)	35 257 (*25* %)	:	142 858 (100 %)
Slovenia	167 458 (*56* %)	49 387 (*17* %)	77 023 (*26* %)	3 480 (*1* %)	297 348 (100 %)
Enwise-10[1]	**1 476 627 (*47* %)**	**728 140 (*23* %)**	**916 818 (29 %)**	**9 692 (*0* %)**	**3 153 887 (100 %)**

Source: Frank, 2003.
Note: (1) Total Gross Expenditure on R&D (GERD) does not correspond to the sum of R&D expenditure by sectors - : = not available

Under the communist regime, there was virtually no private sector research[19]. During the 1990s, the BES was an emerging sector in the Enwise countries, but today R&D expenditure is still small in absolute terms (European Commission, 2003a) and some decline in the numbers of researchers has been observed for Bulgaria, the Czech Republic, Estonia, Latvia, Romania, the Slovak Republic and Slovenia between 1998 and 2001 (European Commission, 2003b).

The variation in the availability of financial resources across sectors that is a recurrent theme in this Chapter also emerges here with regards to the *fields of science*. Table 3.7 below reveals how R&D expenditure per capita researcher is distributed across the main fields of science in public[20] research in nine of the ten Enwise countries[21]. The figures appear higher overall, because the data for researchers by fields of science are reported in full-time equivalent, and not in head count, as was the case for the sectors. This should not however be a distraction from the main observation, which is that research is attracting investment of less than 10 000 Euros *per capita* researcher per annum in five of the nine Enwise countries presented in Table 3.7 and that this also extends to Social Sciences and Humanities in Estonia and Poland. Taking the numbers of researchers into account, the gap in resource allocation between *hard* and *soft* sciences is widest in Poland and narrowest in Romania and Bulgaria.

19. In fact some industrial research was reported as performed in the BES during this period, but in the strict sense of the definition this was GOV or HES R&D performance (Paasi, 1998).
20. By public, reference is made here to the HES and GOV sectors. Data for Researchers are in full-time equivalent.
21. Hungarian data is missing.

Table 3.7
R&D expenditure, in Euros per annum, *per capita* researcher (women + men combined) and by fields of science in HES and GOV sectors in 2000

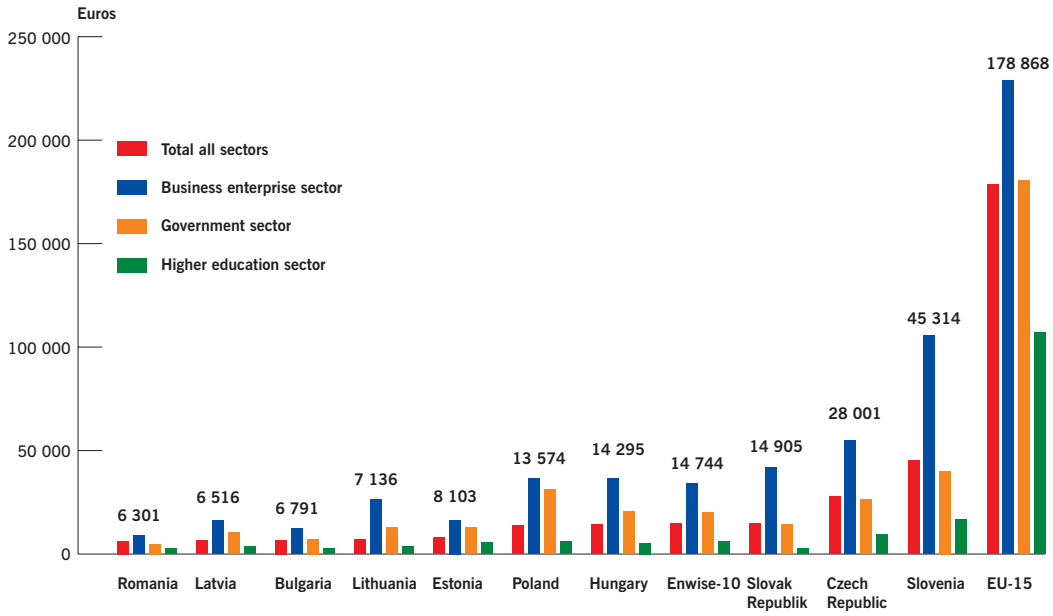
Field	Natural Sciences	Engineering & Technology	Medical Sciences	Agricultural Sciences	Social Sciences	Humanities	Total
Country							
Bulgaria	5 584	5 700	2 661	20 247	4 264	4 606	**6 753**
Czech Republic	35 333	43 057	42 079	35 052	26 781	22 287	**35 909**
Estonia	11 862	13 543	15 812	16 492	7 539	8 721	**11 828**
Latvia	11 126	7 947	8 388	11 938	6 132	4 916	**9 211**
Lithuania	8 838	9 455	6 569	12 974	4 201	5 441	**7 488**
Poland	21 671	20 788	18 367	37 231	5 246	3 810	**15 578**
Romania	3 975	6 857	7 892	10 194	7 662	3 173	**5 841**
Slovak Republic	8 527	6 258	3 995	24 582	4 112	2 823	**6 483**
Slovenia	55 192	51 191	34 791	40 528	37 142	28 390	**44 589**
Enwise-9	**18 038**	**18 465**	**15 770**	**29 020**	**7 152**	**5 748**	**15 004**

Source: *Eurostat, S&T statistics.*
Notes: Unit: Data on researchers are in full-time equivalent. Exceptions to reference year: LT, PL (HES): 2001; LV: 1999

- **What does this imply for women researchers in the Enwise countries?**

It has emerged earlier in this Chapter that the relatively higher percentages of women's participation in research in the Enwise countries than in the EU-15, could be partly explained by higher female employment overall and in Professional occupations. Women are nonetheless under-represented in research in the Enwise countries. It remains hard to distinguish what this means in terms of working conditions for women because of the differences that exist between sectors and fields of science. By connecting data on researchers to data on R&D expenditure, one can see in Figure 3.4 below that the R&D expenditure per capita researcher varies across the Enwise countries according to sector as well as to country and field. There is higher expenditure per capita researcher in the BES than in the other sectors.

Figure 3.4
R&D expenditure, in Euros per annum, *per capita* researcher and by R&D sector in 2001



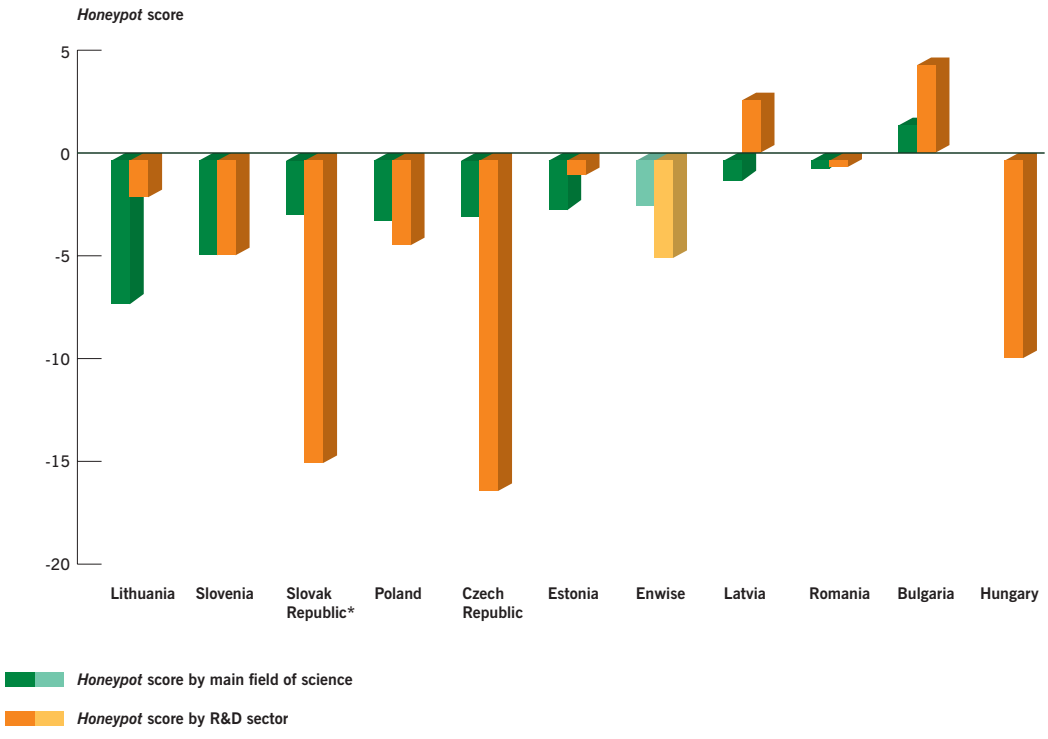
Sources: *Eurostat, S&T statistics, European Commission, 2003b.*
Notes: Unit: RSE data are in head count & refer to 2001 except for BG, EE, LV (HES+GOV), PL, SI: 2000
R&D expenditure data refer to 2000 - EU-15 average: DG RTD estimate based on 2001 data
Data labels indicate average R&D expenditure per capita researcher across all sectors

Spending is less than 3 000 Euro for every researcher working in the HES in Bulgaria, Romania and in the Slovak Republic, whereas in Slovenia, it amounts to more than 105 000 Euro *per capita* researcher in the BES. For the EU-15 BES, the expenditure *per capita* researcher is highest in Sweden at 283 000 Euro (European Commission, 2003d)[22] and lowest in Portugal with 121 000 Euro in 2001 (up from 93 000 Euro in 1999). **In fact, a pattern emerges here where the highest proportions of women are to be found in the countries and sectors with the lowest R&D expenditure and the lowest proportions of women are in the sectors with the highest R&D expenditure.** This fits with the suggestion that men are leaving these areas because they are no longer sufficiently attractive.

This pattern can be standardised so that the respective group behaviours of women and men *vis à vis* the fields of science[23] and the sectors[24] of R&D can subsequently be examined. A special tool has been developed for this purpose and is referred to as the *Honeypot* indicator[25]. This name is intended to bring to mind the image of bees orbiting around a hive, since this indicator is a measure of the relationship between concentrations of women and men and R&D expenditure. It quantifies the loss of access to and/or control over R&D expenditure experienced by women researchers *en masse* because they are more likely to be concentrated in the low expenditure R&D sectors or fields of science.

22. Data for 1999 in current Euro.
23. The Frascati Manual (OECD, 2002) provides definitions for the six main fields of science: Natural Sciences, Engineering and Technology, Medical Sciences, Agricultural Sciences, Social Sciences & Humanities.
24. HES, GOV and BES in this case.
25. It can be calculated from available and official R&D statistics and is comparable between countries and over time. The score itself is the difference between the expected R&D expenditure per capita pro rata for women and the observed R&D expenditure per capita pro rata for women expressed as a percentage of the expected R&D expenditure per capita pro rata for women.

Figure 3.5
***Honeypot* scores by main field of science and by R&D sector in 2001**



Source: *Eurostat, S&T statistics; DG Research, WiS database.*
Notes: Unit: head count except for * where full-time equivalent
Exceptions to reference year: RSEs: BG, EE, LV (HES and GOV only), PL, SI: 2000
R&D expenditure: HU (GOV & HES): 1999
Honeypot scores by field are for HES and GOV sectors only
Data for researchers by field and sex are not available for HU
* HES expenditure data missing

By comparing the *Honeypot* scores for the *fields of science* with those for the distribution by *sector*, it appears that the distribution of women and men researchers across the *sectors* seems to be a stronger determinant of inequality in most countries. When interpreting the results from Figure 3.5, it is important to note that the negative *Honeypot* scores indicate that **women are losing out on their expected share of access to/control over R&D expenditure**. Scores around 0 indicate no differences between the sexes. Because the calculation ignores any effect from hierarchical distributions within the category of researchers, it is highly likely that these results in fact represent the *best possible* scenario for women.

In the Enwise countries where the overall percentages of women are low (for example, the Czech Republic and Hungary), women's Honeypot scores are negative, signalling that in these countries, women researchers are far more likely than their male counterparts to be distributed in low-expenditure sectors. The most negative scores, yielded in the Czech Republic, the Slovak Republic and Hungary, indicate that women are missing out on 16.47%, 15.05% and 9.96% respectively of their expected share of R&D expenditure.

Conversely, in the Enwise countries, where the results from the *Honeypot* indicator are positive (Latvia and Bulgaria), there are higher proportions of women researchers (see Table 3.2). Slovenia is the outlier, as shown in Figure 3.6, since it has much higher R&D expenditure per capita researcher than the other Enwise countries. Slovenia could therefore be regarded as the Enwise country with the optimal gender-investment scenario.

Women appear to have more equal access to R&D expenditure where the overall proportions of women and men in research are more balanced (i.e. Romania). In the first instance, it could therefore be hastily assumed that a critical mass of women in the research ranks (as is the case in Bulgaria, Latvia and Romania) is sufficient for ensuring equitable access to R&D expenditure between the sexes. However, Figure 3.6 shows how the *Honey-*

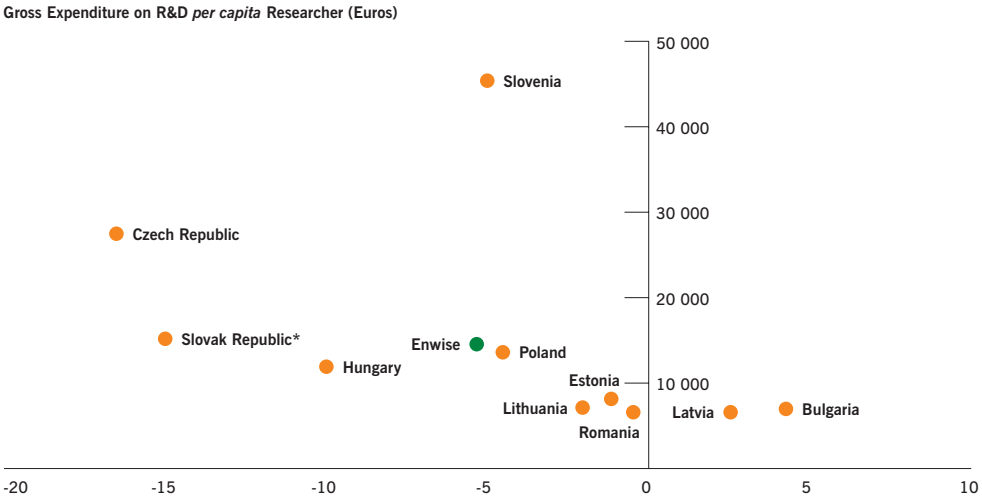
"Between a rock and a hard place..."

As a last year student of the Latvian State University I had the opportunity to finish my graduation work in the Moscow region in a high-level biological research centre. After university I continued my post-graduate studies in this research centre. Together with my husband, we defended, exactly the same day, our thesis for the degree of Candidate of Sciences. I remember that somebody mentioned (but only to me) that this was a very rare situation for a wife and a husband to start their career at the same time. After returning back to Latvia I started to work in one of the leading research institutes of Latvia. I had the opportunity to start new research and my research initiatives were supported by the director of our institute. I made a radical change in my career 7 years ago. I turned to administrative work and started to work in the Ministry of Education and Science. It was a hard decision for me…The research I performed was very expensive and therefore I had to think how to proceed with my research works. Actually I had two possibilities: to leave my country and go abroad to continue my research (such an opportunity was offered to me) or to change my way of life. Because of my family and children, I chose the latter.

Biographical statement by Maija Bundule, Latvian member of the Enwise Expert Group.

pot score for the R&D sectors and the R&D expenditure per capita researcher are strongly and negatively correlated. The apparently positive *Honeypot* scores therefore need to be considered with regards to the volume of R&D investment. Indeed, Bulgaria, Latvia and Romania also have the lowest R&D expenditure per capita among the Enwise countries (see Table 3.7 and Figure 3.4).

Figure 3.6
Correlation between *Honeypot* scores by R&D sector and Gross Expenditure on R&D (GERD) *per capita* Researcher in 2001



Source: *Eurostat, S&T statistics; DG Research, WiS database.*
Notes: Unit: head count except for * where full-time equivalent
Exceptions to reference year: RSEs: BG, EE, LV (HES and GOV only), PL, SI: 2000
R&D expenditure: HU (GOV & HES): 1999

The picture shown in Figure 3.6 above has serious implications for women in the Enwise countries. The relationship between gender and available financial resources – and hence the potential rewards – signal that **opportunities for women researchers are only really comparable with those of men in the Enwise countries where there are least resources for R&D.**
This all points to a scenario where women are being used as a kind of **secondary human** resource to prop up the R&D domains that are of little interest to men, because the reward system is no longer sufficiently attractive. At the other end of the scale, women appear to be squeezed out of R&D where the reward systems are more promising and the stakes are higher, as in the Czech Republic for example. The high proportions of women in R&D in the Enwise countries therefore signal better news for R&D than they do for women, since women are prepared to perform the same work for less money and under less favourable conditions. The HES and GOV are traditionally regarded as providing safer and more stable occupations, even though the pay is lower. The national contributions (Enwise working documents, 2003) support the emerging picture of women tending to choose to work and remain here in order to manage supporting their families with at least one stable income in the new competitive workplace.

The value of the *Honeypot* indicator is that it gives a supra-level vision of what the overall patterns are for the distributions of monetary control between the sexes by combining elements of the R&D context and gender. But three other important reward systems should also be considered which are salaries, the attribution of research funding and the quality of working tools and equipment. The scenarios presented hereafter are fragmented examples of what is happening on the ground. There is not yet[26] a harmonised way of examining pay for scientists or researchers in the Enwise countries or for comparing scientific salaries to those of other highly-qualified professionals.

Low pay: Case studies in Lithuania and in the Czech Republic

Table 3.8
Lithuanian Monthly Gross Earnings in Science in 2001

Position		Scientific qualification	Monthly earning in Litas (and ○)
Professor	Principal researcher	Scientific degree	1 732-2 310 (502-670)
Docent (Associate professor)	Senior researcher	Scientific degree or corresponding (for docent) MA degree or higher education	1 155-1 848 (335-536)
Lecturer (reader)	Researcher	Scientific degree or corresponding (for lecturer) MA degree or higher education	866-1 270 (251-368)
Assistant	Junior researcher	MA degree or corresponding higher education	866 (251)

Source: *Lithuanian Government (March 21, 2001. Nr.319) in Zvinkliene, 2003.*
Note: 1 ʁ = 3.45 Litas

Table 3.8 above itemises the pay regimes for academic staff in Lithuania. The figures refer to the top and bottom pay scales for each position in Higher Education and Government research institutions. The actual earnings of scientists depend on the internal structure and budget of each institution within the framework of a legal scale system. The national unadjusted pay gap was 16% in 2001 (this is the difference in men's and women's gross hourly earnings as a percentage of men's gross hourly earnings). In real terms this represented the difference between 7.06 Litas (2.05 Euros) per hour for men and 5.92 Litas (1.72 Euros) per hour for women. In Lithuania in the same year, the average monthly gross earnings for men were

26. All Enwise countries are expected to respond to the European Structure of Earnings Surveys (SES) by June 2004 and the results will be published by early 2005. It is hoped that these data - and the data emanating from the SES for 2006, which will be published in 2008 - will provide a better picture of the progress towards equal pay for women and men scientists. This information will also enable a comparison with other knowledge-intensive fields, so that the attractiveness of scientific careers in Enwise countries and beyond can be monitored.

Opening doors in Poland?

A Polish survey on Internal Brain Drain stated that an educated Polish person speaking several languages could earn more as a door-keeper of the Grand Hotel than as a researcher in the field of philosophy. Due to this budget constraint, scholars and researchers are inclined to undertake double or even triple employment.

Source: Oleksy, 2003.

Gender pay gap in the new German Eastern *Länder*

In the new *Länder*, employees with Higher Education qualifications, 37% of men (compared to 70% in the old *Länder*) but only 18% of women (compared to 29% in the old *Länder*) had a monthly income of over 2 045 euros, in April 2001. Thus, twice as many men as women were in the higher income group. In the old *Länder*, the pay gap was even greater, with two and a half times as many men as women in this group. For female and male employees as a whole, having a Higher Education qualification paid off financially.

Source: Statistisches Bundesamt (2002): Bevölkerung und Erwerbstätigkeit. Stand und Entwicklung der Erwerbstätigkeit. Stuttgart: Metzler Poeschel in Burkhardt, 2003.

1 181 Litas (342.32 Euros) and 961.8 Litas (278.78 Euros) for women, showing a slightly wider gender pay gap of 19% because of gender differences in patterns of full-time and part-time work. This means that an experienced lecturer, or even a newly appointed senior researcher, is earning something in the region of the average monthly wage for all occupations: hardly a strong incentive for the highly qualified women and men in Lithuania to pursue an academic career.

Czech data from 1999 show that, among employees with basic educational attainment, women's salaries were 74.7% of men's salaries (representing a gender pay gap of 25.3%). In 2001, the average gross monthly earnings for full-time employees in enterprises[27] were 18 481 CzK[28] (572 Euros) for men and 13 755 CzK (426 Euros) for women - a similar gender pay gap of 26%. Among employees with a university education, the salaries are higher but the gender pay gap is even wider: these women only earn 62.5% of men's salaries - a pay gap of 37.5%. In 1999 the average salary for male graduates was 27 814 CzK (less than 1 000 Euros) and 17 395 CzK (600 Euros) for women. This indicates that, whereas female graduates earn more than female non-graduates, the qualification only boosts their earnings by about a quarter of the average salary. However, men, if they are graduates, will earn one and a half times more than the average.

27. NACE categories A - O with more than 9 employees.
28. Ceská Koruna (Czech Crowns) - 1 Euro = 32.3 CzK.

Factors that widen the gender pay gap in Poland

In Poland, different mandatory retirement ages exist for men (65) and women (60). This widens the pay gap between men and women. The pension of a woman who retires 5 year earlier than a man and whose wages were the same, will be up to 40% smaller. Polish women, most of whom always used to work full time in demanding jobs, traditionally preferred an earlier retirement age, which they saw, not without reason, as a compensation for a life time of working two jobs – in the home and in the workplace. Today, they are in the process of realising that the *privileges* they enjoyed under the old system represent added costs to the state in a market economy and may now work to their disadvantage.

Source: Oleksy, 2003.

Gender pay gap in the Slovak Republic

The table below shows women's salaries as a percentage of men's salaries according to level of education. Worryingly, the gender pay gap in the Slovak Republic is much wider in the most educated group, which includes Slovak women scientists and researchers.

Level of education	1996	1997	1998	1999	2000
Basic	75.7 %	73.9 %	72.4 %	74.1 %	72.6 %
Lower Secondary	69.5 %	67.5 %	69.5 %	71.5 %	70.7 %
General Secondary	80.3 %	68.1 %	76.7 %	77.3 %	77.9 %
University	**74.7 %**	**84.2 %**	**72.2 %**	**66.8 %**	**65.4 %**
Total	74.5 %	78.5 %	77.0 %	75.0 %	75.0 %

Source: G. Mesežnikov (ed), Slovakia 2002 - A Global Report on the State of Society, Bratislava: SME in Velichová, 2003.

Research funding

The data on the success rates of research funding applications are not comparable between countries, but are comparable between the sexes. The published statistics (European Commission, 2003b) are based upon numbers of applications, ignoring both the amounts of funding applied for and the amounts received. Women from the Enwise countries generally submit fewer applications than men. Applications submitted by men appear to be consistently more likely to be successful than those from women. The gap between the success rates for women and men is widest in Hungary and Poland.

A connection can also be found between research funding success and 'take-home' pay. Net earnings in senior positions may also depend on bonuses linked to, for example, the number of projects at stake, the total amount granted for the implementation of each programme and the tasks to be fulfilled in each project. In Latvia, two thirds of grant holders are men. Male scientists do not leave science if they have the opportunity to make extra money by carrying out parallel activities in business or in other universities.

The state of the art – Can the Enwise countries compete with their IT facilities?

According to some members of the Enwise Expert Group (Hungary, Latvia, Romania and the Slovak Republic) there are no reports of gender discrimination regarding the access to the Internet or the availability of personal computers. However, even though the situation is improving (see Table 3.9), there is still a lack of available IT equipment in state research institutes and universities. The main problem seems to be a lack of modern and high quality computers and access to the Internet. This has an impact on the efficiency of research and communication, with a knock-on effect for the ability of women and men researchers in the Enwise countries to compete in terms of exploiting their innovations.

Should women have to fight for funding… against other women?

The most exciting argument I received came from the Sandra Harding text: "there is a great value from the different cognitive pattern of women in scientific research and science can only benefit from this". In this perspective, one of the main arguments from the workshop receives even more *weight*: it must be ensured that research projects written by women have more possibilities to compete for funding. The problem is that even the involvement of more women in a decisive body will not help the situation, because most of those women well established in science already accepted men's rules of the *game*. Therefore, my only hope is that more widely discussed and elaborated ideas will change at least the situation for the new generation.

Lithuanian young female scientist (age: 35, sociologist) at the Enwise workshop on Young scientists, Prague April 2003.

Table 3.9
Availability of computers for students and staff in Higher Education establishments in Latvia (2000-2003)

Academic Year	Number of computers	Inter alia			Number of students	Number of students per computer
		Studies	Administration	Research		
2000/2001	5 959	4 645	:	:	101 270	17.0
2001/2002	8 057	5 198	:	:	110 500	13.7
2002/2003	8 720	5 540	2 430	750	118 845	13.6

Source: Central Statistical Bureau of Latvia in Bundule, 2003.
Note: : = missing data

In the concerned national contributions (Enwise working documents, 2003), it is reported that about every second scientist has a computer. Practically every scientist has her/his own e-mail address. Access to Internet is provided for researchers in all state research institutes and higher education establishments, but is sometimes limited to strict hours or days of the week. The Ministry for Education and Science in Latvia partly covers the costs for the use of Internet in state research institutes and universities. Table 3.10 below itemises the numbers of computers with access to the Internet in Higher Education establishments in Latvia and the percentage of these computers with Internet access. In the course of preparing the Enwise report, it was discovered that, in some cases, simple Word files needed to be converted to RTF in Brussels so that they could be read in Prague…

Table 3.10
Access to Internet in Higher Education establishments in Latvia (2000-2003)

Academic Year	Total number of computers with access to Internet	Inter alia: for research	Percentage of HEE computers with Internet access
2000/2001	4 746	3 801	79.6 %
2001/2002	6 726	4 182	83.5 %
2002/2003	7 649	4 907	87.7 %

Source: Central Statistical Bureau of Latvia in Bundule, 2003.

Girls on Top?

The distributions of male and female scientists throughout the scientific hierarchy constitute a major explanatory factor for the pay gap, but they also underlie the entire reward system, including prestige, academic and intellectual recognition and decision-making power (Osborn et al., 2000). For example, scientific productivity often appears to be higher for men than for women, because the energies of many collaborators are accredited to just one person (usually the male boss). The measurement of the different distributions of women and men in hierarchical systems is commonly referred to as *vertical segregation*[29].

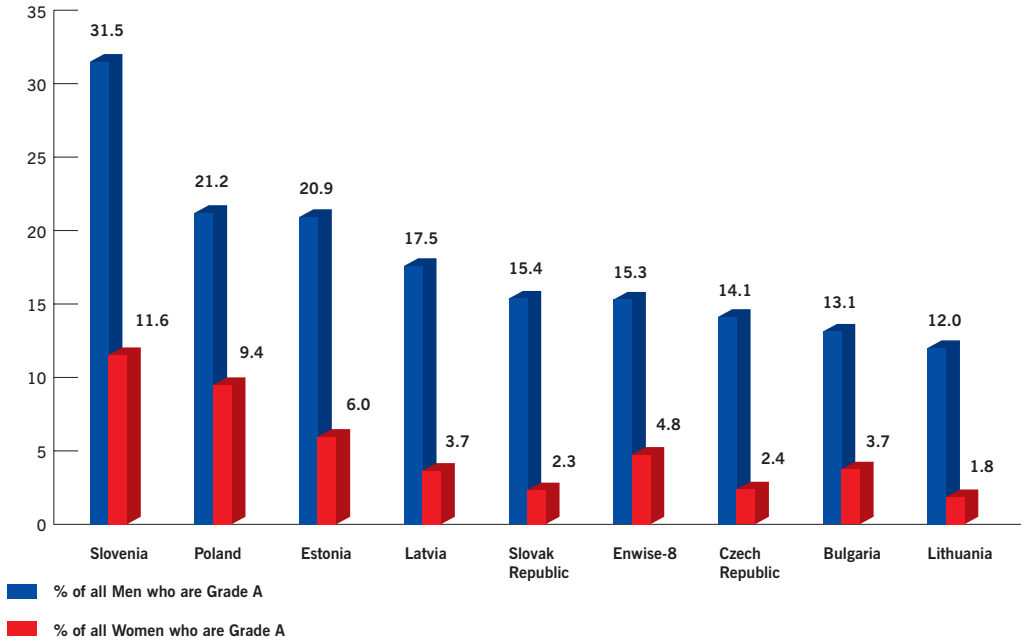
29. See Blackburn et al. 2002 for a more technical discussion on the orthogonal relationship between vertical and horizontal segregation and the measurement of vertical segregation.

University staff

In the "*She Figures 2003*" (European Commission, 2003b), the data[30] reported to the Commission by the Statistical Correspondents of the Helsinki Group reveal sharp differences in the participation of women among all academic staff and the participation of women in senior grades. Levels of women's participation among university staff are similar to their presence as researchers. But this declines sharply in the senior grades[31] (full professorships), so that men are more than three times more likely to reach these positions than women.

30. The best data available on vertical segregation that are broadly comparable and are focussed on teaching and research staff are drawn from surveys of Higher Education institutions that are conducted in most countries. There is no formal collection at international level of many of the variables in these surveys. Many of the definitions are common, but the coverage varies from country to country.
31. For details of the corresponding grades, see Annex 8 of this report.

Figure 3.7
Women and men academic staff in Grade A positions in 2000 (percentages)



Source: *DG Research, WiS database.*
Notes: Unit: head count
Data missing: Hungary and Romania
Enwise-8 totals exclude Hungary and Romania
Data are not yet fully comparable between countries due to differences in coverage & definitions

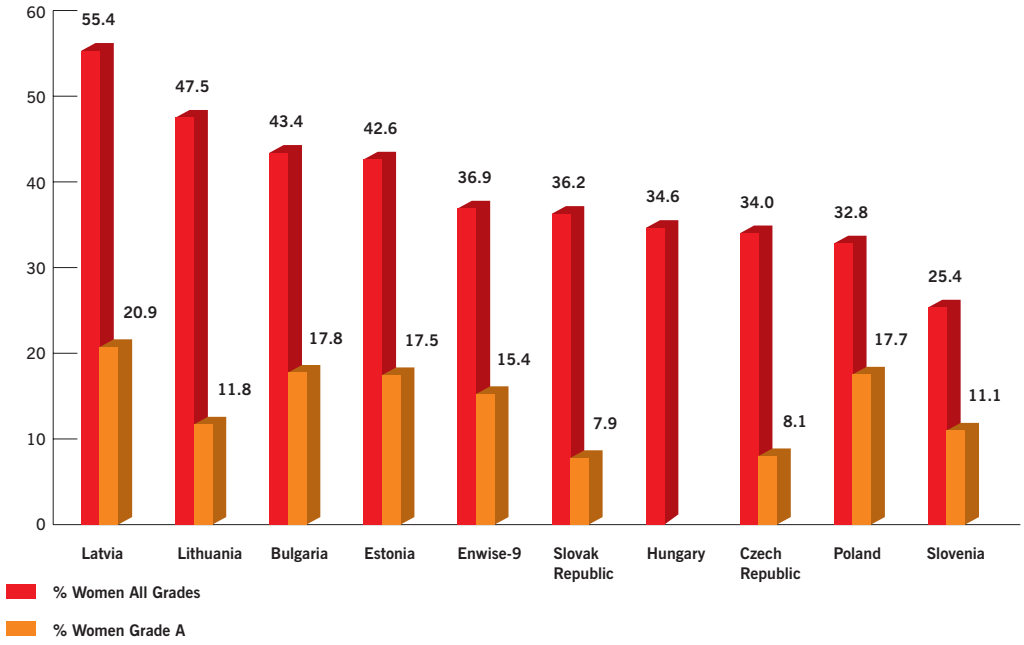
A true Slovak story on *equal opportunities* at the university

I have worked at the Slovak University of Technology in Bratislava for more than 20 years and have been Deputy Head of the Department of Mathematics for 7 years. Every three years, it is possible to apply for leading academic positions. This year, I decided to apply for the position of Head of Department. My professional profile was at least as good as that of two other male candidates, if not better. The results of my psychological tests showed that I was the most suitable candidate for the position. However, I was not accepted for the position. What were the reasons for this? Incompetence could not be the case, neither could lack of experience or insufficient professional qualification… In general, authorities do not acknowledge preference for men or reluctance to promote women in technical sciences and engineering. But it is clear that women will never reach the leading positions in the university, unless there are mechanisms in place to support equal opportunities… The mainstreaming of gender equality procedures is urgently needed at all levels of policy-making and administration procedures.

Biographical statement by Daniela Velichová, Slovak member of the Enwise Expert Group.

As can be seen from Figure 3.7, the worst situation for women is to be found in Lithuania and in the Slovak Republic, where men are nearly seven times more likely than women to reach the most senior grades and six times more likely in the Czech Republic. Men are still more than twice as likely as women to reach these top positions in Poland and Slovenia, but these are the Enwise countries with the lowest sex discrimination in academic careers, as can be seen from Figure 3.8 below.

Figure 3.8
Women among academic staff and among grade A staff in 2000 (percentages)



Source: *DG Research, WiS database.*
Notes: Unit: head count
Data missing: Hungary (% Woman Grade A) and Romania
Enwise-9 totals excludes Hungary (% Woman Grade A only) and Romania
Data are not yet comparable between countries due to differences in coverage & definitions

The example of **Polish universities**, where women constitute a third of all academic staff, is typically illustrative of vertical segregation in the Enwise countries, even though the statistics show that women have the best chance of promotion in Poland of all the Enwise countries. Polish women constitute approximately 33% of academic staff and tend to be concentrated in the lower academic positions. In Poland, only 16% of full professors and 22% of associate professors are women; however, 31% of the academic staff with a *Habilitation*[32] and 39% with a PhD are women (both full-time and part-time positions are included).

Decision-making power is crucial, not as an end in itself, but because it is only through equal and representative participation at the highest levels that women can actively shape the scientific questions and answers of the time. The Women and Science Unit has recognised this need to promote the individual and collective voices of women scientists by launching a **European Platform for Women Scientists**[33], which will act as a forum for policy-shaping and for promoting a more ethical gender dialogue. This plat-

32. This is the professional assessment that has to be successfully completed in order to obtain the title of Professor in Poland.
33. http://europa.eu.int/comm/research/science-society/women-science/network_en.html

form will also develop synergies between existing stakeholders and support gender equality at institutional level.

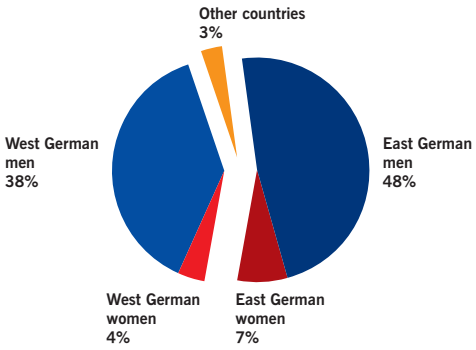
Women's ability to influence **decision-making** in **Slovenia** appears to have improved gradually over the last decade: in 1993 there were only 4% women among the fellows of the Council for Science and Technology, while in 2001 they were 17.1%. In the Slovenian National Scientific Research Council, the presence of women has also risen from 5.9% in 1993 to 30% in 2001. Equally, this segregation is reflected in the composition of senior figures in the Academies of Sciences[34] of all the Enwise countries where only 9% of scientists at the highest level (the Board of Directors) are women.

34. Annex 9 of this report presents the female representation in the National Academies of Sciences in the Enwise countries.

Academic (dis)appointments in the new German Eastern *Länder*

After reunification and for a very short period, the new appointments to all professorships were one of the main features of the personnel renewal of East German Higher Education institutions. This process included the historically unique opportunity to make a huge step towards gender equality, because there were a lot of highly qualified female scientists interested in scientific work. But the reality was quite different. The decision-makers were male and they preferred men. Statistical surveys and case studies confirm that - in relation to the number of applicants - the largest group considered to be worthy of being short listed and appointed were men from the old *Länder* with women lagging behind.

A survey conducted by the Projektgruppe Hochschulforschung Berlin-Karlshorst showed an appointment rate of 75% in 1995 and disclosed the following appointment figures (n=about 5 000 persons):



The renewal of the East German Higher Education system appears to have done little to alter the traditional male dominance in this field, but has brought some fresh advantages and opportunities to West German men. East German scientists had good chances in medicine, engineering, natural science and mathematics - that means in subjects which were during the communist period were not so close to the political system. All these subjects were male dominated. Consequently, former gender segregation supported men to start a new scientific career under new political conditions.

East German women had first of all chances in the new sector of *Fachhochschule* (universities of applied sciences) characterised by higher volumes of teaching, smaller research budgets , lower salaries and often located in little towns. The enormous gender differences in appointments according to the type of institutions, the level of salary and the field of science/research prove the discriminatory tendencies and the perpetuation of hierarchical structures. Several structural effects of marginalisation compounded the problem: the combination of *university* (especially in a renowned place and high level of scientific reputation), *C4-professorship* (highest position) and *traditional male subject* led to a nearly total exclusion of women from positions.

Source: Burkhardt, 2003.

Being young, female and an EU project leader in Slovenia

It is hard to say how many of the difficulties encountered in the local environment were due to gender issues and how many due to my young age. It is clear that being a young woman scientist is not trivial and a lot of energy is to be used for setting good working conditions. For instance, the idea of getting a project and taking care of the work, but letting the others decide on the usage of the associated funding may have been common practice under the communist regime, but nowadays it is not acceptable. The good part is that not only young researchers of both sex but also some senior researchers recognise that and are prepared to fight. Having clear recommendations and support from EU can be very helpful in such situations.

Source: Mladenič, 2003.

Research & Development occupations

In R&D, there is also marked gender dissimilarity across the three occupations: researchers, technicians and support staff. This is best described using the *Index of Dissimilarity*. This indicator quantifies the percentage of all R&D personnel who would have to change occupation in order to achieve a balanced gender distribution in each occupation. The higher the proportion of R&D personnel who would have to change occupations, the greater the differences in the distribution of occupations between the sexes. This is another way of getting behind the summary indicators to find out whether things are really as equal as they might seem between the sexes.

It is important to interpret the results of the *Index of Dissimilarity* alongside the proportion of women within each occupation[35]. In the Czech Republic and in Hungary, around a quarter of all R&D personnel would need to change occupations in order to achieve the same proportions of women and men within each occupation overall. In Bulgaria, the Czech Republic, Estonia, Hungary and the Slovak Republic the highest levels of occupational dissimilarity in R&D are to be found in the sectors where women are most likely to be concentrated as researchers[36]. In Slovenia, there are also high levels of dissimilarity in the HES where more than a third of women researchers are working. Latvia is the only Enwise country where there is little occupational dissimilarity in the R&D sector where the majority of women researchers are employed.

35. See Annex 7 of this report.
36. See also Annex 6 of this report.

Table 3.11
***Index of Dissimilarity* of R&D personnel across the occupations in 2000(1) by R&D sector (percentages)**

Index of Dissimilarity in R&D sectors	Higher education	Government	Business enterprise
Country			
Bulgaria	5.9 %	20.3 %	10.0 %
Czech Republic	23.5 %	28.5 %	21.5 %
Estonia	17.5 %	26.1 %	23.0 %
Latvia	4.7 %	14.1 %	10.9 %
Lithuania	17.8 %	18.5 %	16.6 %
Hungary	27.7 %	23.1 %	28.5 %
Poland	15.3 %	18.2 %	14.4 %
Romania	14.1 %	8.8 %	12.6 %
Slovak Republic(2)	12.1 %	24.7 %	18.0 %
Slovenia	20.9 %	9.1 %	8.0 %

Source: *Eurostat, S&T statistics.*
Notes: Unit: head count except for (2) full-time equivalent
(1) Exceptions to the reference year: LV (BES), LT, 2001

More women from the Enwise countries needed in the European Parliament!

Enlargement of the EU to the East is an important development that we applaud. And sex discrimination is both socially unacceptable and a barrier to growth... The fight for equality is never won…Equal treatment includes equal representation because it is vital for gender equality that women from both accession countries and current Member States take their full place in society. This must include the political arena. In the European parliament, only 31 per cent of existing members are women. This may be reduced after accession, as women make up only 14 per cent of the shadowing delegates of the countries poised to join the EU…I strongly agree with Ms Diamantopoulou that at least a third of MEPs should be women. …I have strongly encouraged women to stand in these elections and will encourage my colleagues in both member and accession states to do the same.

Source: Patricia Hewitt, UK Secretary of State for Trade & Industry in Financial Times, November 4, 2003.

As a general rule, in the HES and GOV sectors the highest levels of dissimilarity in the Enwise countries are due to an under-representation of women as researchers and an over-representation of women as support staff in R&D. In the Enwise countries, there are never more men than women in support staff positions in the HES and GOV research institutions. However, in the BES, men outnumber women among supporting staff in the Czech Republic, Hungary, Poland, Romania and Slovenia. The high Indexes of Dissimilarity in the BES for the Czech Republic and Hungary are also mainly a result of the under-representation of women among researchers.

- **Gender limits promotion – Letting the excellence evaporate…**

The following data from the **Slovak Academy of Sciences** provide a good example of how the interface between horizontal and vertical segregation affects the different potential career outcomes for women and men. In this case, the percentages of women decline with seniority for Earth and Medical Sciences, but rise with seniority for the Historical & Human Sciences. In the Medical Sciences, where there are 40% women among all staff, women are under-represented among PhD holders and particularly among professors. The proportion of women declines as the grade rises, but this decline is sharper in the Earth and Space Sciences.

Table 3.12
Women among academic staff at the Slovak Academy of Sciences by degree of seniority, qualification and field of science in 2002 (percentages)

Section	Women in all staff	Women in all DrSc	Women in all Professors	Women in all researchers with qualification degree I (equivalent to grade A)
Earth & Space Sciences	17.1 %	9.2 %	8.9 %	7.7 %
Medical Sciences	39.9 %	11.8 %	7.7 %	19.4 %
Historical Sciences	41.9 %	19.2 %	24.2 %	21.7 %
Total	**32.7 %**	**12.4 %**	**13.1 %**	**15.6 %**

Source: *Sedová et al, 2003 in Velichova, 2003.*
Notes: Unit: head count
Earth & Space Sciences comprise Earth and Space Sciences, Mathematical and Physical Sciences, Information Sciences, Technical Sciences - Medical Sciences comprise Medical Sciences, Biological and Chemical Sciences, Agricultural and Veterinary Sciences - Historical Sciences comprise Historical Sciences, Human Sciences, Culture and Arts Sciences
Grade A Researchers comprise Doctors of Science and Professors

Concluding remarks

- **The 3% *Barcelona objective* and the BES**

In 2002 there was widespread recognition that Europe needs to invest more in research at the European Council meeting in Barcelona, and the corresponding target of 3% expenditure of GDP on R&D by 2010 was set, of which two thirds should be privately funded. Given that the current EU-15 average expenditure on R&D is 1.93%[37] (European Commission, 2003d), and that the corresponding input for the Enwise countries ranges from 1.45% in Slovenia and 1.33% in the Czech Republic to 0.48% in Latvia, this will require a somewhat greater effort for Enwise countries[38].

The major part of the increase is expected to occur in the BES, which is still under-developed and under-resourced in most Enwise countries. In a context where the outlook for women in business is generally unpromising, there are some serious implications here for the critical mass of researchers, both women and men. At present 20% of all researchers in the Enwise countries are employed in this sector. Less than one fifth (the Enwise average) of all researchers in Bulgaria, Estonia, Hungary, Latvia, Lithuania and Poland are employed in market-led research. Such an increase in intensity is only achievable by raising the absolute numbers of researchers and this in turn is not possible without a major overhaul of the infrastructures and organisations that accommodate them. There are signs that the BES is performing in the Czech Republic, Romania and Slovenia. In **Romania**, which boasts 11% of all Enwise researchers, there are the highest proportions of women and men in the BES, but the lowest overall R&D expenditure per capita researcher (6 301 Euro) and lowest for the BES (8 854 Euro). Furthermore, an exodus of researchers, both men and women occurred between 1998 and 2001 (European Commission, 2003b). Conversely, in the **Czech Republic** and **Slovenia**, the researcher population has been stable over the last few years and R&D expenditure is comparatively high, but women are less well-represented, suggesting that women are given the cold shoulder where the rewards and possibilities are more attractive.

- **Settling for less – the GOV and the HES**

If the BES is a new, slightly more promising but risky workplace for researchers in the Enwise countries, the HES and GOV research institutions provide safe but low-paid working situations for professional women who are also juggling their domestic responsibilities. Anecdotes provided by some members of the Enwise Expert Group indicate that women are also settling for these positions in order to avoid the high risk of unemployment. However, between 1998 and 2001, there was a decline in the numbers of researchers in the GOV[39] in the Slovak Republic, Romania and Bulgaria, as well as in the three Baltic countries. As a result of this group behaviour, women are underpinning the sectors, which in turn fail to provide them with the necessary working tools or motivating salaries.

37. The R&D intensity for EU-15 countries ranges from 3.65% in Sweden and Finland to 0.75% in Portugal and 0.67% in Greece.
38. See also Table 2.6 in Chapter 2.
39. BG, EE, LV (1997-2000) ; LT (2000-2001).

- **The work-life *double burden***

  The fact that women continue to shoulder the major part of domestic work in the Enwise countries is part of the explanation for this gender bias and underlies the differences that can be observed between the sexes in this Chapter. Although there is clearly political will to redress this, opportunities on the ground for men to assume more child care responsibility are ignored.

- **Research in the Enwise countries**

  Although there is huge potential for research to take its place as an engine for economic growth in the Enwise countries, all the sectors – each in its own way – need well-targeted investment to tackle the main problems highlighted in this Chapter, which can be listed as follows:

  - Low R&D expenditure per capita researcher for all the Enwise countries and all R&D sectors;
  - High proportion of women researchers in the Enwise countries and R&D sectors with the lowest R&D expenditure; unequal access for women researchers to R&D funds;
  - Decline in the numbers of women and men researchers in the GOV sector and the BES during the last three to four years in many countries;
  - Lack of knowledge about where non-research Professional women are concentrated;
  - Poor representation of women in the senior echelons of University staff and academies of sciences;
  - Low prestige of the Social Sciences and Humanities and weak investment in the *hard* sciences;
  - Lack of data for pay gap and educational attainment of researchers and other R&D personnel;
  - Cut-backs in child-care provision that could help alleviate the *double burden* and non-response to or lack of monitoring of existing policy measures.

Voting for Future or Holding the Plastic Bags?

"OK ladies! Now those who vote for the future should raise their hands!"

Source: Lendvai, Ildikó (2002). 'Women on the stage and in the audience of politics', Népszabdság, 01.02.2002, Budapest.