ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

GENDER MONITORING 2012-2013

EPFL, April 17, 2014

TABLE OF CONTENTS

INTRODUCTION

EPFL is making considerable efforts to increase the number of women at all academic and administrative levels. The 2012 ETH Board has set concise objectives for the 2012-2016 period for the ETH domain in terms of gender equality at academic levels and for executive positions (Table 1). The aim of this report is to present the student and personnel gender situation at EPFL over the preceding decade (2002-2012), to underline the achievements reached over this period, to put the numbers in the perspective of the ETH Board objectives, and to propose an outlook on future developments and actions.

Table 1: ETH Board Objectives, 2012-2016

	2016 Objective	EPFL in 2012
Bachelor Students	35%	27%
Master Students	35%	26%
Doctoral Students	35%	29%
Scientific Personnel	30%	25%
Assistant Professors	28%	22%
Full/Associate Professors	13%	7%
Executive Positions	25%	18%

The first chapter deals with the representation of women within the student body with a quick outlook on gender equality by country of origin, while the second chapter does so with personnel (academic and non-academic staff). Then, the third chapter underlines the persistence of the leaky pipeline as one goes up the academic ladder while emphasizing the progresses made in those regards. An outlook on the policies put in place and those necessary to achieve further progress in terms of gender equality are presented in chapter four followed by conclusions in the last chapter.

I. STUDENTS

This chapter presents the evolution of numbers and proportions of women within the student body from 2002 to 2012. The first section underlines general trends while subsequent subsections go into more details on the evolutions and trends by level of study and academic section; the last part overviews patterns in terms of gendered diversity.

1.1 GENERAL TRENDS

Over the last decade, both the proportion and the absolute number of female students have gradually and systematically increased at all levels of study (see figure 1.1 and 1.2 below). For bachelor students, the proportion rose from 20% in 2002 to 27% with absolute numbers of 643 female students in 2002 and 1324 in 2012, an increase of 105% of women students at the bachelor level over ten years. Similarly, at the master's level, the proportion of women rose from 17% in 2002 to 26% in 2012 and, in absolute number of female students enrolled, 205 in 2002 and 588 in 2012, which roughly represents a 186% increase over the decade. Finally, at the doctoral level, the percentage of women enrolled was 23% in 2002 to reach 29% in 2012 and the number of PhD female students went from 206 in 2002 to 586 in 2012, a rise of 184% over the last ten years.

Figure 1.1: % of Women, 2002-2012

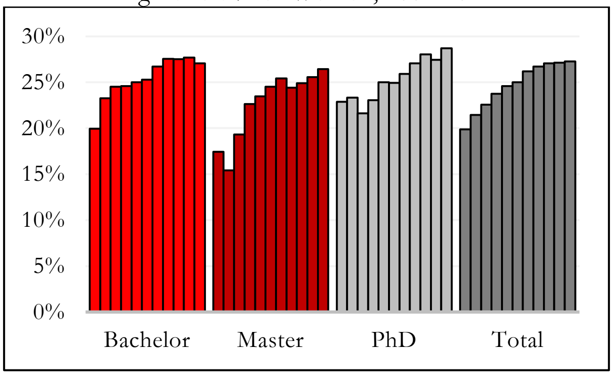
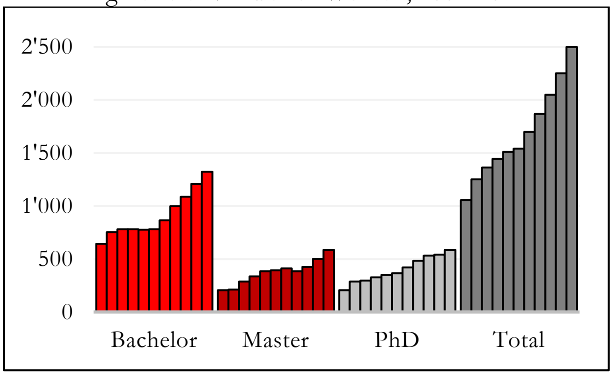


Figure 1.2: Number of Women, 2002-2012



Consequently, the university-wide enrollment of female students rose from 20% in 2002 to reach 27% in 2012, with *the proportion of women at all levels of study being 37% higher in 2012 than in 2002*. Additionally, and reflecting the general rise of enrollment regardless of gender within the EPFL, the sheer number of female students went from 1'054 in 2002 to 2'498 in 2012, a 137% increase, for which the master and PhD levels, where the university can more directly act in terms of gender equity, contribute the most drastically. These trends are reviewed in greater depth in the following sections.

1.2 Students by Section

1.2.1 Bachelor Students

Evidently, not all sections are affected by the positive rising trends of women proportions and enrollment in a similar manner. Figures 1.3 and 1.4 respectively present the proportion and number of women in 2002 and 2012 by section at the bachelor's level. For the most part, both the proportion and the number of women have increased throughout sections. Some sections have demarcated themselves by being well above average in those regards (CH, FSV, AR, SIE; a list of section abbreviation can be found in the appendix) while other sections have experienced stagnation or even decreases in both the proportion and number of women, yet not necessarily for the same reasons. What these graphs also illustrate is that, regardless of the trends, some sections have remained much gendered, such as GM, MT, EL, SC, and INF.

Figure 1.3: % of Women by section, BS

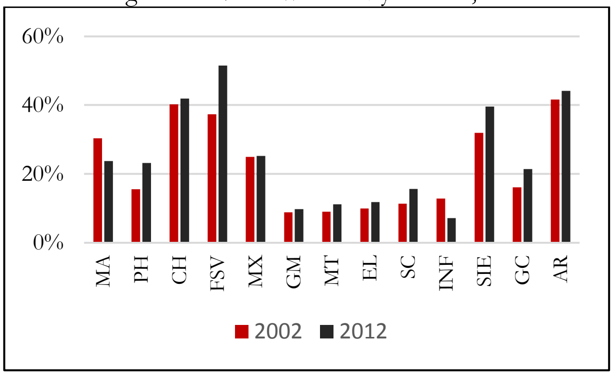
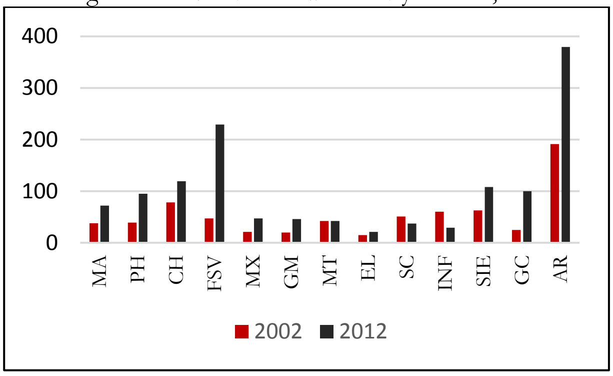


Figure 1.4: Number of women by section, BS



For FSV, data start in 2003

Amongst these sections, the fact that there are more women in FSV and AR illustrate cultural phenomena insofar as these two sections have traditionally been more attractive for women than "hard" sciences and engineering. In the case of sections where the number of enrolled women has decreased, this usually reflects a drop in enrollment for both genders, with the exception of INF where both the proportion and the number of women enrolled have dropped. This phenomenon is the same in the computer science field in some other countries such as the US[1,2]. Nevertheless, regardless of the number of women enrolled by section, the proportion of women rose in each section but MA and INF.

1.2.2 Master students

The proportion of women students at the MS level rose in all but two sections between 2002 and 2012, as illustrated by figures 1.5 and 1.6, which respectively present the proportion and number of women at the MS level by section. Similarly to the BS level, FSV has experienced the sharpest increase amongst all sections. However, MA, CH, and AR, unlike their BS counterparts, represent other sections with sharp increases both in terms of proportion and of number of women. These sections, along with MX and SIE remain high above the university average. On the other hand, and similarly to results presented in the previous section, GM, MT, EL, and INF portray statistics well below the average, again demonstrating that some disciplines are more gendered than others and that they are also

[1] Varma, Roli. 2010. "Why so few women enroll in computing? Gender and ethnic differences in students' perception." *Computer Science Education*, 20(4): 301-316.

[2] Women and Information Technology. 2012. "By the numbers", document available online at : www.ncwit.org/sites/default/files/legacy/pdf/BytheNumbers09.pdf (last retrieved on March 30, 2014)

potentially more resistant to change in that direction. However, one can note that the percentage of female master students has nearly doubled for EL, showing that efforts in this field are successful.

Figure 1.5: % of Women by section, MS

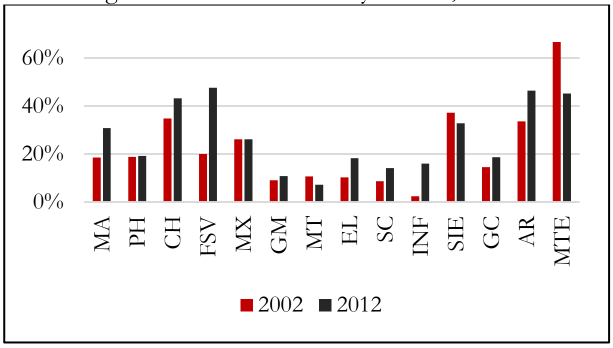
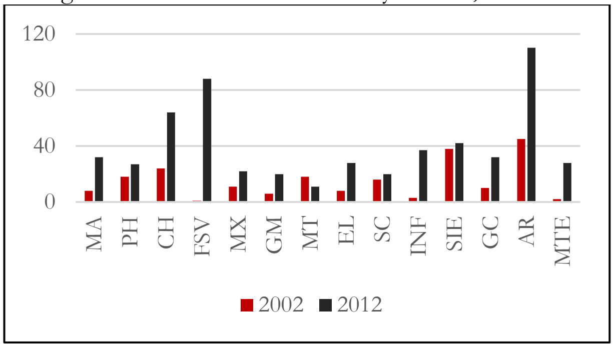


Figure 1.6: Number of Women by section, MS



For MTE, data start in 2003; for FSV, data start in 2004.

Finally, the MTE section's numbers are somewhat affected by the overall low numbers of students enrolled, consequently, the proportion of women fluctuates significantly over the decade but, after a sharp drop between 2003 and 2004, it has tended to gradually rise afterwards. Nevertheless, the figures are more flattering at the MS level than at the BS level across sections. Numbers for the two newest sections at the MS level (IF and EME) appear in the appendix.

1.2.3 PhD Students

The next two figures present the proportions and number of women at the PhD level across sections within the EPFL (to allow comparisons with BS and MS, PhD students were counted per section and not per doctoral program). Again, one can notice that some sections are more gendered than others. FSV has experienced a decrease in the proportion of women enrolled, yet a large increase in the number of women; these results illustrate more the impact of the rapid growth of the section in general rather than a drastic change in women's interest in the discipline insofar as the percentage of women in that specific section dropped from 59% in 2003 to 39% in 2004 to then gradually and systematically increase from 2004 onwards. As for the MTE section, the small number of students enrolled accounts for the large fluctuation over the decade in terms of proportions.

Figure 1.7: % of Women by section, PhD

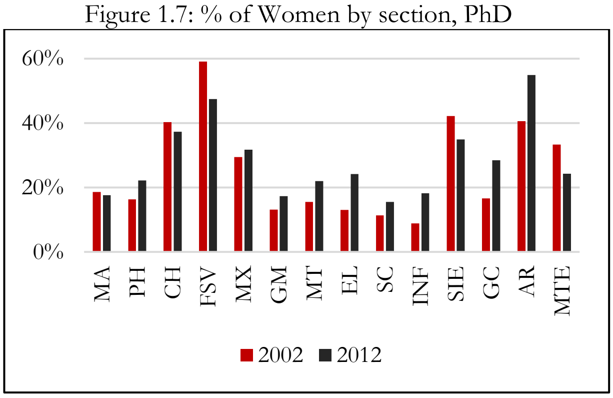
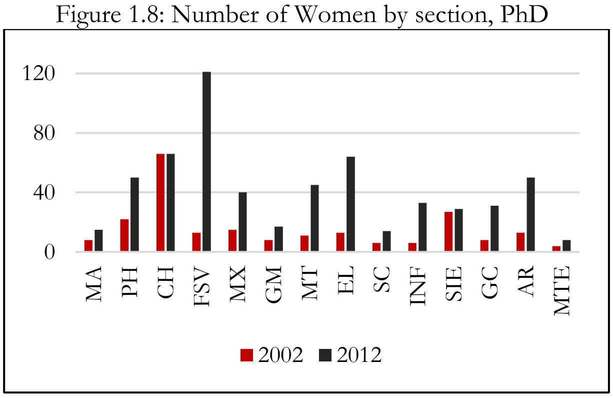


Figure 1.8: Number of Women by section, PhD



For MTE and FSV, data start in 2004.

What these graphs show us, most importantly, *are the apparent strong efforts involved in recruiting quality women PhD students in traditionally more gendered sections* (GM, MT, EL, SC, INF, and GC) as illustrated both by the important increases in the proportion of women and, most strikingly, in their absolute number. At the PhD level, student recruitment is more competitive than at any other level of study and the different schools and sections have more possibilities to attract women than at lower levels of study. The reservoir for recruiting PhD students is wider because many of them are recruited abroad. Cultural issues in gendered sections are less present in some countries and that allows for better recruitment of women in these fields[3] Numbers for the newest section at the PhD level, IF, appear in the appendix.

1.2.4 Some Sections under Scrutiny

Four sections, MA, MT, SC and INF, possess characteristics that differ from the others; either the proportion of women differs across level of study or it fluctuates a lot due to decreases in the overall enrollment for said section. Figures 1.9 and 1.10 present the number and proportion of women and men in MA for the 2002-2012 period to illustrate the variations across levels outlined above.

Based on these graphs, it appears that the apparent drop in the proportion of women at the BS level is mainly due to the fact that though the number of women enrolled has increased over the decade, it has done so at a much slower pace than that of men; between 2010 and 2012, the number of women in mathematics remained relatively stable (from 66 to 72) while it rose drastically for men (from 164 to 231). Over the decade, the number of women barely doubled (38 to 72) while it almost tripled for men (87 to 231), which accounts for the drop in the proportion of female at the BS level. PISA survey 2012 shows that boys scored higher than girls in mathematics in 37 out of 65 countries and economics, while girls outperformed boys in just 5 countries: Jordan, Qatar, Thailand, Malaysia, and Ireland[4]. According to the survey, even when girls perform as well as boys in mathematics, they tend to report less perseverance, less ability to learn mathematics and more anxiety about mathematics than boys; on average, they are also more likely than boys to attribute failure in mathematics to themselves rather than to external factors. Although Switzerland is very well positioned concerning mathematics in the survey, these results also apply to Switzerland and explain why men are more willing to choose mathematics for their university studies than women.

Figure 1.9: % by Gender in MA, 2002-2012

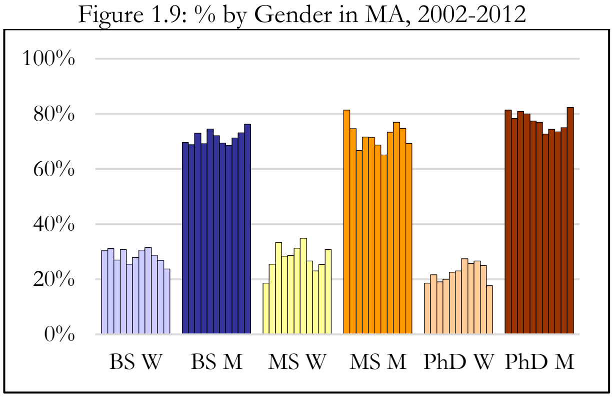
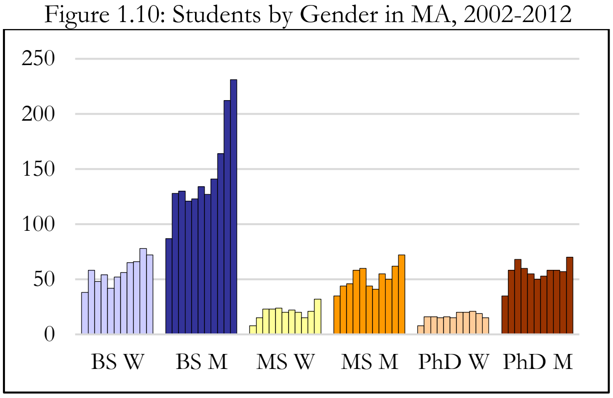


Figure 1.10: Students by Gender in MA, 2002-2012



W: women; M: men

Insofar as they have experienced similar patterns, Figures 1.11 through 1.14 present the number and proportions of women and men in MT and SC for the 2002-2012 period. These graphs illustrate the drop in the number of women at the BS level both in MT and SC in spite of their relative stability in their proportion throughout the decade. Indeed, the number of students, regardless of gender, strongly decreased at the beginning of the period to then steadily increase, which accounts for the underlined fall in the number of women in these sections presented earlier. In terms of the other levels of study, the PhD level experienced relative stability over the period in terms of the distribution across gender and their relative proportion. On the other hand, at the MS level, the number of women constantly decreased in MT while that of men dropped to then go up again, which explains the

[3] Charles, Maria. 2011. "What gender in Science?" *Contexts*, 10(2): 22-28.

[4] Organization for Economic Co-operation and Development. 2013. "PISA 2012 results in focus: What 15-year-olds know and what they can do with what they know." Document available online at www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf (last accessed on March 30, 2014)

decrease in the proportion of women in that section. At the same time, the number of women remained stable in SC while that of men also dropped to then increase again, accounting for the slight increase in the proportion of women over the period.

Figure 1.11: % by Gender in MT, 2002-2012

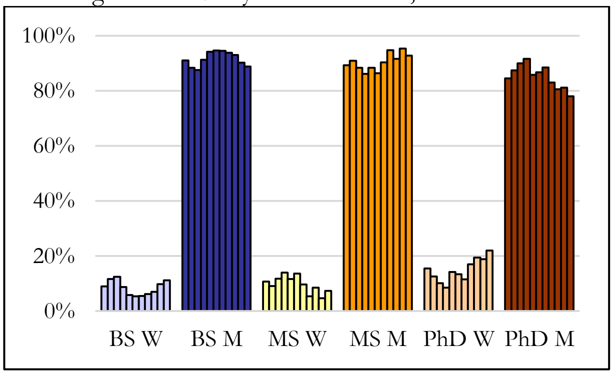


Figure 1.12: Students by Gender in MT, 2002-2012

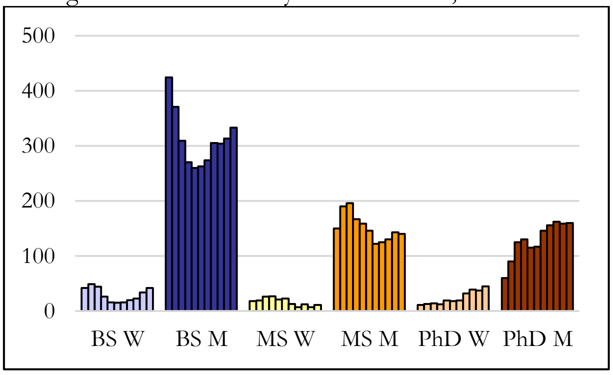


Figure 1.13: % by Gender in SC, 2002-2012

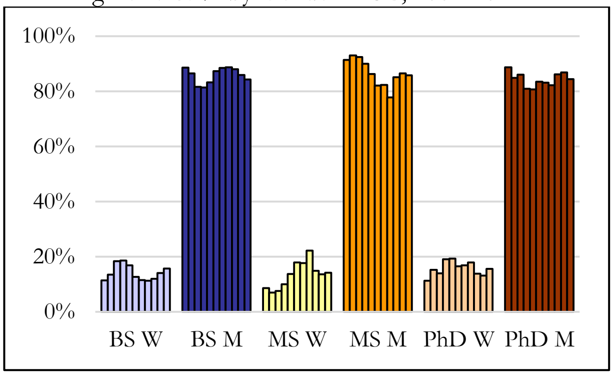
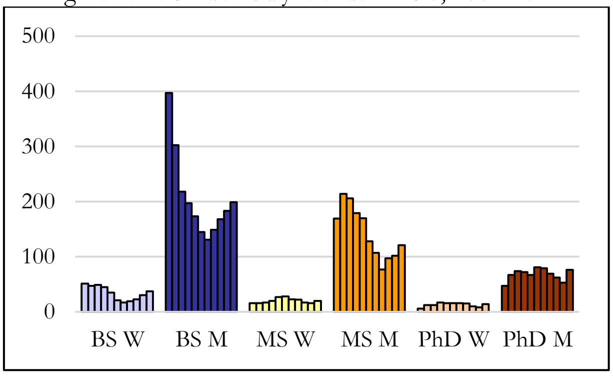


Figure 1.14: Students by Gender in SC, 2002-2012



Finally, figures 1.15 and 1.16 present the patterns for enrollment and proportions by gender in the computer science section (INF). Here, the pattern resembles that of all sections at the MS and PhD levels, i.e., both the number and proportion of women has increased throughout the decade. However, such is not the case at the BS level. While the number of men drastically dropped at the beginning of the decade, it increased very rapidly after 2007 to almost reach its initial level. In the meantime, the number of women also dropped but never returned to its original state. This helps account for the drop in the proportion of women through the decade.

Figure 1.15: % by Gender in INF, 2002-2012

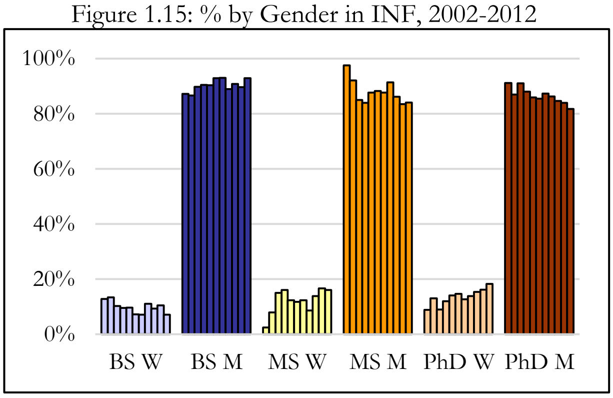
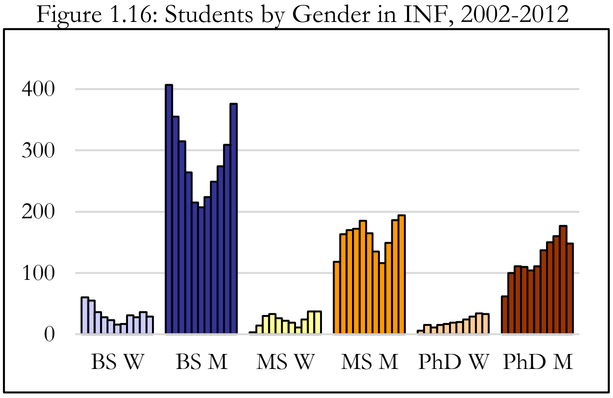


Figure 1.16: Students by Gender in INF, 2002-2012



The graphs for SC and INF at the bachelor levels may have an explanation emanating from the state of the economy and career perspectives. Indeed, the general drop in enrollment in both sections, regardless of gender, could be attributable to the IT bubble. This decrease in the number of students in computer science was generally observed in the in the US and European countries such as France. Yet, both the number and proportion of women in INF decreased much more drastically than in SC; actually women appear to react much more negatively than men to the crisis, a phenomenon that led them to flee the computer science fields at higher paces than their men counterparts. Furthermore after 2007, women seemed to have shown more skepticism than men in a potential embellishment of economic affairs and have continued to be reluctant to enroll in these two sections, especially in the case of INF. In addition, the associated of computer science with "hackers" and "geeks" is enhanced in our countries despite of the variety of professions computer science opens to. This image is not appreciated by girls and young women and has led to a decrease of women in these fields[5]. As a matter of fact, the communication aspect of SC might have had a more positive impact on making women return to the computer science filed, which may explain why they have done so at a higher rate in SC than in INF. Indeed, the words information and communication in the name of these fields in universities seems to increase the interest of young women towards choosing them (*Ibid*).

1.3 Diversity

1.3.1 General Trends

Figures 1.17 and 1.18 show the proportion of women by origin (Swiss and residents as well as non-residents) and by level of study in 2002 and 2012. Overall, the proportion of women has been higher for non-residents than for their resident counterparts, regardless of the year. This phenomenon might be attributed to cultural differences whereby non-residents emanate from countries where technical disciplines have traditionally been more open to women.

Figure 1.17: Women by Origin, 2002

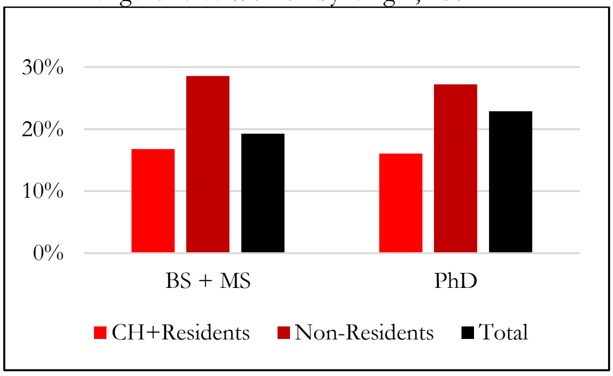
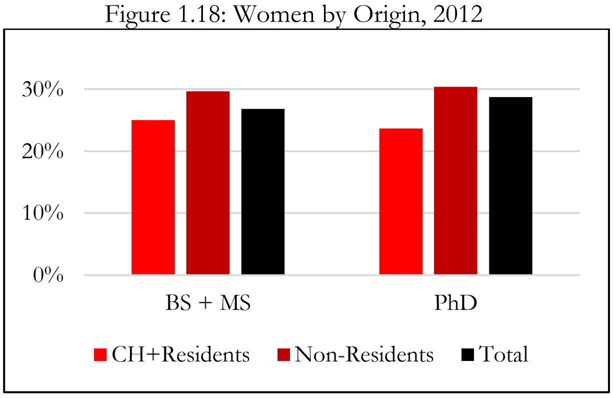


Figure 1.18: Women by Origin, 2012



Nevertheless, the gap between residents and non-residents has widely closed between 2002 and 2012 at the BS+MS level as well as at the PhD level. The proportion of female residents at BS+ MS level rose from 17% to 24% an increase of 41%. At the PhD level the proportion rose from 16 to 24%, an increase of 50% On the other hand, during the same time-span, the proportion of non-residents at BS+MS and PhD levels rose by barely 1 and 3 percentage-points respectively. It seems, then, that the improvement of the proportion of women university-wide is mostly to be attributed to the university's capacity to attract more Swiss and resident women rather than to a general increase of women regardless of origin. These results are encouraging towards the policies put in place to make polytechnical fields appeal to women.

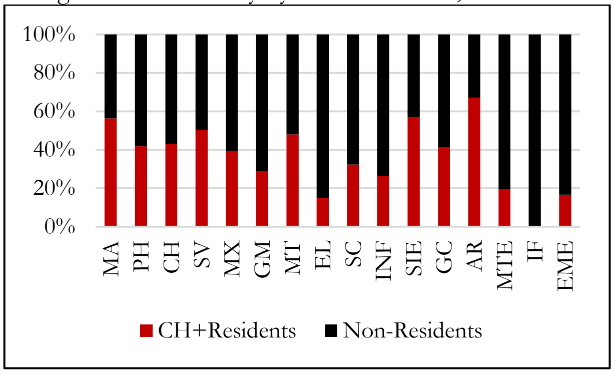
1.3.2 Diversity by Section and School

Figure 1.19 displays the proportion of CH + resident and non-resident women students, by section in 2012. With the exception of IF and EME where there are too few women enrolled (respectively 12 – all of whom are non-resident! - and 18), it appears that the most gendered sections

[5] Collet, Isabelle. 2011. "Effet de Genre: Le paradoxe des études d'informatique. » *TIC & Société*, 5(1) . Online article available at ticetsociete.revues.org/955 (last accessed on March 30, 2014)

are also the sections where the proportion of non-resident women is the highest. This is especially striking for GM, EL, SC, and INF. On the other hand, the less-gendered sections either possess more resident than non-resident or have similar proportions. These two graphs help illustrate the role of culture on enrollment in the different sections regardless of the level of study.

Figure 1.19: Diversity by Section in 2012, all Women



The following figures show that the proportion of CH + residents is higher at the BS level than non-residents in all but two sections GM and EL. At the MS level the distribution of CH + residents and non-residents is uneven across different sections. At the PhD level in all sections but 1 (MTE) the proportion of CH + residents is much lower than the percentage of non-residents.

Figure 1.20: Diversity by section in 2012, BS

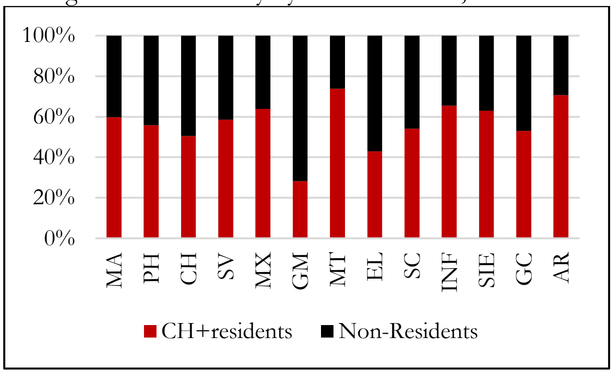


Figure 1.21: Diversity by section in 2012, MS

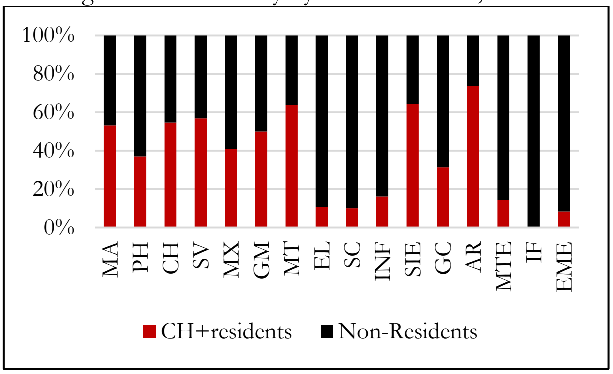
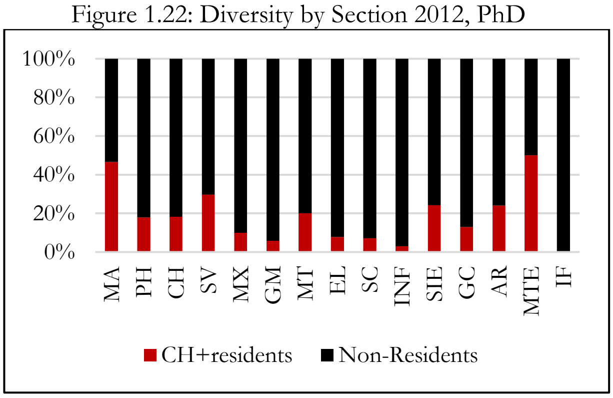


Figure 1.22: Diversity by Section 2012, PhD



II. PERSONNEL

This chapter proposes to present the gender patterns for personnel. General trends are presented first to then go into more depth into trends regarding the different positions. Numbers and trends dealing with issues of gendered diversity appear in the last section. The numbers presented are in full-time equivalent rather than in absolute numbers of employees.

2.1 GENERAL TRENDS

Figures 2.1 and 2.2 present the proportion and number of women employees from 2002 to 2012 by type of position. Overall, both the number and, most importantly, the proportion of female has gradually and steadily increased over the decade. Within the teaching staff, the proportion remains relatively low in 2012 (12%) yet, *the proportion of teaching women has increased by about 250% over the decade.* In other categories of staff, the rise has been less marked; from 20% to 26% within the scientific staff, from 12% to 22% within the technical personnel and a small increase from 67% to 70% within the administrative staff. Not surprisingly, that last category has the highest proportion of women, while, in spite of the sharp increase over the decade, women remain overly under-represented in the teaching positions.

Figure 2.1: % of Women Employees, 2002-2012[6]

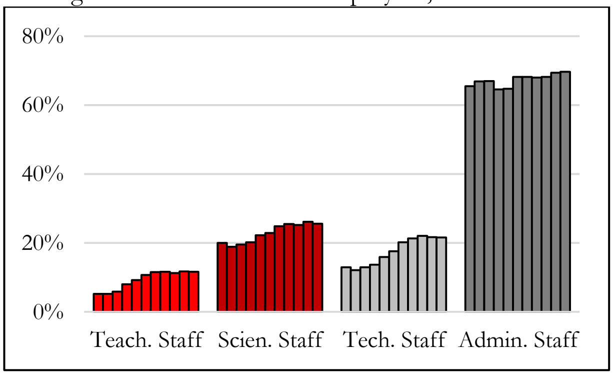
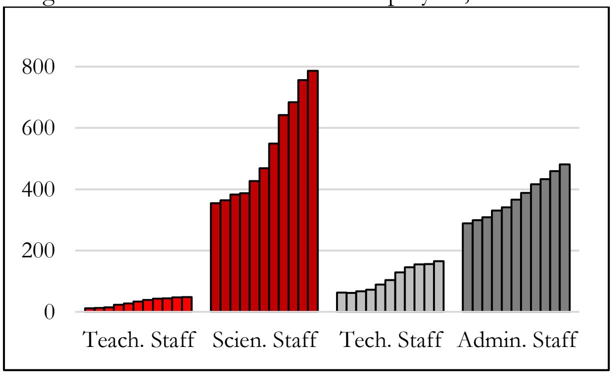


Figure 2.2: Number of Women Employees, 2002-2012



Figures 2.3 and 2.4 present the proportion and number of women holding executive positions - salary class ≥ 24 (before 2007) or level ≥ 10 (since 2007). Again, both the proportion and number of women holding executive positions have increased over the decade, *the proportion has tripled between 2002 and 2012*, going from barely 6% to 18%. At the same time, due to the overall increase in the sheer number of employees, the number of women holding administrative positions has quadrupled. Nevertheless, in spite of these progresses towards higher levels of gender equity within the personnel, women remain under-represented in the executive bodies as they only represent 18.4% of these positions in 2012 – *the ETH Board objective of 25% was therefore not achieved.*

[6] Teaching staff PO, PA, PATT, PA/BPFN, PT, and MER; Scientific Staff: Assistants and scientists; description of abbreviations can be found in the appendix. All categories include personnel in the different schools and sections as well as administrative personnel which are not attached to any school or section.

Figure 2.3: % of Women Executives, 2002-2012

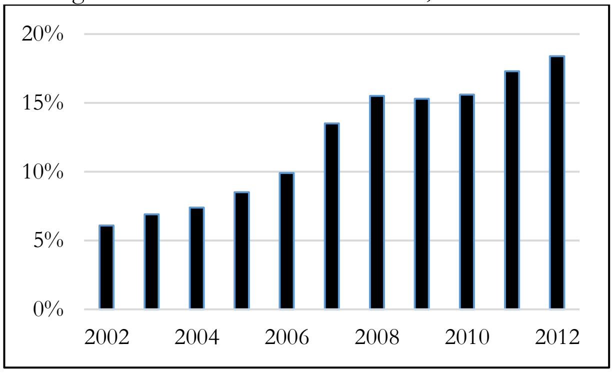
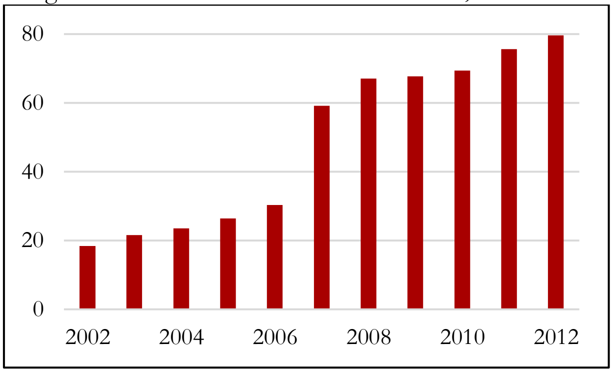


Figure 2.4: Number of Women Executives, 2002-2012



The next series of graphs illustrates the evolution of employment rate of women and men through the decade. Figures 2.5 and 2.6 deal with employment rates for professors; in general, regardless of gender, most employees at the professor level occupy full-time positions and little gender disparities seem to exist at that level. Furthermore, the proportion of full-time positions has increased through the decade and gender differences have tended to disappear.

Figure 2.5: Women Professors by Employment Rate

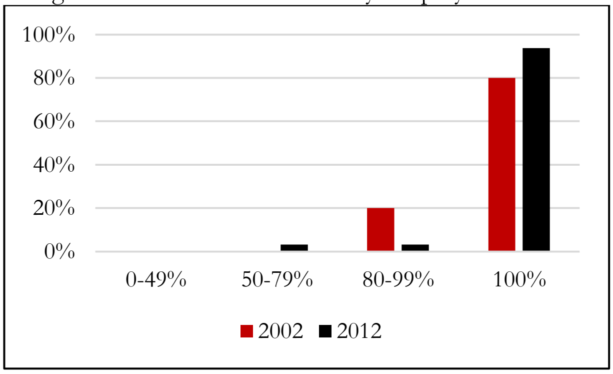
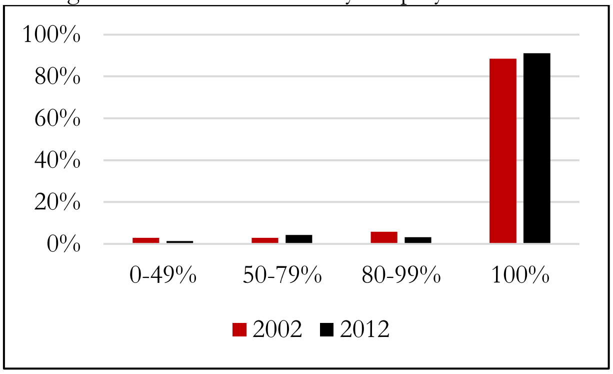


Figure 2.6: Men Professors by Employment Rate



When it comes to scientific positions[7] (figures 2.7 and 2.8), while most men occupy full-time positions for the entire period, the employment rates of women has evolved towards that of men, with a much higher proportion of women working full-time over the decade. The fact that men and women have more similar patterns over the decade is a positive sign and probably reflects cultural and internal policy changes. On the other hand, a full time recruitment policy can be a hindrance for those, men and women, who would like to better reconcile family and career having part-time jobs (for ex. 70 or 80%). In practice this can prevent women, especially, to apply for jobs with higher responsibilities and thus be one of the reasons for not having more women in executive positions.

Figure 2.7: Women Scientific Staff by Employment Rate

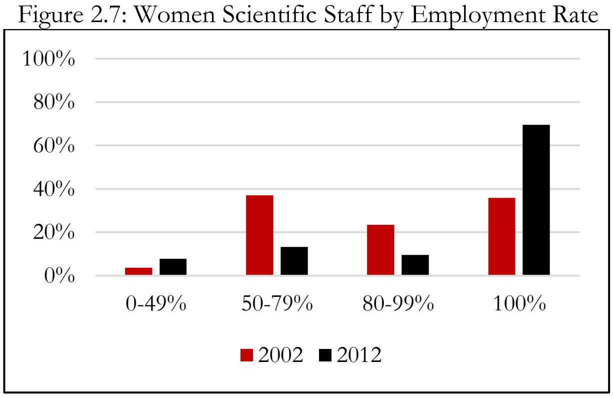
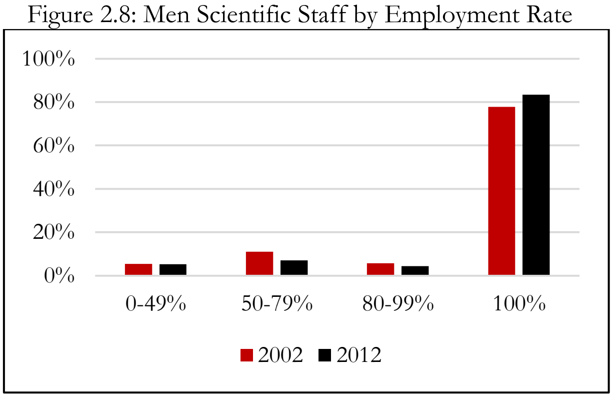


Figure 2.8: Men Scientific Staff by Employment Rate



[7] Only scientists are included in these graphs as the figures for assistants are misleading due to a progressive eradication of part-time positions and a subsequent sharp increase in the proportion of women in full-time positions.

Finally, figures 2.9 and 2.10 indicate that not much change has occurred over the decade for non-academic positions. Most women were holding part-time positions in 2002 and the proportion thereof has remained relatively stable. At the same time, most men work at full-time rates. In these non-academic positions, such trends are to be expected insofar as they provide more flexibility when it comes to workloads, which allows for a better division of time between work and family.

Figure 2.9: Non-Academic Women by Employment Rate

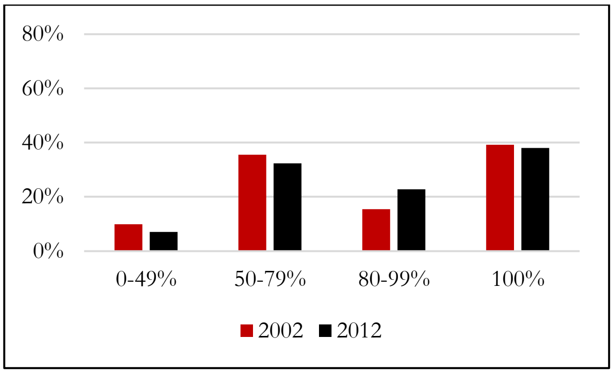
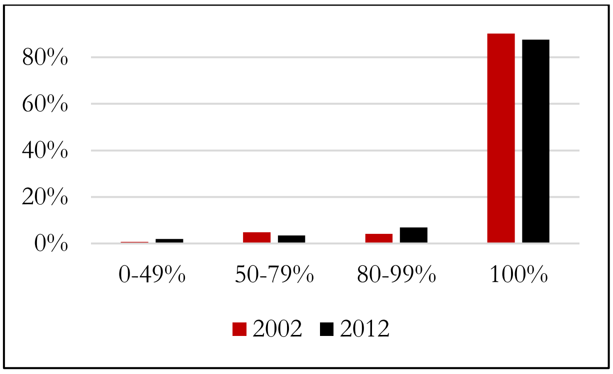


Figure 2.10: Non-Academic Men by Employment Rate



These series of graphs tend to demonstrate that the higher one goes up the academic ladder the smaller the gender gap is in terms of employment rate, with a drastic decrease in the possibility to work part-time. For non-academic positions, the gender gap remains strongly visible and follows traditional lines whereby most women occupy part-time functions while most men work at full-time rates.

2.2 Employees by School

2.2.1 General Trends

Figure 2.11-2.14 present the general trends by type of position held for women over the 2002-2012 decade in terms of proportions and of number of FTE (full-time equivalent) positions held. All sets of graphs demonstrate that regardless of the type of position, with the exception of PA/FN and PA, both the proportion and number of women holding academic positions have increased over the decade. The trends for PA/FN are most likely attributable to the overall decrease of these types of positions at EPFL (PA/FN are selected and financed by the Swiss National Science Foundation).

Figure 2.11: % of Women in Scientific Staff

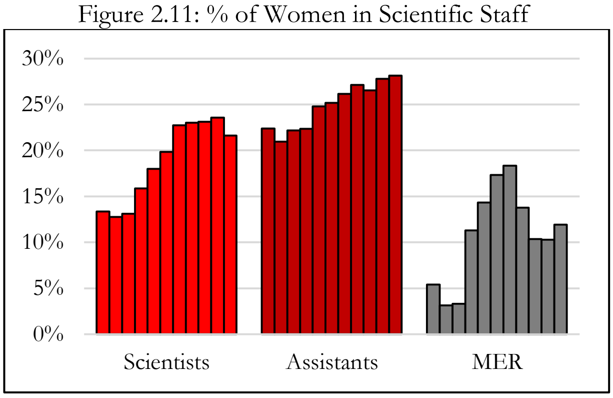


Figure 2.12: Number of Women in Scientific Staff

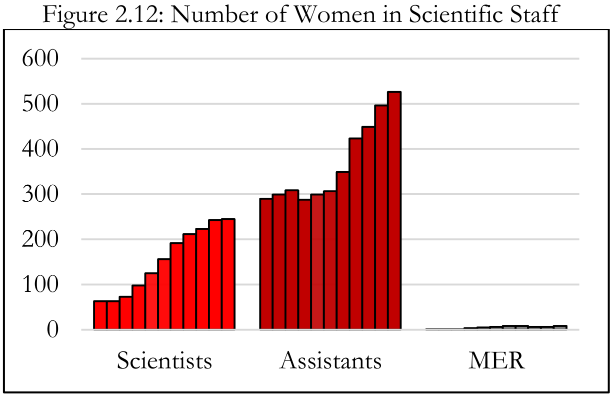


Figure 2.13: % of Women among professors

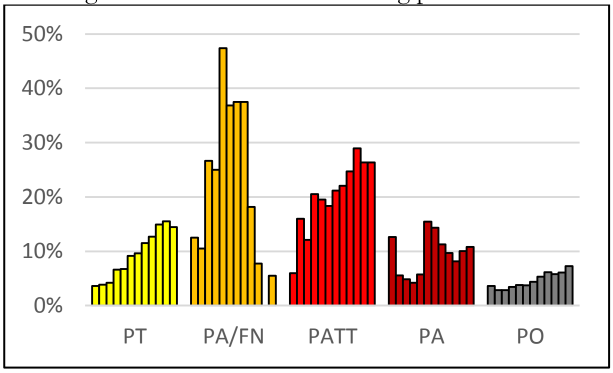
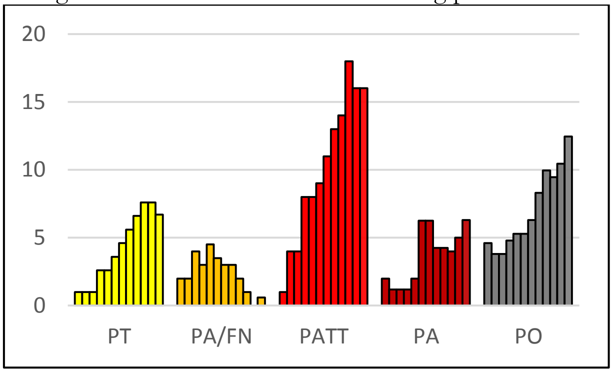


Figure 2.14: Number of Women among professors



These figures include women holding academic positions within the different schools and sections studied below as well as those in central services for which detailed statistics are not presented. The next sections detail the distribution of women across types of positions by school.

2.2.1 Scientific Staff

The figures presented in the next two sections deal with relatively low number regardless of gender; indeed, with the exception of scientists and assistants, the number of FTE for each type of position oscillates between 1 and 50 depending on the school and type of position. Statistics presented below are hence to be taken with some caution especially for teaching personnel.

The next series of graphs presents the proportion and number of women holding different scientific positions in each of the schools in 2002 and 2012. In general, there are much less MERs than either assistants or scientists, this specific category will also be presented in the next section as MERs are both part of the scientific and of the teaching staff.

Regarding the School of Basic Sciences (SB: mathematics, physics and chemistry – figures 2.15 and 2.16), proportions and numbers have remained relatively stable for both MERs and assistants (respectively around 12% and 28%) while strong efforts to integrate women appear to have been made for the recruitment of scientists with a rise of 8 percentage point (from 11% in 2002 to 19% in 2012), with the absolute number of women that has almost been multiplied by 5 (16.6 FTE in 2002 and 68.6 in 2012). This positive evolution is a first step towards more gender equity and efforts must be sustained in that direction.

Figure 2.15: % of Women in SB

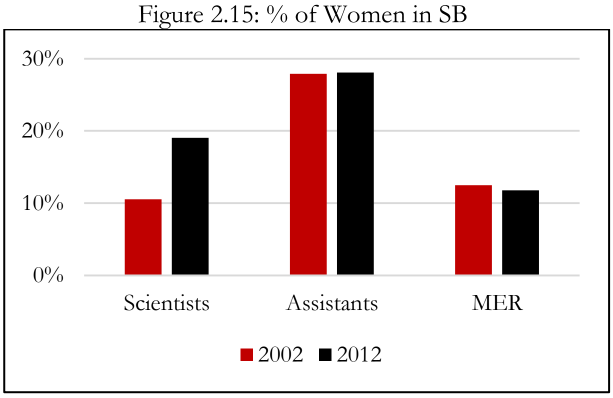
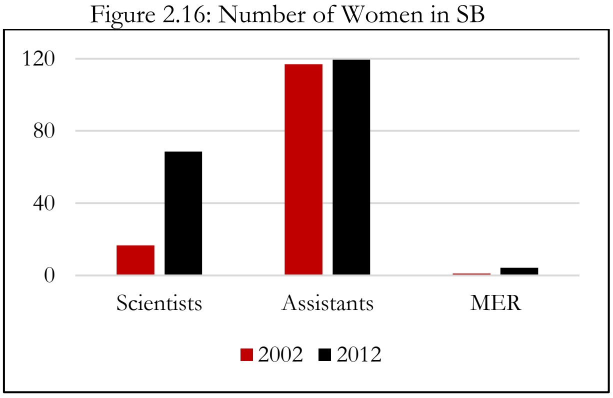


Figure 2.16: Number of Women in SB



The School of Engineering (STI) also traditionally attracts much more men than women. Figures 2.17 and 2.18 display the evolution between 2002 and 2012. Again, though the proportion of women in that area remains very low, it has experienced increases through the decade; there were no female MERs in 2002 and the proportion reached 12% in 2012; in the meantime, the proportion of assistants increased from 16% to 22% and, again, the sharpest increase is to be attributed to scientists which proportion doubled from 7% to 14%.

Figure 2.17: % of Women in STI

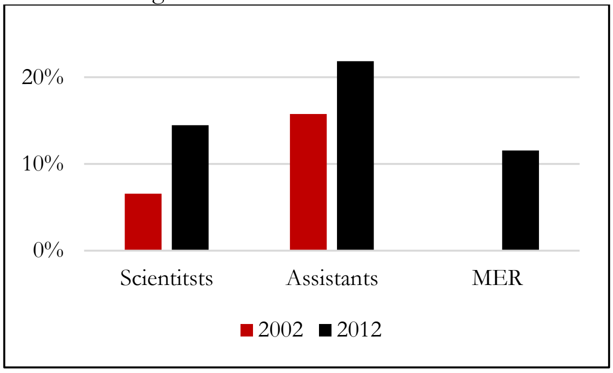
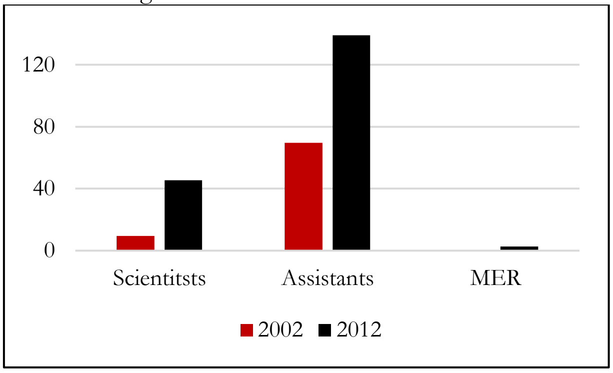


Figure 2.18: Number of Women in STI



Contrarily to the previous two schools, the computer science field has experienced improvement in the assistant section while the proportion of women has decreased at the scientist level (see figures 2.19 and 2.20). The proportion of MERs went from none to a quarter through the decade while assistants experienced an increase from 14% to 19% and scientists went down from 24% to 14%.

Figure 2.19: % of Women in IC

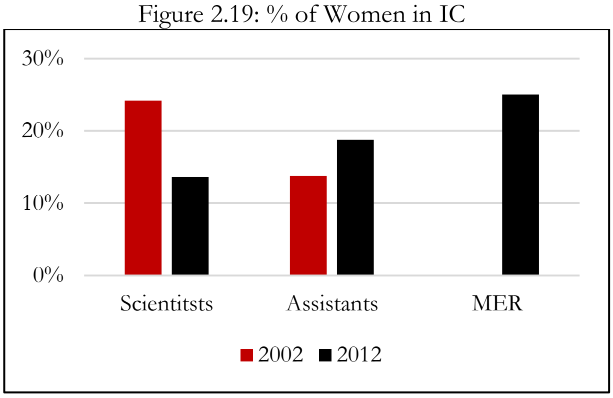
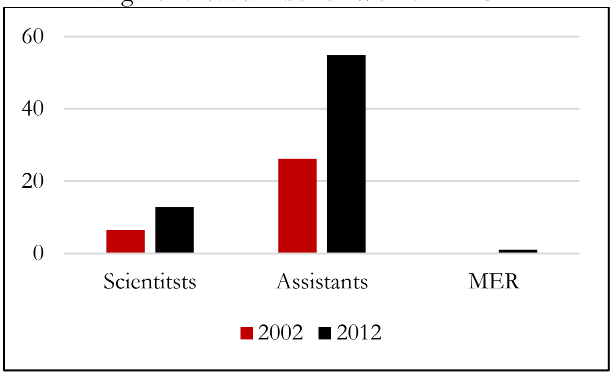


Figure 2.20: Number of Women in IC



The School of Life Sciences (SV) represents one of those the most capable of attracting women as already illustrated with figures in the student body (figures 2.21 and 2.2). Regarding MERs, there were only two male positions in 2012. Nevertheless, the number of women has almost doubled for both assistants and scientists, a fact to mainly attribute to the general increase in the size of the school over the decade. Still, *women assistants in Life Sciences are now a majority compared to men assistants* and the proportion of female scientists gained about 11 percentage-points and women represent one third of Life Science scientists in 2012.

Figure 2.21: % of Women in SV

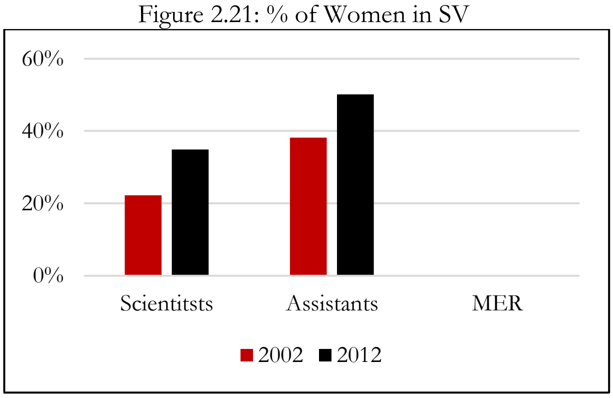
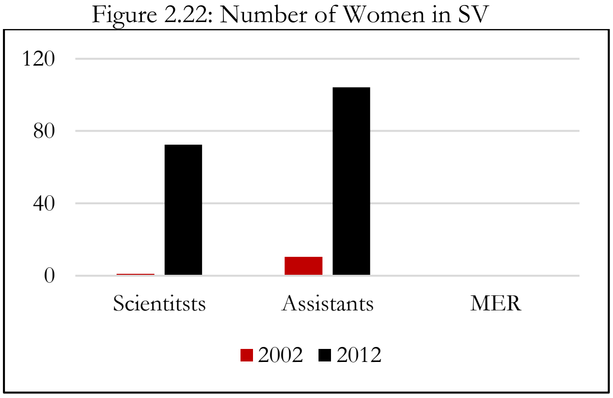


Figure 2.22: Number of Women in SV



The School of Architecture, Civil and Environmental Engineering (ENAC) also suffers less from gender inequalities than others (see figures 2.23 and 2.24). Again, the proportion of women in both assistant and scientific positions has increased through the decade, respectively from 30% to 38% and from 22% to 27%. Yet these improvements as well as the proportion of MER remain relatively moderate.

Figure 2.23: % of Women in ENAC

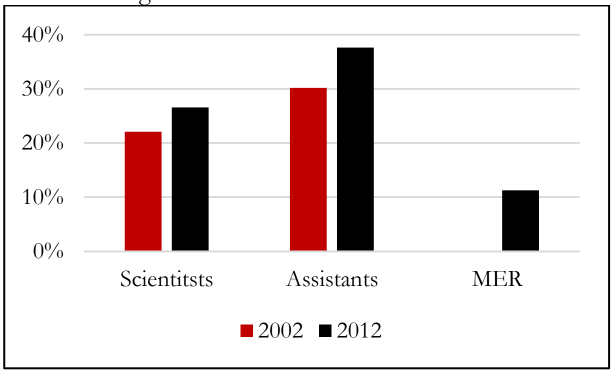
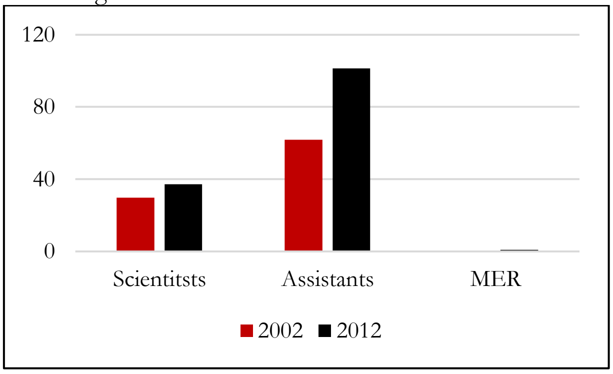


Figure 2.24: Number of Women in ENAC



Finally, figures 2.25 and 2.26 show the evolution for the School of Management of Technology (CDM). There was only 1 male MER for the entire period. Regarding the other two types of positions, while the number of both has increased, the proportion has decreased for assistants. However, the size of this school remains rather small compared to that of others with less than 20 FTE for each position throughout the period. Hence, these two graphs need be analyzed with caution.

Figure 2.25: % of Women in CDM

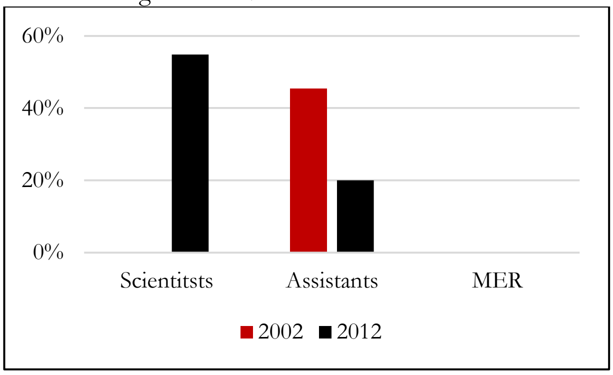
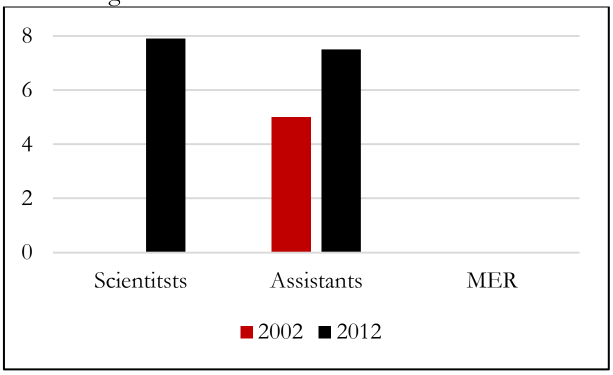


Figure 2.26: Number of Women in CDM



Similarly to what has been seen for the students, certain schools are less gendered than others. However, in spite of these inherent limitations in attracting women, progress has been made in each school to increase the share of women personnel in non-teaching positions with more or less success.

2.2.2 Teaching Personnel

This section presents the proportion and number of women within the teaching personnel for each school in a similar manner as the previous section. MERs are included in this part as they are classified as scientific collaborators as well as teaching personnel due to the duties they fill. Again, due to the relatively small number of FTE for most of the figures presented below, the proportions of women under scrutiny need be taken with caution.

Regarding the School of Basic Sciences (SB), the trends appear somewhat contradictory (figures 2.27 and 2.28). On the one hand, with the exception of associate professors, the absolute number of women have increased in all types of categories (there were, however, no women holding PA/FN at either end of the period). On the other hand, the proportion of women notwithstanding the type of position has remained stable or has relatively increased with the exception of PA with 67% in 2002 and only 12% in 2012, to be attributed both to the dropping from 2 to 1 (promotion to full professor) woman and a concomitant increase of the number of men associate professors from 1 to 7.5 FTE.

Figure 2.27: % of Women in SB

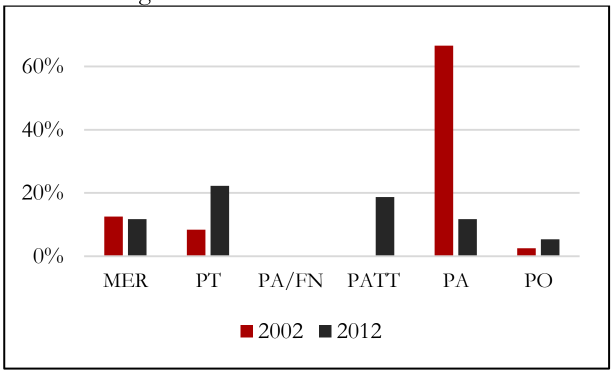
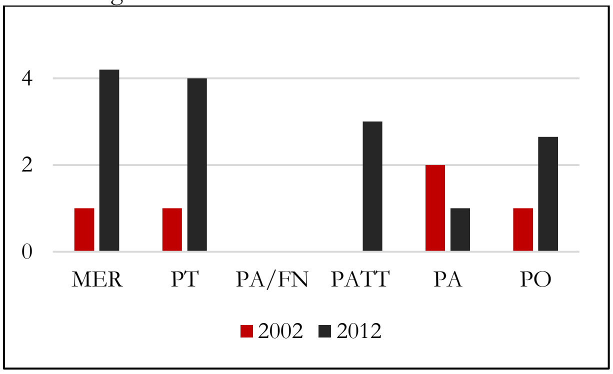


Figure 2.28: Number of Women in SB



These trends are even more marked in the School of Engineering (STI), one of the most gendered of all. With the exception of the PA/FN and PO positions, there were indeed no women working in this school in 2002. It appears that where the strongest possibilities to promote gender equality through recruitment exist, i.e. PATT, the school has managed to attract women to reach levels that approach 40%. In order to achieve these promising results, STI has introduced policies to promote women at the PATT level; the strong advancement of women in tenure track positions provides a reservoir that will help improve the representation of women at the PA and PO levels in the near future.

Figure 2.29: % of Women in STI

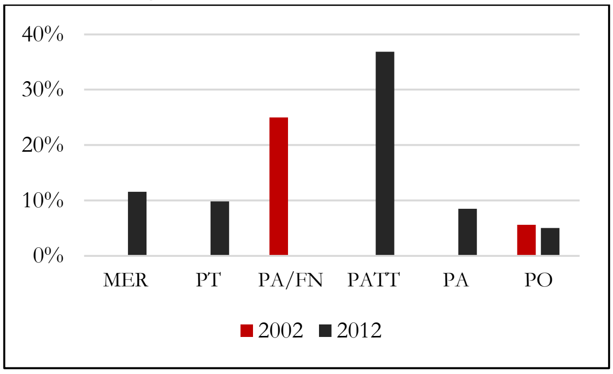
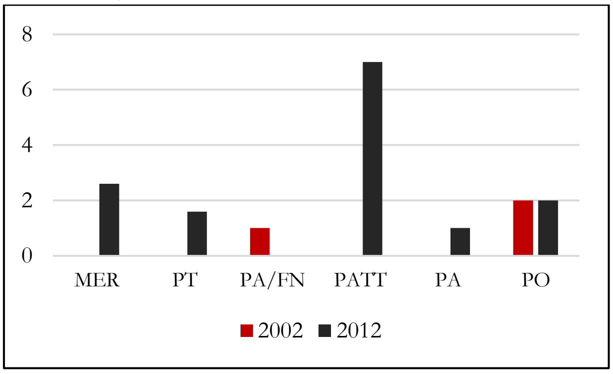


Figure 2.30: Number of Women in STI



Similarly, the School of Computer and Communication Sciences (IC) has experienced relatively strong increases in the proportion of women in teaching positions with the exception of PA/FN, where there was no position in 2012. However, there was actually only 1 women per type of teaching position held. Since the total number of PO is higher than PATT and PA, the higher we go up the ladder, the less represented women are. Thus, women represent 57% of PT position while they only amount to 4% of PO.

Figure 2.31: % of Women in IC

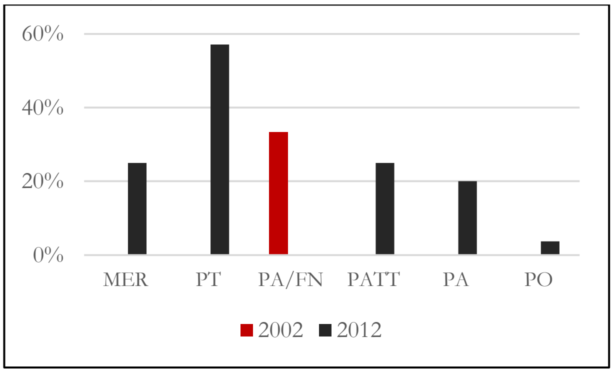
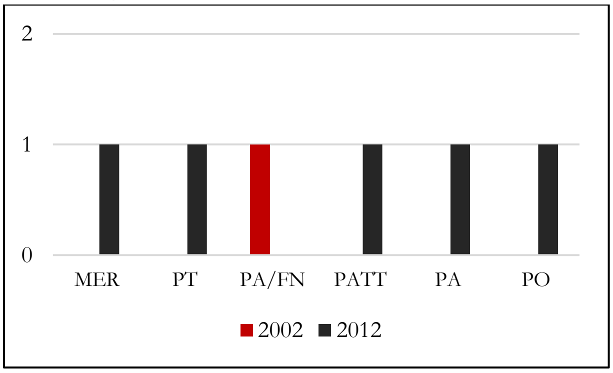


Figure 2.32: Number of Women in IC



The School of Life Sciences (SV) had only two teaching positions in 2002 and it started its main growth in 2005 (Fig. 2.33 and 2.34). In 2012, the proportion of women was above average for PO and PT, but remained low for the other categories. Again, these numbers need to be interpreted with caution as apart for the PO there was a maximum of one woman per category. However, one would have expected a higher proportion of women considering the fact that the number of female students was higher than in the other schools.

Figure 2.33: % of Women in SV

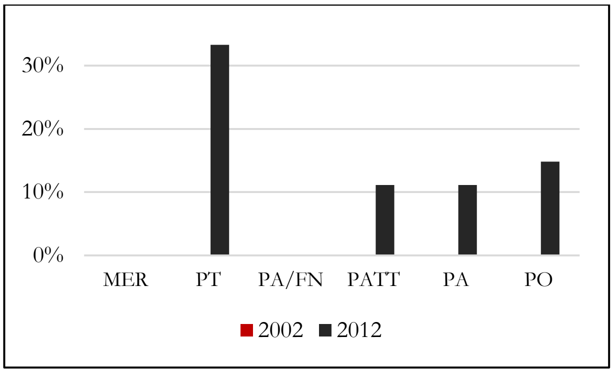
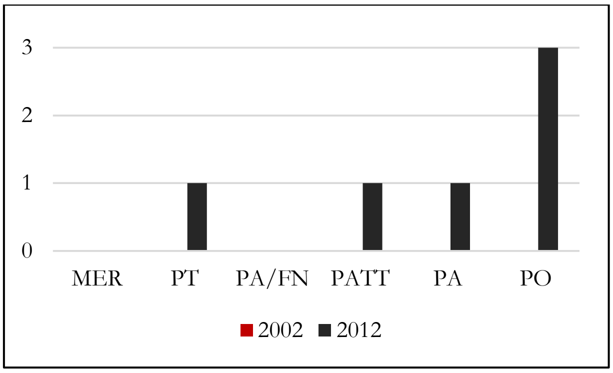


Figure 2.34: Number of Women in SV



The School of Architecture, Civil and Environmental Engineering (ENAC) also suffers less from gender inequalities than others in terms of students. But, similarly to SV, this does not translate well into the teaching body with the exception of PATT (the only position was held by a woman in 2002 and they held 3 out of 7.7 in 2012 – see figures 2.35 and 2.36). Indeed, for the only other positions where they were women in 2012 (MER, PA and PO), there were no more than one full-time position in either and hence they do not represent more than 9% of their respective category.

Figure 2.35: % of Women in ENAC

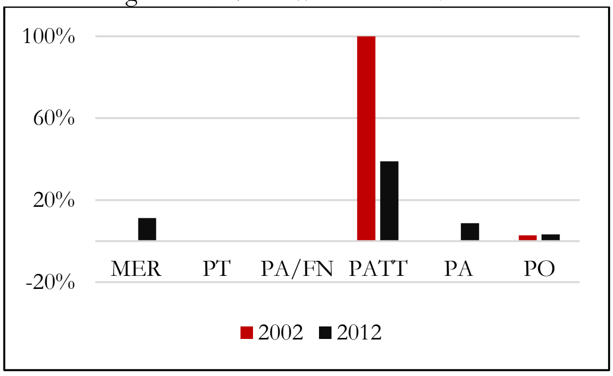
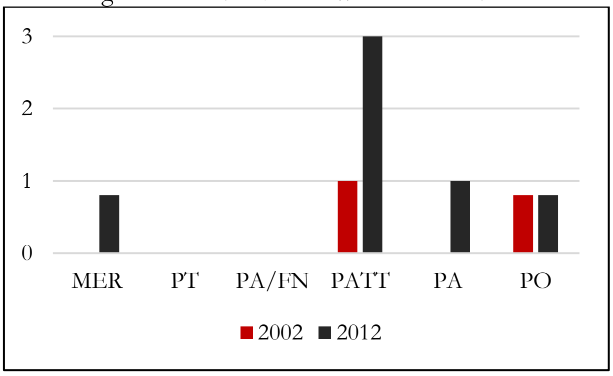


Figure 2.36: Number of Women in ENAC



Finally, figures 2.37 and 2.38 show the evolution for the College of Management Technology (CDM). Similarly to the previous two schools, the college was very small in terms of teaching personnel at the beginning of the period and, with the surprising exception of POs, all positions where held by men. There were only 2 women in professorship positions in 2012, an illustration of both the relatively small size of the college and its difficulties to attract women within its highest academic levels.

Figure 2.37: % of Women in CDM

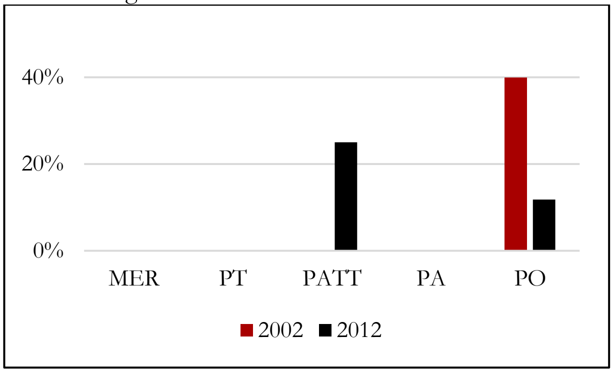
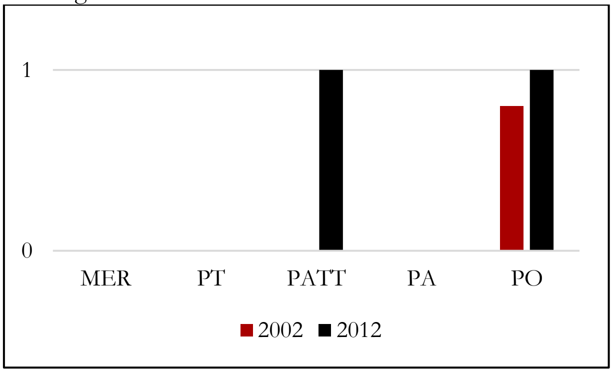


Figure 2.38: Number of Women in CDM



In general, though the number of personnel at the highest hierarchical levels remains relatively small and hampers our capacity to draw solid conclusions on the *real* efforts that have been made within each school or college, the patterns outlined in the previous sections still seem to hold. In other words, the higher we go up the ladder, *the less women there are in terms of proportions and absolute numbers*, however, for all schools, *there have been increases in the proportion of women at all academic levels over the decade*. It is important to note though that for less-gendered schools at the student level (FSV and ENAC), the proportion of women holding academic positions have not moved much and remain relatively low or around university averages; thus within these schools, necessary efforts should be made to attract women within the teaching staff. On the other hand, STI, a much gendered school at the student level has evidently enacted efficient policies to attract qualified women at the PATT level, which should, down the road, lead to increased representation of women at the PA and PO levels.

2.3 DIVERSITY

Figures 2.39 and 2.40 show the origins of women in 2003 and 2012 by broad categories. Data for 2003 are presented as those of 2002 are not available. For non-academic personnel, i.e. technical and administrative personnel, most female employees come from Switzerland with relatively large numbers emanating from the European Union (EU), both in 2003 and 2012, as non-scientific workforce is mainly recruited locally. Women working in teaching and scientific positions mostly come from outside Switzerland in 2003 and even more so in 2012. *The proportion of Swiss and resident women in academic positions (teaching and scientific staff) has decreased from 24% to 18% between 2003 and 2012*. This reflects the fact that recruitment in these levels is international and that the proportion of non-Swiss and non-resident is increasing among PhD students. Furthermore, all PhD students wishing to embrace an academic career need to do their postdocs in other universities, which explains the high number of persons coming from outside Switzerland at these levels. It would be interesting to follow the career path of the PhDs to see if they return to Switzerland after their postdocs.

Figure 2.39: Origin of Women, 2003

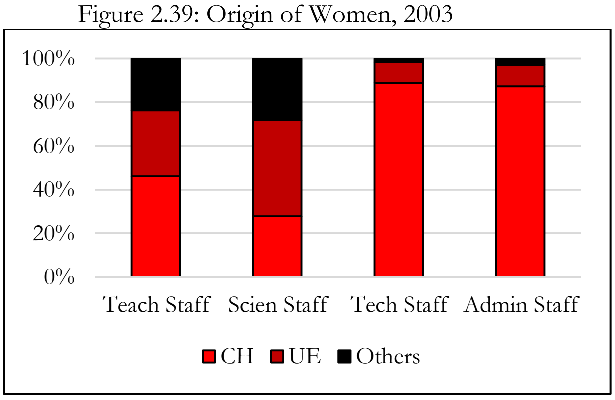
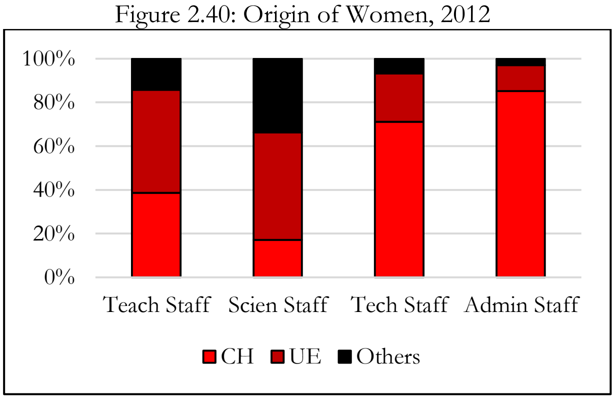
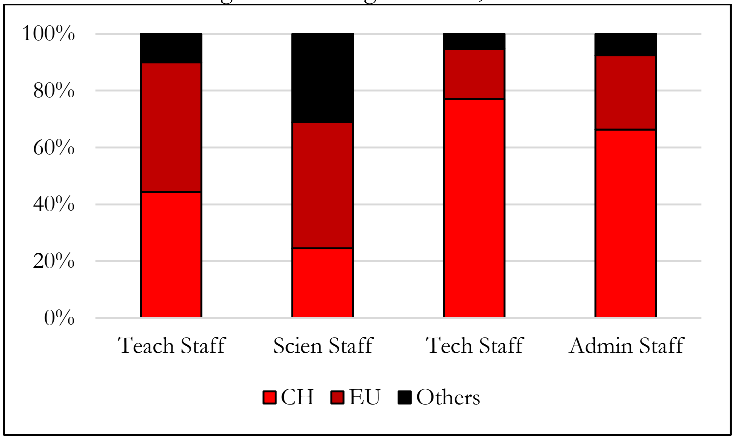


Figure 2.40: Origin of Women, 2012



A comparison between the origins of women and men in 2012 (figures 2.40 and 2.41) shows that the proportion of UE and other origins is higher within women for academic positions (teaching and scientific staff), but lower for the administrative staff. This confirms that, for cultural reasons, women from outside Switzerland are more attracted to an academic polytechnic career than Swiss or resident women.

Figure 3.41: Origin of Men, 2012

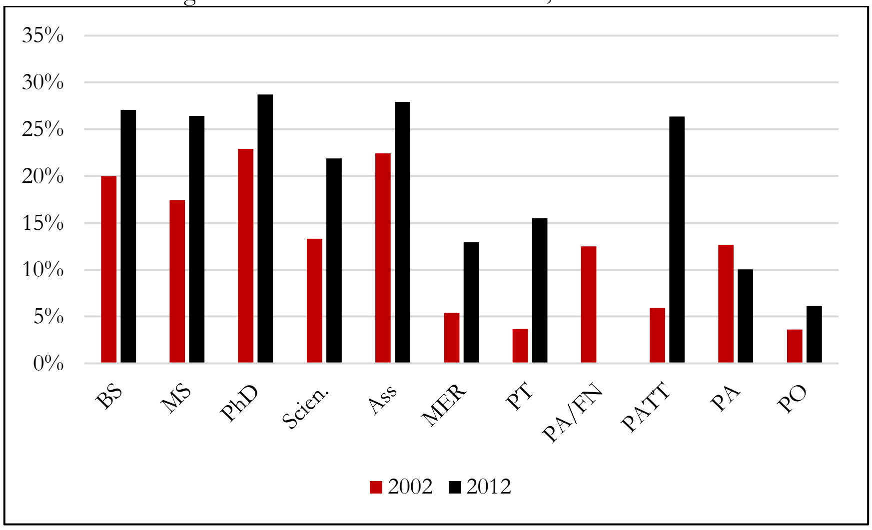


III. LOOKING AHEAD

THE LEAKY PIPELINE AND ETH BOARD OBJECTIVES

The graph (figure 3.1) shows the evolution of the proportion of women at the EPFL within the student and academic personnel bodies for 2002 and 2012. The proportion of women has increased at all levels with the exception of the PA/FN and PA positions. The most important increases have to be attributed to MER, PT and PATT – *the proportion of female MER has more than doubled (from 5% to 13%), that of PTs has been multiplied by 4 (from 4% to 16%) while the proportion of women PATT has also almost been multiplied by 5 (from 6% to 26%)* - illustrating that efforts have been made to attempt to improve gender equality university-wide.

Figure 3.1: % of Women at all Levels, 2002 and 2012



The degrees of change have been notable, increases in the student category for example are respectively of 35% for BS, 52% for MS and 25% for PhD, over the decade in spite of the fact that attracting women (especially within the student population) is an objective achievable over the medium to long-run. In order to put these in the light of the objectives set forth by the ETH Board, graph 3.2 shows the leaky pipeline according to the categories proposed by the Board and table presents 3.1 the efforts needed to attain the ETH board objectives.

Figure 3.2: ETH Board Objectives and EPFL Achievements in 2002 and 2012

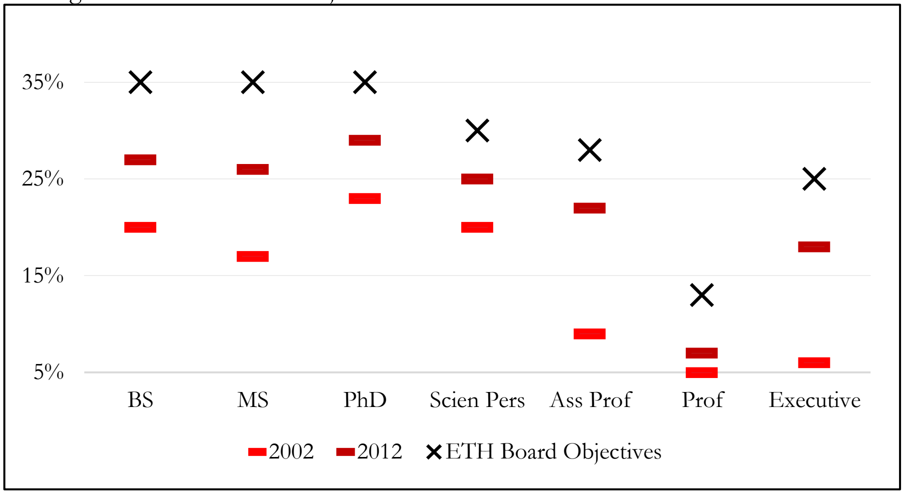


Figure 3.2 and Table 3.1 show that regarding students, the EPFL is to reach **35%** of women. In 2012, women accounted for **27% of BS, 26% of MS students and 29% of PhD students** for a total of 27% of women students within the entire student population – *a 7 percentage-point increase from 2002 but still 8-percentage points away from the 2016 objective*. Women are expected to reach **30%** of the scientific personnel by 2016; though they increased from 20% to **25%**, *there still remains a 5% deficit to cover in 4 years*. As explained above, the proportion of assistant professors has experienced a very sharp increase over the decade to graze the objectives set at **28%** with a level of **22%** in 2012. Finally, though the proportion of women has also increased with the full/associate professor category it both started at too low levels and grew too little to even begin to hope to reach the **13%** benchmark by 2016; though *the proportion increased by half*, it only reaches **7%** in 2012.

Table 3.1: Efforts Needed to Attain the ETH Board Objectives

	2012	2016 ETH Obj.	% Increase Needed	% Point Increase Needed
BS	27%	35%	30%	8%
MS	26%	35%	35%	9%
PhD	29%	35%	21%	6%
Scientific Personnel	25%	30%	20%	5%
Assistant Professors	22%	28%	27%	6%
Professors	7%	13%	86%	6%
Executive Positions	18%	25%	39%	7%

Regarding the 2016 ETH Board objectives the prospects are uneven across categories. As a matter of fact, though some of the objectives might seem achievable – the third column displays the increase needed in terms of percentage – it seems very hard to reach the one for professorships, which would entail an 86% increase over only 4 years. Furthermore, though the university has leeway over the selection of certain positions (mainly from PhD student through PATT), there exists much less room for the selection of entry-level students and full professors. In addition, these efforts are to be made over 4 years while similar levels of improvements in terms of percentage change had barely been achieved over the previous 10 years. Were the rate of change to remain the same over the next five years, the EPFL could only hope to attain the ETH Board's objectives for assistant professors and maybe scientific personnel. Efforts should be enhanced. In addition to the existing measures, actions and measures targeted as a function of the results of gender monitoring should be developed and implemented.

IV. Outlook

In the following chapter the actions and measures that should be developed or continued in order to move across the objectives are described.

One of the categories where important efforts should be made, as the objectives are far from being achieved, is the professors. Measures for recruitment of female professors should be developed based on the best practices in the world and the specificity of each school.

The objectives concerning the proportion of the staff in the executive positions settled for 2011 (25%) were not achieved and set up again for 2016. The results show that in order to bend in the direction of the objectives an action plan must be put together involving HR services and the schools.

A fine analysis of the female scientific staff population should be done. This gives the possibility for developing specific actions involving HR service, schools, sections, and head of units and the office of equal opportunities leading to a higher recruitment of women in this category.

Concerning master and PhD levels, monitoring results show that there is a higher presence of female students from abroad more or less marked in different schools. One should, on the one hand, encourage with targeted actions, female students with a MS degree to continue at the PhD level and on the other hand put together strategies to recruit more students abroad. Specific action plans should be developed for different sections and schools in collaboration with the schools, with the doctoral school, the doctoral programs and with the service of study programs promotion,

The other category where tremendous efforts are necessary is the one of bachelor level. Even though, over the last decade, both the proportion and the absolute number of female students have gradually increased, specific actions are necessary in order to continue the increase and overcome the cultural issues constructing barriers against the choice of some fields by girls. This level is very important and needs a special attention because it prepares also the reservoir for the upper levels.

Maria Charles[8] analyzes the reasons leading to a significantly higher participation of women in scientific fields in developing countries than in advanced industrial countries. About half of Malaysian computer science graduates and nearly half of the Indonesian engineering graduates are women. Gender stereotypes in scientific and engineering fields seem almost absent in these countries, girls believe in their capacities and parents and teachers encourage them to continue in these fields.

The PISA survey 2012[9] reports that the s*tudents' attitudes towards mathematics are already well-formed by the time students are 15. Even when girls and boys perform equally well, girls are more likely to feel anxious towards mathematics, and have less confidence in their own mathematical skills and in their ability to solve mathematics problems than boys."* Going to details one can see that Malaysia and Indonesia cited above as the countries where women gain the most degrees in engineering and computer science, are among countries having the less gender gaps in students beliefs in their ability to learn and use mathematics. Malaysia is also one of the only five countries (Jordan, Qatar, Thailand, Malaysia, and Ireland**)** where girls over perform boys in mathematics.

[8] Charles, Maria. 2011. "What gender in science?" *Contexts*, 10(2): 22-28

[9] Organization for Economic Co-operation and Development. 2014. "Are boys and girls equally prepared for life" Document available online http://www.oecd.org/pisa/pisaproducts/PIF-2014-gender-international-version.pdf (last accessed on April 1, 2014)

In order to make cultural changes in advanced industrial countries, it seems to be necessary to develop specific programs for children and youngsters. The office of equal opportunities of EPFL put together a program to promote STEM (Science, Technology, Engineering, and Mathematics) subjects among youngsters especially among girls, to encourage them to choose scientific and engineering fields. A marked goal of the program is to give confidence to girls in their capacities in mathematics and scientific fields. Another goal is to work with teachers, schools, and parents in order to shatter stereotypes. A communication implying media is also very important to change mentalities.

Having started with one course for 25 young girls, the program gained credit and recognition and was enlarged progressively. Today, the program, widest for promotion of science among youngsters including the gender dimension in Switzerland, is active with a presence in 7 French speaking cantons, and created several partnerships with private and public economic partners. Since 2010, this has opened to possibility to work yearly with more than 8'000 children and youngsters aged 7 to 15.

Significant effects are expected in 10 or 15 years due to, on the one hand, the quantity of children who should benefit from the program and their young age, and, on the other hand, to the necessity of cultural changes which need time. However, these actions together with the visibility and presence of EPFL might have already contributed to enclosing the difference between the female resident and non-resident students via teachers, parents and media (Figures 1.17 and 1.18). This program will be continued and enhanced during the following years in order to contribute to prepare the reservoir of the next generation of scientists, made of girls and boys, within the Swiss French-speaking part of Switzerland.

In order to try to increase the number of female students at the bachelor level, special actions such as targeted internships and actions for middle and high-school girls should be developed and actions for recruitment from abroad should be enhanced.

V. Conclusions

Numerous actions and measures were setup during the last decade leading to an increase in the number and proportion of women in almost all categories and at all levels. The following results are encouraging:

1) The proportion of female Swiss + resident students at BS+ MS levels as well as PhD level rose significantly between 2002 and 2012.
2) A policy set up by the STI school, which possesses some of the most gendered fields, was fruitful and women constituted 37% of the PATT population of this school by the end of 2012.
3) The rate of PATT women's promotion to associate professor positions is the same as that of men, which will help fix the leaky pipeline at the professorial level.
4) Three out of 9 school or transversal deans are women.

Despite the efforts and encouraging results, the objectives fixed by the ETH Board have not yet been achieved. An action plan leading to the enhancement of some of the existing actions and the development and implementation of new ones should be set up.

Actions 2014-2016

:

Following the gender monitoring results and the objectives of the ETH-board:

- Specific action plans will be developed for the different categories of female students and staff, involving all actors at the central and school levels.
- Measures for recruitment of female professors will be developed within the above-mentioned plans, based on the experience of the STI School, best practices in the world and the specificity of each school.
- Specific attention will be given to the introduction of new fields which can interest women, such as digital sciences.
- Actions such as mentoring and coaching programs to encourage academic careers for all categories of female within the academic staff and enable career advancement will continue.
- An action plan will be developed concerning the recruitment of more women in the executive positions.
- Actions put together to better reconcile family life and professional activity will be continued. In addition, the development of measures for job sharing and part-time possibilities for men and women and in positions with higher levels of responsibilities should be studied and implemented.
- The program of promotion of science amongst youngsters and especially young girls will be continued in collaboration with different external partners.
- Besides actions to increase the local reservoir for recruiting female bachelor students, new actions should be developed to recruit female BS students from abroad.
- A communication plan will be developed in order to increase the visibility of actions and the visibility of EPFL's scientific women.

Appendix

Source of Data

All data on students and personnel were provided by the Division of Planning and Finances; most data are freely available online at vppl.epfl.ch/chiffres or vppl.epfl.ch/figures.

Figures on Women in IF and EME

Table 2: Number of Women Enrolled in IF and EMEF

	2009	2010	2011	2012
IF – Ms	10	9	12	15
EME – MS	-	-	8	12
IF – PhD	0	0	0	0

Table 3: % of Women Enrolled in IF and EME

	2009	2010	2011	2012
IF – MS	27%	20%	22%	23%
EME – MS			40%	30%
IF - PhD	0%	0%	0%	0%

Technical Notes on Personnel

Personnel figures are calculated at the end of each calendar year on December 31, reflecting the state at one point in time each year rather than averages over each calendar year.

Teaching Staff PO, PA, PATT, PA/BPFN, PT, and MER.

Scientific Staff Assistants (PhD students) and scientific collaborators, without MER and PT.

Scientific Personnel Category defined by the ETH domain including assistants, scientific collaborators, MER and PT.

PO Full professor, highest rank of professor.

PA Associate professor, mid-level tenured professor, may be promoted to full professor (PO).

PATT Tenure Track Assistant Professor. Can be tenured and promoted to PA after two periods of four years (or faster, depending on achievements).

PA/FN Assistant Professor without tenure track selected and financed by the Swiss National Science Foundation (four & two years).

PT Adjunct Professor ("Professeur titulaire"), academic title above MER.

MER Senior Scientist ("Maître d'enseignement et de recherche"), academic title below PT enabling to supervise PhD students.

Assistant PhD student with assistantship duties. PhD students who do not carry any assistantship duties are only counted in the student statistics (very few concerned). Likewise, assistants who have already defended their PhD thesis but still carry an assistant duty are only counted in the staff statistics. PhD students carrying assistant duties are both in the students and staff statistics.

Scientist (scientific collaborator): Specialist in different fields of science and technology.

Technical employee: Member of a unit focused on technical duties (lab assistant, technician, operator, engineer, etc.).

Administrative employee: Member of a unit focused on administrative duties (secretary, assistant, administrative collaborator, project manager, head of services, etc.).

FTE Full-time equivalent.

Technical Notes on Students

BS **Bachelor** is an academic degree awarded for an undergraduate that lasts normally 6 semesters. It is an academic title that complies with the Bologna Agreements and entitles the holder to pursue a Master's degree (N.B: Bachelor degrees do not correspond to the American "undergraduate school").

MS **Master degree** allows student to further specialize a sub-domain of their discipline and develop knowledge in an area of specialty (3 or 4 semesters). (NB: Master degrees do not correspond to the American "graduate school").

Doctoral Student (PhD) is a postgraduate program in which students conduct their own research under the supervision of a thesis director.

Enrollment The figures for students are calculated about seven weeks after the beginning of the fall semester.

Residents Foreigners who were usually raised in Switzerland and whose permanent legal residence is in Switzerland. If not specified they are considered as Swiss.

Non-Residents Foreigners coming to study in Switzerland and whose permanent legal residence remains outside of Switzerland.

Schools and Sections Abbreviations

SB – School of Basic Sciences (Sciences de Base)
- **CH** – Chemistry (Chimie et Génie chimique)
- **MA** – Mathematics (Mathématiques)
- **PH** – Physics (Physique)

FSV – School of Life Sciences (Sciences de la Vie)

STI – School of Engineering (Sciences et Techniques de l'Ingénieur)
- **MX** – Materials Science and Engineering (Science et Génie des Matériaux)
- **GM** – Mechanical Engineering (Génie Mécanique)
- **MT** – Microengineering (Microtechnique)
- **EL** – Electrical Engineering (Génie Electrique et Electronique)

IC – School of Computer and Communication Sciences (Informatique et Communications)
- **SC** – Communication Systems (Systèmes de Communication)
- **INF** – Computer Science (Informatique)

ENAC – School of Architecture, Civil and Environmental Engineering (Environnement Naturel, Architectural et Construit)
- **SIE** – Environmental Engineering (Ingénierie de l'Environnement)
- **GC** – Civil Engineering (Génie Civil)
- **AR** – Architecture

CDM – School of Management of Technology (Collège du Management de la Technologie) - Fi
- **MTE** – Management of Technology (Management de la Technologie)
- **IF** – Financial Engineering (Ingénierie Financière)