WOMEN IN SCIENCE AND TECHNOLOGY — THE BUSINESS PERSPECTIVE

REPORT

SCIENCE AND SOCIETY

European Commission

WOMEN IN IN SCIENCE AND TECHNOLOGY
THE BUSINESS PERSPECTIVE

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Women in Science and Technology – the business perspective

If Europe is to become a real knowledge-based society, then it needs more researchers. We know that women are under-represented in research and this is particularly true in the business sector: the industry average is about 18%, despite the growing number of female university graduates.

What has to be changed to attract more women researchers to industry and to keep them there? Real progress on such issues requires real dialogue, which is why I am greatly encouraged by the exchange that has taken place between the members of the Women in Science and Technology (WiST) group, whose findings are presented here. The expert group examined the situation in a number of Europe's top companies, looking at the private sector experience of inequality, diversity and gender mainstreaming. Such collaborative effort between the public and private sectors gives us a genuine insight into the sometimes unforeseen factors which can make or break our policy decisions.

By participating in this exercise, the companies involved recognise that diversity is a matter that can no longer be ignored. In recent years, there have been a number of studies highlighting a link between gender distribution in a company's management and its profitability. The WiST group report provides yet further compelling evidence of the need to address the issue of gender within research. This is unavoidable if we are to be able to recruit the numbers of researchers needed to make Europe a true knowledge society. It is inevitable if research is to reflect the society within which it operates.

Janez Potočnik
Commissioner for Research

When practitioners and experts meet

Early in 2005 a group composed of 20 company representatives and 5 experts in economics engineering and social sciences worked to make the business case for gender diversity in Science and Technology. The challenge of this mix is that practitioners do not always have a social science background while most social sciences experts do not have enough exposure to business. This is a set-up either for a rich learning experience or for a "dialogue de sourds" (dialogue between deaf people) as we say in French. In any case it has helped us form our judgment on many issues and I am sincerely thankful to the EC for having provided us with the support for it. Working with this team of experts and exchanging between colleagues gave us an opportunity to enlarge our understanding of the issues and better perceive all of its facets, including non-business aspects like socio-economical undercurrents.

A certain past is behind us

As a group, we have taken a variety of approaches to this problem, collecting a great deal of information in the process. First, however, I would like to remind you of where we came from as a technical business community, for we are still paying the price for the reputation we built up in the past.

Not so long ago, in the 80's, the reality of technically intensive industries was that they were managed almost exclusively by men. Only men were engineers, their spouses were housewives. If the spouse had a job it would often be just a job not a career. If in the US, companies were making efforts to employ women, albeit with mixed results, very few in Europe took the issue seriously. Women clearly resented this state of affairs but raising this issue was not accepted at the time .The companies were not responsive and no one wanted to risk bending or changing the rules.

The business culture was clearly suffering as a result of this discriminatory approach. The world was evolving but industries were stuck in the past, culturally speaking. Businesses needed talents but yet there was little room in our industries for women engineers. The price we are paying for this today is a continuing tendency in young women to avoid careers in engineering and science. This past is largely behind us. Dual careers are becoming the norm. Companies that sincerely engage in opening scientific, management careers for women are leading their respective industries and competition for female engineers is fierce. Today, if you raise the dual careers issue, you will have the undivided attention of your Executive management team and your Board.

Getting faster and better results

However, all of us are concerned with the slow rate of change in our industrial world and with the surge of more advanced societal and business issues. Why are there still so few women studying engineering at the university level, while so many are studying medicine or natural sciences? Why don't women rise to the top as often as men? Why does it have to be so difficult for everyone and especially for dual careers couples or single parents with young children to balance work and life? How can management become really engaged in closing the gap?

This progress is slow because of a subtle and strong resistance. In many instances, academia in this domain seems far too satisfied with the status quo. Many HR managers, myself included, would readily admit that they are not really prepared for the surge of dual careers. Top managers are still hesitant to take risk on talented women by accelerating their career or to openly raise the issue as a strategic move for the company.

What is lacking in many respects is a sense of urgency.

- To repair the "leaking pipe line" which loses sometimes as many as 2/3 of female students with a good track record and strong interest in math and physics between high school and college .

- To provide solutions for dual career couples and single parents and respect their basic need for work-life balance by combining the efforts of the business community and society at large.

- To manage this cultural change with the same holistic approach as the one followed for example in the search for quality.

- To develop in managers the ability to optimize the efficiency of a diverse group.

- Finally to measure this efficiency and objectively observe the business impact of gender diversity as it is being deployed.

Ensuring that company culture is in tune with the evolving needs of our times is vital, and our delay in addressing this issue is not a good sign. This issue may not be an obvious one but it has deep economic and social implications. The companies in our group which are ahead and enjoy the most balanced gender diversity are struggling to sustain their level of diversity because of the limited reservoir of women graduating in technical disciplines from universities. The companies at intermediate level see the risk of a plateau. Finally, the ones that are merely beginning are meeting the strongest internal resistance.

By working together as a group, we are showing young graduates our commitment to making the technical and scientific business world a much less discriminatory work environment, as quickly as possible.

Pierre Bismuth
Schlumberger

"Women are, in this broadened perspective, not passive recipients of welfare-enhancing help brought about by society, but are active promoters and facilitators of social transformations. Such transformations influence, of course, the lives and well being of women, but also those of men and all children-boys as well as girls."

Amartya Sen (2005), *The Argumentative Indian, Writings On Indian History, Culture and Identity*. New York: Farrar, Straus and Giroux.

PART I – Synthesis
Margo Brouns, Groningen University

1 – Introduction

In 2003 the European Commission published The Wake-Up Call for European Industry[1]. In order to realise Europe's ambitions in achieving a competitive knowledge-based society[2], the number of researchers must be increased. Business is a crucial partner for mobilising talent and women are obviously the source of untapped potential. Increasing the participation of women is fundamental to achieving the European innovation goals.

Although the proportion of women reaching top positions in government and business has increased, Europe-based companies still have a long way to go in attracting and retaining female talent. There are many well-qualified women in the EU whose talents are not being used. Companies need to provide women with the opportunity and introduce them to the excitement of contributing to innovation and management of research.

The Wake-Up call announced five actions, including:

> _Analysing the Business Case: A panel of experts (sociologists, economists, scientists, etc.) will review existing research, analyse the results and assess the business case today to develop stronger arguments for the promotion of women in industrial research._

There is a clear need for a better understanding of the present situation, the reasons why change happens so slowly, and what can be done to speed up the processes of change. The WIST group (**W**omen **i**n **S**cience and **T**echnology) was set up as a strong collaboration between almost twenty leading multinational companies (see annex II for the complete list of companies) and five experts from several disciplines (engineering, cultural change, econometrics, economy and policy) to discuss and study these issues and to improve our understanding. This set-up allowed researchers to be confronted with companies' experiences and analysis of good practices; companies to be confronted with scientific analysis of recent developments at the micro and macro levels; the results to be communicated to the public and an open European forum involving top managers of technology-driven companies to be organised. The expert group has met five times[3] to discuss presentations from companies and experts. Pierre Bismuth, HR for Schlumberger, was chair of the group – he invited the companies, encouraged the experts and structured the discussions.

Aim
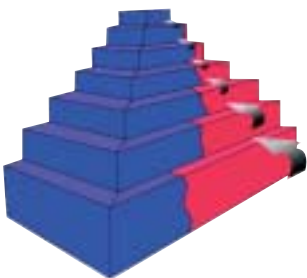
The aim of the expert group was to analyse the possibilities for the promotion of women in Science and Technology from a business perspective and to develop an integrated approach to the cultural change involved. And most importantly, the group wanted to give new impulses to these ongoing changes.

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[1] Rubsamen-Waigmann, H. et al. (2003) Women in industrial research: A wake-up call for European industry Luxembourg : Office for Official Publications for the European Communities.
See Annex 1 for the Wake-Up Call

[2] Business is a crucial partner in achieving the knowledge-based society that was called for in the Lisbon Summit (2000) by the Heads of State and Government, and the target of reaching 3% investment of General Domestic Product in Research and Development by 2010 set by the Barcelona Council of Ministers (2002).

[3] In Brussels-EU (twice), Paris-TOTAL, Geneva-HP, Paris-Schlumberger

The participating companies and experts share the conviction that attracting, developing and employing men and women equally in Science and Technology requires a significant cultural change, which is essential for innovation, growth and competitiveness. They have publicly taken a leading position in this cultural change and are highly visible as they are prominent representatives of European industry.

Scope

The project's task was to draw up an analysis of existing expertise on these issues. It developed an integrated approach and took into account the economic, sociological and political dimensions. Some questions served as guidance through this process: Where do companies stand as regards women in S&T and managerial jobs and where do they want to go? How can change happen at a faster pace and what measures are effective, what measures are not effective? In answering these questions the expert group came to focus on the following five issues all of which are described in this report:

• To identify positive and negative events which milestone a typical woman engineer's career and understand the mechanisms of the resulting leaky pipeline. This project was carried out by Dr Ruth Graham from Imperial College (London, United Kingdom) who interviewed a number of women at different career stages all over Europe.

• To investigate work-life balance issues, especially to support dual careers. This project was in the hands of Prof. Daniela Del Boca, Economics, from the University of Turin, Italy.

• To highlight the complexity of managing diversity. Prof. Martha Maznevski teaches at IMD (Lausanne, Switzerland), where she conducts workshops with companies on this topic.

• To identify instruments for organisational change. Prof. Michel Domsch from Helmut Schmidt University (Hamburg, Germany) introduced a social audit instrument – the Gender Dax – and analysed the process management of ten companies.

• To mesure diversity effects on individual and collective performance. Dr Laure Turner from ENSEA (Paris, France) conducted this research in close collaboration with four companies.

This synthesis reflects the most important insights, presenting pieces of a complicated puzzle. It paints a picture of what has been established, while at the same time mapping the road still ahead of us. Although the issue has been on the agenda for more than a decade, sometimes even causing a kind of fatigue, the problem has not been solved. The participating companies differ in terms of area, number of employees, organisational culture and the degree of gender diversity. The company profiles published in this report reflect current trends and strategies. Across all diversity, the companies share a conviction that something needs to be done in order to speed up change – they take responsibility for future balance in the workforce.

The participating companies are: (see also annex 2)

Airbus, Air Liquide, BP, EADS, EDF, ENI, European Space Agency, France Telecom,. Fraunhofer Gesellschaft, Gaz de France, Hewlett Packard, Infineon, Intel, Schlumberger, Shell, Siemens, TOTAL and Xerox.

2 – A waste of talent and motivation: the leaky pipeline

Leaky pipeline in Europe

The graph in Figure 1 illustrates the Europe-wide percentage representation of men and women at each stage of the research career ladder, from undergraduate student through to the single highest post at which research is conducted, equivalent to a full professorship (Grade A).
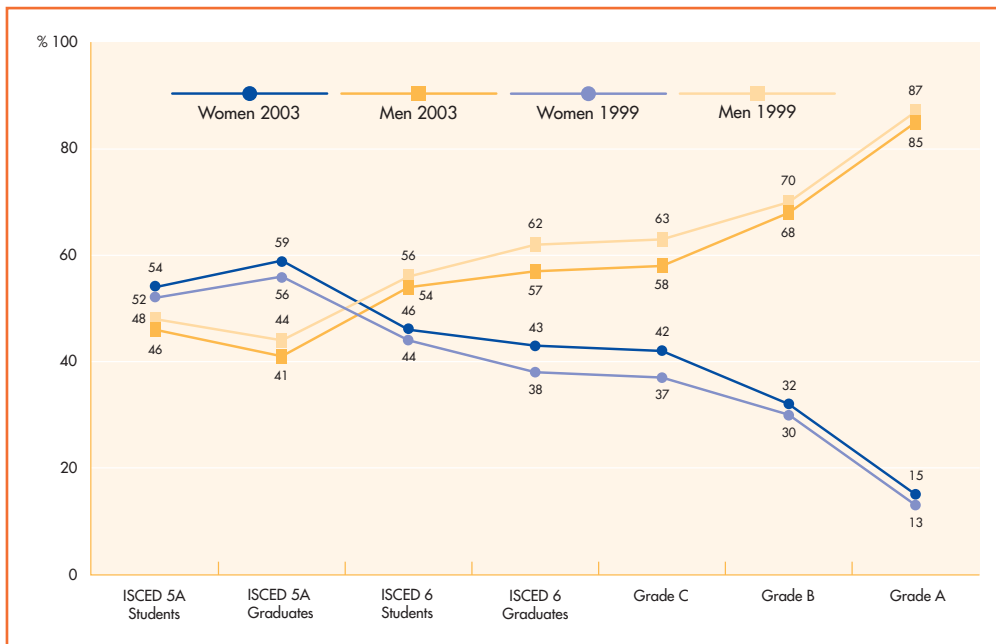
Figure 1. Percentage of male and female participation across EU-25 countries, 1999 & 2003, all disciplines[4]

A progressive decline in the representation of women is apparent at each stage in the career progression, which is often referred to as the 'leaky pipeline'. The following figure illustrates the equivalent participation levels for Science, Engineering and Technology (SET) disciplines, at each stage of the career ladder.
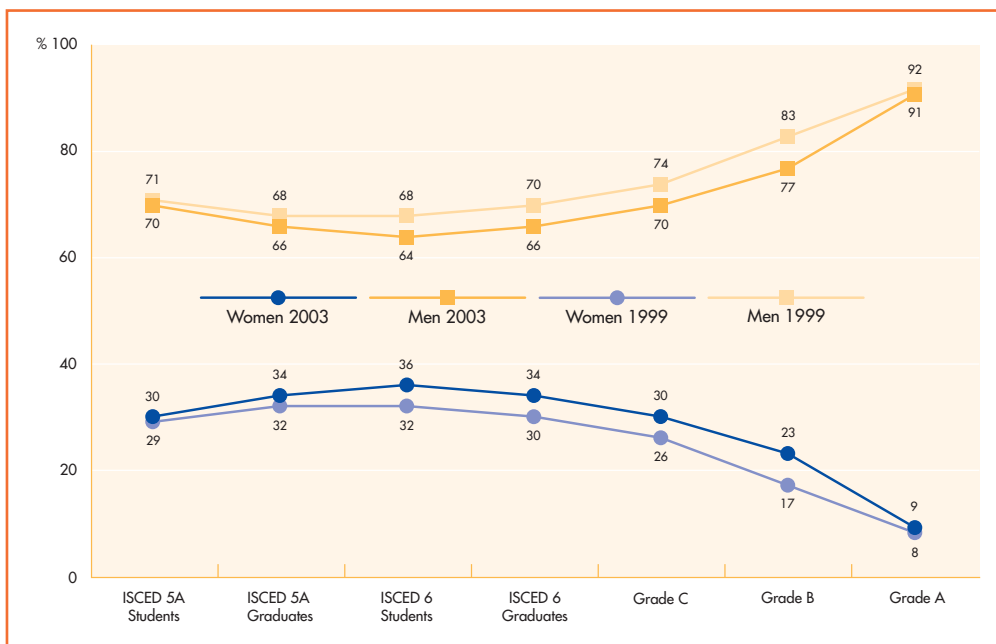
Figure 2. Percentage of male and female participation in science and engineering across EU-25 countries, 1999 and 2003[5]

[4] Source: She Figures 2006, European Commission, pp 55

[5] Source: She Figures 2006, European Commission, pp 56

The remarkable difference between the two figures is the starting point of the graph indicating that many more young men enter education in science and engineering than women. Moreover, a second striking difference with the first graph is that in the first stages of the career – up to Grade C – the participation levels remain almost constant, indicating that there is no gender-specific leaky pipeline at these stages. Women and men drop out at the same rate. This means that the number of women entering science and technology education is relatively low compared to other areas, but within the academic setting the pipeline does not leak as much in the hard sciences as it does in the social sciences and humanities. In the final career stage the dominance of men is in fact comparable – 85% and 91% respectively. Unfortunately, sex-disaggregated data on career development of men and women in S&T industry is only available for some companies, but not on a general European level.

I was the only girl in my GCSE engineering class. I actually quite liked that, as it made me feel like I was changing something just by being there. During the course, we were asked to design and build a product for a 'made-up' client. My stepmother is an engineer, and she gave me a real design brief of a test rig for a strain gauge which she needed in her research. I really loved this work, and this is when I started thinking about studying engineering at university. My stepmother has been a bit of a role model for me in engineering. Her work sounded exciting, and she is successful, an engineer and is actually a nice person! I also really liked the importance behind engineering – it can really help people and it seems to have a real impact on the way we live. (Girl UK, aged 16, A Level; quote copied from Graham.)

The two graphs also illustrate the gender segregation and the presence of women across the different sectors of the labour market. Many more women are attracted to the social sciences and humanities than to science and technology. However, the different S&T disciplines do not show the same patterns; biology and life sciences attract far more female students than computer sciences and physics.

Table I. Proportion of female PhD (ISCED 6) graduates by broad field of study, 2003.

	EDUCATION	HUMANITIES & ARTS	SOCIAL SCIENCES, BUSINESS & LAW	SCIENCE, MATHEMATICS & COMPUTING	ENGINEERING, MANUFACTURING & CONSTRUCTION	AGRICULTURE & VETERINARY	HEALTH & WELFARE
EU-25	**60.5**	**51.4**	**43.1**	**40.0**	**21.9**	**49.6**	**51.1**
Austria	65.3	47.5	43.4	30.2	18.9	65.9	72.0
Belgium	43.8	42.2	36.1	33.1	14.3	30.6	45.4
Cyprus	-	-	-	100.0	-	-	-
Czech Republic	66.7	48.6	40.0	36.7	22.3	36.7	42.2
Denmark	-	46.9	38.6	33.6	23.8	52.4	54.0
Estonia	50.0	58.8	62.5	21.9	17.6	37.5	72.5
Finland	66.7	57.9	51.6	43.1	25.5	41.7	64.3
France	49.0	55.5	41.4	38.4	25.9	55.6	56.1
Germany	52.6	49.5	34.5	29.9	11.4	54.3	47.7
Greece	:	:	:	:	:	:	:
Hungary	59.5	56.4	35.9	37.5	29.7	32.0	43.3
Ireland	50.0	53.1	47.2	56.6	31.2	31.6	50.7
Italy	72.5	58.5	50.4	54.0	31.2	54.4	61.5
Latvia	83.3	66.7	100.0	57.1	37.5	100.0	0.0
Lithuania	-	78.9	63.9	47.2	43.9	50.0	68.3
Luxembourg	-	-	-	-	-	-	-
Malta	100.0	33.3	0.0	-	-	-	-
Netherlands	-	43.8	48.5	40.1	19.9	44.3	48.7
Poland	:	51.6	42.7	50.1	24.1	53.8	47.2
Portugal	65.4	66.8	53.9	58.1	34.1	64.6	63.3
Slovakia	72.4	46.2	49.6	57.3	26.2	32.1	71.3
Slovenia	60.0	63.0	37.7	44.8	19.3	36.4	52.0
Spain	59.2	48.6	47.3	46.6	21.3	41.2	49.3
Sweden	64.0	53.2	48.3	34.8	26.4	50.7	59.4
United Kingdom	53.6	45.9	42.2	41.9	19.6	45.2	52.4
Bulgaria	52.2	68.4	50.0	52.8	31.4	46.4	56.4
Iceland	-	50.0	-	0.0	-	-	33.3
Israel	73.8	51.4	51.6	44.0	25.0	45.5	55.6
Norway	60.0	33.7	49.5	40.7	22.8	46.9	46.9
Romania	-	58.9	46.6	57.6	38.3	36.6	66.5
Switzerland	54.2	44.7	28.9	29.4	15.2	57.5	47.7
Turkey	35.3	29.2	29.7	34.8	28.9	39.8	62.6
Japan	48.6	48.7	32.4	19.9	9.2	24.7	25.7
United States	66.0	45.7	55.9	35.5	18.0	36.8	68.5

Source: She Figures 2006, European Commission, pp 39

One remarkable fact is that differentiation along the lines of gender is not a universal phenomenon. Some countries succeed in attracting more women to science and technology (see table 1), and to senior positions. In Southern European countries, S&T attracts more women than in Western or Northern European countries. National culture seems to be a determining factor in the personal choices that men and women make (Thaler, 2005).[6]

Evidence of this European variance could also be found within the participating companies; although the percentages of women managers vary across countries, it is not in a systematic way, divided along the north-south lines. For one of the IT companies, 25% of the managers in Italy were female, 16% in Spain, 18% in France and 29% in the UK. It also revealed that many of the women managers are active in the non-specific fields – HR, Finance and communication departments – which have been called the 'velvet ghettos', the soft domain, for women (Gas and Oil industry).

The educational system

Recent data published by the OECD indicates that the potential pool of female scientists and technologists is increasing in most European countries. Although men are still outnumbering women – the number of women has increased more rapidly than that of men (see figure 3).

Figure 3, Average annual growth of S&E tertiary graduates. Source: OECD 2005
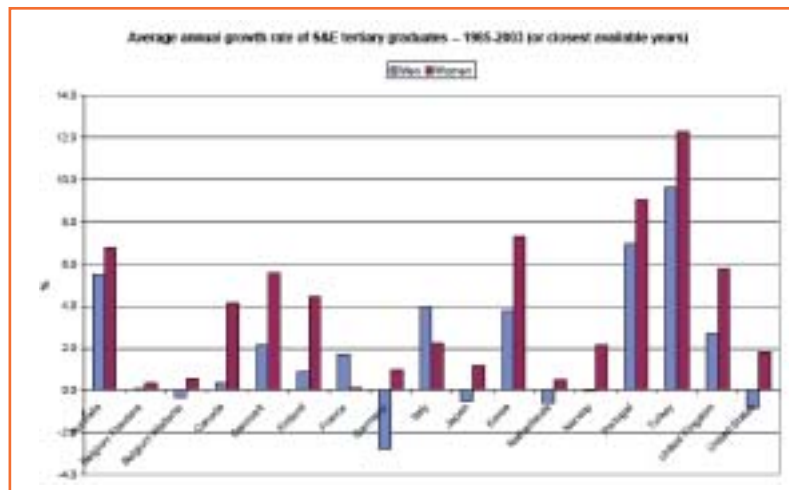
Nevertheless, as figure 4 shows, this is not enough by far to compensate for the existing under-representation of women and reach a balance within the next decade. In a few countries (Portugal, Turkey, Netherlands) the percentage of women entrants is even decreasing. This is certainly a problem for a country such as the Netherlands as there is already a rather low percentage of women entering science and technology.

Figure 4: S&T entrants female percentage annual change vs average. 1999-2003

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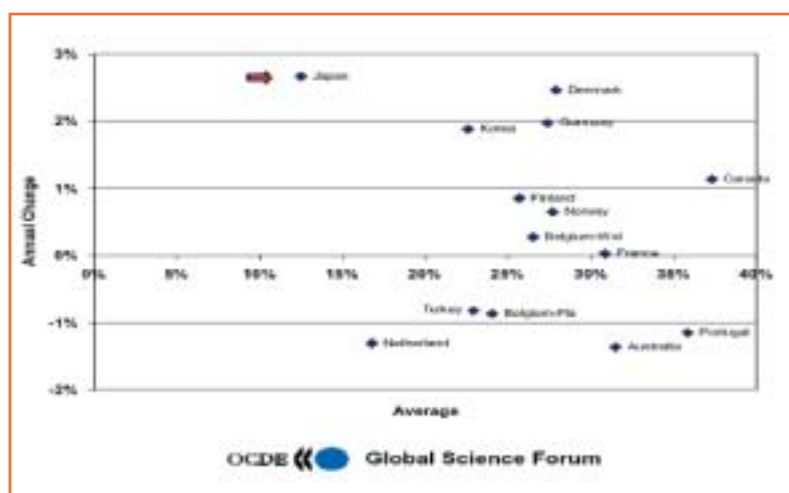
[6] Anita Thaler (2005). Influence of Gender and Country-specific Differences on Success in Engineering Education. Graz: University of Graz (unpublished paper)

The reasons why female students do not opt for S&T training have been researched extensively. One of the assumptions is that the stereotype of engineers as logical, rational, machine-oriented people does not fit with the self-image of women as 'people-oriented' (Faulkner, 2000).[7] For this reason – it is assumed – women are less attracted to S&T. In order to research the relationship between self-image and S&T image, Thaler conducted international comparative research on self-image (people-oriented, technology-oriented) and drop out from S&T education (Thaler, 2005). It showed that the self-image of young people does not depend solely on gender but also on cultural background, more specifically on national culture. For instance, Austrian men describe themselves as more people-oriented than their Finnish or German female counterparts. On the basis of this investigation, Thaler concludes that there is no general personality profile that is connected to drop out.

The positive statement is that S&T talent is not an innate quality of men and women – it's mostly culture, and therefore open to change. The negative statement, however, is that culture hasn't changed much over the years.

The relevance of national culture is also revealed in Wächter's investigation of interdisciplinary engineering education (Wächter, 2005).[8] This study confirmed the hypothesis that women are more attracted to interdisciplinary engineering curricula; a stronger emphasis on social and environmental aspects of technology would make S&T programmes more attractive to women. But not only to women. The comparative study among seven European countries showed that one-third of engineering students want to be taught non-technical subjects with – contrary to expectations – only a slight gender difference. This means that men and women have similar preferences regarding interdisciplinary programmes. At the same time, the differences between the countries were substantial; students from France and Finland were satisfied with the existing curricula, whereas the majority of Austrian and Greek students preferred more non-technical subjects. For them interdisciplinarity contributes not only to the content but also to the social climate. Sagebiel (2005)[9] highlights the importance of inclusion. Students – men and women – fear isolation. This is a significant decision-making factor in their choices to leave S&T education. Again, the experiences of isolation seem to vary across European countries. Female students from the UK, Slovakia and Austria experienced feelings of isolation, whereas in France women feel accepted overall and even appreciate their 'exotic' status.

On the basis of these empirical investigations, we might conclude that the gender difference is partly reality and partly perception but always contextual. Emphasizing differences isolates women and freezes their identity.

The Moloney Search survey, consisting of 100 in-depth interviews with female final-year computer scientists in the UK, revealed that 35% of the female students in computer science choose not to pursue a career in their field of study.[10] They expect the environment to be 'too male' and anticipate a lack of career progression. For these reasons they prefer general management jobs, consulting or banking (Moloney Search, 2005). The lack of role models in computing careers is generally discouraging.

Different research carried out among former IT professionals in the UK pointed out that the major drivers for women leaving this profession are related to the long working hours and total commitment to the job, the lack of flexibility in balancing work and private life, and the organisational culture which lacks the atmosphere of inclusiveness (DTI, 2005).[11] Many of these issues – work-life balance, the need for inclusiveness – will be discussed below.

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[7] Wendy Faulkner (2000). Dualisms, Hierarchies and Gender in Engineering. Social Studies of Science, 30, 5, 759-792.

[8] Christine Wächter (2005). *Interdisciplinary Engineering education – An Opportunity for more Gender-Inclusiveness?* University of Graz (paper presented at the 4th European Conference on Gender Equality in Higher Education, Oxford)

[9] Felizitas Sagebiel (2005). *Masculinities in engineering education and coping strategies of female students.* University of Wuppertal (paper presented at the 4th European Conference on Gender Equality in Higher Education, Oxford)

[10] Women in technology: *Can employers do more to attract female technologists?* London: Moloney Search. www.moloneysearch.com.

[11] Department of Trade and Industry (2005). *Women in the IT Industry: How to retain women in the IT industry?* (Phase 2 Research). London: DTI. www.dti.gov.uk

In an attempt to attract more young women, many of the WiST companies organise 'Girls Days' or contribute to a Junior Academy, creating an opportunity for girls and women to gain experience with science and technology, and to provide a view behind the scenes of traditionally male sectors. According to Graham (see below) these 'women-only' events are very important for many girls and women in order to feel comfortable in a primarily technology-driven situation, mostly dominated by men. This issue has been addressed on several occasions during the WiST sessions. Most participants support the idea of organizing special events for girls and young women, but the idea of organizing special events for more senior women to discuss views and experiences was disputed. Some experts point at the positive effects of bringing women together, as they rarely find themselves in a majority situation, others point at the risks of segregation.

I had a great experience during the Women's Day. They encouraged us. Just …go! It really confirmed me in the choice of my studies. I also look forward to the moment when I work in the aeronautical field. I can't wait. (4th-year Engineering student, girl, France; quote copied from Graham)

If we want to realise female potential in all areas of the labour market, it is important to understand not only why women leave S&T, but also why women find other functions or sectors more attractive. Women do have something to loose when entering the S&T sector, both financially – the gender wage gap is largest in male-dominated occupations (Löfström, 2004)[12] – and in terms of decision-making. Segregation tends to be paired with less equality in terms of empowerment. (Hakim, 2004).[13] Other sectors provide women with access to senior positions and regard work-life balance as a common problem instead of as a personal restriction (Blackburn & Jarman, 2004). This is partly the effect of better working conditions in the public sector compared to the private sector. Recently published data on the EU-15 countries indeed show that the percentage of female researchers working in higher education (34%) and government (31%) is higher compared to the private business sector (15%) (She Figures 2003). Only in a few new member states – for instance Latvia – are women researchers more likely to be employed in the private sector than in the public sector.

For many women it is a rational choice not to enter – or to decide to leave – a sector where the level of facilities is rather low, where their problems are individualised and competition is tough. The individualistic approach can hold women responsible for social conditions that are beyond their control (Gerson, 2004).[14]

This means that not always the best will survive the pipeline to senior positions in the business sector. Apart from all the effects this has on individual lives, the social, cultural and financial costs are easily underestimated. The group saw this as a collective failure. Acknowledging this discrepancy between lived experience and organisational discourse on gender equality is a first step in framing the real issue – which is about changing organisational practice and its core value system. The next chapters will address this management issue in detail.

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[12] Asa Löfström (2004). Occupational segregation and its consequences. *25th CEIES seminar: Gender Statistics – Occupational Segregation: extent, causes and consequences.*

[13] Robert Blackburn and Jennifer Jarman, Segregation and Inequality. *25th CEIES seminar: Gender Statistics – Occupational Segregation: extent, causes and consequences. Catherine Hakim (2004). The Causes of Occupational Segregation: New Data Needs. 25th CEIES seminar: Gender Statistics – Occupational Segregation: extent, causes and consequences.*

[14] Kathleen Gerson (2004). Understanding work and family through a gender lens. *Community, Work & Family*, vol.7, no.2, 163-177.

3 – Why so slow? Reconstructing the puzzle

For some years now, there has been a growing awareness and a sense of urgency among companies, universities and governments to increase the representation of women at all levels. Leading companies and their CEOs have expressed their commitment, implemented action plans to recruit and retain talented women, and organised support for women at every stage of their careers. As Michel Domsch reports – *thousands of Gender & Diversity reports in all media, well-developed and known tools and HR instruments, lots of awards and audits* – we know a lot about causes and remedies. Nevertheless, as we have seen, the gender balance in senior positions in companies and universities is changing rather slowly. What kind of mechanisms are slowing down the process, and more importantly, how can we speed up change?

> *When your organisation is better for women, it's better for everyone. Professor Maznevski, IMD, Lausanne.*

In this chapter we will discuss the fundamental meaning of work-life balance issues and the lack of adequate process management. In the next chapter we will address the complexity of managing diversity.

Balancing work and life as a critical issue

In modern industrialised society, social life used to be organised around a very specific gender arrange-ment – men as the breadwinners, women as the care providers. Women who could afford it withdrew from paid work to raise children and men earned a living for the family; work and family life were largely conceived of as separate spheres (Gerson, 2004).[15] The picture of the private sphere has changed dramatically in the last few decades, and it seems as if companies have not sufficiently adapted their organisations to this fact. More women are working, and they are working longer hours. Women have changed the social contract, are taking up roles in the public sphere and are less available at home. This not only means that spouses have to commit themselves domestically, but more fundamentally, companies are being confronted with women and men who are not dedicating their lives completely to a career. This

> *…one of my colleagues accepted a move to a remote area, where he met his wife, and the woman didn't want to leave her parents. So, now he is buried, he is nothing. Should the company have intervened? He made a choice and takes responsibility for it. (man, top manager Oil and Gas industry, France, 55 years old, divorced, 3 children).*

has resulted in new issues and challenges for the companies, as well as fundamental changes at many different levels. In many of these organisations the old view of highly committed employees who can rely on private support at home still persists. And all workers face a stubbornly persistent 'ideal worker' ethics that equates work commitment with uninter-rupted employment and very long workweek (Gerson, 2004: 166). This results in a work-family conflict that both men and women experience especially if they have children at home.

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[15] Kathleen Gerson (2004). Understanding work and family through a gender lens. *Community, Work & Family*, vol.7, no.2, 163-177.

The easiest solution – and the most superficial one – is to organise childcare and other facilities that do not touch the hardcore structure and culture of the organisation. But that's not enough in the long run. According to Suzan Lewis, Rhona Rapoport and Richenda Gambles, the fundamental changes will not take place without questioning deeply held assumptions about working practices, families, culture and personal lives.[16]

If I want to build my career, I will have to work abroad in the period before I have children, not that I am free, in the next few years. During this time I will need to give everything in my life to the company if I want to reach this position. (woman, Italy, aged 27, copied from Graham).

During one of the meetings, the discussion focussed on spotting high potential employees, their recruitment and the facilities to take major steps in careers. It showed that many women in their thirties tend to leave the company or the career tracks. Why does this happen? 'What's happening to them?' – the CEO asked. The answer is that the company is very welcoming to women, even in positions of power, as long as all the rest remains the same; as long as the company itself does not need to change. For many young women (and men) this is a real problem, because they are confronted with common problems which they nonetheless experience as personal.

Let us take an example. In most multinational companies a career without a significant period abroad is unthinkable. A few decades ago, a husband could take his wife and family with him wherever the company needed him. But the social contract has changed, the husband is no longer the only spouse with public relationships, and men and women have to negotiate at the kitchen table to decide about staying or leaving. The workplace is a crucial factor in this dynamic between work and family. Asking young men and women to become expatriates has changed its meaning dramatically. Many companies and their managers expect employees to be (or stay) time rich, certainly if they want to have a career. As Lewis has pointed out, there are two major barriers to fundamental shifts in organisational culture. The first is related to current policies which enable some employees to adapt to but not to challenge traditional work structures, and the second is the organisational discourse of time as representing productivity, commitment and value (Lewis, 1997).[17]

This has some severe effects on career development. One of the participating companies looked at the population of high potentials in a good position for progressing in the succession planning. Half of the high potential men and women are in a dual career situation, sometimes with both having a career in the same company. The early 30s looks like the time where everything happens. They arrive at that age, already married, are getting children at that time and having the best opportunities to progress in the organization. Women and men reach a significant responsibility level by their mid 30s with comparable family situation. However women are grouped in a lower level, while the most successful men do continue to progress rapidly to higher levels whatever their marital status. There is at least a gap of one management level building up with time due probably to work life balance pressure on women.

What it tells us is the following:

- Companies have to perform better in supporting dual careers.

- Companies need to take some calculated risks with the best performing women to give them the chance to catch up with the gap.

- Companies need to pay particular attention to dual career men and women in the early 30s as they then experience the maximum pressure of work/life balance.

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[16] Suzan Lewis, Rhona Rapoport and Richenda Gambles (2003). Reflections on the integration of paid work and the rest of life. *Journal of Managerial Psycholog*y, vol.18, no.8, 824-841.

[17] Suzan Lewis (1997). 'Family Friendly' Employment Policies: A Route to Changing Organisational Culture or Playing About the Margins? *Gender, Work and Organisation*, vol.4, no.1, 13-23.

The arrival of many more women on the career ladder demands critical reflection on the 'ideal worker' ethics and the development of alternatives to standard career behaviour. Women in their thirties leave their positions because of the major time investments and commitments they need to make in order to proceed with their careers, the lack of commitment from their companies to solve a common problem, and last but not least, because of the limited perspectives that their investments will prove to be worthwhile. One way to reduce the pressure caused by the co-occurrence of major life-issues – do I want children? do I want a career? do I invest in a partnership? – is to step back for a while and choose a more supportive work environment. The lack of flexible work arrangements, the lack of role models and the lacking perception of equal opportunities are important factors for women to leave companies in the R&D sector.

As Daniela Del Boca states in her paper: 'Trade-offs between costs and benefits of family-friendly policies exist also at the workplace (Del Boca, see below). Firms must support the careers of those who wish to invest time in providing for the welfare of their families as well as the success of the firm. It is not only a question of protection and support of the worker, but also of the welfare of the firm and its owners. Given the sizeable human capital investment that firms make in their highly educated professionals, firms should develop policies that offer opportunities to balance work and family in order to retain highly qualified workers of either sex.'

> *Companies are – apart from being producers of commodities and services – also social institutions producing time structures, social networks and meaningful relationships. Companies do not sufficiently acknowledge their societal roles.*

Time sovereignty, and flexibility, seem to be crucial. When workers feel supported and able to control the amount and conditions of their work, their perception of conflict between work and family diminishes (Gerson and Jacobs, to be published).[18] All kinds of flexible work patterns – working at home, telework, flexible times of work, part-time work – restore this sovereignty and create the opportunity to fulfil other roles outside of work. Or as Gerson and Jacobs state: *We cannot afford to base work-life policies on outdated stereotypes, in which women are seen as less committed to work than men. Yet we can also not afford to create new stereotypes, in which working mothers, and to a lesser extent fathers, are seen as shortchanging their children. These images place all workers in an impossible position…* What has been changing over the years, and will change progressively, is that this time issue does not only relate to (young) women in the workplace, but also to men. They share family responsibilities and employers can no longer expect an unlimited presence at work. This will definitely affect the issue of mobility. The WiST group discussed this consequence of the growing numbers of dual careers on many occasions. Companies will be increasingly confronted with employees who do not want to move from one country to another because their spouse is not prepared to give up his or her job. The consequences of dual careers on mobility affects men and women in a very similar way. Seen from this perspective the work-life balance is no longer an issue for one sex specifically, but a general question for all employees.

Companies – apart from being producers of commodities and services – are also social institutions producing time structures, social networks and meaningful relations. Organisations do not recognise their social influence, nor do they take responsibility for their societal roles.

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[18] Kathleen Gerson and Jerry Jacobs (paper in preparation for publication), *Changing the Structure and Culture of Work: Work-Family Conflict, Work Flexibility, and Gender Equity in the Modern Workplace.*

This draws attention to the question of responsibility for facilitating the of work-life balance. What can we expect from governments, what is the responsibility of the companies and what are the duties of the individual? Across Europe many arrangements have been developed. According to Esping-Anderson, three types of welfare capitalism can explain the structure of care facilities: liberal welfare states organise a minimum of collective facilities (for instance the UK and the USA), corporate welfare states support the corporate structures of society (Germany, Austria, France) and social-democratic states are characterised by high investments in collective facilities and measures such as child care and parental leave (Scandinavian countries).[19] These differences affect the actual issues related to the work-life tension and the necessity for companies to implement specific facilities. In other words, the answer to the question – who is responsible? state, company or individual? – varies across Europe. Nevertheless, business is one of the major stakeholders in solving this issue.

Holistic solutions: process management

The expert group identified process management as an important factor affecting the slow progress towards gender diversity. Many reports and conferences express commitment, but this does not always imply major efforts and implemented policies. As Michel Domsch states in his paper, there is a lack of management commitment to sustainable and significant change, in which planning, decision-making, implementation and evaluation follow the ordinary process cycle. The participating companies are at different stages of awareness and process management. Some started as early as the 1970s to develop diversity-oriented policies – usually as a response to ethnicity and racial issues –, some have started only recently with a growing awareness of the importance of a gender-diverse workforce. One of the Gas and Oil companies designed a very ambitious and straightforward programme in the 1990s, starting with 'awareness', immediately followed by 'hardwiring and establishing infrastructure', moving on to 'ownership', and finally 'achieving breakthrough behaviour'. In other words, infrastructure and ownership, according to this company, are preconditions for success. Complex cultural changes can only take place if the top-level management is not only committed, but also an active actor taking the lead.

The past decade has witnessed an increasing use of social audits as a management instrument, strongly linked to the usual language of firms. The Gender Dax is one example that measures not only numbers, but also processes, planning and available tools. Domsch reports on this in his paper. The application of the Gender Dax to ten companies revealed some important differences among these committed companies. Percentages of women varied from 15% to 32%, most of the companies deployed active strategies, focused on support for women, such as coaching, networking and mentoring programmes, or on measures to improve work-life balance, part-time work, flexible working hours and, to a lesser extent, child care. Audits and self-assessment are regularly used tools, but organising feedback from gender action plans is rather seldom within these companies. Setting more transparent goals and using instruments and concrete measures would contribute to the quality of process management. Accountability is a driving force behind many business processes, as is managing diversity.

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[19] Gosta Esping-Andersen (1990), *Three worlds of welfare capitalism*. Cambridge: Polity press. Gosta Esping-Andersen (1999), Social foundation of post-industrial economics. Oxford: Oxford University press.

This certainly holds true for human resource management. Kochan et al. (2002)[20], who investigated the business case for gender diversity, make a very clear statement: companies need to adopt a more analytical approach and produce better HR data to be linked to business performance. This will improve the learning capacity of HR practitioners, so that they themselves can answer the question: under what conditions do gender diverse teams outperform or under-perform other teams? Laure Turner, in her paper, expressed a similar need for aggregated data as a business tool, in order to improve the explanatory power of the econometric modelling techniques. Collecting, sharing and using the data will not only improve the general knowledge of what's going on, but also provide an understanding of what is not going on, as regards gender diversity.

Diversity initiatives should be linked to accountability systems and tools to measure progress. In other words, companies have to do what they usually do in business: set goals, plan, check and act if results do not comply with the scheduled goals. These process skills seem crucial for future progress. From this point of view we can conclude that although some of the participating companies already have years of established policies, a lot could be gained in the future by managing and monitoring the process accurately.

One of the powerful strategies is to connect gender diversity closely to the strategy of the company. Only a few of the participating companies explicitly link participation of women to their core business strategy and the content of the business. One of them is a strong advocate of gender mainstreaming. This means that gender diversity is no longer an isolated target, but an integrated aspect at all levels of the company. One of the participating research institutions organises Think Tanks in which women are explicitly employed, and focuses on target-group-specific product design. The value of an integrated approach is that the issue gets general and company-wide acknowledgement, similar to, for instance, security issues. Measures taken to improve the gender balance cannot be isolated from all other company dynamics but are a general part of it. After all, this change will not benefit women exclusively.

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[20] Thomas Kochan, Katerina Bezrukova, Robin Ely, Susan Jackson, Aparna Joshi, Karen John, Jonathan Leonard, David Levine and David Thomas (2002). *The effects of Diversity on Business Performance: Report of the Diversity Research Network.* Cambridge/Mass: MIT Sloan School of Management.

4 – Gender diversity: a Business Case?

There are a lot of reasons why companies should aim at a gender balance in R&D and in senior positions. These reasons vary from 'democracy and justice', to 'demographic trends' and 'economic reasons'. Nowadays, the focus has changed from moral-justice reasons to hard economic evidence. Is there a business case to make? From this perspective, there is some specific interest in 'proving' the economic value of gender diversity. In the expert group we have debated this issue extensively, and one of the experts – Dr Laure Turner (ENSEA, Paris) – worked together with four companies to gain a better understanding of the connections between gender diversity and performance.

Is there a business case?

From a moral imperative to a business case?

In the last decades, women have become better qualified and motivated to take up public roles. Nowadays, young women entering the labour market are even better educated than men (Eurostat, 2005). A workforce consisting primarily of men is clearly one which is not realising its full potential. It is very unlikely that the dominance of men is a result of meritocracy. By its very meaning, the meritocratic ideal rules out any social determinants other than talent and effort. 'La carrière ouverte aux talents': instead of ascribed characteristics, achieved characteristics should make the difference. *Nepotism should go, bribery should go, inheritance should go as means of attaining public office. (…) individual merit should be the only test that should be applied* (Young, 1994 (1958): xiii). Companies, universities and research institutions clearly embrace the meritocratic ideal: only talent and effort should be decisive for the educational and labour-market career. From this point of view, unequal opportunities are not only a matter of injustice but primarily a matter of wasted talent.

Arguments in terms of 'wasted talent' already imply a more economic approach, as is also the case when referring to a better anticipation of customer needs, as well as less measurable effects such as improving the image and credibility of the company. The business case touches the heart of all companies: diverse teams produce better results, as we will see in the discussion below. But what if there is no clear business case? One of the representatives from the IT sector made a clear statement during the meetings: What's wrong with moral reasons for realising gender balance? Whilst the business case is the first reason to drive diversity, the moral imperative is also mentioned, albeit seen through a corporate social responsibility lens. The campaign for more gender diversity will gain general support if based on a broad spectrum of arguments, varying from justice to profit.

> *Employers who focus on diversity will be positioned better to tap into an increasingly educated and skilled segment of the talent pool. The company that leverages its female talent internally will be better able to develop products and services that could appeal to its external customers.*
>
> *(Catalyst, 2004)*

Gender diversity as a business case

To date, existing investigations have failed to make an unambiguous business case for gender diversity. Some investigations reveal evidence of the positive effects of gender diversity (Catalyst, 2004; Smith et al., 2005); others contradict these findings (Kochan et al., 2002).[21] In fact, several questions circulate under the label 'gender diversity as a business case'.

- Firstly, there is the question of whether firms managed by a gender-balanced top team perform better than firms led by men only (what is the specific contribution of female leadership styles?).

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[21] Part of the reason for the lack of consistency in these results is related to the differences in samples, methodology and statistical analysis.

- Secondly, there is a general question of whether heterogeneous teams outperform homogeneous teams.

- Thirdly, is there a positive performance effect of engaging more women in traditionally male-dominated forms, teams and units, such as S&T?

The first question – on the composition of top management – is the subject of a heated debate that mostly takes place in the popular management magazines; the second – comparative analysis of (non-)diverse teams – is hard to tackle and few scientific investigations have tried to open up this black box; the third – on diversity in S&T teams – was until recently underexposed to critical analysis. Laure Turner reports on this subject in this document.

Gender diversity in top management

In 2004, Catalyst published the results of an examination of 353 of the Fortune 500 of America's largest corporations. The study explored whether there is a demonstrable connection between the gender diversity of top management and organisational financial performance. Does gender diversity improve the bottom line? This study showed that there is a connection between diversity and financial performance.[22] The group of companies with the highest representation of women in their senior management teams experienced better financial performance than the group of companies with the lowest representation of women (Catalyst, 2004: 2). The top quartile of financial performers in Catalyst's sample average over 20% women in their top management teams, and in the bottom quartile almost no women were represented in most senior management teams.

However, this examination failed to show the underlying nature of the causal relationship between gender diversity and performance. It could be the case that both phenomena – gender diversity and financial out-performance – are expressions of the same organisational efficacy, as Hunter correctly stated (INSEAD, 2005).[23] Diversity of senior management is – from this point of view – an expression of a culture that outperforms the competition.

Most recently a study was published on the performance of 2500 Danish firms.[24] The purpose was to evaluate the influence of the proportion of women in management on firm performance. One of the motivations behind this study related to new regulations in some countries (Norway) as regards the gender composition of the boards of directors of private firms in order to improve equal opportunities. Does gender balance affect performance? The conclusion was ambiguous and dependent on definitions of performance and the measure of women's representation in management. The effect on firm performance varies from none to positive – positive effects mainly related to female managers with a university degree. Less well-educated women have less influence on firm performance. The study also tried to reveal the direction of the causality: do women on boards really affect firm performance or is it actually the case that better performing firms are more likely to hire women? The study found that if there is a positive relationship, this is due to board diversity affecting firm performance and not the opposite. From this point of view, we can conclude that there is a business case on gender composition of the top levels of the companies, especially related to well-educated women. More turns out to be better.

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[22] Catalyst (2004), The Bottom Line: *Connecting Corporate Performance and Gender Diversity.* New York: Catalyst. www.catalystwomen.org.

[23] Mark Hunter (2005). The business case for diversity. *INSEAD Quarterly*, Issue 10, 2005, 4-7.

[24] Nina Smith, Valdemar Smith, Mette Verver (2005). *Do Women in Top Management Affect Firm Performance? A Panel Study of 2500 Danish Firms. Bonn: IZA*

Heterogeneous and homogeneous teams

According to Kochan and his team (2002), the relationship between the diversity of teams and the bottom line is more complex than implied by the popular rhetoric (Kochan et al., 2002: 6). The empirical literature does not support the simple notion that diverse groups perform better; on the contrary, if not managed, diversity is likely to have a negative effect, leading to conflict and turnover (see also Martha Maznevski's report in this document). Their extensive research conducted at four large US organisations that have long-standing commitments to building diverse workforces showed that gender diversity had either no effect or a positive effect on team processes (Kochan et al., 2002). The positive effect is that gender-balanced groups have more constructive interaction than either predominantly male or female groups (p.29).

This last conclusion was supported by the results from Laure Turner's investigation of team performance in four participating companies (Turner, this volume). She found that the individual performance was highest in teams that were gender balanced (those which were 33-66% women) followed by predominantly male teams and finally the predominantly female teams.[25] The analysis of a sample of 1506 individuals (30% women) indicated that gender diversity has a positive impact on the individual performance of men and women. However, only the increase in women's individual performance proved to be significant. Hard evidence of the positive impact on collective performance was difficult to obtain due to the low number of investigated cases (69 teams), but the data indicate a positive effect of gender diversity.

Managing diversity: the real challenge

The expert group has discussed the complexity of managing diversity on many occasions. As we have described above, there is no unambiguous evidence for the premises that gender diversity will improve team performance. There is no simple business case. Some mixed groups outperform homogeneous groups, and some show the worst-case scenario. How can we understand this difference in achievements?

When answering this question the WiST group often discussed the definition of diversity. What do we mean by diverse? Gender diversity, ethnicity, age, they have all been much debated by the expert group. Although the focus was on gender diversity, many companies also recognised the need for ethnic diversity. In some cases the need for cultural change was more strongly related to national diversity – especially in initially national companies that have become multinationals (Oil and Gas) – than to gender diversity.

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[25] Negative results of predominantly female teams could be related to a specific allocation of women – they were over-represented on projects that were not directly linked to core R&D.

The following image, presented by Martha Maznevski, illustrates the issue. The performance of teams that

In teams and leadership situations, diversity provides potential.

consist of very different people varies substantially. The worst-case scenarios and the best-case scenarios are both related to mixed groups when compared to homogeneous groups. According to Maznevski, the difference lies in the quality of the management, trained to acknowledge and respect differences. Creating an atmosphere of inclusion is certainly one aspect of well-managed teams.

Thus the most decisive element in the varied performance of these groups is the way these teams are managed. Well-managed teams outperform all other groups, homogeneous as well as diverse teams.

Managers (M) express their commitment to women: I expect the quality of output will definitely increase if more women enter the work floor and women are better at teamwork and communication – aspects that are crucial to our work.

… but do this in a very ambivalent way: Women must not allow us to engage them in minor tasks and the specific contributions of women do not belong to the organisation's core values. This is what Eckles (2004) calls 'ambivalent sexism', very difficult to handle for ambitious people.

(quotes copied from Van Doorne-Huiskes et al., 2005)

How can we mitigate the risks? In order to make diversity productive, major investments in quality of management have to be realised by focusing on similarities and differences. Maznevski has introduced the MBI approach: Map, Bridge and Integrate differences. Mapping is the ability to understand the relevant differences in a management situation; Bridging is the ability to communicate effectively across differences, taking differences into account – transmitting meaning as it was intended; Integrating is the ability to bring the differences together, combining and building on them in a synergy. This means that differences have to be acknowledged, respected and communicated in order to make them productive. A carefully managed team is a team that is trained to recognise diversity and respects it. Or, as one of the companies commented: Diversity management is about valuing difference and trust. (Gas and Oil). But this is never easy: *Diversity doesn't happen by accident!* (IT business).

An internal Shell investigation partly revealed the reason behind the success or failure of mixed teams.[26] The diversity of the 56 teams investigated was measured by non-work-related factors (gender, age) and work-related factors (number of years in the company, function). It showed that diversity tends to have a negative effect on performance if there is a low level of inclusiveness – the extent to which the members of a group feel connected to each other in one team – and a positive effect if there is a high level of inclusiveness. In other words, inclusiveness is the determining factor for the effect of diversity on process indicators – such as learning, participation, and communication – and performance indicators.

If there is a low level of inclusiveness, diversity tends to have a negative effect on the effectiveness and innovativeness of the teams. The graph below, copied from the Shell report, gives a clear expression of the inclusion effect. The light line refers to a situation of low inclusiveness: an increase of diversity leading to a decline of process and performance indicators. The dark line, referring to a situation of a high level of inclusiveness, is completely different: increasing diversity improves process and performance.
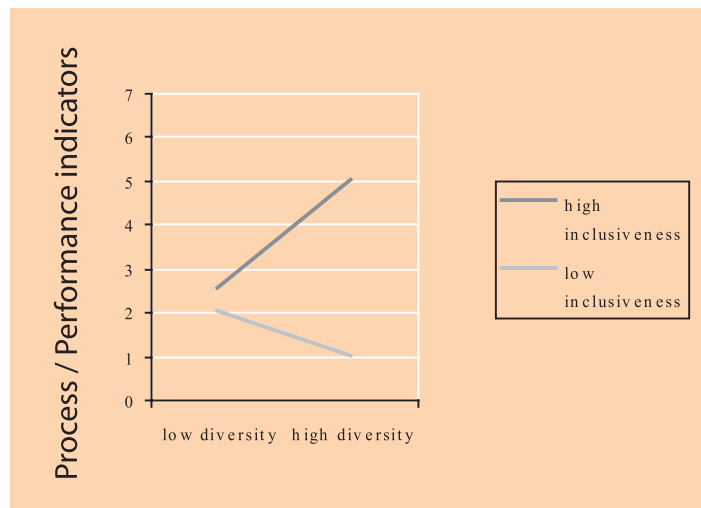
Source: RUG/Shell, 2003

The role of stereotyping

One of the fundamental issues in managing diversity is to recognise differences without reinforcing stereotypes – mostly focused on women who 'Take Care' and men who 'Take Charge'.[27] In the 1970s already, Rosabeth Moss Kanter highlighted the role played by stereotyping the advancement of women's careers.[28] In a minority situation the traditional stereotypes will determine the perception of women's performance, whereas men in a majority position are viewed as individuals. Tokens are strongly visible and run the risk of being perceived as representatives of their sex, instead of representatives of a profession. In a situation dominated by men – in number and culture – such as the research and technology domain, women are in a vulnerable position.

But even in a non-token position there is some evidence for gender bias related to stereotyping. Research on assessment of the competences of men and women

My own ambition is usually higher than my line manager thinks. They see that you have already done well as a woman, and think you are therefore at the conclusion of your career, rather than at the beginning. When I returned to my home country, after working abroad, people from Human Resources said to me 'for a woman in research, you are already a line manager – this is more than you could have expected', with the implication that I should be happy for the next thirty years until I retire, with no prospect of promotion! (Technology Manager, The Netherlands; quote from Graham)

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[26] Jet Bredero, Leontien de Bruin, Lida van Doveren, Lotte ten Hove and Gerben van der Vegt (2003). *Team Diversity research.* Groningen/Assen: University of Groningen/Shell.

[27] Catalyst launched a project on the stereotyping of US Business Leaders and used this phrase in the project's title.

[28] Kanter, R. Moss (1977). Men and women of the corporation. New York: Basic Books.

reveal a possible bias related to stereotyping. Experiments conducted by Foschi showed that different requirements were applied to men and women in assessing each other's competence (Foschi 1996, 2005).[29] In experimental settings, similar achievements led to different assessments of the task competence of men and women. These gender-biased judgments appeared to be pervasive: both men and women applied double standards when working as evaluators of themselves and of others.

Recently, De Pater (2005)[30] published research on the relationship between career prospects, work experience and gender. The good news is that for the identification of high potential, managers primarily rely on challenging assignments the candidates have experienced. Having challenging experiences was positively related to supervisors' evaluations of interns' potential for career advancement. In the statistical analysis gender did not contribute significantly to the explanation. This means that gender does not matter in this case – men and women with similar experiences have an equal chance of being perceived as 'high potential'. The bad news, however, is that women had to behave more proactively than men in order to gain these challenging assignments in the first place. This means that they have to prove their abilities first, in order to get the best opportunities to demonstrate their qualities. There is a general trust in men's competence whereas women have to prove themselves first. The research also showed that in this specific case, on average men were more eager to get these tasks – Doing the Right Things – whereas women sometimes preferred tasks that reduced the risk of failure – Doing Things Right. This statement did not get full support from the members of the group, who emphasised that men and women want to be judged on equal terms, doing the right things right.

Reflection on these differences and similarities, and how these are communicated between managers and employees, seems crucial for creating a gender-diverse stimulating environment.

Over the years, many lists of characteristics have been produced to conceptualise gender differences (rational/emotional, collaboration/individual, aggression/compassion, etc.). Some experts do not feel comfortable with these lists and these constructions of masculinity and femininity because there is a risk of freezing the identity of men and women in these images. On several occasions, the expert group discussed the importance of stereotypes in assessing the competences of men and women, but also the ambivalence related to positively reinforcing traditional female-attributed characteristics. In particular, the companies with a long-standing tradition of gender-diverse policy expressed their

> *Young women – especially those who have to operate in a male-dominated environment – strongly hold to ideals of gender equality (Van den Brink, 2004). We are not different, we are equal, they say. In these cases, difference is experienced as deviance, and as a potential risk. This has been called the 'paradox of equality' for young women: they do not want to be perceived as different from men, they emphasise equality, but at the same time they know they are members of a minority group.*

ambiguity as regards notions of 'feminine values'. What kind of values are meant to be feminine? And why call them feminine? Does this imply that only women are responsible for these values? On the other hand, if culture has to change, value systems have to change, too. New concepts of the 'ideal worker' develop in reaction to the pressures generated by a gender-mixed workforce.

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[29] Foschi, M. 1996. Double Standards in the Evaluation of Men and Women. Social Psychology Quarterly 59:237-254 ; Foschi, M. 2005. Gender and the Double Standards in Competence Assessment. In Gender Equality in higher education. Miscellanea. Third European Conference Genoa, 13-16 April 2003 edited by V. Maione, 140-148. Milan: FrancoAngeli.

[30] Irene de Pater (2005). Doing Things Right or Doing the Right Thing. A New Perspective on the Gender Gap in Career Success. Dissertation, University of Amsterdam.

Outlook: a sense of urgency

What are the key mechanisms related to the slow progress of realising the full potential of women in S&T companies? We discussed the individualised interpretation of work-life balance issues (Del Boca), we addressed the unbusinesslike way the processes are usually managed (Domsch), and we also analysed the problems with managing diversity in an effective way (Maznevski and Turner). What these criticisms have in common is that in current gender policy in companies, the gender issue is more or less separated from general business issues, and gender diversity is not part of the core value system fundamental to running a business.

The need for change may not be fully understood by those who are in a position to make a difference. Those who are in power do not always experience relinquishing control as something positive – and certainly not enough to tackle the resistance that usually accompanies major change processes. In principle, change implies risk – the risk of losing control, the risk of having to adapt personal attitudes and practices. As one of the representatives said, it never comes easy. Nevertheless, the future is gender diverse and the social dynamics of breaking down gender barriers is irreversible. Leading companies recognise the powerful effects of diversity and they are investing culturally, socially and economically in a realisation of this future.

5 – What next?

Companies and experts have explored as a group the progress yet to be made in integrating gender diversity in S&T. They are seriously concerned about the leaky pipe-line which illustrates the difficulties for universities to attract top students of both sexes in S&T. At corporate level, they see many potential improvements in addressing the cultural change as a major transformation of the company, in preparing managers to the challenge of diversity and in cooperating with communities and employees. Specifically, they recommend the following actions:

✦ To invest in the process of change management to include gender diversity, make management accountable of progress.

✦ To nourish the talent pool - expose women to challenging work experiences.

✦ To address concretely work-life balance issues, which are common to men and women.

✦ To implement internal programs as soon as possible: role models, mentoring, coaching, child care.

These types of actions are supported by a group of leading international companies, who realise that the challenge of gender equality needs proactive attention. To optimise our resources in Science and Technology, we must be innovative in our approach. The past 12 months' informed debate has concluded on this very clear message: when these actions are implemented in depth, results will show that gender diversity pays off.

PART II – Experts' contribution

Dual careers: public policies and companies' strategies.

Daniela Del Boca
University of Turin, CHILD and IZA

1. Introduction

In most countries the increase in women's labor market participation appears to be relatively greater among higher educated women compared to less educated. Some researchers have attributed this to the process known as "assortative mating" in which wives and husbands do not marry randomly but share the same characteristics in terms of education and employment status. Recent empirical studies have shown that in about 55-60% of dual earner couples, both spouses have the same level of education (Gregg and Wadsworth 1996). The growth of employment among higher educated women has implied a growth in "dual career" couples.

For dual careers couples, the balance between work and family is complicated by a greater commitment to high demand jobs, higher costs of interruptions during child bearing years, and a more difficult coordination of work schedules and job locations.

In the following section of this report, we review comparative statistics for the labour market characteristics of women across educational groups and across countries (e.g. employment rates, gender wage ratio, and job segregation) and draw some implications regarding costs and benefits of several social policies. In the third section we report and discuss companies' responses to employment growth in dual careers households.

2. Comparative Facts

The comparison between employment rates for women with low education (secondary school or below), and high education (university or more) show that the better educated group experiences far higher employment rates than the less educated group in all countries. The gender employment gap is also far less for the more educated group (Table 1, see p.32). More educated women are more likely to work full time and work continuously over the life cycle irrespective of the presence of children.

However, the employment rates vary significantly across countries. There are substantial differences among Mediterranean countries (e.g. Spain, Italy, Greece), Nordic countries (e.g. Sweden, Finland, Denmark), Anglo-Saxon countries (e.g. United Kingdom and the US), and continental European countries (e.g. France, Germany, Netherlands).

In the Nordic countries employment rates are the highest while the gender gap is the lowest. In the Mediterranean countries the opposite is true. This reflects substantial differences in the organization of the welfare state (Esping Andersen 1990). Nordic countries provide the most generous support of maternal employment: long and generous parental leave (lasting for up to 3 years), large availability of affordable child-care for children of all ages, greater opportunities for flexible hours and part-time employment (mostly

in the public sector)[1]. As a result in Nordic countries the labor market attachment is similar for mothers and non mothers (OCDE 2002 Employment Outlook pg 84). Conversely, the Anglo-Saxon countries and the Mediterranean governments traditionally consider children as private goods and leave most of the burden on the family itself. (Boeri Del Boca Pissarides 2005).

Countries with more generous social protection, have also the lowest gender wage gap (Table 2, see p.32). However, there still exist greater differences at the top of the wage distribution—what is commonly known as a glass ceiling[2]. In countries with less generous social protection, such the US and UK, the gender wage gap is larger, but the occupational segregation by gender is much lower (Olivetti and Petrongolo 2005, Goldin 1990).

The reason why occupational segregation by gender is highest in Nordic countries is due mainly to their unusually high proportion of female employment in female dominated occupations such as education, health care, and some social services such as child-care providers. The public service sector is far bigger than in other countries. This creates better opportunities for women to get a job in the extended caring sector. These services also help to support the high labor market participation of women in these countries but are mostly part time jobs with low career perspectives (Esping Andersen 2005).

In turn, the low level of segregation in the Mediterranean countries can be interpreted in terms of the relative scarcity of occupations which are traditionally either male or female dominated such as professionals in private and social services.

Table 3 (see p.33) measures and compares the vertical distribution of jobs of women and men it shows that women are underrepresented at higher level jobs relative to men. The representation ratio in jobs with supervisory roles is closest to 1 in the United Kingdom and the US, whereas it is below 0.5 in Italy (OCDE 2002, Employment Outlook pg 95). There is remarkable absence of connection between gender gap in employment rate (very low in Northern Europe) and female representation in managerial jobs (more or less similar to Southern European countries).

We now turn to the analysis and comparison of the role of public policies and firms' policies, and the potential role of these policies in supporting dual career couples in balancing work and the family. In Table 4 (see p.33) we report estimates of labour market responsiveness of all women and higher educated women to several policies using ECHP data (European Community Household Panel) (Del Boca 2005). Both the effect of public policies such as the availability of public child care,[3] optional parental leave, and the effect of company initiatives (such as in-site child care and part time) are analyzed and compared. Table 4 shows the influence of facilities on the probability of married women becoming active on the labour market. Higher numbers reflect stronger influences, positive or sometimes negative (children 0-5). The empirical results show that married women's employment probability depends positively on having parents close by, and the availability of public child care and part time options, and, holding factors constant, is higher in the Nordic countries confirming earlier results (Del Boca, Locatelli,Vuri 2005, Del Boca Pasqua, Pronzato 2005) . Highly educated women's employment is more responsive to initiatives in the workplace provided by the firm (e.g. in-site child care), rather than the availability of public child care which is typically characterized by rigid hours and long vacations. They are more likely to be employed in situations where part time is available, and holding factors constant are higher in the Anglo-Saxon countries. They are more likely to reside in a

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[1] Nordic governments, concerned with the fall in fertility in the 1970s, started to design policies that allow women to continue to work and have the number of children they desire (see for a detailed discussion (Gustafsson 2005).

[2] In Mediterranean countries the low wage gap is the result of a selection effect since only women with higher education are employed.

[3] We focus on child care for children under 3, the supply of childcare varies across countries considerably. Nordic countries have the highest proportion (40%), while in Southern Europe it is much lower (5-6%).

large urban area where it is easier to conciliate the co-location problem of both spouses, confirming trends showing that dual career couples are increasingly likely to be located in the largest metropolitan areas (Costa and Kahn 2000).

3. Dual careers perspectives and companies strategies

We now discuss factors emerging from dual career interviews and relate them with strategies that WIST firms have put in place to deal with the issue of dual careers employees.

Guild (2005) reports several dual careers couples's experiences at different stages of their life cycle. These experiences reflect how the difficulties in managing work and the family change with different change stages of their life/career. The dual careers couples interviewed, though satisfied with their joint careers perspectives, report how much coordination and flexibility involves the management of their lives especially when children were present.

The first couple does not have children yet. They report as a major difficulty to have to move to follow each other's work. They also report that because of their demanding jobs they have to postpone children to the future. They work at the same company, but rather than this causing tension, they find it valuable to share experience with somebody who knows their work, even if they anticipate tensions with the co-workers if they would work on the same projects. The second has been married for twenty years without children and both are very dedicated to their careers. They work (and live) in the different cities during the week (Philadelphia and Detroit) and see each other on week ends. They report that this implies a lot of organization and communication to compensate for the distance. The third couple has a child. It is the wife who has decided to work from home one day a week, though the husband is very involved in childcare. They made a decision to wait to have children, anticipating several efforts in restructuring the workweek given long and demanding hours that their careers imply.

Different issues are related to the different life cycles: the difficulties implied by dual career are certainly less when there are no children and mobility does not involve the organization and the stress of delegating child care. The costs of children in dual career families are certainly higher given that acquiring flexible services and combining them implies a lot of coordination.

Gaz de France in 2003 has made a qualitative and quantitative survey that confirms some of the above results about dual careers[4]. Their results show that stereotypes are still relevant in defining "masculine career patterns" which implicitly require a spouse's domestic support. Their life-stories illustrate that in managers' careers, characterized by numerous business trips and little leisure time, work-life balance is still generally resolved by the cost of the spouse' occupational life. The few women managers with children need to have a very efficient and planned organization of work to accommodate the long hours and responsibility which often include arriving early in the office, skipping lunch-time, working at night at home, cutting socializing and networking. Among the younger dual careers however, stronger aspirations emerging for women to have a better work-life balance and for men to be more available as fathers, have implied important changes in the allocation of time, especially concerning child care.

Another company, TOTAL, has focused on the issue of dual careers. For them, the most important issue related to dual careers has to do with international mobility. While in the past, the "expatriation model" has

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[4] Six month study(2003) based on HR information system as well as life stories of 60 managers and high flyers with diversity of qualifications, occupations, family situation and geographical location (Cecile Guillaume and Sophie Pochic).

always been "a working man, travelling with his housewife", progressively, the company has looked for tailor-made solutions for working spouses and recently focused also on the husband's career. The dual career case studies they collected can be categorized in different types of outcomes. A first type is "dual career in the same firm", which is the easiest one because the management of careers can be made easier by the firms' policies. A second type is "dual career in different firms" that implies more negotiation between the partners. Others which concern careers in different environments and level of management may imply frequent commuting or long separation in which one of the two is "mover" and the other is "stayer". The comparison of these case studies illustrate some success or failure factors. They for example indicate that dual careers are easier to manage if both are active in compatible environments, that early negotiation terms in the couple help to lead two careers, and finally that if the career leader is the wife, stereotypes still affect both.

What are the companies' strategies in order to mitigate dual careers's difficulties and constraints? To investigate the issue we have sent a questionnaire to twenty companies. Only 9 companies responded. One company said that no information was available about dual careers and did not complete the questionnaire (HR). The other 8 companies completed the questionnaire (Air Liquide, Schlumberger, Gaz de France, Shell, Infineon, Xerox, Intel, TOTAL). As Michel Domsch' report describes, the proportion of women are respectively 31% at Xerox, 27.8% at Infineon, 23% at Air Liquide, 19% at Shell, 15% at Schlumberger. Women in top management are 33% at Infineon, 27% at Xerox, 10.4 % at Gaz de France, 9.6% at Shell and 4.8% at Air Liquide. The earnings distribution of these companies (Air Liquide, Infineon, and Shell) are characterized by basic equality between men and women in terms of salary and bonuses.

Table 5 (see p.34) summarizes the responses to the main questions asked in the questionnaire. According to the companies, the main reasons to support dual career workers are the possibilities of attracting, recruiting and developing the skills of the best employees and the difficulties of replacing highly skilled professionals, the importance of mobility and international assignments[5] and finally the concern for future labour shortage.

Their initiatives concern several areas from in site childcare, flexible working hours and arrangements, cooperation with local kindergarten, re-entry positions after parental leave, support for the spouse's job in case of employee re location. The differences across countries depend on local policies and laws but also reflect cultural differences.

The implementation of such policies reflects an important step in the attempt to reducing the difficulties and constraints of dual careers couples. As Gerson and Jacobs (2004) show, in dual career families, men and women 's desire to meet work demands and also to care for their families are becoming more similar.

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[5] In the case of or internal mobility, Air Liquide and Total propose the service of a placement agency that supports the spouse in the research of a new job. Air Liquide and Total has also signed the CINDEX (Centre Inter-Entreprises de l'Expatriation) intra enterprises agreement: if the partner works for a company member of the CINDEX, he/she can interrupt his/her contract during the international assignment of his/her spouse (max. 5 years) and take it back at the end of the international assignment.

4. Concluding Remarks

The cross countries analysis shows that women in Nordic Europe are protected by family-friendly social policies, but are faced with high job segregation. Conversely, women in Anglo Saxon countries have more career opportunities but little social protection. The 2005 OCDE publication *Babies and Bosses* comparing several countries' social policies concludes by recommending that some policies should be re-equilibrated, recognizing their costs and benefits. While for example the UK government should provide more affordable childcare, the Swedish government is warned to control the high costs associated with an extremely generous family-friendly policy which may have undesired effects on job segregation.

Trade-offs between costs and benefits of family friendly policies exist also at the workplace. Firms must support the careers of those who wish to invest time in their families as well as in the success of the firm. It is not only a question of protection and support of the worker, but also of the welfare of the firm and its owners. Given the sizeable human capital investment that firms make in their highly-educated professionals, firms should develop policies that offer opportunities to balance work and family in order to attract and retain highly qualified workers of either sex. Work-family policies should then be gender neutral (for example neither parents should be penalized for taking care of their children). All the empirical evidence presented here show in fact that, in dual career households, a growing number of women are now more committed to their jobs and their husbands more committed to the family.

Table 1 : Employment and Gender Gaps across Education in Selected Countries				
	Low education		*High education*	
	Employment rate	*Gender gap*	*Employment rate*	*Gender gap*
Denmark	68.2	9.2	88.7	4.5
Finland	69.5	8.3	84.8	8.0
Sweden	65.4	14.5	87.8	4.3
US	49.7	26.5	81.9	11.6
UK	49.1	17.3	86.4	8.0
Italy	35.8	46.8	78.7	12.4
Greece	38.2	45.1	74.0	12.4
Spain	38.2	45.2	74.1	14.8
France	56.5	23.6	83.1	8.5
Germany	55.4	20.9	83.4	10.5
Netherlands	53.4	32.4	86.6	8.8

Source : OCDE Employment Outlook 2002

Table 2 : Gender Wage Gaps across Education		
	Low	*High*
Denmark	12.1	15.6
Finland	19.7	27.0
Sweden	19.8	24.5
US	30.9	35.5
UK	49.1	30.4
Italy	16.1	7.0
Greece	38.2	21.1
Spain	23.2	12.4
France	19.5	16.9
Germany	28.3	23.9
Netherlands	24.0	27.0

Source : OCDE Employment Outlook 2002
Ratio of median female to male hourly earnings (full time work)

Table 3 : Women in Managerial Occupation and Jobs with a Supervisory Role Female Representations Ratios		
	Senior officials and managers	*Job with a large supervisory role*
Denmark	0.5	0.5
Finland	0.6	0.6
Sweden	0.6	0.7
US	0.9	0.8
UK	0.8	0.8
Italy	0.3	0.5
Greece	0.6	0.4
Spain	0.6	0.6
France	0.7	0.6
Germany	0.5	0.5
Netherlands	0.5	0.5

Source ECHP European Household Community Panel 1994-1998

Table 4 : Estimates of the probability of working of married women (standard error in brackets)		
	All	*High education*
Women's age	.210**	.382**
Tertiary education	.820**	
Presence of Parents	.457**	.403*
Children 0-5	-.354**	-.285**
Urban area	.374**	.794**
Optional Parental leave	.151**	.175
Part-time	.043**	.021
In site Childcare	.003	.038*
Public child care	.015**	.005
Nordic	.692**	.568
Anglosaxon	.101**	.190*
Constant	-1.076**	-1.260*
N. obs.	10,341	3364

Table 5 : Results of the questionnaire on Dual careers					
	Information on dual careers	Relevance of issue	Reasons	Facilities	Cross-country differences
Shell	Not available	yes	Talent retention and diversity inclusiveness efforts	1. In site child care 2. flexible hours 3. Special leave for sick children 4. Reduced hours of work for child care	Depend on local employment legislation and local policy
Schlumberger	23%	yes	Recruit and retain the best people	1. Flexible time, 2. schooling assistance for international assignments	Depend on local governments guidelines
Infineon	Not available	yes	Mobilize available potential given the predicted labour shortage	1. Cooperation with local kindergarten, 2. Re-entry positions after parental leave, 3. Flexible hours, 4.teleworking	No information available
Gaz de France	63%, 9 % have a partner in the company	yes	-	On site-kindergarten	No information available
Air Liquide	Not available	yes	Related to mobility and international assignments	1. Child care benefits (until 3 years of age) 2. International and national mobility policy	International mobility are part of a group wide policy
Xerox	80%, 5% have a partner in the company	yes	Highly skilled women very difficult to replace	1. Flexible hours 3. Child care leave	Local government policies
Intel	Not available	yes	Helps the company competitiveness, by attracting and retaining the best employees	Telecommuting, flexible schedules, paid time off, child care, training.	Most work/life practicesconsistent across sites,
Total	Not available	yes	Especially for international mobility	1. International and national mobility policy 2. partners assistance 3. In site child care or child care benefits 4. Part time work	Policies adapted to local context, environment and legal rules. Socio-cultural differences also play an important role.

6 Same program as in Total

7 For example part time work is open to all employees assigned in France and some flexible work and job sharing arrangements in United Kingdom (Aberdeen).

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Quality Management in Gender and Diversity
- The Role of Social Auditing -

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A. Situation in Gender and Diversity

The situation in practice looks like a paradox:

On the one side, there are thousands of gender and diversity research projects, publications and reports in all media; hundreds of gender and diversity best practices, networks, conferences, meetings, workshops; a huge number of programmes organized by governments, foundations, EU Commission; good and well known relevant HR tools, instruments; there are more and more qualified and career oriented women and gender and diversity sensitized firms in most of the European Union member-states.

But on the other side - for more than twenty years now– there is only a low significant and sustainable progress in the field of gender and diversity in industry, especially in the field of women in science and technology [3,6].

An I.P.A. research study about "Resistance in Gender Equality in Practice" (group of 20 German companies, questionnaire and interviews) shows the following results:

In most of the "resistance cases" there existed

-   no or very low commitment of top management in the field of gender and diversity

-   no systematic planned ways from developed gender and diversity policy to implemented gender and diversity culture

-   no obvious incentives for gender and diversity engagement

-   poor gender and diversity marketing or branding campaigns

-   not enough relevant information and discussions about gender and diversity in management and within the company in general

But also in companies without explicit resistance to gender and diversity, a real powerful gender and diversity process management could not be observed. Discussions within the WIST Group and on other discussion plateaus with practitioners brought out that a more systematic and more intensive quality management in the field of gender and diversity in practice is needed.

Our research therefore focused on the subject of more quality management in gender and diversity in science and technology in practice (business case).

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B. Reasons for more Quality Management

Intensive discussion within the WIST Group made clear that in this context especially the following four reasons are important.

(1) In general it is not the question to have enough men and women with qualifications for science and technology. The total number of avaible men (in the companies and on the labor market) within the next five to ten years might be enough from the quantitative point of view.

But all the companies look for highly qualified and motivated experts, for career oriented employees, they need high potentials in science and technology [4, 5, 13]. But it is obvious that within all groups of human beings there is a certain percentage of top people with high potential (Fig. 1), a big group of reasonable middle and a certain percentage of employees / applicants with low relevant competencies in science and technology.
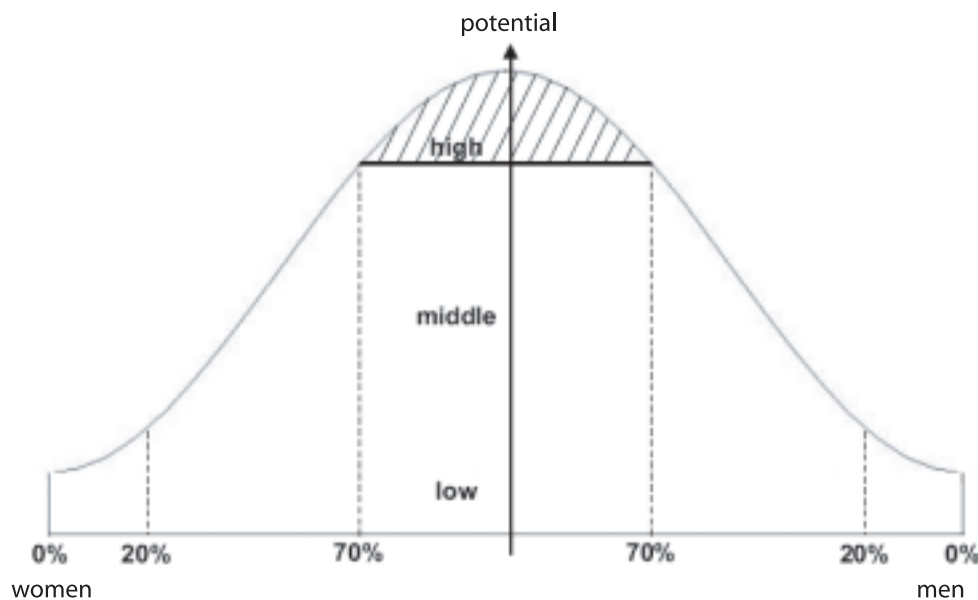
Fig. 1: Potential on the internal and external labor market

To get enough high potentials in this context means that excellent quality-oriented internal and external recruitment and selection, development etc. has to be done regarding men and women, to win this fight for high potentials in science and technology.

(2) Recruiting the right potential very much depends on the individual employer attractiveness. Besides challenging projects and job security, equality and family friendly policy belong to the most important motivation factors. This means that -to get the relevant target group of high potentials for the company- it is a must to implement gender mainstreaming activities within a concept of high qualified diversity management. All these activities should be put on an open information platform which is freely accessible for the target group of male and female high potentials in science and technology.

(3) Converting good policy into culture means: relevant gender and diversity "input" has to be transferred into needed and wanted "output" (Fig. 2).

Gender & Diversity „Input"	Moderation Variable	Gender & Diversity „Output"
G & D Policy: Guidelines; Development of Tools / Instruments; Information Compaigns; Workshops etc.	The Power of Transformation Process Management; here: main focus on quality	G & D Culture: Best Practices; Positive Actions; Networks; better performance; enough applicants for science and technology jobs

Fig. 2: From Policy to Culture

But somebody has to be responsible for that. The discussion within the WIST Group shows quite clearly that in this context there is a big need for more process management (moderation variable) done by promoters [7], regarding especially more quality aspects within this transformation process.

(4) An instrument is needed to measure the level of quality of gender and diversity, to use it for evaluation and benchmarking and to integrate it as an incentive element into the strategic quality planning, implementing and controlling activities of a company.

C. Quality Management Models

In discussions with experts about quality management very often the EFQM (European Foundation for Quality Management) Model is used.

It is one of the most famous and developed quality management models in Europe. Detailed descriptions of its development within the last 15 years, of applications, memberships, implementations awards, modifications etc. are published by EFQM itself and are available in a huge number of publications [10, 16].

(1) EFQM is based on some fundamental concepts: it is process oriented, excellence / quality management oriented, learning and innovation oriented.

(2) Essentially the EFQM Model tells us that: results of customer satisfaction, of people (employee) satisfaction and of impact on society are achieved through leadership driving policy and strategy, people management, the management of partnerships and resources and processes, leading ultimately to excellence in business results.

(3) The nine boxes in the EFQM Model correspond to the criteria which are used to assess an organisation's progress towards excellence.
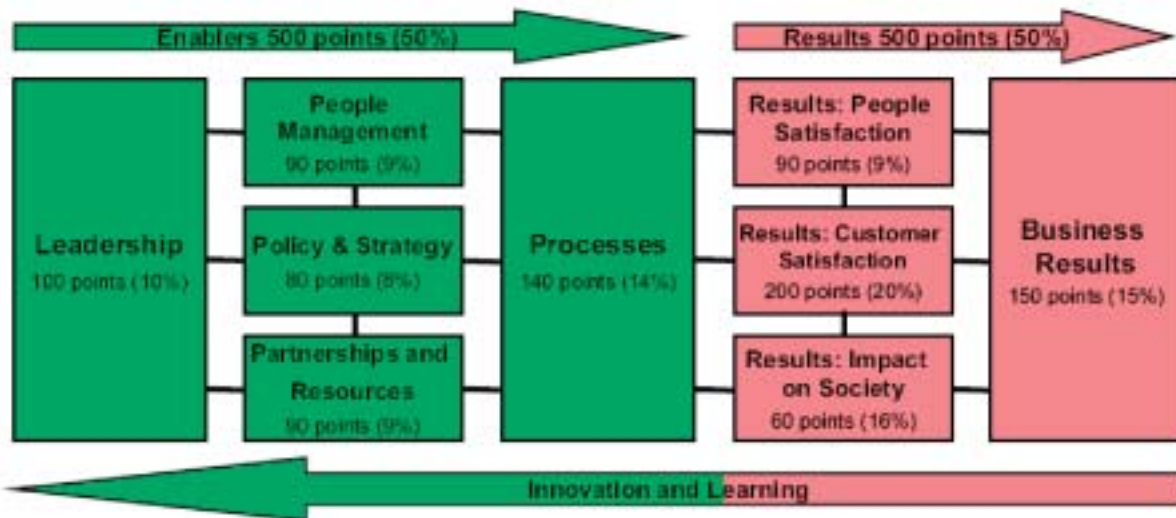
Fig. 3: Structure of EFQM Model

For convenience, enablers and results are used to group criteria. The enabler criteria are concerned with how results are being achieved. The results criteria are concerned with what the organisation has achieved and is achieving.

For the purpose of meaningful assessment for the award, a relative value must be ascribed to the nine criteria within the EFQM Model. The figures in the EFQM Model show the maximum number of points that may be given to each of the criteria and the equivalent percentages. Enablers and results are valued at 500 points each.

It should be mentioned that beside the EFQM way of implementing higher quality other quality management systems are developed, discussed and used: for example the Deming Model [14, 15] or the Malcolm Baldridge National Quality Award [9, 12, 18].

The WIST Group recommends to be aware of the EFQM philosophy and its basic concepts for quality management in gender and diversity. But since the EFQM Model was not specially tailored for gender and diversity, it was recommended:

- To investigate and to evaluate existing social audits focused on gender and diversity also.

- To think about the development of a WIST specific model designed for the quality management in gender and diversity, possibly with special regard to the field of science and technology.

D. Social Auditing

In general, auditing is the procedure of an independent, systematic and documented examination of a specific topic using check lists, aiming to provide an objective statement on this topic [1]. It can be rewarded with a prize, an award or a certificate for best practice, innovation and performance.

Audits serve as

- controlling instruments to verify the quality management

- provider for information on the efficiency of the company´s performance

- indicators for strategic decisions

- a benchmark to compare different companies

A special I.P.A. research study (within the (former) EU-network "Family & Work") in the field of social auditing and campaigns using these social audits with the main focus on gender and diversity, equality of men and women, worklife balance, family-friendly policy, inclusiveness and similar things reveals:

- A big number of social audits are already developed and used in Europe for different aims.

- 38 different social audits and relevant campaigns were investigated.

- Nearly all of them have been developed within the last fifteen years.

- The number of social audits increased significantly between 1999 and 2005.

- Most of the audits (inkl. campaigns) are implemented in Germany (11), Austria (4) and Great Britain (9).

- During the past years, many new social audits concerning family and work and promoting women in their careers have evolved throughout Europe.

- The broad participation of European companies in social audits indicates a generally rising interest in the topic of family and work programs.

All the campaigns using social audits to increase the quality in gender and diversity is of immense benefit. But the I.P.A. research study also identified some very impor-tant critical points:

- Most of the audits are national approaches. Especially for globalized companies and benchmarking purposes, there is a need for European (worldwide) approaches.

- It is not quite easy to get detailed information about the audits themselves (objectives, methodology, criteria, process and organizational details etc.). More transparency about these quality management tools for the different interest groups is needed.

- There are no detailed results from these quality assessments available, or they are difficult to access. Different databanks and systems exist, some of them are protected by access authorization, only some selected information is available at any time. An information platform showing this specific gender and diversity quality in detail in order to present the attractiveness of the employers was discussed.

- On the one hand, the investigated social audits refer to all employees, all men and women, and on the other hand they refer to all departments within a company (total view). For WIST purposes, there is the special need to focus on gender and diversity in science and technology. In this area, there prevail special recruitment and selection procedures, special career paths, working time

arrangements, compensation and benefit systems, more project and virtual working situations etc. Therefore, a tailor-made audit for this field of application has to be recommended.

- In nearly all cases, the quality management of gender and diversity, supported by audits, was not an integrated part of the companies overall strategies, had no influence on balanced scorecards, management by objective (MBO) and incentive systems etc. But realizing a sustainable change in this area requires the development of an appropriate tool and a very strong responsibility and commitment of the management to use it. In other words, this instrument has to be accepted and implemented in the management process.

Therefore, the WIST Group recommends the development of a tool, based on gen-eral concepts of quality and excellence management (e.g. like the EFQM method), using the basic concepts of measuring business excellence [2, 11] and especially the concepts of social audits with special regard to the mentioned critical points.

E. An Example

Within the WIST Group meetings the author presented the genderdax (www.genderdax.de) as an example whose philosophy and method might be helpful for further discussions.

(1) Information Platform

genderdax is a new information platform offering a comprehensive overview of working conditions and specific opportunities to women with high potential. "Gender" refers to the issue of equal opportunities for women and men. As in the case of the German stock exchange (Deutsche Börse), the word "dax" refers to an exclusive circle of top companies. Application and membership is free of charge for the companies. It is open to everybody, no passwords etc. are needed.

(2) Advantages

For companies, an information platform provides various advantages:

Women with high potential frequently have great expertise, a great deal of practical experience and they are generally highly motivated. Most of them are very interested in international postings and, when given the opportunity to do so, tend to be highly successful. They display a high degree of loyalty to their company and, if given appropriate support, they do not change jobs simply to further their careers.

Many companies now recognize the value of such qualified women with great promise, and consequently provide coaching and systematic career development for such individuals. Therefore, special advantages are:

- an excellent opportunity to specifically target highly qualified women.
- equal opportunity companies registered in an information platform gain a clear competitive advantage in the labour market and improve their corporate image.
- these companies benefit from an increased public awareness as well as increased media interest.
- the platform offers companies the opportunity to publicize special programmes to improve working conditions and to further personal development.

(3) Model

Similar to the EFQM Model, the collection of information and its assessment can be structured in three main sectors (Fig 4):

Fig. 4: Sectors and Criteria

Within each of these sectors (input, process promoters, output), certain (30) gender and diversity relevant criteria are listed [17]. Details (sub-criterias) are given in the application form. All the companies' information on these criteria are available on the information platform.

It is essential to assess the companies' activities. The genderdax committee for example uses a special quantitative Model (Fig. 5) to assess the quality level regarding gender and diversity within the applicant company.
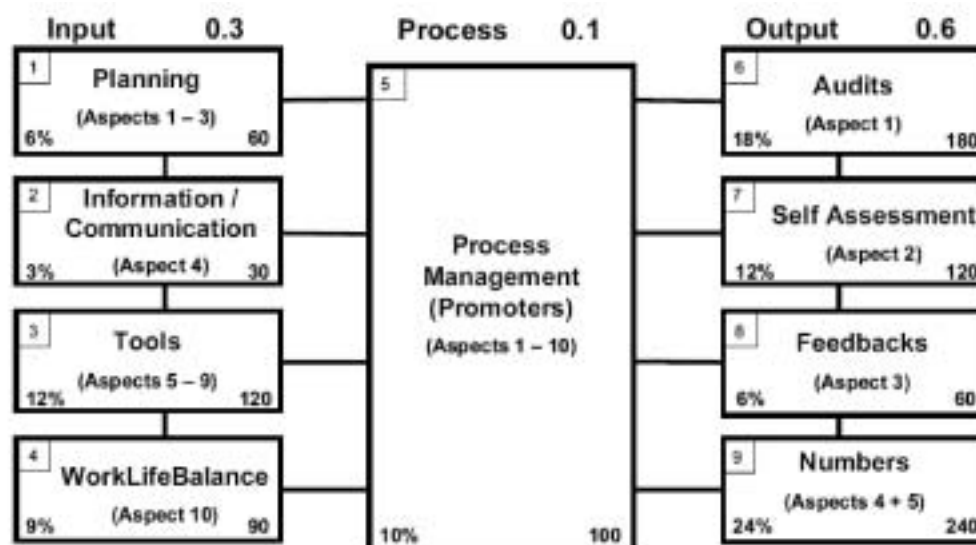
Fig. 5: Assessment Model

In addition to the self assessment of the applicants, interviews, company visits, analyses of relevant documents etc. take place. In all can get up to 1000 QP (quality points). To join the community as a member (which means also to be "published" with the company specific gender and diversity information), a company needs a minimum of 150 QP in the sector(s) "Input", 50 QP in the sector "Process Promoters", and 200 QP in the Sector "Output". The Fig. 6 gives an overview of different, possible initial positions of companies.
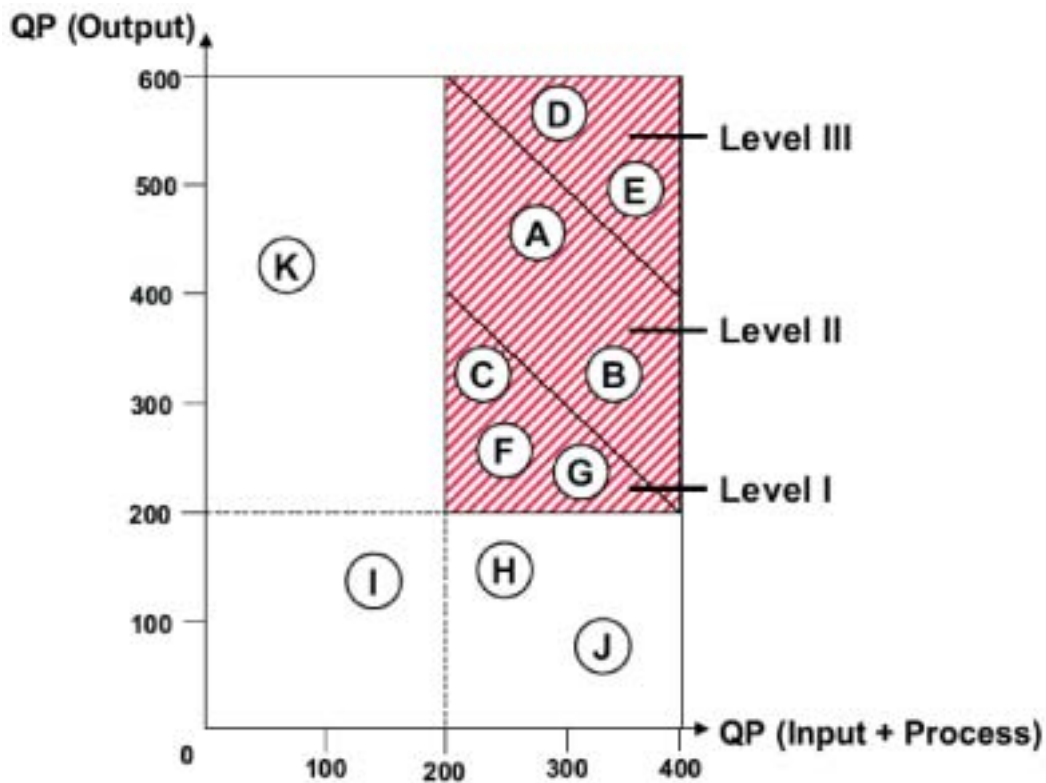
Fig. 6: Portfolio

A,B,C, D, E, F and G are companies with a high level of quality management in the field of gender and diversity. They score 400 QP and more:

    Quality Level I: 400 and more / less than 600 QP
    Quality Level II: 600 and more / less than 800 QP
    Quality Level III: 800 / up to 1000 QP

The Companies H, I, J and K would not be listed on the platform, because (up to now) they do not satisfy the criteria of the minimum standard.

(4) WIST Study

To check the relevance of this tool for quality management regarding gender and diversity, eleven WIST companies (Air Liquide, EADS, EDF, European Space Agency, Fraunhofer Gesellschaft, Gaz de France, Hewlett Packard, Infineon, Schlumberger, Shell, Xerox Research Centre) used the genderdax (gd) application form to report on their special policy and culture in this field. The WIST companies decided not to publish their details on the information platform at this stage. But Fig. 7 and Fig. 8 summarize the

results. It is based on the information given by all the eleven WIST companies using the genderdax application form.

A company can achieve a maximum of 1000 Quality Points, which are split in three main sectors (Input: max. 300; Process: max. 100; Output: max. 600 Quality Points) and nine criteria. The average results of all eleven (mentioned) WIST companies are presented in Fig. 7. Of course, there exist individual tables of results based on the information for each WIST company. These individual results can be used for detailed evaluation, internal and external benchmarking and new company oriented strategic planning for gender & diversity. Within the genderdax ranking the first rank is occupied by a company which achieved a total of 825 QP (out of 1000). The average result was 540 QP (see: Fig. 7). Again: The assessment is based on information given in the application form. Further investigations, interviews, surveys etc. could modify the results. But the main purpose at this time is to demonstrate how the genderdax model is operating.

gd Sectors & Criteria	QP max	QP media	QP deviations	
			min.	max.
I. Input	300	166	29	229
1. Planning	60	35	0	60
2. Information	30	19	5	28
3. Tools	120	48	6	86
4. WorkLifeBalance	90	64	18	90
II. Process /	100	82	33	100
5. Promoters				
III. Output	600	292	70	497
6. Audits	180	82	0	180
7. Self Assessment	120	76	0	120
8. Feedback	60	22	0	60
9. Numbers	240	112	0	200
Sum	1000	540	246	825

Fig. 7: WIST Results I (all companies)

Fig. 8 shows the average quality level of gender & diversity management within the companies. The genderdax Quality Profile demonstrates the degree of performance regarding each criteria as percentage of maximum QP. Also in this case individual company Quality Profiles exist, and these individual profiles can be used for evaluation, benchmarking, developments, strategic gender and diversity planning etc.

This sensitive information is not published on the genderdax Information Platform, but it is used to check the individual gender & diversity quality level of the company. Again: a company needs a minimum of 150 QP for Input, 50 QP for Process and 200 QP for Output to be elected as a genderdax member and to be published on the genderdax Information Platform. This minimum result assures the user of the genderdax Information Platform to get information on companies which fulfill at least this quality level. Of course, within the community of gd member companies all the detailed information can be used for internal genderdax benchmarking, genderdax workshops etc.
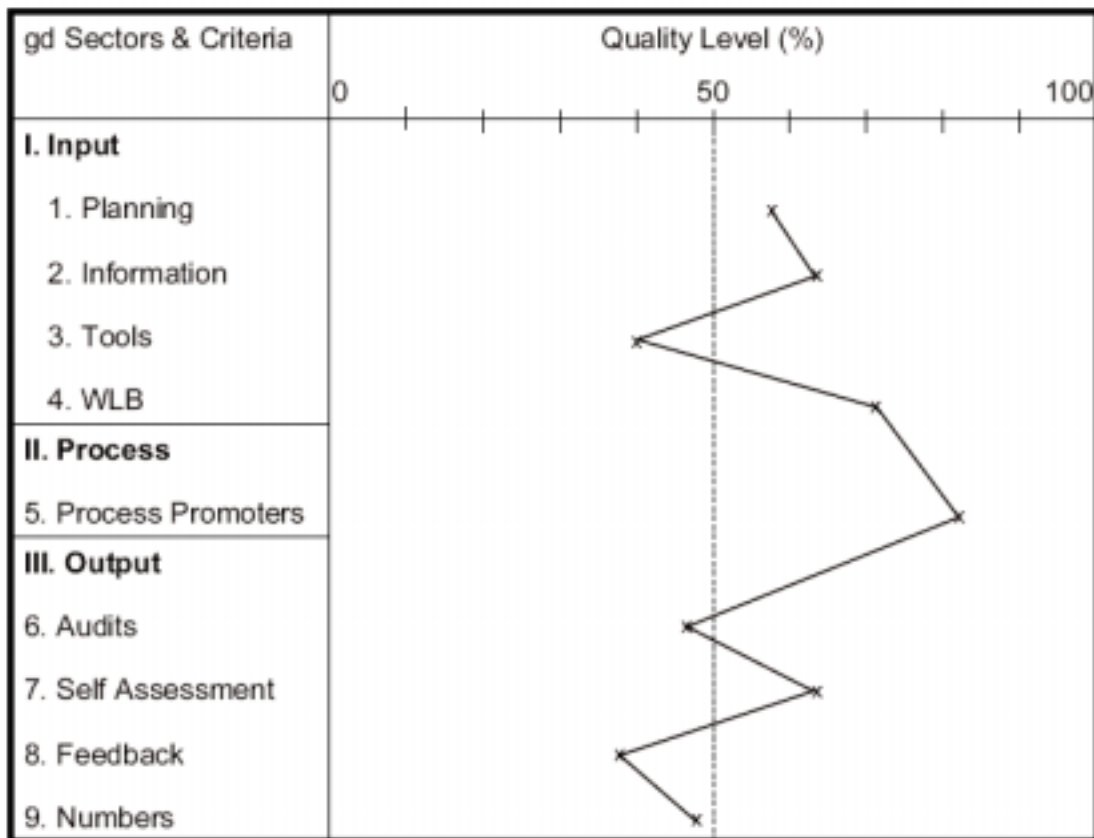

Fig. 8: WIST Results II (gd Quality Profile; all companies)
gd = genderdax

The general discussion during the WIST meetings regarding the benefits of such an information platform brought up:

- The list of criteria includes most of the relevant information on the gender and diversity activities of a company.
- A structured check-list is very helpful to investigate and to assess the special gender and diversity subjects.
- It can be used as an audit to check and to develop the quality level of gender and diversity management. Therefore, it should be used as part of the total quality management.
- It can be used for internal and external benchmarking of gender and diversity also.
- Publishing this information on an information platform is likely to increase the employer's attractiveness and might be useful to gain a better position on the labour market with respect to recruiting female high potentials. But also during workshops, the exchange of experiences just between the platform members is already a valuable advantage.
- The analytical and quantitative model also allows rankings.
- Some of the WIST companies recommended to publish the results on an information platform. Others recommended not to publish them, because of the different expected impacts on the images of the companies. But they agreed that rankings can be useful for benchmarking within the group of companies.
- All WIST companies realised the value of the audit results for balanced scorecards, controlling, management by objectives etc. and related tasks. This means that it has to be integrated into the strategic management as a quality tool, to detect and to point out the incentives which are needed to further the development of gender and diversity.

F. Conclusion

Because of the different reasons explained before, there is a need for better process management in order to approach a sustainable progress in the field of gender and diversity. The main focus of this paper therefore was on quality management in this area. But further developments are needed to meet the specific requirements. In this respect the example of a special assessment model in combination with an information platform, which can be used for these purposes, was presented. Further details should be discussed and executed by a follow-up project.

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The Leaky Pipeline: Stories from Throughout Europe

Ruth Graham, Imperial College London, Faculty of Engineering

Expert Group on Women in Science and Technology – the Business Perspective

In contrast to the research and data presented elsewhere in the report, this chapter aims to capture the personal voice of the real experiences of women scientists and engineers. The diagram in Figure 1 illustrates the Europe-wide percentage representation of men and women in science, engineering and technology in 1999 and 2003. The graph presents the levels of gender participation at each stage of the research career ladder, from undergraduate students (ISCED 5A) through to the single highest post at which research is conducted, equivalent to a full professorship (Grade A).
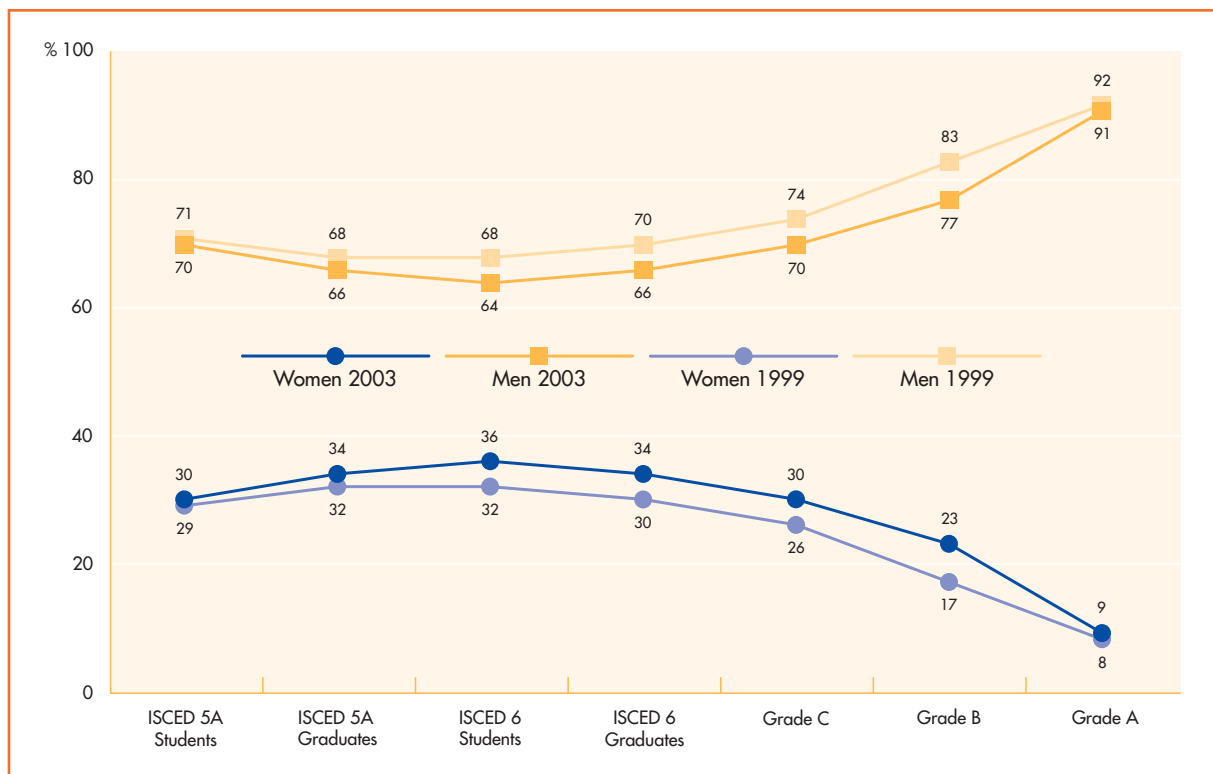
Figure 1. Percentage of men and women in academic careers in science and engineering, EU-25, 1999 and 2003[1]

A decline in the representation of women is apparent in the career progression, which is often referred to as the 'leaky pipeline'. This chapter seeks to illustrate the causes and impact of this using the voices of female scientific and engineering researchers from across Europe. The personal experiences are taken from interviews, conducted between March and December 2005, of women and girls at various stages of their career progression. During these interviews, some women spoke of how they have overcome barriers to

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[1] Source: She Figures 2006, European Commission, pp 56

their progression and developed strategies for success in their scientific careers, while others spoke of difficulties that they were unable to surmount. Although each woman's experience is unique, recurrent themes and issues across the biographical accounts are apparent. This is particularly striking as the accounts relate to women pursuing careers in science and engineering throughout different European countries and to women at differing stages in their career. The various themes summarising each of the key eight stories provided in the chapter are illustrated in Figure 2.

A number of the women whose stories are told here have asked for their identities to be withheld.

2. Support from family and school

4. Successful interventions

6. Strategies for success in early career

8 Strategies for success in senior positions

1. At risk due to lack of support

3. At risk following motherhood

5. At risk due to women and science initiatives

7. At risk due to isolation and exclusion
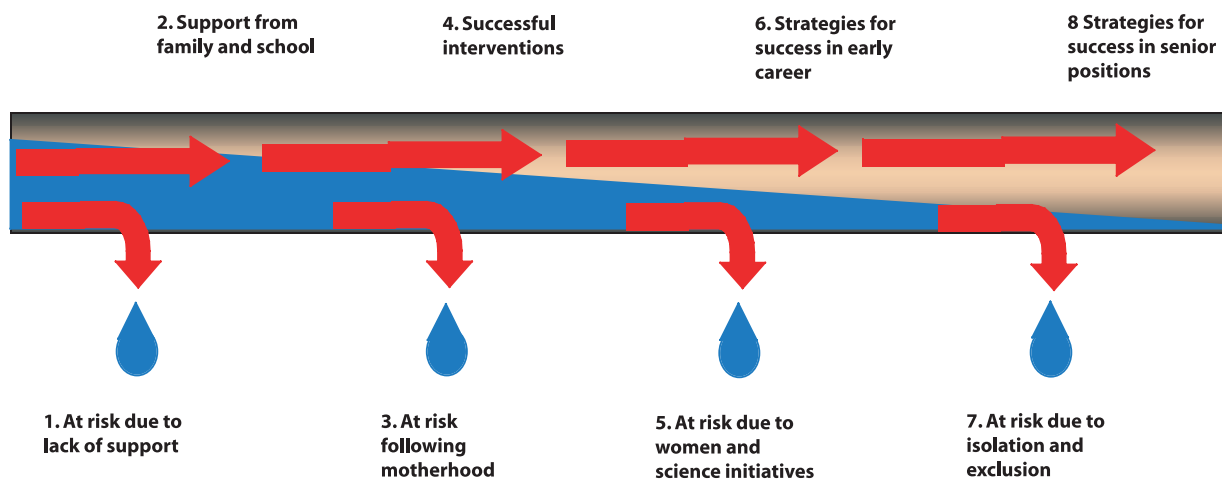
Figure 2. The 'leaky pipeline', illustrating the key themes covered in this chapter based on the personal experiences of female scientists and engineering from throughout Europe

To add a personal note, as an engineer myself, the process of conducting these interviews gave me a huge insight into the lives and careers of women engineers and scientists. I was particularly struck by the numbers of women who spoke of the damaging impact that involvement with 'women and science' initiatives have had on their careers. Initially, I was surprised by these observations and experiences. But as I began to reflect on the career paths of my female peers, I saw evidence of the same pattern: those who had been involved in 'woman and science' scheme were less likely to have early career potential realised than equally-skilled and talented women who did not.

1. At risk due to lack of encouragement and support
Poppy Beacock, A'level school student
UK

'I was the only girl in my GCSE engineering class. I actually quite liked that, as it made me feel like I was changing something just by being there. During the course, we were asked to design and build a product for a 'made up' client. My stepmother is an engineer, and she gave me a real design brief of a test rig for a strain gauge which she needed in her research. I really loved this work, and this is when I started thinking about studying engineering at university. My stepmother has been a bit of a role model for me in engineering. Her work sounded exciting, and she is successful, an engineer and is actually a nice person! I also really liked the importance behind engineering – it can really help people and it seems to have a real impact on the way we live.'

'During the GCSE engineering course, we visited the local aerospace company one afternoon each week for 'engineering experience'. I did not really enjoy this. There was a lot of hanging around. I had thought that engineering was important, but this work seemed a bit pointless. One time, for four weeks, I was just filing two bits of metal so that they fitted together – but they had no purpose! The instructors were very 'masculine' and they didn't seem to think that I could really do anything. When I was not strong enough to work some of the machines, they seemed quite pleased, like it proved something. One day, some of the boys got sent out of the workshop for misbehaving, and started messing about with marker pens in the classroom outside. When I got out, I found that they had written 'lesbian' on the soles of my shoes. It didn't really upset me as they were not picking on me particularly, but it made me feel like engineering was quite a low-status option for people who could not do anything else. All of the engineers I met at the aerospace company were really boring as well, and I thought that I did not want to work in that sort of environment, otherwise I might end up like them!'

'I am now studying Maths, Physics, English Language and English Literature for A' level – I thought this combination of subjects would keep my options open for the future. I have decided now to study English at university, rather than engineering. I would love to be a successful English professor! I find English really exciting, and my English teacher and mum have really supported me with this and are encouraging me to study this at university.'

'Male students studied electrical engineering in their shop lessons. They build all kinds of stuff with coloured lights and buzzers. At the same time I was knitting socks with the other girls.'

IT researcher, Finland

2. Support from family and school
Stefania Zuccarino
Process Engineer
Italy

'I was strongly influenced by my father, who was an engineer and really loved his job. He worked abroad for 27 years, and I only saw him occasionally. When he came home, his stories were fascinating – he always talked about such interesting places and people. He is still an important influence in my life and work, and always helps and supports me in any doubts about my career.'

'Without the influence of my father, I would have done something very different, such as working in fashion, as I was always creative and loved to paint. In many ways, I did not have much choice about going into engineering. I had some concerns about this in the past, but now I am happy with my choice. Engineering gives many different career options, in a country where you are not guaranteed work. My father did not want me to work on a plant, as in his life he had never met a woman there, but this is what I really wanted to do.'

'Now he supports my desires and he always gives good advice. I'm sure that for him if I manage to reach my full potential it will be a big source of pride, and I will be very happy if it will happen.'

'There were no engineering /science initiatives in my secondary school. My experiences in science from that age are purely from family activities: our family went to many science parks (such as Heureka in Southern Finland). My parents were most important of all! They never let me go the easy way saying, 'I can't do mathematics'. Especially my mother always 'knew' I could do it.'

Process Engineer, Finland

'My science teacher at school had a big influence on me. She used to tell us the stories of the lives of the scientists we were studying, and I loved to hear about these adventures! I used to dream about what it would be like to be a scientist!'

Product design engineer, Spain

'At school we were taught by nuns, who were all dedicated and strong women, and often very young. I can remember a teacher in elementary giving a lesson about nuclear energy, which I liked very much. I still remember this lesson very well, and actually then taught this to my own son, years later, when he was in elementary school. Following this lesson, I decided to be a nuclear engineer, and became the first female to graduate in Nuclear Engineering from Milan University.'

Materials Scientist researcher, Italy

3.   At risk following motherhood
Aura Paloheimo
University researcher in information processing science
Finland

'Since my first child was born, I have been so tired, but also very happy! I think many women want to get back to work, but some of them want to work part time or in less critical positions when their children are small. When the children grow up, women can start focusing in their career again. I think most problems are due to evening meetings and such. It is difficult and tiring to arrange childcare, and I wouldn't like to be parted from my child all day and night. Also I think, having your own children makes you think about whether your work is truly important or not.'

'Nobody will believe that you can actually get back to work after maternity leave. If you get back, everybody is just waiting for you to announce next pregnancy and then stay at home for a few years or so. We have a one year old daughter and I'm so happy every afternoon when I get back to home from work. I also feel very happy working, and wouldn't want to stay home all day. We are expecting the next baby to be born in the winter and I've been very tired with the first child, work, pregnancy and all kinds of nanny and childcare problems. But hopefully I'll manage to the next maternity leave and then back to work.'

'I find it difficult to handle the balance between home and work life. If I have to make a choice, my work suffers. I have a constant guilty conscience, because my working hours are too short and I tend to sneak out from the lab too early. On the other hand I have managed to take care of all my responsibilities, so I guess, no bigger harm done. Despite this going home too early, I'm quite happy: I can forget about all the working problems instantly when I get home. I get to spend valuable hours with my daughter every evening. I don't have any hobbies, so all my spare time I spend with family or taking care of the everyday household tasks.'

'When the children were young, I handled my job perfectly, but the attitude of some of my managers was not always appropriate, with remarks such as "do you plan to stay at home?", or "there is a rumour that you are pregnant, is it true?". I think that it is slightly changing in the company.'

Project Manager in oil company, France

4. Successful interventions
Katrin Gaebges
do-Ing[2] participant and Mechanical Engineering student
Germany

'During the 2nd semester of my degree, I was asked to participate in a student recruitment initiative. Most of the girls I met during the project thought that mechanical engineering meant lying underneath a car with their hands covered in oil. I felt that there was such a lack of information that I thought it would be really necessary to supply this information. This is why I decided to participate in the do-Ing project.'

'do-Ing consisted of many modules, including visits of university students to schools to explain the topics of an engineering course and what a job as an engineer could look like. We offered special 'campus days' to the school girls, during which they could experience a 'real lecture' and visit a chair of the faculty of engineering. Also during these events we organized contact between the school girls and female students. We did a project called 'What's the connection between a wind kite and mechanical engineering?' during which school girls could build their own kite and learned the principles by which a kite flies. We also organised panel discussions and factory tours where students and school girls got to meet female engineers who could become role models and, more importantly, could talk about their experiences.'

'I also learned a lot for myself during this experience. I learned that there really are women who experience discrimination because of their gender during their internships or at university, which I have never experienced. I became more aware of the special situation that women engineers take in society and I listened carefully to the life stories of the female engineers I got to meet.'

'I had a great experience during the Women's Day. They encouraged us. Just…. go! It really confirmed me in the choice of my studies. I also look forward the moment when I work in the aeronautical field. I am very impatient!!'

4th year engineering student and participant in EADS Women's Day, France

'I didn't know so many girls did Physics and Maths – seeing so many people doing the same thing as you is encouraging to get you into engineering. Before I came here I did not really know what I wanted to do for a career, but the competition made me feel that becoming an engineer would allow me to make a real difference to the world and that is really exciting.'

School student and participant in the Green Design Challenge, UK

'I chose this joint degree because I was not totally sure what I wanted to do for a career, and I knew that this degree would give me a lot of options. Because the engineering degree is joint with education, there are a lot of women in the course. Many girls do not see engineering as an option, but if they see young teachers who are both engineers and 'real' people, they might develop a different image when they see the word engineering. Hopefully, we will be able to make these subjects – often considered boring and difficult – fun and accessible!'

Second year female student on the Engineering and Science degree course at KTH, Sweden

[2] More information about the do-Ing project is available at http://www.do-ing.rwth-aachen.de/

5. At risk from involvement with women and science initiatives
Researcher in materials science
Spain

'Soon after I graduated, my first boss asked me to speak at a school to some girls about engineering. I was really pleased, because it showed that he trusted my abilities and I also felt that it was my duty to speak to other girls. I had very good experiences at school and at university, and had a lot of support from my mother and father. I thought that it was very important to make sure other girls also had this support. After this, I talked a lot in schools and to visiting groups about engineering, and also helped to do a survey of how the department helped women. I found all these things very interesting, and after my son was born, this was an easy way to keep in touch with the department, and for a short period I dropped much of my research and concentrated on the work on women.'

'I now see that my career has not moved in the same way as my male colleagues. I realised that I had put two distractions into my career, my son and my work on women - and this was at least one distraction too many. These were things that my male colleagues did not have to think about in their career. Perhaps this was not the reason why I have not become more senior, but I wonder now about where my career would be without these distractions. I do not blame my boss, but wish that someone had told me sooner about how this work would affect my career. I now try to do very little work in women and science, and am just concentrating on improving my research. I am still often asked to do things like give talks to girls or become a mentor, and I find it very difficult to explain why I do not want to do this.'

'I often wonder how many research papers I could have written if I added up all of the time I have already spent on women and science initiatives.'

Post-Doc Medical Engineer, UK

'Involvement with these projects discredits your scientific reputation, and will always make your fellow male academics suspicious of the reason for your successes.'

Lecturer of Electrical Engineering, Germany

6. Strategies for career development
Rosa
Mechanical engineer
Italy

'In the past, the oil industry could send a man abroad, and it was always simple for them to take their wife with them, and the wife would look after the house and the children. The situation is a little different for a woman, and if I had a family, it would certainly be different. However, if you don't have experience of field work, based abroad, you will not be able to follow the kind of career that I want, in a technical field. There is a more experienced woman in the company who told me her experience - if you work abroad for 3-4 years, and then afterwards take a senior position and are responsible for a project, then you will not need to work abroad for long periods again. If I want to build my career, I will have to work abroad in the period before I have children, now that I am free, in the next few years. During this time I will need to give everything in my life to the company if I want to reach this position.'

'In the last two years, my company has employed hundreds of new graduates, and has estimated that 30% of this group will rise to responsible positions in the company. I want to be part of that 30%!! If this does not happen, I think I would leave the company to do something completely different. I have a dream about changing the oil business from within…'

'During my time working abroad, I will earn a lot of money, and my dream would be to use this to study for an MBA in Business Administration, and take this experience back to the oil industry and try to make a real difference! Although my company respects civil rights more than most, the oil industry generally is a 'dirty' business. Every problem in the world seems to be related to this industry. Some years ago, I had a different vision for my life, and I wanted to become Mother Theresa somewhere - now I am working in the oil business!! I feel that an engineer is someone who should be finding water in Africa and improving the conditions for people lives. Every day in my job I see huge amounts of money, and I don't understand why this is so much. I believe that women care more about this kind of problem than men. If we had a woman company president, perhaps the strategy of the company would be different and we could spend more money in these areas. I believe this would ultimately help the business as well as helping the world.'

'I have suffered from isolation only once in my career so far, when I became a manager in the field. Some of my male colleagues wanted this job and as they were disappointed they managed to make my day-to-day life very difficult. I solved these problems by: (i) doing my job well, (ii) requesting an audit, (iii) maintaining my network, (iv) showing outside my small environment, the positive work that my team was doing, and (v) finally changing job!'

Project Manager in oil industry, France

7. At risk from isolation and exclusion
Helga
Retired Professor of Physics and Material Science
Germany

'When I was studying for my PhD, my professor seemed to have much more confidence in my male colleagues, talking to them rather than me about my research. I was the first student to ever get a distinction in my diploma, so he knew that I was bright and capable, but, as a woman, I don't think he took me seriously.'

'While working in industry, I had a boss who had no experience working with women. He always tried to push me into the laboratory, and away from leading the research projects. While he was away on vacation once, I successfully applied for significant funding for my own research project. I showed that I could start and lead a project without anyone's help. However, when I had been granted a major part of another project, I was not invited to be involved or even contribute to project discussions. I felt that my boss was trying to push me away from the interesting topics and hold me back from promotion.'

'Unfortunately, I was frustrated at an early stage of my studies and de-motivated along my career. There have been positive experiences, however, such as a post-doc stay at Stanford University: I was respected and integrated into the scientific community, I worked successfully and I myself (not my professor) presented my work at big international conferences. Again during a sabbatical leave at MIT, I was impressed by the open discussion among the colleagues. When I returned from MIT, however, my colleagues at my home institution excluded me from a research-body, using the reason I had missed some meetings. Although everybody knew that I had missed out the meetings due to my sabbatical leave (for which I had full permission), no member of the body helped me and I was expelled. The isolation and exclusion finally lead to pre retirement in 2003 at the age of 50.'

'During my studies and career I wrote diary, sometimes a few pages a day, sometimes only a few lines. If I happen to come across these notes (as I did recently) I am shocked about what happened to me because I had already forgotten. I think this was a method to stand it all through: I wrote it down and put it aside; I tried to forget it to be able to go on. A few years ago I read that Lise Meitner [an Austrian-Swedish physicist who first identified nuclear fission] seemed to have a similar strategy of survival. I was a 'persona non grata' and felt like a leper with whom nobody wanted to have contact. Throughout my diary there are almost daily entries using words such as …upset …nervous …high blood pressure … headache… few hours of sleep … nightmares… worn out …do not know how to survive the day.'

Selected diary entries during PhD

5.2.79

I am fed up today. My supervisor is so distrustful, always thinking that I am making mistakes. I feel like a slave on a galley with somebody standing over me holding a whip. Also, behind my back, a lot of false information is spread by my male colleagues about which, I only hear accidentally. It is so humiliating for me that behind my back they are saying that I am stupid, that I do not care about anything, and that I am superfluous to the group.

8.2.79

Today was another horrible day. The male technicians are always questioning my capabilities. My supervisor pushes me and constantly checks my work. He is never satisfied, always distrustful and in a bad mood. Before he leaves in the evening, he comes to my desk and questions the way in which I am working and when he arrives in the morning, he immediately checks to make sure I have started working. Although I work without interruption, I constantly have to apologise for not having instantly done what he asked. I work 24 hours, around the clock. No-one else in the group is put under as much pressure as myself and the one other woman in the group. (Probably he would not dare to treat the others in the same way as they would have defended themselves.)

14.2.79

This week was just horrible. Each morning I wake up long before the alarm goes off and go to the institute with a stomach ache. Even though, I present a lot of good results to my supervisor, his reaction is always: "Is this all?" He accuses me of being neglectful and careless in my work.

10.10.79

My supervisor wants me – unlike my other colleagues – to stay in the evening after the practical training to work at my equipment. He constantly pushes me and is in a bad mood. Today he shouted at me that the days pass by and I still have not done anything. I was so upset that I left to go home.

Selected diary entries during professorship:

08.03.93

First working day. I realise with astonishment that my desk stands in the chemical laboratory. I have to share the desk with a lecturer and the room with a chemical assistant. At the same time, all my male colleagues have their own desk in their own office. A professor for physics, who arrived half a year before me and another professor for physics who arrived half a year after me, have immediately received their own desk and office.

30.03.93

I feel isolated as I am far from my colleagues and cannot communicate with them. I feel so uncomfortable in this room that I try to spend very little time in it. I took to stay in my car before my lectures and listen to music or read and to go from there directly to the lecture room. During the lunch break, I flee outside, sit on a park bench to eat my sandwich or go to the nearby church when it is raining in order to find some rest and relaxation. I feel like a homeless person or a down-and-out.

15.04.93

Today – after imploring pleading – I finally got a desk in an office. However, I realised that the students are used to using this desk for meetings and I have to fight again.

'My own ambition is usually higher than my line manager thinks. They see that you have already done well as a woman, and think you are therefore at the conclusion of your career, rather than at the beginning. When I returned to my home country, after working abroad, people from Human Resources said to me 'for a woman in research, you are already a line manager – this is more than you could ever have expected', with the implication that I should be happy for the next thirty years until I retire, with no prospect of promotion!'

Technology Manager, Holland

8.   Success in senior posts

Professor Helen Atkinson

Professor of Engineering and Head of Mechanics of Materials,

UK

'Shortly after taking up my first lectureship I became pregnant. After our first child was born, I needed to work part-time. I thought the best way to make the job manageable was to strip out the research and to concentrate on teaching. However, my Head of Department advised that, from a career development point of view, I needed to build my international research profile. He therefore took administration out of my job profile, halved my teaching load and my research was maintained at virtually that of a full-timer.'

'Several years later I was encouraged to apply for a Senior Lectureship. At that time, the standard University promotion procedures called for assessment under four categories: research, professional standing, teaching and administration. Under my part-time working arrangement, I would not have been eligible for promotion, as I had no significant administrative responsibility. The University reviewed the promotion criteria to deal with the situation of part-timers whilst still maintaining the quality threshold. I was successful in my application and later became a Reader.'

'When my husband took a job in a new area, I needed to 'sell' myself to a different University. The foresight of my original head of department, and the support of his successors, meant that the CV I submitted was virtually indistinguishable from a 'normal' full-time CV for a Chair, in terms of all the key experiences. I was appointed to a professorship, again working part-time. (The part-time fractions have crept up over the years).'

'The key to success for me, was understanding the drivers for the Department and for promotion. You can have a hugely rewarding part-time career provided that you give your Department what it needs (e.g. income, publications, international standing, strong teaching) within the ground rules established for the part-time arrangement. For each promotion, I took advice on everything from improving my CV to the applications procedure, from as many sources as possible. I also built a team of post-docs and PhD students that supported my research themes and worked collaboratively with a range of colleagues. This strategy has enabled me to have a successful career, as well as having the chance to spend time with my children, especially when they were little. I must pay tribute to the Department I worked in, who were immensely supportive.'

'I handled motherhood through very good personal organisation: subcontracting household and childcare responsibilities, sharing work with my husband, leaving work at 6pm (and re-working if needed after 9:30pm) and giving the rules of the same to my manager. I believe that motherhood helped me to understand better how to manage a team.'

Engineering Project Manager, France

Getting Results With Diversity

Martha Maznevski and Karsten Jonsen,
IMD, Lausanne

"Half of potential human knowledge is in female heads"
Lester Thurow, Economist

Jack and Jill are considering which route to take to climb up the hill. Together they possess the knowledge it takes to find the best way up, but if they only focus on what they know in common, instead of what each of them know, they may never reach the top before darkness sets in.[1] It seems quite obvious to pool their knowledge and forces together, but diversity is not always that simple, especially in organizations where conformity and homogeneity has been nourished and celebrated for generations. Think about "the way things are done around here". Does that allow for different views?

Differences exist. They are inherent to human nature. The differences will remain even if we try and mask them - which we often do. However, there is extensive evidence that similarity leads to attraction. Cognitively, people feel more attracted to similar than dissimilar others, e.g. when it comes to physical characteristics, personality, attitudes and values. They gravitate toward partners who provide verification and drift away from those who do not. People naturally emphasize the qualities they share with a group and de-emphasize their uniqueness. The great challenge in human life, as well as organizational, is to verify people's unique attributes and perspectives so that they can offer their ideas and creativity for the benefit of the whole.[2] This leads the way for the *potential variation* becoming *realized variation*.

In brief, diversity sometimes contradicts our natural tendencies to seek homogeneity. This highlights the need to take explicit action which will be beneficial in the long run.

Increase diversity without chaos.[3]

We compare managing diversity to creating laser light and white light. You align people with a laser, then let diversity shine with the white light. Laser light is a beam of light in which all the photons are moving in the same direction, at the same speed and wavelength. It accomplishes a specific purpose. A company's laser is the answer to the question: what do we *not* want different perspectives on? There should be a very clear definition of what performance means in the company, separating it from what people often *assume* it means. The laser could include the company values and direction. In the continuing "war on talent" the laser light and clear definitions of what there must be alignment on, often allows organizations to look beyond the typical "pool of similarity" and tap into a broader variety of potential workforce – also if it means loosening up on or revising traditional job descriptions.

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[1]   Adapted from Garold Statter and William Titus (2003). Hidden profiles: A brief history. *Psychological Inquiry*, vol. 14, no. 3&4, 304-313.

[2]   William B. Swann, Jr., Jeffrey T. Polzer, Daniel Conor Seyle and Sei Jin Ko (2004). Finding value in diversity: Verification of personal and social self-views in diverse groups. *Academy of Management Review*, vol. 29, no. 1, 9-27.

[3]   Martha Maznevski and Karsten Jonsen (2006). The value of different perspectives. The Financial Times, March 24th.

White light is about creating a broad spectrum of ideas and perspectives on other issues. It answers the question: what should we have diversity on? Which different views and values can and should thrive in the organization without destroying the laser? The toughest part to answering this question is separating real performance criteria from assumed ones. Many multinational firms, for example, have a policy that "everyone who is to be considered for a senior management position must have both line and international experience". This is a good example of a laser: it identifies an important set of experiential criteria that are related to judgement needed to run the company. However, in most companies there is an unwritten rule that potential senior managers must have both line and international experience before they turn forty – after that time, they are considered "too old" to gain the required experience.

Many women in dual-career families and men from cultures outside of North America and Western Europe prioritize family during their late 20's and 30's, rather than a globally-mobile career. Does this make them unprepared to take on international experience afterwards? Not necessarily – by building a stable family and learning to juggle a family and a career they are often more prepared to manage the stress of an expatriate life and adapt to changes than those who do so earlier in their careers. In fact, research shows that women's multiple role commitment provides not only psychological benefits but also enhance effectiveness in their management roles.[4]

Managing diversity: the real challenge?

There is no unambiguous evidence for the premises that gender diversity will improve team performance. There is no simple business case.

Studies have shown that gender diversity can have a positive impact on individual performance as well as the team level (see for example Turner, this volume), but it is contingent on a number of aspects that can be influenced by managers. Some mixed groups outperform homogeneous groups, and some show the worst-case scenario. How can we understand this difference in achievements?

The following image illustrates the issue.

In teams and leadership situations, diversity provides potential.

DiStefano & Maznevski, "Creating Value with Diverse Teams in Management," Organizational Dynamics 2000

WIST   Maznevski - 3   Approaches   IMD

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[4]   Marian N. Ruderman, Patricia J. Ohlott, Kate Panzer and Sara N. King (2002). Benefits of multiple roles for managerial women. Academy of Management Journal, vol. 45, no. 2, 369-386,

The performance of teams that consist of different people varies substantially. The worst-case scenarios and the best-case scenarios are both related to mixed groups when compared to homogeneous groups. The most decisive element in the varied performance of these groups is the way these teams are managed. Well managed teams outperform all other groups, homogeneous as well as diverse teams. The important point to notice here is that diversity well managed outperforms other teams. In other words; *diversity does provide an advantage when it is managed well.*

How do we manage diversity?

"For many companies, the opportunity cost of both discrimination and blindness has become prohibitive as has the cost of under-utilizing people by relating them to working with primarily 'with their own kind'"
*Nancy J. Adler, Professor*

The diversity debate is moving from 'a legal and moral obligation' to an inevitable *reality* inside as well as outside of today's life in organizations. The pressure is therefore on how *diversity is valued and utilized rather than just contained*. The role of a manager is to set up conditions under which people are most likely to perform well over time. This is done through the Environment/Climate, Interactions and Systems/Processes. In addition, the *approach* taken by a group to working with differences determines positive and negative outcomes.

1. *Creating the right climate*. The first approach is to create an environment that encourages debate and open dialogue. An *inclusive* culture that encourages different views on certain things (the white light) and where there is a high degree of trust, respect, empowerment and acceptance and verification of differences. In this work environment there is a high tolerance for debate and conflict, as long as these are primarily rooted in task-related matters. At the same time, there is a low tolerance for discrimination and a hard stand on harassment.

An internal Shell investigation partly revealed the reason behind the success or failure of mixed teams.[5] The diversity of the 56 teams investigated was measured by non-work-related factors (gender, age) and work-related factors (number of years in the company, function). It showed that diversity tends to have a negative effect on performance if there is a low level of inclusiveness – the extent to which the members of a group feel connected to each other in one team – and a positive effect if there is a high level of inclusiveness. In other words, inclusiveness is the determining factor for the effect of diversity on process indicators – such as learning, participation, and communication – and performance indicators.

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[5] Jet Bredero, Leontien de Bruin, Lida van Doveren, Lotte ten Hove and Gerben van der Vegt (2003). Team Diversity research. Groningen/Assen: University of Groningen/Shell.

If there is a low level of inclusiveness, diversity tends to have a negative effect on the effectiveness and innovativeness of the teams. The graph below, copied from the Shell report, gives a clear expression of the inclusion effect. The light line refers to a situation of low inclusiveness: an increase of diversity leading to a decline of process and performance indicators. The dark line, referring to a situation of a high level of inclusiveness, is completely different: increasing diversity improves process and performance.
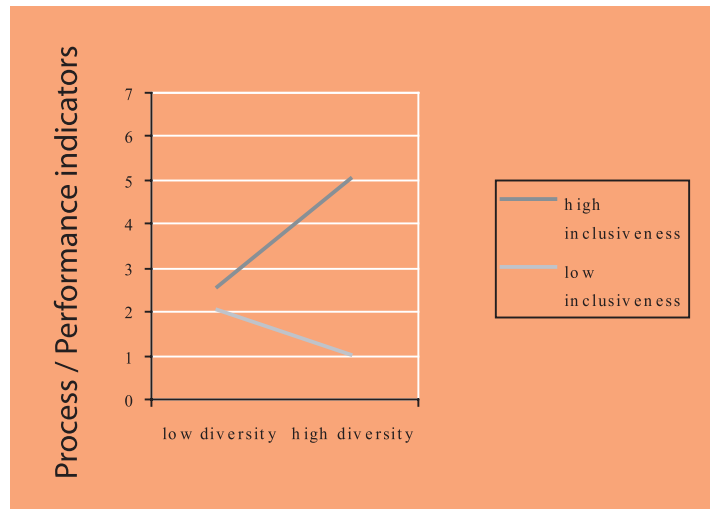
Source: RUG/Shell, 2003

The inclusive approach also examines the networks of informal influence and helps women develop the 'right kind' of relationships to get into the important networks, but it also question the existents of some networks that are biased and perhaps outdated. It provides formal networks where no informal ones exist, as it takes time to build new ones up. One example that can help this happen is the mentor-role, which can easily be used to 'introduce' women to the important and informal networks inside and outside of the organization. Also support-groups of various kinds can be helpful.

2. *People management systems*. The second approach is to make sure that the management systems are supporting the laser performance. The vision of gender-diversity only becomes real when the processes and systems in the organization support the official statements of equal opportunities etc. One example is the reward systems. Performance appraisal and reward systems must reinforce the importance of effective diversity management. For example, if you don't have any measures or metrics that can reward managers for hiring women, or at least making sure that they consider hiring women, it is less likely to happen. Organizations often give priority to recruitment in their diversity efforts. But hiring isn't enough. Retention is equally important. Organizations that have sought to work effectively with diversity have learned that not only is it important to keep the talented women they have, but retention rates are good indicators for the gender-inclusive climate within the organization that ultimately make people stay. Women leaders are often leaving their positions because the environment is not inclusive and the systems and processes not supportive of their career and advancement. Skanska, for example, has recently instituted individual performance measures for managers, bases on proportion of women retained.

Other important systems for creating 'full structural integration'[6] include:

Education efforts. Ensuring that skills and education levels are evenly distributed throughout the organization, so there is no correlation between one's identity group and one's job status.

Career development. Ensuring that special career development efforts for women and minorities. This can also help create a healthy talent-funnel for objective and 'fair' promotion processes.

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[6] Taylor Cox (1991). The multicultural organization. Academy of Management Executive, vol. 5, no. 2, 34-47.

Flexible work schedules and benefits. Ensuring that there is structural flexibility in the workplace, policies and benefits that enable women, single parents, dual career couples and minorities carrying out their 'multiple commitment roles'.

3. *Communications and Interactions*. The third approach is to bridge across differences for effective communication and leadership. Bridging is the ability to communicate effectively across differences, taking differences into account – transmitting meaning as it was intended. Bridging increases effective communication by paying particular attention to interacting across differences. It requires practicing three sets of communication skills: Positive attitudes, decentering and recentering. The positive attitude is a motivation to understand others from their own point of view and confidence that this will help performance. Decentering is speaking and listening from the others' point of view (seeing white light). Recentering is creating common ground (laser light) and building on it.

Bridging is part of the MBI approach; Map, Bridge and Integrate differences. The mapping is the ability to understand the relevant differences in a management situation; Integrating is the ability to bring the differences together, combining and building on them in a synergy. This means that differences have to be acknowledged, respected, and communicated in order to make them productive.

When all this is put together and practiced as often preached, organizations can reach the highest level of diversity perspective, the 'integration-and-learning perspective'[7] that can provide the rationale and guidance needed to achieve sustained benefits from diversity.

Change to Facilitate Gender Diversity

The approaches and conditions mentioned in the previous section are all long term objectives that can be reached through top management commitment (see section on leadership), training and everyday actions.

Training is a crucial step to engage in gender and other diversity. This can bring people awareness and skills concerning differences and their own biases, diversity advantages and to how to communicate better across gender and other differences. Training can help minimize the detrimental effects of diversity and it can maximize the performance opportunity, but it cannot solve structural issues overnight and it cannot completely eradicate sexism, stereotyping and prejudice (the antecedents of discrimination). It can be part of an on-going process that also includes every day actions such as dialogue.

A typical example of a training intervention is the MBI approach, which can be a one-day workshop. Another highly effective training intervention is to have a one-day workshop with the company's top women, followed immediately by a half-day workshop with the company's top management team (often only men). During the first day, women engage in active training around leadership, networking, and mentoring; they develop a strong network among themselves; and they set an agenda for the top management team issues. During the second day, the top management team can then work through those issues with the same facilitator in a non-threatening environment.

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[7] Robin J Ely and David A Thomas (2001). Cultural diversity at work: The effects of diversity perspectives on work group processes and outcomes. Administrative Science Quarterly, vol. 46, no. 2, 229-273.

Leadership

"Unfortunately, there are currently few minorities and almost no women who chose to be engineering graduates students 30 years ago. Bluntly stated, a women's view on how to run our semi-conductor company does not help us, unless that woman has an advance technical degree and experience as a CEO".[8]
- letter from a CEO

We have heard this statement from many CEOs and top managers. The top management's support and *genuine commitment* to diversity is crucial, but is very easy to find good arguments for not taking action. Top management provide for the human, financial and technical resources and they also need to set out a vision and exemplify it (walk the talk). When a CEO, for example, articulates values but does not follow through in actions, people will develop scepticism, cynicism, mistrust and low commitment to action. This is particularly important when it comes to the many middle- and line managers who feel threatened by diversity initiatives and therefore resist. One of the actions that can be taken is to appoint diversity dedicated 'agents', e.g. men as diversity managers. People who are advocates for women leaders and whose actions and attitudes can influence those of their *peers*. Research shows, for example, that people are more likely to change their stereotypic beliefs when these are *not* shared by people they identify with.[9] In other words, 'one of the boys' may have good chances of influencing gender diversity positively, as they are perceived as not having self-vested interests in the cause.

Overcoming extreme resistance in a single CEO or in a few top managers is often close to impossible. In this case, the best advice is to warn the company that it will lose its best women (it may also lose contracts!), and another company will see the performance gains. Leaders who do step forward and genuinely support diversity with their actions will achieve higher performance from this, and model it for others. This is the single most powerful way to change a company culture.

Leaders must provide the courage it takes to overcome one of the most fundamental obstacles to gender diversity; namely the matter of relative numbers, or what *proportion* of managers at a given level are women.[10] The relative numbers of socially and culturally different people in a group are seen as critical in shaping interaction dynamics. With certain exceptions granted, "less than 20% in any particular situation is not always a large enough number to overcome the problems of *tokenism* and develop supportive alliances".[11] Looking at the European landscape of especially top-management level in large corporations, there is still some courageous work to do by the leaders who have the power and long-term interest in doing so.

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[8] T. J. Rogers (1996). A letter to Doris Gormley, OSF.Dir., Corporate Social Responsibility, The Sisters of St. Francis of Philadelphia Our Lady of Angels Convent, May 23. Defence of non-diversity in *Perspectives in business ethics*, Hartman, Laura Pincus, page 469.

[9] Charles Stangor, Gretchen B. Sechrist and John T. Jost (2001). Changing radical beliefs by providing consensus information. *Personality and Social Psychology Bulletin*, vol. 27, no. 4, 486-496.

[10] Rosabeth Moss Kanter (1977). Some effects of proportions on group life: Skewed sex ratios and responses to token women. *American Journal of Sociology*, vol. 82, no. 5, 965-990.

[11] Accordingly, research has shown that an increase of gender diversity from an average of 21% to 50% would raise the probability of producing priority deliverables before schedule of about 40% (Turner, this volume).

"I believe that placing arbitrary racial or gender quotas on corporate boards are fundamentally wrong". "Choosing a board of directors based on race and gender is a lousy way to run a company".[12]
- letter from a CEO

This is the view about diversity that we hear most frequently. Perhaps it is not even wrong when seen from the perspective of a single individual or organization. Nevertheless, more than 10 years after these typical statements; almost 40% of top 200 European companies have no women on their boards.[13] The question arises, how do we change attitudes? Is 'the Norwegian example' of imposing a 40% female *quota* for boards (of publicly listed companies) the right one to follow? Will it bring a superficial change only, or will it bring a more lasting change in attitudes and beliefs - and subsequently results and performance?

This is to a great extent a question of how it is implemented, the communication around it and the resources put in place to make it happen successfully. Attitude changes can be rooted in different sources. Such changes ultimately rely on deep rooted cognitive and affective processes. The most efficient contain role modelling, training and dialogue, which can help reach a high level of intrinsic motivation. *Intrinsic* motivation is *sustainable* under most circumstances. In contrast, when systems are based on reward punishment and control, it can result in extrinsic motivation (and a reduction of the intrinsic motivation). Extrinsic motivation is more superficial and works primarily under salience of external control.[14] Nevertheless, since changes in gender diversity seem to be happening in a very slow pace, behavioural processes (e.g. affirmative action) can indeed be used as accelerators and subsequently sway attitudes and opinions in a positive direction. This needs to be supported by the right leadership.

Making the Organization Better for Women Makes it Better for Everyone

Companies with more gender diversity at the top perform better.[15] But this performance gain comes only partly from the contributions of women. The most important impact of having an organization that empowers women is that it also empowers and enables the best performance from every employee, whoever they are.[16] Organizations and systems that suppress diversity also suppress good ideas, contributions, and innovations. By focusing the laser light and allowing white light to shine through the environment, the people management systems, and the communications and interactions, diverse contributions from everyone come together around the company's goals. This synergy effect may seem elusive, but it is possible. And the investment is more than worth it.

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[12] T. J. Rogers (1996). A letter to Doris Gormley, OSF.Dir., Corporate Social Responsibility, The Sisters of St. Francis of Philadelphia Our Lady of Angels Convent, May 23. Defence of non-diversity in *Perspectives in business ethics*, Hartman, Laura Pincus, page 469.

[13] CEO (2006), vol. 1, page 8, SPG Media Publication

[14] Richard M. Ryan and Edward L. Deci (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, vol. 55, no. 1, 68-78.

[15] Catalyst (2004), *The Bottom Line: Connecting Corporate Performance and Gender Diversity*. New York: Catalyst. www.catalystwomen.org.

[16] See also Turner, this volume, table 2 (model 2).

Gender Diversity and Performance

Laure Turner[1], ENSEA, Paris

1 Introduction

This paper aims at empirically assessing the impact of gender diversity on performance in order to propose an objective approach in building the business case of gender diversity. Companies increasingly devote large amounts of their resources to implementing and sustaining diversity, yet the impact of diversity on performance has not been clearly established, mainly due to the lack of appropriate data and measurement protocols[2]. Our purpose in this study is to 1) show results obtained by analysing the data provided by companies participating in the WIST group; and 2) illustrate how a simple protocol can be used for measuring progress in implementing diversity within companies and for evaluating the impact of diversity on performance over time. This study's originality lies in isolating the specific effect of gender diversity on performance from the effects of other forms of diversity, particularly in terms of age, nationality, status and seniority. It is a first step towards showing a causal link between gender diversity and performance.

2 Methodology and Data

This paper focuses on one aspect of company performance, R&D performance. Three main reasons justify this choice. First, R&D provides clear indicators of performance: success of the R&D projects, patents, publications, bonuses related to invention,…Secondly, the link between the inputs (researchers, resources) and performance (innovation, research and development) is strong. And third, companies in the panel have quite homogenous assessments of individual and collective R&D performances which allows to merge their data in order to build a satisfactory sample size.

The aim of the paper is to measure the specific effect of gender diversity on both individual and collective R&D performances, separately from the effects produced by other forms of diversity such as age, nationality, status and seniority. To do so, we need to work in a *controlled setting* so that the pure impact of gender diversity on performance can be measured. Econometric models of the kind used in this study allow this, and their results will be presented[3].

Our research strategy was the following. Using econometric modelling, we measured how the make-up of R&D teams, and specifically gender diversity within teams, impacts R&D performance. *Gender diversity* is understood as a proportion of women per team. *Performance* is measured both at the individual level and at the team level. *At the individual level*, the measures of individual performance used by the companies in the sample are bonuses for successful research achievements or evaluation of achievements as regards to

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[2]   See among others Catalyst (2004) for bibliographical indications.

[3]   Further methodological explanations can be found in a previous research work on scientific productivity in the public sector : "La recherche publique dans la production de connaissances, contributions en économie de la science", Laure Turner, PhD dissertation, Université Paris 1, 2003 (http://www.crest.fr/pageperso/laure.turner/laure.turner.htm). See also note 5.

annual objectives. *At the team level*, performance is measured by the success of the R&D projects led by the teams. Companies in the sample rate annually either the projects or the teams with respect to their objectives and their achievements. For one company in the sample, no rating was available so we built an indicator of performance combining several data: the real costs of the projects terminated in 2004 as compared to the anticipated costs, and whether priority deliverables on finished projects had been delivered before or behind schedule.

The data were kindly provided by four major companies of the WIST group: Air Liquide, EDF, Shell and Schlumberger[4]. Since the results specific to each firm must be kept confidential, no mention of the name of the companies will appear in what follows. For the same reason only a general description of the data will be given.

The data collected for our sample concerns the year 2004. The members of the R&D research personnel from the four pilot companies are sorted according to their participation in research projects, that is, by project/research team. We also know the individuals gender, age, seniority in the company, nationality, and position or grade which we grouped in three levels (3 being the highest grade). Whereas men are present equally in all three job groups, women are relatively less numerous in senior positions (job group 3): 40% of the women are in job group 1, 37% in job group 2 and only 23% in job group 3. The performance measure, both at the individual level and at the team level, is also a three level measure, 3 describing the highest achievement. *Table 1* describes the construction of the performance measures.

1506 individuals comprise our sample, 26% being women. During the year 2004, these members of the four companies' R&D research personnel worked on 272 projects, and some on several projects, so that the total number of observations in the sample is 3812. On average, women work in teams where the proportion of women is 35%, whereas men work in teams where the proportion of women is 23%. Interestingly, for one company, the data contained the gender of the projects' coordinators. While both men and women are just as likely to be project managers, the teams they coordinate are very different in terms of diversity: female project managers run teams where 70% of their members are women whereas men run teams where only 21% are women. Notice that there is little cultural diversity in the database, since 99% of the individuals are citizens of the country in which they work. A drawback of the database is that one firm is over-represented in the data as compared to the others. However this bias could easily be corrected using the protocol described below if additional data become available.

The next section presents the estimation on the data of the impact of gender diversity within team on individual and collective performance.

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[4] The companies studied here are at different stages in the implementation of diversity as Michael Domsch chapter in this report shows.

3 Results

3.1 Gender Diversity and Individual Performance

Simple statistics on the relation between gender diversity and individual performance are presented in *Graph 1*. This graph compares, in an *uncontrolled setting*, the proportion of individuals whose performances are rated 1 to 3 (1 being lowest and 3 being highest), with the proportion of women in each project. The relation of gender diversity to individual performance is slightly positive. We see that when the proportion of women working per project is in the 33-66% range, the proportion of individual performances rated 3 is higher than when the proportion of women is in the 0-33% range.

In a controlled setting that is clear from effects of age, seniority, gender, position, nationality, team age and job group diversity on performance, we find that **gender diversity has a positive impact on individual performance** assessed by our three level measure[5]. The detailed results of the model are in *table 2*. The model estimates that an increase of 10% in the gender diversity within teams would increase by 2.6% the probability of achieving the highest individual performance rating (rank 3). Notice that the main individual determinant of individual performance is the job group: workers belonging to job group 3 are more likely to achieve the highest individual performance rating. Age (or seniority) has only a small impact on performance, three times smaller than the gender diversity effect[6].

We studied the firms separately in order to look at the impact of gender diversity on research bonuses. **Gender diversity has a positive impact on individual performance when assessed in terms of the ratio "research bonus to salary"** in a setting controlled for age, gender, position, nationality, team age and job group diversity effects. The model shows in this setting that an increase by 10% in the gender diversity at the team level leads to an increase of 0.7% in individual performance. Saying it differently, if the average proportion of women per team was 37% instead of 27%, team members would increase their research bonus by 0.7% because their performances would have improved over the year. And if the proportion of women in a team was raised to 50%, an increase of 1.7% in an individuals' performance would be observed. The detailed results of the model are in *table 3*.

Note that on average, the time spent by men and women on projects is equivalent. Taking into account the **time contribution** of each individual to projects did not modify the results.

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[5] Econometric modelling can be understood as follows. The model assumes that performance is determined by some individual characteristics (age, gender, nationality, position) and by some team characteristics (gender diversity, job group diversity, average age). The model measures the contribution to performance of each of these factors. A factor estimate indicates to what extent differences in performance across individuals (or teams in section 3.2) is due to differences in this factor, the other factors being held unvarying. For instance, for the gender diversity estimate, it comes down to looking at the impact of gender diversity on performance when individuals share the same characteristics and are part of teams of similar age and job group diversity: differences in individual (or collective) performance is then due to differences in gender diversity across teams since it is the only varying factor in this exercise.

[6] The coefficient on *gender* is negative, a result that must be handled with care: if individual evaluations are biased downward for women, the gender variable is capturing this bias ; moreover, further investigation and information is needed to understand the factors explaining the result on gender. In particular, we are not controlling for any variables such as the marital status, the number of children, etc.

3.2 Gender Diversity and Collective Performance

For three out of the four companies in our sample, the performance measure at the team level is a three level measure with 3 describing the highest achievement. *Graph 2* shows the number of projects that are rated 1 to 3 according to the proportion of women in those projects. We see, in that *uncontrolled setting*, that the relation of gender diversity to collective performance is ambiguous, since both the number of projects with the highest rating and the number of projects with the lowest rating increase with the proportion of women working per project. A controlled setting is needed to investigate the impact of gender diversity on collective performance. The econometric model that looks at the impact of gender diversity on the performance of the team or of the project, in a setting that controls for the mean characteristics of the team in terms of age, seniority and nationality, leads to no statistically significant results. This is due to the small number of teams/projects for which the three-level performance measure is available (69 teams/projects).

We were able to build an econometric model for the fourth company in our sample. As mentioned above, because the data on this company prevented us from using the three level performance measure, we built two indicators to replace it: (I1) the realized costs of the project as compared to the anticipated costs, and (I2) whether the date of delivery of priority deliverables was before or behind schedule.

Several model specifications were tested to identify the contribution of gender diversity to collective performance as measured using indicators I1 and I2 in a *controlled setting*. We controlled for the effects of age and position diversity in teams as well as for variation in the size of projects (in terms of priority, cost and duration). It appears that increasing **gender diversity has a positive impact on collective performance** assessed by I1 and I2 [7]. More gender diversity increases the probability that priority deliverables are achieved before schedule *(table 4, model 1)*. To get an idea of the order of magnitude of the impact predicted by the model: an increase of gender diversity in teams from an average of 27% to 50% would raise the probability that priority deliverables would be produced before schedule by about 8.5%. Similarly it would raise the probability that real costs will be smaller than anticipated costs by 15%. That said, these results should be handled qualitatively, and not for the figures per se, since the explanatory power of the model is statistically quite low here given the data.

Interestingly, there exists **a clear domain effect** in the data. **Women are over-represented on projects that are not directly linked to ground R&D**. In projects aimed at supporting R&D the proportion of women is close to 50%, and in projects aimed at product commercialization or client support, it is about 40%. When we consider the data without those domains, that is only projects clearly related to R&D, the average proportion of women per project is 22%. It is only 21% for high priority projects labelled as being "challenges" for the company. On this restrained sample of "challenging projects", the results show a very positive impact of gender diversity. More gender diversity increases the probability that priority deliverables will be achieved before schedule with a much greater order of magnitude than when the whole sample of projects is considered: an increase of gender diversity in teams from an average of 21% to 50% would raise the probability of producing priority deliverables before schedule of about 40%[8] *(table 4, model 2)*.

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[7] Results for indicator I1 are not reproduced here because the data available on projects were too few for results on many of the variables in the model to be statistically significant.

[8] Once again this result can only be considered as a qualitative result because of the statistically low explanatory power of the model given the data.

This clearly indicates that the impact of gender diversity is moderated by the fact that women are over-represented in teams dealing with projects that are not aimed at R&D per se or not in position to contribute to R&D performance. When we eliminate the domain bias, gender diversity is shown as having an important favourable impact on collective performance[9].

4 Conclusion

This study shows that a business case for implementing gender diversity can be empirically made – to the extent of available appropriate data. Companies are producing the data they need for evaluating the impact of this diversity on performance over time. They have developed indicators for measuring annually performance of individuals and teams. By processing R&D data using an econometric model which controls for other sources of diversity and for differences among individuals, we've been able to conclusively show on our sample **that individual and collective performance would be increased by more gender diversity** (it being approx. 26% in the sample).

We have also suggested the need to aggregate data across firms in order to improve the explanatory power of our econometric modelling techniques. This then is a second conclusion from our study: protocols can and should be established not only for improving data collection but also for sharing these data across firms at a level of aggregation which ensures statistical relevance and confidentiality.

Thirdly, when quantifying the impact of diversity on performance, we must keep in mind that **women are over-represented in some domains and on projects that are not designed to be major contributors to the performance of the activity under study. Therefore, the gender diversity impact on performance is likely to be under-estimated in general.** In order to make an accurate business case for gender diversity, care must be taken to consider only those projects which explicitly contribute to the performance of the activity under study (R&D in our case).

This is somewhat an illustration of a more general phenomenon pointed out in this report. Other studies in this report have evidenced that women are under-represented in specific scientific and engineering fields despite their diplomas, their background and their general ability to work in those fields. **What our study shows is that this bias is likely to have a measurable cost in terms of performance.** Allowing more women to enter those fields is likely on the contrary to have an objective and direct impact on individual and collective performance. Two factors of success for businesses and science in general lie in allowing more women to take an active part in R&D and in the development of appropriate diversity management strategies within research teams.

A final proposal concerns the need to take our study further. Several questions could not be explored in sufficient depth because of the limited data and time frame of our research. First, we showed the need above to develop a variety of performance indicators in order to lead quantitative analysis. Second, a wider set of explanatory variables than the one used in this study could be developed by taking into account

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[9]   See note above.

relevant factors as marital status, number of children, diploma and trajectory after university, mobility, part-time work, HR practices, industry characteristics, etc. Third, we need to account for the fact that better performing companies are more likely to implement a diversity policy. More generally speaking we need to account for the fact that different HR managements might result in differences of performance. Finally, we know little at the present time about women's trajectories in firms after hiring. In order to produce knowledge about these three subjects, several years of data would have to be collected.

5 Acknowledgments

Graph 1 – Correlation between Gender Diversity and Individual Performance uncontrolled setting
Full sample (3812 observations)

Graph 2 – Correlation between Gender Diversity and Collective Performance uncontrolled setting
(69 projects)

Table 1: Definition of the individual and collective performance measures
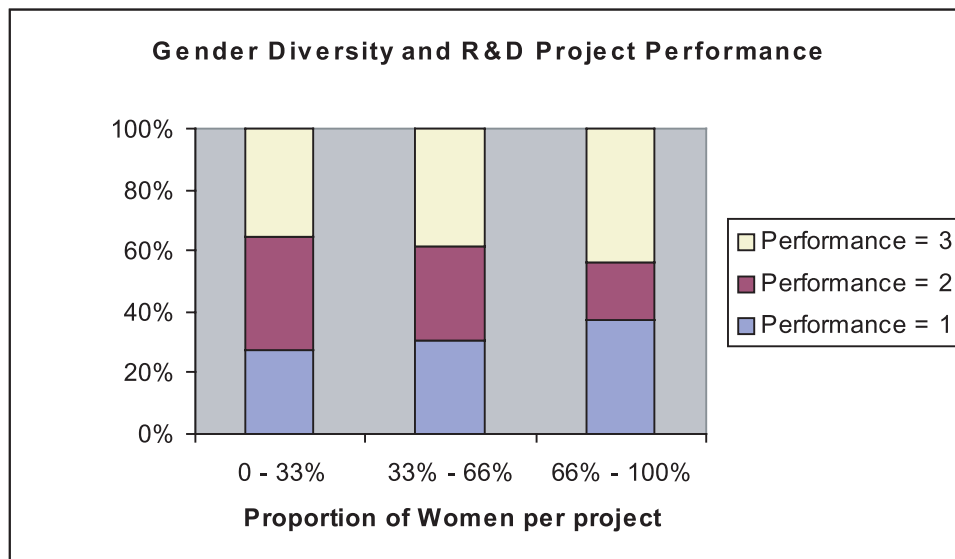
Individual evaluation	Performance measure
Company n°1 Outstanding Exceeds Expectations Meeting Expectations	3 = Outstanding (24% of the individuals) 2 = Exceeds Expectations (46% of the individuals) 1 = Meeting Expectations (30% of the individuals)
Company n°2 Factor: individual performance parameter given to employee over 2004. Salary increment and bonus are determined via this Factor. Mean = 1.03, Median = 1.0 Minimum = 0.7 Maximum = 1.3	3 = individual performance parameter is >1.1 (one third of the individuals) 2 = individual performance parameter is between 1 and 1.1 (one third of the individuals) 1 = individual performance parameter is <1 (one third of the individuals)
Company n°3 Research bonus as a percentage of the salary Mean = 8.1%, Median = 8.2% Minimum = 0% Maximum = 26.4%	3 = research bonus represents more than 8.9% of the salary (one third of the individuals) 2 = research bonus represents between 7.5% and 8.9% of the salary (one third of the individuals) 1 = research bonus represents less than 7.5% of the salary (one third of the individuals)

Team/project evaluation	Performance measure
Company n°1 (18 projects) A – B - C	3 = A (22% of the projects) 2 = B (61% of the projects) 1 = C (17% of the projects)
Company n°4 (51 projects) Rating of the project as regards to the objectives (percentage of success) Mean = 83%, Median = 90% Minimum = 0% Maximum = 100%	3 = success is 100% 2 = success is between 75% and 100% (one third of the individuals) 1 = success is below 75% (one third of the individuals)
Company n°3 (209 projects) Two indicators: the real costs of the projects terminated in 2004 as compared to the anticipated costs (I1), and whether priority deliverables on finished projects had been delivered before or behind schedule (I2).	Specific treatment

Table 2 : Gender diversity and individual performance (total sample)

Ordered Probit, Method: maximum likelihood
Number of observations   =   3812
Dependent variable:
Individual performance (ordered from 1 to 3), Mean = 2, Standard deviation = 0.8
Explanatory variables:

Variable Name	*Label Name*	*Mean*	*Min- Max*
Gender diversity	*Proportion of Women per project/team*	*26%*	*0% - 100%*
Jobgroup	*Position or grade, ordered from 1 (lowest) to 3 (highest)*	*2*	*1 - 3*
Gender	*Gender dummy variable equal to 1 if the individual is a woman*	*26%*	*0% - 100%*
Nationality	*Equals 0 if foreigner and 1 otherwise Notice the absence of nationality diversity*	*0.99*	*0 - 1*
Age	*Date of birth of the individuals (equivalent to age in 2004)*	*1965*	*1944 - 1980*
Seniority	*Date of hiring in the company. Since this variable is collinear to Age, both will not be part of the equations simultaneously.*	*1991*	*1962 - 2004*
Jobgroup diversity	*Average position or grade within the team. Position or grade is ordered from 1 (lowest) to 3 (highest)*	*2*	*1 – 3*
Team average age	*Average date of birth within the team (equivalent to average age in 2004)*	*1965*	*1950 - 1974*

Model Estimation

	Estimates	Marginal effects, for Probability that (Individual performance = 3) – mean probability = 0.3
Gender diversity	**0.223***	**0.078***
Jobgroup (reference is level 1)		
- senior position (level 3)	1.747***	0.606***
- intermediate position (level 2)	0.971***	0.350***
Gender	-0.230***	-0.077***
Nationality	0.270	0.087
Age	0.066***	0.022***
Jobgroup diversity (reference is level 1)		
- proportion of seniors (level 3)	-0.473*	-0.165*
- proportion of intermediate position personnel (level 2)	-0.241	-0.084
Team average age	-0.244**	-0.007**

Log likelihood = -3721.508   Pseudo R^2 =   0.1110

Estimates shown are significant at the 10% level (*), 5% level (**), and 1% level (***) respectively.

The impact of gender diversity on individual performance is computed as follows: *Probability that (Individual performance = 3) = marginal effect of 'gender diversity' (ie 0.078)* (gender diversity - mean of gender diversity ie 0.26)+ mean of Probability that (Individual performance = 3) ie 0.3*
An increase in gender diversity of 10% (from 0.26 to 0.36) corresponds to an increase in Probability that (Individual performance = 3) by 2.6%.

Table 3 : Gender diversity and individual performance measured as research bonus over salary

Linear regression, Method: Ordinary least squares
Number of observations   =   3602
Dependent variable:
Individual performance: research bonus over salary (%), Mean = 8.1%, Standard deviation = 0.02, Minimum 0%, Maximum 26.4%
Explanatory variables:

Variable Name	Label Name	Mean	Min- Max
Gender diversity	Proportion of Women per project/team	27%	0% - 100%
Jobgroup	Position or grade, ordered from 1 (lowest) to 3 (highest)	2	1 - 3
Gender	Gender	27%	0% - 100%
Nationality	No data available- Insignificant percentage of foreigners.		
Age	Date of birth of the individuals (equivalent to age in 2004)	1965	1945 - 1980
Seniority	Date of hiring in the company. Since this variable is collinear to Age, both will not be part of the equations simultaneously.	1991	1962 - 2004
Jobgroup diversity	Average position or grade within the team. Position or grade is ordered from 1 (lowest) to 3 (highest)	2	1 – 2.8
Team average age	Average date of birth within the team (equivalent to average age in 2004)	1965	1956 - 1971

Model

	Estimates
Gender diversity	**0.006***
Jobgroup (reference is level 1)	
- senior (level 3)	0.035***
- middle (level 2)	0.021***
Gender	-0.004***
Age	0.001***
Jobgroup diversity (reference is level 1)	
- proportion of seniors (level 3)	-0.006*
- proportion of intermediate position personnel (level 2)	non significant
Team average age	-4.6*10-4 **

Adj-R^2 =   0.2801

Estimates shown are significant at the 10% level (*), 5% level (**), and 1% level (***) respectively.

Each estimate measures the contribution of the factor to individual performance.
The impact of gender diversity on individual performance is computed as follow: *Individual performance = estimate of 'gender diversity' (ie 0.006) *(gender diversity - mean of gender diversity ie 0.27)+ mean of ind.perf. ie 0.081*
An increase in gender diversity from 0.27 (ie 27%) to 0.37 corresponds to an increase in individual performance of 7.4%.

Table 4 : Gender diversity and collective performance

Ordered Probit, Method: maximum likelihood
Dependant variable: *Collective performance on a project = 2 if Anticipated date of delivery of main deliverables > Real date of delivery, = 1 otherwise, Mean =1.62, Std deviation =0.48*
Explanatory variables:

Variable Name	Label Name	Mean	Min- Max
diversity	Proportion of Women per project/team	See models	0% - 100%
Jobgroup diversity	Average position or grade within the team. Position or grade is ordered from 1 (lowest) to 3 (highest)	2	1 – 2.8
Nationality	Data not available. Insignificant percentage of foreigners.		
Team average Age	Average date of birth within the team (equivalent to average age in 2004)	1965	1956 - 1971
Team average Seniority	Average date of hiring in the company within the team. Since this variable is collinear to Team average Age, both will not be part of the equations simultaneously.	1991	1982 - 2000
Challenge	Equal 1 if the project is identified as a 'main challenge' by the firm	0.45	0 - 1
Duration	Duration of the project. Another indicator of the importance of the project (in days)	1170	358 - 3239
Spendings	Spendings for the project in 2004. Another indicator of the importance of the project (in k?)	177.6	0 - 617.5

Model 1
Number of observations (terminated projects*deliverables) =   598
Average Proportion of Women per project/team = 27%

	Estimates	Marginal effects, for Probability that (Project performance = 2) – mean probability = 0.6
diversity	**0.590***	**0.223***
Jobgroup diversity (reference is level 1)		
- proportion of seniors (level 3)	1.673**	0.633**
- proportion of intermediate position personnel (level 2)	1.391*	0.526*
Team average Age	0.038*	0.015*
Challenge	0.013	0.005
Duration	-0.0002	-0.00008
Spendings	-0.0007**	-0.0003**

Log likelihood = -385.2963   Pseudo R^2 =   0.027

Estimates shown are significant at the 10% level (*), 5% level (**), and 1% level (***) respectively.

Model 2 (only fully R&D oriented domains and challenge projects)
Number of observations (terminated projects*deliverables) = 221
Average Proportion of Women per project/team = 21%

	Estimates	Marginal effects, for Probability that (Project performance = 2) – mean probability = 0.6
diversity Jobgroup diversity (reference is level 1)	**2.074***	**0.800***
- proportion of seniors (level 3)	2.927**	1.128**
- proportion of intermediate position personnel (level 2)	1.390*	0.536*
Age diversity	0.007	0.003
Duration	-0.0006*	-0.0002*
Spendings	-0.0001	-0.00005

Log likelihood = -138.13825   Pseudo R^2 =   0.0751

Estimates shown are significant at the 10% level (*), 5% level (**), and 1% level (***) respectively.

The impact of gender diversity on collective performance is computed as follows: *Probability that (project performance = 2) = marginal effect of 'gender diversity' (0.223 in model 1 or 0.8 in model 2)* (gender diversity - mean of gender diversity ie 0.27 in model 1 or 0.21 in model 2)+ mean of Probability that (project performance = 2) ie 0.6*
An increase in gender diversity from 0.21 (ie 21%) to 50% corresponds to an increase in Probability that (project performance = 2) by 8.5% in model 1 and by 40% in model 2.

PART III – Companies profile

Diversity: an asset for the Group

For Air Liquide – an international group involved in very different lines of business – diversity in every area is a source of dynamism that the company constantly fosters. Diversity exists in nationalities, cultures, skills, profiles, experience, the men/women ratio as well as in the possibility of having very different jobs during a career. The opportunities for geographic and professional mobility are real. There are many bridges between business sectors and units and an employee can go from a technical sector to management or sales positions.

Diversity also means integrating more women: in 2005, worldwide, 17% of engineers and managers were women and they make up 28% of all hires in these categories. Women constitute 24% of employees considered as having "high potential" in the Group compared to 20% in 2003.

Diversity is also reflected in country of origin: there are 36 different nationalities among the company's expatriates and 20 among executive managers.

Human, social and societal resources

A certain number of human resources indicators are followed at Group level including diversity. The Group has also been increasingly involved in the social and societal sectors.

Diversity
Objective
To strengthen the position of women in the Group, in particular through recruitment of engineers and managers. The Group's objective is to increase the hiring of women in this category, from nearly one out of three new hires today to more than two out of five within five years (2005-2009).

Monitoring the objective
In 2005, the proportion of women among engineers and managers hired clearly increased in Europe and especially in France (over 50% of these hires). Worldwide, this percentage was 28%, still well below the Group's objective due to Asia (24% of engineers and managers hired were women) and the rapid growth in this region.

Indicators for the Group as a whole

Diversity	2003	2004	2005
% of women among engineers and managers	14 %	17%	17%
% of women among engineers and managers hired during the year	24%	31%	28%
% of women among employees considered high potential	20%	21%	24%
N° of nationalities	2003	2004	2005
Among expatriates	36	36	36
Among senior managers	25	21	20
Among employees considered high potential	35	37	40

EADS- WIST contribution

By end of 2005, women represented about 15% of the EADS workforce worldwide.

In particular, the latest HR data displayed a very satisfactory performance regarding women employment in research: nearly 30% of women were, for example, employed in EADS' Common Center for Research in France.

Such results clearly derive from a determined policy in the field of research.

Since 2004, EADS, through its foundation for research, has built a partnership with the French Ministry for Research in order to bring support to the Irene Joliot-Curie award which encourages women to join scientific carriers and distinguishes a woman scientist of the year. In 2005, the 10,000 Euro award went to Rose Dieng-Kunst, head of research at INRIA (a French research institute dedicated to informatics and automatics research). As the CEO of EADS, Noël Forgeard, puts it: "women account for only 31% of researchers in the public sector and 21% of researchers in the private sector. It is our responsibility to allow women to unleash their potential while maintaining an optimal balance with their personal life", adding that the initiatives undertaken by EADS research foundation amounted to "more than 24 millions ? on 5 years".

This EADS policy is also rooted in a strong commitment to private / public partnerships. The CEOs repeatedly emphasize the fruitfulness of such partnerships between public and private research and the necessity of building powerful synergies in order to maintain Europe's competitiveness on global markets : "Major EADS achievements such as Airbus, Eurocopter or Ariane could never have been born without outstanding research partnerships", claimed Noël Forgeard at the Joliot-Curie award ceremony in November 2005.

The active participation of EADS to the Women Initiative in Science and Technology is thus a natural commitment: it is of the utmost importance to support such studies and benchmarking both on the interplay between private and public research and on the link between gender diversity and performance - the latter being the true cornerstone of the diversity business case.

However, it cannot be too strongly emphasized that scientific and technological vocations need to be encourage as early as possible: consequently, EADS leads an active HR marketing policy aimed at increasing scientific vocations among young girls: for example, more than 300 collaborators teach classes in some of the best engineering French schools.

Similar initiatives are also led in Spain and Germany where, for instance, Girls days are organized at EADS plants. Numerous partnerships with universities and engineering schools have been signed in the past five years, including such prestigious institutions as Centrale Paris or FEMTEC in Berlin.

Naturally, all these initiatives need adequate publicizing, in order both to increase public knowledge and reinforce the awareness of the challenges linked with diversity. Among other events, one can highlight the IIWE (International institute for women in engineering) meeting that took place in July 2005 at EADS Paris headquarters and production sites: 80 young women took part in numerous workshops on diversity and scientific vocations.

In addition, EADS is a partner of the Women's Forum: an annual event gathering more than 500 women, ministers, CEOs, artists and politicians from 40 different countries. Many EADS collaborators were part of this "feminine Davos" in 2005.

Regarding for future perspectives, the main objectives are threefold: firstly, to increase the workforce awareness on the subjects of diversity, by means of internal communications, secondly to improve reporting on KPIs, thirdly to pave the way for the launching of an EADS' women network based on existing corporate training alumni networks.

On these burning issues, as well as on many others, EADS, through its diversity taskforce, is eager to share expertise, best practices and return on experience with the WIST members and board of experts.

Women scientists in EDF R&D-a "corporate research center"

The EDF Group is a leading player in the European electric power industry. EDF group operates in 25 countries including 13 in Europe. The EDF Group employs more than 160 000 people worldwide.

In 2003, :

- the global female/male ratio for EDF/GDF was 22,6 %.

- 22% of EDF/GDF female population had an engineering degree.

The EDF R&D is focused on the performance of facilities, renewable energy sources; power regulations and markets, networks, sustainable oriented new services, simulation and information technologies.

In 2005, the R&D staff is composed by :
- 2075 people of whom 31%women.
- 1329 researchers of whom 27% women
- 221 Doctors of whom 34% women

- 20% managers are women
- 11,5 % " senior experts"
- 30% project managers

In 2004, the R&D recruited :
- 50% women among people in pre-doc studies (scientific PhD)
- 49,9 % women among people in post-doc. studies
- 20 % women among engineers

EDF key milestones on gender policy

- **1983** : The "Roudy" law (July 1983, the 13th ; OJ n°83 635) launches a debate about gender equality

  The law provides that corporations of more than 50 employers shall present an annual gender's assessment in terms of employment, training, recruitment, wages.

- **1999** : Agreement between EDF management and trade unions on reduction's working time . Though not pertaining to gender equality, its enfacement influenced female recruitment in 1999 and 2000.

  That reached 40% in 1999 and 2000, while it varied between 20% and 25% since 1983. In 2002 it decreased to 32%. This rate is still higher than that of women in the areas where EDF recruits ("grandes écoles" ; engineer's schools ; scientific universities)

- **2004** : Agreement on 13th July , on gender equality.

  This agreement was deployed in all EDF entities. Signed for three years (renewable) it pertains to wages equality ; employment and recruitment sex ratio; careers, training, working time, working conditions.

  Creation of a female managers' network in EDF

- **2005** : Diversity project deployment, including gender equality.

**Gender Diversity Report
France Telecom R&D Division**

France Telecom is actively involved in gender diversity management, for example the signature of an agreement between Management and Unions on gender equality in April 2004.
This agreement mainly focuses on four areas : access to employment and training, remuneration, career development and work organisation.

As far as the R&D Division is concerned, we have carried out a study of the current situation regarding gender diversity in order to check if the commitments laid down in the agreement have been fulfilled. We have therefore set up action plans to improve gender equality in the Division.

Gender diversity at the R&D Division: some facts and figures
(All mentioned figures date from the end of 2004)
Women's representation:
Women represent 28% of the total staff of Division ; this percentage is lower than the the percentage of women's representation within the whole Group.
This situation can be explained by the fact that R&D staff is mainly made up of highly qualified technical engineers and researchers (74%). We think that our low representation of women in technical fields is directly related to the number of female students in the French Engineering schools (15 to 17% in the last five years on average in 3 of the most famous French telecommunications schools).
 On top of that, more than 80% of the R&D posts are technical, and most of the positions for women are to be found in the HR, finance, communication departments and other support activities.

Access to employment:
24% of our newly recruited staff who were recruited in 2004, were women (if we consider the external recruitment).
27% of PhD and Postdoc students of our R&D Division, are women.

Training:
32% of the employees who attended at least one training course in 2004 were women.

Remuneration:
There is no significant difference between men and women regarding remuneration, especially regarding the newly recruited employees whose salaries are worked out from various criteria such as age, experience, qualifications, geographical location. There is no visible discrimination against women.

Career development:
Out of those employees who got promotion in 2004, 30% were women, (2% more than in 2003).

The percentage of female staff in top positions is 21%.

Work organisation:
23% of women work part time job (compared to 3% of men) within the R&D Division.

The use of videoconferencing is widespread within the R&D Division with 16 geographical sites, 8 located in France and 8 abroad.
Videoconferencing is a good way of avoiding tiring business trips all over France, and enables women to be more efficient in their professional objectives.
Working from home occasionally is also feasible. Employees have access to the office network via a Cisco VPN and a PKI (Private Key Infrastructure), which is a very convenient facility for women who have to stay at home when their children are sick.

The combination of flexibility in work schedule adjustment and the use of telecommunication facilities has contributed to improve women's worklife balance within the R&D Division.

Action plans:

Recruitment:
In order to improve the percentage of women recruited, we try to include at least one female candidate on the shortlist for a job position.
Another action plan is to recruit more women from the PhD and Postdoc students of which 27% are women.

Training:
At the R&D Division, 32% of the employees who attended at least one training course in 2004 were women. This is a relatively high figure when compared to the percentage of women's representation in the Division (28%).

Remuneration
Women on maternity leave :
At France Telecom, the executive staff benefit from a bi-annual bonus based on performance.
For women on maternity leave (up to 6 months in France), the decision of the bonus level was left to the manager's discretion. Manager's discretion was leading to some situations where some women did not receive any bonus at all.
Under the terms of the agreement signed in April 2004, every woman on maternity leave is entitled to get a percentage of bonus based on the average percentage of the previous bonuses.
The R&D division has particularly strived to put this rule in effect by backdating the period of validity to the second half of 2003.
We have set up a six monthly check to identify those women and to make sure this rule is respected.

Women's representation in top management positions:
In order to bring the current percentage of women in key positions (21%) closer to the
overall percentage of female executives (24%), we have decided to look at the top
positions which are held by women. We have to anticipate the departures and the
changes in these management positions. Another step would be to identify the women
who should be suitable for management positions.

Conclusion:

Managing gender diversity is considered as a strategic issue within the R&D Division of
France Telecom.
Moreover all the aspects of diversity are taken into account, such as age, nationality,…

We have identified the areas in which we can progress regarding gender diversity.
Today, our key objectives are:
1/ to improve women's representation in our core activities : by increasing recruitments
from our female students. This leads to a more global issue, shared by many companies
and at a higher level : how to encourage young women to pursue technical careers ?
2/ to facilitate access for women to top positions and encourage them to follow
managerial careers.

If we now consider the whole France Telecom company, a working group whose members
come from different FT units, has been created to work on various propositions of
actions in order to reinforce gender equality within the company.
The culture of the company used to be very masculine. Developing an awareness and a
culture on gender diversity along with the implementation of concrete measures (as the
ones described above) will definitely contribute to improve the situation for highly
qualified and career oriented women.

FRAUNHOFER-GESELLSCHAFT

Up till now, gender mainstreaming in research organisations has been taken into account almost exclusively on a personnel policy level. Research results document that research organisations do not have mature concepts and instruments at their disposal to integrate gender mainstreaming into the design and planning of research plans. On the one hand, research itself lacks the necessary basic knowledge and methods to be able to recognise gender aspects in the research fields and take them commensurately into consideration. On the other hand, the scientists, both male and female, frequently lack the awareness for the problems and acceptance of gender topics. In addition, the existing research approaches and results of gender research are hardly perceived.

In the main project "Gender Aspects in Research" promoted by the Federal Ministry for Education and Research (BMBF), concrete gender aspects are elaborated in research fields which are relevant for the future: life sciences, transportation and traffic, microelectronics and ICT, production technology and work organisation, as well as energy and the environment. These fields also have – measured by the amount of promotional funding – high priority for the BMBF and the EU. The main project also aims to develop an adaptable, transferable implementation concept for the systematic integration of the gender perspectives for research organisations.

The Fraunhofer Society realised and tested this concept on its own research programmes, hoping this can serve as a model for other research organisations

Introductory remarks
by Prof. Dr. Hans-Jörg Bullinger
President of Fraunhofer-Gesellschaft

Germany's sustainable development will be at risk if we do not succeed in expediting innovation, strengthening our innovative potential and regaining our innovative competence. In a global world only those who are the first to transform new innovations into marketable products will be successful. The ability to incorporate customer preferences at an early stage has become a decisive factor for success. In order to develop innovative solutions, it is necessary to understand the diverse needs and expectations of today's men and women. It should also be borne in mind that the role expectations of men and women and the tasks they undertake in their occupations and within the family have changed significantly. As a result, new and diverse needs have arisen. In order to allocate this subject area relevant knowledge and established methodology for the research and development process, the Fraunhofer Gesellschaft is undertaking the project "Gender Aspects in Research". With this project, the Fraunhofer-Gesellschaft is developing potential and know-how, which will be available to its customers.

Introductory remarks
by Dr. Dirk-Meints Polter
Executive Board of Fraunhofer-Gesellschaft
Human Resources and Legal Department

We are in need of a culture that makes room for the new, breaks open obsolete traditions and throws off chains. Diverse and multifaceted teams with a high level of professional competence provide an important repository. To this end, the knowledge and expertise of well-educated women can be better put to use.

The Fraunhofer-Gesellschaft would like to interest more women in research. The company provides women with flexible working models and would like to increase the number of women in leadership positions.

With the project "Gender Aspects in Research", the Fraunhofer-Gesellschaft aspires to enhance the participation of women in science and technology by assuring that their views and ideas in research and development will be taken into account on the marketplace.

Gaz de France

Gender diversity

Gaz de France : the Company's main operation is the distribution of natural gas. The Group also explores for and produces natural gas; operates gas transmission, storage, and trading businesses; offers energy-related construction and heating, air-conditioning, and ventilation (HVAC) services; runs cogeneration facilities; and supplies fuel for natural gas-powered buses. In 2005, it accounted for 52 000 employees in the world, among which 37 000 were employed in France.

1. Key milestones

- **1983 :** The "Roudy" law (July 1983, the 13th) launches a debate about gender equality.The law makes it compulsory for corporations (> 50 employees) to go through an annual evaluation of the respective working conditions of men and women in the company in terms of: employment, training, recruitment, wages....

- **1999 :** Agreement between Gaz de France's management and trade unions on working time reductions.

- **2004 :** On July the 13th., an agreement on gender equality was signed and was to be enforced in the company as a whole (Mother company + all its subsidiaries). Signed for three years (renewable) it guarantees gender equality, pertaining to, respectively: wages equality, employment and recruitment gender ratio, careers, training, working time, working conditions.

- **2004 :** Launching of the so-called **"Diversity project"** in Gaz de France, which aims at deploying the whole corporate diversity policy, including gender equality.

  Creation of a **managers' network** to impulse diversity.

2. Corporate data :

- the global female/male ratio was 26 % in 2004. It was 18,3% in 1983

- the global female/male ratio in management was 26% in 2004. It was 22% in 2000.

- 45% of female in the junior management (under the age of 35)

- 26% of female population had an engineering degree, in 2004..

Gaz de France

Women tend to be more numerous in HR, finance, communication; they are more visible in sales and marketing departments. The youngest can be found in high technical expertise (R&D and geosciences). Gaz de France has very few women in the traditional core departments (gas trade, transportation and distribution).

- 44,1 % of females and 17% of males are working part time.

3. Gender equality

Salaries :

In order to catch up with the salary levels of their male colleagues (a 5% gap was pointed out), a special budget was created and is dedicated to compensate for this gap. It will concern about 350 women (out of 6000) who will get an individual salary-increase during 3 years.

Recruitment :

Gaz de France has committed itself to recruit males and females in the same proportions as the proportions of males and females who graduate from universities / the overall educational system.   This has allowed the company to reach an equilibrium in between male recruitments and female recruitments as for : not only employees, executives and managers (increase of 9 points in the female recruitment, which reaches 40,9 % in 2004) ; but also technical or non-technical jobs.

Worklife balance :

Gaz de France opened in november 2005 a "kindergarten" for more than a thousand employees (1300) in Saint-Ouen (northern surburbs of Paris).

It constitutes the first experience of this kind in the company's history and it has a capacity of 70 children. It should be emphasized that this facility is designed not only for women but for all the employees.

Gaz de France

Access to top management and the work/life balance : Gaz de France has carried out a study of the forms and dynamics of its managers' careers (organisational norms and stages, turning points and individual strategies) concerning both women and men.

Communication and reporting :

o   a new intranet dedicated to professional equality has been set up ;

o   in each department of the company, people have been appointed to be correspondents especially on these professional equality issues;

o   for each quantitative report compiled at any level of the company, it has been made compulsory to specify (when it proves relevant to do so) the gender aspects of the issue;

o   the implementation of the agreement will be managed through action plans in each department of the company, and within complete partnership with the trade-unions.

Hewlett-Packard Company

Creating a level playing field for women

HP is a technology solutions provider to consumers, businesses and institutions globally. The company's offerings span IT infrastructure, global services, business and home computing, and imaging and printing. For more than 65 years, HP has combined its ingenuity, engineering prowess and customer focus to help people around the world apply technology in meaningful ways to their businesses, personal lives and communities.

At HP, we believe that diversity and inclusion are key drivers of creativity, innovation and invention. A diverse, high-achieving workforce differentiates us and is essential to understand, relate to, and serve our customers throughout the world. We also believe that a culture that values differences motivates people to perform at their best. It helps us attract, develop, promote, and retain the best women and men worldwide.

At HP we strive to create an inclusive culture where everyone is valued for their distinctive skills, experiences and perspectives. Our intent is to create a culture that is a catalyst for integrating all of our differences and putting their power to work --- helping us create a competitive workforce that will allow us to win in the global marketplace.

Creating a diverse, inclusive environment has been an ongoing journey of continuous action for many years. It has been a journey guided by deeply held values. Today, our diversity vision is one of global proportions. One that requires courageous, bold actions from many people throughout the world.

HP has already been widely acclaimed for the number of women holding key executive positions, and has also been ranked one of the best companies for women to work for by a number of organisations and publications world-wide. In general terms, HP's strategy goes far beyond HR initiatives. HP applies its leadership and diversity in the marketplace, in the workplace, and in the communities it serves around the world. Our key strategies include: driving results through management leadership; attracting and developing diverse talent; renewing and redefining work-life polices and practices as an enabler of business success; expanding knowledge through diversity learning and education; reaffirming our commitment to employee resource groups; and measuring and tracking results.

2005 Worldwide Workforce Demographics - Gender

HP is committed to building a strong pipeline of talented women. We continuously focus on the recruitment of new and diverse talent. We rely on aggressive and non-traditional methods that allow us to reach a wider pool of women in management and influential positions.   We actively recruit candidates through
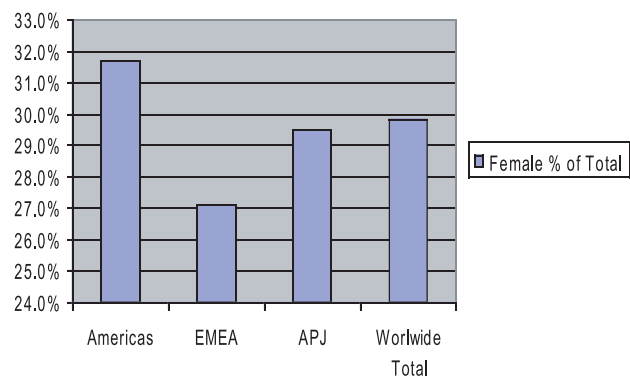
conferences, career fairs, and events. We partner with search firms specialized in diversity recruitment and we evaluate the ability to provide HP with a gender-balanced mix of candidates as a determining factor when selecting our suppliers.

We offer a number of leadership and mentorship programs intended specifically for women. These programs are designed to enhance the participant's leadership skills and business knowledge, while expanding the professional network. They also provide participants with dedicated time to reflect on learning and practice new behaviours in a safe and confidential environment.

We also host a number of events to raise the visibility of high potential women with top management and to allow opportunities for development and networking. During recent "Women@HP" event in Europe, participants completed the Birkman test, attended workshops by Martha Maznevski, Professor of Organisational Behaviour and International Management at the International Institute for Management Development (IMD) in Lausanne, and met with members of the leadership team.

Francesco Serafini, Sr. VP and Managing Director HP EMEA talks with HP employees at the women@hp event

To facilitate retention, we sponsor over 60 employee resource groups, connecting people all over the world. Resource groups represent an excellent opportunity for personal and professional development, while they increase the employee's contribution, creativity and commitment to the company. Access to networks, strong role models and mentors are widely regarded as being important factors in climbing the ladder to career advancement.

A recent study undertaken by women-in-business advocacy group (*) shows that European senior executives reported even more tensions between their personal and family lives that their North American counterparts and said they had less flexibility in their work schedule to manage personal and family responsibilities. At HP we believe that consideration for work-life is an important component of our success because it enhances productivity, optimizes effectiveness, and enables sustained contribution. Nearly 100% of HP employees take advantage of some form of flexible work arrangement, even if just occasionally. Virtually everyone adjusts their start and stop times regularly.   Examples of flexible work arrangements at HP include:

• Flex-time – allows employees to vary the duration and timing of their workday (e.g., start and end times, breaks, lunch) within limits set by management based on core business hours.

• Part-time – allows employees to work a reduced work schedule on an on-going or temporary basis.

• Job Share – Allows two employees to share the tasks and responsibilities of one full-time position. In this arrangement, each job share partner is on part-time status and the employees share the responsibility for coordinating and accomplishing certain job responsibilities.

• Telework – allows an employee to work full-time from their residence for business or personal reasons.

• Flexwork – allows employees to occasionally fulfill their job responsibilities from their home.
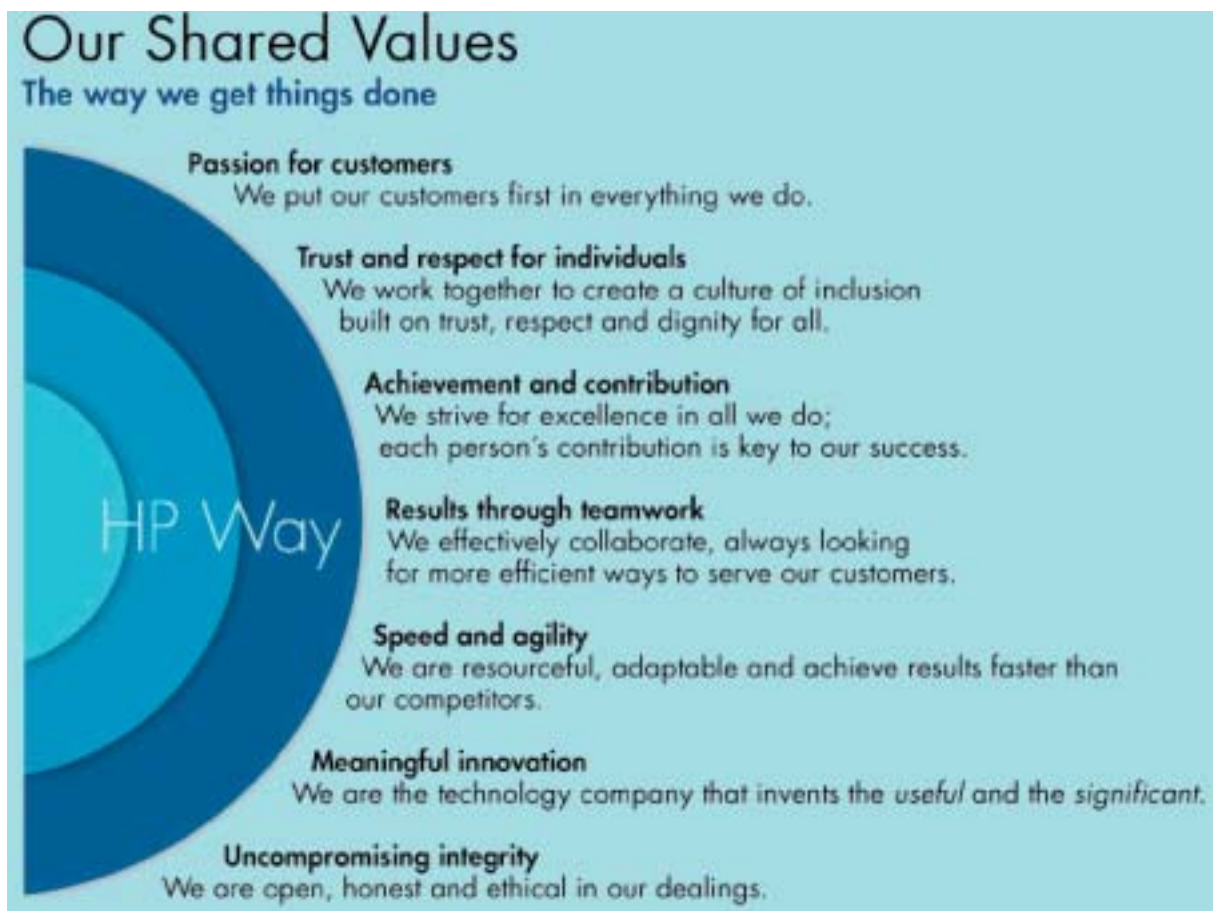
Employees and managers work together to find the best way to meet business and individual needs over the life of their career. This reciprocal partnership has become a hallmark of the company's success.

We realize that in order to establish a true culture of inclusion, commitment from management and accountability for results are absolutely essential, so we have established metrics and a reporting system that allows us to monitor our progress, identifying levels of accountability throughout the organisation and leveraging our resources to maximize impact.

Finally, we have developed and implemented policies to set expectations for behaviour and help create the best place to work.

At HP we are working to realize a vision of having diversity truly woven into the fabric of our company, so that it is an intrinsic part of our nature. Personal leadership from everyone will fuel it and the behaviours will come from conviction. Diversity is a conscious part of how we run our business.

* "Leaders in a Global Economy, A Study of Executive Men and Women" conducted by Families and Work Institute, Catalyst and Boston College Center for Work and Family.

Our Shared Values
The way we get things done

Passion for customers
We put our customers first in everything we do.

Trust and respect for individuals
We work together to create a culture of inclusion built on trust, respect and dignity for all.

Achievement and contribution
We strive for excellence in all we do; each person's contribution is key to our success.

Results through teamwork
We effectively collaborate, always looking for more efficient ways to serve our customers.

Speed and agility
We are resourceful, adaptable and achieve results faster than our competitors.

Meaningful innovation
We are the technology company that invents the *useful* and the *significant*.

Uncompromising integrity
We are open, honest and ethical in our dealings.

HP Way

Diversity @ Infineon

Infineon Austria at a glance

Infineon Technologies Austria AG with its headquarters in Villach, its Research and Development Centers in Villach, Graz, and Linz as well as its IT Services GmbH in Klagenfurt, and a Sales Office in Vienna is developing and producing semiconductors and system solutions with a total staff of 2,700 employees (thereof 800 in research & development) for automotive, industrial and multimarket sectors and for applications in communication.

Infineon Technologies Austria AG is a member of the Infineon Technologies AG group of companies with about 40,600 employees worldwide.

The importance of diversity is gaining in momentum seen in a climate of constant demographic changes and shifting values in society. Infineon Technologies Austria AG, as part of a Group with global operations, actively takes on board the changes in the working world and in society, and directs special attention to internationality and equal opportunities for women.

Project idea: " FIT – Opportunities and Diversity through Women in Technology

The potential of „Women in Technology" is still not being used to its full potential on the skilled personnel market.

Due to the low numbers of women in technical professions the suggestions and ideals in these areas also remain male dominated, a broad spectrum of ideas and innovations are therefore possibly lost.

This prompted the launch of the "FIT – Opportunities and Diversity through Women in Technology" project. Its objectives include providing an impetus to (re)integrate women in technical professions.

The 2,700 employees at Infineon Austria come from 35 nations.

(2005 data)

Percentage of women at Infineon Technologies Austria AG

The percentage of women in Infineon Austria is 11 %.

The percentage of women in Infineon across the globe is higher, it is 30.6 %.

(2005 data)

The percentage of women in Infineon in the individual regions:

Japan	16%
Europe	24,5%
USA	28,1%
Asia	43%

(2005 data)

One of the principles the company outlines in the Infineon "Business Conduct Guidelines" is equal opportunities for women and men in recruitment and salary. This includes giving all staff the same career opportunities. For us it also signifies giving support in reconciling family and professional life by creating a family-friendly setting. We devote special attention to the reintegration of those returning to work after parental leave. The career advancement of our staff is also fostered by an excellent training and development program.

Support

Infineon Technologies Austria AG has joined the Association of Austrian Electrical and Electronics Industries "FEEI" and the Carinthia University of Applied Sciences to support female students in courses of technical studies. This move serves to arouse enthusiasm and to motivate young girls and women to enter into technical occupations. The sum of Euro 1,000 was recently awarded to each of the five best female students.

Infineon Austria will be taking up a patronage as part of the Johanna Dohnal Patronage Award Scheme from 2007. The patronage to the value of Euro 800 will go to a student who receives distinction for her thesis in a technical field.

It goes without saying that Infineon Austria takes part in the Lilith Patronage Award and in the international Girls' Day. Both projects aim to familiarise girls with the various career possibilities open to them. Infineon particularly wants to inspire interest in technical professions and break down the prevailing hurdles associated with technical fields of work.

Co-operation with

WiTEC Women in Science, Engineering and Technology

WiTEC is a European network, which supports women in technical and scientific fields of study as well as in their further professional development.

Infineon is represented by Mag. Monika Kircher-Kohl on the board of directors of WiTEC.

WiTEC supports graduates of technical fields of study through the arrangement of work experience placements at home and abroad. Further to this the international exchange of experiences and networking in the area of „women in research and technology" is accelerated.

FEMtech – Women in Research and Technology

FEMtech is a programme supporting women in research and technology and is for the creation of equal opportunities in industrial and non-university research, at technical colleges of higher education and in research and technology programmes.

FEMtech supports the development and implementation of measures for the promotion of equal opportunities for men and women. FEMtech is supporting the Infineon FIT project over a time period of 24 months.

The Intel Ireland example: Gender diversity philosophy and programmes

Introduction:

Ireland is Intel's manufacturing and technology centre for Europe. The Intel Ireland campus, at Collinstown Industrial Park, Leixlip, County Kildare, is Intel's fourth largest manufacturing site overall, and the largest outside the United States.

Intel decided to locate its manufacturing facilities in Ireland in 1989, and production of motherboards and systems commenced on the 150 hectares former stud farm at Leixlip, near Dublin, in 1990. There are currently two semiconductor factories on the site, Fab 10 and Fab 14, which have merged to form Ireland Fab Operations (IFO), and Fab 24.

In May 2004, Intel announced a further investment of $2 billion in a new facility, Fab 24-2, which will run on the state of the art 65 nanometre (nm) process technology. This factory will soon produce the latest generation of Intel microprocessors.

Being a good neighbour in our local community is important to Intel Ireland. We strive to make a positive contribution to the local community and be seen as adding value. We work closely with our near neighbours, community groups and organizations, local representatives and the community in general in an effort to keep them informed about what is happening on the Leixlip campus and we actively look for opportunities where   we can support them.

We are a significant supporter of education and training at both second and third level in Ireland. At a local level, Intel has worked closely with both the primary and post-primary schools in the surrounding area to ensure that, by working with the schools, Intel's presence can add value and support the local students. On a national level, Intel has a number of initiatives, which are aimed at supporting the Irish education system. We have strong links with a number of national universities and Institutes of Technologies and work with them on regular basis. The Intel Teach to the Future programme was launched in Ireland in October 2000 and to date over 9,500 teachers have been trained nationally. This programme trains teachers to use the PC as a pedagogical tool in the classroom. An Intel Computer Clubhouse was set up in Blanchardstown, Dublin in 2001 and a second one was opened in the inner city area of Dublin in 2003 on the grounds of Media Lab Europe. The Clubhouses allow underprivileged children have access to hardware and software, which allows them to be creative and have both an educational and fun interaction with PCs. Intel Ireland is also a big supporter of the Young Scientist & Technology Exhibition, which encourages students from around the country to continue studying physics, chemistry and mathematics for their senior cycle and third level courses.

At Intel in Ireland we have certainly adopted the company's commitment to diversity and have taken a leadership role in role-modeling diversity initiatives. Intel Ireland's efforts were formally recognized when, for the first time ever in 2003, one hundred workplaces in the EU were honoured for the exceptional quality of their workplace environments. Additionally, the European Commission announced that Intel Ireland was the

recipient of the prestigious EU Diversity Award and described the company as an outstanding workplace in the field of promoting diversity. Anna Diamantopoulou, European Commissioner for Employment and Social Affairs, presented the award.

In 2003 Intel Ireland was also selected by Fortune magazine as one of the top 10 'Great Companies to Work For' in Europe. This is a fantastic endorsement of Intel Ireland as a great place to work and all employees at the site are delighted to be working in one of Europe's top great companies.

Philosophy and General Context

Intel Ireland has a clear philosophy on diversity:-

- Workforce diversity enables us to maximize our competitiveness by assembling the best possible workforce from our society.

- We promote diversity by providing a safe and inclusive work environment that attracts and retains the best people and gives them the support to grow and productively use their individual insights and talents to increase our leadership across the industry worldwide.

We strive to have a culture where everyone's unique contribution is appreciated and where everyone can contribute to their maximum potential.

With that, we are committed to treating all employees on site with respect and dignity regardless of their differences and providing a workplace free of harassment on any grounds (gender, sexual orientation, race, religion, national origin, age, marital/family status, disability, membership of the Travelling Community, etc).

Female Career Development/Advancement – The Employee Life Cycle

The employee life cycle constitutes several stages:-

- Market availability/pool - before entering the workforce
- Hiring – when an employee joins a company
- Integration – familiarization and getting to know the company
- Development – learning and growing in the company
- Retention – staying with the company
- Retirement

Understanding and Influencing Market Availability and Talent Pool

Intel's staffing market intelligence effort ensures we understand the market availability for female employees. We engage external organisations to conduct comprehensive surveys on the numbers of females applying into educational disciplines related to our industry and the number who successfully get into the courses and graduate. We also maintain a close network with selected companies to understand their hiring needs, headcount and availability of experienced candidates. The information provides us with the understanding of the market availability of both female graduates (inexperienced) and experienced candidates already in the workforce.

Data from the colleges in Ireland suggests that the numbers of females entering technical/science courses were extremely low and that these courses were typically male dominated. The obvious result was that the number of female graduates we could hope to hire would be constrained.

Therefore we have put a number of initiatives in place to encourage more females to keep on science subjects for their Leaving Certificate and then go on to technical courses at third level. Examples of such initiatives include being a gold sponsor of the national science fair, having scholarships specifically targeted at females, running courses such as 'Design & Discovery' and 'Seeing Reason' that are not gender specific and make engineering fun for everyone. All these initiatives will hopefully mean that the number of females going into third level technical courses will rise and our female pipeline for hiring will thus also improve.

Intel Ireland also tries to encourage and influence the market by deploying several programmes to encourage females to enter into engineering disciplines thus enlarging the market pool of female candidates. An example of such programmes is the "Careers Day for Future Female Engineers" held in February 2005.

Parity of Hiring

Gender representation is one of the several factors considered in our staffing strategies. As part of our Diversity plan, we regularly monitor parity of female hiring to market availability.

Currently, Intel Ireland female engineers hiring is at 18% while market availability is at 11% (Source: Institute of Engineers in Ireland/IEI). This means that we are hiring above market availability for female employees.

Note: market availability reflects the percentage of female engineers compared to the total population of engineers in a specific country or "market". We strive to achieve a higher percentage within our own engineering workforce.

Development and Career Advancement

Intel Ireland places great importance on a learning organization. The training and development philosophy, strategies and programs is comprehensive and available to all employees, irrespective of gender or any other diversity categories, to support personal and professional development as well as anticipate and fulfill business needs.

On career development, the cornerstone of Intel Ireland's performance management is based on meritocracy: manage and reward based on performance.

Aligned to that, we have several programs and efforts in place to help facilitate female employees' progression and development.

- Mentoring Program – senior managers are required to mentor female managers and senior individual contributors. The objectives are:
    - o To improve retention through individualized mentor relationships
    - o Identify and develop female and URM candidates for potential leadership roles
    - o To create a higher level of visibility and advocacy for female and Under Represented Minorities

o For senior managers and mentors to learn about an under represented segment of our employee base – reverse mentoring

- Bi annual review of female promotion parity by grade as part of the overall focal/performance management process – to review for parity, based on meritocracy/individual performance.

- Quarterly review of male and female parity in terms of grade progression, time in grade, headcount distribution and turnover rate and reasons.

Organisational Health and Retention

In addition to monitoring female LTO (Labour Turnover), Intel Ireland also measures the employee satisfaction through the various pulsing mechanisms we have on site, examples of 1-1s, employee luncheons, employee pulsing sessions, informal gathering and teambuilding activities.

We also have a formal organisational health survey to assess employee feedback and satisfaction on a few key areas. Within that survey, we regularly monitor male and female employees' feedback and satisfaction rates on the various aspects of organizational health.

Pay and Compensation

Intel Ireland does not have a gender pay gap.

Based on the principle of meritocracy, performance is recognised & rewarded based on bi annual reviews. These reviews encompass an equality audit which has a gender focus. While salaries may vary, each employee's total compensation is made up of the same elements:

- Base salary

- Employee Bonus

- Employee Cash Bonus Plan

- Share Purchase Plan

- Pension plan

- Health Insurance cover

- Profit Sharing Scheme

Our hiring and compensation processes ensure there are no gender biases. Based on our pay scale we constantly monitor several gender equity factors: parity of promotions, pay equity, and performance ratings aligned to the principle of meritocracy. In all cases, if a gender based imbalance is found, root cause analysis and corrective plans are developed to address it.

Reconciling Work Life with Family Life: Work Life Effectiveness programmes:

Intel Ireland continuously assesses how to introduce, proliferate and sustain services and programs to help its employees better manage their busy lives while ensuring organisational success.

We do that through three strategies:

- Sustain and enhance family friendly initiatives

- Promote employee and continually improve employee flexibility

- Continue to strengthen the employee/manager relation to facilitate Work Life Effectiveness

As examples of this focus on Work Life Effectiveness, it is worth calling out the following policies either already in place, or under development:

- Alternative Working Patterns Guideline: subject to agreement with their manager and based on balancing business needs with those of the individual, any employee can request to work under a flexible work pattern. Policy in place since 1997.

- Term time policy: under development.

- Gradual Return to Work After Maternity policy: designed to ease the return to work after a maternity leave. Under development.

Summary

In summary, Intel Ireland takes care and effort to ensure equality between men and women. Within the overall umbrella of the Company's meritocracy and Work Life Effectiveness philosophies, we are diligent to encourage women to develop personally and advance professionally, to ensure compensation equity and to help employees have healthy balance of work and family lives.

Gender Diversity, a commitment at every level of the business

A pioneer of cultural diversity, one of Schlumberger's greatest strengths is the diversity of our workforce. Schlumberger is not defined by a 'nationality' that describes its culture, but operates in a truly global fashion throughout the world. As a company, we encourage fair employment practices worldwide and offer equal opportunities to all our employees regardless of race, color, age, sex, religion or national origin.

Workplace diversity: Developing human resources for the future.

Our customers, suppliers and shareholders are increasingly global and diverse. They expect us to understand, respond and deliver services that meet their unique expectations.

We must attract and retain top performers worldwide from the full depth of the talent pool and address the evolving needs of our workforce in terms of quality of life and career expectations. By creating a variety of perspectives—gender and culture—that stimulate productive creativity and innovation—we maintain our competitive edge.

Key Factors Driving Schlumberger Diversity Goals

1. We are a publicly traded corporation concerned with profitability and shareholder return.

2. Meritocracy drives our actions, decisions and employee advancement.

3. While it is a competitive advantage that our workforce communicates in a multitude of languages, English is the common language used for internal management communication.

Gender Diversity: A commitment to act

Schlumberger successfully attracts a globally diverse workforce, employing more than 60,000 people from 140 different nationalities, who are integrated into all levels of the company, including senior management. In this same spirit Schlumberger has been actively promoting gender equality since 1994, thanks to these efforts, women now represent some 15% of the engineering and management staff at Schlumberger, compared with just 6% in 1994 and 11% in 2000.

Schlumberger remains committed to a continuous increase in the percentage of women that we recruit worldwide, ensuring proper career development for high-performing women, and increasing our organizational flexibility to accommodate a wider range of personal situations. In 2006, women are expected to comprise 25% of all field engineer recruits and 34% of recruits for the Schlumberger Research Centers.
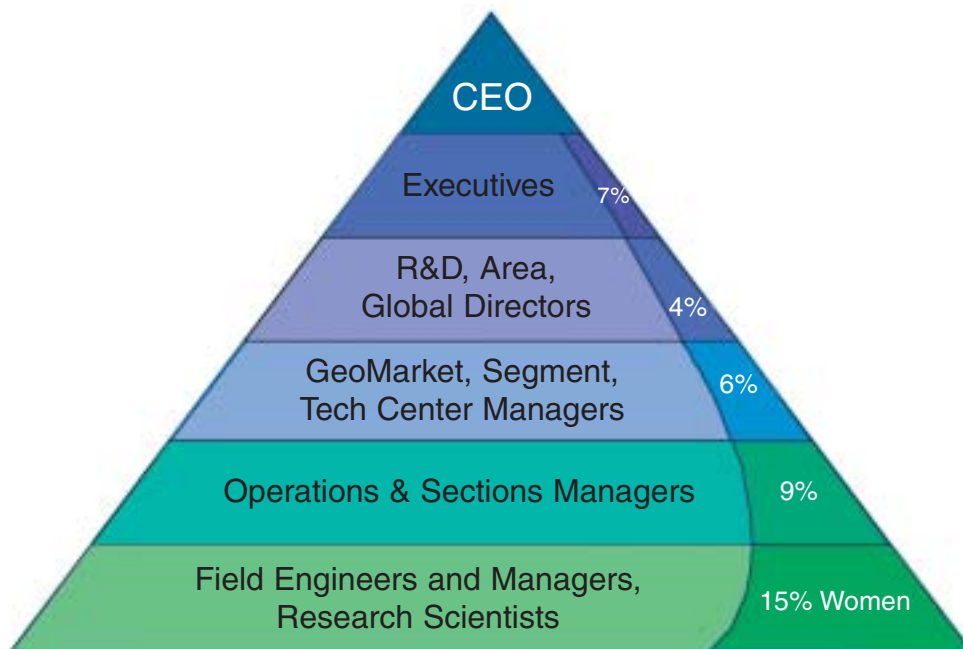
Changing approaches to career management

Schlumberger pays particular attention to the development of women and their careers within the company, most notably through its program for identifying high-potentials employees.

Schlumberger uses succession planning charts to demonstrate and quantify its goal of increasing the proportion of women in top management. In this way, Schlumberger sets itself clear targets for the proportion of women it wants to attract to senior positions within the organization.

(Of the total population of exempt employees in Schlumberger 15% are women. Source "Women in Industrial Research – Speeding Up changes in Europe", Berlin, Germany October 2003, Keynote Speech by Andrew Gould, Chairman and CEO of Schlumberger)

Schlumberger's women professionals

CEO

Executives — 7%

R&D, Area, Global Directors — 4%

GeoMarket, Segment, Tech Center Managers — 6%

Operations & Sections Managers — 9%

Field Engineers and Managers, Research Scientists — 15% Women

(Of the total population of exempt employees in Schlumberger 15% are women. Source "Women in Industrial Research – Speeding Up changes in Europe", Berlin, Germany October 2003, Keynote Speech by Andrew Gould, Chairman and CEO of Schlumberger)

Managing work life balance and dual career families

Schlumberger takes family considerations into account in decisions about personnel matters and assignments.

The company supports social networks and forums that enable women to talk about what they would like to see happening and offer suggestions in areas such as managing dual career families, work-life balance, coaching and mentoring.

When it comes to geographic mobility, our aim is to continue to build on the company's wealth of experience in managing dual career families: ensuring that the right conditions are in place for couples where both the man and the woman work to pursue their careers, whether in their home country or abroad. With this goal in mind, Schlumberger plays an active role in two initiatives: PartnerJob and the Permits Foundation.

In 2000, Schlumberger set up PartnerJob.com in partnership with seven other multinational companies. PartnerJob.com (www.partnerjob.com) is a career Web site designed to enable geographic mobility by helping the partners of employees posted abroad to find appropriate employment in their new country. CVs and information about job vacancies are posted on the site by the member companies, which now number 45.

Schlumberger is also a founding member of the Permits Foundation, an international non-profit corporate initiative to promote access of accompanying spouses of international staff to employment through an improvement of work permit regulations. The Permits Foundation has already been successful in influencing and contributing to change in France, The Netherlands and the USA. It is currently promoting improvements in other countries in Europe, for example in Germany and at the European Union. It has also started to develop networks in Asia and is working to raise awareness of this issue worldwide. The foundation corresponds with government ministries and agencies directly and/or through local networks of employer organisations and other interested bodies. (Source: www.permitsfoundation.com)

Long-term commitment at the highest level

The idea that diversity is a source of innovation and creativity is supported at the very highest level within the business. In October 2003 – at the European conference on women in industrial research – Andrew Gould, the Chairman and CEO of Schlumberger, made a rallying call to all company senior executives to tackle gender diversity by working together on a series of concrete actions. For the full speech please go to: http://www.slb.com/media/about/speech_womenscitech.pdf

Encouraging women to think about careers in scientific and technical fields also requires involvement in the classroom. Teachers often play a decisive role in career choice. That is why Schlumberger encourages the development of 'role models' for women, by providing support for women who are already teaching science or want to do so through its 'Faculty for the Future' program.

Schlumberger

Diversity & Inclusiveness at Shell

Shell at a glance

Since 1907, the Shell Group has been best known to the public around the world for our service stations and for exploring and producing oil and gas on land and at sea; but we deliver a much wider range of energy solutions and petrochemicals to customers.

Whether you look at our locations, our activities or our partners, Shell embraces a world of diversity. We operate in over 140 countries and territories and employ more than 112,000 people, probably among the most diverse group of people in the world. We consider a diverse workforce and an inclusive work environment as vital to building relationships and trust, and key ingredients to our continued success as an established business leader in the 21st century.

Diversity and Inclusiveness at Shell

At Shell, **diversity** means all the ways we differ. It includes visible differences such as age, gender, ethnicity and physical appearance; as well as underlying differences such as thought styles, religion, nationality, and education.

Inclusiveness means a workplace where differences are valued; where everyone has the opportunity to develop skills and talents consistent with our values and business objectives. The aim is to create an organisation where people feel involved, respected, connected – where the richness of ideas, backgrounds and perspectives are harnessed to create business value.

For us, Diversity and Inclusiveness are interrelated and should not be separated.

Our vision and targets

The Group Diversity and Inclusiveness Vision that guides our work is:
- "A recognized leader in Diversity and Inclusiveness"

A framework defines Group targets and principles. They cover global targets for representation of women and local nationals in senior positions, as well for workplace inclusiveness measured through global employee survey.

Our journey towards D&I

The change process to achieve our D&I vision is a long journey characterized by four key stages.
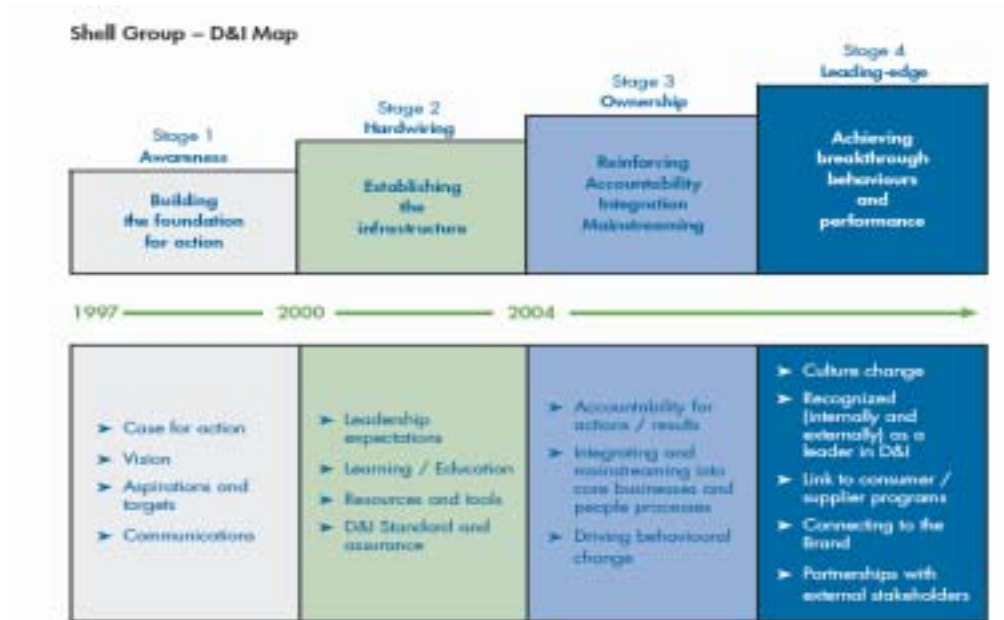

Our current focus is to more fully integrate and mainstream diversity and inclusiveness into our businesses and corporate culture to achieve our goal to become 'A recognized leader in D&I'.

Gender specific diversity & inclusiveness

We have a global target to continuously improve representation of females in senior positions to 20%, which is a long-term minimum target. At present, of the approximately 1600 senior jobs globally, 9.9% are taken up by women. This is still only half way towards our minimum target, but has already more than doubled from the percentage in 1997 when we first started the journey. The percentage of women in positions just below senior leadership level also increased, which supports sustainable progress towards our goal.

Women representation at Shell
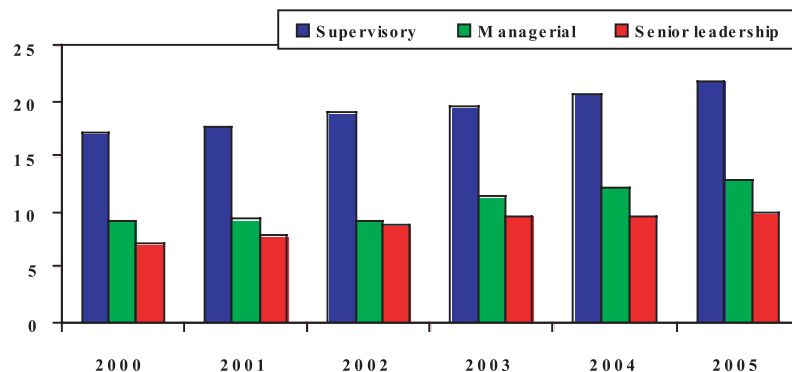
Various actions have been taken to accelerate our progress towards the goal, including:

- engage senior leaders, HR managers and staff about gender culture differences

- skill up HR and D&I practitioners for D&I in their every day work

- study barriers for women's progression and retention at Shell, and implement improvement recommendations

- roll out 'Women Career Development Programme' globally for women in middle level management positions

- support establishment and on-going activities of women's networks (currently 10 in Europe, America, Africa, Asia-Pacific and Middle East, and more are emerging)

- review HR policies and process to ensure that they are free from bias

- carry out women-focused attraction and recruitment campaigns

- communicate to the public through various channels our commitment in supporting women development

Summary

We have made progress to embed D&I into our businesses, but much more needs to be done. **With globalisation, new business opportunities in emerging countries, greater competition for talent, focus on D&I is critical to business success now and in the future**. We need to put D&I at the very heart of our business processes with greater accountability for results, and leverage the power of D&I in improving our global performance.
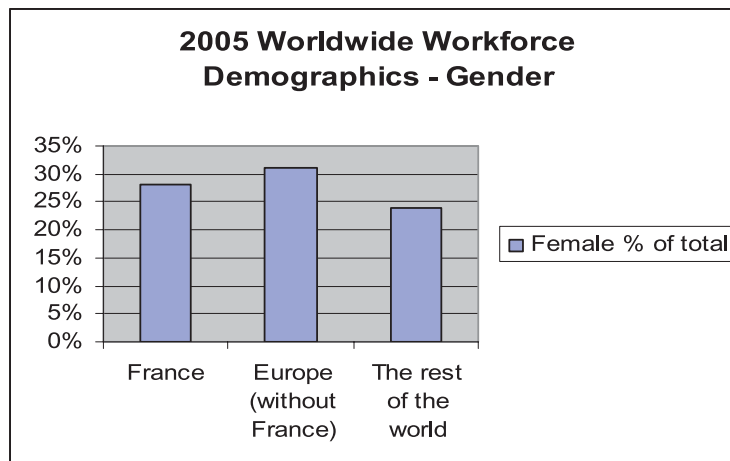
Diversity policy in TOTAL

Total is today ranked as the fourth oil major worldwide, with a presence in more than 130 countries where at least 60% are local employees. Diversity and inclusion are therefore key values in the Group's identity.
In 2003, the Group embarked on an extensive Diversity policy with a view to improving the representation of women and non French nationals amongst the high potentials, middle and top management cadres. Feminisation comes with the many challenges generally faced in a masculine dominated industry like ours. The recognition and promotion of our local talents are also central to understanding the local political and economic challenges, as well as to securing our licence to operate in the various countries.

2005 Worldwide Workforce Demographics - Gender

At the Group level, the main drivers of our diversity policy are:

- **Competitiveness**
  o We truly need the talents and competence of our employees. We select only on these criteria irrespective of gender.
  o Diverse teams have a better understanding of local business issues.
  o Diversity boosts creativity and reactivity.

- **Legitimacy**
  o As far as corporate social responsibility is concerned, an important driver is respecting the expectations of our employees. According to our Group annual internal survey, our employees rank equal opportunities as the first social priority the Group has to work on in the coming years. This request for equal opportunities is more recurrent in the non OECD countries and amongst women, for whom more than 50% have asked for an active women development policy within the Group.

- **Equity**
  o Promoting diversity is a chance for every one to realize his/her full potential.

Principal actions of the Diversity policy:

- **Creation of a Diversity Council.**

    - **Council members**
    The Diversity Council is chaired by a member of the Executive committee, which is the highest level of management.
    The Diversity Council is composed of twelve council members, representing our core businesses (upstream, downstream and chemicals) and representing diverse ethnic and cultural backgrounds, genders, and occupational fields. For example, we have the general secretary of our South African subsidiary, the HR managers of our Indonesian and American subsidiaries, a Chilean lawyer working in Paris, an Indian engineer working in our American refinery…

    - **Council's missions**
    The missions of the council are to act as a focal point on all diversity initiatives, to promote the Group's diversity policy across all its activities and geographical zones, to propose new actions and to establish and follow up diversity indicators. Monitoring the evolution of feminisation is very important.

        For example, the table below shows the evolution in the last three years:

	Women		
	2003	**2004**	**2005**
Recruitment (NP10+)	20%	24%	26%
Managers (NP10+)	17%	18%	19%
Top Executives	4%	6%	6%

    - **Diversity Council's actions**

    The council proposed ten recommendations relating to specific diversity issues to the Executive committee, and these are being implemented.
    - One of such recommendations was to introduce the notion of diversity into annual appraisals. Thus, the new Annual Appraisal form (for the 2005 EIA campaign) has introduced the notion of diversity in the managerial skills assessment.

    - **Setting up gender indicators**

    The indicators are medium term objectives. These indicators address some non classical issues. For example, we can track the number of women per grade (Hay level); the rate of attendance of women to the Group management seminars which are prerequisite to top management positions; the number of women representation in a selection of ninety identified management committees of subsidiaries and large divisions within the Group.

Total has developed a common framework across the businesses to strengthen our efforts on employee diversity around the world. Adapting our guidelines to the local context is paramount. Each business, as well as our biggest subsidiaries, has their own diversity program, which are of course in line with the Group guidelines albeit steered and monitored by the business management. Indeed, there is an annual presentation of the evolution of the

results.   Each of our HR divisions has its own diversity agenda, and the Diversity and Accountability Division acts as a catalyst, a coordinator, to give a global dimension to the approach, and to nurture it through systematic exchanges with the external world.

In France, in October 2004, Total, along with 35 other French companies, signed a **Diversity Charter** asserting their commitment to non-discrimination and to cultural, ethnic and social diversity.   Also, in November 2005, we signed a **global agreement on equal opportunities** with our European unions.   This agreement extends the gender diversity policy to all categories of employees (both managerial and non managerial staff).

Total's ability to attract and retain diverse professional talent is fundamental to our success. For us in Total, a career is likened to a chain. Its reliability of course depends on each of the links in the chain.   In other words, we consider all the steps of a career with the same scrutiny.   We focus our diversity policy on different issues: recruitment, career-mapping, training, mobility and remunerations.

- **Recruitment:**
  Like every other company, our primary focus is recruitment, so we make sure that we recruit women in proportion to the number of the female graduates from our targeted schools. In 2 years, we have more than achieved this goal in France, and we are now ready to extend it worldwide knowing fully well the challenges involved since we recruit in more than 100 countries.

- **Career-mapping:**
  Maternity leaves and remuneration:
  - Between or after the maternities, we keep a narrow contact with the mother, if she is wiling, in order to establish a medium term career path, minimizing the real or perceived risks of a lower dedication to work.
  - And more concretely, to avoid some salary gaps between men and women, we have decided to attribute to each employee on maternity leave an individual salary increase which is at least equal to the average individual salary increases she received in the three last years.

  Detection of high potentials:
  - To avoid misdetections due to stereotypes, we ensure that the committees which decide the selection or development of high potentials reflect the diversity of the Group. In other words, they are not only made up of French male engineers. The idea is that women and non French can also bring a new dimension into the assessment of the candidates. For the top management, we review systematically the annual promotion of women, with long term objectives.

- **Training:**
  Stereotypes awareness: Seminars on stereotypes awareness were developed in a first instance for the managers who work on career-mapping. These are now being extended to line managers.

- **Mobility:**
  To avoid the factual exclusion of women from expatriation opportunities, due to supposed family constraints, we try to enlarge the scope of the possibilities for the couples, and to warn career managers and other decision makers against their own stereotypes.   Stereotypes could put a brake on female careers.

- **Work life Balance:**

    The challenge is now to offer better work life balance opportunities for all of our employees.

    - A first attempt by the Group was through a dedicated extranet service, called "Only you". From the offices, one has the opportunity to manage some of the demands of everyday life e.g. shopping, child care opportunities…This website helps employees based in our Paris offices to find practical solutions.

    - We have now gone a step further with the opening of a Crèche in our La Défense site. Some subsidiaries are already considering this measure as a best practice to share.

    - Our actions are adapted to local context, environment and legal rules. For example, we have some flexible work and job sharing arrangements in United Kingdom (Aberdeen).

Integrity, loyalty and responsibility at Total

Total expects Group employees to act with integrity, loyalty and responsibility. In return, the Group pays close attention to employee's working conditions, ensures that every person is respected and that there is no discrimination. It also takes appropriate measures to protect employees' health and safety, whatever the political or social context or other difficulties encountered in the countries where Total operates.

- These values and common principles are in the corporate Code of conduct.
- Total has an Ethics Committee too. The Ethics Committee's role is clearly defined in the Code of Conduct. It can be consulted by all Group employees on any issue related to professional and business ethics. Women can consult the Committee directly if they know of any gender discrimination.

Opinion and feedback

We want to know what our employees think about Total's commitment to gender diversity. Recently, we developed an electronic brainstorming network of 2 separate groups of female and male employees. This technique, called "debate without meeting", (conducted online via a secure and anonymous site) gave an opportunity to these groups composed each of 200 women and 200 men respectively, representing diverse professional backgrounds, different age brackets and nationalities to comment openly and suggest some measures to promote gender opportunities. Thereafter, they were asked to vote on the different suggestions made. Both men and women, especially in the younger generations rank equal opportunities as the first priority. Following closely is the issue of work life balance.

Despite our progress, we know that we have more work to do if we are to achieve our aspirations - to promote feminisation; and to provide opportunity for all. We believe very strongly that embedding respect for diversity in everything we do will help us get there. We are yet to facilitate tele working or flexible working hours, especially in a country like France where presenteeism is culturally a must! A collective agreement detailing the rules and regulations concerning part time work was signed in October 2005 with the French unions for employees assigned to France.

TOTAL

different ideas. diverse people. dramatic results.

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Drawing on

the Diversity of

a global workforce

and offering an

equal opportunity

to achieve

success

THE
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XEROX

Diversity is about more than race and gender, it's about more than numbers. It's about inclusion. Diversity means creating an environment where all employees can grow to their fullest potential."

Anne Mulcahy
President & CEO
Xerox Corporation

The Diversity Hierarchy

For many people, the term "Diversity" often equates to Balanced Work Force (BWF). However, Diversity may be best described as a hierarchy with four distinct levels:

Creating Diversity — The most basic need is representation, or creating a workplace in which people of different conative/cognitive thinking, gender, race, age, cultural background, sexual orientation, gender identity and physical ability work together.

Managing Diversity — The management practice around Diversity. Are we retaining our people and treating them fairly regardless of gender, race, age, cultural background, and sexual orientation and physical ability?

Valuing Diversity — The work environment where Diversity and varying perspectives are genuinely valued.

Leveraging Diversity — Diversity is critical to the business strategy to strengthen and grow the business through a diverse customer base.

The work environment is integral to Diversity. A productive work environment values all ways of thinking, cultural differences, and new perspectives . When we value Diversity and a heterogeneous employee population, we strengthen the work environment. And the stronger the work environment, the more opportunity we have to leverage Diversity to grow the business.

diversity at Xerox

Xerox is recognized as one of the most progressive companies in the world when it comes to Diversity. We receive great praise and numerous awards for our initiatives in building and maintaining an inclusive corporate culture.

This culture understands and utilizes employee individuality and diverse thinking to establish high performing teams and organizations that work together to achieve common business objectives.

At Xerox, we view Diversity as a business opportunity — it is the acceptance of people of all ages with globally diverse backgrounds whose fresh ideas, opinions and borderless creativity enrich the lives of others.

To be successful today, a company needs creative, motivated employees with different backgrounds and perspectives, who can create innovative solutions. In a business that runs on fresh ideas, diverse perspectives are a priceless resource.

diverse people

Vision

Our vision is for everyone to treat each other with equality, dignity, and respect. As individuals on a team, each member can rely on the other's strengths to build on team potential and company productivity.

Goal

Our goal is to promote understanding and inclusion, and to raise awareness of behaviors surrounding all types of 'isms,' e.g. sexism, racism.

In support of this the company will:

- Leverage differences as a competitive advantage
- Develop leadership that values unique perspectives
- Embrace a framework within which diverse work groups can consistently perform and improve their work

The company has instituted a comprehensive set of Diversity programs in support of these goals. Among them are:

The Balanced Workforce Strategy—which drives equitable representation in all areas of the company.

Employee Roundtables–where senior management gains insight into Diversity issues directly from employees.

Minority/Female Vendor Programs—where the company actively commits to purchasing supplies and products from qualified female- and minority-owned businesses.

Work Life Programs—designed to aid employees in many aspects of their personal and family lives.

Training, Development and Succession Planning—which improves diverse representation at all management levels.

Caucus Groups

In addition, Xerox has recognized employee Caucus Groups which are instrumental in advocating openness, opportunity and inclusion for the entire Xerox community.

There are six recognized Caucuses that serve a vital function by providing employee advocacy, self-development and communications, and by acting as a catalyst for positive change.

Each Caucus Group has a Corporate Champion. The Champions serve as a voice for the Caucus Group at the senior level. They provide a communication link for continuous improvement, and represent and educate senior management on the unique diversity concerns within a particular constituency.

The current Caucuses are:

ACT—Asians Coming Together

BWLC—Black Women's Leadership Council

GALAXE—Pride at Work—Gay and Lesbian Employees

HAPA—Hispanic Association for Professional Advancement

NBEA—National Black Employee Association

TWA—The Women's Alliance

Diversity Role Model Behaviors For Valuing Diversity

Each of us has an important role in ensuring that everyone is treated with dignity and respect and valued for their unique talents and contributions. Practicing Role Model Behaviors is a critical step.

Know Yourself/Seek Information

- Understand your own biases and assumptions
- Find out what's fact or fiction about what you believe
- Monitor your assumptions and behaviors around others

Acknowledge and Value the Contribution of Each Employee

- Reward innovation and flexibility
- Use inclusive language
- Allow employees to feel comfortable showing their true personalities

Create a Supportive Work Environment

- Solicit ideas and opinions
- Encourage employees who make suggestions to take ownership of ideas, investigate their feasibility and be empowered to carry them out
- Listen; allow employees to challenge and disagree with you. When this happens—and it will—don't become defensive
- Make sure that the environment is barrier free; not just for people with physical limitations, but for all workers

Ignite Team Spirit

- Get to know your employees by conducting team building activities
- Find common ground; focus on similarities, not differences
- Reward people as teams; praise hard work of both leader and supporting team
- Foster cooperation
- Build the confidence and self-esteem of each individual on the team

Use Your Personal Leadership to Enact Fair Practices

- Be a visible spokesperson for change
- Work to shape policies

Create and Enforce Human Resource Practices that Value Diversity

- Recruit, hire and promote a diverse workforce
- Support flexible work systems
- Provide performance feedback based on meeting objectives and behaviors

different ideas

dramatic results

When we speak of Diversity, we mean those qualities and characteristics that make us unique aside from visible and physical attributes, such as divergent thinking and cognitive flexibility. Organizations understanding and promoting these aspects of Diversity have a broader and richer base of experiences from which to address business issues and critical analysis.

The Results:

- Improved business and customer solutions
- Greater creativity and innovations
- Improved customer and employee satisfaction
- Recognized as an employer of choice

The success of our commitment to Diversity is measurable. In 2001, Xerox was ranked No. 6 on Fortune magazine's fourth annual list of "America's 50 Best Companies for Minorities." Xerox is also among the companies receiving perfect ratings for 2001 in the seventh annual "Gay and Lesbian Value Report of Best and Worst Companies" by glvReports. In 2000, Xerox won both the Francis Perkins Vanguard and the Dwight D. Eisenhower Award for Excellence … the list goes on.

With our intensified efforts, we will continue our long history of inclusion and strengthen our commitment to Diversity for the future. In so doing, we will improve our position in the global marketplace, and leverage our commitment into improved financial results for the company. In fact, it has been reported that the 20 percent of companies with the highest rate of female/minority hiring outperformed the New York Stock Exchange by almost 2.5 percent! Beyond that, it is an ethical and social obligation that Xerox has always, and will continue to take seriously.

Xerox diversity agenda

For the future, Xerox has increased its commitment to Diversity in the workplace. The goal is to make Diversity a way of life at Xerox and recognize it as a conduit to achieving critical business results.

There are five facets to the plan:

Executive Commitment— Commitment begins at the top. Executive support is vital to be successful.

Communication Process — Effective education of employees and management on Diversity programs, policies and achievements is critical to the success of the plan.

Training/Competency — We must ensure that principles of Diversity are taught to all employees entering the Xerox work environment and are cascaded to all levels of management.

Operational Strengthening — We will address imbalances in our employee population by identifying shortfalls, and strategically closing the gaps.

Strategy Development — Development of a strategy focused on leveraging Diversity to gain business advantage.

One of the centerpieces of the plan was the establishment of the Xerox Diversity Council to serve as an executive leadership body for Diversity and work environment initiatives that represent the balanced needs of all Xerox employees.

The Council is composed of fifteen members, and supported by the CEO. The Council reviews, recommends and advises on Xerox Diversity practices, supports the Diversity plans and assesses Xerox's Diversity performance.

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Annex I – Biographies of the experts

Margo BROUNS

Dr Margo Brouns, educated as sociologist, is senior researcher appointed at the Groningen University and expert in gender and organisational culture. From 1999-2004 she managed, as Associate Professor for Gender Studies, the interdisciplinary project Gender and Sciences. Since 2005 she is part time appointed Professor at the NHL University for Professional Education, and chair of a research programme on innovation and conceptualisations of care.

Her Gender Studies research concentrates on the issue of academic culture and career development from a gender perspective. A study on possible gender bias related to a prestigious grant of the national research council (TALENT) was followed by investigations on the selection procedures of candidates for fellowships for young and excellent researchers (published in 1999 and 2000). Brouns was co-rapporteur for the workshop Minimising Gender Bias in Definition and Measurement of Scientific Excellence, organised by the European Commission (Women and Science Unit) in co-operation with RSCAS-EUI and the Joint Research Centre (EC). The synthesis report *Gender and Excellence in the making* was published in July 2004. Current research, together with junior researcher Marieke van den Brink, concentrates on selection procedures for full professors.

Brouns is rapporteur for the expert group "Women in science and Technology – the business perspective" in which leading companies work together with experts. She is advisor to some Dutch Ministries and companies in developing adequate policies to improve women's career mobility.

Her PhD, defended in 1993 at the Free University of Amsterdam, focussed on power analysis in gender and work issues. Articles were published in *Gender, Work and Organization* and *European Journal for Higher Education*. From 2002-2005 she was vice president of AIOFE (Association of Institutions for gender studies and gender research).

Pierre BISMUTH

Pierre Bismuth is a Senior HR Advisor with Schlumberger, the international Oilfield Service Company. He is Chairman of NExT, a Schlumberger Company specialized in competency management in the Oil and Gas sector .He is also a Senior Consultant for Schlumberger Business Consulting.

He has been with Schlumberger for the last 32 years and was the Vice President of HR for 10 years, since 1994 . He has worked in Europe, South East –Asia, Japan and America. Throughout his career, he has been deeply involved in making this company both nationality and gender diverse in its staffing, global in its policies and teamwork driven in its organization.

As a practitioner, Pierre Bismuth participates in many task forces and conferences and conducts seminars on diversity, the global policies needed to support it, and cultural changes in international companies. He chairs an expert group on this subject for the European Commission. He consults with a leading international advertising Group on the design and implementation of a global HR function.

Pierre Bismuth is French .He is a Statistician Economist , graduate of Ecole Nationale de la Statistique et des Etudes Economiques (ENSAE) .At ENSAE, he currently lectures on Global HR management and he is member of the Advisory Education Board .

Daniela DEL BOCA

Daniela Del Boca, Ph.D. University of Wisconsin-Madison 1988, is Professor of Economics at the University of Turin. She has been Visiting Professor at New York University, Research Fellow at IZA, Fellow at the Italian Academy at Columbia.In 2000 she was President of the European Society of Population Economists (ESPE) .She has published several books and articles in the area of Labor Economics and the Economics of the Family including "Women in the labor force", with T. Boeri and C. Pissarides (OUP,2005). Her articles have appeared in international journals, including The American Economic Review, Journal of Human Resources, Labour Economics, Structural Change and Economic Dynamics, the Review of the Economics of the Household, the Review of Income and Wealth, Labour. She is co-editor of Labour and member of the Advisory Board of the Review of the Economics of the household. She is currently the Director of CHILD (Center for Household Income, Labour and Demographics (CHILD).

Michel E. DOMSCH

Michel E. Domsch is a Professor for Management and Head of the Institute for Human Resource and International Management at HSU, Helmut-Schmidt-University in Hamburg. Since 2004, he is also Director of MDC Management Development Centre at the HSU. He was a research fellow at the Harvard Business School and received his Ph.D. and his postdoctoral degree "Habilitation" in Business Administration from the Ruhr-University in Bochum, Germany. Michel has worked 10 years in Germany and Great Britain for British Petroleum and more than 20 years as a management consultant. Michel's consulting assignments include projects on employee satisfaction, gender diversity and family friendly policies, work-life balance and leadership development. His clients are from the industrial and public sectors. His research focuses on International HRM, Gender and Diversity, Auditing and Work time Flexibility.

Dr Ruth GRAHAM

Dr Ruth Graham became Director of EnVision 2010 in autumn 2005. This initiative was established by the Faculty of Engineering to ensure that Imperial College is at the forefront of innovation and excellence in international engineering education.

Dr Graham's background is in Mechanical Engineering and was awarded her PhD in fatigue analysis in aircraft structures in November 2001 from the University of Hull, in partnership with BAE SYSTEMS. She came to Imperial College in autumn 2002 to work within the Railway Research group in the Mechanical Engineering Department. The communication and promotion of science and engineering has also been a major focus of her work, and she has led a number of projects in these areas. Dr Graham is also a member of research groups and committees designed to widen participation in science and engineering. Current examples of these activities include membership of a European Commission expert group looking at the business case for increased representation of women in industrial research.

Martha MAZNEVSKI

Martha Maznevski (Canadian) is Professor of Organizational Behavior and International Management at the International Institute for Management Development in Lausanne, Switzerland. Before coming to IMD in 2001, she served as faculty at the University of Virginia in the United States and the University of Western Ontario in Canada, and a visiting researcher at the Stockholm School of Economics in Sweden. She earned degrees in Education from the University of Toronto, and in Anthropology (undergraduate) and Business Administration (PhD) from the University of Western Ontario.

Professor Maznevski directs the new program Strategic Leadership for Women as well as company programs for Borealis, Adecco, Skanska and others. She is a core faculty member of programs for Shell, DaimlerChrysler, and the MBA program. She teaches courses and modules on topics spanning a broad range of organizational behavior topics, including teams and leadership in global and virtual (distance) contexts, diversity and inclusiveness, and the relationship between organizational and national culture. She has served as a consultant and advisor to public and private organizations in North America, Europe, and Asia on issues of managing people globally.

Professor Maznevski has presented and published numerous articles on these subjects. Recently she published *The Blackwell Handbook of Global Management: A Guide to Managing Complexity* (Blackwell, 2004), and she is a co-author of the popular textbook *International Management Behavior* (Blackwell), with a fifth edition forthcoming. She conducted a series of studies on global virtual team effectiveness, and published an article which was awarded "Best Paper Published in 2000" by the Academy of Management's Organizational Communication and Information Systems Division.

Her current research focuses on the on-going dynamics of high-performing teams and networks in multinational organizations, and managing people in global complexity. She co-developed the Cultural Perspectives Questionnaire, an instrument that measures individuals' cultural orientations and is widely used as a diagnostic tool in global teams and organizations.

Laure TURNER

Laure Turner

Assistant Professor at ENSAE *(Ecole Nationale de la Statistique et de l'Administration Economique, part of INSEE the National Statistics Institute)*, Laure has a Phd in Economics of Science and Innovation ("La recherche publique dans la production de connaissances, contributions en économie de la science").

She published different papers on econometrics (2001, "Measurement and Explanation of the Intensity of Co-Publication in Scientific Research: An Analysis at the Laboratory Level"; 2002, "Mesure de l'intensité de co-publication dans les réseaux scientifiques et évaluation du rôle de la distance géographique"; 2003, "Explaining Individual Differences in Scientific Research Productivity: How important are Institutional and Individual Determinants? An Econometric Analysis of the Publications of the French CNRS Physicists in Condensed Matter (1980-1997)").

She participated to the CNRS program « Les Enjeux Economiques de l'Innovation » (1999 – 2002) and to the European program « Product Markets, Financial Markets and the Pace of Innovation in Europe » (PMFM) with CEPR (Londres), EUREQua (Paris), ECARES (Bruxelles), IDEI (Toulouse), ZEW (Mannheim), WZB (Berlin), Pompeu Fabra (Barcelone) (2000-2004).

Annex II

Participating companies

AIRBUS	Sarah Cooper
Air Liquide	Laurence Altobell
	Lucia Sainz
BP	Dan Lovely
EADS	Jacques Massot
	Armelle Billoud
EDF	Christine Patte
ENI	Cristina Pedote
European Space Agency	Pascale Depré
France Telecom	Annie Londeix
Fraunhofer Gesellschaft	Martina Schraudner
Gaz de France	Laure Vinçotte
	Ariane Bisquerra
Hewlett Packard	Josefine van Zanten
	Lisa Kepinski
Infineon	Monika Kircher-Kohl
Intel	Patrick Bigand
	Sabina Tomassi
Schlumberger	Deanna Jones
Shell	Joke Driessen
Siemens	Bettina Muttelsee-Schoen
Total	Catherine Ferrant
XEROX	Monica Beltrametti
	Irene Maxwell

Annex III

Airbus, Air Liquide, EADS, Hewlett Packard, Rolls Royce, Schlumberger, Siemens

Women in Science and Technology in the Private Sector

A Wake-up Call from CEOs

This position paper is a joint, public commitment of Chief Executive Officers of companies based in Europe, who are eager to enlarge the reservoir of talent in Europe.[1] We want to see, in the first instance, twice as many women graduating in science and engineering. At the same time, we want to ensure that their skills are used by industry to the best advantage. We sense an urgency to tackle this problem, but we also need to make a commitment to longer-term strategies.

Our companies have different cultures and operate in a diverse range of industries and countries. We are also at different stages in developing policies to recruit, retain and promote women effectively and efficiently. However, we all want women to play a much more important role in decision-making in industrial R&D and we are committed to working together to put this issue on the public agenda.

We are ready to take the following actions:

- *Taking a Stand*: Each CEO and their top management will demonstrate their company's approach at public events.

- *Sponsoring a Role Model*: Each company will fund a major programme, such as endowing a Chair at a university, to create a strategic partnership with the education sector to encourage women in science and engineering.

- *Promoting Change*: Each company will be a catalyst for change: internally, by promoting awareness, initiating or improving specific company measures, defining strategic goals and monitoring progress; and externally, through co-operation with other companies and universities.

- *Making Use of Existing Programmes*: Each company will take full advantage of existing national and European programmes designed to support women in industrial research.[2]

- *Analysing the Business Case*: A panel of experts (sociologists, economists, scientists, etc) will review existing research, analyse the results and assess the business case today to strengthen public communication.

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[1] Rubsamen-Waigmann, H. et al. (2003) *Women in industrial research: A wake-up call for European industry* Luxembourg : Office for Official Publications for the European Communities

[2] Example: Marie Curie Actions in the Sixth Framework Programme of the European Commission (http://europa.eu.int/mariecurie-actions)

We should also like to trigger changes in the perceptions of women in high school and university, and throughout their careers. These changes are designed to encourage them to take up and pursue careers that will lead to the strengthening of the science and engineering workforce. This will require a contribution from a range of partners in society – primary and secondary education, government and public and private sector industry. We hope that our actions will produce a snowball effect on these other sectors of society.

We are working together as a group to make an impact. The challenge is an exciting one; addressing it successfully will enrich and diversify our corporate cultures. We are committed to sustained action on all of these initiatives. We are aware that these actions will demand investment; yet to do nothing would cost much more.

We welcome other companies that are joining us in this venture and we look forward to working together on this long and interesting journey.

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