Widening Women's Work in Information and Communication Technology

CONCLUSIONS AND RECOMMENDATIONS

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Information Society Technologies

RESEARCH PROJECT CARRIED OUT UNDER THE FIFTH EUROPEAN FRAMEWORK PROGRAMME FOR RESEARCH AND TECHNOLOGICAL DEVELOPMENT, WITHIN THE IST PROGRAMME

This publication has been prepared by Fondation Travail-Université (Namur, Belgium) as the synthesis report of the European project IST-2001-34520, in cooperation with the other partners of the project. All publications of the WWW-ICT project are available in PDF format on http://www.ftu-namur.org/www-ict.

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ISBN: 2-930062-19-3
Dépôt legal: D/2004/6624/30

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Introduction to the full final synthesis report

This is the synthesis report of the IST project Widening Women's Work in Information and Communication Technology (WWW-ICT), carried out under the 5th framework programme of RTD of the European Union, in 2002-2004. Research teams in seven countries (Austria, Belgium, France, Italy, Ireland, Portugal and United Kingdom) have carried out biographical interviews and case studies on women in ICT professions. Their conclusions and recommendations address all those "agents of change" who might improve the place of women in ICT professions: organisers of ICT training programmes, career advisers, human resource managers, recruiters, social partners, women's associations, policy makers in the area of equal opportunities in education and the labour market.

1. Contents

This synthesis report presents the initial framework of hypotheses, the methodological options, the key research findings and results, and the conclusions and recommendations. It is designed as a detailed overview of the whole research and refers to other downloadable reports for those who are interested by an in-depth presentation of the research results.

Chapter I – The gender gap in ICT professions
This introducing chapter draws a descriptive approach to gender disparities in ICT professions and occupations. It specifies the way of defining and considering ICT professions. It also provides a quantitative overview of existing gender disparities in employment and education across Europe.

Chapter II – Hypotheses and methodological options
This chapter describes the various dimensions and explicative variables that must be taken into account in order to draw a comprehensive picture of the gender gap in ICT professions. A structured model of interaction of these explicative variables is proposed. The methodological options of the research project are described and justified.

Chapter III – Biographies of women working in ICT

The main conclusions of the biographical interviews are summarised here. After a description of the sample of interviewees, it draws the key characteristics and varied profiles of women's biographies in ICT. It draws eight clusters of career patterns for women in ICT, based on a multi-criteria analysis of the coded biographical sheets and presents common life story patterns. It comments specific aspects of the male biographies and stresses the common and different points as regards female biographies.

Chapter IV – Women's working life in ICT: case studies in enterprises

The chapter presents a synthesis of the analysis of 14 sectoral overviews and 28 case studies of enterprises in two sectors (computer services and e-publishing) and seven countries. It gives a comparative analysis of work and employment in the computer services industry and the e-publishing industry, with an emphasis on social aspects and gender issues. It also highlights some national and contextual issues related to women's work in these sectors across Europe. It summarises conclusions under two main headings: labour markets; organisational structures and practices.

Chapter V – Lessons from practices trying to attract more women in ICT professions

This chapter summarises and analyses the information gathered on good practices aimed at improving women's place in ICT professions in Europe. It draws some avenues for development and evolution of these practices, stressing the importance of driving forces and mobilising initiators. It gives some methodological recommendations related to quality criteria and evaluation process of good practices in this area.

Chapter VI – Conclusions

The conclusions are presented under four headings: education and training; women's working conditions; labour market and labour relations; women's trajectories.

Chapter VII – Recommendations

Recommendations start from the question: what are the conditions that can make ICT professions and careers more attractive for women? The chapter briefly describes the steps leading from conclusions to recommendations. Then it presents, in a synoptic view, the recommendations, the concerned agents of change, and examples of good practices supporting the relevance of the recommendations. Recommendations are finally detailed according to different European policy areas.

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3. Downloadable project reports

Detailed research reports (English only) are downloadable from the project web site, as well as web versions (English and French) of the awareness leaflets summarising the project outcomes for targeted audiences:

http://www.ftu-namur.org/www-ict

D1 – Conceptual framework and state of the art

This report describes the various dimensions of gender disparties in ICT professions and discusses a set of interacting explicative factors. It relies on a state of the art of existing research in this area (September 2002, updated April 2003, English, 156 pp.).

D2 – On-line bibliography

A customised search engine allows for consultation and retrieval of the on-line bibliography (November 2002, updated January 2004).

D6 – Professional trajectories and biographies

The report starts presenting the conclusions from the biographical interviews, as a 12-pages executive summary. The next chapter analyses more precisely the key characteristics and profiles of women's biographies. The third chapter draws eight clusters of career patterns for women in ICT. The fourth chapter accounts for a more in-depth qualitative analysis of life-story patterns. The fifth chapter comments specific aspects of the male biographies. Annex 1 contains the seven synthesis reports on biographical interviews in each country. Annex 2 summarises the quantitative analysis of the coded biographical sheets and explains the methodology of cluster analysis. Final version: January 2004. Two versions are downloadable in PDF format: full version including the annexes (274 pp.) and "light" version, containing chapters 1-5 without the annexes (68 pp.).

D7 – Case studies of work organisation

The report presents the analysis and synthesis of 14 sectoral overviews and 28 case studies of enterprises in two sectors (computer services and e-publishing) and seven countries. Chapters I and II are respectively devoted to a comparative analysis of work and employment in the computer services industry and the e-publishing industry, with an emphasis on social aspects and gender issues. Chapter III describes the case study analysis in computer services and chapter IV in e-publishing. Chapter V highlights some national and contextual issues related to women's work in these sectors across Europe. Chapter VI presents conclusions under two main headings: labour markets; organisational structures and practices. Final version: February 2004. (124 pp., including annexes summarising the main features of case studies).

D8 – Inventory and analysis of good practices

This report summarises and analyses the information gathered on good practices aimed at improving women's place in ICT professions in Europe. After an introductory comment on the definition criteria of "good" practices, chapter I presents a structured overview of collected good practices. Chapter II draws some avenues for development and evolution of these practices, stressing the importance of driving forces and mobilising initiators. The next chapter develops methodological recommendations related to quality criteria and evaluation process of good practices. Conclusions and recommendations are supported by key arguments for the target public. Seven annexes present inventories of selected good practices in Austria, Belgium, Germany, Switzerland, Italy, France and the UK. Final version: February 2004 (118 pp. including annexes).

D9+10 – Conclusions and recommendations

Conclusions are presented under four headings: education and training; women's working conditions; labour market and labour relations; women's trajectories. Recommendations start from the question: what are the conditions that can make ICT professions and careers more attractive for women? The document briefly describes the steps leading from conclusions to recommendations. Then it presents, in a synoptic view, the recommendations, the concerned agents of change, and example of good practices supporting the relevance of the recommendations. Recommendations are finally detailed according to different European policy areas. (Final version, May 2004, 44 pp.)

D12 – Synthesis report

This is the full synthesis report (148 pp.); from which these conclusions and recommendations are extracted.

D14 – Awareness leaflets

Three leaflets are published for three target publics: enterprises and their business partners; education and training organisations; women's associations and agents of equal opportunities between women and men. Each leaflet has the same graphic design (with a different colour set) and the same structure, but a targeted selection of arguments and examples. The web versions are downloadable in French and English. Printed versions exist in French, English, German and Italian, they can be sent upon request by e-mail.

Chapter

6

Conclusions

The question raised at the beginning of the project was "Why is the ICT sector not open to women?" Now it can be reformulated into "What are the main characteristics of ICT which can be relevant for women's employment and quality of working life? And what conditions can make ICT jobs more attractive for women?" The conclusions give interesting – and sometimes unexpected – answers drawn from our research efforts.

1. From hypotheses to findings: some surprises

General assumptions and current responses mentioned in the conceptual framework and state of the art (Chapter II and D1) raise a major question: why is the ICT sector not open to women? We suggested that it might be for several reasons, mainly linked to education (under-representation of women in technical courses), cultural aspects (computer culture as a masculine culture, the importance of an early familiarisation with computer, etc.), family responsibilities (ICT jobs require a high commitment that makes it is difficult to reconcile work with family life), organisational sphere (few role models of women in senior positions, high segregation between "men's jobs" and "women's jobs").

Some generic assumptions on women and technology are refuted by the project findings.

But in fact, from the project empirical evidence, it emerges that such generic assumptions are strongly criticised, and even refuted, by the project findings.

- *Women do not seem to have such a problem of relation to technology.* Taking into account the fact that we report on women already in the field, technology results very attractive for most of our female informants, who speak of ICT as a creative, challenging, fascinating and satisfying world, despite in our sample an early familiarisation with computer is not so common. The existence of a "culture of masculinity" in computing, which according to some authors is responsible for women difficulties in a ICT environment (Cockburn 1988, Wejcman 1991, Hapnes and Sorensen 1995), and also the division between a

female "working with" and a male "working on" way of approaching technology and computers (Cockburn 1988), do not result confirmed by the experiences of our informants.

- *The classical hypothesis of the role of the family in social reproduction of career orientation* (particularly the role of fathers interested in engineering or mathematics) *is not confirmed*, since in most of the cases, family background is not such a determinant in women's choice: as for biographical interviews, only a few informants have a technical family background (in most of these cases is the father who is in a technical profession). This is coherent with the fact that we found only few cases where the attachment to computer began at an early age.
- Although from both case studies analysis and biographical interviews the working conditions in ICT result quite hard (especially long hours working), as many authors already underlined (Hayes 1989, Grint and Gill 1995, Webster 1996, Smith 1997, Vendramin and Valenduc 2002, Gill 2002, Kunda 2002). Nevertheless, this does not appear to be the most explicative variable of the low female participation in this sector: women generally seem to accept them, at least women already in these jobs. Actually, only few cases are reported of women quitting their jobs and not so many of women being unsatisfied about their work. Women might accept longer hours in change of self-management of working time (Gerwitz and Lindsey, 2000). Meanwhile, this point requires a further analysis, since it comes out to be still a controversial matter.

Therefore, according to this empirical evidence, WWW-ICT initial question might be reformulated in: "What are the main characteristics of ICT which can be relevant for women employment and quality of working life? And what conditions can make ICT jobs more attractive for women?"

We can summarise here some interesting – and even unexpected – answers we could draw from our research efforts. They are:

ICT professions are more diversified than they are supposed to be, as well as entry routes in ICT careers.

- *From inside, ICT professions look more varied and articulated than they were supposed to be.* The scarce "readability" of the real content of these occupations might be one of the reasons of the scant orientation of girls to these jobs. In particular, despite most ICT jobs require technical, math and science based skills – which may discourage women without specific technical degrees – other non-technical skills may be important as well. Especially in their more recent developments (e-publishing, multimedia), ICT professions consist of a number of different contents, from technical ones through economic, marketing and management matters, to arts, communication and linguistic subjects.
- By consequence, *there is not a privileged education and route to ICT professions.* Scientific and technical degrees coexist with degrees and diplomas in arts, journalism, economics and human sciences. Moreover a number of our informants' careers has been undertaken

by women coming from different jobs in the company or from different fields of work: a work-based route into ICT is quite common especially among senior professionals – who entered the sector when formal ICT curricula were not enough articulated – but many examples of "by chance" contacts with ICT are reported as well.

- The research, both case studies on work organisation and biographical interviews, confirms that ICT careers are little formalised (especially in small companies) and that institutionalised continuing training inside the companies is quite rare (except for a few large companies, particularly multinational ones). By consequence, one of the most relevant feature of ICT labour market is the fact that *professional development is mainly up to the individual*. In order to enhance their knowledge and build up their career, people benefit from coaching, team-working, professional community networks and through mobility to other companies (ICT careers as "boundary-less" careers). "Employability" rather than employment, skill recognition and certification are important goals for ICT professionals. In such a labour market, women appear to be disadvantaged by the lack of steady role models of successful women (except for a few experiences of women mentors and female professional networks), by the scarcity of time to invest in self-training and by the heavier constraints to mobility.

In such a highly deregulated working environment, individual resources and capabilities are extremely important.

- Working by project is quite widespread. It often implies strict deadlines and long-hours working during some periods (including working at night and/or at home during week-end, being continuously on call, etc.) and also working at the client's often means more stressful rhythms. These hard conditions are balanced by the autonomy for workers in self-managing time (even if generally the hours worked are always more than the standard ones). *The capability of women professionals to reconciling work and family life strictly depends on the span of this autonomy*. On the other hand, we cannot exclude that women in ICT jobs might be involved – as men are - in this kind of self-exploitation resulting from the "seductive and emotional kind of work". This aspect has been pinpointed by Kunda (2002) and confirmed by Lehndorff and Mermet (2001) who speak about "IT long hours often self-imposed by employees".
- *Work in ICT is highly deregulated*. Low union density and few collective agreements in the sector enables individualised negotiation of wages and careers (EIRO 2001), which is a major source of differentiation and sometimes inequality among workers. Outside a steady framework of Industrial Relations, HR practices are much addressed to enhance productivity through competitiveness than through motivation and participation of workers (Webster 1996). Moreover, precarious free-lance work is increasing in the sector, especially in small multimedia and e-publishing companies (Bechmann 2001).

Two different methodologies for the empirical research were used – biographical interviews and company case studies – that provided us with

a wide evidence on the education, the working conditions, the labour relations and the career paths of men and women working in ICT. Moreover, the integration of the two methodologies enabled us to highlight the specific gender issues characterising the condition of women working in this sector, their peculiar education models, their relationship with technology, their diversity at workplace, especially as far as family responsibilities are concerned.

2. Education and training

2.1 Backgrounds and the influence of family

Family as a whole appears to be very important – both in a concrete and a symbolic way – for most of our interviewees. In the majority of cases, families gave a great emotional and moral support (sometimes also an economic one): the fact that parents encouraged their daughter to make their own decision and respected their choice of study and career was mentioned as the most important support. While in some cases parents played a more incisive role having strong expectations over their children's career and success orientation, only in few cases (in Belgium) informants had to fight against the expectations of their family to enter a more traditional career.

Sometimes it was the father's scientific or technical background or interest, which strengthened informants' affinity to technical things and/or encouraged them to go into science and technology studies. In these cases, the father (sometimes also an older brother) was an important role model, who gave them the reassurance they could manage a technical job too. Some fathers had attractive jobs, and not necessarily in scientific fields, such as architect, industrial designer or entrepreneur. They transmitted to their daughters a more general positive attitude towards career.

Family background is not such a determinant in women's choice.

There are also several cases (notably in Austria and Italy, not in Belgium) in which the mother had a strong influence on the daughter's personal development and career choice. These mothers are described as role models – strong, admirable, and supporting, expecting their daughter to be strong and independent – either if they had successful careers and were running their own business or if they were only housewives. This resonates with research stressing the importance of the mother as a role model and source of encouragement for girls (Huang et al. 1999, Hapnes and Rasmussen 2000).

However, family background is not such a determinant in women's choice: as for biographical interviews, only 20 informants (on 140) have a technical family background, 14 have the father in a technical profession; 3 cases only the mother in ICT field, 6 cases both. Therefore, from a general point of view the classical hypothesis concerning social reproduction of career orientation – parents influencing children through

their own professional choices – is only very partly confirmed. Many of our informants have parents coming from very diverse study and career backgrounds.

2.2 The entry into ICT: relation to technology, inclinations, school curricula, and other determinants

The assumption that women are not attracted by jobs that require technical skills is not confirmed by case studies and narratives. Many informants report that the use of technical and particularly problem-solving skills is one the most satisfying aspect of their work, and that they see many tasks as creative: design and developing a web site or service, developing a project and even being involved in coding and programming. A good relationship with technology seems to be important as well for choosing an ICT career.

Early contacts with computer do not appear as a prerequisite.

Early contact with computer applied just to a part of the informants and seems not to be a determinant in choosing ICT as a career. Some of the younger women had computers at home, provided by their father, their older brother, in a few cases their mother, or they bought one from their pocket money. Anyway, most of our informants came late to ICT.

As for the scientific inclination, some, but not all, of our informants excelled in math and/or sciences. The interest in these fields is one of the major entry route to computing. The second one is through an application area: for many of our informants ICT is attractive because it requires analytical and problem solving skills (and they experience this as a source of creativity). Therefore, the assumption that assimilation of informatics with technology, mathematics and physics is a reason for the reluctance of girls to approach computers – which was also questioned by Nelson and Cooper (1997) – does not result from research evidence.

Many routes lead to ICT professions: degrees in informatics, but also in subjects not directly linked to ICT, work-based routes, and careers by chance.

According to our empirical material, another reason for choosing computer science curricula and an ICT career emerging was the aim to get a secure and well paid job, catching the employment opportunities offered by a new-open labour market: computer science like a ticket to economic opportunity. According to some authors (Margolis 2000), this holds true in particular for women with an ethnic background and women living in economically deprived regions. In our results, it particularly fits in the case of some informants from Southern Italy.

In conclusion, as it comes out from empirical data, entry routes in ICT professions can be diverse, both for women and men. Different routes have been found:

- The most common educational curricula include *degrees* (or also technical high school diplomas) *in the area of informatics*: computer science, information sciences, software engineering and information systems. Also maths, physics and other scientific degrees are a frequent entry route to computing (although interest in electronic

engineering, as in the example of a woman fascinated by robotics, is rare);

- *Degrees and diplomas in subjects not directly linked to ICT* are present too, such as in economics, biology, tourism, marketing etc. Among these diverse curricula, most common are journalism and graphic arts, which mainly applied to people working in e-publishing and multimedia activities who entered an ICT career after discovering Internet. They usually acquired ICT skills by self-learning.
- Another part of our informants followed *work-based routes* into ICT. Especially the older informants have no formal education in ICT. They come often from clerical jobs (like secretaries and accountants) – where significant technological change occurred – but also from teaching. They learnt how to use a computer rather late, availing themselves of a variety of resources to acquire the necessary skills: from formal school-based training to learning on the job and complementary special training courses.
- Eventually, a few informants went into ICT career *by chance*, after having eliminated other choices, having had an internship or a temporary job that brought them into contact with ICT, having attended a course or having met a good job opportunity, such as joining her brother's activity. This is more frequent in case of the web professions, where the entry is less difficult.

2.3 Is education the reason for women's under-representation in ICT careers?

The hypothesis that the modes of socialisation of girls discourage them from technology is not conformed by empirical results.

The "skill shortage" that traditionally affects the ICT sector has recently slowed down, due to the slump in ICT and e-commerce activities following the dot.com crash of 2002. This affected employment very much, especially the more vulnerable workers (contractors, free-lancers, older workers and probably women). As for ICT sector, case study reports show a decline in women participation in professional areas too. Nevertheless, there are now signs that employment rate in the sector is rising again and some companies declare an increasing in the applications of women for IT jobs (not in UK where, according to some HR managers of ICT companies, they are still under-represented in the pool of graduates who first apply for jobs). As for e-publishing, even if in recent years many companies got into redundancy programmes, women remain strongly represented, although predominantly in editorial rather than in technical jobs.

One of the categories of explanatory factors of the gender gap in ICT professions includes the educational model. The hypothesis of a socialisation of girls that discourages interest in technical issues, which is confirmed by statistics on graduated in high tech curricula, actually can't be supported by evidences emerging from biographical interviews and case studies, even if our sample includes only women taking up an ICT career.

2.4 Skill profiles

The purpose of WWW-ICT is to go beyond the classical ICT core professions characterising the specialists in networks, software and service and system and to include new professions linked with multimedia and Internet services: digital graphic design, e-publishing, e-business and e-commerce, ERP.

ICT professions are knowing a wide diversification. Hybrid profiles are growing in areas surrounding traditional computer-related jobs.

After empirical research, definition of jobs and functions appears still difficult, due to an evolving situation in traditional ICT professions and to the emergence of new Internet and multimedia related occupations. In ICT services, and increasingly in e-publishing, market growth is now seen as residing not in standard products but in value-added services oriented towards the specific requirements of users and markets. Professions have changed in consequence and have known a wide diversification. Hybrid profiles, made of a mix of ICT-related skills and other competencies, have grown in areas surrounding traditional computer-related jobs. Therefore, especially in Internet and multimedia, job profiles are still little stabilised.

Moreover, in the comparison of the seven countries we faced some difficulties due to the mismatch between formal and actual definitions of the competencies. In addition, for both ICT and e-publishing jobs, there is not always a strong link between the job titles and the required skills, which can vary from one organisations to another. So we tried to draw a picture of tasks and skills, which are most recurrent and characterizing ICT jobs.

The empirical work shows the importance of both solid technical skills, including project management, and non–technical ones.

Our empirically grounded categories of jobs (summarised in Chapter III, page **Erreur ! Signet non défini.**) tend to confirm the job profiles defined by Career-Space. It shows the importance of both solid technical skills, including project management, and non–technical ones. It is confirmed, especially according to case studies evidence, that more "behavioural skills" (Career Space 2001) or "personal qualities" (Valenduc, Vendramin 2000) such as problem solving, communication and relation skills are relevant in order to fulfil the ICT sector needs. The resulting picture is quite far from the "nerdy-ness" and masculine stereotypes sometimes associated with the ICT occupations (especially development work), according with results from both biographical interviews and cases studies informants, who mostly reported of a great satisfaction in doing their work.

2.5 Training and lifelong learning

Companies often do not offer enough formal professional training to employees.

Even if continuous learning is vital in ICT professions as knowledge and skills requirements evolve so rapidly, evidence from research shows that companies often do not offer enough formal professional training to employees. Few organisations operate individual development plans to enable them to assess and meet employees' training and learning needs (in e-publishing, none do). Our results are coherent with other researches that found that most of the countries involved in our research project – i.e. southern European countries (like Italy and Portugal), Ireland and the UK – are characterised by having weak training regimes (on counterpart, in Belgium, continuous training offer is wide and can lead to a qualification equivalent to higher non-university education).

Since the research was undertaken during a period following the bursting of the dot.com bubble, when company profitability was reduced, most case study organisations reported cutting their training provision during this period (as it is evident also from biographical interviews). However, as for the companies included in our case studies, the training opportunities offered by firms do not appear to be completely related to firm size or wealth. Not always large multinationals and big software companies have structured, programmatic training provision for their whole workforce, while some small companies resulted to have systematic training programmes in place – even if many narratives witness that small work organisations do not offer any formal internal training and mainly relies upon self-learning and peer-group support.

Employers and employees give a high importance to work-based learning in order to keep pace with technical developments.

When existing, continuing training in the ICT sector involves not only the enhancement of technical and content skills and knowledge, but also the development of managerial, organisational and interpersonal skills. These are generally incorporated into in-house professional training programmes, and reflect not only the requirement for a combination of skills when working with clients, but also career paths which (particularly in large organisations) sometimes take professionals away from technical work and into managerial functions.

As for on-the-job training, considerable importance is placed by employers and employees on work-based learning in order to keep pace with technical developments. Both companies and workers have benefit from ensuring that this is fully available and utilised: organisations maintain their in-house expertise-base and their competitive advantage, while employees maintain their employability.

Teams and informal networks are the training ground: workers learn from their coach, from older colleagues, from different specialists in the team, from the clients. People benefit from many specialised web-sites in their field, conference attendance, magazines as well. Since the web is the place where strong professional communities are created and continuously structured, it is as well an important way to transfer new

skills. These forms of learning are an integral part and a highly appreciated characteristic of a supportive work culture.

Moreover, further chance to enlarge knowledge and skills, probably the best professional development opportunity, often comes from internal and external mobility. Moving from one job to another and from one firm to another is considered a very typical pattern of ICT career: the "boundary-less career". But it may be a difficult matter for women.

Particularly in some countries (notably in United Kingdom), there is a move towards private certification within the IT sector, for example, through supplier-based training and examinations. This raises questions of how competence recognition is to be handled across the sector where differing curricula are in operation and different competences, or competence labels, are created.

When in-company continuing training is not provided, employees ask for public training. ICT public training supply – at low cost or free – is not homogeneously diffused in all the countries, depending on the overall strength of national training programmes. Even in case of paid courses, skill updating has to be managed by the individual employee, mainly in his/her free time. This may be a problem for women with family responsibilities. Women report also on mixed experiences with e-learning, some are rather critical (notably in Belgium).

3. Women's working conditions

3.1 Work organisation

In organisation design and restructuring, there has been, since the late 1980s, a generalised move away from hierarchical organisations and a tendency to develop flatter structures with fewer layers of management. This organisational change has been widely taken up in both the ICT and e-publishing sectors, particularly in small companies, even if we could also find different, more traditional forms of organisation.

Companies emphasize the need for self-management and responsibility. Traditional hierarchy-based system of control is replaced by self-control and by-peers control (Barley 1996), referred both to the quality of the product and the meeting of deadlines. Particularly as for the second point, in ICT sector, the capacity of managers to estimate and plan the work is a crucial aspect of their function of control and coordination, which may have a relevant impact on working hours and on the quality of working life of employees.

Female ICT professionals perceive both advantages and disadvantages associated with flat organisations.

From the point of female employees, there are both advantages and disadvantages associated with flat organisations. On the one hand, they are informal and flexible and therefore tend to make pleasant working environments on an interpersonal level. On the other hand, career ladders are short or non-existent (Osterman 1996). The lack of formal structures and progression processes can make it difficult for women to gain advancement, particularly given their well-known difficulties in showcasing their own abilities and arguing for their promotion. Moreover, managers are visible and close. Personal relationship with them becomes a key aspect of work and this may positively influence the quality of working life but also, as a few cases show, a negative personal relationship can lead to the decision to leave a job. However, in general, also in ICT sector women still experience glass ceilings, which prevent them progressing beyond middle-management levels.

As it emerges from case studies and narratives, ICT work is predominantly organised around project teams, led by a project team leader or manager. Whereas in web design this reflects the need for a variety of skills – graphic design, programming, content production, video and sound, etc. – software development work is based on a well-defined division of labour, sometimes combined with a high polyvalence of workers. Depending on system architecture, different sets of functionalities are distributed to different modules, with defined interfaces, and different teams being responsible for the development of those modules. In large projects, tasks such as software testing and system integration (re-composition) are carried out by specialists. Despite of this division of labour, developers need awareness of the overall project design and arch of work to be able to do their work.

Being part of a team requires to cooperate and align the work with others, distributing tasks, discussing coding practices, changing design and creating and managing different versions of a system. This also implies helping each other when it comes to special problems requiring a particular skill. Being a member of a good team is an important experience and also a value for the informants. They not only enjoy the personal side of working with friendly and supporting colleagues but also appreciate the support they get in a good team for creating a high quality product and for developing their own skills. Our case study evidence does not show whether women are particularly undervalued within these teams. On the contrary, team may be the occasion for expressing and enhancing some personal qualities (Valenduc and Vendramin 2000) – often considered typically "female" capabilities – as negotiation, communication and coordination abilities.

Project working is another ICT-specific pattern of work organisation. It is based on fixed deadlines instead of traditional schedules.

Project working is another ICT-specific pattern of organisation of work. It is based on fixed deadlines instead of traditional schedules. This results in a peculiar organisation of time, made of hard working periods alternating to more relaxed ones (Boulin 2001). Close to deadline, project working often implies long hours, even night working and week-end working, while during looser periods frequently people can self-manage their hours. According to the case studies and narratives, workers seem to appreciate the opportunity to organise their work themselves, although the span of workers' individual autonomy appears different in different contexts. Even women are generally satisfied from this way of working.

Especially in computer servicing, customer occupies the core place. So often working hours are tailored on their needs and travelling to the client is quite frequent. The strong customer-orientation is one of the reasons of the high pressure on work that characterises these occupations. Employees, commercial staff, managers, all feel tight to the customer. Customer is the key value. This presents a double consequence: on the one hand, orienting self-control of employees in a profitable direction, because the ability of a firm to satisfy its customers is a competitive advantage; and, on the other hand, transferring to the customers a part of the control that was formerly fulfilled by the hierarchy. At-customer working sometimes also implies body-rental of workers, particularly consultants (IT company "sells" the day-time of its consultants to the customer), so workers end up by being considered as "goods", they must be "100% billable". Obviously, this very demanding way of managing human resources may be problematic for consultants having family responsibility.

Networking experiences (coordinated teams working by means of internet/intranet) are widespread either among workers belonging to the same organisation or throughout different companies. They are diffused in Internet and multimedia activities and in "older" ICT professions as well. By means of this way of working strong professional cultures take place (even stronger than corporate culture), which most significant values of are innovation, cooperation, problem solving and result orientation. These cultures are grounded on professional communities, creating and continuously developing through the World Wide Web. Due to these young, highly educated and rather democratic professional communities, women are likely to be less discriminated. Moreover, they often benefit from the marked coaching attitude of senior managers, aimed at enhancing the team spirit and at empowering the team members Anyway, not always they can fully benefit from the chance of professional development, which generally depends on a strong closeness to the community (Coleman 1988) and on the availability to frequently change job, company and work experience.

3.2 Working-time and reconciling work and family life

ICT jobs are typically full-time, with long hours and often locationally flexible. Furthermore, permanent changes and speed are also attributes of

this specific work environment, which enhance the work related stress for many informants, both men and women.

Long hours and availability during evenings and weekends are problematic for working mothers.

People working in ICT have often to cope with high workloads and long hours. Actually, it is common for professionals to work overtime on a voluntary basis. This is particularly true of those in technical (e.g. programming) jobs, and those in senior management roles. It is a pattern that has been found across the countries participating in the study, although only in some cases informants work long hours (50-60 hours) regularly (notably in UK). Moreover, overtime is in general not paid to professionals. In Belgium and in UK a large part of the informants found long working hours a definite draw-back of jobs in ICT, while in the other countries few informants complain about long working hours and stressful working conditions.

For the female informants it is not uncommon to work at home during evenings or weekends, e.g. when the children are in bed, either reading emails and continuing an unfinished job or working on a training programme. Long hours, including availability during evenings and weekends, are a problem for working mothers (in particular for those without a supporting partner) and few companies and/or colleagues generously adapt to the need to reduce or regularise working hours when children are young.

Mobile working, client-based working and even hot-desking are common among ICT professionals and are particularly problematic for women and men with domestic responsibilities, where they involve long distance travelling or periods away from home.

In many ICT services organisations, career development appears to depend on working long hours and thereby demonstrating commitment to the work and the organisation. The typical male habit to "presenteeism" is rather widespread. For these reasons, one can say that one of the major features of the working culture of the ICT sector is the "total availability" (Laufer 2000). A strong interiorisation of company goals, as far as both the quality of the product/service and the observance of the deadline are concerned, is sometimes likely to produce even a company "total control on work and life" (Kunda 1992). This kind of model appears to be rather discriminating against women with family responsibilities. Perhaps it is not accident that in some case study organisations, informants were predominantly young, unmarried and without children.

Evidence from biographies and case studies also shows that, in many cases, the strong interest and passion for ICT work makes women challenge these tough working conditions and strive to the top. Actually, although workers with family responsibilities in general suffer from long hours and others hard working conditions, they sometimes benefit from the possibility to better balance work and family-life. The being more autonomous in managing his/her own work often permits to concentrate

the hours and to take some hours/days off when they need to, usually to dedicate to children and other personal needs: as a matter of fact, 64% of the biographies informants referred to enjoy a high level of discretion and about 41% of the female informants in ICT service companies (often considered as the most unfriendly sector for women and their family responsibility) have one or more children. This evidence confirms the hypothesis that women might accept longer hours in change of self-management of working time (Gerwitz and Lindsey, 2000). Anyway, self-management of hours usually means more time spent working by employees, rather than less.

With some notable exceptions, formal family-friendly policies are unusual in the case study companies.

Actually, with some notable exceptions, formal family friendly policies are unusual in the case study companies covered by this project nor were reported during biographical interviews. In one large multinational ICT services provider, however, flexible working is offered in the context of a more general programme of encouraging women into and through the organisation.

In summary, in ICT sector there is a tacit, unspoken agreement to balance long hours versus the flexibility to arrange them. Moreover, working time arrangements are in general rather flexible, hence individualised. In some cases (Belgium), anyway, the only way to reconciling work and family life is a reduction of hours (with a consequent reduction of pay): this is mainly a female solution that consists of small reduction of contractual working time, from full time to 4/5 time.

3.3 Organisational and national cultures

As for organisational cultures, case studies and biographies give examples of supportive work cultures and exclusionary ones as well.

As for organisational cultures, evidence from research shows there are cases of supportive work cultures and exclusionary ones as well. No clear pattern emerges, with work cultures being organisation-specific, location-specific, and even team-specific.

For example, the evidence for the existence of a "masculine culture" of computing (Cockburn 1985, Wejcman 1991, Hapnes and Sorensen 1995) is patchy. It exists in some companies and takes the form of working long hours late in the night, constantly experimenting with technology, etc. – sometimes also sharing sexist games and socialising in all-male groups. However such culture is not so generally widespread and, whereas exists, women are generally able to transcend it.

Other unsupportive and exclusionary workplace cultures exist which makes it difficult the personal situation and the career of women with children, particularly calling into question their career commitment. However, the most widespread culture we could find is in organisations that apparently do not share any discriminatory culture and claim to be "gender-neutral", but which are generally more likely to be "gender-blind", treating women and their problems as invisible.

On the other hand, we found also several companies – especially large companies in IT sector – which have sought to create woman friendly culture, discouraging sexist language, encouraging women's networks and insisting on equal treatment for women and men. Moreover, in the more female-dominated e-publishing companies, women are not marginalised and generally report feeling comfortable with workplace culture.

As for national cultures, we could not find any discernible variation in labour relations between countries with a strong tradition of industrial relations and those with weaker industrial relations and collective bargaining. The individualised culture of the "new economy" seems to be widespread across companies and countries.

Similarly, national welfare models (notably, childcare provisions) and training regimes do not have particular influence on specific conditions of women and ICT professionals, which mostly depend on employer resources and behaviour. Anyway, in countries with enduring "male-breadwinner and female-domestic worker" models and low rate of female labour market participation – like Italy – there are examples of more explicit hostility against women employment.

4. Labour market and labour relations

4.1 Labour market, career progression, mobility, segregation

In ICT sector, company internal labour markets are quite open and competitive, as high turn-over and little in-company training demonstrate. Therefore, working conditions – especially wage and career mobility – have mainly market regulation rather than organisational or collective bargaining regulation.

The lack of clear career paths can make it difficult for women to gain advancement, particularly given their well-known difficulties in showcasing their own abilities and/or arguing for promotion.

As seen before, in IT companies career ladders are short or non-existent (Osterman 1996) while the individualisation of labour relations can produce competitiveness and exploitation. The lack of clear career paths can make it difficult for women to gain advancement, particularly given their well-known difficulties in showcasing their own abilities and/or arguing for promotion. As for e-publishing, progression opportunities are few as well. Moreover, especially in these professions we found complaints of low pay, low status and poor progression prospects. However, in these jobs horizontal mobility – between different specialist areas of publishing – is more common. In general, in ICT professions women in high positions are still rare: the lack of motivating role models may be a further difficulty for young women.

High inter-company mobility is a specific feature of an open labour market. ICT workers frequently change their jobs, in order to better develop their knowledge capital or even only to increase their wage. Up to now, the external mobility has been very intense also due to the skills shortage in the sector that made it easy to find a better paid job in

another company. However, in recent years, the sector market crisis has produced a reduction of this mobility.

Although women are usually seen to be disadvantaged in competitive labour markets, according to some of our case studies and interviews, at least some of them appear to be competitive enough "to cross the borders of gender order" and have successful careers. We also found a few women in leading positions or entrepreneurs of their own company. However, biographies show that the external mobility of women is less intense than the male one. Due to their family responsibility, women cannot catch all the chances offered by the labour market (especially when the request is to move to another town/region).

As for skills, there is an evidence of different forms of occupational segregation.

As for skills, there is an evidence of different forms of "occupational segregation". Among computer service activities, gendered lines are present between development (female) and network-related tasks (male). Moreover, in some cases women are not included in project acquisition activities, e.g. in cooperation projects with industry, assuming customer prejudices against women. Among e-publishing professions (design of web sites, digital graphics, e-commerce, web journalist, multimedia editors), women result better represented in content-related (editorial) jobs than in more technical areas (system architecture, hardware configuration, and databases integration). Anyway, the assumption among employers that women are more comfortable in management than in technical roles has not been totally confirmed by the research: we found women having a preference for retaining their technical activities, finding them more creative and providing concrete outcomes.

4.2 Employment status

From biographies, it emerges that a few informants are or have been self-employed, building their own software house, web-agency or training academy (and some consider this as an option). The main motivations of these women are to shape their own work environment and to be their own boss. Sometimes they work – or are helped – by their husband or father. In some cases, women went freelance in order to be able to spend more time with their children.

Several of our interviewees work as freelancers. For those with a background in art, journalism or graphic design it is almost a "natural" solution. For a few of them, going freelance offered the opportunity to have more flexibility and time for children and family.

However, companies within the ICT sector generally take a conventional approach to employment status and workers often have permanent full time contracts, while in Internet and multimedia the contingent work (free-lance and temporary work) is more widespread. Moreover, relevant differences have been observed as far as diverse national institutional contexts are concerned. In some countries (for example, UK and Belgium) sub-contractors and free-lancers are only used to meet

variations in market demand, in some others (for example, Italy) free-lance workers have a specific quasi-subordinated status and they are very frequent especially in new multimedia jobs but also in high levels of ICT consultancy. A few experiences of self-employment and running their own company have been found among the informants, both men and women.

Even in salaried jobs, ICT professions are getting more and more similar to independent work rather than to subordinated work, being mainly evaluated by achieved results than by working hours.

Part-time work is less widespread than elsewhere, due to the specific organisation of work that is mainly based on project work and at-client work. Project work is based on objectives to be achieved rather than on time measurement; therefore part-time working arrangements appear quite rigid to be accepted by companies. When existing, it is female and temporary, often related to the period after maternity. Some women who negotiated part-time arrangements told us it had evident consequences on their salary and career but not so much effect on their overall workload.

In conclusion, the evidence form research is that even in salaried jobs, ICT professions are getting more and more similar to independent work rather than to subordinated work, being mainly evaluated by achieved results than by working hours (i.e. company reward systems are mainly based on performance-related pay and overtime pay often is not provided). On the other hand, in these jobs workers give a huge importance to personal development through work: the need to realize an interesting job, in which learning goes on and even the passion for the job is nearly always pinpointed by both men and women while employment security and formal grade seem secondary (Rullani 2002).

In general, we may say that in ICT jobs the implicit contract between employer and employee (or free lance worker) has now changed: while the old contract was based on job security and reward as a counterpart of corporate loyalty, in the new one autonomy, team working and empowerment are offered by employers as a counterpart of higher responsibility and flexibility (ILO 2002).

4.3 Labour relations and Human Resources Management

In general, few collective bargaining is present in European ICT sector. Although different countries are marked by different systems of industrial relations, some issues are common. In none of the countries the whole ICT sector is covered by a single sectoral collective agreement. Moreover, the three main segments of ICT sector have very different industrial relations patterns. Hardware/manufacturing and telecommunications have long and more or less stable industrial relations systems, while software and services companies – including dot.com firms and all the so-called new-economy area – are a world apart. Trade unions still have a long way to go, particularly in these latter companies and in small medium sized ones (Eiro 2001).

Evidence from our case studies and biographies confirm this situation of labour relations. Trade unions are not always reported to be present and/or recognised. In both IT and multimedia sectors, union density is very low, also due to young and high educated labour force (which usually has a scarcer inclination to union membership). In computer services sector, the presence of US multinationals hostile to trade unionism is a further discouraging factor for unionisation.

There is little interest in organised social relations, both from men and women.

Moreover, both for men and women, there is no interest in organised social relations. All adopt self-organisation and personal relation with hierarchy; trade unions are seen as inadequate to these professions and not useful. Individualisation of working and work relation is a common trend well accepted by ICT professionals.

Sector-wide collective agreements usually exist and in large companies collective bargaining at company level too. While basic employment conditions are collectively bargained, career advancement is mainly based on individual performance and wage and benefits are currently negotiated at individual level. Although big firms have more structured internal systems regulating career advancement, mobility and training, in most of our case study organisations only few rules as regards pay and reward systems are reported and the individual negotiation mostly depends on manager's good will. While this situation seems to be preferred by a number of employees who chose to manage themselves their problems and concerns, without any intermediary, women in this situation appear to be disadvantaged. Although they often do not acknowledge to be discriminated, they often refer to be less successful in such negotiation than men are – and the reason is probably because they underestimate themselves.

Employment standards in ICT professions are currently defined in opposition to the civil servant model and the bureaucratic model.

Employment standards in ICT professions are currently defined in opposition to the civil servant model and the bureaucratic model. There is a widespread opposition against all what is too formalised, too rigid and pre-established. As far as human resources management (HRM) is concerned, we must consider that both the ICT services and e-publishing sectors have emerged relatively recently. In many companies, human resource management and labour relations issues – promotion, training, mobility, etc. – have little in common with longer established industries. A considerable number of companies operate individualised employment contracts rather than collective agreements. Individualised human resource management also includes a growing use of periodic appraisals and individual development plans for assessing pay, training needs and career development potential. These are particularly common in large companies and seem to have positive implications for women's career development, as they formalise the criteria for progression and promotion, and move away from informal systems based on friendships, visibility or "men's clubs". Specific policies for encouraging female potential have been found in a few large companies. However, even in these organisations, women remain underrepresented in executive jobs,

so these initiatives seem have not solved the problem of inequality in progression.

Despite a general discourse that denies differences, empirical observations show that most of the female informants have been confronted to differences in attitudes and treatments between men and women.

As far as specific gender issues are concerned, we did not meet any employer explicitly declaring to prefer men to women. On the opposite, it seems that some skills, more frequent among women, are appreciated, which especially suit new occupations related to multimedia and Internet. Yet, a collective gender-blindness (Korvajarvi 2003) seems to exist over possible difficulties that women can encounter in these jobs, especially as far as they have family responsibilities: HR managers and even labour representatives seem not to consider that women are not confronted to difficulties to which men are not. Anyway, despite a general discourse that denies these differences, empirical observations show that most of our female informants have been confronted to differences in attitudes and treatments between men and women: while a few organisations persist in using manifest sexist criteria in recruitment, most are not free from prejudices against promoting women, usually on the basis about their availability for and commitment to the work. Moreover, very few equality programmes have been introduced (mainly in UK companies) but none diversity management policy.

4.4 Social and gender relations

Relationship among colleagues in ICT sector are characterised by a mix of cooperation and competition. Although competition is mainly seen as a male attitude, a few of the female informants admit that in this kind of environment, being competitive is sometimes necessary. A good relationship with the team manager is very important, since both one's career advancement and the possibility to have flexible time for family depend on his/her decision.

In ICT, professional communities are quite a significant resource for professional workers. Women with children may be partly excluded.

In ICT, professional communities are quite a significant resource for professional workers, especially "virtual" communities for those working on web networks. The professional community is a very useful means to learn, to share new skills, and to "sell" oneself on the labour market. Women with children may be partly excluded, since they have not enough time and/or continuity to participate.

As for gender relationships, among the informants there are women who enjoy working in (almost) male environments and who feel that they even benefit from their visibility. There is another group who feels uncomfortable in (almost) male environment. Furthermore, there is a difference between older women, who often experienced a lot of hostility and younger ones whose technical background, competence and familiarity with male environment help them adapting and being accepted. There are cases of "sexist and racist humour" to which the informants react in different ways (sometimes also addressing them openly).

Among few women (notably in Austria and in Italy), we could find a high awareness of gender issues. In some cases, these women engage in activities supporting women in the field, such as training courses.

5. Women's trajectories

5.1 Career progression in ICT

Progression and career follow simple rules: availability, mobility, and long working hours. Adding the gender aspects, women who have a family encounter more difficulties than men.

From a general point of view, we could say that progression and career in ICT follow simple rules: availability, mobility, and long working hours. Before adding the gender aspects, women who have a family encounter more difficulties than men.

Moreover, professional horizon is often at short term. This is linked both to the concern of self-accomplishment at work and, in recent years, to economic instability of firms. People who do not exclude a radical change of activity were often met. Both for men and women, jobs changes are mainly determined by the wish to continue to develop competences and to learn new things. However, women with children are less mobile than those who have no child.

After the "broken ladders" strategy (Osterman 1996) experienced in recent years by many ICT companies, hierarchical levels are now very few and, by consequence, workers benefit from few promotion possibilities (often, women are not among the lucky fews). Formal career paths are also rare, so everybody has to find his/her way, and the employers do not take any long-term commitment. Professional progression happens through changes of firm. As a result, people have to maintain their employability and to self-manage their career. The expressions "nomadic career" or "boundary-less career" refers to these new professional trajectories.

5.2 Trajectories and life stories

As the women entered ICT through a wide variety of routes, occupy a diversity of jobs and live in different personal situation and work environments, it is rather impossible to define clear-cut trajectories. To better comprehend women stories and to define some explicative patterns of their trajectories, in examining biographies we considered some variables: educational and family background, age, caring responsibilities, tasks, relation to technology, size of companies, work experience, personal life. Our analysis took into account not only professional steps but also the full women's life contexts, which provides us a better insight of opportunities, choices, life themes, strategies and constraints of women histories. Eight different patterns were recognised; they are summed up in chapter III (page **Erreur ! Signet non défini.**).

5.3 Male trajectories

According to our empirical information referring to 33 men's biographies, male and female biographies in computing and ICT do not differ radically. However, the men seem more mobile and at the same time less passionate and ambitious than our female informants. The women we interviewed have more articulated lives and other important interests beyond computing.

Among the defined patterns, the one recurrent male trajectory is *building one's own work environment*. In most cases this resonates with being on their own and primarily accomplishing themselves, either if they want to take care (of his family, his staff) and to lead a whole life, combining the world of academia, business, and family life, or to develop and sells their own product.

Other interesting features of men's biographies are: the different role often played by fathers (admired, mythical images); the obviously different role played by partners (available, taking care of children, sometimes also giving professional advice); sometimes the different way to approach to technology (extension of their hobby, tinkering instead of analysing); the grater inter-company mobility (changing companies is more taken for granted).

6. Final remarks

We could not answer to all the questions that the statistic evidence of the employment gender gap in ICT jobs is asking to experts and researchers. This was primarily because the objective of our research was the experience of women already being in these professions, so missing the point of view of women who were discouraged in entering them and made an alternative choice.

However, we are now able to describe some features of women job life in this sector: motivation, strategies, opportunities and constraints. Unexpectedly, from both biographies and case studies, they often appear to be passionate of their work, comfortable with technology and, in general, to feel rather at ease in this world which has always been considered affected of a "masculine culture".

ICT companies are good examples of post-fordist organisations, characterised by both positive and negative aspects.

We have analysed their workplace and we found that ICT companies are a good example of post-fordist organisations, characterised by both positive and negative aspects. Among the positive, and sometimes even woman-friendly, aspects there are: flattened structures and lean organisation, working by project when it allows a larger employees' autonomy in working hours, teams enabling cooperation and friendship among colleagues, a strong relation with professional communities, a professional development to be mainly acquired through learning-by-doing. Among the negative ones there are long hours, severe deadlines, stressful rhythms and even self-exploitation, which make it harder,

especially for women, to balance work and family life (even if several women were found who succeeded in overcoming these difficulties). Other problematic features of the employment in the information society have been pointed out: increasing individualisation in bargaining of the working conditions, rising of job precariousness and overall deregulation of labour relations.

In ICT organisations there are also problems to which women are familiar in almost any workplace.

In ICT organisations we also found problems which women are familiar to in almost any workplace. Women jobs are rather concentrated in some areas (as for computer service sector, the software development and as for e-publishing professions, the content-based skills), although it looks more like a personal choice than an imposed destiny. The glass ceiling is operating in ICT companies as well, where only a few women are in executive positions, although some of them have reached the middle management positions. Stereotypes against women still exist in company organisational and HR cultures, while the cultures of professional teams are often more open and egalitarian.

At present, we cannot answer definitively if these professions will improve the working life of women (i.e. introducing new ways of work organisation, enhancing the self-management of working hours, etc.) and will enable them to better develop their capabilities and qualities (i.e. through learning-by-doing opportunities, exchanges among colleagues and female networking experiences).

However, on the basis of the results of WWW-ICT project, the contribution of all the social actors seems to be precious for realising such an encouraging perspective. Companies, trade unions and public institutions should cooperate in implementing a new regulation of work based on the structuring of new, important rights for women and men of the information society. Each one of them has clearly emerged from the research: time and resource for training, peers' exchanges and networking opportunities (in order to develop the knowledge), recognition and certification of acquired skills (in order to improve employability), a larger workers' participation in the workplace, a better quality of working life (in order to reconcile work and families).

Chapter

7

Recommendations

Research findings refute some usual hypotheses on women and ICT professions. Traditional constraints to women's work (labour market segmentation, glass ceiling) are still present in these professions, while some typical factors of an open labour market (scarce institutionalisation, competitive culture, inter-company mobility) and some typical forms of work organisation in the knowledge economy (project working, flexibility, long hours) are also relevant for employment conditions of women.

As explained in the preceding chapter, empirical evidence tells us that there is not a lack of familiar role models; there are not such problems of relation to technology (women have quite a good relation, indeed); working conditions – although they are often hard – are not the main cause of the gender gap (since women tend to accept them).

In order to get some concluding points which could orient policy recommendations, we have reformulated our initial question into: what are the conditions that can make the ICT more attractive for women? According to this, we articulate a list of topics resulting from what does exist in the ICT sector, at least as far as our research evidence shows. The recommendations consist of two parts. The first section steps from results to recommendations. The second section formulates recommendations according to European policy areas. It ends with a synoptic view of the main recommendations.

1. From results to recommendations

In this part, we go through the main outcomes of the research and highlight a set of recommendations linked with them. When it is possible, we also present some of the good practices we found as examples of concrete and effective actions. For full reference to these good practices, please consult the downloadable report D6, to which descriptions of all selected good practices are annexed.

1.1 Creating a better understanding of ICT professions

There is no sufficient and shared information on the actual content of ICT professions.

The first outcome of our empirical research is that there is no sufficient and shared information on the actual content of ICT professions. As it comes out from the empirical evidence, ICT professions, especially in their more recent developments (e-publishing, multimedia), consist of different contents: from technical strongly math and science-based contents (engineering, physics, chemical, biology), through economic, marketing and management matters, to arts, communication and linguistic subjects.

As a consequence, speaking of one "privileged" road and curriculum to ICT occupations induces in most of the cases rather a distortion. Having a strong inclination to math and technical science is not a condition sine qua non for entering ICT field, although it is often the major entrance route. According to the project findings, it is essential to encourage the circulation of information on diverse career opportunities and diverse skills and job content of ICT professions. Vocational advisors, counsellors, head hunters and human resources managers, but also parents, teachers and students are likely to be the main agents of these kind of initiatives.

- Informing women on the *variety of the content of the ICT professions* and not only by awareness campaigns and programmes addressing girls, but also by real experiences, such as summer school and stages at companies. (See for example "Cybersonda"; the Belgian good practice addressing girls from 13 to 16 to make them discover the different facets of computing world and the "Yolante" programme in Germany, organised by Siemens, which assigned young students, who are oriented to scientific university, to different business division to make them better understand the world of work; "Daughter's at work day" in UK; the German "Girl's day").
- At a systemic level, national educational institutions in charge of the Process of Bologna (which aim is "to continue developing a system of easily readable and comparable degrees, based on undergraduate and postgraduate studies"), should have precise information on the job contents in ICT professions, in order to *better design school and university curricula*. School and university should make clear, grounded and *cross-disciplined curricula*, on account of the great diversity of entry routes into computing and including also the foreseen skills. (For example the initiative of a high school in the north of Belgium, supported by the national ICT employers' federation, "Information administration Bachelor") Finally, teachers and advisors should be trained on the contents of the ICT professions (as in case of the Belgian Electronic@ project; and the SEFIA project in France).
- Workshops addressing human resources managers and unionists could contribute to the reformulation of the *entry criteria in ICT professions* (including also other routes into ICT skills and not just

formal ICT education), both at a *managerial recruiting practices* level, and at the level of collective agreements on entry rules.

- Defining European and national independent *systems of recognition of the skills acquired by workers during their career paths*, that takes into account the variety of ICT competencies, in order to improve and clarify information about the real content of occupations, better define career paths and make inter-company mobility easier.

1.2 Career re-orientation practices

Quite a number of careers in ICT are undertaken after re-orientation.

One of the unexpected results, emerging especially from biographical interviews, is that quite a number of careers in ICT are undertaken "by chance", i.e. due to random or unpredicted events. There are cases of women: i) coming from different fields of work into an ICT job (often just thanks to informal ICT training); ii) having different kind of degrees and curricula, also not technical ones, when they entered ICT occupations; iii) entering ICT jobs attracted by the opportunity to learn new things.

Computing and other skills linked to ICT have sometimes come out to be a good solution to overcome crisis and break in professional life. We even found in some cases that having picked up ICT is useful for reinsertion after unemployment and maternity breaks. As a consequence:

- Vocational advisors, counselling institution should contribute to women's awareness of possible connection between their degrees/profiles and ICT jobs.
- Improving initiative aimed at re-orienting, re-inserting and re-training, by means of ICT *"generalist" degrees and graduations* (arts, human sciences, journalism) to make them more suited to new economy. *Re-training opportunity* might be especially realised by improving the secretariat profiles to maintenance and support ICT skills; the artistic and journalistic profiles changed into web profiles. See for example the Belgian good practice "Interface 3"; the Italian project "intellectual unemployment" aiming at training tutors on-line, web masters and content manager profiles; Austrian "WebAcademy".
- Social partners (unionists, employers associations, companies) and institutions should promote *retraining courses*, or *tutorship for women after unemployment or maternity*, in order to support re-insertion career in ICT jobs without high technical requirement. (Examples of two interesting practices in Austria: the first organised by Microsoft, Siemens and Manpower, called "EDP-Academy for women", the second is the "Thelm@ project" offering courses in ICT and telecommunication addressing women in a region of high unemployment rates).

1.3 Continuing training

Although ICT professions need permanent skills update, formal and institutionalised continuing training inside companies is an exception rather than a rule.

The research confirms that one of the main feature of ICT sector and profession is the need for continuing training due to the rapid changes in scientific and technological matters. Notwithstanding this constitutive feature, formal and institutionalised continuing training inside the companies is an exception more than a rule (companies tend not to invest on training also on account of the high turnover of the personnel). In most of the cases, updating his/her own skills is completely up to the individual. Moreover, providing ICT training courses addressing women results an attractive career perspective for some of the informants.

As for self-training opportunities, according to our data, we must underline the importance of the *team* and of informal network (either inside the company or on web) as a major place for self-training, exchanging competencies and experiences and enhancing ICT skills. On the opposite, from our empirical evidences, e-learning does not seem to be such a widespread practice.

- *Free and low cost courses or subsidising private offer with bonus* for self-education (by which public institutions may encourage workers investment in "human capital") result very important (see for examples the Austrian example "The Web academy" initiative).
- Encouraging and recruiting *women ICT professional as trainers* in ICT courses designed for women. In particular, there are examples showing that female teachers could be an interesting resource in order to strengthen the role model. (See for example the German "Network of female IT trainers", that organised courses to train female ICT professionals as trainers and built up a network between women IT professional acting as trainers).
- Specific training in new ICT skills should be addressed to women in the so-called *"blocked - skill jobs"* (ICT jobs and situations in which nothing new can be learnt on the job).
- Continuing *training for women after maternity leave and when they come back to work* should be improved. In this case, even e-learning may be a useful tool, but only if provided with a strong social component. (See "Web Wise Women" programme and the company's initiatives "Happy computer" in UK).
- *Networks among professionals* in different ICT occupations should be diffused for its being a key source for continuous learning. We found one interesting good practice aimed at promoting and consolidating the networking between women working in ICT professions and women in sciences and training (the network "web women" in Austria; the ADA project in Belgium).

1.4 Reconciling work and family life.

Working conditions are critical and controversial factors. The pattern and rhythm of work in ICT is dictated by project deadlines (sometimes aggressive ones) and emphasis is on completion of work rather than on hours; unpredictability of hours is quite common, also due to lack of efficient project management. Both part-time and teleworking did not emerge as frequent shapes of the work organisation.

If working conditions do not make ICT jobs repulsive for women, difficult working conditions partly explain the low presence of women in ICT professions.

The research does not confirm, in general, the hypothesis that working conditions (hours, geographical mobility; work and life balance) of ICT professions made them "very little attractive for women", although we have cases in Belgium and UK where high workloads and long working hours (50-60 hours per week) are likely to discourage women from choosing or staying in the ICT field. Moreover, if the majority of the informants seem to want to exchange long hours with flexible hours (or working at home), we cannot exclude that difficult conditions are some of the reasons for the low presence of women in the ICT. As a matter of fact, long hours, including availability during evenings and weekends, appear a problem for working mothers (in particular for those without a supporting partner).

As it comes out, the problem of difficult working conditions is worsened by the lack of social regulation: in the ICT sector; there is often no collective bargaining but just individualised arrangements.

- *Project management* (and scheduling competencies) in companies should be improved by training, not only addressing people in charge for organisation of tasks and deadlines, but also addressing employees (self-managing of time). This kind of initiatives would support quality of work, enhancing the predictability of hours.
- Companies' human resource managers should adopt *family friendly practices* (including the improvement of part-time arrangements), in order to enable work-life balance: it would represent a key tool for retention, too. (See successful company policies in Belgium, IBM policy on equal opportunity, that matches actions for attracting and promoting women in the company, with retention practices based on family friendly human resources management and redesign of work organisation to adapt to work-life balance, for men and women; see also the Italian project "Flexibility in working time and working organisation", addressing women back to work from their maternal leave and the company's initiatives "Happy computer" in UK).
- Social partners should try to find new forms of *performance evaluation to integrate those based on "clocking in and out",* in order to trespass the rigid and tayloristic quantitative time control of work, so to let more autonomy to people in self-managing their work.

1.5 New HRM tools in recruitment, retention and mentoring.

In many ICT companies, human resource management and labour relation issues have little in common with longer-established industries.

Few practices directly dedicated to women emerged from the research, except for a few recruiting and mentoring experiences, which have a key role in promoting women participation in ICT labour market and in reducing occupational and hierarchical segregation. As far as human resources management is concerned, we must consider that both the ICT services and e-publishing sectors have emerged relatively recently. In many companies, human resource management and labour relation issues – promotion, training, mobility, etc. – have little in common with longer-established industries.

Moreover, a considerable number of companies operate individualised employment contracts rather than collective agreements.

- As we have seen before, in order to improve *company recruitment practices addressing women*, public institutions should invest in awareness campaign showing the variety of contents of ICT professions (see IBM, Belgium)
- As we have seen before, *family friendly practices help retention* and should be improved. (See the national government initiative in UK, DTI work-life balance challenge fund, to assist IT company in developing family-friendly practices in order to recruit, retain and develop women; the company's initiatives "Happy computer", UK).
- Human resources managers should make young women in contact with successful women inside the company, which is quite important to create *role models* and to show them concrete professional perspective in ICT professions. (See for example "Opportunity Now" initiative by employing organisations in UK).
- *Mentoring practices* should be encouraged, both inside the companies and between companies and universities, for their being an effective tool to develop competencies and to support career path in ICT, therefore Public institutions should assure economical support to these initiatives. For examples, a good practice undertaken in Austria consists of mentoring ships of several months for young computer scientists in industry giving female students impressions of what kind of research and practices is needed and maybe opening them opportunities for further co-operation between science and industry (see the "Fit project", Austria).

1.6 Women networking

Empirical evidence resulting from the biographical interviews shows the importance of networking among women as a source for training, information exchange, general development of an ICT culture and in order to build ICT professional's role model for women.

- ***Networks among women*** should be promoted by women's associations as a way for exchanging knowledge and experiences

among women joining ICT field at different level (teachers, professionals, amateurs). (See for example the "Donna Informatica" initiative in Switzerland, a network involving both women in ICT professions and all those women who are interested in ICT, and the "WITEC" project in UK, promoting women participation in ICT field by creating networking opportunities for women in science, engineering and technology).

1.7 New labour market/ welfare policies

The ICT sector presents a lack of institutionalisation of employment, with important consequences for all employees, but even more for participation and inclusion of women.

Research findings show that in comparison with more traditional sectors, the ICT sector presents a lack of institutionalisation of employment – low union density and a tendency of individual bargaining of wages and careers – that has important consequences for all employees but even more for participation and inclusion of women. Free-lance work is present and the related precariousness as well, especially in the e-publishing and multimedia field. Inter-company mobility is another main feature of the ICT labour market: it results in opportunities for professional development and economical growth, but women (especially with family responsibilities) hardly take advantage from it.

- Trade unions and companies should bargain *"framework" agreements on wage, working hours flexibility and career paths*, as a basis for individual bargaining.
- Public institutions and social partners should ensure *a sustainable flexibility to ICT free-lance workers* by job security measures enabling them to face mobility, unemployment, inter-contract periods and training leaves and especially for women, by paid maternal leaves and other protections measures.

1.8 Research and technology development

It is important that the European programmes focusing on socio-economic research continue supporting the analysis of the impact of ICT technology and activities on the labour market and on working conditions, in order to promote equal opportunities and positive prospects for women and men. According to our findings, further investigation should especially contribute to the enhancement of knowledge and debate on the impact on labour in ICT of different organisational contexts and of different forms of national institutional frameworks of regulation. These research questions are "policy" relevant, since they cross at the same time research and public debate and can strengthen the links between scientific community and European Commission.

- *New forms of work organisation*, notably different forms of teamwork, project working, networking, working at client and so on - need more investigation, not only in a gender perspective, but also in a more

general sense. In particular, consequences of project work on working conditions have to be better clarified.

- *The role and the future of Industrial Relations* in ICT sector and, in particular, the increasing individualisation of employment relations need to be more investigated, in order to produce more focused suggestions for trade-union policies.

A better understanding of the intra-European diversity in the employment regulation will be precious in order to clarify *the role of national institutional frameworks and work cultures in influencing concrete workplace conditions in ICT*. In particular, a deeper insight in this sector labour market may verify whether the prevailing determinants of employment conditions in ICT are: general factors relating with the market of ICT services, the single-company strategy or the different national labour market and welfare regimes.

2. Recommendations by policy areas

2.1 Education and vocational training

EC policies and programmes

There has been growing concern at EU level about the under-representation of women in scientific careers, which is seen as an obstacle for the full realisation of European objectives of social inclusion and of development of Europe as the world's most competitive and dynamic knowledge-based economy. In 1999, the European Commission adopted a Communication setting out an action plan to promote gender equality in science: Women in Science-Mobilising women to enrich European Research. This plan originated a report on women and science in EU from the European Technology Assessment Network (ETAN); the creation of a focus group on women and science (the Helsinki Group), made by civil servant and gender experts from the 15 member states. According with the report on Women in Industrial Research, the objectives for 2010 are:

- Increasing the expenditure on R&D from 1.9% in 2000 to 3% in 2010, in line with the recommendation of the European Council at Barcelona summit of 2003. This will mean increasing the number of researchers, a proportion of them female.
- Changing work culture and organisation to improve inclusion and release creativity.
- Promoting diversity and gender balance through work-life balance policies, creating transparent structures and processes, opening promotion and reducing patronage and nepotism.
- Using "visioning" to implement gender mainstreaming: companies should examine their internal customs and practices that disadvantage or exclude women.

- Developing sex-disaggregated statistics, equality indicators and gender impact assessment as management tools.

Recommendations

- Informing women on the variety of the content of the ICT professions and not only by *awareness campaigns* and programmes addressing girls, but also by *real experiences*, such as summer school and stages at companies.
- At a systemic level, national educational institutions in charge of the Process of Bologna should have precise information on the job contents in ICT professions, in order *to better design school and university curricula*. School and university should make clear, grounded and *cross-disciplined curricula*, on account of the great diversity of entry routes into computing and including also the foreseen skills.
- Workshops addressing human resources managers and unionists could contribute to the reformulation of the entry criteria in ICT professions (including also other routes into ICT skills and not just formal ICT education), both at a *managerial recruiting practices* level, and at the level of *collective agreements on entry rules*.
- Defining European and national independent *systems of recognition of the skills acquired by workers during their career paths*, that takes into account the variety of ICT competencies, in order to improve and clarify information about the real content of occupations, better define career paths and make inter-company mobility easier.

2.2 Continuing training and e-skills

EC policies and programmes

In recent years the European Commission has been stressing the importance of ICT skills in order to guarantee the Lisbon Council 2000 target of "making Europe the world's most competitive and dynamic knowledge-based economy and to enhance social cohesion. Referring to these objectives, the gap still existing e-skills still is a serious barrier and in dealing with it, we have to consider both its quantitative (the number of e-skilled people) and qualitative side. As for the second point, e-skills are a mix of technical, commercial, interpersonal skills aiming to mach service and products addressing customer needs.

If the Lisbon summit can be seen as the starting point, there are successive steps which have been done in order to define, measure, and forecast e-skills. We can draw a path whose main steps are:

- Setting up of the ICT skills monitoring group, made of representatives of the Member State, the Commission, the CEDEFOP, the OECD and the industry consortium Career-space. First report on ICT skills in Europe issued in September 2001, final report and benchmark report in October 2002.

- Organisation of the e-skills summit in Copenhagen (October 2002), heavily supported by the ICT industry (Cisco, IBM, Microsoft, Nokia and HP), and policy declaration at the end of the summit, claiming for a closer and stronger involvement of industrial players in the European policy for the improvement of e-business and ICT skills.
- Policy decision (EC) and implementation of the e-skills forum. The e-skills forum is not anymore made of (mainly) representatives of public authorities in the Member States, as was the ICT skills monitoring group. It is more open to industry and training institutions.

One of the main problems in dealing with e-skills is to reach a shared definition and categorisation of skills (and a certification) in order to assess corresponding professional profiles. There are different actors involved and contributing at different levels in this matter such as the ComTIA e- skills certification consortium, the Computing technology Industry Association, established at worldwide level; Career Space is a consortium of major ICT companies; CEPIS, which is the Council of European Professional Informatics Societies.

Recommendations

- Vocational advisors, counselling institution should contribute to women's awareness of possible connection between their degrees/profiles and ICT jobs.
- Improving initiative aimed at re-orienting, re-inserting and re-training, by means of *ICT "generalist" degrees and graduations* (arts, human sciences, journalism) to make them more suited to new economy. *Re-training opportunity* might be especially realised by improving the secretariat profiles to maintenance and support ICT skills; the artistic and journalistic profiles changed into web profiles.
- Social partners (unionists, employers associations, companies) and institutions should promote *retraining courses*, or *tutorship* for women after unemployment or maternity, in order to support re-insertion career in ICT jobs without high technical requirement.
- Free and low cost courses or subsidising private offer with bonus for self-education (by which public institutions may encourage the workers investment in "human capital") result interesting initiatives.
- Encouraging and recruiting *women ICT professional as trainers* in ICT courses designed for women. In particular, there are examples showing that female teachers could be an interesting resource in order to strengthen the role model.
- Specific training in new ICT skills should be addressed to women in the so-called "blocked - skill jobs" (ICT jobs and situations in which nothing new can be learnt on the job).

- Continuing training for women after maternity leave and when they come back to work should be improved. Even e-learning may be a useful tool, but only if provided with a strong social component.
- Networks among professionals in different ICT occupations should be diffused as a key source of continuous learning.

2.3 Women's employment: labour market and welfare policies

EC policies and programmes

WWW-ICT project is concerned with nature and conditions of work in ICT professions and with identifying the way for improving women's participation within them. The project settles in the framework of the European initiatives addressing employment and equal opportunities.

- The European Commission' Paper on Growth, Competitiveness and Employment, published in 1993, which outlines the development of measures necessary to improve the innovative and competitive qualities of European's organisations and identifies changes to European organisations ranging from the development and implementation of new technologies to the creation of jobs.
- The European Employment Strategy (EES) launched in 1997 and aimed to develop among the Member States a co-ordinated strategy for employment based on common method, and to develop a common framework for action.

Concerning the connection between WWW-ICT and EES, the project directly recalls the four pillars: Employability, Entrepreneurship, Adaptability and Equal Opportunity.

In particular the project addresses pillars I, II and IV of the European Employment Strategy in dealing with individual skills development to overcome exclusion from the labour market; encouraging the modernisation of work organisation within companies and supporting the upgrading of skills to cope with new, flexible working arrangements.

The European Commission has strongly highlighted the emergency of concerns about difficulties that women have in balancing work and life commitments. The equal opportunities issues and the connected measures; aiming at reconciling family and professional life and reducing gender gap and job segregation, appear in the fourth pillar of the European Employment Strategy. Therefore they are directly addressed by some funding programmes such as European Social Fund and Equal, and are as well underlined in the corporate social responsibility issue. In particular, the ESF has changed its focus from being a training programme to becoming a policy-driven instrument, supporting the strategic goals of the EES. As for the Equal programme, it is funded by ESF and is part of the European Union's strategy for more and better jobs and for ensuring that everybody can enter them.

Recommendations

- Public institutions and social partners should ensure *a sustainable flexibility to ICT free-lance workers* by job security measures enabling them to face mobility, unemployment, inter-contract periods and training leaves and especially for women, by paid maternal leaves and other protections measures.
- Trade unions and companies should bargain *"framework" agreements on wage, working hours flexibility and career paths*, as a basis for individual bargaining.
- *Networks among women* should be promoted by women's associations as a way for exchanging knowledge and experiences among women joining ICT field at different level (teachers, professionals, amateurs).

2.4 Corporate social responsibility

EC policies and programmes

The European strategy basic message (Gothenburg Summit in June 2001) is that long-term economic growth, social cohesion and environmental protection, must go hand in hand. This has numerous implications for companies relations with their employees. "Socially responsible human resource management involves a commitment to aspects such as lifelong learning, health and safety, a better balance between work, family and leisure, greater workforce diversity, gender-blind pay and career prospects, profit-sharing and share ownership schemes. These practices can have a direct impact on profits through increased productivity, lower staff turnover, greater amenability to change, more innovation, and better, more reliable output. Indeed, a major thread throughout the paper is that companies often have an interest in going beyond minimum legal prescriptions in their relations with their stakeholders. Peer respect and a good name as employer and firm are highly marketable assets".

Recommendations

- *Project management* (and scheduling competencies) in companies should be improved by training, not only addressing people in charge for organisation of tasks and deadlines, but also addressing employees (self-managing of time). This kind of initiatives would support quality of work, enhancing the predictability of hours.
- Companies H. R. managers should adopt *family friendly practices* (including the improvement of part-time arrangements), in order to enable work-life balance: it would represent a key tool for retention.
- As we have seen before, in order to improve *company recruitment practices addressing women*, public institutions should invest in awareness campaign showing the variety of contents of ICT professions
- Human resources managers should make young women in contact with successful women inside the company, which is quite important to create *role models* and to show them concrete professional perspective in ICT professions.

- *Mentoring* practices should be encouraged, both inside the companies and between companies and universities, for their being an effective tool to develop competencies and to support career path in ICT, therefore public institutions should assured an economical support to these initiatives.

2.5 Industrial relations

EC policies and programmes

As for industrial relations, since 1992, the international trade union of employees, technicians and executives (ex-FIET, now UNI since 2000) runs various working groups of ICT workers and union officers involved in the ICT sector. The ICT forum is the oldest working group, having started in 1992 and continuing now (last meeting on 30-31 October 2003 in Prague). For some years, there is a specific department within UNI, named IBITS (Industry, Business and Information Technology Services).

The European Industrial Relations Observatory published in 2001 a comprehensive study entitled *Industrial relations in the ICT sector*, which covers the European and national aspects (EIRO, 2001). The study highlights that industrial relations are very different in the three main segments of the ICT sector:

- In hardware and manufacturing, industrial relations are still characterised by the adherence to the metalworking industry and its traditions of negotiated sectoral agreements giving a framework for company agreements. However, agreements reached in ICT manufacturing are very often weaker than in the metal industry in general.
- In telecommunication services, the "historical operators" (former public monopolies) have also a strong tradition of negotiated agreements, guaranteed by public authorities. Newcomers in telecommunication services escape from this tradition of regulated labour relations and fall into the same category as software and services.
- In software and services, the companies are either not covered by bargaining structure at all, or they have only few recent "experimental" collective agreements, or they are indirectly covered at a basic level by unspecific collective agreements ("by default"), or they belong to other sector's agreements (for example: commerce, business and financial services). Trade union recognition and application of the labour legislation on workers council is even not guaranteed

Recommendations

- Trade unions should be better aware on the importance to be present in this sector and *adapt their representation model to these new jobs*, in order to raise union density and improve their capability to collective bargaining in ICT sector.
- Social partners should try to find new forms of *performance evaluation to integrate those based on "clocking in and out"*, in order trespass the rigid and tayloristic quantitative time control of the work, so to let more autonomy to people in self-managing their work.

3. Synoptic view

Results	Recommendation	Agents of change	Examples of selected good practices
Creating a better understanding of ICT professions	Awareness campaigns	Vocational advisors, counsellors, head hunters and human resources managers, but also parents, teachers and students	*CyberSonda*, Belgium; *Yolante* and *Girl's day*, Germany; *Daughter's at work day* in UK.
	Cross-disciplined curricula; training addressing teachers and advisors	National educational institutions in charge of the Process of Bologna, school and university	*Information administration Bachelor* and *Electronic@ project*, Belgium; *SEFIA project*, France.
	Managerial recruiting practices; collective agreements on entry rules	Companies' Human Resources Managers, Trade Unionists	
	Systems of recognition of the skills acquired by workers during their career paths	European and national institutions	
Career re-orientation practices	Awareness of the connections between degrees and ICT jobs	Vocational advisors, counselling institutions	
	Re-training opportunity for "generalist" degree and graduations unsuitable to new economy	Social partners and institutions	*Interface 3*, Belgium; *Intellectual unemployment*, Italy; *Web Academy*, Austria.
	Retraining courses, or tutorship for women after unemployment or maternity	Social partners and institutions	*EDP-Academy for women* and *Telm@ project*, Austria.
Continuing training	Free and low cost courses; subsidising private offer with bonus to employees for self-education	Public institutions	*Web Academy,* Austria
	Women ICT professional as trainers	Counsellors and teachers, women's associations	*Network of female IT trainers*, Germany.

	Training for women after maternity	Social partners and public institutions	"Web wise women programme" and "Happy computer", UK.
	Networks among professionals in ICT	Public institutions, women's associations	The network "web women", Austria; "ADA" project, Belgium.
	Blocked - skill jobs	Social partners and public institutions	
Reconciling work and family life	Project management	Companies' HRM	
	Family friendly practices	Companies and trade unions	*IBM* in Belgium; *Flexibility in working time and working organisation*, Italy; *The FI Group* and *Happy computer*, UK
	New forms of performance evaluation, not simply based on working hours	Social partners	
New HRM tools in recruitment, retention and mentoring	Recruitment practices addressing women	Companies' HRM	*IBM* Belgium
	Family friendly practices for retention	Companies' HRM, National governments	*DTI work-life balance challenge fund*; *The FI Group* and *Happy computer*, UK.
	Role models	Companies' HRM	*Opportunity now*, UK
	Mentoring	Companies' HRM and Universities, with public institutions support	*Fit project*, Austria
Women's networks	Networks among women	Women's associations, with public institutions support	*Donna Informatica* initiative in Switzerland; *WITEC project*, UK; *WebAcademy* Austria.
New labour market/ welfare policies	Framework agreement on working hours flexibility	Trade unions and companies	
	Sustainable flexibility to ICT free-lance	Public institutions and social partners	
Research and Technology Development	More investigation on new forms of work organisation, on future of Industrial Relations in ICT, on the role of national institutional settings	DG Information Society, IST programmes officers, national and local research institutions	