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# LOVE, DUTY AND THE S-CURVE. An overview of some current literature on gender and ICT

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#### Abstract:

This paper draws on national statistical overviews and literature reviews of various aspects of gender and ICT in five different European countries, Ireland, Italy, the Netherlands, Norway and UK. It combines the results of these overviews in order to clarify theories, concepts and insights that may be helpful to the next stages of SIGIS work.

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## D02: EXECUTIVE SUMMARY (PARTS 1 – 7)

The project “Strategies of Inclusion: Gender in the Information Society” (SIGIS) aims to study empirically various strategies that are employed to include women into the design and use of information and communication technologies (ICT) in five different European countries, Ireland, Italy, the Netherlands, Norway and UK, in order to map a large variety of such strategies.

The main aim in this report is to provide a knowledge base for the SIGIS project, to help to frame our research issues in a fruitful manner. It is not an attempt to review the field of gender and ICT in general. Nor have we aimed to do a meta-analysis, since available studies are too few and too disparate to allow this. The report is structured in seven parts:

Part one draws on national statistical overviews and literature reviews of various aspects of gender and ICT, which are presented in more detail in parts two to seven. It combines the results of these overviews in order to clarify theories, concepts and insights that may be helpful to the next stages of SIGIS work.

Part two presents a summary of cross-country statistical data on the Information Society and the Internet in Europe and the SIGIS countries.

Part three offers a literature review which shares the aim of the other national literature reviews in this work package – to provide an overview of the situation in the UK/Scotland regarding gender in/and ICT. But unlike the other reviews, it also has a second aim – namely, to selectively draw out relevant themes from the recent (but obviously large) English language literature on the topic, with the hope of reflecting on how we might understand and analyse some of the patterns identified. Specifically, we focus on themes which we believe provide links between what is known about the *reasons for gender exclusion* from ICT and how we might think about *gender inclusion strategies* for ICT.

The intention of part four is to present relevant Norwegian research on gender and ICT through a survey of the available literature and statistics.

Part five presents a review of the situation in Ireland, organised around the components of the research topic – Gender and ICT and the key objectives of providing both a statistical and discursive background. In relation to production this means looking initially at the ICT production sector in general, to see what are the main concerns (why social issues are not on the agenda?) and a perusal of some of the statistics relating to gender in the workforce. This is followed by subsections on gender and ICT sectors, such as electronics, telework, software, media production and games. A further work-related section looks at research on gender and IT in the services sector. In the area of consumption it is possible to explore a number of technologies to see how gender is addressed. Finally there is a section on ICT, gender and education that did emanate from a sustained research agenda in this field.

Part six offers a survey of the sociological literature on aspects of ICTs in Italy together with a review of research describing levels of use, expertise and access to ICTs. Emphasis is given to data showing differences between men and women in their relations to ICTs.

Finally, part seven focuses on the review of Dutch studies related to the inclusion of women in the information society. The second objective is to support the Dutch case-studies. For this reason, the review will focus on knowledge and insights in the domains of the chosen case-studies.

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# **LOVE, DUTY AND THE S-CURVE**

## **An overview of some current literature on gender and ICT**

**Knut H. Sørensen**

### **1. Introduction: Building a knowledge base**

The project “Strategies of Inclusion: Gender in the Information Society” (SIGIS) aims to study empirically various strategies that are employed to include women into the design and use of information and communication technologies (ICT). Case studies will be done in five different European countries, Ireland, Italy, the Netherlands, Norway and UK, in order to map a large variety of such strategies.

As an overture to this work, it is important to clarify its point of departure in terms of assessing the general situation with regard to gender and ICT as well as situating our efforts in relation to previous research in the area. We have chosen to do this in three ways. First, we have prepared a statistical overview of various aspects of gender and ICT, drawing on statistical information from international sources. Second, we have produced national reviews that combine an overview of national research with an effort to describe, in each country, the state of affairs with regard to gender and ICT by combining research results and statistical information. Third, we have done a broader literature review on gender and ICT. This paper is an effort to combine the results of this review with insights digested from the national overviews, in order to clarify theories, concepts and insights that may be helpful to the next stages of SIGIS work.

Thus, to begin with, it is important to note that the main aim is to provide a knowledge base for the SIGIS project, to help to frame our research issues in a fruitful manner. It is not an attempt to review the field of gender and ICT in general. Nor have we aimed to do a meta-analysis, since available studies are too few and too disparate to allow this. We would also like to emphasise that there are already available several efforts to review the research field of gender and ICT or, more broadly, gender and technology, some even done by members of the SIGIS research team (see, e.g., Ahuja 2002, Cronin & Roger 1999, Dryburgh 2000, Faulkner 2001, Lohan 2000, Margolis & Fisher 2002, Spilker & Sørensen 2000, Wajcman 1991, 2000; see also Lander and Adam 1997, Rommes 2002, Webster 1996, Woodfield 2000).

The abovementioned review efforts provide different accounts of the field, although, basically, they report progress in terms of improved theoretical approaches and increased empirical scope. Wajcman (2000) is perhaps the most pessimistic because she wants to expect greater steps forward. Her conclusion is that there are yet too few studies of gender and technology, while empirical data suggest that women are still marginalized with respect to new technologies. Faulkner (2001) values a shift from a concern for women and technology to gender in technology, which signifies a growing interest in gender as a factor that actively shapes design as well as use. However, there is still a strong distress related to the problematic situation of women in the professions of engineering and computer science.

Spilker & Sørensen (2000) argues in a similar vein through their image of “three waves” in studies of gender and technology. The first wave was concerned with the problems new technologies created for women at work. The second raised in

addition the issue of the male dominance in the professions that designed new technologies, while the third wave introduced a more dynamic understanding of the gender-technology relationship by observing the potentially fluid nature of gender as well as technology.

Since the main techniques of collecting data basically have remained the same, innovations in the field are mainly to be found in the theoretically informed interpretative work in the form of detailed case studies and in the narrative structures and strategies of the accounts produced from these interpretations. In addition, of course, there has been an expansion of the sites of research related to gender and technology. This has produced broader insights, a point that we will return to later.

Based on these considerations, the review is organised in five steps. We start out by looking more closely at the main features of the gender and technology problem and the way it is analysed in the research literature (section 2). This is necessary in order to clarify the underlying concerns of the field. A first effort to summarise insights about gender and ICT is provided in the second step, where we give a brief résumé of the five national overviews provided by the SIGIS team (section 3). Here, we look particularly at in-/exclusion of women in relation to ICT in the five countries as well as the way the phenomenon is understood. In addition, this section inquires into the role of national and cultural differences by juxtaposing the five overviews. In turn, this raises the issue of how we may understand the phenomenon of inclusion, how it relates to exclusion and the more general issue of gender and ICT. Section 4, the third step, pursues that agenda through a review of available studies of inclusion processes; how they account for such efforts and the outcomes, with a critical view at how inclusion is conceptualised. The fourth step, section 5, turns to the phenomenon of exclusion. Here, we analyse in greater detail some of the main narrative strategies applied in research on gender and ICT. We believe this to be a key to a better understanding of the different ways in which the problem of in-/exclusion may be framed and analysed. In the fifth and final step, a conceptual model of inclusion is proposed and discussed.

The most common way of understanding inclusion into ICT is as a process of diffusion. As time progresses, more and more people start to use the various ICT products. This is normally described by reference to the S-curve, which is the standard outcome of a diffusion process (Rogers 1995). However, this rather mechanical understanding tends to overlook the need for motivation to become a user. Much of the literature on gender and ICT has pointed to the masculine enthusiasm as a basis for men's engagement with ICT, in contrast to women's more instrumental and utility-oriented – duty-based? – relationship to the technology. In this review, we will examine critically some of the assumptions made in such analyses.

The relationship between inclusion and exclusion is central to such an undertaking. The paper will explore this relationship in order to look into the problems of making inferences from the one to the other. If we know why women may be excluded from the design and use of ICT, is that a sufficient knowledge base from which inclusion strategies may be derived? Or do we need to develop a more independent understanding of inclusion?

The discussion will be pursued from a general belief in the fruitfulness of analysing the gender and ICT relationship as an issue of their mutual shaping or co-construction. We do not study the impact of gender on ICT or the impact of ICT

upon gender, but rather the interplay between them, emphasising that gender as well as ICT has to be understood as dynamic. To see them as mutually shaped or co-constructed means also to study the relationship as potentially changing. Neither gender nor ICT nor their relationship may be assumed to be constant; such stability has to be shown in the analysis of the phenomena at hand. Hopefully, this point will become more clear throughout the paper.

The review analysis is based on keyword and citation based searches utilising the ISI citation index, in combination with a general knowledge of the field. The ISI citation index provides some guarantee of quality of papers, compared to general web-based search engines. The latter provide more hits, but with greater variation in terms of reliability.

## **2. Gender and technology – what kind of problem?**

In the modernist discourse on technological change, there are two basic accounts. The optimistic one perceives technology as an instrument of progress, maybe the most important of these instruments (see, e.g., the Marxist idea of new technology as the major vehicle to develop the forces of production). The pessimistic one argues that the idea of technological progress is seriously faulted, partly because new technologies fail to deliver the promised improvements, but above all because technology has acquired a position of autonomy that transgresses the possibility that humankind may control its own future. Technology, in the argument of writers like Ellul (1964), has become its own imperative, essentially setting the agenda of social change.

Neither of these two accounts is concerned explicitly with issues of gender. However, the optimistic view may be found in some early writings on women's liberation that emphasise how new technologies contribute to making traditional housework less demanding. Cowan's (1982) study of technology and housework has been interpreted as providing evidence for the opposite, however, Cowan's conclusion about "more work for mother" is valid for middle-class women only. This is because middle-class households replaced human servants with technological ones. Of course, her analysis is a reminder to be careful not to assume that technological change has the well-defined, essential qualities usually assumed in technological determinist renderings.

At least as a social science research problem, gender and technology is basically a post-1980 phenomenon. It is in the context of this review also important to underline that the increased diffusion of computers seems to have been instrumental in forwarding the growing interest in gender and technology. In fact, it was largely if not exclusively the visions and outcomes of the large-scale introduction of computers into women's work that provoked the emerging feminist critique of technology. New technology turned out to be, not a neutral force of production, but rather a tool that in many circumstances was employed to undermine women's position as wage labour or as a basis for differential treatment of men and women.

In this manner, the gender and technology problem was initially an issue of social exclusion. The feminist research of the 1980s was concerned that women would lose out in a situation where work would be transformed to demand computer skills as well as adoption to new computer systems that were designed with little or no concern for the invisible skills so dominant in the female workforce (see

Webster 1996). The exclusion issue became even more prominent in research on computers and education, where it seemed obvious that girls were lagging seriously behind boys in computer skills.

The exploration of the exclusion issue also produced a concern for male dominance among those who designed computers and computer systems. This worry was based on the assumption that the exclusion processes that alienated women from becoming computer professionals also shaped computers and computer systems in a masculine image. In turn, this would reinforce the whole system of exclusion. Masculine information technology would continue to put women off, thus keeping them away from a power base that most people thought would become very important in the future. As Faulkner (2001) emphasises, this is no longer only about women working in or with technology. It is also about gender as preferences, skills and relations, which become inscribed in new technologies. Thus, as an analytic category, gender transgresses the production of differences between men and women. Through the development of the gender and technology discourse, it has come to mean a social mechanism that produces differentiation but also particular relationships between people and technology.

The nature of this social mechanism is perhaps best understood through the cyborg metaphor, originally branded by Donna Haraway (1991) to conceptualise the strained, transformative, ambiguous, and ambivalent relationship between nature and technology, human and non-human, feminine and masculine. Haraway meant to make a critical point about the diffuse border of the natural and the artificial, the growing problem of distinguishing between what is human and what is technological. "The cyborg point of view is literal, material, and technical; it is built, located and specific - like all meaning-making apparatuses. Whatever else it is, the cyborg point of view is always about communication, infection, gender, genre, species, intercourse, information, and semiology" (Haraway 1995:xiv).

Thus, the use of the cyborg metaphor leads to a further transgression of the concept of gender by underlining the need to be critical of essentialist arguments that assume the categories of male and female to be dichotomous, transhistorical properties of society and/or nature. Gender, masculine and feminine, has become dynamic and flexible. Of course, this does not mean that the categories are completely fluid and without any reference to hierarchical differences. The critique of essentialism is mainly a critique of a perception of gender as fixed and structurally pre-determined, not a belief in complete freedom of choice or the disappearance of gendered hierarchies.

It is important to note that Haraway's concept of the cyborg tries to strike a balance between optimism and pessimism. This is frequently misunderstood, since the cyborg metaphor has been appropriated by a new wave of ICT optimism. Here it is used to signify a new wave of progress by integrating technology and human affairs.

However, the cyborg is not just a happy creation; from the cyborg point of view, there is no such thing as unambiguous progress. We need to continuously evaluate the outcomes of technological developments, since we cannot a priori assume that they are either benign or harmful. The cyborg concept may in turn help us to see how the gender and technology problem has been repeatedly transformed. Initially, the study of women and computers looked at women as victimised users of technology, critiquing gender bias and continuing efforts to suppress female workers. The scope was then extended to argue the need to

create space for women as designers just as well as users of computers, to identify strategies of reform. Presently, as already indicated by the reference to the cyborg concept, the agenda is to explore the mutual shaping of gender and ICT. Design as well as use are important as objects of inquiry; however, one cannot make deductions from features of the one to qualities of the other. This has to be analysed in the concrete.

The idea that technology and gender is mutually shaped, has not just emerged from Donna Haraway's work. Arguably, the concept of mutual shaping or co-construction of the technological and the social has been a basic constituent of science and technology studies for quite some time (see, e.g., Bijker et al. 1987, Latour 1987). This has been made use of in analysis of gender and technology in several contributions (see, e.g., Cockburn and Ormrod 1993, Cockburn and Fürst-Dilic 1994, Berg & Aune 1994, Berg 1996). Technologies are designed with inherent assumption about the gender of future users, but gender is also constructed by reference to the technologies of modern society. The making of new techno-social relations and practices, of new cyborgs, is in principle a remaking that may change the social as well as the technological, gender as well as machine. However, a remake is not obligatory. New technologies may be introduced and adapted to traditional gender practices, while new gender practices may occur without any technological change. This is why we need to be concrete in our assessments.

Clearly, one of the problems of studying the new information and communication technologies (ICTs) is the potential flexibility of the frames of reference. For example, the Internet as well as other ICTs allow simulation and virtuality (Turkle 1996, Stone 1996). It may not be clear with whom you are communicating or what kind of body you are relating to (see, e.g., Davis-Floyd & Dumit 1998, Balsamo 1996, Springer 1996). Moreover, in terms of gender, ICTs may be embedded in diverse practices. There is not just one male and one female relationship towards computers. In turn, this should remind us that gender also have flexible frames of references (Lie 1998, Berg 1996, Aune 1996).

Still, we need to be careful not to forget the quite pragmatic issues behind the women and computers concern: Why are women more frequently than men excluded from the benefits of ICT, why are women seemingly less interested in the technology, and why do many exemplars of new ICT artefacts seem to reflect masculine rather than feminine interests? In the SIGIS project, we have started from the assumption that the exploration of this challenge in fact needs to be performed from the idea that gender and technology is co-constructed. Thus, exclusion is not an accident, but it is not predetermined either. The relationship between gender and ICT has to be explored empirically to provide insights into the process.

In this way, we may benefit from the changes in the way that the gender and technology problem is presented. The challenge is no longer just to analyse how women are impacted by ICT or to develop strategies to get women included in ICT education and ICT professions from a point of view where ICT as well as women are predefined categories. We should not ask rhetorical questions whether it is ICT or women that need to change, when obviously neither gender nor technology should remain constant in the much-needed broader strategy of getting women included in the Information Society.

### **3. Progress and ambiguity in different contexts. Some comparative remarks**

The gender and technology problem is usually described as universal, at least as common to all industrialised cultures. In fact, there is little reflection in the literature about the possibility of cultural variations. More or less, it is taken for granted that observations made in the UK or US or other OECD countries may be described in a rather universalising language. It is correct that there are no studies of gender and technology yet available that tell about a non-gendered relationship, but there is a general lack of sensitivity towards cross-cultural differences. Here, Berg's (forthcoming) study of higher education in computer science in Malaysia and Singapore may serve as a warning. In these countries, the percentages of male and female students are about at the same level. Moreover, there is not the same kind of immediate recognition of the gender and technology problem found in most other studies of the gendering of higher education in computer science.

In the European context, Hersh (2000) observes that there has been a dramatic increase in the number of women in engineering, that women engineers are still a minority in most countries, but also that there are great differences between countries and even between institutions in the same country. Schinzel (1999) argues that the situation in relation to computer science is numerically speaking more favourable in Romanic and Slavonic countries than in British, Scandinavian and German-speaking countries. Thus, there are good reasons to be aware of the possible impact of cultural differences.

As mentioned above, the SIGIS project has provided national reviews of available research and statistical information related to gender and ICT in five European countries; Ireland (MacKeogh 2002), Italy (Fortunati & Manganelli 2002), the Netherlands (Oost 2002), Norway (Berg et al. 2002) and the UK (Faulkner 2002). These reviews allow some cross-cultural analysis of the gender and ICT problem that suggest a quite intricate pattern of similarities and differences.

However, to begin with, we should note that there are considerable methodological difficulties in the interpretation of these reviews. First, the statistical information on gender and ICT varies considerably, not just in terms of availability but also in terms of methodology. Second, the availability of relevant research differs as well. The Netherlands, Norway and the UK have a quite long tradition of scholarly engagement with the gender and ICT issue, which is not present in Ireland and Italy. Third, the availability of scholarly work in relation to various aspects of ICT in the five countries may vary systematically but also accidentally, and it is not easy to judge the relative correctness of these two very different explanations. Thus, considerable caution has to be exercised in drawing conclusions.

Still, some observations seem quite robust. In all five countries, there has been a strong growth in access to and use of main ICT technologies like home computers, the Internet and mobile phones. While there is a marked gender gap in all countries, the relative differences between men and women are getting smaller. Thus, in the recent period, it seems clear that women have strengthened their relative position as users or consumers of ICT.

This optimistic picture is countered by statistical information about women as ICT professionals. In all five countries, the percentage of women in higher computer science education is very much lower than that of men, and women seem to remain a minority within the ICT industry. The rapidly growing interest of young

women in using ICT does not (yet?) seem to have had any impact upon the low share of young women studying computer science.

The varying degree of scholarly engagement with gender and ICT in the five countries probably reflects differences in the way this problem has made an impact on the national political agenda. In Norway, the problem has been acknowledged as important for two decades. This has led to a long-term engagement in the way public education have been able to support the development and growth of computer skills and computer interest among young girls (Berg et al. 2002). Also in the Netherlands and the UK, there has been some recognition of the gender and ICT problem as a political issue, but not in any way as much as in Norway. In Ireland and in Italy, the topic has been more or less neglected as a topic of political debates.

These observations are not very surprising, since they fit with a more general pattern of differences in the political engagement in equal opportunity and feminist concerns. Considering this fact, one might be tempted to argue that the Italian situation compares fairly well with, e.g., the Norwegian. Perhaps Norwegian political strategies, which have tried to address the gender and ICT problem, have not been particularly successful? This observation points towards a more general problem: To what extent do conscious strategies of inclusion have any real impact relative to ongoing, "automatic" diffusion processes?

The Norwegian review illustrates this challenge fairly well. For more than two decades, educational authorities have emphasised the need to teach children basic computer skills, accentuating the need to be particularly concerned that girls are included in the same way as boys. Recent statistical overviews show that there has been a strong growth in the use of the Internet as well as mobile phones among girls, closing previous gender gaps among adolescents (Berg et al. 2002). However, this development is hardly attributable to the equal opportunity strategies of schools. Rather, as is shown in the Norwegian review, this is due to a changing public image of ICT, which emphasises communication rather than programming, and a widespread experience that mobile phones and the Internet cater for girls' as well as for boys' interests.

Moreover, gender gaps in relation to ICT do not disappear in general. Norwegian statistics show that there is a strong age-gender interaction. While gender gaps in terms of access to everyday life ICT artefacts are disappearing among adolescents and young adults, they remain quite marked among the middle-aged and the elderly. Actual employment of ICT artefacts also appears to be gendered. Women use the Internet less than men, they send more SMS-messages but have fewer mobile phone conversations than men, and boys spend much more time playing computer games than girls (Berg et al. 2002). Even more important, the ICT industry has remained clearly dominated by men.

Thus, there seem to be clear limitations to the effect of political strategies aimed to include women in ICT as well as of the diffusion dynamic that makes ICT available to increasingly large parts of the female population. Of course, it may happen that there is just a time lag and that the girls who presently are eager users of mobiles and the Internet, at a later stage will be motivated to become ICT professionals. However, Norwegian studies of the relationship between girls and ICT suggest that this will not happen without the implementation of new inclusion measures (Berg et al 2002).

The Norwegian pattern of development seems to be indicative of the general thrust of development in the other countries as well. There is a fast growth in the proportion of the population that has access to the Internet and to mobile phones, among women as well as men. However, as already mentioned, we find gender gaps when we analyse most statistical information. This seems to be in accordance with a more general pattern of social inequalities related to ICT. Income, level of education and ethnicity have a clear impact upon access to and use of ICT (Oost 2002, Faulkner 2002, MacKeogh 2002, Fortunati and Manganelli 2002, see also Norris 2001). It is also a general trend that young people have better access to ICT and use these technologies more frequently than middle-aged and elderly people. In the young age group, the gender gap also diminishes. When we compare the five countries, Italy appears to have a markedly different gendered pattern of appropriation of ICTs from the other four. Fortunati and Manganelli (2002) shows that Italy has a larger gender gap in relation to use of the Internet than any other European countries. Italian men come out on top, while Italian women are at the bottom of the statistical measure. However, Italian women are among the most eager user of mobile phones, in particular of SMS services. Thus, in Italy, there seems to be a male and female road to the information society; the male road is based on the Internet while the female road is based on mobile phones. This is not in any way as clear-cut in Ireland, the Netherlands, Norway or the UK.

Previously, we noted that the amount of research on gender and ICT varied a lot between the five countries. Clearly, the richest resource of such research is found in the UK, but also the Netherlands and Norway have a considerable body of scholarly engagement with the topic and, compared to the size of the countries, relatively larger than in the UK. The varying degree of scholarly activity may be seen as an expression of similar differences in the way the issue is treated in the public discourses on the Information Society. The Irish review (MacKeogh 2002) as well as the Italian one (Fortunati and Manganelli 2002) both lament the lack of interest in the topic and note the need for research.

Further, it is interesting to note that the Dutch, the Norwegian and the UK review combines a focus on the one hand upon education, and on the other hand upon everyday life utilisation of ICT. The focus on gender and ICT in education is to some extent obvious, given the common understanding that the educational sector is an arena where policy measures are available and believed to have some effect. Still, there is a striking lack of recent studies that analyse gender and ICT in relation to work, not the least when we note that such studies previously played a much more important role (see Webster 1996). However, there are some important exceptions to which we will return later.

The main bulk of studies of ICT, gender and education has a critical stance. They report from failed inclusion efforts, criticising the way ICT continues to be interpreted as a masculine area where boys appear to have a predefined advantage compared to girls and the way the culture of ICT education provides a "chilly climate" for females. When we look at the recent studies of ICT, gender and everyday life, they display a different approach. Their main focus is on the diffusion of ICT, tracing the way ICT artefacts like the Internet and mobile phones make their way into the households. The basic thrust is market research, mapping future trends and the possibilities that new ICT products might find new markets.

Thus, the five reviews display an interesting contradiction between a critical and an optimistic narrative. The critical narrative, mainly based on studies of ICT and gender in education, to some extent also of ICT and gender in work, argues that women continue to be kept out of the Information Society. Inclusion measures, mostly of public origin, are generally failing to remedy the situation. The optimistic narrative, mainly based on market research or research with a similar orientation, paints a rosier picture of women who increasingly are becoming eager users of ICT.

Given the current prevalence of a liberalist outlook, it would be a commonplace to observe that the optimism of market research reflects the assumed potency of the market and its ability to solve problems. The pessimism produced by educational research would be typical of the conservatism of public sector activities and their inability to really solve problems. However, alternatively, we might argue that the tension between the two narratives may prove to be productive and provide a better understanding of current developments in the gender and ICT relations. Research that take note that women are becoming more frequent users of ICT help us to see that the culture of ICT use is changing. Arguably, ICT products are becoming trivialised in the sense that they are a common part of the everyday life of most people. However, their use is not necessarily trivial. Trailing the diffusion of ICT products, we observe how the development of fairly complex and complicated patterns of using these products is related to efforts to reproduce social relations, to explore new social relations, to find new ways of acquiring information and also to perform work and other everyday life tasks like shopping.

Studies emerging from the more pessimistic outlook that is provided by disappointments about lack of change in the relationship between gender and ICT in education represent an important antidote. Widespread access to and use of ICT does not necessarily give women a position in the ICT culture equal to that of men, neither does it change the masculine impacts on the culture of ICT. An important challenge remains in converting widespread access and use into sustained female participation, e.g., in the design of ICT artefacts and systems. Thus, inclusion efforts to get more women into, e.g. computer science, are still needed because there is no clear evidence that increased use of ICT among women spills over into getting more women into ICT professions. However, the question is how to conceptualise such inclusion efforts. What is inclusion?

#### **4. The riddle of inclusion**

The discourse on exclusion/inclusion related to ICT has very much been focussed on social inequalities and driven by political concerns to counter the processes that produce such inequalities. The system of inequalities in ICT, often referred to as the digital divide, has emerged as an important concern over a long period of time among policymakers as well as academics (see, e.g., Norris 2001, Castells 2001, ch. 9). Gender is not the only issue raised in this discourse.

However, as noted in the previous section, this worry may not be equally important in all countries. Moreover, we need to exercise some care not to make ICT into some kind of fetish. To know and use ICT is not important per se, nor do such skills necessarily contribute to the reduction of social inequalities in general: "The explanation for the digital divide is often assumed to lie in certain characteristics of this technology, such as the need for computing skills and affordable online

connections. The policy solutions designed to ameliorate the digital divide commonly focus on just these sorts of fixes, such as wiring schools and classrooms, training teachers, and providing community access in poorer neighbourhoods. Certainly this can do no harm. But will these initiatives work in terms of diversifying the online population? The results of this analysis suggest that, unfortunately, it seems unlikely. The policy fixes are too specific, the problem of social inequalities too endemic. ... (T)he heart of the problem lies in broader patterns of social stratification that shape not just access to the virtual world, but also full participation in other common forms of information and communication technologies" (Norris 2001:91-92).

Manuel Castells furthers such arguments by asking critical questions about the implications of the digital divide: "Is it really true that people and countries become excluded because they are disconnected from Internet-based networks? Or, rather, it is because they become dependent on economies and cultures in which they have little chance of finding their own path of material well-being and cultural identity? Under what conditions, and for what purposes, does inclusion/exclusion in/from Internet-based networks translate into better opportunities or greater inequalities?" (Castells 2001:247-48).

These quotes should not be read as arguments that the digital divide is not important. Rather, they are meant as a reminder that access to, use of and influence over ICT is not valuable in itself. Inclusion into the culture of ICT, in internet-based networks, in the Information society, is important because ICT are tools to achieve goals and facilitate certain practices. When we consider strategies of inclusion for getting women into the Information society, we assess them not as instruments of persuading women to be interested in ICT per se, but rather as tools of support for women to integrate ICT in their work and everyday life.

It is also important to note that exclusion is much better understood and theorised than inclusion. The phenomenon of exclusion is well grounded in studies of social inequality, which in turn is a major topic of the social sciences, in particular sociology (see Liff 2002). That access to, use of and influence over ICT follows a quite standard pattern of social inequality (Norris 2001), is exactly what is to be expected. From this perspective, the real academic and policy challenge is inclusion and how inclusion may be achieved.

On the other hand, reviewing this literature nevertheless leaves a quite marked impression that a concern for inclusion leads to less exciting and innovative studies than an interest in exclusion. To some extent, at least, this is due to the fact that most inclusion studies are reporting local action or experiments, usually rather limited in scope and driven by very practical concerns. It may also pose problems that inclusion very often is conceptualised as efforts to counter exclusion. Thus, inclusion appears as an epiphenomenon to exclusion, as a kind of conceptual side-kick that cannot be understood and analysed except in relation to exclusion.

Dryburgh (2000) provides an overview of efforts to explain why the number of girls and women in computer science has been declining. Her conclusions point to four areas that are deemed particularly important:

- Structural factors, which includes education policy, curriculum and organisation of computer science departments.
- Lack of role models and mentors.
- A masculine culture and the perseverance of sex stereotypes.

- Experience, attitudes and interest/motivation.

In a similar vein, Ahuja (2002) who reviews research on the scarcity of women in the information technology professions, finds that there is a host of social and structural factors that influence career choice, career persistence and career advancement. Social factors include social expectations, work-family conflict, and informal networks. The major structural factors are occupational culture, lack of role models, problems with mentoring, and organisational/institutional structures. Robertson et al. (2001) argues that in particular the gendering of communication within computer science is a problem for women in the IT profession, combined with exclusivity of networks and lack of support for women from larger legitimising structures that facilitate the performance of trust and expertise. Thus, we may argue that the problem for women in ICT professions is related to features of the dominant occupational cultures that may privilege men over women, for example by the importance of rituals of tinkering (McIlwee and Robertson 1992, Mellström 1995).

Cronin and Roger (1999) suggest a conceptual framework that may be used to classify inclusion strategies for women in science, engineering and technology. This framework is based on an analysis of three aspects of inclusion strategies:

Assumptions about science and technology (objective and neutral versus socially constructed and non-neutral).

Assumptions about gender (including relations between gender and technology).

View of women in science, engineering and technology, emphasising the rationale behind efforts to increase the number of women in these fields.

The result is shown in table 1.

**Table 1 Classification of positions related to women in science, engineering and technology (SET) and proposed actions.**

Position	Actions proposed
1. Foster understanding of SET	Publicise SET as useful, progressive, benevolent
2. Recognise SET's economic contribution	Mass higher education with more SET, wider access and vocational emphasis
3. Promote equality of opportunity	Encourage girls and women into SET, other equal opportunity programmes
4. Subject SET to critical analysis	Critical analysis SET (from within and outside)
5. Change SET culture	Change system rather than change women to fit system, change culture of SET to be more inclusive of all

Source: Cronin and Roger (1999, p. 647).

The findings from the above-mentioned reviews suggest that rather broad inclusion strategies are needed and often will occur. This may make difficult the application of the otherwise neat scheme of Cronin and Roger. Concrete inclusion

strategies will often be developed by actors with different points of view about women in SET and therefore may combine elements of some, perhaps in extreme circumstances all, of their five positions. Moreover, there are some serious deficiencies of the understanding of gender and the gender-technology relationship. This is evident from a tendency to view SET and SET cultures as the main features to be changed, whereas gender remains curiously un- dynamic. While Cronin and Roger rightly points out that the dominant idea in the area of getting more women into SET is to change women and keep ICT constant, it may not be such a great step forward just to reverse the idea of what should be constant and what needs to be changed.

According to Dryburgh (2000), the most commonly successful inclusion measure is based on some kind of women only approach: particular classes or courses for women, computer labs only for women, etc. Educational strategy, the understanding of ICT and even of gender may vary, but the impact of “women only” remains. Henwood (1999/2000, see also Henwood et al. 2000) suggests that to change computer science course philosophy from a traditional one to a constructivist one may not be all that important, because there seems to be “some mechanism at work which continues to re-assert dualistic gender categories and identities in gender-technology relations, despite what would otherwise be very convincing evidence of the potential for their demise” (Henwood et al. 2000:127). Thus, it seems clear that effectiveness of inclusion measures, at least within the educational sector, is influenced heavily by a very local gender dynamic related to a gendered distribution of *perceived* skills and abilities that always gives men the upper hand, a dynamic that is very widespread and persistent.

In this context, Margolis and Fisher (2002) give a very interesting and extensive account of a wide spectrum of efforts to get more women to study computer science at one of the leading US universities in the area, Carnegie Mellon. Arguably a very successful inclusion effort, Carnegie Mellon succeeded in increasing the percentage of women entering the School of Computer Science from 7 % in 1995 to 42 % in 2000. In the same period, they managed to reduce the drop-out rate for women very considerably, to reach about the same low level as for men (less than 10%).

It is worthwhile to consider in greater detail some of the main ideas that were put into action (Margolis and Fisher 2000:130-34):

*Reducing the impact of the experience gap of men and women.* Boys usually have more experience than girls in the use of computers before they begin to study, but the amount of prior experience is not a good predictor of eventual success as a student. Through curricular change, the School provided four different ways to enter the curriculum, depending to the student’s level of experience.

*Admissions policy* was changed so that admissions criteria did not give a strong preference to highly experienced students.

*More attention to good teaching*, since failures in pedagogy or in curricular integration turned out to affect women disproportionately.

*Contextualising computer science* was deemed important since female students particularly found real-world uses appealing.

*Efforts to change the hacker-ish culture* of the School were made, but they were not deemed very successful.

*Outreach to high schools* in order to make teachers more conscious about the way they impacted their female pupils' relationship towards computers and how they could motivate girls to apply to study computer science.

Carnegie Mellon's inclusion efforts are interesting also because the efforts to recruit and keep more female computer science students were based on a broad and careful analysis of the exclusion mechanisms previously at work. All the main actions mentioned above is of this character, and they relate to an image of computer science as a culture perceived as rather hostile by most women. We shall return to this issue in the next section.

Judging from available research, the sector of education is clearly the most prominent area of inclusion initiatives to get more women interested in computer science and ICT. This is, as one would expect. Inclusion concerns are usually voiced in public domains, as part of public politics. Traditionally, the system of education is the major instrument of influencing people's values, interests and skills. However, in the case of ICT, we may observe a growing amount of initiatives not just in the voluntary sector but also from private industry.

To some extent, these initiatives are politically motivated. In the voluntary sector, we find an increasing interest in using ICT as a tool for women and women's organisations to perform politics. This has given rise to quite optimistic accounts that emphasise the potential of the technology, in particular the Internet and related activities, to facilitate the performance of political work through easier access to information and cheaper and quicker communication channels (see Gibbs 1998, Harcourt 1999). Also, claims are made that local community feminist initiatives provide a more secure and more productive learning environment for women to acquire basic skills in the utilisation of ICT (Green and Keeble 2001, Scott and Page 2001).

This literature tends to be more optimistic than the studies of education sector inclusion initiatives, maybe because these feminist activists perceive the use of ICT and in particular the Internet as a definite advantage. This is above all due to the ease of communication and the cheap access to information (Harcourt 1999). But as Scott (2001) points out, inclusion through feminist activism is not without its problems. The obvious one is access, particular in the Third World, but there are important challenges related to developing ways of working within technologically mediated networks that is consistent with feminist ideals. Also, cheap and easy access to information is a mixed blessing.

There has been less interest in studying private sector initiatives. This is surprising when considering the fact that women constitute a very large part of the market for ICT as well as for the services that are developed as part of the commercial Internet, like e-commerce. Arguably, of course, women may be seen as being included through the expected diffusion of ICT, so-to-speak saved by the S-shaped curve that is normally used to describe the diffusion trajectory (Rogers 1995). However, we know that the S-curve does not just happen. It is produced.

Cassidy (2001) shows that during the 1990s, the US computer industry tried to advertise the personal computer with a kind of feminine identity. Through advertisements, the industry promoted the idea that personal computers were an important work-tool as well as an instrument in developing family life. While Cassidy argues that the personal computer did little to change the gender relations of the US family and the situation of women, it seems reasonable to interpret this advertising move as a reasonably successful strategy of inclusion.

A different line of reasoning is provided by Nordli (2001). She observed that, although a minority, more young Norwegian girls were becoming interested in computers through their positive experience from using computers. Their interest was above all related to the ability of computers to function as instruments of communication and the gathering of information, not just as machines for games and programming. The new features, emerging from access to the Internet, appeared as seductive and thus as the backbone of a spontaneous inclusion strategy, without any real educational or industrial effort.

However, there is an emerging interest in inclusion efforts from industry that transcends the advertisements analysed by Cassidy (2001). While computer games have been criticised for being masculine, a toy for boys only, it should be clear from a marketing point of view that games for girls represent an important growth area. While one may be surprised by the rather low interest in pursuing this marketing opportunity, there is little doubt that some companies have discovered the potential.

One of the most high-profiled initiatives has been the development of the "Barbie Fashion Designer". This game may be perceived as "a beachhead in the dynamic dialog between girls and computers. It offers a glimpse into what Turkle calls 'the mirror of the machine'. More importantly, however, it begins a new conversation" (Hamilton and Hokanson 1999). 'The mirror of the machine' in this respect highlights the possibilities in using ICT to allow different and possibly evolving images of femininity to be seen and experienced. The Barbie fashion designer game has also been heralded as an example of what Cassel and Jenkins (1998:14f) calls entrepreneurial feminism, a strategy to promote feminist ideas by targeting new markets consisting of women.

Spilker and Sørensen (2000, 2002) analyses a rather different example of entrepreneurial feminism, the design and marketing of a CD-ROM meant to be a tool to help young women discover the world of personal computers and the Internet. This inclusion strategy was labelled *women-in-particular* because the design was made only from assumptions about what was attractive to (young) women. A contrast was found in a media consortium's effort to develop a web page based strategy that should make the page attractive to all "normal" users, women as well as men. This inclusion strategy, *women-and-everybody-else*, definitely represents an effort to make women into active users of the Internet, but it assumes that there is a kind of standard, unisex mode of utilisation of the web page. The strategy does not aim to cater for women's needs in any outspoken fashion.

We do not know anything about the relative effectiveness of these strategies. It seems reasonable to expect that the *women-and-everybody-else* strategy would be most popular among private companies, since this allows them to address a very broad market segment in one move. However, Spilker and Sørensen (2000, 2002) suggest that there may also be good reasons to for some companies to pursue the *women-in-particular* strategy. This is due to the fact that there are many products that are marketed only for women. In addition, a segmented marketing strategy is often more effective than a general one.

Spilker and Sørensen (2002) also raises the issue that private inclusion initiatives may be more creative and radical than public strategies, which have to be in line with what is considered to be politically and bureaucratically correct. In

terms of potential opportunities, this may be accurate, but it remains an open question whether these opportunities really are made use of.

This section has documented that there are quite a number of studies of efforts made to get women included as users of ICT or as a part of the ICT professions. However, we may still talk about the riddle of inclusion since the effects of such efforts are not very well explained. Arguably, the riddle is related to the relatively underdeveloped features of the concept, which makes it difficult to understand how inclusion works or not. Arguably, inclusion is related to exclusion, to the extent that strategies of inclusion have to be based on some understanding of relevant exclusion processes. In turn, this points to the importance of developing strategies from knowledge about the relationship between gender and ICT.

## **5. Of mice and men. Exclusion narratives**

The literature on inclusion of women into computing or ICT cannot be valued and understood without broader reference to the larger literature that analyses exclusion mechanisms. Mainly, all inclusion strategies analysed in the previous section have been developed from one or several models of how women have been excluded from equal participation in the various ICT cultures and equal use of the opportunities offered by the technology. This may be clarified by analysing in some detail the main narratives about gender and ICT, offered in the research done in the last couple of decades.

These narratives also need to be assessed in a critical fashion, since they often have made their way into popular accounts of how men and women are able to perform in the ICT world. The dynamics is well described in Giddens' (1976) concept of the double hermeneutic circle. Scholars interpret society, but society also interprets scholarly work. The narratives about gender and ICT cannot be expected to be innocent, in the sense that they do not affect the cultures from which they emerge. For example, as noted by Håpnes and Sørensen (1995), some hackers knew very well the social science literature like Turkle (1984) and thus had quite clear ideas about how to behave "properly".

### **5.1. A world without women?**

Feminist scholars have for a long time observed that technology and engineering very much is a men's world. There is a kind of symbolic identity between technology and masculinity, between boys and their toys (Lie 1998, Horowitz 2001). This makes it difficult to be a woman in technology and engineering, partly because women become marginalized, partly because it becomes more demanding to produce and reproduce a female identity. ICT is no different from this pattern.

This narrative is often a tale of long-term exclusion efforts. Noble (1992) argues that it begins with the dominance of Christian clerics in the last thousand years over science and the practices and institutions of higher learning. The ascetic culture of these clerics, says Noble, militated against the inclusion of women. Ruth Oldenziel (1999) claims that the modern profession of engineering in the US were made through conscious efforts to keep women out. In the

symbolic representations of the emerging field of engineering, women either had no place or their efforts were ridiculed.

Rossiter (1982, 1995) provides a good analysis of the barriers to women who wanted to enter science, engineering and medicine, barriers that include about everything from formal rules stating women are not allowed, to more subtle forms for discrimination (see also Berner 1996). In the face of the equal opportunity initiatives of the last decades found in most Western countries, most of the explicit discrimination seems to have been done away with. However, a lot of cultural aspects remain that facilitates more covert discrimination and differential treatment of men and women. Women continue to be a minority in science and engineering, even if their number has grown considerably (Hersh 2000).<sup>1</sup>

Arguably, the outcome is a culture of technology where women and femininity appear as matter out of place. What is produced and re-produced, is a gender-based division of labour in relation to technology, in combination with a gendered construction and appreciation of skills. This regime of divisions and differences may be observed in many circumstances, from children's toys to men's and women's relationship to artefacts and activities in everyday life (Horowitz 2001, Lie and Sørensen 1996). In a way, this may illustrate a major difficulty with this narrative; it is too massive and appears to be insurmountable.

Some recent studies emphasize that (some?) men's fascination with technology is embedded in the opportunity for play when working with gadgets and artefacts (Faulkner 2000a, Kleif and Faulkner 2003). The roots of this fascination may be explained in different ways, for example as an erotic relationship imbued with pleasures of exercising power (Hacker 1989, 1990), as a flight from the challenges of social relations (Turkle 1984), or as a way of reproducing a kind of brotherhood of technology (Mellström 1995). In this manner, one may perhaps see through the traditional, opaque mantle of instrumentalism and rationality usually attributed to the relationship between men and technology.

A different take on the problem could be to explore the differences in men's ways of relating to technology. Historical studies of the establishment of engineering as a profession show that engineers in the 18<sup>th</sup> century struggled to get social recognition as one of the elites of modern society. This strategy to overcome the problem included the inclusion of humanities' subjects in the engineering curriculum, because such knowledge was considered a kind of entry requirement into the educated elite of society (Noble 1977). Thus, the dominant form of masculinity had not appropriated technology as a defining constituent, rather the opposite. Arguably, there still remains a kind of masculinity that is defined in contrast to technological skills, although it has lost its hegemony.

There is also a potential controversy in the difference between a physical and an intellectual relationship to technology. In Willis' (1977) study of the socialisation of boys into a British working class culture, the ability to cope with the strenuous physical relationship to machines – size, noise, need for strength, risk – was an important part in the construction of “real” men, in contrast to the non-physical ‘sissies’. Tinkering with technology often remains a physical activity, and male engineers may struggle to combine an intellectual and a physical relation to

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<sup>1</sup> The situation in medicine appears to be different. In Norway, the admission figures for 2002 show that female students now constitute a majority, ranging between 55 and 80 per cent. At least, this indicates that there is considerable room for change. We do not know why the development within medicine is so different from science and engineering.

technology (Mellström 1995, see also McIlwee and Robinson 1992). The physical skills are important to their male identity, while the intellectual approach is what sets them apart from non-engineers.

In this fashion, we may use the narrative of “the world without women” not just as a tale of the cultural foundation of exclusion of women, but also as a story about how men get included and the different ways in which this inclusion happens. Particularly, we should observe the importance of playfulness, which is an issue that may prove important to women as well (Nordli 2002). In fact, the research on women and technology may have overlooked the possibility that women may be fascinated by technology as well, although perhaps in a different fashion (Berg 1996). These observations are important to avoid that the “world without women”-understanding is used in a way that becomes a self-fulfilling prophecy.

An possible example could be the notorious invisibility of women’s major role in the production of ICT devices and systems on a global level – a significant silence all too frequently-encountered even in much of the research literature. Ever since the early days of radio valve making, the management culture of the electronics industry has favoured women workers, often justifying this on the basis of their physical and/or psychological attributes and capacities for 'delicate' or precise products and production processes. Today, given the highly internationalised division of labour and production processes that characterise the sector, most of this production work and women's labour is concentrated in economies offering low wages and other 'locational' (social and cultural) factors sought by this industry, especially in Asia. "One of the central characteristics of transnational enterprises in the Third World is their heavy reliance on female factory workers, globally between 80% and 90% in offshore manufacturing, but confined almost entirely to the labour-intensive areas of production. In supervisory and management areas, the percentage of female employment falls drops off precipitously. This pattern is also found in the worldwide electronics industry. In Penang's electronics factories, women hold 72% of the jobs ...." (Sussman, 1998: 125).

### ***5.2A chilly culture: The hacker impact***

To begin with, computers could be perceived as potentially more open-ended in their gender symbolism than most other technologies because they appear to be more of an intellectual than a physical technology. Thus, the traditional masculine relationship to large, greasy, noisy machines was not relevant. Computers could be perceived as rather small, silent and neat and thus having more traditional female attributes. In fact, Sørensen and Berg (1987) shows that engineering students perceived the computer as gender neutral, in contrast to their classification of many other technologies. From a feminist perspective, for a while, computers looked promising.

However, what has come to be the dominant narrative in the discourse of gender and computing is a new version of the story of a world without women. The initial promise was corrupted, which has made the new master-tale imbued with disappointment. At the centre of the narrative, which here is called “A chilly culture” is the figure of the Hacker. The Hacker, who appears frequently in the literature,

has in a way become the epitome of the excluding aspects of the culture of computing.

First described critically by Weizenbaum (1976), the concept of the hacker was explored and developed by Turkle (1984). She describes them in a rather contradictory way. They are admired because of their enthusiasm and skills, but at the same time pitied because of their lack of social competence and their social seclusion. And hackers are young males, no women on these premises. This is also evident from Levy's (1984) epic and celebratory expose of hacker history.

Later, hackers came to be cast as the villains of the story of computer science as a chilly culture for women. Rasmussen and Håpnes (1991) shows how female students pinpoint hackers as their main problem as women in computer science. First, they dominate the culture at the department and set standards in terms of what is perceived interesting, how one should study and the appropriate (high) level of engagement with computers. Second, they represent a kind of all-encompassing relation to the computer that the young women find appalling, also because they want to do other things that to just sit in front of the computer. A major problem is that the hackers make them feel second-rate, as excluded from the centre of the discipline, at the same time as they loose interest in a discipline that the female students conceive of as shaped in the hacker image.

Margolis and Fisher (2002) makes similar observations. If women are to feel at home as computer science students, there is a need to change a culture that has developed to accommodate hackers' interests and ways of approaching the discipline, singularly focussed on the need to be in front of a computer screen as much as possible. An additional problem occurs from the consequences that student hackers usually have acquired their habits and particular skills during childhood and adolescence. The phenomenon of the so-called boys' room competence is particularly interesting. It is a widespread assumption that the skills developed by boys using computers for games, programming etc. give them a head-start when they begin to study computer science. In fact, it is assumed by many that these skills constitute the competence really needed in order to be an accomplished computing person. This represents an important problem for young women (and some young men) who have not spent their adolescence in front of a screen and thus feel that they at loss compared to the hackers when they start to study computer science. They are not, so-to-speak, up to the standard.

It is interesting to note with Margolis and Fisher, that the boys' room competence is not important as a predictor of long-term accomplishments in computer science. Still, the fact remains that hackers' skills and screen stamina, as well as the conceived appreciation of these qualities by professors, work to exclude young women from computer science. Even female computer enthusiasts appear to diminish their own abilities in relation to their male co-enthusiasts (Nordli 2002).

The problem reappears, perhaps not surprising, in the ICT industry. Woodfield's (2000) study of a UK software company starts out from the hypothesis that increased emphasis on communication as a core competence in computer science work should improve career possibilities for women. Initially, this assumption is confirmed by the stated policy of the company to focus on the importance of communication skills and their interest in recruiting women, who are generally assumed to be better communicators than men. Thus, they were expected to surpass men in the performance of hybrid jobs where communication

and ICT skills should be combined. However, Woodfield finds that communication skills are not that much valued in practice. Rather, skills that we may recognise as hackerish, are given more weight in the way employees are assessed, by superiors as well as colleagues. Also, at the end of the day, sociability is considered in gendered terms. Male sociability is recognised as the best by most males. Thus, the male dominance is confirmed also in terms of cultural merits, offsetting the potential reform that lay in the official appreciation of more traditional female qualities.

The prevalence of the hacker culture may be surprising, considering that several of its features may be considered problematic in terms of making computers useful to clients and costumers and, consequently, for profit-making. The recent re-appraisal of other aspects of the hacker ethos in relation to the open source movement (see, e.g. Castells 2001, Himanen 2001) poses an interesting challenge in this respect.

### ***5.3 The female communicator: A counter narrative?***

Some feminists have heralded the coming of the Internet as positive turn for women's relationship to ICT. This belief, by some also called cyberfeminism, maintains that the Internet signifies increased emphasis on communication. This "communication turn" will be beneficial for women, since this area is valued as more interesting and women will benefit from their comparatively better communication skills (see, e.g., Plant 1998, Spender 1995). Adam (1997) criticises this cyberfeminist position, above all for neglecting the massive empirical evidence that documents women's negative experience with ICT. Nevertheless, it is probably no accident that the rapid growth in popular access to the Internet coincides with a growing interest in the use of ICT among girls and young women.

At least, this is the argument made by Nordli (2001) based on a study of computer-interested young girls. Their use of the computer is mainly focussed on communication, information gathering and schoolwork. Similarly, the literature on ICT and women's activism (Harcourt 1999, Scott 2001) points to the qualities of the Internet in terms of communication and information gathering. Also Woodfield (2000) uses the idea of women's communication skills as the basis of her initial hypothesis that women face improved career possibilities in the ICT industry as performers of hybrid jobs.

van Zoonen (2002) challenges the idea that Internet is particularly well suited for women. She argues that the Internet has been shaped by men, and that even women's everyday use of the Internet frequently is the outcome of male-dominated relationships. However, Woodfield's account of the situation of men and women in a UK software company provide a more interesting clue to the problem of the optimistic narrative of the female communicator. What happens in the company is a kind of juxtaposition of the software development skills acquired through education and work on the one hand, and communication skills, acquired as a personal quality on the other. The software development skills are subtly attributed to the male gender; men's competence is constructed as culture, as an achievement. The communication skills that are attributed to women is constructed as something that women just happen to have, it is a kind of natural quality.

Woodfield's findings may thus be read as a new version of an old story. When masculinity appears as culture and femininity as nature, masculinity is preferred because culture is valued above nature. Nature is not an achievement; it is an attribute.

Consequently, there are definite dangers in the cyberfeminist story, which curiously is located in a kind of essentialist argument about women's communication skills and interests. In this manner, gender is portrayed as something constant. It is just the technology, in this case computers, that changes. What is worse, the argument invokes once more a traditional dichotomous thinking, only with a reversal of the attribution of value: what women knows, communication, is more important than what men knows, programming. This is definitely a retreat from the current advancements in the study of gender and technology, which emphasise that gender and technology are co-constructed or dually shaped and critique the idea of essentialisms. Moreover, as suggested by Faulkner (2000b), dichotomies are more easily made into hierarchies. A strategy where the use of a dichotomy is combined with an effort to reverse a hierarchy always runs the risk of backfiring.

#### ***5.4 A dynamic view of storylines in the gender and ICT discourse***

Arguably, the main storylines of the gender and ICT/computers research has changed during the last two decades. Following Spilker and Sørensen (2000), we could argue a shift from perceiving women as victims, via a concern to get more women into the design of ICT, to a storyline that emphasises women as active subjects. Parallel to this, there has been a change from focussing on women to concentrating on gender. This is a storyline that includes an interest in men and masculinities but above all attention to gender as a set of dynamic relations.

Above, we have briefly outlined three different narratives about exclusion of women related to ICT. The first of these is a story of a strong, long-term cultural momentum that causes women to be kept out of technology, ICT included. Men does not want women in technology, they have struggled for a long time to keep them out, and this will be difficult to change. The second is a tale about the way in which a masculine minority has been able to impress certain values and practices upon the culture of computing, to the extent that this culture appears to be unappealing not to say appalling to women (and many men). Largely, the second narrative has replaced the first one as the main story about the exclusion of women from ICT professions.

The third story, the counter-narrative about the importance of communication, appears to be the one that really marks the shift from a dominance of exclusion narratives towards greater open-ness towards inclusion stories. However, the latter case helps us to observe a common major flaw in the narrative structure of the three tales, namely the way all three draw upon the binary opposition between the feminine and the masculine as an ordering device. In this manner, as noted above, they are caught in the trap of dichotomous thinking and the related construction of gender hierarchies. Thus, we need to transgress this kind of narrative structure in the tales of gender and ICT.

The concern for inclusion of women into the Information society could be seen as a return to an older issue, as slightly old-fashioned in the light of the current interest in the mutual relationship between gender and ICT. However, we

need to keep in mind that the academic interest to investigate in detail the character of gendered relationships in and of ICT does not preclude a distress about the situation of women in ICT. In fact, the politics of all the storylines is basically fuelled by the inclusion/exclusion concern. The practical value of analysing gender and ICT relationships remain in its contributions to addressing the inclusion/exclusion problem.

In turn, this may raise questions about the role of meta-narratives like this review. Is it possible to distil a kind of meta-storyline about the development of this field of research? If we try to summarise the findings of this review, perhaps the best way of doing so is to emphasise the development towards greater diversity and complexity, in approaches, assumptions and narrative strategies. While the early research very much centred on the problems arising from the sexual division of labour and women's conditions of work, we have observed a broadening of this focus to include everyday life issues as well as concerns about symbols and identities. Also, the early efforts were basically quite pessimistic in their findings, the more recent contributions show greater variety in terms of pessimism and optimism. Currently, there is a greater belief in inclusion also in the short term than there used to be. Finally, there is an increased emphasis on diversity within the binary categories of man and woman, of masculine and feminine. This diversity is partly due to a change in the perception of gender as shifting, dynamic and pluralist relations, but also a product of including a concern for ethnicity and multiculturalism.

## **6. The anatomy of inclusion**

In section 4, it was noted that the phenomenon of exclusion was better understood and more thoroughly theorised than the phenomenon of inclusion. On this basis, it is tempting to view inclusion as a kind of mirror process to that of exclusion. One just needs to change minus to plus. Of course, this is too simplistic, but it allows us to see that to theorise inclusion may not be a simple challenge. We may need to take a step back in order to get a different grip on the problem.

First, it should be noted that we need to have a critical view of the whole issue of inclusion in relation to ICT. Several contributors have pointed to the fact that the idea of a digital divide assumes that the use of ICT is beneficial under all circumstances, making non-use into something that is always a problem and neglecting the possibility that non-use may be a rational response to needs and opportunities (see Norris 2001, Light 2001, Thomas and Wyatt 2000).

Second, it is rather obvious that the phenomenon of inclusion may be translated into an issue of diffusion. People get included into ICT as ICT are diffused throughout society. From this perspective, inclusion is a matter of changing the S-curve, of getting more people to become users more quickly. Thus, to achieve inclusion is to put more energy into marketing activities.

While we should not dismiss diffusion theory as providing some insight into inclusion processes, an emphasis on diffusion means a singular concern for the temporal aspects of the way ICTs are diffused in society. In time, everybody will be included if they are interested and can afford it. Clearly, this point of view is at least partly contradicted by studies of exclusion processes related to ICT. The diffusion perspective is too optimistic.

Third, when we understand inclusion as a mirror image of exclusion, we tend to be concerned mainly with the issue of recruitment or access, of so-to-speak getting inside the ICT culture or into a particular ICT constituency. However, to be included into the Information society is also to remain there, at least to remain as long as one wants to remain. To make inclusion concerns into a worry just about recruitment or access is too narrow.

The obvious alternative is to study inclusion in terms of socialisation. In this way, we may emphasise the process of becoming an insider through initiation, learning, institution-building, etc. Once we begin to understand inclusion as socialisation, we see the need to broaden the idea of the phenomenon to catch the experience of being on the inside. It is no good, for example, to be admitted as a computer science student if the being a student feels like a continuous struggle and your only dream is to quit (see Margolis and Fisher 2002). Ideally, the understanding of inclusion needs to combine a concern for recruitment/access with an interest in socialisation. Strategies of inclusion need, at least in principle, to combine these two.

Inclusion strategies should then be understood as conscious activities or sets of activities aimed to recruit people into and keep them within some system, like women into and in the information society. These activities may in turn consist of different elements:

A model of what the inclusion problem is, in our case, a model of the gender – ICT relationship and its implication for men and women as participants in user and designer constituencies with a focus on ICT.

An analysis of the critical activities or actions needed in order to achieve inclusion and the capacity of the activities to induce change.

An instrument or a set of instruments to initiate these activities and actions.

A procedure or set of procedures to implement these instruments.

The empirical challenge is to be able to map and analyse the practice in terms of these elements.

However, it is important to emphasise that the inclusion concept does not just address issues of recruitment/initiation/access on the one hand and socialisation on the other. The emphasis on mutual shaping/co-construction of gender and ICT in this paper has implied that we wanted to underline the need for change. Much of the analysis of exclusion points to the need to develop inclusion measures that contribute to a transformation of gender as well as ICT. Clearly, important aspects of the current ICT culture are a hindrance for inclusion. However, there are also facets of gender, gender identities and gendered practices that also may need to be modified in order to achieve inclusion.

When we leave the comfortable idea that inclusion may be achieved through diffusion, we are faced with the challenge of clarifying alternatives. What do we do after the S-curve? What kind of relationship do we envisage between humans and ICT artefacts?

The standard engineering narrative identifies technology as a tool of progress, as an instrument of human welfare. This instrumentalist view has been so generally accepted that it has blocked our ability to see beneath and observe also the expressive link many engineers establish towards artefacts and systems. To be included in the Information society appears, from this perspective, as a kind

of duty. Everyone ought to know about computers, because this is useful and beneficial to society.

This call for duty fits neatly into the kind of reasoning many girls offer as a rationale for their school efforts and their choice of topics. They want to do something useful. Thus, to study computer science would appear as a decision in accordance with an emphasis on duty and utility. So much the worse when one encounter the hacker culture – a culture based more upon love of machines than an instrumental attitude. To many girls, this becomes a two-sided problem. On the one hand, their inclination to emphasise utility is in conflict with a dominant emphasis on enthusiasm, playfulness and engagement in the machine for itself. On the other hand, at least some women feel limited by what they perceive as an expectation of women to be useful. They also want to have fun (Berg 2000).

In relation to narratives about ICT, love and duty have become gendered. Love, enthusiasm and play are characteristics of a masculine relationship. Duty and utility are features of the feminine approach to ICT. Inclusion measures that may be expected to contribute to change and transformations of the traditional gender and ICT relationship, probably need to break away from this form of gendering. If we allow love and duty to be more equally distributed, genderwise, we may open up new space for the construction of inclusion strategies.

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