HILARY ROSE*

A Moment of Celebration in a Time of Challenge

First it is an honour to be invited to take part in this European conference on «Women in Science: Mainstreaming Gender Equality in the European Research Area» that it is held here in Rome underlines the political sensibilities of our hosts, for this is also the occasion of the Italian presidency and as such offers an opportunity for our cause.

This meeting marks an important moment in the long journey of the diversity of European feminists both analysing and also working to change the science gender system. It follows the ETAN Report which provided a quantitative and qualitative account of women in the academic research system and offered some tantalising sketches of gender in the industrial research context. The publication of *She Figures* delivers the absolutely necessary next step after ETAN. It provides - at long long last - the first robust statistics showing where women are - and are not - in the industrial side of the European research system. At last we can see the big part of the iceberg which has for so long been hidden under the ocean of ungendered statistics of the research labour market. This meeting is therefor an occasion for both celebration, and congratulation to Nicole Dewandre, her colleagues and indeed the entire Helsinki Group with both its institutional and personal contributions, which have made this possible.

As this is our concluding session, having listened to the richness of the material and ideas presented here - I want to offer a take home message. Despite having at last achieved robust and gendered statistics -so that we can both call for gender informed research policies and also monitor outcomes - my conclusion mixes caution with encouragement. While celebrating this achievement and developing practical proposals which will take us forward from this Rome meeting - we also need to keep in mind the ever changing complexity of the research system itself. Analysis of that changing system even informed by robust gendered statistics remains a challenge we have still to confront.

Let me give an apparently straightforward example of the complexity of discussing gender in research policy. Despite the fact that we meet under the title of «Women in Science», which to anglophone ears seems to point to women in the natural sciences, and thus the topic has a clear unambiguous boundary, the papers we have listened to today, suggest more fluid even contradictory boundaries. Thus today's discussion has rarely been about women just one singular Science but has mostly conveyed the sense of women in the <u>many</u> sciences. Sometimes the boundary in use included women in the natural sciences and technologies only but sometimes mathematics, medicine and even the social sciences have been included. Occasionally - not least when conferees have been reflecting on the long haul question about how the knowledges themselves can be changed, the boundary around «Women in Science» discussion has been at its most inclusively drawn. Here as we have listened to the contribution of women's studies/feminist studies in this process it was clear that many more disciplines from the humanities and the arts had a potential role. So while we speak of «Women in Science» as a kind of shorthand let me suggest that our discussion has

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been of women in «Wissenschaft», that is of women in organised knowledge. The task of mainstreaming gender in the whole research system requires that we keep in mind these many boundaries, not becoming the slaves of any single fixed boundaryline, but instead making sure that our own boundary making and breaking serves our diverse and complex tasks. A major strength has come from the sheer diversity of disciplines such as are represented in this room today working together. This is an extraordinary achievement and one we can congratulate ourselves on.

As a feminist sociologist of science with experience of a decade plus struggle with ungendered European research statistics (those of the US have been gendered longer) I would like quickly revisit the past to remind us of just big an achievement *She Figures* is for research policy analysis and formation. The most important international body collecting statistical material on the research labour force, the national percentage of GNP allocated to research in its various sectors and qualitative material on the national research policy structures, has been the OECD (Organisation for Economic and Community Development. This immensely important body for developing research policy since the mid twentieth century nonetheless played an extraordinarily conservative role on the issue of «women and science». Worst of all despite pressures from without and within, it continued to collect ungendered research labour force statistics. The rich countries club as the OECD is often called, could not even see that only using half of a country's the potential labour force had implications for scientific and technological development and economic growth. OECD's deep held objectives. Thus one of the Helksinki groups achievements has been to bring together a number of important international bodies like the influential but until this moment backward OECD, to produce for Europe this historic novelty - the industrial research labour force broken down by sex.

The one place where gendered statistics have long been gathered has been tertiary education. Such national and international data gathering was encouraged by UNESCO which always had a rather richer social agenda than the narrow economic objectives of the OECD. However despite UNESCO's more woman friendly agenda, their statistics were less than robust and always confined to the tertiary or academic sector. Thus the public discussion of «women in science» - has for too long primarily addressed the positioning of women in the higher education system whether as students or as teachers. Because academic or basic research is organised differently in the various European countries this also meant including the publicly funded basic research institutions such as the French CRNS or the GermanMax Planck Institutes, which form such a significant part of the public sector research effort in continental Europe. Matching such diverse data is not easy. However there has been price to this visibility of the academic sector, namely the widespread assumption that this sector is to be equated with «science». Such an over focus on academia can, and indeed has, produced over-optimistic assessments of how far feminism has changed science. Thus Londa Scheibinger's optimism has to be tempered when we examine women's share of the research jobs in industry - for these figures make grim reading.

So while we now have data on two sectors there is a third even more invisible sector - namely military research. We need to remember when discussing research jobs that for most of the mid- twentieth century and beyond, military research hogged most of the global

research budget. Today military spending is down, a fact I welcome, though it would be mistake to have illusions about the reasons for this. Changes in the nature of warfare and therefor the growth of dual use technologies rather than a sudden turn towards more pacific conflict resolution have greater explanatory value

However although I have been speaking of the three sectors of research, the research system itself has been undergoing massive changes in the last quarter of the 20th century. Most importantly for feminist strategising, industrial research now takes more of the global research budget than academic. Strategically, if we had stayed with the ETAN focus on the academy we would have been looking at a shrinking proportion of the research system. These changes are profound. As one of my feminist mathematician friends sardonically jokes, the men mathematicians are going into industry with its huge salaries and unlimited access to computing power having fun making models of the global economy or devising the algebra for genomics and hedge funds. Gradually the men are leaving academia with its modest salaries and its increasingly shabby buildings to us the women mathematicians. When academic maths was the pinnacle of mathematical excellence women were to be excluded, now the glory days are over women are welcome to inherit what's left. While this sardonic vision is a shade overdrawn, there are elements within the joke we would be ill advised to ignore. We are living in a changing research world and not all the changes are for the better

At the beginning of the 21st century the allocation of the research budget looked very different, today most research is carried out by industry. One interesting feature of this new structure are the new hybrid academic/industrial forms springing up on university campuses in most of the researching countries. These hybrid forms have not come into existence by chance, but are carefully fostered by a consensus among governments which argues that only through a closer articulation of research and industry can innovation and economic growth be secured. While some countries like Britain have driven this hybrid form hardest few escape it. Hybrid forms and the widespread involvement of academic scientists with industry bring with them problems for peer review as a crucial governance mechanism of science. For most EU member states as with the European Commission research policy itself, «quality of life» is an additional desiderata to these primarily technoeconomic objectives. How far Quality of Life is integral to the research objectives, and how far it is merely tacked on has been a matter of debate. Observers note that in the case of EC funded research Quality of Life has to be addressed in any successful proposal but there are few mechanisms to ensure that it is present in the eventual deliverables.

These extensive changes in the way that the production of scientific knowledge have led some influential science theorists to speak of nothing less than a «new production system of knowledge». While there is not the space here to explore this proposed model in detail, both its existence and its influence are important indicators of a profound change. However as these theorists' work is entirely ungendered, it cast no light on where and how gender works within the new mode of production. Feminist analyses are urgently needed or we are not confronting «science» - the research system - as it is but as it was.

These organisational changes are also marked by huge changes in the direction of funding which also shapes the knowledge and technological ooutcomes. Where fifty, forty

even thirty years ago, physics took the largest slice of the research today the life sciences and informatics get the largest. While there still are many disciplines in the universities we would be unwise if we did not acknowledge that the two technosciences of genomics and informatics are set to dominate this new century, and that they will have immense material and cultural implications which feminism ignores at its peril.

While nation states and inter state bodies like the European Union have been pushed by the pressure from social justice movements to intervene in discriminatory social institutions not least the labour market, the research system and the conceptual thinking which both underpins and directs it has lagged behind. It has not just been the painfully slow recognition within Europe of the need to take seriously gender within the research labour force but feminist science theory still remains marginalised. It is not drawn on as a resource to renew the conceptualisation of the research system and the huge changes currently taking place.

The introductory talks to the conference delicately acknowledged the divergent agendas of governments - national economic efficiency - and the social justice demands of women. Let us be clear it is only the immense pressure from the women's movement that has enabled (or should that be compelled?), European governments to see (outside wartime) that women are able to do more than reproduce. (Scandinavia is excluded from this charge). However governments still prioritise the economic argument that wasting potential talent weakens the national research labour supply. As a consequence while they maybe energetic about working to remove barriers and encourage girls and women into research and other hitherto masculine occupations rarely does their agenda exactly map on to the agenda of those whose commitment is to social justice. It is by keeping both agenda's strong that we make progress.

One of the highlights of the conference has been the distinguished presence and presentation of Shirley Malcolm**.** Tactfully and therefore without commenting on the uni-dimensional nature of the struggle we have been debating today, her presentation sharply reminds us that on the issue of diversity in science, we in Europe have a lot of catching up to do. The issue is not just gender, it is race and ethnicity. In part the uni-dimensionality of our concerns may be explained - but not explained away - by the slow development of the European discussion of «Women in Science». We have been much slower on this issue than US feminism. Remember Alice Rossi's pioneering article in Science on the under-representation of women in academia called Why so Few?. This was published almost forty years ago in 1965. By contrast European feminists have much slower to get going in a really energised way involving feminist (both declared and undeclared) science activists, theorists and policy experts. The post WW2 population movements which have changed and are still changing the more or less mono cultural composition of many European countries into multicultural has been slow to impact on our universities This is changing rapidly as second and third generation are no longer prepared to accept the inferior positions allocated to the first. As a result the concept of diversity in play at our meetings has to change it can no longer be restricted to the single dimension of gender .

As Europeans we know - so far with another part of our thinking than that about science - that something like one in seven of is a migrant or a refugee. But if we go very little back into the history of some of the most eminent women in science, race and ethnicity can be seen to have been entwined in the formation of science gender system, and have produced a double burden for some women. So while it is routinely acknowledged that Jewish refugees from Nazi science won an astonishing number of Nobel prizes for their new countries not least the UK and the US, many forget that one of the greatest physicists of the 20th century, Lise Meitner, was denied a Nobel because of her double burden of gender and ethnicity. Nor was she alone, in the DNA story Rosalind Franklin's difficulties with Maurice Wilkins was both about her gender and her Jewish identity. What Shirley. Malcolm starkly reminded us was that by contrast with our European one-dimensional construction of diversity in science, the US has long taken both «race» and «gender» on board. Indeed a number of the interviewees reported in *She Figures* studies saw the agenda as one of ethnic and racial diversity not just gender. They are right and we need to catch up fast!

Dr. Malcolm's presentation also underlined the point that labour markets in or out of science are, if left to themselves, rarely rational. Despite the assumption of rationality in most governments' public rhetoric about the desirability of providing equal opportunities in the research labour market, left to themselves research labour markets are entirely capable of demonstrating irrational discriminatory structures which exclude potential talent. Many current holders of privilege and power find it extraordinarily difficult to see potential talent in a candidate who does not look like younger version of themselves - maleness and paleness are still an unstated almost unconscious requirement. Although there are some welcome signs of change the extreme difficulty that elite national academies have in recognising the achievements of women, reminds us that women's achievements in science are seen as different and less than those of men. That after a century of the Nobel Prize in the Natural Sciences only eleven women have been awarded, speaks of the unconscious science -gender system still unchallenged at the apex of science. That the Nobel committees that make these decisions are Swedish hints at just high a mountain this one will be to climb. No where is this unconscious requirement for maleness clearer than in the grim statistics set out in *She Figures.*

As a feminist sociologist of science and research policy I have wanted these statistics for many years now that *She Figures* has given them to us I have to tell you that they are much grimmer than even my distinctly dour expectations. Women are massively under-represented in European industrial research, and the country, which is the industrial research power house of Europe, namely Germany, has only 9% women researchers.

So I do want to use them to make a research policy observation as to wher we might direct our attention. I have already noted that the research system is ever more industrial, but what I have not said is that much of the European Research Area's budget - pooled taxes from ERA members - is directed towards subsidising industrial research. Indeed the history of the development of European research from the earliest years, lies in trying to stimulate industrial research thence economic growth - with - it has to be said, not too much evidence of success. Some economist's policy comments view this subsidy approach as actually counterproductive. They see it as supporting a welfare handout to industry which thus enables industry use the

European tax money for research so spending less of its own on research. But while I do not anticipate that these criticisms will swiftly modify ERA's research policy, for feminists once cognisant of where the bulk of the ERA money goes, does suggest directing our focus on industrial research. Such focus will give practical meaning to the Amsterdam treaty with its demand for mainstreaming gender. Carrots as policy makers and analysts know, can carry regulatory sticks. The Commission has, for example, done a good deal to ensure that more women experts are recruited within its advisory structures. However more needs to be done within the Commission's own labour force and not least in the research division. Thus the Commission has very usefully insisted that research projects -where relevant -carry a gender dimension. This has given some of us some amusement as academic colleagues hitherto utterly uninterested in gender suddenly become fascinated, at least while the bid writing process is taking place, in the work of their feminist colleagues.

Research contracts from the Commission to industry could and should carry the requirement that women are a planned and growing part of the industrial research labour force. But that is not all. We know now that no single method will achieve the needed change, and that what is needed are a multiplicity of sophisticated mechanisms involving all the industrial partners. However with *She Figures* we have the ability to monitor the efficacy of such strategies. Even with the new tools that the gendered statistics make possible it is important to keep in mind that change will only occur if women and their allies can maintain the political pressure from below.

Lastly because our conference has primarily focussed on the institution of research I want to close by directing attention to the social impact of the changing research system. As I have already indicated, two related technosciences - genomics and informatics - dominate the research system and command most of the research budget. But as well as bringing benefits, science and technology are now widely understood as intensifying risk both to the environment and to human beings. Pollution, GM food, Mad Cow disease are on the environmental and political agenda across Europe. There is also a growing concern that the age of genetic engineering is placing at risk what we understand it is to be human. Whether we read the philosopher Jurgen Habermas's most recent concerns about an imminent future in which human beings are «made not born», or we read the novelist Margaret Attwood's genetically engineered distopia of Oryx and Crake, we cannot ignore the dark sides of the direction of our present research system. Putting this problem in personal and structural terms, unless we work with other social movements not least environmentalism to change the overall direction of science and technology, I am less totally sure that I want my granddaughters or grandsons to enter the paradigms of today's hegemonic research. But letting that uncertainty win out would be to give up. So yes we do have to focus on the detailed struggle to secure access and advance within the current research system, and yes, we need socially and environmentally committed women and men inside, not outside, research. But as researchers and as citizens we also have to struggle to democratise the research system so that it serves the needs of the human beings and the environment alike. In the age of genomics and informatics, where the mode of knowledge is radically changing, the stakes are high.