12. Afterword and Policy Conclusions

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The analyses presented in this book point to the overriding importance of the diffusion process of new information technologies. This diffusion is important not only for economic growth and employment but is important to the performance of the IT sector itself. It must be underlined that this diffusion process is ultimately a social process. Information technology clearly represents a potential increase in productivity and growth. In Europe, much of the policy has concentrated upon technological potential, with rather less concern for the social process. An approach to IT policy which balances the social and the technological is particularly important given both the often disappointing realization of the potential benefits of the use of IT and the disappointing performance of IT and IT intensive industries.

The completion of the Single European Market in 1992 is a significant contributor to the range of pressures which are leading to significant rationalization and increased efficiency in European industry. The studies represented here support findings elsewhere that the successful transformation and growth of European industry crucially depends upon its interaction with the social environment of Europe. The integration of structural changes associated with the introduction of new IT could represent a basis for long lasting high growth in Europe well into the 21st Century, generating new job opportunities. Reaping the long term benefits and advantages from new IT therefore is a crucial challenge for all European countries, with significant implications for their international competitiveness.

The importance of the social and organizational ‘incorporation’ of such structural changes is not surprisingly at the core of the findings of this book. This has emerged quite consistently from the management of innovation literature where successes and failures in innovation are generally more closely related to organizational and social factors than the quality of the technology. When dealing with a pervasive set of technologies, as is represented by IT, with a significant effect throughout the economic system, it soon becomes obvious that far from being imposed on society, the technology has to be imposed through a process of social and institutional
change, negotiation and interaction. As these chapters show, there are various bottlenecks, shortages of adequately trained manpower, lack of retraining and educational provisions, work organization problems that will significantly impede the realization of the potential output and productivity gains associated with IT. This is also true of institutional and regulatory barriers to IT-related demand, where the fragmented markets of Europe might prevent demand reaching a sufficiently large scale to make it profitable for European producers to invest.

The policy recommendations which we put forward, following the research programme of which the chapters in this book were a substantial part, fell into three distinct groups. First, we were concerned that there should be major efforts to reduce the diffusion bottlenecks in work organization, skills, education and training areas. The aim should be to unleash the growth of efficiency of the more rapid diffusion of IT in the context of the larger European Single Market. We were also concerned to reduce the negative social externalities of very rapid diffusion of IT - particularly the danger of an increased duality in the labour market, with increased unemployment amongst the primarily unskilled workforce concentrated amongst ethnic minorities, school drop outs and hard to train individuals. There was also the danger of heightened regional growth inequalities emerging across Europe. The greater mobility of labour in a Single European labour market, particularly the more highly skilled workers, will raise severe social and internal cohesion problems going well beyond the need for retraining, labour adjustments, etc. Conventional Regional Fund provisions from this may prove to be insufficient. There is nothing in the diffusion of IT so far which promises a harmonized, well distributed development pattern. If anything the reverse is true.

Second, recommendations can be aimed at improving the general environment for the diffusion of IT across Europe. By increasing the ability of the IT producing industry to respond to new demands at home and abroad and by policy actions which increase the demand for such products and services, new areas of employment and growth may be generated. One of the major bottlenecks here relates to the urgent need for an integrated, but not monopoly provided, telecommunications infrastructure across Europe. There are indications of a need for European technology policy to become more demand led, so that the increased technological capabilities can be enhanced through direct feedback from learning and experience.

Third, the policy making bodies at national and supra-national level need to facilitate the coherence of micro-economic policies on technology, employment, work organization, training and education. In particular, and as demonstrated even in the qualitative studies represented by this book, the near absence of adequate employment monitoring research tools represents
a major gap in our ability to talk with authority about trends in the employment and technology.

It is not so much the IT itself, the hardware, which should be the focus of attention, but rather the social integration of such technology. Particularly in the case of a pervasive set of technologies such as IT, this argument has crucial implications. It means that technology cannot be imposed on society, it has to be mediated through a process of institutional change and negotiation.

The development of human resources is a complex system involving a number of different national and local institutions and authorities. Furthermore, firms play a leading role in determining the nature of demand for labour and in fashioning enterprise-based training and utilization of labour. Finally, the participation in the labour market is not only influenced by education and labour market policies but is also influenced by the interface with policies aimed at social protection. Similarly, tax policies play an important role in determining attractiveness of investment in human resources relative to physical and other investments. Policies aimed at human resources need in other words to consider action on the part of a number of actors. Given the range of different actors, the co-ordination of policy-making is absolutely critical. As the chapters on training show, there is therefore and explicit need for better co-ordination between education, the traditional preserve of education ministries and training, where labour market authorities and the private sector play the dominant role. As for the level of demand for labour, changes in management practices are likely to have a fundamental impact on the development and utilization of employees. Here the diffusion of IT opens up new directions and possibilities, thus we begin our discussion of policy recommendations by looking at issues of management practices and work organization.

WORK ORGANIZATION AND MANAGEMENT PRACTICES

Social Policy and Technology: a New Priority

The detailed analysis in this book points to a number of crucial areas for policy action both at the Pan-European and the national level. At the European level, as with technology policy, the main goal has been to strengthen European infrastructure. Here the social infrastructure, particularly as represented by the Social Charter, has concentrated on the development of a number of minimum basic social rights. In the words of the European Commission 'ensuring a minimum of consistency', between various employment contract forms 'in order to avoid the danger of
distortions of competition and increase the transparency of the labour market at the Community level. In doing so, we believe the Community has taken a crucial and essential initiative, by setting out the broad social infrastructural framework within which different countries' social policies can in the long term be further harmonized, given the widespread diversity in existing social legislation between member countries. However, just as in the case of technological infrastructure, to limit European social policies to the development of a minimum set of harmonization rules on employment contract, social security and health and safety at work is to dramatically underestimate the importance of the social environment in the structural change processes associated with the single market, and particularly the diffusion of IT.

In our view, the advantages of the harmonization and strengthening of the social infrastructure within the EU will only be realized if they are accompanied by the development of policies aimed at improving the 'social' integration of new technologies both at the private and public sector level. Alongside the Social Charter the interaction between technology, labour and organization is an essential and urgent domain for policy research and action. There is now a significant need for research and policy advice on the issue of how to improve the competitiveness of enterprises at the social level. As this book illustrates, the latter is one of the most essential issues in the long term determination of European competitiveness.

The implication which we draw is that there is an existing gap at the European level in the integration between technology and social policy. The organization of work, which lies at the intersection of these two policy frameworks, because of its influence to European competitiveness is as important an issue as progress on the Social Charter. Also, given the involvement of many actors, policies aiming at institutional implantation of education and research in technology, labour and organization have implications at supra-national level and so require supporting policies and institutional infrastructures.

Workforce Participation

Effective implementation of IT requires a firm positive commitment by the workforce. It is not just a question of passing information down from the upper layers of management, although this is also essential, but of responsible involvement at all levels, which requires more active forms of consultation and joint decision making including social dialogue on initial training. The European Commission has tried to promote such wider participation, particularly through studies supported by the European Foundation for the Improvement of Living and Working Conditions
reviewed here. The findings indicate that the countries which have experienced more advanced forms of participation tend to have better industrial relations and firmer decision making. It seems the case that changes in the relations between managers and trade unions should seek to enrich participation in technological change.

Trade unions are often ill-prepared to cope effectively with technological change, and the implementation of new technologies and related aspects of working practices. Appropriate programmes for raising awareness, knowledge and skills and for facilitating the development of social networks which can relay learning experiences are required. The Single European Market requires going beyond existing trade union structures, so that information can be shared across union and national boundaries and between unions and other groups, such as researchers, education and health services.

**Improving the Quality of Technology Management**

A recurring issue in the book has been the need for more professional management of the implementation of new technologies. This requires a move away from traditional technocratic orientations, within which 'systems' are selected and implemented, with ergonomic and job design issues entering at a late stage, to one in which managers are trained to be more effective in developing the synergies between human and technical resources. Such developments depend upon more direct formal training of managers in the disciplines of technological management, which is so often marginalized within the training of higher level technical and professional staff and even within specialist management higher education, such as Master of Business Administration courses.

One potential advantage of a Single Europe is that there should be more opportunity for comparison between 'best practice' in technology management. As we have seen, new IT is implemented in very different ways in different firms and countries even though engineers and consultants often start out with what constitutes 'normal' best practice.' Whilst we do not claim that this is solely a matter of voluntary choice (corporate decisions are based on a mix of factors including skill, organizational structure, and pre-existent patterns of investment), management competence and the cultural predispositions of management clearly are important. These variations lead to stark differences in prospects for working conditions in different European countries. In order to further develop and spread best practice there is a clear need for mechanisms to transmit new institutional practices, such as; staff secondment schemes, international workshops, cross-national training schemes, etc.
Whilst European Commission sponsored measures such as the Human Capital and Mobility scheme are a move in the right direction, it is necessary for all these efforts to achieve legitimacy in the eyes of management. For instance, the dissemination of new information about management practice has to be visible in the literature and in the conferences attended by senior management personnel. These approaches cannot simply be constrained to an information programme on the potentialities of new technologies. The information needs to extend abstract intelligence into practical know-how and action. Such programmes are important as part of establishing a demonstration effect which could aid the ‘transfer of technology’ (in its widest sense) from more advanced sectors and regions to the lagging areas and industries.

SKILLS, TRAINING AND RE-TRAINING

A large proportion of the training and retraining which takes place in Europe is and will remain at enterprise level. Obviously, firms are in the best position to assess the specific requirements of their own product and process innovations or their organization’s reforms. Such changes are related to their own strategies for research and development and new investment, which cannot be known or integrated by government. Such strategies are often related to programmes affecting company personnel policies, including promotions, recruitment, retirement, participation and employee morale. Governments are also deeply involved in training and retraining through creating an appropriate environment, appropriate incentives and supporting infrastructure. However, a more effective integration between these two levels of training provision is becoming urgent, because of the increasing rate of obsolescence of the existing skills base amongst individuals, firms and the wider labour market.

In a situation in which skills go out of date quickly, retraining is important for at least two reasons. First, the existing profiles of skills cannot simply be scrapped. They have to be modified and substituted over a considerable period. Often it is a question of adding to or combining existing skills. Almost always it is a question of importing understanding of some wider objectives of the organization and its changing role. Sometime there is a need to establish entirely new qualification structures. The software skills gap experienced by many firms is being tackled only in part by the new recruitment of young, recently-trained and educated professionals. It is also being resolved by internal re-training of existing engineers, technicians and other personnel within firms. Such people have the advantage of greater familiarity with the firm’s products and problems,
even though they may lack deep professional training. In the short-run, the re-training and upgrading efforts of firms are essential until there has been an adjustment of long term significance from the formal education system.

Second, the rate of change in IT is such that constant re-training will be necessary even if higher and further education sectors can meet the demand for the output of electronic engineers, software engineers, systems designers, programmers, etc. Life-time re-training is becoming a regular feature of the activity of many firms which are involved in continuous innovation in products and processes and constant renewal of both physical and human capital.

Although much of the re-training will take place at the initiative of firms, many firms are too small, too financially weak, or unwilling to provide it adequately. There is, therefore, an important role for government policy both at the national and European level, in promoting a sufficient level of re-training activity. There are a number of key issues which emerge from the need for government aid in making sure that the general level of re-training activity reaches its optimal level. In particular, there is a need for attention to imbalances and gaps in the provision of re-training.

1. In strategic sectors, such as telecommunications, there are likely to be demographically driven skill bottlenecks over the next 10 years. Sectors such as telecommunications are likely to show substantial and continuing shifts in skill requirements as the demand for more routine jobs supporting network provision decline relative to the growing areas of new telematic services and other valued added services.

2. The re-training strategies in less advanced regions need to reflect current best practice rather than historic practices. So, for instance, there is an opportunity for firms located in such regions to leapfrog obsolete centralized patterns of IT use. The relative lack of inertia created by institutional patterns established under earlier generations of IT may even be turned to a competitive advantage.

3. The formal training system, based as it is upon longstanding and fairly rigid disciplinary boundaries, is often quite slow to reflect the need for managers and workers whose skills span traditional areas of expertise and authority. Thus meeting the need for hybrid managers, who are knowledgeable about IT but are also effective administrators, strategists and entrepreneurs is an area which can only be approached through closer partnership between firms and the training system. It may also require collaboration between firms, as individually they may be unable to provide a sufficient range of experience to support retraining activities. At a most fundamental level, there is also a need for widespread basic
retraining in adult IT literacy and numeracy as part of an overall training
policy.
4. There have been actions to recruit women into technical IT-related
occupations, which are often motivated by skill shortages. Insufficient
attention is often paid to the very real difficulties which women face in
working in occupations traditionally regarded as 'men's work'. The
opportunities for women to play enhanced roles in 'traditional women's
occupations' should also not be ignored. For example, secretaries can
use IT to improve office efficiency, and with appropriate training could
take on many junior administrative tasks.
5. Retraining in order for workers to take part more effectively in the
process of technical change is another area of potential development.
Participation in technological change can be important both in terms of
workers being able to adapt to new techniques more quickly, and being
able to help define more efficient and humane ways of working with the
technology.

THE VET SYSTEM

Developments in the 1980s have shown the need for big changes in public
education, as well as in industrial training and retraining. Amongst the
major issues are:

1. the blurring of the distinction between education and training;
2. the growing role of part-time education and adult education;
3. the rapidly growing demand for certain professions engendered by IT,
such as electronic engineers, systems designers, etc;
4. the accompanying demand for computing skills across a wide range of
other jobs;
5. the need for a more generally highly educated workforce;
6. the rising importance of inter-personal communication skills;
7. the simultaneous need for educational breadth to be combined with deep
professional competence.

The distinction between education and training is blurring as the result of
several developments. Learning is no longer viewed as being coterminous
with the end of extended adolescence; rather it is a lifelong occupation.
Though the responsibility for scientific and technological research and the
preparation of highly qualified manpower has never been confined solely to
educational institutions of higher learning, these activities are increasingly
taking place in industry and other settings outside the education community.
Education and training are less and less the concern of the formal education sector alone. The increasing importance of education qualifications and training as a determinant of labour market authorities has meant that they are provided increasingly by the labour market authorities, employers and others whose main mission has been other than providing education.

These developments imply the need for a re-examination of the fundamental dualism which pervades educational philosophies, that is the dualism between education for the 'citizen' and that for the world of work. Core curriculum needs to cater not so much for an end product but for lifelong learning - initial education is a stepping stone or further education. Particular emphasis should be put on transferable skills, including problem solving and entrepreneurial skills as well as developing positive attitudes and values towards later education and training in different settings.

In a number of European countries educational systems do not equip people well either for further education and training or for the labour market. This problem is compounded by the ageing demographic picture, in which the adult learner becomes important, in some cases perhaps more so than the young learner. There are large proportions of older people with low levels of educational attainment. These people may increasingly find their low levels of skills and competence overtaken by rising qualification requirements, while at the same time encountering more difficulties than do more educated workers in updating their qualifications, because of limited basic educational competence.

The market for further education and training for adults assumes greater importance as abrupt and dramatic changes in skills and qualifications requirements, shifts in occupational composition of employment and uncertainty about future developments emphasize the need for frequent retraining during a lifetime career. Meeting this need requires closer cooperation at the policy level in order to allow for and stimulate the building of new networks and partnerships between different providers of education and training, both public and private. It also requires breaking down barriers between authorities making decisions in the traditionally fragmented training domain. The European Commission's Task Force on Human Resources, Education, Training and Youth has been instrumental in breaking down such barriers at the overall European level, and has brought forward a number of cross-disciplinary networks and partnerships. We would like to see actions of this sort becoming more widely adopted.
LABOUR MARKET INSTITUTIONS

The task of the labour market institutions is to help in achieving smooth and efficient functioning of the labour market with the fullest possible utilization of the labour force. This interest links them with the education authorities on the one hand and with the internal labour markets of firms on the other. Their link with the education system is reinforced by findings of a consistent relationship between the incidence of educational attainment and employment probabilities: adults with the lowest level of attainment consistently face the highest incidence of unemployment and the risk they face seems to be growing. On the other hand, the employment potential of the economy depends upon how the technologies are used, whether or not they enhance productivity and generate new products and services.

In this perspective the challenges facing the labour market authorities are complex and diverse. The main constituency of the labour market authorities is made up of the hard to deal with cases: school dropout, long-term unemployed, hard to train individuals, minorities and so on. They aim to respond to a wide-ranging and heterogeneous set of shortfalls in the supply of skills. Whilst labour market authorities are faced with the responsibility of addressing shortfalls in human resources stemming from weaknesses of the educational system, the enterprise-based training and failures of the labour market, they have little leverage in limiting the nature of the shortfalls they have to address.

Enterprise training often is focused on the group of workers most likely to produce results for the company. One goal of government policies must be to assume special responsibilities for training those left out of the system and who have the danger of becoming locked into a ‘peripheral’ work force, characterized by unskilled temporary jobs and recurrent spells of unemployment. More resources are therefore needed for initiatives at the European level such as the Social Fund. This is part of the broader problem of dualism in the labour market. The implications for VET and for national and European-wide training policies are worth emphasizing. Both the tertiary and the adult education systems will have an increasing responsibility for assisting these efforts of the labour market authorities by special courses and opportunities.

There is scope for considerable variation in the forms of work organization used in conjunction with a particular technology. Different combinations of skills may be required to operate a particular technology depending on the way work is organized. But even if the skill requirements associated with a particular technology were to be defined unambiguously, this would not entail a particular form and organization of VET; particular skills can be achieved by means of different patterns of formation: in one
country a worker may achieve the necessary skill mainly through training in industry, in another country vocational education may play a greater role. It is only possible to understand the role of VET in the context of national structures of educational provision, methods of work organization and the style and institutional arrangements of industrial relations. These factors tend to reduce the benefits available from economies of scale in relation to curriculum and education developments; from standardization of qualifications between countries; and from diffusion of best practices between countries, which could be achieved by closer co-ordination at the European level.

This argument might seem to indicate that the necessary developments in VET provision could all take place at the national level. But there are clear rules for the European Union. Alongside the creation of the large internal market, one of the principal objectives of European policy should be to diminish current disparities in economic and social well-being across its regions. In the absence of action at European level differences in development and implementation of IT are likely to exacerbate even the present extreme disparities between regions. The existing financial resources available within the EU Regional Fund are from this perspective likely to be insufficient and strongly in need of augmentation. A large single market means also a large variety of regional growth patterns with peripheral areas experiencing possible vicious circles of continuous emigration of highly skilled labour and low development.

Policies for upgrading competitiveness at the periphery of the EU cannot be based on VET alone. Some of the newer members of the European Union, Portugal and Greece in particular, face the problem of poor basic education. This inhibits the catching-up process and the effective use of technologies that would increase their competitive position. In addition the skills need to be matched with patterns of sectoral development and the relationship between inward investment and indigenous growth needs to be taken into account.

Members of the European Union have initiated substantial programmes of VET development to meet emergent demands for improved IT-related competence. These have been paralleled by European Commission programmes such as ESPRIT and RACE, which while primarily concerned to promote development of IT have had training spin-offs. Other initiatives such as COMETT, DELTA and EUROTECHNET have been directly concerned with improving the quality and distribution of IT-related skills and the application of new IT to the development and delivery of education and training. There is, however, a continuing need for the development and improvement of European VET provision to meet internal needs and the challenge from other advanced economies. IT-based competence at all
levels of the occupational hierarchy must be developed, from managers to research scientists and engineers, to shopfloor and office workers. There is also a pressing need to develop strategic integration of policies for IT implementation and VET and real dangers that various European policies could be in conflict.

Instruction in the use of IT has been introduced into the curriculum of several member states during the last twenty years, although Denmark ended experimental work in this area in 1985 and investment in it in West Germany fell during the 1980s. An underlying problem is uncertainty about the objectives of such programmes. There are considerable differences between European countries in this respect: for example, France has pursued a strategy of introducing IT as a vehicle for teaching across the whole educational curriculum, while Germany and the Netherlands have tended to confine it to vocational education. The balance of evidence indicates that the French approach is better, but more research is needed to provide a deeper analysis of the relative advantages of each approach. Another area in which progress in the development of training methods leaves much to be desired is in providing training opportunities in respect of the new IT to disadvantaged groups - women, the unemployed adults and ethnic minorities. Whilst some lessons have been learnt about the value of targeted training, the scope of the need dwarfs the resources which have been applied.

It is, therefore, essential to determine clearly the purpose of the inclusion of IT in school curricula. A further stage is to ensure that education and training planners, teachers and trainers gain the necessary competence. Training planners need to understand the implications of IT for the development of training systems: for example the German dual training system is having to adapt as the distinction between school-based and workplace elements of instruction has broken down under the influence of IT. Across Europe, VETs are very varied and there is really no reason to expect or pursue a harmonization in this area. On the other hand, Europe may derive strength from pluralism and variety. However, the benefits of such pluralism will depend upon continued expansion and co-operation between the many initiatives affecting mobility, co-operation, information exchange and comparative research.