CEDEFOP

European Centre for the Development of Vocational Training

PANORAMA

The impact of information and communication technologies on vocational competences and training

Case studies in Italy, France and Spain

Synthesis Report

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FOREWORD BY CEDEFOP

As part of the initiatives promoted by the Ciretoq network – the Network on Trends in Occupations and Qualifications – over the past three years CEDEFOP has produced a series of studies analysing and predicting the needs for vocational skills and competences. Particular attention was devoted to the main phenomena that have affected economies throughout Europe and worldwide over the past few years, including the technological development of communications systems. The integration of telecommunications, information technology and multimedia products has generated information and communications technologies (ICT), triggering off radical changes in society and the economic system.

The patterns of existence of organisations are changing significantly, with sweeping repercussions on vocational skills and their future developments. The watchword for production systems is 'organisational flexibility'. In practice this has brought about a dynamic change in roles, qualifications and competences of direct concern to individuals and their work, raising the problem of continuing training and updating. An understanding of these phenomena is vital if appropriate initiatives to prepare for and back that process of change are to be set up in good time.

Starting with these considerations, in 1996 Ciretoq launched a series of studies to shed light on the significance and scope of changes brought about by information and communications technologies. In particular it analysed the development of competences in the Telecommunications and Administration sectors. In the light of the findings, published by CEDEFOP in 1997[1], another study was conducted in the same countries – France, Italy and Spain – covering the same sectors – Telecommunications and Administration/offices. The aim has been to predict the new competences needed in the medium-term future and identify the training procedures, both current and foreseen, for the acquisition of those competences. The study was linked with the project of three national reports, of which a comparative synthesis is now offered.

This study, commissioned by CEDEFOP, has been conducted by the following working group:

- Lazaro Gonzalez, who was responsible for the national surveys in France and Spain;
- Stefano Poeta, responsible for conducting the Italian survey;
- Mario Gatti, M.G. Mereu, Claudio Tagliaferro, who were responsible for the scientific coordination of the survey in Italy and for drafting the consolidated report.

Mara Brugia
Project Coordinator

Stavros Stavrou
Deputy Director

[1] Cf *'Competencies in two sectors in which information technology (IT) exerts a strong influence: Telecommunications and Administration/offices. Case studies in Italy, France and Spain',* CEDEFOP, Panorama . No. 5064, Thessaloniki 1997 (available in English and Spanish).

CONTENTS

1. INTRODUCTION AND METHODOLOGY

The study that follows is a consolidation of the findings of three parallel surveys conducted in France, Italy and Spain. It is in fact the second phase of a project launched in 1996 on the theme of the impact of new technologies in the telecommunications and administration/offices sectors. This follows the working guidelines planned by CEDEFOP to sound out the developments in vocational skills in European Union Member States in dynamic work contexts, where general and widespread use is made of Information and Communication Technologies (ICT).

In both the first and the second phase, the contexts analysed were the telecommunications and the administration/offices sectors.

The 1996 study identified the main functional areas within these two sectors and the typical practitioners – defined as a set of tasks and working activities – within each of those areas. The current requirements for vocational competence were then analysed.

The conclusions of the first phase of research pointed to further areas of work of relevance to training, showing that the vocational competences required in sectors with a high ICT content are not just technological but organisational as well, and that there is a need to reinforce social skills.

The findings acquired in the first phase[2] were convincing evidence of the advisability of going on to a second phase of research, related to the new competences required in the near future in the two sectors. In this new phase of the investigation, the researchers set themselves the objective of providing replies, in the sectors being analysed, to the following questions:

- were the typical practitioners and the vocational competences recorded in the first phase of the research correctly identified?
- how does the content of work change with the habitual use of ICT, especially those technologies facilitating group co-operation?
- how are vocational competences tending to evolve in these new work contexts?
- how should training respond to the new competences and the creation of the new value system and attitudes required?
- which training methods and instruments best promote the development of such new vocational competences?

To answer those questions, a qualitative approach to the conduct of an investigation was seen as appropriate. A selection was made of case studies conducted in highly innovative French, Italian and Spanish firms of national importance in the telecommunications and administration/offices sectors.

The survey analysed the changes – both current and those foreseeable in the medium-term future in the light of technological and organisational predictions – that might influence the evolution of competences and create new training needs.

[2] See footnote no. 1.

In developing the research, account was taken of the variables in the socio-economic contexts in which the firms operated, and therefore of the impact of such processes as market liberalisation, privatisation, globalisation and standardisation on the structural solutions adopted by the firms to survive on the market.

The impact of technological change was in turn considered from the twofold viewpoint of its organisational consequences and the repercussions on vocational competences, with the aim of determining what steps should be taken to adapt vocational skills to the changes.

The methodology used to investigate those changes was an ad hoc interview questionnaire directed at the people in charge of functional areas of the firm and managers of human resources and training.

The priorities in the interviews were to analyse the following factors:

- the development of company strategies, organisational changes and the criteria adopted in the choice of technological solutions;
- the influence of those changes on the competences of the typical practitioners identified in the 1996 CEDEFOP study;
- the trends in occupations and vocational competences;
- the impact of technologies on vocational training.

In each of the countries, contact was made with leading firms in the sectors being investigated and with the institutions that had conducted research similar to the research commissioned by CEDEFOP in 1996. The data obtained from the interviews were also enriched by the documentation found in the firms and the findings of other available field studies.

Through a comparison of the data collected in the three countries, the research group has produced this synthesis report. It shows the main trends in evolving competences and vocational training. The report concludes with a set of recommendations for those responsible for training policies.

2. TECHNOLOGICAL DEVELOPMENTS AND CHANGES IN VOCATIONAL SKILLS

The research described in this report refers to a very concrete analytical sphere: changes in vocational competences and vocational skills. In tackling this theme, it was considered advisable to direct the research towards the global scenario of the information society, especially as this new context lends itself to analysis from many viewpoints: political, cultural, social and economic. For the purpose of this research, the interest lies above all in economic analysis, specifically on the aspects of changes in the strategies, organisation and technological innovation of companies.

The main questions to which priority was to be given were:

- are European countries moving towards an information society?
- are European countries taking sufficient advantage of the opportunities for growth and competitiveness offered by information and communications technologies?

As regards the first question, the national surveys detected a widespread concern in political and entrepreneurial circles about whether European countries might lag behind in creating the information society, losing the lead they have enjoyed up to now in the 'global village'.

Another issue for consideration relates to the new information and communication scenarios appearing with the advent of networking. A new global model is arriving, based on wider communications and the democratisation of information, making it easier to satisfy the needs of work, culture and leisure.

As regards the second question, in the interviews and documentation collected, much stress is placed on the potential for firms to use information and communications technologies in order to become more competitive and improve organisational set-ups. The point to be emphasised is the rapid consolidation of Intranet within the enterprise, its main applications being to improve internal and external communications, facilitate access to information and promote group work.

The group work technologies (electronic mail, videoconferencing, electronic document management, workflow, groupware, etc.), which are becoming consolidated in parallel with Intranet, are helping to increase the productivity and efficiency of enterprises. From another viewpoint, the general spread of such technologies may lead to a polarisation of the workforce towards two groups of occupations that are moving ever farther apart: the first consisting of the professionals, who dominate and regulate their own professional sphere, enjoying considerable autonomy and the ability to make proposals in a project team, and the other consisting of people who work on the simple, repetitive processing of information in a sort of regression to Taylorism. Workflow technology facilitates this type of Taylorism, with all its over-specialisation and the worker's loss of control of the production process.

Another problem with information and communications technologies is the risk of workforces being downsized, since the same volume of services can be produced with 30% or 40% fewer personnel. In the future – within ten years or so – there may be a significant

decrease in information processing occupations even though at present, according to national surveys, these are the callings that have maintained the largest number of jobs overall in the telecommunications and public administration/offices sectors.

Another important factor in ensuring that enterprises become more competitive is the form in which the enterprise information system is planned and managed. It is far more complex to set in motion an information and communication system than to install a computer network. Essentially it is a strategic action designed to change an organisation as a whole. It entails many steps: arousing the awareness of members of the organisation and motivating them, especially at management level; a feasibility study; careful planning; and a social plan analysing the effects on employment, the skills required of the system users and the reorganisation of work and training.

Many undertakings (including most of those covered by the case analysis) already use modern networked information systems, but many small firms are also moving towards the use of functional computing applications for the processing and automating of commercial, production, finance, human resource and other management data.

The focus of interest in this research, however, is not so much to record what is happening today (and in many enterprises the changes are very slight), but to consider what the future trends will be. The surveys in the three countries covered a number of selected cases and paid particular attention to what is happening with competences and the training needs in those functional areas working with networked communication systems. This was partly because networking has a significant impact on the development of organisations and the future applications of technological innovation, and partly because the surveys can be used to study in greater detail what are defined as the 'key' socio-organisational competences right from the first phase of research.

The importance of networking to the transformation of organisations becomes particularly apparent with the consolidation of technologies such as Intranet and with the ever wider introduction of groupware projects.

Intranet is a private network based on the Internet TCP/IP product, operating within an organisation. The organisations to which the interviewees belonged have Intranet. This technological application has enormous potential, but the most common uses to which it is put in such organisations are electronic mail and internal networking for management-related operations: internal group information, various reports (sales, financial, client information, etc.), catalogues and statistics. In some cases it is also used for training, and certain small groups, usually engaged on programming or planning activities, use groupware and workflow applications.

Intranet has many advantages, including:

- simple hyperlinked access to information;
- independent information access through a navigator;
- connection with various computers within the enterprise, irrespective of the location of other delegations;

- it is an economic technology, needing no more than a browser or navigator and a server program;
- linking with clients and suppliers in the flow of information via an outside network;
- access to Internet services.

Intranet is also a good instrument for improving management and supporting new production opportunities. As a means of communication within and outside production, it has overtaken the traditional local area networks and wide area networks (LAN and WAN).

For reasons such as these, it is estimated that within a few years most undertakings will be using Intranet as a basic information transfer service.

As far as groupware is concerned, this is a set of computer tools providing easy, effective support for group work. It can be used to communicate, co-ordinate and co-operate as part of group projects. It has many applications in administrative work, but it is equally useful in any other area such as design, production and marketing.

The tools include teleconferencing, videoconferencing, an electronic meetings system, conversation and workflow tools, the shared production and editing of documents and electronic mail.

A groupware project is far more than a technological instrument: it is an organisational project entailing a new culture. It involves a new and more horizontal form of management based on the group structure. The new culture supporting a groupware project is based on new values that need to be shared among the various group members, and it leads to new occupational skills among the workers. Groupware projects will no doubt be the key tools for competitive undertakings over the next few years.

The use of networking, then, affects work procedures and the organisation of work and therefore occupations themselves, especially in the following ways:

- the wider acceptance of the client/server principle, to the effect that every department is administered by a server which may be located in a different place from the client, using the network as an intermediary;
- a workstation may be located wherever the network can be accessed. The geographical location of members of a workgroup is of only relative importance. Those working from home and ‘mobile’ workers are becoming increasingly common in jobs associated with maintenance, consultancy, health, insurance and trade;
- groupwork instruments help to conduct vocational activities more independently and efficiently, in that such applications enable each member of a small group to position his or her own work within a process. The group must then gather together all the necessary skills to solve any typical case, combining and integrating the expertise of each member to produce better and faster results than could be achieved from each person working separately;
- groupwork support technologies can be used to construct ‘virtual enterprises’ for the conduct of a given project. Various professionals or small firms will find it easier to pool

their experience and knowledge through electronic messaging, shared archives, support systems for joint decision-making and electronic conferencing systems.

2.1 Trends in the telecommunications sector: the market, strategies, innovation and the organisation of enterprises

The telecommunications sector in industrialised countries, especially in the three countries surveyed, have over the past few years been trying out changes of as yet unknown scope. Such transformations are due mainly to four factors: technological evolution, the liberalisation of services and infrastructures, standardisation and market globalisation.

Technological evolution makes it possible for the various telecommunications services to be converted for everyday use. It can best by summarised by the growing integration of telecommunications, computing and the industry generating the content of new products. Mobile telephony, Internet and digital television are fields for continuing technological innovation, partly stimulated by their mass consumer market and above all the potential market.

The second factor in the changes is the liberalisation of telecommunications services and infrastructure, and privatisation. Over the past few years, especially in 1998, the countries of the European Union – including Italy, France and Spain – have been rapidly moving away from State telecommunications monopolies and towards liberalisation and privatisation. The process is not yet complete, but for the first time there can be competition among certain services, such as the basic telephony and mobile telephony, on top of the competition already launched in the field of ‘added value services’.

The privatisation process increases competition on domestic and international markets by stepping up the search for solutions (in processes, structures and operations) that might systematically improve the overall efficiency of production systems and optimise the efficiency/effectiveness ratio.

The standardisation work promoted by the European Union is laying down certain rules of play for the sector as a whole. This imposes certain constraints on all operators in their approach to their work and their adoption of technological innovation complying with the standards so that they can be competitive and avoid additional costs.

The internationalisation and globalisation of services and the market are becoming the fourth vital factor in change in the sector. ‘Global telecommunications operators’ are gaining ground and, as evidenced by the national surveys, operators in France, Italy and Spain in turn are becoming convinced of the value of forming strategic alliances so that they can provide global services. Internationalisation and globalisation are bringing down all the protection barriers, and telecommunications enterprises are having to compete in an open market with direct rivals. Their approach has to be even sharper because of the confrontation, and it may be better for them to sacrifice certain production strategies in order to guarantee the success of others.

The four elements of change to which we have referred (technological evolution, liberalisation, standardisation and globalisation) are in turn sparking off various changes in tele-

communications undertakings. We can summarise these by listing the four groups of trends reported in the three national surveys:

a) the importance of greater competitiveness in the telecommunications services offered, which at the present time is focused on the following aspects:

- matching client demand more closely;
- improving the innovation of existing products and services;
- reducing costs;
- improving the structure and effectiveness of production processes;
- introducing the latest changes into the field of networked services;
- improving the quality of management, especially the time devoted to the client;
- lowering and containing the price of services;
- achieving satisfactory economic and financial results.

b) winning a position of advantage on the market by:

- taking advantage of traditional monopoly positions;
- opening up to new geographical areas of economic interest;
- taking a place within global alliances;
- expanding the provision of value-added services;
- establishing oneself in the information content product industry;
- retaining and increasing market shares for products and services relevant to key economic sectors.

Developments in basic technologies are making a considerable impact in this sector. Microelectronics miniaturisation techniques have multiplied processing capacity, and the trend is gathering momentum (capacity is multiplied tenfold every three to four years). Optical fibre and its low maintenance cost are considerably reducing the cost of signals transmission. Compression techniques are helping to improve the speed of voice transmission. Digital coding of video signals makes it possible to network multimedia services. The software for telecommunications systems, which now cover about 75% of development systems, is helping to increase productivity and improve process and cost management. The new asynchronous transfer model (ATM), which can be used to transfer any type of coded signal, is the basis for wide-band multimedia communication.

Of particular interest is one aspect of technological change that has already been mentioned: the capacity to integrate information, telecommunications and product content. The information content has up to now arrived at enterprises essentially via traditional systems of communications. Today it can be sent via the computer and can be used for interactive services. Communications media such as digital television already enable the user to select the content and the operator to offer personalised services in response to demand. The integration of information technology, telecommunications and content is not yet here,

but it has aroused enormous commercial expectations and opened up a priority field for the telecommunications sector.

These technological changes have already become commonplace in the applications used within the sector and are one of the main challenges in the changing of enterprises. To confront successfully the restrictions imposed by standardisation, the market and the competition, the technology variable is vital as it appears to offer a range of alternative solutions.

Market trends and the strategies of telecommunications companies, as we have described, are producing genuine competition in the three countries surveyed, in the search for technological solutions that make it possible to compete for client satisfaction in terms of the price and quality of service.

Enterprises are also defining new organisational structures that make it easier to achieve the desired objectives. New 'formulas' are being sought so that vocational competences can be differentiated and on occasions integrated to achieve partial objectives that will promote the achievement of the enterprise's overall aims.

The criteria for organisational innovation, as indicated in the national surveys, are:

a) **attention to production processes**, to find out about the chain and define the points of responsibility that serve as indicators of effectiveness and efficiency, with the aim of the ongoing optimisation of economic and financial results;

b) **decentralisation of decision-making and performance**, the aim being to reduce the time taken to respond to client demand, win client loyalty and contribute to client satisfaction at ever higher levels;

c) **the switch from a vertical logic and structure**, focusing on functions, **to a horizontal, client-centred, logic**. In a sense organisations have been 'flattened', with the number of hierarchical levels being reduced. This also seems to be the future trend;

d) **creation of project groups working as a team.** Within these groups, multiskilling of individuals is the main value. The group members share the same mission, some of the project objectives, a method, the means and the organisation.

e) **protection of the centralisation of planning and control activities,** with particular regard for the economic, financial and product aspects. The aim here is to pursue the global integration of the enterprise by standardising the information system and speeding up information processing, the prerequisites for systematic monitoring of whether operational levels are in line with the medium-term strategic goals. In this field of activity, the solutions derived from the more advanced information and communications technologies are a decisive support.

An overview of the process, market trends, the decentralisation of decision-making, promotion of the project group and centralised protection of the dynamic relations between strategic aims and working objectives: all these are guidelines that significantly influence the procedures governing functional and productive activities.

The fragmentation of structures – and the larger the undertaking the more fragmented they are – and above all the frequency of future organisational changes are factors that multiply and generate operating procedures, both in quantity and in terms of innovation.

If the general direction of those factors is understood, technical solutions for both hardware and software can be identified that can manage the flow of communications. These must:

- be distributed over world markets;
- be rich in data, whose processing must not make decision-making more cumbersome, while at the same time it must allow for the adoption of stringent protection and confidentiality measures;
- incorporate variables relating to the locations for the receipt of input and the production of output, as a consequence of continuous organisational changes.

In the undertakings that have tackled these aspects, there has been a marked propensity to seek solutions that integrate current information technologies with telecommunications, and in the near future with multimedia technologies, to create a business information system that is effective and efficient in operation as a whole.

The incorporation of information technologies into telecommunications networks has made it possible for the those networks to become ‘intelligent’ enough to administer a set of services that facilitate and speed up the flow of communication between the centre and the peripheral locations. At the same time, the continuing development of software will lead to systems that can integrate hardware platforms of varying origins as well as systems and applications created to meet a whole range of needs.

Technology is generating ever more widespread and effective opportunities for responding to the practical requirements of the new organisational ‘formulas’, consistent with the strategic options prevailing in the increasingly competitive contexts.

The telecommunications applications that will be most widely used in the future, as indicated in national studies, are:

- in the **management area**, functional systems for the processing of data in every phase of the compilation, processing, archiving and integration of sub-systems – economic and financial, commercial and the administration of human and physical resources;
- in the area of **planning, production and sales**, the increasingly sophisticated interactive systems, the Executive Support Systems (ESS) dedicated to various fields and the expert systems that can be used to capitalise an undertaking’s know-how. The use of telecommunications networks, increasingly directed towards creating groupware and video/audio communications systems, will render various forms of teleworking possible. The Intranet type of in-house network will make it possible to navigate the wealth of information held by the undertaking.

2.2 Trends in the administration/offices sector: business strategies, innovation and organisation

Administration is an essential function of company management and the raison d'être of the public administration. In this area, information and communications technologies are developing widely in every undertaking, especially as technology is part of the strategic plans of enterprises that must be capable of reacting to market requirements. These requirements are transferred to the departments that deals with the demand: greater focus on the client, the simplification of management, accurate and immediate provision of information, the facility of making transactions without delay, etc. For this reason, the administration/offices sector has to adapt to the strategic lines imposed by the market, and therefore needs to:

a) **improve customer relations.** This means devoting greater attention to the client by cutting down waiting times, simplifying management, reducing errors, providing effective information and supplying a product that meets practical needs;

b) **develop new products and services.** Customers are becoming ever more demanding of the services provided by the public administration, both in the time of provision and in the quality of those services;

c) **improve organisation and internal management.** Many of the traditional forms of organisation and management are inadequate when it comes to competing in their respective production sectors. Undertakings therefore need to rationalise and reorganise the human and technological potential available to them in administrative areas.

Office work is undergoing radical change as a result of changing company strategies. Administrators have become an interface between the organisation and clients, both internal and external. Administrative work consists more and more of establishing contact with clients, selecting information so that practical responses can be made and managing a variety of client situations.

There are many major organisational changes in an area common to production sectors such as public administration/offices. The trends in organisations vary too: while there are concerns that have altered their organisational attitudes, there are also companies or public bodies that have retained essentially vertical organisational structures as yet almost uninfluenced by the market or by technological innovation.

There appear to be three basic trends, however, that will prevail in the future and that are already reflected in the organisation of commercial work:

a) **refocusing of the whole organisation on outside or internal clients.** This presupposes that most of the resources of offices are engaged upon this task, whether in commercial companies or in public administration. This will also have major effects on vocational competences.

b) **automation of traditional administrative work**, such as orders, invoices, accounting documents, records, insurance policies, contracts, etc. The office worker who habitually used to perform such tasks is having to change as a result of this innovation.

c) **there are fewer vocational skills in offices.** The organisation is getting flatter: the organisational set-up in many firms is still vertical, but there is a clear-cut trend towards the horizontal organisation of work.

One problem noted in all three surveys was the lack of strategic plans for the introduction of information and communications technologies entailing the computerisation of existing workstations without redesigning an organisation able to take full advantage of the potential of those technologies.

Nevertheless there are functional areas or sectors in which technologies have for many years been a strategic factor. The innovations adopted in these areas are based mainly on two criteria for the adoption of technologies: as a support and information base for production, and as a platform for interaction with the client.

To an extent the central criterion of client orientation is being introduced into public service bodies as well. Here the current and also the predicted trend is towards adopting technologies as the means of communication with citizens and as a factor in co-ordination among separate administrative bodies.

The main technological changes in the administration/offices sector fields, therefore, are based on information technology and on telecommunications. Today these not only represent an economic sector in its own right but also a technology cutting across all sectors. Information and communications technologies have a greater impact on organisations, as evidenced by two trends: the adoption of technologies such as Intranet on an ever wider scale and the introduction of groupware projects. Both Intranet and groupware tools are profoundly transforming office work, enabling the client to be approached from any location and as part of any type of management, because the information needed is networked. If an administrative worker does not have a good solution to a problem, he can use the group tools to consult, find new solutions and work out tailor-made responses.

3. THE IMPACT OF THE CHANGES ON PRACTITIONERS' SKILLS

The data and assessments set out in this chapter summarise the findings compiled in the national reports. The data are highly relevant in the countries covered by the research, both within the cases analysed and in general, since the concerns surveyed are among the most significant in their respective countries. The research also included public bodies as major providers of employment for which information is a major activity. Account was taken of documentary data on policies and training plans reported by the interviewees. Lastly, this information was supplemented by elements taken from the other studies cited in the bibliography.

From the interviews with human resource managers and the heads of production departments, a consistent belief emerges that the steady evolution of organisational arrangements in the concerns described and the introduction of increasingly sophisticated technological solutions are making a significant impact on the skills of the practitioners with whom the interviewees were involved.

The interpretation of this impact is based on the key practitioners identified in the 1996 CEDEFOP study cited above. Predictions have been made of the mix of skills that will be needed for each practitioner in the medium-term future. The importance of each skill has also been assessed, together with the need for its integration with new capabilities. The analysis follows the same order as the functional areas and the standard practitioners identified in the 1996 study, which were generally confirmed by the people interviewed.

In order to visualise clearly, albeit in outline, the changes in the typical practitioners working in the telecommunications sector, the information compiled is presented in the form of summary tables. The headings of the each table indicate the sector and functional areas in which the typical practitioners selected operate. The first column lists the practitioners investigated. The second column sets out the skills found for each practitioner in the CEDEFOP 1996 study. The third column provides information on trends in their level of importance ($\Uparrow$ means growth, $\Leftrightarrow$ stationary, $\Downarrow$ declining), as recorded in the second phase of the investigation (1997-98). The fourth column indicates the strategic skills of the future, identified through further work on the 1997-98 survey, while the fifth column provides information on which country/countries has/have planned for the strategic skills of the future (as indicated by an asterisk). The absence of information in the third and fifth column in some instances is due to the fact that not all practitioners are to be found in all national situations.

Lastly, the description of the skills contained in the tables refers both to the technical and occupational skills and to horizontal skills – those abilities and capacities commonly known as personal and social skills. The comments that follow the tables, on the other hand, focus on the separate processing of the two main types of skills.

3.1 Vocational changes in the telecommunications sector

As a result of the changes in the existing context as described in the previous chapter, there is likely to be a corresponding change both in the technical and vocational skills of the various practitioners and in the abilities, capacities and personal and social attitudes which go under the name of horizontal skills. The tables that follow show the occupational changes in the functional areas and the relevant typical practitioners identified in the course of the 1996-97 CEDEFOP study, investigated in greater depth and suggested a second time in the 1997-98 study.

The first functional area has been called ‘Research, planning and programming’ (Table 1), in which the following characteristic practitioners operate: the network designer/programmer, the telecommunications systems analyst and programmer, the systems engineer. In the functional area of ‘Installation, management and technical support’ (Table 2) the following practitioners are to be found: telecommunications network installer, network manager and network maintenance engineer. Lastly, in the service marketing and sales area (Table 3), the characteristic practitioners are the marketing and strategic development manager, the commercial development and sales officer and, in the Spanish case alone, the documentalist.

Table 1: Changes in vocational skills in the Telecommunications sector - Functional area: Design, planning, programming

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Network designer / programmer	• High-level knowledge and experience in ICT (Engineer) • Knowledge of organisation • Sensitivity to customer needs • Adaptability • Social and group skills • Foreign languages	⇔ ⇑ ⇑ ⇑ ⇑ ⇔	⇔ ⇑ ⇑ ⇑ ⇑ ⇔	⇔ ⇑ ⇑ ⇑ ⇑ ⇑	• Ability to contribute economic value to the product • Ability to present proposals effectively • Commercial knowledge and attitudes • Ability to listen • Adaptability to different roles • Human and social knowledge and awareness of the social impact of his work • Openness to constant technological change	* * * *	* * * * * *	* * * * *
Telecommunications systems analyst / programmer	• High-level knowledge and experience in ICT (Engineer) • Good entrepreneurial knowledge (management, organisation) • Creativity • Social skills (directing, motivating, negotiating, ability to listen, collaborate, etc.) • Foreign languages	⇑ ⇑ ⇑ ⇑ ⇔	⇔ ⇑ ⇔ ⇑ ⇔	⇔ ⇑ ⇑ ⇑ ⇔	• Human and social knowledge • Knowledge of client organisations • Systematic, overall vision • Multi-skilling and adaptability to new occupational roles • Ability to keep abreast of constant technological change	 * * * *	* * * * *	 * *
Systems engineer	• same as those of the analyst/programmer				• same as those of the analyst/programmer • Ability to evaluate the economic implications of solutions • Flexibility and adaptability	* * *	* * *	* *

Table 2: Changes in vocational skills in the Telecommunications sector - Functional area: Installation, Management and Technical Support

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Telecommunications network installer	• Medium-level knowledge and experience in electronics and information technology (vocational training) • Organisational ability • Adaptability • Social skills: ability to work as a team, ability to communicate	⇑ ⇑ ⇑ ⇑	⇔ ⇑ ⇑ ⇑	⇑ ⇑ ⇑ ⇑	• Updating on new programs and applications • Ability to integrate into the programming group • Global view of the project and organisation • Ability to abstract • Multi-skilling • Sensitivity to customer needs	 * * * *	* * * * * *	* * *
Network manager	• Medium-level knowledge of and experience in information technology and networks (vocational training) • Sense of initiative • Sense of responsibility • Social skills: ability to communicate and to work as a team	⇑ ⇑ ⇑ ⇑	⇑ ⇔ ⇔ ⇑	⇑ ⇑ ⇔ ⇑	• Updating on new groups, software, standards (ability to learn) • Global view of the network and organisation covered • Ability to abstract • Constant improvement in knowledge of organisation • Growing focus on customer needs • Greater initiative • Ability to integrate in a programming group • Ability to evaluate the social impact of own work	* * * * * * 	* * * * * * * *	* * * * * *
Network maintenance engineer	• same as those of the Network manager				• same as those of the Network manager • Ability to monitor and supervise from a distance • Greater initiative and ability to anticipate	* *	* * 	* *

Table 3: Changes in vocational skills in the Telecommunications sector - Functional area: Service marketing and sales

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Marketing and strategic development manager	• University-level knowledge • Technical knowledge of and experience with marketing and organisation • Overall economic view • Product knowledge • Flexibility and adaptability • High-level social skills • Ability to learn • Foreign languages	⇔ ⇑ ⇔ ⇑ ⇑ ⇑ ⇑ ⇔	⇔ ⇑ ⇑ ⇑ ⇔ ⇔ ⇑ ⇑		• Constant updating on new products and factors related to social demand • Human and social knowledge • International knowledge • Strategic overview • Ability to lead and negotiate	* * * *	* * * * 	
Sales and commercial development officer	• Middle- or higher-level technical and commercial training • Organisational ability • Commercial experience and product knowledge • Sensitivity to customer needs • Social skills: ability to lead a group	⇔ ⇑ ⇑ ⇑ ⇑		⇑ ⇑ ⇑ ⇑ ⇔	• Constant technical updating on new products and services • Greater multi-skilling and flexibility	* *		 *
Documentalist	• Knowledge of the field of documentation • Knowledge of and experience with existing information systems • Ability to learn • Ability to take the overall view in practical fields of knowledge • Ability to work as a team and to communicate • Foreign languages		⇔ ⇑ ⇑ ⇑ ⇑ ⇑		• Indepth knowledge of certain fields • Ability to contextualise events and know-how		* *	

The surveys conducted in the telecommunications sector in France, Italy and Spain revealed wide-scale changes in the vocational competences required of all those working in the field. The trends in market demand, however, show that the need for the following practitioners has been increasing:

a) **Network designer/programmer and telecommunications systems analysts/ programmers.** These are the practitioners most affected by technological developments and the market strategies adopted by enterprises. In addition to having to have the technical skills inherent in their job, they must enrich and diversify those skills and become experts: particularly in the design of in-house information systems skilled in company organisation; in international networks, which are useful both for the development of an international market to offset the loss of a domestic market due to competition and to gain a foothold on the market – albeit immature – for global services; and in multimedia and audiovisual technologies, a new occupation for which there is a growing demand; and mobile communications technology.

b) **Instrumentation and network installers and maintenance engineers**, especially for in-house networks. The vocational competences of such operators appear to be evolving towards greater knowledge of information technologies and of specific software and – in particular for maintenance engineers – a significant ability to monitor and supervise, entailing greater planning skills and the ability to represent the network organisation as well as to anticipate emergencies. Social skills are becoming vital for both these practitioners, who are often in direct contact with customers.

c) **Product marketing officer.** This practitioner is currently in great demand, which is likely to increase over the next few years with the growth of the international market. Among the technical and vocational skills, of considerable importance are an indepth, up-to-date knowledge of the sector and the technology available, market demand and opportunities, and international knowledge of other countries' education, legislation and languages.

d) **Sales officers and support staff**. This operational sphere may offer considerable opportunities for less specialised staff, who nonetheless are very senior in their company and who are at risk of being made redundant in their former jobs because their work is now being done by technological means. To take on these new occupational roles, however, this type of staff must be prepared to change attitudes, becoming less 'bureaucratic' and more flexible and adaptable, as needed for customer support.

e) **Documentalists** or information organisers, who facilitate the rapid selection of data relevant to a practical objective. This practitioner is to be found only in Spain.

The practitioners who have been reported as 'new' to the sector are: the **marketing expert,** whose particular professional expertise is to combine a knowledge of planning with product marketing skills, and who is to be found both in the field of research and design and in the sale and marketing of services; and the **expert in content,** who can work with the new multimedia and audiovisual media in the development of new products.

All these practitioners use at least two technological tools: mobile communications for the transmission of data, sound and images, and collective information management applications in the field of groupware.

In general, divergences have been revealed in key practitioners and technical competences in the three countries covered by the surveys, but the horizontal skills described in the national reports are very much the same. Nevertheless, in the development of vocational competences and the medium-term outlook – as presented in Tables 1, 2 and 3 – certain changes can be discerned to have been generated by a number of significant trends.

Market competition is the main spur to changes in vocational skills. Telecommunications operators are obliged to shift the focus of their work: whereas before they have provided a mainly voice transmission service, now they have to become an enterprise providing new services and products. The enterprise's research function is expanding due to the need to update digital technology, create protocols, develop ATM (asynchronous transfer mode) and in general create new products and services.

The changes brought about by the liberalisation of telephone services and growing competition in Europe and worldwide have made it necessary to develop commercial and marketing functions. These, in common with the vocational competences needed to perform those functions, are becoming very important. A supplier must offer a competitive advantage by providing products and services that represent a global solution, that can be used by everyone but that are also highly personalised and geared to the company's communication needs. In this context, quality marketing, negotiating ability, an overview of the market and familiarity with international contract law are key competences.

The evolution of customer demand means that more complex products must be offered, suited to actual needs. This creates a demand for new products geared to the needs expressed by companies and individuals. The occupations facing such problems need to have both marketing and technical skills.

Another basic factor that defines the change in occupations is the digitalisation of networks and services. Personnel responsible for the logistic management of networks are very much caught up in this change. Today, most network maintenance is automated and many problems are detected and solved at a distance.

For network maintenance staff, the new skills are associated with information technology, software and the ability to supervise and monitor. These are less manual and more intellectual, conceptual skills. They also imply a greater ability to react quickly to unforeseen events, since the continuity of a service may depend on this.

Together with the traditional functional nucleus of telecommunications operators, whose work has been to set up and maintain networks, today there is an expansion in other major fields of activity for the general public and for companies. For the general public the focus is on services for the home, the professions, multimedia products, telephone cards, advertising, etc. Work for companies is directed towards networking, data and audiovisual services, etc. The growth area that includes new products and new markets (especially international markets) is the other expanding line for telecommunications companies.

These changes call for great adaptability to new occupational roles and a client-centred approach. The assumption is that attitudes must change, especially among those who see themselves as technicians and specialists by trade but who henceforth have to become more commercially minded. There will also be a need for greater social sensitivity expressed in the knowledge of how to evaluate the impact of one's decisions on the community.

All these factors, and in particular competition among products on the market, are stimulating companies to use the new information and communications technologies, which in turn make a major impact on the choice of organisation, where the trend is towards a flexible organisation that promotes initiative and a greater sense of responsibility among those employed, in an effort to offer a better service and customer satisfaction. In that process of change, information and communications technologies are a means but not an end.

Organisational changes are blurring even further the traditional frontiers between the various occupations in the telecommunications sector. There used to be clear-cut classifications, reflected in status and remuneration. Today there is a change in the content and role of almost every occupation in this sector.

Occupations are evolving towards more horizontal skills that complement a person's core specialist skill. For example, a telecommunications engineer who has received an essentially technical training must today be trained on the commercial and organisational side and as a project leader as well. In some instances he must also have some legal training so that he can negotiate an international contract. An installer must be able to do technical work, but he must also convey a good image of his firm by listening to customers and advising them on new services.

Occupations are evolving not so much vertically as horizontally. Competences are being extended so that a person can co-operate with other departments within a concern. This is always seen more as a horizontal organisation, expanding the range of workers' skills and enabling each individual to acquire new skills in terms of 'knowledge', 'expertise' and 'attitudes'.

The new skills in the sector will continue to evolve in the direction of a horizontal organisation, in line with the following trends:

a) The central nature of personal competences

The three national surveys have shown the growing importance of the human factor in the development of vocational skills in the field of telecommunications. The personal component is a central element in the acquisition of new competences. It is who you are and how you conduct yourself that helps to incorporate the various forms of expertise or knowledge, as well as know-how.

One basic aspect of personal skills is the set of attitudes, sense of responsibility, readiness to learn, preparedness to work with others, adaptability to new situations, willingness to devise new solutions, to create, to take the initiative, a taste for quality and work well done, an openness to the needs of the client and others, etc.

Another aspect of personal skills is the form in which each individual mobilises his knowledge and ability to think – sometimes in the abstract and sometimes in terms of practical realities. In other words, this is the ability to grasp and understand the situation as a whole and on occasions to seek a pragmatic solution to a concrete problem.

Information and communications technologies are making it necessary to move on from knowledge of hardware and software to expertise, to know-how in one's own specialist field, finding solutions and selling them to the client.

b) Greater multi-skilling and a flexible attitude to work are the results of technological and organisational change through which an attempt is made to provide quality, competitive solutions to the changing market needs.

c) Sensitivity to customer needs, external or internal, is another key horizontal skill, in this as in other sectors. Sensitivity is required mainly in the competitive market situation, and is made easier by the introduction of information and communications technologies. Sensitivity to customer needs means the willingness to take account of the requirements and demand; in the case of telecommunications through technical solutions, it is offering effective – rapid, economic and attractive – communications media.

d) The global view or system view has some affinity with abstract thought and the ability to see the essentials. At the same time, however, it is the outcome of an analysis of the meaning of each of the steps that have to be taken to solve the practical problem. This is a need brought about by the growing tendency among firms to seek effectiveness and efficiency in all their projects. For this reason it is vital for all workers to have an overall view of the production processes, not just a view of the practical tasks they are called upon to perform.

e) Constant technological updating is vital for all practitioners in telecommunications, since this is a sector in which technology is central to any process, and innovations come thick and fast.

This feature calls for the ability and willingness to learn in fields such as technological innovation, education, company objectives, new ways of thinking and working, and the ability to relate to the client.

f) The demand for social skills is growing in every functional area and for all practitioners. The following should be noted in particular: the ability to work as a team, which is needed with the new technological solutions such as groupware; for some people, the ability to lead and motivate a team; the ability to listen, an essential when work is increasingly client-oriented; the ability to communicate effectively and efficiently through words, images and data transmitted by the information and communications technologies; the ability to negotiate characteristic of competitive situations in which a range of diverging solutions are available; and the ability to understand social needs and buffer the effects of our work on the community.

g) The need for a higher cultural level, to facilitate contacts with any other key practitioner. This has an impact on the shift of low-skilled personnel towards other departments or tasks.

3.2 Vocational changes in the administration/offices sector

The changes now taking place in the administration/offices sector are also changing the competence of the workers identified as their typical practitioners. The main trends are summarised in Tables 4 to 8, which set out the skills required as described in the CEDEFOP 1996 Study, validated and supplemented by the interviews conducted in the current research project.

Both for telecommunications and the administration/offices sector the functional areas and reference practitioners are those recorded in the 1996 survey. The functional area of 'General and secretarial services' (Table 4) includes the administrative clerk and the secretary. Within the 'Administration/accounting' area (Table 5) there are the general accounting and budget clerk and the analytical and industrial accounting clerk. In the 'Finance and management auditing' area (Table 6) there is the management auditing and preventive security officer. The human resource manager is to be found in the 'Human resource management' area (Table 7), whereas the 'Commercial' area (Table 8) includes the commercial manager. In looking at the public service sector tables, the same guidance as already given for the telecommunications sector applies.

Table 4: Changes in occupational competences in the administration/offices sector - Functional area: General and secretarial services

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of the importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Administrative clerk	• medium-level of cultural knowledge	⇔	⇔	⇑	• constant updating on the new applications of office automation	*	*	*
	• mastery of ordinary office administration tools, PCs and networking	⇑	⇑	⇑	• constant improvement in sensitivity to customer needs and the public	*	*	*
	• knowing how to produce written documents	⇑	⇑	⇑	• ability to grasp administrative process as a whole entity		*	*
	• personal skills: responsibility, sense of initiative, attention to quality, self-checking	⇑	⇑	⇔	• greater autonomy and sense of initiative	*	*	*
					• greater multi-skilling	*	*	
	• social skills: ability to listen, customer orientation	⇑	⇑	⇑	• familiarity with the company's products, services and organisation	*		
					• improvement in the quality of administrative interchange		*	

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of the importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Secretary	• medium-to-high level of cultural knowledge		⇔	⇔	• constant updating on the new applications of office automation		*	*
	• mastery of ordinary office automation tools, on PC and networked		⇑	⇑	• mastery of screen-processed programs		*	
	• personal skills: sense of responsibility, autonomy, sense of initiative, discretion, adaptability, organisational skills		⇔	⇔	• familiarity with foreign languages		*	*
	• attention to quality and work well done		⇑	⇑	• improvement in knowledge of education, organisation and company products		*	*
	• knowing the company's products, services and organisation		⇑	⇑	• greater multi-skilling		*	
	• predisposition for information research, selection, processing and presentation		⇑	⇑	• co-ordination and planning of work		*	*
	• written language skills		⇑	⇑	• knowledge of analytical accounting		*	
	• social skills: ability to listen,. work as a team, 'knowing how to cope' in different workgroup situations, knowing how to guide others		⇑	⇑	• growing need for social skills		*	
	• ability to learn		⇑	⇑				

Table 5: Changes in occupational competences in the administration/offices sector - Functional area: Administration/accounting

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of the importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
General and budget accounting clerk	• medium-to-high level of cultural and economic / accounting knowledge • knowledge of currency regulations • mastery of PC and networked sophisticated accounting packages and programs • personal skills: responsibility, autonomy, sense of initiative, discretion, organisational ability • familiarity with the company's objectives and organisation • ability to learn • attention to quality and work well done • social skills: ability to listen and work as a team, ability to communicate and support to others in own specialist areas	⇔ ⇔ ⇑ ⇑ ⇑ ⇑ ⇔ ⇔	⇑ ⇑ ⇔ ⇑ ⇑ ⇑ ⇑ ⇔	⇔ ⇑ ⇑ ⇔ ⇑ ⇑ ⇔ ⇑	• constant updating on currency regulations, especial European regulations with the adoption of the Euro • updating of software packages and group work tools • greater flexibility and adaptability • global view of the company's opportunities • mastery of economic and accounting terminology in other European Union languages • ability to communicate and provide support on accounting subjects, using appropriate training methods	 * * * 	* * * * * 	* * *
Analytical and industrial accounting clerk	• same as those of the general and budget accounting clerk				• same as those of the general accounting and budget clerk • constant updating on analytical accounting subjects and specific ICT tools for this application	* *	* *	*

Table 6: Changes in occupational competences in the administration/offices sector - Functional area : Finance and management auditing

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of the importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Management auditing and preventive security officer	• medium-to-high and high level of cultural and economic / financial knowledge • mastery of preventive check software packages and programs, on PC and networked • personal skills: responsibility, autonomy, sense of initiative, discretion, organisational ability • social skills: ability to listen and work as a team, ability to communicate and provide support to others within own field of specialisation	⇑ ⇑ ⇑ ⇑			• ability to learn • constant updating on European economic regulations • updating on software and tools for group work • ability to predict • ability to guide	* * * * *		

Table 7: Changes in occupational competences in the administration/offices sector - Functional area : Human resource management

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of the importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Human resource manager	• medium-to-high level of cultural knowledge	⇔	⇑		• constant updating on labour legislation economic management software packages	*	*	
	• mastery of common office automation tools, on PC and networked	⇑	⇑		• updating on aspects of labour law and European monetary regulations	*	*	
	• knowledge of labour and company regulations	⇔	⇑		• greater multi-skilling	*		
	• familiarity with and overview of the company	⇑	⇔		• ability to learn	*	*	
	• personal skills: responsibility, discretion, sense of initiative, adaptability, organisational ability	⇑	⇑		• growing need for social skills	*	*	
	• social skills: ability to listen and work as a team, ability to communicate, 'knowing how to cope' in any situation, especially in conflict management; ability to negotiate	⇑	⇑		• ability to mediate between the employer's and individuals' needs	*		
					• positive attitude to employee satisfaction	*		

Table 8: Changes in occupational competences in the administration/offices sector - Functional area : Commercial

Competences / Practitioners	Competences identified in the Cedefop 1996 Study	Indicators of the importance of competences			Future strategic competences Cedefop 1997-98 Study	Future competences predicted - by country		
		I	S	F		I	S	F
Commercial manager	• medium-to high cultural and commercial knowledge • mastery of ordinary office automation tools, both on PC and networked • thorough knowledge of the company's products, services, culture and objectives • personal skills: sense of initiative, autonomy, adaptability, organisational skills • social skills: ability to listen, communicate and motivate, and group work skills		⇑ ⇑ ⇔ ⇑ ⇑		• updating on commercial subjects, especially European commercial regulations with the adoption of the euro • constant updating on office automation tools as a user • greater multi-skilling • knowledge of foreign languages • ability to produce written documents, protocol agreements and standard contracts		* * * * *	
Receptionist	• average level cultural knowledge • mastery of common office automation tools, on PC and networked • excellent knowledge of the employer organisation: its culture, objectives, products and services • in certain situations: knowledge of foreign languages • personal skills: sense of initiative, autonomy, adaptability • social skills: ability to listen, communicate and motivate and group work skills		⇑ ⇑ ⇑ ⇑ ⇑ ⇑		• constant updating on office automation tools as a user • language updating • updating on customer support techniques • greater multi-skilling		* * * *	

In this survey, the interviews conducted in the three countries generally confirmed the nature of the practitioners identified in the CEDEFOP 1996-97 Study. As in the sectors of telecommunications, administration and office work, there is a tendency – although to a lesser degree – for roles to be increasingly horizontal. The roles for which there is a growing demand, especially in France and Spain, include administrative employees providing support to the public, commercial administrative clerks and secretaries.

a) **Administrative employee providing support to the public**. This practitioner is required in all types of concern. Since information technology has facilitated the previous administrative channels, this person's role is to respond to the questions of all types put by clients and handle all types of problem, other than those calling for a specialist.

b) **Commercial administrative employee:** this is another horizontal role in commercial offices in all sectors, not just in commercial departments but also in offices where customer relations leads to a demand for products and services. Telecommunications, the financial sector, insurance, the retail trade, the hotel and associated trades, tourism, and firms providing personal services are increasingly looking for people with this job profile.

c) **Secretaries.** These are administrative workers able to deal with any communication and administrative work for a management department or group, a production area or company staff. The job opportunities open to them are wide enough for them to enter many other vocational spheres: management secretaries, specialist secretaries (health, legal, scientific, training and human resources, commercial, international), communications officers, staff administration, publishing, etc.

In the administration/offices sector, as in telecommunications, the horizontal skills described in the three national reports are generally comparable, in that the trend is towards greater multi-skilling and horizontal skills for all practitioners. This trend is taking the following practical forms:

a) **Personal skills** are seen as a central factor in occupational skills. Some such skills are to be found in all the practitioners taken into consideration, in particular: sense of responsibility and discretion; initiative and self-reliance; the ability to organise, a concern for quality and for a job well done; interest in learning and an ability to learn; adaptability; and an ability to grasp the process as a whole.

b) **Social skills** are gaining in importance in the vocational skills required in administrative work. Technological tools have altered tasks, releasing working time to devote more attention to the customer or general public, and this type of work is becoming one of the main activities in public services. The growing need for social skills does not arise solely from the use of information and communications technologies, even though they have highlighted the importance of social skills and may help to improve them. Administrative employees have always needed social skills in the performance of their work. The new needs expressed by the strategic orientation of companies ensure that the new competences, such as oral and written language skills, friendliness of manner, a sense of initiative, creativity, the ability to listen and respond rapidly to enquiries, the ability to work as a team, 'knowing how to cope', discretion and patience are becoming core skills in a person's success in a job.

c) These competences are required of a general administrative worker, who is increasingly providing support to the customer or public. They are also needed by experts in accounting who in many jobs have the work of reassuring the internal and external client. They are, however, particularly decisive for secretarial jobs, whose holders are more and more likely to interface between their own departments and the outside. Secretarial staff channel enquiries, take charge of the logistics for the flow of communications and facilitate intervention by other members of a group who can solve a given problem.

d) **Competences in the use of information and communication tools** are also factors in defining the vocational skills of all administrative workers, whose mastery of the information technology instruments used in a concern is regarded as essential. All of them need to be able to use a word processer, spreadsheet, databases and applications specific to the company or workstation. They must be able to network and use electronic mail.

e) In particular, employers appreciate the information technology skills of their administrative staff. These entail not only making good use of existing programs and applications in their work, but also a curiosity about and general interest in this field, the ability to help colleagues to solve the problems raised by the use of information facilities and finding it easy to learn about new technologies as they are introduced.

f) There will be a growing demand for **organisational competences** and the **ability to see the administrative process as a whole.** All administrative workers will be required to be able to teach others and to devise and follow through a complete process. This presupposes a system-wide view of the context in which the organisation operates and a knowledge of the administrative process in its entirety. Some of today's support tools for group work such as workflow applications automate many of a company's routine administrative processes. Nevertheless, the employee cannot just act mechanically in the use of such instruments, but needs to have a concept of the overall administrative process. The instrument does no more than provide access to the information needed for each step and level of the process. The essence of using the application lies in deciding what needs to be recorded and what data are the most significant for the customer. Organising skills are particularly necessary in the case of expert accountants, whose tasks include financial management for internal and external clients.

g) These skills are growing in importance in secretarial work. Management and technicians are increasingly devoting their time to planning and production work in the field and are delegating much of their support and co-ordination work to the secretarial staff. Secretaries have to assume organisational responsibility not just for their own work but for their work on behalf of the group as a whole.

4. FUTURE CHANGES IN OCCUPATIONS

As shown in previous chapters, the changes foreseen in France, Italy and Spain are primarily related to the strategic choices made by employers, who have to allow for interdependent market, legislative and competitive variables that are altering the contexts and forcing those employers to accelerate the adjustment process.

Technology is another variable. Its effect is what we might term schizophrenic: it will offer good support in overcoming the critical point, especially in operations, reached by entrepreneurial systems, but at the same time it will destabilise the occupational routes that have up to now been the basis for the working world.

The introduction of information technologies into the enterprise has helped to make the production process more efficient. It has made the market more competitive, to the advantage mainly of the client, who has obtained higher quality at lower cost. The expansion of telecommunications technologies within enterprises has radically altered the content of work there, influencing the value of the set of skills making the process possible. These changes are not only to technological knowledge (a phenomenon already existing in the past), but are also having an ever greater influence on behaviour patterns and the whole area of human relations, in turn changing the vocational skills of typical practitioners as a whole. In the future, the introduction of information and communications technologies into the enterprise, offering new methods of interpreting and carrying out productive work, will prompt a redesign of the skills that make up vocational competence.

The stage now reached in history may be regarded as a transition period, in that the macro-processes of privatisation, liberalisation and globalisation to which reference has been made are still going on. The integration of information technologies, telecommunications and multimedia technologies is being conducted by a ‘stop-go’ process, so that it is hard to see the end of the road.

In view of these considerations, to give some sort of guidance for vocational training, we propose a general assessment of the trends in competences for all practitioners in the telecommunications and administration/offices sectors covered by the survey. For all three sectors, we shall then suggest a typology of three families of skills: vocational, personal and social.

- **vocational competences** will continue to be in demand for all practitioners, although the relative weight of such skills will differ. In particular the following will be important:
  - knowledge of the main applications of information technologies and telecommunications, which will have an impact on methods of operation in each sector;
  - continuous updating of the interdisciplinary or interfunctional knowledge needed for the solution of problems, in order to contribute to the integration of the enterprise;
  - familiarity with the trends in demand on the market, the competition and the technological development of products and services in the technological sector of operation.

The predicted requirements for **new vocational-type competences** are: knowledge of information and communications technologies and their impact on operations; evaluation and regulation of the chain of economic and financial values of the processes for which one is responsible; the provision of one's services towards the client/supplier; knowing how to 'listen to' clients, internal and external; knowing how to present one's proposals effectively; knowing how to reconcile technological constraints and client needs; carrying out cost benefit analyses of various solutions; sensitivity to customer needs in an effort to secure their overall satisfaction; leadership skills in the sense of being able to motivate, involve and recognise the personnel working in constantly changing organisational situations and working conditions (instruments and procedures); familiarity with the introduction of the euro and its economic and financial implications.

- With regard to **personal skills,** to a growing extent people will have to have
  - openness to organisational ability;
  - creativity in the approach to their own specific activities;
  - adaptability to operational and procedural changes brought about by the introduction of new technological solutions;
  - ability to learn to respond to the need to keep abreast of continuing advances in the applications of technology to their own field of activity;
  - adaptability to work on a variety of projects;
  - ability to think in the abstract;
  - ability to consider the correlations among all the phases in the processes in which they are involved.

The most significant **new personal skills** that are likely to be needed in the future relate to knowing how to: capitalise on one's vocational know-how, perhaps with the use of information and communications technologies; integrate the needs of internal clients in a synergy that makes use of new technologies; present one's own proposals effectively; take a positive attitude towards innovation; adopt a global view of the situations in which one has to operate; and take the 'total quality' approach to one's work.

- The following **social skills** will continue to be significant:
  - working as a team, making effective use of the opportunities offered by the introduction of new information and communications technologies into the enterprise;
  - handling inter-personal relationships;
  - communicating effectively, where appropriate resorting to the new opportunities made available by telecommunications and information and communications technologies;
  - managing work groups by creating a synergy of the contributions of various specialist skills;
  - negotiating, in order to make divergences – in personal relations, vocational, in interests, etc. – converge towards the company's goals;

Among the **new social skills**, of particular relevance is the readiness to consider the effects of one's own activities on the quality of life of the social community, together with a marked sensitivity towards even faint signals in the socio-economic context in which the company operates.

The trend towards horizontalisation that is common to the three European situations investigated, as it relates to the competences of the practitioners taken into account, reflects all the other organisational changes and technological developments occurring within enterprises.

Unlike the past – when changes in methods of organising the production process accentuated the driving function of technology, and man had to adapt passively to the resulting procedures – in today's working world, when changes are made due to structural adaptation and the evolution of technological solutions, the prevalence of the software component over the hardware challenges the individual as a whole, making him the variable that determines the success of any innovation proposed.

We might be tempted, then, to place 'personal skills' first in the list, as they are the driving force in the acquisition of new areas of knowledge and the development of the abilities required by various operational situations. We know, though, that a person is a whole individual and that it would be artificial to break him down into components to facilitate the analytical procedures in our survey. This would lead to decisions that contradict the interdependence of the elements making up personality.

That point is valid per se, but it is even more relevant in the field under consideration: the prevalence of the software component in vocational competences themselves – since the importance of manual operation is steadily declining by comparison with an understanding of 'why' certain phenomena occur and 'how' innovation can be introduced – is highlighting the function performed by an individual's attitudes, and the way in which they direct his behaviour in a positive or negative sense.

The personal relationship factor, moreover, is of importance because successful performance by people working in complex organisations is more and more determined by their ability to 'listen to' the needs of internal and external clients, to define correctly the specifications for rendering the professional service expected by the client, and the ability to 'sell' their proposals. In today's working world, it is important, in terms of overall vocational competence, to know how to present the solutions devised so that they will gain acceptance.

These considerations lead to the conclusion that the further enterprises continue along the road towards organisational processing and information technologies, telecommunications and multimedia and the more they create a synergy of these facilities, the harder it will be to quantify and qualify analytically the competences that make up the vocational skills needed for the work roles. The contribution of a job, then, is based not so much on having a set of skills as on the ability to apply them in synergy in different situations. What is needed is to integrate action and attitudes and benefit from the added value of vocational growth.

5. THE IMPACT OF TECHNOLOGY ON VOCATIONAL TRAINING

The information and communications technologies are having a marked impact on vocational training, both initial and continuing. In this chapter we shall analyse the effects of technological development on continuing training and, in the light of the experience observed in the three countries, set out a series of recommendations which we trust will be useful to those concerned with training policy both in a given geographical area and within the enterprise.

The impact of technological developments is essentially bringing about three types of change:

1. in training needs and content;
2. in training activity, teaching methods, the vocational skills of trainers and forms of organisation;
3. in the overall organisation of enterprises, which is becoming the organisation of knowledge and learning.

5.1 Employers' training response to the requirements linked with the development of occupations

The changes indicated are generating training requirements that have also been expressed, in qualitative terms, by the enterprises interviewed in the three countries. These predictions, therefore, are based on findings in the field as regards the changes predicted in the content of the skills of the typical practitioners taken into account.

Rather than referring to the specific skills of each practitioner, the interviewees felt it better to adopt the horizontal approach, relating the individual requirements of different practitioners to a single sphere of training. The idea was to promote planning of training services designed to impart the main horizontal skills by taking a global approach.

The information given below – which of course is not exhaustive – relates to staff training and development policy in the three countries covered by the survey.

To help meet the need for the continuous development of vocational skills, employers are making available a permanent updating service that breaks down into '**training spheres**' designed to standardise company behaviour patterns. The areas served by the training provision are broad and complex, but they can be somewhat simplified and placed under various headings. They are described here in terms of their goals and the general nature of their content.

a) The company's business in the current socio-economic context and in the medium term. In this sphere comes training for the purpose of presenting the existing and future world of information and communications technologies, including market, regulation and technological trends, and conveying an understanding of the impact of

the context on strategic management decisions and the constant redefinition of the business, with a view to becoming competitive, which is the starting point for the continuous organisational updating required of the company.

b) **Competitive systems directed towards total quality.** Based on the assumption that the client is the centre of focus, training will aim to develop an attitude of integration and service, and to implement this attitude through learning and using logical approaches, methods and techniques that convey an understanding of what the company expects in terms of economic and financial results. Through appropriate diagnoses, the aim is also to identify areas for improvement within the processes that will help to achieve maximum efficiency in operation and excellence in the pursuit of results.

c) **Effective relationships**. Training in this field will be directed towards conveying an understanding of how interaction with others, both within and outside one's own field of activity, is always a two-way process of communication, and how within that process different types of messages may be sent that are not always coherent with each other. Developing the ability to listen and communicate, and the ability to manage interpersonal relations and conflict, enables a person to acquire a conscious mastery of all the variables entering into play in relationships, in order to secure, as effectively as possible, consensus, agreement, credit and authoritativeness, synergy, sharing and the spread of values.

d) **Thinking methods and tools.** This area includes measures designed to direct individual thinking towards an understanding of the causes underlying innovation, organisational and vocational mobility and the complexity of situations in which action has to be taken, through the acquisition of a system-wide view and orientation towards a creative sense of initiative, so that an individual can develop the ability to have a responsible, significant influence on the company's competitive achievements.

e) **Action methods and tools**. Measures in this sphere are designed to improve individual performance by the wider acquisition of working methods and instruments in line with technological development, so that it is easy for people to set up and manage their own work and that of the group to which they are assigned. The aim is to achieve speed of decision and implementation, as well as efficiency in pursuing the required results through the appropriate use of the criteria of organisational synergy, monitoring of indicators of the effectiveness and efficiency of the process for which one is responsible, and the consistency of one's own and other people's behaviour in the light of the company's strategic decisions and values.

f) **Personal effectiveness**. Training in this field is aimed at reinforcing personal ability to make a positive impact on situations and overcome difficulties, especially subjective difficulties. This is done by improving the process of self-perception in order to arrive at a fuller and more realistic self-knowledge and a readiness to try out new procedures for promoting one's own integral development and self-fulfilment.

g) **Company economics and culture**. This sphere includes training ventures to convey knowledge that can be used to interpret correctly the economic and financial implications of one's work and the value it adds to the company's overall results. This knowl-

edge, which may extend to the techniques and methods of budgets, analytical accounting and management auditing, should be regarded as a decision-making aid, in that it helps to pre-evaluate the economic effects of work, and as a support for operation in that it provides elements for the evaluation of operating effectiveness and efficiency in one's own sector and in the company system as a whole. In this area in particular, one specific factor in redirecting company culture is the introduction of the European currency, the euro. In the medium-term future this will modify not only budgeting and accounting techniques but also the cultural references used to evaluate the economic and financial significance of one's one performance and the results of the sector to which one belongs.

In those companies in which the procedures for the provision and use of training have been determined in greater detail, a marked tendency has been found towards organising what we might call 'managerial' activities.

The provision of training services is inspired by the criteria described below, which as a whole help to achieve effective teaching and value for money for training directed at the continuous updating of skills.

1. **Planning aids.** For the management of the many ongoing measures for the continuous updating of vocational skills, employers have a list of activities that sets out:
   - the **objectives of specific measures**, generally related to the aim of promoting the acquisition and development of knowledge, skills, attitudes and competences through which individuals can improve the level and quality of performance and their contribution to the work group and company to which they belong. The aim is also to reinforce the company's values, culture and identity – vital factors in taking advantage of opportunities and meeting the challenges of high competitive global markets, facilitating integration among colleagues belonging to different sectors of activity.
   - the **subjects proposed**, defined in terms of knowledge, abilities and thinking and working tools – in short, those competences that the training venture is intended to confer or develop. These may be specialist or interfunctional, vocational or managerial.
   - the **target group**, in other words the holders of the posts towards which individual measures are directed, in the light of the needs they have been designed to meet, in order to facilitate choices by the people potentially interested and by their superiors.
   - the **training routes**, in the sense that training ventures are distributed along ideal learning routes, ordered in progressive and modular sequences, in order to devise itineraries for the traditional development of skills in the various specialist and managerial occupational roles.

2. **Personalisation**. In general, training activities are set up with the intention of increasing the variety of training situations so that people can meet their needs for vocational qualifications by choosing procedures in line with their style of learning. To this end, the provision of training includes not only classroom activities but also enriching additional 'opportunities' inspired by the 'self-study' formula.

3. **Applicability**. In order to promote the transfer of the results of training into practical everyday work, measures are devised and implemented in such a way as to:
    - facilitate the acquisition of skills related to the role performed by the individual, providing an opportunity to embark on the application of what has been learned, even if only on occasions in a simulated situation;
    - contextualise the subjects and content in line with the specific nature of the company, through: recourse to internal instructors and demonstrators; the use of case studies, experience, the example of the 'best in class' and presentation of company best practice; and the use of multimedia training technologies such as videoconferencing and groupware.

Personnel working in high-profile specialist roles and in managerial roles are offered a consultancy support service to promote the transfer of classroom learning to everyday work. This service takes the form of personalised advice provided by a pool of experts who, when contacted by telephone, fax, e-mail or other means, help the person on a 'just-in-time' basis to overcome difficulties and solve the problems encountered when applying what has been learned in training to the working context. The service may also take the form of a follow-up workshop attended, at their request, by people motivated to tackle and solve specific problems encountered in the field, working in a small group of colleagues supported by facilitators.

4. **Not just classroom training.** Changes in the provision of training are due not only to technological innovation but also to the search for teaching solutions that increase the motivation to learn through involvement and participation. In the companies covered by the field surveys, the experience of **action learning** was found. This took the form of learning situations through participation in work groups, benchmarking directed towards the improvement of skills, organisational learning initiatives, study visits and workshops. The prevailing common feature of these initiatives is that the learning processes are activated by reference to the realities of the individuals' working situation, going on to diagnose critical decision-making and operations in the workplace and ultimately devising innovatory solutions to be applied in context, one factor being the comparison with other 'best-in-class' company situations. All the information, cognitive, methodological and instrument support needed is provided in the course of work and immediately invested in actual working experience. This is in the final analysis the 'learning by doing' method, which can also be applied to learning abilities and attitudes other than those purely used in work.

From the above, it is evident that organisational culture calls for a new training pedagogy which entails, according to Gloria Schuck:

- the revamping of traditional training programmes for employees and managers;
- conversion of the workplace into a learning environment;
- rethinking the roles of workers and managers so that they can be brought together in the creation of new meanings;
- compensating people who create and participate in an environment in which new forms of thought and action are sought.

From the national surveys, we noted the existence of several **methods of training**:

- **classroom training**, directed towards areas or subjects focusing on changing attitudes;
- **workplace training** with the support of networked courses and tutoring by the work-group leaders;
- **on-line training**, at home or at work, via a distance teaching network, with tele-tutoring and the support of a multimedia resource centre;
- **a 'virtual campus',** using a network to channel the training and spontaneous communication of members of the training community, as well as the schedule, news and all administrative management notices.

5.2 The impact of technology on training

It could be said that there is no longer any aspect of company life unaffected by the introduction of technology of some kind. Training, too, has 'felt' the effect. It offers fresh opportunities for providing a service matching more closely the needs of employers and the end recipients. This is what has also emerged from the evidence given by the interviewees in the three countries surveyed.

In the final analysis, technology has affected training at two levels: firstly, the actual learning process, in the sense that new methods of conducting training have become available as an alternative to the traditional face-to-face teaching; secondly, in the vocational skills of the trainers, who have to grasp the significance and implications of the new opportunities provided by technology and put them to good use in the design and implementation of training measures.

In the first respect, technological developments have made a significant impact on the 'approaches to training', as ways of working are always in the end influenced by the tools available. Experience in the field acquired by the companies on which the field survey was conducted demonstrates that this has always been the case with the workings of the in-company training world.

The arrival of information and communications technologies in the training area in the early eighties aroused considerable interest, especially in larger concerns whose organisational complexity was due to the nature of their core business. These were the years in which CAI (Computer Aided Instruction*)* products were seen as a response to at least two kinds of need:

a) the need to decentralise training, bringing it to the beneficiary, despite the rigid methods of distribution, thus helping to keep down costs, at least in theory;

b) the need to support each individual's own particular way of learning, respecting his own rhythm, timing and method of use, in order to make the training more effective, at least in principle.

Developments in computer technology over the next few years made solutions available which, with the processing of sound and images, could be used in practice for producing

increasingly sophisticated teaching aids (CD-ROM, CDI, hypertext). These are used in company training programmes where the number of staff and the specific nature of the subjects covered justify the cost of supply. Such products, together with courseware, come to represent a part – a more or less sizeable part depending on the company – of the provision of vocational qualification services through training channels.

Further impetus for the development of company training distribution methods was provided by telecommunications, which entered training in the second half of the 1980s. This was done by promoting networked services that could be used to test out new techniques for the design, implementation and management of distance training. This solution helped to overcome the constraints of distributing courseware in the form of disks and replaced it with a networked system, backed by software meeting the training objectives but also the managerial type of needs as regards the use of the training.

As distance training gradually evolved, it was enriched by added value services such as:

- aids for drawing up individual training plans and for planning the use of packages;
- instruments for measuring the effectiveness of self-teaching;
- aids for statistical processing of the results in the light of the specific needs of a company's internal and external clients.

The integration of computer technology, telecommunications and multimedia technologies is providing new opportunities for supporting the training service. The conditions are almost ripe for a further quantum leap in the procedures (teaching, organisational and logistic) through which training may meet user demand.

In the near future, there will be multi-functional systems devoted to the continuous updating of personnel, who will be able to:

- place a company's cumulative store of all its know-how at the disposal of all its personnel,
- interconnect individuals and groups among themselves and with in-house and outside experts with a view to the creation of virtual learning groups,
- from local workstations, call up and use courseware, videocassettes and documentary material on individual training plans,
- call on experts' advice and support on-line.

There may be other services as well, devised and planned by training officers in order to make best possible use of the potential that technological developments will make available in the future.

Groupwork technology may enormously facilitate both what are defined as first-level effects (increasing productivity) and second-level effects (communication and co-operation). These effects will be achieved if the decision-makers and the recipients of training have a shared vision of the organisation based on participation and the exchange of training.

One consequence, in the opinion of the companies interviewed in the three countries, will be that groupware instruments will become increasingly relevant to improving learning; it is predicted that their use will be extended widely in the application of training programmes.

Regarding the development of trainer's vocational skills, the contacts highlighted one of the most critical factors, connected not so much with the introduction of technologies and with their use, in other words the difficulties for trainers in taking full advantage of the potential.

Sophisticated technologies, with all the variety and wealth of opportunities they offer for activating the learning process, are radically changing the skills entailed – first of all, the vocational skills of the training designers, whose professional field has to extend to specialist and managerial abilities. From the specialist viewpoint, the designer has to know about the intrinsic characteristics and performance of the new technical solutions that can be adopted to improve the performance of training projects. On the managerial level, the designer needs to a growing extent to evaluate the value for money of alternative responses to the demand for training. Full professional maturity will be the ability to integrate the specialist dimension of his role with the managerial factor and to design training measures of the maximum teaching effectiveness with the maximum efficiency in implementation.

One of the greatest challenges to the companies covered by this survey is to help the personnel working on training to achieve this standard of professionalism. They are well aware that all the policy and working decisions on this subject, as in all other fields of activity, suffer from heavy constraints. Decisions on how much and which kind of training to provide in the classroom, how much and which as self-training, the extent to which training measures should be centralised, and to meet which needs, or whether those measures should be decentralised, on how many and which of the training needs should be met in-house and what alternative outside solutions to choose: these are only some of the problems to be tackled. The solutions to those problems will have significant organisational and logistic repercussions and will determine the number and quality of personnel.

In those concerns in which a significant recourse to the use of innovative technologies, in order to improve the effectiveness and efficiency of training provision, has been discerned it was noted that there was greater awareness of the importance of having employees with the set of skills associated with new 'ways of providing training'. The decision to engage in the provision of training through the appropriate use of the potential of information and communications technologies, in order to maximise learning effectiveness and value for money, means that they must be certain of securing professionals able to tackle the design and implementation of training measures, integrating the traditional with innovation, face-to-face relationships with virtual relationships, self-motivation with the outside promotion of the learning process.

In medium-sized and small firms, the training sector is responsible for determining and planning activities to meet the needs of the whole personnel structure for all types of qualifications. Training measures may be imparted internally, with the support of in-house trainers and outside experts, but it is more common to call on outside providers. The lo-

gistic structures devoted to training are in fact reduced to the minimum and are often shared with other types of use.

In medium-sized and large concerns with their own distinctive set of competences, the formal structure is such that training provision comes under the Personnel and Organisation Department. The training section in turn is internally structured according to the criterion of the recipients of training, usually manual workers, office staff and managers.

In those companies whose activities are widely distributed (for example over a geographical area) and where there are many families of occupations, there is a process of decentralisation of the training of manual workers according to programmes agreed with the head office, the measures being planned by specialists in each sector from the training department.

Recourse to the use of sophisticated technologies for training may justify the creation of a dedicated section, again within the training department, to take over the whole subject in close collaboration with the sections engaged on the design and implementation of training measures. In general, this section designs and produces training packages and manages the distance training system.

In short, we could say that technology is making a significant impact on the forms of organisation of training, and that the main changes are tending to be in the following directions:

- training is recognised as part of a company's strategic plan, for which there must be agreement by management negotiated with the workers, and whose results must be assessed;
- the management of training must meet the criteria of effectiveness and efficiency, in common with any other area in a concern. It must start with an analysis of the needs, must be properly planned and must treat every worker as if he were a client;
- new training management practitioners are emerging, who design and negotiate training policies and plans, or who impart or develop training as experts on a subject, or again who persuade workers to learn on their own in the workplace or at home;
- the size of a concern and the diversity of skills in each one are influencing the new training procedures;
- there is a growing need for training to be closer to the place of work;
- technologies are paving the way to new forms of teaching and learning.

6. RECOMMENDATIONS ON TRAINING AND THE DEVELOPMENT OF SKILLS IN A CONTEXT OF TECHNOLOGICAL CHANGE

The introduction of new information and communications technologies has highlighted the importance of improvements to initial training in the development of basic skills for any occupation.

The 'passport' for access to the information society can be said to be sound initial education. The strongest barriers to entering this society are being encountered by the countries, social groups and individuals who lack such a foundation.

In addition to general education, the basic skills for working in an information technology context as they ensue from the research are:

- a **sense of personal initiative** and **creativity,** which are reinforced by education in that it produces a climate of acceptance of new or diverging ideas and stimulates independent thought;
- **social skills and above all the ability to work as a team**. Schools and universities should incorporate these into their teaching objectives, showing people how to co-operate on problem-solving and on sharing their knowledge;
- **organisational skills and a system-wide view of organisations,** for which the educational system should accept responsibility by promoting pupils' participation in group activities in the school, organising games and sports for them with their fellow pupils and placing the concepts imparted to them in the overall context;
- **fluidity in the spoken and written language.** The more traditional function of basic schooling in learning is to teach young people to express themselves and be familiar with the main codes – texts, numerical data, and images – that are currently the raw materials of the information society.

Education and training establishments have a central role to play in the development of the basic competences needed for work in an information technology context. We would refer to the general trends as they emerge from the national surveys as regards the levels of education and the qualifications needed for finding work in the administrative and telecommunications sectors:

- the certificates obtained at the end of compulsory schooling are not a path to these working sectors, since the entrepreneurial system regards the minimum educational level for work in occupations in both the sectors to be upper secondary education.
- a secondary education diploma and a qualification obtained in the vocational training system, especially at higher level, are appropriate for access to various occupations in the public service, commercial office and telecommunications sector, in the functional areas of installation, management and technical support.
- for access to most other occupations in the telecommunications sector a degree in engineering or a university-level technical diploma is required.

The findings of the survey suggest that a set of criteria be adopted in a proper review of study plans, to include:

- **academic knowledge** – not just technical knowledge but also familiarity with organisation and management, as well as commercial knowledge in many cases;
- **vocational skills,** in the sense of know-how as required by the production system;
- **ability to communicate**;
- **ability to learn**;
- **ability to innovate,** and above all a positive attitude to change.

In constructing measures, the public education and training system should involve employers and give them a role in order to promote synergy to ensure that basic training is as closely linked to continuing training as possible.

Updating and job retraining today constitute the main problem to be faced by those working in telecommunications. This problem is increasing in severity, since the sector makes intensive use of technology and is going through a very rapid process of innovation that rapidly renders existing knowledge obsolete.

Retraining in office work is slower but no less deep-rooted. New technologies are bringing about considerable gains in productivity and call for a different way of working.

This scenario suggests that it would be advisable to back plans for technological innovation by a social plan that is the outcome of an agreement with the workers. One fundamental element of that social plan must be training. The workers must participate consciously in the change in the content of their work, coming to an agreement with employers on the guarantees and future prospects. Arousing the awareness of workers and their training are vital issues in any technological change, not just because this presupposes the mobilisation of new knowledge and skills but also because it implies certain new values: the central role of the individual, the importance of co-operation, la sense of personal initiative.

The ‘social plan’ must include the set of new values and guarantees. The national surveys have highlighted the following new values:

- information represents wealth for the enterprise and wealth for the worker;
- communication, dialogue, participation, co-operation and the contribution of ideas to the enterprise’s activities are vital factors;
- everyone, including management, must learn from others; we all have something to teach;
- continuing training is an inherent part of work; working tools (information and communications technologies) are also tools for training.

The guarantees incorporated into the social plan must include the following:

- every new working method or tool must be accompanied by appropriate training;
- people whose jobs disappear due to technological innovation must be offered the opportunity to transfer to new jobs through the acquisition of the new skills demanded;
- there must be support measures to those seeking another job inside or outside the enterprise;
- there must be guaranteed participation in the conversion of work structures;
- policies must be developed for the management of competences over the medium and long term, to ensure that changes can be made without risk to the enterprise and its workforce.

These values and guarantees also call for changes in the objectives and content of training. The new training objectives in a context in which information and communications technologies are in general use must, therefore, be directed towards the continuous stimulation of interest and the ability to learn, learning how to cope with new jobs, how to use the new technologies as working and training tools, develop an enterprise culture in all workers, develop social and communication skills, provide scope for written communication, anticipate and promote retraining, especially for personnel having a lower level of cultural and educational background, and supporting the training role of executives and managers.

The new content of continuing training reflects these objectives, together with the more technical objectives reported by enterprises as key skills for the near future:

- the adoption of new computerised and networked instruments;
- the development of oral and written communication techniques;
- an enterprise culture: production, communication, quality, focusing on the client, etc.
- the development of managerial abilities with all the various specialist skills;
- a knowledge of new products and services;
- marketing, commerce and selling techniques;
- integration of business and commercial management studies in technical curricula;
- provision of training in technology to commercial students;
- foreign languages (which are generally left to self-training);
- updating and further training on practical issues in the various technical, commercial and administrative specialisms.

This is by no means an exhaustive list of the enormous variety of the new contents of training, but it does indicate the direction in which competences are evolving.

It should be pointed out that on occasions the provision of training includes subjects linked with sociology and psychology which might appear to have little to do with the goals of the

enterprise, but which will strengthen the polyvalence of training or improve adaptability, one of the skills in most demand.

Information and communications technologies offer an opportunity to use new strategies and instruments for training. Some of their main advantages as training instruments are that they:

- can be used to store, process and transmit a volume of information that would have been unimaginable using the conventional paperwork;
- facilitate self-training, leading to interactive, synchronised and distance learning so that a worker can chose the time, place and pace of training;
- be the same tools as customarily used in administrative and telecommunications work;
- permit unlimited access to technical information stored in databases;
- make it possible to combine voice, images and texts, facilitating the assimilation of new knowledge;
- facilitate the individualisation of training.

Considering the potential of technologies as a means of training, a set of innovatory practices is recommended, such as those employed by some of the organisations surveyed. The practices may be summarised as follows:

1. Every worker may conduct most of his training at his place of work.

For this to be an effective system, it is important for:

- the computer and communications systems at the place of work to be usable for training in the form of CD-ROM, courses that can be accessed by the company network specific applications installed on PCs, etc.;
- co-learning methods to be placed on a formal footing: colleagues should help each other to learn;
- the group leader or manager to assume the role of trainer as part of his responsibilities;
- there to be resources outside the workgroup to which it can turn when there is a need for experts, tutors or multimedia resources.
- the training acquired to be recognised by the employer;
- scope to be allowed for short-term training, to be managed from one's own workstation.

2. Many of the existing resources now in hard copy will have to be converted into multimedia resources.

   To this end, multimedia resource centres have to be developed, serving both their own enterprise and a group of different enterprises in the same sector. The resource centres will continue to rely on books and hard copy for some time, but thought should be given to the creation of CD-ROMs, interactive videos and the use of videoconferencing, electronic mail, group software, etc. The company's network should facilitate ac-

cess to these resources in the workplace or a worker's own home if he prefers. The costs arising from the use of those resources (telephone, post, etc.) should be borne by the employer. Resource centres must be able to rely on certain trainers and leaders to facilitate and propagate knowledge and provide support in its use.

3. The role of the professional trainer and the tutor will remain vital, but will made new demands:

- the designer of multimedia materials for training will acquire an important role;
- the trainer entrusted with the implementation of courses must be able to develop both classroom and distance training. The technology available (videoconferencing, groupware, e-mail) will make it possible for all training methods to be used in real time;
- the tele-tutor will become an important practitioner. He will develop his work both on the network and in face-to-face contact. His work will be both batched and synchronous, since this is made possible by networking technology;
- experts inside and outside the enterprise who take on the trainer's task for a temporary period must be made familiar with the use of on-line technologies

4. Training centres will have a broader mission. Their main terms of reference may be to:

- organise classroom or distance courses that would be difficult to arrange in the workplace: lengthy courses, those directed towards changing attitudes rather than providing information, courses for workers in various fields of work whose job requires them to be mobile;
- serve as the basis for distance tutoring operations;
- host and manage multimedia resource centres;
- serve as the meeting place and forum for the pooling of experience by professionals;
- train the trainers;
- design multimedia materials for training;
- offer space to enterprises or groups wanting to publicise new training products, services or methods.

In concluding this chapter, it could be said that training is increasingly becoming a strategic element in the process of technological change in organisations. The new information and communications technologies are formidable tools in the service of training in and the development of vocational competences. They are not, however, an end in themselves. The key factor is the organisation's culture, which must be shared by all its members. Training must also be used as a preparation for successfully mastering technological innovation.

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8. ANNEX: CASE STUDIES

FRANCE

Human resources and relations department

Insurance company

Human resources division

Financial company

Training development department

Telecommunications company

Marketing and strategic development

Telecommunications company

SPAIN

Training and consultancy service

Telecommunications company

Technical department

Public service authority

Training centre

Telephone group company

Directorate of information technologies and communications

Telecommunications company

Directorate of training and selection

Telecommunications company

International programmes and research unit

University

General management

Bank

ITALY

Directorate of information systems
Telecommunications company

Directorate of human resources and organisation
Space industry company
Directorate of human resources
Food industry company

Administrative and management auditing department
Telecommunications industry company

Corporate personnel department
Telecommunications industry company

Information systems section
Telematics industry company

Administrative and management auditing department
Telecommunications industry company

CEDEFOP – European Centre for the Development of Vocational Training

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Case studies in Italy, France and Spain

Synthesis Report

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The study analyses the vocational changes – both those now occurring and those that can be foreseen in the medium-term future – among practitioners in the sector of Telecommunications and administration/offices, as well as current and future training procedures to face those changes.

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