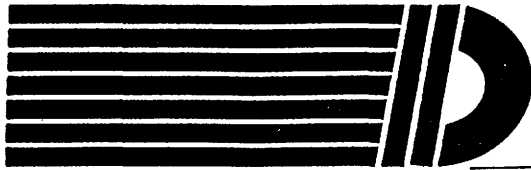


DEVOTECH

**DEVELOPMENT OF A MULTIMEDIA
ENVIRONMENT IN EUROPE**

**SUMMARY
(English Version)**



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January 1995

Final report available in French

Requirements For The Development of a Multimedia Environment Based on Telecommunications Infrastructure and Cable TV Networks

Report to the Commission of the European Communities

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January 1995

Project manager : Laurent ABRIL - DEVOTECH Conseil

with the collaboration of :

Jean-Patrick THEVENY - DEVOTECH Conseil

Stefan STANISLAWSKI - Analysys

Simon NORRIS - Analysys

DEVOTECH Conseil
113, rue Anatole France
92300 Levallois Perret
FRANCE
Ph : (33-1) 41 05 91 30
Fax : (33-1) 47 58 02 31

ANALYSYS
St Giles Court, 24 Castle Street
Cambridge CB3 0AJ
UK
Ph : (44-223) 460 600
Fax : (44-223) 460 866

This study does not necessarily reflect the views of the Commission, nor does the Commission take responsibility for the accuracy or completeness of the information contained herein. The opinions expressed in this report are the ones of DEVOTECH Conseil, Analysys and of the professionals interviewed in the course of the survey.

SUMMARY

0. Introduction and approach of the study

This document is the final report of a study on "the requirements for developing a multimedia environment built on telecommunications and cable television infrastructures". This study was launched by the European Commission - DGXIII - within the framework for preparing a Green Paper on cable and telecommunications infrastructures. It was given to DEVOTECH Conseil in partnership with Analysys Ltd.

The objective of the study is to examine the various barriers to developing multimedia products and services in the European Union. The study is intended to be exploratory and wide ranging rather than detailed in nature. For that purpose we have adopted the following approach : first we define and describe multimedia services and the main equipment involved. This description includes the principal commercial and technical developments for business and residential environments. It is followed by an assessment of the types of networks most appropriate to developing multimedia services.

Further on, this study presents an assessment of the potential market for multimedia applications. The situations in the United States and Japan are presented in order to better illustrate the world-wide context in which multimedia is developing. Nevertheless, the main objective of this study remains that of identifying and analysing the barriers to developing a multimedia environment. All the barriers are discussed: regulatory, financial, local loop capacity problems, intellectual property protection, consumer protection and so forth.

Finally we conclude with observations about eliminating these problems which, in our opinion, hinder the development of a multimedia environment in Europe.

1. Defining and presenting the multimedia value chain model

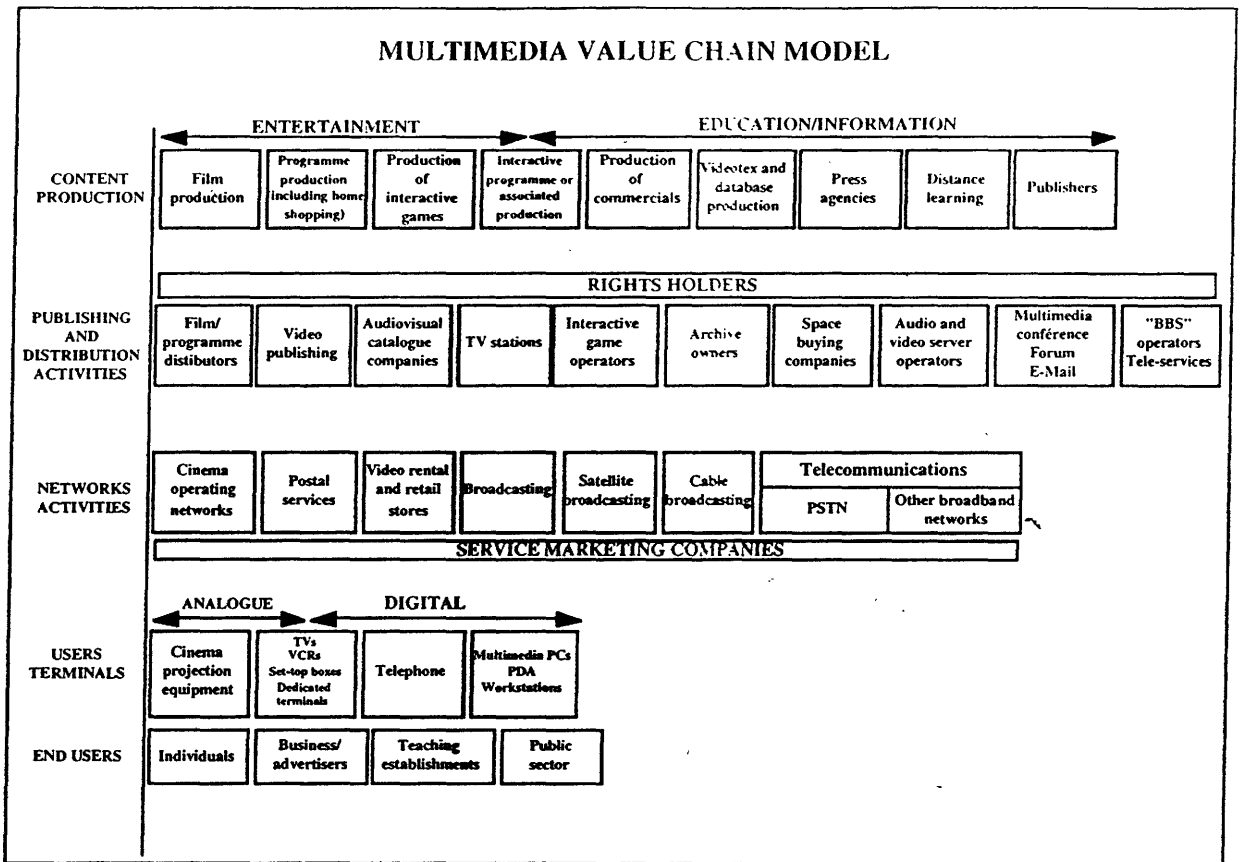
We define multimedia as incorporating several types of information (e.g. text, sound, fixed and moving images and data) on the same medium with which the user can interact. By interactivity we mean the possibility for the user to manipulate the content, and this notion is what really characterises a multimedia product.

Multimedia products and services can be classified into two categories: on-line and off-line. Within the framework of this study focused on telecommunications infrastructures, we have, above all, examined on-line applications.

To complement the preceding definition and to set out the methodological framework of the study, we have used a model created by DEVOTECH Conseil called "the multimedia value chain model". We have developed this model to make defining and understanding multimedia sector problems easier. This model has been used during the whole study for the following aspects :

- an accurate definition of multimedia,
- a methodological guide for analysing the relationships between those involved in multimedia,
- a description of the equipment and services that comprise multimedia and an evaluation of their impact on different networks,
- categorisation of participants interviewed at each level of the model,
- an analysis of the barriers to developing multimedia services,
- commented proposals to minimise these barriers.

FIGURE 1 :



The participants identified in the five levels of our model must be considered not as businesses, but as functional elements in the chain.

We distinguish five main levels in this **value chain** : content production, distribution and publishing, networks, user terminals **and the users themselves.**

To understand the overall function of the **chain** and to analyse the consequences of multimedia on the main participants involved, we have analysed the *key paths* linking the participants along the chain down to the end user

Clearly content producers play a fundamental role in the whole multimedia chain because they are the source of products. Their unavoidable role as content providers makes them, at least for some of them, **players** of considerable financial power. It is also important to note that new distribution techniques enable them to extend their field of action, that is to say to reach an **increasing** number of users. Consequently, at first glance, content producers seem to be **the largest beneficiaries** of multimedia.

2. Multimedia services and technologies

Multimedia services and applications

The present state of the demand for on-line multimedia services is not well known. This is due essentially to the fact that today the supply side and technology drive the market. Killer applications have not yet developed so the market is fragmented.

Looking at the description of multimedia services and applications that exist today or can be developed in the near future (there is a complete description at the end of the final report) it seems that these applications are not revolutionary in terms of services themselves. In the first phase, residential on-line multimedia will be introduced as a new distribution channel for services that are identical to those that we know now. Similarly, in the professional environment, the lines of business will remain the same at least in the immediate future for the next ten years. On the other hand, the distribution channel for business services will expand overall as a result of multimedia. In both market segments, the services will be consumed through traditional distribution outlets and multimedia outlets that will exist side by side. Thus, the multimedia distribution mode will gradually replace the traditional modes.

Multimedia technologies

Today it may seem rash to speak of technological discoveries that will give birth to tomorrow's new applications. Nevertheless, we have noticed that since the middle of the 1980s, compression, real-time image processing and the processing power of computers have continued to advance as costs have constantly fallen. These on-going developments confirm that idea that the technology is not a barrier to developing multimedia and that current technological developments can support the main applications envisioned, even if the technologies are still too costly to be economic.

The basic technologies (storage, compression, micro-processors, and so forth) come into play in most components of the multimedia chain, from data acquisition and retrieval to data transmission by networks. These technologies are available today. They will continue to experience significant advance in terms of performance and price. Right now they make multimedia application development on carrier networks possible as long as access to the networks is easy and economical.

3. Transmission networks for multimedia applications

The convergence of audio-visual and telecommunications business lines, along with the expected competition among participants of these sectors, is leading to identical needs in transmission infrastructures. Technically this convergence is manifested in the infrastructures. The pilot projects that telecommunications and cable operators in the United States are running (within the framework of new regulations) exemplify this fact. The main question to be asked involves the technical options available to telecommunications and cable operators for upgrading their system architectures to support both interactive multimedia applications and telephone services in the context of the forecast competition. This problem relates mainly to access networks (i.e. the local loop architecture).

With the development of multimedia applications on the horizon, the local loop is a major challenge for cable operators and telecommunications companies. In fact, technically the local loop is a bottleneck in terms of the transmission bandwidth. It is both the end user's access and a major financial investment.

Technologies to improve the capacities of twisted pairs in the local loop (e.g. ADSL/HDSL type) are not taken very seriously in the United States or Japan by telecommunications operators. In Europe they are more credible because here the local loop is shorter, more recent and of better quality than in the United States, in particular. Everywhere, however, technologies improving transmission over twisted pairs are considered as transitional. Nevertheless, they will quickly meet the demand for multimedia services and generate the revenue for modernising infrastructures.

The convergence of telecommunications and cable operator networks is resulting in a tendency to hybrid fibre optic/coaxial cable architectures capable of carrying telephony, video and other interactive services. Eventually fibre optic will come closer to the user as the price of opto-electronic equipment falls.

Telephone network operators, cable operators and equipment manufacturers are convinced that for long distance transmission, ATM will play a major role in offering broadband services. The question still to be answered is up to what level in the local loop ATM cells can be transmitted.

Telephone service issues are very important. Upgrading the infrastructures of the telecommunications operators to become capable of supporting multimedia services can be justified purely only on the basis of the voice telephone service since the operating costs of hybrid fibre optic/coaxial cable networks are lower than those of traditional for twisted pair networks. This aspect has been confirmed in the study

conducted by Mercer Management Consulting for the Commission and by DEVOTECH Conseil's research work in the United States.

In Europe, most telecommunications infrastructures are owned by telecommunications operators (presently monopolies), cable operators and a few large users that have their own networks for internal use. Water, electricity, motorway and other companies are particular examples. Some of them have conduits in which cable can be laid. A KPMG study for the Commission shows that 71% of the costs of building a fixed telecommunications network infrastructure are due to civil engineering work, particularly the burial of the cables. In conclusion, a company that can use its existing conduits to install its network will reap considerable economic benefits in terms of lower infrastructure costs and, consequently, more competitively priced service.

4. Analysis of the potential multimedia market

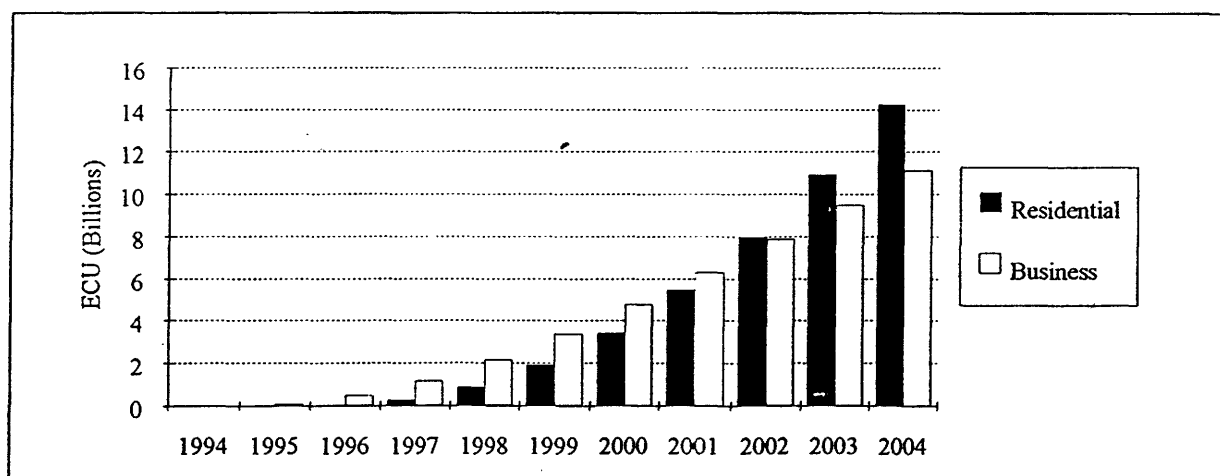
4.1 Introduction

The aim of phase 4 of the study was to develop a possible growth scenario in the 12 current members of the EU for multimedia services. The scenario takes an optimistic, though realistic, view of developments, and assumes that broadband infrastructures are developed sufficiently quickly to allow demand to be fully realised. The forecasts cover both the residential and business environments, broken down into growth rates for individual services where appropriate.

4.2 Results

Models developed during the course of this study show that, in terms of total service revenues, early growth will be most marked in the business sector, although it is the residential sector which will provide the greater potential in the long term. This is illustrated by Figure 2.

FIGURE 2 : *Business and Residential Services: Total Service Revenues*

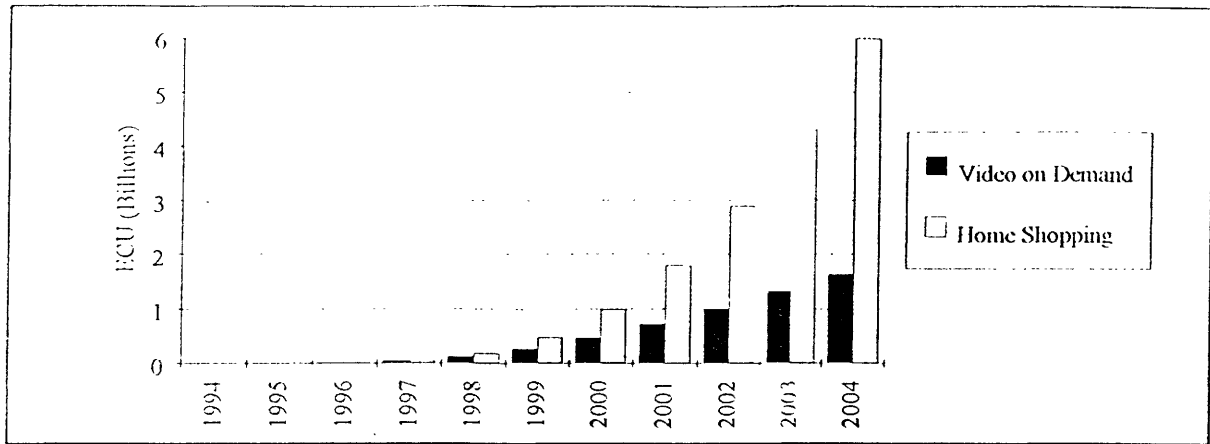


Note that this graph shows the total revenues for connection, subscription, and for the provision of all services. It therefore represents the size of the multimedia service sector in its entirety. An important conclusion can be drawn; multimedia will continue to be a relatively modest opportunity for the next ten years at least, and investment in network infrastructure will not be justified on the strength of these services alone. To encourage early growth, network operators must be given the opportunity to benefit from economies of scope by developing service-independent networks which are able to offer voice, data communications, broadcast entertainment etc.

In the residential sector, the model indicates that video on demand and home shopping will lead during the growth phase, with the latter showing by far the greatest growth

potential of all services considered (in terms of total service revenues). This is illustrated in Figure 3.

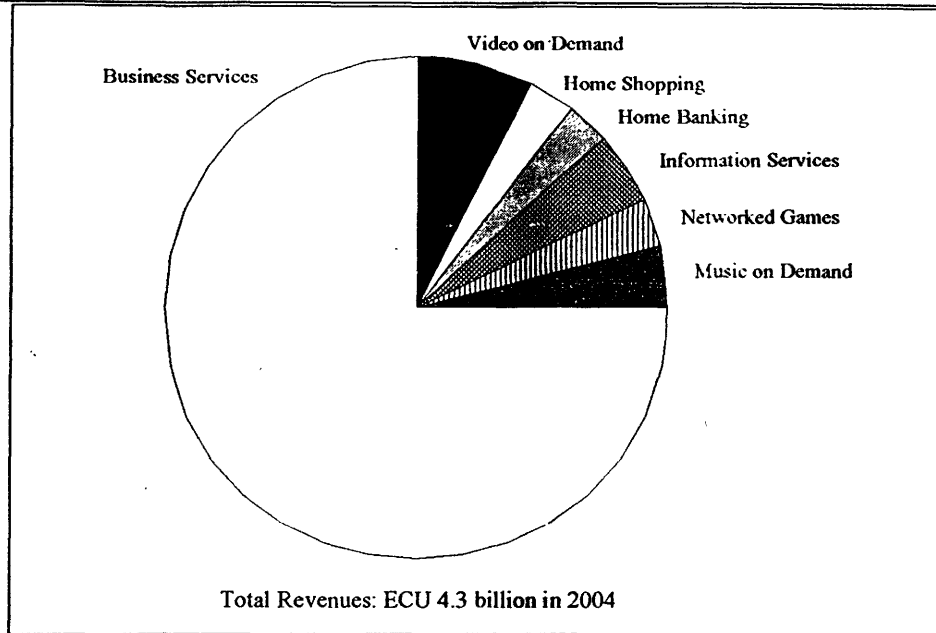
FIGURE 3 : Leading Residential Services: Total Service Revenues



Consideration of the types of service which are expected in the residential and business sectors, and the value chains for these two sectors, indicates some important structural differences. In the business sector, the emphasis is on providing enhanced communications between individuals. A large part of the total revenues generated, therefore, will be available to the network operator. In the residential sector, by contrast, the emphasis is on the provision of a service from a commercial organisation to an individual subscriber. In this case, a significant part of the value chain will be taken by the content producers and service providers for development, promotion and distribution.

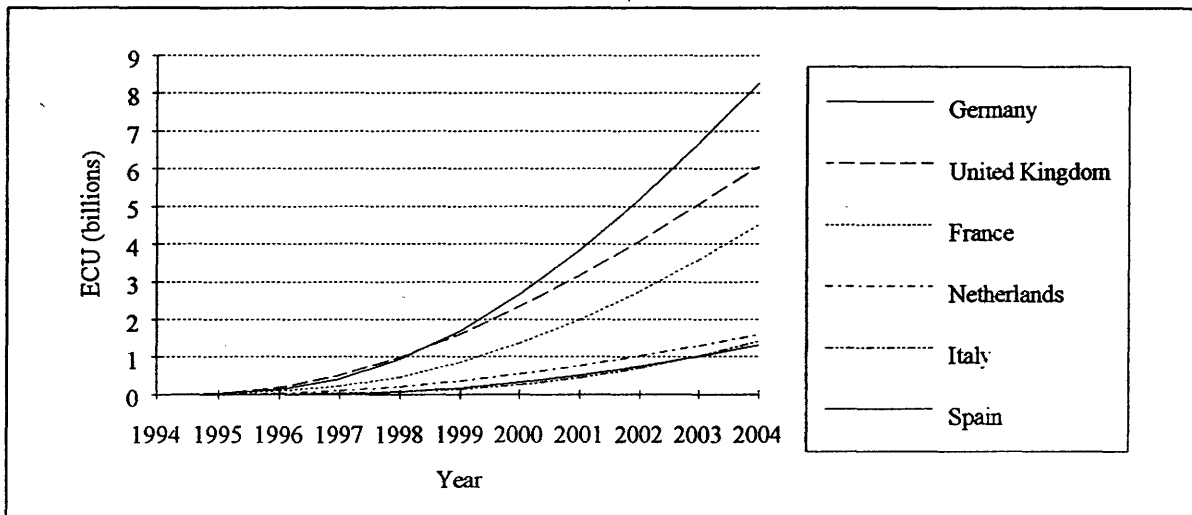
Expressed in terms of revenues accruing to network operators, the balance is tipped significantly towards the business sector as shown in Figure 4, and home shopping is relegated to being one of the lowest revenue earners. However, we believe that total revenues will be the principal driver of service growth and therefore maintain that it is home shopping that will lead the residential sector.

FIGURE 4 :
Breakdown of Revenues Accruing to Network Operators



Taking each of the EU Member States individually, the largest markets are shown to be Germany, the UK and France with Germany reaching total revenues (for all services in both the business and residential sectors) of more than ECU 8 billion by 2004. Market growth projections for the six largest markets are shown in Figure 5.

FIGURE 5 : *Six Largest EU Markets by Total Multimedia Revenue*

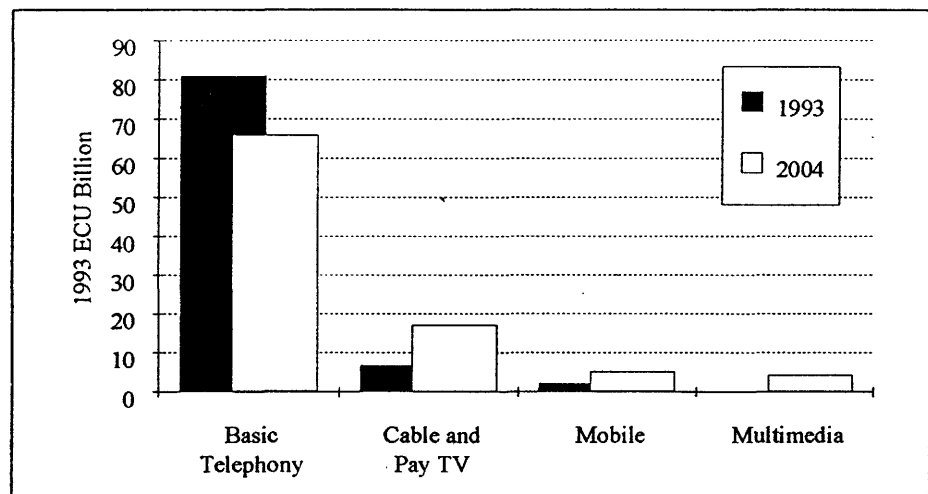


4.3 Conclusion and further action

The above analysis shows that, based on current assumptions, there is potential for significant growth in the business multimedia market in the short term (within the next five years) and in the residential market in the medium term (the next five to ten years).

In terms of network revenues, however, the opportunities are put into perspective by Figure 6, which shows revenues accruing to network operators from multimedia services compared with total revenues from other mainstream services:

FIGURE 6 :
Comparison of Multimedia Network Revenues with Other Telecoms Services (Sources: Kagan, CIT Research, ITU, World Bank, EITO, Analysys)



It is clear that, even ten years from now, multimedia will represent a significantly smaller source of revenue than other more established services such as fixed and mobile telephony and broadcast television. The opportunity is nevertheless significant in the longer term; our models indicate that on average across all Member States, penetration by 2004 will have reached 37% of the total addressable market in the business sector and 14% of the total addressable market in the residential sector. Provided the quality of service offered is high and churn can be kept to a minimum, we believe (as shown in our tables of assumptions for the models) that penetration could reach as high as 60-70% in the business market and 40-50% in the residential market in many Member States. We would not expect saturation of demand in the next 15-20 years.

5. The Development of multimedia in North America and Japan

5.1 The American market

Despite uncertainties, especially about regulatory developments in the telecommunications and cable television sectors, the American market remains very dynamic. The operators, the content providers and the different regulatory bodies generally want competition on infrastructures especially in the local loop. This competition is inevitable despite the delay caused when proposed telecommunications legislation was withdrawn in September 1994. Similarly, business line restrictions will disappear over time even if the process is not as orderly as the government would have desired.

The investments required both for information highway infrastructures and services will be made by the private sector. However, the government will provide some subsidies, set up incentive measures and set an example by offering services on Internet. It is also consulting manufacturers to discuss the copyright problem.

Commercially, the sector is extremely active. All the industrial participants are committed to pilot projects to examine both technical and marketing aspects of the new multimedia. Similarly, alliances have been established between cable and telecommunications operators, on one side, and content or service providers on the other.

5.2 The Japanese market

Compared to the United States, Japan is behind in multimedia. The reasons are to be found in the low penetration of cable and PCs (both in homes and businesses). Telephony competition is more developed than in most European countries and is gradually being extended into the loop and in multimedia.

Private investors and operators are aware of the challenge, but because of the low penetration rate of cable, mergers and alliances are taking place between operators and investors. Cable operators do not have the required investment capacity despite loans granted by the government. American companies are also very active, among them cable operators (Time Warner), manufacturers (Silicon Graphics) and software developers (Microsoft and Oracle).

The government and the investors are very much aware that the country is behind in the content and software fields. For that reason initiatives to train artists and writers have been undertaken. Discussions about the problem have been conducted in consultation with industry. In 1995 plans to propose a new law instituting a data base in which writers and artists can put their works for managing rights and royalties.

It should also be remembered that in the mind of the government and the MPT (PTT Ministry in Japan) one aspect of developing multimedia is reinforcing competition and lowering selected barriers. Cable operators will be permitted to offer telephone services, which will have the expected effect of increasing the cable penetration rate and increasing competition among services and infrastructures in the local loop. This deregulation of local infrastructures will go hand in hand with an effort to make interconnection with NTT's networks easier and affordable, which has not been the case up to now according to those whom we met and spoke to.

Furthermore, through the MPT the government plans to set up a fibre optic infrastructure reaching every home between now and the year 2005. To encourage the private sector to finance the enormous investments required by this project, the government plans to grant loans at low interest rates and to enact incentive measures for sharing conduits and burying them underground.

The determination of the government, investors and manufacturers to catch up in software and content and the co-ordinated approach of industry as a whole to rise to the challenge of multimedia was striking during our stay in Japan.

5.3 Conclusion

The United States and Japan are pursuing a variety of projects and experiments. Above all, these two countries have strongly expressed their commitment to information highways. Some of those to whom we spoke mentioned a divergence of viewpoints between Europe, on the one hand, and the United States and Japan on the other. According to them, Europe is very worried about the impact of multimedia on society, especially in terms of employment, leading it to hesitate to reform regulation.

However, for the United States, Japan is a competitor that has been strengthened by the prosperity of its interventionist economy and could be tempted to invest massively in the multimedia sector and other fields such as infrastructure and content. The co-ordinated approach of the two economies in the telecom equipment sector or the software and content sectors poses the question of what Europe's position is with respect to this Pacific Rim alliance.

6. Economic impact of multimedia

The aim of this part is not to make an exhaustive analysis of the economic impact of multimedia on business and employment but rather to single out certain aspects of multimedia influence on the industrial structure of a few business sectors in the multimedia value chain and to formulate the employment issues brought up by multimedia. Rather than speculate about the developments of the sectors involved, we prefer to use sectors as examples to bring up the general issues brought about by introducing multimedia as a medium for offering services.

6.1 Impact of multimedia on the business sector

Generally, in our opinion, the majority of business services will evolve not in their basic nature, but rather in the way that they operate.

- gains in productivity and performance through using multimedia services can be envisioned and expected,
- changes in the industrial fabric of these sectors will appear with the following consequences:
 - very highly skilled links in the multimedia chain will probably emerge, operating remotely and covering vast geographic regions. Such niche players will make substantial gains in productivity,
 - then these new links will compete among themselves at a national, even international level,
 - the skills of those who remain in contact with the final user of these services will be relatively devalued,
- finally, changes in society's rules of the game will appear. Lifting technically based access restrictions to certain people (experts and so forth) or access restrictions to knowledge-disseminating services may change the rules of social competition: for example, access to instruction from a very specialised teacher will become very easy and will no longer be a source of discrimination on the basis of geographic location.

To widen the debate, one can wonder to what extent the dissemination of multimedia technologies will not be accompanied by deep structural changes in public contact services in particular and in the economy in general:

-
- growing exposure of economies to international competition?
 - effects on the industrial structure of the sectors involved, in particular the emergence of a new specialised link exposed to international competition?
 - deep transformations in the employment market with consequences on the skills demanded and on career patterns and mobility between sectors?

Vested interests can be expected to rise up in opposition to change as they face radical transformations of the economic fabric.

Such opposition can only come at the expense of the common interest, and consequently political leaders should focus their action on defusing such socio-economic reactions without hindering the development of multimedia.

6.2 Impact on Employment

Broadcasting multimedia services will cause profound changes in the employment market by acting on the following aspects at the same time :

- the numbers of employees of each sector affected and
- the profile of skills that will be required in those sectors.

The number of employees will diminish in the telecommunications sector because of the competition necessary to promote the development of multimedia.

The total number of employees is the aspect to which society is the most sensitive. Once the fascination with these technologies has passed and when the first effects become apparent, this aspect may become the focal point of the multimedia debate. In any case, this limited description of the causes for unemployment is invalid if we confine ourselves to a remark by the French economist Alfred Sauvy, who has stressed that innovation in Western history has never destroyed employment, quite to the contrary.

Our aim here is to describe in detail the conditions in which broadcasting multimedia could have a good effect on the economic development of the European Union. These conditions have already been studied previously by DEVOTECH Conseil.

- Far from being caused by opening up to international competition and the dissemination of new production techniques, the growth of unemployment results from the incapacity of these countries to innovate sufficiently. A free market approach to economics explains this incapacity to innovate by the inefficiency of the markets that compose the economy. Multimedia is a technological innovation that may bring to gains in productivity and constitutes an opportunity for economic development.
- The dissemination of multimedia technology,
 - if held back, in the countries of the European Union, will be a cause of relative impoverishment (all things being equal),
 - if promoted, will be a cause of unemployment and breaking of the social contract (a society of haves and have-nots) only in the event that creative economic forces are not simultaneously unleashed through improving the efficiency of markets in the economy (capital markets, employment markets, good and services markets and the like).

Creating new forms of industrial organisation or new production techniques is a better way to share employment. Fostering the creation of new industrial patterns of organisation like multimedia requires an improvement in the efficiency of all the markets on which the economy rests: the process by which special or exclusive rights are granted, capital markets (no insider trading, effective financial communication, etc.), the labour market (limits on allocating guaranteed employment and setting remuneration and regulations by vested interests, limiting barriers to imports, etc.). For that reason :

- in launching their activities, the newcomers are disturbed by those who hold economic power in the framework of traditionally organised industries, and being satisfied with their comfortable situation, they are deliberately seeking to make it stable,
- bans on abusing leading positions must be reinforced in a framework of equal treatment of the participants in the multimedia chain. This condition is probably one of the most essential for guaranteeing maximum efficiency of the markets,
- the absence of competition-diverting mechanisms or regulations specific to technologies must be guaranteed etc.

-
- the social means for career mobility and mobility between sectors must be ensured (training offers, training time financing, etc.)
 - it is also appropriate to reinforce possibilities for circulating information (access rights to information, etc.) and conditions of equal access to information.

7. Analysis of the barriers to developing multimedia

The objective of chapter 7 of the main report is to present the problems brought up and identified by those whom we interviewed for this study. These problems are related to developing multimedia applications and involve various types of participants in the multimedia sector. We have chosen to present this chapter by classifying the barriers according to the economic sector involved and in the sequence of the multimedia value chain. The various barriers are classified into the following categories: legal and regulatory, economic and financial, technical (or problems with standards), strategic, and social & cultural.

7.1 Content Producers

Author's Rights

The main problem with multimedia is the "proliferation of rights". By this we mean the difficulty of managing and defining ownership rights given the increasing number of elements that multimedia products borrow from other works, elements for which usage rights must be obtained before the product can be marketed. This difficulty is one of locating the original of a multimedia work as well as the growing difficulty of tracking authors (to ensure respect the authors' rights) cited by many in the industry as the real barrier to multimedia growth.

Equity quotas

Some countries of the European Union, including France, Germany, Portugal, and others, have set up equity limits and quotas on the capital of content production companies. These quotas vary from country to country.

Quotas on broadcasting content

Opinions in the industry are quite divided on the problem of quotas. However, on the basis of our interviews, it seems that there are more opponents to the quota system than supporters. The quota policy, which was defined in a television broadcasting context cannot sensibly be applied to an interactive multimedia environment in which the consumers (business or residential) request the information or service themselves.

Financing content

The absence of mechanisms to finance content that will feed the multimedia chain can slow down the development process for the whole industry. This situation fosters uncertainty leading the European telecommunications operators to question the timeliness, for them, of investing in their infrastructures, given the uncertain supply and poorly understood demand for existing multimedia services.

Absence of a structure in the European production industry

An unstructured European programme production industry may not be able to meet the demand and expectations of consumers and finally may not benefit from the birth of new multimedia services.

Mastery of the technological tools by content artists and writers

Artists and writers must master the tools that enable them to develop applications that are attractive to the user and, therefore, profitable. The "traditional" content producers do not always have the skills required to develop good quality, interactive products.

Home shopping

A sizeable challenge for businesses wanting to develop home shopping services in Europe is that the continent is culturally fragmented and has a variety of regulatory prohibitions. This point is all the more important as our study shows that home shopping is the most promising application of the residential sector in terms of revenues.

Language barrier

Europe is a fragmented market in which each country has its own language and culture. This particularity is a brake on developing pan-European multimedia applications and for this reason denies European producers the economies of scale U.S. producers enjoy in their home market.

7.2 Networks

Business line restrictions

Regulatory restrictions prohibit some types of network operators from transmitting certain services. These restrictions slow down the development of the emerging multimedia market, a nascent one that is trying to mark out its own boundaries. The main problem is that all business line restrictions lead to distortions in competition, which can potentially place them in an awkward position with respect to provisions of the Treaty of Rome.

Absence of competition in infrastructures

With the exceptions of UK, Sweden and Finland, the States of the Union do not allow free access to the market for telecommunications network operators. There are, however, initiatives (in Spain and the Netherlands) to increase competition on the networks.

Many of the participants interviewed, especially the newcomers, think that in order to build a modern profitable broadband infrastructure, both telephone and programme broadcast services must be integrated.

The absence of competition in the infrastructures has a serious impact on multimedia application development by reducing innovation.

Universal service

There is a twofold fundamental problem in universal service as applied to multimedia: first defining which services can be described as universal and secondly the cost of universal multimedia service and distributing that financial burden for universal service among the participants.

Shortage capacity in cable TV networks

The problem brought up mainly affects minorities who are unable to obtain licenses to broadcast their programmes on cable because capacity is already exhausted.

Organisation of regulatory bodies

The two principal issues relating to regulatory bodies are, on the one hand, the absence of neutrality vis-à-vis the technology on the part of certain regulators and, on the other

hand, their role and position in the convergence process of the content and telecommunications industries.

Investments to be made to put in place an infrastructure supporting multimedia applications

The local loop is a bottleneck for multimedia service in that for both cable operators and telecommunications companies, it must be altered to support the bandwidth and degree of interactivity required by multimedia. The problem is in the high level of investment (especially civil engineering and burying cables) is not yet justified by proven multimedia revenues.

Vertical integration and abuse of a dominant position

The convergence of the information, content and telecommunications industries is leading to alliances, either horizontal or vertical in the industry. The relationships among the participants, especially those based on vertical integration, may create situations in which abuse of a dominant position occurs. However a degree of vertical integration may in some cases be necessary to offset the risk of investment in multimedia.

Network interconnection

Interconnection becomes a barrier the moment that it is not offered to an operator or when pricing practices (interconnection fees or "access deficit" type payments) weigh heavily on an operator's capacity to interconnect via or with a leading operator.

Vertical access to the network infrastructure and the user

Closing a vertical access is similar to abusing a leading position (see above). Open access is necessary to promote the growth of new content suppliers and to prevent network operators from exploiting a leading position on the market. Provision for open access also enables competitive market forces to intervene at the service level, thus maintaining prices at a minimum and ensuring innovation and diversity. If competition at the network level is inefficient or non-existent, then the absence of open access could prevent service providers from having access to users in the same manner that they would have in a competitive market. In other words, open access is all the more necessary when the network operator is a monopoly.

7.3 User terminals

Access control and access to multimedia servers

Controlling access to servers exercised by a single broadcaster or operator may effectively exclude other potential newcomers by creating an artificial barrier to their entry.

In what is a client/server relationship between a converter box in the home and a multimedia server in the network, the absence of standards may limit the consumers' choices for those who do not have access to all the servers from their terminal.

7.4 Users

Demand-related restrictions

Poor knowledge of the real demand for multimedia and the requirement to generate a critical mass to develop services constitute a difficulty that confronts all the participants in the market. Up to now, multimedia has only attracted a marginal fringe of consumers. One of the main difficulties for suppliers is therefore to identify the markets that interest the consumers.

Psychological aspects

Does the consumer really want to interact with television programmes? For many individuals, the essential attraction of television is the passive experience of watching it, and some participants wonder about the success of interactive applications on cable.

Social reactions to developing multimedia

Developing new services may provoke strong, even vested interest type reactions in some professions, for example the medical and teaching professions.

Protecting individual freedoms and private life and the security of network-transmitted information

The more channels there are and the more services that are developed, the more difficult it becomes to ensure protection of the users, privacy, freedom of expression and security against fraud or theft. The principles for this protection are written in the law (respecting human dignity and the status of children, religious and political neutrality), but the means currently available to respect these principles will be insufficient in the future.

7.5 Other problems

More general problems were identified during our interviews:

Regulatory fragmentation of the European market

When technologies evolve, legislation often takes some time before it can adapt to these changes. This delay can cause many problems, notably problems of competition among the various economic participants. Furthermore, the European regulatory scene is fragmented into several sectors: business line restrictions, cross holdings in the media, intellectual protection rights, content regulations and consumer protection.

Immature technology

Immature technology is mentioned by many participants (cable operators, telecommunication companies, hardware manufacturers and producers) barrier to the rapid development of business applications for which real time processing, and high bitrates are important technical parameters.

Incompatible standards

One result of the alliances in the multimedia sector is the emergence of standards that are incompatible among themselves. Consequently, they demand network interfaces to be made for each type of equipment and slow down application development based on these standards, leading to additional costs and confusion for the public, offering at least part of the benefit of early development.

Using standards to tie up the market

Standards can form a threat to the extent that they have been developed by groups of companies wanting to lock up the market. The proprietary solutions developed by large groups slow down the arrival of newcomers.

8. Observations

In chapter 4 we estimated the potential market for multimedia. Our estimate shows that in ten years, multimedia will not be a significant source of revenue for telecommunications operators, in terms of transmission, compared to established services such as fixed or mobile telephony or broadcasting. However, the long term potential is significant.

In the same chapter, we underlined the difference between business and residential multimedia in terms of breakdown for the overall turnover in the sector. In the business environment, content is a small proportion compared to information transmission. In the residential sector, on the contrary, the content or goods exchanged via multimedia services or applications will be much more significant than transmission. Therefore, it is important to facilitate the development of content for the general public and to allow access to the infrastructures for this content, particularly by limiting vertical access restrictions. Furthermore, diversified, innovative telecommunications services with attractive pricing, especially for the business environment, must be promoted.

In the present state of multimedia development, the only certainty is that the demand is unknown. On the other hand, the technology has developed to a stage which already enables the participants to offer the applications cited previously. Just as in chapter 3, we indicated that upgrading the infrastructures of telecommunications operators capable of supporting multimedia services is justified only on the basis of efficiency improvements in vocal telephony services since the operating costs of hybrid fibre optic/coaxial networks are lower than those for twisted pair networks. In this context, deregulation would enable investment in the services and content fields to be accelerated.

Consequently, at this early stage of multimedia development, the regulatory environment should offer the best conditions possible to encourage innovation and applications. Content is preponderant in multimedia, at least in the residential sector, however, the renewal of telecommunications operator's infrastructure cannot be justified on the basis of the sole multimedia services. Hence accompanying regulations are important for deregulating the telecommunications sector.

In concluding the study, we propose some observations about the main problems and barriers that have been updated during this study and presented in the preceding paragraph. These observations deal with the most important constraints that weigh on developing multimedia and on initiatives that could be considered at the European level. They result from the many contacts that we were able to establish with all the participants of the market.

To encourage technological innovation and the development of services or applications, - the driving forces of the multimedia market-, to be able to find their market, the participants in the multimedia market want a certain number of barriers to be removed. Therefore we propose twelve observations, in order of importance, which deal with both transmission infrastructure aspects (telecommunications or cable television) and content (services, applications and programmes).

The objective of these observations is to review the conditions in which the multimedia market can fully realise its potential. In our approach we have sought to favour competitive mechanisms which engage market forces. In such a dynamic and emerging sector as multimedia, the dynamic energy of the market must be restrained as little as possible. This condition is necessary so that innovation, future applications and the like can surge forth. Regulatory action is contemplated only (i) to keep the market from degrading into uncompetitive states or (ii) to prevent abuse of a dominant position. In the latter case, we favour *a posteriori* regulation after the abuse has been established. However, certain *a priori* rules of conduct are suggested to promote behaviours, consistent with those in perfectly competitive markets and to avoid a proliferation of complicated and lengthy lawsuits. These *a priori* rules of conduct will furnish the regulators with the guidelines needed for a rapid decision in the event of a dispute.

These observations imply :

- no recourse to business line restrictions as a regulatory tool
- equal access for all the participants to all the resources arising from innovations so that a varied offer can be constructed, as appropriate to meet the needs of the market,
- sufficient competition in the supply all of these resources to make them as accessible as possible.
- sufficient guarantees to cover remuneration for innovations (patents) and possibilities for enhancing the value of the offer (approved distribution)

8.1 Business line restrictions

OBSERVATION 1 :

Business line restrictions should only be used as a regulatory tool of last resort.

OBSERVATION 2 :

Reinforce co-ordination between the different regulatory activities of the Commission to take into account of the convergence of telecommunications and audio-visual sectors which must be regulated in a harmonised and co-ordinated manner.

Encourage the member states to adapt their regulatory structures to take into account the convergence of the audio-visual and telecommunications sectors.

8.2 Competition in infrastructures

OBSERVATION 3 :

As quickly as possible, promote the emergence of competition on the infrastructures including the local loop. Competition means that as much as possible, at least three overlaid infrastructures should be available (no local duopolies). Multimedia infrastructures may be wireline or wireless.

Through appropriate European and national authorities, promote availability of the radio spectrum necessary to stimulate innovation and investment in broadband technologies.

Adopt a neutral regulatory policy with regard to technology so that the market can freely choose the solution that is most economical and most appropriate to the users' needs.

OBSERVATION 3 a :

Accelerate opening up basic telephone services to competition.

8.3 Access conditions and vertical integration**OBSERVATION 4 :**

The Commission should make sure that national and European regulations provide for non-discriminatory access to networks for multimedia service operators as long as market conditions, technology or costs permit.

To limit abuse of a leading position, we suggest :

- Defining that a vertically integrated firm occupies a globally dominant position when it has a dominant position in a specific activity (an added value segment being a complete service or the processing of a marketable product). This activity might be only a part of those performed by the firm as a whole.
- Encouraging these companies to create affiliates for the activities in which they have a leading position. To do this, mechanisms must be set up to monitor financial transparency, to separate accounting between the links of the chain, etc.

It is desirable to make sure that these rules apply to all the participants in the market and that they prevent attempts at cross subsidies.

8.4 User converters (free supply and access)

OBSERVATION 5 :

Encourage industry to define the necessary standards that allow the owner of a converter to have access via various servers to any type of multimedia programme.

In the event that interface standardisation is impossible, promote the manufacture and supply of converters by third party companies to encourage increased competition in the converter sector, leading to multi-standard terminals.

This observation does not deal with access control for which work is underway in the framework of the DVB.

8.5 Special Access

OBSERVATION 6 :

The Commission should enlarge the notion of special access included in the ONP draft directive on "Vocal Telephony" to include innovative requests that could come from multimedia server operators. The main objective would be to encourage innovation from a technical, pricing, etc. viewpoint. It is particularly necessary to authorise specific and exclusive agreements between an operator and a service provider.

8.6 Network interconnection

OBSERVATION 7 :

The rules for network interconnection must include a set of conditions specific to multimedia. In particular :

- financial conditions for broadband capacity.
- technical interfaces for different types of traffic (asymmetrical for example).
- new protocols to manage the transmission of pricing and billing information.

8.7 Investments for building infrastructures

OBSERVATION 8 :

It is desirable to adopt rules that favour equitable sharing of rights of way. These rules should include four major aims :

- encouraging those holding rights of way to share and offer them at prices based on cost.
- at the European level, permitting harmonising administrative procedures authorising access to conduits.
- avoiding monopolistic agreements between network operators possessing conduits to that extent that rights of way are rare resources.
- to encourage the operators who invest in building conduits let other participants, in particular newcomers, invest to increase the capacity of these conduits.

8.8 Absence of a structure in the European production industry

OBSERVATION 9 :

Promote structuring of the pan-European content industry so that it can satisfactorily meet the demand induced by new multimedia services.

8.9 Universal service

OBSERVATION 10 :

- It serves no purpose to define universal service for multimedia. It is possible that when this sector is more mature, the notion of universal service can be defined at the governmental level.
- If the notion of universal service is defined for the multimedia, the egalitarian principle of universal service must be abandoned because this engenders cross subsidy mechanisms that slow down investment.
- Defining the notion of universal service is a function of general government policy and should not be part of the specific regulation of multimedia.

OBSERVATION 10 a :

- Instead of granting subsidies only for the telephone services, clients granted subsidies must be allowed to choose freely among the services within the limit of the subsidy. The consumer's right to choose is thus respected. Recognising the consumer's right to choose fits in with the rapid development of services and takes into consideration the uncertainties of the demand facing multimedia applications. Direct assistance to the consumer is preferable.
- Create a public network for national and pan European governmental and civic information. This network should accommodate different types of access to information so that that everyone can profit from it. This network should be interconnected to private operators' networks. Local, regional, national, and European authorities should encourage installing free access terminals in public places.

8.10 Specific problems of home-shopping

OBSERVATION 11 :

- The Commission could work in co-operation with European home-shopping channel operators and the national regulators to harmonise the advertising rules so that home-shopping could develop into a new distribution channel.
- Harmonising the various procedures for purchasing goods remotely in the countries of the Union, and for consumer protection criteria would encourage the development of transactions using telecommunications networks.

8.11 Copyrights and authors' rights

OBSERVATION 12 :

Setting up a mechanism for collectively managing rights should be studied. It would be in charge of organising the acquisition and transfer of exploitation rights while protecting the legal rights of the author.



DEVOTECH

111-113, rue Anatole France 92300 Levallois-Perret - FRANCE
Tél. : 33.1 41.05.91.30 - Fax : 33.1 47.58.02.31