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Van Bastelaer, Béatrice; Pierson, Jo; Burgelman, Jean-Claude; Punie, Yves; Neuckens, Frank; Lobet-Maris, Claire

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CHAPTER 2: DEVELOPMENT OF MULTIMEDIA IN BELGIUM

Béatrice van Bastelaer, Claire Lobet-Maris (CITA) and Jo Pierson (SMIT) in collaboration with Jean-Claude Burgelman, Yves Punie and Frank Neuckens (SMIT)

1. Introduction

1.1. Summary Highlights

The development of multimedia in Belgium is negatively influenced by the following factors: the linguistic problems, the division of competencies, the lack of central initiatives due to other priorities, the absence of key actors driving the development of multimedia, except a very active banking sector, and a low equipment level of the households in terms of PCs and Internet connections.

1.1.1. The Linguistic Problems and the Federal State

Belgium suffers from linguistic problems since many years. The north of the country speaks Flemish (similar to Dutch) while the south, and a large majority in Brussels speak French. This linguistic aspect and the consequent political problems have led to the evolution of Belgium to a federal state. This aspect has two main consequences. The first one is that the federalisation of the state contributes to an increasing complexity in terms of competencies in the field of multimedia and Information Highways (IH). There are too many levels of decisions. The second consequence is more related to the linguistic aspect in itself. Indeed, the development of multimedia is very different in the northern and in the southern parts of the country. This is due to different political priorities but also to the fact that multimedia and IH are seen, in Flanders, as a way to express the Flemish identity and culture by creating a Flemish Information Society. In that way it also fits in with the general Flemish policy for more federalisation and adds up to ways of legitimising this process. However, it has to be noted that some key

persons like the Flemish Prime Minister and Minister for science and technology mainly promote this. The southern part of the country does not seem to follow this kind of motivation but, maybe as a direct result, there are much less multimedia initiatives and applications in Wallonia and in Brussels than in Flanders.

1.1.2. The Division of Competencies

As briefly explained above, the multimedia field, as a lot of other economic or cultural fields, suffers from an important division of competencies due to the number of decision levels involved in the definition of a multimedia strategy: the regional level, the community level and the federal one. As multimedia implies convergence of different technologies which depend from different levels of power, one can easily imagine how this division can impede the development of multimedia in Belgium.

1.1.3. The Lack of Public Initiatives due to Other Priorities

As in many other European states, the government has to face important economic problems (public debt, unemployment, social exclusion,...). For most of European governments, the priority of the moment is the necessary convergence towards Maastricht criteria in order to build the common currency, the reduction of public debts and deficits, the decrease of the unemployment rate. Times are more dedicated to the reduction of public investments than to a huge involvement in the multimedia field, even if sometimes and in some countries, this domain is regarded as having a positive effect on the economic activity and promoters refer to employment arguments. Nevertheless, it has to be said that for the Flemish region, public sector promoters and their related organisations play the major role in shaping multimedia development. However, these initiatives are mainly concentrated on hardware and technology. Roughly only 10% is devoted on software and content.

1.1.4. The Absence of Key Driver Actors

Maybe due to its small size, Belgium, and especially the Southern part of the country suffering from economic recession, is deeply missing key

drivers actors in the field of multimedia, i.e. in the IT supply sector, in the telecom sector, in the audio-visual sector, etc. One can also refer to the general lack of venture spirit and capital for high risk initiatives in Belgium as opposed to other countries. The banking sector however has always been and continues to be a very innovative sector in Belgium. But, as the public sector has no money to invest in multimedia infrastructures and applications and as the Belgian private sector is not driven by one or more important actors, the Belgian multimedia 'market' will probably be invaded by foreign actors or will stay very passive and, as a consequence, small-scale.

1.1.5. The Low Penetration Rate of PCs and Internet Connections for Households

As in France, the PC equipment rate of the Belgian households is quite low. The figure of almost 13% mainly concerns traditional PCs which are most of the time not usable for multimedia applications. Concerning Internet penetration, even if the years 95 and 96 have seen an important progression of the private connections, the situation is quite far from the use of Internet in the Scandinavian households or even closer, in the Dutch ones. This is of course an important obstacle for the diffusion of on-line and off-line multimedia applications towards the end users.

In conclusion

Multimedia development in Belgium suffers from different constraints, caused by various politico-institutional, socio-cultural and economic factors. At the present level of our analysis, it seems that existing projects pay little or no attention to aspects of real user context in the tradition of 'social learning', which is important for successful acceptance of multimedia.

1.2. National Image of Multimedia in Belgium

In Belgium, the MM image is rather oriented towards infrastructure, mainly through the development of telecom and cable TV networks. The satellite option is not very present. The content part of MM is rather tight. There are really few big public programmes concerning MM applications development and not more private developments, except maybe in the banking sector. But there is no real imaginative and innovative developments, except on the Web, concerning education or

culture for example, two sectors which suffer from lack of finance. But this is maybe going to change, as shown by recent initiatives by the Flemish government in the education sector.

For citizens and most users, multimedia means mainly Internet and no much off-line developments. They regularly hear about Information Highways and Information Society but without knowing very clearly what these concepts mean, apart from Internet which is more and more developing. The question is to know whether politicians and other actors who push the concept of Information Highways do have a clear idea of what it means precisely and concretely. This is far from sure.

The analysis of policy factors in Flemish-speaking Belgium showed that public sector promoters and their related organisations play a major role in shaping multimedia development and strategies for the appropriation. It is quite clear that without the political will 'to do something' in this field, the Flemish community would still be lagging behind. In particular the Flemish Government is very much aware of its role in stimulating the supply and adoption of new information and communication technologies.

But, even if infrastructure seems to be the priority of existing initiatives, mainly from the public sector or with a heavy public incentive, there is no accompanying measures devoted to the equipment level, either of households or firms.

In general, users seem to be really absent of all these processes. Public initiatives are oriented towards the supply side with no real consideration or interest for the demand side. Moreover, there has been no public debate about MM and Information Highways development. The main feeling is thus that there is no global and general strategy in Belgium in the MM field with parallel and coherent developments of infrastructure and applications together with equipment measures, that there is no real public appropriation of MM but that without some important public actions like in the Flemish part of the country, Belgium will really be lagging behind its neighbours in the development of MM.

2. National Context

2.1. Geographical and Political Situation

Table 1: Geographical and Geo-Political Indicators

Size (km ²)	30 514
Population (mio)	10.1
Population Density (94)	331.4
Comments	Federal state Linguistic divisions

Source: *L'Etat du Monde 1997- annuaire économique et géopolitique mondial*, Editions La Découverte, Paris.

Introduction

Belgium is a small country, bounded on the North by the Netherlands, on the East by Germany and Luxembourg and, on the South, by France. It is situated at the heart of Europe, in a historically dynamic economic region.

Being the capital of Europe (thus a central place for lobbying) but also centrally located geographically speaking, Brussels attracts a lot of international companies (1). This is also the case for many telecom companies and the proximity of the complete liberalisation of the European telecom market in 1998 speeds up this movement.

Since 1993, the Belgian constitution states that "*Belgium is a federal state composed of communities and regions*". Four legal reforms were implemented in 1970, 1980, 1988-89, and 1993 to reach this federal status. The Federal state is responsible for the general concerns of all Belgian citizens (finances, Army, Justice, social security, external affairs, development co-operation, monetary policy, responsibilities within the European Union and NATO, ...) while the division of competencies between communities and regions is defined along two main axes. The first axis concerns language and, more generally, culture. As Belgium has three official languages (French, Dutch and German), it also has three communities that are defined by the "*people who compose them and the links that join these people*" (2), that's to say language and culture. Therefore, Belgium is composed of the French-speaking Community, the Dutch-speaking or Flemish Community and the German-speaking Community which is the smallest one. The division into regions is based on economic autonomy and independence. Belgium has three regions: the Flemish Region, the Walloon Region and the Brussels-Capital Region. These regions are competent for economic

matters. In some respects, they can be compared with the American states or to the German Länders (3).

Each entity (region and community) has a council (legislative body) and a government (executive body), except the Flemish Region and Community which have a common council and government. Belgium has always been and continues to be one of the most eager builders of Europe (Dehaene, 1995) and is often presented as the model of a federal state with relatively pacific coexistence of different cultures and languages (Dehaene, 1995; Lijphart, 1981). The continuous Belgian commitment towards a federal European Union is due to a political and popular will. This move towards Europe has never been subject to a referendum in Belgium because Belgian citizens almost never call it into question. However, the increasing liberal move within the European economy and policies is moderated in Belgium, as in Germany, by a well-established social tradition of negotiation between trade unions, the employers' organisation and the government, especially on employment questions.

2.1.1. Division of Competencies regarding Multimedia Matters

In Belgium, different institutions and political levels are responsible for infrastructure, audiovisual content, telecom services, etc. This division is partly due to the federalisation of the state and the existence of communities and regions, together with the federal level, which have specific competencies, sometimes well defined but sometimes also unclear. Multimedia and telecoms are the examples of domains where the division of competencies is really fuzzy and may impede the development of these sectors.

Concerning *infrastructure*, traditionally, the Belgian landscape was organised around two separate worlds: the telecommunication infrastructure and the TV cable network. The federal authority and the CATV infrastructure regulate telecom networks by the communities because of cultural issues (4). According to Minon (1996), two main factors will contribute to spread confusion into the traditional borderlines between these two worlds. The first factor is the telecommunication infrastructure's liberalisation, which opens the telecommunication market to alternative infrastructures. The second element concerns the digitalisation technique that will foster the competition between telecommunication and alternative infrastructures since, in a foreseeable future, each infrastructure will be technically able to offer the same range of digital services.

According to Lowette (p. 90), "*the deregulation in Belgium follows the 'normal' European path*" for equipment and satellite communication (1994), for the mobile sector (1995), for the provision of non-restricted services on the cable networks (beginning of 1996) and for the opening of the assets of the national telecom operator. Indeed, as in the other European countries, telecommunication infrastructure and basic services (5) are still under the monopoly of the Belgian telecommunication operator, Belgacom, until January 1998. The regulation of the telecom sector is ensured by the IBPT, *Institut Belge des Postes et Télécommunications*.

Concerning the TV cable network, the infrastructure is currently under a *de facto* monopoly of local agencies (called *intercommunales*) i.e. organisms owned and managed by groups of cities, sometimes with a private partner (*mixed intercommunales*) i.e. Electrabel, the electricity and utility company, sometimes without (*pure intercommunales*). The French-speaking, German-speaking and Flemish communities are fully competent to regulate the diffusion of broadcast services on the TV cable network.

At the level of *services*, new multimedia services raise a particular legal problem linked to the definition of the legal framework to be applied to the supply of these services. Traditionally, in the Belgian law, a distinction is made between broadcast services (6) which are regarded as cultural matters and therefore regulated by the communities, and interpersonal services linked to the telecom infrastructure and thus depending from the federal authority.

In the past, frontiers were clear between radio and television on the one hand and telephone on the other hand. These framework differences were therefore not so important. But nowadays, this situation is less and less coherent since all types of service, through digitalisation, may be supported by many kinds of infrastructure. Similar services may then receive a different legal treatment given the supporting infrastructure or the concerned governing authority.

If we consider multimedia from a *science and technology policy* point of view, the situation is as follows. In the first phase of the Belgian state reform (1980-1985), regions were given decision powers for part of the science policy, more specifically with respect to some aspects of applied research. The second phase of state reform in 1988 regulated the transfer of new powers and means for industrial research to the regions and communities. Communities are responsible for fundamental research while regions are competent for basic industrial research with economic objectives. In addition the field of education became the responsibility of the communities, together with large university funds.

This reform also included new legislative regulations regarding competencies and financing.

Since the national St-Michael's agreement (1993) on federalisation, the primary power for science and technology policy has been fully transferred to the communities and the regions (7). The federal government is now only responsible for a limited, well-defined series of residual domains. The powers of the Flemish and Walloon authorities on the other hand cover the whole spectrum of science and technology, with the main emphasis on applied research projects.

Nevertheless, it should be noted that the European Union also largely funds science policy and initiatives.

As long as the Belgian regulatory framework will remain fuzzy regarding the definition of concepts and the delimitation of competencies, conflicts will subsist on the legal and political levels. Such competencies conflicts will perhaps have a negative effect in the long-range on the Belgian multimedia market despite the rather exceptional cable situation in Belgium (as this could not be extensively exploited). The solution to this problem, according to Willems, Gérard, Pouillet and Queck (1995), is probably a clear division of infrastructure and services regulation aspects and the creation of a unique regulatory institution for each of these elements. However, this technical and rational solution will probably have little chance to succeed given the Belgian political landscape.

2.2. Economic and Technological Background

Introduction

Belgium is quite a rich country. In fact, it has a relatively high GDP/capita ratio compared to the rest of Europe but most of this wealth is made by savings; Belgium has the most important saving rate in Europe (18.7%).

Trade is an important aspect of Belgian economy because of the small interior market and of the integration of Belgium in the Benelux in 1958 and later in the Common Market and the European Union. Exports account for more than 70% of GDP (Dehaene, 1995) and Belgium is the 10th biggest world exporting country for products and the 8th for services (8). The Belgian economy is very open to the rest of the world and not very protectionist.

Table 2: Economic and Technological Indicators

Economic Indicators	
GDP/Capita (US\$) (95)	20 852
GDP annual growth rate	2.1
Unemployment rate (06/95)	9.6
2nd degree scolarisation (%)	88
3rd degree scolarisation (%)	40.2
R&D (% GDP)	1.7
Education Expenses (% GDP)	5.1
Technological Indicators	
Home PC penetration (%)	12.99
Number of households PC with CD-Rom drive (1994)	68,000
Progression rate of PC with CD-Rom drive (94/93)	467%
Telephone density (%)	86.1
Number of terrestrial channels	7
Number of cable/satellite channels	3
Per capita ICT expenditure (ECU) (1994)	809
Number of Internet hosts (07/95)	23 7 06
Internet hosts (per 1000 hab) (07/95)	2.4
Internet hosts progression rate	
07/91-07/92	347%
07/92-07/93	185%
07/93-07/94	178%
07/94-01/95	54.4%
01/95-07/95	26.7%
Number of Internet Providers (1994)	71
Number of Internet users (per 10,000 hab) (94)	102.02

Source: L'Etat du Monde 1997- annuaire économique et géopolitique mondial, Editions La Découverte, Paris - ITU World Telecom Report 95 - KPMG Report for ISPO -OECD report on Information Infrastructure Convergence and Pricing: The Internet, 30-31/01/96 - Statistical Yearbook 1996, European Audiovisual Observatory.

As many other European countries, Belgian economy is mainly based on services (9) while most industrial sectors face an economic recession, especially in the Walloon Region. Economic differences between the northern and the southern parts of the country, strengthened by the present slump and the increasing unemployment rate (officially 9.6%) worsen the long-lasting antagonism between Walloons and Flemish-speaking people. Belgium is more and more a culturally divided society with two main regions, two main languages and two economies.

Belgium is characterised by a huge public debt (10), mostly owned by Belgian citizens, that induces highly restricting economic measures and cuts in public expenses in order to satisfy the Maastricht convergence conditions (11) and enter the Monetary Union. The importance of the interest charges reduces the latitude of the Belgian government in the definition of policy priorities (Dehaene, 1995). Belgian policy is thus mainly directed towards the management of this public deficit, the re-establishment of the firms' competitiveness and the reduction of unemployment and, in some months, towards the reform of Justice because of the dramatic events of Summer 96. However, because of these priorities, there seems to have no long-term policies regarding education, improvement of the public service efficiency, definition of the public service or engagement towards an Information Society.

2.2.1. Telecoms and cable infrastructure

The Belgian *telecom infrastructure* is still under the monopoly of Belgacom. But in November 95, Belgacom's capital was opened to a new entrant, the ADSB consortium formed by Ameritech, Tele Danmark and Singapore Telecom. ADSB's motivation can be explained by the fact that the consortium joins "*forces with a company that is the dominant player in the European Union's capital - a prime location for the European headquarters of international companies and a springboard for possible expansion into neighbouring France and Germany*" (Tucker, 1995). This motivation justifies the over-expected price offered by ADSB to get 50% minus one share of Belgacom in spite of the fact that the state telecom company suffered from poor performances and chaotic management (see table 5).

In fact, Belgium's central position makes this rather tight internal market very attractive for telecommunication operators since many headquarters of private and public companies are located in Brussels. The perspective of telecom general liberalisation in 1998 claimed urgently for a reinforcement of the competitive position of the national operator, particularly on the professional market on which new entrants are already present, as Global One, British Telecom, Unisource, France Telecom, AT&T, MCI, Nynex, Telecom Italia, etc. But the danger for the national TO comes also from new domestic entrants like CATV operators, since the July 96 European directive authorises the commercial exploitation of 'non reserved' services on alternative infrastructures. In that context, Belgacom's privatisation could also be interpreted as a strategy to reinforce the federal position in front of some

regional or community based strategies promoting alternative infrastructures like Telenet that will be explained later in this paper (see 4.2.5.).

Concerning *cable penetration*, Belgium is the world leading country with almost 95% of the Belgian households having a cable connection. According to Lowette (1995), "*this leads to the unique situation that there are more residential users connected to the cable network than to the telephone network*" (p. 91). In other European countries, cable is often owned by the national telecom operator (France Telecom in France, Deutsche Telekom in Germany, KPN in the Netherlands). In Belgium, the situation is quite different and cable is mostly the ownership of *intercommunales*.

This cable infrastructure will probably be used for the future information highways in Belgium. The question is to know if there will be a co-operation with the telecom infrastructure, i.e. between Belgacom and the cable operators, or if the two infrastructures will develop in parallel which is the solution chosen by the consultant, Toon Lowette, because of a possible objection from the European authorities to the first solution of co-operation.

2.2.2. Home and businesses PC penetration

We will see later that Belgium is not an important manufacturing country regarding computers but that the trade for these goods is quite important. Toon Lowette quotes figures from the European Information Technology Observatory concerning PC sales in Belgium. These sales are in constant increase since 1993, for desktop PCs as for portables. Concerning ICT expenditure per capita (ECU), figures are also increasing since 1992 (1992: 709, 1993: 771, 1994: 809) (EITO, 1996). Concerning households PC equipment, the rate is quite low (13%) and it does not make the distinction between multimedia equipment and non multimedia equipment. But figures about the number of household PCs with CD-Rom drive show a significant progression rate concerning this type of equipment (467% between 1993 and 1994) (EAO, 1996). But, as in France, one can globally assess that the equipment rate for multimedia PCs in Belgian households must be around 4 or 5%.

With regards to the equipment rate of the firms, the situation is quite different. A survey made in the Euregion Meuse-Rhin (12) in May 1995 and quoted by Lowette shows that on 250 large companies and SMEs located in this borderline region (half of them are in Belgium), 94% had stand-alone computers, 76% have a Local Area Network, 57%

had mini-computers and 72% had portable computers. A similar survey made by the University of Namur and the Vlerick School of Management (13) in 1995-1996 gives almost the same results. Table 3 summarises most of this last research results for the two parts of Belgium, which present quite the same characteristics.

Table 3: Firms PC Penetration

Equipment Use	Walloon and Brussels SMEs	Flemish SMEs
Terminals	26%	24%
PCs	90%	87%
Bigger systems (mainframe, mini's)	19%	13%
Use of computers hardware	94%	96%
Telecom Infrastructure		
Fax	95%	95%
LAN	42%	48%
DCS (X.25)	11%	11%
Leased lines	7%	7%
ISDN connection	11%	6%
Satellite	2%	1%

Source: Adapted from WALTHÉRY Pierre, LOBET-MARIS Claire, HENROTTE Véronique, DELHAYE Renaud (1996), "Utilisation des systèmes d'échange d'information inter-organisationnels (SIO) par les PME en Belgique francophone", Actes du deuxième colloque international de management des réseaux d'entreprise (CIMRE'96), volume 1, Lausanne, HEC, 23-24 septembre 1996, pp. 19-37 and from Dolfeyn Marleen, Meert Bart (1996), Het gebruik van Telematica in Belgische KMO's, Aanvulling op Tweede Wetenschappelijk Verslag, dvsmu, augustus 1996.

2.2.3. Internet Development

Until the end of 94, Internet was mostly used by the academic world through the academic and research network, Belnet, freely provided by the federal science policy department (Lowette, 1995). Concerning Internet use by firms and by individuals, 1995 seems to have been the 'Internet year' in Belgium and 1996 followed the same pattern. In fact, the number of providers, connections for firms and individuals, conferences on the subject, etc. increased remarkably during these two years (Online News vol. 3, Nr 1).

3. Key Players in Multimedia

3.1. Map of Key Multimedia Players

In general, there are no key leaders actors concerning multimedia development in Belgium, either in the IT supply sector or in the audio-visual or telecommunication sectors. Most international actors are of course present in Belgium but there is no national champion or leader. Except maybe for the banking sector which has always been one of the most innovative sectors in Belgium and one of the most technology advanced banking sectors in Europe.

To summarize, the main multimedia players in Belgium are the following:

- *Telecommunications*: Belgacom, Telenet, CATV operators
- *IT and Telecom Supply Sector*: Alcatel Bell and Alcatel SDT, Telinfo, Siemens
- *Broadcast Media and Audiovisual Sector*: no important actors
- *Off-line and on-line multimedia products*: Orda-B, Cygnus, Hypervision Multimedia Productions, Medialine, IMmedia
- *Banking Sector*: Isabel, BBL, Générale de Banque, Kredietbank, Crédit Communal de Belgique
- *Press, Edition and Publicity*: Financieel-Economische Tijd, Roularta, Persgroep, Concentra, Rossel, Echo, Vers l'Avenir.

The strategies and activities of these actors will be described in detail in the following points.

3.2. Infrastructure Operators

3.2.1. Telecom Operator: Belgacom

At the present time, *Belgacom* is the main telecom operator. Since November 1995, Belgacom is partly owned by the ADSB consortium (Ameritech, Tele Danmark and Singapore Telecom) and some Belgian companies of which two banks (Crédit Communal de Belgique, Krediet Bank) and Sofina, an investment company. In this alliance, the ADSB consortium brings its experience in the field of telecom and multimedia services, specially for the professional markets and electronic commerce.

It is too early to assess the consequences of this alliance concerning Belgacom's performance but the following table shows that, at the present time, Belgacom is far away from the national operators of

the neighbouring countries in the ranking of the world telecom operators (see *table 4*). While Deutsche Telekom is the 3rd, France Télécom the 4th one, BT the 5th and PTT Telecom at the 22nd position, Belgacom is at the 29th ranking place. The difference between these operators is not only in terms of revenue but also in terms of performance (see *table 5*). It took a lot of time for Belgacom to abandon a situation of public enterprise never judged on its performance. Things begin to change, especially since the entrance of ADSB but during all these years, the neighbouring competitors have much more progressed and seem more able to face the 1998 competition. In fact, all of them are present in the Belgian market, already looking at the firms sector.

Table 4: Ranking of some telecom operators (revenue of 1994)

Ranking	Operator and country	Revenue in Mio of US\$	Progression rate 93-94
1	NTT (Japan)	68 852.2	14.5%
2	AT&T (USA)	43 425.0	8.9%
3	Deutsche Telekom (Germ.)	37 712.6	5.7%
4	France Télécom (Fr)	23 288.4	3.8%
5	BT (UK)	21 262.6	3.5%
22	PTT Telecom (NL)	6 970.3	9.6%
24	Telecom PTT (Switz.)	6 767.6	11.6%
29	(Switz.)	3 498.0	9.0%
33	Belgacom (Be)	2 806.2	11.7%
35	Tele Danmark (Dk)	2 613.4	6.5%
36	Telenor (No)	2 517.8	14.0%
	Mercury (UK)		

Source: ITU World Telecom Report 95, p. A-84.

Table 5: Belgacom performance compared to other operators

Indicator	Number of telcos	Weighed average	Belgacom score	Lowest telco	Highest telco	Belgacom ranking
Turnover per line (US\$)						
Local call (\$/min)	18	847	779	400	1807	13
50 km distance call (\$/min)	18	0.04	0.04	0.01	0.06	8
64 KB leased lines to near country (\$/month)	18	0.16	0.06	0.03	0.035	4
Relative communication costs for business firms	18	2 052	1 913	784	3 241	12
Number of lines/100 hab	18	172	161	100	247	9
GSM penetration rate	18	47.5	44.0	34.8	66.5	6
GSM growth rate (01/96)	11	1.76	2.48	0.01	9.12	3
	12	68.5%	83%	43%	130%	2

Source: Adapted from Belgacom annual report 1995

However, in Belgium, Belgacom is one of the most important Belgian firms (8th in terms of turnover, 5th in terms of value added, investment and number of employed people) (Belgacom Annual Report 1995). Since 1995, Belgacom has a multimedia and Infowhighways division as well as a R&D division. Before the creation of this last division, most of the telecom R&D activity was subcontracted to two Belgian firms, Alcatel Bell and ATEA-Siemens. Now Belgacom has its own R&D division which sometimes co-operates with the multimedia division for specific technical multimedia experiments.

The first objectives of the multimedia division were the development of existing products like the videotex, Infogate (the teletext product made in collaboration with some TV channels) and the Internet access. While those products are presented as multimedia products in Belgacom annual report (1995), one can really be doubtful about the real multimedia characteristics of videotex and teletext.

Belgacom has its own experiments, like Tectris (see *part 5*), a technical VOD experiment on the telecom network but the operator also takes part in some local or regional experiments or projects like MANAP in Antwerp (Flemish Region), a 65-km long fibre optic

network (see [part 5](#)) or Périclès, an Internet project in Namur (Walloon Region) (see [part 5](#)).

Concerning Internet, Belgacom participates in two firms: Interpac which provides access to the firms and Skynet which is rather oriented towards the residential market. It has also parts in Event Network, a thematic TV channel and Paratel, the leader of audiotex services (in collaboration with VTM, the Flemish private TV channel and Tijd Electronic Services, a company created by an important Flemish press group).

In conclusion, until now, Belgacom initiated or participated in a few multimedia projects or developments and the strategy still concentrates on traditional activities: telephony, fax, and mobile activities. In a near future, however, it will maybe benefit a lot from the multimedia expertise of its new partners from the ADSB consortium.

3.2.2. Potential Competitors on the Telecom Infrastructure

In a near future, *Telenet* (see [4.2.5.](#)), using the cable infrastructure, will probably be one of the main Belgacom competitor at least in the northern part of the country. Competition could also come from more sectoral initiatives like the *Isabel* network (see [3.5.](#)), mostly on the Internet area and, of course, for all the other telecom operators already present on the Belgian market: British Telecom, Global One (consortium created by France Telecom Network Services, Deutsche Telekom and Sprint), Esprit Telecom, Unisource, Telecom Finland, ... The Belgian market seems thus to be more and more attractive for these companies which consider Belgium as a battlefield for the professional telecom market (big companies) but are not interested by the final users market which is too limited.

3.2.3. CATV Operators

As already explained, Belgium is the world leading country with almost 95% of the Belgian households having a cable connection. There are 38 cable networks and the average Belgian cable television subscriber receives between 30 and 36 channels (Lowette, p. 92).

The cable ownership is quite different in the northern and southern parts of Belgium. In fact in the Flemish part, Electrabel, the electricity and utility company, controls via the *intercommunales* around 60% of the cable. The situation in Wallonia is more scattered since

Electrabel only controls 30% of the cable, the rest being spread between more than 10 sub-regional operators.

This situation has currently been pointed out as one explaining factor of the presence of a cable strategy in the Flemish part of the country (Telenet) and the absence of a similar strategy in Wallonia. Recently, the Walloon CATV operators have decided to merge in a commercial association called ACM (*Association Câble Multimedia*). The status of this new association are still under consideration but the project is clearly to merge and to improve their cable infrastructures in order to shape an interconnected network for business communications and multimedia interactive applications. This merging has two main rationales. The first one is related to the EEC directives regarding the liberalisation of the alternative infrastructure (July 1996) and the full telecommunication competition (January 1998). By this merging act, the CATV operators intend to better negotiate their entrance on the telecommunication market. The second rationale is linked to the 'satellite' threat on the broadcast market. With this merging, the CATV operators hope to be in a better position in order to resist to the satellite penetration.

3.2.4. Other Alternative Infrastructures

Other alternative infrastructures do exist in the North and South of Belgium: the MET infrastructure of the Walloon Ministry of Equipment and Transport, the HERMES network of the national railway company, etc. The geographic coverage of those infrastructures is limited, as it directly follows the main axes of road or rail traffic lines. These proprietary infrastructures are currently used for private communications. With the liberalisation of the alternative infrastructures, some strategies appear to open those infrastructures in order to improve the return on investment. This strategy is very clear in the Walloon region with the WIN project (see [4.3.2./c.](#)).

3.3. IT and Telecom Supply Sector

Concerning IT supply sector, we must say, according to Toon Lowette, that "*Belgium is not a major computer manufacturing country*" (p. 93). Belgium does import more computer hardware and parts than it exports these components. However, the trading activity of computers is very important in Belgium due to its central position in Europe.

Regarding the electronic industry in general, according to a 1994 study on this sector in the Walloon region conducted by Fabrimetal, this industry represents almost 100 firms, a turnover of 37 billions BEF and 6700 jobs. Still according to this study, the telecom sector, which is considered as being part of the electronic industry, represents 19% of the value added of the Walloon electronic sector and 21% of its turnover. It is likely that these figures change a little bit in 3 years, especially concerning the employment but they give an overall idea of the importance of the sector in the Walloon Region.

For the rest of the telecom industry sector, it has always been an important part of the Belgian activity, mainly for the exports (69% of the production is exported (Lowette, p. 94)). The principal Belgian firms, Bell Telephone, ATEA, ACEC have been progressively bought by foreign groups like Siemens (ATEA-Siemens) or Alcatel (Alcatel Bell).

The main actors of the IT and telecom supply sector are thus the following:

The French Alcatel is present in Belgium through two subsidiaries. *Alcatel Bell*, formed by the former Bell Telephone and Alcatel, based in Flanders and Alcatel SDT based in the Walloon Region. Alcatel Bell benefit from a large part of the public R&D funds. It is mainly providing technology and hardware and has instituted a multimedia award to innovating applications on multimedia networks. The criteria for this awards are originality, feasibility, interactivity and social relevance (14). *Alcatel Bell SDT* is developing the same kind of products. However, Alcatel Bell as well as Alcatel Bell SDT have only few concrete initiatives on the field of multimedia applications in Belgium. Their activities are mainly orientated towards telecom infrastructure, basic services, security systems, etc. Since the beginning of January 1997, Alcatel Bell and Alcatel SDT have merged with ETCA and create a new company, Alcatel ETCA.

Telinfo is a Belgian group focused on tele- and datacommunications. It operates the second mobile network through one of its subsidiaries, Telindus, and in collaboration with France Telecom and a group of Belgian investors. The Telinfo group represents 963 employees and in 1995 the turnover was BEF 6.05 billions (ECU 128.723 millions). Telindus produces mainly network technology and software, data communication and mobile communication and is the largest internetworking company in the Benelux (15).

The German *Siemens* is also present in the IT and telecom supply sector through different companies:

- Siemens s.a. (16) producing telecom components, energy systems, etc.

- Siemens Nixdorf Information Systems (17) producing computers, operating and applications software, etc.
- Siemens Nixdorf Software specialised in R&D in operating and applications software, mostly for some sectors like administrations, health or banks.
- Siemens Atea (ATEA-Siemens) (18), a large telephone equipment manufacturer which produces systems and products for telecom networks.

The Flemish company *Leernhout&Hauspie* is market leader in language and speech technology. Microsoft recently became an important shareholder in this Flemish company, possibly in order to implement its know-how in Windows next edition.

Concerning the rest of the sector, there are few other firms like *Gillam* in the Walloon Region specialised in telecom systems, *Spacebel Informatique* specialised in telecontrol and in the development of systems for the health sector, *Stesud* on the field of telecom consultants and EDI systems, *Codenet* from the Tractebel group specialised in Virtual Private Networks, etc. But, in general, all these firms do not have specific multimedia activities and the sector in general suffers from a lack of innovative and leader firms in that field.

3.4. Broadcast Media and Audiovisual Sector

The audiovisual and broadcast sector in Belgium is not a really important actor in the field of multimedia products. Most of the TV channels have interactive teletext systems, some have audiotex and videotex (VTM, a commercial TV channel) but there seems to be no specific strategy for these companies in terms of multimedia development.

Due to the fact that most Belgian households look at foreign TV programs (mainly French origin for the French-speaking part and Dutch and Anglo-Saxon origin for the Flemish part of the country), Belgium is influenced by the strategies of these foreign actors and by their multimedia conception.

But concerning the rather tiny Belgian market, the development of multimedia products does not seem to be very profitable and the solution will probably be, as for movies producing, the co-financing with French or Dutch TV channels.

While the French-speaking part of the country will probably only be interested by French-speaking products, it could be different with Flanders as Flemish people are more used to the English language. For

example, most of the English TV programmes presented on Flemish TV channels are in original version with subtitles while this is a very rare occurrence for the French-speaking channels.

3.5. Off-line and On-line Multimedia Products

In the field of on-line and off-line multimedia products, *Philips Interactive Media Centre* (PIMC), established in 1988 in Hasselt (Flemish region), produces CD-I and CD-Rom and adapts programmes to various European languages. It also co-operates with various institutions and companies for the development of software and content (EDM, Hypervision, etc.).

Orda-B, established in 1971, is a computer service bureau for the Benelux and one of the first companies to distribute CD-Rom products mainly for the business sector (CD-Rom on application development, software distribution, compression services, consultancy). It also works in the fields of document processing, telematics and speech technology. *Cygnus* is an example of a new small company for development of CD-Rom and software. It produced the CD-Rom "Brugge Revisited" in Dutch (English is planned), which is distributed by BMG Interactive. *Hypervision Multimedia Productions* is a spin-off from the *Katholieke Universiteit Leuven* (KUL). Its main activities are multimedia applications development, software distribution, mainly for CD-Rom platforms, CD-I and Internet.

There are also newcomers in the field of multimedia applications in the Walloon Region as *Medialine* specialised in authoring systems, *Immedia* in off-line animation product or *Neurones Cartoon* in on-line animation services, etc. Those firms are true multimedia producers but due to the scarcity of venture capital in Belgium, most of these small companies have tremendous problems to carry on their business. Even if some venture capital organisations do exist in Belgium as *Technicom* in the Walloon Region, a merger of the Regional Society of Investment (SRIW), the tradition of venture capital is not yet well prepared to support these new types of very small and risky entrepreneurship.

3.6. Banking sector

The Belgian banking sector is the most important telecom application sector in Belgium (Lowette, p. 96). In the beginning of the 70's, the banks were already electronically connected to the National Bank and

the Clearing institute. Then, a common format for all bank accounts was decided for productivity gains. Since many years, these banks have been very active in the field of electronic and interactive services for corporate banking, home banking on PCs and phone banking (Lowette, p. 105). Some figures provided by Toon Lowette (p. 105) proved this situation:

- Up to 70% of all transactions orders and money transfers at the 7 largest Belgian banks come from on-line connection with the clients;
- Over 72 000 companies have modem links with their banks;
- Some 50 000 private individuals connect to their bank with their PCs;
- Almost 1.1 million Belgians (more than 10% of the population) use audiotex phone banking from their home.

Moreover, Belgian people use debit and credit cards, automated teller machines and outdoor point of sales payment terminals. Since 1995, they may also use Proton, "the first generic cash card for small payments in shops, telephone boots", ... (Lowette, p. 106).

There are three other major initiatives from this sector, constantly seeking for innovations in electronic banking services.

The first one is *Infotrade*, an on-line "producer of electronic information database services and distributor of a number of foreign on-line information services" (Lowette, p.106), provided by three banks, BBL (*Banque Bruxelles Lambert*), *Générale de Banque* and *Kredietbank*.

The second one, who will maybe change the Belgian Internet world in a near future (Online News, vol. 3, Nr 1), is *Isabel* (Interbank Standards Association BELgium). Isabel is a network, mainly oriented towards banking activities, initiated by the same Infotrade partners (BBL, Générale de Banque, Kredietbank) but which gathers today almost 30 banking institutions. Isabel aims at providing a unique access point to services provided by different banks. Before Isabel, most firms had to use several monobanking access software for their electronic transactions to different banks. With Isabel, there is a unique network, with a unique software, a unique electronic signature. Isabel also provides financial, legal and commercial information, Internet access and e-mail possibilities (van Campenhout, 1996). At the beginning, Isabel will mainly be used for transactions between firms and their banks. The future objective is that banks use this network for connection and commercial transactions (EDI for example) with other firms. In the longer term, Isabel could also be opened to the residential market.

The third initiative is *Publilink* of the *Crédit Communal de*

Belgique (CCB). This bank is the monopolistic organism for local authorities treasures. Since 1994, CCB has developed the Publilink network based on Belgacom's leased lines. This network offers to local authorities basic transactional services to regulate their financial transactions with CCB but also e-mail services. At the very beginning, this network was only shaped for financial services. It is now clear that Publilink tries to extend its position in the field of public administration offering gateways to some large public databases as the Social Security systems and to Internet.

To summarise, the most important actors in the banking sector are BBL, the *Générale de Banque*, Kredietbank and CCB, the two last ones being now shareholders in Belgacom capital.

3.7. Press and Edition

Most of the Belgian press editors have developed multimedia products or activities, at the beginning mainly in Flanders. Apart from the presence of all these actors on the Web, mostly since 1996, some of them have created Central Station, then Belgium Online.

The aim of *Central Station* was the electronic diffusion of press information, a kind of press review mainly for firms. But due to copyright problems with the French-speaking journalists, which seem to be an obstacle for most multimedia projects in the Belgian edition field, the project was abandoned some months ago despite the fact that it was much supported by the editors who see in Central Station a potential for new revenues (subscriptions and publicity). It has been since retaken by Tijd Electronic Services, the subsidiary of a Flemish edition group.

Belgium Online was an initiative of 6 Belgian editors (Financieel-Economische Tijd, Roularta, Persgroep, Concentra, Rossel and Echo) which represent almost all the sector with the major newspapers and magazines (*Knack*, *Le Vif/L'Express*, *Trends-Tendances*, *Het Laatste Nieuws*, *De Nieuwe Gazet*, *De Morgen*, *Het Belang van Limburg*, *Le Soir*, ...). They were joined by 3 IT firms: Codenet (from the Tractebel Group) for the Frame Relay technology, Cimad (system integrator, subsidiary of IBM) and Telindus. Belgium Online was mainly an Internet access and service provider and has specific agreements with IBM Global Network for world-wide connections. Belgium Online, launched in October 96, aimed at providing 'local information for local people' (in French, Dutch or English) but mostly value added information and services for the economic world and secure commercial transactions with Digipass, a payment system agreed by most Belgian

banks (L'Echo, 10/10/96). It tried to make contact with Isabel, the network of the banking sector (see 3.5.) but it failed for different reasons. However, other contacts with Mobistar, the second mobile network (operated by Telindus, partner of Belgium Online), *La Poste* (the national post monopoly service), Reuter press Agency and other banks were more successful. But the project seems to have problems in taking up, which led to its merger with Internet Access Provider United Callers.

To summarise, the most important actors in the press and edition sector are the following:

- *Concentra* (*Het Belang van Limburg*) which has a 'New Media' division doing several experiments and projects concerning new (multi)media:
 - *Kanaal 27* (see part 5) which combines linear teletext and interactive videotex;
 - *Limburg On Line* (19), a digital platform for all Limburg information suppliers on Internet, in co-operation with Belgium Online;
 - *Telekrant*, a cable paper for the regional distribution of information via text, images and photographs;
 - the Munt-project, the development of a multimedia database (since mid 1995), financed by the federal office of science, technology and culture;
 - a multimedia logotype database, i.e. a database for the digital storage of company logos, especially used in the graphical sector (ads, papers etc.);
 - *Digital Regio Limburg* (see part 5);
 - narrow casting within the medical care sector, i.e. cable paper via television in hospitals, which informs patients and visitors on hospital news.
- The group *Vers l'Avenir* (*Vers l'Avenir*, *L'Avenir du Luxembourg*), one of the most important press groups in the Walloon Region, based in Namur, which has also created a new division, called *Les Nouveaux Médias de l'Avenir*. This division develops Internet sites and initiates projects like Cybertec (see part 5) for the development of Internet and multimedia services in the Walloon Region or participates in the *Périclès* project in Namur (see also part 5).
- *De Tijd* (*Financieel-Economische Tijd*) which created a new division for on-line services, Tijd Electronic Services, provides Internet services and CD-Rom and has restarted the *Central*

Internet services and CD-Rom and has restarted the *Central Station* project;

- *Roularta Media Group* (*Knack*, *Le Vif/L'Express*, *Trends-Tendances*) which mainly produces CD-Rom;
- *Rossel (Le Soir)* which also produces CD-Rom and has projects of on-line press services.

4. Public Initiatives

4.1. Public Sector: the Federal Level

As quoted before, the Belgian federal authority remains fully competent for telecommunication infrastructure and services. Despite its competency, the federal authority has been relatively absent in the field of Information Highways. Many reasons explain this absence of strategy, amongst them the dominance in the federal agenda of the public debt problem and the search for solutions for reducing this debt; and of the important unemployment rate. As a consequence, at the Belgian federal level, the Bangemann report did not give rise to important debates and projects.

However recently, the federal government, more particularly the minister of telecommunication Elio Di Rupo, took an initiative to stimulate the development of the "information society" in Belgium. At the Minister Council on 30th May 1997 all kind of measures were announced with regards the "information highways" in Belgium. More over the minister plans to organise a "Roundtable of the information society" which will be spread over 5 sessions in 5 Belgian cities: Antwerp, Bruges, Gent, Liège and Mons (Villars, 1997, p. 50). The main topics will be

- The information society and the suppliers of tools, services and networks
- New Organization forms with regards companies and work
- The information society and the consumers
- The information society, culture and education
- The informatin society an democracy

At the end, a closing session will be held in Brussels.

4.1.1. Market and Infrastructure Regulation

Concerning effective initiatives, as it seems that one of the real purposes of the Bangemann report was to claim for an accelerated agenda in the liberalisation of telecommunication infrastructures, the major initiative of the federal level concerns the privatisation process of Belgacom. This process was carried out rapidly according to a very swift agenda. Launched at mid 94, the process was brought to a successful conclusion in December 1995 through the selling of 49,9% of Belgacom's capital to ADSB.

4.1.2. Protection of the Public Service: the Belgian Conception of the Universal Service

Another federal initiative, in opposition to most of its European partners, is the adoption of a particular position on the field of *universal service*. Indeed, the federal Belgian government was the first European member state to vote a special law concerning universal service provision. In the *loi-programme* of December 20th 1995, the federal government considered specific mechanisms to fund universal service, based on an obligatory contribution of telecom operators and service providers. In this *loi-programme*, the Belgian federal government has adopted an evolutive and extended concept of universal service, not restricted to the non profitable segments of telephone, fax and file transfer markets as stated by the European Commission. The Belgian law aims at extending the coverage of universal service to all telecommunication services of public interests for schools, administrations, disabled people, elderly, etc. (Lauwers, 1996). This quite innovative position has isolated Belgium on the European scene, the European Union promoting a very liberal and restricted concept of universal service (Dermine, 1996).

4.1.3. Lack of Public Investment

In its very market-driven approach, the Bangemann report stresses on the leverage effect that the public sector, being by nature a critical mass of potential users, could have on the market of Information Highways. This pure market consideration is of course more positively presented in the Bangemann report, focusing on "*more efficient, transparent and responsive public services, closer to the citizens and at lower costs*"

(Bangemann, 1994, p. 5). Apart from all the remarks that could be made on this statement of the Bangemann report (to our knowledge, a technology has never transformed, by itself, a rigid bureaucracy into a flexible adhocracy!), one must recognise that in Belgium, the public sector does not play a leading role in Information Highways and in Information Technology in general. The main explanation for this weak investment is the dramatic public debt of Belgium which prevents public authorities from realising major investments in new technologies and services. The current time is more devoted to a large agenda of rationalisation and privatisation of public bodies than to public administrations modernisation.

Two exceptions to this lack of public investment need however to be stressed. The first one is the funding of Belnet, the academic and research network, free of charge for universities thanks to the annual funding of BEF 100 millions (ECU 2.13 millions) from the federal office for science, technology and culture (OSTC). Belnet also participates in the TEN-34 initiative (TransEuropean Network interconnect at 134 Mbps, a new digital broadband backbone. The other exception is the Bistel network i.e. the set-up of a data-base server with administrative and news information necessary for decision-making.

4.1.4. Support to R&D

Despite the fact that most competencies in the field of R&D, especially in the IT and telecom sectors, have been transferred to the regions, the federal level stays competent for fundamental research and in some exceptional cases for applied research in domains of national interest. Considering Information Highways as a domain of national interest, the federal science policy department (OSTC) launched in 1994 a scientific programme for telecommunications diffusion.

The objective of this federal research programme was the "*stimulation of telematics technologies use*" (Prime Minister's Service, 1996a, p. 2) into specific users, i.e. users that are usually not considered as target public by the commercial applications that's to say the non profit sector, the SMEs and the liberal professions. The OSTC more specifically supports projects including federal administrations or federal scientific and cultural institutions. This programme has three specific axes: the development of targeted pilot applications, the constitution of an interdisciplinary expertise basis and a forum for telecom use.

This programme mirrors the main European R&D initiatives of the 4th framework European programme. It is built on the same technological options pushing the ISDN technology and the ATM protocols. It focuses on the development of demonstration platforms specially in domains of public and non-profit interest, following the same orientations than the European Telematics programme. But one of the major differences with the European orientations concerns the emphasis on socio-economic research through the second axis of the programme: 'Constitution of an interdisciplinary expertise basis'. The objective of this second axis is the set-up of a "*coherent and multidisciplinary scientific expertise basis in Belgium on all the factors conditioning the diffusion of telematics applications into specific users*" (Prime Minister Service, 1996b, p. 1).

This positively shows the willingness to address specific social, economic, legal and cultural issues regarding the shaping of the so-called Information Society. It is worth underlining the dominance of legal issues in this programme. This dominance is not proper to this specific programme but concerns more widely the Belgian public debate on Information Highways. To some extent, this debate appears entirely captured by legal and technical engineering issues while fundamental debates on social aspects for example are pushed out of the limelight.

Concerning the demonstration platforms supported by this programme, they 'demonstrate' clearly the lack of imagination in the field of Information Highways applications. Most of them concern rather classical process innovations based on the experimentation of network solutions for administrative or associative organisations. Again, this is not proper to this specific programme. The same statement can be established for the EU Telematics Programme.

4.2. Public Sector: the Flemish Level

4.2.1. DIRV (1985-1992)

The first steps towards some kind of long-term technology policy were taken between 1985 and 1992 by the first official Flemish Governments headed by a Christian-Democrat minister. They set up the action programme *Derde Industriële Revolutie in Vlaanderen* (DIRV) aimed at helping Flanders participate in the Third Industrial Revolution by stimulating the development of innovative technologies. The spin-off was the annual fair (Flanders Technology) that was meant to bring together all the Flemish organisations and captains of industry in new

technologies. This was expected to give a major impulse to the research, development and diffusion of science and innovations, including multimedia.

4.2.2. Vlaanderen-Europa 2002 (1992)

Major initiatives in the field of multimedia were taken only by the last two Flemish Governments headed by the Christian-Democrat prime minister Van den Brande. A few months after the first Van den Brande Government took office in 1992, the project *Vlaanderen-Europa 2002* was launched. The objective of this comprehensive plan was to develop some kind of long-term vision for public policy that would exceed more than one period of office (20).

The project is built on a scheme of seven 'tracks' (21). It is mainly used as a general framework for policy initiatives on different fronts. This was also the case for multimedia initiatives, as we shall see later on. Real Flemish government activities in the field of the multimedia were only possible, however, after authority for science and technology was transferred to the regions in 1993.

4.2.3. Technologiënnota Vlaanderen 2002 (1994)

The first real policy document, initiated mainly by prime minister Van den Brande, was the *Technologiënnota Vlaanderen 2002* presented on 25th April 1994. The objective of this document is to provide a well-founded justification and motivation for the allocation of funds, that belong to the *Fonds voor Industrieel Onderzoek Vlaanderen* (FOIV). This document was based on a certain paragraph in the *Vlaanderen-Europa 2002* document (Van den Brande, 1994c, p. 2), more specifically the part of *Een Werkend Vlaanderen* ('A Working Flanders') where information technology (IT) is presented as one of the four elements, together with biotechnology, environment and new materials, spearheading the technology policy.

The importance of IT was reproduced in the *Technologiënnota Vlaanderen 2002* where it is described as one of the three pillars (IT, biotechnology and new materials) for which specific action was planned. This action consists of a programme for multimedia applications defined within the 'tracks' of the *Vlaanderen-Europa 2002* project.

In order to set up the Flemish action programme for IT several studies were undertaken. These analyses should provide insight into Flanders' potential with regards to IT. The research and development activities of IT-companies settled in Flanders were examined on quantitative and on qualitative level by the *Vlaams Instituut voor de bevordering van het Wetenschappelijk-Technologisch onderzoek in de industrie* (IWT) together with some parameters of business economics. Other studies were conducted on IT-patent applications and on existent bibliography presenting the scientific output in the field of IT.

One of the most important conclusions of these studies is that in the near future any real innovation in the sector of telecommunications and consumer electronics can be expected mainly from multimedia applications. The basic technologies on which multimedia and telecommunication are built are for the most part micro-electronics, digital signal processing, software, data transmission and communication. Precisely these basic technologies are regarded as the main field of expertise of Flemish research institutes. Thus IT and more specifically multimedia are recognised as one of the most advanced technologies that will shape the future of Flemish prosperity and welfare (Van den Brande, 1996b, pp. 7-8).

An action programme was then suggested that should include the support of multimedia applications. For this a working group was set up to define three relevant and comprehensive multimedia applications that would fit in with the seven 'tracks' (see above). A budget of BEF 1,200 million (ECU 25.5 millions) would be granted at most for all three applications for a period of three years (Van den Brande, 1994c, pp. 55-59).

4.2.4. Actieprogramma Informatietechnologie (1994)

The *Technologiënnota Vlaanderen 2002* and its preliminary studies formed the basis for the *Actieprogramma Informatietechnologie*. This programme, also largely initiated by prime minister Van den Brande, was approved by the Flemish Government at the end of 1994. The primary objective of this programme is to stimulate R&D in IT, in such a way that Flanders could achieve a competitive position in a number of multimedia applications (Van den Brande, 1994c, p. 52). The programme is therefore mainly focused on the development of multimedia, more specifically on the basic and system technology for multimedia applications and telecommunications. The technological framework for the programme corresponds to a priority 'activity map'

centred round 5 multimedia application fields (programmes-on-demand, teleworking, edutainment, mobile communication and multimedia process control). This programme must also pay special attention to underlying borderline technologies to allow for the next generation of two-way broadband communication via cable networks (IWT, 1996, p. 9). The latter was probably included with the Telenet Vlaanderen initiative in mind, as "*accordance with Telenet Vlaanderen*" is also one of the selection criteria for project approval (IWT, 1995, p. 15). As a result the IWT was entrusted with the task of organising a call for tenders, which led to approval of 28 projects for a total budget of BEF 1,052 million (ECU 22.4 millions). At the beginning of 1996 this funding was ratified by the Flemish Government (Van den Brande, 1996b, p. 29). It should be noted that all approved projects are purely technology-oriented, and that there is no clear distinction between fundamental or applied market-oriented research. The action programme also provides for the establishment of an IT-centre for the advancement of technology diffusion, with a budget of BEF 50 millions (ECU 1.06 million) for a 3-year period. The centre aims at better transfer of IT research results to Flemish companies, in particular to SMEs (IWT, 1995, pp. 33-35).

4.2.5. Telenet (Vlaanderen) (1995-1996)

Not long after the Van den Brande government took office in 1992, it became clear that "*to build the Flemish Information Society*", it would have to take advantage of the high rate of cable TV penetration in Flanders (90%). A cable initiative was justified, first because its supervising authority was regional. Secondly, the Flemish Government realised that current cable TV infrastructure was only used for the transmission of TV signals. Finally, it was stated that the multimedia sector was not able to develop unless it could have a less expensive and more efficient network (Van den Brande, 1996, p. 18).

Following these conclusions, different studies were conducted mostly by the *Gewestelijke Investeringsmaatschappij Vlaanderen* (GIMV), the Flemish Investment Company, and a study syndicate was formed. One of its conclusions was the creation of a consortium called Telenet Vlaanderen: to set up an interactive broadband network based on existing cable TV networks and alternative infrastructures.

The Telenet Vlaanderen consortium (endly established in May 1996 as "Telenet") then carried out a viability study and elaborate a business plan for the project.

Telenet general idea was to connect all Flemish cable company networks with each other so that one broadband interactive network could be created that would enable various kinds of broadcasting, telecommunication and multimedia services to be provided. This interconnection had already been approved by an earlier legislative modification (22). So work has started on connecting these cable companies through a fibre optic backbone (Hart & Blyaert, 1995, p. 4) of approximately 600 km and upgrading local networks with two-way amplifiers. Spring 1997 was set as a provisional deadline for this phase. The budget for the whole plan was BEF 50 billions (ECU 1.06 billion) over a period of 15 years. Government contribution would be limited to a BEF 118 millions (ECU 2.5 millions) loan for GIMV preliminary studies (Van den Brande, 1996b, p. 19).

Along with GIMV, the main partners in Telenet are the *intercommunales* that own the cable TV networks in their respective regions. It was no easy task to harmonise these different organisations, all of which had different make-ups and goals (KB, 1995, pp. 5-6). The other partner was the American phone company US West that was brought in for its expertise in converging networks. Finally, various financial companies belong to the shareholders of Telenet.

The non technical ambition of Telenet is to provide a whole range of interactive services via cable TV to residential and business customers (Hart & Blyaert, 1995, p. 4). To make the initiative profitable management in the first phase will rely mainly on telephone services (POTS). These should be available as from January 1998 with the European liberalization in telecommunication. With regards MM, predictions based on extensive market research show that by the year 2010, 26% of Telenet's revenues will come from interactive MM services, 64% from plain old telephone services, 9% from new telecom services (Telenet, 1996, p. 3).

However even before offering telephone services, Telenet has already started to give Internet access via coaxial TV cable. At the end of August the company announced its 21 first clients for its commercial Internet suite which is called "Pandora" (<http://www.pandora.be>). Before the end of this year some 60,000 families should be connected to Telenet. Each year this figure is expected to increase by some 500,000 to 600,000 until the whole of Flanders will be reached in 2002 (Vangoethem, 1997, p. 74).

4.2.6. Medialab (1994-1995)

In 1994, the study syndicate 'New services on cable and/or telephone networks' advised the Flemish Government to set up some kind of publicly-sponsored multidisciplinary research body. Three main objectives were formulated concerning this research centre called *Medialab* (Studiesyndicaat, 1994, p. 57):

- Commissioning tasks for implementing telematics projects. In this system, the government co-operate with Medialab, as one of its clients;
- Setting up demonstration projects in co-operation with the private sector, with a focus on SMEs;
- Carrying out policy-supporting studies.

The argument being that the non-technological aspects of multimedia initiatives are crucial in enhancing the chances of multimedia technologies, the creation of Medialab was approved by the Flemish Government on 26 October 1994 (IWT, 1996, p. 9). In April 1995 Medialab was launched with an initial budget of BEF 100 million (ECU 2.13 million) over a period of three years. As far as the government was concerned, Medialab was to set up an expertise network in mainly four priority areas: teleworking, telebusiness, multimedia education and information acquisition and diffusion. Legal, organisational, institutional, educational and commercial aspects were to be examined by groups that already had the expertise. At the end of 1995 a call for tenders resulted in the approval of 13 projects.

4.2.7. Other Initiatives from the Flemish Government

Finally, and with regards to the Flemish government, the various initiatives listed in *Multimedia in Vlaanderen* can be discussed briefly (Van den Brande, 1996b, pp. 18-40).

First two separate projects are handled: *Telenet Vlaanderen* and *Internet*. The former has already received plenty of attention in earlier sections. The latter deals with the importance of Internet within the Flemish context. It is seen as a starting point for further multimedia evolution. As the number of accounts is still growing, this could be an important application within the Telenet concept. But one of the bottlenecks in this picture is the fact that given the overload of information, individual offer by Flemish companies could be untraceable for national and international users. Consequently, some kind of co-ordinating platform should be established (Flanders Online),

which would enhance salience and facilitate localisation. This would also create a fixed address for people looking for information about Flanders on the Internet. The government plan for Internet is aimed at four organisations or sectors: libraries, social sector, government and education. With regards the latter the Flemish Government has recently taken several large-scale initiatives to introduce Internet within primary, secondary and higher education.

One chapter in the multimedia document is entitled 'Towards a coherent multimedia policy'. The government wishes to go beyond the project-like aspect of multimedia and launch initiatives at a structural level with a view to establishing a solid sector as part of the Flemish economy. What is needed then is simultaneous development of infrastructure and content.

On the services and software side, five initiatives are discussed. First, Medialab as the knowledge centre (see above). Second, the creation of a multimedia fund given the current lack of venture and seed capital for multimedia applications. This kind of fund is not regarded as a luxury given the rather limited market in Flanders (as a result of its minority language). Moreover, it is recognised in the document that new applications quite often take a long time before they become profitable. Hence the idea of a multimedia fund, which could help finance the capital-intensive phase between R&D and the final market introduction of a new multimedia service. A special fund of at least BEF 100 million (ECU 2.13 million) a year will be therefore created within GIMV. In combination with private capital, it will be used:

- for market guidance of selected products from existing multimedia companies in Flanders;
- to attract foreign companies that wish to deploy activities in Flanders;
- to establish new multimedia companies in Flanders.

Until now, there have been no concrete steps and no funds have been allocated yet on this matter.

A third initiative, on the services level, is the funding of demonstration projects that could lower the threshold of ICT and multimedia applications (see above). A budget of BEF 50 million (ECU 1.06 million) has been earmarked within the budget of Van den Brande as minister for science and technology, to cover those operations. The money will be used to inform the general public about the opportunities and problems of broadband multimedia applications. The purpose also is to overcome a number of technical, legal and social bottlenecks. The first evaluation report will be published in 1997. To set the example, the Flemish Government has set up its own Web-site and wishes to use it to

improve government-citizens relations. This is seen as a fourth initiative.

Finally, the *Expertisecentrum Digitale Media* (EDM), a special technical research institute in multimedia and software at the *Limburgs Universitair Centrum* (LUC, Limburg University Centre), is sponsored by the Flemish Region. In addition to the EU subsidy (BEF 107 million - ECU 2.28 million), a Flemish investment of BEF 92 million (ECU 1.96 million) in this institute has been made to promote fundamental research as well as applied R&D with respect to multimedia technology and services.

Besides the chapter on a 'coherent multimedia policy' two other initiatives are mentioned. First the government wishes to stimulate the combination of multimedia and permanent training. This is important for three reasons. The universal accessibility of new technologies and multimedia should be ensured by offering education in the use of multimedia. Secondly, communication between the people who organise training and the target group is not always well organised. More (multimedia) channels of information should therefore be built to improve this relationship. A training programme can be presented, e.g. via a multimedia demonstration. A third angle would be to use multimedia for better and more efficient training. As a consequence multimedia and new technologies are also mentioned in a policy document on permanent training within the scope of strategic innovation policy (Van den Brande, 1996a, p. 3). The document includes a call for tender on education and training projects for the 1997-1999 period, which can feature aspects of multimedia. Moreover, in the section concerning supporting actions, one paragraph deals with "the support for use of new technologies and media for training" (Van den Brande, 1996a, pp. 3-7). However, no budget for these actions is proposed.

Finally, the 'cluster policy' is also mentioned as an overall strategy. The document *Clusterbeleid* states that co-operation between different (competitive) partners (companies, collective research centres, universities etc.) in one or more similar fields should be promoted to create a critical mass (Van den Brande, 1994a, pp. 2-3). In the multimedia policy document such certified networks are regarded as very suitable when dealing with multimedia services. The multimedia development requires always a level exceeding approach. The submitted proposals that will be approved can count on extra support and guidance. Two initiatives are mentioned. 'Flanders Language Valley' aims at setting up a high-technological industrial estate around the company Lernout & Hauspie, the market leader in language and speech

technology. A second project is called DSP Valley (Digital Signal Processing), which should stimulate DSP activities in Flanders.

4.2.8. Initiatives from the Flemish Parliament

As far as we know, only two main initiatives by the Flemish Parliament are worth mentioning (23). It was the Flemish Government who provoked the first parliamentary initiative at the end of 1995. It was successfully proposed that the public *intercommunales*, controlling most of the cable networks, would be able to participate in private companies. This was necessary for the establishment of Telenet Vlaanderen. The fact that the government tried to secure approval for decisions of this kind under cover of budget discussions was firmly criticised by some representatives. They argued that fundamental measures concerning information highways should be preceded by a wider-ranging and more detailed debate in Parliament. The government accepted the argument. As a result a draft decree was submitted that would allow *intercommunales* to participate in private companies (24).

About the same time, the second initiative was taken in the form of a draft resolution (25) concerning the need for parliamentary debate on the subject of the economic, social, cultural and societal consequences of the information highways (26).

It was then decided to link this Draft Resolution with the Draft Decree mentioned earlier. However, the committees that would discuss the proposals agreed to first organise several hearings with the parties concerned and the experts before coming to a final conclusion and voting. These hearings took place in November 1995. As a result, the basic debate would be more firmly founded.

The combination of these two initiatives apparently induced a change of mind concerning developments of information and communication technologies. The government also realised that it should increase the involvement of parliament in these important issues. To prepare further discussion with concerning the Flemish Information Society, the government prepared its own document on multimedia (Van den Brande, 1996b, p. 3). The discussion and related hearings are currently focused on the issue of 'universal service', which should lead to a Resolution at the beginning of 1997. Other issues should be discussed in the near future. One of them is a proposal by Agalev, the green party, to establish some kind of institute for Technology Assessment closely related to multimedia issues. However, no final decision has been arrested yet.

4.2.9. Analysis of these Policies

When analysing the statements in various official documents and publications, it becomes clear that since 1993 - when decision-taking with regards science and technology were regionalised - there has been a constant search for a well-balanced Flemish IT and multimedia policy. An important goal seems to be the integration of fundamental research and applied industrial research with a more immediate economic objective.

On the level of the political discourse, it is interesting to see how the multimedia subject has evolved from an item within official publications (e.g. Van den Brande, 1994c) to a formal and independent policy document (Van den Brande, 1996). It can be said therefore that in only 3 years multimedia has become a major item on the Flemish political agenda.

Moreover, the analysis of policy factors in Flemish-speaking Belgium showed that public sector promoters and their related organisations play a major role in shaping multimedia development and strategies for the appropriation. It is quite clear that without the political will 'to do something' in this field, the Flemish community would still be lagging behind. In particular the Flemish Government is very much aware of its role in stimulating the supply and adoption of new information and communication technologies. But the question is not so much whether there is support, but how it is implemented and how this support fits into a broader vision.

An appropriate strategy would start with organising a thorough and multidisciplinary debate and consultation about Flemish Information Highways between all the relevant actors including the political authorities, companies, (potential) users etc. Talks should include discussing the services and applications that should be offered and what the implications might and would be for policy. This corresponds to the motto 'going from vision to action' in stead of vice versa. Ever since the Belgian Regions first had decision-taking powers for science and technology in 1993, Flemish political actors have tried to consolidate existing know-how and expertise. As a result, sectors or companies that are doing well and have high potential success rates get most support for their technology and services. This occasionally leads to a lack of venture capital, which requires a clear vision and daring decisions and which will perhaps only be profitable in the long term. At their congress in October 1996 the Flemish employer's alliance *Vlaams Economisch Verbond* (VEV) arrived at the same conclusion with regards to Flemish companies. An enquiry showed that entrepreneurs talk a lot

about innovation, but that little is done in reality. Only 1.5% of Flemish general managers see attracting venture capital as an important priority. For this reason the action *Innovative Undertaking* was started by VEV, as a kind of successor for the *Derde Industriële Revolutie in Vlaanderen* (DIRV) (Despiegelaere, 1996, p. 39). The Flemish authorities have also taken an important initiative by establishing a multimedia fund. However, eight months later the fund has still not been activated.

It cannot be denied that the policy of the Flemish Government has changed during the course of the last six years, from a collection of all kinds of separate initiatives to a more integrated approach. However, only few initiatives take into account patterns of specific multimedia use and social learning. Multimedia development is usually seen from a technological viewpoint. Only recently has the government realised that societal and user aspects need to be incorporated in the development of applications. This should occur via Medialab. This programme was assigned to explore extra-technological aspects of multimedia applications and services, which should lead to a sort of permanent knowledge and expertise centre. The preparatory working groups advised the government to define the task of Medialab in a very broad sense, covering many areas and aspects of society. In the final project description and in the approved tenders this scope was rather limited.

4.3. Public Sector: the French-Speaking Level

By comparison with the North part of the country, the South suffers from a clear division of competencies between cultural matters and economic ones.

This explains partly the fact that there was no clear and unique policy response to the Information Highways European call but a scattering of multiple and redundant initiatives. The second factor explaining the lesser political investment of the French-speaking public authorities in that domain is related to the scarcity of private key drivers pushing the political response. Finally, it must be underlined that there is a lack of cultural and political motivations to shape a long-term vision of a French-speaking Belgium, a motivation which is very present in the North of the country.

To clarify the analysis, the presentation is structured in two parts, the first one devoted to the initiatives taken by the French-speaking Community and the second to the Walloon drives.

4.3.1. Initiatives of the French-speaking Community

As already underlined, according to the Belgian State Reform, the Community is fully competent for cultural matters. Regarding multimedia policy, this competency is particularly important in the education (basic, secondary and higher education) sector and in the audio-visual and broadcast policy. Since 1992, the French-speaking Community is dominated by a coalition of Socialist and Christian-Social Parties.

a. Education Initiatives

Since 1992, the education sector has been heavily marked by various reforms aiming at the rationalisation of this sector and at reducing the financial deficit of the French-speaking Community. These reforms have fully occupied the French Community government till December 1996 with a series of new decrees concerning the higher education sector. This activity and the large social troubles that have shaken the education world have let very few place to develop multimedia plans and strategies for the education sector. Moreover, the important public deficit of the French-speaking Community constitutes a very serious barrier to new multimedia investments in the education sector.

The situation of the Universities is quite different when compared with the rest of the education sector. They benefit from an annual funding of BEF 100 million for their use of the Belnet network (see above). Moreover, thanks to their research and development activities, most of the Belgian universities have implemented modern networks and multimedia applications for research and educational purposes.

With regards to the rest of the education sector, the situation is quite disastrous. There is no policy and no planned budget to improve this situation. As far as PC penetration is concerned, one could compare the situation of the schools as if they have only one blackboard by school... In this situation, the purchase of PCs and multimedia applications is let to private initiatives (parents associations, private sponsorship, etc.). This situation raises important questions about the multimedia culture of the youth and the risks of inequalities between information rich and information poor children, that is to say those who have a PC at home and those who have not.

Even if the French-speaking Community government is very conscious of this situation, currently there is no long-term plan to reform the situation.

b. TITAN (1993)

TITAN (Televisual Interactive Terminal Associates Networks) is a consortium set up in 1993 by the French-speaking Community in order to manage the transition of the cable network to the digital technique. This consortium was formed by the main telecom and CATV network operators, the TV channels, the main concerned industrial firms or service providers, the French-speaking and German-speaking authorities and the main French-speaking universities. As a technical group, this association has realised major advances by conducting technical studies on five domains: services, decoding terminal, networks, financing and contracts, and legal aspects (Titan, p. 29).

But this consortium has never left its status of non lucrative association to form a financial structure in order to develop a new strategic network offer on the Belgian market. Many reasons explain this inertia. Once again, the first reason is the crucial lack of killing applications that could foster the alliance between the major players. The second reason concerns the decoding terminal, the remaining uncertainty about the standard choice and subsequently the lack of commercial plans for the production and diffusion of this terminal. The third reason is the inability of the southern CATV operators to elaborate a real and coherent strategy due to their high fragmentation but also to the relative weakness of their management resources. The last reason is the lack of private investment to dynamise the strategy, especially investments coming from media and press companies.

c. Decree concerning New Services on the CATV Network (1996)

In 1996, the Minister-President of the French-Speaking Community government has taken a new decree on the exploitation of 'new services' on the CATV network. Traditionally, the Community is competent for the regulation of the CATV broadcast services. This new decree extends this competency to all services, broadcast and interactive. With this proposal, the French Community wants to assert its full competency to regulate the cultural content of new multimedia services. Its purpose is to clarify the legal situation of multimedia services using the CATV network. But this clarification has been appreciated by the multimedia sector as new constraints and controls put on a multimedia market which is already difficult to develop in the South of Belgium. In fact, according to this decree, the exploitation of multimedia service requires a legal authorisation based on the evaluation of the cultural content of the service. This decree has been voted by the French-speaking government

in January 1997, its current form should evolve to encounter the reactions of the multimedia sector after a probationary term.

4.3.2. Initiatives of the Walloon Region

As already pointed out, the Walloon Region is fully competent for economic matters and for science and technology policies. Even if telecommunication is a federal competency, since 1993 the Walloon Region has considered the telecommunication policy as an important dimension of its economic policy. The political statement consists in building a modern telecommunication infrastructure for the Walloon Region. But, this policy statement is hard to implement since the Walloon Region has no regulatory authority to concretely act on this domain. It is the reason why, except in the field of Science and Technology for which the Region is fully competent, the Region encounter important barriers in the achievement of its policy.

a. Syndicat des Télécommunications (1995)

In early 1995, the Minister-President of the Walloon Region launched a task-force to define a policy response to the European Information Highways policy and to the Flemish policy initiatives. This task-force gathered the major multimedia actors present in Wallonia: the CATV operators, Belgacom, Alcatel Bell SDT, etc. and was hosted by the Regional Society of Investment (SRIW). The mission of this group was analytical, i.e. to draw an inventory of all the existing infrastructures in the Walloon Region, to design scenarios for network developments able to support multimedia interactive applications and to assess the financial and institutional conditions of the Walloon telecommunication policy.

Apart from this analytical mission, the expectation of the Minister-President of the Walloon Region was to create a coalition of interests between SRIW, Belgacom and CATV operators to support major investments in the shaping and implementation of a modern communication infrastructure for Wallonia.

Unfortunately, as TITAN, this group never transformed into an economic holding. Different reasons explain this failure. The first one is linked to the Walloon economic situation. This depressed situation is not attractive for investment and Belgacom particularly was very reluctant regarding a very uncertain return on investment. The second reason is the scattering situation of the CATV operators. Both from technical and institutional points of view, this was not suitable to set up a common project. The situation has changed now with the setting up of

the ACM (*Association Câble Multimédia*) society, a by-product of this task-force.

The group concludes that the market-driven approach was inappropriate for the development of a modern infrastructure of communication in Wallonia which, according to the *Syndicat des Télécommunications*, needs policy voluntarism and public investment.

b. Recommendations from the Economic and Social Council of the Walloon Region

In May 1996, the Economic and Social Council of the Walloon Region (CESRW) adopted unanimously a series of recommendations for the information, telecom and media sector (CESRW, 1996a). These recommendations are the following (CESRW, 1996a, p. 14-15):

- Establish a concerted program of economic promotion of the sector (through R&D programmes, demonstration pilot-projects and specific financial measures in order to encourage creation of new products);
- Pay attention to the 'democratic' aspect of the information society (universal service for example);
- Enlighten the problem of the division of competencies through the different levels of power and decision;
- Promote a co-ordinated management of the regional infrastructures (telecom and cable networks);
- Convince the service operators to better contribute to the development of the Walloon Region;
- Encourage the creation of new multimedia services through a specific operational structure;
- Look for a maximum of synergy with the region and the city of Brussels.

The two following initiatives, WIN and *Du Numérique au Multimédia* seem to answer to some of these recommendations.

c. WIN - Walloon INtranet (1996)

Following the conclusion of the *Syndicat des Télécommunications* and the CESRW's recommendations, the Walloon Government decided to study the opportunity to develop an Intranet for the Region. The Minister of regional planning, equipment and transport is currently in charge of this mission. The WIN (W-Intranet) project intends to develop a high-speed communication backbone based on SDH, ATM and TCP-IP communication protocols.

The main objectives targeted by this public intervention in an infrastructure's project are :

- * the democratic access to the information infrastructure for all citizens at reasonable prize;
- * the attractiveness of a modern and high speed infrastructure for corporate investment into the Walloon Region;
- * the impact of this infrastructure on economic and social development of the Region.

As far as applications are concerned, two main priority users groups are targeted by the project. The first one consists in secondary schools. This part of the project is called *Cyber-Ecoles* and is jointly managed by the regional and community authorities. The second one consists in public administrations and bodies of the Walloon Region (*the extended administration*). But the true priority of the WIN project remains on the infrastructure side.

To manage the project, the Walloon Government has set up a group gathering representatives of the regional ministers, of the French-speaking Community and of the Regional Investment Company.

The project appears to be very ambitious and radically oriented towards the future. Its success will depend on the capacity of the Walloon Government to federate all the necessary economic and political forces around the project. If it succeeds, it could have a very positive effects on the attractiveness of Wallonia and on the progressive building and consolidation of economic activities based on information and communication.

d. Impulse R&D Programme on Multimedia (1996)

The R&D policy of the Walloon Region is traditionally mainly based on a bottom-up approach, R&D projects being defined by the firms and universities. By comparison with the Flemish R&D policy and the European one based on the top-down design of large impulse programmes, the Walloon Region has always privileged a more open approach. This approach is justified by the industrial characteristics of the Walloon Region for which a sectorial approach based on important public investment in a limited number of industrial branches appears economically inappropriate.

Nevertheless, when examining the R&D budget of the Walloon Region, it appears that the computer and telecommunication technologies take an important part in the Walloon R&D with 20% of the budget for the year 1995. But most of the funded projects concern process or infrastructure innovations.

Since 1996, the Walloon Minister in charge of the R&D policy has adopted a long-term plan to better link R&D efforts with socio-economic developments of the Region. Facing important issues of

industrial reconversion and unemployment, the plan has identified multimedia product and service innovations as one of the important lines of its new R&D strategy. Two main reasons explain this multimedia orientation. First, the European call for a clear political sign for Members States concerning the impulse to the development of new multimedia services and applications in the framework of Information Highways. Secondly, the recommendations of the Economic and Social Council of Walloon Region (CESRW) claiming for the establishment of a concerted program of economic promotion of the multimedia sector through R&D programmes, pilot projects and specific measures to encourage the creation of new multimedia services and products.

In June 1996, an impulse R&D programme was launched to sustain the development of new multimedia services and products in the Walloon Region. This programme called *Du Numérique au Multimédia* is a three-year programme of BEF 700 million (ECU 14.9 million) to be distributed through two calls for proposals. To design the programme, large hearings amongst multimedia producers, operators and users have been organised during six months. This process has given rise to a clear identification of R&D priorities along three main axes: generic developments consisting in R&D progress in multimedia authoring systems, navigators, interfaces, etc.; applied developments based on the design of new multimedia services or products (on- and off-line); pilot systems concerning the design and experimentation of new on-line services on CATV or on telecom network. The first call for proposals has been a success with more than 130 projects. On these 130 projects, 30 have been selected to be funded. One important result of this programme is that it has underlined the existence of new multimedia entrants, i.e. very innovative small firms. For the majority of the selected firms, it is their first experience of public R&D funding.

At this stage, this programme seems to prove that there are potentialities for multimedia innovations in Wallonia. Its long-term assessment should bring further evidence about its impact on regional development and job creation.

e. European Structural Funds - Objective 1: CEDITI and MULTITEL (1995)

In 1994, the Hainaut county has been recognised by the European Commission as eligible for structural funds devoted to depressed regions of Europe. These 'Objective 1' structural funds consist in a co-financing structure equally shared by the Region and the European Commission. These funds must serve the economic and social reconversion of the concerned region.

Regarding the R&D and multimedia policy, an important part of the funds is allocated for the creation and support of two new R&D centres in the field of ITC and multimedia in the areas of Charleroi and Mons.

In those two areas, local authorities have developed policy responses to the crisis, with a central place for communication and multimedia technologies as factors of firms modernisation and new activities creation.

Apart from traditional roles of research and development, the primary mission of these research centres is to help the creation of new economic activities in the region and to facilitate the transfer of modern technologies and process towards the regional firms.

The first centre is CEDITI, *Centre de Diffusion des Technologies de l'Information*, a university centre created in collaboration with the *Université Catholique de Louvain* (UCL), the *Université Libre de Bruxelles* (ULB) and the *Facultés Universitaires Notre-Dame de la Paix de Namur* (FUNDP). This centre, based near Charleroi, has different activities. One of these, BIZNET, aims at developing new IT services for the large audience and the firms (access to servers, networks interconnection, ..) and another one is the set-up of multimedia teleservices centres i.e. centres where the large audience may have access to multimedia terminals and services. Learning and telelearning activities in the field of IT are also forecast in a near future.

The second centre called MULTITEL (*Centre montois du Multimedia et des Télécommunications*) is another university centre created and managed by the three universities of Mons. This centre is specialised in two main research domains: signal treatment on cable infrastructure and voice recognition intelligent systems. Apart from its R&D activities, this centre has also developed a series of activities of technological guidance and training for various firms implemented in the Mons area.

At this stage, it is difficult to assess the return of this funding on the regional development of the Hainaut. Some spin-offs of these centres are indubitably creative, and a real partnership between research centres and local firms is currently developing. Those signs are encouraging but need more long-term evidences to prove the social and economic rewards of the EC funding.

f. Analysis of these Policies

In the French-speaking part of Belgium, the policy efforts on multimedia are surely more developed by the Walloon Region than by the French-speaking Community. This has already been explained by the current

public deficit of the French Community that leads to a policy more orientated towards rationalisation than towards the development of new visions and projects. This state is particularly prejudicial for the education sector which suffers from a total absence of ITC and multimedia policy.

The policy of the Walloon Region is certainly less volunteer than the one developed by the Flemish government. Many reasons explain this matter of fact.

First of all, regarding the infrastructure policy, the Walloon Region encounters several barriers to implement its policy vision of a modern regional backbone: a depressed region with a lack of investors; a scattering situation of the CATV operators impeding a federative strategy and a lack of legal authority allowing concrete actions on this field.

In 1994, the regional authority was in favour of the set-up of a new regional operator in charge of the implementation and the exploitation of the regional backbone. In this vision, the new operator should have been formed by the joint efforts of Belgacom, CATV operators, public authorities and other private investors. For the reasons explained above, this vision was never realised. Moreover, many observers have questioned this strategy regarding the European directive on full telecommunication liberalisation. This explains the current withdrawal of the regional authority in this matter. Its actual role consists in defining specifications for the future regional backbone and in identifying the public users requirements. This position is the only practicable one regarding regional settings and European constraints.

Regarding multimedia services and products, the policy is mainly the fact of the R&D regional authority. This policy has evolved during these last years. Before 1996, there was no specific R&D policy in multimedia, though the part of the regional R&D budget devoted to the ICT was traditionally important. But this important part was mainly oriented towards telecommunication components and process innovations but not towards development of new multimedia services or products. In 1996, the regional R&D plan has underlined the necessity to support a specific R&D programme in the multimedia field following CESRW's recommendations but also the European trends. The interesting side of this programme is that it is oriented towards multimedia services and product innovations. This orientation is quite unusual for the regional R&D policy since traditionally this policy has mainly supported process and industrial innovations. The result of this new orientation is that the programme has contributed to identify and support new multimedia actors mostly very small, young and highly

innovative businesses. For the regional R&D administration, the management of those projects appears to be more risky than the usual management of projects concluded with the well-known R&D 'happy few'. But it is a clear political option of the regional R&D Minister to give a chance to newcomers in order to help the development of a multimedia sector in Wallonia and not only the public funding of the traditional IT sector.

A last remark concerns the political importance given to multimedia in Wallonia. As other European regions, Wallonia has to face important economic problems and those problems make difficult the development of a long-term political vision for the Region. So, multimedia and all related issues regarding Information Highways appeared as an opportunity to fill a political gap by a technological project. But, by comparison with Flanders, the project appears more moderate. As already underlined before, different economic, cultural and political reasons can explain this situation. But behind those reasons, an idea progressively arises in Wallonia: multimedia policy is a very partial and insufficient solution to the dramatic social and economic crisis.

5. Review of some Multimedia Experiments and Trials

5.1. Public Initiatives

5.1.1. Local Government

Périclès (Programme for Extending Resources in Information and Communication by a Local Exchange System) is project initially developed by the City of Namur, the BEPN (*Bureau Economique de la Province de Namur*), the provincial organe for the economic development and NEW (*Namur-Europe-Wallonie*), an organism which aim is to promote Namur and its region. The project gathered other partners as the *intercommunale*, CIGER, specialised in computer development for administrations, *Les Nouveaux Médias de l'Avenir*, subsidiary of the *Vers l'Avenir* press group which will provide regional information, the Walloon Region, Belgacom and the University of Namur (Computer Science Department).

This project, which aim is to develop the city and the province of Namur as one of the more advanced Walloon area in the field of ICT, has three axes. The first one, the Syrecos project (*SYstème Régional d'Echange et de COmpétenceS*), realised in the framework of an European project (DG XIII - Telematics Application) with Luxemburg and French partners, in collaboration with the regional office for employment finding (FOREM) aims at the set-up of training tele-services (*Périclès*, pp. 9-11).

The second project is very specific and concerns the obtention of construction licence, i.e. an information flow between architects and the competent administration.

The third axis is the *serveur-citoyens* (27) (citizen server) which aims at drawing nearer Namur's administration and its citizens via Internet. This server has been officially opened in October 1996 and proposes different services (*Périclès*, p. 7):

- The connection to the local administration with the presentation of all the administrative services and the possibility to make an on-line demand for dance party authorisations;
- The agenda of all activities of the province;
- The obtention of an e-mail address;
- The access to the public libraries of the city (research, reservation, etc.);
- The access to regional information
- An access to specific newsgroups, mostly dedicated at the city and the province (activities, cultural, economic and political life, ...).

It is too early to deeply assess the current development of this project but at the present time, it seems clear that the problem of users, the Namur citizens, has been very roughly approached by the designers of the project. The only indication on users preferences and needs that will be taken into account by the designers is their access to some Web pages, mostly for the *serveur-citoyens*.

MANAP (Metropolitan Area Network Antwerp) (28) was set up by Telepolis Antwerp (29), a non-profit making company responsible for information and communication technologies at the city of Antwerp. MANAP is a 65-km long fibre optic network with two ATM-switches and a capacity of 155 Mb/s that is due to be upgraded to 600 Mb/s. On this horizontal "wide area" multimedia delivery system several multimedia applications and services are offered to the city staff and city population as a whole. These services include 'telematics services for better administration', tele-medicine, services to the citizens and visitors and Belgacom information booths (phone booths that will be converted

to kinds of multimedia kiosks offering telephone and interactive services like consultation of city information and the use of e-mail).

MANAP, with its optic fibre and ATM-switches, presents a real step forward in technological terms. But MANAP is still struggling with how this technology should be filled-in appropriately. To a certain extent, MANAP is therefore the result of a 'top-down' strategy. First, the broadband technology was created and after its implementation the real search for useful multimedia applications and services with surplus value began. In the preliminary business plan only digital telephony was considered. It is often believed that technologies and applications that are developed on a successfully performing network, will automatically find their users. However, the problem is often that many 'forecasts' on the extent of use prove later not to be correct (Burgelman & Van Langenhove, 1991, pp. 66-72). The main reason, in many cases, is that the social context where new applications need to be incorporated is neglected, in particular the role of different users in the innovation process. This can be prevented if social experiments are set up that incorporate forms of social learning.

5.1.2. Employment Office

Work Information System (WIS) is an initiative of the *Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding* (VDAB), a semi-governmental body, which is responsible for employment-finding and professional training (30). VDAB is one of the main intermediaries between the (other) job-seekers and companies that offer employment. This is achieved by creating various channels of communication.

WIS is a networked multimedia application conceived as a means of interacting between the participants on the labour market. It concerns a system that offers job-seekers an interactive selection-tool for finding interesting vacancies and opportunities for professional training, a means for registering and a database with other relevant information. It is for example possible to print out selected job-offers or to enrol for a specific training scheme. This service is offered on separate WIS-appliances outside the VDAB-offices. In the near future all these WIS-appliances (in the VDAB-offices) should be connected through a specific network of leased lines. Concerning the vacant jobs, 96% of the main database can be consulted via these appliances. For the other 4% the stipulations are too specific.

To increase service to citizens, municipalities can purchase extra WIS-appliances (together with the necessary software) at a cut price and

install them in public places of their choice (31). This has already been done by some 100 municipalities (1/3 of Flanders), which has led to a total of 374 WIS-appliances in the whole of Flanders according to the most recent estimates.

In September 1995, a limited version of WIS was introduced on Internet (32). It includes the vacancies, some general information and the module to register for employment.

Based on user data, the WIS-system is generally regarded as a success. Most figures were far above expectations. Two main aspects are responsible for the success of WIS. First, there is the constant user feedback, made possible by frequent market surveys and inquiries. These user data are mainly collected for VDAB in general, but certain aspects are specifically relevant for WIS or other (new) projects. The second critical success factor is the fact that this multimedia technology is supplemented by content based on years of experience in employment-finding.

In the French-speaking area, the FOREM, office communautaire et régional de la Formation Professionnelle et de l'Emploi, equivalent to VDAB, proposed a similar Internet service with services to firms and to job-seekers (33).

5.2 Private Initiatives

5.2.1. Media

Kanaal 27 (34) is a project initiated by CUM New Media, a subsidiary of *Concentra Uitgeversmaatschappij* (CUM) (*Het Belang van Limburg, Weekkrant, Jet*) (35). The *Kanaal 27* project, also called *Regionale Interactieve Teletekst* (RITS), is a linear teletext as well as an interactive videotex service that has been using the transmissions of local TV station *TV Limburg* since 3rd May 1994. In October 1996 the teletext was renamed *TVL tekst* and the videotex became *Bel TV*, but they are still offered in the same combination. The hybrid multimedia application *Kanaal 27* offered some 50 services to the Limburg population, which included entertainment services (games, popquizzes etc.), information and consultation (vacant jobs, library catalogue, selling and reselling, local government information etc.), communication (chat box, mail system etc.) and transaction (bank services, tax guide etc.). In October 96, some 5,800 persons (5% of all cable subscribers) had a password, which gave them access to the on-line databases and other *Kanaal 27* services.

Kanaal 27 was partly funded by the *Europees Fonds voor Regionale Ontwikkeling* (EFRO) and by an international alliance of regions (INTERREG). The project team for this multimedia application originally consisted of three main partners. First Belgacom that had already gained some experience with its own videotex, Interelectra, the utility company that controls the distribution of electricity and cable TV for almost the whole of Limburg and CUM itself for the general guidance and co-ordination of the project. This project team was working together with TV Limburg and the *Expertisecentrum Digitale Media* (EDM) at the LUC.

When Kanaal 27 was set up and developed, the user was the central focus from a marketing point of view and after a thorough evaluation of the first results, some modifications were introduced in accordance with the target group.

While this form of interactive teletext presented an acceptable user interface, that made the consultation of databases possible without extra investments in knowledge or appliances, the platform being considered here is not suitable for business-to-business services. For these the PC is a much more appropriate channel. Consequently interactive teletext should be aimed at being used by the residential public.

Tectris is a Belgacom technical test of VOD on telecom networks made in Brussels during 6 months from January 1996 amongst 50 households, mostly Belgacom employees. From a technical point of view, this test is successful but different problems appear mainly due to the important cost of such an application for the residential market. Future evolutions could be to design specific video applications for the business market and/or to find less expensive technical solutions.

5.2.2. Entertainment

The *Antwerp Zoo* provides a CD-I called *Zoo Eenvoudig* (Zoo, the simple way) to its visitors (36). In this experiment, the zoo is considered as a multimedia intermediary between the supplier, *Philips Interactive Media Systems*, and the final user of the multimedia application, i.e. the visitor. This animal encyclopaedia in Dutch guides the visitor round the zoo and is played on a portable CD-I appliance that has to be rented. The same CD-I can also be consulted free of charge at CDI-booths, in five different buildings in the zoo. It is also possible to buy a commercial version of the CD-I for at home.

As far as its educational assignment is concerned, the zoo authorities feel that people of all ages should learn something when they visit the zoo. For this reason information boards have been put up at many different places with explanations in 4 languages (Dutch, French, English and German). But the problem is that many people do not read the information provided. That is why alternatives had to be found, which would stimulate visitors into searching for information. That was partly the reason why the interactive CD was introduced.

The main strong points of the CD-I "*Zoo Eenvoudig*" are largely the same as for other interactive applications. The interactivity makes it easy and fun to use (for a lot of people). Also there is sufficient capacity for data in the form of text, speech and some photographs. Furthermore, the two versions (zoo and commercial) of this CD-I make it possible for the application to be used as a guide as well as an encyclopaedia at home.

The fact that only a Dutch version is available constitutes an important weakness as far as the zoo and its many foreign visitors are concerned. Providing versions in other languages was not part of the agreement with Philips. Also the quality of some pictures and quality of some text parts in the zoo-version are poor. Furthermore, the CD-I does not include video (MPEG), which makes it less fun to watch. However, the main weakness concerns the mobile platform on which it can be used. The portable appliances are not comfortable to carry because of their weight.

The possibility of putting the CDI-content developed by the zoo on the Internet is seen as an important opportunity. Given the educational objective, it would be an excellent opportunity to offer students, teachers and schools an interactive animal encyclopaedia.

5.2.3. Education

Cybertec is a cyberbus mainly for the secondary schools. This project has been initiated by *Les Nouveaux Médias de l'Avenir*, in collaboration with the regional urban transport company (TEC), IBM, the *Crédit Communal de Belgique* and Belgacom. This project, begun in September 1996 for an unlimited period, aims at providing a bus equipped with 10 CD-Rom PCs connected to Internet to the secondary schools of the Walloon Region. The bus stays one week at the school and the first day is dedicated to explanations on Internet provided by the responsables of the project to the teachers. The bus is free of use, PCs are rented by IBM, Internet connection is offered by Belgacom and the schools only

have to provide 3 electric connections and 2 telephone lines or 1 ISDN line. The success encountered by these initiatives amongst schools is quite high and the objective now is to rent the bus to firms during week-ends.

5.2.4. Internet

CampusNet is realised in collaboration between the *Université Catholique de Louvain* (UCL) and the local cablo-operator (*Séditel*). The aim is to provide an Internet connection on the university campus through the cable network.

5.3. Mixed Public-Private Initiatives

Digital Regio Limburg is a project for which the *Gewestelijke Ontwikkelingsmaatschappij Limburg* (GOM), initiated a co-operation between several partners with regards to multimedia (provincial and local authorities, Concentra, CATV operator Interelectra, Philips, EDM-LUC, Kinopolis Group, several service companies). One of their goals is to create a 'smart region' in Limburg to enhance the technological culture, by offering multimedia education and training. In addition, a kind of 'multimedia valley' is planned.

Notes

1. More than 2000 international organisations are established in Belgium, some of them have their international headquarters in Brussels (European Commission, NATO, ...). Many of these organisations are coordination and distribution centers.

2. <http://www.belgium.be/belgium>.

3. <http://www.belgium.be/belgium>.

4. As explained by Minon (1996), different laws have progressively widened the competencies of the Communities from a simple regulation of the cultural contents of broadcast services to the full regulation of the contents and their infrastructures, (mainly but non exclusively through the cable network).

5. Telephone, telex, radiomail, telegraph and leased lines.

6. Broadcast services can be defined as services whose emission is due to be received by the "audience in general" (State Council decision) or by the "public in general or a part of it" (decree of July 17th 1987). This definition is difficult to apply to new multimedia services as explained by Marc Minon (1996, p. 50): "The apparition of pay-per-view services, near

video on demand and then video on demand will probably shake this definition".

7. Special Law for the reform of institutions dd. 8th August 1980 (Art. 6bis §1-3, 92bis §1, 92ter) (Modified: Law dd. 8th August 1988 / Special Law dd. 5th Mai 1993 / Special Law dd. 16th July 1993): "The Communities and the Regions are entitled to organise scientific research within the scope of their respective powers, including the research in execution of international or supranational agreements or acts." (Art.6bis §1) [Own translation]

8. <http://www.belgium.be/belgium>

9. In 1986, services account for 64.8% of the Belgian GDP (Fédération des Entreprises de Belgique, 1988, p. 145).

10. More than BEF 10.000 billions (ECU 213 billions) (almost 130% of the Belgian GDP) (Bureau du Plan, 1994, p. 24).

11. Mainly the requirement of a budget deficit inferior or equal to 3% of the GDP and a total debt of maximum 60% of the GDP.

12. Inventarisstudie naar potentiële elektronische dienstverlening in de Euregio Maas-Rijn, Concentra Uitgeversmaatschappij, Hasselt, May 1995.

13. Survey on the use of Interorganisational Systems in Small and Medium Sized Enterprises of the Walloon Region, conducted by CITA (Cellule Interfacultaire de Technology Assessment) of the University of Namur and financed by the federal office for science, technology and culture. The same research is made at the Vlerick School van Management in Gent and concerns the Flemish part of the country.

14. Last year, the award has been attributed to a project of increased political participation of the citizens via Internet (www.alcatelecom.be).

15. <http://www.telinfo.be>

16. <http://www.siemens.be>

17. <http://www.sni.be>

18. <http://www.siemens.be/atea>

19. <http://www.lol.be>

20. *It should be a project that is supported by the whole Flanders. Finally it should also be a project which should enable Flanders to confirm and strengthen its cultural identity in Europe and in the world* (own translation from Vlaanderen-Europa 2002).

21. The 7 tracks' are A viable Flanders/A creative Flanders/A working Flanders/A learning Flanders/A caring Flanders/An accessible Flanders/A democratic Flanders.

22. Cable Decree of 4th Mai 1994 (Art.6).

23. Though very recently the number of legal proposals has increased significantly.

24. Voorstel van Decreet van de heren Johan De Roo en Gilbert Bossuyt - *Houdende machtiging van de intercommunales voor kabel distributie tot deelname aan een*

vennootschap waaraan de bevoegde overheid de uitbouw en/of exploitatie van het kabelnetwerk in Vlaanderen tot een interactief communicatienetwerk toevertrouwt.

25. Resolution: Recommendation to act on behalf of the parliament aimed at the government, which simultaneously states the viewpoint of the former in the respective matter.

26. Voorstel van Resolutie van de heren Jos Geysels, Gilbert Bossuyt, Johan De Roo, Jean-Marie Bogaert - *Betreffende de ontwikkeling van informatiesnelwegen in Vlaanderen.*

27. <http://www.namur.be>

28. The description of this multimedia project is mainly based, besides printed material, on an extensive interview on 18th November 1996 with Mr. P. Van der Cruyssen, the coordinator European projects of Telepolis Antwerpen.

29. <http://www.dma.be>

30. The information on this subject is mainly based on an extensive interview on 14th November 1996 with Mr. K. Tirez, WIS project manager at VDAB. To complete the data, these answers were supplemented by brochures and some publications in the media on the WIS-system.

31. At the present time, 60% of the WIS-appliances are in town hall, 20% in library, 10% in arts centre and 10% in other places.

32. <http://www.vdab.be>

33. <http://www.forem.be>

34. The main data on this MULTIMEDIA application was gathered in several publications on the subject of this project, among which an evaluation report (CUM, 1995). To get an insight into the general strategy on MULTIMEDIA, Mr. J.P. Coenen (New Media Director of the publishing company Concentra) was interviewed on 15th November 1996.

35. <http://www.concentra.be>

36. On 10th December 1996 an interview was conducted with Mr. Van den Sande, the Operations Manager at the Antwerp Zoo. Much of the information on this subject was gathered from the interview. Also, some background information in a few publications was used to complete the overview. It included a student report on user interfaces in which the CD-I Zoo Eenvoudig is also mentioned (Daems, 1993). A brief qualitative user study by Philips was used as well. In addition, some data were found in the zoo-guide (Zoo Antwerpen, 1993) and on the Internet.

Glossary

ACM

Association Câble Multimédia

Cable Multimédia Association

BBL

Banque Bruxelles Lambert

BEPN

Bureau Economique de la Province de Namur

Economic Office of the Namur Province

CCB

Crédit Communal de Belgique

CEDITI

Centre de Diffusion des Technologies de l'Information

Diffusion centre of Information Technology

CESRW

Conseil Economique et Social de la Région Wallonne

Social and Economic Council of the Walloon Region

CUM

Concentra Uitgeversmaatschappij

Concentra Publishing Company

DIRV

Derde Industriële Revolutie in Vlaanderen

Third Industrial Revolution in Flanders

EDM

Expertisecentrum Digitale Media

Expertise centre in Digital Media

EFRO

Europees Fonds voor Regionale Ontwikkeling

European Fund for Regional Development

FUNDP

Facultés Universitaires Notre-Dame de la Paix de Namur

University of Namur

FOIV

Fonds voor Industrieel Onderzoek Vlaanderen

Fund for Industrial Research in Flanders

FOREM

Office communautaire et régional de la Formation Professionnelle et de l'Emploi

Regional and Community Office for Professional Training and Employment

GIMV

Geweestelijke Investeringsmaatschappij Vlaanderen

Regional Investment Organisation Flanders

GOM

Gewestelijke Ontwikkelingsmaatschappij Limburg

Regional Development institution

IBPT

Institut Belge des Postes et Télécommunications

Belgian Institute for Post and Telecommunications

IWONL

Instituut tot aanmoediging van het Wetenschappelijk Onderzoek in Nijverheid en Landbouw

Institute for the advancement of Scientific Research in Industry and Agriculture

IWT

Vlaams Instituut voor de bevordering van het Wetenschappelijk-technologisch onderzoek in de industrie

Flemish Institute for the advancement of scientific-technological research in industry

KUL

Katholieke Universiteit Leuven

Catholic University of Leuven (Flemish Region)

LUC

Limburgs Universitair Centrum

Limburg University Centre

MET

Ministère de l'Équipement et des Transports (Région Wallonne)

Ministry for Equipment and Transports (Walloon Region)

MULTITEL

Centre montois du Multimedia et des Télécommunications

Multimedia and Telecommunications Centre of Mons

NEW

Namur-Europe-Wallonie

OSTC

Federal Office for Science, Technology and Culture

PÉRICLÈS

Programme for Extending Resources in Information and Communication by a Local

Exchange System

RITS

Regionale Interactieve Teletekst

Regional Interactive Teletext

SNCB

Société Nationale des Chemins de Fer Belges

Belgian Railway National Company

SRIW

Société Régionale d'Investissement Wallonne

Investment society of the Walloon Region

SYRECOS

SYstème Régional d'Echange et de COmpétences

Regional system of Exchange and Competencies

TITAN

Television Interactive Terminal Associates Networks

UCL

Université Catholique de Louvain

Catholic University of Louvain (Walloon Region)

ULB

Université Libre de Bruxelles

Brussels University

VEV

Vlaams Economisch Verbond

Flemish Economic Federation

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Concentra (CUM): <http://www.concentra.be>

Federal Information Service: <http://www.belgium.be/belgium>

FOREM : <http://www.forem.be>

Limburg On Line: <http://www.lol.be>

Namur serveur-citoyens (Péliclès): <http://www.namur.be>

Pandora: <http://www.pandora.be>

Siemens Nixdorf: <http://www.sni.be>

Siemens: <http://www.siemens.be>

Telinfo: <http://www.telinfo.be>

VDAB: <http://www.vdab.be>

Zoo of Antwerpen: <http://www.ufsia.ac.be/antwerp/zo o.html>

Interviews

14th November 1996: interview with Mr. K. Tirez, WIS project manager at VDAB.

15th November 1996: interview with Mr. J.P. Coenen, New Media Director of the

Multimedia in Belgium

publishing company Concentra.

18th November 1996: interview with Mr. P. Van der Cruyssen, coordinator of the European projects for Telepolis Antwerp.

10th December 1996: interview with Mr. Van den Sande, Operations Manager at the Antwerp Zoo.