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Or. Fre.

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FRANCE'S EXPERIENCE WITH THE MINITEL: LESSONS FOR ELECTRONIC COMMERCE OVER THE INTERNET

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MAIN POINTS

In France, the existence of the Teletel, a videotex system accessible via the Minitel, has had a major impact on the circumstances under which electronic commerce has developed. The French system, which began its nation-wide expansion in the early 1980s, long led the world in opening up electronic commerce to consumers. Indeed, in 1994, 1.2 million French households had used Minitel to make a purchase[1], whereas in the same year, only 800 000 American households had used the Internet to buy at least one product.

There is a flip side to this success, however, which is the lack of involvement on the part of French industry in the Internet, as well as the slow and hesitant growth of computer use in France. That is why the French Prime Minister, Mr. Jospin, in a speech at Hourtin on 25 August 1997, asked that all concerned, in particular France Télécom, participate in the further development of the Internet.[2]

The 1994 France Télécom project of an Internet-compatible Minitel proposes to do this. It does not require the rapid and costly replacement of the Minitel system and gives the French network time to evolve and to correct its shortcomings, so as to become an integral part of the Internet[3].

This report adopts a chronological approach. The first part, 'The Success of the Minitel Project in France', examines the factors which contributed to the French success; an attempt has been made to highlight the reasons behind this accomplishment and to draw lessons for the future of similar networks. The second part, 'Reappraising the System', takes a look at the current situation. 'The Future of the Minitel' is a more forward looking analysis, examining the future of the French data system, specifically its relationship to the global Internet system. To conclude, the final section of this report examines the lessons that can be drawn from the Minitel experience and applied to electronic commerce on the Internet. Section four provides a detailed analysis of the following nine important lessons to be drawn from the Minitel experience.

1. **Developing information networks: the role and position of the government.** It is interesting to note that as in the case of the Internet, the impetus and the initial funding for the Minitel came from the public sector, although the role that the respective governments were to play turned out to be very different. Experience shows that a reduction in the price of terminals and services, in particular "killer applications" such as the information directory (Minitel) and electronic mail (Internet), encourages the growth of electronic commerce.

2. **The link between 'business to business' and 'business to consumer' electronic commerce.** Although the Minitel was heralded as a project to 'democratise the information society' and the first terminals were distributed free of charge, the socio-economic profile of the average Minitel user closely resembles that of an Internet surfer. People who use information technology and telematics at work tend to use Minitel at home. There is therefore a link between 'business to business' e-commerce and 'business to consumer'

e-commerce which makes the development of 'B to B' one of the most important driving forces behind the growth of 'B to C'.

3. **The role and nature of 'B to C' "killer applications".** Both Minitel and the Internet have witnessed the emergence of "killer applications" i.e. applications that dominate all the others available on the system. They pioneered electronic commerce and created a client base that other services could draw on. However, such applications are far from homogeneous, indeed there are identifiable differences between them.

4. **The importance and basis of user confidence.** The different ways in which the Minitel and the Internet are used clearly demonstrate that if electronic commerce is to expand, users must trust and have confidence in the technical and regulatory frameworks (from payment methods to dispute resolution, etc.) of the system. In France, it would appear that user confidence has resulted from a combination of different factors. Seeing that the Minitel is a purely national network, companies listed on the Minitel must comply with the provisions of commercial and civil law recognised and enforced by the French courts. Furthermore, France Télécom, a well-known and trusted company with a pre-existing relationship with service providers and consumers, acts as payment intermediary and system mediator.

5. **The creation and enforcement of legal and commercial regulations.** This follows logically from the previous point. If consumers are to use electronic commerce, they need to be aware of the regulatory environment of the sector and be confident that the rules and regulations governing transactions will be enforced. We have still not established how (executive instruments or other) or at what level (international or local) such rules would be defined. Their definition is essential for the development of electronic commerce.

6. **The choice and role of network intermediaries.** Although our report on the Minitel experience has not solved the problem regarding the level at which these rules should be defined, it has provided us with valuable insight into how they should be applied. The choice and role of the network intermediary has a considerable impact on the growth of the electronic commerce sector. In France, the fact that a well respected, trusted company was responsible for the payment system and transaction security and acted as the mediator in dispute resolution had a positive effect on the acceptance of electronic commerce by Minitel users.

7. **Complementary payment systems.** The billing system used by France Télécom, based on time charges, can have positive or negative effects depending on how it is used and the type of service billed. It would appear that this system could compliment those used on the Internet (subscription, service fees, etc.).

8. **The impact of standards on innovation.** Minitel's experience has shown that, in contrast to 'open' standards, which are used on the Internet, proprietary standards do little to encourage technological innovation. As a consequence, the system is slow to adopt new technology and is unable to compete with 'open' systems.

9. **Self-regulation.** Like the Internet, the Minitel was confronted with the problem of the growth of 'personals'. It is interesting to note that the means by which the Minitel addressed the issue of adult services were similar to the self-regulatory mechanisms being tested on the Internet.

Finally, this report has left a number of questions unanswered. We have yet to determine the most effective way to organise and regulate the sector (the role, organisation and appropriate degree of competition for electronic commerce network intermediaries), and to assess the social and economic knock-on effects of electronic commerce (in particular on growth and employment).

PART 1. THE SUCCESS OF THE MINITEL PROJECT IN FRANCE

First stage: From lagging telecommunications to leading telematics

An initiative of the DGT

One of the principal characteristics of the French telematics project is that it was started at the initiative of the government, through the National Telecommunications Administration (*Direction Générale des Télécommunications* - DGT). The project got under way in the late 70s. Two major events had an impact on the period and on the French economy at the time, namely the oil crisis, which affected all industrialised nations, and the telecommunications overhaul plan. The project originated with an idea summarised in the 1978 Nora-Minc report to French president Valéry Giscard d'Estaing (Nora, Minc, 1978). The French president was concerned about the recession that industrialised countries were going through and was looking for new areas where French industry could have a competitive edge, and new ways to enhance its competitiveness. The report suggested that this could be the service sector and promising future technologies (telephony, computers, telematics), which would be the sources of growth and competitiveness in years to come. The report pointed out the lead enjoyed by the United States in computer technology and electronics, noted the success of new experiments conducted by the CNET[4] on a new videotex system known as Télétel[5] and expanded on an idea first voiced by Gérard Théry, the head of the DGT at the time, of a *Plan Télématique*, as part of the Telecommunications Plan then in progress.

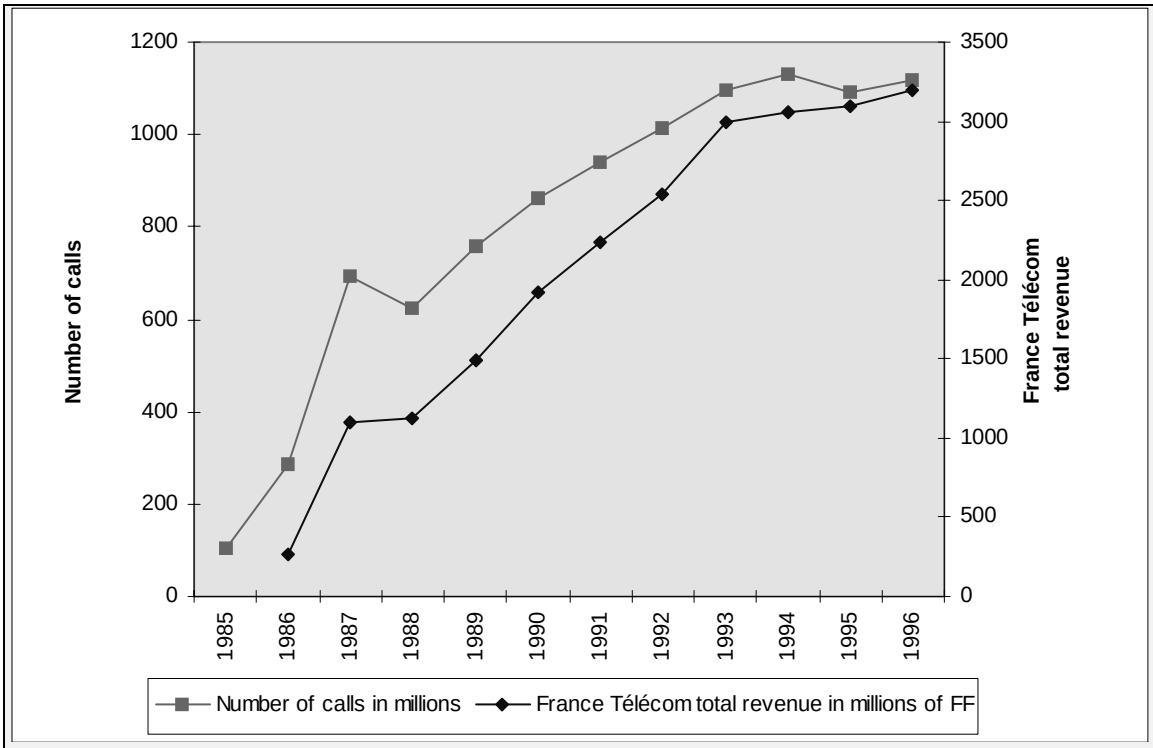
The Telecommunications Plan as a building block

The Telecommunications Plan was launched in 1974. At the time, Gérard Théry had noted that the French telecommunications system was probably one of the most inefficient, unsophisticated and under-developed in all the industrialised countries. By 1974, there was a telephone in only 12 per cent of all French homes. The head of France Télécom submitted a plan to the government, aimed at creating 14 million new lines over a seven-year period. The project was accepted, with the DGT becoming the main agency and co-ordinator for the telecommunications sector. The National Industrial Agency (*Division des Affaires Industrielles* - DAI), which was in charge of specifying, jointly with the CNET, the technical features and standards of the new network, set down certain objectives in terms of standards, compatibility and low-cost equipment with suppliers. The project was highly successful. By the middle of the next decade, France had caught up. Between 1981 and 1989, the proportion of homes with telephones rose from 74 per cent to 95 per cent. Seventy per cent of the network was digital. The first stage had been completed. The DGT moved on to the next challenge which consisted of developing new on-line services.

A political, economic and social project

Backed by a public-sector company, the project called for services which would "contribute to improving democracy and citizenship". They would have to be accessible to the entire population, serve everyone's needs and provide as much public and commercial information as possible. The system was also expected to create an incentive for all to become more familiar with computers and telematics, so as to prevent the development of "a two-tier information society, consisting of those with access to it and those without." Furthermore, the system had to be upgradable, so as to incorporate services with more added value. It also had to make a profit. After a few tries, the Télétel was given its public start in 1983 (Figure 1). Between 1983 and 1991, 5 million terminals (the Minitels) were distributed free of charge throughout France. By 1989, 38.2 per cent of all residents of France had a Minitel at work or at home, giving them access to more than 12 000 services (Table 1). As of 1997, the number of services had more than doubled since 1989, accounting for more than 110 million hours of usage yearly.

Figure 1. The different phases of development of the Minitel



1982	Start.
1983-1987	The "personals" era, when calls to bulletin boards accounted for about half of the time spent on-line by consumers.
1987-1988	The turning point: reform of the Minitel's "morals".
1988-1992	Development of Business to Business services.
1992-1994	Peaking (business stagnates).
1994-1998	New projects.
1998	New Internet compatible Minitel.

Sources: France Télécom data, analysed by Faverie, OECD 1997.

Table 1. The development of the Minitel

Data for the month of October of each year

Year	Terminals distributed (000)	Home use (percentage of homes with a terminal)	Services available	Number of users (000)	Télétel calls excl. electronic directory (thousands of hours per year)
1983	120	NC	NC	NC	NC
1985	1 887	NC	1 889	NC	NC
1987	3 373	NC	7 196	NC	52 395
1989	5 062	NC	12 377	NC	70 090
1991	6 001	17	17 297	NC	82 699
1993	6 485	20	23 227	14 500	89 688
1995	6 400	22	25 100	16 000	84 000
1997	6 150	22	25 201	17 000	83 000

Source: France Télécom. Data from "*La lettre de Télétel et Audiotel*" 1983 to 1997.

A forward-looking policy in a competition-free environment

According to Thomas J. Housel and William Davidson, France's success was due first of all to the structure and regulation of the telecommunications sector, and to a deliberate approach favouring the development of projects with a positive long-term return on investment: "France's co-ordinated policy and regulation afforded an environment conducive to taking risks with new technology implementations that required long-term return on investment." (Housel, Davidson, 1991, p. 42).

1980-1990: the Minitel was the result of advanced techniques

The success of France's data-transmission system had to do in part with the fact that, at the time the Minitel came out, a modern and productive infrastructure existed which was in a position to offer a wide range of sophisticated services which were relatively easy to use. As shown in Part 2, the Minitel did not hold on to its technological lead, so that today the system has been overtaken by the advances of the Internet. In 1983, the Minitel was actually the most sophisticated data transmission system available and it remained so until the advent of browsing systems developed for the Internet in the early 1990s.

Minitel is the name used for the terminal linked to the Télétel network. The system, in operation since October 1982, extends to all of France and has expanded as the number of terminals and available services increased. It consists of the switched telephone network RTC (*Réseau Téléphonique Commuté*) for users and the Transpac network for servers, along with videotex access points to link the two. The Télétel access service acts as the interface between Minitels and the servers in three ways, namely as a telecommunications device, for interaction between users and servers, and as a means of determining the method of payment (box 1).

Box 1. The features of the Télétel access system

The Télétel network consists of the RTC, Transpac and the videotex access points. It links the Minitels with the server.

- The switched telephone system. The RTC was developed under the Telecommunications Plan during the 1970s (see above); it is 70 per cent digital and covers all of France.

- The Transpac network is a nation-wide public transmission network for batches of data. It makes possible the transmission and routing of data between businesses and serves as the interface between videotex access points and servers.

- The videotex access points link the two networks.

Source: based on Rincé (1991, pp. 20-21)

By combining these techniques, anyone who is connected to the network has access to data-transmission, service providers and communication facilities. The Minitel is compatible with other techniques and technologies used in business, such as personal computers, office electronics and other telecommunications devices. It can be used by companies for sales or financial transactions, and as a promotion, telecommunications or information tool.

The Minitel was the first instrument that combined a computer with a telephone and, as such, it became dominant in its field from the middle of the 1980s. Thanks to the Télétel system, firms could develop their own server and bulletin board, as well as use them for in-house, external and business communications, and for relations with customers and suppliers. Confidentiality of data is ensured by the fact that this is a closed network (not accessible from the outside), as well as by access codes or passwords. This is one reason why the Minitel is more popular than the Internet in France, with both consumers and business. In France, 95 per cent of firms with more than 500 employees and 80 per cent of all businesses use the Minitel.

The "Kiosque" system provides for secure billing and ease of access

Users of the service are charged for calls from their Minitel to the server as well as various rates for using services. Billing is included with invoices for telephone service. France Télécom collects all payments and turns over portions to service providers. "This billing system, which requires no password or subscription, exists nowhere else in the world; it makes things simpler for users (a single bill) as well as for service providers, who need not concern themselves with collecting payment." (Rincé, 1990, p. 103).

A clear division of responsibilities among the participants

A service offered by the Minitel requires a co-operative effort on the part of three players, namely France Télécom, the service provider and the supplier of the medium. France Télécom acts as both the carrier responsible for the quality of transmissions and the network's overall manager. It looks

after the finances of the system by setting rate levels, giving out codes, collecting fees and redistributing payments. Service providers create the sites and are liable for their content. Those supplying the medium are the servers, which act as the interface between the services and the networks. Clear boundaries have enabled each participant to develop an expanding market with capital investments under their control. (Rincé, 1990, p. 102).

The "network effect"

All industrial projects targeting new markets are initially faced with problems caused by the lack of both supply and demand. It is not sufficient just to promote new technology for a market to develop. Problems caused by the lack of demand and supply can be long lasting and ultimately lead to the success of less ambitious but more accessible competing projects (those more akin to past practices and customs, or less costly)[6]. That is why the videotex development policy had as its objective to break this cycle and to generate a "network effect" (see Box 2), by making equipment available to the broadest population, developing public services, using cross subsidies to reduce the cost of certain services and assisting new-project developers.

Box 2. Positive network externalities, increasing returns from adoption and "network effect"

By the "network effect" we mean the dynamic process by which a solution becomes useful or useless depending on whether it is adopted: *"The circumstance in which the net value of an action (consuming a good, subscribing to telephone service...) is affected by the number of agents taking equivalent action will be called a 'network effect'"* (Liebowitz and Margolis, 1994, p. 135). This process depends on the existence of increasing returns from the solution adopted, with six sources in all.

1. Learning by using (Rosenberg, 1982): the more widely a given technology is adopted, the more frequently it is used and the more productive that technology becomes (up to a certain saturation point).

2. Positive network externalities (Katz and Shapiro, 1985, 1986a, 1986b): the usefulness of a product for its user increases the more it is adopted, directly through the widening of the community of users (e.g. the telephone) and/or indirectly through the improvement in the supply of related products.

3. Economies of scale: the extensive adoption of a product yields economies of scale for the production of its component parts.

4. Reduced risk (Cowan, 1991): the more widespread a technology, the lower the risk from adopting it.

5. Expansion of the compatible environment: the greater the volume of production, the greater the number and range of compatible products (Chou and Shy, 1990).

6. The "Bandwagon effect" (H. Leibenstein, 1950): the more widely distributed a product, the easier and cheaper it is to obtain information about it.

Source: Faverie, 1996, pp. 30-31.

A mass-development strategy

Unlike in other European countries, where systems were developed in which all services were sited on the powerful computer system of the national telephone company (Germany, United Kingdom, etc.), the architecture of the French network was standardised to include as many services as possible. First generation terminals were given to telephone subscribers free of charge[7], and were extremely easy to learn to use. The techniques selected made it possible to keep the cost of access as low as possible, both for service providers and for users (it costs as little as FF 100 000 to start an information service). This approach had the advantage of countering objections by potential users based on operating difficulty and cost.

Considerable public-sector input

On the supply side, the government played a role as a service supplier and project promoter by creating services such as the Electronic Directory (Table 2), which is still the most widely used service today (France Télécom, 1996a), or by helping media companies develop their telematics projects[8].

The Electronic Telephone Directory combined data processing and teleinformatics by creating a very large data bank (24 million subscribers in 1989) that could be consulted from a distance by thousands of users at the same time. Simple to use and flexible, the Electronic Directory was designed to gradually replace the printed versions and relieve telephone directory assistance services. Users can access the data bank containing 24 million names and retrieve information based on four variables, i.e. the subscriber's name, occupation, address or location. Using the index, it is also possible to obtain data about telecommunications products and services, as well as full postal codes and considerable information regarding the rights of citizens and administrative procedures. For business, the electronic directory is also a new promotional tool. It provides a 24-hour showcase with information on the business, sales outlets, products, etc. The Electronic Directory is also used by firms for their direct-marketing campaigns (Rince, 1990). Whether we take the figures for 1988 or for 1994, the telephone directory is still the most widely used telematic service. In 1988, 85 per cent of Minitel users had consulted the directory during the previous month (INSEE, 1988). In 1994, this service was still the service that 45.8 per cent of households consulted the most (INSEE, 1994). Calls to the service totalled 23 million hours per year (France Télécom, 1994), or close to 20 per cent of total traffic.

Table 2. Calls to the Electronic Telephone Directory in millions of hours per year

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Traffic	13.2	16.4	19.9	22.0	23.0	23.0	23.0	23.0	22.0	22

Source: France Télécom; *La Lettre des Services en Ligne*, 1997 figures.

Cross subsidies

As the network faced no competition, France Télécom was able to cross-subsidise various types of services and customers, but mainly between telecommunications and telematic services. According to T. Housel and W. Davidson (1991), the Minitel project would never have come to life in the absence of subsidies from the telecommunications side. Because of cross subsidising, the DGT was able to set rates

based not on the financial performance of the project but on the market penetration and development objectives adopted. The absence of competitors had another impact. Since France Télécom started its project in an environment where no network service existed (in France, the Internet was not yet accessible in 1983), it benefited from the broadest possible development base.

From "personals" to "business to business"

"Personals" helped launch the Minitel

Another advantage which helped the Minitel was the relatively flexible attitude of the government and France Télécom (officially until 1987) with respect to bulletin boards for personals. From 1983 to 1987, the growth of the Minitel was attributable primarily to the increase in this type of service ("sex chat lines"). In 1987, calls to those sites totalled 2 million hours a month, or close to half of all consumer calls at the time (Table 3). A segment of public opinion objected to this use of the Minitel, which was denounced by several opposition members of parliament. The media gave the issue wide coverage and it became a problem relating to public morals. There was a spectacular drop in monthly calls to 3615 sites (from 70.6 million in January to 52 million in November), caused in part by companies barring 3615 calls from business terminals and a general drop in the use of the Minitel (down 10 per cent for Kiosque services). In an effort to stop this slide and save the Minitel, the government and France Télécom decided to react by making the network more "moral" and focusing on the market for business-to-business services.

Table 3. Volume of traffic at call numbers[1]

millions of hours on-line per year

B to C	"General Public" Services (B to C)		"Professional" Services (B to B)		"High Value Added" Services
	3614	3615	3616	3617	3628 et 3629
Tariffs (hourly in French Francs)	21.90	50.05 58.40 75.10	30.78 44.86	131.40	328.50 543.40
Description	Organisations offering products and services via correspondence, such as banks, travel agencies, games and "personals"		Points of access - in general to databases - aimed at professionals, where information can be obtained relating to a professional's particular activity.		Services consulted principally by professionals. Essentially data bases
1987	13920	34444	169	7	0
1988	19540	32630	3254	202	23
1989	24200	33703	5751	710	123
1990	27252	34906	7754	1344	353
1991	28617	34708	8932	2072	731
1992	30986	35192	8726	2671	1174
1993	33365	36454	7500	3037	1378
1994	33878	33319	7665	3341	1285
1995	33010*	32775*	6677*	3435*	11492
1996	33000*	37577*	2504*	3898*	7783
1997	30560*	39244*	2386*	4076*	7141

1. The codes in the above table refer to different categories of tariff and not to any specification more precise than "general pubic", "professional", or "high value added". There are equally services billed to the server, services directed at the hearing-impaired, etc. The codes "3615" and 3614" have the same definition of service, but their tariffs differ. Consequently, it is normal to find equivalent and competing services in the same range of tariffs and, therefore, under the same code. It may happen that a producer has chosen a strategy of differentiation by selecting a category different from that chosen by the majority of competitors. For a more complete discussion of services, see Annex 1.

Source: Figures for 1986 to 1994 were published in *La Lettre de Services en Ligne*, Annual Report 1994. Other figures were estimated based on partial data (generally for 9 months, except in 1997, when France Télécom had information covering only the first half of the year).

* Transfer to 3623.

Making the Minitel moral

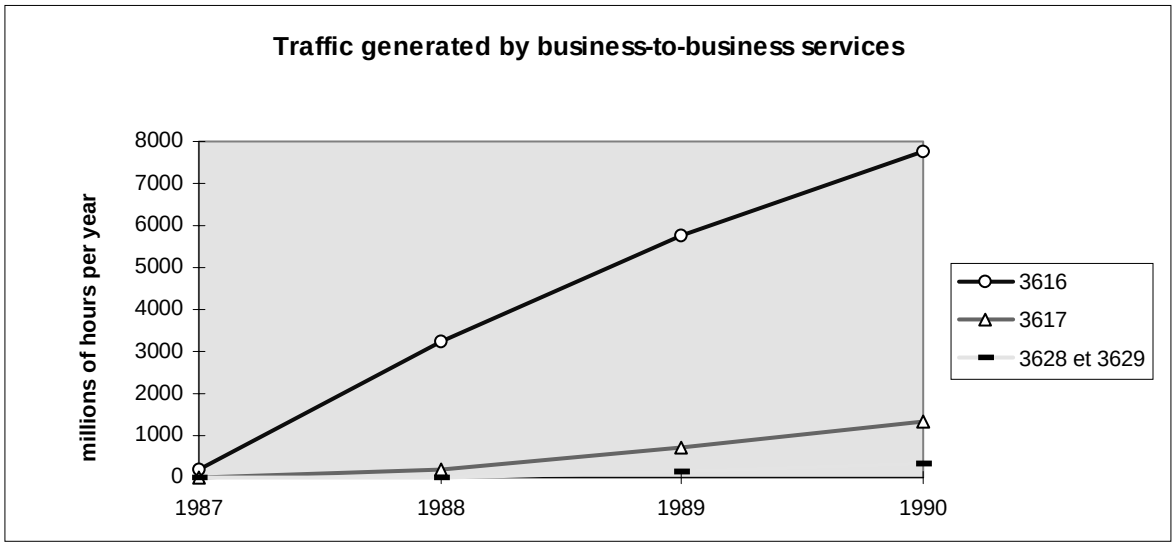
"It is immoral for the government to use billions in public funds to create a network and assume the investment risk so that a few bulletin-board services can enrich themselves shamelessly. This is contrary to the public-service nature of telecommunications," declared then telecommunications Minister Gérard Longuet[9] (*Vidéotex magazine*, 1988). The manner in which the morals of the services were to be improved was by adopting a Minitel code of conduct, setting up a consultative committee for handling disputes arising from the granting of access numbers, and charging different rates for 3615, 3616 and 3617 services (see Table 3 and Annex 1).

The development of business services

Having denounced the "depravity" of personal bulletin boards, Gérard Longuet added that "the data system must primarily contribute to the French economy and be used by firms that increase our nation's wealth." (*Vidéotex magazine*, 1988). France Télécom launched a new advertising campaign, with slogans designed to appeal to business ("*Taper Télétel c'est taper fort en affaires*" and "*Télétel plus que jamais à l'heure professionnelle*"). During the ensuing years, there was an expansion in business-to-business services accessible by dialling 3617, 3628 or 3629. From 1987 to 1990, the number of business sites is reported to have risen by 104 per cent, while there was a 127 per cent increase in calls (Brousseau, 1991). In subsequent years, the growth in services levelled off at 16 to 20 per cent annually.

While this strategy of promoting business-to-business services was successful (Figure 2), it did not prevent bulletin boards for personals from holding on to their position as the leading consumer service (exclusive of the electronic telephone directory), accounting for 34.6 per cent of time spent on-line. In 1992, their share was still substantial, even though it had declined to 26.9 per cent (see Table 4).

Figure 2. An increase in business-to-business use

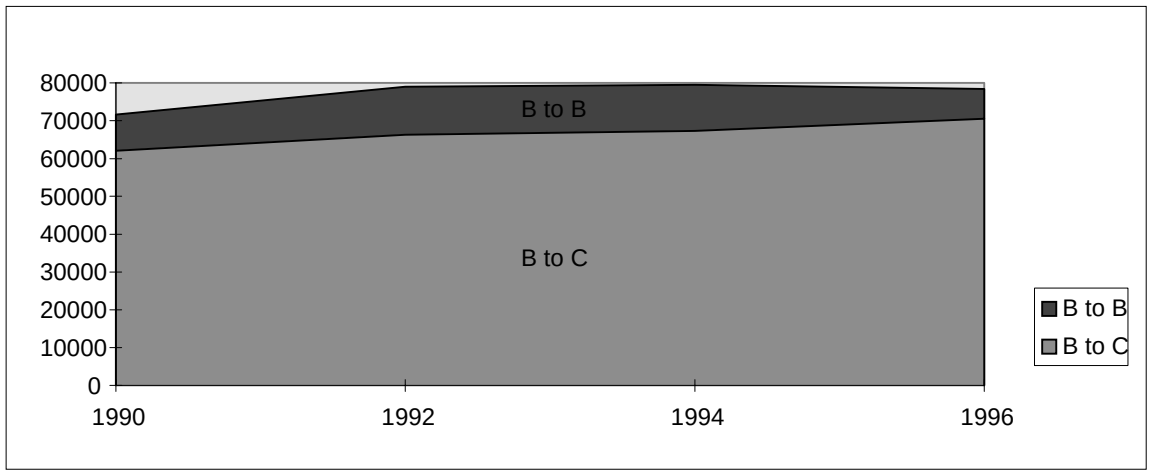


Source: France Télécom.

Numbers used by consumers generate the most traffic volume. Services accessible by dialling 3614 or 3615 accounted for 87 per cent of all traffic in 1990, 84 per cent in 1992, the same in 1994 and 90 per cent in 1996 (Figure 3 and Table 4). Measured in revenue, the imbalance in favour of consumer services is offset somewhat by the effect of rates[10].

Figure 3. Breakdown between business-to-consume and business-to-business services

in millions of hours on-line



Source: Faverie, OECD, 1997

Table 4. Minitel use by type of service

Type of service	1988		Type of service	1992	
	All services	Consumers excl. electr. directory **		All services*	Consumers excl. electr. directory **
Business-to-business	27	-	Business-to-business	22.8	-
Electronic directory	18	-	Electronic directory	20.7	-
Personals	19	34.6	Personals	15.2	26.9
Bank-to-bank	11	20.2	Bank-to-bank	10.6	18.7
Consumer services	10	18.1	Jobs, training, media	9.7	17.1
Games, entertainment	10	18.1	Games, tests, astrology	8.1	14.3
General information	5	9.0	Leisure, tourism, shopping	7.0	12.4
			Transportation	6.0	10.6
	100	100		100	100

* Source: France Télécom.
** Figures derived from the preceding column. Faverie, OECD, 1997.

Overall productivity

For the French government, the Minitel is considered a success because its evaluation of the project is not assessed on the basis of pure financial return, but on that of "overall productivity" standards, including short-term and long-term positive economic and social externalities (see Box 3).

Box 3. Measuring the productivity of the Minitel

In 1989 a dispute arose between an Inspector General and the then Minister for PTT and space, Paul Quilès. The Inspector's report claimed that the Minitel project was not breaking even.

Paul Quilès answered by first stating that "the system must be evaluated not just on the basis of its immediate income but on that of the income it generates for the rest of the economy," and secondly that "the productivity of this system can be measured only over the long run"; and finally that "it is very hard to assess the social benefits from special services for the handicapped, free information, distant education, etc. from a standpoint of financial profitability alone."

By adding up the income generated by the entire Transpac system (FF 650 million); the increase in revenue by firms manufacturing the technology, software and terminals required by the system; and the growth in VAT generated by the system[11], the Minister came up with a total added value generated by the project of about FF 5 billion in 1988.

Source: based on Housel, Davidson, 1991.

Limited democracy

It is important to note, however, that the objectives which aimed to make the Minitel accessible to the whole population were not actually achieved. In spite of the extensive distribution of Minitels to households, free of charge, people with a higher socio-professional status, income and level of education are far more likely to own terminals and use the services (France Télécom, 1990; INSEE, 1994).

PART 2. REAPPRAISING THE SYSTEM

Has the Minitel peaked?

In 1994, the expansion of the Minitel system in France started to decline. Although the drop in the number of Minitel terminals sold was apparently compensated by the growth in emulation boards, there was a decline, firstly, in the total number of Minitel compatible terminals, and secondly and more importantly, in calls to the Kiosques. Furthermore, the Internet started catching up with the Minitel.

A switch from Minitels proper to Minitel emulation boards

Following considerable growth in the number of Minitels in France, which continued until 1985, the annual growth rate began to fall and, although Minitels were being replaced by newer models[12], from 1990, it continued to decline at an even faster rate (Table 5). However, it would appear that from 1990 to 1994, this stagnation in the number of Minitels was compensated by the growth in the number of Minitel emulation boards which enable a PC to access the Minitel (Table 6)[13].

Table 5. A declining number of Minitels

Year	1985/83	1987/85	1989/87	1991/89	1993/91	1995/93	1997/95
Change (per cent)	+ 1472.5	+ 78.7	+ 50.0	+ 18.5	+ 8.0	- 0.2	-3.0

Source: OECD, based on the data in Table 1.

Table 6. Growth of emulation boards

Year	1993	1994	1995	1996
No. of Minitel emulation boards (thousands)	390	700	1 000	1 300*
Annual growth rate	nc	+79.48	+ 42.85	+ 30

* Figures provided by France Télécom (1997b)[14]

Source: IREST bulletin, No. 75, 1996.

A decline in calls to Kiosques

Through 1994, the Kiosque system kept posting new highs in terms of its business information services (up 17 per cent in 1994, according to France Télécom), while services to consumers began to decline. Overall volume was stagnating (Table 7). In 1995, growth in the business-to-business sector also started to drop sharply (see Annex 3). Revenues of service providers rose by a mere 5 per cent. From 1995 to 1996, Télétel sales fell by 4.5 per cent, to FF 6.3 billion from FF 6.6 billion (France Télécom, 1996a).

Table 7. A fall in Minitel volume

(excluding the electronic directory)

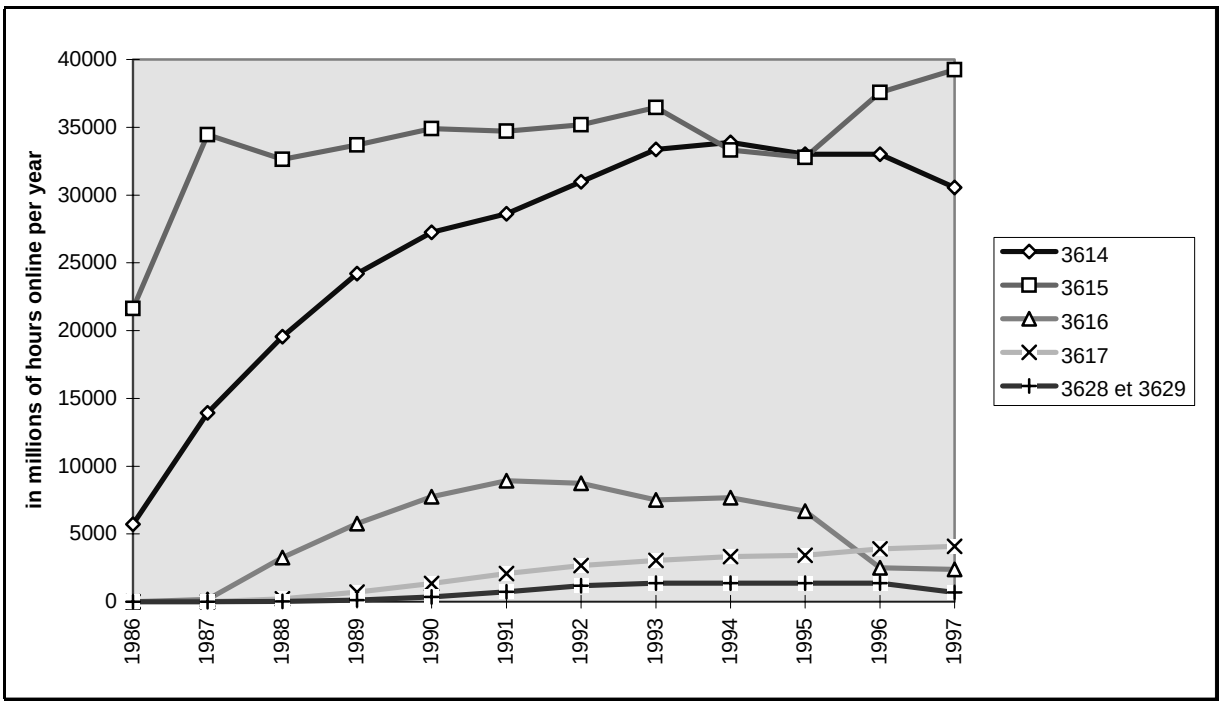
	1990	1991	1992	1993	1994	1995	1996	1997
Calls (millions) *	862	938	1 015	1 094	1 130	1 091	1 118	1 157
Hours (thousands) *	78 710	82 735	86 943	89 688	87 023	84 000	85 000	83 000
Duration of calls (minutes) *	5.48	5.29	5.14	4.92	4.62	4.62	4.50	4.30
France Télécom Kiosque revenue (FF million, net of VAT)**	1 918	2 239	2 545	2 994	3 060	3 100[1]	3 200	2 900

1. Data not available from France Télécom, estimated for Figure 2.

Source: * France Télécom direct communication 1997. ** *Lettres des Services en Ligne,* 1997 figures.

Kiosque services appear to have peaked in 1993, for both business-to-business and business-to-consumer services (Figure 4).

Figure 4. Have Minitel services peaked?



Note: Services accessible by dialling 3614 and 3615 are for consumers; others, accessible by dialling 3616, 3617, 3628 or 3629 are generally business services.

Source : Figures for 1986 to 1994 were published in a special issue of *La Lettre de Télétel et Audiotel* , with a review of business up to 1994. Other figures were estimated based on partial data (generally for 9 months, except in 1997 when France Télécom had information covering only the first half of the year.

The Internet is catching up

According to the IDC consulting firm (1996a), the Minitel generated about FF 12 billion in revenue in 1996[15]. The Internet was still a negligible quantity at the time, but IDC believes that it is going to catch up with the Minitel in terms of volume by 1998/1999, with both systems generating around FF 15 billion in annual business. The 2001 forecast for electronic commerce in France puts total volume at FF 57 billion, or about 2 per cent of domestic private spending for 1996. Out of those FF 57 billion, FF 9 to 10 billion would consist of consumer spending, and the balance of "business to business" purchases. The sector should start to expand sharply in 1997, with a total volume estimated at FF 410 million. The US market was estimated at USD 1 billion in 1996 and is expected to reach USD 100 billion by the year 2000. The data and estimates correspond to those of Datamonitor (Datamonitor, 1996). According to this firm, consumer sales over the Internet in France are expected to increase from USD 1.5 billion in 1997 to USD 13.7 billion in 2001.

The original system's limits

Other explanations have also been suggested, such as the shortcomings of the system and its inability to meet demand on the one hand, and the better organisation and technological edge of the Internet on the other. Recent surveys by France Télécom have disclosed areas of discontent on the part of

users (both businesses and consumers) with the Kiosque services (see Table 8). The main criticisms of the system are that it is obsolete and too slow and that its profitability is a factor of the time spent on-line. At the macro-economic level, the system is suspected of shielding costly services with little added value from foreign competition and of hindering the expansion of personal computers and the Internet in France.

Table 8. User dissatisfaction with the Minitel

Study	Scope of study Methodology	Findings
France Télécom	Télétel, Audiotel: 1994 data. 4 series of 2 000 surveys conducted on a sample of 1 800 French persons 15 and older.	**What is your opinion of the cost of the Minitel?** Too costly 56.5% Fair 25.1% Inexpensive 18.4% **Why don't you use a Minitel at home?** Too costly 66.3% Too time consuming 52.7% Too complicated to use 42% Not useful enough 19% **How can the Minitel be improved?** By lowering rates 91.4 By making it faster 81.5% By improving the information 78.1% By making it easier to use 61.3 %

Source: France Télécom, *La Lettre des Services en Ligne*, Special Issue No. 13, June 1995.

An obsolete technology

Faced with a rapid innovation dynamic, a public policy of mass development like the one followed by France Télécom has two disadvantages: it is extremely expensive and can only evolve in large consecutive leaps. This is why the Minitel failed to keep up with changes in electronic data systems: with its black and white monitor, time-consuming page-by-page scrolling, no hypertext or icons and no possibility of saving information.

Negative consequences of the quest for profitability

Today, it would appear that the Kiosque system, which provided the impetus for the Minitel, has become the principal obstacle to its continued growth. Users are effectively charged for the time they spend on-line and service providers are paid accordingly. Hence, for most services, only the duration of calls matters. The more time a caller spends on a call, the greater the return. Hence there is a tendency to make calls last longer. The Minitel format thus works in a perverse way, since simple, fast and efficient services generate less revenue than complicated, slow and inefficient ones (at least in the short run, for over time demand will inevitably drop).

Excessive mark-ups

As a result of the above, the overall value of services seems to be far lower than the fees charged. There are two reasons for this, one being that the added value of the services is too low, the other that providers set rates for their services in excess of their actual value.

Increased competition

The preceding arguments bolster the view that the Kiosque system has peaked. The market is no longer such that the novelty value of services is a more important consideration than their price (a situation which generated returns from innovations); the market has now moved beyond this take-off level and is at a stage where suppliers are going to have to lower their mark-ups if they wish to endure and expand. There is competition among services and systems, so that value for the money becomes a key factor and only efficient and competitive services will survive. Competition from the Internet has become a reality. Primarily demand driven, it is likely to force providers on the Minitel to upgrade their services by offering more value and lowering prices.

Limited export markets

One of the major objectives of the French electronic data system was to export all of its component parts, including the standards, technology, equipment, software, know-how, etc. The next target after the domestic market was the global market, which would make it possible to earn a return on the considerable capital investments made at home. The ambitious programme did not fare as well as expected. The Télétel standard was adopted (either officially or informally) by only a few countries, including China, Greece, Israel, Switzerland and Turkey. In Spain, certain private groups, including banks, have set up Télétel access points for customer services; this resulted in tens of thousands of Minitel terminals being sold there. At the end of 1994, 15 countries were connected to the Télétel system using Minitel emulation boards (see Table 9) for a total of 230 737 hours per year, or only a little over a quarter of the French figure for the same period.

Table 9. Minitelnet use in foreign countries, 1994[16]

Country	Use (annual hours on-line)	Share of total (%)
Italy	116 890	50.66
Belgium	38 073	16.50
Switzerland	18 723	8.15
Luxembourg	16 880	7.32
Portugal	10 575	4.58
United States	8 557	3.70
Andorra	6 995	3.03
Netherlands	4 245	1.85
Germany	2 423	1.05
United Kingdom	1 830	0.79
Gabon	1 733	0.75
Other countries	3 813	1.60
Total	230 737	100

Source: *La Lettre des Services en Ligne*, Special Issue No. 11, June 1994.

The uncompromising 'Frenchness' of the services on offer can explain the limited take-up of Télétel services abroad. If the aim was to target the global market, then the services should have been modified to suit the needs of global customers. This could have been achieved, in particular, by integrating foreign services into the system or increasing the number of foreign versions of French services. Furthermore, those implementing the system abroad did not take the measures implemented in France to overcome the problem of a simultaneous lack of supply and demand.

Lagging behind in home computers and the use of the Internet

On 25 August 1997, French Prime Minister Lionel Jospin noted that "the small number of homes equipped with personal computers and the still limited number of French users connected to the Internet confirm that the we have fallen behind." Figures reviewed by the OECD (see Table 10) disclose that indeed, France does lag behind most other OECD countries in computers. In 1995, only 14.3 per cent of all French homes had personal computers, as compared with a ratio of 32 per cent in Denmark. In Canada, 28.8 per cent of all homes had personal computers and the figure was above 20 per cent in the Netherlands, the United States, Germany, Belgium and the United Kingdom.

Table 10. France is behind in home computers and Internet connections

Study	Scope of study Methodology	Conclusions
Andersen Consulting		In 1997, 15 per cent of French homes had personal computers, as against 45 per cent of US homes.
OECD: Information Technology Outlook 1997, p. 98.	IT equipment in selected OECD countries.	Percentage of homes equipped (1990) PC — Videotex Canada 16.2 -- USA 15.0 -- France 11.0 16.9 (Minitel) Percentage of homes equipped (1995) PC — PC with modem — Videotex Denmark 32.0 -- -- Canada 28.8 -- 9.8 Netherlands 27.0 -- -- United States 25.5 -- 15.4 Germany 25.0 -- -- Belgium 21.0 -- -- United Kingdom 20.8 -- 4.0 Ireland 18.0 -- -- Japan 15.6 -- 3.0 France 14.3 20* (Minitel) 1.0 Italy 14.0 -- -- Spain 12.0 12.0

* 1993 Data

Source: Author.

According to Mr Jospin, "the Minitel […] could end up hindering the development of new and promising applications of information technology[…] We are determined to close the gap in terms of information technology, as it could soon have dire repercussions on competitiveness and employment […] [That is why, he adds, we must] favour a gradual shift of Minitel services over to the Internet […]" (Hourtin, 25 August 1997). [17]

PART 3. THE FUTURE OF MINITEL

Faced with this situation, a series of proposals and changes have been launched to embrace the Internet while exploiting the unique qualities of the Minitel. France Télécom has developed the ISI project, the *Internet Service Intégré* (Integrated Internet Service), a new webphone system comprising telephone services and Minitel and Internet access.

The France Télécom proposal

In early 1996, France Télécom launched a new project, an Internet-compatible Minitel providing access, without the use of a computer, for the price of a local call. At the time of writing, the project is still relatively secret and the product, with the temporary code name "ISI" *(Internet Service Intégré)*, is still only at the prototype stage with the first usability tests due to start in December 1998. The service is scheduled to become available in 1999 and promises to include all the good qualities of the Minitel while diminishing its shortcomings.

Internet/Minitel integrated terminal project

France Télécom's project aims to exploit both the growth of the Internet and the established market for Minitel services. The new terminal will enable users to use telephone services and access the Télétel network and the Internet. It would be an integrated terminal, providing access to the Minitel services in a familiar format (using a faster videotex system) and the Internet. The interface will consist of an NC (Network Computer), a personal computer stripped of any hardware not needed for the Internet (floppy disk drive, hard disk, CD player), which will get its "intelligence" from the network. The system has the advantage of being less costly than a PC, as it will be priced at between FF 2 000 and 3 000 for home models[18] and FF 4 000 to 4 500 for business units. The cost of subscriptions will range from FF 60 to FF 200 per month depending on the service option selected.[19]

A project with non-proprietary standards open to competitors

ISI will use Internet language and presentation (including hypertext). Compatibility with TCP and IP will enable ISI users to access and use the Internet. The standards to be used will be developed by a forum of companies, ISRF (Internet Screenphone Reference Forum)[20], which brings together network operators such as France Télécom and KPN, companies specialising in electronics such as Alcatel, Matra Nortel and Philips, and in computers, such as IBM, Sun, Lotus and Belgacom and service providers[21]. According to France Télécom, new players are also welcome to participate in the forum and assist in the development of the standards. It is intended that forum participants reach a broad consensus on the standards to be applied, and that these standards be in line with developments on the Internet. The standards will then be codified and made public. Once this process is complete, manufacturers building competing terminals should be able to use the standards and market their products freely. The standards chosen by the forum will form the basis of all new terminals which must incorporate them if they are to be

sold on the market. However, nothing must dampen the innovative spirit of terminal manufacturers. They should be able to develop their products and integrate new components not necessarily emanating from the forum. France Télécom will pioneer the market by launching a range of new terminals in 1999, selling them through their network of outlets and authorised distributors. According to France Télécom, once they have set the ball rolling, "nothing should prevent manufacturers from selling competing terminals through other distribution channels, in particular through general retail outlets. It all depends on how the market evolves and the return manufacturers can earn by developing competing products."

Promoting the Kiosque fee system

Rates are to be set based on past experience by both the Internet and the Minitel, with various alternatives including time charges, service fees or flat rates. Management and co-ordination will remain centralised for traditional Minitel services and also for Internet services, which will use the Kiosque fee system. This centralised payment system uses time-based charges and is managed by France Télécom. The computer Kiosque system was launched on the Internet in April 1996. With this project, France Télécom hopes to demonstrate the usefulness and effectiveness of its fee system, while at the same time expanding its potential market. France Télécom's management and the government both believe that there is a potential for centralised billing on the Internet system and that the Kiosque system would be better designed for this purpose than the existing systems on the Internet, especially those designed for high volume, low-cost information services. "The transitional stage presents a unique opportunity for time charges," notes France Télécom chief executive Michel Bon (*Le Monde*, 30/08/97).

France Télécom to provide access to the Internet

In July 1997, the Telecommunications Regulatory Authority (*Autorité de Régulation des Télécommunications* - ART) gave permission to cable operators to offer subscribers high-speed access to the Internet.

Reactivation of the Internet-Minitel connection

At the same time as it is developing the project to offer Minitel users access to the Internet, France Télécom is giving new life to its Internet-Minitel connection (Table 11). Opened in 1988, the connection gives Web users around the world access to all Minitel services. It can be accessed through the Web at minitel.fr or minitel.com. It enables service providers on the Minitel to participate in the development of the Internet. France Télécom set up the Minitelnet service, enabling Minitel users to use an e-mail address and to exchange electronic messages with Internet users.

Table 11. Access to the Minitel via the Internet - Traffic volume

Traffic volume	1988	1989	1990	1991	1992	1993	1994
Volume of calls (thousands of hours)	1	3	152.4	312.2	506.2	931.2	1 344.4
Increase (in per cent over previous period)	-	+ 200	+ 4 980	+ 104.8	+ 62.1	+ 84	+44.4

Source: France Télécom Intelmatique (www.minitel.fr).

For France Télécom, the project is interesting from several standpoints. The telephone company is expecting revenues on the order of FF 3 billion a year; it will become an Internet access provider; the project will also makes the Kiosque system available to foreign companies and give France Télécom a strong voice in French policies concerning the information superhighway.

Télétel and Internet: partners or rivals?

Hardware targeted at different users

In contrast to when the Minitel was first brought out, the new hardware will not be free. Furthermore, there are now many ways to access Minitel services via the Internet[22]. When the transition takes place, users will have the choice of either the France Télécom NC (Network Computer) costing about FF 2 500 to access the Minitel and the Internet, or a PC with a modem, with computer applications in addition to the Internet and the Minitel, for about FF 10 000. The two packages on offer would not necessarily appeal to the same category of user. Although France Télécom is offering a less sophisticated product, it is cheaper and would appeal to consumers who are not particularly interested in using the more advanced applications that come with a home PC.[23]

Télétel: The advantage of being the first market entrant

The Télétel network is French and was the first network to be available on the French market. It has an edge over the Internet in terms of its language, established user base and reputation, and customer loyalty. Furthermore, France Télécom is in a position to offer Internet access to a mass market and thus benefit from economies of scale which can be passed on to consumers. As a result, France Télécom could be a highly competitive player in this sector.[24] The ability to access the Internet through the Minitel should stem the decline in the demand for Minitel services and allow it to benefit from the network externalities associated with the Internet.

France Télécom's approach means that service providers currently operating through the Télétel network are in a position to choose whether to continue doing so or switch to the Internet. According to Louis Roncin, head of the *Syndicat National de la Télématique* (and Chairman of AGL, one of France's leading on-line service providers)[25], the majority of French service companies are in favour of preserving the Télétel network (in particular the centralised payment system) as it would shelter them from exposure to the intense and fast-moving competition present on the Internet and would give them time to grow and become more competitive.

Electronic mail: integrating the "killer application"

The Internet will always have the upper hand over the Télétel network as long as the latter fails to develop an electronic mail system, the Internet's "killer application". The absence of email on Télétel no doubt protected the postal and telephone services from the ferocity of electronic mail, but today, it would appear that one of the main reasons why French users connect to the Internet is to gain access to this service. An integral part of the ISI project is the provision of an email service; access to both the "killer application" and the Télétel network will thus be possible from a single user interface and will enable Télétel to compete with Internet/PC's on an equal footing.

Innovation and the uncertainty factor

In addition to the 'network effect', there is also the problem of innovation. It is important to differentiate between innovation firstly, in the context of the ISI project, and secondly, in relation to the Télétel network. In principle, the ISI project "should apply the most advanced telematic techniques available", which according to France Télécom should make the ISI system "faster, more reliable and more profitable for service companies than the PC Internet system" (assuming equal demand). However, such sophistication will not be a feature of the first ISI terminals. According to Mr Zermizoglou, head of France Télécom's Minitel-Internet project, "to attract the consumers we are targeting, we need to come up with the cheapest possible terminal, although we are also well aware that our target users are quite taken by some of the more sophisticated features such as a colour screen. It's a marketing problem. When we launch the first webphone we don't yet know if we should launch the cheapest, least sophisticated model (black and white monitor, no facility to receive charts and tables as still images), a more expensive, sophisticated model (colour monitor, charts and tables), or the whole range. It all comes down to marketing, not technical know-how." The first terminals (generation 1999), will not be able to reproduce the moving pictures and sound effects available on Internet services, although more sophisticated versions may be launched in the future. However, with its position on the market as it is, the system will always be catching up and imitating its competitors.[26] As for the Télétel network, innovation is even more uncertain. The network should no longer be developing but should aim to continue in its present form. If anything, service companies will switch from Télétel to the Internet.

Has the Minitel experience had a positive impact on the French multimedia sector?

At first glance it would appear so. Both service providers and users in France are now familiar with the consumer electronic commerce market, a consumer base has been established and French service companies are held in high repute. On the other hand, the Internet and Minitel systems differ in the way they are organised, and in the way they generate income and market their services. Furthermore, the know-how acquired by French players in this field is not directly transferable to the Internet. When asked "is it useful to have videotex know-how when working on the Internet?", 56 per cent of respondents said no (France Télécom, 1997). It is important to note however, that although 62 per cent of French players believe that they will not make money on the Internet, 75 per cent have already created their own Internet site or plan to do so (France Télécom, 1997a).

The shift to the Internet is already under way

The broad availability of the Minitel, and over a decade of experience in using it, means that France has a highly computer-literate population and the transition to the Internet should be relatively easy. Although a relatively small portion of French businesses use the Internet (Table 12), the transition could be relatively rapid. In terms of demand, the development of the Intranet networks should provide the impetus for more widespread use of electronic mail. On the supply side, a recent survey by Le Monde Informatique of France's 1 000 largest firms found that a quarter of the firms were present on the Internet and the number of French-based Web sites had more than tripled in one year, increasing from 10 000 to 30 000.

Table 12. In France, only 10 per cent of all businesses are connected to the Internet

Survey	Survey scope	Methodology		Market penetration
		Population polled	Sample size	
LOUIS HARRIS	Businesses and the Internet August 1996	Chief executives of firms with 10 or more employees	403	9% of all firms are connected to the Internet. 3% of all firms have a Web site and 19% plan to acquire one. 5% of all firms have an intranet, 17% plan to set one up.
IDC	Internet and intranet projects. Late 1996	Major French corporations.	100	22% of all German, French and British firms have set up an intranet system; in 7% it is in progress; 21% plan to have one.
UFB LOCABAIL	Computers in small and medium-sized firms. January 1996	Firms with 6 to 200 employees	6 000	7% of all small and medium-sized firms are connected to the Internet.
BVA for SFIB and SYNTEC INFORMATIQUE	French employers and telematics. End October 1996	Decision makers (half of them CEOs). Private-sector executives.	500 705	29% of all French firms use telematics to communicate with their subsidiaries.
INFOCLIP	Capital spending for multimedia. September 1996	Communications officers of corporations in the Paris area with more than FF 100 million in revenue and more than 100 employees	500	13% of all firms have created multimedia applications, 38% have opted for the Internet. 23% have projects in this area.
TELETECH INTERNATIONAL for *TELETRAVAIL MAGAZINE*	Work at home, equipment in office or home. September 1996	Chief executives.	500	43% of all chief executives use a modem to transmit data. 4.5% use an Internet link at the firm.

Note: When considering the conclusions of the surveys, it is important to keep in mind that each used a different working method, sample population and sample size.

Source: "Les Entreprises Françaises et l'Internet : des Informations encore Limitées" DAFSA, 1997. http://www.dafsa.fr/commerceline/numero2/French-version/Enquête htmls.

Long-term risk of losing customers to Télétel

This changeover could lead to a reverse network effect for the Télétel system. Whilst the growth of a network is fostered by positive externalities and increasing returns so that its acceptance grows exponentially, the absence of these factors has the opposite effect. This means that the less a network is used, the less useful it is for its customers, the less profitable it is for service providers, and so the less it is used. As such, as more services migrate from the Télétel to the Internet, the Télétel will see its installed base shrink.

PART 4. LESSONS FOR ELECTRONIC COMMERCE

As an early pioneer of on-line services, the Minitel has already confronted many of the problems that today plague electronic commerce on the Internet such as user access, trust, a number of different payment systems, setting standards and creating a regulatory framework (Box 4). The solutions employed to deal with these issues make the Minitel a useful case study for electronic commerce in general.

Interventionist public policy as an aid to development

Like the Internet, Minitel was the product of public sector research and investment and grew out of a long term political, economic and social project. The public sector also created free on-line information and administrative services (for the price of a telephone call), and supported the creation and expansion of a number of services which, in France, were to become the Minitel's "killer applications".

Lowering entrance barriers to facilitate user access

The Minitel's answer to the problem of access to the network was to deploy a very sophisticated network system with terminals that would be now be called network computers or thin clients -- terminals that allow users to interact with a network but have little stand-alone computing power. This, along with subsidisation by the government, lowered the price of getting on-line and helped fuel a widespread diffusion of the technology, leading to a self-reinforcing network effect. Out of a total French population of almost 60 million, 15 million regular and 22 million occasional users own a Minitel. There are terminals in 95 per cent of all French companies with more than 500 employees and in 80 per cent of all businesses. Thus one potential lesson to be learned from the Minitel experience for the development of electronic commerce is the importance of lowering barriers to access, particularly in terms of price. "Our experience with the Minitel has taught us that in order to promote the use of computers and information technology in France, measures have to be taken to bring down the price of computer hardware and software, such as reducing the VAT." (J.L. Trétois, GEIS, in *Interview*, 2/09/97)[27].

"Business-to-business" as a launch pad for "business-to-consumer"

"Although Minitels were distributed to households free of charge, disparities in equipment between households have become apparent and are similar to those which emerge in the wake of all new technology. Income and profession (and also qualifications) are important factors" (INSEE, 1988, p 45). The socio-economic profile of the average Minitel user closely resembles that of an Internet surfer: a youngish (30-50 year old) male graduate working in senior or middle management[28]. A comparison of the data available on Minitel and computer use at home and in the workplace (TOTTO, 1987, 1993; INSEE 1988, 1995) appears to reveal that the same categories of people, if not the same people, use ITC at home and in the workplace. This implies that those who use TIC in general and, by extension, electronic commerce, at home, use it at work as well. This provides us with some insight into why, in terms of use and demand, business-to-business e-commerce is an important driving force behind business-to-consumer

e-commerce. Furthermore, in contrast to the Internet, the business-to-consumer segment of Minitel e-commerce dominates the business-to-business segment which implies that if a dynamic does indeed exist whereby business-to-business encourages the growth of business-to-consumer, it is not as powerful in the opposite direction[29]. Drawing from this analysis, a way to boost business-to-consumer e-commerce would be to develop professional hardware and encourage businesses to have terminals on their premises.

"Killer applications" and the growth of electronic commerce

Both Minitel and the Internet have witnessed the emergence of "killer applications" i.e. applications that dominate all the others available on the system. They pioneered electronic commerce and created a client base that other services could draw from. It is interesting to note that the most ferocious "killer application" to emerge from both the Minitel and the Internet was a free information service (pay only for the cost of the telephone call) - the information directory in the case of the Minitel and e-mail on the Internet. Apart from the different nature of these services, the 'killer apps' of the Minitel are very similar to those that dominate the business-to-consumer segment of the Internet: intangible products such as adult material, travel services and financial services. Consumer banking services on the Télétel network are particularly advanced. As early as 1988, calls to these services accounted for 20.2 per cent of all non-electronic directory traffic and in 1995, approximately 35 per cent of all bank account enquiries were made though the Télétel network (DAFSA, 1995).[30]

Establishing trust and user confidence: secure payment systems and respected transaction intermediaries

The Minitel has achieved a far higher rate of e-commerce transactions than what currently takes place on the Internet. Some of this success is attributable to a simple and secure payment system set up by the DTG, and to the fact that a well-known, trusted third-party, France Télécom, acts as a payment intermediary between the service and the consumer. This pre-existing relationship, and the ease of use of the payment system led to a rapid uptake of e-commerce. A lesson to be drawn from this is the important potential role of well-known and respected institutions as intermediaries in electronic commerce.

A fee system tailored to the type of service

As we have already mentioned, there are advantages and disadvantages to the time-based fee system employed by France Télécom. For a network operator with a long history of managing time-based communication charges, such a system would be simple to set up and run. This is not its only strong point, for such a system also means that all information services will generate income. For high volume, low-cost information services in particular, it would appear that a time-based system would be easier to install and be more efficient than other fee systems. The most serious drawback of the system is that it can introduce economic distortion into the relationship between the value added by a service and the rates charged or fees collected.

Fostering an innovative spirit

As successful as the widespread acceptance of the Minitel was, it effectively set a new technological standard which was not open to competitors. This locked in a technology that failed to keep up with other technological developments such as packet-switching protocols (e.g. TCP/IP) and protocols

that are broadly interoperable across a wide variety of communication service providers with other network providers. Consequently, the system and some of the services it supports may now be at an economic disadvantage vis-à-vis other network systems not based on proprietary technology.

One lesson that may be drawn from this is that *de facto* standards set by market acceptance may be superior to *de jure* standards set by the government or private entities. Although the Internet protocol, TCP/IP, was, like the Minitel, formally developed as a co-operative effort between government and industry, it was a non-proprietary, open system. Thus, the lesson to be drawn does not involve how standards are set, rather, the question is whether standards will be open to use by competitors. To achieve widespread adoption and interoperability, systems must be truly open.

Regulation and self-regulation of electronic commerce

As in the case of the Internet, the Minitel was confronted with an image problem because of the popularity of sex chat lines that threatened to limit its appeal to a mass market. It is interesting to note that the means by which the Minitel addressed issues of immoral services were similar to the self-regulatory mechanisms being tested on the Internet: establishment of a code of conduct, creation of dispute resolution mechanisms, assignment of different access numbers (filters) to different services and use of market mechanisms such as differential pricing for services to address public interest goals (taxes).

France Télécom's role as sole intermediary was the logical consequence of the government monopoly in the telecommunications sector at that time. It enabled France Télécom to cross-subsidise customers and services and, more importantly, telecommunications and telematic services. Cross-subsidisation helped get the project off the ground. As discussed above, France Télécom's unique role and identity gave consumers confidence that its servers were reliable, that any disputes would be effectively resolved, and that payments would be handled properly. The problem remains that a competition-free environment does not promote higher quality, lower prices or innovation. It is clear that if its Minitel services were to continue to be attractive, France Télécom would be forced to counter these economic distortions even though, like all other players in the network sector, it benefited from the rise in call times. As far as innovation was concerned, as a state-owned company, France Télécom had to have public service goals and make technical advances available to society as a whole. This was expensive and may explain why Teletel technology now lags behind that used to run the Internet. Another reason may be that, lacking competitors, France Télécom had less incentive to innovate. This raises the question of what role and structure are best suited to this intermediate level of electronic commerce, and how much competition is appropriate.

Table 13. Minitel/Internet: differences and shared features

Minitel	Internet
French system. Limited international market. The system is accessible to all Internet users but little use is made of that option (1.4 million hours of traffic in 1994).	Originally started in the United States but quickly expanded world-wide. Full Internet access is available in 69 countries and e-mail service in 146. Some 70 per cent of all servers are in English (1997)
➢Six million Minitel terminals in use, but they must be upgraded to the new interface standard. ➢ 25 000 servers (1996). ➢ 45 million users world-wide.	➢An existing base of 23 659 networks and 2.2 million computers. ➢240 000 sites listed in 1996; 100 000 new sites every month around the world. ➢ 82 million users world-wide.
Network Computer system.	PC and modem.
System upgraded in stages, with a single company, France Télécom, responsible for deciding when and how to upgrade.	Upgrading on an ongoing basis. Many widespread entities are capable of making the system evolve.
Non-proprietary system.	Non-proprietary system.
Interface: Minitel (old and new models)	Interface: personal computer.
Centralised structure.	Decentralised structure.
Time-based charges. Evolving toward flat rates or access fees.	Connection charges; publicity. Evolving toward flat rates or time charges.
Language: French.	Language: predominately English, but accommodates all languages.
Télétel volume in France in current version (1994-1997). ➢ 15 million regular and 20 million casual users (1997). ➢ 2 billion calls per year (1997). ➢ 1.2 million French homes make at least one purchase a year via the Minitel (1994)*	➢ 800 000 US homes made at least one purchase via the Internet in 1994 * Internet in France in its current version (1994-1997): ➢ 500 000 French "web surfers" (1996). ➢ 7.5 per cent of all French homes connect on a regular basis to the Internet (1996).
Simple to use but limited functions.	Complicated to use but many functions are being upgraded all the time.
Security of operation: permanent connection.	Lack of operating security: no permanent connection. Improving.
Simple and efficient billing for services.	Various payment methods. Development of electronic purses.
Price of new hardware: FF 2 000 to 2 500 for consumers, FF 4 000 to 4 500 for businesses (1998).	Cost: FF 5 000 to over 15 000 for a computer, FF 1 000F for a modem (1997).
High rates expected to decline. Current cost of connection is FF 184 per hour on average for consumer services and FF 500 per hour on average for business services (1997)	Low cost expected to rise. Monthly access fee: FF 55 to 150 and up (1997). Connection: FF 15 per hour (1997).
The Minitel is a simple to use communication tool to access paying on-line services.	The Internet does not generate any income for itself. It puts people in contact with each other and helps them communicate and link up with the world.

Sources: France Télécom information, *La Lettre de Télétel*, *France Télécom Intelmatique, Internet Society News.*

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APPENDIX

THE VARIOUS SERVICES AVAILABLE ON THE TELETEL

The various services available on the Télétel

Number dialled	General description of services available at that number	Users	Hourly charges (in FF)
3605	Calls charged to the server	?	0
3613	Services exclusively for users identified by a password.	Business. For internal business matters. Example: Firms wishing to make price lists or catalogues available to their sales representatives.	7.30
3614	Consumer services.	Consumers. Example: mail-order house, bank	21.90
3615	Consumer services.	Consumers.	50.05 58.40 75.10
3616	Business services.	Business.	30.78 44.86
3617	Access number for business, to obtain information relating to their business.	Business. Example: 3617 ELECTRE data base containing French books for bookstores and libraries.	131.40
3618	Other subscribers can be contacted by dialling this number. The call triggers a message to the subscriber, telling him to connect his Minitel to contact the caller.	Special services for persons with hearing problems.	58.80 F (less at certain times, as for the telephone)
3619	Access to foreign videotex services.	Mainly business	na
3621	Data bases. Accessible in ASCII.	Business	na
3622	Minitelnet connection.	--	na
3623	Introduced in 1994, this number provides a more high-speed connection (9 600 baud). Since 1995, France Télécom has been seeking to shift 3614 and 3615 services to this number.	Consumers and businesses.	36.00 77.40 133.80 334.20 567.00
3628	Services with added value (level 1) Data banks.	Primarily business services.	328.50
3629	Services with added value (level 2) Data banks	Primarily business services.	543.40

Data are merely estimates and were obtained from sources written in 1991 and 1995. *Lettre de Télétel et Audiotel*.

NOTES

[1] See: www.premier-ministre.gouv.fr "Préparer l'entrée de la France dans la société de l'information". Speech delivered by the Prime Minister at Hourtin, Monday 25 August 1997.

[2] See Note 1 above.

[3] The Internet consists of a series of networks communicating by means of the same TCP/IP standard.

[4] *Centre National des Etudes de Télécommunication* (National Institute for Telecommunications Studies).

[5] Initial tests were conducted in 1977.

[6] In this connection, see the failure of the cable project in France (Faverie, 1990).

[7] From 1984, France Télécom started to sell more advanced terminals.

[8] See Jean-Marie Charon (1991), "Teletel and the Press" in *European Telematics*, J. Jouêt, P. Flichy, P. Beaud (editors) Elsevier Science Publishers.

[9] Gérard Longuet was Deputy Minister in Charge of PTT at the Ministry of Industry, PTT and Tourism.

[10] We have estimated the rate for one hour of business-to-business services at FF 200, as against FF 50 per hour for business-to-consumer services.

[11] With the VAT at about 20 per cent, the Minitel generates close to one billion francs in government revenue.

[12] In 1996, one third of all Minitels were highly advanced models sold by France Télécom.

[13] Minitel emulation boards allow access to Teletel by using terminals other than Minitel terminals. They require a modem. The number of new Minitel access points began to grow both in France and throughout the world at a time when modems, and therefore the Internet, began to appear on the market.

[14] "Bilan des services en ligne de France Télécom pour 1996", an interview given by Philippe Bellenger, a France Télécom Multimedia Division manager responsible for formulating telematics trend charts, in La Lettre de l'audiotel et du Minitel 63, 3rd quarter, 1997.

[15] Total revenue from commerce in France was FF 2 600 billion in 1996.

[16] Minitelnet is the gateway facility, available since 1988, allowing Internet access via the Minitel.

[17] See Note 1 above.

[18] According to the model chosen.

19. These estimates range from 60 to 100 FF, or from 100 to 200 FF depending on the source.

20 http\\www.ccett.fr/isrf

21 The names of these companies were supplied to us by France Télécom, although press articles have also linked Alcatel, Matra SA and Northern to the project. This project will enable the companies to find out whether there is a segment of the consumer market for NC's.

22 They include software which makes it possible to connect to the Minitel service and locate information using the most common Internet browsers.

23. Private communication.

24. The ISI service offers unlimited Internet access for 60 FF per month, and use of traditional Minitel services.

25 *"Les fournisseurs de services réclament la modernisation du Minitel"*, Le Monde, 28/08/97

26. France Télécom will probably only offer one type of terminal, thereby not inciting their manufactures to innovate.

27 A lesson to be drawn from the development of the Internet is how free or very cheap services encourage an increase in network traffic. Indeed the very first Internet services, communication and information services for researchers, were free of charge. They pioneered the network and proved to be the catalyst for the growth in network traffic. It was only later that firms began to realise that the network had commercial potential although they never completely abandoned the idea of free services as they are a useful means of recruiting new web users.

28 A significant difference between the Minitel and the home computer is the family environment in which it is used. 81 per cent of single men use the Minitel. This figures drops to 20 per cent if they live with a partner. Households with children are more likely to use home computers as children tend not to use the Minitel and PCs are widely used by students (who very often live with their parents).

29 Further research is required to understand the reason for this development.

30. 27.1 via cash dispenser, 21.7 directly at the bank, and 16.7 per cent of telephone enquiries.