

Establishing a national IT infrastructure

The case of the French videotex system Minitel

In the late 1970s, videotex¹ was an important fixture of the telecommunications landscape of most industrialized countries. Many national post, telephone and telegraph (PTT) companies and commercial ventures started pilot videotex projects. Some social commentators and researchers began discussing videotex as one of the driving forces in the movement towards an information society.

A decade later, most of the enthusiasm has evaporated. France's famous Télétel² (over 6 million subscribers and 17 000 services, as of December 1991) is the only commercially viable national videotex system so far. The limited success of videotex ventures is surprising, since there were at least 50 videotex projects in 16 countries of Western Europe, Japan and North America in 1982.

Indeed, Britain's Prestel (150 000 subscribers and 1 300 services) and Germany's Bildschirmtext (250 000 subscribers and 3 500 services), which rank second and third in the world, are considered commercial failures, and their prospects for growth are not very good.

What made Télétel such a success?

Information technology and french industrial policy

In the mid-1960s, particularly after the American Congress had denied a permit to export a large IBM mainframe computer to the French government, French political commentators started to voice concerns that France was falling behind the USA in

information technology and that it would soon be in an intolerable situation of technological and cultural dependence. For example, President Valéry Giscard d'Estaing, in gathering support for moving France into the information age, stated: 'For France, the American domination of telecommunications and computers is a threat to its independence in the crucially significant if not overriding area of technology and in the field of culture, where the American presence, through television and satellite, becomes an omnipresence.' This line of thought continued to be voiced during the 1970s and became a central piece of the industrial policy of the country.³

1 Videotex is a generic term for an easy-to-use, computer-based, interactive system to access and selectively view text and graphics on a terminal screen. The content is usually organized into tree structures of pages that are selected from a series of hierarchical menus. Videotex systems typically offer a wide range of information-retrieval interactive, and transactional services, such as directory and reservations systems, financial reports, home banking and shopping. Videotex was developed in Europe in the mid-1970s for consumer applications. Because of its consumer origins, videotex excels at delivering information to untrained and casual users. The user may use a dedicated videotex terminal or other access deliveries (e.g. PC). The primary objective of commercial videotex systems is the efficient delivery of value-added information and services to a maximum number of users profitably for both the system operator and the service provider.

2 The system is popularly known as Minitel. In strict terms, however, Minitel refers only to the dedicated terminal itself. Throughout this case, we use Télétel when we refer to the whole system and Minitel when we allude to the device.

3 Although the 'enemy' has changed and the main villain is now Japan, the policy is still very much in place today, as illustrated by the French government's decision in 1991 to save the consumer electronics companies Bull and Thomson from insolvency.

This case was written by W. Cats-Baril, Tawfik Jelassi, Associate Professor at INSEAD, and James Téoul, Professor at INSEAD. It is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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In 1975, President Giscard d'Estaing asked two researchers, Simon Nora and Alain Minc, to suggest a strategy to computerize French society. The Nora–Minc report delivered in 1978 and published in 1979 went on to be a best-seller (a first for this type of report). Nora and Minc coined a new word, 'Télématique' (from telecommunication and informatique), and proposed it as the cornerstone of that strategy. Télématique was the merger of computers and communication technologies to create information–processing applications with broad societal impact.

Indeed, Nora and Minc predicted that eventually Télématique would affect all aspects of society – education, business, media, leisure, and routine day-to-day activities. The way they saw it, Télématique would, by increasing access to information, lead to decentralization of government and business decision-making and therefore to an increase in national productivity and competitiveness and an improvement in the ability to respond to an increasingly fast-changing environment (Nora and Minc 1979). Nora and Minc's view, however, implied that a new national communication infrastructure was necessary for France to remain among the leading countries of the industrialized world. Their report also underlined that such a transformation would require a long-term strategy and co-operation between the government and business sectors.

One of the recommendations of the report was for the Direction Générale des Télécommunications (DGT), as France Télécom was then named, to encourage co-operation between computer services companies and hardware manufacturers to produce the technical components of the required infrastructure. Another recommendation was for the DGT to implement a research programme to develop applications that would leverage and take advantage of that infrastructure (Nora and Minc 1979).

These recommendations are typical of French industrial policy. The strategy of having the government orchestrate and subsidize large technological projects by creating alliances among companies and 'rationalizing' an industrial sector by encouraging mergers – the computer and electronics sector being a prime example – had been used before (e.g. Ariane, Airbus, Concorde, TGV). As a senior official of the French government put it, 'This type of large industrial project, or, as we [the French] call them, "les grandes aventures", has always captured the imagination of French politicians.'

The French telephone system in the 1970s

In 1974, when Giscard d'Estaing became President of France, the French telecommunication system was very weak. There were fewer than seven million telephone lines for a population of 47 million (one of the lowest penetration rates in the industrialized world, equivalent to that of Czechoslovakia), a four-year wait to get a new line, and manual switches still in use in most rural areas in the country (Chamoux 1990; Mayer 1988).

President Giscard d'Estaing decided to make the reform of the telecommunication infrastructure a top priority. In April 1975, the Conseil des Ministres (a cabinet-level meeting of the secretaries of all agencies) approved the President's programme under the banner 'Le téléphone pour tous' (a telephone for everyone).

Also in 1974, Gérard Théry took over as director of the DGT. At that time, the strategic direction of telecommunication technology was set by the Centre National d'Etudes des Télécommunications (CNET). The CNET was, and continues to be, the research and development arm of the DGT. The CNET was dominated by engineers whose responsibility and vocation was the design of new products. They focused on technical prowess and innovation.

Once the design of a product was complete, the CNET negotiated the development and commercialization of the product directly with the telecommunication industry. Housel (1990) notes that because the CNET engineers were constantly trying new technologies without a clear technological migration plan, manufacturers were forced into short production runs, making manufacturing economies of scale impossible, driving up prices, and making network compatibility difficult to achieve.

Théry changed the orientation of the CNET. From an attitude of technological change for the sake of technological change, the CNET moved to a more pragmatic and commercial stance. The change in culture was difficult at first: most of the engineers went on a long and bitter strike. Eventually, Théry's vision prevailed. Not only did the internal focus of the CNET change, but a new relationship between the DGT and French telecommunication manufacturers was established (Housel 1990; Marchand 1987a, 1987b).

Théry's strategy to establish a more commercial orientation at the CNET was implemented creating the Direction des Affaires Industrielles et Internationales

(DAII) and bringing in an outsider – Jean-Pierre Souviron – as its director. One of the principal functions of the DAII was to ensure standardization of equipment. The DAII invited bids not only from the traditional suppliers of the DGT (e.g. CIT-Alcatel, Thomson) but from others as well (e.g. Matra and Philips). In order to drive down equipment prices, the DAII announced that from then on an important criterion in choosing suppliers would be their ability to export and thus acquire larger markets.

The government push towards standardization and export was partially responsible for lowering subscription charges and more than doubling the number of telephone lines between 1974 and 1979. By the late 1980s, the penetration rate was at 95%, one of the highest telephone-penetration rates among the industrialized nations (Chamoux 1990; Housel 1990).

The transformation of the French telephone network from the ‘joke of Europe’ to Europe’s most modern (‘from the ugly toad to the handsome prince’, in the words of a government official) took some ten years and very substantial resources. Indeed, from 1976 to 1980, the DGT was the largest investor in France, averaging around 4% of the total national investment in the country (Hutin 1981). The cost of the transformation has been estimated at around FF120 billion. The magnitude of the investment raised questions as to how to maintain expansion of the telephone network and how to leverage the modernization costs. In early 1978, with the telephone-penetration rate growing very quickly, Théry realized that telephone traffic alone would not be enough to leverage the telephone network and the public packet-switched network (Transpac).

Théry asked the CNET to generate ideas for new services and established a list of requirements that they would be required to fulfil. The services would have to: (1) provide greater access to government and commercial information for all citizens; (2) benefit as many elements of society as possible; (3) demonstrate the value of merging computing and telecommunications; (4) be flexible enough to avoid quick technological obsolescence; and (5) be profitable (Housel 1990).

In November 1978, Théry prepared a report for the Conseil des Ministres detailing six projects: the electronic telephone directory, the videotex, the videophone, the wide distribution of telefax machines, the

launching of a satellite for data transmission, and the voice-activated telephone. The background for his presentation was the Nora and Minc report and the need to counter the threat of IBM capturing critical strategic markets if left unchallenged, as perceived by Théry. ‘Let us be the Japanese of Europe’ was his battle cry (Marchand 1987). The Conseil des Ministres gave a green light only to the electronic telephone directory and the videotex. Three years after the successful launch of the ‘Le téléphone pour tous’ campaign, ‘la grande aventure du Télétel’ was about to begin.

Teletel: A Brief History

Work on Télétel began in the mid-1970s. The first Télétel prototype was shown at the 1977 Berlin Trade Fair. At that show, the British demonstrated a very impressive operational system (CEEFAX, the precursor of Prestel). Théry realized he had to move fast. He persuaded the government to allow the DGT to pursue the videotex project (during the inter-ministerial meeting of November 1978). It was agreed to test Télétel in 1979. Initially, there were plans for two applications: the development of an electronic telephone directory and classified ads.

With the installation of seven million telephone lines from 1974 to 1979, the French telephone directory was obsolete as soon as it was printed (even printed twice a year). Also, the cost of printing the directory had gone up so rapidly that in 1979 the paper telephone directory lost FF120 million. Between 1979 and 1984, seven million additional lines were to be installed. The cost of printing the directory alone was expected to double in the next five years and the quantity of paper needed to quintuple from 20 000 tons in 1979 to a projected 100 000 tons by 1985. Directory assistance was hopelessly overloaded. It required 4500 operators to provide a barely acceptable level of service. The number of operators needed in 1985 was forecasted to be 9000 (Dondoux 1978; Marchand 1987a, 1987b).

Directory automation was proposed both to address the directory assistance problem, which was becoming a serious public relations issue, and to bring about savings by avoiding the costs of printing telephone directories. The success of the electronic telephone directory assumed that a great majority of the subscribers would be able to use it. This notion in turn implied that subscribers would need to have access to an easy-to-use, inexpensive terminal.

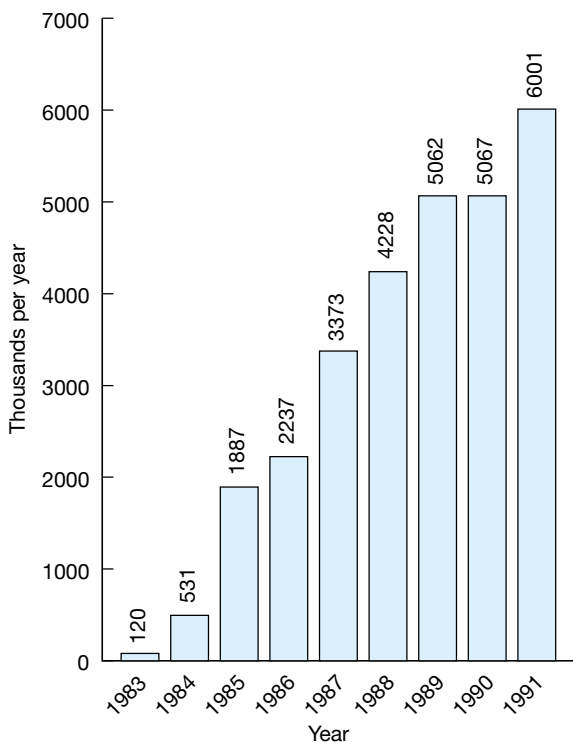
At the DAI, planners developed the scenario of distributing terminals free of charge to subscribers. They reasoned that as long as a dedicated terminal could be produced for FF500, then the cost of the terminal could be recovered in less than five years (the cost of each paper telephone book was FF100, and it was increasing). The government agreed to try out the electronic telephone directory concept during the Conseil des Ministres of November 1978. The first test was carried out in Saint-Malo, Brittany, in July 1980.

Another application that was discussed in order to help launch Télétel was offering classified ads. But after a vicious attack from the press and its powerful lobby, which saw their main source of income threatened, the DGT capitulated. On 12 December 1980, Pierre Ribes, Secretary of the PTT, stated unequivocally that there would be no classified ads offered through Télétel in the videotex experiment to be started in Vélizy, a suburb of Paris, in June 1981. The press has consequently dropped its resistance to the Télétel project (Marchand 1987a, 1987b).

The initial testing of the electronic directory began on 15 July 1980 in Saint-Malo.⁴ The actual videotex experiment started in Vélizy (under the name Télétel 3V) in June 1981 with a sample of 2500 homes and 100 different services. After two years, the Vélizy test showed that 25% of the users were responsible for 60% of all traffic, one-third of the sample never used the device (this proportion of non-users has remained constant throughout the dissemination of minitels), and, overall, households had had a positive experience with Télétel. The experiment was considered a success in both technical and sociological terms (Chamoux 1990; Marchand 1987a, 1987b).

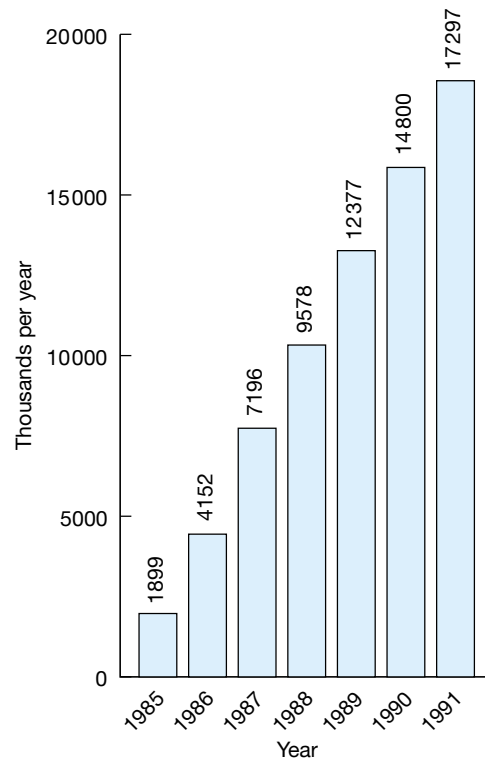
⁴ By comparison, the British television-based system Prestel had a field trial with 1400 participants in 1978 and started commercial service in the Autumn of 1979. Full nationwide operation was established in March 1980. At the end of 1981, Prestel had only one-tenth of the users predicted for that time (Thomas and Miles 1989). This failure has been attributed to the late delivery and high prices of television monitors (Prestel needed a connection between the telephone and the television set), uncoordinated marketing, and bad quality of the databases (Schneider *et al.* 1990).

Exhibit 1 Rate of Minitel distribution (1983–1991)



Source: France Télécom.

Exhibit 2 Growth of Télétel services (1985–1991)



Source: France Télécom.

On 4 February 1983, a full-scale implementation of the electronic directory was started in the area of Ile-et-Vilaine. In the opening ceremony, Louis Mexandeau, the new Secretary of the PTT, exulted: 'We are here today to celebrate the beginning of a "grande aventure", an experience which will mark our future.' François Mitterrand had replaced Valéry Giscard d'Estaing as President of France, the 'left' was now in power, but the rhetoric on the importance of Télématique to the future of the country and the underlying industrial policy remained the same.

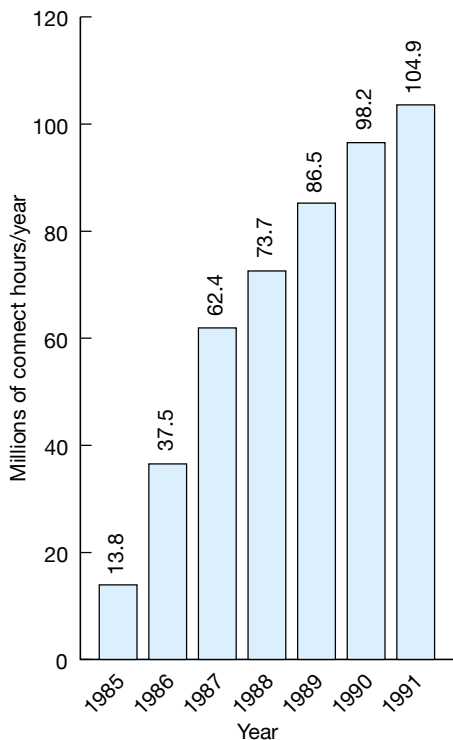
Soon after the successes of Vélizy and Ile-et-Vilaine, the free, public distribution of Minitel terminals was implemented: there were 120 000 minitels in France by the end of 1983, over three million by December 1987, and more than six million by December 1991 (see Exhibit 1). Videotex services went from 145 in January of 1984 to 5 000 at the end of 1987 to more than 17 000 by December 1991 (see Exhibit 2). Traffic on the Télétel system and on the electronic telephone

directory has increased steadily over the past several years (see Exhibits 3 and 4). Moreover, these two systems have been continuously expanded and improved (see Table 1). In 1989, France Télécom created new organizational entities (e.g. Intelmatique) to export Télétel and the accompanying know-how.

Télétel had to overcome four serious challenges in the early years. First, there were vicious attacks by the newspaper owners, in particular François-Régis Hutin, owner of *Ouest-France*, who found among many philosophical reasons to stop videotex one very pragmatic one (Hutin 1981).⁵ Videotex was a serious threat to their main source of revenue: adver-

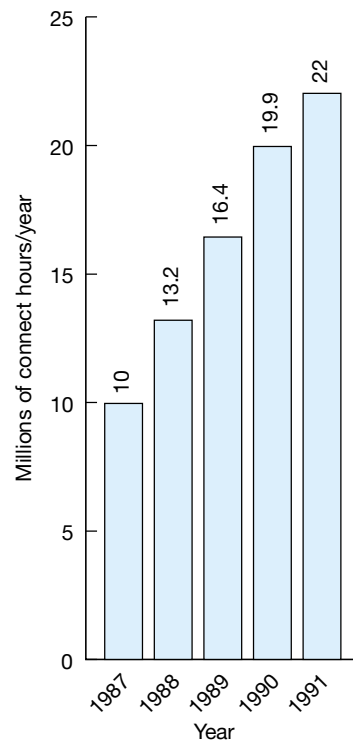
⁵ Typical of the attacks is the call to arms by the political commentator George Suffert. He argued, in an article titled 'The fight of the century: Teletex versus paper', that it was dangerous to let the DGT have a monopoly on the videotex system. He wrote: 'He who owns the wire is powerful. He who owns the wire and the screen is very powerful. He who owns the wire, the screen, and the computer has the power of God.'

Exhibit 3 Total Télétel usage (including ETD) (1985–1991)



Source: France Télécom.

Exhibit 4 Usage of the electronic telephone directory (1987–1991)



Source: France Télécom.

Table 1 Evolution of the electronic telephone directory (ETD) and videotex networks

	Dec 1987	Dec 1988	Dec 1989	Dec 1990	Dec 1991
Number of access points to the ETD	58	72	78	82	86
Number of ports to the ETD	14 220	17 280	19 020	19 020	20 640
Number of information centres	31	40	42	44	47
Number of documentation centres	15	18	22	23	25
Number of videotex access points (VAPs)	43 160	49 611	50 500	53 000	57 000

Source: France Télécom.

tising. After a long fight, a political compromise was reached, giving newspaper owners a say in the development of Télétel services, subsidies and technical help from the DGT to develop their own services, and a virtual monopoly on services for the first couple of years in exchange for dropping their resistance to the videotex concept.

A second challenge was some politicians' feeling that the system could be abused by the state. These politicians declared publicly that this new mode of information dissemination was a potential threat to the liberty of the citizenry and that Télétel was the latest attempt of the state to manipulate information ('the Big Brother syndrome'). Later, the rapid proliferation of 'chat' services (*messageries*), some of which were considered pornographic (*messageries roses*), brought criticism from both government and private groups who were concerned that the state was billing and indirectly subsidizing immorality.

A third challenge was the early battle to establish an international videotex standard. The most advanced videotex system in the 1970s was the British Prestel. Prestel was based on the CEEFAX standard, whereas the French were using XXX. The DGT realized that they were at a disadvantage and tried to have their own videotex standard recognized at several international forums. In a decision typical of the byzantine regulatory politics in Europe, the Conférence Européenne des Postes et Télécommunications (CEPT) established a European videotex 'standard' in 1980, with ten variations! One of these variations was the French standard. Although this decision led to the incompatibility of the European videotex systems during the 1980s, it allowed the DGT to continue developing Télétel as planned.

The fourth challenge that Télétel had to meet was the negative publicity that surrounded the 'crash of 85', the only system failure since its inception. The

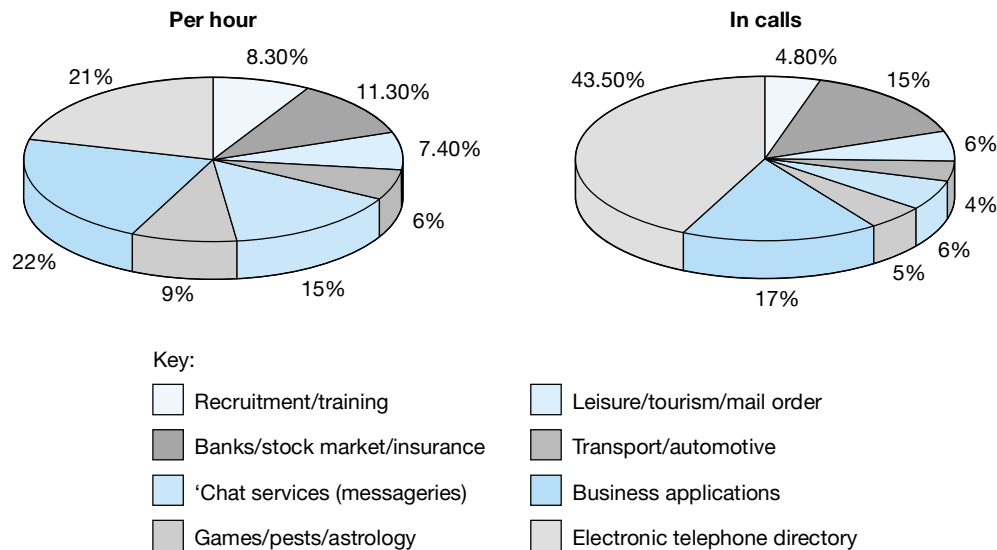
Exhibit 5

Table 2 Demographic statistics of Minitel users

	<i>Minitel Users population (%)</i>	<i>French population (%)</i>
Sex		
Male	50.5	47.2
Female	49.5	52.7
Age (years)		
15–24	17.6	19.3
25–34	28.2	20.6
35–49	31.9	22.4
50–64	16.9	20.6
64 years	5.5	17.1
Job category		
Agriculture	4.6	6.0
Small business, handicraft, trade	12.1	7.7
Professions, executives	19.1	8.6
Office and skilled workers	36.2	24.7
Non-skilled workers	17.8	26.1
Non-working	9.8	26.8

Source: Adapted from 'La Lettre de Télétel', France Télécom, June 1992.

crash was the result of very heavy traffic of the *mes-sageries* services. This heavy traffic caused an overload of the Transpac switching system, and the network went down. The technical problem was easy to solve: the switching system was changed to handle higher volumes, and there has not been another crash since. The perception that Télétel was mostly about sex lingered much longer, slowed down Télétel's development, and, paradoxically, increased its international visibility.

Overcoming these public controversies made Télétel stronger in the long run. Indeed, the political fury that Télétel generated in 1978–80 and later in 1985 led to a

full and rich discussion on the issues of privacy rights, authority of the telecommunication agency, regulation of computer services, and the need to prevent the creation of a second class of citizens shut out of the information age. This discussion involved the President of France and the most notable political commentators and intellectuals in the country, and eventually created a broad national consensus on the use and limitations of the technology.

Today, Télétel is an integral part of the French society lifestyle. A survey conducted by France Télécom in October 1989 indicated that some 40% of the population had access to Minitels at home or at work. Another survey, conducted in 1991, showed that the system was used regularly by a broad cross-section of the population in a variety of ways (see Exhibits 5, and Tables 2 and 3).

The success of Télétel as a sociological development and its positive impact on the technological literacy of the population are unquestionable. The primary concern about Télétel now is whether it is a profitable operation. But before exploring this issue, let us describe some of the technical choices and characteristics that have made Télétel the only successful commercial videotex system in the world so far.

General characteristics of Télétel

A comparison of the technical characteristics and policies that were used in implementing Télétel with those of the other commercial videotex systems (e.g. American, British, German) explains to a certain degree the great success of Télétel and the rather tepid development of the others. The comparison of videotex systems can be made on the basis of four characteristics: (1) terminal design and strategy of terminal distribution; (2) system architecture and other

Table 3 Minitel traffic statistics

<i>Télétel Traffic (including electronic telephone directory (ETD))</i>	<i>1986</i>	<i>1987</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>
Total number of calls (millions)	466	807	1010	1242	1482	1656
Number of connect hours (millions)	37.5	62.4	73.7	86.5	98.2	104.9
Average usage per Minitel per month (minutes)	105.9	111.3	97.0	93.2	92.4	90.16
Average number of calls per Minitel per month	21.9	24.0	22.2	22.3	23.2	23.77
Average length of call to Télétel (including ETD) (minutes)	4.8	4.6	4.4	4.2	4.0	3.79
Average length of call to Télétel (excluding ETD) minutes)	6.3	6.1	5.8	6.5	5.5	5.3

Source: Adapted from 'La Lettre de Télétel', France Télécom, April 1992.

aspects of service provision; (3) billing system; and (4) regulatory environment (see Schneider *et al.* 1990).

Given the British experience, where the high price of the TV-based videotex set-up chosen became a barrier to implementation, and the DGT argument that the Télétel investment would be paid back through increased telephone traffic and savings in the production of the telephone directory, it was clear that Télétel's success was critically dependent on the development of an easy-to-use, dedicated and inexpensive terminal for mass distribution. The Vélizy experience also established the need for a user-friendly terminal with an easy-to-use interface. The motto for Télétel became 'make it simple' – simple to manufacture, simple to install, simple to use.

In an approach typical of French industrial policy, the government (rather than the consumer electronics industry) decided on the specifications of the videotex terminals. The DAI opened the procurement of terminals to multiple vendors and the promise of a production run of some 20 million terminals encouraged low bids. The total cost of the original basic Minitel terminal to the DGT was approximately FF1000.

The key decision on whether to distribute Minitel terminals free of charge generated intense controversy within the DGT. On the one hand, distributing Minitel on a free and voluntary basis gave the system an aura of democracy: those who wished to have a Minitel would not be impeded by cost. This also made it easier for the mass public to try out the device and the services it offered.

On the other hand, some senior officers at the DGT thought that a nominal fee on a per-month basis not only was sound policy from a financial point of view, but would also send an appropriate message to the users to counteract the 'if-it's-free-it-can't-be-very-good' syndrome. They reasoned that once the system was distributed for free, it would be practically impossible to charge for it later on without generating intense public resistance. In what turned out to be a critical decision for the success of Télétel, it was decided that Minitel terminals would be distributed free of charge.

Another critical success factor of Minitel was the decision to implement the Télétel concept by interfacing the public switched telephone network with the Transpac packet switching data network. The subscriber was linked to the electronic directory or

any other database via his telephone through a gateway – called a videotex access point (VAP) – giving access to the Transpac network to which the servers and host computers were to be connected.

This design approach had three basic advantages. First, Transpac charges are based on traffic (i.e. minutes of connect time) and not on distance, which means that any provider, independent of its geographical location, has equal access and equal costs in gaining a national audience. Second, it established a common standard protocol (i.e. the CCITT X.29), making connections to the system straightforward and relatively cheap (FF100 000), a crucial point in attracting service providers. Third, the networks were already in place, included the latest technology, and could support a rapid expansion in the number of subscribers and providers.

More importantly, the decision to use the Transpac network kept the DGT from becoming an information provider. With the exception of the electronic directory, the DGT acted as a common carrier and was responsible only for the transmission of information and administration of the network.⁶ This is in contrast to the centralized solution offered by the British and German systems, where British Telecom and the BundesPost provided the design and storage of the databases. In Télétel, the storage and manipulation of information were left to the information providers.

The decision to build Télétel on a decentralized network and with an open architecture went a long way in (1) alleviating the 'Big Brother' concerns of the press and politicians and (2) encouraging innovation in information services, since clear telecommunications standards were used and the entry barrier to the information provider market was very low.

Another critical element in the success of Télétel is the billing system introduced by France Télécom in March 1984 and named the 'kiosk'. The billing is done by France Télécom, not by the service providers. The system was named after the newsstands where a variety of publications can be bought without leaving a record of what was bought or who bought it. The Télétel charges appear on the regular

⁶ That has now changed. France Télécom decided in 1990 to enter the information-provision business by offering what are called added-value services. Most of these services are offered through joint ventures with privately owned companies.

telephone bill as 'Minitel use', with no reference whatsoever as to what specific service was used.

The kiosk works as follows: when the connection to the desired service has been set up through the VAP, the VAP sends charging pulses to the subscriber's meter at a faster-than-usual rate to cover the cost of using the Transpac network and the cost of the service. The Transpac network keeps track of the connection time and pays each provider as a function of that time. The kiosk is a very clever idea because it protects the anonymity of the users (important on both financial and philosophical levels), because it does not require passwords or payments in advance, because service providers do not have to worry about billing and its associated administrative costs, and because it allows differently priced services to be offered easily through a series of different numbers.

France Télécom's monopoly position in basic telecommunication services and the fact that it did not have the return-on-investment pressures of a commercial firm provided Télétel with the necessary time to mature.⁷ Infrastructure-based services like Télétel require a longer time horizon to assess and determine profitability. There is no doubt that the regulatory umbrella shielding Télétel in the early years is one of the critical factors in its success.

Another aspect of the French regulatory environment important to the development of Télétel was the ability of France Télécom to subsidize ventures out of its subscribers' revenue. Such subsidies are forbidden by American and British regulations. The subsidies allowed France Télécom to take a long and patient view on Télétel and helped amortize the free distribution of Minitel terminals, which amounted to a cost of FF6 billion over ten years.

Yet another specific benefit of this protective regulatory environment is described by Housel (1990). He notes that the ability to implement changes of tariffs quickly without going through a lengthy political process to justify them allowed France Télécom to respond quickly to changing market conditions. For example, there were many services that Télétel users could access and use without staying connected for very long. The user paid no fee because the tariff allowed free access. Because of the revenue-sharing arrangements with the service providers, however, France Télécom had to pay for each connection. France Télécom asked the regula-

tory bodies to charge subscribers a small access fee for every connection regardless of its duration. The request was barely scrutinized and the charge was approved without debate.

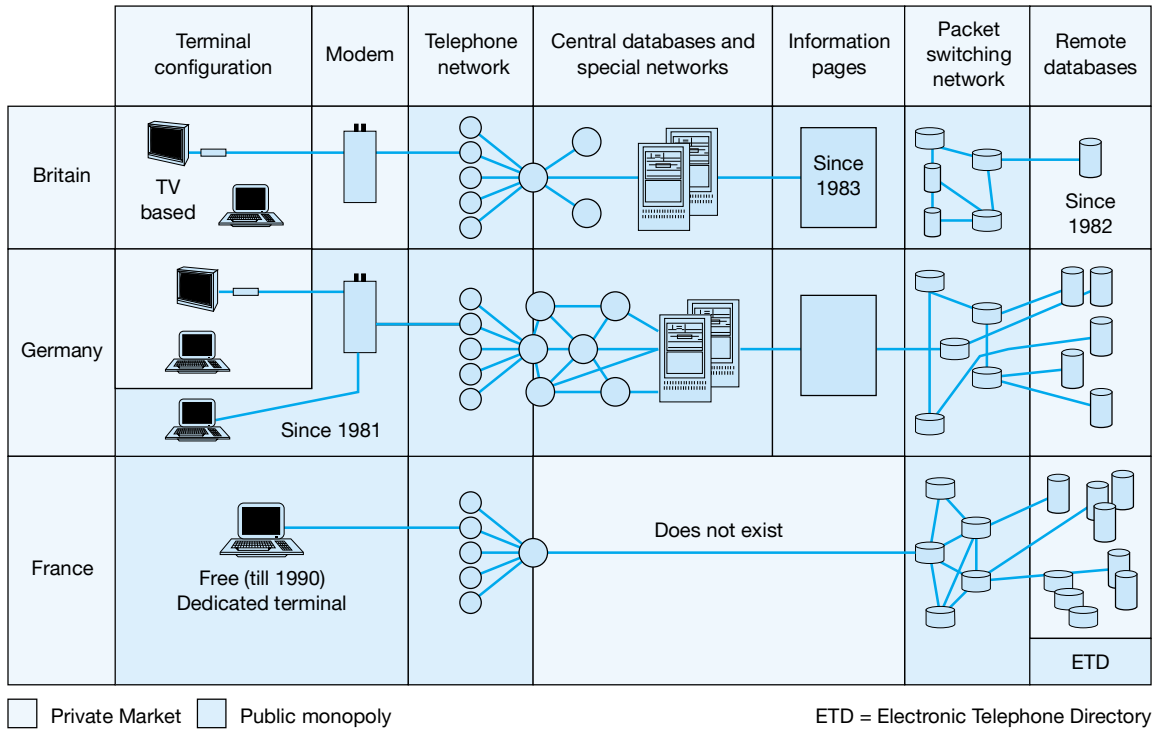
The regulatory environment in France also enabled France Télécom to run the kiosk billing system. The arrangement has come under fire on two fronts. First, the fact that the billing system results in the state (in the form of France Télécom) collecting fees for the distribution of services that may be deemed pornographic has been argued to be against the law. Second, it has been suggested that, even if it is not illegal, billing, which could be a very profitable stand-alone operation, should be a service offered by a third party and not by France Télécom. These criticisms have not stopped France Télécom from performing the billing.

The regulatory environment in Europe, with its myriad of standards and protocols, was also beneficial for Télétel initially because it served to protect the fledgling service from being battered by competition from abroad. However, that same environment has now become a barrier to Télétel's penetration of other European markets. Finally, one must note that it is to France Télécom's credit that in such a heavily regulated environment it pursued an open network architecture and stayed out of the information services business, with the exception of the electronic telephone directory.⁸

This policy of decentralization and liberalization of services, contrary to the centralization policies in Britain and Germany, led to an explosion of services. Indeed, while in France the number of providers has grown steadily and the number of services today surpasses 17 000, in Britain the number has stagnated at 1300 or so, and in Germany the number has not only stagnated but actually declined to around less than 3000 (Schneider *et al.* 1990). A comparison of the videotex systems in France, Britain and West Germany is shown in Exhibits 6 and Table 4.

7 France Télécom is directly accountable to the French government for all its ventures and is required to justify its fee structures. More than other state agencies, France Télécom is asked to demonstrate the viability of its investments and therefore is under some profitability pressures, mild as they may be.

8 Whether France Télécom would have taken such an enlightened position without the ferocious criticism of the press lobbies and consumer watchdog groups is debatable. Still, when it comes to Télétel, the executives of the DGT and France Télécom have consistently exhibited excellent judgement.

Exhibit 6 Technical configuration of videotex systems in Britain, France and Germany

Source: Schneider et al. (1990)

Table 4 Implementation strategies and structures of the videotex systems in Britain, France and Germany

	Britain	France	Germany
Terminal configuration	Adapted TV set provided by TV industry and to be bought by subscriber	Simple dedicated compact terminal (Minitel), free distribution (until 1990)	Adapted TV set provided by TV industry and to be bought by subscriber (change in 1986: multitels)
Network architecture	Several central databases, one update centre, closed system	Primarily privately owned databases, service computers connected to Transpac	Hierarchical network: one central database with regional sub-bases; interconnection to private computers
Information provision	Only by private IP (common carrier), (change in 1983: BT becomes IP)	Trigger service 'electronic phone book' by PTT; other services by private IPs	Only by private IP (common carrier)
Billing system	Subscription fees, page-based charges, phone-call charges	No subscription fees, time-based charges	Subscription fees, page-based charges, phone-call charges
Regulation political control	No specific regulations, less politicized	Specific regulations, liberal regime politicized, promoted by industrial policy	Specific regulations, very restrictive regime politicized

Source: Schneider et al. (1990).

Téléétel: A sociological success

It would be a mistake to analyze Téléétel exclusively on return on investment without taking into consideration its sociological impact. Although measuring the non-financial benefits (i.e. social educational, and political) brought by Téléétel is difficult, the increase in technological awareness and literacy of society has to be factored in any cost-benefit analysis of the system.

Through its 17 000 services the Téléétel system offers information about entertainment events, train schedules, television and radio programmes, jobs and classified ads, interactive games, banking services, grocery and home shopping, home banking, comparative pricing, and many other consumer services (Housel 1990; Marchand 1987; Mayer, 1988; Sentilhes *et al.* 1989). Most services follow the same rules and command structures, and the same multicriteria search process (e.g. a subscriber deciding on whether to go to the movies can search for what films are showing in a given area, on a given topic, or starring a particular actor or actress), making it very easy for users to move from one application to another.

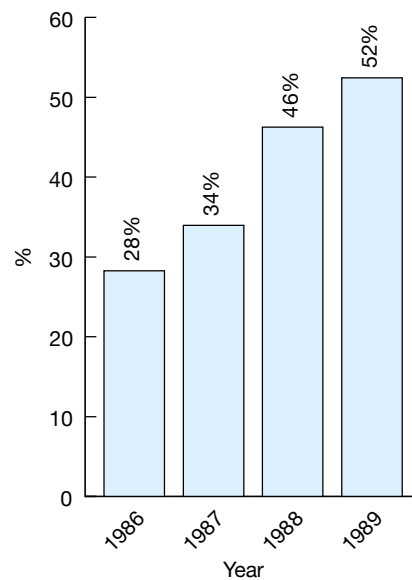
It is hard to assess the impact of Téléétel on business, since this impact varies by company size and industry sector. France Télécom estimated in 1990 that the overall penetration of the business sector is at least 30 % and growing and that the penetration for large companies (more than 500 employees) is 95%. Indeed, some industries have been profoundly affected by Téléétel applications. For example, transportation companies using the Telerouting system have minimized the number of empty return trips for their trucks and moving vans by posting the schedules of return trips on Minitel and matching them to requests from customers (Marchand 1987; Sentilhes *et al.* 1989).

Almost every French bank has developed its own Minitel-based home-banking system, allowing customers to check the status of their accounts, order cheques, pay utility bills and trade stocks.⁹ Most retailers have also developed an electronic catalogue business and, although volumes are moderate at present, they are expected to explode as soon as payment can be done

directly with the Minitel terminal.¹⁰ Television stations run Minitel-based surveys every night. Travel agencies, insurance companies and consumer products companies have developed Téléétel services.

Whether the aim is to be in greater touch with the client, to increase efficiency in distribution, to gain market share, or to develop videotex products and services, Minitel has become an important component of the business strategy of companies operating in France. Exhibit 7 shows the increase in business-related volume over the years, and Table 5 shows the main applications for business users in 1991.

Exhibit 7 Professional traffic as a percentage of all Téléétel traffic 1986–89



Source: France Télécom.

Table 5 Minitel main applications for business users

Electronic telephone directory	43%
Banking services, financial information, stock market	19%
Tourism/transport/hotels (timetables, reservations)	18%
Company-specific applications (including email)	16%
Professional data banks	14%
General information (general databanks, newspapers, weather forecast)	32%

Source: Adapted from 'La Lettre de Téléétel,' France Télécom, June 1992.

⁹ For more information, see the case study by Tawfik Jelassi, 'Home banking: an IT-based business philosophy or a complementary distribution channel – CORTAL versus Crédit Commercial de France', INSEAD, 1992.

¹⁰ For more information, see the case study by Tawfik Jelassi, 'Minitel: a home retailing application,' INSEAD, 1992.

From a social point of view, Télétel has had an impact in a wide variety of ways. For example, the success stories of the various Télétel chat services (*messengeries*) range from relatives separated by World War II finding each other to faster matching of organ donors and people in need of a transplant. Although the chat services have been in steady decline since the mid-1980s and represented only 6% of all the calls to Télétel in 1989, they are still one of the most popular services available (representing 15% of the total connect time; see Exhibit 5).¹¹

The anonymity that the chat services provides have encouraged the sick (e.g. people with cancer or AIDS) and the troubled (e.g. drug addicts, divorced, abused) to discuss their more intimate problems with others. Télétel has also played a role in helping individuals who have difficulty getting out and around (e.g. the disabled, the elderly) to shop, bank and make reservations. Universities now use Télétel to co-ordinate student registration, course schedules and examination results. Other services give students access to help from teachers at all times.

Télétel services have been used in the political arena in innovative ways. During the last presidential election, a service allowed Minitel users to exchange letters with the candidates. Any voter accessing the service could view the open letters and the politicians' replies. Another example is the service sponsored by the newspaper *Libération*, which in December 1986 broadcast information on the students' arrest as well as specific messages sent by the organizers of this unrest. These examples illustrate how broadly Télétel has been used as a decentralized, grass-roots vehicle for the discussion of a variety of societal issues. This utilization is very much in keeping with the original vision of Télématique proposed by Nora and Minc back in 1978.

Télétel: is it a financial success?

With a project of the magnitude of Télétel, it is very difficult to generate precise estimates of costs and revenues. There is a public perception, based in part on the free distribution of Minitel terminals, that Télétel is another Concorde: a high-technology, money-losing proposition. A recent report from the State Auditor General has stated that Télétel revenues have not covered its operating, depreciation and capital costs. The Secretary of the PTT, Mr Quilès, disagrees with that assessment.

On the one hand, the total investment in Télétel consists of the cost of the Minitel terminals plus the cost of the gateways to the Transpac network (VAPs) plus the cost of ports to the electronic directory network. The Minitel terminals cost approximately FF1000 per terminal, including R&D. The typical VAP has costs of around FF5 million. On the electronic directory network, one port costs approximately FF50 000. The following are approximate figures describing the investment of France Télécom in Télétel:

Minitel terminals	FF 5.4 bn
Electronic directory	FF 1.0 bn
R&D directory	FF 0.2 bn
VAPs	FF 0.6 bn
R&D (Télétel)	FF 0.3 bn
Transpac	FF 0.3 bn
<u>Total</u>	<u>FF 7.8 bn</u>

On the other hand, the sources of revenues from Télétel include: (1) fees from revenue-sharing with information providers (France Télécom takes an average of 30% of the revenue generated by information providers); (2) advertising (of the Minitel offerings of some service providers); (3) electronic directory usage above and beyond the free allocation; and (4) rental of Minitels (Housel 1990).¹² Gross revenues from Télétel were approximately FF2 billion in 1989. Payments made by France Télécom to service providers for their share of Télétel revenues increased from FF278 million in 1985 to FF1.3 billion in 1987 and FF1.8 billion in 1989. By December 1991, they had reached over FF2.2 billion.

For purposes of cost-effectiveness analyses, however, the savings from printing fewer telephone books and having fewer directory assistance operators must be taken into consideration. Also, the additional revenues based on value-added tax from products, services and increased employment spawned by Télétel should be included but are difficult to calculate. Finally, the Transpac revenue generated by Télétel, almost 50% of all Transpac revenue (close to FF1 billion), needs to be considered. Quilès estimated that the total value added of Télétel amounted to approximately FF6 billion in 1988.

¹¹ The chat services are very lucrative, since both individuals 'talking' pay for the 'conversation', unlike a telephone conversation, where only one party gets charged for it.

¹² Second- and third-generation Minitel terminals are not distributed; as of 1990, they must be paid for or leased.

France Télécom's official version is that Télétel revenues and expenses were in balance at the end of 1989 and the system is expected to start showing a significant return on investment in 1992. Unofficial estimates give a return on investment for Télétel during the 1980–90 period between of 8 and 12% (Housel 1990). Moreover, in 1991 France Télécom started to charge a monthly fee for the new Minitel terminals.

The view of senior officials of France Télécom is that this type of accounting may be a bit premature and potentially misleading, since Télétel is a major infrastructure project for which profitability needs to be measured on a long-term basis. Nevertheless, officials have been on record all along saying that the break-even point for Télétel would be ten years. Given France Télécom's numbers, those predictions seem to be right on target.

Recent developments

From a hardware point of view, the line of Minitel terminals has been expanded to include eight models with varying levels of intelligence and functionality (e.g. colour screens, extended keyboards, compatibility with ASCII standards, service number memory). More than 600 000 terminals offering these capabilities had been installed as of 1990.

The new generation of Minitel terminals allows the user to prepare a message before placing a call, to monitor call set-up, and to switch between voice and text transmission during a call. They also serve as automatic answering devices with protected access, and a portable Minitel that can be used over the cellular telephone network is available. Integrated services digital network (ISDN)¹³ terminals have already been tested for the Télétel system.

From a software point of view, the kiosk now allows eight levels of pricing. A new routing capability allows information providers to use several host computers under a single Minitel access code. This new routing capability also allows the caller to access another service within Télétel without making a new phone call.

France Télécom is also experimenting with natural language interfaces for Télétel services. The Minitel

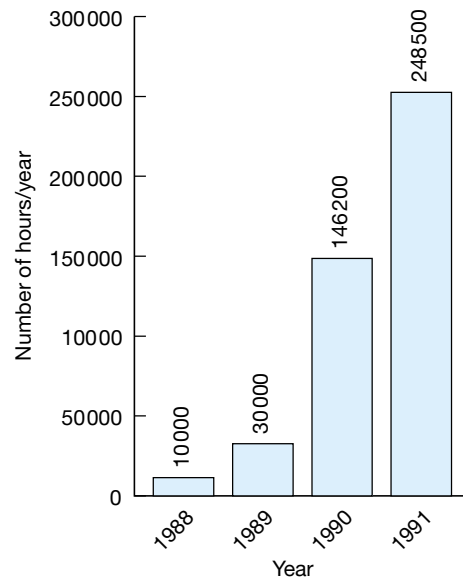
Service Guide came online in 1989, with an interface that allows users to access the guide to Minitel services using French and without the need for special commands or the correct spelling.

With the internal market becoming progressively saturated and growth slowing down, France Télécom has made the international market a high priority. France Télécom has created Intelmatique – a division to sell videotex infrastructure and know-how. Recent clients include the Italian and Irish telephone companies.

Intelmatique markets the Minitelnet service, which provides foreign users with access to the Télétel network. The new service utilizes a multi-tariff billing scheme corresponding to the same tariffs on Télétel and greets foreign users with a personalized welcome in their native language. The service generated 248 000 hours of traffic in 1991, an increase of almost 200% over 1990 (see Exhibit 8). Italy (52% of the traffic) and Belgium (15.5% of the traffic) were the two major markets (see Exhibit 9).

Major efforts are currently being made to export Minitel services to the US market. A number of companies (e.g. US West) have established gateways with the Minitel system. The Minitel Service Company, another entity of Intelmatique, was set up for the sole purpose of selling videotex know-how in the USA.

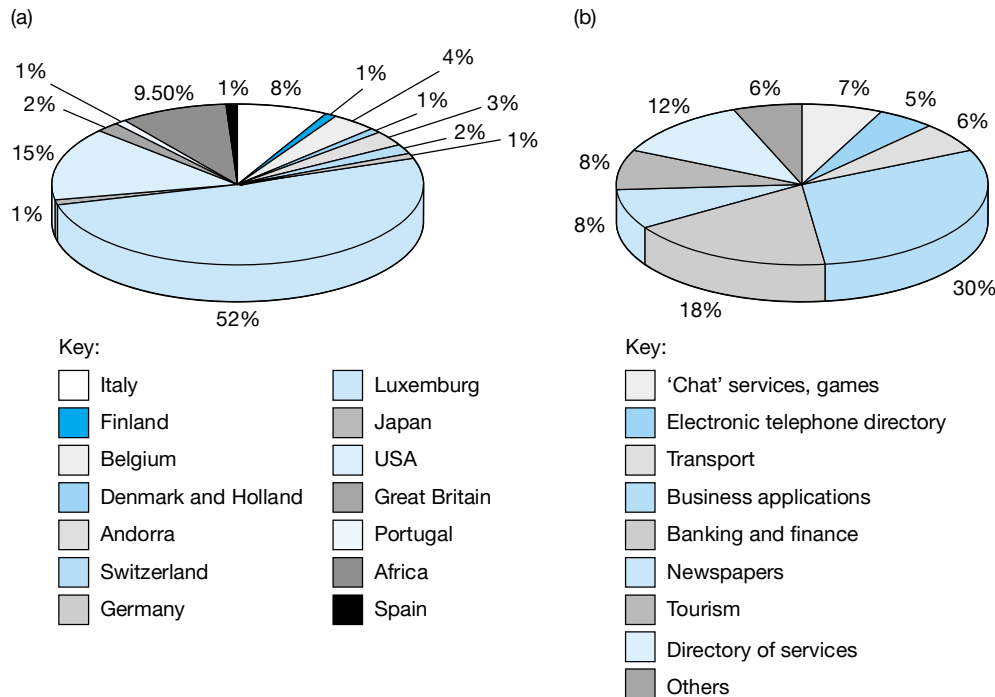
Exhibit 8 Growth of Télétel international usage via MinitelNet (1988–1991)



Source: Intelmatique.

¹³ ISDN is capable of handling simultaneously data, voice, text and image transmission over a digital network.

Exhibit 9



Source: Intelmatique.

Télérel is an example of a product spawned by government industrial policy. The Télérel story is about a successful government-directed technological push sustained by political will and technical vision. However, it is also a story about how, even within an enlightened industrial policy framework, good people are needed to make decisions on the fly to adapt to changing social, political and technological environments.

Although Télérel is a stereotypical case of the French industrial policy of 'les grandes aventures' and can be understood only by analyzing the industrial policy and political environment of France, there are some lessons from the Télérel experience that can be generalized to other products, services and contexts. The following questions serve as a guide in studying/reflecting on those lessons.

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DISCUSSION QUESTIONS

- 1 What are the critical success factors in the introduction and development of Télétel?
- 2 What types of services/applications benefit the most from Télétel?
- 3 Who should use Télétel rather than email or electronic data interchange (EDI) solutions, and why?
- 4 What other telecommunication products could be introduced by France Télécom to exploit the Télétel experience?
- 5 What are some of the future directions for the development of Télétel?