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The Power of Ideology

The Quest for Technological Autonomy in Argentina and Brazil

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Argentina's Aborted Venture into Computers in the Mid-1970s

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The following two chapters are ambitious: they attempt to clarify further the cognitive and ideological elements involved in the development of policy and to shed more light on the groups that through their influence and access to the power structure succeeded in effecting political and economic changes. Involved is a single choice—whether to develop a national computer industry or continue to rely on foreign suppliers of data-processing equipment—that is intrinsically related to the linkages between scientific and technological development and economic development and to the need to manage interdependence and reduce technological dependency.

Given that the developed countries such as the United States and Japan indisputably dominate the computer field, the choice for Brazil and Argentina in the 1970s was not between dependency and absolute self-reliance. Rather, it was between dependency and starting the *national* manufacture of micro- and minicomputers, technologically and economically much easier to substitute than the medium-sized and large computers, thus paving the way to increased self-reliance and managed interdependent relations. Those who favored the latter course knew that it was the only realistic alternative and that the technological and economic, managerial, and political learning to be ex-

tracted from the experience could positively influence the development of larger and more sophisticated computers in the future.

The decision to set up a national computer industry grew from technological developments in the international computer industry[1] and the trend away from large, expensive systems toward smaller and cheaper ones. The availability of relatively inexpensive integrated circuits, along with the possibility of obtaining technology under license, helped Brazil shift its technological dependence from the older computer hardware market dominated by market giants[2] to the dynamic semiconductor market, and the foreign components and software know-how available from small new companies. Joseph M. Grieco, in a rich study of the Indian computer industry, found such developments to be crucial to the Indian decision to set up a domestic industry.[3] He also identified key state institutions in assertive countries, such as India, that promoted the computer projects against both opposing domestic interests and the multinationals. As he pointed out, the establishment of such an institution in Brazil, matching the experience of India, was critical to the relative success of subsequent choices.

But as the cases of Argentina and Brazil will demonstrate, much more than technological change and the creation of state institutions is involved in the establishment of a new industry. To find out how these and other factors affected the Latin American experience, we must disaggregate the notion of state, even institutions, and explore the development and evolution of ideologies and their impact on the actors involved in the political and economic processes. We must study the actions of ideological groups such as the pragmatic antidependency guerrillas and their influence, or lack of it, over political power. And we must look at the relationships between science and technology in general on the one hand and the development of the national computers on the other.

The cases I will present have a clear comparative appeal, especially because Brazil and Argentina met, at approximately the same time, such different fates in their attempts to establish a domestic computer industry. Argentina, after a prototype had already been built, decided to halt the experiment and rely on the market's "efficiency"—which meant dependence on foreign computers. Brazil, after a process of consciousness-raising and political give-and-take, proceeded with the state-promoted and state-supported computer industry, reckoning on

some inefficiency in its beginning stages, because they saw that they could not afford to remain dependent on multinational corporations for computers.

What has happened in the 1970s and early 1980s in Argentina and Brazil is not the end of the story; it is just part of these countries' "journeys toward progress," one sequence of choices and changes, one frame of a motion picture. From a long-range perspective, an Argentine computer industry can still be developed and flourish, and that of Brazil can fail or succeed. The two countries can also choose to cooperate and share their expertise in order to develop and strengthen their potentialities in the computer field. But the future, whatever happens, will be affected by the choices made in the 1970s. These choices and their timing have not only irreversibly altered the direction these countries will take toward progress, but they have also altered the nations' relative capabilities and attitudes.

These choices have also affected the multinationals, their markets, and their strategies. Brazil learned that the multinationals were adaptable, and the multinationals learned that those who do not adapt pay a price. And other countries and actors may have learned from these interactions and experiences, broadening the effect of the choices even more. By incrementally changing the images and perceptions national actors have about multinationals and, more important, about themselves and their ability to develop in the context of international dependency, bold national choices may have the propensity to transform the relative capabilities of national and multinational actors and their relative bargaining power vis-à-vis each other, thus leading to change at the level of international interactions.

The story of the Argentine computer concerns an idea that did not become reality—not much can be said about something that did not actually occur. The data are sketchy. They are based on studies of the electronics industry;[4] on an article written by Eugenio Lahera Parada in 1976 on FATE (Argentine Tire Mfg. Co.), the enterprise that was to produce the computers and finally decided not to;[5] substantially on interviews with past and present members of the firm and with persons from the science and technology establishment, government officials, and business figures close to FATE; and on events surrounding the decision to commercially develop a national computer.

Electronics and the Computer Market

Electronics in Argentina

To illustrate the background of the decision we must first look at Argentina's electronics industry, focusing on the first half of the 1970s, when the major developments took place.[6] In the 1950s and 1960s the industry had grown at high levels in terms of the physical value of production, higher than the growth rates for the manufacturing sector as a whole.[7] Production concentrated at first in consumer goods for the domestic market, but started to change slowly at the end of the 1960s, when the field of electronic instruments and components began to acquire some dynamism. But the importation of active and passive components remained dominant. Many factories just assembled products for the domestic market, relying on a large amount of imported materials.

In 1973 and 1974, surveys of the majority of electronics industry enterprises (the remainder were too small and insignificant to affect statistics) found 285 enterprises in 1973, with a total of 21,392 employees, of whom 1,869 were technical personnel and 683 professionals. Labor in this industry was highly qualified compared to other developing countries such as Korea.

Total production value in 1973 was approximately $285 million. One year later it was higher; the United Nations Conference for Trade and Development (UNCTAD) figure is $593 million. During 1974 the electronics industry's per capita gross product was 41 percent higher than that of the manufacturing sector as a whole. Significant drops in production, though, occurred in 1975 and 1976, with a drop of 18 percent in 1975 alone.[8] One study concluded that although Argentina's electronics production lagged behind Brazil's, it was far more advanced in technologically sophisticated equipment.[9]

Among the components manufactured in Argentina were electronic tubes, integrated circuits, and semiconductor manufacturing equipment. The foreign firms involved in this subsector were IBM, Texas Instruments, and Olivetti. In 1974 multinationals controlled about 30 percent of the electronics sector production and accounted for 90 percent of the exports,[10] most of it in data-processing equipment and parts.

In 1973 the electronics industry exported less than it imported;

among the exports were ceramic and plastic capacitors, transistors, cathode ray tubes, and magnetic ceramics.[11] Electronic products exports enjoyed some benefits, such as drawbacks, reimbursements, fiscal benefits, and special financing systems, but in 1974 these were reduced to only reimbursements of up to 15 percent according to the type of product, with 5 percent additional reimbursement in the case of opening of a new export market. The orientation was clearly to supply the internal market.

Because production was geared largely toward domestic consumption and was mostly in the consumer electronics sector, it required a relatively low technical level. Most of the capital goods and technologies for the professional sector were imported. But technological backwardness was not the main factor hampering dynamism of the national enterprises. Indeed, one study has shown that in 1978 R & D expenditures in the electronics industry amounted to 9.3 percent of total production value, with data-processing and office equipment accounting for one-third of those expenditures.[12]

Between 1971 and 1974 the industrial electronic instruments subsector (worth $10 million), with only 10 percent of the firms producing through foreign license, achieved product quality and a price structure competitive with imports from the United States. Something similar happened with medical electronic instruments, where production was based on local design and engineering without the use of licenses.[13] Furthermore, several laboratories and research centers were working on silicon crystals and the implantation of ions in semiconductors,[14] and it was believed that by 1976 prototypes could be built, with manufacture soon to follow. At the universities teams were working on computer hardware and software. Petrocolla et al. have shown the constant effort taken to adapt designs to both local conditions and the new components entering the market. They concluded that this type of technological modification and adaptation effectively broadened the market, either because of lower prices or because new products increased demand.[15] Thus, while in general the industry could by no means match IBM and Olivetti technologically, there was some local production and adaptation, mainly in the industrial and medical electronic instruments subsectors, with computer technology only a few steps ahead.

But there were other problems, and they were not technological. Argentina was in a state of economic and political crisis, and the electronics sector did not receive the government's attention and support

as a future leading sector. According to the Argentine Association of Electronic Industries (CADIE), the difficulties the industry encountered in the first half of the 1970s were due primarily to the following factors: price control instituted between 1973 and 1976; a delay in infrastructure work that led to divestment and the flight of human resources; the use of personnel in nonproductive jobs; a strong contraction in demand since the end of 1975; and an increase in the real cost of domestic and foreign components. After the Videla government came to power, the main problem was the lack of protection for the industry.[16]

The Computer Market

The office machine and data-processing equipment subsector showed a consistent rate of growth compared to the electronics sector as a whole. Production increased steadily between 1970 and 1976 (the period when the domestic computer idea was born and partially implemented), from $14.1 million to $117.9 million (1978 dollars).[17] Also, this subsector accounted for a majority of the electronics industry exports (over 60 percent in 1973) and, in contrast to the overall electronics sector, enjoyed a positive trade balance between 1970 and 1974.[18]

There were an estimated 356 computers in Argentina at the end of 1969; 20 percent were used by the government, 27 percent by heavy industry and manufacturing, 17 percent by banking and finance, 10 percent by data service business, 7 percent by education and research, with the rest scattered among other users. By 1973 there were about 500 computers, worth $130 million.[19] Some 70 percent of the computers in use were installed in the second half of the 1960s; virtually all of this equipment had been imported and most of the hardware supplied by the multinational corporations. Imports of computer hardware in 1969 reached $5.3 million, and that of peripherals $2.9 million. By the end of 1969 IBM held 65.9 percent of the market, while NCR had 15.1 percent, Bull/GE 10.1 percent, Burroughs 6.7 percent, Univac 2.1 percent, and others 0.1 percent. Seventy-five percent of the computer installations were leases, preferred over purchase because of expected support from the leasing firms and a belief that the equipment was subject to rapid obsolescence.[20] Prior to 1974 three companies were producing data-processing and office machine

equipment: IBM, Olivetti, and FATE. They employed 1,340 individuals, including 145 technical personnel and 142 professionals.

IBM Argentina, which started its activities in 1923, manufactured computer hardware. In 1973 it was the thirty-second-largest Argentine firm working to full capacity, with a total of 610 employees, of whom 140 were technicians and professionals. All but 5 percent of its production was for export, half of which went to the United States, Canada, the United Kingdom, Japan, and Sweden and the rest all over the world.[21] IBM exports increased from an FOB value of approximately $22 million in 1974 to $29 million in 1975, but dropped back to $22 million in 1976. In 1980 and 1981 exports were approximately $57 million and $97 million, respectively.[22]

Olivetti Argentina was ranked thirty-fifth among the largest Argentine companies in 1973, when it employed 230 people and worked to only 30 percent of capacity. It operated under a foreign license, assembling electric accounting machines since 1962, electronic calculators since 1969. In 1973 it produced 8,000 "Logos" calculators.

Texas Instruments produced transistors. In 1974 it began to market pocket calculators (imported from Brazil), selling 70,000 in six months, a 60 percent market share for that year. But then import restrictions lowered that share to 20 percent during the first semester of 1975, and Texas Instruments decided to strike a bargain with the Argentine government: in exchange for lifting the restrictions, the American company offered domestic production of calculators. Argentina accepted, and Texas Instruments began to produce 5,000 calculators a month.[23]

FATE, a private, 100-percent-Argentine-capital company, was set up as a tire manufacturing company in the 1940s, but by the end of the 1960s it began to diversify into electronics, more precisely electronic calculators and printed and integrated circuits, and into an aluminum venture with a company named Aluar. FATE soon rose to the "big league" in Argentina (ranked forty-second), owing at least partially to its technology policy. After some successful technical assistance contracts with General Tire in the United States, FATE became more interested in technological assimilation, training technicians and engineers, providing space for university researchers, and getting involved in the production of R & D–intensive products. The creation of an electronics division and the manufacture of desk calculators beginning in the early 1970s fit this pattern.[24]

FATE Electronics and the National Computer That Never Was

The history of FATE's computer starts with the production between 1956 and 1959 of Argentina's first experimental computer, known as CEFIBA,[25] and with the work of scientists in the early 1960s at the University of Buenos Aires, which had a Mercury-Ferranti computer that was used for research in the components, digital techniques, automation, and industrial electronics areas. These activities produced a cadre of qualified scientists in the computer field, who later were recruited by FATE.

Three groups of scientists in the engineering department of the University of Buenos Aires, specializing in computation, semiconductors, and process control, were the seed for what was about to come. They were under the supervision, and intellectual guidance, of Humberto Giancaglini and Alberto Bilotti, the latter an expert in microelectronics and solid states. Roberto Zubieta was an engineer who worked at the department's semiconductors laboratory and who became the leading intellectual and active force in the development of an Argentine computer. Other scientists involved in electronics R & D during the "golden age" of Argentine science, and who would become part of the FATE team, were Hector Abrales, Carlos Duro, Horacio Serebrinsky, and Pedro Joselevich, director of the department's electronics application laboratory. But all these efforts at the university stopped in 1966 with the "night of the long clubs." Many scientists left the universities, some leaving the country and others going to work for the multinationals; Zubieta went to Texas Instruments.

Oscar Varsavsky, a physicist, became the other key actor, with Zubieta, in FATE's development of electronics and the computer. Varsavsky strongly favored technological autonomy in Third World countries in general, and Argentina in particular, and wrote extensively on the subject.[26] One of the most renowned Argentine scientists of his time, he was listened to with respect. It was Varsavsky who, at the end of the 1960s, convinced Manuel Madanes, FATE's owner and a strong nationalist, of the benefits of developing electronics within FATE. At that time FATE was in excellent financial condition owing to its production of tires and its diversification into aluminum with Aluar, which had taken the company into more capital-intensive and technologically sophisticated investment. In the venture with Aluar, Madanes had ex-

plicitly set out to acquire some measure of technological independence by creating an excellently trained scientific group within the company. Now, Varsavsky suggested, with money available, the time had come for intelligence-intensive enterprises.

We should remember that this was the time when Onganía was on the way out, nationalism was growing, and the mild antidependency science and technology policy was already under way. It was also quite relevant for FATE that Gelbard held a significant amount of Aluar's shares, so that the General Economic Confederation (CGE), and after 1973 the ministry of economy, were very supportive of FATE and its enterprise. This "link" would later be one of the causes of FATE Electronics' downfall.

Madanes accepted the idea of vertical rather than horizontal diversification, getting involved in digital electronics first with the production of calculators, then "going up" toward computers. Varsavsky approached Zubieta, and both started to "look for people with technological autonomy consciousness." Zubieta brought in the core of the university groups: Bilotti, Joselevich, Abrales, Duro, Serebrinsky, and many more; Zubieta and Bilotti were placed at the head of the technological operation. According to several sources, Varsavsky brought to FATE the best Argentine minds in the electronics of his time.

In July 1969 Zubieta and Bilotti began to organize the technological structure, the heart of FATE Electronics. Zubieta was given almost total autonomy to make allocation decisions, and he became the operation's spearhead, selecting goals and using the means at his disposal to achieve them. His colleagues admitted that he was an excellent leader, with a good deal of political sensibility and a spirit of opportunism. His core ideas were basically three: technological self-reliance is possible, it should be the goal, and the state should help in bringing it about.

Now Zubieta was in command of a group of antidependency-minded scientists within a company headed by someone close to the Peronists, to Gelbard, and to the CGE, when all were on the rise. He envisioned FATE as an "island" and example of technological self-reliance. According to one of the highest-ranking scientists of the FATE group, "there was a challenge kind of attitude." As long as FATE was financially solvent, and its political contacts among the very best, the picture looked bright.

The engineering department at FATE Electronics became the enterprise's most dynamic element, the engineers by far outnumbering

the employees in commercialization. Fifteen percent of the personnel were involved in R & D, all in engineering and development, as there was no basic or applied research.

FATE's strategy was to develop, copy, and adapt technology. Although some components, such as chips, had to be imported, FATE Electronics used no foreign licenses or any other trademark. It searched aggressively for nonproprietary technological information, such as that available in journals (it subscribed to 80), and visited foreign plants and international fairs; it sent technicians to study at MIT; and sometimes it consulted foreign experts and bought foreign machinery, equipment, and components to train domestic personnel. FATE's technological style clearly matched a pragmatic antidependency ideology. This is also why it spent 7 percent of its gross sales on R & D (fixed cost), a good share for such an endeavor in Argentina. FATE also received direct help in R & D mainly from the National Atomic Energy Commission (CNEA), the National Institute of Industrial Technology (INTI), and La Plata University.[27]

FATE Electronics received operational financial aid from the World Bank, and their position in the marketplace was boosted when President Lanusse fixed a high tariff for the importation of electronic calculators and a somewhat lower (but still high) tariff for mechanical-electronic calculators, of the kind Olivetti was producing in Argentina. FATE also received import exemptions and, as did the multinationals, draw-backs and subsidies to encourage exports.

FATE developed a new line of products almost every year. It produced four calculator models in direct competition with Olivetti, with the brand name CIFRA: #311 (1150 integrated circuits [IC]); #211 (7 IC); #121 (3 IC); and 100/13 (1 IC). The calculators were of FATE's own design; circuits were first purchased in foreign markets, then built abroad according to FATE's specifications. Finally in 1974 FATE itself began to produce about 15–20 percent of its demand for integrated circuits. The first calculator took fifteen months to build. Production grew considerably between 1971 and 1975, from 500 to 134,000,[28] and FATE's share of the market rose from 1 percent to 50–55 percent (helped by protection). Importation of components decreased from 70 percent in 1971 to 40 percent in 1975.[29] FATE's success led to the building of a semiconductor manufacturing plant with capacity for 1,400 workers, and some in the company began to consider establishing plants in Mexico and Brazil. By 1972 FATE Electronics was making money.

These developments had a clear positive-feedback impact. Zubieta was confident that technological change was not a problem: FATE Electronics was meeting all challenges, and it had practically put Olivetti out of business. As one ex-member of the Zubieta group put it, this was "a period of delirium."

The next stage, the computer, came right along. Madanes had been approached by the military, who told him how important computers were for the armed forces. The scientists at FATE told him the enterprise was viable. Madanes then advised the military that he needed government support, which the military promised to provide. The computer idea branched into two: a medium computer (which some said would be similar to the IBM 360; others, to the IBM 370[30]—in any case, it would be simpler and faster than either of these), to be called Serie 1000; and a microcomputer, Sistema 75.

Sistema 75, the second project, was built under the supervision of Bilotti and successfully commercialized. With a memory of up to 16K, it was designed for cards and later for disks. Manufacture began in 1974, and a considerable number were reportedly sold.

Development of the Serie 1000 started in 1972, and by December 1973 its specifications were complete. According to one report, Serie 1000 was to have a microprogrammable processor, with up to 2 megabytes memory capacity. Memory and microprocessors were to be MOS/LS, designed with the help of an American company, Macro-Systems. The peripherals included disk units, magnetic tapes, a linear printer, a CRT terminal, and a data-entry terminal. Serie 1000 was to work with an advanced operating system, multiprogrammable and with realtime extension, and be compatible with COBOL, FORTRAN, BCPL, and other languages. The system was designed to diminish costs, using a "spooling system" (*impresión diferida*) for printing and a low-cost terminal with direct-to-disk data entry. It was also designed to interface with larger systems.

Building of Serie 1000 began in 1974. The hardware was assembled with mostly foreign parts, with the intention of adding Argentine components as soon as they were developed. By the end of 1975 a prototype, basically different from the IBM 360, was complete and working. Software development proceeded at a much slower pace; it turned out to be one of the computer's major obstacles.

FATE's technicians believed that Serie 1000 would be on the market by 1977, competitive with foreign firms in terms of price; others doubted the capacity to produce it commercially. Although one engi-

neer involved in marketing argued that the problems ahead had to do mainly with production, the consensus was that marketing was being disregarded and would become another major bottleneck.

A CNEA scientist with close links to the project argued that it was workable. The problem, he felt, was that "there was no awareness within the government about computers. The effort being made was not institutional or governmental, but personal." Some of the military, especially air force personnel, expressed interest in the development of domestic computers, but they were not then in power, and the military who came to power in 1976 had a completely different, pro-liberal ideology. FATE did receive political support from the Armed Forces Center for Scientific and Technical Research, the CGE, and Gelbard, but the latter two lost political power at the end of 1974 (when Isabel Perón and López Rega took control of the Peronist movement), and soon thereafter the import exemptions and export incentives were ended.

FATE's electronics venture prompted contrasting responses from IBM and Olivetti. IBM did not pressure the government against FATE Electronics computers because it did not feel threatened. Most of its Argentine market was in large machines for the public sector. Furthermore, its disbelief in the Argentine capacity to produce domestic computers led it to take a wait-and-see attitude during the Peronist period, preparing itself not to sell its products if things should turn sour.

Olivetti, however, had lost much of its calculator market to FATE. Skeptical in the beginning about FATE's chances, Olivetti decided to put up a fight when FATE Electronics began to grow. At the head of this effort was Edgar C. Bustos, an engineer who became the main lobbyist against FATE's venture. He said that since FATE was copying technology and using imported elements, the "self-reliance" policy was in fact a fake—a very inefficient fake—and that without high protection the project was doomed. He applied the most pressure on the technical staffs of the ministries, but other companies were also putting pressure on the government not to continue to protect FATE. As the head of the Chamber of Office Machines Manufacturers, Bustos also helped push entrepreneurs against FATE's venture. The argument was efficiency. As Bustos saw it, FATE, by failing to influence the armed forces and the bureaucracy sufficiently, finally lost to the lobby campaign waged against it.

During 1975 FATE's financial situation was bad. Zubieta's critics ar-

gue that although the goals were viable and the engineering department a success, he failed in management, specifically in the allocation of funds and in marketing. In the same year FATE and its owners became involved in an economic scandal concerning Aluar, which attracted public attention because of Gelbard's association with Aluar.

The process of deciding to terminate calculator and computer production took place between November 1975 and August 1976, at the peak of the political and economic chaos of the Peronist interlude. The timing could hardly have been worse for FATE Electronics. Madanes, by then burdened by the national turmoil, the financial difficulties of the company, the Aluar scandal, and the lack of government support, decided to bring a new general manager to FATE, R. Bargagna, whose business background and liberal outlook were a signal that the end was near.

As Bargagna said, "Madanes under these conditions would not think of investing even more on the computer." The end came late in 1975, and Bargagna was the "key" decisionmaker with power delegated by Madanes. According to Bargagna, the nationalists among the military and the government were consulted and told, "'If you want a national computer show me the purchase orders.' Up to that moment we had spent $2.5 million, and we needed another $2.5 million to continue with the project. They did not respond positively and the decision was simple."[31] Bargagna felt that the ISI process had already been exhausted and that a new approach was needed. It was time, he said, that industrialists understand that they have to modernize and compete rather than rely on overprotection. Bargagna's concerns were efficiency and market considerations; he deplored inefficient and overprotected ISI projects and saw technological change in the international computer field as being so rapid that the Argentine computer would be obsolete by the time it was marketed. In Brazil, however, this same change was a decisive motive for embarking on the manufacture of national minicomputers, with the ultimate goal of autonomous technological development. In pure market terms, of course, Bargagna was right.

The timing of the decision—*before* the Peronists were ousted by the military—was not directly connected with a political regime change, but the decision was anticipatory. "Everybody knew there was going to be a coup and that the Peronists would be out; the question was when."

Bargaining continued in the first months of 1976, but Zubieta was in no position to make deals. He and his collaborators were identified

as militant Peronists and classified by military intelligence as a focus of subversion. When he and his group left FATE Electronics, the Serie 1000, the microcomputer, the international venture, the semiconductor plant, the calculators, were all terminated. FATE Electronics became an assembler of foreign products and the Argentine representative of Nippon Electronics Company. And as Lahera wrote in a postscript to his article (and a postmortem to the computer idea), "the enterprise decided to concentrate in the sector it knows best—tires . . . which presented the best options."[32]

Some time later, Zubieta fled to Brazil, where he became a manager of one of the most important Brazilian microelectronic enterprises, Elebra, a subsidiary of Doças de Santos. The insight gained from time and experience brought him to the conclusion that a country can reduce dependency, as Brazil had in computers and Argentina in nuclear technology, only with almost full government support and freedom to develop a self-sufficiency strategy—the lack of which had doomed the Argentine computer industry to failure.

FATE started the electronics project on the premise that self-reliant development was possible and that the company could benefit from it, but Argentina lacked a systematic science and technology policy, institutions to support the development of an electronics technology, and government awareness of the industrial relevance of computers; and so it failed. FATE also suffered from the political and economic turmoil of the time, which personally involved its shareholders and led Madanes to reject any further investments. Madanes then named a general manager whose ideology was totally different from that of the group that had developed the computer. Bargagna knew that the military was returning to power; he believed that efficiency and the market, not protection, were the answer for Argentine industry; and he was convinced that technological change in semiconductors would make FATE's project inviable—so he decided to kill it.

In the last analysis, the computer project succumbed to bad timing; the disintegrating Peronist government lacked the means to successfully pursue it, and the new military government set goals of efficiency and modernization that led to the dismantling of much of Argentina's industrial capabilities. As Marcelo Diamand commented, FATE and the computer became the first victims of the change of government. They also fell prey to a lack of awareness of the dynamics of development, of the fact that a successful technological project might, despite short-term inefficiencies, have more important national payoffs.

In 1980 the Argentine government started to show some interest in microelectronics, which was intensified after the Falklands (Malvinas) war. An informatics subsecretariat within the planning secretariat was set up and an Informatics National Commission planned. But political repression had led to mistrust and a considerable brain drain. Meanwhile, Argentina has asked Brazil, which has acquired significant expertise in the last decade, for assistance in developing its computer industry.

Whether the Argentine computer experience was "good" or "bad" for Argentina's development in general is an ideological question. So is the subject of the "right" strategy for scientific, technological, and economic development. Nationalists view the loss of capacity to innovate and to adapt to what is becoming a crucial technology as a failure; from a market perspective there was no failure—efficiency decided what had to be done.

Interviewees were asked what happened to the knowledge and experience generated within FATE: *where have all the scientists gone?* "Gone to IBM and other multinationals, every one," was the response, and implicit in this answer was the question, when will they ever learn, when will they ever learn?