# ARAMIS or

## THE LOVE OF TECHNOLOGY

## Bruno Latour

TRANSLATED BY CATHERINE PORTER

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Can we unravel the tortuous history of a state-of-the-art technology from beginning to end, as a lesson to the engineers, decisionmakers, and users whose daily lives, for better or for worse, depend on such technology? Can we make the human sciences capable of comprehending the machines they view as inhuman, and thus reconcile the educated public with bodies it deems foreign to the social realm? Finally, can we turn a technological object into the central character of a narrative, restoring to literature the vast territories it should never have given up—namely, science and technology?

Three questions, a single case study in scientifiction.

Samuel Butler tells the story of a stranger passing through the land of Erewhon who is thrown into prison because he owns a watch. Outraged at the verdict, he gradually discovers that draconian measures forbid the introduction of machinery. According to the inhabitants of Erewhon, a cataclysmic process of Darwinian evolution might allow a simple timepiece to give birth to monsters that would rule over humans. The inhabitants are not technologically backward; but they have voluntarily destroyed all advanced machines and have kept none but the simplest tools, the only ones compatible with the purity of their mores.

Butler's Nowhere world is not a utopia. It is our own intellectual universe, from which we have in effect eradicated all technology. In this universe, people who are interested in the souls of machines are severely punished by being isolated in their own separate world, the world of engineers, technicians, and technocrats.

By publishing this book, I would like to try to bring that isolation to an end.

I have sought to offer humanists a detailed analysis of a technology sufficiently magnificent and spiritual to convince them that the machines by which they are surrounded are cultural objects worthy of their attention and respect. They'll find that if they add interpretation of machines to interpretation of texts, their culture will not fall to pieces; instead, it will take on added density. I have sought to show technicians that they cannot even conceive of a technological object without taking into account the mass of human beings with all their passions and politics and pitiful calculations, and that by becoming good sociologists and good humanists they can become better engineers and betterinformed decisionmakers. An object that is merely technological is a utopia, as remote as the world of Erewhon. Finally, I have sought to show researchers in the social sciences that sociology is not the science of human beings alone—that it can welcome crowds of nonhumans with open arms, just as it welcomed the working masses in the nineteenth century. Our collective is woven together out of speaking subjects, perhaps, but subjects to which poor objects, our inferior brothers, are attached at all points. By opening up to include objects, the social bond would become less mysterious.

What genre could I choose to bring about this fusion of two so clearly separated universes, that of culture and that of technology, as well as the fusion of three entircly distinct literary genres—the novel, the bureaucratic dossier, and sociological commentary? Science fiction is inadequate, since such writing usually draws upon technology for setting rather than plot. Even fiction is superfluous, for the engineers who dream up unheard-of systems always go further, as we shall see, than the best-woven plots. Realism would be misleading, for it would construct plausible settings for its narratives on the basis of specific states of science and technology, whereas what I want to show is how those states are generated. Everything in this book is true, but nothing in it will seem plausible, for the science and technology it relies upon remain controversial, open-ended. A journalistic approach might have sufficed, but journalism itself is split by the great divide, the one I'm

seeking to eliminate, between popularizing technology and denouncing its politics. Adopting the discourse of the human sciences as a master discourse was not an option, clearly, for it would scarcely be fitting to call the hard sciences into question only in order to start taking the soft ones as dogma.

Was I obliged to leave reality behind in order to inject a bit of emotion and poetry into austere subjects? On the contrary, I wanted to come close enough to reality so that scientific worlds could become once again what they had been: possible worlds in conflict that move and shape one another. Did I have to take certain liberties with reality? None whatsoever. But I had to restore freedom to all the realities involved before any one of them could succeed in unifying the others. The hybrid genre I have devised for a hybrid task is what I call scientifiction.

For such a work, I needed a topic worthy of the task. Thanks to the Régie Autonome des Transports Parisiens (RATP), I was able to learn the story of the automated train system known as Aramis. Aramis was not only technologically superb but also politically impeccable. There was no "Aramis affair," no scandal in the newspapers. Better still, during the same period the very same companies, the same engineers and administrators, succeeded in developing the VAL automated subway systems whose background forms a perfect counterweight to the complex history of Aramis. Even though I had not gone looking for it at the outset, the principle of symmetry hit home: How can people be condemned for failing when those very same people are succeeding elsewhere?

I could have done nothing without the openness and sophistication, new to me, of the world of guided transportation (that is, transportation that functions on rails). The few engineers and decisionmakers in this field, who have been renewing the framework of French urban life through spectacular innovations in public transportation over the last twenty years, were nevertheless willing to cooperate in the autopsy of a failure. It is owing to their openmindedness, with special thanks to the RATP, the Institut National de Recherche sur les Transports (INRETS), and Matra Transport, that Aramis can be presented to us all as an

PREFACE

exemplary meditation on the difficulties of innovation. So Aramis will not have died in vain.

This book, despite its strange experimental style, draws more heavily than the footnotes might suggest on the collective work of the new sociologists of technology. Particularly relevant has been the work of Madeleine Akrich, Wiebe Bijker, Geoffrey Bowker, Alberto Cambrosio, Michel Callon, John Law, and Donald MacKenzie. Unfortunately, the book was published too soon for me to use the treasure trove of narrative resources developed by Richard Powers, the master of scientifiction and author of *Galatea 2.2*, whose Helen is Aramis' unexpected cousin.

Here is one more cue for readers:

In this book, a young engineer is describing his research project and his sociotechnological initiation. His professor offers a running commentary. The (invisible) author adds verbatim accounts of real-life interviews along with genuine documents, gathered in a field study carried out from December 1987 to January 1989. Mysterious voices also chime in and, drawing from time to time on the privileges of prosopopoeia, allow Aramis to speak. These discursive modes have to be kept separate if the scientifiction is to be maintained; they are distinguished by typography. The text composed in this way offers as a whole, I hope, both a little more and a little less than a story.

"IT'S TRULY A NOVEL, THAT STORY

ABOUT ARAMIS . . ."

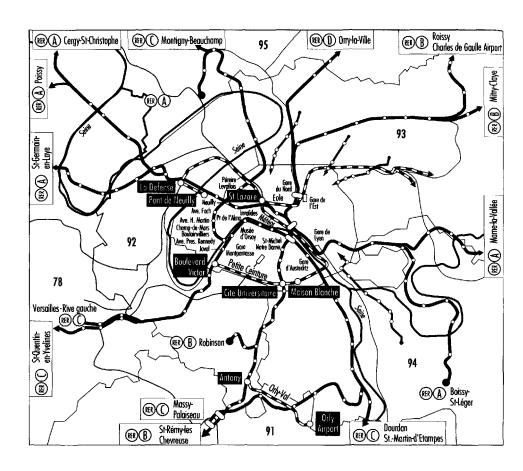
"NO, IT'S A NOVEL THAT'S TRUE, A

REPORT, A NOVEL, A NOVEL-REPORT."

"WHAT, A FAKE LOVE STORY?"

"NO, A REAL TECHNOLOGY STORY."

"NONSENSE! LOVE IN TECHNOLOGY?!"



## PROLOGUE: WHO KILLED ARAMIS?

The first thing I saw when I went into Norbert H.'s office was the new RATP poster on the wall [see Photo 1]:

#### [DOCUMENT: TEXT OF THE RATP'S ADVERTISEMENT LAUNCHING THE R-312 BUS]

Darwin was right!

RATP means the evolution and adaptation of buses in an urban environment.

In 1859 Darwin proposed his theory of evolution, maintaining that the struggle for life and natural selection should be seen as the basic mechanisms of evolution.

The latest product of this evolution is the R-312 bus, which is about to begin service on Line 38. For the occasion, today's buses and their predecessors will join in a big parade in honor of the R-312.

The theory of evolution has its advantages. Thanks to Darwin, you can ride our buses around the Luxembourg Garden for free on Wednesday, June 1.

"Chausson begat Renault, Renault begat Schneider, Schneider begat the R-312 . . . Darwin's theory has its downside," said my future mentor solemnly when he saw me reading the poster. "There are people

who want to study the transformation of technological objects without worrying about the engineers, institutions, economies, or populations involved in their development. The theory of evolution can take such people for a ride! If you leave your engineering school to come study innovation, my friend, you'll have to drop all that third-rate biology. This may disappoint you, but—unless I'm completely incompetent in such matters—a bus does not have sex organs. Never mind the poster: the R-312 doesn't descend from the Chausson APU 53 the way humans descend from apes. You can climb aboard a bus, but you can't climb back to the Schneider H that was all over Paris in 1916. Frankenstein's monster with his big dick and his lopsided face? Such things exist only in novels. You'd have quite a crowd of people parading around the Luxembourg Garden if you really wanted to honor all of the new bus's progenitors."

I hadn't yet done any in-depth studies of technological projects. I'd just emerged from a telecommunications school where I'd taken only physics and math; I'd never seen a motor, or a chip, or even the inside of a telephone. That's why I wanted to spend a year at the Ecole des Mines, in sociology. There at least, or so I'd been told, ambitious young people could learn the engineering trade and study real projects in the field. I didn't find it at all reassuring to be abandoning the peace and quiet of technological certainties only to apprentice myself to a laboratory Sherlock who'd just been entrusted by the RATP with the investigation of a recent murder: "Who killed Aramis?" I'd read *The Three Musketeers*, but I didn't know Aramis and wasn't aware he was dead. In the beginning, I really thought I'd landed in a whodunnit, especially since Norbert, the inspector to whom I'd been assigned, was a fellow at least forty years old with a Columbo-style raincoat.

"Here's the beast," my professor said [see Photos 11–14]. "It's a new transportation system, apparently a brilliant design. A combination of private cars and public transportation. The ideal, you might say. In any case, it's not like the R-312; there wasn't any parade in Aramis' honor, and there certainly weren't any Darwinian posters. Just a slightly sad farewell party on the boulevard Victor, at the site of the Center for Technological Experimentation (CET) three weeks ago, in early De-

cember 1987. A promising, seductive, dazzling line of technology has been buried without fanfare. The site will be an empty lot for a while, until it's developed as part of the renovation of the quai de Javel. You should have seen how mournful the engineers were. According to what they told me, the project was really admirable. They'll never have another chance to build, from the ground up, an entirely automatic and entirely revolutionary system of guided transportation—a system running on rails. But Aramis fell out of favor. 'They dropped us'—that's what the engineers say. 'They' who? The Nature of Things? Technological Evolution? The Parisian Jungle? That's what we've been asked to find out, my friend, because we don't belong to the transportation world. Some people claim that Aramis wouldn't have kept its promises. But others, apparently, say that it was the State that didn't keep its promises. It's up to us to sort all this out, and we can't rely on Darwin or on sexual metaphors. And it won't be easy."

Personally, I didn't see the problem. I replied confidently that all we had to do was take a close look to see whether the project was technologically feasible and economically viable.

"That's all?" asked my mentor.

"What? Oh, no, of course not; it also has to be socially acceptable."

Since my professor was a sociologist, I thought I was on the right track. But he grinned sardonically and showed me his first interview notes.

### [INTERVIEW EXCERPTS]

"It doesn't make any sense. Six months ago, everybody thought it was the eighth wonder of the world. Then all of a sudden everything fell apart. Nobody supported it any longer. It happened so fast that no one can figure it out. The head of the company can't figure it out either. Can you do something? Say something? . . . "

"It had been going on for twenty years; the time had come to call it quits. It'll be a fine case for you muckrakers from the Ecole des Mines. Why did they keep that monstrosity going so long on intravenous feedings, until somebody finally had the balls to yank out the tubes? . . . "

"It's typically French. You have a system that's supposedly brilliant, but nobody wants it. It's a white elephant. You go on and on indefinitely. The scientists have a high old time . . ."

"That's France for you. You get a good thing going, for export; it's at the cutting edge technologically; people pour money into it for fifteen years; it revolutionizes public transportation. And then what happens? The Right comes to power and everything comes to a screeching halt, with no warning, just when there's finally going to be a payoff. It would really help if you could do something about it. Why did they drop a promising project like this after supporting it for so long? . . ."

"The industrial developer let it go. They got their studies done at our expense; then it was 'Thank you' and 'Goodbye' . . . "

"The operating agency couldn't accept an innovation that was the least bit radical. Corporate culture is the problem. Resistance to change. Rejection of a transplant . . . "

"The public authorities are losing interest in public transportation. It's another ploy by the Finance Ministry, business as usual  $\dots$ "

"It's an economic problem. It was beautiful, but it cost too much. So there was no choice  $\dots$ "

"It's old-fashioned. It's backward-looking. It's the sixties. In 1987 it's no good, it won't fly  $\dots$ "

"In ten years—no, five—it'll be back, take my word for it. It'll have a new name; but the same needs create the same technologies. And then people will really kick themselves for abandoning it just when everybody would have wanted it . . . "

"But what's the real answer?" I asked with a naïveté that I regretted at once.

"If there were one, they wouldn't pay us to find it, chum. In fact, they don't know what killed Aramis. They really don't know. Obviously, if by 'real answer' you mean the official version—then, yes, such versions exist. Here's one."

Four questions for M. Maire, head of research and development.

Do transportation systems like Aramis really fill a niche, from the user's point of view?

The idea of little automated cabs that provide service on demand is seductive a priori, but hard to bring off economically. Furthermore, the creation of a new mode of transportation is a tricky business in a city where billions of francs have been invested in the infrastructures of other transportation systems that do the job perfectly well. In new cities or in cities that don't have their own "on-site" transportation, a system like Aramis can offer an interesting solution. The project designed for the city of Montpellier would be a good example, except that there, too, implementation had to be postponed for financial reasons.

People talk about the failure of the Aramis project. But can't it be seen as a success, given card was played and appropriate conclusions were drawn?

It's not a failure; on the contrary, it's a technological success. The CET has demenstrated that the Aramis principles were valid and that the system could work. We did play the card of experimentation, there's no doubt about it. But the evolution of needs and financial resources doesn't allow for the implementation of such a system to be included among the current priorities for mass transportation in Paris. Why would you want us to keep on trying to perfect a transportation system that we see no real use for in the short run, or even in the medium run?

The Aramis CET was the first phase of a project that was intended to serve the southern part of the Petite Ceinture in Paris. The problem of providing this service still hasn't been resolved. Aren't there some risks involved in coupling a research project like this with a project for upgrading the transportation network?

The important thing now is to protect the existing track

system of the Petite Ceinture so as to aveid mortgaging the construction of a future public transportation line. Anyway, some market studies will have to be redone, perhaps with an eye toward liaison with an automated mini-metro. As for the notion of risk, I don't agree. If we don't try things, we'll never accomplish anything new. Generally speaking, it stimulates research if you have concrete objectives. It also makes it easier to mobilize decisionmakers around a project-even if there's some risk in doing so!

Aramis comes across as a technological gamble. Do the studies that have been carried out give Matra Transport and the RATP a head start in the realm of automated urban transportation?

Even if the Aramis project wasn't initially intended to be a melting pot for new urban transportation technologies, it ended up playing that role. There will be a lot of spillover. Besides, research has shown how important it was to take a global approach in thinking about the transportation of tomorrow. The key to success is as much in the overall vision of the system as in mastery of the various technological components.

I wasn't used to making subtle distinctions between technical feasibility and "official versions" of what is feasible or not. I'd been trained as an engineer. I didn't really see how we were going to go about finding the key to the enigma.

"By going to see everybody who's being criticized and blamed. Nothing could be simpler."

My boss had his own peculiar way of going about these things. In the evening, after the interviews, he would organize "meetings and confrontations" (as he called them) in his file-cluttered office. What he actually did was arrange our interview transcripts in little bundles.

"That's the big difference between sociology and justice. They don't come to us; we go to them. They answer only if they feel like it, and they say only what they want to say."

"You see," he went on during one of these daily "confrontations," "there have been hardly any questions about the proximate causes of Aramis' death. It all happened in three months."

#### [INTERVIEW EXCERPTS]

The scene is the RATP premises on the boulevard Victor, in December 1987, three hundred yards from the workshop where the five Aramis prototype cars sit motionless. The project engineers are talking heatedly:

"While a meeting was under way in February 1987, M. Etienne [of Matra] secretly distributed a 'provisional verbal note' (it was in writing, all the same) saying 'Stop everything.' Frankly, we didn't understand what was going on." Ino. 2]\*

M. Girard, in a temporary office downtown:

"The end didn't surprise me. The Finance Ministry was all it took . . . We had a colossus with feet of clay. Its whole support structure had disappeared in the meantime . . .

"It hardly matters who was responsible for piling on the last straw; that was just the proximate cause. In any event, the point is that *all it took was one last straw*. It doesn't matter who killed the project. As for the proximate cause, I don't know"

"But you know the remote cause?"

"Yes, of course. Actually, when I realized that Aramis had been called off, it didn't surprise me. For me, it was *built right into the nature of things*." [no. 18]

M. Desclées, in an elegant suburban office of the Institut National de Recherche sur les Transports (INRETS):

"There's one thing I don't want to see glossed over in your study . . . There was a very important political change after 1986.† Soulas, the new RATP president, had been general inspector of finances, whereas Quin's experience

\*The numbers refer to the original interviews. Certain protagonists were interviewed several times. Some interviews were conducted in a group setting. Certain data come from sessions devoted to summing up the investigation for the benefit of the client; these sessions are called "restitutions."

 $^{\dagger}$ The legislative election brought the Right to office for a two-year period of power sharing between President François Mitterand and Prime Minister Jacques Chirac.

was in marketing and public relations. The new president wanted to bring all superfluous research to a halt. After a few months I went to see him; he told me to 'cut all that out.' I said, 'When you've already spent 95 percent of your budget, maybe it's best to keep going.'

"Soulas got the endgame under way when he told Etienne that the construction of the line would not be included in the next Five-Year Plan; this was in late 1986 or early 1987.

So the RATP people may tell you that they 'don't understand what happened,' but the first blow came from within their own ranks." [no. 1]

M. Frèque, one of Matra's directors, speaking at Matra headquarters:

"By late 1986 I'd become convinced that it had to stop . . . Our conclusions were increasingly negative. Production costs were going up, with harmful results for us because the State's participation was constant whereas ours was variable

"So as early as the twenty-seventh month we were going in a different direction from the protocol. The others were saying, 'Finish your product and do what you can with it. Later on, we'll see about building the line.'

"Read the protocol: by the twenty-seventh month we were supposed to be in production! In my first report, this was clearly spelled out; later on, they glossed over it.

"That was it, for me. I'd faith in this thing. We came to an agreement. The testing team worked on November 11, a legal holiday, and I'm very proud of that. When the ship is going down, you stay at your post until the last minute—that's something I believe in." [no. 6]

Matra headquarters again. M. Etienne, the president is speaking:

"What changed everything was the change of president [of the RATP]. He came in June; I met him in October 1986. He said, 'Give me time.' I took him to Lille on October 26 to see VAL. I remember I sent him a note. 'Here's what we think: we don't have any major applications; the system has to be simplified; the network isn't complicated enough to justify a complicated system.'

"He told me, 'There'll be practically nothing in the Tenth Plan for the RATP—not for Aramis at any rate, not for construction of the line.' I thanked him for his frankness. Now that I've gotten to know him, he's very straightforward. 'Nothing will happen for the next seven years.

". . . The RATP was accepting the cutbacks, very quietly. We were wondering how far they were going to allow this thing to go.

"But during that period I found out for certain that neither the DTT nor the finance minister intended to contribute a thing. Soulas was right.

"This is where my February 1987 note came from. Nothing was going to happen for seven years. 'Matra wants to pull out early'—that's what the RATP people were saying.

"What we were saying here was: 'Let's refocus Aramis, make it more efficient.' We wanted to renegotiate. 'When we start up again seven years from now, we'll at least have something to start with.'

"They sulked. 'Since you want to pull out, we'll shut the whole thing down.' That wasn't what we wanted. But the State and the public authorities didn't have any more money.

"With patience, Soulas got the reforms he was after. He got Aramis shut down; he was totally honest." [no. 21]

M. Maire, one of the directors in charge of the RATP's research and development, speaking at the agency's headquarters:

"Etienne showed VAL to Soulas, and Soulas saw his chance to ask: 'What about Aramis?' 'It won't get a cent.' 'I get the picture,' Etienne replied."

"So the final decision really did come from the RATP?"

M. Etienne: "No, no, not at all. Soulas was the mouthpiece for the Finance Ministry. For them, any innovation is a drain on resources. It certainly wasn't a question of Soulas' being won over by the RATP, or by our people, our engineers." [no. 22]

M. Soulas, president of the RATP, in his plush second-floor office overlooking the Seine:

"Aramis died all by itself, Professor H. I didn't intervene. I can say this quite freely, because I'm an interventionist president and I'd tell you if I'd stepped in. I didn't understand what was happening. It had been on track for fifteen years.

"It was a seductive idea, Aramis—really quite ingenious. It wasn't a line like a subway, but more like a bloodstream: it was supposed to irrigate, like veins and arteries. Obviously the idea doesn't make sense if the system becomes a linear circuit—that is, if it ceases to be a network.

"But this good idea never found a geographic footing. It was abstract. In its linear form, it tended to get transformed into a little metro; as a system, it became increasingly hybrid and complicated. Many people admired it. It became more and more technical, less and less comprehensible to the uninitiated, and a source of anxiety for the Finance Ministry. I watched it die. I didn't intervene in its death; I didn't have to."

"But you pushed a little, didn't you?"

"No, I didn't need to push. I found out one day that Aramis was being jettisoned. Matra had decided, or the RATP technicians . . . I'd be interested to know whose decision it was, actually. My feeling is that Matra made the fatal move. In any event, the top priority now is adding a line that will parallel Line A of the RER. Before, we could afford to experiment with Aramis; now we can't even manage a night on the town, as it were."

[Settling back more comfortably in his armchair.] "It's extraordinary that they've asked you to do this study! You know what it reminds me of? Oedipus' asking the soothsayer why the plague has come to Thebes! . . . You have the answer in the question itself. They wear blinders. Oh, there's not an ounce of ill will among the lot of them, but I've never seen such unpolitical people. 'How could it happen?' they must be wondering. 'How could we make something that works, and then it all goes belly-up?' It's touching, really—shows an extraordinary lack of awareness. Their own case intrigues them, because they like sociology . . . Aramis is such an intricate mess, incredibly intricate." [no. 19]

"You see, my friend, how precise and sophisticated our informants are," Norbert commented as he reorganized his notecards. "They talk about Oedipus and about proximate causes . . . They know everything. They're doing our sociology for us, and doing it better than we can; it's not worth the trouble to do more. You see? Our job is a cinch. We just follow the players. They all agree, in the end, about the death of Aramis. They blame each other, of course, but they speak with one voice: the proximate cause of death is of no interest—it's just a final blow, a last straw, a ripc fruit, a mere consequence. As M. Girard said so magnificently, 'It was built right into the nature of things.' There's no point in deciding who finally killed Aramis. It was a collective assassination. An abandonment, rather. It's useless to get bogged down concentrating on the final phase. What we have to do is see who built those 'things' in, and into what 'natures.' We're going to have to go back to the beginning of the project, to the remote causes. And remember, this business went on for seventeen years."

"There's one small problem," I said timidly. "I don't know a thing about transportation."

"Neither do I," replied my boss serenely. "That's why I was chosen. In a year, you can learn about any subject in the world. There's work ahead, but it will be good for your education. You're going to lose your innocence about the sexuality of technology, Mister Young Engineer. And I'm going to take advantage of the opportunity by writing a little commentary, a little sociology manual to make your work easier. You're to read it in addition to the books on this list; they're all in the school library."

He put on his old raincoat and disappeared in the drizzle, heading down the boulevard Saint-Michel.

Left to my own devices, I looked at the list. It included eighty-six titles, two-thirds of them in English. Tell an engineer to read books? It was quite a shock. As for the commentary, I was certainly going to need it, because there was a further complication: the laboratory where I was doing my internship used the word "sociology" in a way that absolutely no one else did.