France's Monumental Science Museum

Amid a lot of controversy, a former Paris abattoir is being converted into one of the world's biggest science museums

Paris. In the mid-1970's, two problems lay near the top of the personal agenda of Valery Giscard d'Estaing, then the president of France. Number one: how to limit the impact of a major scandal over the lavish investment of public funds in a vast, multistory abattoir on the northern edge of Paris, a building that new meat-processing and transportation techniques had made obsolete even before it was completed, and was thus never put into operation.

Problem number two: how to match the success of his predecessor, President Georges Pompidou, who had managed to preserve his name for posterity by having it attached to a new arts complex in the center of Paris. Despite (or perhaps because of) its architectural idiosyncrasies, the building, known as the Pompidou Center, had become one of the social and cultural focal points of the city soon after its opening at the beginning of the decade.

A solution soon offered itself. The abattoir would be turned into one of the world's largest and most modern science museums.

Two justifications were used. On the one hand, the new museum would show the world what French science and technology were capable of achieving, in the process encouraging enthusiasm for science among the nation's schoolchildren. On the other, it would help to combat a distrust of science that appeared to be growing among the general public and bridge what was perceived as a dangerous gap between France's traditional literary culture and the new culture of science and technology.

The feasability of Giscard's proposal was soon endorsed by a small committee, headed by the eminent French physicist Maurice Levy. And in 1979, the French government gave its approval to plans for what is currently known as the National Museum of Science, Technology and Industry of the Park of la Villette, after the new 135-acre park 3 miles northeast of the Gare du Nord in which the museum will be situated when it opens in 1986.

Giscard's loss of the presidential election in 1981 put an end to his personal ambitions for the museum. However, President François Mitterrand soon showed himself as enthusiastic about the proposal as his predecessor. It fitted neatly with two of the main priorities of the new government: a boost for science as the key to economic growth and a role for government-supported culture in overcoming an alienation from science and technology that was claimed to be a source of economic vulnerability. After a detailed review of the plans for the museum, the new government endorsed the idea, and the museum continued to be worked on almost without missing a step.

Yet if there has been unanimity in top political circles about the symbolic importance of the new museum for French science and technology, turning the idea into reality has proved to be a far more contentious task. Ever since it was initially proposed, the museum has stimulated heated controversy over topics that range from the best way of presenting scientific ideas to a nonscientific public, to criticism of the way that funds for an expensive Paris-based project will once again divert support from smaller-scale projects in the French provinces.

> "It is a fantastic project, but I do not know if it is wise to try to do it all at once," says a British museum expert.

The latest victim of such controversies has been the director of the team responsible for putting together the new museum, André Lebeau. A physicist with extensive managerial experience in the French space industry (but not in museums), Lebeau was appointed to head the team in 1980 by Alice Saunier-Seïte, President Giscard d'Estaing's Minister of Universities. In early July, he was summarily sacked from his position, apparently on the instructions of the President's office and after disagreements with the overall head of the Villette development project, Paul Delouvrier. No official reason has been given for Lebeau's removal.

The current estimate is that it will cost $330 million to convert the abattoir into the museum and a further $190 million to furnish the contents. When it is completed, annual running costs are currently estimated at $90 million.

Significantly, funding for the museum was one of the few areas of the science budget to escape the cuts imposed earlier this year as part of a package of austerity measures. This has been a source of some contention in the scientific community, but it appears to underline the support the museum is getting from the political center.

Shortly before his departure, Lebeau said that "the role of the museum is to create an attitude towards knowledge" rather than transmit large quantities of knowledge itself. Reál Jántzen, head of the department responsible for the conception of the exhibits, stresses that one goal of the museum is "to show the visitor that science, technology, and industry are human activities, that their real meaning lies in practice, and to that extent science and technology are an integral part of our culture."

This pragmatic approach to science has been translated into the organization that has been adopted for the new museum. Rather than dividing exhibits into traditional disciplinary categories, they will be grouped into four major sectors, corresponding to the different levels at which science and technology touch the lives of individuals.

- The first sector, under the title "exploring," will have two subthemes, astronomy and space, ranging from a description of the objects seen in the night sky through science fiction to the use of space in industrial development.
- The second sector, "using and producing," will have six themes: the earth and its resources; the structure of matter; energy; the human body; the transformation of matter; and the fabrication of objects (the two which have been selected are the washing machine and the European Airbus).
- The next sector looks at "living and inhabiting," with the six themes of atmosphere, biosphere, construction, heredity, transportation, and "science, technology, and our historical heritage."
- The final sector—reflecting the future orientation of the museum—will be devoted to "communication." Here the six themes will be light, sound, the human brain, mathematics, computers, and

the relationship between the arts and the sciences.

The 20 themes, divided into their four sectors, will take up three times the floor area of the National Air and Space Museum in Washington, D.C. In addition, there will be a large area devoted to temporary exhibitions; a "mediatheque" giving access to scientific and technical information in both printed and computerized form; a "news room" supported by French science journalists which will provide background information on current scientific news stories; the first hemispheric projection screen to be installed in Europe; a 1000-seat conference hall; and a "discovery room" for children between the ages of 5 and 11.

All of this is scheduled to be completed by 1986. Recognizing the size of the task they face, members of the museum team have been rapidly visiting science museums in other countries—particularly the United States—to observe the experiences of others and draw up what Lebeau describes as "a balance sheet of experience throughout the world." Several ideas have emerged from this exercise. For example, one museum which has strongly influenced thinking in the museum team, according to Jántzen, is the Exploratorium in San Francisco, established by Frank Oppenheimer in the 1950's as a place where both adults and children can get an introduction to science by experiencing firsthand the properties of matter and of human perception.

Given the high level of financial and political commitment from the French government, the rest of the museum world is watching with interest to see how the project develops. This interest is heightened by the fact that, despite the detailed organizational planning that has already been put in, several key issues remain hot debating points.

One is the relationship between the traditional museum approach, where objects are left to speak largely for themselves, and a more explicitly didactic strategy in which the object is backed up by extensive explanatory information about both its nature and its social significance.

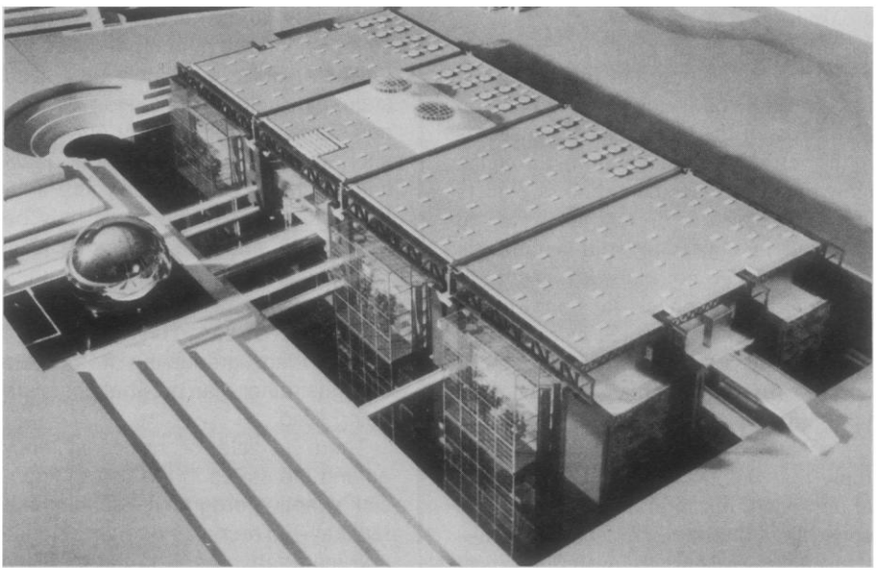
Lebeau tended to go for the object-based approach, concentrating on the impressions made by the concrete forms taken by science and technology, rather than providing detailed information about them. Some, however, have strongly criticized this tactic, arguing that objects on their own can stimulate curiosity only to frustrate it if inadequate information is available.

This, for example, was one of the main comments made by members of an independent organization, known as the "Liaison Group for Scientific Cultural Action" when it visited earlier this year a trial mock-up of possible exhibits for the museum. "They still seem to be thinking in traditional museum terms, believing that you can have an object which speaks for itself, and that there is one unique discourse to be made about each object, whereas there are in fact always several ways of speaking about such things," says Marcel Froissart, professor of physics at the Collège de France, who was the chairman of the visiting group. Related concerns are expressed by some of the historians on the museum staff, who had argued for a historical dimension to be inserted into each of the individual themes. They complain that in many cases they have had little influence in the preparation of exhibits.

A second area of controversy concerns the balance to be struck between the eulogistic and the critical approaches to modern science. Should the museum concentrate on generating positive feelings about science and technology—particularly French science and technology? Or should it take a more neutral, critical stance, giving equal weight to both positive and negative aspects.

Industrial sponsors, who will be playing a significant role in preparing some of the exhibits on modern technology, have few doubts about where they would like to see the balance. "I think that the future museum will be a unique shop-window for French industry, certainly useful to future clients and our national and international industrial partners, and which will allow the French to understand better what their industrialists are doing," says Jean A. Legrand, director of public relations for the oil company Elf-Acquitane and president of a working group concerned with the presentation of industry in the museum.

Others, however, warn against excessive emphasis on this "shop-window" approach. Philippe Rocqueplo, a left-wing author of several books on the role of science in modern culture, suggests that, rather than merely applauding the achievements of modern science and technology, the new museum should "show why things are as they are, what choices have been made and for what reasons, what alternatives are available and what are the predictable consequences."



Slaughterhouse-turned-presidential monument

An artist's concept of the Giscard, now Mitterrand, museum

In this case, the scales have been explicitly influenced by political factors. President Giscard d'Estaing's conception of the museum heavily favored the "shop-window" approach; his successor has—in principle—demanded greater emphasis on the social and political environment in which science takes place, interpreted as a greater role for the social sciences in the preparations of exhibits.

One controversial factor which has not been substantially influenced by the change in administration, however, is the effect the museum will have on other institutions both in Paris and in the provinces. There is already concern at both the Conservatoire National des Arts et Metiers and the Palais de la Découverte—Paris' traditional technology and science museums, respectively—that they will be deprived of funds in order to provide support for the new project. Similar concern exists in local museums

of science and technology in provincial centers throughout France, many of which have only been opened in the past decade, and still face a precarious hand-to-mouth existence.

In principle, the new museum will work closely in support of local centers, for example by producing travelling shows for them, or as a center of information and documentation. The practice could work out differently. The liaison group's critique states directly that "the project for la Villette and the money allocated to it risk stifling regional developments," adding that "the funds currently anticipated to support these latter projects are miserly, and should be increased."

Foreign critics express a further set of concerns, suggesting that the museum's planners may be trying to go too far too fast. Most of the large science museums in the world have been built up through a slow but steady accumulation of objects and expertise; the French are trying to do it all in 6 years. "It is a fantastic project, but I do not know if it is wise to try to do it all at once" says one British museum official. "I would have opened one tenth at a time, using your experience to revise your plans for the next tenth, and so on."

To which the French museum officials reply that this may be the ideal method of approach, but in practice the political constraints that they are working with—their major goals are to finish the project on time, and to demonstrate that they have met the mandate which they have set—dictate otherwise. They are confident both goals can be met.

With President Mitterrand's recent decision to abandon plans for a World Fair in Paris in 1989 that was to have celebrated the 200th anniversary of the French Revolution, the successful completion of the museum has taken on an even greater national importance. Significantly one of the first planned temporary exhibitions will celebrate another bicentenary, the publication of Diderot's *Encyclopédie*, one of the first deliberate attempts to place French industry on a "scientific" footing.

Furthermore, it has escaped few observers that, unlike the planned world fair, the new museum is scheduled to open before the end of Mitterrand's current 7-year term in office. And France will perhaps find itself heading into the next presidential election with a newly opened "Mitterrand Center for Science, Technology and the Future," like the *Encyclopédie* trying to reconcile a literary nation to the new demands of science and technology.—**DAVID DICKSON**

The Uneven Crisis in Science Education

The purported crisis in science and mathematics education in the United States is highly diverse, according to a survey of the 50 states compiled and published by *Education Week* (27 July, p. 25). The survey is part of a 64-page special supplement devoted to this crisis.

Central is the issue of teacher shortages. Thirty-one states, including Texas and California, report a serious shortage of math and science teachers. But other highly urbanized states, including Illinois, New Jersey, and Massachusetts, report only slight shortages or even surpluses of qualified teachers. Others, such as Pennsylvania, say that shortages may be developing, and a few, such as New York, keep such poor track of their science and math teachers that judgments must be based on what kinds of teachers are graduating from state colleges rather than on what posts are being filled.

There is little or no consistency among the states in the use of financial incentive programs—supplementary pay—to recruit and retain science and math teachers. And there is little yet to indicate whether those incentives work. Fourteen states have incentive programs, and eight are considering them. Of the 14, only Connecticut and Washington report adequate numbers of science and math teachers. Maryland and New Hampshire, two states currently faced with shortages, considered but rejected incentive programs this past year.

Much else makes the U.S. science and math education crisis a study in diversity, if not confusion. The states, and in some cases local school districts, set vastly different standards for students. According to the survey, Florida sets the most challenging standards, requiring 3 years each of science and math in high school. Twelve states have neither a mathematics nor a science requirement; 20 require at least 1 year of science; and 15 require 2 years. Proposals to boost requirements now are being considered in several states, the survey found.

By itself diversity may not be bad, but it is bound to complicate attempts to assess the national scope of the science education problem, particularly when it comes to distributing funds in an attempt to solve it.

—**JEFFREY L. FOX**

Round Two: Mosher Appeals Case Again

Steven W. Mosher has again appealed his expulsion from Stanford University's anthropology department. Mosher, who was dismissed from the doctoral program last February for alleged illegal and unethical activities while conducting field research in China, has this time taken his case to vice provost Gerald J. Lieberman, dean of graduate studies.

Mosher already appealed his dismissal to Norman Wessells, dean of the School of Humanities and Sciences. In July, Wessells, acting on the advice of a three-member panel he appointed to review the case, upheld the anthropology department's decision. Lieberman has appointed an appeals officer from within Stanford to help handle the case.

Mosher has contended that he was ousted for political reasons because he published an article in a Taiwan weekly about birth control practices in China. Stanford denies this, but refuses to elaborate on the exact details of Mosher's alleged misconduct (*Science*, 13 May, p. 692).

So far, Stanford has handled the Mosher case as an internal matter. Although one member of the panel appointed by Wessells came from outside the university, no external committee has been set up to review the case. Some have suggested that an outside review would at least provide the appearance of a more objective assessment of the evidence, but Mosher himself is opposed to bringing in outsiders. In a letter to Wessells, he said he wanted a single investigator from within the Stanford administration to prevent "further dissemination of the libelous and confidential report compiled by the anthropology department," which formed the basis of his dismissal.

If Lieberman should uphold his dismissal, Mosher has one level of appeal left. He can take his case directly to Stanford president Donald Kennedy.—**MARJORIE SUN**