

## SYNOPSIS

The Channel Tunnel linking Great Britain and France is an engineering achievement and symbol of man's imagination and daring. But it is also one of the world's largest private financial failures. The author describes this mega-project from the perspective of five executives involved in the endeavor. The case presents the potential reason for the financial shortcomings of the project and offers insight into the organizational challenges.

## LEARNING OBJECTIVES - "THE CHANNEL TUNNEL: LARGER THAN LIFE, AND LATE?"

- In discussing this case, participants should gain a better understanding of:
- conflicts with stakeholders
  - project scope management
  - financing a project
  - the importance of the balance between planning and implementing

# Discussion Point

- This project had to face many challenges and certainly more has been written about this mega-project.
- Discuss the reasons for the managerial failure of this project. What are the TWO viewpoints from the case worth noting?.

# The Channel Tunnel: Larger than Life, and Late

Virginia Fairweather

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## SYNOPSIS

The Channel Tunnel linking Great Britain and France is an engineering achievement and symbol of man's imagination and daring. But it is also the one of the world's largest private financial failures. The author describes this mega-project from the perspective of five executives involved in the endeavor. The case presents the potential reason for the financial shortcomings of the project and offers insight into the organizational challenges.

## LEARNING OBJECTIVES

From this unsuccessful project and the discussion of the case, the students will acquire a better comprehension of:

- conflicts with stakeholders
- project scope management
- financing a project
- the importance of the balance between planning and implementing.

## DISCUSSION QUESTIONS AND POSSIBLE ANSWERS

1. Despite facing many management failures, the Channel Tunnel is certainly one of the world's engineering wonders. The author concentrates her analysis on the conflict between Transmanche Link (TML) and Eurotunnel. Suggest a course of action that should have been taken to prevent this conflict.
  - a. Among other reasons, the conflict arose due to the misunderstanding of the lump-sum contract by Eurotunnel and TML. Some ways to avoid this problem include allocating enough time for the planning stage of the project and the use of proper project scope, cost, and procurement management.
2. Some of The Intergovernmental Commission (ICG) decisions caused a portion of the cost overrun on the project. As a project manager, what could you have done to minimize the impact of these decisions?

- a. *PMBOK Guide*, Section 11, Project Risk Management, has four processes—risk identification, quantification, response development, and response control—that give some insight into how to handle this kind of situation. These processes are defined as follows:
  - “Risk Identification—determining which risks are likely to affect the project and documenting the characteristics of each.
  - Risk Quantification—evaluating risk and risk iterations to assess the range of possible project outcomes.
  - Risk Response Development—defining enhancement steps for opportunities and responses of threats.
  - Risk Response Control—responding to changes in risk over the course of the project.”
- b. Certainly, not all risks can be anticipated but an effective risk management process can help to alleviate the effects of many unplanned events.
3. In an interview in the article, one executive, in referring to the bank and contractor who put the project together, said that they “had no idea how to be owners.” What is the role of the owner of the project? Where did the owners of this project fail?
  - a. Peter W. G. Morris in *The Management of Projects*, Chapter 8, The Management of Projects, The New Model, states that owners generally have three roles:
    - “To ensure that the project as conceived and realized meets its objectives.” (Sponsor’s role) This is the most critical one.
    - “The task of ensuring that once handed over operations, the product will perform optimally.” (Operator’s role).
    - “Ensuring that the project is realized effectively and efficiently.” (Builder’s role).
  - b. In addition, the owner must provide funds for the work and may provide any required insurance and indemnity, approve changes, obtain permits, resolve conflicts, and establish standards.
  - c. The article points out that the biggest mistake of the project owners was allowing the “lump-sum contract for the fixed equipment. This contract was inappropriate for a project of this nature that had never been done before. Apparently, the owners were pressured into agreeing to it.
4. List some of the other factors that might have contributed to the cost overruns and schedule delays on this project.
  - a. Answers to these questions might include such issues as the lack of understanding of the technical aspects of the project by the owners, political impacts that were not anticipated, late changes to the design for safety and security, varying contracting and payment methods, the involvement of multiple governmental agencies, etc.

KEY!  
DISCUSS

## ADDITIONAL DISCUSSION POINTS:

This project had to face many challenges and certainly more has been written about this mega-project. The instructor might ask the students to research other reasons for the managerial failure of this project. Two viewpoints from the literature are worth noting:

• Peter W. G. Morris in *The Management of Projects*, Chapter 7, The 1980's: Expansion of the Strategic Perspective of Managing Projects, states that the problem was "the old problem of concurrency—of starting construction before the design is properly worked out."

• O.P. Kharabanda and J.K. Pinto in, *What Made Gertie Gallop: Learning from Project Failures*, Chapter 15, The Channel Tunnel: Is There Light at the End?, suggest among other problems that the old love/hate relationship between France and England may have had an important influence on the project.

DISCUSS \*

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# The Channel Tunnel: Larger Than Life, and Late

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*The Channel Tunnel is finally open for business. Cheers are in order, but the project is more than a year late, with its original cost estimate doubled to \$14.9 billion, and it led to a \$2.25 billion claim that was settled last month. Project veterans suggest there are lessons to be learned.*

The Channel Tunnel linking Great Britain and France is an engineering achievement and a symbol of man's imagination and daring. But it is also the world's largest privatized project with implications for other such financial arrangements. Along with engineers and contractors, bankers and the governments of France and England were trying something unprecedented and there are lessons to be learned from their experiences. As one project executive says with some irony, the project of the century had the "claim of the century." (This claim for \$2.25 billion was resolved in early April, with the final contract value fixed at approximately \$1.7 billion. Under the settlement, project owner Eurotunnel will pay the contracting organization, Transmanche Link (TML), approximately \$105 million-\$127 million, in addition to payments already made under an earlier agreement.)

The privatization payback will come long after the ribbons have been cut and the champagne has been drunk. About 600,000 shareholders as well as banks and other governments looking at privatization will wait until the next century for the promised returns. The list of obstacles to that payback is a long one. The final cost of the system is \$14.9 billion, about double the original estimate. The high-speed rail link on the United Kingdom (U.K.) side to London is only on the drawing boards, the fares for the Channel crossing are higher than hoped (\$325 to \$465), and ticket sales are lower than expected. The existing ferries cost less and have the attraction of duty-free shops, absent on the train system because duty-free sales were supposed to end with the advent of the European Economic Community.

Some of the payback pressure was eased when the two governments agreed to extend the concession to Eurotunnel for another ten years, until the middle of the next century. The extension is conditional on Eurotunnel's next public offering (this summer) raising about \$750 million.

But even with the delays, cost overruns, and the bureaucracy, many of those involved look back at the job as the adventure of a lifetime. If its lessons are heeded, the Channel Tunnel will point the way for future international privatization projects. Some participants look back at the project and touch on a few of the problems.

John Noulton, a Eurotunnel executive, has been with the project since the mid-1980s and helped draft the concession documents the French and British governments signed off on in 1986. He says the original government white paper relied on tried, and tested, technology, but that costs had "ratcheted up" nonetheless.

Noulton describes just one hitch in the original plans. In a classic underground construction scenario, the state-of-art tunnel-boring machine bit bad ground in spite of decades of soil investigations. The tunnel-boring machine with its sophisticated computer controls was designed for compact chalk, he says, as was the tunnel-lining system. The precast concrete lining segments were supposed to lock together by compression. When they hit the bad patch, water affected the electronic system, says Noulton, and worse, the designed-for-compression could not take place in the hollows in the outside ground. At one point, he recalls men were standing on top of the lining segments, trying to hold them together with a belt. We had to inject grout to solidify the ground, a costly endeavor, he says, but "once you've got the machinery down there your main cost is manpower."

Noulton says these problems were encountered in the service tunnel, the first of the three running tunnels. By the time they proceeded to the rail tunnels, engineers knew what to expect. In the end, the tunneling was finished on schedule, he says.

As to the claim, Noulton joins a general chorus second guessing whether the project's fixed equipment should have been contracted on a lump-sum basis. The fixed equipment, in this case, means the mechanical and electrical work, catenaries, signaling, and telecommunications. That contract resulted in the \$2.25 billion claim against Eurotunnel by the contracting organization, TML. The claim wended its way through the project appeals system until a protocol was reached in July 1993. Under that arrangement, Eurotunnel advanced \$75 million each month to TML to complete the job.

Nonetheless, this was an "unstoppable project," says Noulton, ticking off what he sees as the high points. First was the "tremendous elation and momentum" created when both nations signed the treaty approving the project in 1987. Raising the money was the next high point. The public offering of shares in the project was made right after the United States stock market's Black Friday, in October 1987. Even under those inauspicious circumstances, "overnight" we had more than 100,000 shareholders, says Noulton, which he calls "a miracle."

The third phase was construction. In spite of delays, the job was "pretty well" on time, he says. Now the project is in the "make it work, make it pay" phase. That task looks daunting, but payoff wasn't expected until the next century, he says.

John Neerhout Jr. was project chief executive at Eurotunnel from early 1990 to 1993. Neerhout came from the Bechtel Co., San Francisco, to which he has since returned. Neerhout made some sharp comments on the \$2.25 billion claim and its origin in a speech to the Project Management Institute last fall, and a portion of that speech follows:

Managing the construction contract was complicated by numerous factors, but perhaps the central problem was the banks' early involvement in the renegotiation of the contract, and the multiple methods of compensation for differ-

ent parts of the works. Tunneling was done on a cost-plus fixed-fee basis with a target cost above or below which there would be a sharing of the difference. Rolling stock was procured on a cost-plus-percentage-fee basis. The banks insisted on the least defined portions, the terminals and the mechanical and electrical (M&E) equipment, to be done on a lump-sum turnkey basis.

As difficult as some of the earlier technical and commercial problems were, it was the fixed equipment that caused the most intractable problems ....

As fitting for the project of the century, TML made the claim of the century demanding an additional amount equal to 150 percent of the original lump-sum price for the M&E (i.e., from \$930 million to \$2.25 billion at 1985 prices!).

They maintained that all of the cost overruns were due to Eurotunnel's interference and disruption. From our perspective this was nonsense. Their organization was not adequately set up for M&E work. They subcontracted design to 46 contractors. TML's attention had been devoted primarily to tunneling in the early years. So, when subcontractors' bids came in and commitments were made, TML's cost forecasts kept increasing.

Their reaction was to make a claim for recovery of all costs on the basis that Eurotunnel had caused such delay and disruption that the contract lump sum was no longer valid, and did this without any substantiation of their claim, as required by the contract.

That was in July 1991. Eurotunnel referred this claim immediately to the disputes panel as per the contract. In March 1992, to Eurotunnel's and the banks' horror, the panel ruled in TML's favor, ordering Eurotunnel to pay \$75 million per month until a negotiated settlement was reached.

Eurotunnel had to pay, but filed for arbitration with the International Chamber of Commerce, asking for an urgent award to stop the interim payments. The arbitrators made two interim awards, both in Eurotunnel's favor. In September 1992 they ruled that the payments were incorrect. In March 1993 they ruled TML had to reformulate its claim into individual claims for variations and/or breach of contract.

Several high-level negotiations resulted in agreements and contract amendments while others got nowhere. The first of these agreements was made in late 1988 and again in late 1989. The major tunneling claims were settled, and the rolling stock fee was capped. But on fixed equipment, TML rejected offers to settle made in December 1991 and in May 1992. We tried again for a settlement in the second half of 1992, going through very detailed and lengthy negotiations, but could not reach agreement.

Parallel negotiations during mid-1992 did settle new claims for the tunnels and old claims for the terminals.

No serious negotiations were held in the first half of 1993 as TML adopted an "economic" slowdown.

Several overtures were made through various channels and finally, again under the auspices of the Bank of England, agreement was reached on a protocol to secure the transfer of control (from TML) and phased opening. It was signed by Eurotunnel, TML, the Agent Banks and the Bank of England on July 27, 1993. Under the protocol, Eurotunnel took early control of the sites and conducted the final testing with TML's assistance.

That's the good news. The bad news is that Eurotunnel has to advance additional money against the fixed equipment claims not settled. TML must still substantiate their entitlement [This was done in December 1993.] We estimate the process to resolution will last well into 1995!

Peter Middleton is an executive with the Maitre D'Oeuvre (MDO). This oversight group was, like just about everything on the project, a scrupulously even combination of French and British firms, SETEC and Atkins, respectively. Every three months, Middleton says, the group prepared a "hefty" status report for the owners, the contractors, and the banks.

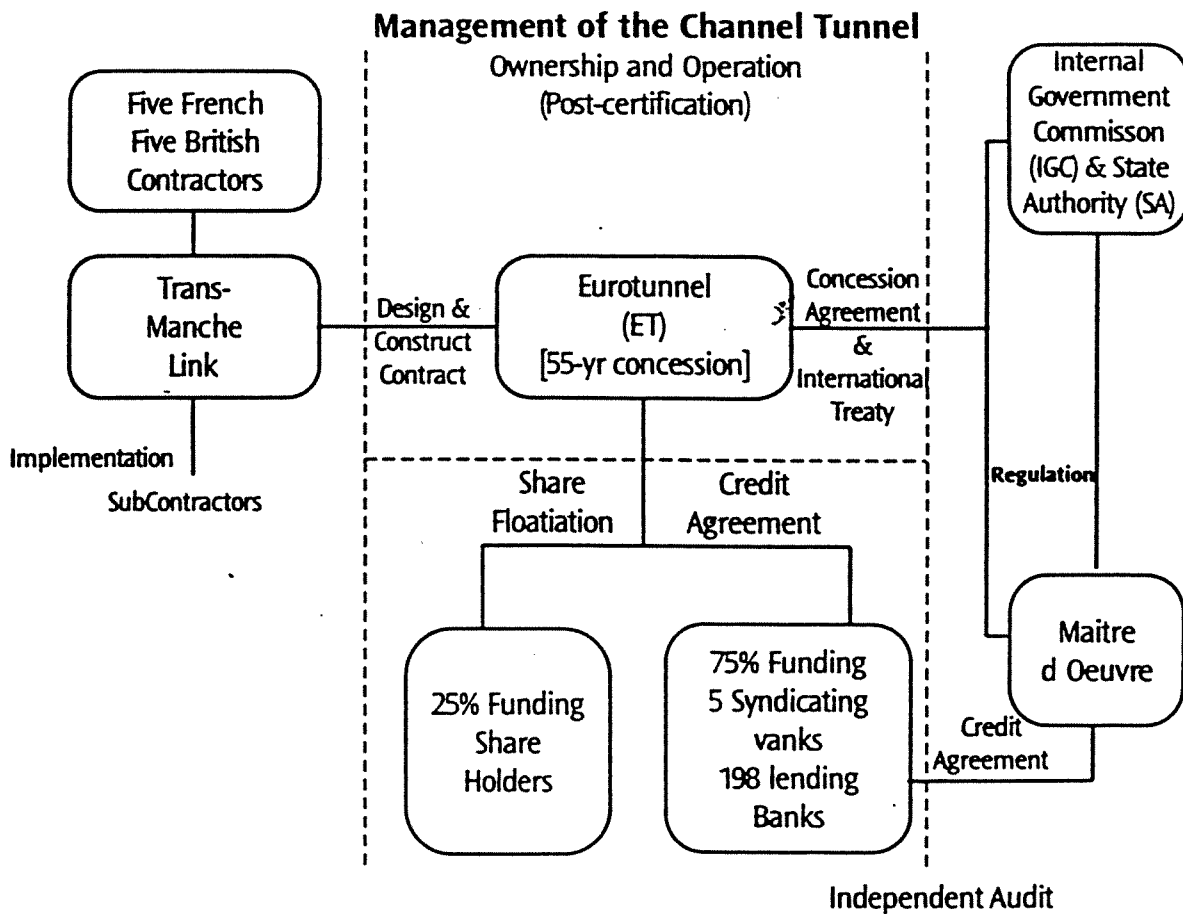
Looking back to the beginning of the project, Middleton says the banks and the contractors who put the deal together in the mid-1980s were a daring lot, but "had no idea how to be owners." As a result, they went ahead with what is regarded by many as the "disastrous" lump-sum contract for the fixed equipment. While there have been delays and unanticipated costs elsewhere, this aspect of the entire project possibly caused the greatest cost overruns and resulted in the claim.

Middleton says the civil work contract definitions and the contract terms were "reasonable," and the scope familiar to the parties. This part of the contract was written on a cost-plus-fixed-fee basis, with overruns to be shared by the owner and the contractor. The lump-sum contract was inappropriate for work "imperfectly understood" by the banks and the contractors, says Middleton. But there was a lot of pressure to go forward, he says. The contractors wanted the work, the bankers wanted certainty, says Middleton, and so the lump sum prevailed.

Frank Cain, senior vice-president, Bechtel Power, Europe, Africa, and the Middle East, spent a year as Eurotunnel's project chief executive, succeeding colleague Neerhout.

On the claim on the fixed equipment, Cain thinks the lump-sum contract was inevitable: "Banks always want lump sums and certainty." Cain has tried to "particularize" the claim—break it down. "It's easier to pick up pieces to agree on," he says. Parties came close to an agreement in early 1993, but the banks would not buy in, he says. At that point, the current protocol took effect, in which Eurotunnel paid TML each month against a final settlement.

The Intergovernmental Commission (IGC), the oversight body made up of civil servants from France and the U.K., mandated that where there were differences in the two countries' standards, the higher of the two should prevail. In theory this was a great idea, he says, but contractors couldn't easily interpret this when differences related to items such as a concrete pour.



**FIGURE 1** A VASTLY SIMPLIFIED CHART OF THE PROJECT'S MANAGEMENT. IN ADDITION, MANY OF THE GROUPS NOTED HAD THEIR OWN LEGAL AND ENGINEERING CONSULTANTS. IN DECEMBER 1993, THE PROJECT WAS HANDED OVER TO THE OWNER, EUROTUNNEL, TO COMPLETE TESTING OF THE RAIL SYSTEM AND EQUIPMENT AND TO BEGIN SYSTEM OPERATION.

Cain takes the construction veteran's view that "delays and cost overruns are not unusual in a large project." Nonetheless, he faults IGC for both. Under its safety charge, it instituted an "arbitrary" and last-minute requirement for Euroscan at both terminals. This first-of-its-kind electronic antiterrorist device will check trucks at random before they enter the tunnel. Design and installation of Euroscan caused delays and higher costs, says Cain.

Jack Lemley is another American asked to help salvage the troubled project on the contractor side as chief executive for TML. Lemley, a heavy-construction veteran who had set up his own niche consulting firm out of Boise, Idaho, was troubleshooting in Nepal when he was asked to take charge for TML. Reluctant at first, Lemley decided to take on his "European adventure." He talks about the organizational challenge and government interference, with quite a different point of view than that of John Neerhout.

Lemley says his greatest initial challenge was to meld what were two operations: Translink (the five English contractors who were part of the original proposal in the mid-1980s) and Transmanche (the five French counterpart contractors). Each had its own managing director. The Translink director had responsibility for commercial and business affairs, the Transmanche director, for coordination of all engineering. Lemley changed this to two managing directors, one for all engineering and one for all construction. Lemley

thinks this and other changes made for a more efficient operation and got the project back on schedule.

Safety on this project was "far ahead of the rest of the industry," says Lemley, and this is the other achievement he likes to point to. The safety record improved during his tenure, Lemley adds. "We were running half the national average of accidents for the French or the British."

Lemley's regrets about the project loom larger than his satisfactions, but they stem from matters out of his control. The tunnel concession, in his opinion, gave the governments "free rein to change physical criteria without providing the money to do so." The government in this case is IGC. Parties to future concessions and, by implication, other privatization projects, must understand that if requirements are upgraded, someone must pay, he warns. Eurotunnel, the owner of this transportation system, could have been a "tremendously rich utility," says Lemley, but IGC has taken away every margin for error.

Lemley remains rankled about IGC'S escalating safety requirements. While safety on the job was a Lemley priority, the safety of the system became a growing concern with IGC, and costly changes were dictated to TML at every step of the way. IGC dragged its collective feet until costs for some modifications skyrocketed, according to Lemley. One example cited by others involved a series of safety-related options that included the widening of pedestrian doors in a passenger car train, from 600 mm to 700 mm. When final approvals were not forthcoming, TML went ahead with the manufacturing phase to keep on schedule. The change would have cost about \$9 million before manufacturing. When the IGC finally decided they would not accept the 600 mm door, the change cost almost \$70 million plus a nine-month delay.

Lemley says TML used seismic design criteria that were used for nuclear power plants in both countries. Nonetheless, midway through design, IGC decided to increase these by a factor of four, says Lemley. "We found that the tunnel was over designed, but we had to upgrade the mechanical and electrical systems to conform to new criteria."

The approval process went through several steps, first TML, then Eurotunnel, then MDO, and finally IGC, too many, in Lemley's estimation. But his greatest grievance is the fact that IGC could ask for anything "hiding behind the concept of the public welfare and safety," and someone else had to pay for it. The concession agreement did not and could not provide for these unforeseen and costly changes. It's unfair, he says, to the developer to change the rules midstream. Finally, Lemley, who left the project last fall to resume his own consulting, sees "great merit" in the \$2.25 billion claim.

## CHANNEL CROSSING HISTORY

In 1751, the Amiens Academy in France conducted a competition on "better ways" than by ship to cross the English Channel. Since then, and possibly before, there have been several attempts to circumvent nature and geography, and several false starts. In 1974, the idea got as far as the tunneling stage, but the effort was abandoned. What follows are some important dates and statistics about the last and successful effort.

- 1978: British and French contractors decide to resume the failed 1974 efforts.

- 1983: Five French banks and contractors, and five British banks and contractors propose the tunnel scheme.
- 1985: The French and British governments ask for proposals for the fixed link.
- 1986: The Anglo-French treaty was signed. Transmanche Link (TML), made up of five British and five French contractors, won the contract and Eurotunnel was declared the owner of the fifty-five year concession for the link.
- 1990: The service tunnel, running from both sides of the channel, breaks through.
- 1991: In May, the north tunnel is completed and in June, the south tunnel is completed.
- 1993: The first shuttle locomotive goes through the tunnel. In December TML hands the project over to owner Eurotunnel.

Some Channel Tunnel trivia:

- The two running rail tunnels have 7.6 m inner diameters.
- A service tunnel has 4.8 m inner diameter.
- The tunnels are 38 km long, linked by 150 cross passages of 3.3 m for equipment.
- The project required eleven tunnel-boring machines.
- Tunnel linings are interlocking concrete rings, cast on sites on both sides of the channel.
- Larger crossover chambers are 164 m long, 21 m wide and 15 m high. The French used a mini-Mount Baker method to tunnel their side; the British used the new Austrian tunneling method.
- The construction access shaft on the French side was 55 m in diameter and 75 m deep; on the British side, the shaft was 110 m deep and 10 m in diameter.
- About 15,000 workers were employed on the project.
- The project also included terminals on each side of the channel and the creation of a park below Shakespeare Cliff on the British side, where tunnel muck formed 30 ha of new land behind a seawall.
- The trip takes three hours from Paris to London and the cost ranges from \$325 to \$465.

## Study Questions

### THE CHANNEL TUNNEL: LARGER THAN LIFE, AND LATE

1. Despite facing many management failures, the channel tunnel is certainly one of the world's engineering wonders. The author concentrates her analysis on the conflict between Transmanche Link (TML) and Eurotunnel. Suggest a course of action that should have been taken to prevent this conflict.
2. Some of the Intergovernmental Commission (ICG) decisions caused a portion of the cost overrun on the project. As a project manager, what could you have done to minimize the impact of these decisions?

3. In an interview in the article, one executive, in referring to the bank and contractor who put the project together, said that they "had no idea how to be owners." What is the role of the owner of the project? Where did the owners of this project fail?
4. List some of the other factors that might have contributed to the cost overruns and schedule delays on this project.