



---

**Poseidon House  
Castle Park  
Cambridge CB3 0RD  
United Kingdom**

TELEPHONE:  
INTERNATIONAL:  
FAX:  
E-MAIL:

**Cambridge (01223) 515010  
+44 1223 515010  
+44 1223 359779  
apm@ansa.co.uk**

---

## **Training**

# **Proposal for Training in Distributed Systems [CNET]**

**Chris Mayers**

### **Abstract**

Proposal for a programme of training courses for CNET (France Telecom).

Notes:

1. This document has non-standard front matter in front.doc. The page with the APM masthead is intended as the second page; the other page is the first page (bound inside the front cover). A template for new proposals should sort this out. (The APM doc system overwrites frontispiece.doc when you check out a document.)

---

APM.1450.03

**Approved**  
Marketing and Contracts

11th July 1995

---

**Distribution:**  
**Supersedes:**  
**Superseded by:**



---

# Contents

---

<b>1</b>	<b>1</b>	<b>Executive Summary</b>
1	1.1	Requirement
1	1.2	Proposal
1	1.3	Costs
2	1.4	Benefits
2	1.5	Key assumptions
<b>3</b>	<b>2</b>	<b>Analysis of the Requirement</b>
3	2.1	Overall requirement
3	2.2	Course adaptation
3	2.2.1	Course requirements
5	2.2.2	Practical exercise
5	2.2.3	Translation into French
5	2.3	Exploitation via third parties
<b>6</b>	<b>3</b>	<b>The Proposal</b>
6	3.1	Overview
6	3.2	Course adaptation
6	3.2.1	Course customization
8	3.2.2	Practical exercises
8	3.2.3	Environment for practical exercises
9	3.2.4	Course slides and handouts
9	3.2.5	Translation into French
10	3.3	Project Plan
10	3.3.1	Project Control
10	3.3.2	Progress Reporting
10	3.4	Timescales and Costs
10	3.5	Terms and Conditions
11	3.6	Confidentiality, Rights, and Liabilities
<b>12</b>	<b>4</b>	<b>Experience and Qualifications</b>
12	4.1	Overview





---

Poseidon House  
Castle Park  
Cambridge CB3 0RD  
United Kingdom

TELEPHONE: Cambridge (01223) 515010  
INTERNATIONAL: +44 1223 515010  
FAX: +44 1223 359779  
COMPANY No: 2300071  
ARPA Internet: apm@ansa.co.uk

---

**Proposal  
for  
Training in Distributed Systems  
for  
France Telecom**

**Proposal  
for  
Training in Distributed Systems  
for  
CNET**

**France Telecom  
CNET**





---

# 1 Executive Summary

---

## 1.1 Requirement

---

France Telecom have a requirement for a customized training programme in distributed systems for applications designers. This proposal from Architecture Projects Management Ltd. ("APM") is a detailed response to that requirement, prepared at the request of Jean-Bernard Stefani of the Centre National d'Etudes des Télécommunications (CNET).

Architecture Projects Management Ltd thank France Telecom for the opportunity to submit this proposal.

## 1.2 Proposal

---

APM propose that:

- APM customize its standard public training courses in distributed systems to satisfy France Telecom's requirements
- APM develop its existing 'hands-on' practical exercise in ANSAware into 1-day practical sessions
- APM assist France Telecom in the translation/adaptation of the course material into French

This proposal does not cover the presentation of these courses in English. If required, APM will submit a separate proposal for the presentation of these courses in English.

This proposal is based on APM's best understanding of France Telecom's requirements.

## 1.3 Costs

---

APM propose that the work be carried out on a fixed-price basis. The price includes course customization, the development of a practical exercise, and assistance with translation/adaptation of the course material as defined above.

---

**Table 1.1: Price per course**

---

Title	Cost
Distributed Systems Architecture and Standards	52,000 French francs
Introduction to Design of Distributed Applications	117,000 French francs
Advanced Design of Distributed Applications	90,000 French francs



The complete courses will be ready for first presentation (in French) as follows:

**Table 1.2: Availability dates**

Title	Date
Distributed Systems Architecture and Standards	September 1995
Introduction to Design of Distributed Applications	September 1995
Advanced Design of Distributed Applications	December 1995

This assumes that the project can start on or before 1 July 1995.

#### 1.4 Benefits

This project would have the following benefits to France Telecom:

- effective transfer of proven training course material to France Telecom
- rapid availability of training in French
- course content customized to France Telecom's requirements

#### 1.5 Key assumptions

This proposal makes the following key assumptions:

- France Telecom will review the course material as allowed for in the Project Plan, and provide feedback promptly so as to avoid project delay
- France Telecom will adapt and translate the course material into French during this project
- France Telecom will present the courses (in French)
- The project can start on or before 1 July 1995. (The translation work by France Telecom will start on or before 1 September 1995.)
- France Telecom will nominate a person as a single point of contact with the APM project manager.
- APM retains copyright and intellectual property rights to that which it develops.
- France Telecom retains copyright in the French translation.
- France Telecom are granted the rights to exploit the courses internally, including in its telecommunications training schools (Ecole National Superiere des Telecoms Paris et Bretagne, Institut National des Telecoms), but not externally via a third party.

## 2 Analysis of the Requirement

### 2.1 Overall requirement

France Telecom require training in distributed systems principles and practice, primarily for applications designers. These applications designers may be building applications, or procuring, specifying, and testing applications written by outside developers.

Training in distributed systems is currently hard to obtain. This is because:

- ANSA's research in this field over the last 9 years is only just beginning to emerge into general commercial exploitation
- the industry experience acquired in building distributed systems is only now becoming a coherent body of practical knowledge

Thus we now see research and practical experience converging into widespread exploitation.

Currently-offered commercial training courses are of low technical content and usually focus upon a particular specific and narrow technology, trading out the more general principles in favour of attempts to sell or promote a particular solution. These would have three disadvantages for France Telecom. First, the examples used in those courses would not match France Telecom's needs. Second, the training would have too narrow a focus; it would concentrate just on specific products rather than cover overall principles. Third, France Telecom would not be able to retain control over the course material, and so not be able to give repeat presentations of the course to new staff.

Both parties are therefore agreed that the need is for a training programme which first provides knowledge and insight into general principles of distributed systems and then supplements this with detailed technical examples which are directly relevant and based upon France Telecom's needs and experience.

### 2.2 Course adaptation

#### 2.2.1 Course requirements

The following courses are required:

**Table 2.1: Course durations**

Title	Duration	Exercise?
Distributed Systems Architecture and Standards	1 day	No
Introduction to Design of Distributed Applications	2 days	+1 day
Advanced Design of Distributed Applications	2 days	No

The “Introduction to Design of Distributed Applications” course is followed by a 1-day practical exercise. This is discussed below.

Each of these courses must be suitable for a maximum of 15 people.

The following topics are specifically required:

- Object-Oriented Methods for Distributed Systems
- Management in Telecommunications Networks
- Transactions in Distributed Systems
- Distributed algorithms and related theory (“Advanced Design” course)

#### 2.2.1.1 *Distributed Systems Architecture and Standards*

The aim of this course is to provide a comprehensive up-to-date survey of the industry open distributed computing standards and organizations, including OMG CORBA and OSF DCE.

Emphasis is on an architectural approach, using the principles of the ISO/IEC/ITU-T Reference Model for Open Distributed Processing (RM-ODP) as embodied in the ANSA programme.

On completing this course, participants will be able to describe and relate the key industry standards to their work, and use the viewpoints of RM-ODP to partition complex design problems.

#### 2.2.1.2 *Introduction to Design of Distributed Applications*

The aim of this course is to provide an understanding of the principles of distributed systems, from requirements to overall design.

Topics covered should include the partitioning of applications, the limitations of client/server technologies, trading, and distributed transactions. The OMG CORBA specifications are used as the basis for this course.

On completing this introductory course, participants will understand the basic principles of distributed systems, and will have written a simple client/server application.

#### 2.2.1.3 *Advanced Design of Distributed Applications*

The aim of this course is to provide techniques for the effective design, engineering, and management of distributed applications.

Topics covered should include the ODP/ANSA Engineering Model and its transparencies in detail, and important distributed algorithms and the theory behind them. The OMG CORBA specifications are also used in this course.

On completing this advanced course, participants will understand how to specify, manage, and develop services, and will have written and tested a simple server application incorporating concurrency features.

#### 2.2.1.4 *Course prerequisites*

The “Introduction to Design of Distributed Applications” course would have the following prerequisites:

- participation in the “Distributed Systems Architecture and Standards” course
- a degree qualification in computer science or a related discipline, or equivalent industrial experience

- basic fluency in C programming
- basic fluency in using simple Unix user commands

The “Advanced Design of Distributed Applications” course would have similar prerequisites:

- participation in the “Distributed Systems Architecture and Standards” course
- a degree qualification in computer science or a related discipline, or equivalent industrial experience
- participation in the “Introduction to Design of Distributed Applications” course, or knowledge of the material covered by that course

The “Advanced Design of Distributed Applications” course is technically challenging, and would be faster-paced; participants must anticipate this.

### **2.2.2 Practical exercise**

France Telecom require that the “Introduction to Design of Distributed Applications” is followed by an appropriate 1-day practical exercise to reinforce the knowledge acquired in that course.

This practical exercise should be carried out on equipment readily available to France Telecom; either Unix workstations or PCs. Either ANSAware or a CORBA implementation should be used.

### **2.2.3 Translation into French**

France Telecom require that the training courses be presented in French. The scope of the translation should include:

- course slides and handouts
- essential reference material

The following need not be translated:

- the software examples themselves
- supplementary reference material (for example, journal papers)

It is recognized that France Telecom are best placed to carry out this translation. France Telecom will require assistance, tutoring, and guidance in carrying out this translation. This would be part of a ‘hand-over’ activity.

From APM’s experience, it is recommended that the course customization by APM be completed before the translation into French is started in earnest. This will minimize the effort involved.

It is understood that either one or two France Telecom staff would be involved in the adaptation. It would be recommended that one or both of these staff attend at least one of the corresponding APM public courses.

---

## **2.3 Exploitation via third parties**

It is understood that third parties may wish to exploit the course materials described. Such exploitation is subject to further negotiation; it is outside the scope of this proposal.

## 3 The Proposal

### 3.1 Overview

APM already market training courses that satisfy much of France Telecom's requirement. The length and precise content of these public training courses does not match France Telecom's requirement exactly; however, these courses are modular, and can be reorganized to match France Telecom's requirement: APM propose a set of training courses as described in the Requirements above:

**Table 3.1: Course durations**

Title	Duration	Exercise?
Distributed Systems Architecture and Standards	1 day	No
Introduction to Design of Distributed Applications	2 days	+1day
Advanced Design of Distributed Applications	2 days	No

Each course will be suitable for groups of 10-15 participants; 12 is a recommended number, striking a balance between course throughput and individual attention.

APM propose to implement the 1-day practical exercise using ANSAware 4.1.1. Although the 1-day practical exercise is an integral part of the course, APM recommend that courses be developed so that they can be presented independently of the 1-day practical exercise; this will give greater flexibility in actual scheduling of the courses.

### 3.2 Course adaptation

#### 3.2.1 Course customization

APM propose the following course content. Each session is nominally 1 hour long. Additional time should be allowed for Welcome and Course Roundup sessions.

Where an APM Reference is shown, this is used as the base document for the customization. In most cases this will require rework by APM before hand-over to France Telecom.

### 3.2.1.1 *Distributed Systems Architecture and Standards (1 day)*

---

**Table 3.2: Distributed Systems Architecture and Standards**

---

Title	APM Ref.
Introduction to Distributed Systems Architecture	APM.1329
Introduction to CORBA and DCE	APM.1322
The ODP Reference Model	APM.1336
The CORBA Object Management Architecture	APM.1345
Objects in Distributed Systems	APM.1350
The COM Object Model	APM.1407

### 3.2.1.2 *Introduction to Design of Distributed Systems (2 days+ exercise)*

---

**Table 3.3: Introduction to Design of Distributed Systems - day 1**

---

Title	APM Ref.
Introduction to Distributed Systems	APM.1395
Distributed and Networked Operating Systems	APM.1317
Templates for Distributed Applications	APM.1320
The Computational Model	APM.1327
Structuring Distributed Applications	new
Trading in Distributed Systems	APM.1330

---

**Table 3.4: Introduction to Design of Distributed Systems - day 2**

---

Title	APM Ref.
Specifying Services for Distributed Systems	APM.1348
Designing Applications with CORBA	APM.1352
CORBA Object Services	APM.1349
Transactions in Distributed Systems	APM.1170
Object-Oriented Methods for Distributed Systems	new
Management of Distributed Networks	APM.1324

For detail of the 1-day practical exercise following this course, see below.

### 3.2.1.3 Advanced Design of Distributed Systems (2 days)

**Table 3.5: Advanced Design of Distributed Systems - day 1**

Title	APM Ref.
Distributed Systems Update	new
Service Quality in Distributed Systems	APM.1321
Telecommunications Network Management	new
Remote Procedure Call in Distributed Systems	APM.1344
The Engineering Model	APM.1331
Replication Techniques for Distributed Systems	APM.1358

**Table 3.6: Advanced Design of Distributed Systems - day 2**

Title	APM Ref.
DCE Distributed Services	APM.1373
Distributed Algorithms	new
Persistence in Distributed Systems	new
Exploiting High-Performance Networks	APM.1357
Real-time Distributed Systems	APM.1353
Multimedia in Distributed Systems	APM.1354

### 3.2.2 Practical exercises

Two distributed processing environments were considered for use in these training courses: ANSAware and CORBA.

Using ANSAware 4.1.1 for these training courses would have the following advantages:

- France Telecom already have a base of expertise in ANSAware, and full exploitation rights to it
- The exercise can be based on sample applications that are a standard part of ANSAware
- As the new ANSAware/RT evolves throughout 1995 and beyond, it will be possible to demonstrate its new features and incorporate it into training courses as appropriate

APM therefore propose ANSAware 4.1.1 for use in the practical exercise.

For the content of the 1-day practical exercise, APM propose an enhanced version of the Simple Bank example. This is because:

- it is an effective illustration of many distributed systems concepts
- this example has been successfully used on APM training courses for several years
- this example is a sample application supplied with ANSAware

The precise enhancements to the Simple Bank 1-day practical exercise will be determined as part of the course customization.

### 3.2.3 Environment for practical exercises

APM assume that Unix workstations be used for the practical exercise, rather than PCs. This is because ANSAware is supplied in source code form.

Configuring a network of Unix workstations is easier than configuring a network of PCs, because the Unix workstations have the networking support and C compilers already configured.

ANSAware supports various systems including Sun4 with SunOS 4.1.1. This is the recommended platform; APM already use this for ANSAware training courses.

To minimise disruption, the same machines should be used for each course presentation.

Previous experience shows that two people can share one workstation without problems. This is in fact an advantage for a technical course of this kind, as it allows a person lacking a specific technical expertise to be paired with someone who already has it. It also builds confidence by allowing participants to sort out simple problems between themselves without needing to involve the course presenter.

For 10-15 people, up to 10 networked workstations will be needed, allowing for a machine for the course presenter, and one spare. Preferably these should be on a separate Ethernet segment to avoid potential disruption to other users; it can normally be left connected to the main network.

#### **3.2.4 Course slides and handouts**

Most of the existing APM course material has been prepared using the FrameMaker document preparation system, version 3.0. This has been found to be effective, even though FrameMaker is not usually used for presentations.

APM propose to convert all the course material into FrameMaker 3.0 format before hand-over to France Telecom. It is understood that France Telecom will obtain FrameMaker as necessary.

The International version of FrameMaker (imaker) is understood to provide support for French.

#### **3.2.5 Translation into French**

Although APM have prior experience in translating software products into French, it is recognized that France Telecom are best placed to carry out this translation.

APM therefore propose to assist France Telecom with tutoring, and guidance in carrying out this translation. This is part of the 'hand-over' activity.

APM also propose to enhance the existing course handouts to include self-explanatory audience notes. This will reduce the need to provide briefing material for the France Telecom adaptation team, but will mean that there is more text to translate. APM believe that this will result in more effective course material.

APM also propose to document some background briefing material for the France Telecom adaptation team. This will explain the overall course structure, the relationship between the modules, and identify those concepts that are likely to prove difficult. This will simplify communication within the France Telecom adaptation team.

APM would welcome the opportunity to review the course material after translation.



### 3.3 Project Plan

#### 3.3.1 Project Control

The development and delivery of this training programme will be governed by a Project Plan agreed with France Telecom. Subsequent changes to the Project Plan will be recorded and negotiated by agreement between APM and France Telecom.

APM will provide a Project Manager for this project. France Telecom will nominate a person as a main point of a contact with the APM Project Manager. Whilst it is expected that APM will liaise with various contacts within France Telecom, this person must be responsible for agreeing project decisions.

#### 3.3.2 Progress Reporting

APM's Project Manager will provide regular monthly progress reports to the nominated France Telecom main point of contact.

### 3.4 Timescales and Costs

The costs are summarized as follows:

**Table 3.7: Price for "Distributed Systems Architecture and Standards"**

Element	Cost
Course Customization	26,000 French francs
Adaptation Hand-over and Guidance	26,000 French francs
<i>Total</i>	<i>52,000 French francs</i>

**Table 3.8: Price for "Introduction to Design of Distributed Systems"**

Element	Cost
Course Customization	52,000 French francs
Adaptation Hand-over and Guidance	65,000 French francs
<i>Total</i>	<i>117,000 French francs</i>

**Table 3.9: Price for "Advanced Design of Distributed Systems"**

Element	Cost
Course Customization	39,000 French francs
Adaptation Hand-over and Guidance	51,000 French francs
<i>Total</i>	<i>90,000 French francs</i>

### 3.5 Terms and Conditions

This proposal is subject to APM's standard terms and conditions.

---

### 3.6 Confidentiality, Rights, and Liabilities

---

APM will retain copyright and intellectual property rights (IPRs) to that which it develops and will grant France Telecom a licence in perpetuity to use it internally, including its own staff or students sponsored by France Telecom in its telecommunications training schools (Ecole National Superiere des Telecoms Paris et Bretagne, Institut National des Telecoms). France Telecom may not exploit the course material externally, to or via third parties.

France Telecom will retain copyright in the French translation, and will grant APM a licence in perpetuity to use it internally.

APM reserves the right to use non-France Telecom-proprietary material in other courses which APM may develop and deliver to the general market from time to time, and APM's quotation takes this into account.

APM agrees to keep confidential all France Telecom proprietary information, in accordance with the principles and details established in the ANSA Sponsorship Agreement Revision 7.

This proposal is provided for the sole purpose of enabling France Telecom to evaluate the proposed project and workplan. It is provided on the understanding that all ownership rights and copyright in it remain with APM and that it shall not be disclosed to any third party without the express consent of APM.

This proposal does not constitute a contract or any part of a contract and nothing contained in it shall be binding unless and until it is expressly incorporated in a formal contractual agreement.

This proposal is valid for sixty (60) days from 1 July 1995.

---

## 4 Experience and Qualifications

---

### 4.1 Overview

---

APM has been researching into distributed systems for over 9 years. Having originated many of the key concepts in distributed systems and successfully introduced them into international and industrial standards, APM is well placed to train organizations in their practical application.

The APM Business Unit has presented training courses in distributed systems, ranging from one-day executive overview courses, to one-week in-depth courses on ANSAware. The experience derived from developing and presenting these courses has been incorporated into this proposal.

APM understands that this project is of key importance to France Telecom, and APM will therefore allocate high quality resources and management attention in order to ensure its success. The staff which APM will allocate to this task will include:

- Chris Mayers, who will be the Project Manager, liaise with France Telecom, and lead the course development
- Ian Macmillan, who will develop the source code for the practical exercise

The technical content and overall quality of the course will be overseen and approved by Dr Andrew Herbert, APM's Technical Director.