PROGRAMME FOR
HARMONISED AIR TRAFFIC
MANAGEMENT RESEARCH
IN EUROCONTROL

PHARE

EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION, EUROCONTROL

DOC 95-70-01

PD/3 Demonstration Project Plan

PHARE/EEC/PD3-1.1.3.5.2/DPP;3.3

EUROCONTROL

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* The PHARE Participants are:

- the EUROCONTROL Agency;

- the CENA (Centre d'études de la navigation aérienne);

- the STNA (Service technique de la navigation aérienne);

- the NLR (Nationaal Lucht- en Ruimtevaartlaboratorium);

- the RLD (Rijksluchtvaartdienst);

- the LVB (Luchtverkeersbeveiliging);

- the DLR (Deutsche Forschungsanstalt für Luft- und Raumfahrt);

- the DFS (Deutsche Flugsicherung GmbH);

- the UK CAA (Civil Aviation Authority);

- the NATS (National Air Traffic Services);

- the DRA (Defence Research Agency)

Revision history

Date	Version	Reason for update	PD Review Team
January 1995	Draft Version 0		
February 1995	Draft Version 1	For review by PD3CG	
February 1995	Version 1	Incorporate comments from PD3CG	
March 95	Version 2	Incorporate comments from PRT	M. van Gool (Chairman) R. Gingell (PD/1) J. Reichmuth (PD/2) P. Huet (PD/3 Cena) W. Post (PD/3 NLR) M. Bisiaux (PD/3 EEC) B. Maddock (EFMS) B. Overgaauw (PATN) I. Wilson (PATs) JR. Velten (CMS) P. Jorna (GHMI)
May 96	Version 3	Reassessment of the whole project	M.Le Guillou Y. Sagnier M. Bisiaux
September 96	Version 3	Incorporate comments from full PD3CG	M. Bisiaux
November 96	Version 3.1	Include comments from PCC/37 + text revision by PHARE cell	M. Bisiaux
April 1997	Version 3.2	Planning status at PMB/19A and risk assessment revised	M. Bisiaux
July 1997	Version 3.3	To replace Version 3.2 containing wrong versions of Annex F and G	M. Bisiaux

PD/3 Demonstration Project Plan

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1. Scope of the document

PD/3 is a joint programme of the PHARE partners, hosted by EEC, NLR and CENA, and with significant contribution from NATS and DLR.

Four main documents are intended to define and describe the PHARE Demonstration PD/3 as a whole as an outcome of the initial definition process:

- the **Demonstration Operational Specification** document providing the top-level description of the operational philosophy investigated and, as much as possible, demonstrated by PD/3 and the corresponding candidate operational scenarios expected to be simulated during the final large-scale demonstrations

- the **Operational Scenario Document** describing the working procedures of the baseline and advanced organisations to be demonstrated in PD/3.

- the **Demonstration Facility Specification** document describing the technical, operational and analysis requirements to be met by the simulation environment in support of the PD/3 large-scale demonstrations

- the **Demonstration Project Plan** document containing a description of all elements necessary to define the organisation of, and to manage, the PD/3 project, including the task descriptions, the resource allocations and the project schedule

This initial definition activity followed the logic illustrated in figure 1 below, and more specifically concerning the delivery of first versions of these top-level documents. They might be subsequently periodically reviewed in accordance with the intermediate results progressively obtained, for instance, through Internal Operational Clarification Projects (IOCP), by the preceding Demonstrations PD/1 and PD/2 or through other external projects (EXT).

This version of the Demonstration Project Plan describes the project organisation as following the PMB/18 decisions and subsequent re-organisations in mid 1996. The project plan and risk assessment have been updated to reflect the situation at PMB/19A in February 1997.

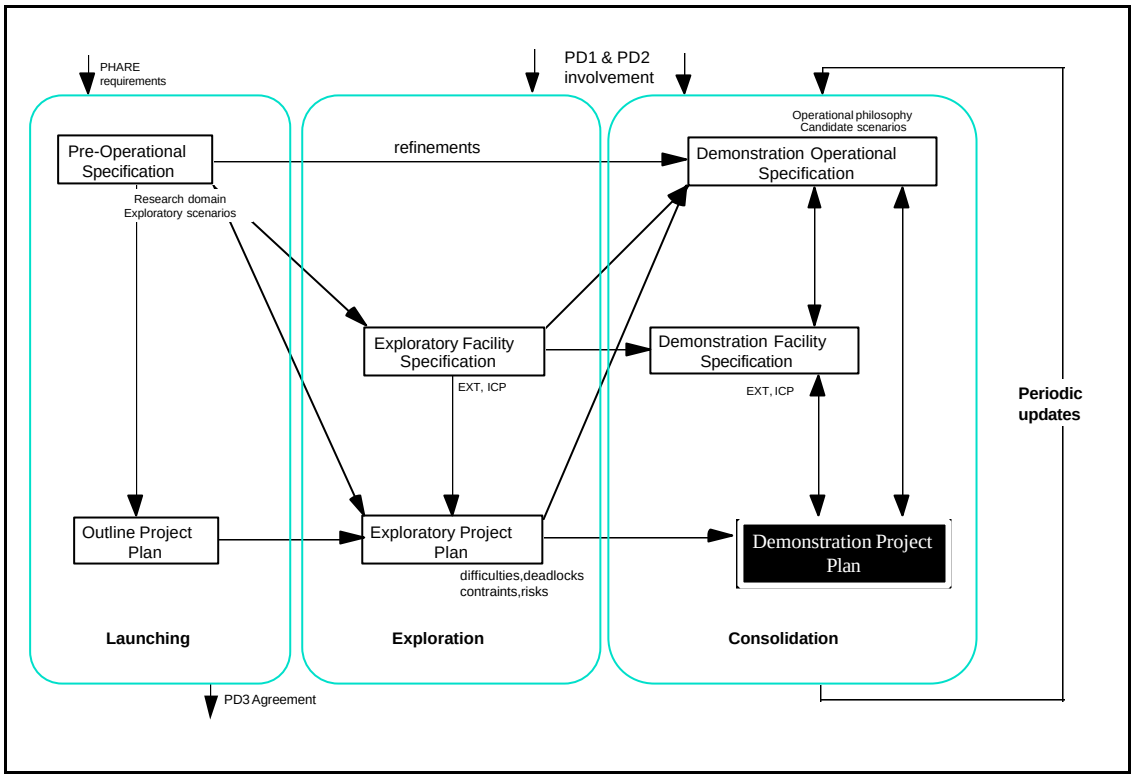

Figure 1: Logic of the PD/3 definition activities

The PD/3 Pre-Operational Specification document provided a first description of the operational philosophy and the related research domains to be investigated by PD/3, and the "exploratory scenarios" being used as the starting point of the exploratory step.

In order to elaborate valuable candidate scenarios, to specify the required facilities and to build up the corresponding Project Plan during the so-called consolidation step, a first-pass exploratory step was carried out, consisting of detailed analyses based upon the exploratory operational scenarios. The objective was to identify and record the feasibility problems to be solved during the consolidation step.

At the end of the exploratory step, the PD/3 Exploratory Project Plan document provided a first detailed description of the project activities based upon the Exploratory Scenarios and an identification of the corresponding problems, difficulties and constraints.

This Demonstration Project Plan contains a description of all the elements applicable to the PD/3 project, including annexes with a full Work Breakdown Structure (WBS) with work package descriptions, resource allocations and project schedule. The document forms the deliverable of task PD3-1.1.3.5.2

This document supersedes the Outline Project Plan and the DPP version 2 issued March 95. It also supersedes the PD/3 Management Structure Document.

2. Introduction

Today's ATC system is at times unable to handle the demands made upon it. Furthermore, EUROCONTROL traffic growth scenarios, based on a 1995 reference, consider, in attempting to establish strategic capacity objectives for EATMS, that an increase of 45% might be expected in 2005 and around 150% in 2020[1]. Restrictions imposed to safeguard the system from overload often lead to delays during peak periods. In less busy areas the required capacity goals can be achieved by the well-proven technology and procedures that represent "best current practice". However, in the busier areas the scope for increasing capacity through existing ATC methods and technology is limited. Although improvements in the existing methods and technologies must be pursued, changes in the technology and processes of ATC must also be envisaged if system capacity and productivity gains are to be secured.

One of the limiting factors in the present ATC system is the capacity of the controller. A means must be found by which the system can be improved significantly to meet this predicted demand. This will have to be achieved whilst maintaining or improving system safety.

To evaluate the performance of new concepts taking advantage of enhanced technologies, the PHARE Programme has identified options to be investigated through a series of real time simulations entitled "PHARE Demonstrations".

The term Demonstration is used in the context of PHARE to describe a large scale validation activity, comprising integrated ground system, air system and air-ground datalink facilities. A Demonstration is the last step in a validation process consisting of functional testing, basic evaluation of individual tools and partial validation of subsystems of increasing complexity.

The first two Demonstrations PD/1 and PD/2 concentrate on the air and ground systems available in the 2000 time-scale and address en-route and TMA research issues separately.

PD/1 and PD/2 investigate the provision of automated assistance to both the Planning and Tactical Controllers and the application of data-link for air to ground communication. The provision of automated assistance to the controllers is intended to support them in the resolution of conflicts and in planning the efficient use of the airspace. The introduction of data-link to communicate between the airborne systems and ground environment is expected to remove some of the communication load from the controller, to enable the use of onboard data to improve the precision of the ground system's aircraft model for trajectory and conflict prediction, and in addition a limited exchange of trajectory data.

PD/1 and PD/2 provide a first step in the process of introducing automated tools and data-link facility within an advanced ATC and airborne environment and of obtaining the controllers' reactions. The results of PD/1 and PD/2 provide inputs to the following PHARE Demonstration as well as help to refine the techniques used in measurement and analysis of the results.

[1] EATMS User Requirement Document, Vol. 1, Ref. EATCHIP Doc.: FCO.ET1.ST04.DEL01 Edition 1.0 September 1995, page 30

PD/3 will provide a coherent validation plan elaborated in co-operation with the PHARE VAL project , bringing together the en-route and Extended TMA results, extending the work to encompass a series of demonstrations defined in a plural-site environment. It will concentrate on the air and ground systems which could be available in the 2005-2015 time-scale and will address the influence of different controller working methods.

3. PD/3 objectives

3.1 General

- Proving and demonstrating the feasibility and merits of a future air-ground integrated air traffic management system in all phases of flight;
- Provide input to the definition of future European Air Traffic Management System concepts.

3.2 Specific

The two specific objectives of the large scale PHARE Demonstration 3 project are to:

- Provide evaluation of a future ATM concept for the time period 2005 - 2015, which supports the introduction of the following functional elements:
    - Multi-Sector Planning
    - Air-Ground integration
    - Traffic Organisation
- Evaluate the transitional introduction of 4D and Data-Link equipped aircraft in this new ATM concept.

The range of operational concepts explored by PD/3 is combining functional elements whilst keeping the man in the loop. This is being done by following a « Human Centred Approach » with the introduction of new tools to support the controllers.

PD/3 will constitute a further step towards the validation of a long-term air-ground integration concept, but will more specifically concentrate on the validation of the medium term systems (2005-2015) where the controller remains a key control element. It can also be stated that PD/3 mainly aims at providing results to support the specification of the European ATM System (EATMS), which will be the first operational system with advanced functionality and is conceived to progressively replace the system operational at the end of EATCHIP Phase III.

PD/3 will be hosted by CENA at Athis-Mons and/or Toulouse, by EEC at Brétigny and by NLR at Amsterdam, where local demonstrations that aim at evaluating different and complementary sides of the concept will be performed in a co-ordinated way.

PD/3 is also expected to meet the following “operational” and “collaboration” objectives.

The **operational objectives** concern the demonstration of the feasibility of the PD/3 operational philosophy in accordance with the way the foreseen enhanced CNS technologies or automation capabilities can be used and integrated to support it. They must cover:

- the en-route environment

- the extended TMA (ETMA[2]) environment
- the *integration* of the en-route and ETMA concepts
- the use of data link applications through PATN[3]

For the En-Route environment PD/3 is intended to demonstrate the capacity and productivity benefits of the core[4] PD/3 operational philosophy, i.e. the traffic organisation planning philosophy, including the following and progressive ATC enhancements:

- introduction of advanced assistance tools including co-operative tools which aim at organising the traffic in a « human-in-the-loop » philosophy;
- introduction of multi-sector planning, optimising the way the traffic is organised on a scale larger than the traditional sector;
- introduction of 4D trajectory negotiation and 4D planning in a multi-sector environment (some issues concerning, for example, the mode of co-operation between air and ground, the role of the aircraft and the pilot in the future ATM concept, or the controller or pilot HMI, are covered by this).

In a similar way for the ETMA environment PD/3 is intended to cover the experimental domains related to the traffic organisation planning philosophy with the following ATC enhancements:

- introduction of advanced tools to help the controller organise the traffic
- introduction of planning functions including the Arrival and Departure Manager tools.
- introduction of 4D trajectory negotiation and planning

One important aspect of PD/3 concerns the integration of the en-route and ETMA concepts with the demonstration of a planning function supporting the transition between the en-route and TMA flight phases.

The **collaboration objectives** are to:

- demonstrate the capability for a group of ATC research establishments in Europe to combine their skills and efforts to specify, design and implement common demonstration environments based upon a standardised architecture and integrating the components developed under other PHARE projects;

[2]The ETMA environment covers the APP sectors and also the ACC terminal sectors dealing with the descending and climbing traffic to and from the concerned airport. On the other hand "En-route" concerns only the ACC sectors outside the extended TMA and dealing mainly with in-cruise traffic

3The use of PATN in PD/3 will provide an integration test for the ATN concept in a (simulated) ATC application environment

4The core operational philosophy mainly refers to the research domains retained in PD/3 for the en-route and ETMA environments. It is only a part of what should be a complete ATM operational philosophy. (Ref.: DOC 95-70-02 “PD/3 Demonstration Operational Specification”, PHARE/CENA/PD3-1.3.1/OPS;3.1 March 95 - Annex 1)

- demonstrate the feasibility to elaborate and run large co-ordinated demonstrations, taking advantage of the facilities available in the various establishments.

It is expected that PD/3 will provide results in the following areas:

- feasibility of multi-sector planning in association with 4D trajectory negotiation, and hence of the traffic organisation planning philosophy, in en-route and ETMA environments;
- compatibility of the controller - automated system integration options with the operational concept;
- compatibility of the pilot - automated system integration options with the operational concept;
- the interface between the various en-route and ETMA modes of operations and planning tools;
- proposed directions and improvement for further experiment and demonstration;
- experience from the co-operation of several European ATM research establishments;
- availability at the PHARE establishments of simulation facilities supporting further research and validation of ATM concepts for EATMS.

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4. Project Plan principles

4.1 Project Plan build-up issues

It was assumed for the two first PHARE Demonstrations that many of the initial activities, in particular functional testing and basic evaluation of individual tools, had already been performed as local activities of establishments or as part of a tool development programme and therefore they are focused on the final demonstration.

It is naturally still intended to integrate in PD/3 the tools developed and evaluated by the other PHARE projects and to use the results obtained through the other research activities. Nevertheless, when one considers the objectives and ambitions as derived from its basic requirements, it becomes obvious that fully maintaining the assumption that PD/3 is a single step in the validation process is somewhat unrealistic.

Some functionality or concepts included in PD/3, such as multi-sector planning, are not well known yet and need some more experimental and validation activity before being correctly specified and incorporated into a demonstration. Some others, such as 4D trajectory negotiation, offer a series of options which are not yet sufficiently assessed to make the appropriate choice. The danger here is to specify a PHARE Demonstration based upon *a priori* ideas and non-validated choices which together will lead to unsuccessful scenario demonstrations and without worthwhile results. It seems quite unreasonable to develop rather expensive facilities without a guarantee on the effective benefits. Therefore some more limited simulations or experiments will be performed prior to the PD/3 demonstrations.

In addition, several scenario demonstrations are required to fulfil the PD/3 objectives. The scenarios are to be defined so as to cover as much as possible the PD/3 operational research domain. Also there must be the possibility to assess the respective contributions of each new concept or functionality to the general PD/3 philosophy. Some demonstrations may require less facilities or resources to deploy than others, but it is considered achievable to build a PD/3 Project Plan which concentrates all the experiments and partial assessments into some scenario demonstrations scheduled within the same short period of time at the end of an overall, complete and lengthy period of definition and preparation. The PD/3 Project Plan gives the possibility to stagger them in order to be able to spread the validation effort over several years, to get first results as soon as possible and to start the running of a limited number of large-scale demonstrations only at the end of a coherent validation programme.

4.2 Principles for the PD/3 project

1) The purpose of PD/3 is to demonstrate the feasibility of an ATM system implementing an advanced operational philosophy and to assess its benefits as a whole when compared to a baseline system relatively close to the EATCHIP Phase III system.

2) This assessment will be carried out by means of a limited set of demonstrations, firstly by running a baseline scenario and then an advanced scenario, setting in action the PD/3 Operational Philosophy. The validation of the whole project will be based on comparisons between the results measured in the baseline and those measured during the advanced organisation.

A clear and coherent scenario demonstration programme will be provided in order to be able to:

- build up a productive validation plan;
- globally demonstrate the validity and quality of the ATM operational philosophy defined as operational framework for PD/3;

3) PD/3 will integrate the outputs of the other PHARE projects, in terms of software architecture and components (e.g. CMS, PATs, PATN, GHMI, VAL, EFMS, MET), guidelines and recommendations (e.g. VAL, PD/1, PD/2) or operational results (e.g. PD/1 and PD/2).

4) PD/3 will also include a complementary programme of Internal Operational Clarification Projects (IOCPs) aiming at :

- providing an incremental development process leading to the large-scale demonstrations;
- clarifying the PD/3 Operational Philosophy and the definition of the final demonstrations scenario;
- validating partial options or concepts before integration into the large-scale demonstrations;
- allowing choice between concurrent options for specific parts of the system.

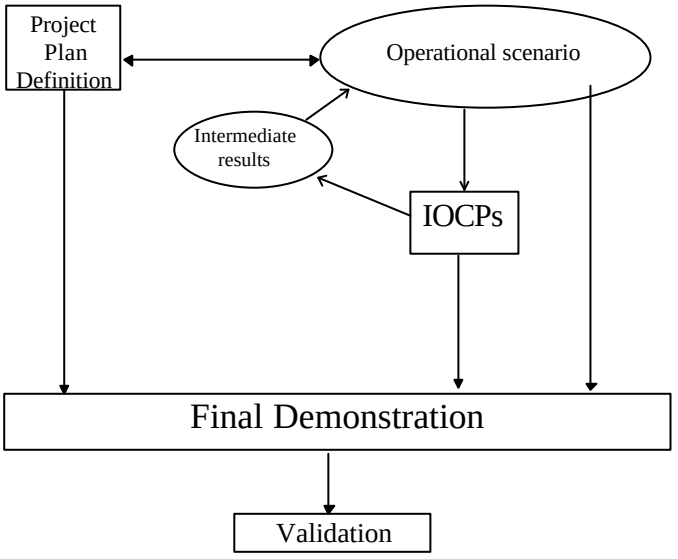

Figure 2 : PD/3 principles

4.3 IOCPs and PD/3 organisation

In the exploration phase of PD/3, a number of subjects were identified as potential study topics for clarification projects. Most of them were of operational nature, some were technical topics. For each topic, a brief description was made to identify a study methodology and how much time and effort would be related to that. On the basis of the available resources and time, decisions were taken to limit the number of IOCPs to three, one performed by each core

PD/3 establishment. The selection of these three subjects has been based on the "PD/3 Demonstration Operational Specification" document. As a result the following IOCPs were started:

- the "En-route Multi-Sector Planning Procedures" IOCP led by EEC;
- the "Human Centred Approach" IOCP led by CENA;
- the "ETMA/En-route Interface" IOCP led by NLR.

Each IOCP can be seen as a sub-project with its own (limited) Operational Specification, Facility Specification, and Project Plan. For each one, a top level description has been produced by the performing establishment during the initial definition phase of PD/3. These IOCP descriptions form part of the of the present Demonstration Project Plan.

While the day to day management of each IOCPs is under the responsibility of the leading establishment, it was recognised that an operational monitoring of the project would be necessary to ensure the consistency of the IOCP programme and the exchange of information and views on the concepts exploration. This monitoring task was allocated to the Operational Task Force (OTF).

At the end of PD/1 it became apparent that the planned participation of NATS in PD/3 could best be performed by means of an additional IOCP. This IOCP consists of further research into the PD/1 results and is being conducted by NATS during 1996 and the first quarter of 1997.

Following the 1995 reassessment, the IOCPs have been integrated in the overall PD/3 planning and extended into 1997. In this way a streamlined project set-up has been achieved in which the various steps of the IOCP projects coincide with major platform development steps for the final demonstration. The resulting changes in the IOCPs are reflected in an update of the IOCP Programme which forms a part of the annexes of this document.

It has furthermore been decided by the PHARE Management Board (PMB) that the final demonstrations will be performed in a distributed way in each of the 3 main participating centres (EEC, NLR, CENA). Their demonstrations will be harmonised so that a collective evaluation of PD/3 objectives may be ensured at the end, but the platforms will not be connected, nor the experiments synchronised.

4.4 IOCP PROGRAMME MANAGEMENT

While the overall management of the IOCPs will be under the responsibility of the leading establishments, it has been recognised that an operational monitoring of the projects was necessary to ensure the coherence of the programme and the exchange of information and views on the concepts exploration.

The Operational Task Force (OTF) shall monitor the concept evaluation performed by the IOCPs so that IOCP results can be used in the refinement of the Operational Scenario options. The Operational Task Force will in particular review the projects specifications and the reports produced by the IOCPs so as to be able, at regular intervals, to propose possible

re-orientations of the concepts explorations, which could be submitted for experimentation to the relevant IOCP within the extent permitted by the projects resources.

The partners from all the PHARE projects shall be made aware of the findings of the IOCP programme, as requirements for PD/3 are likely to be influenced by the results of the experiments.

The overall review of the IOCPs projects will take place at PD3CG level and will be reported to PCC by the PD/3 Project Leader.

5. Authorities, accountabilities and responsibilities

PHARE is managed through two management bodies :

- PHARE Management Board, PMB, consisting of high-level representatives of the PHARE partners, taking decisions on a political level concerning the execution of the PHARE Agreement, reporting to the EUROCONTROL Committee of Management.
- PHARE Co-ordination Committee, PCC, chaired by the PHARE Programme Manager, taking decisions on progress of planned activities and priorities between activities and reporting to the PMB.

The major contributing projects are:

- the PHARE Advanced Tools (PATs) project, which is responsible for the provision of advanced computer assistance tools for PD/3;
- the Common Modular Simulator project (CMS) responsible for the development of the Application Programming Interfaces (API) and the provision of an integration platform for testing the PATs integration;
- the Ground Human Machine Interface project (GHMI) responsible for the specification of the HMI for the demonstration systems necessary to support the PD/3 operational scenarios;
- Experimental Flight Management System project (EFMS), responsible for providing an experimental FMS that is capable of supporting the air-ground integrated ATM concept of PD/3;
- Airborne Human Machine Interface project (AHMI), responsible for the development of the airborne interface associated with advanced EFMS features;
- Validation project (VAL), responsible for the definition of the requirements for the measurement and analysis techniques for the PDs and support for the validation itself;
- PHARE Aeronautical Telecommunications Network project (PATN), responsible for the development of an experimental ATN to support the air-ground and ground-ground communication in the PHARE demonstrations;
- PHARE Meteo (MET) group, responsible for developing an experimental short-term meteo forecast model and providing meteorological data for use in PD/3 experiments.

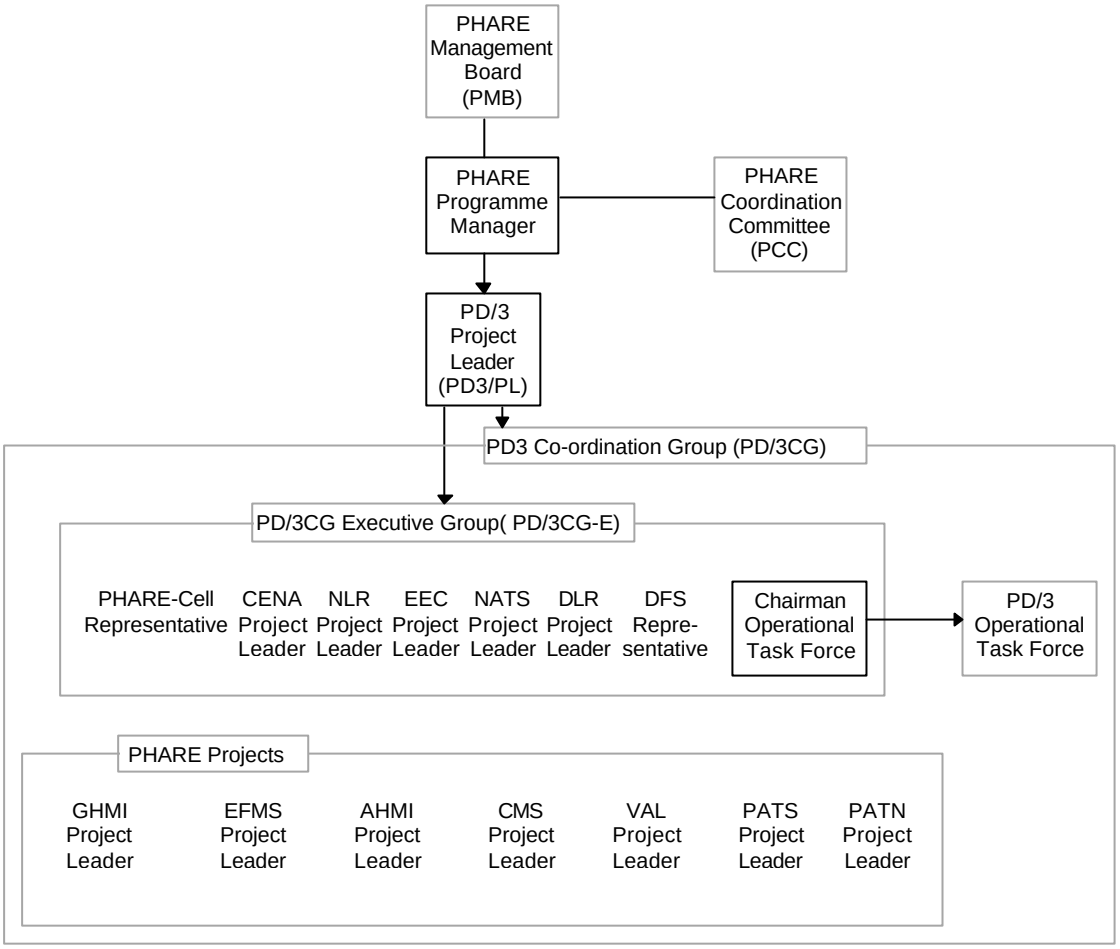

Figure 3 : PD/3 Project Management structure

The PD/3 Management Structure includes the following bodies and actors.

1. PD/3 Project Leader (PD/3PL)

The PD/3 Project Leader shall be responsible for:

- management of the plural-site demonstration;
- chairing the Executive PD/3CG and approving/arbitrating the recommendation of this group;
- similarly, chairing the Full PD/3CG in co-operation with the representative of the PHARE Cell;
- define the implementation of the PMB, PCC actions and decisions in liaison with the PD/3CGs;
- liaising with the other PHARE project leaders to solve the issues associated with the developments required by the demonstration set-up.

The PD/3 Project Management is provided by the EUROCONTROL Experimental Centre.

The PD/3 Project Leader reports directly to the PHARE Programme Manager. He provides progress reports to the PCC.

2. PD/3 Local Project Leaders

The PD/3 Local Project leaders shall be responsible for :

- management of local PD/3 project teams;
- management and monitoring of local PD/3 activities;
- contributing to the overall project tracking and to the elaboration of the PD/3 related decisions;
- implementing PMB, PCC and PD/3CG actions and decisions.

The PD/3 Local Project Leaders shall report to the PD/3 Project Leader.

3. PD/3 Co-ordination Group

The PD/3CG comprises local Project Leaders from the PHARE PD/3 partners, a representative from the PHARE cell and all the PHARE Project Leaders. It is chaired by the PD/3PL. The Chairman of the Operational Task Force participates in the PD/3CG.

The PD/3CG is responsible for assisting the PD/3 PL in defining and co-ordinating the PD/3 project.

Depending on the type of questions to be addressed, the PD3CG shall operate as two different bodies.

1. The executive PD/3CG (PD/3CG-E) including only the PD/3PL, local PD/3 Project Leaders, the representative of the PHARE Cell and the OTF Chairman, and,
2. The full PD/3CG including in addition the other PHARE Project leaders.

The full PD3CG shall function on an invitation basis only and may include only part of its participants depending on the addressed issues.

The full PD3CG will be used to approve PD/3 major deliverables on technical grounds, before PCC approval.

4. PD/3 Operational Task Force

The OTF is responsible for the definition of the Demonstration Operational Specification Document and definition of the operational scenarios of PD/3.

The OTF shall review and monitor the progress of operational aspects of the Internal Operational Clarification projects and feedback IOCP results in the operational scenarios for the final PD/3 demonstrations.

The OTF shall assist the PD/3CG by contributing to the elaboration of the experimental programme and review the results of the demonstrations. The OTF chairman reports to the PD/3 Project Leader.

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6. Deliverables

6.1 Deliverables from PD/3

Table 1 lists the PHARE deliverables to be produced by PD/3. A complete list of deliverables, including internal deliverables shall be used by the Executive PD3CG to monitor the project.

Table 1 : PHARE Deliverables from PD/3

Task Ref	Deliverable Name	Date
PD3-1.1.3.1m1	PD/3 Demonstration Operational Specification	Feb-95
PD3-1.1.3.2.2m1	PD/3 Operational Scenario Description : draft	May-96
PD3-1.1.3.2.2m2	PD/3 Operational Scenario Description : Final	Nov-96
PD3-1.1.3.3m1	PD/3 IOCP Programme	Jul-95
PD3-1.1.3.3m2	PD/3 IOCP Programme Document - Rev1-	Aug-96
PD3-1.1.3.4m1	PD/3 Demonstration Facility Specification (draft)	May-95
PD3-1.1.3.4m2	PD/3 Demonstration Facilities Specification Final	Dec-96
PD3-1.1.3.5.1m	PD/3 Demonstration Project Plan (initial version)	Feb-95
PD3-1.1.3.5.2m	PD/3 Demonstration Project Plan - Final	Jun-96
PD3-1.2.2m	Inter-site Simulation Requirements Specification	May-96
PD3-2.1.1m1	CENA HCA IOCP Justification and requirement s	Feb-96
PD3.2.1.2m	CENA HCA IOCP step 1 report	Mar-97
PD3-2.1m	CENA IOCP HCA final report	Aug-97
PD3-2.2.4.1m	CENA PD/3 Facility Specification	Feb-98
PD3-2.2.5m1	CENA Training manuals	Dec-97
PD3-2.3m	CENA PD/3 system software	Jun-98
PD3-2.4m	CENA PD/3 Final report	Dec-98
PD3-3.1.2.2m	**EEC** Specification of the MSP Role	Jun-96
PD3-3.1.3.1m	**EEC** MSP IOCP Step A Report	Nov-96
PD3-3.1.3.2m	**EEC** MSP IOCP Step B Report	Jan-97
PD3-3.1.4m	**EEC** MSP IOCP Final Report	Dec-97
PD3-3.2.1.1m	EEC PD/3 Facility Specification	Jan-97

Task Ref	Deliverable Name	Date
PD3-3.2.1.5.2m	EEC Training Manuals	Mar-97
PD3-3.2.2m	EEC PD/3 system software	May-98
PD3-3.2.3m	EEC PD/3 Final Report	Oct-98
PD3-4.1.3m	**NLR** IOCP ER-ETMA Step 1 report	Dec-96
PD3-4.1.4.1m	**NLR** IOCP ER-ETMA Step 2 Design and procedures specification	Jun-97
PD3-4.1m	**NLR** IOCP ER-ETMA final report	Oct-97
PD3-4.2.2.2m	**NLR** IOCP step 1 adaptation specification	Oct-96
PD3-4.2.2.3m	NLR IOCP step 2 adaptation specification	Jun-97
PD3-4.2.6m1	NLR Training manuals	Dec-97
PD3-4.3m	NLR PD/3 system software	Jun-98
PD3-4.4m	NLR PD/3 Final report	Dec-98
PD3-5.2.3.4	NATS Report and recommendations	Oct-96
PD3-5.2.7m	NATS PD/3 system software	Mar-97
PD3-5.2.8.4	NATS PD/3 Trial report	Mar-97
PD3-6	DLR PD/3 Trial report, system software (tbd)	**Jan-99**
PD3-7.1m	PD/3 Final synthesis report	Dec-98

7. Simulation elements

The PD/3 simulation system comprises all the elements necessary to simulate the air/ground environment. It integrates local simulation systems, situated at the participating partners' site.

A detailed description will be given in the PD/3 Demonstration Facility Specification document.

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8. Training and simulation needs

The Training and Simulation needs vary according to the phase of the Demonstration which is in progress. It is simplest to consider them separately under each phase, the phases being IOCPs, Demonstration Platforms Development and Integration Test Phase, Facility Test Phase, Training and Pilot Phase, and Main Phase. A detailed training and simulation description will be provided.

8.1 IOCPs

Each IOCP will have its own training and simulation needs, varying from one to another and to be defined individually.

8.2 Demonstration platforms development and integration test phase

The aim of this period of tests is to allow controllers who know the simulated environment to exercise the system and evaluate it from their real system experience in terms of workload and performance.

During the early stages of the development and testing of the Demonstration platforms, use can be made of non-operational controllers. Test runs will be arranged to fit in with the development needs and with the availability of staff.

This phase will contain the development/adaptation of the hosting site platforms with integration of the PATs, the data link aspects and the dedicated controller HMI.

The connection with the research aircraft and flight simulators equipped with EFMS via PATN will be established.

An adaptation of the present assessment and validation tools will also be performed in order to meet the requirements of the experimental methodology to be used.

Towards the completion of the Demonstration platforms development and integration there will be integration simulation test periods during which it might be useful to use ACC and TMA operational controllers.

These test periods will allow testing of traffic samples, experimental parameters and operational procedures before the formal measured test runs of the Pilot and Main phases are carried out.

8.3 Pilot « In-depth Facility test » phase

This task, which aggregates the former « facility test » and « pilot » phases, is the last test of the complete air-ground integrated system, including research aircraft and full complement of controllers. It is the general rehearsal before the PD/3 final demonstration phase.

It first includes evaluation and selection of measurement techniques to be applied in co-operation with the Validation project, and then a limited rehearsal of the scenarios to be run during the final demonstration. Every scenario shall be rehearsed at least once.

For the 1st part, the training and simulation needs and provisions will be similar to those indicated for the integration tests. Non-operational controller staff can be used and trials arranged to fit in with system testing needs and controller availability.

In addition to this, a training programme must be organised for all controllers involved in the main phase. This would consist of a more general part about the ideas and operational procedures implied by the operational scenarios and a part to make the controller familiar with the basic GHMI (Mouse/Window) techniques. In order to accomplish this, a special training facility (to be delivered by GHMI project) has to be provided to the participating controllers with a training programme capable of measuring the degree of experience with the GHMI techniques.

The Pilot phase ends with the final shake-down and practise phase for the whole demonstration facility. Fine tuning of all aspects of the system will be completed. Logistics of all aspects of the simulation will be tested out, including those relating to the interface to the research aircraft. Non-operational controllers can be used for this part of the phase.

8.4 Demonstration phase

The Demonstration phase will involve the performance of a structured evaluation exercise according to a predefined experimental programme.

9. Analysis requirements

The PHARE Validation Project (VAL) has identified the data to be recorded and the analysis techniques to be employed to meet the defined aims of the PD/1 and PD/2 demonstrations. Using the experience gained in these two experiments, and recognising the declared aims of PD/3, VAL will produce a defined set of data and analysis techniques to be employed in the PD/3 IOCPs and demonstrations. With the division of PD/3 into three separate demonstrations to be conducted at EEC, NLR and CENA, it is vital that common experimental methods and analysis techniques are employed. PD/3 will, therefore, work closely with VAL in these areas.

Due to the developmental nature of the IOCPs, it is recognised that the participating partners will wish to conduct analyses not required by VAL during these trials. VAL will, therefore, produce two sets of data capture and analysis requirements:

(1) a limited data and analysis requirement to be used in the IOCPs, with the aim of monitoring the development of PD/3 and assisting in the preparation for the final demonstrations;

(2) a comprehensive set of data and analysis requirements for use in the PD/3 demonstrations, to ensure that the aims of the PD/3 programme are achieved.

Three categories of data will be recorded throughout the PD/3 programme: subjective, objective and observed.

Subjective performance measures are those where the controllers perform some form of self assessment. The three subjective measures used during the PD/1 and PD/2 demonstrations were Instantaneous Self Assessment (ISA - used in PD/1), Subjective Workload Assessment Technique (SWAT - used in PD/2) and NASA Task Load Index (TLX - used in PD/1 and PD/2). A decision on the subjective performance measures to be used in PD/3 will be finalised following the analysis of the PD/2 SWAT data.

Objective measures are those which are directly recorded by the simulator. This data may be used to investigate controller workload, quality of service, safety, etc.

There are three main methods of collecting *observed data*:

- through the use of suitably qualified personnel, each observing a specific aspect of the trial;
- through the use of video recording equipment;
- through the use of audio recording equipment.

VAL will make recommendations for the collection of observed data to the participating partners.

Each of these data types may be collected in a non-intrusive, intrusive or disruptive manner:

Non-intrusive data collection is totally transparent to the participating controllers. Data recording through the system software of, for example, aircraft on frequency, is non-intrusive; as is recording of all controller and pilot communications. Non-intrusive data collection will, therefore, not affect the controller's performance in any way.

Intrusive data collection will be apparent to the controllers; however, it should have a minimal affect on the performance of their duties. The collection of workload measures through ISA and SWAT, where the controller is required to push a key every two minutes, is intrusive data collection. Although it may initially distract the controllers from their main duties, they soon become used to performing such a simple task without affecting their overall performance.

Disruptive data collection, as its name implies, will affect the controller in the performance of his duties by intermittently disrupting him from the controlling task to perform another function. For example, the collection of secondary task measures is a disruptive data collection. Disruptive data collection will not be used during the PD/3 demonstrations; however, the partners may wish to incorporate such data collection during the IOCPs

10. Resources

10.1 Initial Resource Plan

The Initial Project Resources based on the draft Demonstration Project Plan and forming the basis of the PD/3 agreement are recalled in Table 2 and Table 3 below.

This resource plan was modified as a result of the definition process carried out during the Exploratory and Consolidation definition steps with the objective of providing a validated plan while remaining, as much as possible, within the resource figures accepted in the PD/3 Agreement.

	1994	1995	1996	1997	1998	Total
CENA	2.0	5.0	9.0	7.0	5.0	28.0
DLR		0.4	0.4	2.0	2.0	4.8
EEC	2.0	5.0	7.8	7.3	4.5	26.6
NATS		0.4	0.4	2.0	2.0	4.8
NLR	1.4	4.0	7.0	6.9	4.0	23.3
Total	5.4	14.8	24.6	25.2	17.5	87.5

Table 2 : Planned Resources for PD/3 on the basis of the Draft Demonstration Project Plan (Agreement Figures in man-years)

	1994	1995	1996	1997	1998	Total
Global staff expenses	650	1780	2950	3020	2100	10500
Missions	30	50	50	50	30	210
Equipment			200			200
Use of aircraft				300	300	600
ATC Controller Expenses		20	20	100	100	240
Communications			20	20	20	60
Total required	680	1850	3240	3490	2550	11810

Table 3 : Planned Funding Provisions for PD/3 on the basis of the Draft Demonstration Project Plan (Agreement Figures in kECU assuming 120 kECU/man-year)

10.2 New Project Plan Structure

The new structure of the PD/3 Project Plan, following the PMB/18 decisions, takes into account the following considerations:

a) It identifies more clearly how the transfer of results and experience is managed between PD/1, PD/2 and PD/3. The deliverables of these projects are highlighted.

b) The activities supporting the high level definition and management of the project, as well as the major deliverables to PD/3 from the other PHARE projects, are presented.

c) The multi-site issues have been removed and the IOCPs programme has been redirected to lead to the final demonstration set-up covering both the operational and the simulation environment in a stepwise approach.

d) The structure of the project plan now reflects the activities of each participating PD/3 partner in detail and separately, so that reporting on the different centre's activities and progress can be more easily screened.

Thereby each centre has its own section describing its tasks related to the full development and trials performance cycle:

- IOCPs, adapt hosting site, pilot phase, the final demonstration and analysis/reporting.

The DLR contribution to PD/3 is still an empty budgetary frame. It copes within the project plan for 176 man-weeks up to the end of 1998. DLR is in the process of detailing their transfer of PD/2 knowledge into PD/3.

e) The project plan integrates the detailed presentations of the IOCPs programmes and shows how they contribute to the final demonstration.

The IOCP programme has been initially streamlined to the strict minimum with three main themes:

- EEC: Multi-sector planning IOCP
- CENA:Human Centred Approach
- NLR: En-route/TMA interface IOCP

An additional IOCP has been re-introduced when considering a greater involvement of NATS in PD/3 after PD/1 achievement. It concerns the reuse of material from PD/1 and validation:

- NATS: Follow-up of PD/1.

The detailed planning of each IOCP is given in the respective section of each partner's project plan.

The possibility to define and attribute other tasks for DLR has also been considered but has not been formalised yet as a fifth IOCP.

The main activities related to inter-site simulations running and the necessary interconnection of the platforms have been given up, but in order to facilitate the use of common tools and to have comparable test means for the 3 on-site local final demonstrations, an harmonisation of those platforms through the use of CMS concepts is highly desired. The CMS project is then charged with :

- provide a test bench for PATs integration
- provide software control procedures
- support for the 3 sites adaptation and harmonisation
- technical support during the tests and demonstration running period

The IOCP programme was revised to cover both:

- the operational concept clarification towards the final advanced organisation;

- the incremental development and integration of the simulation environments required for the final demonstration.

As part of the 1996 reassessment process PMB/19 concluded that the IOCPs were starting to delay the preparation of the final platforms and the start of the final integration of the tools.

In order not to loose what was achieved it was decided to stop IOCP work that could not be finalised before the end of April 1997. The repercussion of such an approach was shown in a revised PD/3 planning which was further approved at PMB/19A.

This new project schedule is provided in a Gantt chart at Annex G.

In the definition of the experimental programme of PD/3, the IOCPs target a preliminary investigation of tasks, roles and computer assistance, as proposed by the Operational Scenario Document (OSD). A refinement of this OSD for the final demonstration is planned, when the IOCPs results are available, aiming at a consistent and traceable input from the IOCP results.

10.3 The revised effort and budgetary frame

The PD/3 Project Plan and the associated effort/budgetary frame have been elaborated and agreed by the PD3CG18 during its meeting in Brussels from 20 to 22 May 1996. The resource plan was based on the following assumptions:

- limit the operational validation programme to four IOCPs
- limit the final demonstration to one baseline and one advanced organisation.
- No multi-site connected simulations will be performed.

Table 4 below presents for each centre the new effort requirements and a global comparison between the effort figures in the specific PD/3 Agreement and the reassessed figures, on which the initial project plan was based.

The reassessed figures result in differences with the previous versions of the project plan and with the figures endorsed in the specific agreement.

The figures reflect in particular the following amendments to the planned effort:

- suppression of the multi-site interconnection related tasks. The total amount of the effort associated to these tasks has not been saved in their totality, because they included some tasks related to the adaptation of the local hosting site.

- integration and update of the effort of the HMI development for both the IOCPs and the final demonstration, which had been previously underestimated (major part of the 1997 increase).

- increase of the tasks related to analysis and reporting, which had also been underestimated.

- increase in some integration and test tasks, taking into consideration at each site all tools and PD/3 GHMI.

Resource Name	1994	1995	1996	1997	1998	Total
CENA	2.5	4.6	9.6	9.6	5.3	31.6
EEC	1.7	4.6	8.5	10.3	5.0	30.1
NLR	1.7	4.0	9.5	7.4	5.4	28.1
NATS	0.0	0.0	1.9	2.0	2.0	5.9
DLR		0.4	0.4	2.0	2.0	4.8
Total MY	5.8	13.7	29.9	31.3	19.8	100.5
Agreement	5.4	14.8	25.6	25.2	17.5	87.5
Difference	0.4	-1.1	4.3	6.1	2.3	13.0

Table 4 : Reassessed Resources Requirements for PD/3 (in man-year)

The total increase over the three years up to the end of 1998 is in the order of 13 man-years with a peak in 1997. The total resources of the PD/3 project were estimated and endorsed by the specific PD/3 agreement at 84,2 man-years. The increase of 13 man-years is well below 20% of such overall total effort provided by all establishments and therefore has been implemented on the basis of a decision taken at the level of the PHARE Management Board, without seeking new approval by the EUROCONTROL governing bodies (in accordance with paragraph 11.2 of the specific agreement relating to the performance of PD/3).

The total funding requirements on the basis of the revised effort and budget needs for missions, equipment, flight costs , Controllers and communications is given in Table 5.

	1994	1995	1996	1997	1998	Total
Global staff expenses	700	1640	3590	3740	2370	12050
Missions	30	50	50	50	30	210
Equipment			200			200
Use of aircraft					300	300
ATC controller expenses		20	20	100	100	240
Communications			20	20	20	60
Total required	730	1710	3880	3910	2820	13060

Table 5 : Actual Funding Requirements for PD/3 on the basis of the Demonstration Project Plan (Figures in kECU assuming 120 kECU/man-year)

10.4 Budget reallocation between PHARE projects

The PD/3 partners confirmed at PCC/35, prior to the approval of the above revised plan, that the required increases in effort can be achieved within their establishments within the anticipated time-frame.

The establishments funding had to be complemented by the possibility of a 50% co-funding from the EUROCONTROL FCO PHARE Budget within the limits of the present 1996 budget and the present draft 1997 budget and 5-Year Programme.

For the year 1996, the suppression of the tasks related to the multi-site connection and their impact on the current CMS project plan has resulted in a practically balanced situation within the 1996 ceiling of the FCO PHARE budget which could be accommodated.

For the year 1997, the budget table presented at PCC/35 showed an excess of about 570 KECU above the present FCO PHARE budget of 5423 KECU of credits of commitment.

Possible savings were identified in other PHARE projects in-line with the directives of PMB/18 .

For the year 1998, the revised PD/3 Project Plan results in a figure for the required FCO PHARE funding slightly below the present figure of the 5 Year Programme. Therefore no problems are expected as long as the present 1998 FCO budget projections will be approved by the EUROCONTROL governing bodies.

It was agreed that, although not all savings could be realistically achieved, the margin for opportunities was sufficiently wide to support the revised PD/3 budget.

The 1996 review further showed that redirecting to platform integration the effort associated with these IOCP would allow to compensate partly for the significant initial underestimation of the effort required for platform development and tools integration. Assuming that the PHARE budget cannot be increased to cover the remaining costs , the NLR had opted to reduce its

scope whilst CENA and EEC had accepted to cover the current cost increases internally. As a result, the PD/3 PHARE budget remained unchanged.

11. Risk management

This chapter constitutes a re-assessment of the status of the project risks as enunciated in the previous version of the PD/3 Demonstration Project Plan (DPP). It indicates:

- the initial risk statement and anticipated actions
- a list of new elements to be taken into account following the 1995 PD/3 re-assessment and the subsequent project reorientation
- a list of planned actions to control these risks

The initial rating of risks used two estimates: a subjective estimate of the identified risk probability (High, Medium or Low Risk), and an assessment of the magnitude of the impact of the identified risk on the project (High, Medium or Low Impact).

A third section is added to indicate what has been the appraisal of major remaining risks prior to the 1996 reassessment.

11.1 External risks

PD/3 as currently planned requires deliverables from other PHARE activities during the build up to the demonstration. The deliverables which have been identified as potential risks to the successful completion of the project are detailed below together with the steps taken to minimise the effects of the risks. Each of the deliverables are identified as milestones in the PD/3 programme and progress towards these milestones is continuously monitored and reported in the PD/3 Project Leader's reports to the PCC.

11.1.1 PATs: PD/3 PATs set validated

Summary of the initial statement

- Risk that not all of them are delivered on schedule with complete fulfilment of the PD/3 requirements: risk High for some, Medium impact

Reassessment:

- PATs planning has been reviewed to be in line with PD/3 planning
- Discussions between PD/3 and PATs are under way to clarify the tools requirements and to get a common understanding of the PD/3 operational concepts
- Delivery of all the tools and integration in the PD/3 local platforms still on the critical path
- Validation of the functional consistency of the tools as a whole is expected to reveal some additional difficulties

Planned actions

- Continuation of the clarification of the tools requirements in 1996 with PATs group, a joint workshop is planned in April 1996.

– PD/3 carefully surveys the PATs integration for PD/2 and will run preliminary PATs integration exercise during summer ‘96 for the first IOCP experiment.

– monitoring of the consistency of PATs and PD/3 planning

The mitigation of the risk is still based on the fact that PD/1 versions of the tools are available and updated PD/2 versions are currently being integrated.

11.1.2 CMS: PARADISE platform and PATs integration

Summary of the initial statement

– Risk that CMS encounters difficulty in integrating the PD/3 versions of all PATs tools and the various servers in an efficient and operationally meaningful manner: Low risk, High impact

Re-assessment:

– There is a significant risk of insufficient consistency between the PARADISE APIs and the PATs tool set.

Planned actions

– reduction of the associated risk is expected from the continual centralised integration process for the PATs configuration management, consisting of integration in PARADISE and by making the platform available at each site

– definition of “builds”, to be applied for each site and associating the tool set with a specific PARADISE version

– anticipation of the integration of the PATs in the platforms as much as possible without waiting for full delivery of the whole set of verified tools

11.1.3 GHMI: Delivery of ground HMI specifications to PD/3

Summary of the DPP statement

– Risk that GHMI will not have the time to complete the task of prototyping and specifying HMI for PD/3 within the PD/3 time-scale: High risk, High Impact

Re-assessment:

– GHMI specifications delivery still on the critical path

– Discussions between PD/3 and GHMI are under way to clarify the GHMI requirements, which nevertheless will remain incomplete for some time due to the uncertainty about the final PD/3 Organisations

– Strategy for GHMI implementation and planning not yet sufficiently clarified

– If the GHMI prototype is not sufficiently developed and tested, there may be a negative effect on the operational evaluation within the final PD/3 demonstrations. The acceptance of the operational concepts by the controllers may also be influenced negatively

- The possibilities for exchanging GHMI software between the partners may be limited if not all the partners will use the same development software

Planned actions

- Follow-on of the clarification of the GHMI requirements in early 1996
- Close co-ordination between the *GHMI Design Team (DT) and the PD/3 OTF has been set up.*
- Definition of principles for simplifying the GHMI integration on the partners' sites
- Incremental process involving IOCP activity, GHMI prototyping and specifications and GHMI development to be put in place in 1996
- The IOCPs contribute to the GHMI prototyping, specifications and development. Co-ordination between IOCPs and GHMI DT is set up.
- The delivery of the first issue of GHMI specifications is planned for the end of 96.
- The GHMI development policy is being discussed by PD/3 partners. They retain the following principles; one development by CWPs and a proposal for work-sharing to minimise GHMI development cost.
  - *NLR: Arrival TMA position*
  - *EEC: Multi-sector planning and en-route sector position*
  - *CENA: En-route sector position and Departure TMA positions*

The only option to deal with a possible delayed GHMI software development, related to late availability of the GHMI specifications, is to delay the final demonstrations.

The current GHMI planning is in line with the PD/3 plan. Monitoring of the GHMI specifications progress will be performed until the GHMI specification is ready. The effort on training will be harmonised at the different sites.

11.1.4 VAL: Experimental methodology and analysis facilities

Summary of the initial statement

- Risk that the analysis facilities will not be fully ready in time to meet the PD/3 deliverable: Low risk, Low impact

Re-assessment:

- No new information

Planned actions (in co-operation with VAL)

- Analysis of PD/1 results against PD/1 objectives (through the NATS IOCP) to be taken into account in PD/3 operational and validation discussions.
- Definition of the PD/3 experimental plan, taking into account PD/1 and PD/2 experience.

– ***PD/3 and VAL co-operate to issue the PD/3 experimental plan covering both IOCPs and final demonstration.***

11.1.5 PATN: PATN delivery (Phase 1) and application processes developed (Phase 2)

Summary of the initial statement

– Risk that PATN will not have the resources to complete the network implementation task and the development of the application processes for PD/3 within the PD/3 time-scales: High risk, Medium impact

Re-assessment:

– PATN has received funding for completing the network implementation and for Phase 2

– Discussions between PD/3, PATN and other PATN users have been initiated to clarify the PATN and operational data-link applications requirements The progress in this area has been very slow

– PD/3 operational data-link applications have been separated in two sets, one of high priority and one of low priority, in order to better fit to PATN resources

– *delay in the PATN prototyping activities occurred due to late discussion and approval of the DLCRDs.*

– There exists uncertainty about the PATN partner's experience/resources for application development

Planned actions

– Follow-on of the clarification of the PATN requirements in early 1996

– A prototyping activity, to be carried out in 1996, has been launched to check the feasibility of using PATN in PD/3 in terms of performances and in terms of data-link application integration (Down-link of Aircraft Parameters application)

– ***The co-ordination problems, including the availability of effort, are being discussed between the different players in a series of meetings starting in March 96.***

– ***Subsequently, a discussion process was launched in the second half of 1996 in order to finalise development of the DLCRDs and agree on the necessary changes to the active documents***

11.1.6 EFMS: EFMS equipped A/C - Flight simulators ready for PD/3

Summary of the initial statement

– Risk that the EFMS project does not deliver an EFMS version which meets the PD/3 requirements: High risk, Low impact

Re-assessment:

- A second draft of the PD/3 requirements for EFMS has been issued and presented to EFMS group. PCC/35 approved the URD of EFMS phase 2 provided the programme would be flexible towards PD/3 needs
- PD/1 and the NLR flight simulator have demonstrated the 4D trajectory negotiation and navigation capabilities with appropriate interactive AHMI using the EFMS
- The risks associated with the integration of the EFMS in real aircraft and flight simulators have to be considered.

Planned actions

- Follow-on of the clarification of the EFMS requirements in 1996. Specific actions have to be scheduled to finalise the match between the PD/3 requirements and the capabilities of the EFMS Phase 2.
- ***Joint EFMS-PD/3 meetings are taking place to discuss both operational scenario and DLCRDs. EFMS and PATs issued a proposal for the trajectory negotiation within a multi-sector environment which seems to fit in PD/3 requirements.***
- Experience from PD/1 and PD/2 will be used when dealing with a live aircraft in a simulation exercise.
- ***The research aircraft of NLR, DLR and CAA are intended to participate in PD/3. The level of participation of the real aircraft in the demonstration will need further discussion at PCC level. DLR will provide assistance and will contribute to the integration of the real aircraft in the PD/3 environment.***

11.1.7 AHMI

Summary of the initial statement

None

Re-assessment:

- The use of appropriately equipped flight simulators is considered as an efficient, alternate way to involve the airlines community more widely in the PD/3 programme. The adaptation of the flight simulators HMI is not currently provided under the AHMI programme.

Planned actions:

- Definition of the complementary activities to the PHARE AHMI programme to cover the adaptation of the flight simulator's displays
- Revision of the PHARE Validation methodology to cover acceptably the airborne users.

11.1.8 MET

Summary of the initial statement

– The deliverables to be expected from the PHARE MET project not yet clearly defined: Low risk, Low impact

Re-assessment:

– Discussions between PD/3 and MET have clarified the basic met requirements

– The MET deliverables are limited to providing sets of meteorological data for use in the simulation runs.

Planned actions:

– PD/3 will indicate to the MET project the required data format and the amount of data required.

11.2 Internal risks

11.2.1 Immature operational content (IOCP, PD/1&2 results)

Summary of the initial statement

– Risk of preparing large-scale demonstrations based upon operational scenarios not previously sufficiently validated

– PD/3 is an ambitious programme as regards its operational scope

Present knowledge

– different opinions still exist on whether the PD/3 scenario is sufficiently advanced.

– there may not exist a common view on the operational concept within the other PHARE projects. It may furthermore take a lot of communication to get a shared view throughout PHARE.

– considerable work carried out by OTF to refine the operational scenarios, but still with the same need for partial and intermediate validation

– IOCP teams are in place and have started their work

– PD/1 pilot phase confirmed the need for having sound operational scenarios before running the simulations

– There is no definition of the baseline scenario

Planned actions

– consideration of the lessons to be learnt after PD/1 pilot and main phases, and analysis of its results

– IOCP activity in 1996

- continuation of OTF's activity in 1996 with the objective to provide an "Outline Operational Scenario Guideline" covering a baseline and an advanced organisation as well as indications of more, alternative options for the controller task allocations , thus following the recommendations of PCC/36
- first lessons to be learnt from PD/2 pilot phase
- ***the definition of the advanced organisation is progressing well thanks to the co-operation between the PD/3 partners and between the PHARE projects.***
- ***PD/3 has made proposals to reduce the complexity of the operational requirements and of the infrastructure foreseen to run the simulation.***

11.2.2 Management and Co-ordination

Summary of the initial statement

- Challenge to conciliate the current objectives of PD/3 with its scheduling constrained by the finish deadline of the PHARE programme in 1998
- PD/3 is a multi-partners project, which entails an important negotiation and co-ordination overhead that must not be underestimated

Present knowledge

- co-ordination workload confirmed, in particular the elaboration of the PD/3 External Requirements
- Lack of visibility on the tasks dealing with the adaptation of local sites

Planned actions

- *The Project Plan has been restructured to provide the required visibility on all aspects of the project*
- Preparation of the 1996 re-assessment
- Increasing the visibility of intermediate IOCP results
- Tight monitoring of the execution of the revised project plan to be performed, through the new management structure of PD/3

11.2.3 Complexity of the large-scale demonstrations

Summary of the initial statement

- Large-scale demonstrations involving an important number of working positions to be manned

Present knowledge

- Concerted actions have been launched with VAL to address final demonstration experimental plan. PD3CG members have decided to reduce the number of sectors

actively simulated during the demonstration. It will allow a reduction in the number of controllers and CWPs to run the experiments. A final proposal is being prepared by OTF.

Planned actions

- Thorough definition of the simulated airspace will have to be done in order to limit the number of positions and controllers required (in particular in TMA), at the cost of possible loss of realism of the simulations
- Thorough definition of the simulated traffic will have to be done in order to keep manageable volumes of data, at the cost of possible loss of realism in the simulations (in particular in respect of the multi-sector planning function)
- ***Actions in progress linked to the previous one and to the IOCPs multi-sector planning.***

11.2.4 Availability of Air Traffic Controllers

Summary of the initial statement

- High risk of not finding available controllers in sufficient number to prepare and handle the required number of demonstrations

Present knowledge

- The PD/1 experience and the detailed IOCP planning have confirmed the need to monitor closely the involvement of Air Traffic Controllers in all phases of the demonstration programme and to consider possible interaction with other study programmes
- The PD2 experience has shown an increase in available controllers for this type of experiments

Planned actions

- Provision of the required co-ordination for the involvement of controllers
- Establishment of a data base of ATC controllers available for demonstrations

11.3 Major risks - 1996 assessment

The project risks were further appraised as part of the 1996 project assessment along with the impact of those risks on PD/3. While none of these risks are severe enough to cause the outright cancellation of PD/3 certain risks could have a severe impact.

A number of additional risks were identified by individual partners related to their platforms.

The risks common to all partners are identified in order of severity in the table below.

Risk	Impact	Risk Management
External products to be integrated e.g. PATS, PATN	1. Reduced Simulation capability. 2. Potential for delay. 3. Problems of assuring compatibility between tools and functions.	1. Clarify inter/intra tools/functions communication requirements. 2. Develop closer relationship with tools providers. 3. Develop "own" functionality. 4. "Drop" product.
No common baseline organisation definition	1. No common measurement reference organisation for PD/3 2. Limited value of validation.	1. Develop alternative baseline. 2. Review possible options
Late delivery of Externally or Internally prepared specifications	1. Delay to development. 2. Incomplete definition, reduced testing and poor performance.	1. Request advance delivery of draft specifications. 2. Develop "own" specification.
Unavailability of Controllers	1. Delay to system integration tests. 2. Reduced simulation format.	1. Early contact with Administrations. 2. Develop controller pool.
Complexity of Operational Scenario	1. Difficulty in specifying, building and testing components. 2. Potential delay.	1. Reduce complexity.
Unavailability of Operational Staff for preparation at EEC	1. Late data preparation definition.	1. Contract staff option.
EEC EONS HMI build capability	1. Potential for delay. 2. Reduced capability in NLR and CENA demonstration	1. No option
Uncertainty concerning PD/3 Training Platform (s)	1. Reduced training capability. 2. Poor results. 3. Additional cost.	1. Identify training responsibility in PHARE.

11.4 Further reassessment planning

Feasibility re-assessment should take place in the following time periods:

- Late 1997, based upon:
  - the results of the integration and facility tests and first progress report for the Demonstration pilot phase
  - IOCP Results in 1997

12. Project acceptance

12.1 Review process

12.1.1 Introduction

The PHARE Demonstrations are collaborative projects which are managed by the respective hosting sites and require deliverables from other PHARE projects for their successful outcome.

The PHARE projects listed in Chapter 5 are providing deliverables to PD's.

Each of these projects shall provide appropriate information relating to their deliverables to PD/3 . Their deliverables shall be approved by the respective project leaders using appropriate quality control procedures.

Categories of PHARE Deliverables

1. Internal PD/3 deliverables

   Deliverables that are important for the internal project progress;
   internal deliverables may include local sites PD/3 deliverables which require specific features to be checked for consistency with the plural-site demonstration approach (as an example local validation plans, experimental plans ...)

2. PHARE deliverables

   Deliverables identified as important at the level of the PHARE programme

All deliverables will be written in the English language.

12.2 Approval / Signing-off Procedures

Internal PD/3 deliverables are to be signed-off by the appropriate local project leader and approved by the PD/3 project leader following review by the PD/3 Executive Group, and reported in a progress report to PCC. Depending on the nature of the deliverable, co-ordination with other PHARE projects may be necessary before its review by the Executive Group.

PHARE deliverables are to be approved in four stages:

1. Review by the PD/3 Executive Group. The document will be signed by the author(s) and then submitted to the PD/3 Co-ordination Group for technical acceptance
2. Approval of technical contents by the PD/3 CG. On acceptance, the document will be signed by the PD/3 project leader and then submitted to the PCC for final acceptance
3. Approval of organisational and inter-project co-ordination aspects by the PCC and signing by the PHARE Programme Manager

4. Final approval as a PHARE deliverable by the PMB

12.3 Software control

The design, production, testing and control of software developed to support PD/3 will be subject to the local procedures of the hosting sites. Procedures will be developed, in the context of PATs and CMS with input from local sites, to handle software delivered from the PHARE partners for inclusion with the hosting site facilities or exchanged between the PD/3 partners.

12.4 Quality Management

Quality management procedures shall be defined and applied to PD/3 in particular in the following areas:

- Management
- Experimental Plan
- Validation Plan
- Software development and control
- Training plans
- Configuration and Change control

13. Project reporting

The major steps in the management of the project plan and progress reporting are as follows:

13.1 Project review

The local PD/3 project leaders will provide the PD/3 Project Leader with progress reports before each meeting of the Executive Group (which means in principle every month), on the basis of their local project plans:

- a synopsis of the project progress (status, problems and risks)
- a summary of the activities in the reporting period with respect to the agreed project plan (milestones and deliverables, actual start date and finish date of tasks, percentage of completion of current activities and associated status, progress and risk, activities for the next reporting period);
- an actual and cumulative effort accounting report
- an indication of anticipated delays on current and late start of future tasks.

13.2 PD/3 project status Consolidation

Each local project leader is responsible for maintaining his local project plan (in MS Project® 4.0 format). The PD/3 Project Leader is responsible for maintaining the common part of the project plan.

The executive PD/3CG will meet monthly to consider and assess the progress of the project and agree on possible corrective actions.

Three weeks prior to the PCC meeting, the PD/3 Project Leader will update the resource plan with the plans from the local PD/3 project leaders, and deliver it to the PHARE Cell in view of the consolidation of the overall PHARE project plan. Once the local project leaders have provided their local plans to the PD/3 PL they will not update the plan until the project plans are returned by the PHARE Cell after the PCC meeting.

13.3 PHARE consolidation

The PHARE Cell will integrate the updated PD/3 project plan together with updates of the plans from all other PHARE projects into one consolidated plan. A clear indication of changes as compared to the previous PCC version of the plan will be included in the version of the plan which will be distributed to the PCC for approval two weeks before the next PCC meeting.

13.4 Approval

The PCC will assess the results of the consolidated plans and determine where changes need to be made.

Where necessary, the PCC will pass major problems to the PMB for decision.

13.5 Final consolidation

The PD/3 Executive Group will review the observations made by PCC and PMB in order to update the plans accordingly.

13.6 Schedule for meetings

Three types of meetings have been identified to support the above project reviewing cycle:

Type of Meeting	Frequency
PD/3 Co-ordination Group	On request of the PD/3 Project Leader
PD/3 Executive Group	monthly
Local PD/3 follow-up meetings	monthly

All PD/3 meetings, attendees and reimbursement are subject to the established PHARE mission approval procedure.

14. Document configuration

14.1 Related documents

A list of key PD/3 related documents will be maintained in the PHARE Document database. The rules for document identification are given in the following chapter.

The following is a list of the key documents for PD/3:

1. PD/3 Outline Project Plan, (Ref: PHARE/CENA/PD3-1.1.2/OPP;2)

   This document provided the PD/3 outline project information on which the PD/3 Agreement has been based. The information is now superseded by the present document

2. PD/3 Demonstration Operational Specification (Ref: PHARE DOC 95-70-02, and PHARE/CENA/PD3-1.3.1/OPS;3.1)

   This document defines the broad operational objectives of PD/3

3. PD/3 Demonstration Project Plan (Ref: PHARE DOC 95-70-01, and

   PHARE/EEC/PD3-1.1.3.5.2/DPP;3

   This document provides the PD/3 project information

4. PD/3 Demonstration Facility Specification (Ref: PHARE DOC 95-70-09, and PHARE/EEC/PD3-1.1.3.4/FAC;Draft 1 dated November 1996)

   This document is an initial detailed description of the technical, operational and analysis requirements to be met by the simulation environment in support of PD/3

5. IOCP results reports

   Documents providing results of the Internal Operational Clarification Projects

6. PD/3 Operational Scenarios

   This document describes the modus operandi for the different classes of controllers necessary to support the operational scenarios of PD/3. It is structured in two volumes including an “Outline Operational Scenario Guidelines”, giving a high level description of the baseline and advanced organisation as well as alternative options for the controller task allocations, and a detailed scenario description.IOCP results reports

7. PD/3 Multi-site Simulation Specifications

   This document, initially intended to supersede the PD/3 Demonstration Facility Specifications, and covering the multi-site requirement specifications, will not be produced in the revised context of PD/3. The results of the Inter-site Simulation Task Force work are published as the “PD/3 Demonstration Facility Intersite Simulation Requirements Specification” ,

PHARE DOC 96-70-20 (PHARE/EEC/PD3-1.2.2/WD;1.5) dated May 1996

8. PD/3 Exercise plan and scenarios

   These documents will describe the exercise plan, including training set-up, the detailed scenarios and air server scripts used for each of the traffic samples

9. PD/3 Final report

   This document will close the PD/3 project by providing analyses and conclusions of the project, as results of the IOCPs and of the large-scale demonstrationsPD/3 Exercise plan and scenarios

10. PHARE Document Database

    This document contains the status in terms of versions of the key PHARE related documents and will be re-issued whenever a document is updated. The latest version will be held by the PHARE CellPD/3 Final report

11. Configuration Control document

    This document contains the status in terms of versions of all the PD/3 documents and will be re-issued whenever a document is updatedPHARE Document Database

14.2 Document identification

Document configuration is controlled by revision number which is maintained by the PHARE Cell for the key PHARE related documents. Documents will be uniquely identified as follows:

<Programme>/<Establishment>/<WBS no.>/<document type>;<revision no.>

<Programme> is always PHARE.

<Establishment> is the identification of the establishment holding and maintaining the document (e.g. EHQ, CENA, NLR, EEC etc.). In the case of a document containing contributions from a number of establishments this will be the Task Leader establishment.

<WBS no.> is to be taken from the task description.

<document type> is to be taken from the following list:

-
- ADD Architectural Design Document
- AGN Agenda
- ATP Acceptance Test Plan
- DDD Detailed Design Document
- DPP Demonstration Project Plan
- EFAC Exploratory Facility Specification

- EPP Exploratory Project Plan
- IDn Information Document number n of a meeting
- IOSD Initial Operational Scenarios
- ITR Integration Test Report
- FAC Facility Specification
- LSP Logistics Support Plan
- MIN Minutes of Meeting
- MSS Multi-site Simulation Specification
- OPM Operator's Manual
- OPP Outline Project Plan
- OPS Operational Specification
- OSD Operational Scenarios Document
- PNn Project Note number n of a task
- POPS Pre-Operational Specification
- QAP Quality Assurance Plan
- QAR Quality Assessment Report
- REQ Requirements
- SAP Safety Assurance Plan
- SMM System Managers Manual
- SRD Software Requirement Document
- SSD Scenarios Scripts Document
- SSR Study Report
- STP Software/System Test Plan
- STR System Test Report
- TDn Technical Document number n of a meeting
- TPR Task Progress Report
- TRM Training Manual
- URD User Requirement Document
- UTR Unit Test Report
- WDn Working Document number n of a meeting
- WPn Working Paper n of a task

The status of each PD/3 document will be maintained in the Configuration Control Document which will be re-issued each time one of the configured documents is updated.

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15. Glossary

ACC	Area Control Centre
AHMI	Airborne HMI project
AM	Arrival Manager
APP	Approach Centre
ASCOT	ATM Simulator Configuration Tool
ATC	Air Traffic Control
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
CAA	Civil Aviation Authority
CENA	Centre d'Etudes de la Navigation Aérienne
CMS	Common Modular Simulator
CNS	Communication, Navigation and Surveillance
DLR	Deutsche Forschungsanstalt für Luft und Raumfahrt Institut für Flugführung
DM	Departure Manager
DPP	Demonstration Project Plan
DRA	Defence Research Agency
EATCHIP	European ATC Harmonisation and Integration Programme
EATMS	European ATM System
EEC	Eurocontrol Experimental Centre
EFMS	Experimental Flight Management System
EHQ	Eurocontrol HeadQuarters
ETMA	Extended TMA
EURATN	EURopean ATN
EXT	EXTernal deliveries to PD/3
FMS	Flight Management System
GHMI	Ground HMI project
HMI	Human Machine Interface
ICP	Internal Clarification Project
IOCP	Internal Operational Clarification Project
ISTF	Inter-site Simulation Task Force
LORAS	Library Of Reusable ATM Software

MET	Meteo project
NLR	Nationaal Lucht - en Ruimtevaartlaboratorium
NM	Negotiation Manager tool
OPP	Outline Project Plan
OPS	Demonstration Operational Specification document
ORG	Operational ORGanisation used as demonstration scenario
OTF	Operational Task Force
PATN	PHARE Aeronautical Telecommunication Network
PATs	PHARE Advanced Tools
PCC	PHARE Co-ordination Committee
PD/1	PHARE Demonstration 1
PD/2	PHARE Demonstration 2
PD/3	PHARE Demonstration 3
PD3EG	PD/3 Executive Group
PD3CG	PD/3 Coordination Group
PHARE	Program for Harmonized ATM Research in Eurocontrol
PMB	PHARE Management Board
PREPCOT	PREParation Configuration Tool
R&D	Research and Development
TMA	Terminal Manoeuvring Area
TP	Trajectory Predictor tool
VAL	Validation Tools project
WBS	Work Breakdown Structure

16. ANNEXES

A) Multi-Sector Planning Procedures IOCP

B) Human centred approach IOCP

C) ETMA/En-Route Interface IOCP

D) PD/1 Follow-up IOCP

E) PD/3 Responsibilities

F) Task Descriptions

G) Gantt chart

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Add annexes A to G from Annexes.Doc