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## BRITE/EURAM (1989-92), AREA 5 SECOND YEAR REVIEW REPORT

COMMUNICATION FROM THE COMMISSION

# BRITE/EURAM (1989-92), AREA 5

## SECOND YEAR REVIEW REPORT

### 1. Introduction

The BRITE/EURAM (1989-92) Programme was approved<sup>(1)</sup> on 14 March 1989. Area 5 of the Programme is devoted to aeronautical research and technology. In reaching its decision, the Council agreed with the Commission that the implementation of the work specified in Area 5 should be accomplished in the first two years of the programme. It is further specified, in Article 4 of the Council decision, that, during the second year, the Commission should undertake a review of the research relating to aeronautics and report to the Council and to the European Parliament on the results of this review together, if necessary, with any proposals for modification or prolongation. This document fulfils that requirement.

In conformity with the requirements of Article 4 of the programme decision and of the Community plan of action relating to the evaluation of Community R&D activities<sup>(2)</sup>, arrangements have been made to set up an independent panel to evaluate the research work relating to aeronautics. The panel has published an Interim Evaluation Report<sup>(3)</sup>. The findings contained in that report are taken into account in this review.

### 2. Aeronautical Research & Technology Acquisition in Europe - The Policy Background

#### 2.1 The Historical Position

The Commission considers that Community support to aeronautics research and technology acquisition is an essential part of its industrial strategy for this sector.

The considerations which prompted the Commission to propose the present Community action in the field of aeronautical research and technology acquisition were set out at length in a communication adopted by the Commission in June 1988<sup>(4)</sup>. In their essentials, the main arguments were set out in the synopsis of that communication:

"The aeronautical industry of the Community is a key segment of the European industrial base. Aviation makes a vital contribution to the civil life and commerce of the Community and aircraft and helicopters are indispensable elements of the military forces which contribute to the defence needs of

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- (1) Decision 89/237/EEC (OJ L98/18 of 11.4.89)
  - (2) OJ C14/5 of 20 Jan 1987
  - (3) Research Evaluation Report No 43 - EUR 13000
  - (4) COM(88)294 final of 7 June 1988

Europe. The activities of the industry involve the continued advance of knowledge and technique over a wide range of high technologies, a process which yields important spin-off benefits to other sections of industry and to education: and the industry is a major exporter. For all these reasons, the Member Countries who have an indigenous aeronautical industry see that industry as having strategic importance and their governments give substantial support of various kinds.

At the present time the industry is performing successfully in both civil and military markets with a range of products which are fully competitive world-wide. The necessity for cooperation between companies in the development and production of major aircraft has been recognized for many years and the practice is firmly established in the European industry: the most notable illustration of this reality is provided by Airbus Industrie. Despite these important achievements in adaptation to the changing market and to the increasing sophistication of the product, the position of the industry is by no means secure. The climate of competition is increasingly severe and nowhere more so than in the area of technology which provides a vital basis for product competitiveness.

The pace of advance of aeronautical technology is very rapid. This advance is stimulated not only by the direct competitive thrust of the world's largest companies and national governments but also by the formidable investments in Defence research and development, world-wide, which yield considerable 'dual-use' benefits to civil product design and manufacture. At the same time the sophistication and, hence, the intellectual and financial cost of making each major step is increasing. Failure to sustain a competitive, state-of-the-art, technology base would certainly be fatal to the prospects of the European aeronautical industry.

However, the cost to individual companies of acquiring the technology by their own research efforts has become unsustainable: and the alternative of buying technology under licence from the main external generating sources of technology, the U.S.A. and Japan, is hardly feasible, given that the buyers and sellers in such transactions will be in direct competition with each other in the world market. To overcome this threat the industry must be stimulated and assisted to extend its cooperation at European level, which already exists in development and production, to the field of research and technology acquisition.

The Commission has examined this problem closely, with the assistance of a substantial study carried out in the industry. It has concluded that the market opportunities open to the industry over the next twenty years are good and that, if its level of competitiveness can be maintained, there are good prospects for the European industry to maintain its proportion of the world market, despite the emergence of new or stronger competitive suppliers. The situation regarding regeneration of the technology base is less satisfactory: currently, the effective level of research and technology acquisition activity achieved by and for the industry is not sufficient to build up the base of new and improved technologies which will be needed to allow the recognized market possibilities to be realized. If this shortfall and loss of trading opportunities are to be avoided, a major reinforcement of research and technology acquisition is needed. The Commission has concluded that this reinforcement must include a new, greatly enhanced, level of cooperation in research and technology. The enhanced effort must be strategically focused upon key elements for the future technology base as defined by industry in the light of long term product trends. It must also harness the whole range of aeronautical and related talents and interest throughout the Community including those in universities and small/medium enterprises."

Two years on, this analysis remains largely valid but the situation of the aeronautical field has evolved in some important respects.

## 2.2 Recent Developments

On 23 April 1990, the European Communities adopted the third Framework Programme (1990-1994)<sup>(5)</sup> which, inter alia, aims to reinforce Community action in accordance with

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(5) Decision 90/221/Euratom,EEC (OJ L117/28 of 8 May 1990)

Article 130f of the EEC Treaty. This Article defines as Community aims the strengthening of the scientific and technological base of European industry and the encouragement of that industry to become more competitive at international level. The actions being pursued in Area 5 of BRITE/EURAM are wholly consistent with these aims.

The past two years have seen a continuing growth of public concern for questions of environmental impact and quality of life as influenced by transport systems of all kinds. In the case of aeronautical transportation, these concerns are principally focused upon the noise and exhaust emissions emanating from aircraft and upon the various inconveniences and economic penalties flowing from congestion in the current air transport system. To respond to these concerns, research in aeronautical technologies capable of ameliorating environmental impact and enhancing air transport system traffic handling capacity needs to be encouraged.

In the sphere of international relations, the past year has seen striking progress in the replacement of East-West confrontation by increasing dialogue and substantial agreements on steps towards reduction of military force levels. These developments have major implications for the field of aeronautics - on the one hand holding out the prospect of a rapidly enlarging and increasingly integrated world air transport system and on the other a marked decline in the volume of aeronautical development and production activity for Defence purposes. Both of these tendencies will have consequences for the European aeronautical technology base.

The enlargement and integration of the world air transport market may be expected to increase the breadth and dynamism of the market for aeronautical products and this in its turn can be expected to lead to an increase in the range and intensity of world market competition in technological aspects: in these conditions, the largest actors may be expected to realize important benefits of scale with respect to technological capability.

The relative decline in major power Defence expenditures which can be foreseen is likely to reduce the direct transfer of aeronautical technology from Defence research to civil application. While this might in itself tend to slow the pace of technological innovation, the release of resources, both financial and human, may have the inverse effect of permitting an acceleration of innovation in the civil field. At this stage, the combined effect of these influences is hard to predict.

Looking directly at the world technological scene, the general trends in civil aeronautics remain broadly similar to those referred to in the Commission's previous communication. The tempo of product innovation in the market place remains high, as evidenced by recent appearances of new aircraft, such as Airbus 321, 330, 340, Boeing 747-400, 777, McDonnell Douglas MD-11, ATR-72, and new very high thrust engines, such as RR Trent, GE 90 and P&W 4082. Intensified activity directed towards future supersonic civil transport has become apparent and actions oriented towards hypersonic and tilt rotor vehicles continue. At the same time, there have been conspicuous signs of technological protectionism, most notably manifested in the wide-ranging debate within the USA on measures to restrain leakage of US aeronautical technology to commercial rivals in other countries.

## 2.3 The Current Position

In its Communication "A competitive European aeronautical industry" (23rd July 1990), the Commission draws the conclusion that, as regards industrial competitiveness, there continues to be a strong need for encouragement of collaborative aeronautical research, drawing upon the diverse capabilities and talents existing throughout the Community and strategically focused upon key advances in the aeronautical technology base as identified by industry in the light of long term product trends. At the same time, increased attention needs to be given to technological aspects of aircraft operations and their impact upon the human and natural environment.

## 3. Experience of, and Lessons to be Drawn from, the Exploratory Activity in BRITE/EURAM Area 5

### 3.1 Historical Aspects

The main elements of the chronology, proposal solicitation and selection process and implementation are described in Annex 1 of this report. In general terms it can be said that the programme execution has proceeded satisfactorily. The issue of participation was one of particular concern and here it can be observed:

- eleven Member States have significant participation in the programme;
- more than 20% of the participating organisations are SME's;
- more than 30% of the participating organisations are universities;
- focused fundamental research, which is mainly the preserve of university researchers, accounts for about 6.5% of programme volume: in addition, university participation accounts for about 16% of the volume of industrial applied research.

### 3.2 Achievements

#### 3.2.1 Technical Achievements

Even though this report is made at an early stage of practical execution, it is already possible to identify important technical achievements. Project synopses have been published<sup>(6)</sup>, annual progress reports on all projects (of which the first are due at the end of this year) will provide detailed information on technical achievements to date and a technical overview will be given at the conference which will take place in Spring 1991. Here a few broad technical indications will be given.

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(6) "BRITE/EURAM Area 5: Project Synopses" - EUR 13210, October 1990

In the field of validation of computational fluid dynamic(CFD) codes, considerable progress has been made in establishing a set of standard reference cases for which well specified collateral physical measurement data are available. In the field of aerodynamics, a major research investigation into laminar flow technology, addressing both natural and hybrid laminar flow, is well advanced. Design of a naturally laminar flow test glove which will be flight tested on the wing of a Fokker F100 airliner has been established by extensive CFD and high speed wind tunnel tests. Under the heading of propulsion, important progress has been made in understanding of basic combustion processes in aeroengine combustion systems in a project which has brought together most of Europe's engine makers to devise design approaches whereby aeroengine emissions may be yet further reduced. Work is also well advanced on preparation of advanced means for investigating airframe integration of advanced propeller and propfan propulsion systems. Among the activities of particular relevance to helicopters, preparation is well advanced for an extensive experimental data gathering exercise to be carried out on an instrumented scale model rotor in the DNW wind tunnel. The experimental phase will be used for validation of new and improved noise prediction codes.

### 3.2.2 Organisational Achievements

The process of solicitation/evaluation/selection/negotiation has demonstrated the readiness of substantial groups of industrial/SME/university/research centre actors to join together to propose major collaborative research endeavours on subjects of considerable importance for future aeronautics - such as tools for computational fluid dynamics, laminar flow control for drag reduction, combustion technology for reduction of power plant exhaust emissions, techniques for enhancement of the flightdeck - Air Traffic Control interface, etc.

The formation of research teams to put forward research proposals has shown the willingness of companies which are in direct competition in the market place to join their research efforts together in a Community framework in order to pursue important pre-competitive research investigations of common interest.

Some of the projects now being implemented (eg in the fields of acoustic fatigue and health and usage monitoring) exhibit the well known advantages of Community research cooperation for tasks for which it is important to bring together a variety of national and/or industrial collections of experimental data, testing experiences, etc to form coherent, well characterised, data bases for common R&D use and to provide potential bases for standardisation.

In several of the projects which are now being implemented (eg electrical actuation, novel optical sensing techniques) the proposals have followed the desirable course of competitive confrontation of alternative technical approaches to solution of an important problem in a coherent technical framework of well standardised performance goals and test conditions.

In some areas (eg computational fluid dynamics), as work on the projects progresses, some teams involved have expressed a wish to establish, or strengthen, the technical links between activities in contiguous research projects; the aim being to achieve a closer integration of

the separate technical goals and internal technical assumptions of the several projects in a larger, coherent, technical framework established in common.

#### 4. The Views of the Independent Evaluation Panel

In January 1990 the Commission, having regard to the Community plan of action relating to evaluation of Community research and development<sup>(7)</sup> and to Article 4 of the programme decision<sup>(8)</sup> and having consulted the Management Committee for Area 5 of BRITE/EURAM 1989-92, appointed a panel of independent experts to which it entrusted the task of conducting the independent programme evaluation. The panel was asked to provide an interim statement of its views, to be considered in conjunction with the review of the programme which is the subject of this present communication. To prepare the way for its final evaluation report and to be able to respond to the request for a contribution in the same time frame as this present review consideration, the panel embarked upon a process of continuous evaluation, starting shortly after it was constituted. Based upon this work, the panel issued an interim evaluation report<sup>(9)</sup> in July 1990. The Conclusions and Recommendations of that report were as follows:

##### MAIN CONCLUSIONS

The evaluation panel agreed that there is a strong case for having a European aeronautics initiative, the rationale for which is contained in chapter 3.4 of this report. The panel believes that the current exploratory phase of the aeronautics activity represents an important step towards a larger initiative, even though the money involved is only a small fraction of the amount which the aeronautics industries themselves invest annually in research and development.

The exploratory phase has been valuable for the development of transnational research relationships and for testing the effectiveness of programme organisation. The cooperation engendered has helped to develop multi-disciplinary as well as intra-disciplinary working relationships, over and above what might otherwise have been achieved on a national basis, thus supporting the principle of subsidiarity espoused by the Single European Act. Furthermore, it has made a small but useful contribution in supporting the competitiveness of European aeronautics.

Early evidence suggests that an EC funded programme of collaborative aeronautics research is viable. This is crucial. The European aeronautics industry must not be dependent on knowledge generated outside Europe, particularly now there are growing indications that the USA may extend restrictions on the transfer of aeronautics technology.

There are, though, a number of issues which deserve further attention when entering a new phase of aeronautics research. The evaluation panel has commented on both the procedures and management of the existing aeronautics activity and on the nature and form of any future action. On this second point, the potential financial scale, duration, and other more fundamental organisational requirements have been examined and a series of recommendations have been issued.

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(7) OJ C14/5 of 20 Jan 1987

(8) Decision 89/237/EEC (OJ L98/18 of 11.4.89)

(9) Research Evaluation Report No 43 - EUR 13000

## CONCLUSIONS RELATING TO THE EXPLORATORY PHASE

In the opinion of the evaluation panel the content of the current workprogramme represents a reasonable research agenda consistent with the scale and duration of this limited programme. This has been achieved by thorough discussions and consultation undertaken by the European Commission with many of the significant European industrial, academic, and governmental bodies in this sector. The evaluation panel wishes to endorse the value of such discussions in helping to form a coherent set of objectives.

On the question of how the programme itself has been organised, there appear to be two separate issues. First, the role of aeronautics within BRITE/EURAM - area 5, and second the degree to which the programme has been successfully implemented.

On the first issue, research undertaken by the technical group of the evaluation panel has shown that the management has succeeded in avoiding overlap between the funded research of BRITE/EURAM - area 5, and areas 1-4.

Yet to be fully effective, a European aeronautics research initiative requires a long term commitment to technology validation as well as to other upstream research. At the European level, this can only be achieved if there is a satisfactory level of coordination and complementarity between the industries, universities and other relevant national bodies (the exploratory phase has already contributed to establishing mechanisms for this purpose). The evaluation panel argues that these requirements give aeronautics research a very separate identity, which should not be entirely dependent on policy made for BRITE/EURAM.

Whatever the solution for a near term continuation of aeronautic activities, it is important that the Commission adopts a clear and unequivocal position. It is crucial that a strong signal is sent to the aeronautics community that the Commission has a long term commitment to aeronautic research and technology validation.

With regard to the second issue, concerning selection procedures, the evaluation panel notes that most of the workprogramme's topics and subtopics were covered. However, there were some disturbing omissions. With a finite level of funding there will almost always be problems of this sort. Some of these might have been obviated, however, if there had been further dialogue between the evaluators and those submitting proposals, and if the procedures were more flexible.

A separate but associated issue is the cost and complexity of submitting proposals which the evaluation panel believes is unnecessarily burdensome under the current arrangements. Both these problems could be improved upon (recommendation 5).

As yet it is difficult to conduct a thorough analysis of all programme activities. Nevertheless on the basis of the evidence which has been received, the panel has been unable to detect any significant weakness and has no substantive criticism of the manner in which the programme has been managed. Also, there appears to have been a notable degree of success in involving a large number of SMEs, and obtaining a reasonable participation of Smaller Member States.

## RECOMMENDATIONS

- 1) In view of the central importance of aeronautics to the economy and industries of the Community, the evaluation panel recommends that the Community adopt a full programme of research and technology validation to follow the existing exploratory phase. This would also have the advantage of promoting the objectives set out in the Single European Act. The panel believes that it should not be limited to research but should also include technology validation, since this is a crucial aspect of aeronautic technology development.
- 2) The panel recommends that a further programme should take account of the long duration, often more than 10 years, of aeronautic research and technology validation activities. However, it is acknowledged that for industrial, administrative, legal, and political reasons it may be necessary to divide the programme into a series of consecutive parts.



- 3) To be effective, a further programme must command substantially greater resources than the current exploratory phase. The panel feels that pending further evaluation studies, the initial rate of programme spending should be 3 or 4 times the current annual commitment.
- 4) A new phase of the aeronautics programme should cover all relevant technical areas including those already identified by the Commission work statement which was endorsed by the Management Committee. However, the definition of a further workprogramme should include more precise objectives. In particular, the selection of tasks should take account of a weighting of priorities according to expected economic, industrial, social and Community benefits.
- 5) The panel believes that the costs associated with the preparation and support of proposals have been too high compared to the real work of the research programme. As an improvement, the panel recommends a three stage process for proposal selection. A preliminary requirement for prequalification based on a minimum of information would form the first stage. This would be followed by a period of dialogue between the Commission and the proposers who pass through the first stage, to improve the chances of potentially worthwhile work being accepted. A full and rigorous appraisal of detailed proposals would represent the final stage of proposal selection.
- 6) The panel recommends that the programme management consider and take steps to improve the effectiveness of mechanisms for dissemination of results, particularly to industries outside the aeronautics sector.
- 7) It is recommended that a review mechanism be established to ensure that programme content is updated on a regular basis, reflecting the evolving science and technology agenda. The Commission should consider linking this process to some form of continuous evaluation of the programme.
- 8) It is recommended that the Commission establish an advisory body to assist them in the task of reviewing and updating the aeronautics science and technology agenda. This would be composed of representatives from a wide range of European aeronautics interests coming from industry (including operators), government and the science communities.

## 5. Conclusions

### a) The findings

In the light of the foregoing review and of the advice of the Independent Evaluation Panel, the Commission notes that the implementation of the current activity in BRITE/EURAM Area 5 is proceeding satisfactorily and that aeronautical research action in a Community framework has been shown to be both practical and effective.

The active dialogue which has developed between the Commission, national representatives and concerned parties throughout the European aeronautical community provides an effective assurance that all actions being pursued in the Community framework fully respect the principle of subsidiarity.

The involvement of SME's and universities in Community aeronautical research is practicable and useful, both for the smaller actors and for their larger partners. Despite the absence of major aeronautical manufacturing industries in some Member States, considerable success has been attained in encouraging meaningful participation by competent workers throughout the Community; special studies being undertaken for the Commission may be expected to yield further progress in this direction.

The Commission concludes that there continues to be an important need to stimulate the Community-wide research collaboration which is needed to strengthen the aeronautical technology base upon which the competitiveness of the European aeronautical industry is founded; increased public concerns for the environment and for reduction of air transport congestion call for research in common to provide means for alleviating these problems. Community research action needs to be planned with a long term perspective, corresponding to the long cycle time of research and technology validation in the aeronautical field.

### b) The proposed action

In the short term an integrated activity will be promoted as foreseen in the 3rd Framework Programme<sup>(10)</sup> and indicated in the specific programme proposal concerning Industrial and Materials Technologies<sup>(11)</sup>.

Various enabling technologies such as mathematical modelling, acoustics, fluid dynamics, high performance materials, design, process engineering, non-destructive testing, sensors, etc., will be integrated in a systems approach considering the whole product cycle from conception through design, fabrication, operation and maintenance.

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(10) Decision 90/221/Euratom,EEC (OJ L117/28 of 8 May 1989), Annex II, 1.2.B

(11) COM(90) 673 final SYN 261, Annex I

Special attention will be given to the air transportation system as a whole, to the links with air traffic and to environmental considerations about noise and emissions. This approach will be pursued so as to assure maximum cross-fertilisation resulting from a broad participation of research establishments, universities, SME's and other (non-aeronautical) industries, in particular from Member States without major aeronautical industry.

The technical content of the proposed action as outlined in the annex has been endorsed by the Management Committee for BRITE/EURAM Area 5 on 19th June 1990.

The funds estimated necessary for the above activity - over the period 1991-1993 - correspond to 100 MECU, which is a level of support for research relevant to aeronautics similar to the present BRITE/EURAM programme.

The action can be implemented through the ordinary and/or the exceptional procedure. It does not prejudge possible future activities under the 4th Framework Programme.

## PROGRAMME IMPLEMENTATION DETAILS

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### PROJECT SELECTION STATISTICS

#### 1 Chronology

Following the adoption by the Council of a common position on the Commission's proposal for the programme BRITE/EURAM (1989-92), a call for expressions of interest in participation in work in Area 5 was published in the Official Journal on 9 February 1989.

The workprogramme, based upon Annex I of the Council decision and refined in consultation with industry, research institutions and National Authorities, was finalised in mid-March 1989. The 4 principal technical areas contained a total of 15 topics to which proposals could be addressed.

The call for proposal of projects to be undertaken in Area 5 of BRITE/EURAM (1989-92) was published in the Official Journal on 23 March 1989.

At the closure, on 9 June 1989, 112 proposals had been received, of which 96 were for industrial applied research activities and 16 for focused fundamental research.

Evaluation, conducted by a force of about 60 technical experts drawn from most Member States, working in panels under the chairmanship of Commission officials, was accomplished in the period 19 to 28 June 1989.

The Management Committee, at meetings on 17 July and 12 September 1989, approved two lists of research proposals to be accepted, based upon acceptance lists proposed by the Commission. In total, 30 projects were approved: these subsequently gave rise to 28 research contracts, two of which each combined two proposals.

On 24 July 1989, contacts were opened with the proposers of projects which had been selected and, on 30 August 1989, negotiation of specific contracts commenced.

On 30 November 1989, the first contract was signed; by 31 January 1990, 21 contracts had been signed; all contracts had been signed by the end of July 1990. Twenty-one projects had made half yearly progress reports at the time of this review.

## 2 The Proposal Selection Phase

Despite the fact that this exploratory action entered fields of research new to Community experience and although the time allowed for responses was rather short in terms of contemporary Commission practice, the responses of actors of all sizes, types and national origin were most encouraging and an entirely adequate flow of research proposals was forthcoming.

The quality of the proposals received was good. Proposals which were strongly recommended by the expert evaluators, comprised some 42% of the total number submitted. If all had been approved, they would have required a total level of Community funding exceeding the resources made available for programme execution by a factor of two.

In reaching decisions on the proposals to be accepted, the Commission and the Management Committee found it necessary, in pursuit of programme balance, to select a set of proposals whose total demand for Community funding was significantly in excess of the financial resources allocated to the programme. This incompatibility necessitated additional negotiations with a number of the teams of proposers to agree upon reductions of project work content such that the total financial demand upon the Community would not exceed the availability of funds to the programme.

At the outset of the activity, knowledge of what was afoot was not as widespread in the Community as the Commission would have wished, despite a substantial exercise of information distribution by mail-shots and solicitation of expressions of interest. As a result, the initial involvement of smaller actors in the proposals received was not as high as the Commission and the Management Committee desired. An exercise to improve this aspect of the proposals was undertaken following project selection and, thanks to efforts made by all parties, a substantial improvement was achieved by the time of completion of contract negotiations.

Section 4 contains a short selection of data relating to the proposal selection phase together with a list of projects selected for implementation. The data presented there throw an interesting light on the range of organisations which have been successful in submitting joint proposals to participate in this programme. In particular, it can be observed that:

- eleven Member States have significant participation in the programme;
- more than 20% of the participating organisations are SME's;
- more than 30% of the participating organisations are universities;
- focused fundamental research, which is mainly the preserve of university researchers, accounts for about 6.5% of programme volume: in addition, university participation accounts for about 16% of the volume of industrial applied research.

### 3 The Implementation Phase

The average number of partners per project (about 11) is significantly higher than the norm for current Community research programmes. Although this high number clearly has the potential for difficulty in project management, there are two factors which combine to minimise the likelihood of such difficulty. The first factor relates to project structure. Most of the projects consist of a number of major sub-projects within each of which the number of contributing partners is substantially less than the full project complement. The second factor is the character of the lead contractors. Most of the projects are led by a major aeronautical company. Such companies have unrivalled competence in, and experience of, management of multi-partner international projects. The experience of the 21 projects which have been running for more than six months bears out the expectation that a high number of partners is not a cause of significant difficulty in the aeronautical field.

The programme in Area 5 of BRITE/EURAM (1989-92) was the first to use new, standardised, research contract documentation which has been introduced across the whole range of Commission managed research programmes. In general the experience of applying the new procedure has been satisfactory but there were, inevitably, some problems in application of the new process which gave rise to delay and/or extra work. The lessons to be learned from these problems have been fully registered and are being applied to ensure that such problems do not recur.

### 4 Project Selection Statistics

On the ensuing six pages a selection of statistical data is presented relating to the phase of proposal and project selection. It should be noted that all data relates to the situation at the close of contract negotiation.

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BRITE/EURAM (1989-1992)

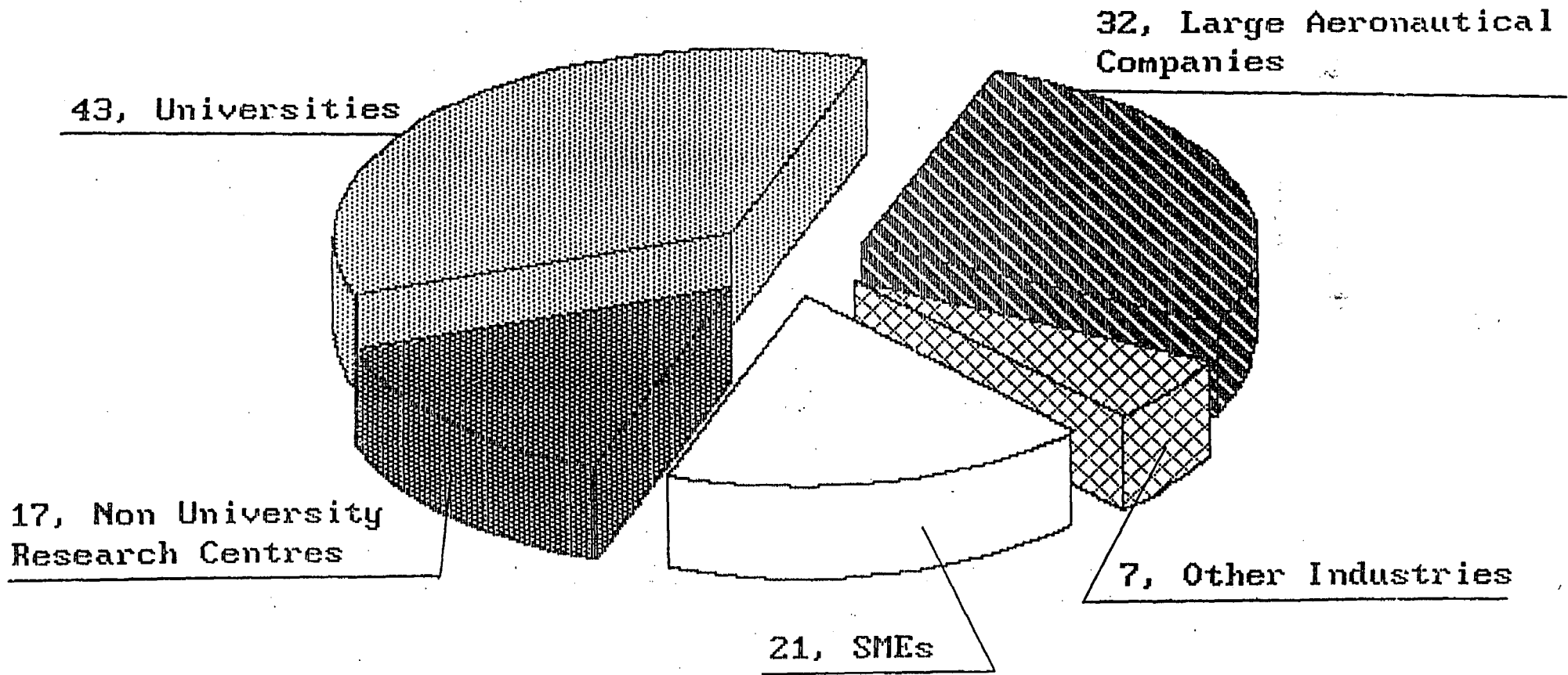
AREA 5

AERONAUTICS

GROSS STATISTICS

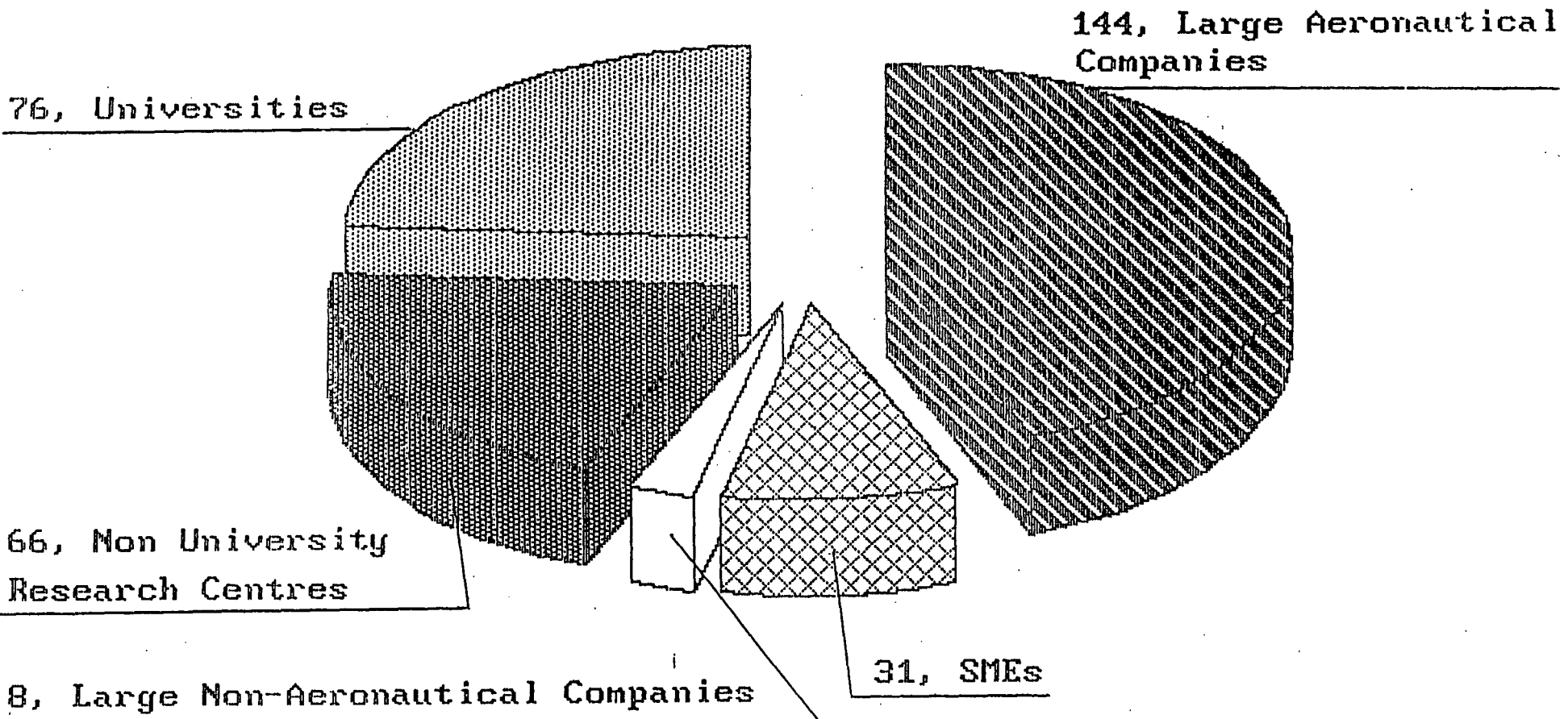
	Nos of Organis.	Nos of Particip.	Total Value (MECU)	Total EC Funding (MECU)
Proposals Received	231	870	260	142.5
Contracts Awarded	120	325	70	35

**Number of Participating Organisations**

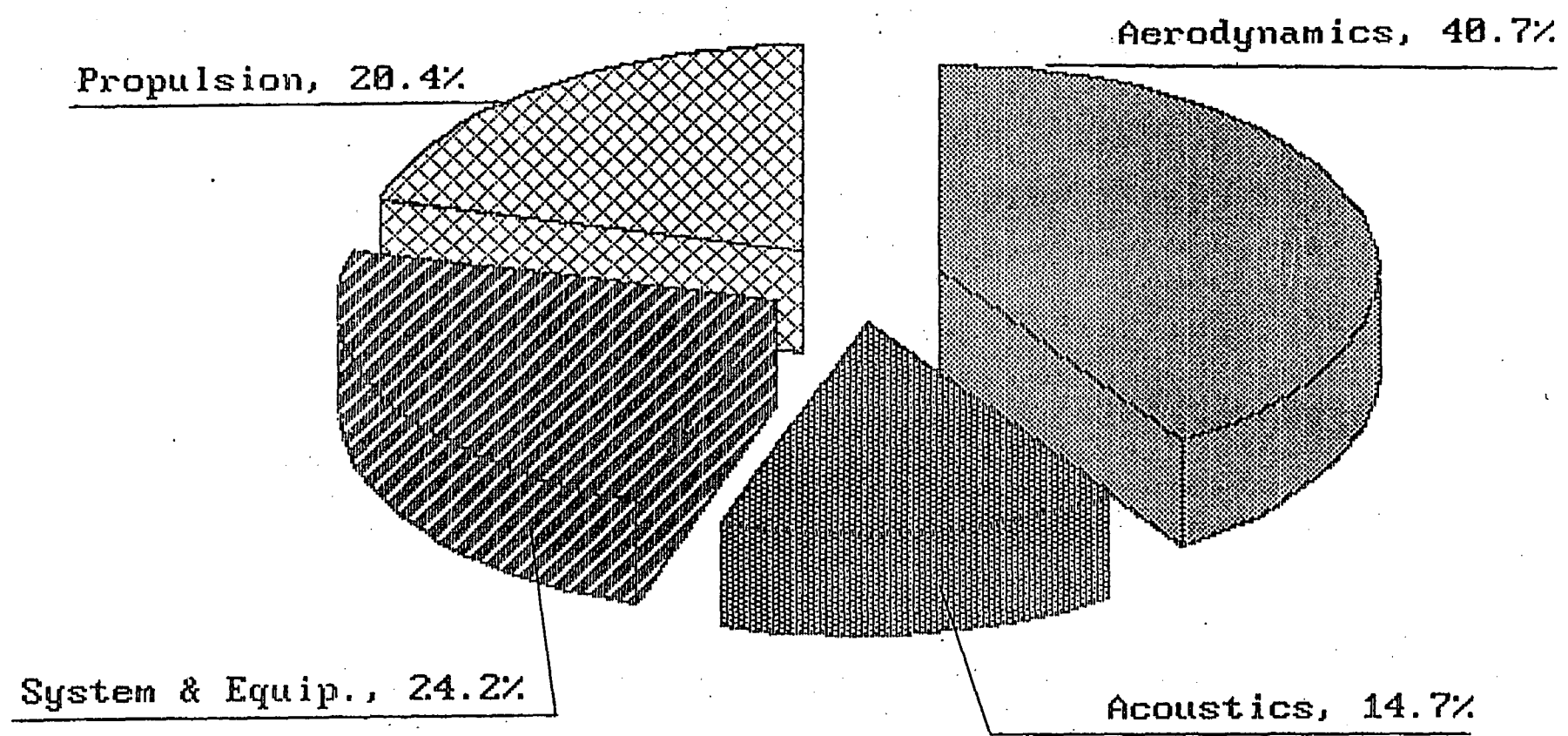




**Number of Project Participations**

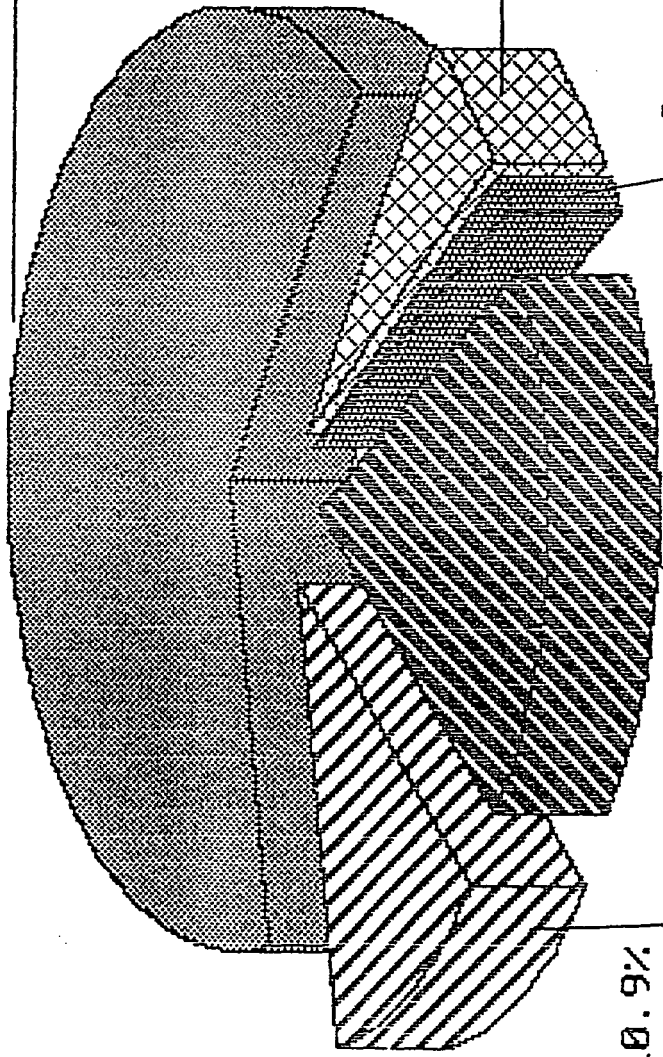


**Division of Total Volume of Work between Research Fields**



Division of Total Volume of Work between Types of Organisation

Large Aero. Cies, 62.6%



Universities, 10.9%

Non-University, 19.4%

SMEs, 5.6%

Large Non-Aero. Cies  
1.5%

Division of Total Volume of Work between Types of Research

