

Public expenditure
on Research and Development
in the Community countries

Analysis by objectives
1974 – 1975

Detailed report

EUROPEAN COMMUNITIES

Public expenditure on Research and Development in the
Community countries

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Detailed analysis by Research
and Development objectives

3rd Report from the Sub-committee "Statistics"
to the
"Committee on Scientific and Technical Research" (CREST)

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F O R E W O R D

The third report from the Sub-committee "Statistics" to the Committee on Scientific and Technical Research (CREST) presents an analysis of public expenditure on research and development for the budget years 1974 and 1975. As in the previous reports, budgetary appropriations for R&D are examined. For the years up to 1974 this analysis was based on appropriations of final budgets, taking into account any changes which may have occurred in the course of the budget year; the appropriations for 1975 are taken out of provisional budgets.

The objectives are broken down for the first time in this report in accordance with the 1975 version of the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets (NABS), which was approved by CREST in Spring 1975 (doc. EUROSTAT/200/75/1). This new version of the NABS takes into account new trends in research activities; thus, for example, all research connected with the "Production, distribution and rational utilization of energy" was grouped in one chapter, which also includes nuclear research. Research on "Social and sociological problems", which is receiving particular attention, is dealt with in another new chapter.

The new version of the NABS is sub-divided into ten main objectives (chapters) with around 130 sections (2 digit) and sub-sections (3 digit). The old version contained 12 main objectives and 77 sub-divisions. The two versions of the NABS are not, therefore, fully comparable.

The practical application of the new Nomenclature has caused many problems, delaying the submission of this detailed report. Provisional data for a number of Member States were already available in July 1975, but the complete figures required for the preparation of this report were not available until the end of October 1975. The Sub-committee "Statistics" has taken the necessary steps to ensure more rapid preparation next year.

Survey methods and definitions are the same as for previous reports. However, the Sub-committee "Statistics" is currently engaged on a thorough analysis of these methods and definitions with a view to further improving the comparability of data between the Member States in the future.

The draft report has been completed by the Secretariat at the end of November 1975. The Sub-committee "Statistics" of the CREST has approved the present version during its meeting held in Luxembourg on 27 and 28 January 1976.

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This report was originally drawn up in German language.

A general view of the development of R&D in the Community

In the Member States' budgets for 1975 a total of 10,300 million units of account (at 1975 rates of exchange) was provided for the public financing of R&D. At current prices this sum represented a rise of about 70 % by reference to 1970 but, because of the increasing rate of inflation, the real growth in funds made available for R&D amounted to only about 20 % in this period.

Between 1970 and 1973 the sums provided from public funds for R&D in the Community increased fairly steadily, both in money and in real terms. Since 1973 the increase in these credits has continued, albeit at a slightly lower rate, in money terms. However, in real terms the sums available for R&D have remained practically constant. In the last year it appears that these have shown a reduction in real terms of about 2 %.

Up to 1973 the public financing of R&D increased more rapidly than the total budgets but since then this trend has been reversed, both in money and in real terms, the total budgets rising faster than credits for R&D and the share of the total devoted to R&D declining from 3.8 % in 1970 to 3.5 % in 1975. However, there has been no significant change in proportion which credits for R&D represent of the Gross Domestic Product (1 %).

In 1975 the amount available from public funds for R&D in the Community was equivalent to 40 units of account per head of population while in 1970 the corresponding figure was 24.

The objectives of the public financing of R&D have not undergone any fundamental changes:

- Since 1970 the share of civil research in the total of public funds devoted to R&D has risen, slowly but steadily (1970: 75 %, 1975: 78 %).
- As previously, almost half of the funds devoted to civil R&D are directed towards the "General promotion of knowledge".

- There is a slight reduction in the level of research of a mainly technological character (connected with the exploration and exploitation of the earth and its atmosphere, energy, industrial productivity and technology and space exploration).
- Objectives of a primarily human and social character (the improvement of the human environment, the protection of health and the problems of life in society) appear to be receiving greater importance in the public credits for R&D.
- The relative importance of research in the field of agricultural productivity and technology has increased slightly.

A comparison of the objectives of the public financing of research in the Community and in the U.S.A. reveals a similar development in each case, despite the different initial situations. In the U.S.A. as in Europe, the volume of research of a human and social character has risen steadily since 1970. Technological research, which diminished between 1972 and 1974 in the Community, had shown a decline from 1970 in the U.S.A., principally on account of the big reduction in space exploration research. However, the energy crisis led, in the U.S.A. as in Europe, to a relative growth in research in this area in 1974. It must be noted, with regard to this comparison that the U.S.A. devotes 92 units of account (at current exchange rates) per head of population to research financed from public funds and the Community only 40 units of account.

Part I

General Trends in Public R & D Expenditure
1970 - 1975

Chapter 1 - The main trends in public financing of R&D

1. General trends in the Community

In the Member States' budgets a total of 10,344 million u.a. was provided for public financing of R&D for 1975. Public expenditure as a percentage of the total funds available for R&D varies between 40 and 60 % according to country; it may therefore be assumed that for 1975 a total of approximately 20,000 million u.a. was made available in the Community for research and development purposes.

1.1 Increase since 1970

Based on the respective prices and rates of exchange, R&D expenditure in the Community increased by 71 % from 1970 to 1975 and by 82 % if calculated at 1970 exchange rates in which case the amount for 1975 would be 11,019 Mio u.a.

The following average annual growth rates were calculated per countries (1970-1975):

Germany	14.4 %
France	10.7 %
Italy	9.9 %
Netherland	12.5 %
Belgium	11.6 %
United Kingdom	13.7 %
Ireland	22.4 %
Denmark	14.8 %
E U R 9	12.7 %

The average growth rate for the Community has been calculated as in former reports as a weighted average of national growth rates based on national currency, weighting being based on the contribution of the various countries to Community R&D expenditure in 1970.

The high nominal increase in the funds made available for R&D should not, however, be overvalued. In view of the continual rise in the rate of inflation, the real increase was only approximately 20 % for the period 1970-1975 - taking the consumer price index as the basis of adjustment.

1.2 Increase with respect to the previous year

The sum of 10,344 Mio u.a. (calculated at current rates of exchange) provided in the Community for public R&D expenditure was approximately 7 % higher than the corresponding sum for 1974. However, the increase amounted to more than 8 % between 1973 and 1974.

In real terms - taking for adjustment the increase of consumer price index between March 1974 and March 1975 - allocations for public expenditure on R&D have decreased in the Community by about 2 %.

Real growth was only given in the Netherlands (about 5 %), in Ireland and in Denmark (2.5 %). A very small real increase was also registered in Germany (near to 1 %). Real decrease was between 4 and 5 % in France and in the United Kingdom and rather 10 % in Belgium. (See Table 11 of the Statistical Annex.)

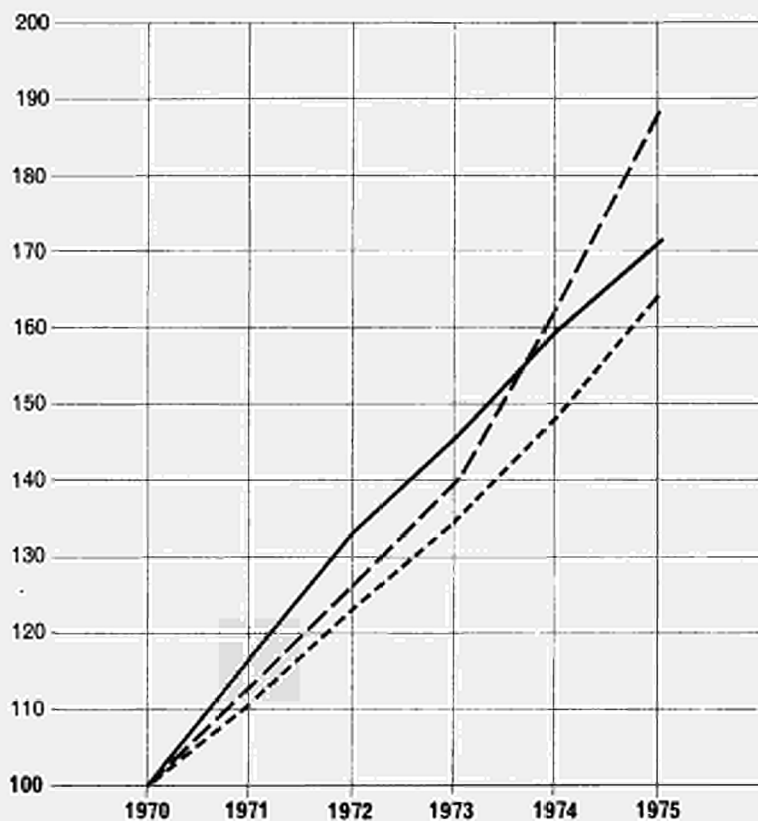
1.3 Proportion of the total budget

Whereas in the years 1970-1974 the funds allocated for R&D in the Community increased at a somewhat higher rate than the total public budget, in 1975 the total budget increased for the first time at a higher rate than the R&D expenditure included in it. Thus in 1975 the proportion of the total budget allocated to R&D expenditure, which for the Community had remained more or less constant at 3.8 % since 1970, fell to 3.5 %.

COMMUNITY

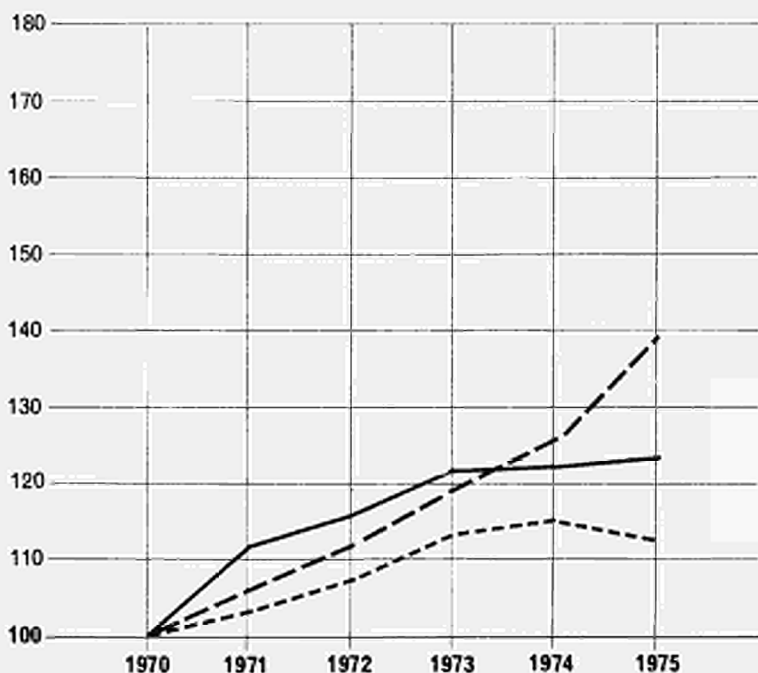
— R&D expenditure
 - - - Total budget
 - - - Gross domestic product
 1970 = 100

Increase in monetary terms
 Calculation at current exchange rates



Estimation of the increase in real terms

R&D expenditure and total budget deflated by the index of consumer prices
 Gross domestic product (volume index)



1.4 Proportion of the gross domestic product

The trends in the scale of public R&D expenditure were very similar to the trends in the gross domestic product; R&D expenditure as a proportion of the gross domestic product amounted to just under 1 %, in 1970, and a little over 1 % in 1974 and 1975.

2. Contribution of the Member States

2.1 Appropriations for R&D, total budget and gross domestic product

The Member States have naturally contributed in varying degrees to the increase in public R&D funds in the Community. Germany and France, with respect to both their share of the total budget in the Community and their share of the gross domestic product, had a greater than average contribution to R&D in the Community in 1975. The United Kingdom's contribution to R&D was higher than its share of the gross domestic product but lower than its share of the budget. Italy's contribution to R&D was again considerably less than its share of the total budget or the gross domestic product (see Table B).

Based on 1970 exchange rates, the proportionate contributions of the Member States to public R&D expenditure in the Community have not changed significantly.

2.2 Appropriations for R&D and population

In comparison to their share in the Community population again Germany and France have contributed more to public R&D funding than should be expected. This is true also for the Netherlands in a somewhat reduced form. For the United Kingdom, Denmark, Ireland and Belgium the share of R&D expenditure in the Community was only a little smaller than their percentage in the population. For Italy there was no correspondence between the two parts.

2.3 Main features of the research policy in the Member States

The important trends in the Member States were as follows:

2.3.1 Germany

Publicly financed R&D expenditure has again increased: in 1974 the Federal and Länder budgets allocated DM 11.9 thousand Mio and in 1975 DM 12.7 thousand Mio for R&D purposes. Compared to previous years, there was a change in the method used to calculate R&D expenditure for universities. This change was a significant factor in the further decrease in the share of R&D expenditure in the public budget.

There were different trends in expenditure in the various categories of objectives (chapters of the NABS). The highest increase was for research connected with social and sociological problems (Chapter 7 NABS) at 28.5 %. In spite of persistent methodological problems, it is clear that there has been a considerable increase in the funds made available for the social sciences and welfare sector in the widest sense, in recognition of the importance of such research to society. Research on health and nutrition, regarded as particularly worthy of assistance, was reflected in the research on the improvement of human health (Chapter 3 NABS). There was also a considerable increase in the funds for research on environmental pollution. The increase in expenditure were thus mainly devoted to the improvement of living and working conditions.

2.3.2 France

The increase in R&D expenditure in France calculated on basis of initial budgets, established for 1975 in relation to the previous year, was higher than that for 1974 vis-à-vis 1973 but lower than the increase in the total budget. The increase had two elements: projects within the "enveloppe-recherche" recorded 13.2 % more finance, while those outside this framework recorded 8.3 % more.

The following aims were taken into account in defining the "Research package" (enveloppe-recherche):

- limitation of the large-scale non-energy programmes,
- rapid growth in research on energy problems, both in the electro-nuclear programmes of the Commissariat à l'Energie Atomique (CEA) (24 %) and in research on new sources of energy and possible ways of saving energy (54 %),
- maintenance of the research potential of the other sectors.

Outside the "Research package" the following trends are to be noted:

- a decrease in the research funds for the defence sector (- 2 %),
- greatly increased research activity by the Centre national d'Etudes des Télécommunications, as in previous years, with respect to programmes such as electronic transmission and remote data-processing in particular,
- a significant increase in the research activities of the major civil aviation programmes (new programmes for the engine CEM 56 and helicopters).

2.3.3 Italy

In the Italian budget 431 thousand Mio Lire were earmarked for research purposes in 1975, representing an increase of approximately 70 thousand Mio Lire over 1974.

The appropriations for research connected with the production, distribution and utilization of energy showed a very high increase, the greatest contribution being from the Comitato Nazionale per l'Energia Nucleare. Similarly, the credits for research in general were also increased, particularly the funds for the University and the National Institute of Nuclear Physics, which conduct mainly pure research in this field.

Since the established programmes are now entering a phase of implementation, more funds were allocated to the Consiglio Nazionale delle Ricerche, thus enabling it to provide better subsidies for all research objectives.

2.3.4 The Netherlands

The general criterion for determining public R&D expenditure in the Netherlands was to keep capacities at their existing level. New activities must be made possible by better utilization of existing means or by the gradual phasing out of those current projects for which the demand may be assumed to decrease in future years.

The government of the Netherlands has taken a series of measures designed to make this revaluation process easier. These measures are intended to direct research programmes to the areas preferred by the government, and comprise:

- the creation of additional funds for the central organization for applied scientific research (TNO), whose budget will increase from Fl 4 Mio in 1975 to Fl 9 Mio by 1978,
- provision of additional funds for important technical developments in the budget of the Ministry of the Economy: Fl 10 Mio in 1975, rising to Fl 40 Mio by 1978.

In the non-university sector of general promotion of knowledge, the funds available to the Netherlands' Organization for the Promotion of Pure Research (ZWO) have been increased from Fl 2 Mio to Fl 3 Mio for 1975 and subsequent years. They will be used in particular for promoting and extending interdisciplinary cooperation in social and biological research.

In the field of applied research, the government of the Netherlands is trying to use a proportion of the research capacities to solve problems in the following important sectors: energy, environment, road safety, crime prevention, building, and living and working conditions.

2.3.5 Belgium

A complete analysis was not possible, because the indications on university investments in R&D were not available when this report was being prepared. The following therefore concerns current expenditure, the total budget for R&D having increased in the same proportion.

This stagnation was mainly due to the fact that R&D funds allocated to the universities decreased by 1.2 % at constant prices (+ 12.7 % at current prices) in line with the fall in the number of students, university financing being based on the number of students. The universities account for 47 % of total R&D appropriations.

The most important objective of research funding continues to be nuclear energy as in the past 15 years, but the proportion allocated to this purpose fell from 21.6 % in 1974 to 19.3 % in 1975.

Industrial technology and research have now reached the same level as energy: 19.2 % of public R&D funds, compared with 16.7 % in 1974. Mechanical and electrical engineering accounted for about 50 % of the increase. Total appropriations for this purpose increased by 32 % since 1974. Funds for agricultural technology also increased by 22 % at current prices.

The proportion allocated to public health was fairly stable (16.4 %). Two thirds of this research is done in the universities. Funds for state research centres, financed by the Ministry of Health, however, have increased by more than 50 %. The national programme against water pollution has ended and a new phase on air pollution is about to begin.

The "exploration and exploitation of space" increased by 47.6 % between 1974 and 1975 and received 4.5 % of R&D funds, due to renewed Belgian participation in international space research.

6 United Kingdom

1975-76 saw the continued implementation and consolidation of the conclusions set out in the 1972 White Paper "Framework for Government Research and Development", whereby applied R&D is viewed in the context of functional programmes. There is in the UK no R&D budget as such, hence it is meaningless to discuss allocations in terms of percentages of the aggregate; each Department assesses - and is responsible for - its own R&D programmes as a means of achieving more general objectives.

Policies for basic scientific research - the maintenance of the national science and technology base including the supply of scientific manpower - are the responsibility of the five Research Councils and the Advisory Board for the Research Councils. In its 1974 Review, the Advisory Board concluded that expenditure on "big" science (where costs per research worker are high) should be restrained in order to sustain growth in the "small" and "medium" sciences; thus guidelines set for the growth of the Science Research Council budget over the next five years have been set at a level lower than those for the remaining Research Councils.

The aggregate of these decisions led to an estimated decrease in R&D expenditure between 1974-75 and 1975-76 of approximately one-half of one per cent as a proportion of total public expenditure. A further feature to be noted in the context of R&D expenditure is a change in the basis of estimating that portion of the total university grant thought to be spent on R&D. A more accurate estimate of the time spent on research has led to a discontinuity in the series, evidenced by a reduction of some £ 20 Mio in the present estimate for 1974-75 when compared with the estimate included in the previous report.

Two organizational changes took place during the last year. Responsibility for organizing work on off-shore technology - until recently handled through the Department of Industry's Requirements Boards - passed in May 1975 to the new "Off-Shore Energy Technology Board" under the chairmanship of the Chief Scientist of the Department of

Energy. The new Board is responsible for considering the long-term strategy for support of R&D in this field. The second change resulted from the formation in January 1975 of the Health and Safety Executive, responsible through the Health and Safety Commission to the Secretary of State for Employment. R&D programmes on safety in mining and nuclear safety are now integrated into the new Executive.

2.3.7 Ireland

Basic data for Ireland for 1975 is not strictly comparable with data for 1974 since the latter only refers to a nine months period. However, if figures for 1974 are projected on a 12 months basis some trends and facts emerge. Appropriations for 1975 are about 26 % higher in monetary terms but due to recent inflation are only ahead in real terms with 3 %.

Making allowance for such relocations Agricultural research (Objective 5) was still the largest single item although its share of funds has fallen to 38.8 % (from over 40 % in previous years). The trend for gradually increasing support for industrial R&D continues and such support now accounts for almost one quarter of all funds.

Support for health research and research into the problems of life in society showed a marked increase, while that for the general promotion of knowledge appeared to have remained practically constant (in real terms) and to have fallen somewhat as a percentage of the total appropriations.

2.3.8 Denmark

The total public R&D expenditures for the fiscal year 1975-76 exceed the expenditure of 1974-75 by 16 %, expressed in current prices prevailing at the time of budgetting. In fixed prices a small increase of about 2 % is noted.

The changes have been almost uniform for the following objectives: 2. Energy, 5. Agriculture, 6. Industry, 7. Social and sociological problems, and 10. General scientific development, all with average increases. The groups: 1. The earth and the atmosphere, 3. Human health and 9. Defence show somewhat higher increases.

The groups 2. Human environment and 8. Space differ essentially from the general trend with a decrease of 8 % and an increase of well above 50 % respectively.

The decrease for the human environment is due to a change in the organization of the Ministry of Public Works. The increase for space research is a consequence of a very strong increase of the members' budget of ESRO/ESA. In view of the fact that this contribution also weighs heavily on the total sum of expenditures for multilateral research cooperation, these expenditures, too, will show a marked increase.

VOLUME AND IMPORTANCE OF PUBLIC
R&D EXPENDITURE

TAB. A

(Calculated at current exchange rates)

	1970	1974	1975
Total R&D expenditure (Mio UA)			
Deutschland	1 776,6	3 701,2	3 955,9
France	1 745,6	2 494,4	2 730,5
Italia	429,9	440,7	485,2
Nederland	295,8	504,3	585,8
Belgique/België	194,1	334,4	345,0
United Kingdom	1 506,7	2 003,0	2 046,4
Ireland	13,4	22,7	26,4
Danmark	85,6	145,1	168,6
EUR 9	6 047,7	9 645,8	10 343,8
Increase over the previous year (%) (calculated in national currency)			
Deutschland	16,7	5,5	6,9
France	1,8	12,2	7,6
Italia	29,1	5,0	20,3
Nederland	13,1	8,7	16,2
Belgique/België	18,6	19,6	3,2
United Kingdom	.	18,9	11,4
Ireland	27,6	9,8	26,8
Danmark	.	9,7	16,2
EUR 9	.	8,3	7,2
R&D expenditure as a proportion of total budget			
Deutschland	4,16	4,72	4,35
France	5,84	6,08	5,61
Italia	2,08	1,39	1,33
Nederland	3,65	3,25	3,03
Belgique/België	2,81	2,72	2,32
United Kingdom	3,49	3,04	2,72
Ireland	0,86	0,98	0,91
Danmark	1,77	1,81	1,84
EUR 9	3,84	3,78	3,48
R&D expenditure as a proportion of gross domestic product			
Deutschland	0,96	1,21	1,22
France	1,24	1,17	1,12
Italia	0,46	0,37	0,38
Nederland	0,94	0,91	0,96
Belgique/België	0,77	0,80	0,73
United Kingdom	1,25	1,34	1,21
Ireland	0,34	0,43	0,42
Danmark	0,55	0,59	0,61
EUR 9	0,98	1,06	1,02

CONTRIBUTION OF MEMBER STATES TO R&D
EXPENDITURE IN THE COMMUNITY

TAB. B

(Calculated at current exchange rates)

	1970	1974	1975
Analysis of total R&D expenditure by country (%)			
Deutschland	29,4	38,4	33,2
France	28,9	25,9	26,4
Italia	7,1	4,6	4,7
Nederland	4,9	5,2	5,7
Belgique/België	3,2	3,5	3,3
United Kingdom	24,9	20,8	19,8
Ireland	0,2	0,2	0,3
Danmark	1,4	1,5	1,6
EUR 9	100,0	100,0	100,0
Analysis of total budget by country (%)			
Deutschland	27,1	30,7	30,6
France	18,9	16,1	16,3
Italia	13,1	12,4	12,3
Nederland	5,1	6,1	6,5
Belgique/België	4,4	4,8	5,0
United Kingdom	27,3	25,8	25,2
Ireland	1,0	0,9	1,0
Danmark	3,1	3,1	3,1
EUR 9	100,0	100,0	100,0
Analysis of gross domestic product by country (%)			
Deutschland	30,1	33,5	32,2
France	22,9	23,3	24,2
Italia	15,0	13,0	12,8
Nederland	5,1	6,0	6,1
Belgique/België	4,1	4,6	4,7
United Kingdom	19,5	16,3	16,7
Ireland	0,6	0,6	0,6
Danmark	2,5	2,7	2,7
EUR 9	100,0	100,0	100,0
Analysis of population by country (%)			
Deutschland	24,2	24,1	24,0
France	20,2	20,4	20,5
Italia	21,4	21,5	21,6
Nederland	5,2	5,3	5,3
Belgique/België	3,8	3,8	3,8
United Kingdom	22,1	21,8	21,7
Ireland	1,2	1,2	1,2
Danmark	2,0	2,0	2,0
EUR 9	100,0	100,0	100,0

Chapter 2 - Changes in the objectives of publicly financed R&D

Preliminary methodological remarks

As mentioned in the introduction, public R&D expenditure in the 1975 budget year was broken down for the first time in accordance with the 1975 version of the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets (NABS). For comparison purposes the data for the 1974 budget year were broken down in the same way. Only the values for the Chapters of the NABS could be calculated; in the opinion of the CREST Sub-Committee "Statistics", it will not be possible to undertake a complete retrospective correlation of all the data for previous years because of the excessive amount of work involved.

From the outset NABS was designed as an evolutive nomenclature. Revisions at relatively short intervals (roughly every five years) are to take into account the latest guidelines for research and development. If the revision of the Nomenclature meets this requirement, a direct comparison with previous versions will not be possible.

This continual adaptation of the Nomenclature to the latest situation in research and its trends is necessary for optimum representation of the current situation, but an obstacle to longer-term considerations.

Since there has been a practical and political interest in analysis of the trends in publicly financed R&D over a period of several years, an attempt has now been made to calculate rough values for previous years, using the double breakdown for the 1974 budget year by chapters of the old and new versions of the NABS, by means of coefficients (see Annex I, Main Methods and Definitions).

These approximations, expressed in terms of expenditure on R&D in u.a. per head of population, have been used for the following analysis. Great care must be taken in interpreting them and it cannot be stressed

enough that the figures are estimates of sizes and not, in contrast to the other data in this report, the results of statistical analyses of actual budget documents.

It must also be pointed out that all the statistical services of the Member States, which supply these data, have made improvements to their methodology over the years ; particularly as regards the correlation of national research programmes with the Chapters and Sections of the NABS. In some cases, this can impair the comparability of time data.

Unless otherwise stated, the following analysis is based on calculations at current exchange rates. Corresponding data at 1970 exchange rates are given in the statistical Annex. Growth rates have always been calculated on the basis of data in national currency. For the Community weighted averages have been established, weighting being based on the contribution of the various countries to Community R&D expenditure in 1970. Proportions (in %) have also been based on data in national currency.

1. Slow increase in the proportion allocated to civil R&D

1.1 Proportion of total expenditure

Since 1970 expenditure on civil R&D as a proportion of total appropriations for R&D has increased slowly but at a steady rate. In the Community it amounted to almost 75 % in 1970 and has risen to 78 % in 1975.

Research on defence ~~was~~ carried out on a large scale by two Member States : the United Kingdom (46,5 % of total R&D expenditure) and France (31 %); in Germany the proportion ~~was~~ still roughly 10 %, but in the other countries 95 % and over of the funds available ~~was~~ used for civil R&D (see Table C).

1.2 Scale of expenditure on civil R&D

A total of 8 069 Mio u.a. ~~was~~ earmarked for civil R&D purposes in the 1975 budgets of the Member States, as against 4 578 Mio u.a. in 1970.

Per head of population this amounted to an increase from 18.2 u.a. in 1970 to 31.2 u.a. in 1975. However, this increase in the amount per head of population has developed differently in the various Member States.

	Expenditure on civil R&D in u.a. per head of population	
	<u>1970</u>	<u>1975</u>
Germany	24.1	56.8
France	24,5	35.6
Italy	7.7	8.4
Netherlands	21.6	41.4
Belgium	20.0	35,0
United Kingdom	16.0	19.5
Ireland	4.5	8.5
Denmark	17.3	33.1
EUR 9	18.2	31.2

1.3 Annual increase

From 1974 to 1975 expenditure on civil R&D in the Community increased by 9.4 %, a somewhat higher increase than that in total R&D expenditure (7.2 %). Furthermore, this increase in expenditure on civil R&D from 1974 to 1975 was higher than the corresponding increase from 1973 to 1974, whereas the increase in total expenditure was higher from 1973 to 1974 than in this last year.

The following are the average annual growth rates in civil R&D expenditure for the period 1970-1975 :

Germany	16.2 %
France	10.1 %
Italy	10.1 %
Netherlands	13.2 %
Belgium	11.5 %
United Kingdom	11.5 %
Ireland	22.4 %
Denmark	14.7 %
EUR 9	12.7 %

2. Significant proportion again allocated to "General promotion of knowledge"

2.1 As a proportion of civil R&D expenditure

Approximately half of the appropriations for civil R&D in the Community are earmarked for general promotion of knowledge (Chapter 10 NABS). Compared to 1970 this proportion has increased in most of the countries except in the United Kingdom; there are, however, considerable differences between the various countries. In France it amounts to only 37 % and in the United Kingdom 40 % of civil R&D expenditure, but in Germany almost 58 % and the Netherlands approximately 56 % (see Table D).

The chapter on "General Promotion of Knowledge" covers all research which contributes to the general furtherance of knowledge without being focused on specific objective. For reasons of international comparability, research financed from higher education budgets is included in this chapter, although part of such research may be related to specific objectives. It is planned to break down this research by objectives at a future date, but this is not possible at present because of difficulties in collecting data. As in previous reports, it was therefore again necessary to reclassify the very detailed data for Belgium according to the Community method.

2.2 Scale of expenditure on "General promotion of knowledge"

In the Member States of the Community a total of 3 962 Mio u.a. was earmarked for research in general in 1975, almost 50 % more than 1970.

Per head of population appropriations for general promotion of knowledge increased from 8.7 % u.a. in 1970 to almost 15 u.a. in 1975. There are considerable differences between the various countries :

	Expenditure on general promotion of knowled in u.a. per head of population	
	<u>1970</u>	<u>1975</u>
Germany	14.2	32.9
France	.	12.5
Italy	3.6	4.6
Netherlands	12.0	23.1
Belgium	10.5	18.5
United Kingdom	6.9	7.3
Ireland	0.4	1.1
Denmark	10.6	19.7
EUR 9	8.7	15.3

2.3 Increase over the previous year

Appropriations for the general promotion of knowledge increased by 7.9 % in the Community from 1974 to 1975 ; this is less than the increase of the total expenditure for civil R&D.

The highest increase over the previous year is in Italy (25,1 %), the other countries show increases between 14 % and 11 %, lower increases occur in Germany (6 %) and Belgium (1 %).

3. Slight decline in the primarily technological objectives of R&D

In this analysis the following chapters of NABS have been grouped as research activities with primarily technological objectives :

- Exploration and exploitation of the earth and its atmosphere (Chapter 1 NABS)

This chapter includes, inter alia, geophysical research, oil and mineral prospecting, land hydrology, oceanographic research, meteorology and aeronomy.

- Production, distribution and rational utilization of energy (Chapter 4 NABS)

This chapter includes all research on the production, storage, transportation and distribution of energy, rational utilization of all types, research on methods of obtaining increased efficiency in the production and distribution of energy, and research on means of effecting economies in the final consumption of energy.

- Industrial productivity and technology (Chapter 6 NABS)

This chapter covers all research on industrial products and their production methods, including industrial applications of radiation and nuclear techniques.

- Exploration and exploitation of space (Chapter 8 NABS)

This research comprises all civil research projects in this field, particularly on launchers, satellites, orbiting space stations, etc.

3.1 Technological R&D expenditure as a proportion of civil R&D expenditure.

- 3.1.1 In 1975 approximately one-third of civil R&D appropriations in the Community were allocated to technological research of the type mentioned above.

Within this group of related objectives, approximately 37 % of total expenditure was allocated to research on problems of energy supply, approximately 40 % to research on industrial productivity and technology, 16 % to research on exploration and exploitation of space and 7 % to research on exploration and exploitation of the earth and its atmosphere.

The proportion allocated to technological research in the Community has decreased somewhat compared to 1970. It was then 36 %, i.e. approximately 4 % higher than in 1975 (see Table D).

- 3.1.2 Exploration and exploitation of the earth and its atmosphere (Chapter 1 NABS) take up only approximately 2 % of civil R&D appropriations in the Community; this percentage has remained more or less constant since 1970. There is increasing interest in research of this type in Ireland, but interest appears to be waning in Italy, the Netherlands and Belgium (see Table E).
- 3.1.3 Although the production, distribution and rational utilization of energy (Chapter 4 NABS) are amongst the most important problems of today's world, this is not reflected in the analysis of public expenditure on R&D in this field. If anything, the proportion allocated to this research has decreased since 1970; at any rate, there has been no significant increase since 1974. Approximately 12 % of the 1975 civil R&D appropriations in the Community is earmarked for research on energy (see Table E).
- 3.1.4 Only slightly higher is the proportion of public expenditure on civil R&D allocated to industrial productivity and technology ; this proportion has also decreased slightly since 1970 (from almost 15 % to just under 13 % in 1975).

The downward tendency is again particularly marked in the United Kingdom and Italy; Denmark and Ireland, on the other hand, have increased their allocations (see Table E).

3.1.5 Allocations to the fourth element of technological R&D have remained constant over the six-year period (almost 5 % of Community civil R&D). There have of course been shifts between the countries; the proportion has decreased in France and Germany, but increased in nearly all the other countries (see Table E).

3.2 Scale of expenditure on primarily technological R&D

A total of 2 614 Mio u.a. was earmarked for this type of research in the 1975 budgets of the Community, as against approximately 1 628 Mio u.a. in 1970. At 1970 exchange rates, the sum for the Community amounted to 2 797 Mio u.a. in 1975.

In the Community, approximately 6.5 u.a. per head of population was spent on technological research in 1970; in 1975, 10 u.a. per head of population were allocated. However, this average conceals considerable differences in the individual countries; approximately 15 u.a. per head in France and Germany, just under 3 u.a. in Italy.

	Expenditure on technological R&D in u.a. per head of population	
	1970	1975
Germany	6.7	15.3
France	.	15.5
Italy	3.9	3.0
Netherlands	3.8	5.5
Belgium	6.1	11.5
United Kingdom	6.8	8.1
Ireland	0.9	2.3
Denmark	2.6	5.9
EUR 9	6.5	10.1

3.3 Increase over the previous year

In the Community approximately 8 % more is earmarked for expenditure on technological research in 1975 than in 1974. For research on energy, the increase over the previous year is 10.4 %; exploration and exploitation of the earth and its atmosphere, 10 %; exploration of space 6.9 % and industrial productivity and technology 4.9 %.

- 3.3.1 Above average increases over the previous year for research in the energy sector (Chapter 4 NABS) are to be noted in Ireland (+ 58 %), the United Kingdom (+ 27 %) and Italy (+ 25 %); the low Community average is explained partly by a very low growth rate in Germany (+ 4.8 %).
- 3.3.2 There are similar trends in the field of research on industrial productivity and technology (Chapter 6 NABS): increases of between 20 % in France and Ireland and 34 % in Belgium, a small increase (+ 4.2 %) in Germany and even a decrease in the United Kingdom (- 9 %).
- 3.3.3 In research on the exploration and exploitation of the earth and its atmosphere (Chapter 1 NABS), the following trends are to be noted : a high increase in the United Kingdom (+ 30 %), an increase in Denmark (+ 20 %), and a decrease of similar magnitude in Belgium and Ireland (- 20 %) and in Italy (- 15 %).
- 3.3.4 There are also widely differing growth rates in the various countries in relation to the previous year with respect to research on the exploration and exploitation of space (Chapter 8 NABS): the highest growth rate is in Denmark (54 %) and Belgium (44 %), followed by Italy (25 %), the Netherlands and the United Kingdom (20 %). In France there is a decrease of just under 6 %.

4. Greater emphasis on R&D orientated primarily towards human and social problems

For the purposes of this analysis, the following chapters of the NABS have been grouped as research orientated primarily towards human and social problems :

- Planning of the human environment (Chapter 2 NABS)

This chapter comprises all research connected with land development, construction and planning of buildings, civil engineering, new transport systems, new techniques in telecommunications systems and water supply.

- Protection and improvement of human health (Chapter 3 NABS)

This chapter includes, in addition to purely medical research, research on food hygiene and nutrition and, especially research on pollution.

- Social and sociological problems (Chapter 7 NABS)

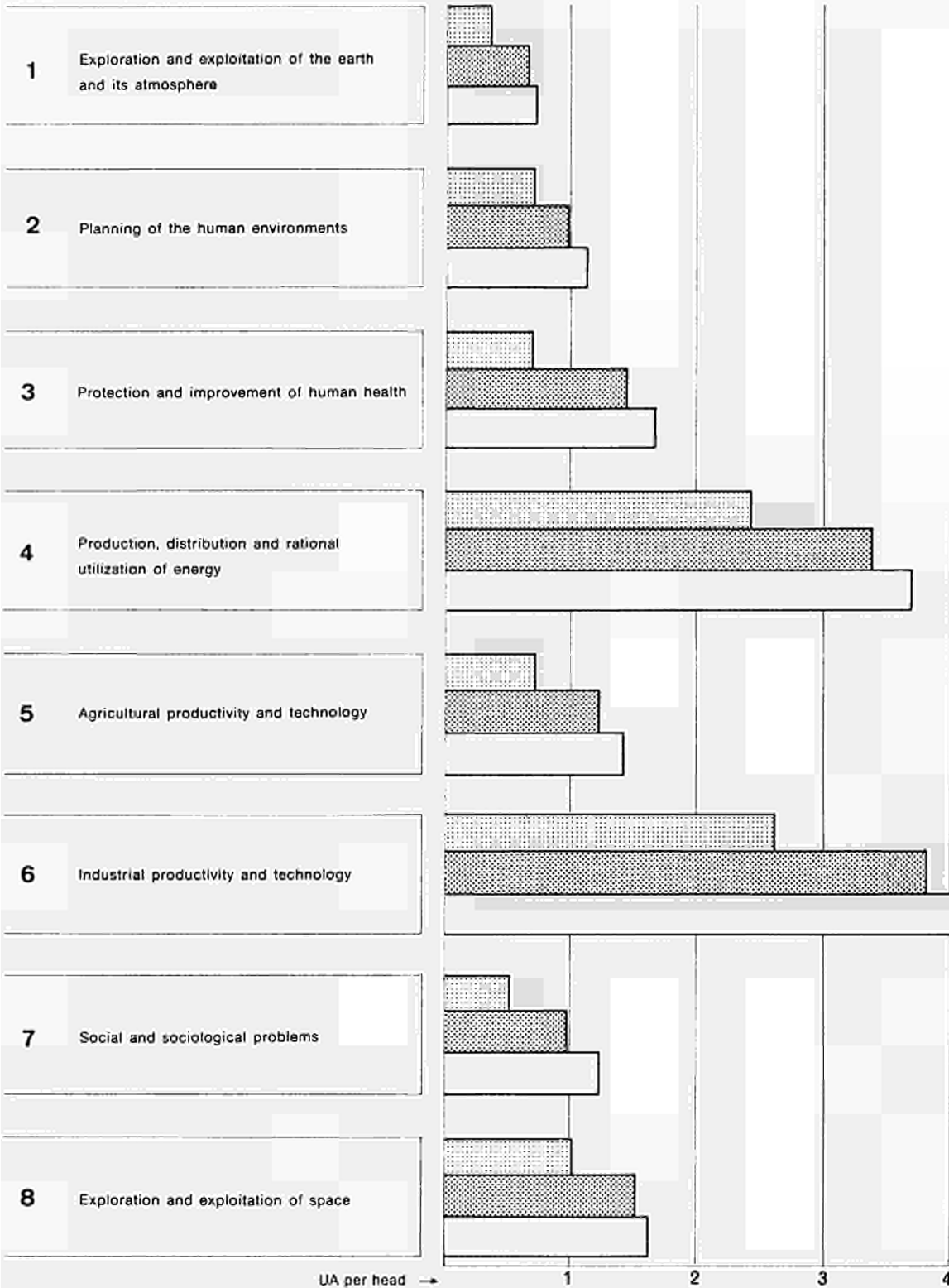
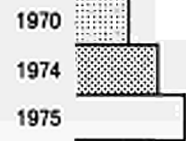
- The purpose of the research grouped under social sciences and humanities is to understand, and as far as possible to solve, problems of life in society. This research extends from systems analysis and planning via education and vocational training and improvement of working condition to research on social relationships and conflicts.

4.1 Expenditure on human and social R&D as a proportion of civil R&D expenditure

- 4.1.1 In the Community approximately 13 % of civil R&D expenditure in 1975 was allocated to research with distinct human and social objectives. There were fairly even spread over the three research objectives in this group : 42 % on the protection and improvement of human health, 30 % on social and sociological problems and 28 % on the planning of the human environment. Compared to 1970, this proportion rose by approximately 3 % in the Community (see Table D).

NABS objectives

Expenditure on R&D in UA per head
(estimation for 1970)



- 4.1.2 3.7 % of civil R&D expenditure in the Community is allocated to the planning of the human environment (Chapter 2 NABS); however, France and Ireland devote almost 7 % and the Netherlands 6 % to this objective and in the latter the tendency is for this proportion to increase (Cf. Table F)
- 4.1.3 A good 5 % of civil R&D expenditure in 1975 was allocated to research on the protection and improvement of human health. The Netherlands, Denmark and France attached relatively great importance to this objective as early as 1970 and these countries have maintained this percentage (approximately 7 %): in Belgium, though, there has been a definite decrease (from approximately 7 % to 4 %) (See Table F).
- 4.1.4 The importance attached to research on solving problems of life in society is shown by the increase in the appropriations for this type of research in the Community from just under 3 % in 1970 to approximately 4 % in 1975.

First place is occupied by the Netherlands (almost 8 %), followed by Ireland (7 %), Germany (6 %), Belgium and Denmark (4 %). The only country which shows a decrease in relation to 1970 is Belgium (see Table F).

4.2 Scale of expenditure on human and social R&D

The budgets of the Community countries provided for total expenditure on human and social R&D of 1 046 Mio u.a. in 1975, as against 475 Mio u.a. in 1970. Calculated at 1970 exchange rates the sum for 1975 would be 1 051 Mio u.a.. In the Community, expenditure per head of population on human and social R&D amounted to 1.9 u.a. in 1970 and 4 u.a. in 1975. This average is composed of widely differing sums in the various countries :

	Expenditure on human and social R&D in u.a. per head of population	
	<u>1970</u>	<u>1975</u>
Germany	2.1	7.5
France	.	5,4
Italy	0.6	0.5
Netherlands	3.3	8.3
Belgium	2.8	3.5
United Kingdom	1.3	1.7
Ireland	0.7	1.7
Denmark	2.4	4.4
EUR 9	1.9	4.1

4.3 Increase over the previous year

Appropriations for R&D with human and social objectives increased by 18 % in the Community from 1974 to 1975; the highest increase was for R&D aimed at solving social and sociological problems (24 %), and for research on both the planning of the human environment and the protection and improvement of human health the increase was 16 %.

4.3.1 Special emphasis was placed on research on solving social and sociological problems in Ireland (+ 75 %), the United Kingdom and the Netherlands (approximately 40 % each) and Germany (just under 30 %); Belgium allocated less funds for this purpose than in the previous year (- 14 %).

4.3.2 For research on the protection and improvement of human health, the highest increase in appropriations over the previous year is shared by the United Kingdom and Ireland (40 %), followed by Denmark and Germany (approximately 20 %). Appropriations in this sector were lower than in the previous year in Italy (- 16 %) and Belgium (- 5 %).

4.3.3 There has been a quite considerable increase over the previous year in the planning of the human environment in the United Kingdom (+ 67 %); a special effort was also made in this sector by Italy (+ 34 %) and the Netherlands (+ 30 %). The countries with a negative growth rate were Denmark (- 8 %) and Belgium (- 14 %).

5. Trends in R&D objectives in the Community and the USA

Preliminary methodological remarks

Because of the special methods and definitions developed for Community purposes in the analysis and comparison of statistical data relating to public expenditure on R&D within the Community, it is very difficult to compare the results of such statistics with documents from other countries based on different principles. In connection with the recent revision of the Frascati Manual at the OECD, it is planned for all countries to break down budgetary appropriations in accordance with a uniform nomenclature, comparable with the NABS; however, no results have so far been published.

For the purposes of the following comparison, which had to be a very general one for the reasons outlined above, a publication of the National Science Foundation, "An Analysis of Federal R&D Funding by Function" (NSF 74-313), was used. This report refers to the period 1969-1975 and contains actual budget figures for the years up to 1973 and provisional budgetary appropriations for 1974 and 1975, as in the Community investigation

Public expenditure is broken down by R&D objectives in accordance with a nomenclature which has 14 functions and 40 sub-functions. Direct comparison of the two systems is not possible; however, the broad classification according to primarily technological and primarily human and social research used here probably results in usable sizes and permits identification of the general trends. An attempt was made to eliminate the main difference in methodology, namely the complete breakdown of all research except general promotion of knowledge, by including this latter category as far as possible in the comparative figures for the Community (see Annex I : Main Methods and Definitions).

The following comparisons are based, for the U.S.A., on federal funding only, this does not include allocations for R&D provided by the different states.

It should also be kept in mind that many R&D activities have been carried along for quite a lot of years in the U.S.A., while these same activities are quite new in the Community, a good example of this difference is space research.

5.1 General trends in public R&D expenditure in the Community and the U.S.A.

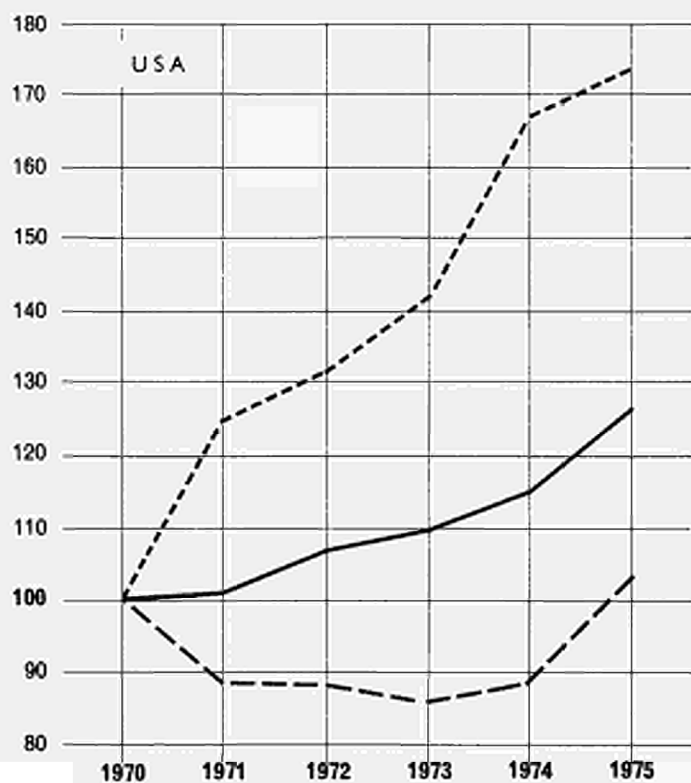
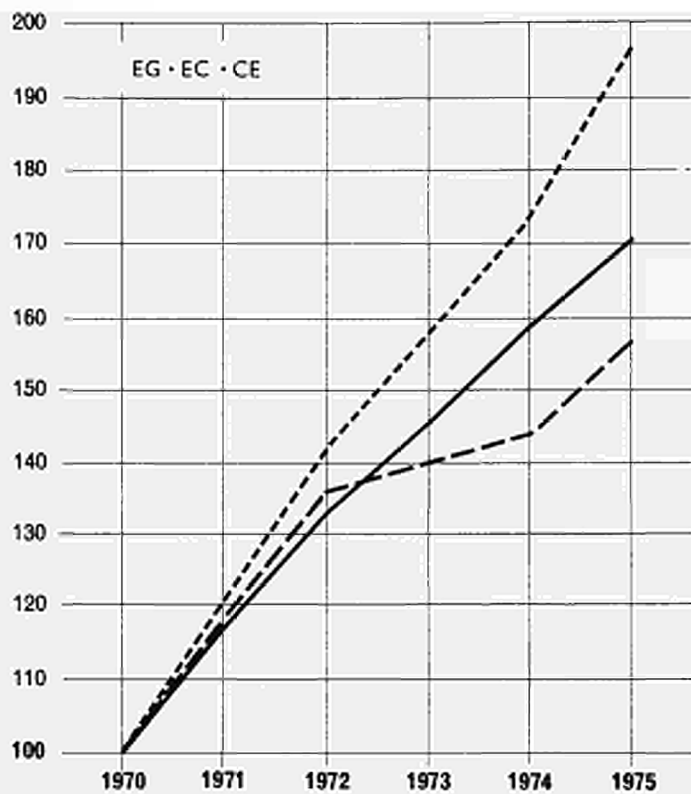
- 5.1.1 In the United States federal budget a sum of 19 597 Mio dollars (13 900 Mio u.a. calculated at current exchange rates) was earmarked for promotion of R&D for the 1975 budget year, as against 10 344 Mio u.a. in the budgets of the Member States of the Community.

The proportion of public R&D expenditure covers in the U.S.A. as in the Community about 50 % of all public and private R&D funding.

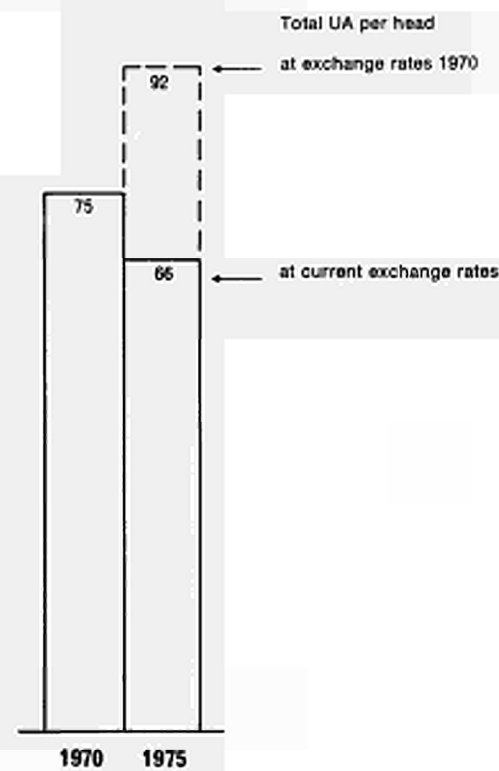
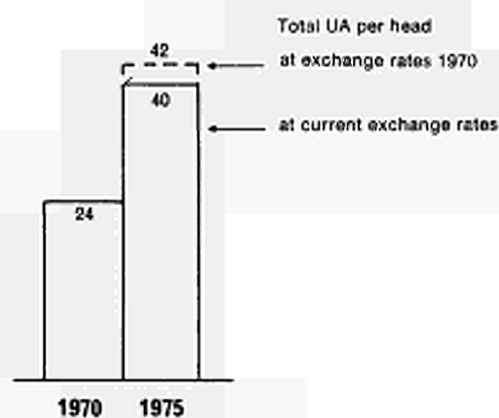
Per head of population this amounts to 65.1 u.a. in the United States and 40 u.a. in the Community. In 1970, 74,7 u.a. or dollars per head were allocated for publicly financed R&D in the U.S.A., 24 u.a. in the Community.

- 5.1.2 Total R&D expenditure in the United States has increased nominally far less than in the Community : + 28 % as compared to 71 % in the Community for the period 1970-1975. In real terms there has been no increase in the U.S.A., whereas the real increase in the Community over the same period is estimated at approximately 20 %.

Comparison of trends EC – USA



— Total expenditure
 - - - Technological objectives
 - · - Human-social objectives
 1970 = 100



5.2 Comparison of the general objectives of publicly financed R&D in the Community and the USA.

- 5.2.1 **A major proportion of public R&D expenditure in the United States** is allocated to defence (52 %); there is therefore a considerably smaller proportion available for civil R&D than in the Community (48 % compared to 78 % in the Community). The proportion allocated to research on defence has remained more or less constant in the USA since 1970, but has shown a downward trend in the Community, except in the United Kingdom.
- 5.2.2 Of the 6 650 Mio u.a. available for civil R&D in the United States, approximately half is allocated to primarily technological research ; it is slightly less in the Community, even when general promotion of knowledge in the fields of mathematics, sciences and engineering is included for the purposes of proper comparison.

Both in the Community and the United States the increase in technological research since 1970 has been smaller than the increase in total R&D expenditure and above all the increase in research on human and social problems. From time to time there has even been a decrease in the United States, caused by a considerable reduction in expenditure on space exploration, which amounted to approximately 23 % of total R&D expenditure in the USA in 1970, but only 13 % in 1975. In the same period research on the generation of energy almost trebled, amounting to approximately 5 % of total public R&D expenditure in the USA in 1975. In the Community the increase for this objective has been considerably smaller, but more than 9 % of all R&D appropriations is allocated to research of this type.

- 5.2.3 Research on human and social problems in the Community has more than doubled since 1970, and greatly increased in the United States as well (+ 74 %). Compared to the previous year, the highest growth rate of all in the USA is for research on energy, with high growth rates also for research on the science and technology base, and on the natural resources. In the Community the highest growth rate compared to 1974 was for research on problems of life in society.

EXPENDITURE FOR CIVIL R&D

(Calculated at current exchange rates)

	1970	1974	1975
Expenditure for civil R&D (Mio UA)			
Deutschland	1 462,1	3 263,0	3 519,6
France	1 241,4	1 645,9	1 884,5
Italia	411,8	418,1	468,1
Nederland	281,8	485,6	564,9
Belgique/België	193,3	332,2	342,6
United Kingdom	888,7	1 060,9	1 095,4
Ireland	13,4	22,7	20,4
Danmark	85,3	144,2	167,4
EUR 9	4 577,8	7 372,6	8 068,9
Increase over the previous year (Calculated in national currencies)			
Deutschland	18,8	5,7	7,9
France	1,8	10,4	12,6
Italia	29,0	4,9	22,3
Nederland	14,0	8,7	16,4
Belgique/België	18,6	19,0	3,1
United Kingdom	.	12,1	12,5
Ireland	27,6	9,8	27,6
Danmark	.	9,3	16,1
EUR 9	.	6,9	9,4
Civil R&D as a proportion of total R&D expenditure			
Deutschland	82,3	88,2	89,0
France	71,1	66,0	69,0
Italia	95,8	94,9	96,5
Nederland	95,3	96,3	96,4
Belgique/België	99,6	99,3	99,3
United Kingdom	59,0	53,0	53,5
Ireland	100,0	100,0	100,0
Danmark	99,6	99,4	99,3
EUR 9	75,7	76,4	78,0
Civil R&D expenditure by head in each country compared with the Community average, calculated from UA			
Deutschland	132,3	183,7	182,0
France	134,6	109,5	113,9
Italia	42,2	26,3	26,9
Nederland	117,2	125,2	132,6
Belgique/België	109,2	118,8	112,0
United Kingdom	87,8	66,1	62,6
Ireland	24,9	25,7	27,1
Danmark	94,9	99,8	106,1
EUR 9	100,0	100,0	100,0

PRINCIPAL OBJECTIVES
CIVIL R&D

	1970*	1974	1975
Distribution of Civil R&D expenditures			
R&D expenditure with predominantly technological objectives			
Deutschland	27,6	27,3	26,9
France	.	43,5	43,6
Italia	50,5	35,7	35,6
Nederland	17,4	14,2	13,2
Belgique/België	30,8	30,1	33,0
United Kingdom	42,7	44,6	41,3
Ireland	19,8	28,6	27,3
Danmark	15,1	17,0	17,7
EUR 9	36,4	33,0	32,4
Expenditure with predominantly human and social objectives			
Deutschland	8,9	11,8	13,2
France	.	15,0	15,2
Italia	7,4	7,1	5,8
Nederland	15,1	18,5	20,1
Belgique/België	14,1	11,5	9,9
United Kingdom	8,4	6,7	8,6
Ireland	15,6	17,6	19,7
Danmark	13,6	13,2	13,3
EUR 9	10,6	12,0	13,0
Expenditure for general promotion of knowledge			
Deutschland	59,0	58,9	57,9
France	.	35,5	35,1
Italia	46,9	54,1	55,3
Nederland	55,3	57,8	55,8
Belgique/België	52,6	53,9	52,8
United Kingdom	43,2	36,9	37,2
Ireland	9,0	14,7	13,3
Danmark	63,1	60,2	59,3
EUR 9	48,6	49,8	49,1

* Estimation

R&D EXPENDITURE WITH PREDOMINANTLY
TECHNOLOGICAL OBJECTIVES

	1970*	1974	1975
Exploration and exploitation of the earth and its atmosphere (Chapter 1 NABS) as a proportion of civil R&D			
Deutschland	2,1	1,9	2,0
France	.	4,5	4,3
Italia	1,6	1,7	1,2
Nederland	1,4	1,0	1,1
Belgique/België	3,5	2,4	1,9
United Kingdom	0,6	0,9	1,0
Ireland	1,5	3,2	2,1
Danmark	1,7	1,6	1,7
EUR 9	2,2	2,3	2,3
Expenditure per head in each country compared with the EUR 9 average, calculated from UA			
Deutschland	128,2	153,0	158,3
France	.	212,1	215,3
Italia	33,3	197,7	13,9
Nederland	74,4	57,6	65,3
Belgique/België	176,9	125,8	93,1
United Kingdom	20,5	25,8	29,2
Ireland	17,9	36,4	25,0
Danmark	76,9	71,2	77,8
EUR 9	= 100	= 100	=100
Production, distribution and rational utilization of Energy (Chapter 4 NABS) as a proportion of civil R&D (%)			
Deutschland	12,9	12,2	11,9
France	.	11,6	11,9
Italia	24,4	18,6	19,0
Nederland	6,3	4,0	3,9
Belgique/België	13,3	15,0	14,4
United Kingdom	12,1	12,1	13,7
Ireland	0,1	0,4	0,5
Danmark	2,7	2,9	2,8
EUR 9	13,5	11,8	11,9
Expenditure per head in each country compared with the EUR 9 average, calculated from UA			
Deutschland	127,5	190,2	182,2
France	.	107,1	114,9
Italia	77,4	41,5	43,2
Nederland	56,4	43,0	44,1
Belgique/België	108,6	151,6	136,2
United Kingdom	79,8	68,0	71,9
Ireland	0,4	0,9	1,1
Danmark	18,9	24,6	25,1
EUR 9	= 100	=100	=100

* Estimation

TAB. E
(Continued)

	197c*	1974	1975
Industrial productivity and technology (Chapter 6 NABS) as a proportion of civil R&D (%)			
Deutschland	6,7	8,6	8,3
France	.	18,7	20,0
Italia	19,2	6,3	6,1
Nederland	6,6	6,6	5,5
Belgique/België	10,1	10,1	13,0
United Kingdom	26,9	27,6	22,4
Ireland	18,0	25,1	24,7
Danmark	8,3	9,7	9,5
EUR 9	14,8	13,4	12,9
Expenditure per head in each country compared with the EUR 9 average, calculated from UA			
Deutschland	60,7	116,9	116,9
France	.	152,5	176,9
Italia	55,8	12,2	12,7
Nederland	53,6	61,0	56,2
Belgique/België	76,2	88,8	113,4
United Kingdom	162,4	135,6	109,0
Ireland	30,9	48,1	52,0
Danmark	54,3	71,9	73,4
EUR 9	= 100	= 100	= 100
Exploration and exploitation of space (Chapter 8 NABS) as a proportion of civil R&D (%)			
Deutschland	6,0	4,7	4,8
France	..	8,8	7,4
Italia	5,1	9,2	9,3
Nederland	3,1	2,6	2,6
Belgique/België	3,9	2,6	3,6
United Kingdom	3,2	3,9	4,2
Ireland	-	-	-
Danmark	2,4	2,8	3,7
EUR 9	5,7	5,5	5,3
Expenditure per head in each country, compared with the EUR 9 average, calculated from UA			
Deutschland	142,6	157,1	163,3
France	.	176,9	158,4
Italia	38,6	44,2	47,0
Nederland	67,3	59,0	65,7
Belgique/België	78,2	56,4	75,9
United Kingdom	50,5	47,4	49,4
Ireland	-	-	-
Danmark	41,0	50,6	72,9
EUR 9	= 100	= 100	= 100

* Estimation

EXPENDITURE WITH PREDOMINANTLY
HUMAN AND SOCIAL OBJECTIVES

	1970*	1974	1975
Planning of the human environment (Chapter 2 NABS) as a proportion of civil R&D (%)			
Deutschland	2,1	2,9	2,9
France	.	6,5	6,8
Italia	3,1	1,3	1,4
Nederland	1,3	4,9	5,6
Belgique/België	1,3	1,7	2,4
United Kingdom	4,4	1,1	1,7
Ireland	6,6	7,2	6,9
Danmark	2,7	1,7	1,4
EUR 9	3,9	3,4	3,7
Expenditure per head in each country compared with the EUR 9 average, calculated from UA			
Deutschland	71,4	155,6	143,9
France	.	207,1	212,3
Italia	34,3	10,1	10,5
Nederland	121,4	178,8	201,8
Belgique/België	35,0	58,6	43,9
United Kingdom	101,4	21,2	28,9
Ireland	42,8	53,5	51,8
Danmark	65,7	50,5	39,5
EUR 9	= 100	= 100	= 100
Protection and improvement of health (Chapter 3 NABS) as a proportion of civil R&D			
Deutschland	2,6	4,3	4,7
France	.	6,8	6,8
Italia	3,3	4,2	2,9
Nederland	6,8	7,0	6,9
Belgique/België	6,7	4,7	4,3
United Kingdom	3,0	4,2	5,3
Ireland	5,3	5,7	6,3
Danmark	6,9	7,3	7,7
EUR 9	3,9	5,1	5,4
Expenditure per head in each country compared with the EUR 9 average, calculated from UA			
Deutschland	91,3	154,8	160,9
France	.	146,6	142,6
Italia	37,6	21,9	14,2
Nederland	214,5	171,2	169,2
Belgique/België	192,8	109,6	89,3
United Kingdom	69,6	54,8	61,5
Ireland	34,8	28,8	31,4
Danmark	172,5	143,8	151,5
EUR 9	= 100	= 100	= 100

* Estimation

TAB. F
(Continued)

	1970*	1974	1975
Social and sociological problems (Chapter 7 NABS) as a proportion of civil R&D			
Deutschland	4,2	4,6	5,4
France	.	1,6	1,6
Italia	0,8	1,6	1,5
Nederland	4,3	6,6	7,5
Belgique/België	6,2	5,1	4,2
United Kingdom	0,9	1,3	1,6
Ireland	3,7	4,8	6,6
Danmark	4,0	4,1	4,2
EUR 9	2,8	3,4	3,9
Expenditure per head in each country compared with the EUR 9 average, calculated from UA			
Deutschland	202,0	244,4	255,7
France	.	51,5	45,9
Italia	14,0	12,1	10,7
Nederland	186,0	237,4	259,8
Belgique/België	246,0	173,7	120,5
United Kingdom	30,0	25,3	26,2
Ireland	34,0	35,4	45,9
Danmark	140,0	118,2	113,1
EUR 9	= 100	= 100	= 100

* Estimation

Chapter 3 - Public R&D expenditure as a contribution to multilateral and bilateral R&D projects

1. Sum available for multilateral and bilateral R&D projects as a proportion of total R&D expenditure.
 - 1.1 As in previous years, the R&D budgets of the Member States contained an element of approximately 11 % for contributions to multilateral and bilateral projects. There was no significant change in this proportion for the Community compared to either the previous year or to 1970; however, in the countries which are only able to make a small contribution to this international cooperation, there has been a higher increase than in the large countries, which contribute over 25 % of Community R&D expenditure to cooperation of this type (Germany 32 %, United Kingdom 31 % and France 24 %). (See Table G).
 - 1.2 A total of 1 147 Mio u.a. was available for these purposes in the Community in 1975; per head of population this amounts to 4.4 u.a. as against 2.7 u.a. in 1970. The figures for the various countries are as follows :

Expenditure on multilateral and bilateral R&D projects in u.a. per head of population

	<u>1970..</u>	<u>1975</u>
Germany	3.0	5.9
France	3.7	5.2
Italy	0.9	1.1
Netherlands	1.0	2.7
Belgium	1.5	4.3
United Kingdom	4.1	6.2
Ireland	-	0.
Denmark	0.7	2,0
EUR 9	2.7	4.4

N.B. It has not been possible to itemize all expenditure as contribution to multilateral and bilateral R&D projects, this is especially the case of the United Kingdom. This analysis had there to be limited to broad lines.

- 1.3 Compared to 1974 appropriations for multilateral and bilateral R&D projects increased by approximately 13 % in the Community, i.e. at a higher rate than total expenditure. There was a particularly high increase of 44 % in France (mainly R&D on industrial productivity and technology), followed by Denmark with 42 %, Italy with 28 %, and the United Kingdom with 21 %; the other countries showed an increase of 5-10 %, and in Germany there was a decrease of roughly 1 %.

2. The main objectives of publicly financed contributions to multilateral and bilateral R&D projects have changed only slightly compared to the previous year.
 - 2.1 International cooperation in the field of research on defence (Chapter 9 NABS) is still a major feature, but the proportion of the total of appropriations for international cooperation allocated to this objective has decreased slightly (from roughly 28 % in 1974 to just under 24 % in 1975). The principal countries involved in research of this type are the United Kingdom and Germany.
 - 2.2 Cooperation between the Community countries or with other countries in the field of exploration and exploitation of space (Chapter 8 NABS) remains an important research objective in 1975, with 22 % of contributions or almost 60 % of all R&D expenditure allocated to it. All the Member States except Ireland are involved; the proportion of total appropriations for multilateral and bilateral R&D projects allocated to this type of research varies between 48 % in Italy and 12 % in the United Kingdom. Compared to the previous year, this proportion has increased in most of the countries except Denmark.
 - 2.3 In third place in the table of multilateral and bilateral R&D projects in the Community comes general promotion of knowledge (Chapter 10 NABS) with 18 % of total expenditure of this type.
 - 2.4 On the whole, there seems to be a slight downward trend in research on increasing industrial productivity and technology (Chapter 6 NABS) with regard to multilateral and bilateral projects; France is an exception in this respect and there are still no data available for the United Kingdom.

2.5 Finally, mention must be made of the cooperation of Italy, the Netherlands and Belgium in particular in international R&D projects on the production, distribution and rational utilization of energy (Chapter 4 NABS). In Belgium approximately 70 %, in the Netherlands 38 % and in Italy 16 % of all funds are allocated to projects of this type.

R&D EXPENDITURE FOR MULTILATERAL
AND BILATERAL ACTIONS

(Calculated at current exchange rates)

	1970	1974	1975
R&D Expenditure for multilateral and bilateral actions (Mio UA)			
Deutschland	181,9	371,1	366,6
France	189,6	188,2	274,9
Italia	48,0	54,1	63,6
Nederland	13,4	34,2	37,4
Belgique/België	14,6	40,4	42,5
United Kingdom	231,6	317,4	351,2
Ireland	-	0,1	0,1
Danmark	3,3	7,2	10,1
EUR 9	682,5	1 012,7	1 146,5
Expenditure on multilateral and bilateral actions as a proportion of total expenditure on R&D (%)			
Deutschland	10,2	9,7	9,0
France	10,9	7,5	10,1
Italia	11,2	12,3	14,2
Nederland	4,5	6,8	6,4
Belgique/België	7,5	12,1	12,3
United Kingdom	15,4	16,6	16,8
Ireland	-	-	-
Danmark	3,9	5,0	6,0
EUR 9	11,3	10,5	10,9
National contributions to multilateral and bilateral actions in R&D			
Deutschland	26,6	36,6	32,0
France	27,8	18,6	24,0
Italia	7,0	5,3	5,6
Nederland	2,0	3,4	3,3
Belgique/België	2,1	4,0	3,7
United Kingdom	33,9	31,3	30,6
Ireland	-	-	-
Danmark	0,5	0,7	0,9
EUR 9	100,0	100,0	100,0

Part II

Objectives of public R&D expenditure in 1975

Chapter 4 - Main features of planned public expenditure on R&D

1. Main features by objectives (chapters of NABS)
 - 1.1 An analysis of the correlation of the 1975 budgetary appropriations with the chapters of the NABS gives an initial pointer to the fields given special consideration by the governments of the Member States in allocating public R&D expenditure.

An arrangement of the chapters of the NABS according to their share of total R&D expenditure in the Community puts general promotion of knowledge (39 %) in first place, followed by defence (22 %). Next come industrial productivity and technology (10 %), research on production, distribution and rational use of energy (9 %), protection and improvement of human health and exploration and exploitation of space (4 %), agricultural productivity and technology (3.6 %), social and sociological problems and planning of the human environment (3 %) and finally exploration and exploitation of the earth and its atmosphere (2 %) (see Table H).

Approximately 70 % of the total R&D funds available in the Community were allocated to three main objectives: general promotion of knowledge, defence and industrial productivity and technology. Appropriations for economically important objectives such as industrial and agricultural productivity and energy barely exceed those for research on defence (23 % as opposed to 22 %). Total appropriations for primarily social objectives such as the improvement of human health, planning of the human environment and solving the problems of life in society were no greater than those for research on industrial productivity.

- 1.2 There are some considerable variations from one Member State to another in the order of priority for objectives of publicly financed R&D established according to chapters of NABS (see Table H). The most important differences in the order of priority were noted for defence research, promotion of agricultural productivity and for R&D in connection with social and sociological problems.
2. Main features of planned R&D analysed under consideration of more detailed objectives.

The Nomenclature for the Analysis and Comparison for scientific programmes and budgets NABS wants that all university research activities are classified in chapter 10 "General promotion of knowledge". This chapter therefore always comes first when classification in order of priority is done by chapter.

There exists however a very different structure of university research in the various Member States. In many cases university R&D is actually basic research and cannot be affected to any other objective of NABS. In some countries however, especially in Belgium, R&D is generally done by universities even if it is not basic research.

That is why the following list covers not only chapters of NABS but also some sections or sub-sections. This gives a more correct view of R&D activities in the Community.

The order in this list is given by the proportion of each chapter of NABS with respect to total R&D expenditure in the Community.

N A B S		%
10	General promotion of knowledge	38.6
10.0	Research of a general nature	2.3
10.1	Research in the exact and natural sciences	18.4
10.2	Agronomic research	1.6
10.3	Medical research	7.3
10.4	Engineering research	4.1
10.5	Research in the social sciences and humanities	4.7
9	Defence	22.2
6	Industrial productivity and technology	10.1
6.5.1	Office machinery and data-processing equipment	1.5
6.7.1	Aeronautical engineering	3.9
4	Production, distribution and rational utilization of energy	9.3
4.1	Primary energy products and associated products	1.9
4.2	Primary energy conversion	6.4
3	Protection and improvement of human health	4.3
8	Exploration and exploitation of space	4.2
5	Agricultural productivity and technology	3.6
7	Social and sociological problems	3.1
2	Planning of the human environment	2.9
1	Exploration and exploitation of the earth and its atmosphere	1.8

1 % of R&D expenditure in the Community represents a sum of 103,400 units of account.

If classification of the objectives is not done within the system of NABS but only in decreasing order of percentage in total R&D expenditure, defence research took the first place of R&D in the Community (22 %); it was very nearly followed by research in the exact and natural sciences in the framework of general promotion of knowledge (18 %). Priority was about the same for industrial productivity and technology (10 %) and R&D for production, distribution and rational utilization of energy (9 %). The amount provided for R&D on primary energy conversion was only a little smaller than that allocated to medical sciences in general promotion of knowledge. Were also rather equivalent space research and engineering research. More examples of this kind could be found.

R&D OBJECTIVES RANKED ACCORDING TO THE
VOLUME OF EXPENDITURE

a) As a proportion of total expenditure in each country	EUR 9 (%)	D	F	I	NL	B	UK	IRL	DK	
General promotion of knowledge (NABS 10)	38,6	1	1	2	1	1	1	2	3	1
Defence (NABS 9)	22,2	2	2	1	5	8	10	1	-	10
Industrial productivity and technology (NABS 6)	10,1	3	4	3	4	6	3	3	2	3
Production, Distribution and rational utilization of energy (NABS 4)	9,3	4	3	4	2	7	2	4	8	7
Protection and improvement of human health (NABS 3)	4,3	5	6	7	7	4	4	6	6	4
Exploration and exploitation of space (NABS 8)	4,2	6	7	5	3	9	7	7	-	6
Agricultural productivity and technology (NABS 5)	3,6	7	9	8	6	2	5	5	1	2
Social and sociological problems (NABS 7)	3,1	8	5	10	8	3	6	9	5	5
Planning of the human environment (NABS 2)	2,9	9	8	6	9	5	9	8	4	9
Exploration and exploitation of the earth and its atmosphere (NABS 1)	1,8	10	10	9	10	10	8	10	7	8

b) in u.a. per inhabitant for each objective	EUR 9 u.a./head	D	F	I	NL	B	UK	IRL	DK	
General promotion of knowledge (NABS 10)	15,33	1	1	5	7	2	4	6	8	3
Defence (NABS 9)	8,80	2	3	2	5	4	6	1	-	6
Industrial productivity and technology (NABS 6)	4,02	3	2	1	8	6	3	4	7	5
Production, distribution and rational utilization of energy (NABS 4)	3,70	4	1	3	6	5	2	4	8	7
Protection and improvement of human health (NABS 3)	1,69	5	2	4	8	1	5	6	7	3
Exploration and exploitation of space (NABS 8)	1,66	6	1	2	7	5	3	6	-	4
Agricultural productivity and technology (NABS 5)	1,44	7	7	4	8	2	6	5	1	3
Social and sociological problems (NABS 7)	1,22	8	2	5	8	1	3	7	5	4
Planning of the human environment (NABS 2)	1,14	9	3	1	8	2	5	7	4	6
Exploration and exploitation of the earth and its atmosphere (NABS 1)	0,72	10	2	1	8	5	3	6	7	4

Chapter 5 - R&D envisaged for primary technological objectives

1. Research on the exploration and exploitation of the earth and its atmosphere (NABS 1)
 - 1.1 45 % of public appropriations for research on the exploration and exploitation of the earth and its atmosphere in the Community is allocated to "Soil and substratum" (NABS 1.1), i.e. to exploration of the earth's crust and mantle. Ireland (75 %) and Denmark and the United Kingdom (66 %) are making above-average contributions to this objective. In the forefront in Ireland is oil and mineral prospecting, in the United Kingdom exploration and exploitation of submarine shelves.
 - 1.2 Oceanographic research involving physics, chemistry and biology (seas and oceans, NABS 1.3) takes up 25 % of the funds for the whole objective in the Community; contributions to this type of research are particularly high in the Netherlands (65 %), Italy (45 %) and France (32 %).
2. Research on the production, distribution and rational utilization of energy (NABS 4)
 - 2.1 Approximately 70 % of public expenditure to be used for research in the energy sector in the Community in 1975 is allocated to research on primary energy conversion (NABS 4.2); most of this (9 % in the Community) is devoted to problems of nuclear fission.

In the energy research sector, above-average contributions to primary energy conversion are made by the Netherlands, where practically all research of this type is devoted to this objective, the United Kingdom (80 %) and Germany (almost 70 %).
 - 2.2 In second place in the energy research sector is R&D on the extraction, transportation, storage and utilization of fossil and nuclear fuels (primary energy products and associated products, NABS 4.1).

Approximately 20 % of energy research appropriations in the Community is allocated to this type of research, 80 % of which is used for research on nuclear fuels. Italy (28 %), Germany and France (23 %) make above-average contributions to R&D on primary sources of energy.

2.3 Only 0.3 % of energy research in the Community were allocated to research on energy conservation (NABS 4.4). This kind of research is not very expensive, but it must be supposed that the part would be slightly higher if this research could always clearly be separated from other R&D objectives. Only Ireland devoted approximately two-thirds of its energy research expenditure to this objective.

3. Research on industrial productivity and technology (NABS 6)

3.1 40 % of research on industrial products and production methods, major objectives in the Community, is devoted to the transport sector. The main feature by far is aeronautical engineering (NABS 6.7.1), which takes up 96 % of the funds for R&D on transport.

This Community average is of course strongly influenced by the importance of aeronautical engineering R&D in the United Kingdom (approximately 75 %); France devotes approximately 40 % of its industrial research funds to this objective, the Netherlands and Germany approximately 25 %. International collaboration is important in this area.

3.2 Approximately one quarter of R&D expenditure in the industrial sector goes on electrical, electromechanical and electronic engineering (NABS 6.5). Of this, approximately 60 % is allocated to research on office machinery and data-processing equipment (NABS 6.5.1), and the remainder is used for research on telecommunications equipment and other electronic apparatus.

France (33 %) and Germany (28 %) make above-average contributions to this objective; Italy, with 22 %, is just below the Community average.

3.3 Approximately 25 % of research expenditure in the industrial sector is also allocated to research of a general nature (NABS 6.0) on metrology, reference substances and methods, automation, materials and the rational use of raw materials and technological forecasting in industry; research of this type is particularly important in Italy and the Netherlands (approximately 50 %), Ireland (40 %) and Germany (36 %).

4. Research on exploration and exploitation of space (NABS 8)

4.1 By far the greatest proportion of public expenditure on space exploration goes on research on launchers and satellites (NABS 8.1). Allocations vary between 80 % in Denmark and 100 % in the United Kingdom. A breakdown for France is not yet available.

Of prime importance in the United Kingdom is research on applications, whereas the Netherlands, Belgium and Ireland are more concerned with scientific exploration in this particular field.

4.2 Research of a general nature in the space sector is carried out in Denmark (20 %) and the Netherlands (10 %) in particular.

Chapter 6 - R&D envisaged for primarily human and social objectives

1. Research on planning of the human environment (NABS 2)

- 1.2 There is a great concentration of research on the planning of human environment in the Community on the research on transport systems (NABS 2.4) and telecommunications systems (NABS 2.5). Each of these objectives takes up approximately 27 % of the total R&D appropriations for the planning of the human environment.

The emphasis is on transport systems in Germany (56 %) and the United Kingdom (32 %), and on the development of telecommunications systems in France (60 %) and Italy (28 %).

- 1.2 Problems of land development (NABS 2.1) take up a bare 10 % of appropriations for this objective in the Community; Denmark (22 %) and France (12 %) are above this average.

2. Research for the protection and improvement of human health (NABS 3)

- 2.1 Chapter 3 of NABS "Protection and improvement of human health" includes as well pure medical research as research on food hygiene, nutrition and pollution. It does not include medical research in the sense of basic research which is included in the chapter on general promotion of knowledge (NABS 10.3). As proportion of total R&D expenditure in the Community this medical research is higher (7.3 %) than research itemized in chapter 3 (4.3 %).

- 2.1.1 An analysis based on all R&D concerning promotion and improvement of human health (NABS 3 and NABS 10.3) showed that about 15 % of civil R&D expenditure in the Community was allocated to these objectives. Germany, the Netherlands and Denmark were a little above this average with about 18 %. The proportion registered in Belgium was equal to the average of the Community (15 %), Italy had only a somewhat smaller percentage (12 %). The lowest percentages were noted for France and the United Kingdom with little less than 10 %, for Ireland this proportion was 8 %.

2.1.2 Per head of population 4.7 u.a. were allocated in the Community to this kind of research, there are however variations between countries:

	Expenditure on R&D in the area of health 1975 in u.a. per head of population
Germany	10.8
France	3.5
Italy	1.0
Netherlands	7.8
Belgium	5.3
United Kingdom	1.9
Ireland	0.7
Denmark	5.9
E U R 9	4.7

2.2 If the analysis is limited to chapter 3 of NABS, it can be said that just under a half of the funds for research on protection and improvement of human health in the Community goes on medical research (NABS 3.1). This proportion is considerably higher in France (80 %, Denmark (68 %) and the United Kingdom (60 %).

21 % of the funds for R&D on the protection and improvement of human health is used for research on pollution control. Belgium (46 %), the Netherlands (38 %) and Ireland (30 %) make particularly high contributions to this objective.

Ireland, Belgium and Italy conduct research on water pollution control in particular; Belgium is again to the fore in research connected with air pollution, followed by Germany. Belgium is also very much concerned with radioactive pollution of the environment, a problem tackled by France as well.

3. Research connected with social and sociological problems (NABS 7)
 - 3.1 The research objective "Social and Sociological Problems" is still a relatively new one; it is therefore not surprising to find a high proportion of research of a general nature here (NABS 7.0). The Community proportion of approximately 30 % is easily exceeded in Belgium (66 %) and Ireland (38 %).
 - 3.2 In second place in this research sector is research connected with education, vocational training and retraining, which receives approximately 20 % of R&D expenditure on this objective in the Community. The leaders here are the Netherlands (36 %) and Ireland (27 %).
 - 3.3 A good 9 % of R&D funds is allocated to research on the improvement of working conditions (NABS 7.5); research of this type is carried out in Germany and France in particular. A roughly equal proportion is devoted to research on social relationships and conflicts (NABS 7.7). The high proportion allocated to this type of research in the United Kingdom (32 %) and Denmark (25 %) is of note.

Chapter 7 - R&D envisaged for research in connection with agricultural productivity and technology

1. Chapter 5 of NABS "Agricultural Productivity and Technology" covers all research promoting agricultural activities; this includes chemical fertilizers, biocides etc. but not basic agronomic research which is classified in General promotion of knowledge (NABS 10.2).

In the Community 3.6 % of total R&D expenditure are devoted to R&D promoting agricultural productivity and technology (NABS 5), and 1.6 % to agronomic research (NABS 10.2).

- 1.1 Considering all agricultural research (NABS 5 + NABS 10.2) 6.7 % of the appropriation for civil research in the Community are allocated to this objective. This is a very important part of R&D in Ireland (40 %). Denmark, the Netherlands and the United Kingdom put into this field around 10 % of their funds for civil R&D. For the other countries the percentage was 5 to 6 %.

- 1.2 The average expenditure per head of population for research in the agricultural field was 2.1 u.a. in the Community. The following amounts were calculated for the various countries:

	Expenditure on R&D in the agricultural field 1975 in u.a. per head of population
Germany	2.7
France	1.9
Italy	0.5
Netherlands	4.9
Belgium	2.0
United Kingdom	2.1
Ireland	3.4
Denmark	4.4
E U R 9	2.1

2. Research oriented to promotion of agricultural productivity and technology (Chapter 5 NABS) was to 36 % into research on crops including foresting and wine. This aim is particularly important in Belgium' R&D (65 % of agricultural research), Italy devoted to this 43 %, Germany 40 % and Denmark 34 %.

Another third of funds allocated to agricultural research concerned research of general nature which is either basic research or **covers** research for several items impossible to separate. Germany intended to spend about half of this funds on this, France 44 %.

Another important objective of R&D in agriculture was research related to domestic and wild animal production. 21 % of the allocations for agricultural research in the Community were devoted to this matter, in Ireland 53 %, in the United Kingdom 33 % and in Belgium 30 %. Veterinary medicine took an important place within this research in Ireland.

Research on fishing and fishery products took 7 % of the funds for agricultural research in the Community, 12 % in the United Kingdom and 7 % in France and Germany.

A N N E X E S

MAIN METHODS AND DEFINITIONS

Definitions

Public financing of R&D

For the purposes of this report public financing of R&D means the budgetary appropriations of the budgets of Central Government as defined by §§ 239, 240 and 242 of the European System of Integrated Economic Accounts (ESA). In Germany the "Länder" belong to the central government sub-sector, but the autonomous regions in Italy are not included in this sub-sector.

For the years up to 1974 the analysis is based on appropriations from final budgets, which also take into account any budgetary changes which may have occurred in the course of the financial year.

For 1975 the analysis is based on appropriations from provisional budgets, recorded very early in the preparation of the budget. These will be replaced by final appropriations in the next report.

The ways in which budgets are worked out are not identical in all member countries. When work on methodology will be finished a more detailed specification of these ways can be given. Differences subsist also in the valuation of appropriations; thus, for example, in Denmark, where not only price-evolution is taken into account, but also the evolution of wages and salaries.

Budget year

The budget year usually corresponds to the calendar year, but for the United Kingdom and Denmark, where the fiscal year begins on 1 April, the budgets for the fiscal year beginning in April this year have been used. The figures shown for these two countries in the 1975 report refer therefore to 1975/76. In Ireland the budget year is the same as

the calendar year from 1975; for comparison purposes the data for 1974, which refer to a period of only nine months, have been extrapolated for the twelve months period on the assumption that the appropriations for the other three months are equivalent to the monthly average for the known months.

M e t h o d s

Break-down by objectives

Break-down by objectives used in this report is, for the first time, the 1975 version of the Nomenclature for the analysis and comparison of science programmes and budgets NABS (doc. EUROSTAT/200/75/1). This new break-down still causes technical difficulties for the national statistical services in the member countries; this explains the fact that the sections and sub-sections could not be completely filled out in all cases. This resulted in not always correct calculation of total figures for EUR-9. These difficulties should be eliminated before the next report.

The existence on the questionnaire of a sub-section NABS 9000 "Expenditure not itemized", has been expounded in different ways. For some countries it really contains expenditure that cannot possibly be itemized (e.g. for France and for the United Kingdom). On the contrary, for the Netherlands this sub-section contains expenditure that, for special political reasons, has not yet been affected to any objective, so the affection can be chosen, during the year, according to the circumstances.

Therefore, in the computer tables the sub-section 9000 has been eliminated in the calculations of expenditure on civil R&D as well as in the ones of percentages, which causes a total-expenditure-rate that might be over 100 %. This is not quite correct for the Netherlands. For technical reasons this could not be modified immediately; however, the calculation methods will be changed before the next report.

This report also presents a re-arrangement of R&D for primary technological objectives and of R&D for primarily human and social objectives. This has been done in the following way:

R&D envisaged for primarily technological objectives:

- Exploration and exploitation of the earth and its atmosphere (Chapter 1 NABS)

This chapter includes, inter alia, geophysical research, oil and mineral prospecting, land hydrology, oceanographic research, meteorology and aeronomy.

- Production, distribution and rational utilization of energy (Chapter 4 NABS)

This chapter includes all research on the production, storage, transportation and distribution of energy, rational utilization of all types, research on methods of obtaining increased efficiency in the production and distribution of energy, and research on means of effecting economies in the final consumption of energy.

- Industrial productivity and technology (Chapter 6 NABS)

This chapter covers all research on industrial products and their production methods, including industrial applications of radiation and nuclear techniques.

- Exploration and exploitation of space (Chapter 8 NABS)

This research comprises all civil research projects in this field, particularly on launchers, satellites, orbiting space stations, etc.

R&D envisaged for primarily human and social objectives:

- Planning of the human environment (Chapter 2 NABS)

This chapter comprises all research connected with land development, construction and planning of buildings, civil engineering, new transport systems, new techniques in telecommunications systems and water supply.

- Protection and improvement of human health (Chapter 3 NABS)

This chapter includes, in addition to purely medical research, research on food hygiene and nutrition and, above all, research on pollution.

- Social and sociological problems (Chapter 7 NABS)
- The purpose of the research grouped under social sciences and humanities is to understand, and as far as possible to solve, problems of life in society. This research extends from systems analysis and planning via education and vocational training and improvement of working conditions to research on social relationships and conflicts.

Estimates in the NABS chapters (1975 version) for 1970 and 1972

Any change in the Nomenclature poses the problem of the continuity of the time series. The best solution to this problem would be to update the basic data in accordance with the new Nomenclature. For practical reasons this cannot be done, however.

The only breakdown available is that of the 1974 data in accordance with the old and the new versions of the NABS; however, it is not possible to calculate rational and complete transitional formulae as there are not enough sub-sections in the new version. The following method was therefore used to obviate the difficulty:

- a) Comparison of the concordance of the chapters of the 1975 version of the NABS with the 2- or 3-digit sections of the old Nomenclature in order to determine the essential groupings in the old version which might correspond with the new chapters.
- b) On the basis of this model, coefficients were calculated for each country for 1974 in order to permit the transition from the old NABS groupings to the chapters of the new version.
- c) By means of these coefficients, R&D expenditure by chapters of the 1975 version of the NABS was calculated on the basis of the data for 1970 and 1972 given in the old breakdown; this is expenditure in u.a. per head of population only, which affords a good basis for comparison between the various countries.

The estimate is based on assumptions which are difficult to prove; in particular, it cannot be stated whether the coefficients are really valid for all previous years. The result of the calculations seems to give a workable size, however, but great care should be taken when interpreting them.

Comparison between public expenditure on R&D in EC and USA

The comparison between the Community and the United States is based on the publication of the National Science Foundation's "An Analysis of Federal R&D Funding by Function", Surveys of Science Resources Series, NSF 74-313 and which bears down upon the Federal American Budget.

For purposes of comparison, dollars have been converted into u.a. at the exchange rate of 1 u.a. = 1.41 Dollar.

For description of primarily technological objectives, the following functions have been considered:

1. Space
2. Energy development and conversion
3. Science and technology base
4. Natural resources (without food)

The primarily human social objectives include:

1. Health
2. Environment
3. Transportation and communications
4. Income security and social services
5. Area and community development, housing
6. Crime prevention and control

For the Community research on the exact and natural sciences (NABS 10.1) and engineering research (NABS 10.4) out of general promotion of knowledge (NABS 10) have been added to the technological objectives, medical research (NABS 10.3) and research on the social sciences and humanities (NABS 10.5) to the human social oriented research.

R e f e r e n c e D a t a

(see Table 11 of the Statistical Annex)

R&D expenditure as a proportion of the total national budgets

The proportion of the total national budget set aside for R&D establishes the importance of research in the individual countries.

The reference figures for the total budget in the annual reports on public R&D expenditure are taken for all the countries from the tables of the Commission's Directorate-General for Economic and Financial Affairs. The definition of total budget in central government corresponds to that used for budgetary appropriations for R&D.

The amounts in question are provisional figures for the current year, as in the case of R&D expenditure, and actual payments for preceding years, except in the cases of Belgium, where expenditure is recorded at the allocation stage, and the Netherlands, where expenditure is recorded partially at the allocation stage and partially after commitment.

R&D expenditure per head of population

The same series of population figures is used as the basis for per capita calculations of R&D expenditure as for the corresponding calculations in the integrated economic accounts.

The total population of a country is defined by the ESA as all persons, national or foreign, resident in that country on a given date, even if they are temporarily absent from it (see § 802). The annual average population or the population as at 30 June is used.

R&D expenditure per 10 000 u.a. of the gross domestic product

The calculation of R&D expenditure per 10 000 u.a. of the gross domestic product links public R&D expenditure to the total production of goods and services within the individual economies. The gross domestic product is defined in accordance with § 128 of the ESA.

Conversion into units of account

Conversion of non-floating currencies to u.a. is based on International Monetary Fund (IMF) parities and, in accordance with the Washington Agreement (December 1971), on parities or central rates. Should a parity change occur during the year, a weighted pro rata temporis exchange rate is applied.

Conversion of floating currencies (£ since 23 June 1972, Lit since 14 February 1973 and FF from 21 January 1974 to 10 July 1975) is based on market rates between these currencies and the u.a. These market rates are determined as follows :

- For every non-floating Community currency, the following is calculated :
 - the equivalent value in u.a. on the basis of central rates, and
 - the equivalent value in the floating currency at the market rate.
- A market rate between the u.a. and the floating currency can be determined in stages from each non-floating currency, on the basis relationship between these equivalent values.
- From the simple arithmetical mean of the market rates for floating currencies, worked out from the non-floating currencies, their average market rates in terms of u.a. can be established.

This procedure corresponds to that used for conversions within the integrated economic accounts.

To convert the final budgetary appropriation values, the annual average exchange rates are used; for the provisional appropriations the March exchange rates of the year in question are used, for practical reasons.

Price-adjusted Series

The price-adjusted series on trends in R&D expenditure are calculated in the form of indices on the basis of the data in national currencies; the consumer price index, as published monthly by EUROSTAT in "General Statistics", is used for price-adjustment purposes.

Estimates of price-adjusted series for the Community take the form of weighted averages of the price-adjusted series of the Member States; weighting is based on the contribution of the various countries to Community R&D expenditure in 1970.

Deflation of data on a current year, for which no average price-index is yet available, is a methodological problem.

In this report the March 1975 values of the consumer price indices have been used for the charts for 1975. These indices correspond approximately to the price-level at the time R&D appropriations were determined, but do not cover the total evolution of prices for the whole year.

For information the June 1975 values of the consumer price indices are included in Table 11 of the Statistical Annex. As to the analysis of the evolution in relation to the previous year, the evolution of the consumer price indices from March 1974 until March 1975 have been taken into account.

List of the publications
of the Statistical Office of the European Communities (EUROSTAT)
on public financing of R&D

- Recherche scientifique et comptabilité nationale
Etudes et enquêtes statistiques n° 1/1968

- Public financing of research and development in the Community countries
Analysis by objectives 1967-1970
Report by Statistical Experts Group of the Working Group on "Scientific
and Technical Research Policy" (PREST)
Statistical Studies and Surveys 1970 - EUR 4532

- Public expenditure on Research and Development in the Community countries -
Analysis by objectives 1967-1971
2nd Report by Statistical Experts Group to the Working Group on
"Scientific and Technical Research Policy" (PREST)
Statistical studies and surveys Nr 2/1971

- Public expenditure on Research and Development in the Community countries -
Analysis by objectives 1968-1972
3rd Report by Statistical Experts Group to the Working Group
"Scientific and Technical Research Policy" (PREST)
Statistical studies and surveys Nr 1/1972

- Public expenditure on Research and Development in the Community countries -
Analysis by objectives 1969-1973
1st Report from the Sub-Committee "Statistics" to the "Committee on
Scientific and Technical Research" (CREST)
Statistical studies and surveys Nr 1/1974

- Public expenditure on Research and Development in the Community countries -
Summary analysis by main Research and Development Objectives 1973-1974
2nd Report from the Sub-Committee "Statistics" to the "Committee on
Scientific and Technical Research" (CREST)
Statistical studies and surveys Nr 1/1975

- Nomenclature for the analysis and comparison of scientific programmes
and budgets (NABS) - 1975 version
EUROSTAT/200/75/1

List of members of Sub-committee "Statistics"
of the "Committee on Scientific and Technical Research" (CREST)

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