# Business enterprise research and development, 1997 / Office of National Statistics.

## Contributors

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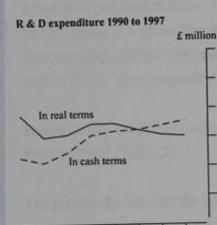
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# **First Release**

# **Business Enterprise Research** and Development 1997

12000

In 1997, in cash terms and compared to 1996:



1990 1991 1992 1993 1994 1995 1996 1997

- Total expenditure increased by two per cent to £9.6bn
- Civil expenditure increased by two 11000 . per cent to £8.2bn 10000
- Defence expenditure increased by 9000 four per cent to £1.3bn. 8000
- In 1997, in real terms (1995 prices) and 7000 compared to 1996:

Total expenditure decreased by one per cent to £9.0bn

- Civil expenditure decreased by one per cent to £7.8bn
- Defence expenditure increased by one per cent to £1.3bn.

## Expenditure performed by Business Enterprise in cash & real terms 1993 to 1997

UK Businipana	W Spellik (	Services of	£million				
	1993	1994	1995	1996r	1997	96-97	
In cash terms	South Parts	internet los 1					
Civil	7,710	7,770	7,863	8,065	8,209	+2	
Defence	1,359	1,433	1,391	1,297	1,343	+4	
Total	9,069	9,204	9,254	9,362	9,553	+2	
In real terms (199	5 prices)						
Civil	8,048	7,996	7,863	7,824	7,762	-1	
Defence	1,419	1,475	1,391	1,258	1,270	+1	
Total	9,466	9,472	9,254	9,082	9,033	-1	
r = revised	10 M 10						

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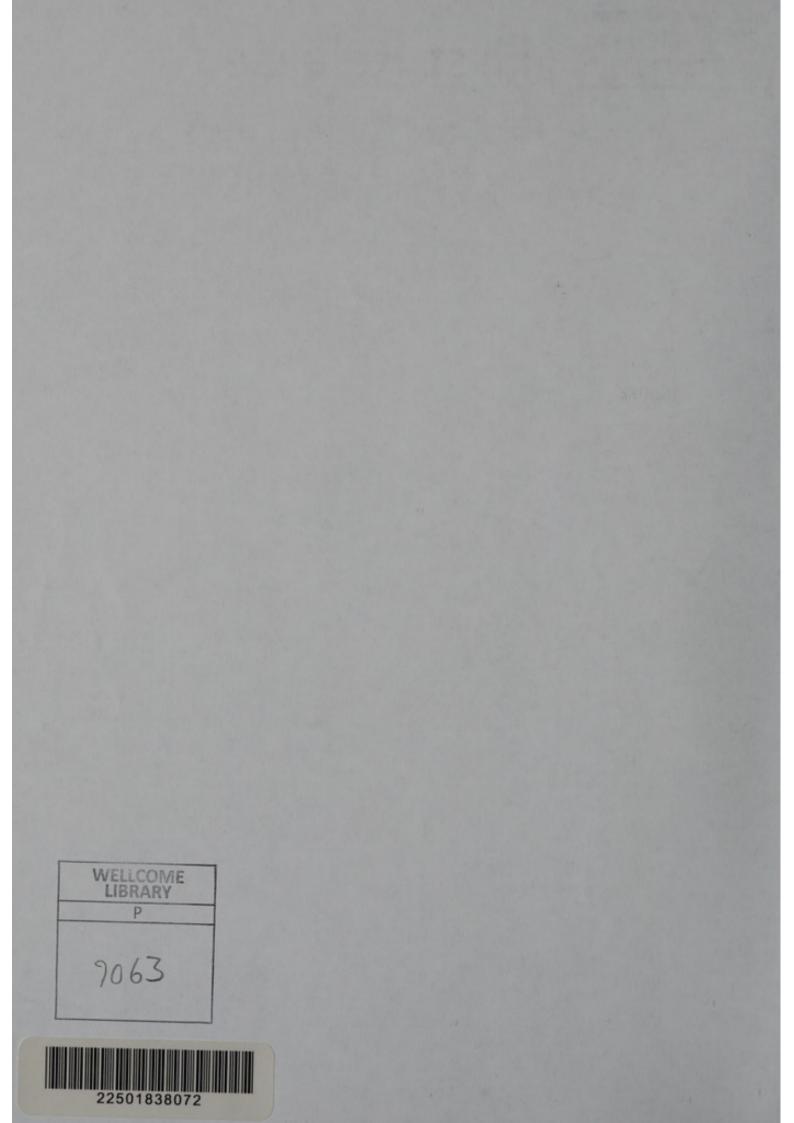
0171-533 6363/6364 Statistician Peter Jones

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Next publication date To be announced

Prepared by the Government Statistical Service





#### UK Business Enterprise R&D 1997

Expenditure on R&D performed in UK businesses: cash and real terms; 1990 to 1997 (Table 1)

In 1997, £9.6 billion was spent on R&D performed within UK businesses a rise of 2 per cent at current prices compared to the 1996 total. In real terms (using the gross domestic product (GDP) deflator), expenditure decreased by one per cent and in 1997 represented approximately 1.2 per cent of GDP. This proportion has declined from 1.5 per cent in 1990.

Expenditure	on	R&D	performed	in	UK	businesses:	product	groups,
1990 to 1997	(Ta	ble 2)						

The product group with the largest R&D expenditure was pharmaceuticals: expenditure in 1997 was £2,151 million, 23 per cent of all spending. Other major product groups were motor vehicles and parts accounting for £963 million (10 per cent) and aerospace £893 million (9 per cent).

## Sources of funds for R&D performed in UK businesses: 1990 to 1997 (Tables 3 and 6)

Funding of R&D from businesses' "own funds" was £6,103 million in 1997 (64 per cent of the total). Funding of R&D in UK businesses from abroad was £1,856 million in 1997 (19 per cent of the total). Funding of R&D in UK businesses by the UK Government was £927 million in 1997 (10 per cent of the total). This proportion has declined from 17 per cent in 1990.

#### Employment on R&D performed in UK businesses: 1990 to 1997 (Table 4)

The number of staff employed on R&D decreased by 3 per cent between 1996 and 1997. The number of scientists and engineers employed on R&D remained fairly static between 1990 and 1997, whilst employment in other categories fell.

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Expenditure on R. S.D performed in U.S. bararesses and east state. 1990 to 1997 (Tel to 1)

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The product george with the latent is been inposition, whe plantaneously also appreciations in 1997, and 52,151 millions, 23 per local of all speeders. There is a local product george areas moder with our who are still part or all.

nomenessi famés na 12440 gerhansed is Ule babainers (260 to 1797) (Tables 3 and 5)

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Expenditure on R&D performed within UK businesses: civil and defence, by broad product group, 1992 to 1997 (Table 5)

In real terms, civil R&D fell by one per cent in 1997 and defence R&D increased by one per cent. In 1997 chemical products accounted for 34 per cent of the total civil R&D expenditure. The second largest civil R&D broad product group was services, accounting for 26 per cent of total civil R&D expenditure. Defence R&D continued to be dominated by aerospace and electrical machinery product groups.

# Regional breakdown for Business Enterprise expenditure on R&D in the UK, 1997 (Table 7)

The regions with the largest R&D expenditure were the South East and Eastern. Both accounted for 24 per cent of the total expenditure.

Expenditure on RAU performed within Lie braisewest civil roa defence, he broad product group, 1992 of 1997 (Table S)

In real recent, civil REDO fell by one per sent in 1997 and defines E.C.D. mentagent by use per rest. In 1997 chemical products accounted for 28 per earl of the toble with RED requiring the two definitions for the sent of the first bread product group was writered for accounting for 26 per cont of test civil RED representation. Defense & AD controlled in the decidented by strongence and electrical machinesy product groups

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The regions with the largest 10.2D expendence were the South East and Exaters. Both apparently we for part court for four-copenditions

# STATISTICS

#### **BACKGROUND NOTES**

#### The 1997 Survey

#### Sample design

- Between 1985 and 1993 there were four-yearly large scale surveys. The 1993 survey was the last large scale survey and since then ONS has moved to an annual small scale, stand alone sample survey based on a continually updated register of R&D performers.
- Approximately 1,600 forms were sent out to businesses believed to be performing R&D. These 1,600 companies were selected using a stratified sample.
- 3. The 364 largest R&D spenders in 1997 were all sampled. These accounted for 86 per cent of the 1997 total R&D expenditure figure. Smaller R&D performers and others believed to be performing R&D were selected using various sampling fractions. Industry group and company employment were the stratification variables.
- Completed forms were returned by 1,501 businesses, representing a response rate of 94 per cent.
- Estimates were made for the R&D activity of unsampled and nonresponding businesses.

#### Revisions to past data

- 1996 data have been revised where necessary to take into account misclassification and updated population information.
- GDP and GDP deflators used have been revised in line with the new European System of Accounts (ESA95) definitions. (See ONS National Accounts First Release dated 24 September 1998).

#### More detailed information

 A more detailed analysis of the results of this survey, and description of methods used, will be published in Business Monitor MA14, due for release in January 1999. It will be available from ONS Direct Tel: 01633 812078. & NATIONAL

#### EARCHOROLIND NOTES

#### The 1997 Survey.

#### states design

- Approximately 14.00 frame ware sent out to husinesses believed to be performing 1.8.00. These 1.300 companies were selected using a substituted sample.
- The New Sergers R&D speeders in 1997 were all sempled. These seconds for 26 per cent of the 1997 total R&D experiment figure. Standar RaD performing and others fellipted to be performing R&D were allocated using variant sampling frames. Industry storp and second organic organ were deserted forsize variables.
- Completed forms were returned by 1,501 businesses, opproximity, a remouse rate of 3-4 per cent.
- Softwates were wate for the R.4D strivity of cularchies and that responsions buildeness.

#### Warkshows to good data

- 1996 den have been revised where necessary to rike into account relation from and undered population information.
- A. OLP and GOP deflators used have been tevland in Los with the pro-European Spotence of Accession (1.5 A 25) deflations. (SectOP 5 Mail and Accounts Final Reference decod. 24 September 1993).

#### Nurve detailed tador tador ta

A more develoed analysis of the results of this survey, and development of methods used, will be published in Business Mouline M.S.I.S. due for release in January 1999. It will be available from ONS Deven Tail 01633 \$1,2078.



#### Definitions

#### Research and Experimental Development (R&D)

9. R&D and related concepts follow internationally agreed standards defined by the Organisation for Economic Co-operation and Development (OECD) and published in the Frascati manual. R&D is defined as "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of the stock of knowledge to devise new applications".

#### R&D performed in UK businesses

10. This refers to R&D performed in the UK within business enterprises. It excludes R&D funded by UK businesses that is performed overseas or in other sectors of the UK economy (such as higher education; government departments, agencies, and non-departmental public bodies; local authorities; and private non-profit organisations). Public corporations are counted as business enterprises.

#### **Product Groups**

 The broad product groups consist of aggregations of the detailed product groups. "Services" includes R&D consultancy and other services in support of manufacturing industry.

#### Employment

- Employment is calculated by respondents on the basis of "full-time equivalent" staff averaged over the year. The categories of employment used are:
  - Scientists and Engineers: professionals engaged in the conception or creation of new knowledge, products, methods and systems.
  - Technicians: qualified personnel who participate in R&D projects by performing scientific and technical tasks, normally under the supervision of professional scientists and engineers. They will usually have a scientific or engineering qualification.
  - Administrative and Other: other supporting staff, including skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

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#### **Rounding of Figures**

 There may be discrepancies between totals and the sum of their independently rounded components.

#### General

- For information on available aggregated data on Research and Development please contact Jane Morgan on 01633 813109, e-mail jane.morgan@ons.gov.uk.
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#### EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: CASH AND REAL TERMS AND AS A PERCENTAGE OF GDP 1990 TO 1997

		State of the second second	and the second	and the second second	100 million (1997)	2-7		Emillion
	1990	1991	1992	1993	1994	1995	1996	1997
DLBX	8 318	8 135	8 489	9 069	9 204	9 254	9 362	9 553
DLBC	9 779	9 006	9 096	9 466	9 472	9 254	9 082	9 033
DLIT	562 674	589 836	612 630	647 249	685 805	722 909	764 314	813 672
	1.5	1.4	1.4	1.4	1.3	1.3	1.2	1.2
	DLBC	DLBX 8 318 DLBC 9 779 DLBT 562 674	DLBX     8 318     8 135       DLBC     9 779     9 006       DLBT     562 674     589 836	DLBX     8 318     8 135     8 489       DLBC     9 779     9 006     9 096       DLIT     562 674     589 836     612 630	DLBX     8 318     8 135     8 489     9 069       DLBC     9 779     9 006     9 096     9 466       DLBT     562 674     589 836     612 630     647 249	DLBX     8 318     8 135     8 489     9 069     9 204       DLBC     9 779     9 006     9 096     9 466     9 472       DLBT     562 674     589 836     612 630     647 249     685 805	DLBX     8 318     8 135     8 489     9 069     9 204     9 254       DLBC     9 779     9 006     9 096     9 466     9 472     9 254       DLBT     562 674     589 836     612 630     647 249     685 805     722 909	DLBX     8 318     8 135     8 489     9 069     9 204     9 254     9 362       DLBC     9 779     9 006     9 096     9 466     9 472     9 254     9 082       DLBT     562 674     589 836     612 630     647 249     685 805     722 909     764 314

1995 = 100							Sour	ce: Offic	e for Nationa	onal Statisti	
	1990	1991	19	992	1993	1	994	1995	1996	1997	
GDP deflator used to convert cash terms to real terms DLXX	85.1	90.3	9	3.3	95.8		97.2	100.0	103.1	105.0	
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#### EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES: DETAILED PRODUCT GROUPS, 1990 TO 1997

			-			-				£million
					£m	illion				% of total
and the second	_	1990	1991	1992	1993	1994	1995	1996	1997	1997
TOTAL	DLBX	8 318	8 135	8 489	9 069	9 204	9 254	9 362	9 553	100
Agriculture, hunting and forestry; Fishing	DLBY	67	76	80	89	80				
Extractive Industries	DLBZ	115	129	126	62	66	65	64	44	0.5
Food products and beverages; Tobacco products	DLCP	196	196	225	191	228	189	198	180	1.9
Textiles, clothing and leather products	DLCQ	19	23	25	44	22	23	27	33	0.3
Pulp, paper and paper products; Printing and publishing; Wood and straw products	DLCT	48	43	44	40	44	39	57	44	0.5
Refined petroleum products and coke oven products; Processing of nuclear fuel	DLCE	373	369	386	370	354	377	364	349	3.7
Chemicals, man-made fibres	DLCC	722	707	720	721	689	701	627	680	7.1
Pharmaceuticals, medical chemicals and botanical products	DLCD	1 206	1 199	1 4 4 6	1 679	1 820	1 813	1 852	2 151	22.5
Rubber and plastic products	DLCR	46	35	25	67	72	60	67	60	0.6
Other non-metallic mineral products	DLCS	53	44	43	42	56	54	60	47	0.5
Casting of iron and steel	DLCJ	50	40	43	50	51	46	39	39	0.4
Non-ferrous metals	DLCK	31	24	22	16	15	20	15	15	0.2
Fabricated metal products	DLCL	52	48	63	72	72	100	91	88	0.9
Machinery and equipment	DLCO	480	490	517	593	689	583	514	552	5.8
Office machinery and computers	DLCN	471	327	256	252	134	150	161	102	1.1
Electrical machinery and apparatus	DLCA	502	518	523	576	567	494	490	424	4.4
Radio, television and communication equipment	DLCB	593	484	479	558	517	602	662	655	6.9
Precision instruments	DLCM	268	276	283	312	273	303	307	336	3.5
Motor vehicles and parts	DLCG	571	605	636	682	669	795	946	963	10.1
Other transport equipment	DLCI	16	17	18	17	24	18	30	27	0.3
Shipbuilding and repairs	DLCH	33	16	16	18	17	20	20	15	0.2
Aerospace	DLCF	984	1 005	898	782	860	886	812	893	9.3
Furniture; Other manufactured goods	DLCU	20	20	22	28	28	21	16	25	0.3
Recycling	DLCV	1	1	1	1	1		1	-	-
Electricity, gas and water supply	DLCW	188	192	187	214	177	168	148	130	1.4
Construction	DLCK	19	19	15	11	11	8	8	10	0.1
Wholesale and retail trade	DLDE	4	4	4	5	6	8	4	5	0.1
Transport and storage	DLCY	7	8	10	13	8	15			
Post and telecommunications	DLCZ	341	317	386	389	408	414	455	496	5.2
Miscellaneous business activities; Technical testing and analysis	DLDC	144	146	156	195	181		141	112	1.2
Computer and related activities	DLDB	435	494	555	635	744	675	749	703	7.4
Research and development services	DLDA	244	244	261	329	311	247	389	333	3.5
Public administration	DLDD	19	19	18	16	10	14	17	13	0.1

1 .. denotes disclosive figures.

Source: Office for National Statistics

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#### SOURCES OF FUNDS FOR R&D PERFORMED WITHIN UK BUSINESSES: 1990 TO 1997

A State of the second se	and the second second							CALCULATE STATE	£million
		1990	1991	1992	1993	1994	1995	1996	1997
£ MILLION									
TOTAL	DLBX	8 318	8 135	8 489	9 069	9 204	9 254	9 362	9 553
UK Government	DLDO	1 392	1 189	1 171	1 129	1 088	1 050	899	927
Overseas total of which:	DLHK	1 289	1 299	1 270	1 398	1 474	1 748	2 047	1 856
EC Programmes All other funding from abroad	DLDQ DLDS	Ξ	Ξ	-	104 1 294	83 1 390	99 1 649	140 1 908	117 1 739
Other UK Business	DLDU	478	498	565	613	583	731	723	667
Own funds	DLDW	5 160	5 149	5 483	5 903	6 040	5 723	5 688	6 103
Other	DLDY	-	-	-	26	19	3	5	1
		1990	1991	1992	1993	1994	1995	1996	1997
PERCENT									
TOTAL	DLDN	100	100	100	100	100	100	100	100
UK Government	DLDP	17	15	14	12	12	11	10	10
Overseas total of which:	DLHL	15	16	15	15	16	19	22	19
EC Programmes All other funding from abroad	DLDR DLDT	:	-	-	1 14	1 15	1 18	1 20	1 18
Other UK Business	DLDV	6	6	7	7	6	8	8	7
Own funds	DLDX	62	63	65	65	66	62	61	64
Other	DLDZ	-	-	-	-	-	-	-	-

1 From 1990 to 1992 source of funds for "other" was included with own funds. 2 - denotes nil, figures unavailable or too small to display.

Source: Office for National Statistics

# Other UK Government 0% 10% **Overseas - EC** 1% Overseas - Other 18% **Own Funds** Other UK Business 64% 7%

## Sources of funds for business R&D, 1997

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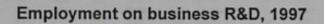
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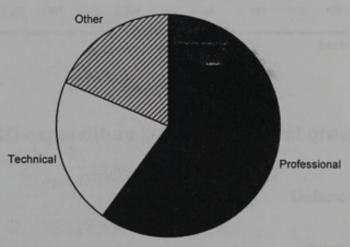


# EMPLOYMENT ON R&D PERFORMED WITHIN UK BUSINESSES: 1990 TO 1997

	the second s					17	Full time equivalent in th			
		1990	1991	1992	1993	1994	1995	1996	1997	
TOTAL	DLEI	171	159	159	164	157	146	143	13	
Scientists and engineers	DLEJ	83	80	82	86	83	83	83	8	
Technicians, laboratory assistants and draughtsmen	DLEK	43	38	38	40	40	33	33	30	
Administrative, clerical industrial and other staff	DLEL	45	41	39	37	34	30	27	26	
As % of total employment										
Scientists and engineers	DLEM	48	50	51	52	53	57	58	60	
Technicians, laboratory assistants and draughtsmen	DLEN	25	24	24	24	25	23	23	22	
Administrative, clerical industrial and other staff	DLEO	27	26	25	23	22	20	19	15	

Source: Office for National Statistics





Professional = Scientists and engineers
Technical = Technicians, lab assistants and draughtsmen
Other = Admin, clerical, industrial and other staff

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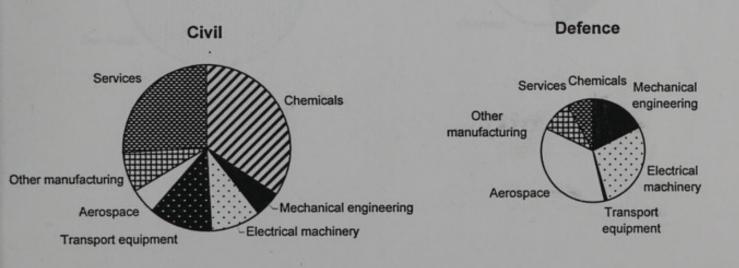
#### EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN UK BUSINESSES BY BROAD PRODUCT GROUPS, 1992 TO 1997

				C	ivil						Defe	ence		
		1992	1993	1994	1995	1996	1997		1992	1993	1994	1995	1996	1997
In cash terms														
TOTAL	DLEV	7 092	7 710	7 770	7 863	8 065	8 209	DLBW	1 397	1 359	1 433	1 391	1 297	1 343
Manufacturing	DLEP	5 050	5 550	5 534	5 603	5 787	6 094	DLEX	1 254	1 193	1 314	1 291	1 205	1 234
Chemicals	DLEQ	2 238	2 473	2 590	2 511	2 477	2 829	DLEY	20	26	10	3	2	2
Mechanical engineering	DLER	325	398	405	395	395	407	DLEZ	236	246	335	266	210	232
Electrical machinery	DLES	885	999	827	823	896	803	DLFA	357	377	379	423	417	377
Transport equipment	DLET	574	622	661	823	987	994	DLFB	64	59	14	10	10	11
Aerospace	DLEU	403	374	380	413	359	412	DLFC	493	412	481	473	453	481
Other manufacturing	DLEV	625	684	671	639	673	648	DLFD	84	73	95	116	113	131
Services	DLEW	2 042	2 160	2 236	2 260	2 277	2 115	DLFE	143	166	120	99	92	109

			Civil							Defence					
		1992	1993	1994	1995	1996	1997	-	1992	1993	1994	1995	1996	1997	
In real terms (1995 prices)															
TOTAL	DLBA	7 599	8 048	7 996	7 863	7 824	7 762	DLBB	1 497	1 4 1 9	1 475	1 391	1 258	1 270	
Manufacturing	DLBD	5 411	5 793	5 695	5 603	5 614	5 762	DLBL	1 344	1 245	1 352	1 291	1 169	1 167	
Chemicals	DLBE	2 398	2 581	2 665	2 5 1 1	2 403	2 675	DLBM	21	27	10	3	2	2	
Mechanical engineering	DLBF	348	415	417	395	383	385	DLBN	253	257	345	266	204	219	
Electrical machinery	DLBG	948	1 0 4 3	851	823	869	759	DLBO	383	394	390	423	405	356	
Transport equipment	DLBH	615	649	680	823	958	940	DLBP	69	62	14	10	10	10	
Aerospace	DLBI	432	390	391	413	348	390	DLBQ	528	430	495	473	439	455	
Other manufacturing	DLBJ	670	714	691	639	653	613	DLBR	90	76	98	116	110	124	
Services	DLBK	2 188	2 255	2 301	2 260	2 209	2 000	DLBS	153	173	123	99	89	103	

Source: Office for National Statistics

## Civil and defence R&D expenditure by broad product groups, 1997



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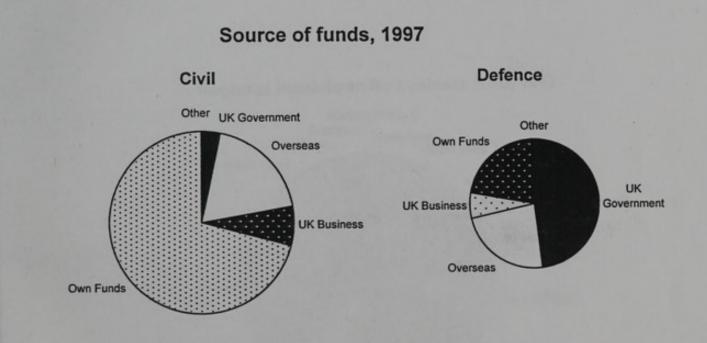
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#### SOURCES OF FUNDS FOR CIVIL AND DEFENCE R&D IN UK BUSINESSES: 1992 TO 1997

				C	ivil						Defe	ence		
		1992	1993	1994	1995	1996	1997		1992	1993	1994	1995	1996	1997
UK Government	DLFG	478	390	363	321	253	280	DLFN	693	739	726	729	646	646
Overseas total of which:	DLHS	981	1 103	1 135	1 419	1 755	1 543	DLIF	289	295	338	329	292	313
EC Programmes All other funding from abroad	dlfh Dlfi		104 999	83 1 052	99 1 320	140 1 615	117 1 426	DLFO DLFP	1	295	338	329	292	- 313
Other UK Business	DLFJ	430	537	505	672	655	580	DLFQ	135	76	78	59	68	87
Own	DLFK	5 203	5 660	5 749	5 449	5 397	5 805	DLFR	280	242	292	274	290	298
Other	DLFL	-	20	18	3	5	1	DLFS	-	6	-	-	-	-
TOTAL	DLBV	7 092	7710	7 770	7 863	8 065	8 209	DLBW	1 397	1 359	1 433	1 391	1 297	1 343

Source: Office for National Statistics

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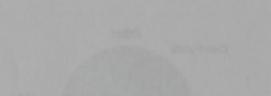


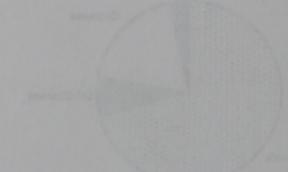
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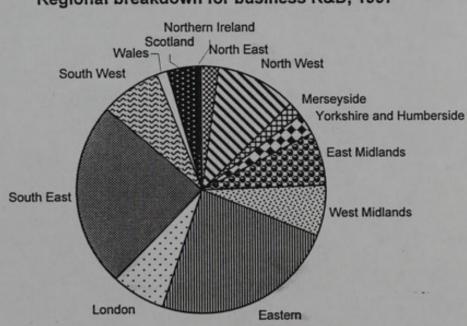




#### GOVERNMENT OFFICES REGIONAL BREAKDOWN OF R&D PERFORMED WITHIN UK BUSINESSES: EXPENDITURE AND EMPLOYMENT, 1997

		Expenditure £million 1997		% of total 1997		Employment FTE in thousands 1997
United Kingdom	DLBX	9 553	DLDN	100	DLEI	139
England	DLKI	9 003		94.2	DLKJ	129
North East North West and Merseyside	DLJO	216		2.3	DLJE	4
North West	DLJT	999		10.5	DLKE	14
Merseyside	DMRG	188		2.0	DMRH	3
Yorkshire and Humber	DLJP	256		2.7	DLKA	14 3 6
East Midlands	DLJQ	679		7.1	DLKB	11
West Midlands	DLJN	647		6.8	DLJY	
Eastern	DLJR	2 303		24.1	DLKC	12 28 9 30
London	DLKL	659		6.9	DLKM	9
South East	DLJS	2 296		24.0	DLKD	30
South West	DLJM	760		8.0	DLJX	12
Wales	DLJU	113		1.2	DLKF	2
Scotland	DLJV	356		3.7	DLEG	7
Northern Ireland	DLJW	81		0.8	DLEH	2

Source: Office for National Statistics



## Regional breakdown for business R&D, 1997

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