

Executive Summary

Introduction

- This evaluation of the Applied Research Programme (ARP) has been prepared for the Science and Technology Evaluation Unit (STEU) of Forfás by Fitzpatrick Associates, Economic Consultants. Under the Programme Forbairt (and previously Eolas) part-funds joint college-company applied research projects in the 18 technological colleges ie Dublin Institute of Technology and Regional Technological Colleges. The Programme operates as a counterpart to the Higher Education Industry Co-operation (HEIC) programme, which involves similar assistance to university research.
- The present review examines the performance of the Programme over the six years 1989-94 inclusive. The evaluation involved an examination of ARP data and records, a postal survey of participant companies, visits to participating technological colleges, and interviews with key informants. The principal conclusions and recommendations are presented in this Executive Summary. More detailed conclusions and recommendations are contained in Chapter 6 of the Main Report.
- Over the six-year period under review (1989-94) the ARP provided a total of £5 m in support of applied research in the colleges. Some 285 companies participated, involving 381 joint projects in the 18 colleges. Company participants were principally small indigenous ones - 80% of the survey respondents were Irish owned, half of them have 50 employees or less. All technological colleges participated to some extent. The main college participants were Kevin Street (DIT), and Cork, Carlow and Athlone RTCs. Together these accounted for 50% of the projects and 53% of total project costs.

Main Conclusions

- The Programme is perceived by participating companies as a useful, relevant and beneficial one. Over 90% of respondent firms stated that they would participate in the Programme again, while over 85% rated it as "medium" or "high" in terms of relevance to their needs. The Programme also compared well in practice with companies' overall expectations. This was particularly so in relation to technical outcome and to the overall college-company collaborative experience. While two-thirds of the respondents indicated that the practical capability of the colleges is rising, the level of commercial expertise within colleges is not rated highly by companies.
- The participant companies' assessment of how the Programme was run were also generally positive. Areas where concerns were indicated are in relation to the promotion of the Programme and the low level of assistance available in locating academic partners. The college researchers and the college Industrial Liaison Officers (ILOs) are generally strongly positive about Programme management. Particular compliments were paid in relation to non-bureaucratic flexibility and speed of response. Some concerns were expressed in relation to recent developments through which the Programme would appear to colleges to be more bureaucratic and subject to longer approval delays, as well as to some continued vagueness in relation to selection criteria.
- Largely reflecting the size of the Programme, its overall level of penetration of the industrial sector is relatively low. A total of 285 companies participated in the programme over the 1989-94 period. This compares with a total of about 4,600 manufacturing companies, 3,800 indigenous manufacturing companies, and 670 identified R&D performers;
- The Programme appears to have avoided a high level of "repeat business", ie multiple projects among a few companies something which would have further

Evaluation of the Applied Research Programme 1988-94

limited its market penetration. Nearly 80% of companies had just one project during the 1989-94 period. The ARP has therefore helped to establish new college-company links.

- During the period covered by the evaluation, the orientation of college culture towards industry has clearly improved considerably. Companies were of the view that colleges' industrial orientation is improving. ARP has undoubtedly contributed to this. However, it has done so as part of an overall package of influences rather than as a stand alone intervention.
- About 80% of responding companies indicated that they either had or would use the results arising from their ARP project. The main type of commercially applicable results achieved, or likely to be achieved, were new or improved products.
- The majority of companies viewed the Programme as "complementary" rather than as "competing" with other national programmes. There was also evident complementarity between ARP and the Industrial Liaison Officer scheme. The population of ARP companies also has relatively little overlap with other programmes such as HEIC, R&D Grants, or the Industry R&D Initiative. This indicates that the Programme has helped entice new indigenous firms into research and development.
- The evaluation highlighted a number of important information deficiencies which should be remedied in order to improve future monitoring, reporting, evaluation and assessment of the Programme. There is a need to collect more quantifiable data on the impact of the Programme on participating colleges, and in particular its human resource and employment impact. There is also a need to improve the level of basic company information in terms of company participation, ownership, size and sector.

Recommendations

1. An "ARP function" should continue within the overall S&T spend, ie assistance should continue to be available to support links between technological colleges and companies in the area of applied research.
2. We recommend in favour of amalgamation of the existing ARP and the HEIC into a new "Higher Education Industry Research Programme". This should be a new Programme, rather than absorption of ARP into the existing HEIC. The amalgamation of these two programmes will ensure that the new Programme will achieve a minimum efficient size and should lead to some economies of scale in administration.
3. Some increased resources should be devoted to managing, monitoring and promoting the new Programme, with a specific identifiable budget for these functions. In addition, attempts should be made to have a stable Programme budget for a number of years.
4. The Programme should sharpen its objectives generally. In particular it should re-focus on the objective of "building links between colleges and companies", as opposed to merely supporting collaborative R&D as such. The priority for a new joint ARP/HEIC should therefore be on promoting new research and development links between colleges and companies.
5. To allay technological colleges' fears of being "swamped" by universities in a single joint Programme, a proportion of the budget could be reserved for some years for technological colleges;
6. The existing 75% grant rate should be reduced to 50%, but with flexibility for first-time participating companies to contribute half of their contribution (25% of total) in genuine in-kind form (including labour);

Evaluation of the Applied Research Programme 1988-94

7. The clarification or removal of Forbairt's provision on intellectual property rights/royalties;
8. Companies and colleges should be equally eligible to make applications and sign contracts, and company eligibility should be unambiguously extended beyond manufacturing to include the services sector;
9. ARP is only one component of a wider relationship between Forbairt and the technological colleges. It is therefore timely to consider the option of replacing existing small separate "vertical" schemes, each interfacing independently with the college, with a more college-specific "programme approach". Such an approach would mean that the various separate components could be brought together into a single annual programme of Forbairt support in colleges. However, this option has implications wider than those of the present evaluation. A possible approach to such a coordinated Programme framework is set out in Chapter 6 (Section 6.10).

Introduction

This report presents the results of an evaluation of the Applied Research Programme (ARP) carried out by Fitzpatrick Associates, Economic Consultants for the Science and Technology Evaluation Unit (STEU) of Forfás. The review deals with the six years 1989-94 inclusive.

The report contains six chapters. Chapter 1 summarises the objectives of the evaluation, its methodology and work programme. Chapter 2 provides background on the technological college sector at which ARP was directed. Chapter 3 contains an overview of the Applied Research Programme. Chapter 4 provides a profile of ARP projects. Chapter 5 contains the findings of the survey of participating companies. Chapter 6 presents the issues arising, the conclusions and recommendations.

1. Objectives, Methodology and Work Programme

This report presents the results of an evaluation of the Applied Research Programme (ARP) carried out by Fitzpatrick Associates, Economic Consultants for the Science and Technology Evaluation Unit (STEU) of Forfás. The review deals with the six years 1989-94 inclusive.

1.1 Objectives

The objectives of this evaluation of the Applied Research Programme, adopted from the Terms of Reference, are to determine:

- a) the relevance of ARP to the problems and needs of industry, particularly indigenous companies;
- b) the Programme's success in meeting its existing objectives, and the appropriateness of these objectives for the future;
- c) the efficiency and effectiveness of the Programme's operating procedures;
- d) the Programme's market penetration in terms of company characteristics and participating colleges;
- e) the degree to which the Programme has stimulated an industry-oriented research culture and capability in the RTC sector;
- f) the extent to which completed ARP projects are commercially implemented;
- g) the Programme's complementarity with other national programmes.

The evaluation has concentrated on projects assisted during the period 1989-94, which corresponds to the period for which project level data are available. However, the report also takes account of available information covering the programme prior to this.

1.2 Methodology and Work Programme

The evaluation involved six phases:

1. initial consultations with ARP management, current and recent, and with STEU in order to obtain background information on the scheme, to clarify the availability of data and to discuss the methodology.
2. an analysis of available management data covering finance, projects, participating colleges and companies. This was carried out in order to provide an overall profile of ARP projects by company, college, regional location and expenditure over the 1989-94 period.
3. a survey of companies involved in ARP during the years 1989-94. This focused on individual projects. Questionnaires relating to 342 projects were despatched by post to 262 contacts in 233 companies (and institutions). After intensive follow-up replies were received from 144 projects (42%). However, 55 of these indicated that either the company or person responsible for the project had moved, that it was too early to assess the project or that the company had ceased trading. Out of the remaining 287 questionnaires 89 were completed giving an effective 31% project response rate.
4. ten of the 14 participating colleges were visited in order to interview participant staff, researchers, Industrial Liaison Officers and heads of development. Representatives of all of the participating colleges were consulted by letter and phone.
5. interviews with the various personnel involved in the programme's operation and management, as well as with the industrial development agencies. This included consultation with ARP management, Forbairt, Forfás, Shannon Development, Udaras na Gaeltachta, Department of Enterprise and Employment, and IBEC.
6. formulation of conclusions and recommendations and drafting the report.

2. Overview of Technological Colleges

2.1 Types of College

The Applied Research Programme operated with the technological colleges. These colleges constitute the bulk of non-university third-level education in Ireland. The sector currently consists of 16 colleges in two distinct categories:

- (a) the five Dublin Institute of Technology (DIT) technological colleges - Bolton Street, Kevin Street, College of Commerce, Cathal Brugha Street, and the College of Marketing and Design;
- (b) the 11 Regional Technical Colleges (RTCs) - Cork, Waterford, Galway, Carlow, Dundalk, Tralee, Sligo, Athlone, Limerick, Letterkenny and Tallaght.

The two groups of colleges share a recent administrative origin within the VEC system. However, their longer-term historical origins are quite distinct. The DIT Colleges each originated separately in the pre-independence second level "technical school" vocational training system in Dublin. Kevin Street was established in the 1890s and Bolton Street in the 1900s. The other colleges were established later.

The colleges were absorbed into the mainly second-level VEC system after the 1930 VEC Act (recently replaced). DIT was initially established as a loose federation within the Dublin VEC in the 1960s.

The RTCs are of much more recent origin. With the exception of the new college at Tallaght, these were established during the late 1960s and early 1970s as part of the educational reform and development of that period.

The technological colleges now constitute a major portion of the third-level education sector. For example, in the academic year 1992-93 nearly 40% of third level full-time students were in the RTC/DIT sector (which also includes the non-technological DIT colleges), as against only 5% in the mid-1960s (Table 2.1).

Table 2.1: Full-Time Student Numbers by Third Level Sector, Selected Years 1965/66-1992/93

	1965/66		1975/76		1980/81		1985/86		1992/93	
	No.	%	No.	%	No.	%	No.	%	No.	%
Universities/RCSI/ NCAD	16,007	77	23,121	70	26,104	63	23,388	59	47,839	57
RTCs/DIT	1,007	5	6,331	19	10,910	26	18,953	34	32,198	38
Colleges of Education/ Other Aided	1,679	8	2,238	7	3,164	8	2,212	4	991	1
Non-Aided	2,005	10	1,313	4	1,338	3	1,534	3	3,045	4
Total	20,698	100	33,003	100	41,516	100	55,087	100	84,073	100

Source: HEA

A key feature of Table 2.1 is the extent to which the technological colleges absorbed growth in third-level education numbers over the past 30 years. Between 1965/66 and 1992/93 the third-level full-time student population grew from under 21,000 to over 84,000, ie by over 63,000. This growth in numbers was shared approximately equally by the universities and the technological colleges (ie somewhat over 30,000 each) despite their very differing starting

Evaluation of the Applied Research Programme 1988-94

points. In the mid-1960s the universities already had about 16,000 students, whereas the technological colleges only had about 1,000.

The overall figures also underestimate the technological colleges' importance in two ways. First, their student population is much more concentrated in technological and business subjects than that of the universities, with a correspondingly low involvement in the arts and humanities (see Table 2.2). Second, the technological colleges have a large number of part-time students not captured in the figures in Table 2.1.

Table 2.2: Student Population by Discipline, 1992/93, (%).

	<u>Universities</u>
Arts, Law	43
Business	16
Engineering/Architecture	13
Medicine/Dentistry	9
Science/Agriculture/Veterinary	19
Other	0
	<u>100</u>

Source: HEA

Evaluation of the Applied Research Programme 1988-94

2.2 Technological Colleges by Size

Table 2.1 shows the combined role of the RTCs/DIT in overall third level education, and the rapid growth in this over the last two decades. Table 2.3 shows the respective size of the RTC and DIT groups within this, and the size of individual colleges.

Table 2.3 Total Full-time enrolment at Third Level Colleges

	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
R.T.C.								
Athlone	1,448	1,253	1,228	1,464	1,829	1,989	2,032	2,023
Carlow	1,521	1,562	1,630	1,785	1,994	2,104	2,063	2,096
Cork	1,704	1,811	1,952	2,008	2,243	2,385	2,632	3,146
Dundalk	1,012	1,081	1,152	1,347	1,580	1,766	1,943	1,967
Galway	1,532	1,627	1,817	1,919	1,989	2,220	2,217	2,772
Letterkenny	663	691	700	874	874	1,130	1,295	1,462
Waterford	1,751	1,848	2,136	2,330	2,486	2,680	2,807	3,057
Sligo	1,015	1,011	1,140	1,243	1,323	1,350	1,566	1,742
Tralee	493	492	656	916	1,035	1,177	1,348	1,517
Tallaght	0	0	0	0	0	0	0	573
Limerick	0	0	0	0	0	0	0	2,009
R.T.C. Total	11,139	11,376	12,411	13,886	15,353	16,801	17,903	22,364
D.I.T.								
Bolton Street	1,386	1,508	1,649	1,841	2,016	2,126	2,289	2,284
Kevin Street	1,432	1,404	1,404	1,579	1,760	1,866	2,230	2,385
Cathal Brugha St.	887	1,011	1,013	1,035	1,082	1,145	1,532	1,646
COMAD	1,269	1,286	1,297	1,385	1,424	1,499	1,599	1,687
College of Commerce	1,085	1,053	1,080	1,243	1,284	1,225	1,380	1,284
College of Music	0	0	0	20	20	19	44	78
D.I.T. Total	6,059	6,262	6,443	7,103	7,586	7,880	9,074	9,364
Total	17,198	17,638	18,854	20,989	22,939	24,681	26,977	31,728

Source: Department of Education

Evident features of the table are:

- the dominant overall size of the RTCs as a group in the technological college sector - 22,364 out of 31,678 full-time students in 1992/3 (70.5%);
- the now higher average size of RTCs than of DIT colleges (calculated excluding the new Tallaght RTC and the DIT College of Music);
- the distinct size groupings within the RTCs:
 - Cork, Waterford and Galway with about 3,000 students;
 - Athlone, Carlow, Dundalk, and Limerick with about 2,000;
 - Letterkenny, Sligo, Tralee and Tallaght as smaller RTCs;
- within DIT, Bolton and Kevin Street colleges are the largest with well over 2,000 students each (equivalent to mid-sized RTCs), and Cathal Brugha Street, COMAD, College of Commerce with 1,300-1,600 students each.

A comparison of the total teaching staff numbers shows that there are more than twice as many full-time teaching staff in the RTC sector as in DIT. Including part-time teaching staff, in terms of full-time equivalents, Table 2.4 shows that 63% of the technological teaching staff are in the RTC sector.

Evaluation of the Applied Research Programme 1988-94

Table 2.4: Teaching Staff Numbers in Technological Colleges, 1993/94

	Full-time No.	<u>Part-time</u> FTE ¹	<u>Total</u>
RTC	1,562	404	1,966
DIT/Other ²	693	468	1,161
Total	2,255	872	3,127

Notes: ¹ Expressed as Full-time equivalents.

² Other = Killybegs Catering School and Dun Laoghaire College of Art and Design.

Source: Department of Education

2.3 Research and Consultancy in Technological Colleges

2.3.1 Origins and Role

"Research and Consultancy" has been an ongoing topic of debate in and around the technological colleges for a considerable period. This reflects the realisation that third-level colleges have a wider role than purely teaching, and that this wider role includes research and consultancy. Within the sector, the debate has tended to put these two topics together. They are, of course, conceptually somewhat different activities even if the boundary between them is not always clear in practice. The ARP explicitly excludes consultancy from being eligible for assistance under it.

The research and consultancy traditions in the two groups of technological colleges are quite different. The Dublin colleges have a long tradition of involvement in external consultancy by academic staff, although mostly on a personal and informal basis. Contributory factors in this involvement were both their location (ie proximity to the Dublin market) and the nature of the subjects taught. The construction-related professions in particular facilitated dual activities in teaching and practice.

Research and consultancy in the RTCs began to be promoted, particularly by the NBST, during the 1980s. However, it has been dogged by a series of ever-recurrent obstacles, over and above difficulties facing college-company links throughout the third-level sector as a whole. A report on "Barriers to Research and Consultancy in the Higher Education Sector" prepared for the NBST by Fitzpatrick Associates in 1985 summarised these problems under the following headings:

- legal issues;
- employment terms of staff;
- academic ethos;
- college management;
- resource constraints.

The recent establishment of the colleges as independent entities has overcome the legal constraints. However, many of the other issues remain.

2.3.2 Recent Developments

Recent developments of major significance from the perspective of research and consultancy in the technological colleges are:

1. enactment of the new college legislation which legitimises research and provides a legal basis for research and consultancy activity in these colleges;
2. provision of assistance from Forbairt (formerly from EOLAS) towards the promotion of this activity (see Section 2.4 below);
3. a new programme of refurbishment and expansion of college buildings launched under the 1994-99 CSF.

2.4 Agency Involvement with Technological Colleges

2.4.1 EOLAS

During the latter half of the 1980s the NBST, and subsequently EOLAS, embarked upon a "suite" of schemes designed to promote links between technological colleges and companies, partially based on models that had previously been employed in the university sector. These were:

1. the Applied Research Programme, to which the remainder of the present report relates;
2. funding for Industrial Liaison Officers;
3. funding for regional technology service centres. Centres now exist at many colleges (see Annex 1), and further centres are planned under the 1994-99 CSF.

2.4.2 IDA

The former IDA was also involved in the provision of assistance to colleges. This took a number of forms:

1. part financing of Innovation Centre buildings at some colleges. Finance was also provided by IFI (Border Region) (see Annex 1);
2. grant aid to eligible campus companies;
3. indirect assistance via companies in receipt of R&D and feasibility study grants who subsequently used college services.

2.5 Colleges' Regional Economic Role

2.5.1 RTC Concept

As reflected in their name, a dimension in the original RTC concept was their "regional" role. This encapsulated a number of features: their location outside Dublin, Cork and Limerick; planned provision of places for students from their catchment area; and their ability to provide suitably trained technical staff for companies in their regions. For example, the Steering Committee on Technical Education, which reported in 1969, projected the need for RTCs based on geographically defined student catchment areas. More recently, the early descriptions of ARP refer to it as providing services for companies in the regions.

Colleges' actual or potential regional role is therefore an interesting one, and one which will be returned to subsequently in our recommendations. It is therefore illustrative to examine to what extent it has been manifest in practice.

Evaluation of the Applied Research Programme 1988-94

2.5.2 Student Intake

Recent analysis done for the Steering Committee on the Future Development of Higher Education suggests that, in terms of student places, RTCs do not currently cater particularly for their own regions. Instead, there is a high degree of migration to colleges outside students' own region of origin. On this the report states as follows:

"the regional nature and focus of these institutions was a major theme in their development. It was anticipated that they would draw their student body mainly from the regions served and thus ensure a regional balance. However, the growth in demand, when taken in association with the application system, has led to a pattern of access to these colleges somewhat different from that originally envisaged. In the case of a number of RTCs and the DIT, the student inflow tends to be drawn to a significant extent from virtually all parts of the country. Among those who accepted diploma course offers in 1993 from those counties which contain diploma-giving institutions, nearly 40% migrated outside their county of residence to avail of these offers. This proportion rises to nearly 50% if the Dublin region is excluded". In summary, a regional student role and a single central national applications system are fundamentally at odds with each other.

2.5.3 The Colleges as a Development Node

A wider, and more recent, concept of colleges' regional development role is that they can act as nodes of development for their region. This argument emerges very frequently in the documentation emanating from college interests, and indeed even more so in literature involving applications for new colleges. It has also been an element in the University of Limerick development in the Mid-West. Colleges' roles as regional science and technology centres of excellence are generally explicit or implicit aspects of this concept.

There are a number of reasons to be cautious in relation to the potential of this wider regional economic development role for RTCs:

1. it is far from being subscribed to universally in the colleges. Many academics see their role as being to teach "full stop", with any wider spinoff as entirely accidental. Furthermore, many involved in RTC based research also see themselves as national rather than regional centres of excellence, and even strongly reject the regional label as synonymous with "second class";
2. the underlying regional development model is frequently couched in very vague terms, and can therefore be construed in almost any sense which suits the purposes of particular arguments and viewpoints;
3. related to the point above, it is a matter on which it is very difficult to produce solid evidence one way or another. Anecdotal evidence of college/regional links abound, but the extent to which these represent typical or simply occasional one-off situations is difficult to decipher. At a wider level, it is difficult to disentangle cause and effect and to attribute developmental impacts in ways that can trace them back to college sources;
4. evidence from other countries is mixed. While frequent high profile examples of the "Cambridge Phenomenon" and of the US are cited, these relate to situations which are very different from the typical Irish RTC one. Also, some analysts have questioned whether the overseas evidence on this matter is as reliable as frequently presented.

With regard to the Irish situation, research done for the Steering Committee on the Future Development of Higher Education examined the pattern of new manufacturing start-ups and the relationship with the distribution of HE facilities, and did not find any clear pattern. More specifically, in relation to science and technology, outside the Dublin area there is no evident pattern of a relationship between the R&D intensity of industry and the regional distribution of third-level colleges (see Table 2.5). However, it must be emphasised that such variables can have so many causes, it is difficult to draw any definitive conclusions from them.

Evaluation of the Applied Research Programme 1988-94

Table 2.5: R&D Intensity of Industry and Number of Third Level Colleges by Region

Region	Number of Universities	Technological Colleges	(R&D spending as % of R&D Companies turnover)
Donegal	0	1	3.3
North-West	0	1	1.0
West	1	1	2.4
Mid-west	1	1	3.2
South-west	1	2	0.6
South-east	0	2	0.4
East	4	6	0.9
North-east	0	1	1.0
Midlands	0	2	9.8
Total	7	16	1.1

Source: Forfás, Forbairt, Department of Education.

None of the above negates the general concept of using RTCs as a regional economic development tool, but simply indicates that their real potential in this regard is probably modest.

3. Operation of ARP

3.1 Objectives and Targets

This Chapter describes the ARP's aims and procedures. These are described in terms of the "official position". Comment on the extent to which they are followed in practice is reserved to later Chapters.

The Applied Research Programme (ARP) was initiated in EOLAS on a pilot basis in 1987, and launched fully in 1988. The scheme started as the RTC Industry Partnership Scheme but was extended in 1989 to include the Dublin Institute of Technology (DIT) colleges, as well as the then CoACT and Thomond colleges in Limerick. The overall objective of the ARP was set out as to "develop the RTCs and Colleges of Technology as resource centres for industry, and particularly local industry, through the development of applied research and problem solving capability and the fostering of links to local industry". This objective was to be achieved primarily by encouraging links with industry through collaboration in joint research projects.

The programme was modelled on the existing Higher Education Industry Cooperation Scheme (HEIC), as a response to a perceived need for positive discrimination in such schemes in favour of the technical colleges. It was one of a "battery" of schemes initiated by EOLAS to promote technological college links with industry - the others being the Industrial Liaison (ILO) Scheme, and subsequently the "Regional Technology Centres".

As the ARP developed the objective changed somewhat in emphasis from developing links with industry to enhancing the colleges' technological capabilities and developing a sustainable capability. This is evident in the criteria in the Programme's guidelines:

"help RTCs and the Colleges of Technology to enhance their technological capabilities and develop links with local industry. It is also intended to further promote the role of RTCs on their localities" (Application and Conditions 1992).

"to develop a sustainable capability in applied research for local (and national) industry in the RTCs and Colleges of Technology" (Guidelines and Conditions 1994).

Under the ARP it is intended that companies will benefit from access to the colleges' expertise and facilities. Colleges receive financial support for undertaking relevant industrial research as well as gaining the benefit of developing an industry-orientated research culture and other spin-off benefits such as student placements and improved teaching.

3.2 Application Procedure

Under the Programme, grants for research and development projects are awarded to research workers in the technological college sector. Universities are ineligible, but technological colleges can in principle apply for HEIC support (and occasionally have done so). The basic aim is to fund the additional, marginal costs of projects but not to contribute to college (or company) overheads. Applications can come only from the college.

Between 1988-1992 the programme operated through a competitive process, with one call for project proposals in each year. For example, 235 projects were submitted in 1992 of which 94 were supported. From 1993 onwards, subject to the availability of resources, the Programme has been permanently "open". Applications for grants may be made at any time by the college, with awards on a first come first served basis subject to suitability and

Evaluation of the Applied Research Programme 1988-94

resources. After 1993, with a tightening of the Programme's criteria, it was necessary for the companies to also make a submission indicating their commitment to the project. Applications must have the authorisation of the college Industrial Liaison Officer (ILO) or Head of Development.

Applicants must complete a standard Application Form outlining the technical work to be undertaken, the industrial and academic partners, and the approximate costs. The Application Form is attached as Annex 2. The Programme funds up to 75% of the (marginal) costs of collaborative higher education industrial R&D projects, with the other 25% of the cash contribution being contributed by the participating company.

Until 1994, informal checks were carried out to ensure that applications were not being made for the same project to different state sources of funding. Since 1994 a declaration has been added to the Application Form stating that the project is not being funded from any other source and that no applications will be made to any other programme while the application is being evaluated under the ARP.

3.3 Assessment Procedure

Once a formal application has been received, ARP management identifies a suitable technical referee and sends him/her a copy of the application with a standard project assessment form (See Annex 3). In the majority of cases a suitable technical referee will be located within Forbairt. When this is not possible an alternative will be located (eg Teagasc).

The project is assessed technically in terms of the following:

- industrial relevance;
- technical merit;
- appropriateness to the ARP;
- the likelihood of commercial benefits;
- costs and company contribution.

The ARP management makes the commercial assessment of the proposal in order to ascertain the potential value of the project to the company and the likelihood that the resulting expertise or technology can be applied commercially.

At this stage of the procedure ARP management may contact the proposer to clarify any technical or commercial aspects of the project. If necessary the proposal may then be modified. Once the commercial and technical appraisals are deemed acceptable, ARP management prepares a summary report on the proposal.

Up to 1995, recommended projects went to an ARP Approvals Committee. This was internal to EOLAS/Forbairt and consisted of the Group Director, S&T Infrastructure; Manager, Research and Technology Support; and the ARP Manager. This committee then took the decision on whether to approve or reject the proposal. Under the 1994-99 Industry OP a Measure 4 Committee, with representatives from Forbairt, the Office of Science and Technology (OST), the education sector and industry, will administer the funding of ARP as well as the HEIC, Strategic Research, Applied Scholarships and Basic Research through the Research Support Fund.

3.4 Contract and Payment Procedure

When projects were approved, ARP management draw up a standard letter of offer to the college ILO/Head of Development outlining the grant offered. There is no separate contract with the college, and the letter of offer to the ILO/Head of development constitutes the contract.

Evaluation of the Applied Research Programme 1988-94

The schedule of payment for the project depends on duration. It generally involves an initial payment of between 40-50%. A second payment of approximately 40% of the grant offered will be made on submission of interim reports, with a final payment of 10-15% pending submission of a final report. From 1992/3 onwards researchers could no longer apply for a new project if the final report for any other project is outstanding. Payments are made to the Finance Officer of the participating college. These payments are made in the form of one lump sum covering all of the ARP approved projects rather than separate project specific payments.

In terms of the company's contribution, Forbairt receives a letter of undertaking from the company that it will pay the college any cash and provide the agreed amount of benefit-in-kind as stated in the application. The company then sends this money directly to the college and provides the benefit-in-kind directly to the project.

Prior to 1993 most of the company contributions consisted of benefit-in-kind which was often difficult to quantify. In recent years there has been a shift away from the provision of benefit-in-kind company contribution's and more stringent requirements on the company to provide a cash contribution.

If the proposal is rejected the ARP manager contacts the proposer to convey the decision.

3.5 Selection and Rejection Criteria

The general approach to selection has been informal and flexible, with a high degree of case-by-case judgement. Procedurally, applications must be made from research workers in the Regional Technological Colleges or Colleges of Technology. In practice some of the proposals and project ideas will have come from the industrial partner. Projects should be of potential benefit to industry with a company (or group of companies) expected to contribute at least 25% of the college/institute costs of the project. The overall level of industry commitment and co-operation, represented by the overall level of company contribution, including benefit-in-kind, above the minimum 25% requirement, is taken into account in assessing the project.

The industrial partner must be located in the Republic of Ireland. The project should consist of applied research or experimental development carried out entirely or mainly in the college.

In addition to these general criteria and the technical criteria, the quality of projects is assessed taking into consideration the following:

- conformity of the project with the scope and objectives of the programme;
- commercial potential and importance of the project particularly to the industrial partner;
- clearly defined problem;
- clearly stated and quantified technical objectives;
- demonstration of the innovative nature of the project;
- project plan and cost justification.

In order to increase participation of RTCs and technological colleges in ARP, "mini projects" have also been assisted. They generally involved preparatory work which was expected to assist the colleges in developing their industrial expertise. These projects did not require an industrial partner and a limit of £3,000 was generally placed on these projects.

Projects may be refused for a number of reasons. The most common failing is that the R&D project is not innovative, ie the scope of the project, its technical content and aims are not innovative in nature or may be perceived to be consultancy rather than R&D. Alternatively,

some projects are considered to be too speculative or ambitious, and thus the result is unlikely to be applied commercially in industry.

The scope of the programme includes the generic industrial technologies such as chemistry, physics, biology, engineering, and environmental science. Marketing and business projects are excluded.

3.6 Monitoring and Assessment

The academic partner in the college who is overseeing a project assisted under the ARP is required to submit a final technical and financial report within 3 months of the scheduled completion date. Where projects are of 12-24 months' duration, an interim report is also required. Where projects are of 12 months' duration or less, a final report suffices.

These reports are assessed by the ARP manager with the aim of ensuring that the project is progressing satisfactorily and that the industrial partner is participating to the agreed level.

The financial report includes a statement of salaries and wages disbursed, equipment acquired, and other expenses incurred in the course of the year. The technical report is assessed by the ARP manager and may be passed to technical experts for their opinion. The final report gives a brief description of the content of the project and the extent to which it succeeded, both technically and in terms of commercial impact. In a number of cases it may be too early to assess the project's impact as this may not be evident for a number of years.

Monitors are assigned to each project and are requested by the ARP manager to visit the projects at least once and to fill in a standard project monitoring sheet. This report is based on interviews with the college participant and the company partner. It is intended to assess the project's current technological position, the realisation of technical aims, outputs to date, inputs from the company, and the overall level of satisfaction within the company and the college.

The monitors, like the technical referees, tend to be in-house Forbairt experts and carry out visits on a "voluntary" basis. Given the limited resources the number of visits, especially to the smaller projects, is equally limited and the level of monitoring is not as complete as it might be. However, the involvement of ILOs in administering the scheme means that any serious problems can also be raised with ARP management through this channel.

3.7 Promotion of the Programme

There has been little formal or widespread pro-active promotion of the Programme. During the early years of ARP, most of the promotion was carried out by college researchers who approached partner companies and drew up proposals for potential projects. After 1990 all projects were forwarded through the ILOs. However, companies could also contact the colleges with specific areas of research.

ARP management estimate the promotion budget to be between £5,000-£10,000 a year. A major reason for the relatively low key promotion is that the scheme was promoted by the colleges' ILOs. To date, Forbairt regional managers have not been involved in promoting the programme to companies.

3.8 Relationship with the ILO Scheme

In 1990 the Industrial Liaison Officer (ILO) Programme was started in order to manage the growing industrial activity of the colleges, and to build further links with industry. The network of 14 ILOs was used to route requests for assistance from industry to the most suitable resource. The ILO programme together with the ARP were used to promote the development activities related to, and synergistic with, applied research within the RTCs and technical colleges.

3.9 Management Costs

Programme management estimates direct ARP management costs in Forbairt, (previously in EOLAS) at approximately £45-50,000 a year. This includes Forbairt programme staff costs (based on allocation of staff time) and other direct costs such as travel and publications. This is equivalent to about 5% of the 1994 programme budget - which is in keeping with international norms in public R&D programmes. As this figure excludes Forbairt central overhead costs, which are approximately 35-40% of salary costs, it is an underestimate of the overall costs of managing the programme.

4. Profile of ARP Projects

4.1 Introduction

This analysis of projects is based on information provided by the Forbairt ARP management from the ARP database covering the period 1989-94. Reflecting the nature of the Programme administration, the database is college-focused. It is primarily designed for the management and administration of the Programme. The database provides limited information on company contributions, in terms of cash and benefit-in-kind, prior to 1993.

It has been possible to obtain data on the location of most of the companies from the company addresses supplied for the survey. However, there is no underlying data covering the ownership, size or the sector of the participating companies on the database. This information was collected as part of the survey, and is therefore provided only for the sample of responding companies.

During the six-year period covered by this evaluation, 1989-94, a total of 381 main ARP projects were undertaken with 285 individual companies. A further 61 "mini-projects" were undertaken without industrial partners. These "mini projects" were designed to increase the participation of RTCs and technological colleges in the programme.

4.2 Profile of College Participants

Analysis of the 442 ARP projects by college (inc mini-projects) shows that Dublin Institute of Technology, Kevin Street is by far the largest single participant college. This college had over one-fifth of the projects and received nearly one-quarter of the total project funding. Adding the other three main participants - Cork, Carlow and Athlone RTCs - these four colleges account for half of the projects and 53% of the total costs. DIT constituent colleges together accounted for 32% of the projects and 33% of the costs.

Table 4.1 ARP Projects by College, 1989-94.

College	Number of Projects	Total Cost of Projects (£'000)	% All Project Costs
Athlone RTC	47	451.3	8.3
Bolton Street (DIT)	30	306.5	5.6
Cork RTC	50	594.3	10.9
Carlow RTC	30	525.5	9.6
Dundalk RTC	29	368.0	6.8
Galway RTC	17	287.7	5.3
Kevin Street (DIT)	96	1,315.1	24.1
Letterkenny RTC	14	197.9	3.6
Limerick RTC	8	146.8	2.7
Product Development Centre (DIT)	5	17.5	0.3
Sligo RTC	22	275.7	5.1
Tallaght RTC	8	173.8	3.2
Tralee RTC	19	191.3	3.5
Waterford RTC	25	282.3	5.2
Thomond College	28	138.9	2.5
College of Commerce (DIT)	4	49.4	0.9
College of Catering (DIT)	8	103.7	1.9
College of Marketing and Design (DIT)	2	24.9	0.5
Total	442	5,450.6	100.0

Evaluation of the Applied Research Programme 1988-94

The level of college involvement also depends upon personal contacts between the college researchers and the companies. "Researchers" in this context refers to the full-time staff who manage the ARP projects as opposed to the research assistants who are employed to carry out work on specific projects. Annex 4 contains a list of the participating researchers by college and project. The 442 projects were spread across 18 colleges (including the five DIT Colleges and Thomond College) and managed by 274 researchers over the six-year period. In twelve of the colleges ten or more researchers participated in ARP projects. This indicates that participation in the programme is spread fairly evenly across the technical colleges with the exception of Kevin Street (DIT) which accounted for 19% of the researchers involved in ARP.

The majority of the researchers managed just one ARP project. However, in terms of project numbers, the researchers involved in just one project carried out just over a third of the projects. Over 80% of the researchers were involved in one or two projects and these researchers accounted for two-thirds of the projects (Table 4.2).

Table 4.2 ARP Projects by Number of Researchers 1989-94

College	Number of Researchers by Number of Projects								Total Number of: Researchers	Projects
	1	2	3	4	5	6	7	8		
Athlone RTC	14	3	3	1	1	1	0	1	24	47
Bolton Street (DIT)	13	6	1	1	0	0	0	0	21	30
Cork RTC	15	7	3	2	1	1	0	0	29	50
Carlow RTC	11	9	3	0	0	0	0	0	23	30
Dundalk RTC	13	4	0	2	0	0	0	0	19	29
Galway RTC	5	3	1	1	0	0	0	0	10	17
Kevin Street (DIT)	28	11	8	1	3	1	1	0	53	96
Letterkenny RTC	9	0	2	0	0	0	0	0	11	14
Limerick RTC	0	2	1	1	0	0	0	0	4	8
Product Development Centre (DIT)	0	1	1	0	0	0	0	0	2	5
Sligo RTC	10	4	2	0	0	0	0	0	16	22
Tallaght RTC	4	2	0	0	0	0	0	0	6	8
Tralee RTC	7	3	1	1	0	0	0	0	12	19
Waterford RTC	7	6	1	1	0	0	0	0	15	25
Thomond College	10	5	2	0	0	0	0	1	18	28
College of Commerce (DIT)	2	1	0	0	0	0	0	0	3	4
College of Catering (DIT)	5	1	1	0	0	0	0	0	7	8
College of Marketing & Design (DIT)	0	1	0	0	0	0	0	0	1	2
Total	153	69	30	11	5	3	1	2	274	442

Note: On a number of projects there were two or more researchers.

Taking all of the researchers who managed three or more projects, we find that 19% of the researchers were involved in the management (sometimes jointly) of 31% of the projects. This is a similar proportion to that under the HEIC where 18% of the researchers managed 36% of the projects.

There is therefore a mixed picture with a small number of researchers involved in a large number of projects and the majority of researchers involved in two or fewer projects.

Thirty-three of the researchers were involved in "repeat business" where more than one project was carried out by the same researcher for the same company. Overall there were 41 repeat projects or 11% of the joint college-company projects. Twenty-seven researchers carried out two projects with the same company, five carried out three and one researcher undertook four.

4.3 Profile of Company Participants

4.3.1 Participation in ARP

While the Programme is open to the private sector and semi-state commercial bodies, most of the participants have been private companies. Over the period 1989-94, 278 private companies and seven state companies participated in 381 main projects ie an average of 1.3 projects per industrial partner. Out of the seven state companies two were state agencies, namely EOLAS and the NMRC, which each had two projects each. On average these agencies received ARP funding of £10,000 per project.

Given that there are approximately 4,600 manufacturing companies in Ireland the participation rate in the ARP is approximately 6%. The 1991 EOLAS survey of Business Expenditure on Research & Development identifies 670 R&D performing companies in Ireland. Compared to this the participation rate is equivalent to 42% of R&D performing companies.

4.3.2 Frequency of Participation

Nearly 80% of the participating companies participated in just one project. However, these companies accounted for approximately 60% of the total grant aid to joint college-company projects. The remaining 65 industrial partners participated in two or more projects and these companies accounted for 41% of the grant aid (Table 4.3).

Table 4.3 ARP: Projects by Company Participation 1989-94.

	Number of Projects Per Company or Institution						Total
	1	2	3	4	6	8	
Number of Companies	223	41	14	5	1	1	285
% of Companies	78	14	5	2	-	-	100
Number of Projects	223	82	42	20	6	8	381
% of projects	59	22	11	5	2	2	100
Grant £000's	2850	929	588	244	103	100	4814
Average grant per project	12.8	11.3	14.0	12.2	17.2	12.5	12.6

Note: Excludes 61 mini projects with no industrial partner, which received £191,000 in grants.

These figures are broadly comparable to those of the HEIC, except there were fewer HEIC companies participating three to four times and a higher proportion participating six times or more.

Analysis of the companies participating in the programme by number of projects highlights Loctite and Medlabs as the most frequent users of the programme. They participated in eight and six projects respectively. In the case of Loctite their average grant per project was lower than the overall average, while Medlabs' was higher. Two out of the five companies that participated in the programme four times were state companies (Coillte and Bord na Mona).

4.3.3 Company Size, Ownership and Location

As the project management's database is college-based it does not contain data covering the ownership, size or the sector of the participating companies. This information was collected as part of the survey, and is therefore provided only for the sample of responding companies.

Evaluation of the Applied Research Programme 1988-94

Compared to the underlying population of Irish manufacturing firms there is some bias in the responding ARP companies towards larger employers. However, in comparison to the HEIC the ARP programme has a larger proportion of small firms employing less than 50 people and fewer large firms employing 100 people or more.

Table 4.4 ARP: Size of Respondent Companies

Number of Employees	% of ARP Respondents	% of all HEIC Projects	% of all manufacturing Firms
1 to 19	32	28	61
20 to 49	24	14	20
50 to 99	11	12	9
100 to 499	17	27	8
500 or more	13	14	1
Unknown	3	5	1
TOTAL	100	100	100

Nearly four-fifths of the project responses to the survey were from Irish-owned companies. Assuming ARP respondents are representative of all ARP participating companies, a comparison of ARP projects by company ownership with those participating in the HEIC indicates that the ARP has a much higher proportion of Irish participants than the HEIC programme. The breakdown of ARP respondents by ownership is comparable with that of all Irish manufacturing companies.

Table 4.5 ARP: Respondents By Ownership

Ownership	% of Respondents	% of all HEIC Projects ¹	% of all Manufacturing
Irish	79	51	83
Foreign	21	45	17
Unknown	0	4	0
Total	100	100	100

Note: ¹ over the period 1989-91.

Relative to the underlying spatial spread of manufacturing companies there has been a concentration of ARP projects in the Midlands and South West and a lower proportion of projects in the East and South-East. Compared to participants in HEIC there would appear to be a higher proportion of ARP projects in the South-West and Midlands and half as many in the Mid-West with comparable representation from the East region (Table 4.6).

Evaluation of the Applied Research Programme 1988-94

Table 4.6 ARP: Company Location

Region	% of all ARP Companies ¹	% of HEIC Companies ²	% of all manufacturing
East	39	42	46
West	9	14	7
South-East	8	8	11
South-West	18	9	14
Mid-West	9	18	9
North-West	3	1	6
Midlands	14	8	7
TOTAL	100	100	100

Note: ¹ Excludes 61 mini projects with no industrial partner and 39 projects for which the company location is unknown.
² over the period 1989-91.

The spread of grant assistance by company location broadly reflects the spread of projects by company location. Over a third goes towards projects for companies in Dublin City and County, while significant proportions go to the South-West, Midlands and West. While Midlands based companies accounted for 14% of the projects they received less than 10% of the grant (see Table 4.15 Section 4.4.5).

Excluding the projects where the company location is unknown, or where there is no industrial partner, an analysis of the college and company location indicates that companies tend to form links with colleges based in their own region. Approximately three-quarters of the ARP projects carried out in Dublin's colleges were with Dublin-based companies. Similarly, three-quarters of the projects carried out by Cork, Tralee, and Galway RTCs were with companies based in their region.

Approximately half of the projects of colleges in Limerick were based in the same region. In the remaining colleges the majority of identified projects were carried out with companies in the same region. However, in each case a significant proportion of the projects were also carried out with Dublin-based companies. The high concentration in the East region reflects the underlying location of companies. This is an interesting finding in the context of the colleges' "Regional" development role. It is discussed further in Chapter 6.

Evaluation of the Applied Research Programme 1988-94

Table 4.7 ARP: Projects by College and Company Location, 1989-94

	East	South East	South West	Mid West	West	North West	Mid East	No Firm	Unknown	Total
Bolton Street (DIT)	20	0	1	1	0	0	4	1	3	30
Kevin Street (DIT)	53	1	7	3	4	0	10	9	9	96
Product Development Centre	4	0	0	0	0	0	1	0	0	5
College of Commerce	2	0	0	0	0	0	0	1	1	4
Dublin College of Catering	6	1	0	0	0	0	0	0	1	8
College of Marketing and Design	1	0	0	0	0	0	0	1	0	2
Tallaght RTC	6	0	0	0	0	0	1	1	0	8
Dublin Total	92	2	8	4	4	0	16	13	14	153
Waterford RTC	5	13	4	0	0	0	0	0	3	25
Carlow RTC	7	10	3	3	1	0	3	0	3	30
South-East Total	12	23	7	3	1	0	3	0	6	55
Cork RTC	2	1	34	2	1	1	0	7	2	50
Tralee RTC	0	1	5	5	0	0	1	3	4	19
South-West Total	2	2	39	7	1	1	1	10	6	69
Limerick RTC	2	0	0	5	1	0	0	0	0	8
Thomond College	6	1	2	6	1	0	1	11	0	28
Mid-West Total	8	1	2	11	2	0	1	11	0	36
Galway RTC	0	0	2	0	11	2	0	0	2	17
Athlone RTC	14	0	1	6	8	0	6	10	2	47
Dundalk RTC	3	0	0	0	0	1	18	4	3	29
Mid East Total	17	0	1	6	8	1	24	14	5	76
Sligo RTC	4	0	1	0	2	3	2	7	3	22
Letterkenny RTC	1	0	0	0	1	3	0	6	3	14
North-West Total	5	0	1	0	3	6	2	13	6	36
Total	136	28	60	31	30	10	47	61	39	442

4.3.4 ARP Projects by Duration

Most ARP projects are scheduled to run for 1 year. These projects account for slightly more than half of the total project costs. The shorter projects, lasting six months or less, account for 14% of the projects and for less than 6% of the total project costs. Conversely, the larger projects expected to run for 18 months to two years account for 20% of the projects and 33% of the project costs. These findings reflect the fact that the largest cost element of the ARP projects is labour related and thus the longer projects have higher costs. While the majority of the projects are running to schedule, some of the projects overran their finish date.

Table 4.8 ARP Projects by Duration 1989-94

Duration Months	Number of Projects	% of Projects	Total Cost (£'000)	% All Project Costs
0 - 3	11	2	32.7	0.6
4 - 6	55	12	288.2	5.3
7 - 11	30	7	268.4	4.9
12	239	54	2,808.0	51.5
13 - 17	16	4	252.5	4.6
18 - 23	32	7	550.0	10.1
24	59	13	1,250.8	22.9
Total	442	100	5,450.6	100.0

4.3.5 Projects by Industrial Sector

The ARP covers a broad range of industrial sectors, but participants are generally involved in high technology or R&D intensive areas. While there are no data covering all of the ARP projects by industrial sector, data from the survey gives an indication of the main sectors. Excluding the projects and companies of which the industrial sector is unknown, the chemical

Evaluation of the Applied Research Programme 1988-94

and pharmaceutical sector accounted for over one quarter of the projects. Other important sectors were engineering and bio-technology. The electronics and software sectors are less prominent in the ARP (11% of projects) than in HEIC (21% of projects).

Table 4.9 ARP Scheme: Industrial Sector of Responding Companies by Project

Company Sector	Respondents' Projects %
Electronics	6
Chemical/Pharmaceutical	26
Software	5
Engineering	13
Telecommunications	7
Bio-Technology	9
Food/Drink	6
Other Manufacturing	9
Other ¹	11
Total	100

Note: ¹ service industries, semi state institutions.

4.3.6 Projects by Type of Research and Development

There is no record of the general category of research being undertaken ie whether basic, applied etc. An indication of this was obtained from the survey (Section 5.4). This shows that most of the companies perceive the research to be applied and more product than process specific.

4.3.7 Projects by Type of Technology

With regard to technology, a significant proportion of the projects involve the application of engineering solutions, chemical analysis or are of a biology/biotechnology nature. Projects involving these types of research accounted for over 60% of the projects and project costs.

Computer applications and information technology projects accounted for less than 14% of the project costs under the ARP. In comparison software and computer science projects under the HEIC over the 1989-91 period accounted for nearly 30% of the project costs.

Evaluation of the Applied Research Programme 1988-94

Table 4.10 ARP Projects by Project Discipline, 1989-94

College	Number of Projects	Total Cost of Projects (£'000)	% All Project Costs
Analytical Science	6	96.9	1.8
Biochemistry	11	178.4	3.3
Biology	49	736.3	13.5
Biotechnology	49	720.4	13.2
Chemistry	60	740.7	13.6
Computer Applications	48	616.6	11.3
Construction Technology	6	65.3	1.2
Electronics	24	234.4	4.3
Engineering	111	1,202.3	22.1
Environment	11	106.1	1.9
Food	15	175.6	3.2
Information Technology	10	130.7	2.4
Physics	16	227.6	4.2
Process Technology	6	57.2	1.0
Technical Drawing	1	13.6	0.2
Timber Technology	5	47.3	0.9
Miscellaneous	14	101.3	1.9
Total	442	5,450.7	100.0

4.4 Financial Analysis

4.4.1 Budget Size and Trend

During the pilot phase of the ARP in 1988 21 projects were undertaken at a cost of £250,000 or £11,900 each. Over the period 1989-94 grant funding to the ARP nearly doubled. From a programme with 39 projects and grant funding of £470,000 in 1989, it grew to 62 projects and funding of nearly £910,000 in 1994.

This rapid growth in funding can be attributed to the availability of ERDF funding under the Operational Programme for Industrial Development. The number of projects showed particularly strong growth in 1991 and the level of grant aid peaked at £1.26 m in 1992. There was a marked decline in the number of projects and the value of grant aid in 1993. This reflected two key factors. Firstly, there was a strengthening of the criteria in terms of a cash contribution from participating companies. Secondly, following the strong growth of the Programme in 1991-2 many of the researchers who were willing to undertake collaborative industrial research were already engaged in projects and many of the colleges had probably reached physical capacity constraints.

Evaluation of the Applied Research Programme 1988-94

Table 4.11 ARP: Budget and Average Grant Size (£000s), 1989-1994

	1989	1990	1991	1992	1993	1994	Total
Joint Company/College Projects							
Grant Allocated £'000	472	852	1,122	1,259	201	909	4,815
Number of Projects	39	66	97	94	24	61	381
Average Grant £'000	12.1	12.9	11.6	13.4	8.4	14.9	12.6
Company Cash Contributions	n/a	n/a	n/a	n/a	90	355	445 ¹
Project Cash Contribution as a % of Project Costs	n/a	n/a	n/a	n/a	31%	28%	29%
Projects with no Industrial Partner							
Grant Allocated £'000	0	0	109 ²	43	0	39	191
Number of Projects	0	0	33	15	0	13	61
Average Grant £'000	0	0	3.3	2.8	0	3	3.1

Notes: ¹ Covers the period 1993-4.

² Includes one project costing £16,500 for which no industrial partner is given.

Colleges benefited from just over £5 m worth of grant funding for R&D projects under the ARP between 1989-94, with 96% of this funding going to joint college-company projects and the remainder to college projects with no industrial partner.

4.4.2 Comparison of ARP and HEIC Expenditure

Over the period 1988-94 the ARP received more state funding than the HEIC in every year except 1991 when the figure was comparable. On average the ARP has received 56% of the joint ARP and HEIC budget. Over the same period the average grant assistance to ARP projects has been £12,500 while under the HEIC it has been £22,700.

Table 4.12 Grant Expenditure on ARP and HEIC, 1988-94

	1988	1989	1990	1991	1992	1993	1994	Total
No of Projects								
ARP	21	46	72	126	94	26	22	407
HEIC	18	26	38	41	20	25	10	178
Forbairt Expenditure								
ARP (£'000)	250	500	920	1,160	1,160	800	300	5,090
HEIC (£'000)	160	350	890	1,200	650	600	200	4,050
ARP Expenditure as % of Total	61	59	51	49	64	57	60	56

Note: Due to differences between project approval and budget payments these figures differ slightly from those obtained from the Forbairt database.

Source: Forbairt

4.4.3 ARP Projects by Size

Approximately two-thirds of the projects carried out with partners received grant aid of £15,000 or less. The proportion of projects costing less than £15,000 has remained more or less constant, while the proportion costing £10,000 or less fell from roughly half to two-fifths.

Evaluation of the Applied Research Programme 1988-94

There has been an increase in the proportion of larger projects, with half of the projects costing over £25,000 occurring in 1994. The average grant size for college-company projects rose by 23% or 3.5% per annum in current prices between 1989-94. This is a relatively low rate of growth compared to the HEIC programme where the average grant per project doubled between 1987-91.

Table 4.13 ARP: Grant by Size (£000s), 1989-1994

Grant Size	1989	1990	1991	1992	1993	1994	Total
0 - 5	3	7	24	18	8	7	67
5 - 7.5	5	9	11	2	5	8	40
7.5 - 10	11	11	9	12	3	9	55
10 - 15	11	15	24	20	5	13	88
15 - 20	6	15	16	28	3	6	74
20 - 25	1	8	10	10	0	8	37
25 - 30	2	0	3	4	0	8	17
30 - 35	0	1	0	0	0	1	2
40 plus	0	0	0	0	0	1	1
Total	39	66	97	94	24	61	381

The continued relatively small average project size is a positive feature of ARP. It reflects the Programme "target market" ie company demand for low cost applied research. It also matches the project capacity of many of the colleges. Given constraints on research time and space, a number of the colleges indicated that they would be unable to carry out larger projects ie £50-100,000.

The small project size also enables the programme to offer support to a larger number of companies for a given budget. If the average grant size in 1994 were comparable to that of the HEIC, ie £20,000, ARP would have assisted 45 companies rather than 61 companies.

4.4.4 ARP Grants by Type of Expenditure

Analysis of grants by type of expenditure over the period 1993-4 shows that nearly 60% of the assistance was used to cover salaries of research assistants employed to work directly on the project. Project staff costs are based on salary scales used for graduate and technical staff. The salaries of permanent academic staff are not eligible. Items of equipment required for the projects accounted for over a quarter of the grant funding. However, additional equipment is also provided by the companies.

The equipment purchased under the programme becomes the property of Forbairt during the project, but will become the property of the college on completion. Funding of project specific materials, other than those which would be expected to be provided in a laboratory, accounted for less than one-sixth of the total project costs. College overheads are not allowable as eligible expenditure.

A larger proportion of the ARP funding has been used for employing research assistants than under the HEIC programme, and a smaller proportion for project equipment. Funding for materials was slightly higher under the ARP than the HEIC.

While there may be a need to strengthen the technological colleges' capability through the provision of additional equipment (see section 6.10) this is not the primary role of ARP. The balance between labour and equipment expenditure is therefore encouraging as ARP grant assistance is contributing more towards the development of human resources, which will assist the development of college-company links, than to pure capital investment.

Evaluation of the Applied Research Programme 1988-94

Table 4.14 ARP: Breakdown of Grant by Type of Expenditure (£000s), 1993-94

Category	ARP Projects 1993-4		HEIC Projects 1989-91	
	Expenditure	% Total	Expenditure	% Total
Staff	706	59	1,602	52
Equipment	200	17	870	28
Materials	187	16	333	11
Travel	52	4	95	3
Other	46	4	162	5
Total	1,191	100.0	3,062	100

4.4.5 Company Contributions

As stated in Section 3.4, since 1993 participating companies must provide at least 25% of the total project cost in cash. As can be seen from Table 4.11, the average company contribution in cash exceeded this minimum over the period 1993-4 with an average financial contribution from the companies equivalent to 29%.

Project management, using their own knowledge and the Forbairt database of grants approved under the IDA R&D grant scheme, do their best to ensure that there is no double funding through other grants. Since 1994 researchers must complete a declaration stating that funds will not be sought from other sources for the same project.

Forbairt does not actually carry out an audit of the projects but relies upon the third level colleges'/institutes' Industrial Liaison Officers or Heads of Development to verify that the company has fulfilled its commitment. Grant support is dependent upon the participation of the industrial partner to the agreed level.

Over the period 1993-4 company contributions from companies in the East, West and Midlands regions accounted for nearly 70% of the company contributions.

Table 4.15 Applied Research Programme Grant Allocation by Company Location, 1989-94

Region	Grant 1989-94		Company Contribution 1993-4	
	£000's	%	£000's	%
East	1,769	36.7	190	42.6
South-East	320	6.6	21	4.7
South-West	761	15.8	48	10.9
Mid-West	362	7.5	29	6.5
West	440	9.1	60	13.5
North-West	175	3.6	14	3.2
Midlands	462	9.6	60	13.5
Unknown*	525	10.9	23	5.2
TOTAL	4,814	100.0	445	100.0

Note: Excludes £191,000 awarded to 61 mini projects with no industrial partner.

In addition to the company's cash contribution, companies may also provide contributions of equipment or material. These additional contributions are taken into account when assessing the company's overall commitment to the project. Consultations with the colleges indicated that besides the exclusion of overheads and payments to full-time staff, they were reasonably satisfied with the level of funding.

4.5 Impact on Participant Colleges

4.5 Impact on Participant Colleges

It is difficult to isolate the impact of the ARP on the R&D activities and wider industrial orientation of the participating colleges. Changes in their level of R&D have resulted from a number of factors including the placement of ILOs in these colleges, the establishment of the S&T Service Centres, and the establishment of new college structures. However, an indication of the impact of the ARP can be gained by considering the overall change in the level of R&D in participating colleges.

With assistance from the Science and Technology Evaluation Unit of Forfás, an analysis was undertaken of the change in the level of research expenditure by participating colleges based on the Surveys of Research in the Higher Education Sector in 1984 and 1992. Over this period the level of research expenditure in the technological colleges from business and direct government sources (the two areas in which ARP funding impacts) rose by nearly 10-fold in constant 1992 prices. In 1992 ARP grant funding of £1.16 m was equivalent to 48% of the business and direct government funded research expenditure in participating colleges and 25% of total research expenditure. The ARP has undoubtedly contributed to a fast growth rate in business and direct government funded research in the participating colleges over the period. However, despite this fast growth, the colleges' industrial and direct government R&D earnings were outpaced by growth in EU earnings.

The average figures for all of the technological colleges obscure the fact that in some RTCs the ARP is the main source of research funding, and the only source of collaborative industrial research funding. ARP funding would appear to be the most important source of business and government-funded research in participating colleges.

In comparison to the technological colleges, business-funded research expenditure in the universities more than doubled and direct government-funded research increased by five-fold. While the technological colleges did not receive any indirect government funds for research in 1984 or 1992, this type of research funding in the universities increased by 54% to £29 m in 1992 prices between 1984 and 1992 and accounted for 42% of research expenditure in the university sector. State-funded expenditure of £650 m under the HEIC programme in 1992 was equivalent to just 1% of total research expenditure in the university sector.

Overall the universities spent £68.3 m on research in 1992 compared to the technological colleges' £4.7 m in 1992 prices. The technological colleges' share of total higher education research expenditure has therefore fallen from 11% in 1984 to 6.4% in 1992. Of the £68.3 m expenditure on R&D in the universities £12.0 m (18%) was PATS related and £56.3 m was non-PAT university research expenditure.

Evaluation of the Applied Research Programme 1988-94

Table 4.16 Research Expenditure in Technological Colleges and Universities
(£000s 1992 prices) 1984,1992

Sources of Funds	1984 ¹ £000s	% Share 1984	1992 £000s	% Share 1992
Technological Colleges				
Business	60.7	19.7	665.6	14.3
Direct Government	156.1	51.0	1,742.7	37.5
EU	6.8	2.2	1,237.9	26.6
Private	67.2	21.9	67.6	1.5
Foreign	15.4	5.0	16.2	0.3
Own	0.3	0.1	920.0	19.8
Indirect Government	0.0	0.0	0.0	0.0
Total	306.5	100.0	4,650.0	100.0
Universities				
Business	1,935.8	7.0	4,685.4	6.9
Direct Government	3,481.4	12.7	18,054.3	26.4
EU	1,538.1	5.6	11,342.1	16.6
Private	437.8	1.6	1,033.4	1.5
Foreign	572.5	2.1	1,987.8	2.9
Own	733.5	2.7	2,255.0	3.3
Indirect Government	18,817.0	68.4	28,960.0	42.4
Total	27,516.1	100.0	68,318.0	100.0

Note: ¹ 1984 expenditure inflated to 1992 prices using the CSO consumer price index.

Source: Forfás

From the college visits and consultations it is clear that the ARP has enabled a large number of graduates to gain practical research experience. While a lot of the colleges found it difficult to quantify the impact of the ARP, Bolton Street indicated that the number of staff members involved in industrial R&D increased from 3 in 1989-90 to 12 in 1993. Similarly, the number of research assistants employed rose from zero in 1990 to 12 in 1993. Given that most of the projects, including the mini-projects with no industrial partner, have resulted in the temporary employment of research assistants it is estimated from information provided by the colleges and the number of projects that over 400 graduates have benefitted from research related employment in the technological colleges as a result of the ARP. The ARP has also led to graduates gaining full-time employment with the industrial partners on completion of the ARP project.

As stated in Section 4.2 the ARP has resulted in the involvement of 274 college staff in industrial R&D between 1989-94. The ARP has also led to the involvement of new departments in industrial R&D. For example at Dundalk RTC this type of research had in the past only been carried out by the science departments. However, under the ARP the three engineering departments, civil, mechanical, and manufacturing, as well as the food science and computing departments have become involved in industrial research.

In addition to these employment benefits there have been spin-off benefits from the ARP:

- it assisted colleges in developing applied industrial research from a minimal base. In some cases experience under the ARP was a contributory factor in the establishment of S&T service centres;
- it generated interest and activity in industrial research among college staff;
- it helped staff to keep experience up-to-date;
- it helped staff to develop and use practical teaching examples;
- it has led to some smaller consultancy projects;
- it is good for public relations;
- it has assisted colleges in getting EU work.

4.6 Relationship with other S&T Grant Schemes

4.6.1 Relationship with the HEIC R&D Scheme

A comparison of ARP participants over the period 1989-94 with those which were grant-approved under the HEIC Scheme over the period 1989-91 was carried out. Of the 285 ARP participating companies and institutions, 19 (less than 7%) also received R&D support under the HEIC Scheme. In terms of the number of projects, companies participating in both schemes accounted for 49 ARP projects or nearly 13% of the projects which involved industrial partners. In terms of ARP grant funding these companies received £628,000 over the period, or 12.5% of the total grant funding over the period.

The 19 ARP participants in the HEIC scheme represent one quarter of the companies and institutions that received funding under the HEIC Scheme between 1989-91. Out of the companies which received funding under both schemes 58% were foreign owned, 21% were state-sponsored bodies (ESB, Telecom Eireann, Bord na Mona and Coillte) and 21% were private Irish companies.

4.6.2 Relationship with the Industry R&D Initiative

A comparison of ARP participants over the period 1989-94 with those who were grant-approved under the "Measure 6" Industry R&D Initiative in 1993 was also carried out. Of the 285 ARP participating companies and institutions 14 (or 5%) also received R&D support under the "Measure 6" Industry R&D Initiative. In terms of the number of projects, companies participating in both schemes accounted for 37 ARP projects or nearly 10% of the projects which involved industrial partners. In terms of ARP grant funding, these companies received £492,000 over the period 1989-94 or 9.8% of the total grant funding over this period.

The 14 ARP participants represent 21% of the companies that were approved funding under the "Measure 6" Industry R&D Initiative in 1993. Of these 14 companies which were approved funding under both schemes 7 (50%) were foreign-owned, 6 were private Irish companies and one was a state sponsored body (Bord na Mona).

4.6.3 Relationship with the IDA/EOLAS R&D Grant Scheme

An analysis was also undertaken comparing ARP participants between 1989-94 against companies receiving S&T support under the IDA/EOLAS R&D Grant Scheme over the period 1990-91. The findings indicate that 26 companies (or 9%) of the 1989-94 ARP participants had been approved for grants under the IDA/EOLAS R&D Grant Scheme. In terms of the number of projects, companies participating in both schemes accounted for 44 ARP projects or nearly 12% of the projects which involved industrial partners.

In terms of ARP grant funding these companies received £589,000 over the period 1989-94 or 11.8% of the total grant funding over this period.

5. Survey of ARP Companies

5.1 Introduction

The survey of participant companies was carried out using a postal questionnaire. Questionnaires relating to 342 projects were despatched to 262 individual contacts in 233 companies and institutions that had taken part in the ARP Scheme during the 1989-94 period. Annex 5 contains a copy of the survey questionnaire. The sample excluded the 61 mini projects with no industrial partner and 39 projects where there were insufficient company data. The company contact and company names and addresses were provided by Programme management.

Of the 342 questionnaires 55 were returned uncompleted. In 26 cases the contact person had left the company and there was nobody qualified to complete the questionnaire and in 21 cases the companies had either moved or ceased trading. In the remaining eight cases the companies indicated that the project had only started and that it was too early for them to assess the scheme and complete the questionnaire. Given the time period covered by the ARP projects under review it is very likely that the incidence of companies or personnel moving is actually higher than recorded, and that additional questionnaires were not returned for similar reasons.

Extensive phone and fax follow-up was undertaken in order to achieve a reasonable size sample. Out of the remaining 287 questionnaires 89 were returned by 63 companies and institutions giving a 31% project response rate. While this exceeded the target of 80 responses it is relatively low given the follow-up by fax and phone. This partially reflects company "survey fatigue" - a number of companies contacted have adopted a policy of not filling out questionnaires. It also highlights the problem of carrying out an evaluation some time after projects are completed, and within industry where people and companies are relatively mobile. The main survey results are provided in the following sections in tabular form, in percentages.

5.2 Profile of Respondent Companies

As described in Chapter 4, there is limited information on the profile of the underlying population of ARP participant companies against which to compare the profile of the respondents. In particular, no data are available on the population size profile. The pattern of respondents by location indicates a lower response rate from participating companies in the East and a higher response rate from those in the West, South-West and Mid-West than would be expected from the underlying population.

Table 5.1 ARP Company Location

Region	Percentage of Respondents	Percentage of all ARP Companies ¹
East	27	39
West	12	8
South-East	17	18
South-West	15	9
Mid-West	12	9
North-West	1	3
Midlands	16	14
TOTAL	100	100

Note: ¹ Excludes 61 mini projects with no industrial partner and 39 projects for which the company location is unknown.

Evaluation of the Applied Research Programme 1988-94

Analysis of the respondents by duration of project indicates that the sample was broadly representative. However, a slightly higher proportion of the respondents were engaged in projects lasting seven months to one year and there was a lower proportion of responses from those involved in projects taking 13 months to two years. This may reflect the fact that a higher proportion of the companies involved in longer projects had not completed their projects and were therefore unable to respond.

Table 5.2 ARP Projects by Planned Duration (months), 1989-94

Duration (months)	Number of Respondents	% of Respondents	% of all Projects
0 - 6	15	17	15
7 - 12	45	51	61
13 - 24	29	33	24
Total	89	100	100

In terms of responses by college partner the sample was broadly representative with a similar proportion of respondents to that of the main participants (Kevin Street (DIT), Cork RTC, Carlow RTC and Dundalk RTC). However, there was a particularly high response from companies collaborating with Athlone RTC and a lower than average response rate from companies dealing with Waterford and Galway RTCs.

Table 5.3 ARP Survey Responses by College, 1989-94.

College	% of Respondents	% of all Projects
Athlone RTC	21.3	10.2
Bolton Street (DIT)	4.5	7.6
Cork RTC	11.2	12.0
Carlow RTC	10.1	7.9
Dundalk RTC	9.0	6.4
Galway RTC	0.0	4.4
Kevin Street (DIT)	22.5	22.8
Letterkenny RTC	0.0	1.5
Limerick RTC	3.4	2.3
Product Development Centre (DIT)	0.0	1.5
Sligo RTC	1.1	3.5
Tallaght RTC	2.2	2.0
Tralee RTC	3.4	3.5
Waterford RTC	3.4	6.4
Thomond College	6.7	5.0
College of Commerce (DIT)	0.0	0.6
College of Catering (DIT)	1.1	2.0
College of Marketing and Design (DIT)	0.0	0.3
Total	100.0	100.0
Total number of projects	89	342 ¹

Note: ¹ Based on 342 projects as excludes 61 projects with no industrial partner and 39 projects which were not surveyed due to lack of company data.

In terms of responses by project discipline, the sample of respondents is broadly representative with a similar proportion of respondents in the larger sectors (Biology, Chemistry, Computer Applications) as in the underlying population. However, there was a relatively high response rate from companies involved in engineering projects and a low response rate from companies in biotechnology.

Evaluation of the Applied Research Programme 1988-94

Table 5.4 ARP Projects by Project Discipline, 1989-94

College	Number of Respondents	% of Respondents	% All of Projects
Analytical Science	2	2.2	1.8
Biochemistry	3	3.4	3.3
Biology	12	13.5	13.5
Biotechnology	7	7.9	13.2
Chemistry	12	13.5	13.6
Computer Applications	9	10.1	11.3
Construction Technology	3	3.4	1.2
Electronics	4	4.5	4.3
Engineering	26	29.2	22.1
Environment	1	1.1	1.9
Food	3	3.4	3.2
Information Technology	2	2.2	2.4
Miscellaneous	1	1.1	1.9
Physics	3	3.4	4.2
Process Technology	0	0.0	1.0
Technical Drawing	1	1.1	0.2
Timber Technology	0	0.0	0.9
Total	89	100.0	100.0

5.3 Company Assessment of ARP

Approximately three-fifths of the respondents stated that the college had initiated the project, with the remainder indicating that they had initiated it. These findings are consistent with our initial perception that most of the projects are initiated by the colleges. The proportion of college initiated projects may actually be higher since the companies may have initiated the initial contact, while the colleges may have informed the companies of the ARP scheme.

Generally the respondents' assessment of the Programme was favourable with at least two-thirds of the respondents rating it high or medium for every category (Table 5.5). The Programme received the highest score in terms of value for money with nearly two-thirds of the companies rating it high. The Programme was also rated highly in terms of advice/assistance with the proposal. Assistance with locating academic partners received the lowest ranking.

Table 5.5 Companies' Rating of ARP

	High	Medium	Low
Promotion of the programme	30	44	25
Advice and assistance with proposal	42	47	11
Assistance in locating academic partners	31	37	32
Processing of contracts	29	53	18
Monitoring of R&D work in the college	33	49	18
Value for money (ie Company's contribution)	64	23	13

Given the different sample sizes and time periods these overall results are not directly comparable with the findings of the evaluation of the HEIC Scheme (period 1989-91). However, it would appear that the ARP scheme was given a higher rating in terms of assistance in locating suitable partners but was rated lower in terms of value for money, promotion and processing of contracts. The ARP may be perceived as poorer value for money since the companies must provide 25% of the project cost in cash while under the

Evaluation of the Applied Research Programme 1988-94

HEIC the grant rate is lower, at 50%, but the companies can include contributions in-kind. It is also likely that companies actually receive more grant aid in absolute terms under the HEIC than under the ARP since the HEIC projects are larger.

The Scheme compared well with companies' original expectations, particularly as regards technical results and the overall collaborative experience. Commercial results were also at or above expectations for the majority of companies, although nearly one-third of the respondents indicated that their commercial expectations had not been achieved.

Table 5.6 How has the Programme compared with the company's original expectations ?

	Above	The Same	Below
Technical progress/results	39	46	15
Commercial progress/results	14	54	32
Collaborative experience with a college	41	51	8
Overall achievement of project's aims	34	50	16

Ninety-five per cent of the respondents would advise other companies to participate in the scheme, and 92% think it is likely that they would participate in it again.

Asked how the benefits of their ARP project were split between the company and the college, 60% of the respondents indicated that they were split equally, 28% thought that they were mainly to the college and 10% thought they were mainly to the company.

5.4 Type of Research Undertaken

Over half of the companies described the type of research used in their projects as applied, with one-fifth indicating that it was basic R&D. In comparison to the HEIC scheme a lower proportion of ARP projects were perceived to consist of basic R&D or software development.

Table 5.7 Respondents' ARP Projects by type of research

	%
Basic R&D	20
Applied R&D	51
Prototype Development	19
Pilot Plant/Demonstration	3
Software Development	5
Other	<u>2</u>
Total	100

An analysis by college of the type of project research undertaken showed that a higher proportion of the basic research projects were conducted at Carlow RTC and DIT Kevin Street, with these types of project accounting for 56% and 35% of these colleges' projects respectively.

5.5 Alternatives to Participating in ARP

Without the ARP, about half of the respondents would not have carried out the project, while half would. Of the respondents that would still have carried out the R&D project without the ARP, the majority would have carried it out in-house and little more than one-tenth would have carried it out in co-operation with the higher education sector. This indicates that the scheme has succeeded in increasing the level of co-operation between industry and the colleges. While it has helped to increase the overall level of R&D, its impact in this regard is very much less.

Table 5.8 Without the Scheme, what is the most likely course your company's project would have followed?

	%
Carried out - In-house	30
- within the same college	9
- within another college	3
- with an external contractor	4
- by our parent company	2
- other	1
	49
It would not have been carried out	49
Don't know	2
Total	100

An analysis of whether the company would have proceeded with the project without the ARP scheme was done by company size. However, this did not show a clear correlation between size and participation.

Sectoral analysis of whether the company would have proceeded with the project without ARP indicates that none of the electronics companies would have proceeded whereas nine out of ten of the engineering companies would still have undertaken the project.

5.6 Companies' Assessment of ARP Colleges

Overall the companies' assessment of the participating colleges was very favourable with 95% of respondents rating them high or medium. The colleges' technical expertise and ability to collaborate were ranked especially highly with over 55% of companies assessing the colleges highly. The commercial expertise of participating colleges was given a particularly low ranking.

Table 5.9 ARP Companies' Assessment of Third Level Colleges

	High	Medium	Low
Technical expertise	57	36	6
Commercial expertise	11	49	40
Ability to collaborate	56	37	7
Ability to meet deadlines	28	55	17
Relevance to company's needs	36	50	14
Overall	41	53	6

Evaluation of the Applied Research Programme 1988-94

In response to a general question on the industrial orientation of the colleges, over two-thirds indicated that it was rising while just 10% thought it was falling. In terms of the colleges' practical capability the majority of respondents indicated that it was rising while 8% stated that it was falling. These findings would indicate that in the view of companies involved in the ARP the majority of colleges are improving their industrial orientation and practical capability.

Table 5.10 What is happening to the Colleges' Industrial Orientation and Capability? (%)

	Rising	Falling	Staying the same
Industrial orientation is	70	10	20
Practical capability is	64	8	28

5.7 Commercially Applicable Results

When asked whether they would use the results arising from the ARP project, about 80% of respondents indicated that they either had or would. Asked about the main commercially applicable results achieved or likely to be achieved, over 60% of respondents stated that it would lead to new or improved products. These findings show that the results of the ARP projects focus more on new and improved products than those of the HEIC scheme where new and improved products resulted from 27% of the projects and improved processes and methods from 42% of them.

Table 5.11 The main commercially applicable results already achieved or likely to be achieved

	%
New products	33
Improved products	28
New processes/methods	5
Improved processes/methods	20
Other	15
Total	100

Besides the applicable results, the vast majority of the respondents reported intangible benefits associated with the Programme. These include a greater understanding of colleges' R&D capability, an enhanced level of technology, and a strengthening of existing links with colleges. Nearly one third of respondents indicated that they had commenced undertaking R&D as a result of the programme (Table 5.12).

Table 5.12 Other Results of Participating in the HEIC Scheme

	Yes
Gained better appreciation of college's research capability	91
Commenced undertaking/commissioning R&D	32
Enhanced its level of technology	69
Formed new links with colleges	51
Strengthened existing links with colleges	73

Evaluation of the Applied Research Programme 1988-94

Less than one-fifth of respondents had previous R&D links with their college and the most common link was a personal one (Table 5.13). While this suggests that the development of more personal contacts might lead to more collaboration it also shows that there is already a high level of personal contact between the colleges and the participating companies.

Table 5.13 ARP Respondents with Links to The College Prior to the Project by Type of Link

	%
Personal	52
Through Graduates	29
Through R&D	19
Through consultancy	9

In those cases where new links have been established with a college, 86% of the respondents stated that these would continue or have already continued after completion of the project.

5.8 ARP in Relation to other R&D Schemes

Eighty-three per cent of the respondents considered the ARP programme to be complementary to other state R&D schemes, and 11% considered it to be competing with them.

The separate analysis of companies participating in the ARP and other S&T grant schemes indicated that these companies accounted for 10-13% of ARP projects and that between 5-9% of the ARP participating companies had participated in one or more of the HEIC Scheme, the IDA R&D Grant Scheme or the Measure 6 Industry R&D Initiative (Section 4.6). When asked about participation in the IDA R&D grant scheme 19 of the respondents (21%) stated they had participated while a further 2 (2%) indicated they had applied. Out of those that responded, 25% thought that the ARP scheme was better and 38% rated it as worse.

Only nine respondents participated in other EOLAS schemes and 36% of these felt that the ARP scheme was better. Of the 14 respondents who participated in the new Industry R&D Initiative, 28% rated the ARP scheme above the Measure 6 initiative and 67% ranked it below it.

Of the six respondents that had participated in the HEIC Scheme, half ranked the ARP scheme below the HEIC Scheme and one rated it above.

In response to an open-ended question nearly two-thirds of the respondents stressed the scheme's advantages over other R&D schemes. The three main advantages of the ARP scheme as perceived by the participating companies were access to college expertise and equipment, the low cost and industrial contribution from the company and the low level of bureaucracy associated with the scheme.

Evaluation of the Applied Research Programme 1988-94

Table 5.14 The Main Advantages of the ARP Compared to Other R&D Schemes

	%
Access to college's technical expertise and equipment	21.4
Cheaper/low industrial contribution	20.3
Low level of bureaucracy	13.1
Handled off-site in the college	9.5
Collaboration with college staff and direct interaction	8.3
Cost effective method for R&D	8.3
High level of staff commitment	8.3
More applied research	7.1
Potential to employ graduates	3.7
Total	<u>100.0</u>

Responses: 84 (from 57 companies)

Slightly more than two-fifths of the companies indicated the main disadvantages of the ARP scheme compared to other state schemes for R&D development. The three main disadvantages were thought to be the colleges' lack of commercial expertise and knowledge, the small scale of the projects and the limited control of the company over the research carried out in the colleges.

Table 5.15 Main Disadvantages of the ARP Compared to Other R&D Schemes

	%
Lack of commercial expertise in colleges	27.7
Insufficient funding and too small a scale	14.9
Company has little control over research as in college	14.9
Researchers have limited time for R&D	12.8
Slower and fail to meet deadlines	10.6
Colleges restricted by lack of space and equipment	10.6
R&D is RTC based	6.4
Uncertainty/delay in receiving funding	2.1
Total	<u>100.0</u>

Responses: 47 (from 38 companies)

5.9 The Future of ARP

Participating companies were asked what future they would recommend for the ARP. Over half stated that it should be "expanded", more than one-fifth indicated that it should be merged with other schemes such as the HEIC scheme, and one-fifth said it should be "unchanged". None felt it should be reduced in scale.

Table 5.16 What the Companies Recommend For The Future Of the ARP

	%
Unchanged	20
Expanded	54
Reduced	0
Merged with other schemes (eg HEIC)	22
Discontinued	4

Over half of the companies made recommendations regarding changes to the scheme. While these covered a broad range of topics the most common recommendations related to:

- increased company involvement;
- increased funding;
- better promotion of the scheme;
- need to improve the colleges' commercial awareness.

Table 5.17 Specific Changes Recommended for the ARP

	%
Increase company involvement/participation	19
Increase funding	17
Improve promotion of the scheme	11
Improve colleges' commercial experience/knowledge	11
Improve R&D facilities in colleges	10
Improve selection of researchers	6
Extend over a longer period	6
Extend to other colleges	5
Introduce more monitoring/reviews with company	3
Focus more on developing contacts	3
Other*	9
Total	100

* improve links to Forbairt technical services; focus on smaller projects.

Responses: 62 (from 50 companies)

5.10 Companies' Participation and ARP Grant Rate

Asked what is the lowest grant rate at which they would still participate in ARP, half of the respondents indicated that they would participate with a grant rate of 50% or less. However, 36% of respondents indicated that they would only participate if the grant rate remained much as it is at 70-75%.

Table 5.18 Lowest Grant Rate At Which Companies Would Still Participate

Grant Rate %	% of Respondents
75	23
70	13
60	13
50	51
40	0
30	1
Total	100

Analysis by company size of the lowest grant rate at which companies would still participate indicates that a higher proportion of the very large companies (500+ employees) and medium size companies (50-99 employees) would participate with a reduced grant rate of 50%.

Table 5.19 Companies' Participation by Lowest Grant Rate (%) and Size (No. Employees)

Grant Rate %	Company Size					
	1-10	11-49	50-99	100-199	200-499	500+
75	19	29	10	20	33	17
70	19	8	0	20	0	17
60	6	17	20	40	11	0
50	56	46	70	20	44	67
40	0	0	0	0	11	0
30	0	0	0	0	0	0
Total (%) of Cos	21	32	13	7	12	16

Analysis of the companies which would still participate with a 50% grant rate or less by nationality indicated that 55% of foreign-owned respondents would participate as against 48% of Irish respondents.

6. Summary, Conclusions and Recommendations

6.1 Introduction

This chapter summarises the key findings and issues arising from the review of the ARP, as described in previous chapters. It also presents the conclusions and recommendations of the review.

The chapter is divided into nine subsequent sections. Sections 6.2-6.9 deal individually with the issues specified in the Terms of Reference (see Section 1.1). Section 10 is an additional section which outlines a possible wider Forbairt relationship with technological colleges for the future.

6.2 Relevance of ARP

The first item in the Terms of Reference asks the consultants to report on "the relevance of ARP to the problems and needs of industry, particularly indigenous companies". Conclusions in relation to this are:

1. as a Programme whose objective is to promote research and product development links between technological colleges and companies, the Programme in principle retains its relevance. Indeed, with the renewed emphasis both on S&T and on development of indigenous industry, the relevance of a programme of this kind has been enhanced rather than reduced during ARP's existence;
2. the assessment of the Programme by companies participating in it, as indicated in our survey, is generally positive:
 - over 90% of respondent firms state that they would participate in the Programme again, and would advise other companies to do so;
 - over 85% of the companies rated the Programme as "medium" or "high" in terms of relevance to their company's needs;
 - companies' evaluations of various individual aspects of the Programme are also generally positive, with a strong majority of companies assessing it as either good or medium (as distinct from low) on a variety of criteria;
3. no underlying data is available on the size and ownership of all ARP participant companies. However, based on survey respondents, indigenous companies account for 80% of participants, and nearly one third of participating companies employ fewer than 30 people and one half fewer than 50 people;
4. the dominance of indigenous companies among the survey respondents, and analysis by ownership, showed that the generally positive assessments of the Programme are shared by participating indigenous companies.

Another measure of the relevance of ARP is its degree of market penetration which is covered in section 6.5.1 below

6.3 Success in Meeting Objectives, and Appropriateness of Objectives

6.3.1 Success in Meeting Objectives

Item 2 of the Terms of Reference asks for the consultant's views on "the Programme's success in meeting its existing objectives, and the appropriateness of these objectives for the future". In relation to existing objectives, the aim of ARP when established in 1988 was "to develop the RTCs and colleges of technology as resource centres for industry, and particularly local industry, through the development of applied research and problem solving capability and the fostering of links to local industry". The evidence from this evaluation is that the Programme's objective has been broadly met. Participant companies give it a generally positive assessment, as described in Section 6.2 above. Furthermore, asked specifically about college capability, two thirds of the respondents indicated that in their view the practical capability of the colleges is rising.

Companies also assessed the type of R&D undertaken under ARP as very much in the "applied" category, as opposed to basic research. The Programme also compared well with companies' overall expectations of their participation in it. This was particularly so in relation to technical outcome and to the overall collaborative experience. However, the survey of participating companies indicates that the level of commercial expertise within the participating colleges was not rated highly and nearly one-third of respondents indicated that the commercial progress/results of the programme were below their expectations.

6.3.2 Appropriateness of Objectives for the Future

In relation to the future, there is a need to re-focus on the objective of "building links between colleges and companies", as opposed to more generally undertaking collaborative R&D as such. Otherwise, there is a danger that this ultimate objective could be lost, and that the joint project would become an end in itself. For example, during the period under review (1989-94), about 10% of all projects involved the same company and the same researcher carrying out a subsequent project and 15% involved the same companies carrying out additional projects.

6.4 Operating Procedures

The Terms of Reference request the consultant's assessment of the "efficiency and effectiveness of the Programme's operating procedures". Findings in relation to this matter are as follows:

1. companies' assessment of how the Programme was run were generally positive. Areas where some concerns were indicated were in relation to the promotion of the Programme and assistance in locating academic partners. In this regard it should be noted that the companies had minimal direct dealings with Programme management but instead dealt primarily with college researchers or ILOs. As covered in section 6.9.5 there should be an increased emphasis on promoting ARP within the colleges and through improved links with regional Forbairt centres.
2. college researchers and ILOs are generally strongly positive about Programme management. Particular compliments were paid in relation to the commitment and enthusiasm shown by Programme management over the years, and in relation to non-bureaucratic flexibility and speed of response. Some concerns were expressed in relation to recent developments through which the Programme would appear to colleges to be more bureaucratic and subject to longer approval delays, as well as to some vagueness in relation to selection criteria;
3. in relation to criteria and assessment procedures, there is a balance to be struck between bureaucracy and flexibility. It may be that in regard to evaluation of criteria ARP has erred too far towards informality, has left itself open to accusations that

Evaluation of the Applied Research Programme 1988-94

assessment criteria are unclear, and that it is also sometimes unclear on what grounds projects have been turned down. A sharper and more transparent set of criteria, possibly utilising some form of scoring system, may provide the answer. It may also be appropriate to reduce the level of bureaucracy by allowing programme management to approve small projects, ie less than £10,000, rather than delay them by submission to an approvals committee;

4. a tightening of the Programme's criteria has led to a shift away from company contributions' in-kind towards a requirement for a minimum 25% cash contribution. This is a welcome development since it ensures a definite commitment from the participating companies. Without such commitment and capacity it is unlikely that the projects' will be relevant and their results commercialised.
5. this evaluation has highlighted a number of important information deficiencies which should be remedied in order to assist future monitoring, reporting and evaluation of the Programme. The nature and availability of information evident has generally been weak. The ARP management information systems have historically been college-based. Even here, however, there is a need to collect more quantifiable college data on impact, rather than just financial expenditure data eg the graduate employment impact of ARP in terms of the temporary employment of graduates under the Programme and the instances when the programme has led to the full-time employment of graduates within participating companies.
6. there is also an urgent need to improve the level of basic company information in terms of company participation, ownership, size and main activity. A more systematic approach to collecting and reporting this type of information is essential to the overall monitoring and assessment of the ARP in terms of its impact on indigenous versus foreign companies, small versus large participants and by company sector.
7. the issue of intellectual property rights should be clarified. These are generally agreed between the college and the company prior to commencement of the project. However, Forbairt "reserves the right to recoup its contribution to the college costs from any royalties payable to the college". This could be a disincentive to prospective small new R&D companies, or it could bias the type of projects undertaken away from those that might lead to patents or intellectual property rights. There are, furthermore, question-marks about the appropriateness of the provision alongside the larger R&D grants which have no such provision. If the provision is to be retained, Forbairt should specify more clearly what it means and when and how it would be invoked, in order to avoid uncertainty surrounding the issue.
8. in relation to future operating procedures, these are closely tied in with overall recommendations for ARP's future. Further comments on these matters are therefore reserved until section 6.9 below.

6.5 Market Penetration

6.5.1 Company Level Penetration

The Terms of Reference ask that the Programme be examined in relation to "its market penetration in terms of company characteristics and participating colleges". In relation to companies, a number of conclusions emerge:

1. largely reflecting the size of the Programme, its overall level of penetration of the industrial sector is relatively low. A total of 285 companies participated in the programme over the 1989-94 period. This compares with a total of about 4,600 manufacturing companies, 3,800 indigenous manufacturing companies, and 670 identified R&D performers;
2. the Programme appears to have avoided a high level of "repeat business", which would have limited its market penetration. Nearly 80% of companies had just one project during the period. However, there was some clustering of projects among a fairly small number of companies despite the overall reasonable spread. For example, 21 companies had three or more projects;
3. as stated in section 6.8 most of the participant population of companies have not been involved in other R&D schemes. Thus one of the most positive features of ARP is that it has helped establish new collaborative R&D links with companies not previously involved in R&D.
4. in terms of characteristics, as already indicated, there was a strong emphasis on small indigenous companies, based on the survey respondents, with 80% of companies being indigenous, and half the companies having 50 employees or less;

6.5.2 College Level Penetration

Key findings here are:

1. all technological colleges participated in the Programme during the period with two or more projects (nine of the colleges had 20 or more projects);
2. within colleges the absolute level of penetration is generally fairly low. Over the period a total of 274 staff (excluding temporary researchers) participated in 442 ARP projects. This compares with a total of 2,250 full-time teaching staff in the technological colleges, giving a participation rate of 12%. It should be noted that some staff are in faculties and disciplines not necessarily appropriate to ARP;
3. on average, participating staff have been involved in about 1.5 ARP projects. This relationship is fairly consistent across colleges. As with the companies, most researchers involved are only involved in a small number of projects. However, there was also a small clustering of researchers involved in multiple projects. Taking all staff who manage three or more projects (sometimes jointly) 52 personnel were involved in 200 of the 442 ARP projects over the period;
4. there is a definite pattern of co-operation between colleges and companies in their own region, although this is clearly not absolute.

6.6 Stimulation of Industry Oriented Research Culture and Capability

6.6.1 College Culture

The Terms of Reference request an assessment of "the degree to which the Programme stimulated an industry oriented research culture and capability in the RTC sector". In relation to culture, the following observations can be made:

1. during the period in question, the orientation of college culture towards industry has clearly improved considerably. Many of the activities and attitudes now commonplace in technological colleges at all levels would have been quite unusual 10 years ago. This is evident in terms of research earnings, use by companies of college facilities, provision of short courses for companies, and in views and attitudes of college staff and management;
2. ARP has undoubtedly contributed to this. However, it has done so as part of an overall package of influences rather than as a stand alone programme. It has operated alongside the ILOs, innovation centres, campus companies and regional technology centres, and as part of a wider stimulation of college company links;
3. there is a general "pro college/company link" atmosphere and activity of which ARP has been a part. This has been directly influential in the legislative changes that have occurred, and in the direct reference in this legislation to a college research and consultancy role (something which was absent in the previous legislation);
4. as evidenced by ARP, only a small proportion of college staff on average have direct formal links with industry. However, many more staff are involved in an informal way, particularly in DIT colleges. Furthermore, it must be recognised that many staff will not, and probably should not, be involved in such links. Colleges are ultimately teaching institutions. Excellence in their staff can manifest itself in many ways of which collaborative research and consultancy with companies is only one;
5. even with college staff who are appropriate and inclined to co-operate with companies, many obstacles remain. The new college legislation and management structure removes a major legal obstacle. However, legislation can only at best be "enabling". Institutional, managerial, resource, and attitudinal obstacles still remain, ranging from shortages of laboratory space to "user unfriendly" campuses and to long summer closures. With underlying legal obstacles now out of the way, it may be time to revisit many of the other obstacles which hinder college links with industry;
6. companies were of the view that colleges' industrial orientation is improving. Nearly 70% of respondent companies indicated this as their assessment of the situation.

6.6.2 College Capability

During the 1989-94 period, colleges received about £5 m in grant and company finance under ARP. With regard to the impact of this on college capability the following points can be made:

1. the main impact on college capability is at the human resource level. College staff involved in ARP projects (nearly 300 in all) will have enhanced their capabilities both in their own discipline through the research undertaken, and in terms of their interaction with industry. In addition, the programme allowed additional research assistants to be recruited for the period of the project, some of whom will have remained in the colleges in various capacities;

Evaluation of the Applied Research Programme 1988-94

2. ARP funds were also used in the purchase of project related equipment which in some cases will have involved provision of much needed equipment to colleges. The colleges' capabilities were also assisted by in-kind contributions of equipment and materials from participating companies;
3. the nature of ARP is that it funds marginal costs within colleges. It must be acknowledged that many of the fundamental resource constraints within colleges (in terms of overall staffing and infrastructure levels) could not have been addressed directly by ARP. These frequently constitute primary obstacles to increased college company interaction, eg absence of dedicated lab space. On the positive side, it should be noted that considerable funding for college facilities is earmarked for the 1994-99 structural fund period.

6.7 Extent to Which ARP Projects are Commercially Implemented

The Terms of Reference ask for an examination of "the extent to which completed ARP projects are commercially implemented". This issue was addressed directly in the survey of respondent companies.

Asked if they would use the results arising from the ARP project, about 80% of respondents indicated that they either had or would. The main type of commercially applicable results achieved, or likely to be achieved, were new or improved products. In the circumstances these results seem very satisfactory. Even in the case of relatively applied R&D, it has to be accepted that R&D is an essentially speculative activity and that some projects will inevitably fail for technical or other reasons.

6.8 The Programme's Complementarity with Other Programmes

The Terms of Reference ask for an assessment of "the Programme's complementarity with other national programmes". Findings in this regard are as follows:

1. asked explicitly about this in the survey, a majority of companies viewed the Programme as "complementary" rather than as "competing" with other national programmes;
2. the participant population of companies also has relatively little overlap with other schemes such as HEIC, IDA/EOLAS R&D Grants, or the Industry R&D Initiative. This contrasts with HEIC where a considerable overlap was evident. It points to ARP projects being largely a distinct category, and of genuinely new corporate ground being broken in relation to collaborative links;
3. there was also evident complementarity between ARP and the ILO scheme, both having being implemented in tandem. Less complementarity was evident in practice between ARP and the regional S&T centres. Complementarity here tended to be somewhat "hit and miss" on the ground, and to depend very much on the situation within colleges.

6.9 Future Options

6.9.1 Key Issues

Key issues for the future of ARP are:

1. whether the Programme should be continued or not;
2. if "yes", in what form it should be continued;
3. if it is continued, what its objective and focus should be;
4. links with other programmes and with Forbairt's wider relationship with the technical colleges. Each of these issues is dealt with in the sections below.

6.9.2 Overall Future of ARP

Our conclusion is that the "ARP function" should be continued within the overall S&T spend, ie assistance should continue to be available to support links between technological colleges and companies in the area of applied research. Reasons for this conclusion are:

- the evident effectiveness of ARP over the 1989-94 period in achieving its objectives;
- the continued and increased importance of R&D and innovation from the viewpoint of indigenous Irish industry;
- the relatively small size of the funding involved in the context of overall national spending on S&T instruments;
- ARP's crucial role in supporting applied R&D in technological colleges (where other R&D support is largely absent).

Over 95% of participant companies in the Programme were of the view that the Programme should be continued.

6.9.3 How the "ARP Function" should be delivered

The key managerial issue is whether ARP and HEIC should be amalgamated or whether they should remain separate. From an ARP perspective the arguments are as follows:

Arguments for amalgamation:

1. technological colleges have now "come of age" institutionally and research-wise, and should be ready to compete in the overall HEIC programme (for which they are currently eligible);
2. it would be simpler to have a single programme with a standard set of rules and criteria;
3. in the context of the new Forbairt, there is considerable need for rationalisation of smaller programmes;
4. a separate programme for technological colleges implies that they are somehow "second best".

Evaluation of the Applied Research Programme 1988-94

Arguments against amalgamation:

1. the respondent companies are against it and want ARP to continue as it is;
2. technological colleges are strongly against it, feeling that they would be "swamped" by the universities due to the latter's greater resources, research capacity, etc;
3. the two Programmes perform distinctly different functions, with ARP at the much more applied research end than HEIC;
4. amalgamation with HEIC would lead to a reduction in grant levels from 75-50%.

Underlying our recommendation on this issue we considered the following key factors:

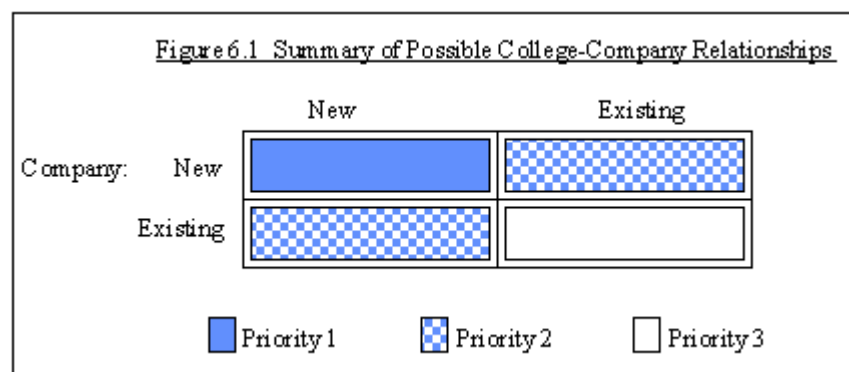
- many of the fears in relation to amalgamation can be dealt with by other means (in particular, a proportion of the new Programme can be reserved for technological colleges at least for an initial period);
- indications from the survey are that a 50% grant rate would probably be acceptable to companies (especially with greater flexibility in regard to in-kind contributions);
- Forbairt could also provide additional types of tailored assistance to technological colleges in the context of their regional development function if it so wishes;
- too much concern about companies' financial ability to participate in ARP could be misplaced. The ultimate objectives/benefits of ARP for companies are that its results be commercialised. If companies cannot meet 50% of the modest costs involved, it is unclear how they could hope to fund commercialisation of the results.
- there is a very strong case for rationalisation of smaller programmes within Forbairt in order to assist companies by simplifying the number of individual programmes and services provided
- amalgamating the ARP and HEIC programmes would also ensure that the new Programme achieves a minimum efficient size and through economies of scale is able to devote more resources to monitoring, reporting and promotion".

Having considered the "pros" and "cons", we recommend in favour of the amalgamation option. However, this should be a new Programme, rather than merely absorption of ARP into the existing HEIC.

6.9.4 On What Should the New Programme Concentrate?

Figure 6.1 presents in schematic form the possible inter-relationships that may take place between colleges and companies. This shows a 4-box matrix contrasting the relationship between new and existing colleges and companies in each direction. The priority for a new joint HEIC/ARP should be on promoting new links. Therefore links between new companies and new college researchers are the ideal, with links between a new party on at least one side second best. Assistance to renewing existing links between a college researcher and a company should be of low priority.

Evaluation of the Applied Research Programme 1988-94



This proposal reflects the view that the core of HEIC/ARP should be on assisting the collaborative link, and not just the underlying project. This is especially so in the current context where considerable funding is available from other sources for R&D per se. Such a focus would also help to break the temptation for college researchers to see ARP as a source of "R&D money" rather than "collaboration money". Such a perception is widespread. However, it is unlikely to be overcome until colleges have separate funds for "untied" R&D. In the absence of such funds, researchers will inevitably face great temptation to "dress up" their R&D interests as industrially relevant whether they are or not.

6.9.5 Operational Features of a "New Higher Education Industry Research" Programme

Many of our proposals in this regard have already been outlined in our evaluation of the HEIC Programme. Key features of a new programme would be:

1. it would be a new programme organised on a common basis for all third level colleges - universities, technological colleges and private third level colleges as appropriate. It would not involve either in practice or appearance subsuming ARP into HEIC;
2. it would focus on research and development projects rather than more mundane consultancy type links. Therefore, the best technological college researchers should be able to compete quite competently in the Programme;
3. to allay technological colleges' fears of being swamped by universities, a proportion of the budget could be reserved for some years for technological colleges (this might be on a pro rata basis with the current respective sizes of ARP and HEIC);
4. a standard 50% Forbairt/company contribution would be applied, with flexibility for first time companies to contribute half of their contribution (25% of total) in genuine in-kind form (including labour);
5. the "ARP micro-projects" would be excluded (but could be included in a wider Forbairt relationship with technological colleges, see Section 6.10 below);
6. companies and colleges would be equally eligible to make applications and sign contracts;
7. the eligibility would be extended beyond manufacturing to include the services sector (traded and non-traded);
8. the new programme would be more actively promoted to potential new participants, both within the colleges and to potential companies, through improved links with Forbairt regional offices and the ILOs. This could be assisted by the national innovation campaign aimed at increasing company awareness of the benefits of investing in research and development, as recommended in the STIAC Report (p 77).
9. in order to clarify the continued availability of funding under the programme a consistent annual budget for the programme would be ensured and appropriate linkages to ensure that potential applicants, colleges and companies, are aware of the availability of funds would be put in place;
10. the clarification or removal of Forbairt's provision on intellectual property rights/royalties.

6.10 Forbairt's Wider Relationship with the Technological Colleges

Recent years have seen major institutional changes on both the college and agency side. Under their new legislation, colleges are now independently constituted with their own boards and management, and research and consultancy have been given appropriate legal status within colleges. On the agency side, Forbairt has been established bringing together major parts of two former agencies (IDA and EOLAS) and with a new regional structure.

In these circumstances, ARP is only one actual or potential component of a wider relationship between Forbairt and the technological colleges. Existing components include the regional technical service centres, and other potential components also exist. It is therefore timely to consider replacing small separate "vertical" schemes, each interfacing independently with the college, with a more "programme approach". Such an approach would mean that the various separate components would be brought together into a single programme of activity in colleges, and supported by Forbairt on an annual basis.

Figure 6.2 attempts to capture this concept in diagrammatic form. The vertical columns represent the existing approach whereby Forbairt has relationships with each college under a series of separate, centrally administered headings. The alternative approach would be "horizontal" college-specific programmes. Each Forbairt/college programme could encompass the various vertical components in a way appropriate to the college, ie Forbairt would provide a "menu" from which the college could choose the "courses". Advantages of a programmatic approach would be:

- it would allow Forbairt as an organisation to have a more structured relationship with individual colleges rather than a series of separate, and possibly not always co-ordinated, relationships;
- it could take account of the quite distinct "personality" of each technological college, rather than trying to erroneously treat the colleges as a homogenous group (which they most definitely are not);
- it would allow both Forbairt and the colleges to focus together on their mutual interest of assisting the development of the regional economy. The regional role of colleges is referred to in both the recent STIAC Report (p 128) and in the new White Paper on Education (p 107);
- it would force both colleges and Forbairt to think through the objectives of their relationship, and what precisely they are trying to achieve together.

Figure 6.2 Forbairt/College Relationship

COLLEGE	TYPE OF RELATIONSHIP							
	HEIC ARP	ILO	Service Centres	Innovation Centres	Campus Companies	SRS (1)	BRG (2)	Other
DIT: KevinSt								
Bolton St								
COMAD								
College of Commerce								
College of Catering								
Product Dev Centre								
RTC: Athlone								
Carlow								
Cork								
Dundalk								
Galway								
Limerick								
Sligo								
Tallaght								
Tralee								
Waterford								

Note: (1) SRS = Strategic Research Scheme
 (2) BRG = Basic Research Grants

Possible features of this approach would be:

1. negotiation on an annual basis of an agreed Forbairt/college programme of activity, to which Forbairt would make an annual financial contribution;
2. presentation by Forbairt of a possible "menu" of ways in which they would be willing to assist colleges, with a selection by the college of which bits it wished to choose;
3. as ARP (and HEIC) are based on competition between individual project proposals it would still be necessary to ensure that colleges "choosing" assistance under the proposed new "Higher Education Industry Research" Programme provide projects that meet the underlying criteria in order to obtain grant assistance;
4. within the Forbairt college programme additional supports would be set up, eg £10,000 annually might be made available for the funding of micro research projects of industrial interest at the college's discretion (to replace the old ARP micro projects);
5. that the Forbairt regional manager and regional office would have a strong role in negotiating and monitoring the agreed annual programme, and in generally promoting college-company links in their region. The programme might be incorporated into Forbairt's new regional plans (which are currently being prepared);
6. that a pre-condition of such a programme would be an agreed written college policy regarding its links with industry, something which virtually no college currently has;
7. possible continuation of Forbairt funding for ILOs. This support was wound down on the assumption that it was being taken over by the Department of Education. However, the Department of Education is funding "Heads of Development" posts which may include the old ILO function but have other duties as well, and in particular responsibility for the major new building programmes. Furthermore, in some smaller colleges these posts have not been sanctioned;

Evaluation of the Applied Research Programme 1988-94

8. fitting in with recommendations in the STIAC Report (p 126) such a programme might include the provision of funding to address the equipment and space shortfall within the technical colleges, where this is a specific constraint on industrial collaboration;
9. a flexible definition on the issue of "regions", taking account of the fact that the optimum definition of regions in an Irish context can be the subject of endless debate. In practical terms, the proposal would be that the Forbairt regional offices deal with those colleges physically located in their region, even if part of colleges' natural catchment areas flows over into other Forbairt regions;
10. that there be increased co-ordination between Forbairt's plans for its own technical services, and the development of services at technological colleges. This is a subject which needs to be addressed in a more "up front" way than has been the case hitherto;
11. that there be greater sensitivity to the issue of private sector competition than has been the case previously, and that services should only be supported where there is "market failure". On this principle, Forbairt assistance under either ARP or other programmes should not be extended to promoting links between the business/commerce/marketing side of technological colleges and industry since development of such services would be very likely to compete with the private sector.