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Book Review

Investment in Knowledge: A Case Study of a Philanthropy's Partnership with Government¹

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This case study describes a co-operation between The Atlantic Philanthropies and the Irish government aimed at strengthening the capacity of Irish universities to undertake basic research of international quality.

The Atlantic Philanthropies were established in Bermuda in 1982 to make charitable grants. Atlantic operated largely in North America until an office in Dublin, Ireland was established in 1990.

Atlantic (originally known as Tara in Ireland) began to invest in higher education projects in Ireland and quickly became the sector's largest private funder, spending €69 million in its first seven years. Ireland's seven universities are almost entirely state funded and possess very little by way of endowment².

Initially, Atlantic's engagement with the universities was broadly based. Interventions supported academic appointments, research, teaching and learning and the non-academic infrastructure. Atlantic invested heavily in university libraries, sports facilities and student housing. The foundation also supported

¹ The authors acknowledge the assistance of Dr Tom Higgins and Yvonne Healy.

² A brief description of the Irish higher education sector is to be found in Appendix 1.

university fundraising efforts and assisted a number of universities to establish access programmes for disadvantaged students.

Notwithstanding the restrictions on public finances in the late eighties and early nineties, Irish society has consistently placed a high value on all education. The ability to attract high quality foreign investment has been central to Ireland's remarkable economic success. It has always been considered important for the economy to maintain an attractive and friendly environment for foreign capital. Access to a workforce with modern skills and flexibility has been central in maintaining this attractiveness and in underpinning this investment. The quality of the education system therefore has always been a central consideration in public policy.

As a result of government policy, the higher education participation rate has grown from some 11 per cent in 1965 to over 50 per cent today. By and large the education sector has served Ireland well and has made a significant contribution to the rapid transition of the Irish economy: from one of the least developed economies in Western Europe to becoming the fastest growing OECD economy.

SUPPORT FOR UNIVERSITY RESEARCH

However, research in the higher education sector was in a very difficult condition at the beginning of the nineties. Spending on basic research was about 11 per cent of the EU norm. About €2 million was all that was available for basic research grants for the whole university system from the national government and only €2.5 million was divided between all seven universities annually for capital investment.

Worse, despite a variety of reports and studies recommending comparatively modest levels of new funding, the Irish government could not be convinced to invest public monies in university research. Were it not for the fact that the universities were able to win support for research from a variety of EU funding sources during these difficult times, research activity in the university system might well have collapsed entirely.

The general direction of university research at the time, therefore, owed more to EU research policy and to some limited private sector funding, than it did either to a national science policy or to the research ambitions of the institutions themselves.

Researchers were forced to react to and be motivated by whatever funding opportunities were available and, as a result, were largely opportunistic in their outlook. There was little evidence of strategic planning and the paucity of research funding provided no incentive to engage in strategic planning.

Public policy at the time was directed more towards increasing the number of undergraduate places, rather than improving the research infrastructure. University presidents were under pressure to pursue volume, in terms of student numbers, and consequently could give little or no attention to long-term infrastructure or to research. The result was a significant expansion in student numbers in return for marginal increases in funding. And there were high rates of emigration of the best talent to academia in the US and UK where they could work in state-of-the-art facilities.

Even so, the quality of research personnel in the university system was widely acknowledged internationally. Individual research and research teams from the universities had shown themselves to be internationally competitive and capable of winning international funding, especially from Brussels. It is clear that with adequate funding regimes provided by the EU, university researchers in Ireland could compete with the best internationally, and participate effectively in international research teams. However, it was clear to Atlantic that a significant potential was being under-utilised.

The lacuna at the heart of public policy on education and research in Ireland was noted in a benchmark report published in 1996 that remarked that there was '...something seriously amiss with public policy towards the support of higher education research in Ireland...' and called for new funding in the order of €25 million per annum for research and for an additional €6 million per annum for capital equipment.³ At the time these levels were felt to represent a serious increase in funding, but in retrospect, were meagre in the context of what subsequently occurred.

Atlantic had been closely following these developments. Based on its own observations and research, it became convinced that the university system in Ireland was not contributing to its full potential to the development of the economy, which was now beginning its dramatic takeoff.

³ Comparative international assessment of the organisation, management and funding of university research in Ireland and Europe. Report by the CIRCA Group for the Irish government. December 1996.

Atlantic perceived a less than satisfactory performance by the university sector as a whole, a disjointed university system with little co-operation between the institutions, with a lack of coherence in getting its message across to the Irish public and government, and with substantial infrastructural deficits accumulated over decades of neglect of capital investment.

Atlantic had also identified a deficit in the strategic management of higher education institutions and sought ways to strengthen the capacity of the university managements to plan strategically.

Atlantic's selection of research as the focus of its investment in higher education was motivated by a conviction that Ireland's future prosperity depended on its ability to create new knowledge.

There were other considerations too. Atlantic's conviction about the role of education in cutting unemployment – around 16 per cent in the early nineties in Ireland – and in raising employment levels was also a serious consideration. It is now estimated (2005) that a shift in education levels in Ireland has been responsible for an estimated annual 1.4 per cent improvement in labour quality.⁴ Unemployment is now at about 4 per cent.

And it is relevant to note that Atlantic's liquid assets had been significantly increased by the sale of its shareholding in Duty Free Shoppers. This enabled Atlantic to contemplate investments in Irish higher education at a higher level than heretofore.

As the Irish university system is a publicly funded system, and as government funding of university research was so meagre, Atlantic's staff concluded that the major research initiative which was being conceived should be pursued in partnership with the Irish government. Only such a partnership, it was felt, would lead to higher long-term public investment in university research. Thus, for the first time in its history, Atlantic decided to enter into talks with a national government.

As a result of these discussions with Irish government officials, it was decided to pursue a strategy of leveraging substantial government money as part of a programme of funding for both capital and recurrent research costs. In the resulting partnership with the Irish government, it was agreed to develop an approach that would support:

⁴ Rob Hamilton, Bank of England quoted in *Irish Times* 10th May 2005.

- high quality basic research proposals
- institutional plans for strengthening research on a strategic and prioritised basis
- institutional plans for closely linking research performance and results to teaching and learning excellence
- inter institutional collaboration between the Republic's higher education institutions

Since this was the first agreement of its kind made by Atlantic with a government, it was unfamiliar territory and carried a certain level of risk. In this context, it is fair to say that Atlantic's success in negotiating this partnership arrangement with the Irish government owes much to the skill of the then chair of the Higher Education Authority in Dublin, Dr Don Thornhill. He was able to design and pre-test the funding model and its related assessment processes, he secured the essential commitment from the sponsoring government department (The Department of Education and Science) and was able to convince the Department of Finance of the benefits of Atlantic's support for basic research in Ireland. Without this, it would have been very difficult for Atlantic and the government to reach agreement, given the extent of inter-departmental cooperation needed to deliver it. Dr Thornhill's standing with the senior political figures involved, especially with the Ministers for Finance and for Education and Science, enabled him to establish a transparent and competitive system for resource allocation that provided the necessary reassurances on quality and objectivity in the assessment process that Atlantic required. Also, his influence with the higher education institutions and their researchers was sufficient to overcome the latter's initial resistance to this new model for resource allocation for basic research that was based on competitive institutional bidding around the strategic planning goals and objectives of the institutions. Critical roles in ensuring the acceptance of the PRTLTI (The Programme for Research in Third Level Institutions) proposal and its financing were also played by Mr Paddy McDonagh, an Assistant Secretary in the Department of Education and Science, and Mr Peter MacDonagh, at that time an adviser to the Minister of Education and Science and subsequently to the Taoiseach (prime minister).

Atlantic has also noted that in 1998 the Higher Education Authority had successfully piloted a small programme to fund research on the basis of competitive bids and independent assessment of those bids.

The funding mechanism pioneered by Dr Thornhill became known as the PRTLTI .

THE PRTLTI

The PRTLTI was initially a partnership between Atlantic and the Irish Government aimed at expanding the capacity of Irish higher education institutions to undertake basic research of international standard. The programme provides both capital and recurrent funding to redress the chronic shortage of suitable research space, equipment and staff in Irish universities.

It represents an integrated research and education initiative, based on proposals from the institutions that are consistent with institutional research strategies and priorities.

Its key features included:

- Supporting institutional research strategies decided by the institutions themselves and not by government or funding agency – on a competitive basis. The competitive nature of the PRTLTI ensured that the universities prioritised only their strongest research areas in their institutional proposals.
- Embedding a culture of strategic planning for research in all higher education institutions.
- Strengthening the synergies between research and education by insisting on specific initiatives that would help to maximise the education dividend at all levels in the institution, from its engagement in the proposed research.
- Forcing the institutions to play to their strengths and to prioritise – a difficult process that resulted in much soul searching within institutions more accustomed to pressing all interests.
- Promoting and embedding inter-institutional collaborative research in order to counterbalance limitations of scale in the Irish system – a radical departure for a system more accustomed to cut-throat competition for limited research funds.

- Supporting projects from all academic disciplines, under the same rubrics, including the humanities and social sciences. Researchers in the latter disciplines took a little time to grasp the changed nature of research funding and to formulate large team-based and inter-institutional proposals.
- Encouraging the establishment of efficient and effective management of research in the institutions. Large-scale inter-institutional projects would not be funded without evidence that the proposed management arrangements would be effective.
- Capturing the 'process benefits' from participation in research – its impacts on human capital, skill development and institutional competitiveness.

The system is based on a relatively simple formula, involving three assessment criteria:

- The institution's strategic plan for research and the extent to which the specific research proposal helped to advance this plan, including the level of inter-institutional collaboration involved.
- The quality of the research content of the proposal.
- The impact of the proposed research on teaching and learning at the institution and the specific mechanisms being proposed to ensure this.

Adjudication was carried out by a high quality international panel that is entirely independent of either government or government departments – a remarkable aspect, given the very large scale of funding involved.

The PRTLTI was launched in 1999 and two further cycles followed in 2000 and 2001. Total funding for these three cycles is shown below.

PRTLTI Funding (€ millions)

<i>Cycle</i>	<i>Total</i>	<i>Government Funding</i>	<i>Atlantic Funding</i>
1	206	112	94
2	79	53	26
3	320	262	58
All Cycles	605	427	178

This funding represented a step change in what was available to the Irish higher education institutions as compared with the limited funds available to them at the beginning of the decade. And the government funds represented new investment in the higher education sector and not funds diverted from other parts of the education domain.⁵

PRTLTI has been well received. External evaluators have described it as a 'unique and farsighted initiative'.⁶ They note that it breaks new ground in research funding schemes, especially in its focus on strengthening the linkages between teaching and research, its emphasis on institutional prioritisation of research investments and its support for institutions working together to create a more competitive critical mass of research effort. It is satisfying to note that it now occupies a central position in the Irish government's strategy for development of a world-class research environment in higher education institutions in the country and that its future support by government is assured.

It also represents a new departure for the funding of research in Ireland. Its focus on building institutional capacity through institutional bidding was a first and initially was strongly resisted by the research community, which wanted a reinforcement of the more traditional project type funding system.

IMPACTS ON RESEARCH

Through the PRTLTI forty-six research institutes or programmes have been created. These range from the Institute of Advanced Materials Sciences in Trinity College to the National Centre for Sensor Research in Dublin City University, and from the Institute for the Study of Social Change in University College Dublin to the Biosciences Institute in University College Cork.⁷

The work of the institutes and programmes supported through the PRTLTI has already been externally reviewed. There has been a noticeable increase in the number and quality of research publications and in participation in international research

⁵ An analysis of PRTLTI funding by thematic area is in Appendix 2.

⁶ *The Programme for Research in Third Level Institutions [PRTLTI] Impact Assessment – Vol I*. Report by the International Assessment Committee, Higher Education Authority, 2004, p. 12.

⁷ A list of the PRTLTI-funded research institutes and programmes is to be found in Appendix 3.

programmes.⁸ A recent bibliometric analysis of research performance by PRTLTI researchers found their impacts in all fields to be increasing and in the range 'high to very high', as well as being higher than overall Irish impact scores.⁹ In addition, peer reviews of PRTLTI work shows that publications are of a high international standard and represent a major contribution to knowledge.

The PRTLTI initiative has resulted in a substantial enhancement in the capacity for world class research in Ireland, the enablement of Irish researchers to participate in the international research community as scientific leaders and peers and the considerable strengthening of the 'fourth level' in Irish education.

As a result of the PRTLTI intervention, some 97,000 square metres of new research space, almost 6,000 new research spaces and 1,600 new research-specific library spaces will have been created. New capital equipment for advanced research worth €135 million will have been added to the system.¹⁰

In 1996, a Nobel physicist remarked of Irish researchers that one encountered so many of them abroad that it would be possible to establish at least one more first class university in Ireland '...if only one could repatriate the best people who have gone abroad'.¹¹

Today, thanks to the PRTLTI it appears that the brain drain of the best research talent in Ireland has been reversed. Key Irish researchers who were forced to go abroad to pursue their careers are returning, Irish institutions are retaining their young researchers at both PhD and post-doctoral levels and high quality researchers from other countries are taking up positions in Ireland. Some 750 principal investigators have been appointed and 450 post doctoral and 1,000 new postgraduate positions for research have been created.¹²

⁸ Almost 5,000 scientific publications in the international literature, more than 600 books/chapters, 1,000 published contributions to scientific conferences, 2,000 presentations at international conferences and over 200 conferences hosted by Irish institutions.

⁹ Centre for Science and Technology Studies (CWTS) Netherlands, April 2004.

¹⁰ *Supra* note 8, at 33.

¹¹ Professor Richard Taylor, Stanford University, winner of the 1990 prize for physics.

¹² *Supra* note 8, at 33.

Increased research capacity has enabled the universities to be more competitive internationally and thanks to PRTLTI support they have been able to leverage research funding from other sources, nationally and internationally. Because of the new facilities provided by PRTLTI, more than €250 million has been leveraged from new sources.

There has been a marked increase in university contract research budgets, since the introduction of PRTLTI. For example, the annual research grants and contracts income of University College Dublin (the largest university) has grown from €15 million to €33 million, while Trinity College Dublin (Ireland's oldest university) has grown from €17 million to €40 million. Industrial collaboration, too, has been strengthened and PRTLTI researchers have secured more than €3 million directly from industrial partners.

THE IMPACTS ON EDUCATION

Institutions have been incentivised, for the first time, to consider the introduction of mechanisms to improve the interaction between research and teaching and to ensure the achievement of a strong education dividend from engagement in research funded under PRTLTI.

The assessment criteria explicitly require institutions to demonstrate improved methods of linking research with teaching and learning. PRTLTI has close links with education policy generally (its public funding comes via the Department of Education and Science), and this has helped to strengthen this aspect of the programme. Thus, while other research funding may be concerned with narrower or more immediate industrial or sectoral needs, the PRTLTI has been laying deeper foundations.

The educational impacts of the programme are evident in a wide range of new and varied courses that have been introduced. Seven bachelor degree programmes, two postgraduate diploma programmes, eleven master programmes and two new diploma courses have been developed as a result of the work of PRTLTI-funded endeavours.

Many of the new PRTLTI research centres provide internships or placements for undergraduates, giving them real exposure to research methods and the research mindset. The high level of contact between undergraduates and PRTLTI-funded post-doctoral students encourages undergraduates to pursue higher degrees. A

more vigorous fourth level capacity is developing, assisted by the stronger links with undergraduates who are encouraged to conduct fourth year projects alongside and frequently in teams with PRTLTI-funded postgraduate and postdoctoral students.

External reviewers report an educational environment that is both stimulating and effective. The ethos in these PRTLTI-funded centres, they say, is open and enthusiastic due to the high levels of interdisciplinary co-operation in all PRTLTI programmes. Relations between staff and students are more open and friendly than in traditional academic departments, because of the close student-researcher interaction which is a requirement of PRTLTI funding. The new PRTLTI-funded facilities, too, are impressive and play an important role in attracting students to their programmes.

The PRTLTI's insistence on linkages between teaching and learning is a key feature of the programme and one that distinguishes it from other more conventional research funding schemes. It is widely believed that the programme will make a significant contribution to the emergence of a strong fourth level in Irish education and to the provision of high quality human resources for the economy.

IMPACTS ON INSTITUTIONAL CULTURE

PRTLTI appears to have had a significant impact on university culture. Institutional thinking has changed and the way in which institutions undertake research has been transformed. The universities are now prioritising their research projects, working to their strengths and collaborating closely with sister institutions.

New research management structures and planning processes have been introduced. In 1997 there was just one institution with a recognisable strategic planning process in place, today all seven of the universities have such processes in operation. All seven have a Research Vice President/Dean compared with just two in 1995. In addition, new systems for financial management and management information systems for research have been widely introduced by the institutions.

For the first time in Ireland, a culture of multidimensional collaboration is being established – there is now collaboration between the academic departments of institutions, between the institutions themselves, between scientific disciplines, between research and teaching and with international research groups.

Almost 30 per cent of the available programmatic funding has been allocated to collaborating partners in inter-institutional programmes.

New inter-institutional structures are being established between institutions which hitherto had little or no collaboration between them.¹³ The Dublin Molecular Medicine Centre is a good example of this. This newly established centre integrates three of Dublin's most prestigious research institutions with six Dublin teaching hospitals to provide a platform for fundamental molecular medicine research. PRTLTI has already provided in excess of €70 million for this project.

Perhaps as important as the funding, has been the change in mindset within the university system. The principles of competition and the benefits of strategic planning are now widely accepted. In the past, Irish universities expected a pro-rata distribution of funding, an illusion that was rudely shattered when some of the larger institutions failed to get funding in the early stages of PRTLTI. The lesson they learned was worthwhile: they returned to later rounds of the competition with far stronger proposals.

CONCLUSIONS

The PRTLTI initiative has made significant progress in respect of all its objectives, progress that will, it is hoped, ultimately manifest itself in stronger and better managed institutions, in centres of excellence that will be capable of matching the best internationally and in the attraction to those centres of the highest quality researchers.

The universities are concentrating on the areas where they have comparative strengths and inter-institutional collaboration is now taking place on a regular basis. Institutions strategically prioritise their research investments and focus on the development of centres of excellence, consistent with their individual strengths,

¹³ Some forty new inter-institutional research programmes, engaging more than 2,000 researchers have been established. Seven new joint research facilities are shared between two or more institutions and ten institutes of technology (regionally based third level institutions with relatively limited research capacities) have been engaged in new research collaborations with the universities. In *supra* note 8, at 37.

while cross-disciplinary and inter-institutional co-operation within the system have accelerated.

Institutional leadership has been greatly strengthened with the emphasis on strategic planning and prioritisation, followed by the provision of resources that enable senior management at the university to deliver on the planned targets, thereby enhancing the image of a planned approach.

SOME LESSONS

A few general lessons can be drawn from the experience in Ireland.

- The PRTLTI would never have been possible without the co-operation and support of a group of outstanding leaders – the presidents of the Irish universities. They immediately appreciated what needed to be done to improve the research output of their institutions and worked tirelessly to change what were, in some cases, centuries' old rivalries and traditions. Their commitment to the project, often in the face of unease among some of their academic staff, cannot be overstated.
- The PRTLTI has demonstrated to Atlantic that productive partnerships with government are possible. A key element in the arrangement was trust – both parties had to trust that the other would live up to its commitments. And for this type of cooperation to be successful it was important that the Atlantic clearly stated its objectives, and that the funding mechanism was transparent and impartial.
- This type of programme can be replicated. The success of the PRTLTI encouraged Atlantic to enter into negotiations with the Department of Employment and Learning in Northern Ireland and to co-fund a similar project there. The Support Programme for University Research (SPUR) involved an investment of Stg£94 million shared equally between the Northern Ireland government and Atlantic.
- The PRTLTI has demonstrated that a conservative research and education system can respond to a new discipline and funding regime. The project has proved that a well-structured funding framework will produce sustainable change not only in institutional behaviour, but also in government policies. By focussing on research, the project has been able to stimulate knock-on changes in institutional behaviour and in teaching

and education excellence. The universities have been free to pursue their own goals. Atlantic has played no role in university governance nor has it attempted to influence the research agendas of the universities.

- An independent, competitive assessment system conducted by international peers free from government or institutional influence is an essential requirement of programmes of this scale.
- This funding model can strengthen institutional leadership in universities and reward the leaderships which are prepared to play to the strengths of their institutions. PRTLTI gave the presidents an influence on the direction of research at the institution not heretofore experienced.
- PRTLTI's efforts to lay deeper foundations through its insistence on a closer binding of research and teaching have been encouraging, but more time is necessary to see the full impacts of this aspect of the programme. The evidence thus far indicates, however, that it is difficult to find really new and innovative ways of improving this relationship. While a lot has been achieved, therefore, there is more to do on this most important dimension.
- A major beneficial impact has been the incentive to inter-institutional collaboration which is now establishing itself in a system heretofore characterised by intense competition and some jealousy between the major universities. This is very important for a small system in which it is difficult to achieve the scale required for internationally competitive research.
- For Atlantic, the test of the success of its investment in PRTLTI will be the willingness of the Irish Government to continue to commit significant public funds to university-based research. The early indications are promising – in June 2005 the Higher Education Authority started its planning of Cycle 4 of the programme, a cycle in which Atlantic will not be participating.

APPENDIX 1: THE IRISH HIGHER EDUCATION SYSTEM

Irish Higher Education Overview

- Third Level education accounts for 1.2 per cent or €1.4 billion of Ireland's economy, of which 85-90 per cent of spending is supplied by the state
- There are 137,323 full-time third-level students, of which 127,681 are Irish
- €142,331,784 in public aid is given annually
- 37 per cent of those in the 25-34 age group resident in Ireland have had tertiary education, compared with the OECD average of 28 per cent
- There are five major sectors of higher education in Ireland
 1. Teacher training
 2. Higher Education Authority funded institutions (including teacher training colleges and the big seven: University College Cork, University College Dublin, National University of Ireland at Galway, National University of Ireland at Maynooth, Trinity College, Dublin City University and the University of Limerick)
 3. Institutes of technology and other technical colleges
 4. Other aided institutions such as art and design and hotel schools
 5. Private institutions such as religious, medical, and other professional schools

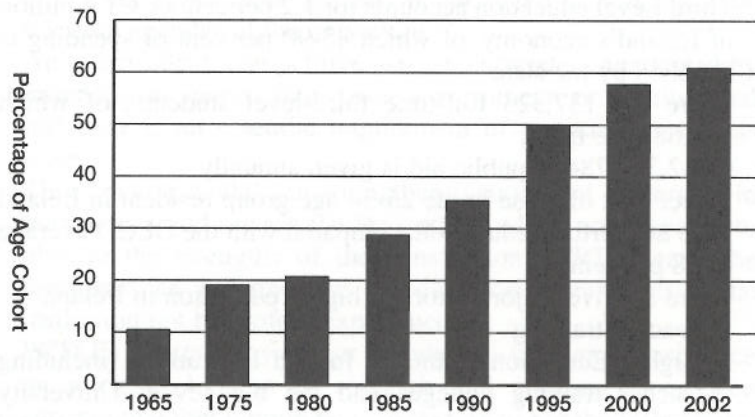
Higher Education in Ireland

Table 1: Geographic distribution of students enrolled in full-time third level courses by type of institution¹⁴

	Teacher Training Higher Education	Higher Education Authority	Institutes of Technology and Other Technological Colleges	Other Aided	Private (Religious, Medical, Other)	Total
Ireland	1,158	69,339	50,172	2,788	4,224	127,681
(N. Ireland)	(2)	(929)	(85)	(31)	(46)	1,093
International	0	5,540	1,324	49	2,195	9,108
Unknown	0	43	11	0	480	534
Total	1,158	74,922	51,507	2,837	6,899	137,323

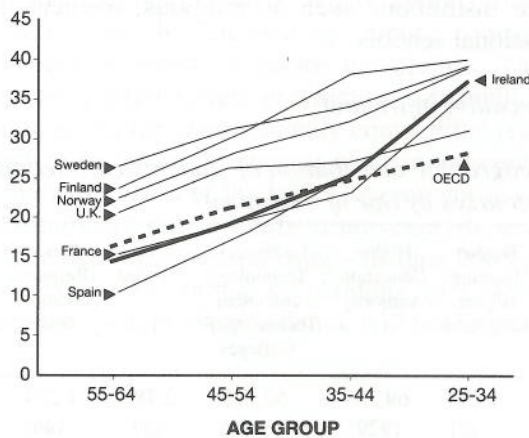
¹⁴ The Irish Department of Education and Science, Statistical Report 2002-2003, Page 120, Table 7.2

Table 2: Estimated rate of transfer to third level of Irish secondary school age cohort¹⁵



The rate of transfer is estimated by taking the total annual intake to all full-time third level colleges as a percentage of the estimated population at age 17. Some persons entering third level may have previously entered. Mature entrants and entrants from outside the state are also included.

Table 3: Percentage of population with tertiary education by age group¹⁶



Source: *Education at a Glance*, OECD, 2004, Table A3.3

¹⁵ The Irish Department of Education and Science, Statistical Report 2002-2003, Page XII, Figure N

¹⁶ The Royal Irish Academy, *Cumhacht Feasa*: Report of the Working Group on Higher Education, Page 5, Figure I

*Table 4: Irish institutions of higher education by mode of study*¹⁷

Higher Education Authority

- University College Cork – National University of Ireland, Cork
- University College Dublin – National University of Ireland, Dublin
- National University of Ireland, Galway
- Trinity College Dublin
- National University of Ireland, Maynooth
- Dublin City University
- University of Limerick
- St.Patrick 's Teacher Training College, Drumcondra
- Mary Immaculate College of Education, Limerick
- National College of Art and Design

Institutes of technology/other technological colleges

- Dublin Institute of Technology
- Athlone Institute of Technology
- Institute of Technology, Carlow
- Cork Institute of Technology
- Dundalk Institute of Technology
- Galway-Mayo Institute of Technology
- Letterkenny Institute of Technology
- Limerick Institute of Technology
- Institute of Technology, Sligo
- Institute of Technology, Tallaght
- Institute of Technology, Tralee
- Waterford Institute of Technology
- Dun Laoghaire Institute of Art, Design and Technology
- Institute of Technology, Blanchardstown
- Tipperary Institute
- Hotel Training and Catering College, Killybegs, Co.Donegal

Other colleges

- Coláiste Mhuire, Marino, Dublin
 - Church of Ireland College of Education, Rathmines, Dublin
 - Froebel College of Education, Blackrock, Co.Dublin
 - St.Angela's College, Lough Gill, Co.Sligo
 - St.Catherine's College, Sion Hill, Co.Dublin
 - National College of Ireland
 - Mater Dei Institute, Clonliffe Road, Dublin
 - Pontifical College, Maynooth, Co. Kildare
-

¹⁷ The Irish Department of Education and Science, Statistical Report 2002-2003, Page 122, Table 7.4

APPENDIX 2¹⁸*Funding Awarded by Thematic Area – 3 Cycles*

Thematic Area	Cycle 1 €	Cycle 2 €	Cycle 3 €	TOTAL €
Bio Science	85,034,359	37,369,661	172,430,432	294,834,452
Chemical and Physical Sciences	46,853,336		12,696,380	59,549,716
Engineering	12,555,170		15,236,857	27,792,027
Environment and Marine	1,203,712	28,488,935	32,632,268	62,324,915
Humanities	2,571,220	2,902,621	10,792,773	16,266,614
ICT	27,618,074	812,632	30,854,636	59,285,342
Social Science	4,436,465	8,908,483	16,634,069	29,979,017
Library	25,776,953		28,696,081	54,473,034
TOTAL	206,049,289	78,482,332	319,973,496	604,505,117

¹⁸ Source: <http://www.heai.ie/index.cfm/page/sub/id/543>

APPENDIX 3¹⁹

A list of the PRTL1-funded research institutes and programmes

<i>Centre/ Research Programme</i>	<i>Lead Institution</i>	<i>Research Collaborations</i>
BIOSCIENCE/ MEDICINE		
<i>Biomedical Engineering</i>		
National Centre for Biomedical Engineering Science	NUIG	UCC, UL, UCD, TCD, GMT, IT Sligo and AIT
Trinity Centre for Bioengineering	TCD	NUIG
Centre for Biopolymer and Biomolecular Research	AIT	Research NUIG, Uni. of Ulster, Coleraine
<i>Cellular Molecular Biology</i>		
National Centre for Cellular Biotechnology	DCU	NUIM, IT Tallaght
Research Programme in Molecular Cell Biology	TCD	RCSI, UCD
Biosciences Institute	UCC	
Research Programme in Food and Health	UCC	NUIG, NUIM, QUB, UL
Conway Institute for Biomolecular and Biomedical Research	UCD	UCD
Dublin Molecular Medicine Centre	UCD/TCD	RSCI, NUM
<i>Immunology</i>		
Research programme in Biosciences – Institute for Immunology	NUIM	

¹⁹ Source: <http://www.heai.ie/uploads/pdf/PRTL1%20Participants.pdf>

A list of the PRTLJ-funded research institutes and programmes - contd.

Molecular Medicine and Biopharmaceutical Sciences

Institute of Biopharmaceutical Sciences
Biopharmaceutical Sciences Network (BSN)
Programme for Human Genomics

RCSI
RCSI
RCSI/BSN
(UCD/TCD)

UCD, TCD, NUIM
UCD, TCD, NUIM

Reproductive Biology

Research Programme in Integrative Reproductive
Biology

UCC

NUIG, RSCI, UCD

Bioengineering - Agroecology

Research programme in biosciences - Institute for
Bioengineering and Agroecology

NUIM

DIT, ITS, GMIT, WIT

Neuroscience

Institute of Neuroscience and National Neuroscience
Network

TCD

UCC, UCD

CHEMICAL AND PHYSICAL SCIENCES

Material Sciences

Institute for Advanced Materials Science
Materials and Surface Science Institute (MSSI)

TCD

DCU

UL

Biological/Physical Science Techniques

Optical Characterisation and Spectroscopic facility
Analytical and Biological Chemistry Research
Facility

DIT

UCC

A list of the PRTLJ-funded research institutes and programmes – contd.

National Centre for Sensor Research	'Engineering' DCU	IT Tallaght
<i>INFORMATION AND COMMUNICATION TECHNOLOGIES</i>		
Research Programme in Smart Space Management	WIT	CIT, TCD
Research in Health Informatics – the MediLink programme	DIT and TCD	
Research Institute for Networks and Communications Engineering	DCU	
Boole Centre for Research in Informatics	UCC	
Institute for Information Technology and Advanced Computation Research	TCD	
Research programme on Grid-enabled computational Physics of Natural Phenomena	DIAS	DCU, NUJG, UCD, HEAnet, Met Éireann, Armagh Observatory, Grid Ireland
<i>Platform Technologies</i>		
National Centre for Plasma Science and Technology	DCU	
National Nanofabrication facility	UCC	
<i>Humanities</i>		
Mediterranean and Near Eastern Studies	TCD	
Irish-Scottish studies	TCD	

A list of the PRTL-funded research institutes and programmes - contd.

National Political and Social Survey	TCD/UCD	
Centre for the Study of Human Settlement and Historical Change	NUIG	UL, UCC, TCD
Humanities Institute of Ireland	UCD	SPD
Research Programme in History and Society	UCC	
<i>Social Sciences</i>		
The National Institute for Regional and Spatial Analysis	NUIIM	DIT, ITS, GMIT, WIT, MIC
Centre for Transportation Research and Innovation	TCD	UCC
Institute for International Integration Studies	TCD	NUIIM
Centre for Innovation and Structural Change	NUIG	DCU, UCD
Institute for the Study of Social Change	UCD	TCD
The Urban Institute Ireland	UCD	TCD
<i>Environment and Marine</i>		
Environmental Change Institute	NUIG	UCC
Environmental Research Institute and ECOSITE	UCC	NUIG
Research Programme in Marine Science - Marine Research Institute	NUIG	TCD
Research Programme in Ecotoxicology, Waste Reduction and Air Pollution	Cork IT	UCC
Centre for Sustainability	Sligo IT	NUIG
Research Programme in Environmental Science	Carlow IT	UCC
<i>Research/ Resources Library</i>		
Library Extension - The Ussher Library	TCD	
Research Library	UCC	