Research and Development in Ireland, 2001 - at a glance
Introduction

Forfás has responsibility for the collection and publication of research and innovation statistics for Ireland. To this end, Forfás monitors Research & Development activity in the state, academic and private sectors and publishes the relevant statistical information in the regular publications *State Expenditure on Science & Technology; Survey of Research & Development in the Higher Education Sector* and *Business Expenditure on Research & Development*.

This publication brings together the key facts and figures from these three discrete sectors (state, academic and private) and provides a statistical compilation of Ireland’s Science and Technology activity, based on the latest data available in 2003.

Author: **Dr. Rhona Dempsey**  
*December 2003*

If you require further information about this publication or any of the surveys please contact

**Michael Fitzgibbon**  
S&T Indicators Unit  
Science & Technology Division  
Forfás, Wilton Park House  
Wilton Place, Dublin 2  
Ireland.
Index

Section 1

National Expenditure on R&D – Headline figures

<table>
<thead>
<tr>
<th>Chart</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gross Expenditure on R&amp;D (GERD) - Ireland, 1993 to 2001</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Gross Expenditure on R&amp;D (GERD) as a percentage GDP/GNP - Ireland, EU and OECD</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>GERD as % GDP/GNP for Ireland and selected countries</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Funding sources of National R&amp;D 1995, 1999 and 2001 - Ireland</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Performance of National R&amp;D by Sector 1995, 1999 and 2001 - Ireland</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>GERD broken down by Funding Source/GERD broken down by Performing Sector - Ireland, 2001</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>Share of Government Budget allocated to R&amp;D, Ireland and selected countries 2001</td>
<td>12</td>
</tr>
</tbody>
</table>
## Section 2

### R&D Workforce

<table>
<thead>
<tr>
<th>Chart</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Researchers per 1000 Total Employment, Ireland, EU and OECD, 1997, 1999 and 2001</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td>Researchers per 1000 Total Employment, Ireland and selected countries, 1997, 1999 and 2001</td>
<td>14</td>
</tr>
<tr>
<td>10</td>
<td>(i) Research &amp; Development Personnel (Full Time Equivalents) 2001 by Sector of Employment</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) Numbers of R&amp;D Personnel employed as Researchers and Support Staff 2001 by Sector of Employment</td>
<td>16</td>
</tr>
<tr>
<td>11</td>
<td>Distribution of all personnel (FTE) engaged in in-house R&amp;D in the private sector, Ireland, 2001</td>
<td>17</td>
</tr>
<tr>
<td>12</td>
<td>Science &amp; Engineering Graduates as Percentages of All Disciplines, Ireland and Selected Countries, 2000</td>
<td>18</td>
</tr>
</tbody>
</table>
## Section 3

*Expenditure on R&D by Main Sector: Business, Third Level and Public*

<table>
<thead>
<tr>
<th>Chart</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Business Expenditure on R&amp;D - Ireland, 1993 to 2001</td>
<td>20</td>
</tr>
<tr>
<td>14</td>
<td>Business Expenditure on R&amp;D as a percentage GDP/GNP - Ireland, EU and OECD 1993 to 2001</td>
<td>21</td>
</tr>
<tr>
<td>15</td>
<td>Distribution of Business Expenditure on R&amp;D by main Industrial sector, Ireland, 2001</td>
<td>22</td>
</tr>
<tr>
<td>16</td>
<td>Higher Education Expenditure on R&amp;D - Ireland, 1993 to 2001</td>
<td>23</td>
</tr>
<tr>
<td>17</td>
<td>Higher Education Expenditure on R&amp;D as a percentage GDP / GNP Ireland, EU and OECD, 1993 to 2001</td>
<td>24</td>
</tr>
<tr>
<td>18</td>
<td>Government Intramural Expenditure on R&amp;D - Ireland 1993 to 2001</td>
<td>25</td>
</tr>
<tr>
<td>19</td>
<td>Government Intramural Expenditure on R&amp;D as a % GDP/GNP, Ireland, EU and OECD 1993 to 2001</td>
<td>26</td>
</tr>
<tr>
<td>20</td>
<td>USA Patents Granted, by Residence of Inventor, 2001</td>
<td>27</td>
</tr>
</tbody>
</table>
Section 1

National Expenditure on R&D – Headline figures
1 Gross Expenditure on R&D (GERD) - Ireland 1993 to 2001

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERD €m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Prices</td>
<td>501.8</td>
<td>667.4</td>
<td>856.2</td>
<td>1,097.0</td>
<td>1,338.7</td>
</tr>
<tr>
<td>Constant Prices</td>
<td>626.1</td>
<td>793.7</td>
<td>987.3</td>
<td>1,215.0</td>
<td>1,338.7</td>
</tr>
</tbody>
</table>

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás).
2 Gross Expenditure on R&D (GERD) as a percentage GDP/GNP* - Ireland, EU and OECD

<table>
<thead>
<tr>
<th>Year</th>
<th>GERD/GNP</th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ireland</td>
<td>1.30%</td>
<td>1.43%</td>
<td>1.45%</td>
<td>1.43%</td>
<td>1.39%</td>
<td></td>
</tr>
<tr>
<td>EU</td>
<td>1.92%</td>
<td>1.81%</td>
<td>1.80%</td>
<td>1.86%</td>
<td>1.93%</td>
<td></td>
</tr>
<tr>
<td>OECD</td>
<td>2.25%</td>
<td>2.11%</td>
<td>2.16%</td>
<td>2.21%</td>
<td>2.33%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>GERD/GDP</th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ireland</td>
<td>1.16%</td>
<td>1.27%</td>
<td>1.28%</td>
<td>1.22%</td>
<td>1.17%</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2000 (Forfás); Main Science & Technology Indicators, 1999, Vol 1; 2001, Vol 1; 2003 Vol. 1; (OECD).

*The use of GNP as a base is the more relevant aggregate for Ireland. GDP data in Ireland are inflated by the transfer pricing policies of large multinationals.
3 GERD as % GDP/GNP for Ireland and selected countries, 2001*

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás); Main Science & Technology Indicators, 1999, Vol 1; 2001, Vol 1; 2003 Vol. 1; (OECD); Singapore R&D 2001 (Agency for Science, Technology and Research, Singapore).

*2001 data used or latest available year.
4 Funding sources of National R&D 1995, 1999 and 2001 - Ireland

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás).
5 Performance of National R&D by Sector 1995, 1999 and 2001 - Ireland

Performers of GERD 1995

- % GERD performed by industry: 23%
- % GERD performed by third level sector: 6%
- % GERD performed by government: 10%

Performers of GERD 1999

- % GERD performed by industry: 23%
- % GERD performed by third level sector: 6%
- % GERD performed by government: 10%

Performers of GERD 2001

- % GERD performed by industry: 68%
- % GERD performed by third level sector: 10%
- % GERD performed by government: 22%

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás).
GERD broken down by Funding Source - Ireland 2001/GERD broken down by Performing Sector - Ireland, 2001

**GERD Funding Sources - Ireland 2001**

![GERD Funding Sources - Ireland 2001](image)

**GERD by Performing Sector - Ireland 2001**

![GERD by Performing Sector - Ireland 2001](image)

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás).
7 Share of Government Budget allocated to R&D, Ireland and selected countries 2001

France: 1.89
Finland: 1.89
United Kingdom: 1.71
Spain: 1.71
Germany: 1.70
Netherlands: 1.69
EU (2): 1.62
Sweden: 1.49
Italy: 1.43
Portugal: 1.37
Denmark: 1.26
Austria: 1.26
Ireland: 1.25
Belgium: 1.19

Notes: (1) IRL, B, D, EL, E, F, FIN, I, SWE, UK, and EU: 2001; DK: 2000; (2) EU does not include L

Sources: State Expenditure on Science & Technology, 2001 (Forfás); Statistics on S&T data 1991-2001, (European Commission 2003 edition); Forfás STI Indicators Unit.
8 Researchers per 1000 Total Employment, Ireland, EU and OECD, 1997, 1999 and 2001

<table>
<thead>
<tr>
<th></th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>8.2</td>
<td>8.6</td>
<td>8.6</td>
</tr>
<tr>
<td>EU</td>
<td>5.3</td>
<td>5.6</td>
<td>5.8</td>
</tr>
<tr>
<td>OECD</td>
<td>6.1</td>
<td>6.4</td>
<td>6.5</td>
</tr>
<tr>
<td>Ireland</td>
<td>5.0</td>
<td>4.9</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás); Main Science & Technology Indicators, 2003 Vol. 1; (OECD).
9 Researchers per 1000 Total Employment, Ireland and selected countries: 2001

<table>
<thead>
<tr>
<th></th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>12.3</td>
<td>14.5</td>
<td>15.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>9.2</td>
<td>9.6</td>
<td>10.6</td>
</tr>
<tr>
<td>Belgium</td>
<td>6.6</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>France</td>
<td>6.8</td>
<td>6.8</td>
<td>7.1</td>
</tr>
<tr>
<td>Denmark</td>
<td>6.5</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>Germany</td>
<td>6.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>OECD Average</td>
<td>6.1</td>
<td>6.4</td>
<td>6.5</td>
</tr>
<tr>
<td>EU Average</td>
<td>5.3</td>
<td>5.6</td>
<td>5.8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>5.2</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Netherlands</td>
<td>5.0</td>
<td>5.1</td>
<td>5.2</td>
</tr>
<tr>
<td>Ireland</td>
<td>5.0</td>
<td>4.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Spain</td>
<td>3.8</td>
<td>4.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Greece</td>
<td>2.9</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Portugal</td>
<td>2.9</td>
<td>3.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Italy</td>
<td>3.0</td>
<td>2.9</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás); Main Science & Technology Indicators, 2003 Vol. 1; (OECD).
10 (i) Research & Development Personnel (Full Time Equivalents) 2001 by Sector of Employment

(ii) Numbers of R&D Personnel employed as Researchers and Support Staff 2001 by Sector of Employment

Sources: Derived from Survey of R&D in the Business Sector, 2001 (Forfás); Survey of R&D in the Higher Education Sector, 2000 (Forfás); State Expenditure on Science & Technology, 2001 (Forfás).
11 Distribution of all personnel (FTE) engaged in in-house R&D in the Business sector, Ireland, 2001

Non PhD 59%

PhD 7%

Technicians 19%

Other Support 15%

R&D Personnel = 9,126

Source: Derived from Survey of R&D in the Business Sector, 2001 (Forfás).
Section 2

12 Science & Engineering Graduates (ISCED 5+ISCED 6*) as Percentages of All Disciplines, Ireland and Selected Countries, 2000


* ISCED 5 and ISCED 6 are sub-classified into ISCED 5A, ISCED 5B and ISCED 6 programmes.

- **ISCED 5b** = Programmes at the tertiary level that focus on practical, technical or occupational skills for direct entry into the labour market.

- **ISCED 5a** = Programmes at the tertiary level equivalent to university programmes. (includes Bachelors and Masters)

- **ISCED 6** = Advanced research programmes at the tertiary level, equivalent to PhD programmes. (taken from UNESCO definitions).
Section 3

Expenditure on R&D by Main Sector: Business, Third Level and Public
13 Business Expenditure on R&D - Ireland, 1993 to 2001

### Table: Business Expenditure on R&D - Ireland, 1993 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>BERD €m Current Prices</th>
<th>BERD €m Constant Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>343</td>
<td>392</td>
</tr>
<tr>
<td>1995</td>
<td>470</td>
<td>522</td>
</tr>
<tr>
<td>1997</td>
<td>612</td>
<td>679</td>
</tr>
<tr>
<td>1999</td>
<td>784</td>
<td>848</td>
</tr>
<tr>
<td>2001</td>
<td>917</td>
<td>917</td>
</tr>
</tbody>
</table>

**Source:**
*Derived from Survey of R&D in the Business Sector, 2001 (Forfás).*
14 Business Expenditure on R&D as a percentage GDP/GNP - Ireland, EU and OECD 1993 to 2001

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BERD/GNP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ireland</strong></td>
<td>0.89%</td>
<td>1.01%</td>
<td>1.04%</td>
<td>1.02%</td>
<td>0.95%</td>
</tr>
<tr>
<td><strong>BERD/GDP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ireland</strong></td>
<td>0.79%</td>
<td>0.89%</td>
<td>0.91%</td>
<td>0.87%</td>
<td>0.80%</td>
</tr>
<tr>
<td><strong>EU</strong></td>
<td>1.18%</td>
<td>1.18%</td>
<td>1.13%</td>
<td>1.19%</td>
<td>1.21%</td>
</tr>
<tr>
<td><strong>OECD</strong></td>
<td>1.44%</td>
<td>1.44%</td>
<td>1.48%</td>
<td>1.52%</td>
<td>1.56%</td>
</tr>
</tbody>
</table>

**Source:**
*Derived from Survey of R&D in the Business Sector, 2001 (Forfás).*

Source: Derived from Survey of R&D in the Business Sector, 2001 (Forfás).
16 Higher Education Expenditure on R&D - Ireland, 1993 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>HERD €m Constant Prices</th>
<th>HERD €m Current Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>133</td>
<td>107</td>
</tr>
<tr>
<td>1995</td>
<td>163</td>
<td>137</td>
</tr>
<tr>
<td>1997</td>
<td>206</td>
<td>178</td>
</tr>
<tr>
<td>1999</td>
<td>276</td>
<td>249</td>
</tr>
<tr>
<td>2001</td>
<td>294</td>
<td>294</td>
</tr>
</tbody>
</table>

Source: Derived from Survey of R&D in the Higher Education Sector, 2000 (Forfás).
17 Higher Education Expenditure on R&D as a percentage GDP/GNP Ireland, EU and OECD, 1993 to 2001

Sources: Derived from Survey of R&D in the Higher Education Sector, 2000 (Forfás); Main Science & Technology Indicators, 1999, Vol 1; 2001, Vol 1; 2003 Vol. 1; (OECD).
18 Government Intramural Expenditure on R&D - Ireland 1993 to 2001

**Table: Government Intramural Expenditure on R&D - Ireland 1993 to 2001**

<table>
<thead>
<tr>
<th>Year</th>
<th>Current Prices</th>
<th>Constant Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>51.5</td>
<td>64.3</td>
</tr>
<tr>
<td>1995</td>
<td>60.2</td>
<td>71.6</td>
</tr>
<tr>
<td>1997</td>
<td>65.4</td>
<td>75.4</td>
</tr>
<tr>
<td>1999</td>
<td>63.9</td>
<td>70.8</td>
</tr>
<tr>
<td>2001</td>
<td>127.7</td>
<td>127.7</td>
</tr>
</tbody>
</table>

**Source:**
Derived from State Expenditure on Science & Technology, 2001 (Forfás)
19 Government Intramural Expenditure on R&D as a % GDP/GNP, Ireland, EU and OECD 1993 to 2001

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOVERD/GNP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>0.13%</td>
<td>0.13%</td>
<td>0.11%</td>
<td>0.08%</td>
<td>0.13%</td>
</tr>
<tr>
<td>EU</td>
<td>0.31%</td>
<td>0.29%</td>
<td>0.27%</td>
<td>0.26%</td>
<td>0.25%</td>
</tr>
<tr>
<td>OECD</td>
<td>0.28%</td>
<td>0.27%</td>
<td>0.24%</td>
<td>0.24%</td>
<td>0.24%</td>
</tr>
</tbody>
</table>

Sources: Derived from State Expenditure on Science & Technology, 2001 (Forfás); Main Science & Technology Indicators, 1999, Vol 1; 2001, Vol 1; 2003 Vol. 1; (OECD).
20 USA Patents Granted, by Residence of Inventor, 2001

Source: USPTO utility patents
(www.uspto.gov/web/offices/ac/ido/oeip/taf/st_co_01.htm)
Forfás
Wilton Park House,
Wilton Place,
Dublin 2.
Tel: 01-607 3000
Fax: 01-607 3030
Website: www.forfas.ie
E-mail: forfas@forfas.ie