



# Research Prioritisation: A Framework for Monitoring Public Investment in Science, Technology and Innovation

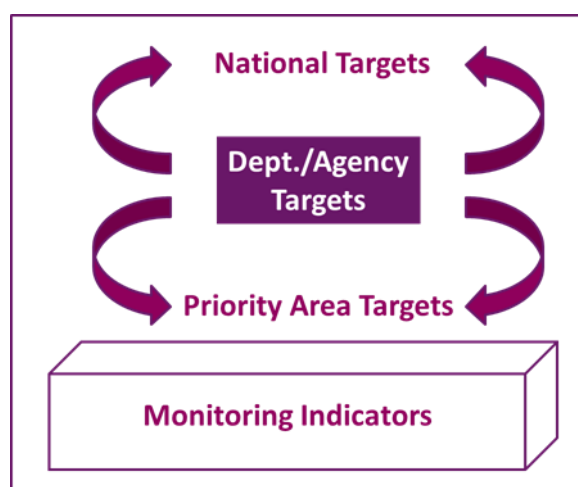
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# 1. Overview of the Framework

## 1.1 Introduction

This paper developed by Forfás sets out a coherent framework of metrics and targets for monitoring the impact of public investment in Science, Technology and Innovation (STI), in the context of the National Research Prioritisation Exercise (NRPE). The Framework comprises three levels of targets, namely overarching National Targets, Department/Agency Targets and Priority Area Targets. These targets will be underpinned by a set of Monitoring Indicators. The Framework is illustrated in Figure 1.

**Figure 1: Framework of Metrics and Targets**



Primary responsibility for the implementation of Research Prioritisation lies with the research-funding agencies and departments. They are the key enablers to achieve objectives at the national level and therefore Department /Agency Targets sit at the centre of the Framework.

The Government's 14 priority areas and underpinning areas of science and technology, which will be the focus of investment in publicly-performed R&D over the period 2013-2017, feature strongly within the Framework. However, the Framework also captures many key outputs associated with the other objectives of national STI policy, such as support for in-company R&D activity, research performed to inform policy, research for knowledge creation, the human capital and education objectives associated with national R&D investment and the internationalisation of Irish research.

## 1.2 National Targets

The systemic recommendations put forward by the Research Prioritisation Steering Group<sup>1</sup> relate to the full STI system in Ireland. Therefore, the Framework, through the National Targets, also aims to reflect the full STI system and, in particular, the outputs and outcomes associated with total Government investment in research and development (GBAORD<sup>2</sup>). The

<sup>1</sup> Report of the Research Prioritisation Steering Group, Forfás, 2012.

<sup>2</sup> Governments Budget Appropriations or Outlays on R&D.

adoption of National Targets also reflects the fact that investment in research contributes directly to performance at the aggregate national level.

### 1.3 Department / Agency Targets

The middle tier of the Framework sets out targets for the research funding Agencies and Departments. These targets are derived from the National Targets where appropriate; from the Action Plans for the 14 Priority Areas; and from the Action Plan for Jobs 2013. These targets are high-level targets rather than programmatic ones. Their purpose is to guide the research funders in establishing internal priorities and in developing their programmes and instruments.

These middle-tier targets make explicit how the departments and agencies contribute to National Targets. Deriving specific agencies' targets from overarching national targets ensures that the requirements of the agencies are aligned with the national objectives and also that there is a consistency in approach across the agencies and departments.

The targets also reflect the behavioural changes required of the agencies as a consequence of implementing prioritisation.

### 1.4 Priority Area Targets

The bottom tier of targets is intended to assess the effectiveness of the Action Plan in exploiting the opportunity that was identified in each Priority Area (PA) as part of the National Research Prioritisation Exercise (NRPE). To accomplish this assessment, a core set of fundamental metrics is set out that can be applied in each of the 14 PAs. This will allow for assessment of how well these sectors are performing relative to the overall economy, and secondly, it will enable comparisons of performance between the 14 PAs.

### 1.5 Monitoring Indicators

The under-pinning layer of Monitoring Indicators comprises a list of 79 lower-level metrics. In the event that some of higher-level metrics are not on track to achieve the prescribed target, these indicators will serve as a diagnostic tool to pinpoint weaknesses in the system and to identify where remedial action is required. The full list of these indicators is set out in Appendix F.

## 2. Overarching Goal of National STI Policy

The Report of the Research Prioritisation Group recommended that the Government should set a new, over-riding national objective to accelerate the delivery of specific economic outcomes from Ireland's investment in research. In the context of the Government Decision of 21 February 2012 to implement the recommendations contained in the Report of the Research Prioritisation Steering Group, it was explicit that implementation of research prioritisation would itself be the Government's priority STI policy goal. Along with a range of other policy initiatives approved by Government and currently being rolled out, implementation of research prioritisation is de facto a manifestation of the overarching goal of accelerating the economic and societal return on Ireland's STI investment. There will be an opportunity to consolidate that overarching goal further in the context of a new Strategy for Science, Technology and Innovation (SSTI) envisaged for 2014 as it is clear that research prioritisation itself will form the main pillar of any new strategy.

## 3. Metrics for National STI Policy

### 3.1 Purpose of Metrics

The report of the Research Prioritisation Steering Group recommended that *policy goals should be under-pinned by a set of national indicators to include indicators of economic impact. These indicators should help to clarify programme level objectives and targets and the allocation of resources. There should also be clarity in the allocation of roles and responsibilities to achieve the high-level targets.*

In response to this recommendation the Prioritisation Action Group (PAG) has devised a Framework of metrics and targets for the twofold purpose:

1. To stretch the public enterprise support system in order to maximise the impact of public investment in R&D under Research Prioritisation.
2. To assess the success over time of the implementation of Research Prioritisation.

Ambitious targets should focus the system on the “*efficiency, effectiveness and impact of our research investment to deliver high quality and well paid employment*” [Action Plan for Jobs 2012].

### 3.2 Choosing the National Level Metrics

A precursor to target-setting is the identification of the most appropriate set of metrics for which targets are to be set. The PAG has previously compiled a list of 78 metrics for the enterprise support environment. These metrics operate at varying levels of granularity and can be categorised into *inputs*, *outputs* and *outcomes* (or impacts). A strategic subset of these metrics must be chosen as a basis for high-level, overarching national targets.

The European Commission’s *High Level Panel on Measurement of Indicators* (HLPMI) proposed a useful set of criteria for selecting metrics (Appendix A). Other considerations influencing the choice of metrics include:

- Too many targets will diffuse effort and may result in easier or less impactful targets being achieved, to the detriment of the more important ones.
- National targets should be strongly correlated with the desired impacts and outcomes of public investment in research.
- National targets, by definition, should not be specific to one research funder or one programme.
- However, the targets should not be so amorphous that the individual contributions from agencies and programmes cannot be discerned.
- National targets should be transparent and easy to communicate beyond the policy community.

### 3.3 Candidate Metrics

Building on the earlier work of the PAG and taking into account the considerations in Section 3.2, the set of fifteen metrics listed in Table 1 have been adopted as the basis for high-level, overarching national targets.

Table 1 sets out the quantitative targets for these metrics. The targets are *per annum* for 2017, *except* where noted as cumulative over 2013-7. The rationale for choosing these targets is outlined in Appendix B and the sources of the baseline data for establishing the targets are listed in Appendix C.

**Table 1: National Targets<sup>1</sup>**

	Metric	Baseline	Target for 2017
<b>Targets linked to Policy Instruments</b>			
NT4	Total Researchers in Enterprise sector	10,618 (2011)	11,718 (+1,100)
NT5	Productivity (value-added / employee) in Irish-owned, research-active, manufacturing firms	€66k (2011)	€75k
NT6	Number firms with (1) small-scale (€100k-€2m),	916	1,016 (+100)
	(2) large-scale (€2m) R&D	154 (2011)	169 (+15)
NT7	Proportion of FDI R&D Investments involving MNC-MNC or MNC-SME collaborations	<i>New metric</i>	10% <sup>2</sup>
NT8	Proportion of turnover attributed to new-to-firm or new-to-market product innovations	9.3% (2010)	10.3%
NT9	Number of enterprises engaged in collaborative research with HEIs/PROs	351 (2011)	386 (+35)
NT15	Share publicly-performed R&D financed by Enterprise	€31.2m (2010)	€180m over 2013-7
NT10	Number HEI/PRO spinouts > 3 years old + number mergers & acquisitions of spinouts	44 (2013)	69 (+25) by 2017
NT11	Number of HEI/PRO licensing agreements	87 (2012)	105(+18)
NT12	National drawdown from <i>Horizon 2020</i>	FP7 €600m over 2007-13	TBC <sup>3</sup> over 2014-20
<b>Targets for International Comparisons</b>			
NT1	Gross domestic Expenditure on R&D (GERD) Intensity	2.14% GNP (2011)	2.5% GNP by 2020 <sup>4</sup>
NT2	GERD <i>private</i> : <i>public</i> ratio (% performed by business enterprise)	69.0% (2011)	66.6% <sup>5</sup>
NT3	Business Expenditure on R&D	€1.96bn (2012e)	€2.2bn (+€240m)
NT13	National citation ranking	20 <sup>th</sup>	20 <sup>th</sup> <sup>6</sup>
NT14	Innovation Union Scoreboard ranking	10 <sup>th</sup> (2012)	8 <sup>th</sup>

**Notes**

1. These National Targets are underpinned by a set of 79 lower-level monitoring indicators; see Appendices D & F.
2. This is a new metric intended to engender a new level of *intra*- and *inter*-agency cooperation.

3. Target to be set by DJEI in conjunction with EI during 2013, once *Horizon 2020* budget confirmed by the European Commission. The current proposal of €71bn represents a 29% increase over the FP7 budget.
4. Target agreed with European Commission under *Europe 2020*.
5. Maintaining a 2:1 ratio is important in ensuring an appropriate balance between activity in the public and private sectors.
6. Maintaining Ireland's current ranking to will be extremely challenging in view of the reduced research budget, the greater emphasis on applied research which tends to generate fewer academic publications, and increasing competition from Asian nations.

### 3.4 Productivity

Capturing impacts on productivity at the firm or sector level is particularly important because:

1. Research leading to process innovation should be reflected directly in firm-level productivity.
2. Productivity determines the robustness and future prospects of a firm/sector. Therefore, enhancing productivity is vital for both job retention and for growth in employment.

It would be unrealistic to expect to see a clear impact resulting from the Research Prioritisation in productivity aggregated across the entire enterprise sector. However, an impact should be seen in firms and sectors directly associated with the Priority Areas. Therefore, productivity will be aggregated across research-active firms.

In addition, in order to ensure that the metric is not distorted by practices such as transfer pricing between subsidiaries of foreign-owned multi-nationals, it will focus on Irish-owned firms. Furthermore, due to the complex relationship between research and productivity in the services sector, it will be restricted to manufacturing firms.

### 3.5 Policy and Societal Impacts

In addition to the above target metrics, Ireland needs improved evidence-based policy, practice, legislative compliance and service delivery across a range of sectors. These needs are met by investment of a portion of the budget of relevant agencies and departments in research that can deliver appropriate outputs, outcomes and impacts. These activities are best described by the following indicator:

*Innovations and influences relevant to policy, practice, legislation and service delivery*

Many of the metrics underpinning this indicator are captured in the monitoring metrics described in Appendix F. In particular, this indicator is linked to M39, M40, M50, M54, M60, and M76. In some instances, however, outputs and impacts associated with the above indicator are best captured in a case study or narrative format.

### 3.6 Indicator of Innovation

The European Commission is currently developing a single, composite indicator of innovation performance. The indicator builds on the work of the High Level Panel on Measurement of

Indicators, and is focused on the performance of high-growth firms (“gazelles”). It is expected that this indicator will be formally adopted by the European Commission during 2013. At that point it should be reviewed by the PAG and possibly incorporated into the STI Framework.

### 3.7 Monitoring Indicators

The Monitoring Indicators, which comprise the bottom tier of the Framework (Figure 1) are listed in Appendix F. They are generally more fine-grained than the metrics in the higher-level tiers. The alignment between the monitoring indicators and the top-tier of overarching national targets are set out in Appendix D.

These metrics should be monitored annually as part of the assessment framework for the national targets. For example, if a national target is not achieved, then the monitoring metrics will facilitate the diagnosis of the failure in the system.

### 3.8 Monitoring Quality at Third-level and Fourth-level

The National Employers Survey, to be rolled out by the HEA, in conjunction with IBEC and ISME, during academic year 2014 will provide qualitative feedback on enterprise take-up of skills, competencies and people and including on PhD graduates. In addition, the HEA is developing a National Student Survey that will, *inter alia*, provide feedback on the quality of students’ educational experience.



## 4. Targets for the Funding Agencies and Departments

In order to facilitate the achievement of the national targets set out in Section 3 and to ensure that the enterprise development system is aligned accordingly, a set of targets are provided for the agencies and departments funding research.

These targets are derived from the National Targets, where appropriate, and are high-level targets rather than programmatic ones. Their purpose is to convey clearly requirements to the agencies and to guide them in establishing internal priorities and in developing their programmes and instruments.

For each body, the metric-based targets have been augmented by a number of key actions drawn from the 14 Action Plans and the 13 systemic recommendations contained in the report of the Research Prioritisation Steering Group. The following points regarding these actions should be noted:

1. These actions were selected on the basis that they lead to a tangible deliverable with a short-term completion date. The other actions from the 14 Priority Area Action Plans are medium- or long-term, as the NRPE has a five-year lifespan.
2. These actions draw heavily from the plans associated with the better-established Priority Areas such as *Health* and *ICT*. For other, more embryonic areas, such as *Innovation in Services* and *Smart Grids Smart Cities*, the Action Plans mandate further investigation by the agencies to identify the optimal initiatives and instruments to exploit the opportunity. This investigation will lean heavily on the views of enterprise and international best practice.
3. In highlighting a subset of the actions for each research funder we must ensure that these actions:
  - (i) Are not perceived as the most important or impactful actions for that research funder.
  - (ii) Do not become the focus of the research funder's work programme, to the detriment of the other actions across the 14 Priority Area Action Plans.
4. An overarching objective of Research Prioritisation is to foster a collaborative approach between all funders. This objective is supported by the NRPE's 13 systemic recommendations for embedding the priority areas into the STI system. The expected outcome from this enhanced collaboration is twofold: the acceleration of economic impact in the priority areas; and a step change in the efficiency and effectiveness of the STI system.
5. Both the wording and co-ownership of the majority of actions reflects this new way of working. Each research funder has a *joint-lead* responsibility with at least one other funder for over 95% of its actions. The actions are as much about engagement and alignment as about the delivery of tangible deliverables such as technology centres or other joint-funding instruments.
6. Key enabling actions are incorporated into the Action Plan for Jobs 2013, to provide a "double-lock" mechanism to ensure their implementation.

The Department/Agency Targets and Actions are set out in Tables 2-14.

**Table 2: Deliverables and Targets for Enterprise Ireland\***

	<b>Action</b>	<b>Objective</b>
EI1	Proportion of competitive funding dispersed via joint instruments with other agencies	10% by 2017
EI2	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review etc.)	Q2 2013
EI3	Commence identification of indigenous enterprise research needs and gaps for the 14 research priority areas, in conjunction with IDA, SFI & other agencies.	Q4 2013
EI4	Establish <i>Central Technology Transfer Office</i>	Q4 2013
EI5	Establish <i>Connected Health</i> Technology Centre	Q4 2013
EI6	Establish <i>Data Analytics</i> Technology Centre	Q4 2013
EI7	Establish <i>Pharmaceutical Manufacturing</i> Technology Centre	Q4 2013
EI8	Explore options in order to respond to industry needs for Technology Centres in Medical Devices and Dairy Technology	Q4 2013
EI9	Support Technology Ireland to undertake a pilot project in therapeutics priority area to maximise synergies between research centres and develop a consolidated branding and marketing message around Ireland's research strengths in the therapeutics area	Q3 2013
EI10	Number of companies actively involved with Technology Centres	220 in 2017 (158 in 2012)
EI11	Income from enterprise secured by Technology Centres and Technology Gateways	€3.5m in 2017 (€2.5m in 2012)
EI12	Undertake joint agency (EI-IDA) interim evaluation of the Technology Centre Programme	Q3 2013
EI13	Finalise additional metrics for assessment of Technology Centres (arising from Technology Centre interim evaluation)	Q4 2013
EI14	Bring together researchers, innovative companies and technology transfer professionals as part of the "Big Ideas" Showcase, the primary technology commercialisation event in Ireland	Q3 2013
EI15	Pilot assignment of business mentors to Enterprise Ireland Commercialisation Fund projects and other relevant projects	Q4 2013

<b>EI16</b>	Increase BERD in client firms	€850k in 2017 (€735k in 2012)
<b>EI17</b>	Increase the total number of people employed (FTE) on in-house RD&I within the Republic of Ireland	9,368 in 2017 (8,516 in 2012)
<b>EI18</b>	Increase number of client firms with (i) small-scale (€100k) and (ii) with large-scale (€2m) R&D	878 in 2017 (798 in 2012); 60 in 2017 (55 in 2012)
<b>EI19</b>	Percentage of total turnover attributed to new-to-firm and new-to-market product innovation activities by Irish-owned firms	7.3% by 2017 (6.6% 2010)
<b>EI20</b>	Increase number of client firms supported to engage in collaborative research (including Innovation Vouchers) with HEIs/PROs	830 in 2017 (752 in 2012)
<b>EI21</b>	Increase number of HEI/PRO HPSU spinouts > 3 years old + number of M&A of spinouts	69 in 2017 (44 in 2013)
<b>EI22</b>	Increase number of HEI/PRO licensing agreements	105 in 2017 (87 in 2012)
<b>EI23</b>	Increase drawdown from Horizon 2020 by client firms	TBC**

\*These targets are provisional and subject to final approval by the Board of Enterprise Ireland

\*\*Target to be set by DJEI in conjunction with EI during 2013, once *Horizon 2020* budget confirmed by the European Commission. The current proposal of €71bn represents a 29% increase over the FP7 budget.

**Table 3: Deliverables and Targets for IDA Ireland**

	<b>Action</b>	<b>Objective</b>
<b>IDA1</b>	Identify enterprise research needs and gaps for 14 priority areas, in conjunction with EI, SFI + other agencies	Q4 2013
<b>IDA2</b>	Establish Connected Health Technology Centre	Q4 2013
<b>IDA3</b>	Establish Data Analytics Technology Centre	Q4 2013
<b>IDA4</b>	Establish Pharmaceutical Manufacturing Technology Centre	Q4 2013
<b>IDA5</b>	Support Technology Ireland to undertake a pilot project in therapeutics priority area to maximise synergies between research centres and develop a consolidated branding and marketing message around Ireland's	Q3 2013

	research strengths in the therapeutics area	
<b>IDA6</b>	Explore options in order to respond to industry needs for Technology Centres in Medical Devices and Dairy Technology	Q4 2013
<b>IDA7</b>	Investigate supporting Irish collaboration with EU centres in the therapeutics area to avoid duplication	Q4 2013
<b>IDA8</b>	Increase BERD in client firms	+10% by 2017
<b>IDA9</b>	Increase number of researchers/technicians employed (FTE) on R&D within Republic of Ireland	+10% by 2017
<b>IDA10</b>	Increase number of client firms with (i) small-scale (€100k) and (ii) with large-scale (€2m) R&D	+10% by 2017
<b>IDA11</b>	Proportion of FDI R&D Investments involving MNC-MNC or MNC-SME collaborations	10% by 2017
<b>IDA12</b>	Percentage of total turnover attributed to new-to-firm and new-to-market product innovation activities by foreign-owned firms	11.8% by 2017 (10.7% 2010)
<b>IDA13</b>	Increase number of client firms engaged in collaborative research with HEIs/PROs	+10% by 2017
<b>IDA14</b>	Increase drawdown from Horizon 2020 by client firms	TBC*

\*Target to be set by DJEI in conjunction with EI during 2013, once Horizon 2020 budget confirmed by the European Commission. The current proposal of €71bn represents a 29% increase over the FP7 budget.

**Table 4: Deliverables and Targets for Science Foundation Ireland**

	<b>Action</b>	<b>Objective</b>
<b>SFI1</b>	Competitive funding dispersed via joint instruments with other state research funding agencies	Double to €3.8m by 2017
<b>SFI2</b>	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review etc.)	Q3 2013
<b>SFI3</b>	Increase the investment by companies in SFI research	+20% by 2017
<b>SFI4</b>	Proportion SFI-trainees moving to industry as a first destination	35% by 2017
<b>SFI5</b>	Increase proportion of invention disclosures, patents, licences and spinouts recorded by Enterprise Ireland that are linked to SFI research	+65% by 2017

SFI6	Proportion of research centres' overall funding secured from non-exchequer investment (corporate R&D, EU etc.)	35% by 2017
SFI7	Proportion of SFI researchers that rely on SFI for the majority of their funding	45% by 2017
SFI8	Research income secured by SFI researchers from international sources such as the EU	€75m by 2017
SFI9	Support Technology Ireland to undertake a pilot project in therapeutics priority area to maximise synergies between research centres and develop a consolidated branding and marketing message around Ireland's research strengths in the therapeutics area	Q3 2013
SFI10	National citation ranking	Top 20

**Table 5: Deliverables and Targets for Forfás**

	<b>Action</b>	<b>Objective</b>
F1	Finalise action plans for the 14 priority areas	Q1 2013
F2	Monitor implementation of Action Plans	On-going
F3	In conjunction with PAG and DJEI, finalise a statement of Ireland's goal for national STI policy and underpinning objectives	Q4 2013
F4	Develop a framework for monitoring the impact of state investment in R&D	Q2 2013
F5	In conjunction with PAG and DJEI, progress implementation of the systemic recommendations in the Report of the Research Prioritisation Steering Group to improve the efficiency and effectiveness of the STI system	On-going
F6	Establish with DJEI a joint Industry-Government Big Data Task Force to progress the Disruptive Reform	Q2 2013
F7	Undertake an assessment of existing and planned initiatives across Government and the private sector that can contribute to Ireland's reputation as a leader in the areas of data analytics and Big Data	Q3 2013
F8	In conjunction with DJEI, bring a proposal to Government on two pilot data analytics initiatives to seek necessary commitment and resources	Q3 2013
F9	Identify the research priority areas in which the three ICT areas will have a role to play	Q3 2013
F10	Undertake an international review to establish what R&D structures are in place to support Innovation in Services and Business Processes	Q4 2013

**Table 6: Deliverables and Targets for DJEI/Technology Ireland**

	<b>Action</b>	<b>Objective</b>
DJEI1	Implement recommendations of Copyright Review Committee	Q3 2013
DJEI2	Undertake pilot project in therapeutics priority area to maximise synergies between research centres and develop a consolidated branding and marketing message around Ireland's research strengths in the therapeutics area	Q3 2013
DJEI3	Develop a framework for how research centres in other PAs should interact and collaborate to ensure they meet industry needs in a sustainable way	Q4 2013
DJEI4	Establish National Support Structure for H2020	Q2 2013
DJEI5	Set targets for Ireland's participation in H2020	Q3 2013

**Table 7: Deliverables and Targets for Higher Education Authority & Irish Research Council**

	<b>Metric</b>	<b>Objective</b>
IRC1	Proportion of funding income dispersed through competitive instruments on which collaborating with other state research funding agencies	12% by 2017
IRC2	Apply mission appropriate standardised principles for assessing research proposals (international peer-review <i>etc.</i> )	Q2 2013
HEA1	Working with the appropriate agencies, through targeted funding instruments and through strategic dialogue with the HEIs, enable the provision of postgraduate programmes to deliver industry-ready graduates for ICT, Medical Devices, Diagnostics, Food and Energy	Q2 2013- Q2 2014
HEA2	Develop a national database and a policy for maintenance and support of existing research and innovation infrastructure <i>etc.</i> The national policy to be adopted by PAG.	Q2 2013- Q4 2013
IRC3	Through the employment-based postgraduate programme target applications in Medical Devices, Therapeutics, Manufacturing, Materials and Services.	Q3 2013
IRC4	Implement a new IRC/DAFM/Industry collaborative programme to have a cohort of Masters research	Q2 2013

students employed for a 18 - 24 month period in agri-food companies

HEA3	Working with the relevant stakeholders, identify key senior researcher posts in the fields of Food and Energy and develop a mechanism to fill these positions.	Q4 2013
HEA4	Introduce a quality framework for PhD education	Q3 2014
HEA5	Bring forward proposals on formal recognition of innovation activity for career progression of academic staff	Q4 2013
HEA6/ IRC5	Increase proportion of post-graduate researchers on enterprise placements (min. 6 weeks / year)	+20% by 2017
HEA7	Through performance monitoring and strategic dialogue incentivise an increase in the proportion of STEM academic staff with formal research and graduate education collaborations with enterprise	+20% by 2017
HEA8	Through performance monitoring incentivise an increase in the proportion of research funding (cash) secured by HEIs from enterprise	+20% by 2017
HEA9	Through performance monitoring incentivise the increase drawdown from Horizon 2020 by HEIs	TBC**

\* Contractual with cash or in-kind contribution from enterprise.

\*\*Target to be set by DJEI in conjunction with EI during 2013, once Horizon 2020 budget confirmed by the European Commission. The current proposal of €71bn represents a 29% increase over the FP7 budget.

**Table 8: Deliverables and Targets for Health Research Board**

	Action	Objective
HRB1*	Proportion of competitive funding dispersed via joint instruments with other state research funding agencies	10% by 2017
HRB2	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review etc.)	Q2 2013
HRB3	Increase number of HRB-funded clinicians and health professionals in the health system	100 (+20%) by 2017
HRB4	Number and value of HRB research awards focused on health policy and practice priorities	51 and €14.8M (+20%) by

		2017
<b>HRB5</b>	Number and value (€) of industry- and investigator-led clinical trials performed in HRB-funded CRF and facilitated through HRB-supported Networks (e.g. ICORG)	120 and €6.9M (+20%) by 2017
<b>HRB6</b>	Establish (T1) and implement (T2) CRF activities at Galway, Cork and St. James Hospital	T1 Q4 2014, T2 Q4 2016
<b>HRB7</b>	Take steps to establish a national bio-banking system and support infrastructure, in conjunction with Funding Agencies and D/Health	2016
<b>HRB8</b>	Increase drawdown from Horizon 2020 for health research	TBC**
<b>HRB9</b>	Establish a mechanism to enhance opportunities for commercialisation of health research through appropriate liaison with enterprise agencies	Q4 2013
<b>HRB10</b>	Fund large-scale clinical research-enabling initiatives (CRFs, NCRF, Clinical Research Networks etc.), one of whose core objectives will be the development of commercial links	Q4 2016

\*This metric does not capture collaborations and synergistic working between agencies that is not based on a co-funding arrangement. Nor does it capture support provided by the HRB to Irish health researchers to participate in EU programmes such as FP7/Horizon 2020 and the EAHC Public Health Programme and international networks such as the International Council for Laboratory Animal Science. See further details in Appendix E.

\*\*Target to be set in conjunction with DJEI and EI during 2013, once *Horizon 2020* budget confirmed by the European Commission. The current proposal of €71bn represents a 29% increase over the FP7 budget.

**Table 9: Deliverables and Targets for Department Health**

	Action	Objective
DH1	Publish Health Information Bill	Q4 2013
DH2	Ensure development of an appropriate national e-health strategy	Q4 2013
DH3	Explore the potential for establishment of a Connected Health Ecosystem	Q4 2013



**Table 10: Deliverables and Targets for Department Agriculture, Food & the Marine**

	<b>Action</b>	<b>Objective</b>
<b>DAFM1</b>	Proportion of competitive funding dispersed via joint instruments with other state research funding agencies	12% by 2017
<b>DAFM2</b>	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review etc.)	Q3 2013
<b>DAFM3</b>	Funding Department and agencies to work together to define and implement a strategic research agenda aligned to the NRPE Priority Areas “Food for Health” and “Sustainable Food Production & Processing”, taking account of relevant ERA-NET and JPI SRA’s through coordinated suite of funding instruments	Q4 2013
<b>DAFM4</b>	Establish a single stakeholder Group to inform and monitor the outputs of initiatives funded in line with the “Food for Health” and Sustainable Food Production & Processing” SRAs.	Q4 2013
<b>DAFM5</b>	Implement relevant actions from Food Harvest 2020	Various
<b>DAFM6</b>	Implement a new IRC/DAFM/Industry collaborative programme to have a cohort of Masters research students employed for a 18 - 24 month period in agri-food companies	Q2 2013

**Table 11: Deliverables and Targets for Teagasc**

	<b>Action</b>	<b>Objective</b>
<b>Tgc1</b>	Proportion of competitive funding dispersed via joint instruments with other state research funding agencies*	12% by 2017
<b>Tgc2</b>	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review etc.)	Q3 2013
<b>Tgc3</b>	Investigate possibility of Teagasc becoming involved in spin-outs resulting from its research activities	Q4 2013
<b>Tgc4</b>	Increase number and value of research collaborations with enterprise	+20% by 2017
<b>Tgc5</b>	Increase drawdown from Horizon 2020 by Teagasc researchers	TBC**

\*Teagasc runs an annual call for post graduate student fellowships (the Walsh Fellowships) and does not run other competitive funding calls.

\*\*Target to be confirmed by DJEI in conjunction with EI during 2013, once *Horizon 2020* budget confirmed by the European Commission. The current proposal of €71bn represents a 29% increase over the FP7 budget.

**Table 12: Deliverables and Targets for Marine Institute**

	<b>Action</b>	<b>Objective</b>
<b>MI1</b>	Proportion of competitive funding dispersed via joint instruments with other state research funding agencies	12% by 2017
<b>MI2</b>	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review etc.)	Q3 2013
<b>MI3</b>	Determine, in conjunction with SEAI, the research facilities required for MRE (heavy mechanical engineering, electrical power systems, marine operations and ICT systems)	Q4 2013
<b>MI4</b>	Establish access programme for HEI & enterprise researchers to research infrastructure	Q2 2014
<b>MI5</b>	Progress the SmartBay marine technology test and demonstration facilities in Galway Bay by preparing for the installation of a fibre optic cable	Q4 2013
<b>MI6</b>	Complete Integrated Marine Research & Innovation Plan (2014-2020)	Q4 2013

**Table 13: Deliverables and Targets for Sustainable Energy Authority of Ireland**

	<b>Action</b>	<b>Objective</b>
<b>SEAI1</b>	Number of research awards, in areas of key strategic importance ,via joint instruments with other agencies	minimum of 4 projects by 2017
<b>SEAI2</b>	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review etc.)	Q3 2013
<b>SEAI3</b>	Identify enterprise research needs and gaps for relevant priority areas, in conjunction with EI, IDA, SFI + other agencies	Q2 2013
<b>SEAI4</b>	Publish Offshore Renewable Energy Development Plan	Q2 2013
<b>SEAI5</b>	Promote Irish participation in the European Energy	Q1 2013

Research Alliance		
SEAI6	Determine, in conjunction with MI, the research facilities required for MRE (heavy mechanical engineering, electrical power systems, marine operations and ICT systems)	Q4 2013
SEAI7	Establish, in association with other agencies, access programme for HEI & enterprise researchers to research infrastructure	Q2 2014
SEAI8	Establish SGSC test-bed facilities	Q4 2014
SEAI9	Establish research centres & networks with participation of all relevant players: enterprise, semi-states, local authorities, planners, funders etc.	Q4 2014

**Table 14: Deliverables and Targets for Environmental Protection Agency**

	Action	Objective
EPA1	Number of research awards, in areas of key strategic importance ,via joint instruments with other agencies	minimum of 4 projects by 2017
EPA2	Apply where appropriate, standardised principles for assessing research proposals (stage-gate, international peer-review <i>etc.</i> )	Q3 2013
EPA3	Develop a suite of funding instruments (new, existing or modifications of existing) across all relevant departments and agencies which will include a programme of research to understanding the toxicological properties and environmental fate of new materials through their life cycle	Q3 2013
EPA4	Coordinate and support industry co-funded programmes to enhance resource efficiency across all business sectors	Q2 2013
EPA5	Ensure, in association with other agencies, mechanisms are in place to facilitate access by HEI/ industry researchers to research infrastructure	Q2 2014

## 6. Targets for the Priority Areas

The Terms of Reference for the PAG specify that one of its roles is, “...*devising indicators to measure impact [of action plans] on the priority areas*”. This means devising metrics to assess the effectiveness of the Action Plan in exploiting the opportunity that was identified in each Priority Area as part of the National Research Prioritisation Exercise (NRPE).

To accomplish this assessment, the metrics must be set in an *external* context i.e. with reference to a national framework. *Internal* metrics, derived from each Action Plan’s vision and objectives, may reveal how well the AP is being implemented with respect to its own vision and objectives, but not whether the PA is fit-for purpose from a national perspective. A well conceived action plan, well executed by its own criteria, will contribute at the national level and exploit the opportunity identified for the associated PA.

Therefore a core set of fundamental metrics is required that can be applied in each of the 14 PAs. This will allow for assessment of how well these sectors are performing relative to the overall economy, and secondly, it will enable comparisons of performance between the 14 PAs. Table 15 sets out the generic metrics to be applied within each of the 14 Priority Areas.

**Table 15: Metrics to be applied for of the 14 Priority Areas**

Identifier	Metric	Source	Rationale
PA-M1	Component of GBAORD aligned with PA	Forfás	Input - <i>public investment in each PA</i>
PA-M2	Productivity (value-added / employee)	Forfás ABSEI	Robustness of PA - <i>prospects for the future</i>
PA-M3	Total Employment	Forfás ABSEI	Impact - <i>desired outcome</i>
PA-M4	Value-added	Forfás ABSEI	Impact - <i>desired outcome</i>
PA-M5	Sales	Forfás ABSEI	Impact - <i>desired outcome</i>

PA-M1 would be gathered from the research funders via the Forfás Science surveys. It is imperative to record the public investment in each PA in order to assess the performance of the PA as recorded by the other metrics.

For each Priority Area, PA-M2 to M5 would be gathered from the Forfás-managed *Annual Business Survey of Economic Impact* (ABSEI). This is an annual survey of over 3,500 client firms of the development agencies. The ABSEI for 2012, currently underway, includes a new question requiring respondents to self-select one or more of the PAs that are relevant to their business. This will enable the disaggregation of the other data captured by the survey by PA. The ABSEI is preferred over the CSO-managed BERD survey as it captures ultimate economic outcomes. The BERD survey captures intermediate impacts which are indicators of activity but are not goals in themselves.

The 2012 ABSEI survey will reflect the era prior to the implementation of prioritisation and therefore will provide a baseline for subsequent surveys, which should reflect the impact of Prioritisation. A target of a 10% improvement in these metrics over the period 2013-17 is set for each of these PAs.

In addition to the current value of the three key impact metrics (Total Employment, Value-added and Sales), their respective rates of change over a three-year window will be monitored. These values, along with Productivity, will provide an indication of the robustness of the associated sector of the economy and their prospects for the future.

## Appendix A: High Level Panel on Measurement of Innovation

The High Level Panel on Measurement of Innovation (HLPMI) was established by Commissioner MGQ and reported in 2010. It identified the following set of desirable/necessary attributes for indicators, and by extension, targets:

- Simple & Understandable
- Sizeable & Direct
- Objective
- Presently Computable
- Stable
- Internationally comparable
- Decomposable
- Low susceptibility to manipulation
- Easy to hand technically
- Sensitive to stakeholder's views.

The HLPMI proposed the following set of top-level indicators for monitoring Innovation performance at a pan-European level:

1. Productivity,
2. Patents / GDP,
3. % employment in Knowledge-intensive activities,
4. Share of fast-growing & innovative firms in the economy (data currently unavailable),
5. Contribution Innovation-related trade in manufactured goods to the balance of trade of goods.

## Appendix B: Setting the National Targets

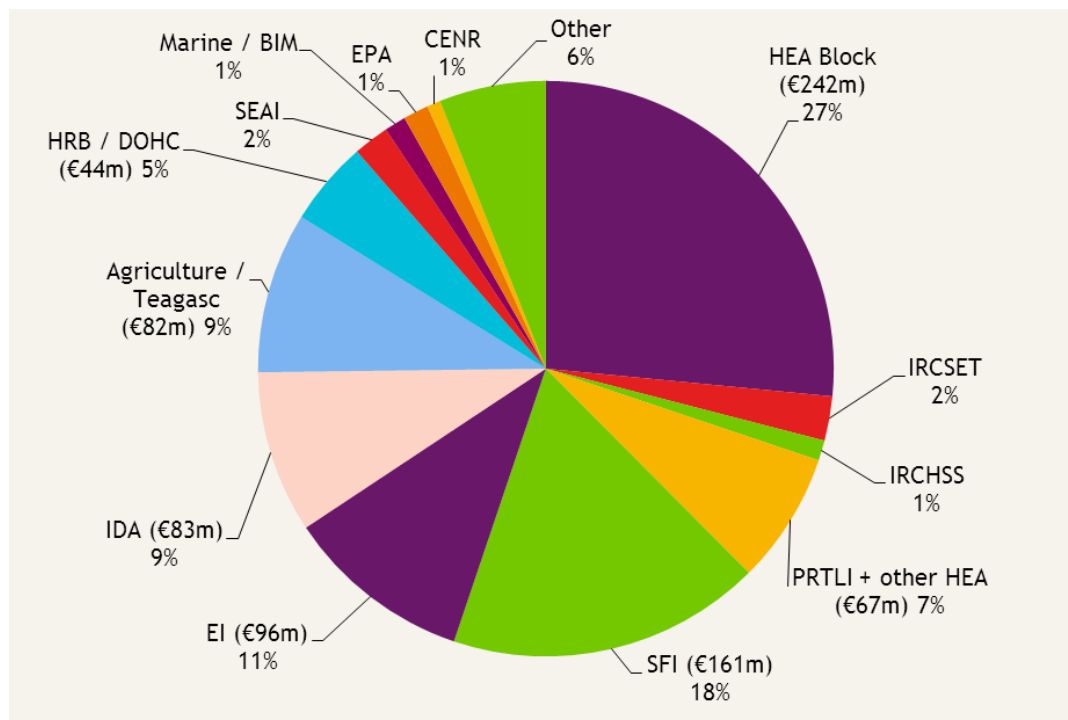
This Appendix outlines out the rationale behind the quantitative targets set out in Table 1.

Target-setting must be predicated on some assumptions about the level of resources available for investment over the period in question. This issue is considered in Section B.1. A further determinant of performance will be the global economy and in particular growth in key export markets. This is addressed in Section B.2.

### B.1 Resources

The breakdown of public expenditure on R&D by funding body is illustrated in Figure 2. The lion's share (75%) comes from just two departments, namely, the Department Jobs, Enterprise and Innovation and the Department Education and Skills. Note that only the competitive components of this expenditure fall within the scope of prioritisation. In particular, the HEA Block grant and the IDA and Enterprise Ireland grants for in-company R&D are excluded. Consequently, approximately €440 million (48%) of overall public expenditure would have fallen *within* the scope of Prioritisation in 2011.

Figure 2: Public Expenditure on R&D^ 2011\* (€912m)



Source: Forfás

^Spending by the State from all sources (Exchequer, EU and other).

\*Latest available data due to timing of underpinning surveys.

The best available guide on the public resources likely to be available for research over the period is the *Infrastructure and Capital Investment 2012-2016: Medium Term Exchequer Framework*, published by the Department Public Expenditure and Reform, in November 2011. This sets out the envelope for exchequer capital expenditure by each government department over the period to 2016.

The paper re-iterates in general terms the Government’s commitment to research as a driver of Ireland’s economic recovery:

“Continued investments in research, technological development and innovation have been and will remain a pivotal element of our enterprise development offering...”

“While the need to address the fiscal target will require some reduction in funding to research and development, supports to industry will be maintained in excess of pre-recession levels when total capital expenditure was at its highest”

The projections for the research-funding departments and the overall Government expenditure are shown in Table 16. Historical out-turn data have been included from the Book of Estimates and the figures for 2016 are used as an estimate for 2017.

**Table 16: Exchequer Capital Investment 2010-17 (€m)**

	2010	2011	2012	2013	2014	2015	2016	2017	Change 2010- 17
<b>Jobs, Enterprise &amp; Innovation</b>	484	487	482	455	457	454	451	451	
year-on-year change		0.6%	-1.0%	-5.6%	0.4%	-0.7%	-0.7%	0.0%	-6.8%
<b>Education &amp; Skills</b>	702	556	410	414	475	475	415	415	
year-on-year change		-20.8%	-26.3%	1.0%	14.7%	0.0%	-12.6%	0.0%	-40.9%
<b>Health</b>	366	347	350	397	390	390	390	390	
year-on-year change		-5.2%	0.9%	13.4%	-1.8%	0.0%	0.0%	0.0%	6.6%
<b>Agriculture, Food &amp; the Marine</b>	488	206	160	187	168	168	168	168	
year-on-year change		-57.8%	-22.3%	16.9%	-10.2%	0.0%	0.0%	0.0%	-65.6%
<b>Communications, Energy &amp; Natural Resources</b>	148	124	74	85	80	79	77	77	
year-on-year change		-16.2%	-40.3%	14.9%	-5.9%	-1.3%	-2.5%	0.0%	-48.0%
<b>Environment, Community &amp; Local Government</b>	1,467	1,018	768	726	528	571	574	574	
year-on-year change		-30.6%	-24.6%	-5.5%	-27.3%	8.1%	0.5%	0.0%	-60.9%
<b>All of Government</b>	6,256	4,512	3,701	3,431	3,230	3,252	3,255	3,255	
year-on-year change		-27.9%	-18.0%	-7.3%	-5.9%	0.7%	0.1%	0.0%	-48.0%

Sources: Infrastructure and Capital Investment 2012-16; Revised Book of Estimates 2013; Revised Book of Estimates 2012; Revised Book of Estimates 2011.

The envelope for DJEI’s capital investment can be taken as a guide to the future research budgets for the three enterprise development agencies: EI, IDA and SFI. The envelopes for other departments are less instructive in this regard as they reflect large adjustments in infrastructure and other capital programmes.



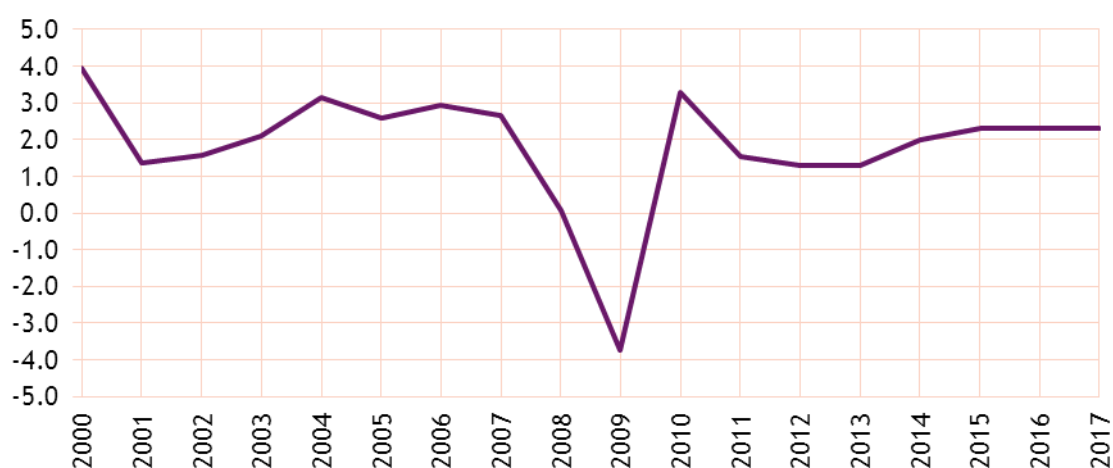
The DJEI capital budget is projected to decline by 6.8% over the period 2010-17. On this basis, a decline in investment in research by EI, IDA and SFI of 7% in nominal terms, over the period 2010-17 is adopted as the underpinning assumption for the target-setting exercise.

## B.2 International Economy

The rate of recovery in the global economy and in particular in key export markets for Ireland will be a further determinant of national performance. However, forecasting global growth over the life-time of Research Prioritisation, 2013-17, is challenging. One relevant guide is the World Bank’s tracking and forecasting of the percentage Annual Growth in real GDP in High Income Countries.

Growth in High Income Economies provides a reasonable proxy for the global market conditions relevant to Irish exports. The World Bank has produced forecasts for this indicator for 2013-15 and by rolling over the forecast for 2015 to 2016 and 2017, it is possible to generate a forecast for the life-time of Research Prioritisation; see Figure 3.

**Figure 3: Annual Growth in real GDP in High Income\* Countries**



### Sources

- 2000-2011 World Development Indicators, World Bank, March 2013
- 2012-2015 Global Economic Prospects, World Bank, Jan. 2013
- 2016-2017 Roll-over 2015

*\*High income group aggregate. High-income economies are those in which 2010 Gross National Income per capita was \$12,276 or more.*

On this basis, the forecast total growth in GDP in high income countries over the period 2013-17 is 10.6%.

## B.3 Numerical Targets

Against the backdrop of declining resources set out in Section B.1 it is legitimate to consider whether any performance improvements in the selected metrics are achievable over the time period to end 2017. There are three considerations which suggest that it is realistic to expect improvements:

1. The economic downturn and subsequent austerity measures have resulted in a greater emphasis on efficiency in departments, agencies and programmes;
2. The more focused and strategic investments that should flow from the NRPE should yield a better return on those investments i.e. greater impact from reduced inputs.
3. The forecast growth in high income countries set out in Section B.2.

The latest available data for the metrics is adopted as the baseline. The general principle adopted is to establish a target of a 10% improvement over this baseline for each metric by the end of 2017. Special consideration has been given to metrics for which this is not an appropriate approach.

## Appendix C: Data Sources

- Business Expenditure on Research and Development (BERD) 2011/2012. This is a biennial survey, conducted jointly by the CSO and Forfás.
- Community Innovation Survey (CIS) 2008-2010, also conducted jointly by the CSO and Forfás.

**Table 17: Data Sources for Target Baseline**

	Metric	Source	Baseline
NT1	Gross domestic Expenditure on R&D (GERD) Intensity	Eurostat H2020 Indicators; CSO National I&E	2.14% GNP (2011)
NT2	GERD <i>private</i> : <i>public</i> ratio (% performed by business enterprise)	OECD Main STI Indicators	69.0% (2011)
NT3	Business Expenditure on R&D	BERD 2011/12 Fig. 1	€1.96bn (2012e)
NT4	Total Researchers (headcount) in Enterprise sector	BERD 2011/12 Fig. 11	10,618 (2011)
NT5	Productivity (value-added / employee) in Irish-owned, research-active, manufacturing firms	ABSEI 2012	€66k (2011)
NT6	Number firms with (1) small-scale (€100k-€2m), (2) large-scale (€2m) R&D	BERD 2011/12 Fig. 26	(1) 916 (2011) (2) 154 (2011)
NT7	Proportion of FDI R&D Investments involving MNC-MNC or MNC-SME collaborations	IDA Ireland	<i>No baseline</i>
NT8	Proportion of turnover attributed to new-to-firm or new-to-market product innovations	CIS 2008-10 Table 5.1	9.3% (2010)
NT9	Number of enterprises engaged in collaborative research with HEIs/PROs	BERD 2011/12 Fig. 43	351 (2011)
NT10	Number HEI/PRO spinouts > 3 years old + number mergers & acquisitions of spinouts	EI	44 (2013)
NT11	Number of HEI/PRO licensing agreements	EI	87 (2012)
NT12	National drawdown from <i>Horizon 2020</i>	FP7 National Support Office (EI)	FP7 €600m (2007-13)
NT13	National citation ranking	Thompson Reuters	20 <sup>th</sup> (2011)
NT14	Innovation Union Scoreboard ranking	European Commission	10 <sup>th</sup> (2013)
NT15	Share publicly-performed R&D financed by Enterprise	HERD & GOVERD surveys	€31.2m (2010)

## Appendix D: Linking Targets with Indicators

There is a strong alignment between the metrics for the National Targets and the Monitoring Indicators. In the event that some of higher-level metrics are not on track to achieve the prescribed target, these indicators will serve as a diagnostic tool to pinpoint weaknesses in the system and to identify where remedial action is required.

**Table 18: Linking Targets with Monitoring Indicators**

	<b>Metric</b>	<b>Associated Monitoring Indicator</b>
NT1	GERD Intensity	M19, M28
NT2	GERD public : private ratio	M50, M54, M59, M61, M62, M63
NT3	BERD	M1, M3, M7, M12, M13, M14, M15
NT4	Total Researchers in Enterprise sector	M2, M3, M32, M48, M53, M65-68
NT5	Productivity in research-active firms	M18
NT6	No. firms with (i) small-scale (€100k) and (ii) with large-scale (€2m) R&D	M4, M5, M8, M9
NT7	Proportion of FDI R&D Investments involving MNC / MNC & MNC / SME collaborations	
NT8	Sales from new-to-firm, new-to-market products & services	M6, M17, M20, M21, M22, M24, M25
NT9	Number of enterprise-HEI/PRO R&D collaborations	M29, M30, M41, M42, M43, M44, M45, M46, M47, M52
NT10	Number HEI/PRO spinouts > 3 years old + M&A	M23, M35, M36, M37, M38
NT11	Number of HEI/PRO licensing agreements	M33, M34, M49
NT12	R&D funding from <i>extra</i> -national sources	M10, M11, M16, M26, M27, M56, M57, M58, M64
NT13	National citation ranking	M39, M40, M51, M55, M60
NT14	Innovation Union Scoreboard ranking	
NT15	Share publicly-performed R&D financed by Enterprise	

## Appendix E: Collaboration in Health Research

Health research is getting ever more complex, and operates in a complex environment. Many of the major challenges for health and healthcare provision are shared across the western world. These include an ageing population; a growing problem with obesity and its related disorders (cardiovascular, diabetes, cancer etc.); increasingly sedentary lifestyles; harmful behaviours such as smoking and alcohol consumption; and growing demands on, and expectations for, effective, efficient and safe healthcare provision.

It is logical, then, that health research which addresses these challenges is increasingly conducted through collaboration across borders. It is essential that Ireland, as a small country, leverages non-exchequer funding, knowledge, expertise and facilities where available. The HRB contributes to this international effort through a number of co-funding initiatives that are not captured in metric HRB1. Examples are:

### Building Capacity

#### Ireland-Northern Ireland-National Cancer Institute Cancer Consortium

The HRB has a long-standing co-funding arrangement with Northern Ireland and the US through the Ireland-Northern Ireland-National Cancer Institute Cancer Consortium. The purpose of the collaboration is to facilitate interactions among the United States, Ireland, and Northern Ireland cancer-control communities through joint cancer control research programs and educational exchange programmes for cancer-control personnel. A number of funding schemes developed under the consortium draw on NCI expertise, such as the Health Economics Fellowships, Cancer Prevention Fellowships, Joint Research Projects in Cancer and the NCI summer curriculum. The All-Island Cooperative Oncology Research Group (ICORG), thought wholly funded by the HRB, was also developed under the consortium.

#### Marie-Curie Post-doctoral Fellowships

The HRB/Marie Curie Post-doctoral Mobility Fellowships are co-funded by the European Commission under its FP7 COFUND action. These three-year fellowships enable researchers to train and conduct research for a period of two years in any sponsor institution abroad, which will be followed by a mandatory reintegration period of one year back in Ireland. This allows Irish researchers to train with top European researchers and bring this knowledge and expertise back to Ireland.

#### HRB - Wellcome Trust Dublin Centre for Clinical Research (DCCR)

The DCCR is co-funded by the HRB and the Wellcome Trust and links the three Dublin medical schools and their affiliated teaching hospitals. The DCCR award covers a new Clinical Research Facility (CRF) at St. James's Hospital, and the DCCR Network which links the new CRF with existing Dublin clinical research centres in Dublin hospitals. The Network is developing a city-wide infrastructure for clinical research to facilitate city-wide multi-site clinical research activities and provide patients with access to the latest advances in diagnosis and treatment of diseases such as cancer, neuro-psychiatric disorders and infectious diseases.

### Sharing knowledge

#### HRB/MRC Methodology Support Hub

The Medical Research Council (MRC) and the National Institute for Health Research (NIHR) have invested £18M to establish eight Methodology Hubs across the UK. These Hubs have a variety of methodological expertise and close links with clinical trial units and other

methodological groups in universities, industry and relevant professional bodies and organisations. The MRC also provides funding for a Network of the Hubs. In 2012 the MRC agreed to allow Irish research groups and centres to participate in their calls, through a co-funding arrangement with the HRB. It is envisaged that HRB investment will enable the recruitment of expert staff in Ireland, and support training, workshops and engagement in Hub Network activities.

### **Cochrane Collaboration**

The Cochrane Collaboration is an international non-profit and independent organisation dedicated to making up-to-date, accurate information about the effects of healthcare readily available worldwide. It produces systematic reviews of the effects of healthcare interventions and makes these available in The Cochrane Library, which is available on the Internet. Since 2002, the Cochrane Library is available free of charge throughout the island of Ireland. This arrangement is sponsored by the HRB and the HSC Research & Development Division, (HSC R&D Division), Public Health Agency in Northern Ireland.

## Appendix F: Monitoring Indicators

Metric ID	Metric	Source	International Comparability	Comments
M1	Business Expenditure on Research and Development (BERD) (€ and as % GDP;-GNP for Ireland)	Eurostat	Yes	BERD in €m; Data to be displayed in € and as % of GDP/GNP; Track also BERD as % of GERD
M2	Total R&D Personnel in Business Enterprise Sector/Total Employment in Business Enterprise Sector	Eurostat	Yes	
M3	BERD in Irish-owned Enterprises (€m)	CSO/Forfás	No	
M4	Number of Irish-owned enterprises investing in “Minimum Scale” R&D (> €100k) and total employment in these enterprises in Ireland	CSO/Forfás	No	Further work required on definition of Minimum Scale in indigenous context; whether to base on R&D personnel or BERD expenditure; previously defined as >€100k per annum
M5	Number of Irish-owned enterprises investing in “Significant Scale” R&D (> €2m) and total employment in these enterprises in Ireland	CSO/Forfás	No	Further work required on definition of Significant Scale in indigenous context; whether to base on R&D personnel or BERD expenditure; previously defined as >€2m per annum
M6	Share of sales in Irish-owned enterprises from products introduced in past 3 years (new to firm or new to market)	CSO/Forfás	Yes	
M7	BERD in foreign-owned enterprises (€m)	CSO/Forfás	No	
M8	Total number of foreign-owned enterprises investing in “Minimum scale”(€100k/year) R&D and total employment in these enterprises in Ireland	CSO/Forfás	No	
M9	Total number of foreign-owned enterprises investing in “Significant scale” (€2m/year) R&D and total employment in these enterprises in Ireland	CSO/Forfás	No	

<b>M10</b>	Total funding to Irish-owned enterprises from EU Horizon 2020 (€ and as % of BERD in indigenous sector)	Enterprise Ireland	Yes	Captures vast majority of EU funding; other programmes such as ESA to be tracked under monitoring indicators
<b>M11</b>	Total funding to foreign-owned enterprises from EU Horizon 2020 (€ and as % of BERD in foreign-owned sector)	Enterprise Ireland	Yes	Captures vast majority of EU funding; other programmes such as ESA to be tracked under monitoring indicators
<b>M12</b>	Total Government Budget for R&D (GBAORD) for support for in-company RTDI activities (€ and as % of GBAORD)	Forfás Science Budget	No	Identify agency programmes that most directly link to this policy goal
<b>M13</b>	Number and value of claims under R&D Tax Credit	Revenue/Dept of Finance	No	
<b>M14</b>	Number of Irish-owned enterprises supported through RTDI grants (No. of firms assisted and total value of grants approved)	Enterprise Ireland	No	
<b>M15</b>	Number of foreign-owned enterprises supported through RTDI grants (No. of firms assisted and total value of grants approved)	IDA Ireland	No	
<b>M16</b>	Financial support provided to enterprises to support applications to EU Horizon 2020	Enterprise Ireland	No	
<b>M17</b>	Share of exports in agency supported enterprises accounted for by the R&D performing enterprises	Forfás ABSEI	No	
<b>M18</b>	Share of gross value added in agency supported enterprises accounted for by R&D performing enterprises	Forfás ABSEI	No	
<b>M19</b>	Non R&D Innovation Expenditure as % of GDP (GNP for Ireland)	CIS Survey CSO/Eurostat	Yes	
<b>M20</b>	Proportion of Enterprises Introducing New Products/ Processes/ Services	CIS Survey CSO/Eurostat	Yes	
<b>M21</b>	Non-R&D Innovation Expenditures of indigenous enterprises (€ and as a % of Sales)	CIS Survey CSO/Eurostat	Yes	
<b>M22</b>	Proportion of Irish-owned Enterprises Introducing New Products/ Processes/ Services	CIS Survey CSO/Eurostat	Yes	
<b>M23</b>	New indigenous research active High Potential Start-Ups (HPSUs)	Enterprise Ireland	No	
<b>M24</b>	Non-R&D Innovation Expenditures of foreign-owned enterprises (€ and as a % of Sales)	CIS Survey CSO/Eurostat	Yes	



<b>M25</b>	Proportion of Foreign-owned Enterprises Introducing New Products/ Processes/ Services	CIS Survey CSO/Eurostat	Yes	
<b>M26</b>	Number of indigenous enterprises participating in EU research programmes	Enterprise Ireland	No	
<b>M27</b>	Number of foreign-owned enterprises participating in EU research programmes	Enterprise Ireland	No	
<b>M28</b>	Publicly performed R&D (HERD+GOVERD) financed by the enterprise sector (€ and as % of Total HERD+GOVERD)	Eurostat	Yes	Metric agreed in context of 2012 Action Plan for Jobs
<b>M29</b>	R&D performing enterprises engaged in joint research projects with HEIs/PROs in Ireland (No. and % of all R&D performing enterprises)	CSO/Forfás BERD Survey	No	Metric agreed in context of 2012 Action Plan for Jobs
<b>M30</b>	Total number of active collaborations between HEIs/PROs and enterprises where enterprise contribution > €0.5m (multi-annual cash or in-kind)	Agency Data	No	
<b>M31</b>	Number of new postgraduate researchers trained under industry/employment based programmes (No. and as a % of all new post graduate researchers)	Agency Data	Yes	Variation on metric agreed in context of 2012 Action Plan for Jobs - agreed metric based on enrolments. However, metric for 2017 time horizon should be based on graduate output rather than enrolments.
<b>M32</b>	Proportion of new postgraduate researchers moving to industry as first destination	HEA First Destination Survey	No	Target for SFI in the context of 2012 APJ - proposed metric based on First Destination Survey would be system-wide metric; SFI metric to be included under monitoring indicators
<b>M33</b>	Number of Licences/Options/Assignments to enterprises based in Ireland (No. and per 100 Million PPP\$ of Research Funding)	Enterprise Ireland	Yes	Metric agreed in context of 2012 Action Plan for Jobs
<b>M34</b>	Total funding secured by HEIs/PROs from Licences/Options/Assignments in €m	Enterprise Ireland	Yes	
<b>M35</b>	Number of New “Spin-outs” Created (No. and per 100 Million PPP\$ of Research Funding)	Enterprise Ireland	Yes	Metric agreed in context of 2012 Action Plan for Jobs
<b>M36</b>	Total number (stock) of active High Potential Start-ups (HPSUs) arising from spin-outs from public research system	Enterprise Ireland	No	
<b>M37</b>	Total equity invested in stock of HPSUs arising from spin-outs from	Enterprise	No	

	public research system	Ireland		
<b>M38</b>	Total employment in stock of HPSUs arising from spin-outs from public research system	Enterprise Ireland	No	
<b>M39</b>	Number of publications in peer-reviewed high impact journals specifically oriented to stated policy priorities and legislative obligations of Government	Thompson Reuters (Special Analysis)	No	Metric proposed by DECLG as a mechanism for reflecting “Research for Policy” within the framework
<b>M40</b>	Number of non-peer reviewed outputs focused on policy-related dissemination (e.g. reports, briefing papers, practice guidelines, handbooks etc.)	Agency Data	No	
<b>M41</b>	Number of Innovation Vouchers redeemed	Enterprise Ireland	No	
<b>M42</b>	Number of companies engaged in research with HE sector via Innovation Partnerships	Enterprise Ireland	No	
<b>M43</b>	Number of companies involved in EI/IDA Technology Centres	Enterprise Ireland	No	
<b>M44</b>	Number of collaborative projects undertaken by Enterprise Ireland funded Technology Gateways	Enterprise Ireland	No	
<b>M45</b>	Industry income to Technology Centres and Technology Gateways	Enterprise Ireland	No	
<b>M46</b>	Number of companies involved in co-financing arrangements with SFI research centres	SFI	No	
<b>M47</b>	Total enterprise co-financing of SFI-funded research	SFI	No	
<b>M48</b>	Total number of enrolments on industry/employment-based postgraduate research programmes	Agency Data	No	
<b>M49</b>	Support for Technology Transfer Office (TTO) infrastructure (Total annual cost and number of persons employed within TTO function)	Enterprise Ireland	No	
<b>M50</b>	Number and value of research awards focused on stated policies and legislative obligations of Government (either exclusively or with a dual policy/enterprise focus)	Agency Data	No	
<b>M51</b>	Public-private scientific co-publications (No. and per million of population)	Innovation Union Scoreboard	Yes	
<b>M52</b>	Proportion of enterprises collaborating on innovation activities	CIS Survey	Yes	

	with HEIs/PROs in Ireland	CSO/Eurostat		
<b>M53</b>	Proportion of researchers departing SFI-funded research teams moving directly to industry (No. and as % of all researchers departing SFI funded research teams)	SFI	No	
<b>M54</b>	Total number of researchers employed in Irish HEIs/PROs (HERD and GOVERD) (No. and per thousand population)	Eurostat	Yes	
<b>M55</b>	Citation Impact Factor (citations per publication normalised to world average)	Thompson Reuters InCites	Yes	
<b>M56</b>	Total funding awarded to Irish HEIs/PROs from EU Research Programmes € and as % of total funding available	Enterprise Ireland based on EC data	Yes	
<b>M57</b>	European Research Council (ERC) funding secured by Irish-based researchers/research teams Number of awards (No. and as % of total number of awards made) and Value of awards (€ and as % of total funding awarded)	Enterprise Ireland based on EC data	Yes	
<b>M58</b>	Share of publicly-performed research financed by non-exchequer sources (enterprise sector, EU, other international sources)	Eurostat	Yes	
<b>M59</b>	Estimated allocation of publicly-performed portion of GBAORD to: <ul style="list-style-type: none"> <li>▪ Priority Areas and Platform Science and Technology</li> <li>▪ Research for Policy</li> <li>▪ Research for Knowledge and Teaching</li> <li>▪ Integrating Infrastructure</li> </ul>	Forfás	No	Will involve special analysis of GBAORD data and will require changes to agency inputs to Forfás Science Budget
<b>M60</b>	Number scientific publications involving two or more HEIs/PROs in Ireland	Thompson Reuters InCites	No	
<b>M61</b>	Number of researchers working directly in large research centres (definition of large research centres to be agreed) - No. and as % of all researchers in HEIs/PROs	Agency data	No	
<b>M62</b>	Total Government Budget for R&D (GBAORD) for publicly performed research in HEIs and PROs (€ and as % of GBAORD)	Forfás	No	

<b>M63</b>	Cumulative investment in physical infrastructure (buildings and equipment) for research in HEIs/PROs since 2000?	Agency Data	No	Would involve constructing new indicator based of PRTL, SFI and other investments in buildings and equipment
<b>M64</b>	Financial support provided to researchers in HEIs/PROs to support applications to EU Horizon 2020	Enterprise Ireland	No	
<b>M65</b>	Number of enrolments at Research Masters level (STEM and HSS breakdown) No. and Per Thousand Age Cohort	HEA	Yes	
<b>M66</b>	Number of graduates at Research Masters level (STEM and HSS breakdown) No. and Per Thousand Age Cohort	HEA	Yes	
<b>M67</b>	Number of enrolments at PhD level (STEM and HSS breakdown) No. and Per Thousand Age Cohort	HEA	Yes	
<b>M68</b>	Number of graduates at PhD level (STEM and HSS breakdown) No. and Per Thousand Age Cohort	HEA	Yes	
<b>M69</b>	Proportion of PhD Graduates from Structured PhD Programmes	HEA	?	
<b>M70</b>	Metrics(s) of quality of postgraduate researcher training	National Employers survey (HEA)	No	
<b>M71</b>	Metric(s) relating to Ireland's ability to produce, attract and retain "world-leading" researchers	SFI	No	
<b>M72</b>	Number of Publications with Irish author Number and % share of world output	Thompson Reuters InCites	Yes	
<b>M73</b>	Number of EU Research Projects Coordinated by Irish Researchers <ul style="list-style-type: none"> <li>▪ Number of awards (No. and as % of total number of awards made)</li> <li>▪ Value of awards (€ and as % of total funding awarded)</li> </ul>	Enterprise Ireland based on EC data	Yes	
<b>M74</b>	Share of publicly-performed research according to OECD Frascati Definitions <ul style="list-style-type: none"> <li>▪ Basic Research</li> <li>▪ Applied Research</li> </ul>	Forfás HERD and GOVERD Surveys	Yes	

	<ul style="list-style-type: none"> <li>▪ Experimental Development</li> </ul>			
<b>M75</b>	Publications co-authored by researchers in Ireland and outside Ireland as a share of all Irish publications	Thompson Reuters, InCites	Yes	
<b>M76</b>	Innovations and influences relevant to policy, practice, legislation and service delivery	Agencies	No	Numeric or narrative account of impacts as appropriate
<b>M77</b>	Number of enterprise clients (for advice, training, consultancy and small commercial services) each year per HEI/PRO and total income earned	Agencies	No	
<b>M78</b>	Number and total value of contract research agreements between HEI/PROs	Agencies	No	
<b>M79</b>	<p>Technology Transfer Office (TTO) Performance Metrics &amp; Commitments (2013-16):</p> <ol style="list-style-type: none"> <li>1. Licence, Option, Assignment (LOAs) 515</li> <li>2. Spin-outs 153</li> <li>3. High Performance Start-Ups (HPSUs) 60</li> <li>4. Research Agreements (&gt;€25k) 1,547</li> <li>5. Invention Disclosure Forms (IDFs) 1,660</li> </ol>	EI	No	

