

**Ireland's Smart Specialisation Strategy for Research and
Innovation
Background Paper**

**S3 Platform Peer Review Workshop
Dublin, 3-4 July 2014**

1. Introduction

Population 4.588 m (Census 2011)

Total area 69,825 Sq. Km

Population density 66 persons per km²

The urban population comprised 62 per cent of the total population in 2011.

Total employment (1Q 2014) 1.888m; total labour force 2.146m; unemployment 12%.

2. National Context for Smart Specialisation

2.1 Economic Context

Ireland has been left with significant challenges following the economic crisis. The economy is estimated to have shrunk in GNP terms by almost 18 per cent over the period 2007-2012 with significant adverse impacts on employment and incomes. Government debt has increased from 25% GDP in 2007 to 125% in 2013, fourth highest ratio of government debt to GDP in the EU.¹ The banking system is weighed down by heavy losses in the property market and the public finances have contracted sharply. The depth of the recession is perhaps best illustrated by the rapid increase in the unemployment rate – up from 4.5 per cent in Q1 2007 to 13.6 per cent in Q2 2013 with total unemployment having almost tripled² since 2007.

Ireland was subject to a macroeconomic adjustment programme until December 2013. Structural reforms and fiscal consolidation have helped to rebalance the economy, underpinning a return to the sovereign bond market and gradual return to growth. The return to growth has been driven by exports underpinned by a solid base of multinational firms, particularly in high-tech industries. Competitiveness, as measured by unit labour costs, has improved markedly although this partly reflects sectoral composition effects due to labour shedding in low-skilled sectors, such as construction, and the strong performance of the high value-added chemicals sector. In a context of declining world trade market shares in most OECD countries, Ireland has shown a resilient export performance despite slow demand in partner countries of the euro area.

Domestic economic conditions are improving, but at a modest pace. Private consumption has stabilised, following a moderate pick-up in household disposable income, but stronger consumer purchases are hindered by efforts made to reduce indebtedness. After five years of contraction business investment is at a very low level. It has recently started growing again, but acceleration is held back by the high debt of non-financial corporations. The SME sector, which accounts for more than 70% of private employment, is constrained by high property-related debt, and has faced several years of weak profitability. Banks have undertaken significant balance adjustments, but are still making losses.

The Government is committed to continuing the process of economic reform and recovery. In its Medium Term Economic Strategy 2014-2020 (MTES), it has set out how it will continue the work of rebuilding the Irish economy, achieving sustainable economic growth, strong public

¹ General Government Consolidated Debt as a percentage of GDP. Eurostat

² Unemployment rose from 4.5 per cent in Q4 2007 to 12.8 per cent in Q4 2013. CSO

finances, and enduring job creation. “After exiting the EU IMF Programme, the Government is focused on maintaining the reform momentum to achieve the goals of creating more jobs to enhance living standards and ultimately to achieve full employment. This will, in turn, create resources for the delivery of a sustainable, adequate and reformed system of social supports and services for those who have completed their working years or who have caring responsibilities or a long-term disability”.³

The main objectives of the budgetary strategy outlined in the 2014 Stability Programme are to correct the excessive deficit by 2015 and reach the medium-term objective by 2018. The programme targets a deficit below 3 % of GDP by 2015, in line with the Excessive Deficit Procedure recommendation.

The Government has adopted and published annual Action Plans for Jobs, beginning in 2012. The 2014 Action Plan sets out how the Government will continue to work to build and sustain a competitive economy that can pay its own way, serve society, and that can survive and thrive in a reformed euro zone and an increasingly globalised international economy.

The Action Plan for Jobs 2014, published on 27 February, places a strong focus on the key areas of SME support, enhanced competitiveness, and the local delivery of assistance to entrepreneurs and smaller firms via the new Local Enterprise Offices. The Action Plan for Jobs also has a focus on specific sectors in the economy, such as agriculture and food, tourism, aviation services, the green economy, retail and construction and property.

A strong commitment to oversight and implementation is key to ensuring the effectiveness of the Plan. Implementation is overseen by a Monitoring Committee, chaired by the Secretaries General of the Departments of the Taoiseach (Prime Minister) and of Jobs, Enterprise and Innovation which reports to the Cabinet Committee on Economic Recovery and Jobs. Quarterly reports - measuring delivery against targets - are considered by the Government and published.

2.2 Enterprise Context

The overall objective of Enterprise Policy as set out by the Department of Jobs, Enterprise and Innovation (DJEI) and Forfás over many years⁴ is to grow incomes and standards of living in Ireland through competitive and sustainable enterprise, innovation, productivity and employment growth.

- Ireland’s enterprise policy is focused on the core planks of productivity and innovation, delivering on an agenda of enterprise transformation – to create a competitive and sustainable platform for growth and job creation.
- Ireland’s enterprise policy embraces start-ups, Irish owned firms (both nationally and internationally trading) and foreign direct investment, including greenfield and expansions. There is a strong focus on intensifying promotion of entrepreneurship and the scaling of Irish owned firms, further developing Ireland’s proposition for FDI in the face of intensified global competition and facilitating collaborative interactions by firms across the supply chain and throughout the country.
- Ireland’s enterprise policy continues to focus on an export-led growth strategy as the most sustainable route to deliver jobs and growth that includes ensuring that policies

³ Medium Term Economic Strategy

⁴ Making It Happen – Growing Enterprise for Ireland, Forfás/DJEI, 2010

are in place to support an efficient and cost competitive market for locally trading activities.

- Enterprise policy is focusing on realising the economic benefits of its investments to date in R&D infrastructures, by strengthening our IP framework, by brokering partnerships between firms and research institutes, and by reducing barriers for SMEs to engage in RD&I. Our policies encompass a broad interpretation of innovation and we have measures in place to facilitate early adoption of technologies by firms of all sizes, and to utilise public procurement in a more strategic way to stimulate innovation that involves collaborative engagements between foreign and Irish owned firms.
- Ireland's enterprise policy aims to derive increased economic benefits by building sector-specific eco-systems, stimulating increased inter-firm linkages between our Irish firms and the multinational base of companies, and facilitating interactions across sectoral 'boundaries'.

These objectives are aligned and synchronised with the EU 2020 Strategy objectives and approach to improving European competitiveness overall. The aims include speeding up the adjustment of industry to structural changes, encouraging an environment for initiative and cooperation between enterprises (particularly SMEs) and fostering better exploitation of innovation.

2.3 Ireland's Enterprise Structure

Ireland's enterprise structure is made up primarily of firms that:

- Are export oriented (or have the potential to export and internationalise), including:
 - Irish owned firms that are regionally spread and create employment for a range of occupations, across a number of sectors involved in services and manufacturing, including software development, medical devices, food, clean technologies, tourism, construction etc. Over the past decade reduced barriers to trade and the pervasive impact of ICTs have made it easier to enter export markets. The export intensity of Irish sectors has increased, as has internationalisation by indigenous firms through Outward Direct Investment.
 - Are foreign owned, and are generally larger scale entities. Foreign owned MNCs have been key to delivering on Ireland's enterprise policy since the 60s. The structure of the MNC base has transformed over the past decades, to evolve from what was originally manufacturing plants, to now encompass a broader range of high value activities through from R&D, to Shared Services, to Customer Technical Contact Centres, to Services sectors and activities as well as manufacturing. The attraction of FDI plays a key role in pump-priming new sectors and activities in the economy.
- Are at start-up stage, driven by Ireland's entrepreneurs:
 - Entrepreneurship is typically associated with innovative new firms competing with, and ultimately displacing, obsolete existing firms and are critical to Ireland's future economic growth. Evidence demonstrates a positive correlation between entrepreneurship and economic performance in terms

of growth, firm survival, innovation, employment creation, technological change, productivity increases and exports.⁵

- A number of start-ups will internationalise at an early stage including what are termed ‘born globals’, many will remain small by choice and trade locally and yet others that will scale and build an export base over time.
- Trade locally and are likely to continue to do so, the majority of which is small in scale, and job intensive:
 - Firms that continue to trade locally play a major role that can be pivotal in determining the performance of Ireland’s entire economy – particularly if they are highly productive and innovative. Locally available, competitive and efficiently produced goods and services can result in increased Direct Economy Expenditure and contribute to an internationally competitive operating environment for all businesses;
 - There are also a number of foreign owned entities (many larger scale) that have invested here to serve the domestic market including those in the hospitality, retail, communications sectors for example. They play a key role in stimulating competition leading to increased innovation, enhanced management capabilities and technology adoption; and
 - Social enterprises also provide employment opportunities and contribute to the social fabric of local communities, and today many operate in a more commercial sphere.

The categorisation of Ireland’s enterprise sectors set out in Figure 1 is based on a detailed analysis of sectors in Ireland and future areas of opportunity for Ireland over the period to 2020, as set out in Making It Happen, which was informed through consultation with key stakeholders and companies (nationally and internationally based). The categorisation acknowledges the importance of both services and manufacturing activities to Ireland’s future economic growth, and the fact that the former distinction between these activities has become increasingly blurred. Convergence and the concept of adjacent possibilities transcend the current definition of sectors, and new opportunities will arise at the blurring of the edges of existing sectors. The sectoral cohorts are set out as follows:

A: Building on Ireland’s strengths;

B: Emerging opportunities and untapped potential;

C: A renewed focus on mature sectors;

D: Locally Traded Services

⁵ Action Plan - The European Agenda for Entrepreneurship, European Commission, COM (2004)

Figure 1: Sectoral Categories in Ireland

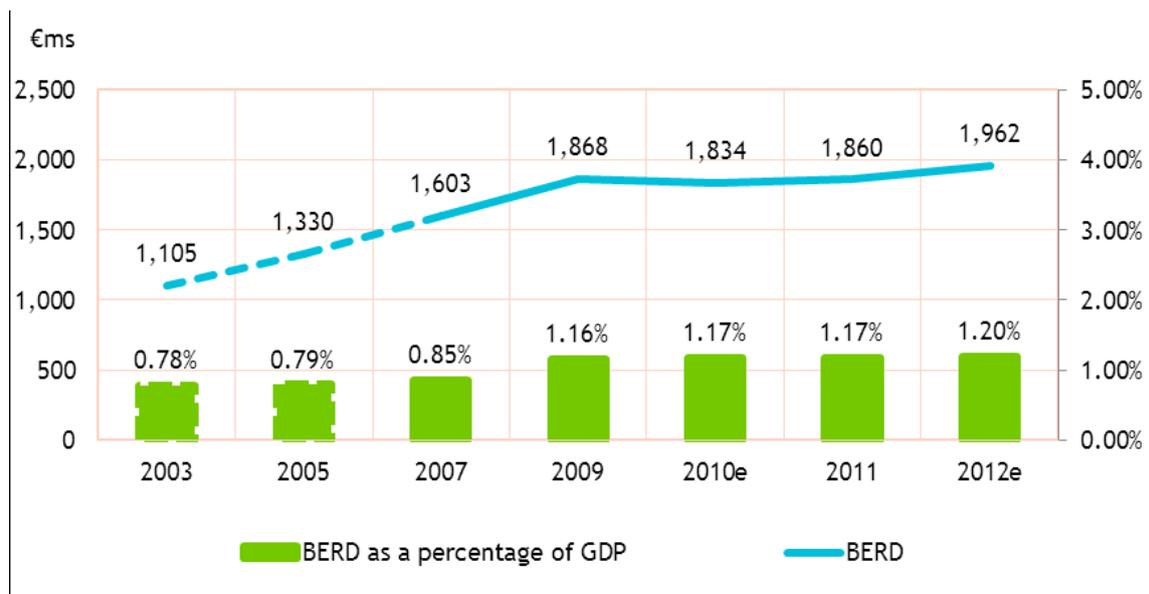


Source: Forfás

2.4 Business Expenditure on R&D (BERD)

Business Expenditure on R&D (BERD) has increased from €1.2 billion in 2003 to over €1.96 billion in 2012, Figure 2.

Figure 2 Business Expenditure on R&D (BERD) Trend and BERD as a percentage of GDP, 2003-2012



Source: CSO databank, Forfás BERD surveys

It important to point out that BERD expenditure has held up in Ireland despite the economic recession; this speaks to the success in embedding the practice of R&D investment in companies in Ireland.

Indicators also show that Enterprise R&D intensity continued to increase. The number of firms active in R&D increased by a third from 1,200 in 2005 to just over 1,600 in 2011. The BERD Survey of 1,600 enterprises engaged in R&D in 2011 showed that 27 per cent had spending of €500,000 or more indicating significant scale of R&D spend.

- The number of R&D active firms with annual R&D expenditure exceeding €2m increased by 31 per cent from 118 to 154, between 2005 and 2011.
- Within this group, there were 70 firms with annual R&D expenditure over €5m.

2.5 Higher Education System

The Department of Education and Skills is responsible for, inter alia, core funding and overarching policy development, including research policy, for the higher education sector. The Higher Education Authority (HEA) and the Irish Research Council (IRC) come under the aegis of the Department of Education and Skills. The Higher Education Authority is the statutory funding authority for the universities, institutes of technology and a number of other designated institutions and is the advisory body to the Minister for Education and Skills in relation to the higher education sector. The IRC focuses on the cultivation of skills and research expertise to address broad societal needs and thus it funds across all disciplines and focuses on early stage career researchers.

The National Strategy for Higher Education to 2030, adopted in 2012, establishes a new performance framework for public Irish Higher Education Institutions within which publicly-funded higher education institutions are being held accountable to Government for their performance against defined national priorities. This is monitored and advanced by way of the Strategic Dialogue process now in place between the HEA and the higher education institutions. This is the central means through which the institutions will develop their future performance in accordance with national economic and societal objectives. The imperative to maximise Ireland's return on investment in research is explicitly emphasised in the Higher Education System Performance Framework 2014-16 under System Level Objective 4: "To maintain an open and excellent public research system focused on the Government's priority areas and the achievement of other societal objectives and to maximise research collaborations and knowledge exchange between and among public and private sector research actors".

3. STI Context

The importance of investment in science, technology and innovation to Ireland's on-going and future economic and social development is reflected in the appreciable allocations for investment in science, technology and innovation by Government in the current and previous National Development Plans, and via the Strategy for Science, Technology and Innovation 2006-2013⁶, and Programme for Government. Government budget appropriations and outlays

⁶ <http://www.djei.ie/publications/science/2006/sciencestrategy.pdf>

on RDI have increased considerably over the past decade, increasing from €504m in 2002 to €801m in 2011, peaking at €948m in 2008. As a result Ireland has successfully built up research capacity and a reputation for research excellence and has an increasing base of enterprises engaging in RD&I activity with RD&I active enterprises demonstrating better resilience in the current difficult economic climate.

Prior to a Government policy decision to make a significant investment in science, technology and innovation, research funding in Ireland was at very low levels. However, from 2000, an ambitious policy strategy was adopted - investing in people, infrastructure and associated facilities to build the science base across many areas of scientific research in both our higher education institutions and other public research organisations; and direct support to the enterprise sector to help individual companies to build their capacity for research and development.

This approach to the investment followed the recommendations of the Technology Foresight exercise⁷ conducted by the Irish Council for Science, Technology and Innovation (ICSTI) in 1998. The ICSTI report identified the need to build world class research capability of sufficient scale in a number of strategic areas.

The government responded to these proposals by establishing an initial Technology Foresight Fund of over €630 million for the seven year period of the National Development Plan 2000-2006. It accepted that such a research fund was necessary to:

- Develop world-class research capabilities in strategic technologies to underpin the future development and competitiveness of Irish owned industry,
- Facilitate the undertaking of R&D in this country by multinational companies in order to support the further development of that sector in Ireland,
- Attract more high technology companies to Ireland in the future, and
- To enhance the environment for the creation of new technology-based firms.

Science Foundation Ireland was established to administer this fund and build research capability in the areas identified by the Foresight exercise. In addition the Government sought to build research capacity in the third level sector through the Programme for Research in Third Level Institutions (PRTL⁸). A key element of this initiative was the requirement that institutions prioritise and collaborate across the sector.

PRTL⁸ provided integrated financial support for advancing national and institutional strategies, through the support of initiatives and infrastructure in key areas of research which address economic and societal needs. Launched originally in 1998, the Programme for Research in Third-Level Institutions (PRTL⁸) has awarded exchequer and private funds totalling €1.21 billion (exchequer €935.4m, private €277.5m). These investments have been made to strengthen national research capabilities via investment in human and physical infrastructure. Cycles 1 to 4 have been completed, Cycle 4 in 2012 and the Cycle 5 investment was initiated in December 2010. The aim of the programme is position Ireland as an internationally recognised location with the infrastructure and skills required for world class research and development.

The Strategy for Science Technology and Innovation 2006-2013 (SSTI) set in train a strong positive trajectory for the STI investment and associated policy.

7 http://www.forfas.ie/media/icsti990430_technology_foresight_overview.pdf

8 <http://www.heai.ie/en/funding/research-funding/programme-for-research-in-third-level-institutions>

The SSTI sought to build on progress in the research base from 2000 and increase innovation in the enterprise sector to accelerate Ireland's economic path of sustainable growth. The Government made a major commitment, through substantial public investment, in the SSTI with the result that we have made significant steps in establishing a strong research environment, based on building scientific excellence in a number of key strategic areas.

In the last decade we have trebled the level of investment in research and development, providing enterprise support for R&D, investing in human capital, physical infrastructure and the commercialisation of research. This investment has contributed significantly to an increase in Foreign Direct Investment (FDI), the competitiveness of indigenous enterprise and to the creation and application of new knowledge and technologies.

In summary the achievements secured from the investment since 2000 place Ireland in a strong position to realise the vision associated with the SSTI of a country renowned for the excellence of its science and an ability to convert knowledge into innovation.

4. Regional Context

4.1 Regional Dimension of Research and Innovation System

Given Ireland's size, a critical mass of expertise cannot be expected in any one institution or region. Collaboration and consolidation are being promoted to build critical mass of research excellence in priority areas and underpinning enabling technologies through development of large scale research centres and through increased coordination and alignment of funding instruments. These centres typically have both academic and enterprise partners in locations in more than one region for example INSIGHT and AMBER⁹. Ireland also seeks to leverage the national investment to catalyse all island and international cooperation in priority areas and maximise draw down of non-exchequer funding.

While Ireland's National Research Prioritisation exercise is a national strategy, clearly, certain priority areas are more important to the economy in certain regions than in others, e.g. Medical Technology concentration in the West of Ireland, or Marine Renewable Energy in the West and North West. In, for example, the Agri food sector, focus is on the urban rural divide and retaining employment in rural areas. However, the enterprise base in a priority area typically spans more than one region and research and development needs in companies are multi-disciplinary requiring collaborations across a number of research areas drawing on research strengths nationally.

The Higher Education Authority is formally encouraging institutions to consolidate, where it makes sense, and to form regional clusters with a view to building critical mass and increasing competitiveness in winning research funding. So, in a bottom up manner, through the competitive funding process which requires co-funding from industry, the large scale centres should be located (either hosted or have major partners) in regions where the impact of investment will be most relevant and with greatest opportunity for skill supply and uptake and spill overs etc.

⁹ <http://www.insight-centre.org/>; <http://ambercentre.ie/>

4.2 Developments in Regional Research and Innovation

A number of reforms are in train around governance and configuration of the higher education system (see Section 2.5) to move to a smaller number of larger autonomous institutions with development of regional clusters. The ultimate vision for regional clusters is that they will create dynamic and innovative regions of knowledge that build capacity and capability at the regional level consolidating research capability and maximising competitiveness.

Among the defining characteristics of the higher education system over the last decade and a half has been the effectiveness of structured forms of inter-institutional collaboration. This has been in part a result of the explicit value placed on collaboration within competitive funding programmes such as the Programme for Research in Third Level institutions (PRTL). Current proposals are around developing regional clusters of universities and institutes of technology in the South, Mid-West, West, and two pillars in the Dublin Region, building on the progress already made. This approach supports the development of current models of collaboration into more stable and permanent arrangements between institutions.

It is the intention that regional consolidation and clustering to achieve benefits of scale will increase regional research competitiveness. This should serve to increase regional competitiveness in winning competitive funding, either Principal Investigator (PI) grants or as hosts or partners in centres, thereby strengthening national centres and bringing a regional or placed based dimension.

Moreover, the approach is particularly relevant to maintaining and enhancing the quality of research at a national level in order to continue to develop a strong international research brand for Ireland, optimise the contribution to grand challenges in the European context and draw down of Horizon 2020 funding as well as maximising Ireland's effectiveness in attracting an increasing share of internationally mobile R&D.

5. Research Prioritisation in Ireland

5.1 Rationale for Prioritisation of Research in Ireland

Having come from a low base, Ireland made very significant progress over the past decade in building a research system that in some instances is amongst the best in Europe; in retaining and attracting top level researchers; and in achieving closer synchronisation between research endeavour in Higher Education Institutions (HEIs), Government agencies, and industry. Ireland is now in the top 20 countries ranked by citations per thousand population and Ireland's growth in citations is among the highest of those countries. Particular strengths are emerging in fields including Molecular Genetics, Probiotics, Immunology, Nanotechnology and Materials.

However, as with any STI system, challenges remain to align publicly funded research more closely with industry and societal needs and optimise efficiency to achieve maximum return on investment. With increasing pressures on exchequer resources, a country of Ireland's size is not in a position to develop critical mass in each and every field of science and the need to focus efforts in a small number of areas with the potential to deliver economic and societal return is increasingly recognised by Government.

5.2 Establishment of Research Prioritisation Process

In October 2010, the Government established the Research Prioritisation Steering Group (RPSG), tasked with identifying a number of areas around which future public investment in STI should be focussed over the period to 2017. The group carried out the bulk of its work in 2011. The high level objectives of the prioritisation exercise were outlined in the RPSG's Terms of Reference:

1. In response to market and societal demand trends, develop a national consensus on a number of priority areas or approaches to challenges/opportunities which need to be underpinned by future investment in publicly-funded STI;
2. Identify and articulate, as far as possible, a non-exclusive list of supporting fields of science and technology (including research in the humanities and social sciences) that will underpin the priority areas/challenges in both the medium term and beyond;
3. Develop a detailed action plan (or "route to market" in the case of commercial applications) for each of the priority areas/challenges put forward that sets out specific goals to be realised in the medium term and beyond and the measures required in the public and private sectors to realise these goals.

The focus of these criteria was to ensure alignment with the overall national policy focus on the transformation of the economy to a more sustainable basis for economic growth for the future, for example as set out in Making It Happen. The guidance of the Steering Group including the following parameters:

- The exercise should take account of fields of research activity where Ireland has built significant strength and capacity and particularly areas that have the greatest potential to deliver economic return through enterprise development, employment growth and job retention in Ireland;
- The process was expected to identify 10-20 priority areas/challenges – the final number depending on the level of specificity attaching to a priority/challenge and, therefore, there was no pre-determined set number;
- Following agreement on the final list of priority areas/challenges, it was envisaged that the majority of the Government's core STI budget would be focused on the priority areas but scope would remain to fund other basic, policy-focused and evidence based research;
- The selected priority areas would be reviewed on a regular basis to ensure their continued relevance and to ensure that new opportunities are identified.

6. Process and Methodology

6.1 Governance - Ensuring Participation and Ownership

The high level Government appointed Research Prioritisation Steering Group comprised a range of entrepreneurial actors including representatives from academia, enterprise, finance, public sector organisations and advisory bodies and the Chief Scientific Adviser to the Irish Government. The group was chaired by a senior industry figure. The process was managed by Forfás, Ireland's National Policy advisory agency, which also supported the work of the Steering Group and assembled the evidence base upon which the findings and conclusions are drawn. ACSTI and the Inter-departmental Committee on STI also provided oversight

throughout the process. An overview of the governance structures in the Irish research system is shown in Appendix I.

6.2 Analysis of context and potential for innovation

6.2.1 National Research and Enterprise Strengths and National and Global Opportunities

A significant input to the work of the Steering Group was background studies commissioned by Forfás on: Global Market Opportunities, Growth Markets and the Positioning of the Irish Enterprise Base¹⁰; Drivers, Trends and Societal Issues from a National Perspective in a Global Context¹¹; and a review of Strengths and Areas of Emerging Critical Mass in Irish Research¹². These studies, which addressed three key dimensions of the Steering Group's mandate: the enterprise dimension, the societal dimension, and Ireland's existing research base, provided context and a basis for assessing the potential for innovation

6.2.2 International Review

The group also examined consultative prioritisation exercises in other countries (UK, Sweden, Denmark, the Netherlands, and Japan). Special workshops on approaches to research funding in New Zealand and Israel were also facilitated by Steering Group members during the process.

6.2.3 National RD&I Focus

Having considered these background studies and international examples the Steering Group focused on reviewing the national Research, Development and Innovation (RD&I) system in Ireland and the potential for innovation.

This was done through formal presentations followed by detailed discussions from the six Government Departments and twelve funding agencies/organisations that support RD&I in Ireland. The presentations covered the mission, funding portfolio and strategic direction within each organisation.

The steering group also spent some time considering the appropriate level at which priority areas for RD&I should be identified.

6.2.4 Beyond Boundaries – The outward looking dimension of Research Prioritisation

The work of the Steering group took account of complementary developments at EU level and other international initiatives. This included alignment with the Seventh EU Framework Programme (FP7) /Horizon 2020 and with European initiatives in respect of “joint programming” as well as taking into account future plans in respect of research and innovation policy in Europe and globally.

10 Review of global market trends, growth markets and the positioning of the Irish enterprise base, 2011. Report commissioned by Forfás, carried out by OCO Global and PA Consulting. (Unpublished)

11 Review of Global Drivers and Trends from a National Perspective in a Global Context, 2011. Report commissioned by Forfás, carried out by CM International. (Unpublished)

12 Review of Strengths and Areas of Emerging Critical Mass in Irish Research, 2011. Study carried out by Forfás gathering quantitative and qualitative information on research focus and critical mass in the public research system. Findings are reflected in the Thematic Working Group reports.

6.3 Identification of Priorities

6.3.1 Identification of potential priority areas

Having completed the analysis of the national context and the potential for innovation and initial deliberations, as discussed above, the RPSG established four Thematic Working Groups (TWGs) with deep knowledge of thematic areas under consideration. Each group was chaired by a member of the Steering Group and other members of the Steering Group were invited to participate. The rest of the membership comprised representatives from each of the relevant funding organisations active in the thematic area and representatives from the university sector, the institutes of technology sector and the enterprise sector. Technical experts were appointed to the groups to facilitate their work. The four TWGs and their respective scopes are set out in the Table 1 below.

Table 1: Thematic Working Groups

TWG Title	Scope of TWG
Health, Wellbeing and Ageing	All health, life sciences, pharmaceutical, medical devices and diagnostics research areas, health systems and delivery, population health, health policy research.
Natural Resources and Sustainable Environment	Agriculture, fisheries and food, marine research, energy, climate change, environment, including built environment, smart living spaces, smart cities, transport and related policy research.
Technology, Social Media; Creative and Cultural Enterprise	ICT including next generation internet and computing, information security, software, gaming, social networking, digital media, digital content, e-learning; Creative and cultural enterprise.
Innovative Processes for Enterprise (Advanced Manufacturing and Business Services)	Advanced manufacturing (including applications in ICT, pharmaceuticals, biopharmaceuticals, bio processing, medical technologies, food and drink etc.); Business and services innovation (e.g. financial services, educational services, etc.)

Potential priority areas were established based on a top down process drawing on priorities identified at EU level and internationally including horizon scanning exercises, and on a bottom up basis from national funding agencies and other stakeholders. An indicative ‘long list’ of potential priority areas based on a wide ranging exercise conducted by Forfás, which drew on international priorities, priorities from European programmes, national areas of focus and background studies described earlier. Each of the funding organisations was asked to augment these lists with potential priority areas within the thematic domain based on their knowledge of existing and emerging research strengths and the potential fit with the other criteria. The TWG examined the areas proposed for overlap, duplication and the opportunity to group and consolidate them and agreed an initial list of areas for which detailed assessments would be undertaken.

The Steering Group defined four high-level criteria and sub-questions under these criteria that were used to assess potential “priority areas”. These criteria and sub-questions are set out in the Table 2 below.

Table 2: The Four High Level Criteria for Assessment of Priority Areas

<p>1. The priority area is associated with a large global market or markets in which Irish-based enterprises already compete or can realistically compete</p> <ul style="list-style-type: none"> ▪ What are the potential applications or products and what are the potential markets that this research could impact? To what extent could the area potentially impact a number of markets or sectors? ▪ Is industry already involved in the research agenda? ▪ What are the potential commercialisation routes and timeframes? ▪ Value chain analysis – where in the value chain might Ireland be a significant player? ▪ What are the critical success factors to commercialisation and do we have the environment to support commercialisation? (People, finance, regulatory considerations, companies, partnering capacity, market etc.)
<p>2. Publicly performed R&D in Ireland is required to exploit the priority area and will complement private sector research and innovation in Ireland</p> <ul style="list-style-type: none"> ▪ What is the potential impact on FDI companies, indigenous companies, SME’s? ▪ Is there significant start-up or licensing potential? ▪ Are there other areas where public investment can be leveraged? Infrastructure, human capital
<p>3. Ireland has built or is building (objectively measured) strengths in research disciplines relevant to the priority area</p> <ul style="list-style-type: none"> ▪ What is the profile of research throughout the commercialisation spectrum from fundamental to commercially relevant and how does it the area benchmark internationally? ▪ Do we have critical mass in this area or could critical mass be developed in a realistic timeframe? ▪ What are the infrastructure requirements?
<p>4. The priority area represents an appropriate approach to a recognised national challenge and/or a global challenge to which Ireland should respond</p> <ul style="list-style-type: none"> ▪ What are the potential societal implications in Ireland and globally? ▪ What potential economic implications are there? E.g. does this challenge present a market opportunity? ▪ If this research is relevant to a global challenge, what is Ireland’s commitment in this area, e.g. targets ▪ Is there scope for cross-government joined up collaborative approach to addressing

challenges?

Forfás and the consultants prepared detailed assessment of each of the proposed areas using a SWOT analysis based on the four high-level criteria and associated sub-questions. The TWG reviewed the assessments and based on deliberations agreed a document to be used as the basis for targeted consultation with stakeholders. In some cases, areas were amalgamated at this point based on the deliberations within the TWG.

Stakeholder engagement events were organised by each of the TWGs at which the TWG perspectives were shared with stakeholders in order to elicit feedback. In parallel, the Steering Group invited the main enterprise and higher education representative bodies to provide formal written inputs to the stakeholder engagement documents compiled by each TWG.

TWGs, having considered the stakeholder feedback, made prioritisation and elimination decisions in working group meetings using a scoring methodology based on the criteria.

Based on this assessment the groups made their recommendations to the Steering Group on proposed priorities.

Discussions with stakeholders were on-going throughout the process through formal briefings and bilateral meetings with stakeholder groups.

6.3.2 Final Deliberations

A further large-scale stakeholder engagement event was organised in early September 2011 to gather feedback from stakeholders on emerging priorities. Based on these inputs and further deliberations the Steering Group agreed the priority areas to be recommended to Government.

There were a number of areas that received significant exchequer funding prior the NRPE that were not identified as priority areas. These areas were not selected as priority areas for Ireland because of challenges around commercialisation and securing a return on the State's investment. Significant examples of such areas included bioenergy and the discovery and development of therapeutics. Many other areas were proposed during the process as priority areas in their own right but they were judged by the Thematic Groups or the Steering Group not to stand-up sufficiently against the criteria to be considered as priority areas in their own right. Examples include climate change, water management, forestry, equine husbandry, specific disease areas within life sciences, disaster recovery, Smart Ocean, Smart Commerce. However, many of these areas are cross-cutting and are therefore captured already within a number of the Priority Areas and their action plans. In addition where they are important policy areas for Ireland, funding for them also falls within the Research for Policy and Research for Knowledge elements.

To a certain extent prioritisation of public R&D funding had already been happening. While research excellence was always one of the key criteria, agencies had strategies in place to align research with economic and social agendas. Therefore much of what had been funded to date was not only world class but also economically relevant and therefore reflected in the Priority Areas to some extent. Post the NRPE a much sharper focus on the new national priorities with increased emphasis on innovation driven research is required.

6.3.3 Outcome - national research priority areas

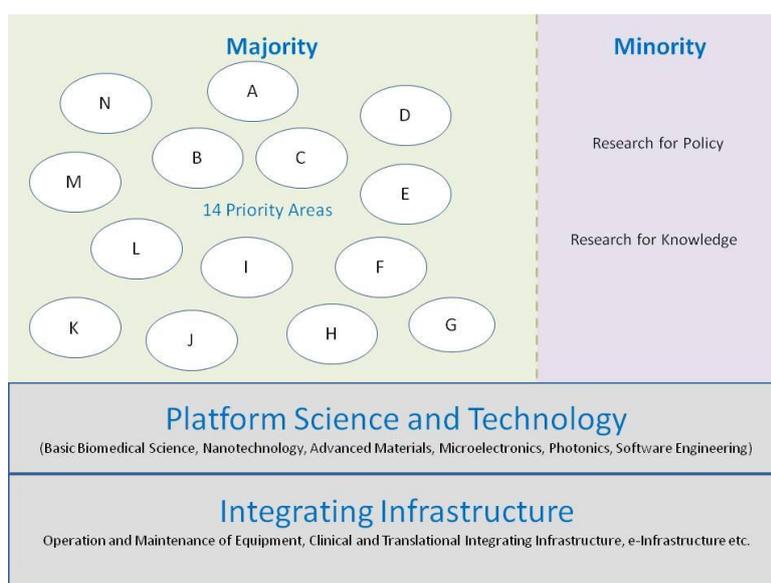
14 Priority Areas underpinned by 6 platform science and technology areas were identified and recommended to Government as areas that would become the focus of future research investment that is oriented towards the Irish enterprise base (see Table 3). Detailed descriptions of the priority areas and opportunities identified are provided in the Steering Group’s Report.

Table 3: Priority Areas for Publicly-performed Research 2013-17

A Future Networks & Communications	H Food for Health
B Data Analytics, Management, Security & Privacy	I Sustainable Food Production & Processing
C Digital Platforms, Content & Applications	J Marine Renewable Energy
D Connected Health & Independent Living	K Smart Grids & Smart Cities
E Medical Devices	L Manufacturing Competitiveness
F Diagnostics	M Processing Technologies & Novel Materials
G Therapeutics – Synthesis, Formulation, Processing & Drug Delivery	N Innovation in Services & Business Processes

Figure 3 below positions the 14 areas and the platform science and technology areas in a wider context. This Figure represents the total funding within the scope of this exercise (i.e. total Government investment in research less the research component of the “block grant” to HEIs and the funding administered by the enterprise development agencies for in-company performed R&D).

Figure 3: Priority Areas and the Wider STI System



Source: Forfás

The majority of the available funding should be allocated to: the priority areas, the platform science and technology that is undertaken in direct support of the priority areas and certain integrating infrastructure that is required to support the priority areas.

In addition to the maintenance and support of existing infrastructure and some allowance for new physical infrastructure, examples of integrating infrastructure identified as being required to support the priority areas include:

- An integrated national system of clinical and translational research capacity that can help Ireland capture the local and global benefits of investment in health related research;
- Data repositories serviced by experts to capture and enable the exploitation of publicly available data from research and administrative sources to benefit future research; and
- On-going investment in the ICT/“e-infrastructure” that underpins all research endeavours in the country.

The minority share of available funding should be allocated to:

- Research for policy - research that Government Departments and their agencies undertake or commission in pursuit of specific policy objectives and mandates; and
- Research for knowledge – as set out in our mandate, a share of future investment will remain untargeted in order to support excellent basic research in new and unanticipated research areas.

The report also contained 13 recommendations to improve the efficiency and effectiveness of the national STI system.

6.4 Entrepreneurial Discovery

The NRPE was undertaken to select areas to focus RD&I investment where Ireland had a realistic chance to excel and therefore maximise impact of RD&I investment on the economy. It was based on a strong evidence base and rigorous analysis combined with stakeholder (broad based) judgement.

Extensive stakeholder involvement was achieved throughout the process from consideration of the need for a prioritisation exercise, through the background analysis and planning phases, designing the methodology, the prioritisation process itself and deliberations therein and its on - going implementation. This involved a number of mechanisms including the Steering Group (broad membership and strong industry chairmanship), more specialised thematic working groups, expert consultancy, broader stakeholder engagement through round table workshops, a conference style event with plenary and break-out sessions, a written submission process, and throughout the process bilateral engagements with key stakeholders.

A wide range of actors were involved including representatives from academia, industry, entrepreneurs, venture capital, industry representative bodies, public sector bodies, advisory bodies, representatives of civil society and research users and beneficiaries, regulators, etc.

7. Implementation of Research Prioritisation

7.1 Vision for National STI Policy

The Report of the Research Prioritisation Steering Group <http://www.forfas.ie/publications/2012/title,9545,en.php> recommended that the Government should set a new overriding national objective to accelerate the delivery of specific economic outcomes from investment in research. In the context of the Government Decision in 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 be the Government's priority STI policy goal. Along with a range of other policy initiatives approved by Government and in the process of being rolled out, implementation of research prioritisation is de facto a manifestation of the overarching goal of accelerating the economic and societal return on our 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) statement, work on which has commenced, as it is clear that research prioritisation itself will form the main pillar of any new strategy statement.

7.2 Governance

Primary responsibility for the implementation of Research Prioritisation lies with the research-funding agencies and departments. However, the Government, in 2012 established a Prioritisation Action Group (PAG), chaired by the Minister for Research and Innovation, to oversee and drive implementation of the National Research Prioritisation Exercise. The PAG brings together senior officials from all bodies providing public funds to support the performance of Research: ten state agencies and nine Government departments.

In its first year of operation, the PAG established nine thematic Working Groups (ICT, Food, Health *etc.*) to develop action plans in the 14 priority areas. The Working Groups provided a formalised and structured framework for collaboration and cooperation between the Government Departments, agencies and stakeholders to ensure a coordinated approach to developing the action plans and drive greater coherence across the system at the level of priority areas.

The PAG, through its on-going work, provides a forum for coordination and alignment of the activities of the funding agencies and is driving new behaviours across the STI ecosystem. These new behaviours are resulting in research funding being tackled in a holistic way by all Departments and funding agencies working together around the priority area action plans – see below. Examples of increased joined up approach to funding include:

- Alignment and coordination of funding programmes and calls across enterprise agencies.
- A requirement for all funding agencies to adopt a stage-gate approach based on excellence and impact when assessing funding proposals.
- Greater emphasis on fostering inter-disciplinary research, both within the natural sciences and also with social sciences and business disciplines in the context of innovation in Services.
- Deeper engagement between enterprise agencies and the national health system to maximise synergies between the biomedical enterprise base and research in the public health sector.

- Funding agencies undertaking a cross-agency review of branding and marketing of the research offering in thematic areas.
- Active communication and cooperation between the enterprise development agencies and clinicians and medical regulatory bodies to ensure mutual understanding of regulatory challenges facing next generation medical products.
- Promotion of partnerships between MNCs and indigenous firms involved in research centres.
- Joined up approach to promotion of strategic international engagement and collaboration by the Irish research community.
- Emphasis on realising impact from state-funded research in line with the recently published National Intellectual Property Policy.
- Strategic sectoral innovation strategies aligned with action plans; and actions part of the Action Plan for Jobs providing a joined up National Innovation agenda.

7.3 Action Plans

Action Plans have been developed for each of the 14 priority areas through working groups chaired by Prioritisation Action Group members, comprising members from all research funders supporting that particular Priority Area and supported by Forfás. The Action Plans represent the detailed blueprint for actions to be taken by funding Departments and agencies to ensure the potential opportunity in each priority area is realised. Each Action Plan includes a vision, key objectives and specific actions along with timelines and those responsible for leading and supporting delivery of the action.

The action plans are accessible through the following link:

http://www.forfas.ie/media/25072013-Implementation_of_Research_Prioritisation.pdf

It is envisaged that the action plans are living documents and will be reviewed and updated on an on-going basis. Quarterly internal reports on progress on implementation of the action plans are generated by the PAG. From 2014, annual reports on implementation progress will be published.

Each action plan seeks to ensure an alignment between publicly funded research within the priority areas and the research needs of enterprise. The PAG carried out a series of 6 thematic workshops aligned with the Priority Areas to facilitate the sharing of information between research funding agencies and departments on enterprise research needs within specific sectors. The objective was to synthesise this knowledge into a comprehensive national picture across all sectors of internationally trading enterprise.

The collective understanding that emerged from these workshops has been opened up for scrutiny and validation via subsequent direct engagement with enterprise.

This picture, when combined with the output from the exercise to map publicly-funded research, will identify gaps (current or potential future) in the capacity of the public research system. This information will guide research funders in the design of future programmes.

The Action Plan elements are aimed at addressing the needs of the specific Priority Areas but have a number of common features. These are:

- The need to foster interdisciplinary research and cross-disciplinary research collaboration,

- The need to foster novel forms of public-private partnerships and collaborations, particularly collaborations involving innovative SMEs,
- The need to ensure on-going industry relevance of the public research base, including the introduction of an appropriate stage gate approach to assessment of funding proposals,
- The need to leverage research networks at EU and international levels and to make use of existing international collaborative programmes, such as FP7 and Horizon 2020, aimed at addressing global challenges,
- The need to address the issues of skills for research and innovation to ensure economic and societal impact,
- The need to address the role of public sector innovation in acting as a key enabler of the wider research and innovation agenda, including issues such as open data, shared infrastructures, and the development of ecosystems within the public sector for the trial and application of emerging technologies,
- The need to develop a more progressive, supportive and responsive domestic regulatory environment, and to adopt a more strategic approach to developing Ireland's capacity to influence international standards and regulations governing new and emerging technologies.

The funding programmes aimed at delivering on the Action Plans are delivered through the relevant programmes as follows.

Science Foundation Ireland

Science Foundation Ireland programmes play a pivotal role in enhancing Ireland's human capital in strategic areas, relevant to the competitiveness of Irish based enterprise. SFI programmes support academic researchers and research teams; support world class research centres whilst endeavouring also to increase the level of industry connectivity and commercialisation resulting from the SFI research effort. SFI programmes include the following:

- development of internationally recognised research centres of scale, excellence and importance to enterprise
- recruitment initiatives to attract iconic research leaders to Ireland, including support for the development and attraction of European Research Council (ERC) scientists in Ireland
- increased support for early career researchers, including exchange studentships and fellowships with industry
- support for commercially relevant applied research and the development of commercial expertise in the HEI sector
- investment in research infrastructure
- focused international collaboration.

PRTL (5th Cycle 2011-2016)

The Programme for Research in Third-Level Institutions (PRTL) , managed by the Higher Education Authority, supports the provision of top-class research infrastructure (buildings, laboratories and cutting edge equipment) as well as human capital development through Structured PhD/Emergent Technology programmes across Ireland's HEIs.

Key objectives of the PRTL programme are to develop critical mass in key research areas and deliver for industry by making PhDs “workplace ready”, outside of academia, to enhance Ireland’s labour force capacity.

Discover Programme

The Discover Programme (formerly Discover Science and Engineering), managed by SFI, aims to increase the numbers of students studying science, technology, engineering and maths (“STEM”) to ensure that there is a “pipeline” of young people who are prepared to pursue third and fourth level qualifications in STEM disciplines for the purpose of securing employment in the knowledge economy.

Enterprise Ireland

- Provides direct supports for R&D activity within Irish firms, and supports for companies to build R&D capability and acquire new technology through licensing. This activity is an important element in supporting companies to bring new products to market and to drive down costs through product and process innovation.
- Supports collaborative R&D activity between industry and academia. This includes support for industry-academic projects known as Innovation Partnerships, Technology Gateways in Institutes of Technology, industry led Technology Centres and supports for networking initiatives. Also included is the Innovation Voucher Initiative, which provides a €5,000 voucher to small businesses to purchase innovation expertise from a third level institute. Technology Centres are public-private research centres of excellence that connect industry to the Higher Education sector to increase the generation and availability of new, industrially relevant knowledge. This is a joint initiative between Enterprise Ireland and IDA Ireland allowing Irish companies and multinationals to work together in these centres. Technology Centres are structured to lie at the boundary between the academic environment and industry and are driven by the companies that are involved, rather than from the academic perspective. They are resourced by highly qualified researchers associated with research institutions who are empowered to undertake market focussed strategic R&D for the benefit of industry.
- Aims to accelerate the commercialisation of third level research programmes and includes the Commercialisation Fund which supports researchers to take the outputs of research with commercial potential to a point where they can be transferred into industry.
- Supports Technology Transfer Strengthening by funding dedicated staff within the Universities to ensure that best use is made of research outputs with commercial potential.
- Supports High Potential Start Up Companies defined as a company based on technological innovation; export-oriented and likely to achieve significant growth in 3 years (Sales of €1m per annum and employment of 10).

IDA Ireland

IDA Ireland programmes provide the basis for winning new FDI investment projects. The IDA’s Research, Development & Innovation (RD&I) Support programme is designed to support

companies at all stages of RD&I and enable them to move from start-up R&D, through developing capacity and adding competence, to a fully integrated RD&I function. Support levels are tied to an assessment of strategic objectives, in conjunction with commercial and technical assessments.

Key Enabling Technologies, Manufacturing and Services

Manufacturing is a crucial sector for Ireland. This sector has substantial capacity for jobs growth, and that is why the enterprise agencies decided to examine new ways of targeting support at manufacturing. Today, manufacturing sector in Ireland employs 210,000 people directly, and as many people again indirectly. A continued and concerted effort is needed to address the barriers to growth in manufacturing. The employment outlook for the sector depends critically on addressing domestic competitiveness factors and a favourable international trading environment. Companies are operating in an intensely competitive global arena and although Ireland's cost competitiveness has improved over recent years, it is imperative that we continue to drive structural change and sustained improvements in our competitiveness. A further improvement in our cost competitiveness is required to assist the manufacturing sector to grow. Conceiving and developing new globally successful operating models, products (both tangible and intangible), and service delivery and business processes, requires companies to respond to global megatrends such as the cloud, web based delivery, big data, mobile commerce, cost of energy, technology pace and globalisation / localisation. Companies must continually innovate so that they have the:

- Core competencies required to be energy and resource efficient, ICT enabled, and a leader in quality;
- Ability to capture customer centric innovation (whether business-to-business or business-to- customer) which both defines and meets the needs of customers; and
- Ability to adopt and utilise key enabling technologies.

Delivering on the above will involve both the creation and diffusion of knowledge towards defined problems. The resulting increased productivity is central for Ireland's economic recovery and sustainability. The research priority areas 'Manufacturing Competitiveness', 'Processing Technologies and Novel Materials', and 'Innovation in Services and Business Processes' underpin both the manufacturing and services sectors.

Key manufacturing sectors include ICT, Life Sciences, Food and Drink, Engineering, and Electronics. Newer industries are developing in the Clean Tech and Renewable Energy Sectors. The Action Plans for 'Manufacturing Competitiveness' and 'Processing Technologies and Novel Materials' aim to fund research that will drive innovation in processing technologies, development and utilisation of existing and new materials, and securing this industry against scarcity of energy and other resources. Success will be defined by increasing the competitiveness of manufacturing as a sector in Ireland, and also by securing Ireland as a location for next generation manufacturing.

Ireland has made a significant investment in the KETs in the last decade and is currently funding a number of Research and Technology centres which focus on KETs, including:

- Advanced Manufacturing: Materials & Surface Science Institute (MSSI), Tyndall National Institute, Irish Centre for Manufacturing Research (ICMR), I2E2 energy efficiency research centre
- Advanced Materials: AMBER (CRANN) - Advanced Materials and Bio-engineering Research Centre, IComp (Irish Centre for Composites Research)

- Biotechnology: SSPC (Synthesis and Solid State Pharmaceutical Centre), PMTC (Pharmaceutical Manufacturing Technology Centre) and NIBRT (National Institute for Bioprocessing Research and Training)
- Micro & Nano-electronics: Tyndall National Institute, MCCI (Microelectronics Circuits Centre Ireland)
- Nanotechnology: Tyndall National Institute, AMBER (CRANN), MSSSI, Inspire (Integrated Nano Science Platform for Ireland)
- Photonics: iPIC (Irish Photonic Integration Centre), NCLA (National Centre for Laser Applications), Tyndall National Institute.

SFI's programmes will continue support for the development of relevant key enabling technologies and the Enterprise Ireland/IDA programmes will support their adoption and utilisation.

8. Monitoring and Evaluation

Through the Prioritisation Action Group, a framework for monitoring the impact of public investment in Science, Technology and Innovation (STI) has been developed, in response to the recommendation in the RPSG report as set out in the previous section of this paper. The framework can be accessed at http://www.forfas.ie/media/22072013-Research_Prioritisation_A_Framework_for_Monitoring_Public_Investment_in_STI-Publication.pdf

Priority areas are to be reviewed to ensure they remain current and relevant and that new opportunities are identified and the PAG is considering a mechanism to achieve this.

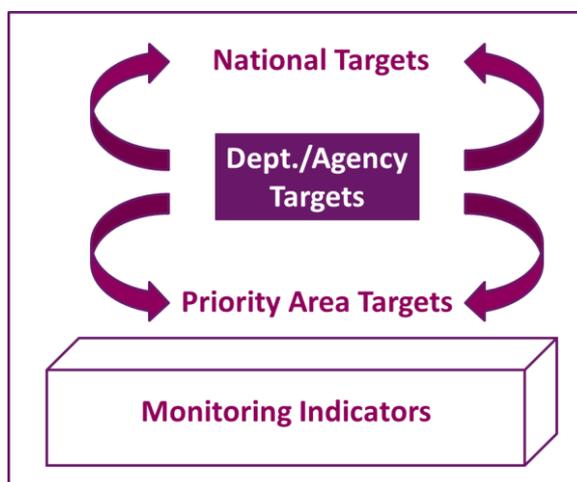
The framework sets out National Targets, Department and Agency Targets and Priority Area Targets. These targets are underpinned by a set of Monitoring Indicators. The purpose of the Framework is two-fold:

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.

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.

The Framework is illustrated in Figure 3.

Figure 3: Framework of Metrics and Targets



Source: Forfás

National Targets

The Framework, through the National Targets, aims to reflect the full STI system and, in particular, the outputs and outcomes associated with total Government investment in research and development (GBAORD¹³). The adoption of National Targets also reflects the fact that investment in research contributes directly to performance at the aggregate national level.

The National Targets serve as the basis for establishing some of the targets for the departments and agencies. These targets make explicit how the Depts. /agencies contribute to National Targets. Deriving specific agencies' targets from overarching national targets ensures that our requirements of the agencies are aligned with the national objectives and also that there is a consistency in approach across the agencies.

The PAG compiled a list of 78 metrics for the enterprise support environment at varying levels of granularity categorised into *inputs*, *outputs* and *outcomes* (or impacts). A strategic subset of these was chosen based on guidance from both the European Commission's *High Level Panel on Measurement of Indicators* (HLPMI).

Department/Agency Targets

In order to facilitate the achievement of the national targets and to ensure that the enterprise development system is aligned accordingly, a set of targets were developed for the agencies and departments funding research. These targets are derived from the National Targets and 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 convey clearly the requirements of the agencies and to guide them in establishing internal priorities and in developing their programmes and instruments. The targets also reflect the behavioural changes required of the agencies as a consequence of implementing prioritisation.

¹³ Governments Budget Appropriations or Outlays on R&D.

Priority Area Targets

The Priority area targets are 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 NRPE. To accomplish this assessment, 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.

Monitoring Indicators

The underpinning layer of Monitoring Indicators comprises a list of 70+ lower-level metrics. In the event that some of higher-level metrics are not on track to achieve the prescribed target, these indicators can serve as a diagnostic tool to pinpoint weaknesses in the system and to identify where remedial action is required. A full list of these indicators is available in 'Research Prioritisation, A framework for Monitoring Public Investment in STI'.¹⁴

9. Budgetary Resources Framework for Research and Innovation

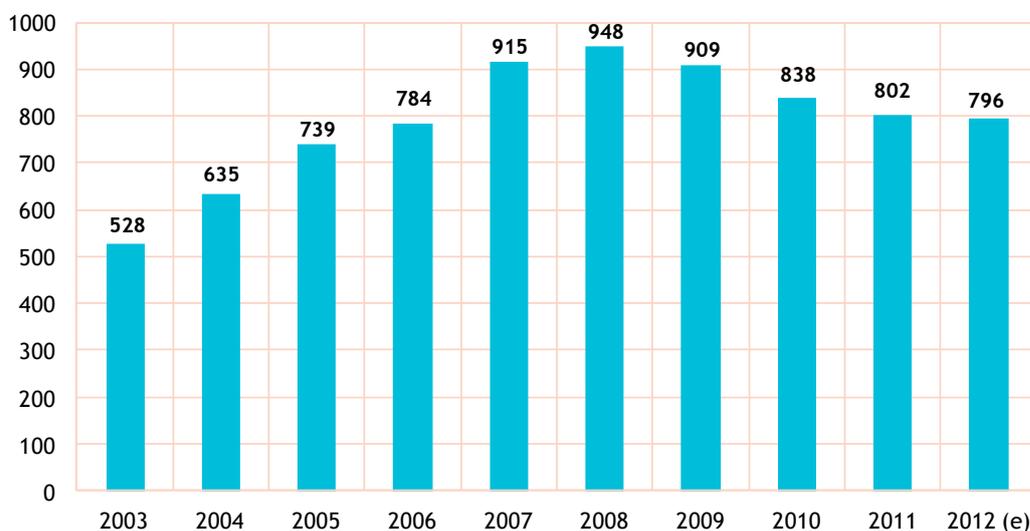
Government budget spending on research and development

The State funding of R&D comprises:

- funding for R&D programmes in the higher education sector administered by Science Foundation Ireland (SFI) and others and core funding via the Department of Education and Skills and the Higher Education Authority (HEA);
- funding for business sector R&D, administered via State agencies including IDA Ireland, Enterprise Ireland and others; and
- Funding for Government sector-performed R&D e.g. Teagasc, the Marine Institute, and others.

¹⁴ http://www.forfas.ie/media/22072013-Research_Prioritisation_A_Framework_for_Monitoring_Public_Investment_in_STI-Publication.pdf

Figure 4: GBAORD trend in current prices, €m. (2003-2012)



Source: “State Investment in R&D 2011-2012” Forfás, August 2013

As can be seen from Figure 4, rapid gains were made in State R&D spending over the last decade. While there is a decline in allocated expenditure in the last four years, the level of R&D funding from the State remains significant, with an allocation of €796m in 2012.

In relation to the Europe 2020 Strategy Headline Target for Research and Development, Ireland has adopted a target of raising combined public and private investment to 2.5% of GNP (approximately equivalent to 2.0% of GDP) by 2020.

Ireland’s National Reform Programme update of April 2014 outlines the position in relation to progress towards achieving the target. The update reported that the research intensity rate for 2012 for Ireland was 2.13% of GNP (1.72% of GDP). The estimated research intensity rate for 2013 is 2.16% of GNP (1.73% of GDP). The public and private sector components of this expenditure are 1:2, in line with the overall Europe 2020 target.

In view of the overall budgetary framework in the context of exiting the crisis, there will be tight control over investment in the period to 2015. Post 2015, in the context of a return to sustainable growth domestically and a recovered global economy, we anticipate a renewal of the pattern of annually increasing public investment in R&D coupled with a quickening of the average rate of growth of private R&D investment from the relatively modest rate of 3% forecast to 2014. This growth will be driven through a continuation of a supportive fiscal environment for R&D investment as well as supports for higher education R&D, industry linkages with higher education researchers, commercialisation of research results, in-company R&D and start-up companies. Accordingly, the circumstances expected post 2015 will enable a resumption of progress towards the Europe 2020 R&D target of 2.5% GNP by 2020 to take place.

10. Conclusion

Ireland has developed and commenced implementation of its national smart specialisation strategy for research and innovation.

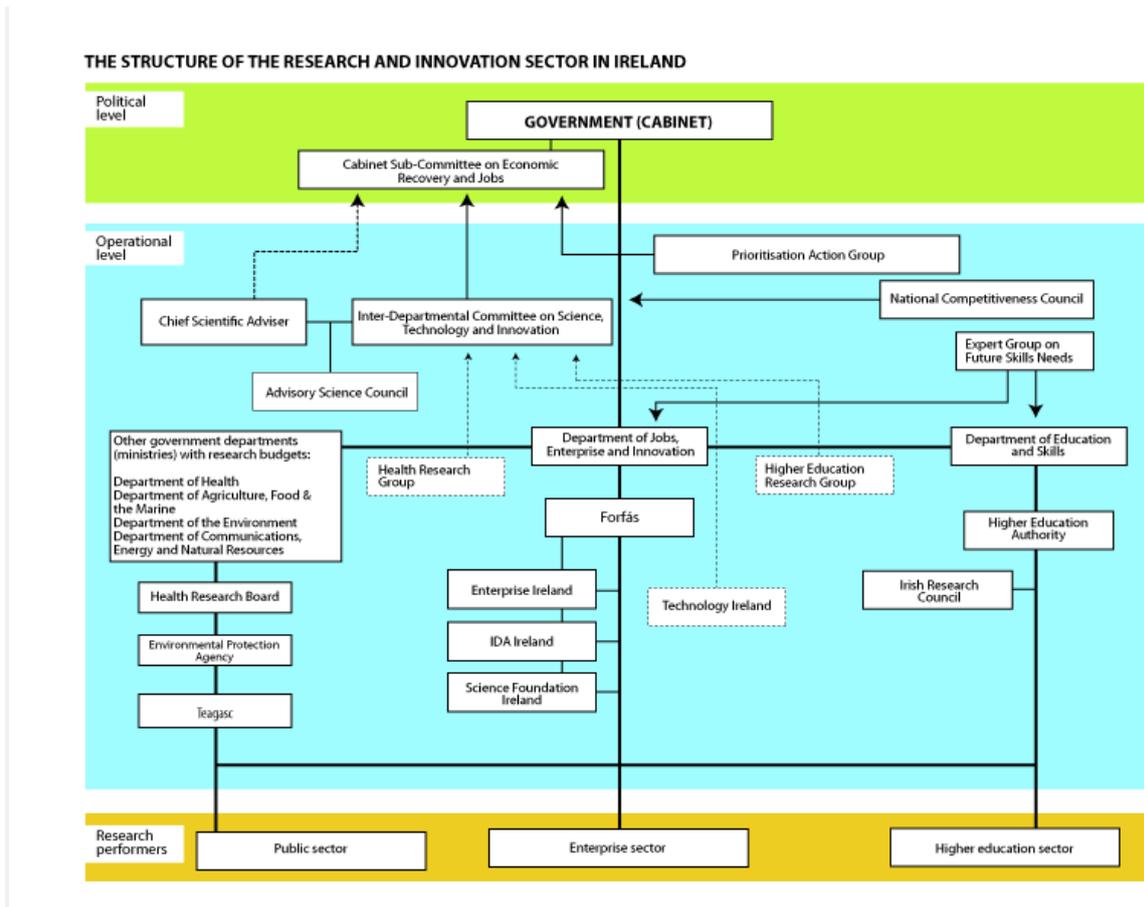
Implementation is being achieved through:

- Government decision to implement the recommendations in the Report of the Research Prioritisation Steering Group as a whole of Government policy goal (February 2012) and immediate adoption by funding agencies in orientation of research funding;
- Establishment of the Prioritisation Action Group (PAG), under the chairmanship and political leadership of the Minister for Research and Innovation, to drive implementation of research prioritisation, aligning all research funders and relevant Government Departments around this agenda; (March 2012)
- Adoption by Government of Action Plans to underpin support for the 14 Priority Areas of research identified in the report of the Steering Group on Research Prioritisation; (June 2013)
- Adoption of a Framework of Metrics and Targets to monitor the impact of Science, Technology and Innovation (STI) investment in broad terms and in relation to implementation of research prioritisation; (June 2013)
- Assessment of enterprise research needs to build a comprehensive national understanding of research needs across all sectors of internationally-trading enterprise completed has been carried out; this enables gaps (current or potential future) in the capacity of the public research system to be identified and guides research funders in the design of future programmes.
- Measures underway by the Higher Education Authority to reform the higher education system including issues such as strategic dialogue and performance based funding compacts, consolidation to improve institutional quality, development of regional clusters and strategic inter-institutional alliances technological university proposals.

Reporting on implementation of NRPE:

- Minister Sherlock presented a first progress report on implementation to the Cabinet Committee on Economic Recovery and Jobs and to the full Cabinet; (July 2012).
- First report on Implementation of Action Plans, Framework of Metrics and systemic recommendations will be published in 2Q2014.
- The first external review of implementation of NRPE will be initiated in 3Q 2014.

Appendix I: Governance of the Research System in Ireland



Source: http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/ie