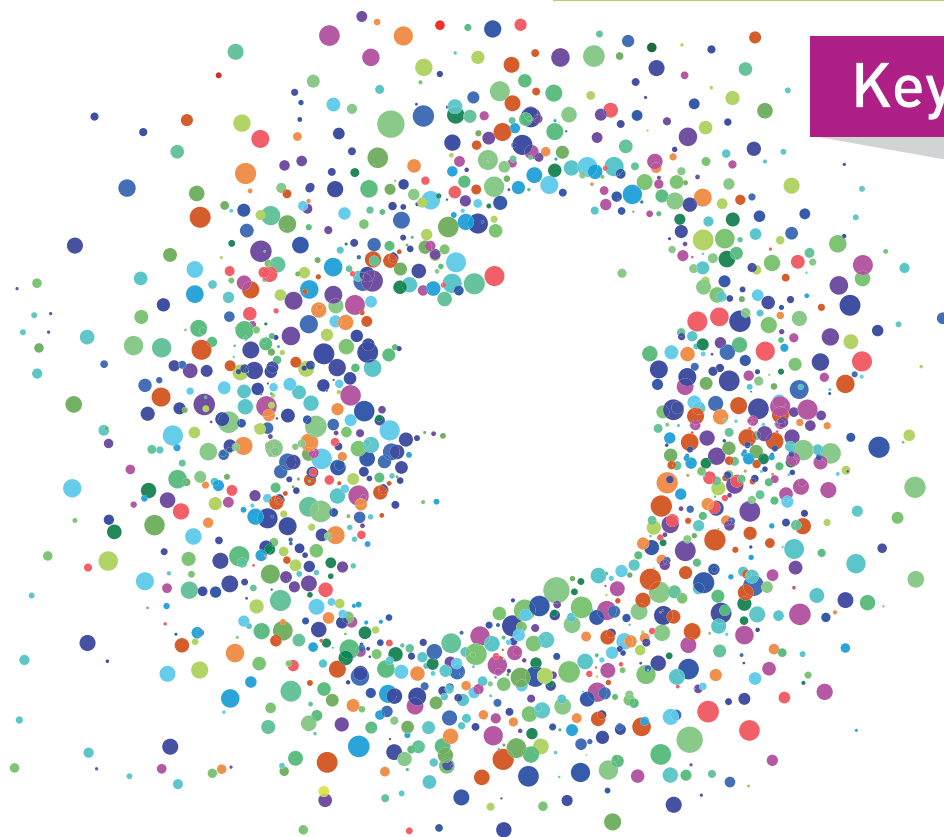


# INNOVATION



# 2020

## Key Messages



# EXCELLENCE TALENT IMPACT

Ireland's strategy for research and development, science and technology

The image features a solid light green background. On the left side, there is a vertical column of green dots of varying sizes, some overlapping, creating a textured, particle-like effect. The text is centered horizontally and stacked vertically in three lines.

EXCELLENCE

TALENT

IMPACT

# INNOVATION 2020

## **Ireland's Strategy for Research and Development, Science and Technology: Key Messages**

Over the past two decades, something remarkable has happened in Ireland. Government's decision to pursue a Smart Economy strategy and invest heavily in science and technology has resulted in the country being transformed into a leading centre for education, research and industry across a range of cutting-edge disciplines.

From a very low base, Ireland has today become home to nine of the top ten global ICT companies, nine of the top ten global pharmaceutical companies, 17 of the top 25 global medical devices companies, and more than half of the world's leading financial services institutions. Ireland is now in the Global Top 20 for the quality of our scientific research, and is ranked first in the world for its research in nanoscience, second in computer science and in immunology, third in animal and dairy science, and fifth in materials science.

## **Vision**

**Ireland - a Global Innovation Leader driving a strong sustainable economy and a better society**

## Innovation at the heart of policy

Our investment in research and innovation has been instrumental in strengthening indigenous enterprise, in securing, diversifying and growing foreign direct investment, in licensing new technologies, in establishing new companies, and in providing the highly educated workforce needed to grow the economy and contribute to society.

Innovation – the quest to find solutions that are original, more effective and deliver positive change – is at the heart of Government policies for enterprise, education, social and cultural development, and the delivery of public services. Innovation is, and will continue to be, one of Ireland's key differentiators.

*Innovation 2020* sets out the strategy and roadmap for continuing progress towards our goal of making Ireland a global innovation leader, with a strong, sustainable economy and a healthy, culturally rich society.

Pursuing this strategy requires sustained investment. Our economy is one of the most open in the world – industry in Ireland will thrive only if it innovates to compete successfully with others internationally, and our ability to attract and retain high-quality foreign direct investment equally depends on continual investment in innovation.

## Innovative people

Innovation is completely dependent on knowledgeable and skilled people, and it is in its people that Ireland has a significant competitive advantage. With one of the youngest populations in Europe and one of the most highly educated in the world, Ireland has a resource that cannot be easily replicated elsewhere. The strategy set out in *Innovation 2020* is to continue developing our talent base with exceptional educational programmes and facilities, complemented by and integrated with world-class research programmes. We will continue to foster linkages between the educational and research institutions and industry, to accelerate the exploitation of new knowledge by industry and to ensure that the educational content is informed by 'real world' needs and experience.

**By 2020:**

Public and private investment in R&D to reach 2.5% GNP.

## Innovation for social and economic progress

Research contributes to the success of the enterprise sector, but it also adds to societal well-being in other areas, such as education, health, housing, environment, mobility, connectivity, culture, and policy formulation. Innovations in these areas can contribute greatly to improving the quality of life – and they can in turn create opportunities for enterprise, as products and services developed to solve a problem in Ireland can be commercialised and implemented elsewhere.

# INNOVATION IN ENTERPRISE

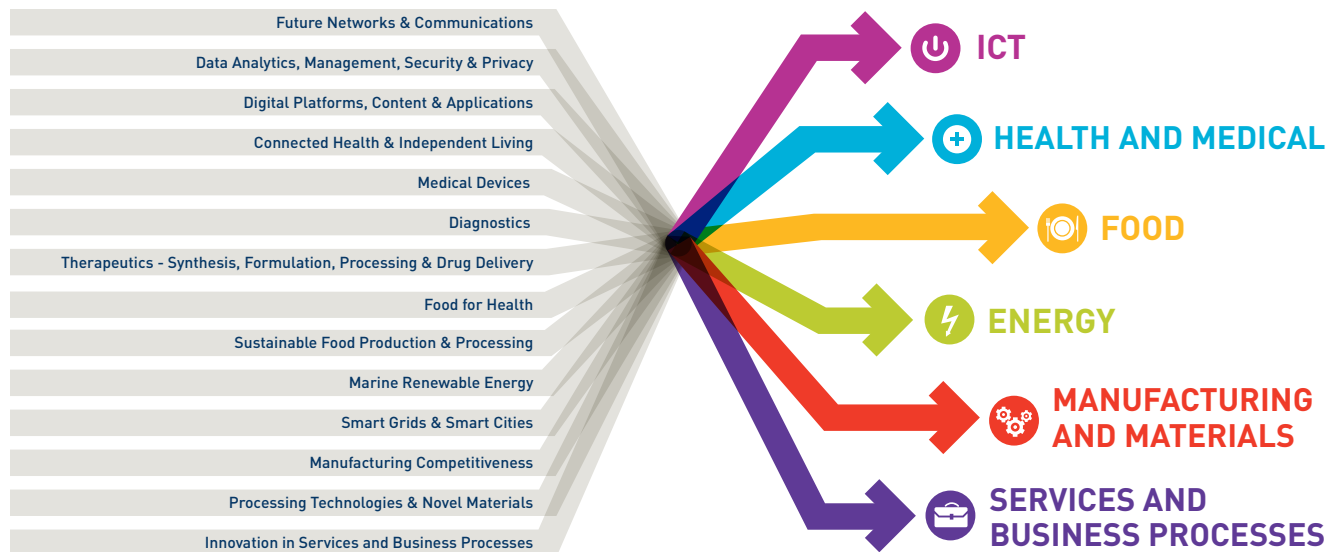
With a young, highly educated population, a supportive policy environment, and a vibrant, open culture, Ireland is an ideal location for business. The strategy in *Innovation 2020* is to make sure that the environment fosters innovation in enterprise, so that companies based in Ireland outperform their competitors on international markets. This will lead to increased, high-quality employment, increased exports and increased tax receipts, which will benefit the whole of Irish society by enabling us to provide high-quality public services.

## Coordination and coherence

Ireland is a small country, so it is absolutely critical that our investment in research and innovation is focused and efficient. A key objective of the strategy set out in *Innovation 2020* is to enhance coordination and coherence across the full suite of policy instruments (R&D grants, R&D tax credits, innovation partnerships, etc.), so that public resources are deployed to maximum effect, and that the supports are readily accessible by enterprise and fully aligned with enterprise needs.

## Focused investment

In order to ensure that innovation becomes a mainstream and essential business development activity for all firms – large and small, indigenous and foreign-owned – public investment in research in support of enterprise will focus primarily on areas that are strategically important from the point of view of our enterprise base. Through a rigorous research prioritisation exercise, we have identified a number of areas that are aligned with market opportunities for Ireland-based enterprise. These are positioned along six broad enterprise themes, as illustrated below.



Our funding policies and practices will also recognise that there are important interdependencies, linkages and synergies between these areas, and that there is significant potential for innovation at the intersection of disciplines that were traditionally regarded as separate.

### Important horizontal themes

Two important horizontal themes are given particular emphasis in the strategy, based on their importance to the Irish enterprise base. The emphasis on Manufacturing & Materials recognises that Ireland’s manufacturing base is a key pillar of the economy; the emphasis on Services & Business Processes recognises that Ireland is highly services-intensive and competes for business in a growing global market. Over the term of the strategy, we will create a number of posts in the higher education sector for world-class researchers with proven track records of solutions-driven research in these areas, and we will support further relevant research through a challenge-based funding system.

### Commercialisation of research

Market-focused research and technology centres are a vital part of the system of public support for enhancing the competitiveness of enterprise through innovation and the commercialisation of research. These centres provide a mechanism through which enterprise can access expertise and technology beyond what they have available in-house to enhance their products and services.

They also provide a path to commercialisation of IP emerging from the public research system. Ireland currently has a sophisticated network of such centres operating in the six thematic areas of the strategy.

**By 2020:**  
 .....  
**40,000 research personnel in enterprise.**

Over the course of the strategy, we will further enhance State support for commercialising research and for transferring knowledge from the public research system into enterprise.

### Testbed Ireland

Ireland is increasingly attractive to multinational companies as a place in which they can test cutting-edge technologies and conduct trials of new products, often in conjunction with public bodies. Ireland’s size – ‘small enough to trial, large enough to prove’ – its unique geographic, demographic and environmental characteristics, and the interconnected public sector makes the country ideal for testing and validating technologies in real-world conditions, before bringing them to a wider market. Over the term of the strategy, we will put in place measures to further encourage this type of activity.

### Collaboration for innovation

Due to the complex dynamics of global markets (consumer and business), the sophistication of business models, and the multi-faceted nature of cutting-edge products and services, enterprise-oriented research must draw not only on the ‘harder’ disciplines of science, technology, engineering and mathematics, but also on the disciplines of arts, humanities and social sciences.

- Interdisciplinary collaboration: Collaboration across disciplines can provide new insights and lead to the development of novel products and services with commercial potential. Ireland has an advantage in pursuing this type of interdisciplinary research – the relatively small size and highly interconnected nature of the Irish public research system greatly facilitates collaboration and cooperation. Over the course of the strategy, we will further promote interdisciplinary research.

- Interinstitutional collaboration: We will also incentivise collaboration between institutions and centres in order to create the critical mass necessary for world-leading research and to ensure optimum use of research facilities.
- Intersectoral collaboration: Collaboration between the enterprise sector and the public research system is also essential if the full value of investment in the public research system is to be realised. To this end, a concerted effort will be made by the enterprise development agencies and Knowledge Transfer Ireland to increase the breadth and depth of industry-academia collaboration.

### **Horizon scanning**

The world is constantly changing, and we must continually re-evaluate our priorities to ensure that our investment in research and innovation is optimal. The next cycle of research prioritisation is due in 2018, and a horizon-scanning exercise will be undertaken in advance to identify areas of strategic commercial opportunity for Irish-based enterprises. The exercise will take into consideration recent and likely future advances in science and technology, the dynamics of international markets and global supply chains, and national and international policy developments.

We will undertake a horizon-scanning exercise to identify areas of strategic commercial opportunity for Irish-based enterprises.

# INNOVATION IN EDUCATION AND RESEARCH

**Innovation is a human activity, and it happens most reliably within a well-educated population. For decades, Ireland has invested in education at all levels, from primary and secondary, through third level and beyond, to lifelong continuous learning.**

Our demographic profile gives us a clear international competitive advantage in this regard. We have the highest proportion of young people in the European Union, and we are determined to continue our investment in education in order to develop the pipeline of talent that drives innovation and social progress.

We will establish a new competitive fund to promote 'frontier research' across all disciplines.

## **Excellence in the higher education sector**

National policy priorities for higher education are set out in the *National Strategy for Higher Education to 2030*, which provides the framework for major innovations in the universities and institutes of technology. Among the changes being progressed are the introduction of technological universities and the development of higher education regional clusters, aimed at concentrating expertise and achieving critical mass to provide optimal teaching, learning and research, complemented by positive engagement with enterprise and the wider community.

## **Researcher education**

The strategy set out in *Innovation 2020* recognises that the quality of postgraduate researcher education is vital to the development of our human and knowledge capital, and outlines plans to increase both the number and the quality of Ph.D.s, post-doctoral researchers and principal investigators over the term of the strategy, and to continue promoting gender equality in researcher careers. In line with the recommendations in the National Framework for Doctoral Education, postgraduate courses will incorporate modules on entrepreneurship, IP management and related topics relevant to the commercialisation of research.

## **Research infrastructure**

Over the course of the strategy, we will further develop our research infrastructure to ensure that our researchers have access to the equipment, facilities and support they need to conduct excellent research. A competitive programme will be put in place to fund the establishment and maintenance of such infrastructure. Access policies will promote interinstitutional collaboration and the use of research facilities by industry.



## Research excellence

As has been the case for years, the first criterion driving funding decisions is excellence. All proposals for funding are independently reviewed by international experts, and only those that are deemed to be excellent are funded. This policy has paid dividends: independent analysis by the European Commission showed Ireland to be the most R&D efficient country in the EU, extracting maximum innovation output from its public investment in research.

## Frontier research

Over the term of the strategy, research funding will be concentrated in the strategically important areas that have particular relevance and impact for the economy and society, as outlined above. We are also establishing a new competitive fund to promote 'frontier research' across all disciplines. Again, funding under the scheme will be awarded on the basis of the excellence of the research proposals, assessed through a rigorous international peer-review process.

## Researcher mobility

Under *Innovation 2020*, a coherent national policy on career paths in the publicly funded research system will be developed, to ensure that trained researchers and innovators can work in security, with clear, structured routes for progression and mobility.

We will also enhance the existing supports designed to encourage the two-way flow of researchers between academia and industry, by increasing awards under the SFI Industry Fellowship Programme, the IRC Employment-based Postgraduate Programme, and the IRC Enterprise Partnership Programme. Our aim is to increase the share of Ph.D. researchers transferring from SFI research teams to industry from 25% in 2014 to 35% by 2020.

We also aim to attract the best and brightest talent from overseas. The quality of our facilities, the strength of our teams, and our growing international reputation for excellence will continue to act as a magnet for internationally mobile researchers.

## Research integrity

The Irish research system must continually protect its reputation for the quality and integrity of its research activity and outputs, so that we and our international partners can rely on those outputs to further advance knowledge and to promote economic and social development. Over the coming years, we will escalate our efforts to ensure that publicly funded research in Ireland is performed to the highest standards of professionalism and rigour, and that the research record in publications and elsewhere is accurate and dependable.

**By 2020:**  
2,250 research  
masters and  
Ph.D.  
enrolments.

We will continue our investment in education in order to develop the pipeline of talent that drives innovation and social progress.

# INNOVATION FOR SOCIAL PROGRESS AND THE ECONOMY

**The goal of establishing Ireland as a global innovation leader is being pursued for the benefit of industry and the economy, and also, equally importantly, for other key benefits that will be felt throughout Irish society.**

## **Innovation in public services**

The recent economic crisis prompted Government to undertake a significant programme of public service reform and innovation. The public service reform plans emphasised the need for innovative approaches to service delivery and to achieving efficiencies. They identified opportunities for digital government initiatives, for improving customer service, for new delivery models and for shared services, among others. Innovation was identified as the key to continuous improvement in the delivery of public services. Under *Innovation 2020*, all Government departments and agencies will take additional steps to ensure that they make the best use of scientific evidence and technological advances in the execution of their mission.

We will introduce a competitive funding mechanism aimed at stimulating interdisciplinary consortia of enterprises, higher education institutions and public service delivery bodies to address major societal challenges.

The Small Business Innovative Research programme will be expanded to help public sector bodies to develop innovative solutions to their challenges by procuring research and development from small businesses. *Innovation 2020* identifies opportunities for health technologies and the health system, for natural resources and environmental sustainability, for the development of the agri-food sector and the energy sector (particularly marine energy), and for the digital society.

## **Grand societal challenges**

At a global level as well as at a national one, we are faced with a number of 'grand challenges', and our success in tackling them will be the major determinant of economic and societal development in the years ahead. These challenges range from climate change to cancer, from dementia to food security, from sustainable energy to economic inequality. These are complex challenges, and solutions will require the engagement of researchers from arts, humanities and social sciences as well as from science, technology, engineering and mathematics. Under *Innovation 2020*, we will introduce a competitive funding mechanism aimed at stimulating interdisciplinary consortia of enterprises, higher education institutions and public service delivery bodies to address such major challenges, and we will also involve civic society in identifying and prioritising them.

# INNOVATION WITH INTELLECTUAL PROPERTY

**Business sectors that depend on and make strategic use of intellectual property (IP) represent an important and growing part of all modern developed economies. They are the greatest contributors to wealth creation and employment growth. This is part of the rationale for investing in research and the generation of new knowledge.**

## **Transfer of IP from the public research system**

The next step in innovation is to ensure that knowledge generated in the research system is applied for social and economic development. To do this efficiently, we need to optimise the transfer of knowledge from our public research system into enterprise, and this has been central to our strategy for science and innovation for many years. Key recent initiatives in this regard include the development of a comprehensive IP protocol that provides a framework for industry-academic collaboration, and the strengthening of the technology transfer offices within the higher education sector, coordinated through Knowledge Transfer Ireland.

During the term of the *Innovation 2020* strategy, we aim to significantly increase the commercialisation of research results via licensing, spin-outs and industry-academia collaborations. We will build on the success of the current Technology Transfer Strengthening Initiative in order to embed knowledge transfer as a core value within the public research system.

We will introduce the 'Knowledge Development Box' to ensure that Ireland remains an attractive location for companies engaged in innovative, value-creating activities.

## **IP management and exploitation by enterprise**

Intellectual property is the core asset of knowledge-based enterprise, a strategic tool for value generation, and a key enabler of innovation. IP rights have become building blocks of entire business models, and they must be protected and used efficiently, in the same way as other assets. Effective IP management capability is a fundamental requirement for success in innovative industries.

Over the term of *Innovation 2020*, we will take steps to raise awareness in industry of the importance of IP management, and of the opportunities arising from effective IP management. We will work to build IP management capabilities in firms, and we will ensure that training and education in IP management is provided in relevant higher education courses.

## **Knowledge Development Box**

Government is committed to ensuring that Ireland is an attractive location for companies engaged in innovative, value-creating activities. The introduction of the 'Knowledge Development Box', announced in Budget 2016, will act as an incentive to companies engaged in R&D, as it enables them to claim tax relief on profits arising from qualifying IP. The Irish Knowledge Development Box is the world's first implementation of the approach endorsed by the OECD for the treatment of R&D for tax purposes.

# INTERNATIONAL COLLABORATION

As a small, open economy, Ireland relies on external demand and international markets for sustainable and continued growth. The market for innovation and research is also global – international cooperation in research and innovation plays an important role in the development and sustainability of a world-class innovation and research system. The strategy in *Innovation 2020* is to continue to facilitate, develop and exploit global research cooperation, and to strengthen our networks with global partners to seek solutions to shared societal problems and to pursue innovation for economic and social development.

Our current engagement at EU level focuses on maximising Irish participation in Horizon 2020 and on our involvement in the European Research Area.

We will continue to facilitate, develop and exploit global research cooperation, and to strengthen our networks with global partners.

## European collaboration – Horizon 2020

Horizon 2020, with a budget of approximately €78 billion, is based on the pillars of excellent science, industrial leadership, and addressing societal challenges. A national strategy has been put in place to support and drive our participation in Horizon 2020, and a National Support Network, coordinated by Enterprise Ireland, provides hands-on assistance to researchers and companies wishing to participate in Horizon 2020.

To support more Irish collaboration with other countries in Europe, and thereby increase the potential for large-scale Horizon 2020 wins, more effective and sustainable supports will be developed, particularly in areas of technology and natural resources where Ireland has unique strengths.

Special measures will be put in place to encourage cooperation and collaboration with Northern Ireland in pursuing Horizon 2020 funding. Overall, our aim is to secure €1.25bn from Horizon 2020 for Irish institutions and companies.

## European Research Area

A number of priorities have been identified for the European Research Area (ERA) as having the greatest potential for positive impact on Europe's science, research and innovation systems. Ireland's and other States' contributions to the ERA will bring benefits by enhancing the efficiency, effectiveness and excellence of the EU research system through the free circulation of researchers, knowledge and technology, and thus support economic competitiveness and the development of solutions to societal challenges. During the term of *Innovation 2020*, we will optimise our engagement in the European Research Area to address these priorities.

## European Fund for Strategic Investment

The European Fund for Strategic Investment (EFSI) is an initiative launched by the European Commission and the European Investment Bank Group aimed at overcoming the current investment gap in the European Union by mobilising private financing for strategic investments. It will support investment in research and development, and will provide support for small and medium-sized companies. It aims to unlock €315 billion of investment over the period 2015-2017. We will investigate the potential of national initiatives to engage with EFSI, in order to secure a proportion of this investment in Ireland.

## International Research Organisations

Ireland is currently an active member of the European Space Agency, the European Molecular Biology Laboratory, the European Molecular Biology Conference, EUREKA, COST, and CECAM. Our participation in these international research organisations yields significant benefits for education, research and enterprise. In addition to continuing our participation in these organisations, we intend to explore options for membership of CERN and ESO, and to apply for full membership of ELIXIR.

## Wider collaboration

We currently have bilateral intergovernmental agreements with China, India and Japan, and Ireland's embassy network will continue to seek opportunities for cooperation with third countries, particularly those with strong education and research links to Ireland.

The US-Ireland R&D Partnership involves the governments of the US, Ireland and Northern Ireland working together for scientific progress by awarding grants for research on a competitive basis.

**By 2020:**  
 €1.25bn secured  
 under Horizon  
 2020.

Areas of focus include health, telecommunications, energy, and agriculture. The Partnership is helping to link relevant scientists, engineers and research centres across academia and industry to make an important contribution to the three economies and expand educational and career opportunities in science and engineering. In the coming years, the Partnership may expand its scope to include other areas of mutual interest to the three jurisdictions.

## International benchmarking

Ireland has joined with New Zealand, Finland, Denmark, Singapore and Israel to form the Six Small Advanced Economies Initiative, with the aim of learning from and benchmarking against each other in science, innovation, economy and foreign affairs. This activity will continue throughout the term of *Innovation 2020*.

The main Irish research-funding agencies (SFI, HRB, IRC) are members of Science Europe – a gathering of all of the major EU research-funding bodies. Ireland is also represented by the Chief Scientific Adviser on the Global Research Council – a grouping of all of the major international funders of research – and on the International Council for Science. Through our membership of these bodies we continue to contribute to, and benefit from, international science policy and initiatives. Enterprise Ireland, through the European Association of Leading National Innovation Agencies, has also entered into a benchmarking exercise with other European innovation agencies.

These activities are undertaken to ensure that our innovation policies and programmes are informed by experience and good practice in other countries.

# COORDINATED IMPLEMENTATION

The strategy set out in *Innovation 2020* was drawn up by the Interdepartmental Committee on Science, Technology & Innovation, which includes representatives of ten Government departments, along with the Higher Education Authority and the Chief Scientific Adviser to the Government. It recognises the role of innovation in creating a better society, improving standards of living, protecting the environment, and generating wealth and employment.

Implementing the strategy calls for an equally integrated, joined-up approach. Government is committed to adopting a whole-of-Government approach to innovation policy in order to ensure coherent, coordinated and streamlined implementation of the strategy. The Innovation 2020 Implementation Group will drive and oversee implementation of the strategy. This group will take over the functions of the three groups that currently have related responsibilities in this area.

The Innovation 2020 Implementation Group will report to the Cabinet Committee with responsibility for research and innovation policy annually on progress in achieving high-level targets and delivering on actions.



