Research for Ireland's Future

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Powering the Smart Economy

Science Foundation Ireland Strategy 2009-2013

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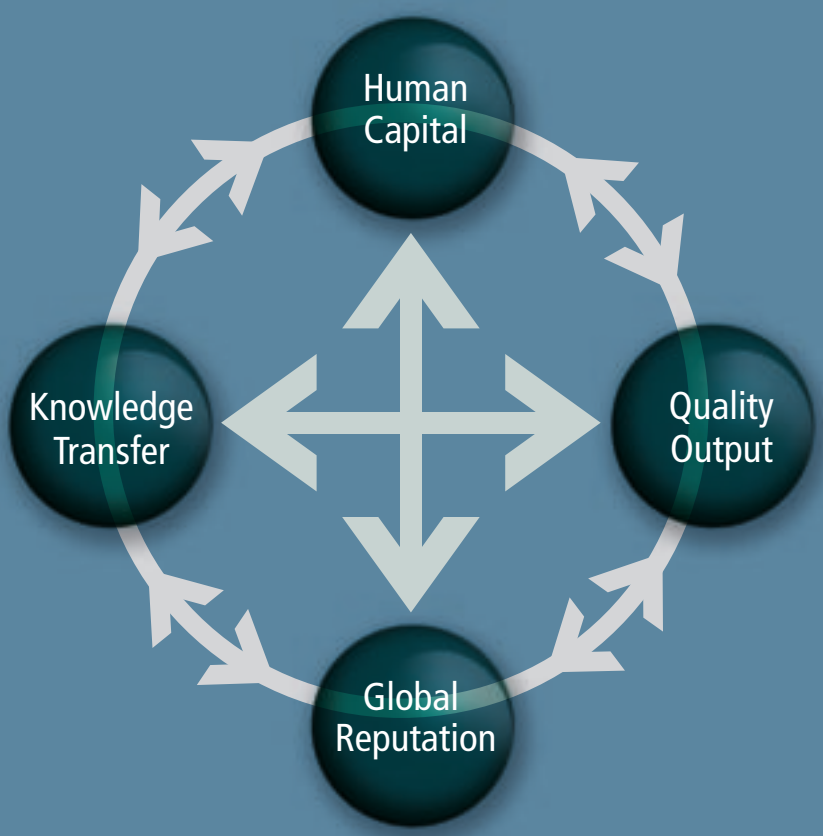
Human Capital
Quality Output
Global Reputation
Knowledge Transfer

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Executive Summary

Science, technology and knowledge-driven enterprises have become increasingly important to economic success in a globalised market. This has been recognised for some time by the Irish Government, who have made an unprecedented national commitment to scientific research, technological development and innovation in recent years. This commitment is reflected in the *National Development Plan 2007-2013*, in the *Strategy for Science, Technology and Innovation (SSTI) 2006 - 2013*, and, most recently, in *Building Ireland's Smart Economy: A Framework for Sustainable Economic Renewal*, published at the end of 2008. The fact that this commitment was reiterated at a time of increasing economic pressure underlines the seriousness of the Government's intent.

Science Foundation Ireland's (SFI) strategy over the coming five years is to make sure that certain key elements of the Government's plans are realised. In the short time since it was established in 2000, SFI has repositioned Ireland in the world of scientific research, from a relatively poor under-performer to a significant force in the strategically important areas of Information and Communications Technology (*ICT*) and Biotechnology (*BIO*). The recent addition of Sustainable Energy & Energy Efficient Technologies (hereafter referred to as *ENERGY*) to SFI's remit presents the organisation with the opportunity to make a contribution to two of the most urgent issues facing the country: energy security and climate change.

Over the next five-year period, SFI intends to maintain the momentum of the past five years, to firmly establish Ireland as a centre for excellent research in leading areas of science and technology. SFI activities have become increasingly relevant to the economy, and the strategy for the next five years will continue this trend, in the belief that high-quality scientific research and researchers are the drivers needed to develop Ireland into a high-value, knowledge-based economy.

In the years immediately ahead, SFI will further align its activities with the Government's *Strategy for Science, Technology and Innovation (SSTI) 2006-2013* and will contribute significantly to the delivery of the vision set out in *Building Ireland's Smart Economy.* This envisages an exemplary research, innovation and commercialisation system at the core of the Smart Economy and a move away from fossil-fuel based energy production through investment in renewable energy and increased energy efficiency.

The task of SFI in this context will be to build scale in its research activities, while maintaining a high level of scientific excellence and an acute awareness of enterprise needs and commercial potential.

Over the period of this Strategic Plan, SFI will focus on four strategic objectives:

1 **Human Capital:**
Build a critical mass of internationally competitive research teams in the sciences and engineering underpinning *BIO, ICT,* and *ENERGY**, such that:

- The Irish workforce is upskilled to the needs of a high-tech economy,
- The absorptive capacity of the country is such that it can identify, acquire and incorporate externally developed technologies, and
- Ireland is well placed to attract and grow high-value enterprises.

* *The primacy of these areas may change in time in response to scientific and technological developments and enterprise needs. SFI will continually monitor developments to ensure the ongoing relevance of its programmes.*

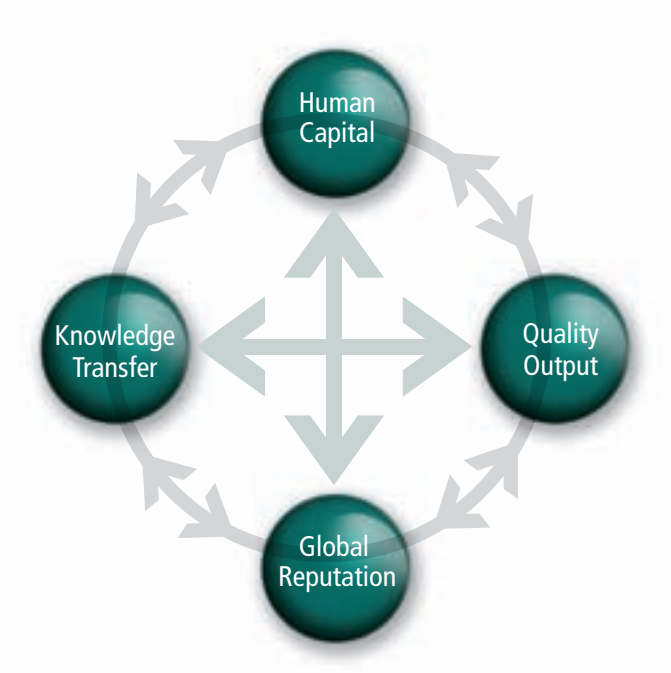
2 Quality Output:
Ensure that SFI-funded research teams continue to produce the highest quality output, as this is the best external endorsement of the scientific value obtained from research investment.

3 Global Reputation:
Increase Ireland's global reputation as a location of excellent scientific research and as a source of human and knowledge capital, such that businesses creating next-generation products and services are attracted to and retained in Ireland.

4 Knowledge Transfer:
Provide quality inputs to the technology transfer/ translational industries in Ireland, and grow partnerships that facilitate the expansion of the national RDI footprint, to ensure that research is optimally exploited for the benefit of Irish society.

The realisation of these interdependent objectives will deliver the basis for a prosperous and sustainable smart economy.

The strategy for the next five years increases the emphasis on linkages between scientific excellence and economic impact. SFI's programmes will be focused more directly on developing and sustaining the underpinning components of the Smart Economy in the areas of greatest strategic value to Ireland's long-term competitiveness and development.



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Introduction

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> *Successful business is always about applied knowledge. Irish business considers a strong science base as a necessary, but not sufficient, condition to enhance the sustainability of our economy.* ***SFI, in successfully building the research platform upon which Ireland can become a world leader as a Smart Economy, is therefore pivotal to Irish business success.***

Turlough O'Sullivan, Director General, IBEC

> *Intel is delighted to be working in close partnership with SFI sponsored research organisations at CRANN, Tyndall National Institute and UCD. In these collaborations, which are focused in the area of nanotechnology, we have seen the emergence of world-class science. We look forward to continuing our active engagement with these research organisations as we look for the next breakthroughs to enable the continuation of device miniaturisation, which is commonly referred to as Moore's Law.* ***We would encourage SFI to maintain or indeed increase its funding levels in pursuit of further scientific excellence, as well as maintaining its focus on key areas where Ireland can make an impact.***

Jim O'Hara, General Manager, Intel Ireland
Vice President, TMG, Intel Corporation.

The decision by the Irish Government to establish Science Foundation Ireland in 2000 had the aim of bringing Ireland into the top rank of world science performers. This decision was taken in the context of an economy that had recently achieved very substantial growth, and a society that was enjoying significant improvements in its standards of living. It recognised that the only way to sustain this prosperity was to ensure that industry in Ireland remains internationally competitive, and that this could be achieved only by substantial investment in scientific research and engineering.

Science, technology and knowledge-driven enterprises have become increasingly important to economic success in a globalised market. The Government, first through the National Development Plan 2000–2006 and subsequently through the National Development Plan 2007-2013, made an unprecedented national commitment to scientific research, technological development and innovation.

The Industrial Development Act 2003 placed SFI on a statutory footing, with the prime objective of promoting, developing and assisting the carrying out of oriented basic research in strategic areas of scientific endeavour that concerns the future development and competitiveness of industry and enterprise in the State.

SFI Vision:

Ireland will be a global knowledge leader that places scientific and engineering research at the core of its society to power economic development and social progress.

SFI Mission:

SFI will build and strengthen scientific and engineering research and its infrastructure in the areas of greatest strategic value to Ireland's long-term competitiveness and development.

Based on the recommendations of the Technology Foresight exercise conducted by the Irish Council for Science, Technology & Innovation (ICSTI) in 1998-99, the focus of SFI investment to date has been on the sciences and engineering associated with the broad areas of *BIO* and *ICT*. These areas are important business sectors in their own right and they underpin developments in a broad range of other industries. In May 2008, the remit of SFI was expanded to include *ENERGY* in recognition of both the challenges and the opportunities presented by the Green/Clean Tech sector, particularly cost competitiveness, energy security and climate change.

Today, as the world economy enters a period of considerable uncertainty, the rationale for investing in research to drive development is stronger than ever, so that the country is favourably positioned to capitalise on the opportunities that will arise when the global economy commences recovery in the coming years.

Recognising this, the Government has reiterated its commitment to investment in scientific and technological research. In *Building Ireland's Smart Economy: A Framework for Sustainable Economic Renewal,* published at the end of 2008, the Government charged SFI with continuing to build Ireland's world-class research capacity in strategic areas allied to the needs of industry.

To date, SFI has committed over one billion euro to research that is:

- Intrinsically excellent, and acknowledged as such internationally;
- Of a sufficient scale and critical mass to facilitate, promote and sustain intellectual interchange and discourse amongst those engaged in research in Ireland and top-class researchers internationally;
- Characterised, in accordance with the founding statutes of SFI, as 'Oriented Basic Research';
- Strengthening the scientific foundations on which high-productivity, high-technology, market-driven investments can be developed;
- Supporting the efforts and strategies of the other enterprise development agencies, in particular, IDA Ireland and Enterprise Ireland;
- Contributing to the consolidation and improvement of the Higher Education Institutes' (HEIs) research and educational activities;
- Building the smart economy through effective partnership with the enterprise development agencies, the Department of Enterprise, Trade & Employment, the Universities and Institutes of Technology, the Higher Education Authority (HEA) and its councils, the Irish Research Council for Science, Engineering & Technology (IRCSET) and the Irish Research Council for the Humanities & Social Sciences (IRCHSS), and sectoral research bodies, such as the Health Research Board (HRB), Sustainable Energy Ireland (SEI), the Environmental Protection Agency (EPA), and the Marine Institute.

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Building on Success

World-class research

Industry linkages

Researcher training

Modernising the research infrastructure

Technology transfer

Partnership – a key ingredient of success

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"2009 sees Wyeth celebrating its 35th year in Ireland. Over that time we have grown to become the largest employer within the pharmaceutical sector. ***Ireland's reputation and capability as a pharmaceutical/ biopharmaceutical base continues to be supported and enhanced thanks to the excellent work of agencies such as SFI.*** *Ireland has been very successful at attracting companies who use very sophisticated technology, like biotech, to make their products in Ireland. We need to build on that and use the critical mass of scientists and technologists, both applied and academic, to start to develop technology and products here in Ireland. SFI is a critical enabler of that ambition by developing the strong academic sector that we need to underpin a future as a Knowledge Economy."*

Matt Corcoran, Managing Director, Wyeth Medica Ireland.

"Green Technology constitutes a major research opportunity that will deliver important benefits to Irish business and society. SFI has the capability to bring those opportunities to life."

Terry Landers, Director, Legal and Corporate Affairs (LCA),
Microsoft Ireland.

Since its establishment in 2000, SFI has made rapid progress towards creating a world-class research programme in Ireland. In *Vision 2004-2008: People, Ideas and Partnerships for a Globally Competitive Irish Research System*, SFI set out its short-term targets under five headings:

- World-class research
- Industry linkages
- Researcher training
- Modernising the research infrastructure
- Technology transfer

In each of these areas, the targets have been exceeded.

World-class research

Target: Recruit to Ireland at least **50** researchers or research teams from the top tier in their disciplines.

Achievement: By 2008, **103** overseas Principal Investigator-level researchers had been attracted into Ireland, bringing the total number of Principal Investigator-led research teams to over 300, with over 2,500 research personnel.

SFI has built an effective working relationship with the HEA to ensure that the human capital delivery of SFI is aligned to physical infrastructure provision via the HEA's Programme for Research in Third Level Institutions (PRTLI).

Industry linkages

Target: Initiate centres, institutes and teams that establish research links between Irish research institutions and industry. Attract or substantially increase the R&D investments of at least **10** foreign-owned firms in Ireland and produce at least **5** significant research collaborations between research institutions and indigenous companies.

Achievement: A step change has been achieved in national and international collaboration within and between academia and enterprise.

9 SFI Centres for Science Engineering and Technology (CSETs) and **12** SFI Strategic Research Clusters (SRCs) have been created, partnering with over **40** multinational corporations (e.g. Intel, Hewlett-Packard (HP), GlaxoSmithKline (GSK), Procter & Gamble and Becton Dickinson) and **32** SME/Indigenous companies (e.g. Creganna, Airtricity and Parthus Technologies).

Beyond the CSETs and SRCs, SFI-funded research groups have played an important role in assisting IDA Ireland in attracting/retaining R&D clients (e.g. IBM and Boston Scientific).

Researcher training

Target: Support the education and training of a stream of post-graduate and post-doctoral students who bring ideas from the funded research teams and centres into universities, research laboratories and industry in Ireland.

Achievement: Between 2003 and 2007, the number of SFI-supported post-doctoral researchers increased from 117 to 604 (a **5 fold increase**), and the number of SFI-supported PhD students increased from 120 to 1,000 (an **8 fold increase**).

The Value for Money Review of Science Foundation Ireland prepared for the Department of Enterprise, Trade & Employment by Indecon International Economic Consultants in 2008 confirms that the productivity of these researchers, in terms of publication outputs, has increased substantially.

Modernising the research infrastructure

Target: Contribute to the development in Ireland of a modern research infrastructure by funding core facilities and overheads. This will significantly enhance Ireland's reputation as an outstanding location for scientific and engineering endeavours.

Achievement: Over 30% of SFI grant value went to HEIs to enable them to develop their research infrastructure.

A number of **world-class facilities** have been developed, including the CRANN Naughton Institute in Trinity College Dublin (TCD), and the Photonics Facility and the National Access Programme in the Tyndall National Institute.

In addition, core grants and specific calls have enabled SFI research groups to acquire large-scale equipment for research.

Technology transfer

Target: Support the development of a technology-transfer system that maximises the exploitation of intellectual property for the economic benefit of Ireland.

Achievement: The quality and quantity of commercially interesting intellectual property generated in the Irish research system has expanded significantly. By 2007, more than **250 patents** had been filed by SFI-supported research groups.

To date, approximately 25% of SFI-supported PhD students and post-doctoral researchers have taken up positions in industry.

To further drive the commercialisation agenda, SFI appointed a Head of Industry–Research Development in 2008.

Over the next five-year period, SFI intends to maintain the momentum of the past five years in each of these areas, to firmly establish Ireland as a centre for excellent research in leading areas of science and technology.

In *Science Foundation Ireland – The First Years 2001 – 2005,* Report of an International Evalution Panel led by Sir Richard Brook reported:

'While it is early in the life of SFI to assess the long-term cultural and economic impact of the research it supports, … impressive progress towards developing a strong research capability in biotechnology and ICT has been achieved. … SFI has responded with energy, with purpose, and with striking effect to meet the objectives originally set for it. … Research of excellent quality is being funded by SFI and the existence of SFI funding is having a positive catalytic effect on the performance of research in Ireland.'

International economic consultants, Indecon, in their 2008 report *Value for Money Review of SFI,* commissioned by the Department of Enterprise, Trade & Employment, reported:

'SFI should continue to implement its core mission of funding excellence in areas where Ireland can compete effectively on a global scale. … Since the late-1990s, a radical transformation has taken place in the research funding landscape … [and] SFI … has played an important role in this turn-around. … There is evidence that the CSETs are playing an important role in building a world-class research system in Ireland [and are] being used as a "strong reference sell" by IDA Ireland in their efforts to attract further international investment in high-tech sectors.'

Partnership – a key ingredient of success

SFI works closely with other State agencies in pursuit of the goal of transforming Ireland's economy into one that is knowledge-based, prosperous and sustainable.

Since its establishment, SFI has sought effective integration into Ireland's overall science policy and implementation structure, and works with others to ensure the consistency and effectiveness of national science policy. This involves working closely with Technology Ireland and the Higher Education Research Group (under the aegis of the Cabinet Subcommittee on Science Technology & Innovation and the Interdepartmental Committee on Science & Technology), and with the wide range of agencies with responsibility for science, technology and innovation.

The complementary relationship between SFI, the HEA, and the HEIs has facilitated the scale-up in publicly funded research, and the transformational change in the Irish research sector that has been brought about in the past decade is already bearing fruit in the economy. The attraction and retention of foreign direct investment (FDI) by IDA Ireland – and in particular high-end, R&D-intensive enterprises – is significantly enhanced by SFI-supported human and knowledge capital. SFI supports IDA Ireland both directly, through its interaction with IDA Ireland client companies in its various programmes, and indirectly, by providing visible evidence of the country's commitment to science and technology.

The growth in high-tech skills and knowledge capital is also creating significant opportunities for entrepreneurial activity. Enterprise Ireland is working with a number of indigenous companies with high growth potential, based on skills and knowledge that were developed with SFI funding.

Together, SFI, Enterprise Ireland and IDA Ireland are working to foster enterprise activity in Ireland that incorporates more intellectual capital, and can therefore command higher prices on world markets. The role of SFI is to ensure that enterprise has ready access to the talent and intellectual property that it needs. As the SFI programme has developed over the past decade, its activities have become increasingly relevant to the economy. The strategy for the next five years will continue this trend, in the belief that high-quality scientific research and researchers are the drivers needed to develop Ireland into a high-value, knowledge-based economy.

The Areas That SFI Funds

SFI invests in academic research and research teams that generate new knowledge, leading edge technologies and competitive enterprises in the fields of science and engineering underpinning ***BIO, ICT*** and ***ENERGY***[1].

Since SFI was established it has contributed to the development and growth of a critical mass of individual investigators and research groups in these broad areas, and more recently in the Energy area. SFI now funds over 300 Principal Investigators across multiple diverse disciplines and continues to encourage growth in these numbers to reflect particular strengths in existing fields, and deliver the goals and targets set down in SSTI.

Biotechnology (*BIO*)

Irish life science research continues to break new ground in many areas and global competitiveness is already emerging in fields such as molecular cell biology, human genetics, glycobiology, immunology and cancer. This extends beyond a strong base in fundamental basic research and has moved increasingly towards a highly productive interface with Ireland's large industrial and pharmaceutical sectors. Particularly encouraging progress has been made in areas that impact human health, including pharmaceutical formulation technology, medical diagnostics and the underpinning science of biosensor research. A large number of research groups have also embraced new platforms for genomic and proteomic research that are already facilitating major strides in the study of a range of human diseases.

Information & Communications Technology (*ICT*)

Information processes underlie all aspects of our society and of our personal lives. SFI investment is concerned with leading research embracing all aspects of this chain of data to information, information to knowledge, and onward to deployment for the citizen and exploitation by enterprise. Research support by SFI in the area of *ICT* includes software, ranging widely over computational thinking and value-chain engineering; hardware, including materials science, opto- and other electronics; and the combination of software and hardware in grids, sensor and other networks. As a result there is now considerable strength in sizable research teams in the fields of: nanotechnology (including nano-biotechnology), advanced manufacturing, photonics, telecoms, finance (in particular mathematical and algorithmic finance; and information security), sensor networks, and e-Society.

[1] *In addition to the above three areas, SFI supports the Research Frontiers Programme, which encompasses all fields of science, engineering and mathematics.*

Sustainable Energy and Energy-Efficient Technologies (*ENERGY*)

In May 2008 the remit of SFI was extended to include research in the fields of science and engineering underpinning sustainable energy and energy-efficient technologies. Through the Charles Parsons Programme and existing investments SFI supports research in various fields such as biofuels, materials science, sensor networks and pervasive computing that address the area of energy.

In *Building Ireland's Smart Economy,* the Government outlined its commitment to moving the economy away from fossil-fuel based energy production through investment in renewable energy and increased energy efficiency, and highlighted SFI's recently added responsibilities in fundamental research in this area.

BIO, ICT and *ENERGY*: Interdisciplinarity and Convergence

Through these investments Ireland's research landscape has become diverse, yet highly interconnected. For example, progress in one field such as glycoscience (specifically the study of sugars expressed by cells of our bodies and those of bacteria) can directly impact on our understanding of another, such as alimentary health and the design of effective pharmabiotics. SFI CSETs and SRCs bring together researchers in diverse disciplines such as physics, chemistry, engineering, material science, and biochemistry and serve as examples of convergence that exist across the sectors supported by SFI, and illuminate the broad yet highly interactive nature of Ireland's research environment.

The addition of new researchers, the growth of collaborative activity and the development of convergence will continue to ensure that new research opportunities are captured effectively to bring economic and social benefits to Ireland.

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Looking Ahead: 2009 Onwards

Human Capital
Quality Output
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In the years immediately ahead, SFI will further align its activities with the Government's *Strategy for Science, Technology and Innovation (SSTI) 2006-2013*, which was elaborated and endorsed in the more recent *Building Ireland's Smart Economy*. The vision of the SSTI is as follows:

"Ireland by 2013 will be internationally renowned for the excellence of its research, and will be to the forefront in generating and using new knowledge for economic and social progress, within an innovation driven culture."

The SSTI targets very substantial growth in Ireland's research, development and innovation activities, by committing €8.2 billion to fundamental, applied and enterprise research.

Over the period 2009 - 2013, SFI will continue to pursue its SSTI objectives. The task of SFI will be to build scale in its research activities, while maintaining a high level of scientific excellence and an acute awareness of enterprise needs and commercial potential.

It is particularly important to pursue this strategy in this period of global economic uncertainty. If Ireland is to emerge as a leading knowledge-based economy, continued investment in upgrading the quality of Ireland's workforce, especially in the sciences and engineering, is not a luxury, it is an absolute necessity. This was the core hypothesis that led to the establishment of SFI, and it remains valid in today's economic circumstances.

An increasing proportion (greater than 40% in 2008) of the FDI projects won by the IDA Ireland are in Research and Development initiatives. These projects frequently involve enterprises that originally located in Ireland to carry out relatively low value manufacturing activities, and are now engaging in higher value activities in cooperation with groups that SFI has attracted to or retained in Ireland through its funding programmes.

Enterprise Ireland's focus on growing the numbers and activities of indigenous companies engaged in research, and on fostering high-potential, technology-based start-ups, is also significant. Again SFI's investments are beginning to bear fruit in these developments.

The recent addition of *ENERGY* to SFI's brief also presents the organisation with the responsibility and the opportunity of making a significant contribution to the challenge of sustainable development. Ireland is particularly dependent on fuel imports, while being particularly well-endowed with sources of renewable energy. There are thus both supply and demand reasons why Ireland should seek to become a world centre of expertise and knowledge in the fields of sustainable energy generation and efficient energy usage.

SFI will continue to focus on research excellence in the years ahead. However, the organisation believes that success will ultimately be judged by concrete outputs, in terms of attracting and developing world-class researchers and intellectual property generated. In this context, publications are a surrogate measure, and not an end in themselves.

Working in partnership with government departments and agencies, enterprise and the HEIs, SFI will focus on four strategic objectives over the period 2009-2013:

1 **Human Capital:**
Build a critical mass of internationally competitive research teams in the sciences and engineering underpinning *BIO, ICT* and *ENERGY*[2], such that:

- The Irish workforce is upskilled to the needs of a high-tech economy;
- The absorptive capacity of the country is such that it can identify, acquire and incorporate externally developed technologies; and
- Ireland is well placed to attract and grow high-value enterprises.

2 **Quality Output:**
Ensure that SFI-funded research teams continue to produce the highest quality output, as this is the best external endorsement of the scientific value obtained from research investment.

3 **Global Reputation:**
Increase Ireland's global reputation as a location of excellent scientific research and as a source of human and knowledge capital, such that businesses creating next-generation products and services are attracted to and retained in Ireland.

4 **Knowledge Transfer:**
Provide quality inputs to the technology transfer/ translational industries in Ireland, and grow partnerships that facilitate the expansion of the national RDI footprint, to ensure that research is optimally exploited for the benefit of Irish society.

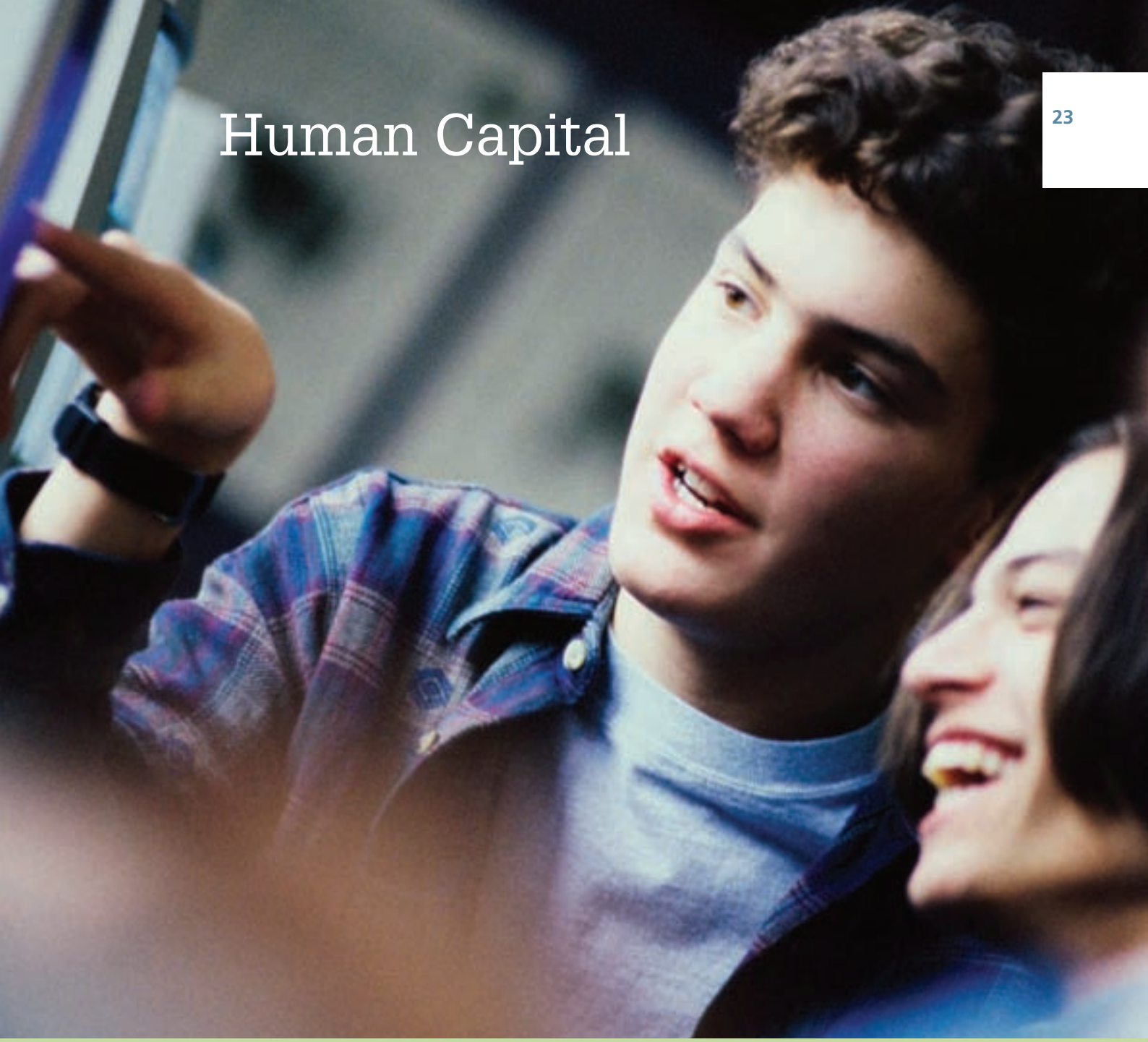
The realisation of these interdependent objectives will deliver the basis for a prosperous and sustainable smart economy. Each of these objectives is dealt with in more detail in the pages that follow.

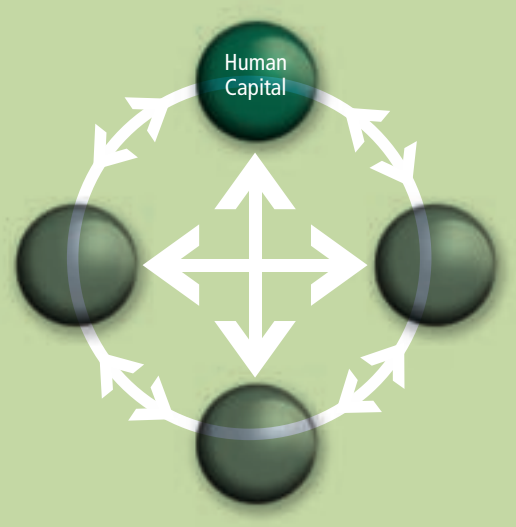
[2] *The primacy of these areas may change in time in response to scientific and technological developments and enterprise needs. SFI will continually monitor developments to ensure the ongoing relevance of its programmes.*

> ***25 PhD students have left my group in the past decade. The majority of PhD graduates from my research team progress to successful careers in the pharmaceutical sector both in Ireland and internationally. 13 are employed in the pharmaceutical sector in Ireland – Pfizer, Novartis, GSK, Eli Lilly. Six are employed in the pharmaceutical sector internationally – Eli Lilly, Indianapolis; Novartis, Basel; and in start-ups in the UK.*** *The availability of PhD graduates with the relevant skills sets has been essential in enabling many of these companies to attract strategic R&D activities to the Irish sites, especially in the area of Process Development.*

Professor Anita Maguire,
Department of Chemistry & School of Pharmacy, University College Cork.

Human Capital





1 Human Capital:

The objective: Build a critical mass of internationally competitive research teams in the sciences and engineering underpinning *BIO, ICT* and *ENERGY*[2], such that:

- The Irish workforce is upskilled to the needs of a high-tech economy,
- The absorptive capacity of the country is such that it can identify, acquire and incorporate externally developed technologies, and
- Ireland is well placed to attract and grow high-value enterprises.

Key drivers: A significant internationally competitive Principal Investigator (PI) base, coupled with sustainable, high-quality production of trained researchers, particularly PhD graduates, is at the core of Ireland's development as a knowledge society. Only such human capital can generate the knowledge capital needed to drive Ireland's economic growth and development. Internationally competitive research teams are the engine for producing the high skills that will be needed in the areas of *BIO, ICT* and *ENERGY,* that have been identified as strategically important to Ireland[2]. In 2003, the Organisation for Economic Co-operation and Development (OECD) recommended a doubling of Ireland's output of PhD graduates - Ireland is on target to deliver this by 2013.

While the focus will remain on those areas of greatest relevance to the high-tech businesses that are likely to develop in Ireland, the skills will also be of benefit outside those areas of enterprise, in interdisciplinary work, and in areas that are as yet unidentified. The majority of researchers trained within this system will progress to careers that are neither within the HEIs nor in their primary skill area. Rather, their training and their ability to solve problems will be required in a range of jobs in the public and private sectors, where their excellence will drive innovation and development, interpret new developments for those in different sectors, facilitate effective communication to a knowledge-based society, and trigger entrepreneurial developments that respond to new markets and societal needs.

Targets: To date, approximately 300 SFI teams[3], selected by robust international peer review, have been established in Ireland. A large proportion of the PIs leading these teams have been attracted from overseas. The challenge for SFI is to retain these teams in Ireland, and to increase their number as defined in the SSTI.

This is necessary in order to achieve the scale required to deliver value to the Irish economy. In terms of human capital the targets for 2013 are:

- 440 world-class, PI-led research teams;
- 2,000 PhD graduates in total, at an on-going average rate of approximately 400 per year;
- 1,000 post-doctoral research training places; and
- A core capability that will significantly assist the retention and attraction of high-tech FDI, and a significant increase in indigenous innovation.

[3] *There are multiple PI teams within some of the larger centres and clusters*

Implementation: Through the combination of the financial resourcing of SFI by the National Development Plan 2007-2013 (€1.4 billion), SFI's reputation for excellence and its suite of quality recruitment, principal investigator and enterprise programmes, SFI is well positioned to achieve its human capital targets.

The PI programme will continue to be central to the growth in the number of research teams, and the Research Frontiers Programme will be critical to increasing the numbers of PhDs. Meeting the targets will depend on attracting new research groups to the HEIs, and this can be done only with the continued active involvement of the HEIs and the HEA. For its part, SFI will continue to use recruitment assistance programmes to facilitate the addition of new staff members to the HEIs in a manner that matches the strategic goals of the third-level institutes with the overall enterprise-driven goals of the SSTI.

Sustainability has to be at the heart of any major increase in the number of research groups, and this will be assisted significantly by introducing the new Starting Investigator Research Grants, and in some cases shifting funding for the group leaders from SFI to the HEIs following a period of support from SFI.

Energy

A specific challenge within the period of this strategy will be to ensure that SFI adequately addresses the needs of the *ENERGY* portfolio. In this respect, SFI will:

- Assist in growing demand for energy-related disciplines at third level, particularly in engineering;
- Grow capacity in energy-related research groups, particularly by recruiting leading engineering researchers;
- Foster interdisciplinarity in energy-related proposals and research capability; and
- Support research that addresses the urgent issues identified by the Irish Energy Research Council – cost competitiveness, security of supply, environmental sustainability and climate change – possibly by issuing targeted calls, including calls for clustering.

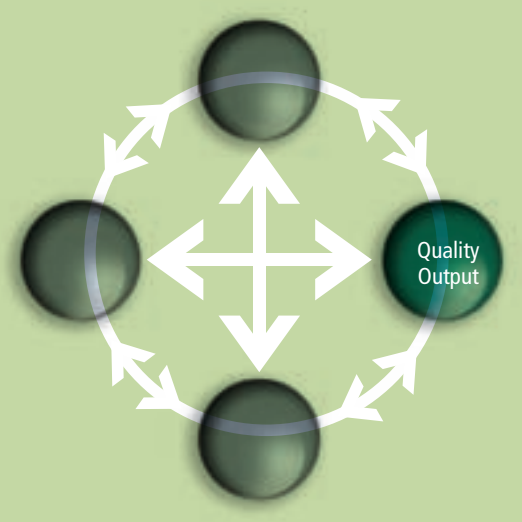
Services

In tandem with the recent addition of *ENERGY* to SFI's responsibilities, the emerging economic importance of service activities demands a response from SFI. As reported in the 2008 Services Strategy Group report *Catching the Wave – a Services Strategy for Ireland*, the services sector is predicted to account for over three quarters of Irish GDP and exports by 2025. It is important therefore that SFI positions its development and contribution in this context. Development of human capital is the primary instrument by which SFI delivers capability to the services sector – the highly trained people that are the products of SFI investment are the most likely source of high-tech innovation in services. Furthermore, specific knowledge capital can be combined with human capital in a targetted manner (e.g. via focussed calls) to facilitate services development and expansion. SFI will use its environmental scanning function (see Page 31) to identify further opportunities in the services sector. It will also seek to identify opportunities within existing and future CSETs and SRCs for increasing the involvement of services companies, as recommended in *Catching the Wave*.

Professor Michael Coey is an internationally recognised authority on magnetism and its applications. He is the author of more than 500 scientific papers and several books, and the holder of 20 patents. He was awarded the Charles Cree Medal and Prize of the Institute of Physics in 1997, and the Gold Medal of the Royal Irish Academy in 2005. He was elected a Fellow of the Royal Society in 2003, and a foreign associate of the US National Academy of Sciences in 2006 in recognition of his achievements in scientific research and is a Member of the Royal Irish Academy.

Professor Michael Coey, Professor of Experimental Physics, Department of Physics, TCD and Deputy Director of the SFI CSET Centre for Research on Adaptive Nanostructures and Nanodevices (CRANN), TCD.

Quality Output



2 Quality Output

The objective: Ensure that SFI-funded research teams continue to produce the highest quality output, as this is the best external endorsement of the scientific value obtained from research investment.

Key drivers: The research output of SFI-funded research teams, as judged by peer reviewed publications and invitations to speak at international meetings and conferences, must be of the highest quality for three principal reasons:

- It is the best surrogate measure of the quality of the human capital output;
- High-tech enterprise is attracted only to top-quality output; and
- Only the highest quality academic research provides sustained knowledge capital that is the bedrock of innovation, commercialisation and development.

Targets: By 2013 SFI aims to increase the quantity and, above all, the quality of Ireland's scientific research publications. More specifically, by 2013 SFI aims to:

- Contribute significantly to an increase in the number of scientific publications by Irish researchers from approximately 800 per million of population to over 1,200[4]; and
- Achieve a Top 10 placement for Ireland in the league of international citation performers and citation impact in the fields that it funds (from its current overall position of 17th place[5]).

Implementation: International peer review will remain the cornerstone of SFI's evaluation system for selecting and retaining PIs and their teams in Ireland. The interactions with this high-powered cohort of experts is one way to further the reputation of research in Ireland, and this will be actively built upon over the next five years.

SFI will expect its research teams to collaborate with international partners and with enterprise, and to embrace interdisciplinary approaches, with the aim of maximising the output quality of its research system.

Programmes in place already allow for extensive international cooperation, and this will be built upon through strategic interactions with countries that have complementary strengths or a supply of well-trained researchers in relevant disciplines. SFI will in particular expect research groups to participate in EU programmes and to cooperate with research groups in the USA.

SFI will drive increased participation and success in international funding competitions such as the EU Framework Programme. Specifically SFI will measure international leverage of its funds and implement mechanisms to increase this leverage over the 2009-2013 period.

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4 *Source: European Commission Directorate-General for Research, Key Figures 2007. Note: Publications data is for 2004. EU-27 level is approximately 700 whereas the majority of EU-15 members are at or above 1200.*

5 *Source: Thompson Scientific, National Science Indicators, 2003 - 2007.*

Increased success in international funding programmes is not only advantageous to Ireland in terms of non-exchequer funding of research, it is also an excellent indicator of the quality of Irish research, as such funds are allocated on the basis of international competitiveness.

Special attention will also be placed on extending and deepening the number of North-South interactions in Ireland, as SFI pursues an active all-island approach to its programmes, in keeping with the SSTI roadmap.

All SFI programmes are 'internationally open' – this is a competitive advantage of SFI on the international stage. SFI will further its excellence-through-internationalisation approach by continuing and expanding its portfolio of programmes that facilitate the movement of top-class scientists into and out of Ireland. Examples of such programmes include the E.T.S. Walton Visitor Award, the SFI Short-Term Travel Fellowship, and the North-South and US-Ireland initiatives. The international collaboration generated by such activities is viewed as essential by SFI in driving the production of top-class human and knowledge capital. SFI also plans to expand its international reach by:

- Taking up membership of the European Science Foundation and enhancing SFI's participation in other international interest organisations, such as the European Molecular Biology Laboratory; and

- Actively engaging with other selected countries where the research agenda matches or complements Ireland's R&D objectives.

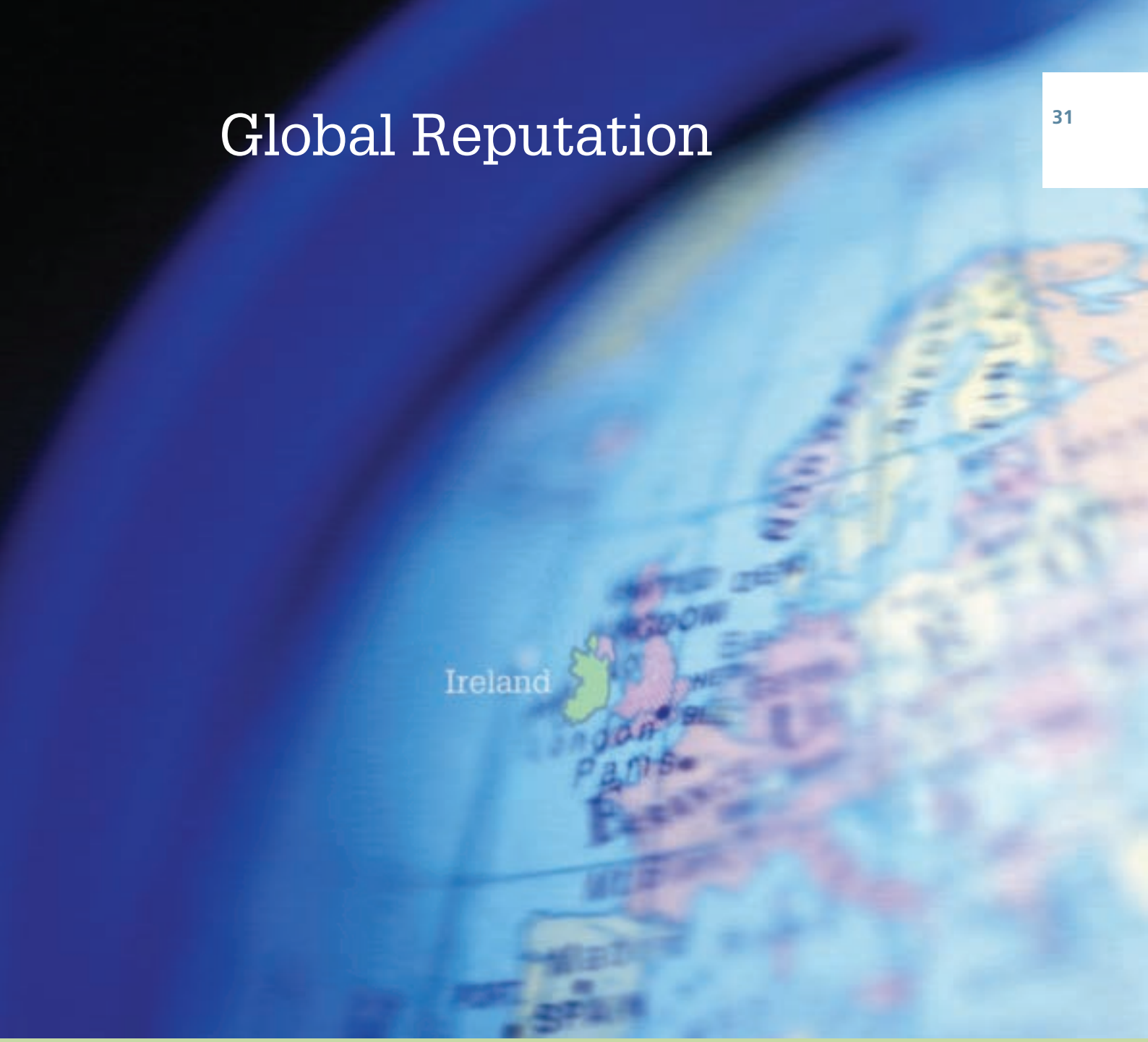
"Today there is growing consensus that global integration is changing the corporate model and the nature of work itself. We are in an age where our society and planet will continue to become smaller and flatter - economically, technically and socially. The competitive advantage in this environment comes from being able to attract the best skills and talents, wherever they are in the world, and collaborate with them to innovate for clients. ***The investment made by SFI over the last number of years has given Ireland a great foundation in the technologies that will enable a Smarter Planet to take advantage of the opportunities presented by the current economic climate.*** *IBM Ireland has a strong tradition of collaboration with SFI to harness R&D talent, openly sharing the many insights that are needed to infuse intelligence into the way our world literally works."*

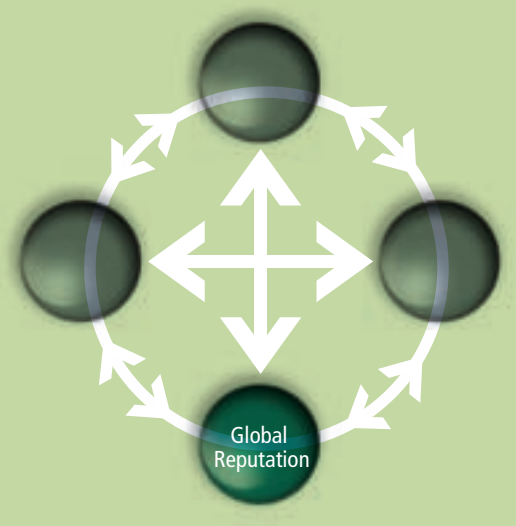
Michael Daly, Country General Manager, IBM Ireland.

"The partnership between IDA Ireland and Science Foundation Ireland, as part of Team Ireland, is essential in securing, retaining and expanding Foreign Direct Investment (FDI) operations in Ireland. *A key focus of IDA is securing Foreign Direct Investment in the areas of Collaborative Research and Development in Clean Technology, Convergence, ICT, Life Sciences and Financial Services. This goal is supported and implemented by joint initiatives between IDA and SFI where we leverage our ability to bring together significant industrial and academic research collaborations with client companies."*

Barry O'Leary, Chief Executive Officer, IDA Ireland.

Global Reputation





3 Global Reputation

The objective: Increase Ireland's global reputation as a location of excellent scientific research and as a source of human and knowledge capital, such that businesses creating next-generation products and services are attracted to and retained in Ireland.

Key drivers: The ambition to establish a worldwide reputation for Ireland as a leading location for research and for top quality researchers in specific skill domains has driven SFI since its inception. If this ambition is not realised, the probability of globally mobile enterprises choosing to locate in Ireland will be greatly diminished. It is already apparent that, as IDA Ireland succeeds in attracting more RDI-intensive enterprise into Ireland, the demand for higher-level skills increases. While it is difficult to predict with any degree of precision the complex manpower requirements needed in a rapidly changing environment, the aim is to create a research and engineering community with an internationally recognised reputation for problem-solving in diverse areas.

Top-quality scientific researchers are highly mobile and are attracted to locations that have the highest reputation for enabling excellent research, as evidenced, for example, by the influx of international scientists to the west and north-east coasts of America.

As such locations are magnets of attraction not only to the academic research community but also to the enterprises that require access to highly trained scientists and associated knowledge capital, SFI will aim to increase the visibility and reality of Ireland as a location that is characterised by world-leading research teams.

The pursuit of the other strategic objectives outlined in this document will help to establish Ireland's international reputation for scientific research, but additional specific actions are required in the coming years to enhance and promote that reputation. Such actions will support the efforts of IDA Ireland to develop the existing FDI base and to bring in new high-tech investments.

Targets: To enhance Ireland's global reputation for scientific excellence, by 2013 SFI will:

- Attract to Ireland a premium cohort of world-class researchers that have been nominated for, or secured, internationally-recognised prizes, awards, or honours[6];
- Recruit 50 new overseas PIs, to supplement the existing 100 overseas PIs recruited up to 2008;
- Assist IDA Ireland, directly and indirectly, in retaining in and attracting to Ireland high-tech foreign direct investment.
- Conduct five Tier 1 international conferences (such as Keystone, WWW, IEEE and EMBO) in Ireland; and
- Systematically scan the science, technology and commercial environments for any developments, challenges or opportunities that might require a change of emphasis in SFI programmes.

Implementation: SFI must continually monitor its external environment in order to identify emerging areas of scientific endeavour that are strategically important for Ireland, and to ensure that the thematic areas it funds continue to be optimal for the future development and competitiveness of industry and enterprise in Ireland.

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[6] *Examples include the Albert Lasker Medical Research Awards (75 winners of which have subsequently won Nobel prizes) and the Robert Koch Medal.*

The Technology Foresight exercise conducted by ICSTI provided the initial focus areas for SFI's work, in *ICT* and *BIO*. SFI has adopted a broad interpretation of these areas, a recognition that the boundaries between disciplines is not fixed, and an acknowledgment of the importance of interaction between the core focus disciplines and others. SFI has also taken responsibility for developing capabilities in the *ENERGY* area, and has responded to particular requirements in, for example, financial services. In the years ahead, it is important that SFI continues to anticipate developments, and not merely react to them.

To ensure that SFI identifies relevant developments and responds quickly to them, an environmental scanning facility will be established, with two converging elements:

- A bottom-up approach that pinpoints scientific and technological developments coming from top international research groups: SFI has built up a large network of premium, international peer reviewers over the past eight years that provide early intelligence on such developments; and

- A top-down approach that pinpoints the market and enterprise demands for science and technology: the integrated approach of SFI, Enterprise Ireland and IDA Ireland together with Forfás ensures that SFI receives early signals from its enterprise partners regarding market and enterprise demands for science and technology.

SFI will continue to work with enterprise development agencies and the coordinated science policy structures of Technology Ireland, the Higher Education Research Group and the Interdepartmental Committee on Science & Technology to ensure a continual process of assessment, realignment and rebalancing of its resources, so that its priorities and programmes are consistent with the development and competitiveness of industry and enterprise in Ireland. This approach has already been implemented, as evidenced by, for example:

- The 2007/8 systems biology call was issued as a consequence of SFI identifying technology developments in systems biology (bottom-up) and IDA Ireland identifying an emerging systems biology industry (top-down);

- The topics that are funded through the SRC and CSET programmes that are closely integrated with the research needs for partnering businesses; and

- Areas of research that are needed to complement the proposed competence centres that are under development by IDA Ireland and Enterprise Ireland.

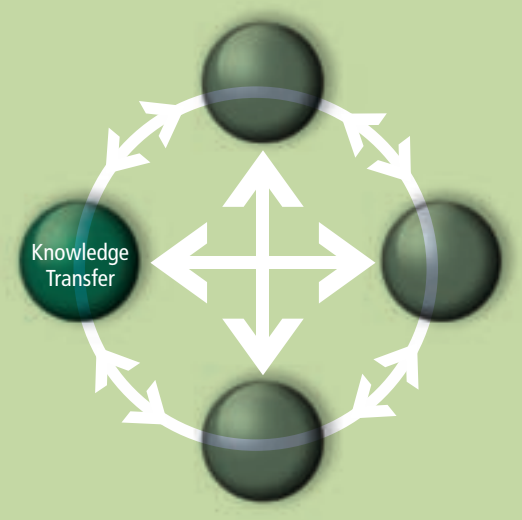
In all of these actions, raising the visibility of Irish research will be pursued in parallel with improving the international quality of the research teams. These two goals are necessarily interconnected, as top researchers will not move to a mediocre environment that is potentially career-damaging. The decision by a top researcher to move to Ireland sends a message to the international scientific community, both in academia and in industry, that Ireland is a new target location.

The attraction of large groups of leading researchers to Ireland for top-class research conferences is another important mechanism for bringing the serious intent of the Irish research project to the attention of the international community. Attendees at such conferences will carry this message back with them to their home laboratories.

“Opsona is in the business of translating basic research discoveries into therapeutics for human immune diseases for the improvement of health. SFI has made a considerable investment in the field of immunology research in Ireland, and as an indigenous SME focused on immunological disorders, it is essential for us to collaborate and work together with leading academic groups clustered here in Ireland. SFI has created an environment which has made such academic-industry partnerships possible. We are also one of two industry participants in the Immunology Research Centre, an SFI funded SRC, which will develop novel therapeutics and identify therapeutic targets for immune-mediated diseases, such as multiple sclerosis, psoriasis and rheumatoid arthritis. Such large-scale initiatives to bring together multiple academic and industrial partners together with a common goal to drive the knowledge economy is beneficial not only to the participants, but eventually the wider community through the translation of such fundamental research into medicines. ***SFI funded research is essential to indigenous SMEs, as the products and intellectual property from such investment will fuel the growth of the SME sector in Ireland in the years to come.”***

Dr. Mark Heffernan, PhD,
Chief Executive Officer OPSONA Therapeutics Ltd.

Knowledge Transfer



4 Knowledge Transfer

The objective: Provide quality inputs to the technology transfer/translational industries in Ireland, and grow partnerships that facilitate the expansion of the national RDI footprint, to ensure that research is optimally exploited for the benefit of Irish society.

Key drivers: The essence of the knowledge society is the use of research to drive innovation and development. SFI's funding of research has the clear intention of supporting the activities of the enterprise development agencies and the HEIs. In the medium to long term, the human and intellectual capital generated through SFI programmes will be critical to the retention and expansion of high value-added activities in enterprises, especially in the areas broadly defined as *BIO, ICT* and *ENERGY*.

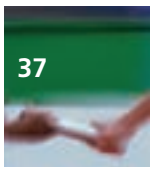
Much of the best enterprise-relevant research is performed in a mixed academic/business environment, where the current and potential needs of enterprise influence the academic activities and vice versa. At the same time, it must be recognised that the research that underpins new developments, typically performed in academic environments, has a long-term timeline; the research and development performed in industry works to a much shorter term cycle. Industry typically converts the results of the more academic research into products, in combination with other technologies and discoveries.

Large high-tech businesses, venture capitalists and entrepreneurs are attracted to pools of high technical skills and readily available knowledge capital, as evidenced in Silicon Valley. Providing environments and supports that forge links between academia and enterprise accelerates this process and leads to an overall expansion in RDI activity, which is a core goal of SFI.

Targets: SFI CSETs have been built for the purpose of forging strong links between academia and enterprise. Nine CSETs have been established to date, in which clusters of top-class researchers from academia join with over 70 multinational corporations and small to medium-sized enterprises to conduct oriented basic research in areas as diverse as nanotechnology, gut biology and software localisation.

Since 2007, SRCs - smaller groupings of PIs and scientists from enterprise - have been established to conduct research that is directly related to industry's needs.

Individual PIs can also play a key role in this respect by ensuring that the intellectual property arising from their research is exploited commercially, in conjunction with HEI technology transfer offices. These offices, which have recently been given additional support by Enterprise Ireland, will be crucial in ensuring that the commercial potential of SFI-funded research is realised for the benefit of Irish society. SFI will continue its close interaction with Enterprise Ireland to facilitate the task of identifying and exploiting opportunities for commercialisation.



Over the next five years, SFI will continue to contribute to the efforts of Enterprise Ireland and IDA Ireland, with the following targets:

- Approximately 1,000 invention disclosures and 500 patent filings arising from SFI-funded research;
- 40 revenue-generating licenses and 30 high-potential start-ups from its research groups; and
- Increasing the number of distinct multinational corporations and small to medium-sized enterprises engaging in formal collaborations with SFI research groups to over 150.

Implementation: Besides facilitating IDA Ireland and Enterprise Ireland in their efforts to extract value from SFI funded research, there are emerging opportunities to leverage greater value through partnership with organisations active in the marine, agricultural, environment and health research areas. SFI is the only agency in Ireland with the remit and the resources to fund significant levels of fundamental research. Hence, strategic partnerships have the potential to combine fundamental and translational research efforts to deliver maximum value for Ireland. For example, in the area of health there may be significant opportunities to link the life sciences research funded by SFI with the translational research funded by the Health Research Board to the benefit of the Irish population. SFI aims to partner with the Health Research Board to ensure such opportunities are exploited. Similar opportunities may arise with the Marine Institute, the EPA, SEI, and the Department of Agriculture, Fisheries & Food. All such opportunities will be investigated.

SFI will also host targeted information sessions to showcase scientific output of interest to enterprise, including sessions aimed at enterprise representative organisations, venture capitalists, and business angels.

> *"**R&D and the application of knowledge will be a critical driver for the future success of Irish industry.** Enterprise Ireland looks forward to working closely with SFI over the period of its strategy to maximise the commercialisation of Irish research, as it is imperative we focus on promoting the level, quality and commercial applicability of R&D undertaken in Ireland."*

Frank Ryan, Chief Executive Officer, Enterprise Ireland.

> *"Ireland's economic development depends on having a world class higher education system, facilitated by a strong research and development base with a strategic focus. **Through the work of SFI Ireland has made rapid progress in building scientific excellence in areas of strategic importance. Now we must harness science and technology for enterprise and for Ireland.***

Martin Cronin, Chief Executive Officer, Forfás.

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Operational Considerations

Value for Money

Organisational Excellence

Education and Outreach

Interdisciplinarity and Convergence

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"With support from SFI the Advanced Biomimetic Materials for Solar Energy Conversion SRC was established in December 2007. This cluster combines cross-disciplinary expertise from University College Dublin, University of Limerick and Dublin City University, as well as industry partners Airtricity, OBD-Tec and Celtic Catalysts. The objectives of the research are to develop novel photovoltaic and photo-electrochemical materials and associated devices to harness Solar Energy based on principles which mimic natural photosynthesis. It is envisaged that this could lead to the development of technologies ensuring security and stability of energy supply as well as assisting in the reduction of greenhouse gases. ***We are looking at the development of a technology that should be at the forefront of industry and be very important to Ireland's economy in the long-term."***

Professor Don MacElroy, UCD, leads the Advanced Biomimetic Materials for Solar Energy Conversion SRC.

There are a number of important principles that underpin all SFI's activities, and these will inform the organisation's pursuit of its strategic objectives over the 2009-2013 period. These are briefly described below.

Value for Money

SFI was established to promote and support oriented basic research for the future development and competitiveness of industry and enterprise in Ireland.

At the core of the SFI mission is the formation of highly trained human capital that ultimately uses leading-edge knowledge capital to innovate, drive enterprise and foster economic and social development.

Such outcomes are of a medium to long-term nature, and are also ones in which it is inherently difficult to identify cause and effect.

Relatively early stage evaluations of SFI have been conducted by an International Evaluation Panel led by Sir Richard Brook (2005) and by Indecon International Economic Consultants (2008). These both reported favourably on SFI's impact, albeit within the constraints of SFI's relatively recent establishment. Notwithstanding this, SFI recognises that it must conduct its activities in the context of expected economic impact, and it should therefore develop sophisticated mechanisms of evaluation that determine the direct and indirect economic consequences of its investments, and use this information to ensure that it delivers maximum demonstrable value for the Irish taxpayer's investment. Furthermore, in addition to maximising value for the public investment in terms of economic outcomes, SFI will continue to apply the Value for Money principle in its internal operations, ensuring that it is efficient and effective in conducting its mission.

Organisational Excellence

The core values of SFI are:

- **Excellence:** We fund internationally recognised world-class research.
- **Engagement:** We are committed to SFI's role in Ireland's development and to the research community.
- **Strategic:** We are visionary, plan for the long term, and invest in research with consequences for the benefit of Ireland's economy and society.
- **Innovation:** We are dynamic, collaborative, creative and responsive to the ever-changing needs of our stakeholders.
- **Integrity:** We inspire trust by acting fairly, objectively, honestly and transparently in the manner in which we operate and the research that we fund.
- **Frontiers research:** We work at the frontiers of research. We advance knowledge, stimulate interdisciplinarity and promote linkages with industry.

These core values continue to underpin the 2009-2013 strategy. SFI's board and staff are committed to implementing these values in the day-to-day conduct of the SFI mission.

SFI has recently reorganised its internal operations to better reflect the needs of the stakeholder community. A number of process excellence initiatives are underway to improve the turnaround time of proposal evaluation, while maintaining quality. Improved use of IT systems are planned to support these efforts. An increased focus is now placed on staff development. SFI will pursue these and other initiatives designed to deliver a better service to the science and engineering community and high tech industry and provide better value for money to the Irish taxpayer.

Education and Outreach

SFI's education and outreach actions will focus on enhancing the general public's understanding of and appreciation for scientific and engineering research. SFI will encourage public engagement with research where possible, by leveraging the resources of SFI-funded researchers (in particular the CSETs and SRCs). SFI will participate in and support scientific outreach events that communicate the excitement of science and engineering to young scientists at school, college, university and in the community, to help develop their interests and skills. The education and outreach activities undertaken by SFI are aimed at supporting SFI's key goals and achieving the objectives set out in this document. These activities will focus on:

- Promoting a broad understanding of the economic and social benefits of investment in scientific research;
- Informing the business community in Ireland (particularly Irish SMEs) and abroad of the scientific developments supported by SFI and encouraging collaboration between SFI funded researchers and industry;
- Supporting the implementation of SFI programmes to attract and retain researchers in Ireland, in association with Irish third-level institutions;
- Informing the general public of scientific developments supported by SFI and encouraging public interest in scientific research generally; and
- Raising the profile of SFI as a leading science foundation, both nationally and internationally.

SFI will engage with the various communities it serves and will seek to utilise new information and communications technologies (webinars, podcasts, etc.) to communicate with its stakeholders. SFI will collaborate and engage with other agencies involved in science education and outreach activities (such as the Discover Science & Engineering Programme) to ensure maximum value for money and to ensure a coordinated programme of government-supported engagement.

Interdisciplinarity and Convergence

Developments in modern research are transcending the boundaries between the traditional disciplines in science and engineering. This emerging trend has gathered pace recently and is likely to move centre stage in the coming years. SFI recognises the potential of convergence and has restructured its internal organisation to an interdisciplinary, programme-based structure to maximise the return on this potential. SFI will continue to foster interdisciplinarity as evidenced in the strategic research cluster programme and via a new initiative that targets the Principal Investigator programme by adding scientists to individual PI teams with an entirely separate skillset.

Conclusion

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This strategy provides an opportunity to refocus and realign SFI's activities such that they continue to meet the core goals for which SFI was established – human capital development and knowledge capital generation to drive the competitiveness of industry. The decision to charge a single agency with significant responsibility for both of these complementary goals has proven to be very effective.

The initial focus of SFI's programmes was on upgrading the scientific skills in Ireland. All the indications are that this has been successful, and that the targets set out in the SSTI can be met.

With the increase in the number of researchers has come greater competition for awards from SFI. This has resulted in ever-increasing research quality, as the competition for grants becomes more intense.

SFI is aware that its success will ultimately be judged on the extent to which the research it supports contributes directly and indirectly to the Irish economy. A broad range of SFI activities, most notably the spectacular success of the CSETs, illustrates the progress that is being made towards this goal.

The strategy for the next five years increases the emphasis on linkages between scientific excellence and economic impact. SFI's programmes will be focused more directly on developing and sustaining the underpinning components of the smart economy. The strategy sets out a number of challenging targets and metrics against which SFI's performance can be judged.

With this strategy, SFI is well positioned to build and strengthen scientific and engineering research and its infrastructure in the areas of greatest strategic value to Ireland's long-term competitiveness and development.

Building on the momentum generated to date, by 2013 the capacity deficit in Ireland will have been largely addressed; the number of active research groups in Ireland will have increased significantly; the quality of the research output from Ireland will have increased; and the profile of Irish industry will have shifted towards one that is clearly knowledge-based. By then SFI's role will inevitably have changed. More acute competition will be anticipated for all of the research grants and new infrastructure requirements will have emerged, as the top research groups will be performing research at the very leading edge of knowledge.

Conclusion

The probability is that research in five years' time will have become significantly more interdisciplinary, and this will give rise to clustering of like-minded research groups. The expansion of research, development and innovation activities in the enterprise sector in Ireland will provide employment for researchers trained within the system, and will create continued demand for high quality researchers. The high-profile success of a number of new start-up companies will provide role models for potential entrepreneurs from academic research. Ireland will by then have become a target location for mobile researchers, and the networking which comes from this will be an added benefit to the outward-looking Irish commercial activities.

The attainment of the ambitious goals in this strategic plan will build and strengthen scientific and engineering research and its infrastructure in the areas of greatest strategic value to Ireland's long-term competitiveness and development.

Glossary

APC	Alimentary Pharmabiotic Centre
BIO	Biotechnology
CRANN	Centre for Research on Adaptive Nanostructures and Nanodevices
CSET	Centre for Science, Engineering & Technology
EI	Enterprise Ireland
EMBO	European Molecular Biology Organisation
ENERGY	Sustainable Energy and Energy-Efficient Technologies
EPA	Environmental Protection Agency
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GSK	GlaxoSmithKline
HEA	Higher Education Authority
HEI	Higher Education Institute
HERG	Higher Education Research Group
HP	Hewlett-Packard
HRB	Health Research Board
ICSTI	Irish Council for Science, Technology & Innovation
ICT	Information & Communications Technologies
IDA Ireland	Industrial Development Authority Ireland
IDC	Inter-Departmental Committee
IEEE	Institute of Electrical and Electronics Engineers
IRCHSS	Irish Research Council for the Humanities and Social Sciences
IRCSET	Irish Research Council for Science, Engineering and Technology
OECD	Organisation for Economic Cooperation & Development
PI	Principal Investigator
PRTLI	Programme for Research in Third Level Institutions
R&D	Research and Development
RDI	Research, Development and Innovation
SEI	Sustainable Energy Ireland
SFI	Science Foundation Ireland
SME	Small and Medium-sized Enterprises
SRC	Strategic Research Cluster
SSTI	Strategy for Science, Technology & Innovation
TCD	Trinity College Dublin
TI	Technology Ireland
UCC	University College Cork
UCD	University College Dublin
USA	United States of America
VCs	Venture Capitalists

Notes

Notes

Research for Ireland's Future

Science Foundation Ireland
Wilton Park House
Wilton Place
Dublin 2
Ireland

t: + 353 1 607 3200
f: + 353 1 607 3201
e: info@sfi.ie
w: www.sfi.ie

NDP National Development Plan
Transforming Ireland

EUROPEAN REGIONAL DEVELOPMENT FUND

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