

2015

Strategy for Research and
Innovation (SSTI II)
IUA Response to Consultation



Strategy for Research and
Innovation (SSTI II)

Irish Universities Association

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Summary of Recommendations

Funding for Research and Innovation

Recommendation

R1. Increase funding for SSTI to further enhance economic growth.

Research Overhead Rate

Recommendation

R2. The new strategy should commit to increasing the overhead rate progressively over time to reflect the full economic cost of research. (See also Section 2.2 Equipment fund)

STI Advisory Structures

Recommendation

R3. Establish a new Advisory Science and Innovation Council under the aegis of the Department of An Taoiseach.

Research Prioritisation

Recommendations

R4. A full assessment of state aid should be undertaken across both industry and PROs with reference to the priority areas with a view to determining whether there is alignment between the evolution of state and industry spending.

R5. Consideration should be given to moving from the current fields of science and technology approach to a challenge based approach. The current fourteen fields could also be recast so as to reduce their number and make them more broadly based. This would complement and could sit alongside a challenge based approach for a selected number of key national priorities. The approach taken in Horizon 2020 with respect to the seven Societal Challenges is also a useful reference point in this regard.

Maintaining and further building excellence in the research base

Recommendations

R6. A dedicated competitive fund should be put in place to support research excellence across all disciplines in higher education. This fund should be administered by the Irish Research Council.

R7. To allow most effective monitoring of our research outputs, a national research resource to include all research outputs (books, chapters etc. in addition to peer-reviewed journals) should be developed, leveraging off existing systems. Building on work conducted previously, a national research classification should be developed (based on OECD fields of Science mapped to Web of Science fields) and similar to that utilised in Australia, Brazil, China, Netherlands and UK etc.

Research Infrastructure

Recommendations

R8. In the absence of an overhead rate which properly reflects Full Economic Cost, put in place a dedicated equipment maintenance and renewal fund.

R9. Establish a national facilities usage scheme accessible to researchers from the public research system and industry.

R10. Assess the need for, demand and requirement for additional research and innovation space in the context of the overall strategy taking account of both the lengthy pause in new capital funding for universities which began in 2008 and the time involved in planning and bringing new facilities on-stream.

International Collaboration and Engagement

Recommendations

R11. Continue and expand national mechanisms to initiate and support industry-academic collaboration.

R12. Explore national funding opportunities to link STEM and AHSS researchers with a view to collaborative Horizon 2020 applications.

R13. Encourage Irish industry to join the European Technology Platforms to influence the development of Horizon 2020 Work Programmes.

R14. Strategically examine the European Joint Programming Initiatives to determine those which best fit Ireland's needs.

R15. Support all sectors public, private and non-profit to engage in Horizon 2020.

R16. Develop new international funding partnerships with strategic international cooperation countries.

Continuing to grow our human capital and maximising the potential of knowledge transfer in all its dimensions.

Recommendations

R17. Put in place measures to support increased output of Masters and PhD level graduates.

R18. Continue to support the introduction and implementation of structured PhDs in the context of the new framework for Postgraduate Education.

Researcher Career Development and Employment

Recommendations

R19. Subject to its further refinement in consultation with funders and policy makers, the careers and employment framework should be adopted as a central part of the human capital component of the new strategy.

R20. A fund for Post Doctorate learning and development should be established.

R21. Further measures should be taken to encourage the mobility of researchers from academia to enterprise.

R22. Mobility from industry into universities should be promoted including developing the “entrepreneur in residence concept” where experienced technologists help scout for IP and other commercialisable ideas and concepts and promote their exploitation.

R23. Redundancy payments should be an eligible cost and be provided for in national research funding grants. An appropriate redundancy payments scheme should be put in place specifically for researchers.

R24. A properly benchmarked remuneration architecture which promotes mobility and which has the flexibility to deliver optimum value for money should be developed.

Building a research and innovation ecosystem spanning the private and public sectors

Recommendations

R25. Continue to support and build collaborations of scale between HEIs/PROs and enterprise.

R26. Continue to develop the existing centres structure to support national and industrial competitive advantage and meet evolving needs.

R27. Put in place stronger incentives for companies to conduct basic/advanced research, both in-house and collaboratively;

R28. In the latter regard, modify the R&D tax credit rules to support greater outsourcing of research to HEIs;

R29. Ensure that the proposed Knowledge Development Box supports innovations arising from collaborative research with clear rules to ensure that the relevant IP originates in Ireland.

R30. Ensure that prioritization reflects the gamut of indigenous and FDI research activity adequately.

R31. Support applied research through direct incentives to firms and by developing capacity both in the IOT and university sectors to collaborate with firms on nearer to market projects – for example through consultancy or joint projects using the existing research centres infrastructure.

Further developing Knowledge Transfer under SSTI II

Recommendations

R32. The HE system has made substantial advances across all the main KT/IP metrics. These advances have come on the back of developments in the KT/IP infrastructure and also through sustained investments in advanced research which is the pipeline for IP. That investment needs to be maintained and grown to feed the pipeline.

R33. Focus needs to shift also from volume metrics to more emphasis on sustainability and impact – for example the longevity and scaling of spinouts.

R34. The national IP protocol should be revised as planned, building on the consultative forum established by Knowledge Transfer Ireland (KTI).

R35. The imperative to ensure that public investment in KT generates economic growth as opposed to revenue needs to be copper-fastened by commitment in the new strategy to continuing support for the KT infrastructure. This involves two things: fully mainstreaming KTI within the Enterprise Ireland structures and timely planning and implementation of a successor to the current TTSI II.

R36. Support for collaborative initiatives such as innovation partnerships and vouchers should be continued under the aegis of Enterprise Ireland.

R37. Within the HE sector and nationally, the concept of KT needs to move beyond “pure play” IP to a more comprehensive strategy for supporting knowledge transfer. This includes a more concerted approach to supporting and incentivizing consultancy, to promoting student entrepreneurship, and to recognizing excellence in KT in HE career development and promotions processes.

Introduction

We welcome the opportunity to input to consultation on the new SSTI and for the associated background paper. Development of a new strategy is a matter of national importance. As such, it is important that time is taken to optimise the strategy. In this respect, we note that a number of critical studies are referenced in the background paper, many of which are not yet complete. The IUA's submission below therefore represents an initial input to the strategy development and consultation process and we are anxious to expand on the matters addressed here and when these other inputs to the strategy development process are available.

Vision for SSTI II

The consultation paper invites comments on Ireland's ambition for STI.

“What should Ireland's ambition be in STI?”¹

In our view, that ambition should not be limited to specific fields or disciplines or excessively focused on particular sectors. We should, by contrast, have an ambition to develop an advanced research and innovation ecosystem in which the evolution of research excellence, advanced human capital and a widespread deepening enterprise competitiveness go hand in hand. We have previously set out our suggested vision for the new strategy as follows:

That by 2020 Ireland will stand out among our peers as the nation which delivers most effectively in translating the benefits and outputs of research excellence into enterprise and economic growth.'

We identify three interlinked components in this regard:

1. Maintaining / further building excellence in the research base.
2. Continuing to grow our human capital and maximising the potential of knowledge transfer in all its dimensions.
3. Building a research and innovation ecosystem spanning the private and public sectors which leads to more startups, enhances sustainable competitive advantage at firm level and deepens and grows Ireland's innovation performance and outputs.

It is important that the process of discourse on the strategy is not diverted into a polarised debate about basic and applied research. However, consistent with our vision and the ecosystem concept, it is equally important that we develop a balanced portfolio of approaches and measures. In regard to the trajectory

¹ Ref Consultation Document Pillar 1 questions

of policy recently, we are concerned that the portfolio has become unbalanced and that gaps are opening up which will damage both research competitiveness and economic competitiveness over time.

Funding for Research and Innovation

While funding for research fared relatively less badly than many other areas of public expenditure during the crisis, it has nevertheless fallen back. In addition, the very significant cuts in overall HE funding have caused collateral damage to the research base. The creation of a more balanced portfolio of research and innovation instruments should not be done on a zero sum game basis. It is important therefore, as economic growth returns and accelerates, that some of the fruits of this growth are reinvested in the new SSTI.

Recommendation

R1. Increase funding for SSTI to further enhance economic growth.

Expectation

Temporal issues are also important. The consultation document refers to Ireland as an innovation follower. To the extent that this is true, it is because of a number of structural weaknesses. The first of these is our short history of concerted investment in research and innovation within our HEIs. The second is due to structural weaknesses in the enterprise base with too low levels of investment in advanced human capital and in research and development – and in advanced research, particularly.

In the twenty first century, the half-life of knowledge is shortening. Investment in ideas whether in industry or higher education needs to be continuous if its asset value is to be maintained. A strategy based on short termism will not address the structural weaknesses referred to above and has the potential to undo much of the progress which has been made under the previous strategy.

While acknowledging weaknesses in our ecosystem, it is important not to underplay the substantial progress that has been made over recent years and which was consolidated under the policy and investment framework of SSTI I. This line of travel needs to continue under SSTI II but policy also needs to be developed and refined in light of experience and changing circumstances.

In Parts One and Two which follow, we identify some important overarching issues which we suggest should inform the strategy. In both cases we address policy, funding/fiscal and regulatory issues.

PART I

1.1 Context – The Research and Innovation Ecosystem

Research and its translation into impact, takes place in the context of the overall innovation ecosystem:

“Innovation entails investment aimed at producing new knowledge and using it in various applications. It results from the interaction of a range of complementary assets which include research and development but also software, human capital, design, marketing and new organizational structures - many of which are essential for reaping the productivity gains and efficiencies from new technologies.”²

The Innovation Taskforce report of 2010 described the ecosystem as being comprised of the following components:

- Entrepreneurs and enterprises;
- Investment in research and development;
- The education system in particular higher education institutions;
- Finance, in particular risk capital;
- The tax and regulatory environment;
- Public policy and institutions.

While the functioning of the venture capital system is probably outside the ambit of the current exercise, the other components all remain highly relevant³.

Interconnectedness is central to the innovation ecosystem concept. SSTI I represented a first attempt to bring better connectedness across different components of the ecosystem (with the innovation taskforce’s report and recommendations building on this). It is vital that SSTI II advances that process further if the maximum value is to be extracted from research.

Therefore, while we pay particular attention to higher education in this submission, we do this fully cognizant of the need for joined up thinking across the different elements of research and innovation policy and programmes.

² OECD quoted in the innovation taskforce report 2010 p2

³ Nevertheless, it is important that policy makers consider alignment between the fields of fiscal, industrial/research, and education policy.

1.2 Universities, Research and Jobs

In developed economies, universities are a key source of new knowledge. That knowledge is derived from research. Along with its creation, knowledge transfer - involving research, scholarship and teaching - is the *raison d'être* for Universities. This transfer is achieved in a whole variety of methods and interactions. However, the most important of these by far is through the graduation of informed and enquiring students. In line with the broad concept of innovation, universities serve the entire economy by providing human capital that supports employment and competitiveness across the diverse sectors of the economy including primary production, manufacturing and services: private and public services.

While a small segment of the economy generates the majority of exports, historical experience suggests that jobs growth is, and will be, dependent on a far more diverse range of sectors.

Research and innovation policy should therefore serve the needs of the overall economy if the main focus is on job creation.

This does not mean that we should ignore the need to prioritise and spend our limited resources efficiently. But it does mean that an appropriate balance needs to be struck between promoting innovation across all sectors and serving the needs of a more limited group of technology intensive enterprises.

1.3 Research and Society

It is important that a new strategy for STI is not focused purely on the economy, since an economy cannot subsist independently of society. This interdependence is articulated in a recent consultation paper from the Expert Group on Higher Education Funding.

Our ideas on the purpose, value or worth of higher education reflect our understanding of the society and economy which they serve. We understand the society and economy to be mutually dependent, with the economy embedded within society, institutional arrangements and culture. This integrated view resists the tendency to draw a sharp line between the economy and society, and between the world of man-made things and the world of ideas and values. Indeed, it is increasingly recognised that society and economy sit within, and are mutually dependent on, environment, which itself is strongly shaped by human activity⁴.

The paper contains a useful analysis and meta-analysis of the distinctive characteristics of the arts and humanities, social sciences and physical sciences. It stresses the importance of multidisciplinary research and notes that this is reflected in EU thinking under Horizon 2020.

⁴ Expert Group on Funding of Higher Education Consultation Paper 1 p2.

1.4 Funding of research in universities

Research in universities is primarily funded through external competitive grants from a variety of public and private funders, national and international.

Various reporting conventions are used to also determine how what proportion of core HE funding is devoted to research. The figure of 196M EURO in the consultation paper attributed to the HEA takes account of this (along with funding for the Irish Research Council).

While the OECD Frascati Manual on research funding statistics makes reference to the “Block Grant”, in Ireland, a block grant does not exist, since HEA funding is divided into two components – the *Grant In Lieu of Fees* which is the free fee component paid for students on behalf of the state and the *Core Grant* which is funded on a formula basis. However, accepting that these two components represent total state funding to cover general university activities, the trajectory of funding from 2008 to 2014 is strongly downwards:

- The core grant declined from €466m to €196m, a decrease of 57 percent.
- The Grant in Lieu of Fees driven by rising student numbers offset by a declining proportion of the fee paid by the Exchequer has decreased marginally from €263m to €259m.
- The aggregate trend in the “Block Grant” was from €729m to €455m, a decrease of €274m.

As regards the percentage of this significantly reduced figure which can be attributed to research, the Frascati Manual recommends that where possible time studies should be used in preference to data coefficients. In this regard, for the purposes of full economic costing, the universities collect survey data on the proportion of time spent by academic staff across three main fields, research, teaching and overall contribution. Research itself is broken down into three sub fields as follows, with the sectoral average proportion of time devoted to them by university academic staff given in square brackets:

- Research sponsored with output [10% or approx. €45.5m of block grant]
- Research no external sponsor with output [13% or approx. €59.2m of block grant]
- Other research and scholarly activity [8% or approx. €36.4m of block grant]

With reference to the data currently being used for GBAORD, it looks as if those data may overstate the amount attributable to “block grant” funded research.

In addition to the reductions in funding, the employment control framework has also impacted on academic staff numbers. While under ECF II relief was given in respect of externally funded staff, core funded staff numbers were subjected to restriction with a knock on effect on research capacity.

The rise in student numbers must also be taken into account, especially in terms of future demographic pressures and the impact on the time available for research.

Conclusion

In summary, the block grant resources attributable to research may be overstated currently, but indubitably are falling. Based on the current state of government policy, there is little likelihood, if any, of increased resources being available through the core grant in the short term and possibly not in the medium term either. This, coupled with the focusing of external resources through the prioritization process, has created a serious funding gap for broadly based research which needs to be addressed. We make recommendations in this regard in section 2.1 on excellence.

1.5 Research Overhead Rate

The main purpose of the Academic Activity Profile (AAP) referred to above, is to provide a time allocation basis which, when married with specified cost drivers, can be used to calculate the real overhead cost of research.

The indications are that the overhead rate required for full economic cost recovery of university research is of the order of 65% when academic staff costs are included or 50% when they are excluded.

Currently, the overhead rate paid by the main research funder is 30% excluding academic staff costs and some funders pay less.

The implication is that the block grant and student contributions are subsidizing the cost of externally funded research. In the context of research prioritization, this may also mean that general university research allocations are subsidizing research in the priority areas.

The underfunding of overheads also has significant implications for sustainability, particularly of equipment and facilities. This is a critical issue which needs to be addressed either through an overhead rate that more accurately reflects full economic costs or through the establishment of a dedicated budget line for equipment and facilities maintenance.

Recommendation

R2. The new strategy should commit to increasing the overhead rate progressively over time to reflect the full economic cost of research. (See also Section 2.2 Equipment fund).

1.6 Implementation Architecture

Implementation and oversight architecture for the strategy should be reviewed. Currently, that architecture is fragmented. A number of committees have been formed to address specific issues, Prioritisation, Horizon 2020 etc. These committees in some cases contain duplicate membership, while in other cases there are gaps in representation. At the same time, there is a lack of clarity on how the system is to be overseen and steered at national level. While we recommend that an overall review should be taken, we wish to highlight specific gaps in respect of national STI advisory structures.

STI Advisory Structures

Maximising the potential of the research and innovation ecosystem requires effective mechanisms for formulating strategy and considering new policy developments. In recent years, governance structures for the national STI system have been significantly rationalised. Of particular note the moving of the position of Chief Scientific Adviser from a full time function to a part time function. The second is the abolition of the Advisory Science Council.

While historically the now titled Department of Jobs, Enterprise and Innovation has acted as lead department on the matter of research and innovation, these developments have significantly altered the policy development and system coordination landscape in a way which as favoured a narrowing of the policy focus onto sectors within the purview of that Department. They have also favoured agencification of policy and a growing disconnect between the Department and research performers across all sectors.

These issues need to be addressed under the new strategy. Ideally one would create a separation between the functions of the Chief Science Adviser and other executive functions.

However, maintenance of the current status quo demands, at a minimum, that an Advisory Science and Innovation Council be established. This should be comprised of a mix of individuals of standing including practicing researchers and innovators across the range of disciplines and persons with experience of research and innovation policy formulation and assessment. Membership should have an international dimension.

To ensure an effective whole of government approach, the Council should operate under the aegis of the Department of An Taoiseach.

Recommendation

R3. Establish a new Advisory Science and Innovation Council under the aegis of the Department of An Taoiseach.

1.7 Research Prioritisation

Research Prioritisation has been given particular prominence in policy in recent years. Our observations on this matter are as follows:

- The report of the RPAG has had a very significant impact on the nature and structure of competitive research funding in Ireland.
- This in turn has been reflected in the behaviour of funding agencies and the response of the higher education sector.
- As such, the objective of streamlining competitive funding into designated priority areas has been achieved.
- However, there is a concern that the implementation structures and processes have become excessively focused on activity and process rather than outcomes.
- A major weakness in the process has been the exclusion of public funding of RTI in firms from the process (both agency grants and R&D tax credits). This needs to become part of the process not least because monitoring this spend can tell us whether the direction of industrial investment is staying aligned with the priority areas or is a leading indicator of a need for change.
- The process as it stands has become excessively agencified, with insufficient input from research performers in industry and the public research system. An alternative perspective on this is given in the following extracts from the new UK STI Strategy:

“We need to choose our priorities. This choice will not be made mainly by Government, but we will have an important role to play in securing the UK’s strengths. We will make strategic choices and bring together the best minds, research institutions and businesses to help solve the great challenges of the day....(Introduction) “So how should government, academia and business identify the key questions and priorities for research and for innovation? The answer is by collaboration, horizon scanning and foresight work, pulling together and sharing intelligence. (Chapter One).”

Recommendations

R4. A full assessment of state aid should be undertaken across both industry and PROs with reference to the priority areas with a view to determining whether there is alignment between the evolution of state and industry spending.

R5. Consideration should be given to moving from the current fields of science and technology approach to a challenge based approach. The current fourteen fields could also be recast so as to reduce their number and make them more broadly based. This would complement and could sit alongside a challenge based approach for a selected number of key national priorities. The approach taken in Horizon 2020 with respect to the seven Societal Challenges is also a useful reference point in this regard.

PART II

2.1 Maintaining and further building excellence in the research base

Under the SSTI, major strides have been made in building the research base. Progress can be evaluated using international bibliometric tools.

The following summary findings are taken from the Thomson Reuters InCites 2 bibliometric database.

- Ireland remains in the top 20 countries in the world in terms of its research impact.
- Irish higher education institutions are (cumulatively) in the top 1% in the world in 19 of the 22 Essential Science Indicator fields.
- Ireland is 1st in the world in Immunology, 2nd in the world in Nanoscience & Nanotechnology, 4th in the world in Computer Science, 7th in the world in Materials Science, 7th in the world in Neuroscience & Behaviour, 9th in the world in Pharmacy & Toxicology, 11th in the world in Biology & Biochemistry, 11th in the world in Molecular Biology & Genetics, 11th in the world in Chemistry, 15th in the world in Psychiatry/Psychology, 19th in the world in Physics - in terms of citation impact (Thomson Reuters InCites2, 2003-2013)*.

However, as with the fall in postgraduate numbers, there are early signs of problems emerging:

- In 2011-2012, for the first time in a decade the increase in the number of documents published by Irish researchers stalled. A subsequent increase in 2012-2013 was proportionately lower than in previous years.
- Between 2011 and 2012, for the first time in over a decade, Ireland's percentage of world papers fell sharply and currently remains at that lower level (2012-2013).
- At the same time, Ireland's overall impact relative to the world declined.
- Based on year-by-year data, Ireland's impact relative to the world in certain leading subjects such as Neuroscience & Behaviour shows a decline during this period.
- A decline in impact similar to Ireland's is also seen in Greece and Portugal during the same period (2011-2013) but is not seen in France, Germany or the United Kingdom (or in selected comparator small countries).

The movements are relatively small but need to be considered with respect to future policy. However, it is clear that the trajectory of outputs is in the wrong direction. These movements most likely reflect both the fall in the volume of research funding and the narrowing of eligible areas for competitive funding arising from the prioritisation exercise. While as we have indicated earlier, prioritisation should

continue in a modified form, we need to redress the emerging weaknesses in the overall research base and recommend as follows:

Recommendations

R6. A dedicated competitive fund should be put in place to support research excellence across all disciplines in higher education. This fund should be administered by the Irish Research Council.

R7. To allow most effective monitoring of our research outputs, a national research resource to include all research outputs (books, chapters etc. in addition to peer-reviewed journals) should be developed, leveraging off existing systems. Building on work conducted previously, a national research classification should be developed (based on OECD fields of Science mapped to Web of Science fields) and similar to that utilised in Australia, Brazil, China, Netherlands and UK etc.

2.2 Research Infrastructure

Under the previous SSTI, SFI and PRTL funding combined to support both people and infrastructure. However, with the run out of PRTL there is no plan in place for new physical infrastructure.

In addition, and as discussed previously, the combination of an inadequate overhead rate and absence of a dedicated maintenance stream has created a serious sustainability problem in respect of the maintenance of equipment. This has been further exacerbated by reductions in maintenance staffing.

Thirdly, while progress has been made on developing a large items register of equipment, more work needs to be undertaken on creating a dedicated facilities usage scheme for researchers from across HEIs and industry.

Recommendations

R8. In the absence of an overhead rate which properly reflects Full Economic Cost, put in place a dedicated equipment maintenance and renewal fund.

R9. Establish a national facilities usage scheme accessible to researchers from the public research system and industry.

R10. Assess the need for, demand and requirement for, additional research and innovation space in the context of the overall strategy taking account of both the lengthy pause in new capital funding for universities which began in 2008 and the time involved in planning and bringing new facilities on-stream.

2.3 International Collaboration and Engagement⁵

Excellence in our research can be reinforced by international collaboration, via access to knowledge, expertise and/or unique research facilities in other countries. It also raises the profile of Ireland abroad and contributes to attracting talented researchers to relocate/return to Ireland. Additionally, it provides an important source of funding for those areas which fall outside the NRPE Priority Areas. As these collaborations frequently involve HE-industry consortia it is also an important part of the research and innovation ecosystem. In this context, we welcome the recognition in the consultation document that international collaboration is in addition to national research initiatives, not a replacement. In fact, international collaboration is enabled by a strong national funding system, which complements and enables international collaboration.

International Collaboration via Horizon 2020 and other mechanisms

The main mechanism for international collaboration is the EU R&D Framework Programmes. The early results from Horizon 2020 are very positive, and give comfort that Ireland will continue to perform well in areas where FP7 performance was strong. In addition, we have well exceeded past performance in the European Research Council (ERC) grants at Starting and Consolidator level, and for the first time have successfully competed to be part of the Knowledge and Innovation Communities in the European Institute of Innovation and Technology. However, a continuation of past performance will not suffice to meet the ambitious €1.25 billion Horizon 2020 draw-down target. In this respect the convening of the Horizon 2020 High Level Group and the Strategic Research Proposals Group arising from the HLG are very welcome, as is the continued work of the All-Island Steering Group in encouraging and enabling North/South applications.

Importance of industry-university collaboration: It is clear that cross-sectoral collaboration is essential for success in Horizon 2020. A large number of the early Irish successes involve consortia with participants from both Irish academia and Irish industry, with the universities bringing Irish-based industry into their consortia. Mechanisms to facilitate early/low level engagement between industry and HE (such as Innovation Vouchers) should be continued and strengthened, on the understanding that the HE-industry links developed should lead to Horizon 2020/other international funding applications. Similarly, the stronger industry-academic links in SFI-funded Centres can lead to collaborative funding applications with international partners.

Universities: The first progress reports on Horizon 2020 show that the HE sector is continuing its FP7 performance into Horizon 2020. Around 66% of the funding secured so far has gone to the HE sector. This success did not occur by accident: all universities have H2020 strategies and targets and have put in place increased resources, including dedicated personnel, to support Horizon2020 applications – the substantial improvements in ERC success are testament to these initiatives. However, continued and increased success will be challenging in the current climate. Some issues which will affect success are: the ability to retain and develop promising early career researchers; the bandwidth of senior staff to engage when they are already running FP7/Horizon2020 projects; motivating staff to reapply having not

⁵ Links to Pillar 4 of the Consultation Paper

been successful; encouraging academics to coordinate more applications; mobilising the academic disciplines that may not have engaged in FP in the past, particularly in the arts, social sciences and humanities (AHSS).

In relation to AHSS, we could further capitalise on our strengths to address the Commission's aim to "mainstream" social sciences and humanities into all areas of Horizon 2020. The Commission's feedback from the first round of Horizon 2020 Calls has identified that this aim is not being met. Ireland has a strong SSH community and there is the opportunity to bring them into Horizon 2020 applications. National funding programmes (such as the SFI Investigators Programme 2015) which link STEM and SSH researchers would encourage these interdisciplinary Horizon 2020 applications.

Industry: In general, in order to engage in international collaboration, industry must be convinced of the potential benefits to their business. These vary considerably with the size of the business: SMEs have different needs to MNCs and a one-size fits all approach will not suffice. When considering the participation of industry in Horizon 2020, there are two separate but somewhat inter-linked issues: awareness of the opportunities and capacity to engage. In terms of awareness, EI and IDA are in an excellent position to raise awareness of Horizon 2020/international collaboration, but it is unclear whether they have the appropriate mechanisms to target the right companies with the capacity to engage.

In terms of capacity to engage, there is a general misconception that every company small or large can participate in Horizon 2020. This is not quite correct. Additionally, the capacity issue is dependent on the size of the company. For small companies (including SMEs), capacity is to do with appropriate facilities, staffing levels (including the % of staff active in R&I), financial robustness (the Commission will not give money to companies who fail the financial verification check), and level of experience in R&I. These points are not so relevant for Phase 1 of the SME Instrument, but are pertinent to the other parts of Horizon 2020. For MNCs, the issues are around the added value of participation, plus the small proportion of MNCs who have R&I facilities in Ireland. In our experience of the Marie Skłodowska-Curie Actions, we see companies of different sizes using the programme in different ways: SMEs are using it to fund early-stage "risky" R&I whilst MNCs are using it for human capital development to train up their future employees in niche areas of interest to the company.

Finally, the Commission is currently preparing the Horizon 2020 Work Programmes for 2016-2017. In preparing them, they placed a strong emphasis on the opinions of the various European Technology Platforms (ETPs), which are industry-led. At present Irish industry is not widely represented in the ETPs, so we are missing out on an opportunity to influence Work Programmes at the earliest stage. This situation should be remedied so Ireland can have more influence on the 2018-2019 WPs, the preparation of which will start in 2016.

Non-academic and public sectors: A potential new client base for Horizon 2020 which has been largely overlooked is the sector of the economy which is non-academic but also non-industry, such as community/voluntary organisations, charities, NGOs, libraries, museums/galleries etc. Due to the Commission's prioritising of "social science and humanities" in Horizon 2020, there is significant potential for them to get involved in Horizon 2020 applications across the programme. Through the Campus Engage⁶ initiative we have observed a lot of enthusiasm from community/voluntary organisations to get involved in research activities. National funding streams should be further developed to engage this sector.

The public sector is another mostly untapped client base for Horizon 2020. There are opportunities to be involved in R&I Calls, but also activities specific for them including Pre-Commercial Procurement (PCP) and Public Procurement of Innovative solutions (PPI). There has been a very low take-up of these across Europe and may be an opportunity for Ireland to lead and win.

Membership of International Organisations

Subscriptions to international organisations provide a vital route for university researchers to access unique research facilities and training unavailable in Ireland, and to meet potential collaborators for Horizon 2020 and other international funding applications. In the absence of the results of the review of Ireland's membership of such organisations, it is difficult to comment on the merits of membership of individual organisations, but it is clear that in addition to a favourable cost/benefit ratio in terms of access to equipment/facilities, the intangible benefits of advanced training and networking to seed new collaborations must be taken into account. In particular, Ireland's participation in COST (European Cooperation in the field of Scientific and Technical Research) has already yielded significant returns in seeding collaborations which were successful in securing FP7 funding. At present, it is unclear whether industry can benefit from subscriptions to international organisations, and if they can, what benefits they would get for engaging.

EU policy developments

There is a wide recognition that the quality of doctoral training in Europe must be raised and there must be more consistency of training between the Member States. The universities are fully engaged in discussions and actions in this area through their membership of the European University Association Council for Doctoral Education. Whilst Ireland is a member of the European Research Area Steering Group on Human Resources and Mobility (ERA-SGHRM), in recent years we have not had much contribution to the work of its two standing Working Groups which explore doctoral training and the larger issue of researcher careers. It would be helpful if a process was put in place to ensure that the universities, who are the main drivers of excellence in doctoral training and researcher careers, were consulted by the Working Groups in the ERA-SGHRM.

Stimulating international collaboration

The US-Ireland R&D Partnership has been a very useful mechanism to seed links with research groups in the United States of America and Northern Ireland. It would be beneficial to develop bi- or tri-lateral

⁶ www.campusengage.ie

funding programmes with strategic international cooperation countries such as Brazil and China, perhaps following on from the International Strategic Cooperation Awards made by SFI. To further stimulate industry-HE collaboration, these programmes could be opened up to industry participants in each country.

While the consultation paper refers to Research Prioritisation as being Ireland's Smart Specialisation Strategy for the purposes of Structural Funds support, more should be done to ensure that EU Structural Funds deliver genuine additionality i.e. co-fund new additional expenditure rather than pre-existing financial commitments.

A significant proportion of the Horizon 2020 Budget has been allocated to ERA-NETs, JTI, JPI and Article 185 Initiatives. Strategic thinking about which of these that Ireland gets involved in, and hence has potential to drawdown funds from, is required.

Recommendations

R11. Continue and expand national mechanisms to initiate and support industry-academic collaboration.

R12. Explore national funding opportunities to link STEM and AHSS researchers with a view to collaborative Horizon 2020 applications.

R13. Encourage Irish industry to join the European Technology Platforms to influence the development of Horizon 2020 Work Programmes.

R14. Strategically examine the European Joint Programming Initiatives to determine those which best fit Ireland's needs.

R15. Support all sectors public, private and non-profit to engage in Horizon 2020.

R16. Develop new international funding partnerships with strategic international cooperation countries.

2.4 Continuing to grow our human capital and maximising the potential of knowledge transfer in all its dimensions.

National policy for STI has been strongly predicated on developing advanced human capital. The diffusion of high level thinking, skills and competency into the economy is not simply relevant to the industrial sector, but to the labour market as a whole including industry, public and professional services and the third sector of civic society organisations. In the context of FDI in manufacturing and internationally traded services, the need to move from "tax to talent" has been cited, particularly in light

of developments in the field of Base Erosion and Profit Sharing, and the revivication of European discussion on the Common Consolidated Corporate Tax Base (CCCTB).

Given the openness of Ireland’s economy and its strong reliance on exports, higher education and research has a vital role to play in delivering talent, both from indigenous sources, and also acting as a magnet for talent globally. A vibrant research system is a key attractor of both staff and student talent which needs the right funding, facilities and regulatory environment. We have addressed the former two factors in this paper. It bears mentioning also that the Euraxess researcher mobility system which is part of continuing to develop the European Research Area is another essential component of the regulatory framework. Further progress needs to be made in relation to the regulation of pay and conditions for top level research talent and discussions are ongoing between the Department of Education and Skills and the IUA in this regard.

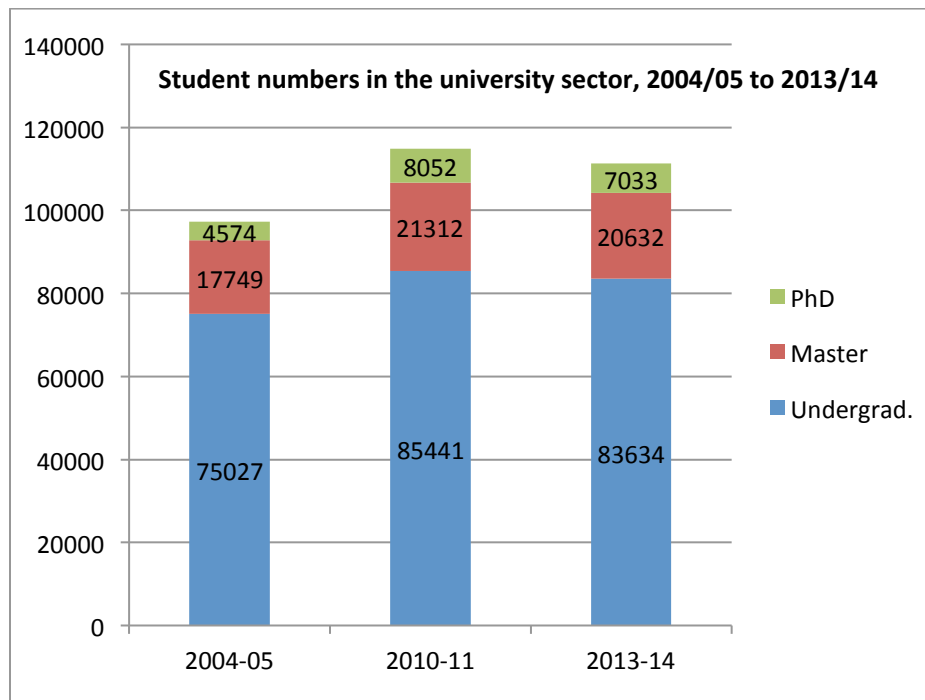
The 2012 Employer survey indicated that the majority of PhD graduates were employed because the job required doctorate level skills or qualifications.

Against this backdrop, it is a matter of concern that, following a period of significant expansion, numbers of PhD and Masters students in the universities are falling. This trend, which is reflective of reductions in research funding, and student supports, needs to be reversed under the new strategy.

Recommendations

R17. Put in place measures to support increased output of Masters and PhD level graduates.

R18. Continue to support the introduction and implementation of structured PhDs in the context of the new framework for Postgraduate Education.



Researcher Career Development and Employment

While much progress has been made in improving the output and quality of our human capital in this space, there are important structural deficiencies which need to be addressed under the new strategy. In addition to the numbers of graduates produced, we also need a clear researcher career development and employment framework. Current gaps in the system include the lack of a structured progression to employment within academia (recognising that these opportunities are limited), unclear pathways to exiting academic employment, and varying levels of learning and development opportunities and careers advisory services across the sector.

In summary, we need a Researcher Careers/Career Development and Employment Framework which ensures a well-functioning ecosystem and provides those who work in it with the best opportunities for career development and advancement, whether in research in the public and private sector, or in other career avenues.

The Framework proposed is currently being developed by IUA and when finalised will support the national social policy objective of researcher mobility both within academia and across the overall economy.

The researcher ecosystem

The ecosystem includes PhD students, postdoctoral researchers, research fellows, and principal investigators supported by a range of staff in administrative, technical and research support roles. It spans research throughout the economy and society and the various public and private research performers.

Overarching principles

The following overarching principles to underpin the framework are proposed:

- The Framework covers, training, mobile career development and employment, including future employment opportunities.
- The publicly funded research system and universities in particular need to maintain a position at the forefront of discovery. The ongoing renewal of the researcher pipeline through the provision of development opportunities is intrinsic to this.
- In furtherance of the objectives of the European Charter for Researchers, and the Code of Conduct for the Recruitment of Researchers, this framework recognises that nationally and internationally the majority of researchers trained by universities will ultimately continue their careers outside the university.⁷ Its' purpose therefore is to prepare those entering the framework for a variety of careers in the public and private sector in research and non-research roles.

⁷ A) "The Scientific Century: Securing our future prosperity", The Royal Society, UK, 2010. https://royalsociety.org/~media/Royal_Society_Content/policy/publications/2010/4294970126.pdf B) "What do researchers want to do? The career intentions of doctoral researchers", VITAE, UK (2012).

- The framework recognises that the research career is predominantly a competitive one and that competition for funding and employment contracts is intrinsic to it. It therefore contains key stages of progression where certain standards must be reached in order to progress further. In this context, tenured positions in academia represent the minority outcome for those who commence as post-doctoral researchers.
- In consequence of this, the framework has a strong professional development component aimed at providing postdoctoral researchers with the skills necessary to advance their careers both within and outside of academia.
- Both training and the overall approach to employment recognises that there is currently a gender imbalance in research and academic employments generally and this will be tackled in the first instance through progression towards Athena SWAN certification and through the measures in relation to grading, pay determination and development proposed within the employment and careers framework.
- The framework also recognises that there are limited support or “infrastructural” roles which are necessary for the sustained functioning of the system and which do not form part of the competitive progression-based career path but which need to be accommodated ideally within existing University grading structures.
- Within the University setting, teaching and research are primary components of the academic mission, and are therefore intrinsically linked. The European Charter regards teaching as an essential means for the structuring and dissemination of knowledge and therefore considers it a valuable option within the researchers’ career paths. Reference to teaching within the framework is subject to the overarching principle of development opportunity, mindful that teaching responsibilities should not be excessive and should not prevent researchers, from carrying out their research activities
- The framework addresses matters related to learning and development and remuneration to bring greater clarity and predictability for researchers.
- It therefore provides for the development of transferrable/complementary skills and an approach to career development that reflects the mobile nature of researcher careers;

Roles covered

Within the wider range of roles in the research ecosystem, a number of specific roles form part of the framework.

The first stage of a research career is the PhD, doctoral training stage. The PhD stage is not included in the grading and salary structure set out in the IUA proposal as it is not typically a salaried employment.

However, as a fundamental stage of the Research Career, the PhD stage will be incorporated within the developmental aspect of the broader Researcher Career Development and Employment Framework once it is fully developed.

The second and third stages of the Research Career, corresponding to the European Commission Framework for Research Careers Levels 2 and 3, are Post-Doctoral researcher (1 & 2), and Research Fellow.

The final stage of the Research Career, Level 4 of the EC Framework (Leading Researcher), is the Senior Research Fellow. We propose that this title be retained, however, we have not made a specific proposal in relation to salary scale, as it is our view that such appointees should be appointed to academic grades commensurate with the seniority of their research role.

Finally, the IUA proposal has also considered roles which support research or what might be termed “infrastructural” roles. The more common of these is research assistant. We have also considered the more senior type of research support or specialist role that may exist within certain research groups and academic units to ensure long term continuity of research knowledge and techniques within those groups/areas.

In summary, within the Research ecosystem there are a range of roles which the Researcher Career Development and Employment Framework needs to incorporate differentially as summarised in the following table.

Researcher Ecosystem	Career Development Framework
PhD Student	PhD Student
Postdoctoral Researcher(1 & 2)	Postdoctoral Researcher(1 & 2)
Research Fellow	Research Fellow
Senior Research Fellow	Senior Research Fellow
Research Assistant	
Research Officer/Research Support Officer	

A more detailed set of descriptors now needs to be put in place to specify these roles. Work is currently ongoing with respect to this.

Learning, Development and Progression

While all research staff should have the opportunity for continuing professional development, the hierarchical component of the framework specifically recognises Postdoctoral Researcher PD 1 and PD 2 as a training and development grade. The nature of the Development Programme implemented for Postdoctoral Researchers will align with and build upon the L&D provision at PhD stage to ensure a structured continuum of development.

The next step in progressing the framework is the development of certified training for both of these roles. While training should be customised to the individual and institution, as part of an overall national

approach, it should be based on common core features. In particular, it should include skills to advance competence as a researcher whether in or outside of academia. This should be complemented by a range of modules to build transferrable skills to enhance overall employability.

A specific project is proposed to agree a common core curriculum, to develop an implementation structure and to establish a fund for learning and development. Policy around the fund should recognise and provide for the concept of protected development time per annum for Post Docs. Since research employers pay into the National Training Fund, the fund should co-finance this activity.

In addition to provision for structured learning and development, more robust systems need to be put in place to manage progression. In particular, a performance appraisal system needs to be adopted which is specifically attuned to the framework. This will require training for both researchers and assessors.

Career Management

Learning and development should be complemented by specific career and employability support for both PD and RF grades. Complementing this, a proactive approach should be taken to contract management. All staff should be advised in a timely manner on contractual matters and be given ample time to secure new employment in the event of contract expiry.

There is the possibility for redundancy throughout the framework. This may arise where a post-doctoral researcher fails to meet the standards necessary to progress, or where the funding needed to support a position expires or is withdrawn. In the latter case, the possibility of redeployment within the place of employment should be explored as a first option and in a timely manner.

In the event that redundancy is unavoidable, a scheme of redundancy payments needs to be put in place which is appropriate to the framework. The current Collective Agreement on Enhanced redundancy does not reflect the specifics of the research environment. Such a scheme should provide for a tiered set of payments reflective of position on the framework and length of service, commencing with statutory redundancy for PD1 and 2 and enhanced redundancy for RF.

However, regardless of the terms, it is clear that redundancy payments are part of the research landscape. Since such payments are not provided for in core funding to universities, they need to be built into grant funding. It is notable that this approach has been accepted by the European Commission under Horizon 2020. To reflect the fact that redundancy payments may span more than one research contract, there is the potential to use an approach similar to that applied to the 20 percent researcher pension contribution with the creation of a control account from which payments are made as the need arises.

Remuneration

The remuneration environment for university researchers differs from the public sector norm because of the particular nature of the researcher career framework and the fact that multiple funders are involved both public and private. At present, there is significant ad-hocracy in remuneration arrangements with different funders taking different approaches. Ultimately, it would be desirable to have a more consistent remuneration framework to support the careers framework and to bring greater

predictability and certainty for researchers. However, it is important that any such framework retains the necessary flexibility. This is especially the case given the mobility which researchers enjoy – both geographically and sectorally. The remuneration framework should be specifically attuned to the research career framework and this aspect should cover not just basic pay, but also other costs including pension contributions and redundancy payments.

Recommendations

R19. Subject to its further refinement in consultation with funders and policy makers, the careers and employment framework should be adopted as a central part of the human capital component of the new strategy.

R20. A fund for Post Doctorate learning and development should be established.

R21. Further measures should be taken to encourage the mobility of researchers between academia and enterprise.

R22. Mobility from industry into universities should be promoted including developing the “entrepreneur in residence concept” where experienced technologists help scout for IP and other commercialisable ideas and concepts and promote their exploitation.

R23. Redundancy payments should be an eligible cost and be provided for in national research funding grants. An appropriate redundancy payments scheme should be put in place specifically for researchers.

R24. A properly benchmarked remuneration architecture which promotes mobility and which has the flexibility to deliver optimum value for money should be developed.

2.5 Building a research and innovation ecosystem spanning the private and public sectors which leads to more start-ups, enhances sustainable competitive advantage at firm level and deepens and grows Ireland’s innovation performance and outputs.

A base of excellent research within the HE sector is an important foundation for the innovation ecosystem. Maintaining and deepening excellence here needs to be complemented by a similar deepening in the enterprise sector. There are still challenges in that regard.

As the consultation paper notes, BERD (the total amount spent on research and development in the enterprise sector, including funding allocated to businesses by State agencies including IDA Ireland, Enterprise Ireland and others) increased significantly from €1.245 billion in 2003 to €1.962 billion in 2012 (+58%). Approximately two thirds of Ireland's R&D is in the private sector. However, it should be noted that, as well as direct subsidies, the annual value of the R&D Tax Credit, which was introduced by Government in 2004, is estimated at around €260 million.

Notwithstanding this, the RDI performance of the enterprise base in Ireland is still below selected comparator countries, and the impacts of such expenditures are also lower. BERD (Business Expenditure on R&D) in Ireland increased from 0.77% of GDP in 2001 to 1.17% in 2011, but still lags behind comparator countries. Provisional EU data indicates an average EU R&D spend for 2011 of 1.26% of GDP.

The consultation paper further elaborates the nature of R&D in the enterprise sector as follows:

- Ireland's enterprise R&D expenditure is dominated by a relatively small number of firms;
- Around 300 firms account for almost 70% of total R&D expenditure in 2012;
- Foreign-owned firms accounted for 66.6% of total R&D expenditure in 2012;
- 13% of foreign-owned firms (107 firms), each spending over €2m, account for 88% of R&D spending in the foreign-owned sector in 2012;
- [But work undertaken by the H2020 HLG notes that the FDI sector in Ireland was much less active in EU R&D programmes under FP7.];
- A large proportion of foreign-owned firms (54%) are not R&D active;
- The pattern of R&D expenditure by sector for Irish-owned firms differs markedly; from the pattern of R&D expenditure, by sector, for foreign-owned firms;
- The four sectors 'Chemicals', 'Computer, Electronic and Optical Products', 'Medical Device Manufacturing', and 'Computer Programming', together account for around 80% of R&D expenditure by foreign-owned firms. By contrast, these four sectors together account for only 15% of R&D expenditure by Irish-owned firms.

Just as with the maturation of the public research base, these data need to be seen in context. It is a positive sign that business research spend is increasing, especially when the recent recessionary environment is taken into account. And while subsidies are a significant contributory factor, evidence suggests they are leveraging increased industry spend.

We also know that efforts to support and incentivize collaborative research are bearing fruit, with the SFI and EI Technology Centres programmes substantially scaling up research collaborations between companies and HEIs. This issue is discussed in more detail below.

In addition, reviews of the various IP and commercialization supports under the aegis of Knowledge Transfer Ireland (KTI) are also positive.

However, there is a concern that too strong a focus on near to market research may actually reinforce the current vulnerabilities inherent in our relatively shallow enterprise research base. In a well-functioning ecosystem both companies and public research organisations would be carrying out a full spectrum of research. One would expect that universities would be undertaking more basic research than firms and the latter more experimental development. Under the new SSTI we need to strengthen and deepen research across the spectrum and, in particular, grow the numbers of firms which have the autonomy in developing their research strategy and the capability to conduct advanced research in Ireland, rather than in locations abroad.

The indigenous / FDI split in areas of focus needs further attention. In particular, the possibility that many indigenous research active firms may be in sectors not covered by the research prioritization areas needs further attention and research.

Research Centres

As indicated earlier there has been significant emphasis in policy on driving consolidation in the research base with a view to achieving critical mass. While questions subsist about the balance between concentration and broader research and innovation support measures, it is clear that there is and will continue to be a central role for focusing research of scale in fields strongly linked to identified areas of national competitive advantage.

Building research of scale which generates impact and competitive advantage requires a continued co-evolution of research strength in our HEIs and in industry. The process of co-evolution which is underway at present is based on a process of development which is both organic and strategic at the same time. We see this as the development of the original SFI funded CSETS and SRCs leading into the latest SFI supported Centres, where the building up and consolidation of HE research strength has been complemented by a deepening involvement of industry in the centres. This has been complemented by the EI supported Technology Centres. And while its roots stretch back further in time, the Tyndall Institute at UCC has followed a similar developmental trajectory.

The SFI Research Professorships in areas of Industrial Importance initiative which is currently progressing represents an additional important step in ensuring that we have a critical mass of research talent in areas of maximum potential impact.

Policy makers are currently considering whether the current infrastructure addresses the spectrum of industry research needs. In that regard, we recommend that the existing infrastructure of centres should continue to be developed to service the existing and evolving needs of industry.

There are strong economic arguments for this approach as follows:

- A critical mass of capability already exists within the HEIs which is being further strengthened with support from SFI;
- The developmental history of the centres shows that partnerships with industry can be deepened and expanded over time;
- Investing in HE based centres has important spillover effects into the respect of the education and human capital development role of the universities. Industry benefits strongly from this through access to talent and the migration of qualified researchers from HE into industry.
- Competitively funded research and the strongly internationalised HE workforce ensure that the talent base is continually renewed.

It is notable that several advanced nations including Denmark, the Netherlands and New Zealand are in a process of moving from stand-alone centres to HE-based centres.

Therefore the following lines of action are suggested for the new strategy:

Recommendations

R25. Continue to support and build collaborations of scale between HEIs/PROs and enterprise.

R26. Continue to develop the existing centres structure to support national and industrial competitive advantage and meet evolving needs.

R27. Put in place stronger incentives for companies to conduct basic/advanced research, both in-house and collaboratively;

R28. In the latter regard, modify the R&D tax credit rules to support greater outsourcing of research to HEIs;

R29. Ensure that the proposed Knowledge Development Box supports innovations arising from collaborative research with clear rules to ensure that the relevant IP originates in Ireland.

R30. Ensure that prioritization reflects the gamut of indigenous and FDI research activity adequately.

R31. Support applied research through direct incentives to firms and by developing capacity both in the IOT and university sectors to collaborate with firms on nearer to market projects – for example through consultancy or joint projects using the existing research centres infrastructure.

Innovation and Knowledge Transfer

An effective and efficient Knowledge Transfer System in Ireland is a critical element in driving a return on the investment in Higher Education R&D.

We highlight four components of the support system for Knowledge Transfer:

- Enterprise Ireland Initiatives such as Innovation Partnerships and Innovation Vouchers which support the commercialization of research and the provision of solutions for enterprise;
- Support through the successive Technology Transfer Strengthening Initiatives (TTSI) to create an effective knowledge transfer infrastructure in the HEIs;
- The development of the IP Protocol;
- The creation of Knowledge Transfer Ireland within Enterprise Ireland (with “pump priming” support from IUA) to further embed knowledge transfer and to provide a mechanism to bring stakeholders together via events and standing consultative fora.

The goals of the TTSI are to increase the level and quality of intellectual property (IP) captured by the HEI’s and transferred out to industry, and to support the development of effective systems and policies to ensure a more consistent experience for companies engaging with HEI’s.

The outcomes from TTSI1 were captured in the review of the programme published in 2014. The evaluation demonstrated that investment through the programme had enabled the development of TT capacity and capability, increased the number, range and depth of interactions with industry and that companies (existing and spin-outs) had benefitted from the HEI system.

Performance under the current TTSI2 was reviewed mid-term at the end of 2014 by a panel of international KT experts who concluded that there had been significant value achieved from the investment in the programme to date.

In the European Commission’s Knowledge Transfer Study 2010-2012 (published in June 2013) Ireland is ranked first (out of 23 countries) in terms of knowledge transfer performance of public research organisations in individual countries. In terms of other indicators of economic impact the study finds Ireland ranks:

- 2nd with an average of 44 invention disclosures per 1,000 research staff;
- 3rd with 13.3 patent applications per 1,000 research staff;
- 3rd with an average of 3.8 start-ups per 1,000 research staff.

However, more work is needed on metrics to more accurately compare Ireland's performance with peer nations, both in respect to our HEI system and our enterprise base.

The Intellectual Property protocol is currently being reviewed with a view to having an updated protocol in place before end 2015.

The current TTSI runs to 2017, but planning needs to start now on a successor.

Recommendations for further developing KT under SSTI II

R32. The HE system has made substantial advances across all the main KT/IP metrics. These advances have come on the back of developments in the KT/IP infrastructure and also through sustained investments in advanced research which is the pipeline for IP. That investment needs to be maintained and grown to feed the pipeline.

R22. Focus needs to shift also from volume metrics to more emphasis on sustainability and impact – for example the longevity and scaling of spinouts.

R34. The national IP protocol should be revised as planned, building on the consultative forum established by KTI.

R35. The imperative to ensure that public investment in KT generates economic growth as opposed to revenue needs to be copper-fastened by commitment in the new strategy to continuing support for the KT infrastructure. This involves two things: fully mainstreaming KTI within the Enterprise Ireland structures and timely planning and implementation of a successor to the current TTSI II.

R36. Support for collaborative initiatives such as innovation partnerships and vouchers should be continued under the aegis of Enterprise Ireland.

R37. Within the HE sector and nationally, the concept of KT needs move beyond “pure play” IP to a more comprehensive strategy for supporting knowledge transfer. This includes a more concerted approach to supporting and incentivizing consultancy, to promoting student entrepreneurship, and to recognizing excellence in KT in HE career development and promotions processes.