

Consultation Paper For Successor to Strategy for Science, Technology and Innovation

Comments from Tyndall National Institute

Pillar 1 Investment in STI and key goals/targets

Key areas to be explored include:

- What should Ireland's ambition be in STI?
- Ireland is currently an innovation follower and lags other small developed countries in R&D intensity. Should we have more ambitious targets for investment
- How can that level of ambition be justified? Where would we target increased funding and how could this be justified?

Ireland has made tremendous progress in raising its position in world rankings for science since the creation of Science Foundation Ireland. The funding for this investment has been made possible in part by the economic wealth that comes from the Foreign Direct Investment (FDI) flowing into Ireland. We cannot assume that we will maintain our current attractiveness to FDI with a business as usual approach and urgently need to reduce our dependence upon FDI with the development of a much stronger indigenous industrial sector. This requires us to further invest in economic competitiveness through an enhanced knowledge based society. Ireland will not compete on costs (energy and labour) but must compete on the basis of knowledge intensive differentiated products and services. Ireland needs to have a much greater ambition in the translation of science and technology research into economic impact if we are to secure the society we imagine for our citizens.

Funding this ambition requires that we must target increased funding from International sources through a more competitive performance from Irish Research. State agencies should preferentially target enterprises willing to locate research activities in Ireland. Improved performance in EU programs (H2020) is essential. The RDI performance of the enterprise base in Ireland must be improved.

Pillar 2 Prioritised Approach to Public Research Funding

Key areas to be explored include:

- How can research prioritisation better serve our national objectives of a strong sustainable economy and a better society?
- How best do we identify emerging areas of opportunity and challenge i.e. horizon scanning?

Research prioritization is essential given the limited funds available to all nations and certainly Ireland. Each nation should compete on specific areas of importance to its society and where it has or can establish international competitiveness. It is important to avoid the conclusion that prioritization is the solution when it is just the identification of the task to be addressed. We need to consider how we are executing on the task. The newly created SFI centres offer part of the solution through creating centres of scale, consolidating resources in a highly fragmented research ecosystem. We need to consider how we can augment these centres to increase translation of research outputs into products and services that can deliver economic impact. Missing from the current research landscape is material investment into product design. and research into advanced manufacturing.

An OECD 2013 Economic Survey Report on Ireland states that Research Technology Organisations (RTOs) such as Germany's Fraunhofer Institutes are lacking in Ireland. They

recommend that “the Government should move to setting up a pilot RTO. The aim should be that the RTOs are eventually seen as the place to go for technological solutions for firms”

Pillar 3 Enterprise-level R&D and Innovation Performance

Key areas to be explored include:

- A review of the outcomes of SSTI 2006-2013 shows that targets for the public research base were largely achieved or exceeded. Opportunities exist for further progress in regard to enterprise RD&I activity. How can public policy best support and more effectively optimise the impacts of enterprise RD&I investment - what actions could be taken to:

- Strengthen the number of innovation performers in the multinational sector?
- broaden RD&I activity in the indigenous sector and build absorptive capacity?

Do we need to enhance the suite of enterprise support programmes to further drive innovation in industry and/or is there scope for consolidation of the existing range of support programmes?

How can we incentivise firms that are R&D active to scale their research efforts?

The ‘Knowledge Box’ is an opportunity to increase the number of MNCs carrying out significant research in Ireland. However this cannot be simply a new vehicle that delivers equivalent net taxation without meaningful change in the level of RDI activity by companies. Qualifying criteria must be specific and unambiguous.

Indigenous SMEs have limited absorptive capacity for fundamental research and are in need of more immediate product level support. A significant increase in product research activity (higher TRL) is increasingly sought by industry and this requires a move more in the direction of an RTO in terms of research staff mix and industry engagement model.

Pillar 4 International Collaboration and Engagement

Key areas to be explored include:

- • How can we further increase/strengthen the effectiveness of our international collaboration and engagement across all areas of STI investment in pursuit of economic and societal goals?
- • What additional measures can be taken to maximise the engagement of industry as a partner in this regard?
- • What additional measures could be taken to enhance Ireland’s participation in Horizon 2020 and other EU Programmes – industry, academia, SMEs and MNCs?
- • Are there research policy or programme developments taking place at EU level where enhanced engagement by Ireland could provide opportunities for research collaboration and ultimate economic or societal benefit?

The Irish research community has been well supported by the National Contact Point NCP teams of Enterprise Ireland in engaging in EU Framework programs, however Ireland is under-represented in the planning phase of future programs. It is essential that Ireland (through its Universities, Research Institutes and Government agencies) takes a more active position on the ground in Brussels in committees and in research body associations if we have an ambition to increase our program leadership. Without this we will not achieve our goals in H2020.

Initiatives for International collaboration such as the SFI supported US Ireland Fund should be expanded. The new initiative supporting collaboration of US NSF funded centres with Irish SFI funded national centres is an example of what can be done to drive International recognition of Irish scientific research .

Pillar 5 Organisational/Institutional arrangements to enhance research excellence and deliver jobs

Key areas to be explored include:

- What could we do to further enhance our landscape and institutional arrangements to maximise the impact of research excellence and deliver jobs?
- Is there a need for a complementary market focused research centre structure in Ireland and how should that be organised?
- How can Ireland optimise its strategic advantages of location, scale and environmental quality as a fundamental component of its research infrastructure?
- How can we further increase/strengthen the effectiveness of our national collaboration and engagement across all areas of STI investment in pursuit of economic and societal goals?

Whereas existing structures and institutional arrangements have achieved considerable success in improving Ireland's research rankings, we need to complement them with structures that have a more overt focus on technology and innovation.

Benchmarking Ireland's performance against other small advanced economies (New Zealand, Denmark, Finland, Singapore, Israel) suggests consideration should be given to establishing Research Technology Organisations (RTOs) that are market led and solution oriented. RTOs are not just a luxury of large economies (CEA-LETI in France, IMEC in Belgium, TNO in the Netherlands, the Fraunhofers in Germany) but a very effective state instrument in smaller advanced economies including the likes of VTT in Finland, Sintef in Norway and CSEM in Switzerland. RTOs engage in research but are also closely engaged with industry, are close to applications and products, understand industrial processes and can take part in the development part of the cycle.

One could take the view that Ireland may not have an industrial base that is sufficiently large (in terms of both scale and number of companies) and sufficiently sophisticated (in terms of the core technology that drives the business) to support a Fraunhofer approach. A counter argument is that high performing RTOs maybe a key in changing the outcome and a necessary approach if we truly have the ambition for higher level industry engagement.

Given the presence of Institutes like Teagasc, NIBRT and Tyndall in the Irish system it should be possible to pilot an RTO program in Ireland and explore the added benefits that this could bring to the system.

Pillar 6 World class IP regime and dynamic systems to transfer knowledge and technology into jobs

Key areas to be explored include:

- The establishment of Knowledge Transfer Ireland has seen an important evolution in our knowledge transfer system but what more can we do to enhance further the transfer of knowledge into jobs?
- In terms of Intellectual Property policy, are there specific interventions or supports of a legislative or non-legislative nature that would improve the business environment and act as an incentive to create and sustain an innovative culture?

Further simplification of the knowledge transfer system is required for industry to engage and for the tax payer to get an increased return on exchequer research spend. The current use of the Universities and Institutes of Technology as owners and licensors of IP created with state funding results in an ineffective process for IP transfer. There needs to be a truly uniform national system for licensing or alternatively a single licensing body. Licensing through a single national state body or agency would free the HEIs of their acute concerns on Liabilities and Warranties and allow a more agile approach for fair value appreciation to the state and ease of access to industry.

Revenue flow back to the institutions of successful inventors would drive the desired entrepreneurial behavior.

Pillar 7 Government-wide goals on innovation in key sectors for job creation and societal benefit

Key areas to be explored include:

- • What steps need to be taken to further the translation of investments in STI into the achievement of stated public policy goals? How can the Strategy enable research programmes to optimally support policy development and actions to address key national challenges in areas such as environment, health, etc.
- • What are the synergies between Government's goals in building a better society and the goal of creating jobs and economic growth?
- • How can we address national challenges and also provide economic opportunities through development of new products, processes, systems?
- • How can we address local and national challenges that are also regional and global challenges - how can Ireland through its research turn national challenges into global opportunities in areas such as sustainable land use, urban and rural development, and vulnerabilities to global trends and changes?
- • How can Ireland harness the opportunities presented by the major developments on observation systems, including the analysis and use of Earth Observation data by a wide array of sectors and users?

All Island initiatives should form a part of STI strategy. Stability and normalization across the whole Island is an important goal for the state. The research community can contribute. Opportunities such as HEI collaborations in H2020 and EU regional programs should be fully exploited. We should exploit our competitive advantage as neighbouring member states with favourable conditions for easy collaboration. New instruments from SFI supporting North South interactions are very positive.

Pillar 8 Research for knowledge and developing human capital

Key areas to be explored include:

- What more can we do to best harness the potential of our knowledge base for sustainable economic and social well-being?
- What additional steps can government take to ensure the development of human capital across the population to ensure the success of the new Strategy?
- How can we ensure that the requisite links between research and scholarship are maintained across all RPOs?
- In order to achieve a sustainable research capacity, are the outputs of our research system at doctoral and postdoctoral level the right ones in terms of volume, quality and relevant discipline?
- How can the new Strategy support and strengthen the reforms taking place under the Higher Education Strategy and align with the new National Skills Strategy and develop capacity to enable Ireland to deal with new and emerging challenges across the full breadth of government strategies?
- How can we better leverage our research talent into the economy? How can those individuals active in research (and those seeking to be), both in the public and private sectors, be best supported to perform and progress including through optimum researchers' careers, recognition and mobility mechanisms.
- How can gender equality in publicly funded research activity be further enhanced?
- How can the Action Plan for Jobs 2015 objective to increase the number of researchers in enterprise be fulfilled?
- Should research and innovation performers be supported to engage citizens more actively in the innovation process to achieve optimal outreach to the public?

Current funding for outreach and engagement is insufficient to achieve the goal a knowledge economy competing in the areas of technology (products and services) and leading in areas such as the Industrial internet. Increased funds for schools engagement are essential if we are to improve our STEM position. Early interest in science is a critical long-term strategy to reduce our dependency on foreign talent to fill our chronic ICT resource deficit.