Enterprise Ireland Summary Input
to
Strategy for Science Technology and Innovation 2

Industry Impacts from the Irish publicly funded research system.

Publicly funded research produces industrial impacts in a number of forms. From EI's point of view the top 4 in order of potential impact are as follows:

1. Trained people that move to industry
2. Attractant for FDI
3. Commercialisation outputs.
4. Local and regional meeting places for companies to network and exchange experience.

No one of these activities can carry the impact expectations of the total funding spent in the research system by itself. But if each operates to its optimum level, the sum of these impacts will provide a rich industrial dividend for Ireland that will justify the annual expenditure.

It is Enterprise Ireland's view that each of these needs to be specifically called out in the new SSTI document and that the policy basis to support Irish developments for each of them is underlined.

1. Trained People:

This is by far the most important resource created by the public research spend. Within the DJEI family of funding it is even more so as the single biggest category of spend is on funding salaries of researchers. As a result Enterprise Ireland believes that the new SSTI strategy must call out the significance of this resource and in doing so provide a policy basis for existing and new initiatives aimed at maximising the transfer of trained people from the Irish research system to industry in Ireland.

This is particularly feasible within the range of researchers funded within the DJEI family. Most of the post-graduate and post-doctoral researchers funded from this source are funded on time limited contracts with a definite end. The Full time workers legislation further underpins the temporary nature of most researcher's employment. This coupled with the natural limit on the number of permanent or tenured academic positions that are available at any one time has the effect of forcing researchers to regularly reflect on their career progression. There is insufficient national focus on facilitating these researchers to make their next career move one to an Irish based company and the statistics available on the current numbers moving to industry based in Ireland are underlining this.

This is a multifaceted issue and some will point out that many researchers want to remain so, that industry may not have the absorptive capacity to fully utilise those skills and many other reasons that may be partially true. What is absolutely true is that there are insufficient efforts being made to promote opportunities in Irish based industry to research community (including the entrepreneurial opportunities) and insufficient efforts being made to market them and their individual skills to Irish based industry at or near times of career choice.

There are a number of schemes currently in operation in this general space such those offered by the IRC, SFI, Intertrade Ireland and even some European funding but there isn't a coherent national system. A national system should be established that ensures that every post-doc and post-grad researcher funded by DJEI knows about them. A National system that ensures that every company based on the island knows about them and that the offer(s) aimed at helping companies in this space are run to company times lines and not infrequent calls for proposals that are better understood by researchers.

Facilitation could include measures like the following:

- A national web exchange where companies could post positions and researchers could post expertise.
- A living listing of researchers near the end of contract or considering the next stage of their careers that IDA and EI could promote directly to their client base (assuming any data protection issues can be addressed).
- Research centres and HEI's hosting open events connecting researchers on contract to industry

These are just examples of actions but SSTI should provide the policy basis to enable initiatives like this and mandate the necessary government departments and agencies to make them happen.

In the last decade, in particular, there has been a welcome influx of non-Irish researchers into our national research system. This has brought in new skills, new approaches and enriched the fabric of our research teams through cultural diversity and new ways of doing things. The current statistics show that the majority of these researchers leave Ireland after their research contracts are over. This underlines the missing opportunity in embedding the skills of more of this cohort of researchers in Irish based industry.

In addition to the previously suggested measures we believe that this cohort requires additional initiatives to optimise the chances of them staying in Ireland and contributing to our industry development when they are finished their research contracts.

Enterprise Ireland believes that the new SSTI provides an opportunity for a policy statement stating that the retention of these skills within the Irish economy is highly desirable. This should provide the basis to engage with the appropriate government departments on the issue of working visas after their research contracts have expired. Such changes should be positively expressed and marketed to those researchers currently within the Irish research system and also used as an attraction point for new research talent but also for students the international education domain.

Given existing national programmes to attract overseas entrepreneurs and specific efforts to attract talent to Ireland in areas of technical skills shortages Enterprise Ireland

believes that it is a mistake not to facilitate those that have already made the decision to spend some of their research career in Ireland.

An appropriate visa system is necessary but probably even more important are efforts to help this cohort of researchers socially integrate and build their personal networks in Ireland while they are on a research contract here. While nobody is at fault for this, the current laisse faire approach to these issues works against a skills retention agenda to benefit Irish industry. Enterprise Ireland thinks that there should be an active social integration effort made to integrate visiting researchers while they are here; this should be national policy.

Delivery of this will have to rest with the research centre, HEI, local authority or regional authority near where a visiting researcher is located during their contract. Some simple steps such as assigning Irish mentors or mandating an Irish "buddy system" could help. What would be of more help would be a focussed dialogue between representatives of the HEI, local authorities, regional authorities and bodies such as the Immigrants council or Chinese student's in Ireland groupings to come up with a more holistic approach to really dealing with this challenge.

Dealing with this issue should strengthen the case to encourage more of this cohort of researchers to stay and contribute to Ireland's economy and for those that do leave they will leave with a stronger connection to the country that hosted them during their research contract. Anecdotally, by way of example, we have seen one case where an Irish high technology start-up was assisted financially by a former non EEA post graduate student who made those connections while in Ireland.

The final piece of Enterprise Ireland commentary on the movement of trained people to Irish industry is aimed at proposing an SSTI policy objective that: By 2020 all post graduate and post-doc researchers would undertake a mandatory structured training programme whose primary aim is to add skills to their technical knowledge that prepares them for a career in industry. This is primarily about enabling them to become industry ready. Enterprise Ireland doesn't have fixed views on training content at this point but would suggest that the preparation of a content menu could be facilitated with industry through the Expert Skills Group mechanism. It would also be important to absorb the lessons learned from the structured PhD courses funded under PRTLI and the new framework about to be published by HEA. Even if the researcher never moves to industry we believe that this preparation will make them more cognisant of industry and entrepreneurial possibilities which will still provide a benefit.

2. Attractant for FDI

While Enterprise Ireland is only responsible for FDI in the food and natural resources domain our interaction with MNC companies in this and other domains leads us to make the following observations that we feel should be considered within the new SSTI.

It is internationally recognised that having a strong mature scientifically excellent research system is an important tool in the attraction of foreign direct investment. Having access to excellent skills is a vital component in making a decision to locate in any country. The international reputation of our research system is a premium marketing tool in lending credibility to that case. An internationally recognised scientifically excellent research system also provides the promise that there is talent, clusters of

talent and an opportunities ecosystem that make Ireland the right location for an FDI investment.

Having research centres of international scale is key to achieving this as is having individual researchers of international reputation. These policies and supporting actions should be continued under the new SSTI.

Enterprise Ireland has one key observation relating to Scientifically Excellent research centres of scale that are heavily influenced by industry. It is in our view a good thing that the existing centres are well supported by the MNCs that are currently located in Ireland. However we also feel that there is a need to ensure that either some of the centres or some of the centres funding should be focussed on advanced technology areas that are not yet represented in the MNC landscape in Ireland.

It is important to keep an eye on where the next wave or technically based FDI will come from as well as looking after the current base. In this respect we think that IDA Ireland, and to a lesser extent EI, should have a more direct strategic input into to either the creation of some of these centres or in the allocation of some centres' funding programmes. In other words Ireland should have some scientifically excellent research centres of scale or some portion of such centres funding that is not directly linked to the existing Irish MNC technology base. That research would instead be defined in conjunction with IDA to cover emerging technology industry targets that are of strategic importance to new areas of FDI.

Part of the FDI agenda is increasing the "stickiness" of Ireland once a company has established itself here. So while scientifically excellent research centres of scale will have helped to win the project, will continue to be of interest to the research arm of the "captured" MNC (here in Ireland and in corporate HQ) other parts of the MNC operations in Ireland will also have an appetite for support from the research system that are more focussed on later levels on the technology readiness scale (points 4 up to 9). The evidence for this can be seen from the fact that established MNCs get value from EI schemes targeted at that research segment such as Technology Centres (33% IDA clients), Innovation Partnerships (40% IDA clients) and Technology Gateways (16% IDA clients). In addition the "in company" product development grants offered IDA are widely used by companies in that research segment. It is also worth remembering that while scientifically excellent centres of scale are important an estimated 60 to 66% of researchers in the Irish research system are outside of that cohort but can still play an important role in embedding and keeping FDI companies here.

3. Commercialisation outputs.

There has been a tendency to seek to determine the industrial impact of the total research system solely from the impacts under the commercialisation heading. This is understandable given that spin out companies, licenses, the impacts on turnover from companies using knowledge generated by the research system and a small amount of revenue back to the research performers are the most visible and easiest impacts to track. They only tell part of the impact story with the larger impacts coming from the first two categories of trained people and FDI attraction. In our opinion it is important that the SSTI spell this out.

Enterprise Ireland's role in the Irish research system is to help the maximum number of Irish based companies to convert scientifically excellent research to investable commercial opportunities that are capable of generating jobs and economic impact in Ireland. As such Enterprise Ireland marshals the best knowledge in developing sustainable Irish based companies with real market led needs and helps them to sweat the research assets funded by SFI, HEA and other agencies for commercial impact.

A market led & industry informed view of the research system

Enterprise Ireland is the most connected and knowledgeable body on the totality of industrial development in the State. This position has been attained through the relentless acquisition of new knowledge and skills, decades of experience and, most importantly, the trust endowed upon us by Irish industry and the Government.

Our obvious focus on the needs of Irish owned companies often hides our broader engagements and economic impacts beyond that group of companies. In fact, our activities span the entire range of economic activity in Ireland.

EI activities directly support disruptive spin-outs, high potential start-ups, micro-SMEs, scaling enterprises, indigenous multinationals and even foreign owned food related multi-nationals. Our Innovation activities extend this scope to State and semi-state bodies and foreign owned multinationals via Innovation Partnerships, Technology Centres and H2020 activities. In addition, Enterprise Ireland staff perform the technical assessments on IDA in-company R&D projects. This breath of engagement coupled with an extensive overseas network has provided us with a deep understanding of industry, its market needs and how it will best consume innovation. It is this understanding which underpins Enterprise Ireland's role in the Research system. Every Enterprise Ireland programme, every staff member's capability and every activity we undertake are defined responses to industry, market requirements and the opportunity to have economic impact.

Ireland's research system has matured greatly over the period of the previous Strategy for Science Technology and Innovation. Successes can be easily measured in terms of the quality of the research performed (citations, publications etc.), the improved collaborative relationship between industry and academia (increased numbers in research collaborations etc.) and the increased commercial potential of the research performed (as measured by Increased licences and spinout companies). However the is considerable scope over the period of the next Strategy to further strengthen existing competencies in the system while addressing deficiencies that have always existed or that exist as a consequence of the system's rapid expansion in recent years.

4. Local and regional meeting places for companies to network and exchange experience.

One of the significant roles that HEI's play in industrial development is that of acting as a meeting place for industry and a builder of social capital in the regions. They provide important knowledge links to networks and knowledge centres outside the region and internationally. This role is attractive to both SMEs and MNCs and provides a fertile environment for company to company and company to academic innovation exchange.

This is especially true with many MNCs and SMEs who might traditionally be seen as direct competitors coming together in collaborations and open innovation exchanges that aren't typically possible in other countries and other environments. It also encourages the exchange of supply chain innovations, opening up new potential business opportunities while providing valuable industrial insight to academic researchers.

Unfortunately while Ireland can point to many cases where this role has demonstrated benefit to industry, there isn't a strategic plan or action plan for a HEIs to take a leadership position in deliberately developing this role to their own and industry's benefit.

It is Enterprise Ireland's opinion that while the technology transfer operations with HEIs have enjoyed a sustained investment by the institutions and the public sector this progress has been mirrored by a decline in investment in the broader based industry liaison efforts of most HEIs.

We see industry liaison and having a "go to" industry contact function within each HEI as a necessary part in the total development of innovation in Ireland and driving the concept of being a meeting place for companies. Contacts on courses, students, facilities for use and other non-research specific begin relationships which when cultivated lead to other forms of partnership.

We believe that a strong Industry liaison function couple with a strategy for each HEI to play an active role in delivering on actions that underpin its role as a local and regional meeting place for companies to network and exchange experiences will directly impact innovation in Ireland.

To make this a reality Enterprise Ireland proposes that each HEI should develop local activities within the "meeting place" concept and that these should form part of their performance compact with the HEA.

On the Industry liaison function Enterprise Ireland proposes that a medium term funding support programme should be investigated with the aim of reinvigorating the industry liaison function within each HEI. It would also be useful to establish a national Industry Liaison form for the exchange of best practice and experiences under the auspices of the HEA.

The following recommendations are informed by Enterprise Ireland's decades of experience in the Innovation system, its knowledge of industry and of the market.

Pillar 1. Investment in STI and key goals/targets

- There is a clear need for a joined up agency approach to oversight & monitoring of systemic knowledge transfer targets. This would allow for the more effective alignment of targets and more harmonised systemic metrics. In addition it is important that there is one source of data collection and management to ensure consistent validation and data cleanliness. Enterprise Ireland recommends that Knowledge Transfer Ireland is the only official national source for Spinout, Licences and national knowledge transfer metrics etc. These metrics should also be built into the HEA institutional performance compacts.

- Where previously the State sought to stimulate commercialisation through traditional technology transfer and to introduce culture change through targeting identifying and protecting IP, licensing and cresting spin-out companies there is now a need to seek quality measures of performance in Knowledge Transfer (KT) recognising that as the KT system evolves patent filings will plateau or drop as we replace volume with quality and pursue these for a longer time period. Enterprise Ireland recommends that these indicators be developed by KTI as part of the new instrument to support technology transfer beyond 2016.
- In order to maintain the most economically advantageous research system it will be necessary for the State to fund research at all stages of the research pipeline from exploratory basic research, to oriented basic research, to applied research and through to commercialisation. It is not possible to forecast the entirety of industrial or societal demands from the research system that will emerge in the coming decade. Enterprise Ireland suggests that it is necessary to have some level of exploratory/basic research funding which allows for a nascent base of activity in new areas of relevance as they emerge.
- In order to ensure the optimum value for money from the State's investment in research support for industry (direct and indirect) it is important to ensure that the State has complete visibility on the totality of investment in any given company. As such it is recommended that the State develop a clearing house across all relevant agencies that provide funding support (direct & indirect) for industry. In addition to ensuring value for money it would also enable the State to be as flexible as possible within EU State Aid obligations.

Pillar 2. Prioritised Approach to Public Research Funding

- A focus on scientific excellence is a strong and effective basis for a research system. However, there is a point in time in a research output's commercial journey where market relevance, utility and other commercial factors become more important than the scientific excellence of the research if there is to be a commercial outcome. The critical importance of the "utility" as well as the "excellence" of different kinds of research must be recognised if there is to be an effective long-term wealth-creating research base. Enterprise Ireland recommends that the current set of commercialisation tools are maintained in direct proportion to the overall research system spend.

- Enterprise Ireland proposes the establishment of an internationally focussed advisory group to manage an ongoing technology road mapping process which will continually inform evolving STI policy.

Pillar 3. Enterprise-level R&D and Innovation Performance

- Enterprise Ireland sees the Institute of Technology (IoT) sector as having the potential to play a very important role in economic development *especially at a regional level* by supporting start-ups and in enhancing the competitiveness of indigenous industry.

  The IoTs' campus incubation, enterprise development and research collaboration activities are critical to developing and maintaining high technology companies in the regions. There has been a long established relationship between EI and the IOT sector that commenced with training and knowledge transfer for local industry through to a more elaborate ecosystem. This includes entrepreneurship, commercialisation and innovation support for industry both at introductory and advanced level. EI's R&D strategic interests for its client and IOTs strategic research interests are closely aligned with a focus on applied R&D, closeness to local industry, readiness to work with large MNCs, with established local industry and with start-up and micro-enterprise sector

  Enterprise Ireland recommends that the SSTI formally recognise the important role of the IoT sector in the system in helping to provide a blended approach to support innovation at all levels and for all sizes of companies in a breath of geographic locations. Support should be put in place to enable IoTs and future Technological Universities to continue to develop this role.

  - IOTs and their potential successors should continue to act as an applied research / 'technology solution' resource, both for indigenous industry, and for FDI sector who compete within their MNC corporate entity for investment – this, over time, should progress to more 'strategic R&D partner' type relationships. The HEA institutional compacts should be employed to drive this activity.
  - HEA institutional compacts represents an important opportunity for IOTs to increase their collaboration in regions between local IOTs and universities.

- Part of the FDI agenda is increasing the "stickiness" of Ireland once a company has established itself here. So while scientifically excellent research centres of scale will have helped to win the project, will continue to be of interest to the research arm of the "captured" MNC (here in Ireland and in corporate HQ) other parts of the MNC operations in Ireland will also have an appetite for support from the research system that are more focussed on later levels on the technology readiness scale (points 4 up to 9). The evidence for this can be seen from the fact that established MNCs get value from EI schemes targeted at that research segment such as Technology Centres (33% IDA clients), Innovation Partnerships (40% IDA clients) and Technology Gateways (16% IDA clients). In addition the "in company" product development grants offered IDA are widely used by companies in that research segment. It is also worth remembering that while scientifically excellent centres of scale are important an estimated 60 to 66% of researchers in the Irish research system are outside of that cohort but can still play an important role in embedding and keeping FDI companies here.
- At present Ireland's support for In-Company R&D is limited to 50% of project costs. The support available for collaboration activities is substantially lower than many of our international counterparts and is well below European Union State Aid limits. Enterprise Ireland recommends that we reassess the policy basis for this national limit with a view to supporting a larger percentage of in-company research projects where the potential outcome of the proposed company project is deemed particularly economically advantageous.
- The Space sector in Ireland has developed into a thriving, vibrant export led market for Irish industry with exports estimated to be €80M and direct employment of 600. These are projected to grow to €130M and 1,100 high value jobs by 2020. In light of a recent positive review of the Irish space industry, it will be necessary to further develop the existing strategy for the Sector with input from the key stakeholders: Government Departments and Agencies as well as industry players involved in space related products and services.

  A major pillar of the strategy will be the market stimulation opportunities provided through the National participation in both the European Space Agency (ESA) and Horizon 2020.

  Both of these programmes provide unprecedented opportunities for industry in Ireland to diversify activities into the new fast growing space sector i.e. to develop technologies that can also be commercialized in a range of market applications.

  Another pillar of the strategy will be to support new start-up companies in the space sector through the planned Space Business Incubator soon to be established (co-funded by ESA and EI)The resulting engagement model will focus activities on Industry in Ireland (HPSUs, SMEs and MNCs) and overseas (with a view to FDI) and drive market development and employment creation activities through this exciting sector.

Pillar 4. International collaboration and engagement

- All research centres of scale should have defined international income targets. This would serve to augment national investments, contribute to H2020 targets and increase the international connectedness and reputation of centres. To further ensure openness and international integration each centre should have an International Strategy.

- An important element of competing for international funding and recognition at European level involves the ability to demonstrate that Ireland has world class research facilities. It is recommended that the SSTI includes and action to position Ireland's research infrastructures at European level to demonstrate that when Ireland's world class researchers are competing internationally they are doing so within world class research facilities.

  While European research infrastructures are often led by the largest institutions in Europe, this can be achieved using Horizon 2020 opportunities to target the inclusion of a European infrastructure hub in Ireland as part of a larger European facility. There are several examples of such hubs already in existence elsewhere. The H2020 High Level group should be charged with delivering this activity.

  This requires the identification of a relatively small number of areas where there is a uniqueness to the Irish infrastructures developed to date and/or planned for future development.

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

- A central pillar of any effective national strategy for science technology and innovation is an effective, accessible and consistent national Technology Transfer system. However, there is an inherent market failure in the Irish research system regarding technology transfer. The principal beneficiary of the technology transfer system is the State and thus the system must be supported by State subvention in order to maintain a high quality flow of technologies and spinout companies.

  Before 2007 there was virtually no formal Technology Transfer and comparatively little technology transfer activity. Since then Enterprise Ireland has invested over €50M in the States' Technology Transfer infrastructure. The effect of this investment was a substantive change in the way the State capitalises on its higher education research investment. For the first time a large, experienced, well-resourced, team of professionals were available to act as an enterprise friendly interface between industry and the higher education system for technology transfer.

Over the lifetime of Technology Transfer Strengthening Initiative, the combined IP-related output of the TTO's in Ireland has increased significantly, with a 14 fold increase in licensing output and a 6 fold increase in the number of spin outs. Under future funding (beyond 2016), these metrics will be expected to continue to grow. However the future focus must be on (1) quality and (2) breadth. Without further funding the advances achieved through the TTSI programme will be lost and we will effectively waste the investment of the previous years, because relationships built over time with industry and academics will dissipate and leave Ireland with fragmented and incoherent commercialisation RPO activity. This has been seen in Canada where dis-investment in TT resulted in a tangible decline in the growth of licensing activity.

Enterprise Ireland recommends that continued TT infrastructural support should contain a combination of core and competitive funding elements to enable continuity in commercialisation support within RPOs and to prime in areas of unmet current and future need to boost innovation with industry.

- The State has invested in the creation of a central resource to facilitate and enhance engagement between enterprise and the research base. In existence for only 18 months, KTI has made a commendable start. KTI should have a role to play in supporting the SSTI 2015-20 and funding beyond its current life span to 2017 should be considered against a forward strategy to underpin the SSTI. Enhancements to the KTI service to support industry (indigenous and overseas) connecting with research, expertise, technology and IP would add value to enterprise innovation as would enriching the connectivity between KTI and key agencies such as IDA Ireland.

- There is insufficient national focus on facilitating these researchers to make their next career move one to an Irish based company and the statistics that we have on the current numbers moving to industry based in Ireland are underlining this. There are a number of schemes currently in operation in this general space but there isn't a coherent national system. Enterprise Ireland recommends that a national system be developed that ensures that every post-doc and post-grad researcher funded by DJEI knows about them. A National system that ensures that every company based on the island knows about them and that the offer(s) aimed at helping companies in this space are run to company times lines and not infrequent calls for proposals that are better understood by researchers.

  Facilitation could include measures like the following:

  - A national web exchange where companies could post positions and researchers could post expertise.
  - A living listing of researchers near the end of contract or considering the next stage of their careers that IDA and EI could promote directly to their client base (assuming any data protection issues can be addressed).

- Research centres and HEI's hosting open events connecting researchers on contract to industry

- Enterprise Ireland recognises that there is a clear need for a dedicated industry facing function within HEIs. This individual would proactively engage with industry in the community, drive collaborative research projects into the institution and create knowledge transfer opportunities. This function would need to be able to coordinate assets across their institution to engage with industry. Such a role would also transcend research collaboration to also include:
    - Being a first point of contact within an HEI for industry
    - Sourcing relevant graduates for industry
    - Influencing courses etc. to make them more relevant to local industry.
    - Identify convergences across their institution

- Enterprise Ireland recognises the importance of the HEI consultancy function and recommends that it be supported in future knowledge transfer funding (beyond 2016). Collaboration with RPOs in all its forms (research contracts, collaborative research projects, and consultancy) is of major value to business and the public sector. The consultancy advice delivered by researchers (not medical or dental) is currently poorly captured by RPOs. This is because current national regulations under the ECF prevents academics from receiving payment as part of their existing role within an HEI – it is viewed as a second job. Yet academics have time allocated as part of their contacts to pursue other activities additional to the core HEI role. UK data shows that 11% of KT revenue to UK HEIs comes from consultancy activity, indicating the value to industry and the public sector of the knowledge that researchers possess and can share.

  To ensure that the State can capture consultancy activity and its value to industry and so that the activity itself can be regularised and actively supported it is proposed to make consultancy support a strand of activity under future Knowledge Transfer funding.

- Enterprise Ireland's experience suggests that the research system must always be cognisant that researchers within the higher education sector will, for the most part, be far more comfortable with the more academic and research aspects of their work. These core strengths are to be encouraged but we must also drive their academic activities closer to industry.

  In order to strengthen the third pillar of an institutions' role it is proposed that there is an alignment of the systemic financial inputs to the institutions to recognise and reward this type of commercial activity. For example an institution's propensity to engage with local industry will not be solely rewarded with additional Enterprise Ireland support (e.g. via Innovation Vouchers or Innovation partnerships) but may also be rewarded via other agencies (e.g. a larger HEA block grant etc.). Such systemic recognition of the importance of

knowledge transfer and industry engagement could achieve a cultural change across the entire spectrum via a balanced scorecard approach rather than rewarding individual components via specific agency funding.

Enterprise Ireland recommends the introduction of a balanced scorecard approach that would serve to support activities of national economic importance which are not adequately supported in the existing system. For example, from the State's perspective it is economically desirable for institutions to undertake a large number of smaller market focused projects for industry. However undertaking such projects are more challenging for many institutions in terms of time and resources than undertaking a fewer number of larger projects. As such the system as a whole must recognise the importance of these smaller projects which benefit indigenous industry while also acting as feeder projects for larger collaborative relationships in the future.

We believe this should be built into the HEA performance compact with HEIS.

- Career progression in the Higher Education System is still primarily academic in focus; researchers are not rewarded in career terms for engaging with industry and indeed such activity may limit their future prospects in the research system. It is proposed that industry engagement and commercialisation be included as part of a balanced scorecard for an academic's career progression. We believe this should be built into the HEA performance compact with HEIs.
- It is recommended the introduction of Academic Tenure Chairs in commercialisation/industry/enterprise related professorships. Currently such premier positions are restricted to strictly academic chairs. The creation of such tenured positions in the enterprise/commercial realms would serve as tangible and seismic markers of the cultural shift towards a more "third pillar" role for the system. There is currently work underway internationally to develop more of these types of positions. In addition to this action the process of recruiting senior researchers from overseas should include an assessment of their previous commercialisation and industry collaboration successes.

- Higher level institutions can play important roles in the community by providing a meeting place for local industry to share innovative know-how. Such innovation fora are currently being piloted and may represent an opportunity for HEIs to become focal point of innovation and information exchange between companies in Ireland. To make this a reality Enterprise Ireland proposes that each HEI should develop local activities within the "meeting place" concept and that these should form part of their performance compact with the HEA.
- If the system is to fulfil the ambitions for RPOs to engage more effectively and consistently with industry there is a clear need to ensure that the research system has a fit for purpose national research administration system. This would bring a professional and consistent rigour across the range of industry-facing research contracting activities including being able to apply a nationally transparent costing methodology and developing an experienced research contracts specialism empowered to negotiate the full research contract with industry and co-coordinating with TT and legal support as required. A coordinated system for effectively costing Irish research is desirable in order to ensure

consistency for industry and value for money for the exchequer. A professional dedicated research contracts function will make RPOs more swift and agile and counter the current perceptions that Irish RPOs are over-bureaucratic, risk averse and slow to deal with. This is a fundamental element of an effective research system is currently lacking and serves to undermine the ongoing positive maturation of our research system. We recommend (1) the development of a transparent costing methodology for all RPOs and (2) the financial pump priming of the development of a professionalised research administrations system akin to the investment in technology transfer through the TTO system. We believe this should be built into the HEA performance compact with HEIs.

- The State's research infrastructure and equipment underpins all research performed and thus needs to be maintained and be fit for purpose. There is also a requirement for consistent and fair access terms for industry when using this equipment. There currently exists a national directory of equipment but this needs to be aligned with a newly developed and strong national access policy for industry. We must also ensure that equipment is maintained and operated to the highest possible standards. This policy should be informed by the OECD's recommendations on access to publicly funded research infrastructures.

- We have one key observation relating to Scientifically Excellent research centres of scale that are heavily influenced by industry. It is a positive attribute that the existing centres are well supported by the MNCs that are currently located in Ireland. However we also feel that there is a need to ensure that either some of the centres or some of the centres funding should be focussed on advanced technology areas that are not yet represented in the MNC landscape in Ireland. It is important to keep an eye on where the next wave or technically based FDI will come from as well as looking after the current base. In this respect we think that IDA Ireland, and to a lesser extent EI, should have a more direct strategic input into to either the creation of some of these centres or in the allocation of some centres' funding programmes. In other words Ireland should have some scientifically excellent research centres of scale or some portion of such centres funding that is not directly linked to the existing Irish MNC technology base. That research would instead be defined in conjunction with IDA to cover emerging technology industry targets that are of strategic importance to new areas of FDI.

- The maturation of the research system has brought about increased resource constraints in many areas particularly with regard to staffing. Enterprise Ireland recommends that we critically access existing competencies and capacities within the system to ensure that we are making the most effective use of the existing limited resources. The increased importance of research commercialisation and effective management of Intellectual Property has resulted in an increase in Business Development and Intellectual Property professionals being put in place in HEIs in a piecemeal manner (often on a project by project/centre by centre basis). While the bulk of their work is weighted towards the establishment of the centre (getting companies to join, shaping research agreements and developing IP contracts etc.) there is an inherent lull in their activities during the middle years of a centre's existence. It is proposed that these individuals are made available to their parent institutions for important business development and IP management duties that can reside outside their host centres.

Enterprise Ireland recommends that (A) these individuals are mapped according to their roles and skills and that (B) that these individuals are welded together in their parent institutions into a cohesive industry focused team.

- The majority (around 2/3) of researchers in the research system are not in national research centres of scale. This provides a challenge for the State to harness the potential of this collective group to work on industry problems. One potential solution to this issue would be to develop a tool that could be hosted by Knowledge Transfer Ireland where companies could post innovation and technology challenges which these researchers could respond to. Where appropriate, suitable research collaboration support schemes, such as Innovation Vouchers and Innovation Partnerships, could be used to fund the ensuing research. A similar tool already exists for the Innovation Voucher programme and has proved useful in enabling linkages between companies and appropriate research talent.

6. World class IP regime and dynamic systems to transfer Knowledge and Technology into jobs

- The State has invested in the creation of a central resource to facilitate and enhance engagement between enterprise and the research base. In existence for only 18 months, KTI has made a commendable start. KTI should have a role to play in supporting the SSTI 2015-20 and funding beyond its current life span to 2017 should be considered against a forward strategy to underpin the SSTI. Enhancements to the KTI service to support industry (indigenous and overseas) connecting with research, expertise, technology and IP would add value to enterprise innovation as would enriching the connectivity between KTI and key agencies such as IDA Ireland.
- Effective knowledge transfer will increasingly require collaboration between multiple HEIs. In order to facilitate this it is proposed that a simplified single contract (inter-institutional agreement) be developed and adopted nationally.
- The process of spin-out company establishment needs to be informed by international best practice and implemented via the national IP protocol in order to increase the number of spinouts and to make the process of their establishment swifter more predictable, consistent, transparent and fair.

  Each HEI should have a conflict of interest policy to ensure researchers are suitably incentivised to drive research commercialisation and to avoid unrealistic expectations.
- In order to optimise the number of commercial impacts of State research investment it is critical that all State funding agencies are aligned with the National IP Protocol.
- Currently some State research performing bodies' operational policies do not permit them to pursue spinout opportunities in a commercial manner. It is

proposed that where such a situation exists these policies/legislation be amended to enable them to do so.

- Having developed an effective national research commercialisation system there is now an opportunity to leverage international sources of excellent research which can be commercialised and exploited in Ireland in collaboration with local HEIs. E.g. Mayo Clinic initiative 2014.

- As the research system continues to mature and the emphasis on commercialisation and industry relevance intensifies it will become important to reassess how the State provides support for the resulting increase in patenting activity. The current patent support system, provided through Technology Transfer Strengthening Initiative funding, is not capable of supporting large and/or proportionately significant increases in patent activity over and above the current levels. Enterprise Ireland suggest that a new system wide patenting support mechanism be developed; perhaps one solutions might be to more directly integrate patent support with existing research project funding where a percentage of a given research scheme's budget would be reserved for protecting outcomes from the funded research.

  As the levels of patenting activity increases there will be an inevitable increase in the cumulative number of patents being supported over the long-term. In order to ensure value for money and that the State is not supporting long term patenting costs on technologies with no commercial value it is proposed that a national patent curation facility be developed. Such a curation function could evaluate the status and commercial potential of supported patents and cease funding in cases where support is no longer economically feasible.

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

- Small Business Innovation Research (SBIR) – The Government is the largest purchaser of goods and services in the economy. Public Procurement accounts for 16% of GDP. In turn €8.5 billion is spent on supplies and services. The Small Business Innovation Research (SBIR) programme represents an important opportunity to leverage a portion of this larger expenditure to drive innovation and market-driven research. SBIR is a mechanism which enables public sector bodies to connect with innovative ideas and technology businesses to provide innovative solutions to specific Public Sector challenges and needs. It is proposed that a proportion (~3%) of the State's public procurement budget be reserved for SBIR and other research and innovation related activities.

  The US is the most advanced market for SBRI. Studies over the years have validated the benefits of SBIR to participating companies, notably, according to

research carried out by Harvard, that SBIR award winning firms had created 5 times as many jobs as non SBIR winners.

8. Research for knowledge and the development of human capital

- There is currently a missed opportunity to embed the skills and expertise of international researchers that are employed on contract in the Irish research system with Irish based companies. The State has invested considerably in the development of these researchers but once their contract is complete there is very little scope to maintain these individuals in the State in either industry of academia. It is proposed that mechanisms be put in place to attract international skills whilst also maintaining them in the system after their initial work/training period. Mechanisms to grant longer term status to workers that transition through research to industry would be very beneficial.
    - An appropriate visa system is necessary to enable non EEA researchers to practice their skills in Irish based industry after their research contract.
    - More important are efforts to help this cohort of researchers socially integrate and build their personal networks in Ireland while they are on a research contract here. Enterprise Ireland thinks that there should be an active social integration effort made to integrate visiting researchers while they are here. We think that this should be national policy. Dealing with this challenge should strengthen the case to encourage more of this cohort of researchers to stay and contribute to Ireland's economy and for those that do leave it will leave them with a stronger connection with the country that hosted them during their research contract. What would be of more help would be a focused dialogue between representatives of the HEI, local authorities, regional authorities and bodies such as the Immigrants council or Chinese student's in Ireland groupings to come up with a more holistic approach to really dealing with this challenge.

- There is a clear need that post-doctoral and post-graduate researchers are industry ready following their research contract. We propose that by 2020 all post-graduate and post-doc researchers would undertake a mandatory structured training programme whose primary aim is to add skills to their technical knowledge that prepares them for a career in industry. Enterprise Ireland doesn't have fixed views on training content at this point but would suggest that the preparation of a content menu could be facilitated with industry through the Expert Skills Group mechanism. It would also be important to absorb the lessons learned from the structured PhD courses funded under PRTLI and the new framework about to be published by HEA. Even if the researcher never moves to industry we believe that this preparation will make them more cognisant of industry and entrepreneurial possibilities which will still provide a benefit.
- The system's current emphasis on STEM related funding has the potential to undermine the important opportunities convergence areas of social sciences. Areas like business process innovation, health studies, information systems/Big Data, statistics and geography all benefit from social science input and convergence. Indeed human dominated systems like IT systems, markets,

medicine, cities and engineering all have significant social science factors and a new national SSTI should recognise this important role.

- The majority of Irish researchers reside outside research centres of scale and many of whom are important contributors to the enterprise research agenda. Enterprise Ireland recommends that the SSTI develops a policy that engages with this important cohort of researchers to encourage them to commercialise research and to participate with industry.

Programme Descriptions P34

Suggest the replacement of Enterprise Ireland Programme Descriptions on P34 with the following:

Enterprise Ireland's role in the research landscape supports the establishment of new companies and the growth of existing Irish based companies. This is achieved by:

- The creation and continued funding and support for the ecosystem that commercialises and de-risks the research outcomes from the publicly funded research system through supporting the creation of new companies and knowledge transfer to existing companies;
- Facilitating Irish based companies to cluster around market led, common technology problems; to find talent in the research system interested and capable of solving those problems; and where necessary, support the funding of the delivery of those solutions.
- Supporting Irish based companies and researchers to tap into international sources of innovation funding such as Horizon 2020 and European Space Agency

EI provides support relevant at all stages of company development, enabling companies of all sizes, from micro indigenous enterprises to the largest foreign owned multinationals to progress from undertaking an initial research project to higher level innovation and R&D activities. In addition Enterprise Ireland supports augment the entire research funding ecosystem by providing funding at what the EU defines as industrial/experimental development which equates to the higher stages of the Technology Readiness Level scale. Supports include:

In-company supports

- Innovative High Potential Start-Ups (HPSUs) R &D Equity - to encourage the establishment, and support the development, of innovation-led high potential start-up companies with a strong export focus.
- R & D Fund – R&D grants to Enterprise are designed to support in-company projects which have the potential to develop novel products and services with a clear competitive advantage in their target market.

Collaboration Supports

- Innovation Vouchers – companies, particularly small firms, do not traditionally look to higher education institutions as sources of commercially relevant knowledge or as collaborative research partners. Innovation Vouchers are designed to facilitate and encourage enterprises to engage in research or development by availing of research institutions' expertise in order to work with academic researchers on specific innovation questions and projects related to the company's needs.
- Innovation Partnerships – Companies wishing to address large innovation challenges do not inherently consider the higher education sector as potential solution providers or as research partners. Innovation Partnerships address this issue while also reducing the risk of undertaking larger R&D projects by funding up to 80% of industry-academic collaborative research projects that deliver company defined, close to market technology solutions.
- Technology Centres Programme- International evidence suggest that there is considerable economic impact to be achieved by companies working collaboratively together while also leveraging higher education expertise to address market & technology challenges. Technology Centres are designed and led by industry with market led research undertaken by academics & industry partners in order to solve sector-wide problems that are, too risky or resource intensive to be attempted by the companies in isolation. Technology Centres embed Multinationals, SMEs and Higher Education Institutes in goal oriented rapid response projects.
- Technology Gateways – The Institutes of Technology have the potential to be powerful drivers of regional innovation however they lack the necessary mechanisms to engage with industry to the fullest effect. Technology Gateways address this issue by providing a Business Development resources in the institutions which actively find companies that can benefit from their institution's

research base, work with industry to define their problems in a manner that can be addressed by the Institute's research base and manage the subsequent research projects.

- New Frontiers Programme – prior to the establishment of this scheme there was a clear demand for entrepreneurial development programmes but no consistent & coherent national support in this area. The New Frontiers programme seeks to raise the number of business start-ups and lay the foundations for a 20% increase in the pipeline of High Potential Start-ups and other sustainable businesses, through unified course structures, rigorous processes both for selection onto the programme, and for the assessment of participants' progress.
- International Collaboration – Enterprise Ireland is responsible for driving Ireland's participation in International research funding initiatives such as Horizon 2020 and the European Space Agency. These dedicated national supports, such as the Horizon 2020 national support office in Enterprise Ireland, provide advice and funding supports to companies and academics wishing to engage in high value international research while also securing important sources of non-exchequer funding.

Realising Commercial Potential

- Commercialisation Fund – excellent scientific research invariably requires additional market knowledge and commercialisation work to bring it a point where it can either be transferred into industry or spun out into a new start-up company. The Commercialisation Fund addresses this gap in the research system by providing supports for academic researchers to take research outputs with commercial potential and develop them into market ready, investible opportunities.
- Technology Transfer Strengthening Initiative – Prior to 2007 the Irish research system did not have a dedicated technology transfer infrastructure to identify, capture, protect and transfer research outputs to industry The Technology Transfer strengthening Initiative instituted a robust technology transfer system which involves a network of dedicated staff with a commercialisation support remit in Universities and Research Institutions.
- Campus Incubation programme – Higher Education institutions' regional dispersed locations and high technological expertise make them fertile locations for young companies in their formative years. Enterprise Ireland's Campus Incubation Programme provides an incubated environment for young technology companies to receive business mentoring, network with other earlier start-ups & leverage on-campus R&D, skills and equipment assets on every higher education campus in the country. With over 60% of incubators in regional locations this scheme is a key contributor to balanced regional development.