

Submission to the
Department of Jobs, Enterprise and Innovation
on the Successor to the Strategy for Science,
Technology and Innovation

March 2015



Introduction and Overview

On behalf of its 13 member Institutes of Technology (IoTs), Institutes of Technology Ireland (IOTI) warmly welcomes the opportunity to input into the development of a successor to the strategy for science, technology and innovation. This is a critical document which should provide a framework for all stakeholders to work together to drive national and regional innovation that can support growth and jobs. The IoTs are committed to further growing strategically-oriented, impact focused research, development and innovation, as set out in their own sectoral strategic position paper¹, and envisage a key role in supporting the implementation of the new SSTI.

The regional aspect to the strategy is particularly important, and it must avoid an overly concentrated and centralised approach in mapping out the future direction through to 2020. The Department of Enterprise, Jobs and Innovation has demonstrated its commitment to balanced regional development, embarking on regional strategies within the National Action Plan for jobs, while its agencies Enterprise Ireland and IDA have prioritised regional development. However the consultation document does not reflect any consideration of how best to maximise the regional impact of the new strategy. The IoTs are a considerable resource in supporting regional innovation and development and **we believe that the work to be progressed against all 8 pillars should include a regional dimension.**

In the remainder of this submission, we address the questions set out in the consultation document within an overall response to each pillar, with the key overriding priorities from an Institute of Technology perspective made clear.

¹ 'Sustaining and Growing the Delivery of Strategically Oriented, Impact Focused Research, Development and Innovation in the Institutes of Technology'. Institutes of Technology Ireland, April 2012. Available at www.ioti.ie/RDI

Pillar 1: Investment in STI and key goals/targets

Ireland can and should be ambitious with regard to the new strategy for Science, Technology and Innovation. The Government, to its credit, has invested significantly in building research capability and facilitating the delivery of research impact over a sustained period, including maintaining a substantial base of funding during the fiscal crisis. In setting its ambition, however, it is important that Ireland recognises both its relative scale and its niche areas of strength and opportunity if it is to maximise the impact of Exchequer investment in future. While there is merit in an aspiration to move from Ireland's current status as an 'innovation follower' to realise the levels of R&D intensity in other small developed countries, this will only happen if State commitment can be matched by more significant engagement by industry, particularly indigenous SMEs, as it is this attribute which truly separates the leaders from the followers. Ireland has a natural advantage in its significant regional ecosystem, where there is strong engagement already in place between higher education institutions and business, and a focus on innovative entrepreneurship. The overall ambition must put the integration of industry engagement with research capability at the centre of the strategy, linking the scientific vision to a clear enterprise development plan from the outset. **Ireland can be the number one country in the world for innovation engaged SMEs with the right focus and investment..**

In this regard, the new strategy should make the principle of '**open innovation**' a key theme. This should adopt a holistic perspective on the key components which facilitate an effective RDI system: Government policy and funding; industry engagement; research; and education. There is a tendency to ignore the critical role of education in working in tandem with research in institutions to maximise the innovation outcomes and impacts. The interconnectivity between staff, students, research infrastructure and industry is also often overlooked in a silo-based investment system which tends to focus on just one of these with each programme or strand. These inter-relationships provide an essential foundation for an effective open innovation regional ecosystem. The recent article by Professor Willie Donnelly and Professor Bill O'Gorman sets out a 'blueprint' for the development of ecosystems of open innovation applicable to regions and small countries². **The new strategy should build on this work and establish a clear vision for the support of such regional innovation ecosystems within Ireland.**

Current STI policy, and funding instruments, have a tendency to favour engagement with MNCs based on their capacity to contribute and absorb large research projects, but the **real growth potential lies within the SME sector and the future strategy should place this as a central goal.** Evidence from the IOT campus-based innovation centres shows that the majority of companies established or supported remain in the regions after 'graduation' and their success leads to an enhancement of their regions. These companies benefit from the ongoing interaction with the research/academic body of the institute and innovation becomes embedded in their company culture. **In line with the central goal above, IOTI would propose a fundamental reconfiguring of the support system to target funding to the SME sector.**

² ECOSYSTEMS OF OPEN INNOVATION: THEIR APPLICABILITY TO THE GROWTH AND DEVELOPMENT OF ECONOMIES WITHIN SMALL COUNTRIES AND REGIONS, WILLIE DONNELLY AND BILL O'GORMAN, 2013 – Handbook on Politics and Technology, Ed. Hilpert, U.

Pillar 2: Prioritised Approach to Public Research Funding

In designing the future research funding approach, **it is critical that the priority is a joined up system which places equal importance on fundamental research, and the ability to apply research in industry, culture and society.** The starting point for the future SSTI investment strategy should be the leveraging of Ireland's unique and competitive strengths, not only in terms of the disciplines in which specialist research capability has developed, but with regard to its wider characteristics which can improve the overall impact of any research funded (e.g. strong regional ecosystems, entrepreneurship, scale, connectivity) .

Building on this wider definition of strengths, there is **a need to change the approach to research prioritisation and the current designated areas.** This should focus on the development of a platform and capability from which research opportunities can be addressed, rather than on the development of specific research disciplines. This might involve, for example, **investment in national test-bed infrastructure** and associated opportunities to increase European collaboration.

The current prioritised approach has created unconnected silos of research activity and a more horizontal, cross-cutting approach should be put in place which links areas of research in a meaningful, cross disciplinary way. For example, the intersection of ICT with tourism, education or agriculture offers significant research opportunities and applications. Meanwhile humanities and social sciences are generally not represented unless they fit with other areas e.g. connected health. Areas such as tourism, creative and cultural industries, education and design are not included, yet offer major potential impact at a societal level. The approach taken via Horizon 2020 more effectively incorporates these areas in a cross disciplinary manner and **success in further progressing the prioritisation agenda will lie in funding cross-disciplinary initiatives where there is major industry interest and opportunities for leadership at EU level.**

A mechanism must also be found to facilitate investment in new research areas which, over time, may then be prioritised. The self-fulfilling nature of the prioritisation process means that the prioritised areas will be successful as a result of securing the majority of investment. Emerging potential areas of research priority are often found through the **interaction between leading edge industry, entrepreneurs and academic research**, with future technologies defined by bringing together these different strands. It is important for Ireland to be seen as an early adopter of technologies, with its indigenous sector heavily engaged in this process. To support this, there is an opportunity to **broaden research, development and innovation activity in the indigenous sector by leveraging the existing contacts in the IoTs and designing programmes which encourage initial engagement in this way.** This should then link to a clear progression pathway to larger scale research investment programmes, with formalised roles for institutes within this process.

Pillar 3 Enterprise-level R&D and Innovation Performance

There has been welcome focus in recent years by Irish research funding bodies (e.g. SFI, Irish Research Council, Health Research Board) on increasing industry engagement in their programmes, albeit with mixed success, particularly in leveraging indigenous company participation. Enterprises remain sceptical about the benefits, and the **most critical incentive to participate will lie in the further demonstration of impact and of minimising of bureaucracy in accessing support to scale research efforts.**

The existing enterprise focused research and innovation support programmes are good, and there needs to be more openness to upscaling investment in areas which are working well. The technology gateway programme, for example, now has a long track record of getting SMEs to engage in research for the first time, deepening that engagement via longer-term projects, and delivering impacts in terms of business growth and jobs. However, the programme remains small scale and outside of the debate on the evolving research landscape. The programme is funded on a piecemeal basis without any future development strategy and this restricts the realisation of its full potential. **As a proven model which delivers impact from RDI, the Technology Gateway programme should be expanded as a vital part of the enterprise support landscape.**

There is a need to ensure that industry-focused programmes remain within the control of agencies with enterprise specific remits, and we would **strongly support protecting and growing the role of Enterprise Ireland in delivering RDI support programmes.** There is robust evidence of the economic impact of Enterprise Ireland initiatives (e.g. New Frontiers, Commercialisation Fund programmes, Technology Gateways, Innovation Vouchers/Partnerships).

A current gap in support for enterprise level R&D lies in **incentivising and promoting companies exploring export markets and becoming export ready by building innovation capability.** All current RDI interventions are focused on those companies already exporting, but significant impact could be leveraged by moving one step back on the development path. Such an approach could build on the IoT role in providing an effective, regional gateway to innovation for industry.

The future strategy also needs to take account of the fundamental difference in the types of support required by MNCs and indigenous industry. Support programmes offered by Enterprise Ireland to industry focus on implementation and product development. Investment for MNCs through SFI centres has a longer-term focus, engages PhD and post-doctorate resources and recognises the greater capacity of MNCs to bring benefit in kind to the project. Yet this approach does not foster a culture of research and development in indigenous industry. **The strategy should focus on the key challenge of growing innovative businesses in the post-incubation phase, where enterprises typically employ 5-10 employees and are trying to build revenues above €1m via innovation in product and service development.**

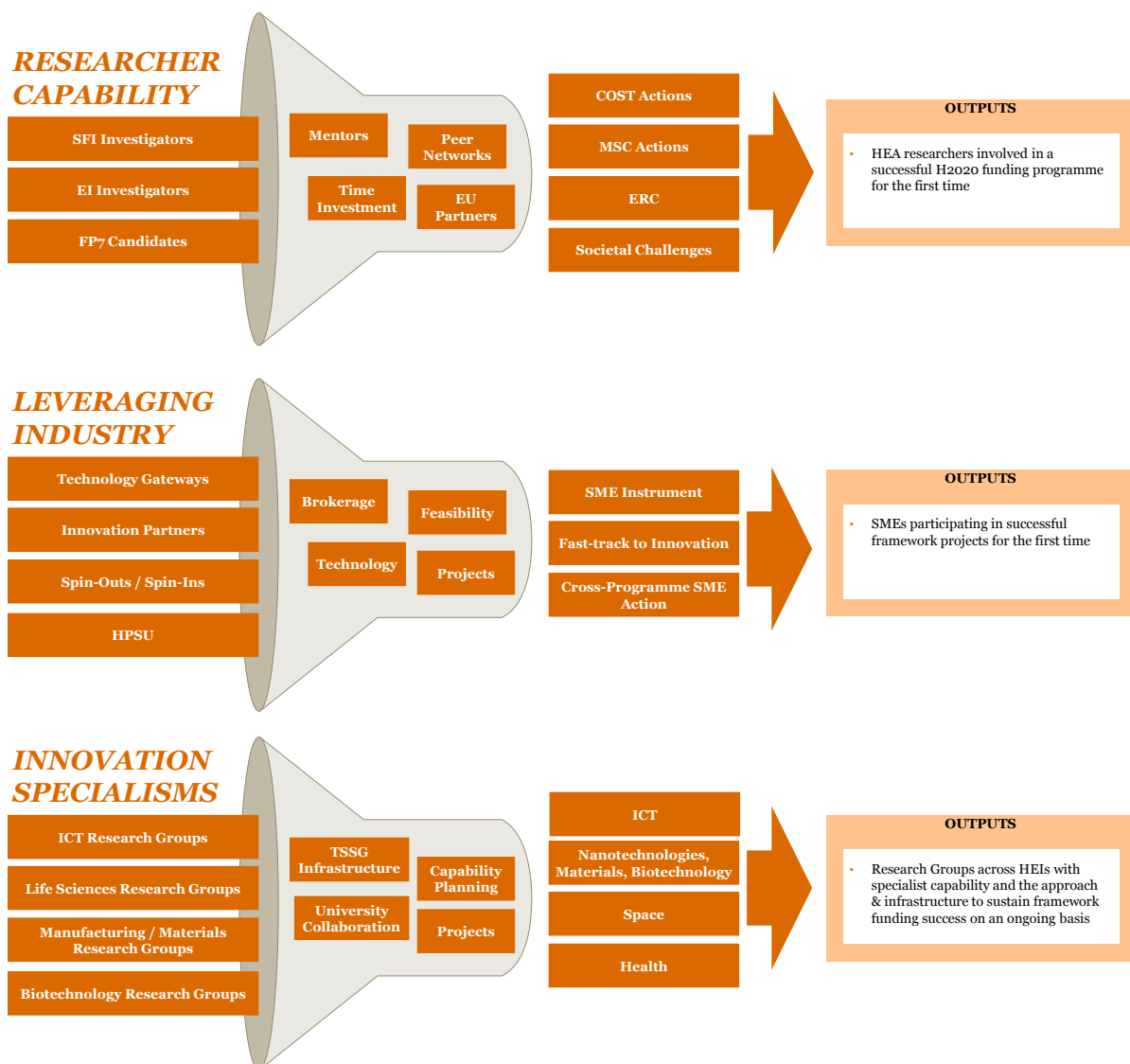
The strategy also needs to clearly incorporate entrepreneurship and incubation within its vision for enterprise support and development. The Institutes of Technology serve as a key driver of regional entrepreneurship and start-up activity. The largest entrepreneurship programme in Ireland, New Frontiers, is delivered by IoTs and creates over 100 new businesses each year. Many of these businesses locate in the incubation and innovation facilities in place in every Institute campus across the State. This critical aspect of regional infrastructure supports up to 350 enterprises at any one

time, and all of the incubation and innovation centres operate at full capacity. It generates a 'spin in' model where new companies access institute research expertise to build innovation capability which helps them to grow, often via the technology gateways, but there is a need for additional targeted support to replicate this model across a wider cohort of enterprises.

Pillar 4: International collaboration and engagement

Horizon 2020 programme performance will clearly be a key driver in building international research collaboration and engagement. Ambitious targets have been set for Ireland in this regard and it is important that focusing on the ‘big bets’ which can make major inroads towards this target does not distract attention from the wide range of activities where Irish HEIs have previously demonstrated success. **A clear focus needs to be put in place around how existing national programmes support researcher capability; leveraging industry; and developing innovation specialisms.** This then needs to be linked to key target components within the H2020 programme, with a very clear set of target outputs developed in each case. An example of how an effective approach to targeting H2020 within the new strategy is provided below. IoT performance in framework funding developed significantly during FP7 but a very successful mentoring and support programme was discontinued for financial reasons, and momentum has been lost.

Figure 1: Focusing the Future SSTI on a Holistic Approach to Horizon 2020 Success



Re-invigorating the role of IoTs in delivering Horizon 2020 success via this type of structured three prong approach would generate significant impact for Ireland and ensure a much more holistic

approach to meeting programme targets. IoTs have particular potential to serve as a mechanism through which SMEs can interact with Horizon 2020 by targeting existing SME contacts, navigating the application process and brokering partnerships. However increased investment is required to fully realise this potential.

The strategy should consider how a more strategic approach to international collaboration could be put in place. Brazil's *Science without Borders* programme has been successful in encouraging two way flows of postgraduate and undergraduate students and in encouraging international research partnerships. While the net investment by the Brazilian Government has been welcome, the additional value delivered in terms of collaboration suggests that establishing partnership programmes with other States could provide a platform for significant further success. **The strategy should therefore consider how networking projects could be supported to build mutual capability.**

There is also scope to improve the potential for cross border and north-south collaborations. Although InterTradeIreland provide some targeted support around accessing EU programmes, there is currently no strategy for strengthening existing links with HEIs and industry in Northern Ireland and in leveraging this to full advantage. **The new strategy must reflect all-island STI opportunities.** It should consider how the funding awarded to support collaborative partnerships through Interreg, Horizon 2020 and other European funding programmes can be effectively targeted via a more strategic approach.

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

A core goal of the new strategy must be to ensure a much more joined up approach across the research landscape to maximise its impact. This submission has noted the strengths of IoTs in linking with SMEs and undertaking applied research. There would seem to be natural potential for IoT research groups and centres to serve as spokes within the SFI research centre model, but there has been little evidence of such an integrated approach to date. A whole system approach must be introduced which utilises the attributes of IoTs in driving regional innovation and SME links, and recognises the developmental stage of activities in some institutes. This whole system approach must include support across the entire spectrum of RDI interventions from postgraduate funding to facilitating short-term projects with industry. This should include:

- **Providing support for a base of key operational personnel and a sustainable technology base (equipment, operating costs, maintenance costs, and ongoing renewal) to facilitate research activity within IoTs.** Unlike the university sector, IoTs do not have access to a specific allocation of core funding to support research. Thus our research centres, though funded initially for setup costs under programmes like PRTLI or the ARE scheme, have to rely on an Institute's own resources and leveraged funding if they are to act strategically to deliver on their objectives.
- **Expanding the Technology Gateway model as the key research flagship initiative across the IoTs.** The Technology Gateways offer the only source of open innovation for industry/SMEs, with SFI centres engaging with companies via a membership model. As noted earlier in this submission, the Technology Gateway programme works well and provides significant return on Enterprise Ireland's investment. Gateways secure 40% of their funding directly from industry which is significantly higher than that achieved by comparable programmes.
- **Providing a sustainable base of postgraduate funding.** A programme such as the HEA-funded Technological Sector Research (Strand I) secured a pipeline of masters and PhD students in key research areas. These postgraduate students are necessary to generate the underpinning knowledge which secures the future relevance of Technology Gateways and IOT research and teaching offerings. The development of entrepreneurial undergraduates requires a research active staff body and a clear embedding of research, innovation and knowledge transfer in undergraduate programmes. This programme was stopped during the financial crisis and should re-commence.
- **Ensuring all HEIs are involved in key STI representative groupings.** There are a number of instances where the IOT sector has been excluded from national groupings e.g. Irish Humanities Alliance and the Horizon 2020 National Support Network (currently only two IOTs are members).

It should also be noted that the growth and scale of research activity in the IOTs has been achieved despite arrangements which do not facilitate a productive research environment with barriers including **staff contracts, teaching workloads, access to pensions and career recognition**. A national strategy should ensure that these issues are addressed to facilitate further development across the entire higher education sector.

Finally, the vision for a **market-focused research centre model has validity**, but it must use the existing resources in this space and tap into the links and expertise available in IoTs and universities. The established technology gateway model should be a key component of any future approach.

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

The introduction of Knowledge Transfer Ireland is a highly positive development and the new body has engaged very successfully and proactively with the IoTs. However, its governance structure presents some risk of it being overly university-centric (with the IUA employing the Director and accountability structures in place involving its Council), whereas it must **work closely with the IoTs to tap into the significant potential that exists to ramp up knowledge transfer activity**. IoTs have a track record of delivering impact for industry (as shown via the many case studies available at www.ioti.ie/RDI) and KTI should be supporting and communicating its role as a lever of industry (and especially SME) engagement in RDI.

Knowledge Transfer Ireland runs the Technology Transfer Strengthening Initiative and the metrics set for the next TTSI programme should move beyond the current generic approach. Targets and metrics need to be broadened and tailored to specific consortia e.g. where the licences do not suit the commercialisation of a particularly strong research area an alternative, appropriate metric should be considered. **The new strategy should, as far as possible, attempt to introduce a common set of performance metrics to monitor progress and impact.** It is critical, however, that these do not overly focus on traditional metrics and consider the critical factors that facilitate STI success. For example, the IoT sector committed to the following key STI indicators in its recent strategic position paper which attempted to adopt a holistic approach to considering performance and impact.

- **Overall RDI Funding:** Overall level of RDI funding from all external sources
- **RDI Funding Profile:** RDI funding profile which is more balanced towards EU and industry investment
- **Industry RDI Investment:** Proportion of the costs of running IoT specialist research centres which are met by direct industry investment
- **RDI Expertise:** No of staff engaged directly in delivery of RDI activities in IoTs
- **RDI Postgraduate Base:** No of postgraduate students undertaking research at Level 9 & Level 10 in IoTs
- **Industry Engagement:** No of industry partners involved in a research or innovation project in partnership with an IoT supported by Exchequer, EU or direct industry funding
- **SME Penetration:** Number of SMEs involved in a research or innovation project in partnership with an IoT which is supported by Exchequer, EU or direct industry funding
- **Industry Ready PGs:** Proportion of Level 9/10 provision involving direct innovation placement with industry
- **Staff Industry Expertise:** Proportion of staff working on RDI projects with direct industry experience
- **Postgraduate Employment:** Proportion of IoT research postgraduates working in industry 3 years after graduation
- **Research Publications:** Number of peer-reviewed publications generated by IoTs as recorded by Scopus
- **Research Impact:** Number of citations generated by research publications by IoTs as recorded by Scopus
- **Licenses and Patents:** No of licenses generated or patents issued as a result of the generation of IP by IoTs
- **Spin-outs & Spin-ins:** Number of innovative spin-out or spin-in companies supported by IoTs
- **New Jobs Created:** Number of new jobs created with support of the RDI activities of all IoTs

The approach to IP management and rights in Ireland, as set out in the IP protocol, 'Putting Public Research to Work' has focused on a traditional understanding of IP and the formalisation of processes around it. **However the importance and value of know-how needs to be recognised in the new strategy along with traditional forms of IP.** In an open source environment it is the strength of expertise and the culture of ideas generation and development that is sought by industry. A 'world class IP regime' has not been defined but the general movement is towards an open source environment, tying in with our earlier recommendation on support of regional innovation ecosystems.

The cost of maintaining patents is huge but protection is a prerequisite for commercialisation and translation. **The new strategy should consider how such patent costs could be more effectively supported across the higher education sector.**

Pillar 7 Government Wide Goals on innovation in key sectors for job creation and societal benefit

The strategy must reflect clear Government wide policy and goals with regard to jobs and growth, balanced regional development, skills and education, communities and infrastructure. This should ensure that a fully integrated strategy is put in place which recognises:

- the **regional aspect** across all pillars;
- the facilitation of an **open innovation ecosystem**; and
- the creation and development of **research excellence**.

The strategy should identify the roles of all the key stakeholders in its delivery, providing clarity on the strengths and opportunities in each case, and providing for a level of investment that will allow each player to realise its potential to contribute to national objectives.

Research can be a key platform to both build a better society and create jobs and economic growth, but this needs to be facilitated by a **policy and funding approach with recognises and supports the practical application of knowledge in delivering these outcomes**. This is why it is critical that an overriding focus on fundamental research is avoided and that innovation projects with impacts on businesses, the community and society are supported. There are many examples of how IoTs have worked with communities to deliver societal impact through innovation (again see www.ioti.ie/RDI for details).

This links to the need for a wider regional approach, with the pivotal role played by IoTs in these economies and their proximity to industry offering major potential to translate RDI into impact. **The strategy should therefore leverage the regional spread of IoTs and their proven ability to support and grow sustainable industry around Ireland**. Many areas served by IoTs have been designated as priority areas within the National Action Plan for Jobs (e.g. Border, South-East) and in the absence of a National Spatial Strategy it is important that a strong regional emphasis is contained within the strategy.

There are also natural assets possessed by Ireland which, combined with the research capability built up around them, can be used to deliver impact. **Expertise in health, sustainability, marine, and wind energy offers potential for impact in different ways which can reinforce wider Government objectives and it is important to consider this cross-fertilisation of policy with research wherever feasible**.

Pillar 8 Research for Knowledge and the development of human capital

The development of human capital is a core issue in STI and it should be a central driver within the new strategy. **Inequality in the existing approach to funding researchers across the HE sector is a major issue that must be addressed within the new strategy.** There is a longstanding postgraduate deficit in IoTs and there is a need for a renewed focus on building core capability in this area, in the absence of the same core Exchequer funding for research which can be directed towards postgraduate provision by universities. **Postgraduate funding and particularly funding for masters level research projects within IoTs needs to be addressed as a key priority.** Masters by research projects can more closely align with company needs, have been identified as a priority within the National Research Prioritisation Exercise, and would fit well with the IoT track record in the practical application of research.

Facilitating researcher careers should also be an important focus of the strategy, and issues around contracts and pension access further exacerbate the deficit in human resource capacity currently faced by Institutes, limiting their ability to use the robust industry partnerships established to progress further impact-focused research.

The strategy must also provide a clear framework around the connection of human capital with industry. The development of Irish Research Council employment-based postgraduate programmes in recent years has been welcome, but the process could be made easier for HEIs and enterprise. A good research idea with an engaged industry partner should be sufficient to release the associated funding resource via a streamlined process, and this should be a key priority.

Despite the postgraduate funding deficit, **IOT researchers represent an area of untapped potential on which the new strategy should focus.** A recent set of researcher profiles was produced by IOTI which notes the significant achievements and focus on impact of many key researchers across the sector (these profiles are available at www.ioti.ie/RDI). These researchers have delivered major results through their research collaborations and transfer of knowledge. This human capital needs to be recognised and harnessed, with developmental programmes put in place.