

## **KNOWLEDGE ECONOMY REPORT 2016**

### **Connect Leadership Board's analysis of what it will take to become one of the best in Europe by 2030.**

#### **1. Introduction**

Following the publication of the 2016 Knowledge Economy Report for Northern Ireland, Connect's Leadership Board is pleased to outline the measures we believe will be necessary for Northern Ireland to become one of the most entrepreneurial knowledge economies in Europe by 2030.

Currently there are 40,000 people employed in the Knowledge Economy and implementation of these recommendations will result in:

- 40,000 additional direct jobs in knowledge economy companies
- paying a 50% wage premium over the average job.
- an additional 80,000 jobs in indirect and induced jobs (assuming we can successfully adapt to the coming automation of many jobs).
- Total potential of 160,000 jobs directly and indirectly by 2030

We welcome the priorities and ambition captured in the draft Programme for Government and Economic Strategy for Northern Ireland which recognise the need for policy and investment action to achieve direct benefits in jobs, exports and sustainable economic growth.

This paper provides an independent assessment of the commitments that will be required from private, non-profit and government sectors.

This comes from our belief that every business in the private sector must be involved in delivering on the economic strategy.

#### **2. Summary of Recommendations**

- The key outcome of Northern Ireland's economic strategy must be the creation and scaling of indigenous companies.
- Northern Ireland must focus on a few sectors and areas of platform technology where we can be world leading
- As research will be at the heart of these sectors, we must create an appropriate number of research institutes that can genuinely claim to be world-leaders in their respective fields and of sufficient size and scale to drive and develop these sectors.
- We recommend a review of how SMEs experience current support for R&D and to examine ways of significantly increasing the numbers of SMEs participating in R&D.

- The implementation of the SQW recommendations on venture capital, now.
- Our primary and secondary education systems must be modernised; introducing more project based learning, a revised curriculum in light of the automation of jobs, increased apprenticeships, facilitating enterprise and entrepreneurship, and recognising more than just academic achievement.
- If we want to really get ahead we need we need to be investing 10% more than the UK average in Higher Education, not just achieving parity.
- Connect at Catalyst Inc is implementing 4 new programmes in 2017 focused on expanding inclusiveness and building communities around our new cluster sectors, scaling and building stronger teams earlier.

### 3. The Challenges

	<b>Growth required to 2030</b>
<b>R&amp;D:</b>	Grow total R&D from £0.519 Billion in 2014 to £1.5 Billion <ul style="list-style-type: none"> <li>• Increase the % of <b>SMEs</b> involved in innovation and increase their £ investment</li> <li>• More multi-national companies doing more world-class R&amp;D in Northern Ireland</li> </ul>
<b>Education:</b>	To fill the 40,000 new knowledge economy direct jobs, we must: <ul style="list-style-type: none"> <li>• modernise our education system so that our young people aspire to and are qualified for these most lucrative opportunities to minimise employers need to import qualified labour.</li> <li>• Prepare our young people to succeed in a working world where 47% of jobs that exist today will be gone tomorrow due to automation.</li> <li>• Support change to an entrepreneurial culture</li> </ul>
<b>Venture Capital</b>	<ul style="list-style-type: none"> <li>• Evolve our local venture capital model to achieve total annual investment of £90M per annum by attracting specialist external venture capital funds to invest the resources to scale our companies.</li> </ul>

### 4. Recommended model: Research centred clusters

In just three years Belfast has become one of the world's top centres for cyber security. This is due to the eco system developed out of the success of Queen's University's Centre for Secure IT (CSIT) based out of the ECIT Global Research Institute and CSIT's model for engaging with industry.

They have generated 1,200 high value jobs with 500 more in the immediate pipeline. The result is 5 cyber security start-up companies and numerous globally significant companies are now engaging in R&D in Belfast.

The key to maximising high value jobs in our economy is growing, replicating and scaling this model in other sectors and geographies in Northern Ireland.

It is now widely accepted that most global corporations cannot meet their research and innovation needs exclusively internally, in fact existing corporations are more likely to be displaced by innovation that they did not see coming.

In specialised fields that emerge as 'strategically critical' demand for talent outstrips supply and capturing the best talent qualified to PhD and post-doc level can make the difference to the future of a company's product/service line.

It is increasingly common for corporations to seek to collaborate in shared spaces of research and innovation in key cluster areas of research and start-ups. As well as gaining access to talent, the corporations also access the intellectual property that is developed within the institute and help influence research activities. Corporations also help open up important other national and international linkages and bring a strong business and commercial perspective to the world of academia.

The value of this model is primarily the high-value jobs that come from the supply of talent to corporations, who can help to maintain competitive advantage in their product/service pipeline and the subsequent investment that flows into the region from making sales in export markets.

Disproportionately high value can be generated for a region when new start-up companies are created and some achieve scale. This happens when talent in the research community (technology insight) meets regularly with their counterparts in corporations (market insight).

New relationships and trust forms and they agree to develop a product to address a market need. A more integrated community can also lead to more commercialisation outcomes for the intellectual property generated from the research by both licensing and new spin-out companies, given the stronger teams that can form to commercialise.

It becomes harder for new and established companies that benefit from the research institute to relocate to other regions because of their dependency on the talent pool and the innovation pipeline.

## **5. Recommendations**

### **5.1 The purpose of the economic strategy: Focus on Indigenous companies**

**The key outcome of Northern Ireland's economic strategy must be the creation and scaling of indigenous companies.** Research & development, clusters, networking, and foreign direct investment all remain critical elements of the

strategy, but the focus of each of those areas must be aligned to achieve the outcome of ultimately creating more indigenous companies. Scaling indigenous companies with leadership located in Northern Ireland represents the highest economic return for our region long term.

## **5.2 Research. And Development**

### **5.2.1 Priority sector clusters - Public Policy 1**

We must focus more narrowly where we have the potential to become world class. We support the work of Matrix in identifying priority cluster sectors including:

1. Future healthcare: stratified & precision medicine, connected health and two platform technology areas:
2. IT: IoT (internet of things) and cyber security & analytics applied in all megatrend sectors fintech, healthcare
3. Advanced Engineering: robotics, materials, applied in transport and other sectors

### **5.2.2 Achieve more world-class research institutes of scale – Public Policy 2**

Key to all of this is achieving world-leading research at scale. Only by achieving significant scale at that standard will we attract the best talent from around the world, develop a reputation for solving significant problems and provide the impetus for foreign direct investment via new opportunities for research collaboration.

To be internationally relevant, our best science-related research institutes will need to achieve a scale of around £50M of funding over five years from local, national and private sources. Sustained, core government funding in quality research is critical to this mix. We believe that Northern Ireland will need to achieve more research institutes of this scale, focused on the priority areas outlined in 4.2.1 and designed consistent with the ECIT / CSIT model; centred on research translation, innovation and entrepreneurship, designed with industry partnership and global reach at the centrepiece of their design to integrate with international and local industry.

Other great examples of this ambition can be seen recently from both the €68M Cúram medical research centre in Galway and when London's Crick Institute is fully operational it will employ 1500 staff, including 1250 scientists and have an operating budget of approximately £130 million a year.

### **5.2.3 Government Procurement – Public Policy 3**

A primary role played by government in the transformation of Silicon Valley, Sweden and San Diego into dynamic knowledge economies, was government procurement. Mechanisms, including the Small Business Research Initiative, which Northern Ireland has been pioneering, are a great example of how government can be an important driver in the development of new products and companies.

For example, within the Northern Ireland priority focus sector of healthcare, there must be a directive to adopt and procure new technologies locally. A culture should exist of willingness to evaluate new products alongside existing methods and to adopt those products if they meet essential criteria (e.g. more accurate, more cost effective, contributes to reducing waiting times).

This increases local manufacturing, creating more jobs, which results in increased taxes to the government who can then increase funds to schools and healthcare. This will encourage life and health science companies to set up in Northern Ireland. Currently, if there is not a market (i.e. adoption) for a product in N. Ireland, what is the incentive to do R&D here?

Continuing with Healthcare, clinicians do not have time allotted within their schedule to perform research. A policy change is required here.

#### **5.2.4 Review SME R&D support – Public Policy 4**

##### **a) Assess ease of access to R&D funding**

Like government, we see the need to significantly increase R&D among SMEs as one of the key challenges of achieving our vision. As part of this, we recommend a survey of SMEs who have participated / not participated in R&D, explore experiences of participation / reasons for non-participation / level of awareness of support / what would it take to ensure participation. The study could be further enhanced by examining and comparing experiences in the Republic of Ireland and the reasons for the known high uptake of ROI and EU Horizon 2020 grants, for example.

##### **b) Support for sales and marketing**

Marketing drives R&D to maximise and simplify the eventual commercialisation process. Marketing should be at the heart of the company focusing R&D, identifying and validating the problem (market), focusing the product (solution/value proposition) and driving commercialisation (promotion and sales). There is a positive opportunity to create significant impetus to maximize R&D by putting more emphasis and resource into marketing support for SMEs in Northern Ireland.

#### **5.2.5 Build cluster communities – Private sector action 1**

While Northern Ireland has a great infrastructure for people to learn from institutions, we are not set up for people to learn from each other. There is a missing “social layer” within our innovation eco-system where people find their tribe, develop new relationships and become inspired by the contagion of sharing ideas and contacts with likeminded ambitious people.

At Connect, we see our role as a catalyst to help things get started so instead of simply organising new activities, we realize that we need to create a platform to help new and existing leaders to organise. We are introducing three new initiatives to help:

1. We will introduce **Congress** in Q1 2017. A new community forum where passionate stakeholders can collaboratively design, coordinate and grow the event stack to scale across NI.
2. **MeetUps**, also going live in Q1 2017. This will enable leaders from the emerging cluster areas to organize their own bear-pit debates between researchers, startups and corporates on how megatrend disruption will play out.
3. To help in the challenge of scaling companies, Connect will be introducing a third new programme, **Peer Support Networks** for CEO, in early 2017.

### 5.3 Venture capital

#### 5.3.1 Implement the SQW recommendations now – Public Policy 5

Capital is the fuel of growth. Northern Irish entrepreneurs need access to specialist investors and their networks to fund the development of new products and then specialist investors who can help them scale multi-national companies. While Northern Ireland's provision of venture capital has never been better, it could be improved further to enable much more creation and scaling of companies.

The Economic Advisory Group (EAG) was established in 2010 to provide independent economic advice on the Northern Ireland economy to the Minister of the Department of Enterprise, Trade and Investment (DETI). The EAG undertook a review of Access to Finance in March 2013, which had been extensively raised as a key issue facing local businesses at the time. In response to one of the EAG recommendations, [research was carried out by SQW Ltd](#) for DETI looking at the long-term development of early stage and growth finance in Northern Ireland. EAG's recommendation following presentation of the findings, conclusions and recommendations of the report was as follows:

*“Recommendation 4: DETI should develop and implement an action plan, involving other key stakeholders such as Invest NI, the NI Science Park and InterTradeIreland, to take forward the SQW recommendations in relation to early stage and growth finance. This needs to be acknowledged as a priority within the department and appropriate resources devoted to it to ensure that actions deliver the results with the ambition that the SQW report outlines. “*

While the conclusions and recommendations in SQW's research missed some important elements of what the optimal model of venture capital in Northern Ireland would be, implementation of the recommendations as written and approved by EAG will be a good start to evolving the model of venture capital investing in Northern Ireland to begin to attract external investors that will give Northern Ireland the firepower and expertise to scale companies. The SQW recommendations must be implemented in full now.

### 5.4 Education

We have the opportunity to fill nearly 80,000 highly paid new jobs if we are to hit our 2030 target.

We have an education system that is embedded in traditional subjects and needs to be updated to meet future economic requirements. For that to happen we need knowledge economy businesses to be directly engaged.

If we do not modernise, our young people will not be employable for Northern Ireland's future opportunities. This is especially important given the extent of automation that will accelerate in the workplace over the coming years.

#### **5.4.1 Project based learning – Public Policy 6**

Educational theory recognises three essential learning preferences, fully developed in the vast majority of human beings by the age of 14. Auditory learners and Visual learners thrive in the classroom situation. Kinaesthetics, or learners-by-doing do not and they have suffered with the increasing focus on school audit and a results' only culture. This single cause may go a long way to explaining our long tail of low performance.

Project based learning and design thinking must be introduced into the curriculum as an essential skill for every child to equip them with the tools to be able to solve problems collaboratively.

#### **5.4.2 Review curriculum – Public Policy 7**

For a healthy Knowledge Economy, the whole population needs communication and basic numeracy and 100% must be the target for every school- and college-leaver. The curriculum body must regularly review and identify relevant subjects for the requirement to introduce new GCSE and A-levels. This is now urgent given the coming automation of many of today's jobs. We believe that coding should be added to the curriculum. Code academies are becoming an increasingly important entry-point for the conversion of non-STEM qualified school leavers and for young people from communities where educational attainment is not valued.

#### **5.4.3 Apprenticeships – Public Policy 8**

Many of the core subjects essential in a vibrant knowledge economy are constrained skills. That means they must be learned in sequence; so early informed choices must be made. Long gone are the days when youngsters could ignore school and then pick up job skills at 16 during a five-year apprenticeship that would enable a job for life. That said, the Apprenticeship process, with the intense focus on practical learning by doing and clear demonstration of the relationship between work and learning has never been more important. New-style apprenticeships and other "earn-as-you-learn" should become readily available from age 14-25 in schools, colleges and universities.

#### **5.4.4 Redefine "Achiever" – Leadership and society**

Northern Ireland society needs to broaden our definition of a "high achiever" to include entrepreneurship in addition to the A\*. We would like to see all school

children at both Primary and Secondary levels have an experience of Entrepreneurship as part of the curriculum preferably based around STEM subjects. This experience would also permit team-working, communications, design thinking etc and a practical understanding of business and money - skills which are essential for anyone starting a business or going into employment, and which employers often find absent in new recruits both graduates and non-graduates. In particular the success of enterprise academies and schools initiatives to enable students to start businesses while learning should be explored.

#### **5.4.5 Higher Education funding – Public Policy 9**

Apart from private company R&D, the significant proportion of future high tech start-ups in Northern Ireland will emerge from graduates, PhD and post-docs. Therefore Northern Ireland should be increasing investment in Higher Education instead of cutting it. We need to remain ahead of the UK average at least by **10%**.

Currently Ulster University and QUB get around 75% of the HEIF funding of English University peers, even though our Universities outperform many of them. On top of this HEFCE has announced a further £120m for tech transfer which is only for England and NI will not be able to bid into this. We recommend achieving parity of funding for NI universities and GB.

## **6. About Connect**

Connect is a tech start-up success system, a network of experienced entrepreneurs and business professionals who offer insight and guidance to fledgling tech companies. Ideas and determination are Northern Ireland's greatest assets. Our job is to maximise their potential and with the support of Catalyst Inc, who provide the necessary underwriting, we're confident about making it happen.

The ideas and ambition of entrepreneurs in Northern Ireland have the power to change the world. We're here to help that happen, by offering insight, applying rigour and pushing possibility.