NCC Statement on Innovation

Competitiveness through Innovation

A Submission by the National Competitiveness Council to the Enterprise Strategy Group

February 2004

National Competitiveness Council

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1. Introduction and Overview

The National Competitiveness Council (NCC) submits this document for consideration by the Enterprise Strategy Group (ESG) in the context of putting in place the foundations for a more competitive, dynamic innovation-driven economy. The NCC defines competitiveness as the ability to achieve success in international markets leading to better standards of living for all. National competitiveness stems from a number of factors, notably firm level strategies and a business environment that supports innovation and investment, which combined lead to strong productivity growth, real income gains and sustainable development.

The Council has made a number of recommendations under four headings outlined below, which are designed to support the knowledge-creation process and to address deficiencies in the **Research and Innovation Agenda**.

NCC Recommendations on Resources and Coherence in Public Investments in Research and Technology Development

1. The provision of significant public resources for investments in R&D must be matched by the establishment of an institutional structure accountable for monitoring, evaluating and reviewing the effectiveness of publicly-funded R&D expenditure. This should include an improved cost-benefit approach to evaluating R&D expenditure.

2. A framework is needed to provide strategic direction to and co-ordination of the R&D funding programmes across all Government departments.

3. The Tánaiste should bring a proposal to Government to re-institute a Cabinet Sub-Committee on Science and Technology at ministerial level, to be chaired by the Taoiseach or his nominee.

4. The state should concentrate research funding in a number of niche sectors and areas of strategic economic opportunity. Embedding a foresight approach in policy making and developing a technology assessment capability within the National Innovation System will be crucial in this regard.

NCC Recommendations on Industry-Third Level Research Collaboration

5. A state-wide technology transfer support network, or intermediary structure, is needed to optimise the uptake of new knowledge or the adoption of existing knowledge by companies. Existing industry liaison offices based in third level institutions should also pool resources to strengthen campus-based technology transfer functions and to provide funding for and access to a network of technology transfer resources and external expertise.

6. The ESG should propose new mechanisms to promote awareness in industry of the range and level of research being carried out in the third level sector and to provide opportunities for the development of industry-academic working relationships.

7. The ESG should encourage swift implementation of the ICSTI National Code of Practice for the management of intellectual property from publicly-funded research.

8. The ESG should call on the Government to commission a "Lambert-style" review of existing industry-third level research collaboration programmes and explore new ways to improve collaboration.

NCC Recommendations on Supporting Clusters and Networks

9. The development agencies should act collaboratively to identify, encourage and facilitate opportunities for cluster development. The agencies should be tasked with the identification and publicising of specific clusters and structures should be put in place in order to monitor the effectiveness of such actions.

10. Enterprise policy should not be about "picking winners" among competing technologies and sectors. Rather it should serve to reinforce existing strengths and should accommodate industry led cluster development.

11. The development agencies should target FDI opportunities which augment the competitiveness of specific clusters. Furthermore, the agencies should encourage and support networks for each of the identified clusters.

12. The development agencies and other relevant policy makers should support the work of networks in interacting with the public sector in order to minimise the administrative burden on enterprise. It is vital that the legislative framework makes delivery of supports for networks as efficient as possible.

13. Policies are required to promote the development of centres of research excellence in third level educational institutions which would be matched against identified clusters.

14. The existing sector representative bodies should consider their role in the promotion of clusters and ensure that they are in the best position to facilitate cluster development.

15. Government needs to be more responsive and supportive to industry needs, in terms of the provision of infrastructure and collective assets, as well as other tools designed to facilitate cluster development.

NCC Recommendations on Fostering a Culture of Innovation

16. Third level institutions in particular should be partners with government and industry in the development of an innovation framework and through the development of research excellence in the 3rd and 4th levels.

17. Courses which encourage and indeed introduce key entrepreneurial skills need to be implemented at various levels of schooling.

2. What is innovation?

Innovation is the creative process that transforms technology and new discoveries and processes into commercial value. As innovation is a cornerstone of competitiveness in a knowledge-driven economy, the quality of innovation support policies are critical levers of economic development. Innovation is dependent on understanding the needs of international markets, an open competitive environment and the ability to foresee changes in demand and market conditions, as well as investment in Research & Development (R&D). However, more than this and for the purposes of this submission, the NCC believes that innovation can most usefully be seen as a mindset, which involves the ability to manipulate and apply knowledge as part of a constant renewal process.

3. Why is innovation important?

Productivity growth is essential to international competitiveness. Traditionally, an economy can improve its productivity in one of two ways: either through a reduction in costs or through the production of higher value added products or services. While emphasising the need to continue to minimise costs (in order to attract international researchers and to ensure that R&D can be undertaken in Ireland at a competitive cost level), it is clear that future Irish competitiveness also depends on productivity gains which accrue from innovations in product and process design. There is generally widespread agreement that the Irish economy will need to be more innovative and knowledge-intensive as part of this process. It is therefore vital to ensure that all of the elements of a knowledge economy and society are properly understood and that there is an innovation mindset in those sectors where it will be needed most.

4. Recent evidence

Benchmarking work undertaken by the Council in this year's *Annual Competitiveness Report* (ACR) highlights Ireland's innovation deficit vis-à-vis our most important competitors and provides clear evidence of the need to implement policies to address this issues: Ireland was ranked 10th out of 12 countries examined concerning patents granted by the U.S. Patent Office per million of population, 10th out of 14 countries surveyed for patent applications per million of population to the European Patent Office and 10th out of 16 countries surveyed for production process sophistication. This is despite high levels of employment in high technology activities (particularly electronics, pharmaceuticals and software) and high numbers of science and engineering graduates, relative to other European countries. This is the core of the paradox of Ireland's image as a technology-based

economy combined with the absence of high levels of innovation activity and research investment to back up that image.

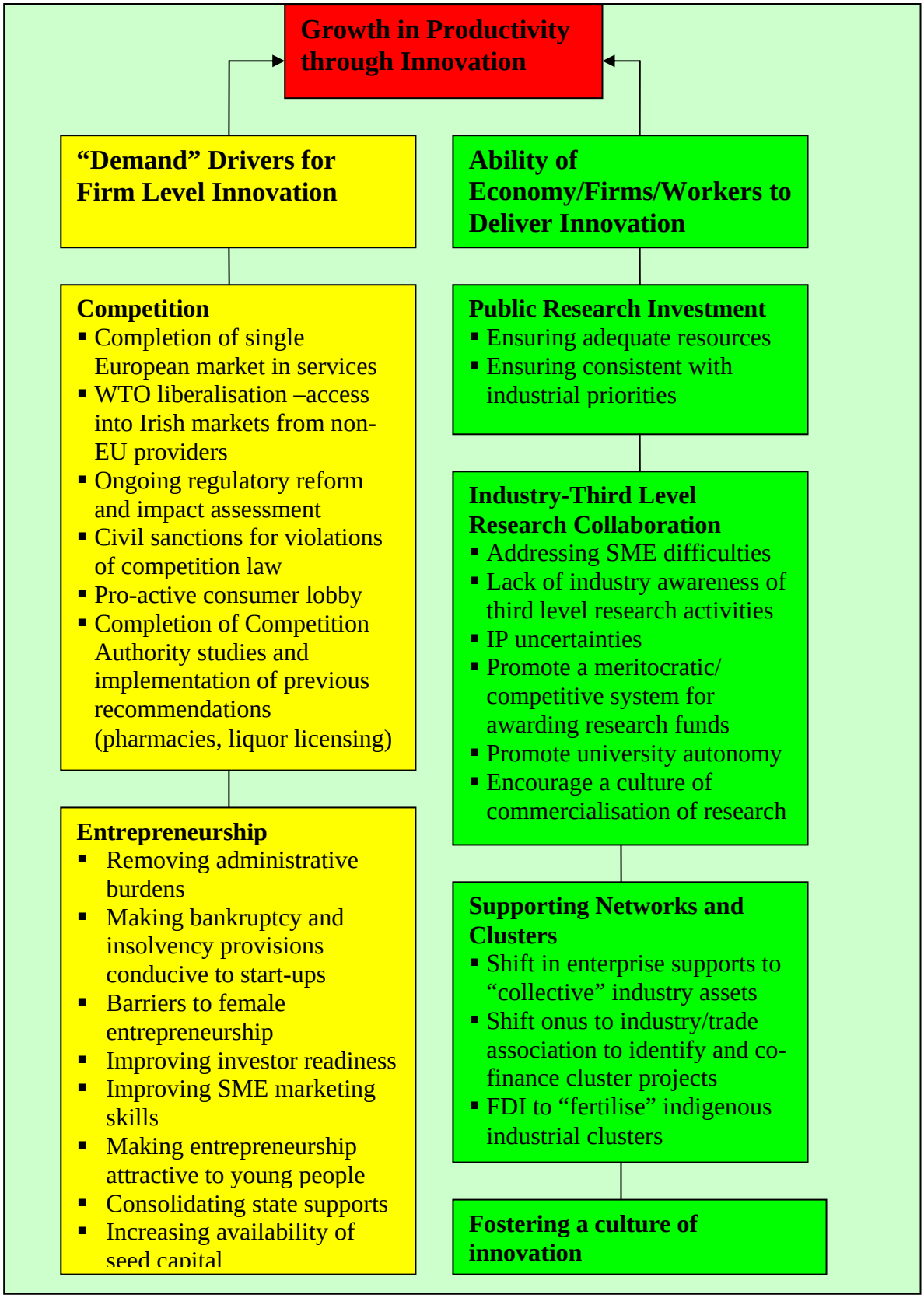
5. Towards a Solution

Ireland's challenge in developing into a more innovation- and knowledge-driven stage of economic development is two-fold:

- Putting in place policies that support the knowledge-creation process, thereby providing Irish firms with access to domestic sources of technological innovation. A key driver of Irish economic growth going forward will be the ability of Irish researchers to develop technologies of relevance to Irish industry, and the ability of Irish businesses to commercialise them. We describe this as the **Research and Innovation Agenda**.

- Putting in place policies that support the propagation and diffusion of new technologies and practices (whether home-grown or foreign). Within industries, technology diffusion and process innovation happens as a result of existing firms adopting new technologies and processes in the face of competition, or through the emergence of new, more innovative market participants. We describe this as the **Competition and Regulation Agenda**.

This submission deals solely with the Research and Innovation Agenda. The views of the Council and its recommendations on Competition and Regulation have already been made clear in the *Competitiveness Challenge 2003*, published in December last year The Council calls on the Enterprise Strategy Group to recognise the vital role that vigorous domestic competition, an appropriate education system and a vibrant entrepreneurial culture play in supporting national competitiveness and enterprise development and to endorse the recommendations contained in the Challenge document.


Growth in Productivity through Innovation
"Demand" Drivers for Firm Level Innovation
Ability of Economy/Firms/Workers to Deliver Innovation
Competition
Completion of single European market in services
WTO liberalisation –access into Irish markets from non-EU providers
Ongoing regulatory reform and impact assessment
Civil sanctions for violations of competition law
Pro-active consumer lobby
Completion of Competition Authority studies and implementation of previous recommendations (pharmacies, liquor licensing)
Entrepreneurship
Removing administrative burdens
Making bankruptcy and insolvency provisions conducive to start-ups
Barriers to female entrepreneurship
Improving investor readiness
Improving SME marketing skills
Making entrepreneurship attractive to young people
Consolidating state supports
Increasing availability of seed capital
Public Research Investment
Ensuring adequate resources
Ensuring consistent with industrial priorities
Industry-Third Level Research Collaboration
Addressing SME difficulties
Lack of industry awareness of third level research activities
IP uncertainties
Promote a meritocratic/ competitive system for awarding research funds
Promote university autonomy
Encourage a culture of commercialisation of research
Supporting Networks and Clusters
Shift in enterprise supports to "collective" industry assets
Shift onus to industry/trade association to identify and co-finance cluster projects
FDI to "fertilise" indigenous industrial clusters
Fostering a culture of innovation

6. The Research and Innovation Agenda

The Council has identified four challenges for policy makers which stand out in the Irish context:

- **allocating adequate resources and ensuring coherence in public investments in research and technological development;**
- **fostering industry-third level research collaboration;**
- **supporting clusters and networks**
- **fostering a culture of innovation**

6.1 Resources and Coherence in Public Investments in Research

Notwithstanding the hugely increased allocations to research under the NDP 2000-06, the ACR 2003 ranks Ireland only 11th out of 16 countries for gross domestic expenditure on R&D. Since scientific advances (alongside intense competition) are amongst the key drivers of innovation, it is imperative that investments in science under PRTLI and Science Foundation Ireland be kept on target. Maintaining consistent, year-on-year support for research is vital to retaining and creating jobs in a knowledge-driven economy. Nevertheless, it is also important that the appropriate balance is found between public and private research in order that science and innovation interact in the most productive and efficient manner possible.

The provision of significant public resources for investments in R&D must also be matched by the establishment of an institutional structure accountable for monitoring, evaluating and reviewing the effectiveness of publicly-funded R&D expenditure, particularly with regard to its impact on the national economy. Similarly, a framework is needed to provide strategic direction to and co-ordination of the R&D funding programmes across all Government departments, to ensure that they are coherent, synergistic and aligned with the needs of national economic development. Irish public research spending is currently spread too thinly across a wide number of government departments. Given the small size of Ireland's economy, the budget for state investment in R&D is too small to create critical mass in all sectors. The state should concentrate research funding in a number of niche sectors and areas of strategic economic opportunity, thus maximising the return on finite resources. Embedding a foresight approach in policy making and developing a technology assessment capability within the Development Agencies will be crucial in this regard.

Forfás has the legislative mandate to measure, monitor and review the effectiveness of publicly-funded science and technology expenditures. The reporting by Forfás in this area needs to be strengthened (the adequacy of indicators currently used to measure progress in innovation should be examined) and positioned within a wider institutional structure that can act on its data and analysis.. To this effect, the Tánaiste and Minister for Enterprise, Trade and Employment should bring a proposal to Government to re-institute a Cabinet Sub-Committee on Science and Technology at ministerial level, to be chaired by the Taoiseach or his nominee. The role of the existing inter-departmental committee on science and technology, which is chaired by the Tánaiste, should also be strengthened.

NCC Recommendations on Resources and Coherence in Public Investments in Research and Technology Development

1. The provision of significant public resources for investments in R&D must be matched by the establishment of an institutional structure accountable for monitoring, evaluating and reviewing the effectiveness of publicly-funded R&D expenditure. This should include an improved cost-benefit approach to evaluating R&D expenditure.

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4. The state should concentrate research funding in a number of niche sectors and areas of strategic economic opportunity. Embedding a foresight approach in policy making and developing a technology assessment capability within the National Innovation System will be crucial in this regard.

6.2 Supporting Industry-Third Level Research Collaboration

Ensuring that the benefits of publicly-funded research are available to industry is essential to national competitiveness. Close working relationships between firms, universities and other research institutes provide advantages in innovation. The reported levels of R&D collaboration by Irish firms in 2001 are, however, almost the same as those reported in 1993. The intervening period has not led to any significant increase in co-operative behaviour, particularly with the higher education sector, despite numerous policy initiatives aimed at raising such co-operation. The Council believes that the Enterprise Strategy should explore new ways to improve the current industry-university collaboration system, considering the following issues.

Firstly, there must be more recognition that small businesses cannot afford to invest money or people in research partnerships. To encourage the formation of consortia of small companies to invest in R&D, a state-wide technology transfer support network, or intermediary structure, is needed to pool limited resources. In parallel, existing industry liaison offices based in third level institutions should pool resources to strengthen campus-based technology transfer functions and to provide funding for and access to a network of technology transfer resources and external expertise.

Secondly, despite a number of initiatives (e.g. Atlantic University Alliance's Technology Transfer Initiative, the web-based information site, *Expertise Ireland*), Irish companies still have difficulties in identifying what research is being carried out in third level sector that is relevant to their needs. One factor here is the lack of information on the research being carried out by individual researchers within the third level sector; the other being that the companies themselves have difficulties in identifying their own technology needs. The Enterprise Strategy Group should propose new mechanisms to promote awareness in industry of the range and level of research being carried out in the third level sector and to provide opportunities for the development of industry-academic working relationships.

Finally, many small indigenous companies—even those with good linkages to third level institutions — experience difficulties in drawing up contracts with university researchers to cover

issues relating to intellectual property rights (IPR). Uncertainty about IP ownership is a significant barrier to effective technology transfer and research collaboration. Specifically, the difficulties relate to the fact that there are no standardised approaches to IPR contracts within the third level sector. The contracts can vary between individual researchers, departments and faculties within the same institution.

The Irish Council for Science, Technology and Innovation (ICSTI) in a Statement earlier this year, recommended a National Code of Practice for the management of intellectual property from publicly-funded research carried out in universities, public research institutions and institutes of technology. A National Code of Practice has been drawn up (to be used alongside case-by-case negotiations) and is due to be approved by key stakeholders early in 2004. The ESG should encourage swift implementation of this National Code of Practice. Further work is required in order to deal with IP issues surrounding public-private research.

While a code of practise addressing uncertainties in IP management is necessary, it is also vital that the state provide support services and advice to those (particularly academics etc.) negotiating IP agreements with private bodies. Such a service would promote greater industry-university co-operation, thus increasing our systemic capacity to convert technological breakthroughs into industrial and commercial successes.

The Enterprise Strategy Group should call on the Government to commission a "Lambert-style" review of existing industry-third level research collaboration programmes and explore new ways to improve collaboration.

NCC Recommendations on Industry-Third Level Research Collaboration

9. A state-wide technology transfer support network, or intermediary structure, is needed to optimise the uptake of new knowledge or the adoption of existing knowledge by companies. Existing industry liaison offices based in third level institutions should also pool resources to strengthen campus-based technology transfer functions and to provide funding for and access to a network of technology transfer resources and external expertise.

10. The ESG should propose new mechanisms to promote awareness in industry of the range and level of research being carried out in the third level sector and to provide opportunities for the development of industry-academic working relationships.

11. The ESG should encourage swift implementation of the ICSTI National Code of Practice for the management of intellectual property from publicly-funded research.

12. The ESG should call on the Government to commission a "Lambert-style" review of existing industry-third level research collaboration programmes and explore new ways to improve collaboration.

6.3 Supporting Networks and Clusters

Ireland's enterprise strategy going forward should recognise that a firm's competitive advantages – particularly in innovation-driven industries – often lie outside the firm itself and are rooted in geographic location and local industry dynamics. The State and industry should jointly and pro-

actively create the industry-specific conditions required for the development of higher skill, knowledge-intensive activities in which Ireland can be a significant player and can build truly distinctive competencies. Accordingly, there is a need for industrial policy to go beyond broad environmental measures by making industry-specific interventions to support emerging *clusters* and *networks* of firms and related suppliers, buyers and collaborators.

Clusters can be defined as "geographically proximate groups of interconnected companies, suppliers, services providers and associated institutions in a particular field, linked by commonalities and complementarities". There are a number of benefits to firms that operate within clusters, including the development of a common supplier base and labour pool, smoother production processes, faster rates of innovation and product development, and new business formation that re-enforces the cluster development.

On the other hand, networks generally refer to groups of firms with restricted membership and specific, even contractual business objectives likely to result in mutual gains. Network members are not bound by geographical restraints, choose each other; agree explicitly to co-operate in some way (common goals) and to depend on each other to some extent. Networks can develop within clusters especially where a wide range of business transactions conducted over a substantial period of time has developed the reputation of the partners and helped build up trust in their reliability and willingness to exchange as well as deliver products or process knowledge.

Interventions should include specialised training and infrastructure, research institutions, formal networks, joint overseas marketing and other semi-public "collective assets" for industries that are capable of enjoying sustainable competitive advantage in Ireland. These interventions should be financed and implemented jointly between government and industry on the basis of industry-driven proposals. Such a change in the nature of state interventions increases the onus on companies to form collaborative partnerships with suppliers, customers and third level institutions to build networks and clusters of excellence to win competitive advantage through innovation.

This process should be explicitly encouraged by:

- the development agencies acting collaboratively to encourage and facilitate cluster development. It is vital to ensure that the agencies are appropriately structured in order to promote and facilitate the necessary change in enterprise policy. The agencies should be tasked with the identification and publicising of specific clusters, and structures should be put in place in order to monitor the effectiveness of such actions,
- encouraging and supporting networks for each of the identified clusters,
- supporting the work of such networks in interacting with the public sector in order to minimise the administrative burden on enterprise. It is vital that the legislative framework makes the delivery of relevant supports for clusters as efficient as possible,
- promoting the development of research centres of excellence in third level educational institutions which would be matched against identified clusters.
- the existing sector representative bodies considering their role in the promotion of clusters and ensuring that they are in the best position to facilitate cluster development,
- Government being more responsive and supportive to industry needs, in terms of the provision of infrastructure and collective assets, as well as other tools designed to facilitate cluster development.

This agenda should not be about protecting "favoured" industries from competition. On the contrary, finding ways to stimulate greater domestic competition within particular industries is essential for driving greater innovation. Neither should it just be about politicians and development agencies "picking winners" among competing technologies and sectors. As economies become more advanced, it is impossible for the state to micro-manage industrial development, given the sheer breadth and complexities involved and the intricate interactions and inter-dependencies between different industries. While the development agencies have enjoyed some success in the past in predicting business trends, their real strength was not the ability to spot winning sectors or emerging technologies, but rather an ability to quickly and pragmatically respond to what was working well and to reinforce existing strengths. This approach of "industry self-selection" rests on the ability to secure early and good intelligence from the marketplace about which industries are competitive in the national business environment.

Government and agency supports for industry should be increasingly organised around clusters and sectors, and there is a need to more closely integrate FDI with indigenous industrial development. FDI should be used more strategically to support indigenous industry and to "fertilise" indigenous industrial clusters. This may require some degree of organisational innovation, as agencies adopt the necessary structures to support changing enterprise policy.

NCC Recommendations on Supporting Clusters and Networks

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10. Enterprise policy should not be about "picking winners" among competing technologies and sectors. Rather it should serve to reinforce existing strengths and should accommodate industry led cluster development.

11. The development agencies should target FDI opportunities which augment the competitiveness of specific clusters. Furthermore, the agencies should encourage and support networks for each of the identified clusters.

12. The development agencies and other relevant policy makers should support the work of networks in interacting with the public sector in order to minimise the administrative burden on enterprise. It is vital that the legislative framework makes delivery of supports for networks as efficient as possible.

13. Policies are required to promote the development of centres of research excellence in third level educational institutions which would be matched against identified clusters.

14. The existing sector representative bodies should consider their role in the promotion of clusters and ensure that they are in the best position to facilitate cluster development.

15. Government needs to be more responsive and supportive to industry needs, in terms of the provision of infrastructure and collective assets, as well as other tools designed to facilitate cluster development.

6.4 Fostering a Culture of Innovation

The success of Ireland's strategy to reposition industry towards knowledge-intensive high-technology activities will depend critically on the supply of high-skilled people, including researchers. As economic transformation accelerates in response to globalisation and technological changes, the role of knowledge intensive industries in Ireland will increase, and "intellectual capital" will assume an even greater role in driving the economy. Formal education will need to be enhanced by a commitment to life-long learning, incorporating informal on-the-job experience, as well as a formal framework that encourages both a return to schooling and the constant up-skilling of the workforce.

Of particular importance is the development of a strong culture of innovation. Further development of the technology assessment capability has the potential to encourage public engagement with science. Additionally, if an appreciation of entrepreneurship is to take root in Irish society, then courses which encourage and indeed introduce key entrepreneurial skills need to be implemented at various levels of schooling.

While all parts of the educational sector have an important role in ensuring that key skills are being acquired by young people and to promote innovation and entrepreneurship as important values, higher education has a particular role, in part through research partnerships with industry and through the active pursuit of knowledge transfer. Third level institutions in particular should be partners with government and industry in the development of an innovation framework and through the development of research excellence in the 3rd and 4th levels. Success here will be dependent on improved collaboration between 3rd level institutions and industry. Ireland cannot afford to renege on its commitment to advancing research and development within the third level system. There is an ever-increasing need for continued and consistent investment in research centres and fourth level education.

NCC Recommendations on Fostering a Culture of Innovation

16. Third level institutions in particular should be partners with government and industry in the development of an innovation framework and through the development of research excellence in the 3rd and 4th levels.

17. Courses which encourage and indeed introduce key entrepreneurial skills need to be implemented at various levels of schooling.

Conclusions

The development and diffusion of innovation, whether in products, services, organisations or processes, are the key sustainable sources for improvements in productivity, living standards and national competitiveness. The challenge for Ireland is to put in place the optimal regulatory regime to encourage such development and diffusion. Innovation clearly does not occur in isolation from the other key drivers of competitiveness (e.g. the business and regulatory environment, economic and technical infrastructure provision, education and the level of entrepreneurship) and therefore must be viewed as just one important element across a horizontal spectrum of policy actions required to optimise Irish economic growth over the coming decade.

It is important to note that raising the levels of innovation and creativity in the economy is not solely, or even mostly, the job of government. Instead, actions need to come from a broad coalition of government agencies, private businesses, trade associations and professional organisations, universities and research institutions, standards setting bodies, and many other institutions that have an impact on the environment for innovation in Ireland.

In this regard there is also an agenda for, among others, industry associations, trade unions, universities and the managers of individual Irish firms. Irish managers need to re-orient company strategies towards a greater level of innovation and the provision of higher value goods and services and to consider more pre-competitive collaboration in order to pool resources and ensure maximum international competitiveness in the knowledge economy. R&D partnerships with higher education should also be pursued.

Such a strategy will require increased investments in R&D, skills, modern production and logistics technology and IT to develop and support more sustainable competitive advantages.

The National Competitiveness Council wishes the Enterprise Strategy Group every success in its deliberations and looks forward to the publication of the final strategy document.