

Welsh Government consultation: Innovation Strategy for Wales - Submission from Higher Education Wales

1. About Higher Education Wales

1.1. Higher Education Wales (HEW) represents the interests of Higher Education Institutions (HEIs) in Wales and is a National Council of Universities UK. HEW's Governing Council consists of the Vice-Chancellors of all the HEIs in Wales and the Director of the Open University in Wales. HEW provides an expert resource on the Welsh Higher Education sector.

2. The consultation context

2.1. In launching its consultation, on 30 April 2012, the Welsh Government identified innovation as one of the key drivers of economic growth and job creation. It is an essential part of the Welsh Government's strategy to transform the Welsh economy in the face of the downturn: 'Wales must move towards a more R&D intensive and knowledge-based economy where the right conditions exist for innovation to flourish'¹. The proposed strategy is explicitly intended to be the companion document of Science Agenda for Wales², published in March 2012, which called for a complementary strategy to deal with the commercial exploitation of R&D and promotion of innovation. The strategy also has a particular importance in the European funding context in contributing to Europe 2020 and the 'Innovation Union' flagship initiative³ and responding to the need to develop a regional innovation strategy as a pre-condition for Cohesion Funding 2014-20.

2.2. The importance of innovation and universities' interaction with business has been recognised within the higher education sector in Wales by a number of major policy reviews. The importance of commercialisation in a Welsh context was emphasised by the Gibson Review.⁴ The Nexus Report concluded that 'for Wales to be successful in the 21st century it has to be in the vanguard of knowledge-economy developments' but that the 'potential arising from knowledge creation will only be realised if that knowledge can be effectively translated through innovation'.⁵ In the UK context, the importance of innovation has been stressed by the Sainsbury

¹ (Welsh Government 2010)

² (Welsh Government 2012)

³ (European Commission n.d.)

⁴ (Gibson 2007)

⁵ (Welsh Government 2004)

Review⁶, the Lambert Review⁷ and, most recently the Wilson Review⁸. Innovation has similarly been identified as a key element of the UK Government's plans to foster growth in England⁹ and the Scottish Executive's plans in Scotland¹⁰.

3. Executive Summary of response

3.1. Higher Education Wales welcomes the Welsh Government's consultation on an innovation strategy for Wales. A detailed response to the consultation questionnaire is provided below. In summary, however, the key points are:

- There is an urgent need for the Innovation Strategy for Wales. Wales lags significantly behind other parts of the UK, particularly in terms of private investment in research and development. Wales' long-term prosperity in a global economy will depend on its ability to foster innovation which is genuinely transformational in nature and can deliver real long-term social and economic benefits.
- Higher Education has a very important role in driving innovation. Universities are major innovators in their own right accounting for more than half of research and development expenditure in Wales. They also play a critical role in supporting innovation in diverse ways including equipping its graduates for future enterprise, facilitating business needs, and leading in the development of an overall culture of innovation. Innovation, however, will be best achieved through an equal partnership between universities, government and business to develop successful innovation eco-systems.
- A successful long-term approach will require sustained investment in the key areas of greatest opportunity for Wales. The three Grand Challenge Areas identified in the Science for Wales strategic agenda should provide the focus of the strategy, but it is necessary to recognise, however, that innovation may have a broader base.
- In particular it is essential that Wales takes advantage of its access to European Funding. The development of a regional innovation strategy is a pre-condition for Cohesion Funding 2014-20, and we would like to see the Welsh Government submit its strategy for external peer review as part of the Smart Specialisation Platform in Seville. More broadly we need to align our strategies and streamline our range of support and processes to facilitate access to the range of opportunities for funding and support.

⁶ (Lord Sainsbury of Turville 2007, 3): 'the best way for the UK to compete, in an area of globalisation, is to move into high-value goods and services and industries. An effective science and innovation system is vital to achieve this objective'.

⁷ (Lambert 2003)

⁸ (Wilson 2012)

⁹ (Department for Business Innovation and Skills (BIS) 2011)

¹⁰ (Scottish Executive 2007)

Innovation, the Economy & Society

4. Q1) In what ways do you think innovation can help improve the economic prospects and well being of the people of Wales?

- 4.1. The current economic downturn provides a major impetus for the innovation strategy for Wales. Measured in terms of Gross Value Added (GVA) per capita, employment levels, and productivity, Wales has not matched expectations.¹¹ To ensure that future economic forecasts are more favourable for Wales, and to safeguard the country's future well-being, urgent action is required.
- 4.2. Innovation plays a major and unique role in driving economic growth. Innovation is associated with new enterprise and job creation.¹² In particular, most economic models emphasise that while other inputs may have an impact on short-run growth, the key factors which affect growth in the long-run are knowledge accumulation and technological progress.¹³ Even where innovation leads to only short-run growth, there can be significant qualitative gains for the economy as competition leads to higher-value goods and services. To improve its economic prospects and remain competitive in the long term there is a pressing need for Wales to become a more innovative country.
- 4.3. As the consultation document points out, the scope of innovation is much broader than research and development. Innovation can take many forms whose impact is accordingly highly varied, from incremental innovation which introduces new ideas to local markets to radical innovation which introduces ground-breaking change on a global level. It will be important to target innovation on the basis of excellence and its potential to be genuinely transformational.
- 4.4. As highlighted in the consultation document, the innovation strategy is also very important for finding the potential solutions for Wales to many of the problems currently facing society from well-being to climate change and sustainable development e.g. active ageing, low carbon, healthy foods, green transport. While these are challenges which are faced globally, they can often require local solutions and can also have a direct economic benefit in reducing costs, for instance in mitigating rising fuel and energy costs.
- 4.5. Universities have a particular important role in innovation and, through their innovation activities, contribute to the Welsh economy and well-being in a number of

¹¹ (Welsh Government 2010)

¹² (OECD 2010, 24)

¹³ (OECD 2010, 21)

distinct ways. Universities are important creators of knowledge and ideas and innovators in their own right, and for more than half of all Research & Development expenditure in Wales.¹⁴ The commercialisation of the outcomes of research and development can lead to radical innovation with a significant impact at a national level and in global markets. Universities also engage in a wide range of knowledge exchange activities with an emphasis on market facing innovation, from consultancy to continuing professional development – this can have a particularly important role in stimulating the regional economy by the novel application of ideas and processes in a regional context. One of the most important contributions of Universities is its education, training and development of students, equipping them with the skills to innovate in their future workplaces or as entrepreneurs in their own right. Universities can play an important role in directly facilitating student innovation, and in encouraging early stage innovation e.g. through student start-up initiatives. More broadly, Universities have an important role in establishing the culture of enterprise in their students and communities as part of their wider civic role. Universities provide access to facilities and resources, and can draw on an extensive network of links with overseas partners and research and development communities. Finally, universities can act as an anchor for innovating enterprise, attracting business and investors to the region.

Innovation

5. Q2) What would a more innovative Wales look like?

- 5.1. The Nexus report outlines a vision of Wales as ‘a small clever country which is known throughout the world for its quality of life generated by its vibrant communities, marine/land environment, educational and cultural dynamism and strong knowledge-driven economy’¹⁵. In our view, this vision serves as a reasonable basis for the innovation strategy for Wales, and accords with the Europe 2020 objectives to deliver ‘smart, sustainable and inclusive growth’.¹⁶
- 5.2. Wales would have clearly identifiable areas of strength in high-value activities as an outcome and sustained investment in areas of competitive advantage. This is likely to reflect a degree of ‘smart specialisation’ and more targeted use of resources reflected in growth in the key areas identified by the innovation strategy. The focus of science/technology intensive innovation would be the Three Grand Challenge areas outlined in the Science agenda for Wales. There would also be growth in key areas addressed by the broader innovation strategy where there is potential for genuinely transformational change such as creative industries and services (e.g.

¹⁴ (Welsh Government 2012)

¹⁵ (Welsh Government 2004)

¹⁶ (European Commission 2010)

financial) in line with Wales' overall economic growth. The innovation strategy would also take into account the need to identify and foster the diffusion and application of the Key Enabling Technologies (KETs) which support innovation in these areas.

5.3. A more innovative Wales would be reflected in increased investment in innovation by businesses and universities, and demand from business for the universities' knowledge-base. Wales would be characterised by a number of well developed innovation eco-systems where the close and open interaction leads to accelerated development. High-growth companies in the UK represent only 6% of all firms employing ten or more people, but account for 54% of all new jobs.¹⁷ It is likely that a successful innovation strategy would be based around a relatively select number of companies demonstrating excellence in innovation and with potential for high-growth which act as anchors and attractors for other firms and businesses.

5.4. Strongly performing Universities would feature at the heart of these innovation eco-systems. Countries with high levels of innovation on average tend to have a stronger track record of investment in higher education.¹⁸ A number of studies point to the importance of interaction between universities and business for stimulating innovation and economic growth.¹⁹ We would also expect to see universities' innovation having clear regional impacts. University research and innovation helps to create high value industrial clusters.²⁰ Interaction between universities and their communities is as strong or stronger in research-intensive universities as in institutions whose mission more explicitly targets their local regions.²¹ There is some evidence to suggest that there is a comparatively strong correlation between University-business interaction where this is connected to a city environment.²² Clearly this has policy implications in terms of spatial planning, and the Welsh Government's recent statement that they are exploring the concept of 'city regions' is worth noting in this context. Universities will be strongly connected to their regional economies,²³ playing a lead in the development of an overall entrepreneurial and innovative culture through the education of graduates and as part of the public engagement and civic role. They would also act as magnets for innovative companies.

5.5. These development of these eco-systems would be managed strategically and would be characterised by well-developed 'triple helix' relationship between

¹⁷ (National Endowment for Science, Technology and the Arts (NESTA) 2009)

¹⁸ (Universities UK 2011)

¹⁹ (Lambert 2003)

²⁰ Well-known examples include Silicon Valley, Massachusetts Route 128, North Carolina's research triangle and, closer to home, the Cambridge effect: (Higher Education Wales 2011)

²¹ (Universities UK; IPPR North 2012)

²² (Universities UK; IPPR North 2012); (European Commission; Goddard, J 2011)

²³ (European Commission; Goddard, J 2011)

university, industry and government.²⁴ We would also see effective coordination of the strategy across different areas and departmental responsibilities with higher education sector developments, for instance, forming an integral part of Wales's wider economic and spatial plans.

- 5.6. Skills and levels of attainment are factors which are consistently correlated with high levels of innovation and growth. In particular, countries with high levels of innovation on average tend to have higher proportions of graduates in their populations.²⁵ Having firm foundations in the earlier stages of education will be essential, particularly for instance in STEM subjects. A priority for the innovation strategy however will be to build on these foundations to increase attainment at NVQ levels 4 and above, the levels which most directly impact on innovation.
- 5.7. Wales would clearly demonstrate its global outlook in its approach, forging links and drawing on best practice from outside the UK as well as within it. In Europe this may include, for instance, the Netherlands or Finland which currently appears to be particularly successful in developing its innovation eco-system and supporting high-growth in targeted sectors through its National Technology Agency (Tekes). A key point raised in Brussels is the willingness of Member States and regions to open funding to cross-border partners within the EU.
- 5.8. Finally, overall investment in innovation would match the scale of challenge to be addressed by Wales in the light of global trends and competition. Europe 2020 aims to ensure that investment across Europe increases to an average of 3% of GDP. This would mean that there would also be significantly more investment in innovation in Wales.

Barriers to innovation

6. Q3) What are the barriers preventing Wales becoming more innovative? What needs to be done to overcome these barriers?

- 6.1. There is major need for Wales to address a number of barriers which prevent it from becoming more innovative. An analysis of the barriers preventing Wales from becoming more innovative depends on an understanding of its current starting point and performance and we have incorporated this in our comments below, first looking at the innovation in Wales generally then looking specifically at higher education.
- 6.2. As identified by the consultation document, Wales currently lags significantly behind other regions of the UK by most current measures of innovation. Grants to industry in Wales from the Technology Strategy Board represented less than 1% of grants to

²⁴ (Etzkowitz 2003); (Universities UK; IPPR North 2012, 18)

²⁵ (Universities UK 2011)

industry across the UK. Business and Enterprise spending on research and development (BERD) at £81/head was (in 2008) the lowest of the UK nations, and its comparison to the England figure at £290/head is striking.²⁶ In the global context, this issue is even more acute given that the UK business as a whole appears to have invested significantly less in R&D than comparative countries, identified as a significant factor in the gap in performance between the UK and comparable economies,²⁷ and European policy also seeks to redress a perceived under-investment in innovation.

6.3. There are a number of contextual factors that define the innovation landscape in Wales and provide the initial parameters for its strategy. Wales is classified as medium-high innovation region in recent EU evaluation which means that innovation is relatively well-established in the context of the EU but not as well established as some other parts of the UK. It has a relative absence of major conurbation, often associated with increased productivity²⁸ and a key challenge for Wales has been to ensure that successful conurbations form larger urban networks which translate their prosperity for other parts of the economy²⁹ (current consideration of a city-region concept is welcomed in this context). The structure of its industry includes a high proportion of small and medium size enterprises (SMEs) rather than large companies who are typically more research intensive. Industry in Wales is also proportionately low in research intensive sectors where R&D development tends to be highly concentrated. Wales also has the unique policy and regulatory conditions of a devolved administration – these can be a significant advantage, but may also create greater complexity or complication particularly in cross-border dealings. There are a number of factors which have a significant indirect influence on innovation, and are addressed by the Welsh Government in other policies. This includes general infrastructure e.g. access to broadband (the High Performance Computing project is particularly welcomed in this respect), and transport (the absence of an international airport has been cited by our members as a particular concern). Addressing the barriers to businesses and individuals for accessing finance is also a key area for Welsh Government attention.

6.4. Turning to the perspective of universities, barriers can be considered under a number of headings which reflect the key areas of innovation activity:

²⁶ This partly reflects the profile of industry in Wales. Research and development expenditure by business and enterprise in Wales is focussed in particular in electrical machinery, services, mechanical engineering and chemicals and shows a particular specialisation in agriculture. (Campaign for Science & Engineering in the UK (CaSE) 2011, 10)

²⁷ (Lambert 2003)

²⁸ The so-called 'agglomeration effect': (Welsh Government 2010, 6) et al.

²⁹ (Welsh Assembly Government 2004)

Universities as the creators of knowledge and ideas and innovators in their own right

- 6.5. Universities in Wales have a disproportionately important role as innovators in their own right. Higher education accounts for nearly half of all Research & Development expenditure in Wales.³⁰ Two-thirds of grants received by Wales for innovation from the Technology Strategy Board were awarded to higher education (£14.2m/£21.3m from 2007-2011³¹) whereas the HE sectors in other UK nations all attract less than a third. Despite its much smaller size, the Welsh HE sector received the same amount as Scotland (£14.4m) from this source. In the context of the innovation strategy, the focus for Universities must be on delivery, ensuring that the process of moving research and development for both basic and applied research feed efficiently into the innovation supply chain.
- 6.6. There are a number of barriers to progress in this area. Balancing academic priorities with innovation requirements can present difficulties for staff. The recent Research Excellence Framework which is used as the basis of quality related grant funding for research in higher education, made steps to ensure that research demonstrated its wider socio- and economic impact. There is further potential, however, to provide incentives for researchers to address areas of economic impact.
- 6.7. The lack of supporting infrastructure in certain areas can be an important factor. There is further need for capital investment in Welsh universities to maximise the potential for innovation. Facilities in Sciences and Biosciences in particular have been identified as priorities in light of the science strategy. Research and innovation needs a strong science base. Key inputs are the supply, quality and mobility of qualified scientific and technical staff, a simplified framework for funding cross-border research. UK Border Agency policy will also be critical in this context to enable universities to attract and employ future researchers and innovators from overseas. The implementation of modernisation strategies for HEIs will depend on investment in research infrastructures, facilities and working conditions which allow for the development of critical mass. Critical mass in research communities can be important, and the submissions to the RAE2008 in Wales demonstrated that the strengths of collaboration between institutions in this respect.

Universities as exchangers of knowledge and new ideas

- 6.8. This analysis above also highlights the urgent need to stimulate innovation in the private sector. Higher Education in Wales has a long tradition of interaction with business and community with a number of areas of particular success. Based on the most recent survey, Wales receives £64m in income from business and

³⁰ (Welsh Government 2012)

³¹ (Campaign for Science & Engineering in the UK (CaSE) 2011, 11)

enterprises. Compared to the rest of the UK, the Welsh HE sector is particularly strong in attracting funding through collaborative research, including income from government departments other than the Research Councils. Nevertheless, there are comparatively low levels of investment in innovation, research and development in Wales compared to the rest of the UK, most obviously in the private sector.

6.9. Looking at demand-side factors, some of the most significant barriers to innovation arising from interaction between universities and business are cultural. These include:

- Awareness, image and perceptions. A number of surveys have confirmed that businesses have a narrow view and limited awareness of what a University is about and what it has to offer, though engagement with universities is generally positive where this does occur. There is clearly a need to promote awareness and tackle preconceptions.
- Entrepreneurial culture. It is clear that Wales is starting from a point where innovation is not a well-established part of Welsh enterprise culture. There is evidence to suggest that most of the job creation will be concentrated in a small number of high growth firms – blanket support for business innovation is likely to be inefficient³², yet identifying future high-growth firms at the point of need for support can be difficult. In this context, the Universities' role in raising individual's confidence, expectations and abilities to innovate, as a foundation for a wider entrepreneurial culture, is extremely important.
- Risk aversion. In the current economic climate, businesses are increasingly cautious in investing in innovation whose return is uncertain. Partly, however, the aversion to risk taking is the product of culture and experience, and can be overcome with increased awareness of opportunities and the development of entrepreneurial skills.

6.10. At the same time, universities are large and highly complex organisations with a sometimes overwhelming volume of different activities. They are not always well geared to respond to the needs of business and industry, since interaction with business competes with a range of objectives and calls on staff time and resource. In the light of this it must remain a priority to have a well-managed and accessible interface for universities and business.

6.11. There are potentially many ideas and products that could benefit society but involve levels of risk and uncertainty that are prohibitive for individual innovators - the role of Government has a particular importance to ensure that Wales continues to take a long-term view and to make an appropriate overall level of investment in such areas.

³² (National Endowment for Science, Technology and the Arts (NESTA) 2009)

Universities as facilitators of student innovation

- 6.12. Welsh universities have an impressive track-record compared to the rest of the UK in promoting graduate start-ups: in 2010/11 there were 267 graduate start-ups from Universities in Wales, nearly 10% of the UK total (i.e. almost double what you would expect for its size).³³ The importance of the role of students and the extent of demand for student innovation has sometimes been under-emphasised. This success needs to be extended and supported, and greater opportunities fostered to support early stage innovation in students.

Universities as providers of the skills to support innovation

- 6.13. Equipping graduates with entrepreneurial skills is necessary to turn innovative ideas into successful products and services. Arguably, Universities major contribution to the knowledge-based economy and innovation-driven growth, is through its supply graduates and postgraduates, and equipping them with the right skills to innovate in the work context. In 2009/10 9,835 students from Welsh universities (68% of total UK) entered employment in Wales within six months of leaving.³⁴
- 6.14. Identifying and embedding the right skills and knowledge requires close cooperation between stakeholders. The lack of good skills information which is specific about the requirements for higher education has hindered this in the past. Nevertheless, universities have a strong track-record of working with business and the professions to ensure that the graduates are properly equipped for the workplace and have the skills to progress in their long-term careers. The Agreement on Skills and Employability in Wales between Higher Education Wales (HEW), the CBI (Wales), NUS(Wales), and Higher Education Funding Council for Wales (HEFCW) provides recent testimony to this fact. There is further potential, however, for harnessing universities continuing links with its graduates: the Gibson Report³⁵ emphasised the important role that Alumni can play in helping universities to focus their commercialisation activities.
- 6.15. Finally, getting the right business model across the innovation eco-system is critical. To deliver greater and more successful innovation across this spectrum of activities requires the involvement of many different partners and sectors. A key feature of the innovation strategy must be an equal partnership between private and public sectors and government, focussed closely on a chain of activities leading to market delivery. The Gibson report highlights issues about the current level of

³³ (Higher Education Statistics Agency (HESA) 2012)

³⁴ (Higher Education Statistical Agency (HESA) 2011)

³⁵ (Gibson 2007)

viability of third mission/commercialisation activities in Universities.³⁶ Similarly, the evidence points to a lack of demand from business/industry for research and development whose budgets have come under increasing pressure in the current economic climate. For any model of cooperation to be sustainable, this must mean finding a model which makes sense in terms of its business case and delivers a viable level of return on investment for acceptable levels of risk for all partners. Government has an important role to play in ensuring that short-term business considerations do not provide a barrier to an efficient business model for the long term.

Supporting innovation

7. Q4) What experience do you or your organisation have of the initiatives that support innovation? How accessible and effective are the various forms of innovation support programmes?

- 7.1. Universities in Wales have engaged in a diverse range of innovation activity reflecting their different missions and characters. As a result they have had extensive experience of initiatives to support innovation from a number of sources.
- 7.2. Universities receive direct assistance for innovation from the Higher Education Funding Council. The bulk of this funding from this source is channelled through its Innovation & Engagement programme allocating funding on a formula basis to support an approved I&E strategy with about twenty per cent awarded via a competitive bidding process. Third mission projects directly funded a number of successful initiatives including the Dragon Innovation Partnership project, Food industry skills project, The Skills Centre, and the Strategic Insight programme which is considered a good, light-touch way of achieving interaction.
- 7.3. The Council, particularly through its innovation and engagement fund, has played a valuable role in directing funding to support initiatives as part of coherent strategic development plans. This approach has allowed institutions flexibility to determine how to best meet the broad range of objectives drawing on their own strengths and to take a long-term strategic approach to developments. This is critical in context where most other sources of funding are for specific projects or opportunities. It will be very important to maintain the system of 'dual-funding', despite the increased pressures on the budget directly available to HEFCW arising from the changes in the fee and funding systems in Wales (and across the UK).
- 7.4. Universities have been recipients of direct assistance from the Welsh Government for a range of specific projects, including via the Department of Business Enterprise

³⁶ (Gibson 2007)

Technology and Skills (BETS) and the Welsh European Funding Office (WEFO). The main source of support for universities from BETS is via the Academic Expertise for Business (A4B) initiative, a six-year £70m programme managed by the Welsh Government and supported by EU convergence funding. Applications for A4B funds must be submitted by a Welsh Further or High Education Institution as a lead partner. The programme covers the commercialisation of academic intellectual property (including early stage development and proof of concept funding), knowledge exchange activities, flexible funding options, support for collaborative industrial research, and knowledge transfer partnerships. It also supports a number of knowledge transfer centres, Welsh Composites Centre (Swansea University), The National Automatic Identification and Data Capture AIDC Centre for Wales (Glamorgan University), Industrial Biopolymers Knowledge Transfer Centre (Bangor University), and the Engineering Knowledge Transfer Centre (Cardiff University). Capital funding has also been used to support a range of knowledge transfer activities. Recent examples which give an overview of the range of support include: Institute of Advanced Telecommunications (IAT) Mimo Testbed (Swansea University); Medialab – HDTV Demonstration Studio (Glamorgan University); Inert Atmosphere Fabrication and Characterisation Facility for Engagement for Emergent Welsh Opto, Bio and Plastic Electronic Sectors (Bangor University); Industrial Bio-Polymers Assessment Facility (IBP) (Bangor University); Expansion of the MEC Micro and Nano Manufacturing Facilities (Cardiff University); Aber Bio-Centre (ABC) Biomass Processing for High-Value Products (Aberystwyth University); Cutting and Fabrication Technology Centre (CFTC) (Swansea Metropolitan University); Alternative Powertrain Engineering Facility (Glamorgan University).

- 7.5. Overall, Welsh Government support has been very successful in taking forward specific projects or pump priming specific areas of academic endeavour which support innovation, particularly under A4B. However, taken as a whole there is considerable number of schemes – vastly more for instance than in Scotland – and there would be substantial benefit to be gained from rationalising these and reducing the complexity further.
- 7.6. Many of the support initiatives are available for the higher education sector UK-wide. As outlined above, universities in Wales have been particularly successful in gaining support from The Technology Strategy Board (TSB). Knowledge Transfer Partnerships (KTPs) in particular have generally been acknowledged as successful. There is greater opportunity, however, to benefit from the UK-wide innovation support. For instance, there is an opportunity for greater engagement with the TSB in large scale showcase events which have a high visibility.
- 7.7. The EU is a particularly important source of innovation support for Wales. Innovation activity has been supported using Frameworks 5, 6 and 7, Objective One and Convergence ERDF and ESF funds. Currently four major collaborative ESF HE

projects are supported including: Knowledge Economy Skills Scholarships (KESS), Access To Masters, Foundation Degrees and Work Based Learning. These are focussed on developing the higher-level skills base need to build Wales' Knowledge Economy and Innovation eco-system and are judged to be highly successful. One of the key challenges in accessing such funding in the past has been the relative complexity of the funding. We welcome the attempt to rationalise the various applicable schemes under Horizon 2020 and to facilitate the sorts of funding outlined above.

7.8. Overall, the support for innovation from these various sources has generally been effective. There are few initiatives which have been viewed as less successful by some of our members such as Know How Wales, Knowledge Bank for Business, and Flexible Support for Business (FS4B). Expertise Wales in particular, if retained, also needs to be more effectively and widely used by businesses and intermediaries. We also welcome the possibility of universities gaining greater ownership of Technia, providing potential advantages in running these initiatives successfully. Overall perhaps, however, the single issue is the total amount of current investment in innovation through these sources. Europe 2020 highlights that countries in Europe should be attempting to significantly increase their investment in innovation and through Horizon 2020 provides a potential means to do so.

8. Q5) How should innovation in Wales be better supported in the future? What should be the role of Government?

8.1. The consultation paper recognises that overall in Wales, although there are many areas of success, the market and current levels of intervention are currently failing to deliver the levels of innovation and associated growth that we consider necessary for Wales to remain a competitive and socially-attractive economy in the twenty first century.

8.2. This government's role could be summarised as supporting activities which have a wider benefit for society and the economy than for the individual parties involved. Innovation has a particular importance for driving economic growth and must remain a priority for government, since it follows that in the longer term the return to the economy will be greater than current investment. Intervention is particularly important where there is potential for greater performance whether this means backing areas of competitive advantage or helping to remove barriers of imperfect information, helping to smooth the risks of investment which may deter individuals, provide greater access to finance, or underpinning the innovation infrastructure with capital investment (see above, under barriers). More widely, the Welsh Government has an important role in shaping the overall innovation system which equally engages all stakeholders, facilitates collaboration and provides effective communication.

8.3. The Welsh Government already reflects this role in supporting innovation through a combination of direct support, facilitation and promotion. Building on the success of past support for innovation, the current priorities for Wales are seen as follows:

- The emphasis must be on innovation which can transform the economy. This means encouraging activities across the full development cycle which extends from blue-sky research and development to close-to-market solutions. There is much evidence to show that many of the opportunities lie outside traditional research and development frameworks and that the UK has not focussed as much resource in these areas as other countries in the past. There is also more to be done to ensure that the results of R&D activity filter down through the supply chain more effectively. At the same time, it is noted that there is evidence to suggest that 'policies which address the tail end of the cycle tend and encourage demand for innovation are more likely to stimulate incremental innovation than foster radical innovation. The latter is better induced by technology-(or supply-)push policies'.³⁷ There is a need to retain an appropriate emphasis on blue sky research and subject-led activities where the market on its own cannot be expected to deliver the levels of investment and to recognise their particular ability to transform the economy.
- The strategy should be focussed on a select number of areas of the greatest potential gain and/or excellence. In particular, the starting point must be 'Science for Wales' which sets out three Grand Challenge areas based on an analysis of current science capacity, strategic and market considerations. The focus of the innovation strategy will be wider, but must be designed to complement these choices successfully. The recent report by the Institute for Public Policy Research for UUK argued that 'too often innovation is thought of only in relation to sectors like high-value manufacturing... In terms of employment, sectors like professional services are expected to be important for future jobs. High-skill knowledge-based industries, such as the creative industries, are also expected to be a source of economic growth. Innovation in these sectors will also be essential'.³⁸
- There is also a need to ensure that there is alignment between policies different Welsh Government Departments including economic and spatial planning policies and higher education sector policy (for instance, its reconfiguration agenda).

³⁷ (OECD 2010)

³⁸ (Universities UK; IPPR North 2012, 11)

- In seeking to emphasise focus, the European Commission's guidance on Smart specialisation should be taken into account. Smart specialisation relies on identifying the unique characteristics, assets and sources of competitive advantage for each region. It emphasises the importance of making choices (i.e. in selecting priorities), building on 'constructed advantage' which matches innovation activities with business needs and capacities, 'critical mass or clusters', and 'collaborative leadership'.³⁹ In many ways building on the approach already adopted in Wales rather than introducing radical change.
- More broadly, it is essential for Wales that the innovation strategy addresses how to capitalise on the potential European funding available and create the conditions for universities to increase their role in future schemes. A key theme of the Wales strategy must be alignment with EU policy. The draft regulations set out a number of 'ex-ante conditionalities' which are likely to be prerequisites for accessing Cohesion Funding 2014-20. For research and innovation this includes the existence of a national/regional research and innovation strategy for smart specialisation which is based on a SWOT analysis, outlines measures to stimulate investment, and contains a monitoring and review system. The exact application of these is not yet fully clarified – e.g. how far all these conditions need to be met before funding can be accessed, or how far the conditions can be met at Member State/UK level rather than at regional level. We would support the Welsh Government in ensuring that its innovation strategy for Wales meets these requirements in its own right.
- The Welsh Government will have a particularly important role in establishing a framework for equal partnership between Universities, the public and private sectors to steer the direction of the strategy as it continues to evolve.
- We would also welcome in particular that the Welsh Government gives further consideration as to how it can facilitate international activities. From the feedback of our members, it is clear that there are aspects of previous activity which are missed, including its ability to act as a focal point for potential investors and its ability to facilitate international development of innovation related activities.

8.4. There are also a range of initiatives which the university, businesses and Welsh Government may wish to further consider together in developing a more detailed plan to accompany the innovation strategy. Based on policies being implemented in other parts of the UK to foster business-university interaction, this could include for instance:

³⁹ (European Commission 2012)

- Exploring initiatives to build a more effective interface between universities and business. In Scotland, a number of initiatives have been reported to be contributing positively and merit further investigation in Welsh context. Initiatives including the adoption of common department names across universities, the development of a common template for confidentiality agreements for business-university interaction, and the development of a shared portal for the sector along the lines of the Scottish version (Interface) which acts as a common access point for all universities, and the employment of agents who will actively help interested parties make the right connections.
- Reviewing the availability of prizes and competitions to stimulate innovation in Wales. We note that proposed BIS measures include the establishment of a prize centre with NESTA, and that NESTA's research has highlighted in particular the potential value of inducement prizes rather than recognition awards⁴⁰. There is also the potential for investigating how universities, who already provide assistance to businesses, can play a greater role in directing funding to support this.

Enabling innovation

9. Q6) What facilities or resources exist which may help differentiate Wales and provide a potential competitive advantage?

- 9.1. Wales offers a strong and unique geographical and cultural identity which offers an attractive prospect for many businesses, families and visitors. Although its conurbations are relatively small by international standards, there are a number of focal attractions e.g. Cardiff. At the same time, Wales benefits from its distinctive rural and coastal heritage and opportunities for innovation afforded by its natural environment.
- 9.2. Devolved administration in Wales provides a unique opportunity to formulate policy which reflects Wales' own strengths and priorities whilst taking appropriate account of its wider UK, European and international context. Policy development is aided by Wales' comparatively small size - a feature of policy making in Wales is the close relationship established between the Welsh Government and other bodies, including universities.
- 9.3. In terms of funding opportunities to support innovation, Wales will continue to have access significant amounts of European funding. As argued above, it must remain a priority to ensure that we maximise our opportunities in this field.

⁴⁰ (NESTA 2012)

9.4. Wales also has great potential for attracting innovators and innovative enterprise. The particular strengths of Welsh universities also help to provide Wales with a competitive advantage in this respect, providing a potential asset for innovators and regional partners attempting to reach or work in international markets. In 2009/10 Universities enrolled nearly 24,000 students from other countries in the EU and overseas, and the percentage of international students in Welsh universities remains high in comparison to the rest of the UK. They also have an extensive network of links with overseas partners and research and development communities. They are also involved in the validation of courses at many centres world-wide. Universities' experience and global connections are a considerable asset for potential innovators.

10. Q7) What should be the role for knowledge transfer from Higher and Further Education and the use of intellectual property in supporting innovation?

10.1. Innovation depends on a complex set of activities from creation of new ideas to their diffusion. In Wales the Gibson Review questioned the conventional policy approach to commercialisation which focused on identifying and protecting intellectual property. The generation and progression of ideas through this innovation landscape can follow many different paths, and involve interaction between many different players. An analysis of the key enabling technologies underpinning modern advances would support this. Knowledge transfer needs to flow in a number of directions, through the close interaction between partners including universities and businesses.

10.2. The role of intellectual property in its broadest sense is clearly very important. The HEBCIS survey suggests that Welsh Universities are comparatively underperforming for their size (5% of the UK) against indicators for the number of areas for patents granted (3%), cumulative patent portfolio (2%), total revenue from IP (3%) and IP including income from the sale of shares in spin-out companies (2%).⁴¹ This partly reflects the composition of industry, and subject base in universities. It is important to recognise that this source of income is likely to continue to represent a small part of income for Universities in general. Also, measures based on these formal outputs do not capture the full extent of creative outputs. Arguably measures which reflect the quality of spin-outs are more important – it is encouraging in this respect that the number of spin-outs from staff and students which have survived for more than three years exceeds the For Our Future Targets in Wales. Nonetheless, it will be important to ensure that Wales has much stronger science base to remain competitive in this area, and we welcome in particular the direction of the Science Strategy in this respect. It will also be important that Universities continue to develop opportunities for greater IP commercialisation.

⁴¹ (Higher Education Statistical Agency (HESA) 2012)

10.3. Universities have a particularly important role in the intellectual creation which cannot be protected or commercialised as legal property (including for instances advances in mathematics) but can nonetheless lead to fundamental shifts in scientific and technological progress, or the creation of intellectual property whose commercial value is more limited (for instance, in humanities) but contributes significantly to the advancement of culture and society and the regional communities that Universities serve. Public funding for such activities can be essential. At the same time there is greater potential for facilitating the diffusion of knowledge created with the support of public funding. We note in particular the developments proposed in the BIS strategy⁴² to open access to publicly funded research and public data e.g. through the Open Data institute and look forward to reviewing how this could potentially be applied in Wales without adversely impacting on interaction between universities and business.

10.4. Innovation in the form of the development of ideas, knowledge and know-how which do not fit into a narrow legal definition of intellectual property form perhaps even more important contribution for the society and economy. The University has a central role in facilitating innovation at this level, particularly through fostering enterprise skills in its students and graduates, providing training for continuing professional development, and through its consultancy activities.

Other

11. Q8) Do you have any other comments you would like to make or are you aware of any information which might be useful to the Welsh Government in formulating a new Innovation Strategy?

11.1. There are a number of comments we would like to make in relation to the next stage of development of the innovation strategy for Wales:

- Investment in key areas will need to be sustained over a period of many years to be effective and the innovation strategy will need to be clear both about its direction and the choices that have to be made between competing priorities.
- It is very important, however, that the innovation strategy provides a flexible framework and that processes that are put in place to ensure that the innovation strategy continues to adapt. The European Commission's guidance places great emphasis on the importance of an 'entrepreneurial process of discovery'. The market will continue to change or transform, as new ideas surface are tested and adopted - all the more so if the innovation strategy is successful. Our collective

⁴² (Department for Business Innovation and Skills (BIS) 2011)

knowledge and understanding of what is needed and what works will also change as stakeholders work in partnership, and we will need a framework that enables to capture and respond to changing requirements and opportunities systematically.

- As part of this, the future strategy should ensure that we systematically capture the information and evidence needed to evaluate policy interventions in this area effectively. It is clear in this response that very considerable activity and support has under-pinned some areas of key success in Wales but many of the most accessible measures of innovation are little more than proxies. It is hoped that HEW and its members will have a further opportunity to collate evidence across the sector to support a more detailed plan to follow this strategy.
- In line with this, we would advocate that the Welsh Government follows the European Commission's recommendation and submits its innovation strategy for external peer review to the Smart Specialisation Platform in Seville, implementing the six-steps approach to its strategy development advocated in its guidance document including: analysis, governance, elaboration of a shared vision, identification of priorities, definition of coherent policies and plans, and the integration of monitoring and evaluation mechanisms.
- Finally, we believe that Higher Education should continue to have an important role in steering the on-going development of the innovation strategy. This reflects the unique importance of higher education at the centre of innovation ecosystem, and the need to ensure that Science and Innovation strategies are aligned successfully. We would in particular like to see that universities are appropriately represented on any future steering group for the innovation strategy.

23rd July 2012

HIGHER EDUCATION WALES

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