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Submitted to **National Innovation Plan: call for ideas**

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National Innovation Plan: Call for Ideas

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Comments:

1 How best can our regulators drive innovation and make the UK the regulatory test bed capital of Europe?

text to speech:

Regulations and standards are very necessary, important and potentially beneficial enablers of innovation. Where regulations and standards increase safety, consumer confidence, standardisation of services and products, or streamlined efficient production processes they can add huge value to businesses and wider society, enhancing quality of life and stimulating innovation. The UK has become known the world-over for its robust regulation of standards, and this can act as a magnet for overseas customers and investors, attracted by the quality of British R&D, innovation, manufacturing and delivery of services. Furthermore, uptake of British underpinned regulations and standards can enhance prospects for exports.

Some regulations however are perceived as being detrimental and over-protective of government, aimed largely at avoiding any potential criticism arising from adverse consequences of undesirable business and other practices. This is especially true where there is likely to be media interest and reaction from activist groups. The result is to stifle innovation. Examples include some aspects of food production and energy generation and also reporting of business ownership and operations. A further and growing problem is with the processes for demonstrating compliance and the increasing tendency to pass administration of measures designed to ensure compliance onto business. Examples include compulsory real time (monthly) payroll reporting to HMRC and compulsory auto-enrolment into pension schemes. This is creating a cumulative burden that threatens to sap business resources for developing businesses and innovative products and services.

There would be use of regulation to support innovation if greater emphasis were to be placed on value adding measures, open discussion of risk and the positive benefits and role of regulations in driving growth. Playing a stronger role in the international landscape to shape regulation is key – e.g. in EU standards the UK typically under invests in representation of key people to engage in devising standards. Effective regulation determines the success of innovation transitioning to exploitation. UKplc needs to place more strategic resources in developing regulation in some key areas including data and environment.

Some 'red tape' needs to be further reduced, especially for enterprising, agile, small/ young companies e.g. HMRC bureaucracy.

2 How can we deliver real culture change within public procurement?

text to speech:

Given the extreme difficulty of increasing public spending in the current fiscal environment, every effort should be made to use public procurement budgets to support innovation via the placement of contracts for new and innovative products and services. Such early adoption by a customer, albeit from the public sector, will help to stimulate confidence in business and leverage additional risk investment from the private sector.

Leveraging public procurement is an important potential stimulant for innovation. In the case of SMEs, equity investors generally seek companies with demonstrable revenues from contracts. The ability to demonstrate such revenues increases the likelihood of being able to raise funds from venture capital providers. The public sector can assist with placement of contracts through SBRI schemes and via public procurement. The US uses its SBIR scheme to support, to great effect, early stage SMEs through the use of procurement contracts, including for research. AIRTO believes that the SBRI mechanism should be used more widely therefore.

In particular, government needs to act in certain sectors where there is an effective or near public sector monopoly in the UK market in terms of procurement, such as health within the NHS. This means that there is really only one significant domestic potential early adopter client for new medical devices, equipment and treatments/products. Any barriers thrown up by NHS purchasing procedures and capabilities can be fatal to commercialisation efforts where there are major export opportunities. Business transformation in our public services would act as a powerful driver for innovation and early adoption through procurement.

The Olympic Delivery Authority for the London 2012 Olympics provides an exemplar for embedding innovation into public procurement to drive innovation. Nevertheless, carrying such lessons over to embed into existing, well-established organisations can be more complicated and to be successful needs buy-in from our public services into the mission of leveraging public procurement to drive innovation coupled with sanction from government for the risks involved. To mitigate potential criticism from the public and media there should be a publicity exercise to inform ahead of time as to the intention and rationale for such an initiative.

3 How can we ensure that we put the UK at the forefront of open data opportunities?

text to speech:

Open data is a very fast moving landscape. Government needs to grasp some key issues now to make the most of opportunities that lie ahead for UK plc. Particularly important issues are:

- i. developing the right application skills base to help the UK leverage open data opportunities;
- ii. ensuring that technology capabilities and infrastructure keep pace with demand for access to data;
- iii. building a clear, fundamental and cohesive understanding of what data already exists. This is pivotal, and developing mechanisms for tracking what data exists and for access will be important;
- iv. policies to define ownership and deal with privacy and usage questions;
- v. understanding the value/supply chains for open data access and application.

At present it is not always clear who the end users will be, what value can be derived from the available data sets and who will comprise the supply chain to the end user for information services utilising data.

4 Where can we maximise the opportunities for innovation, as we deliver high-quality infrastructure that unlocks broad economic opportunities?

text to speech:

Much of the UK's locally based infrastructure clearly focuses on local issues and frequently and understandably brings a parochially dominated approach to prioritisation of issues for attention. Local entities also tend to have limited experience of the wider innovation outlook and landscape and are limited in their reach. Innovation is not always high on the agenda therefore.

Local Enterprise Partnerships (LEPs) largely draw their governing bodies from their local communities. Many of them could benefit from better coupling to the wider innovation landscape by involving additional innovation champions from outside their immediate local area, from business and the Innovation, Research & Technology (IRT) Sector. This would bring a clearer understanding of the key innovation players across the country, enabling better identification of opportunities for innovation and connection to specialist supporting expertise beyond the immediate locality. Initial conversations with LEP representatives, both with and without universities in their areas, confirm enthusiastic support for this idea.

To encourage their greater focus on innovation, the government also needs to state publically clear innovation objectives and encourage LEPs to help deliver them.

The government needs to give particular attention to capital investment in the UK's innovation infrastructure. Encouraging 'more of the same' through indirect financial assistance, via R&D tax credits for example, although necessary will not be sufficient. Raising the UK's innovation performance needs direct, disruptive intervention as well. Incentivising such disruptive innovation is achieved through the activities of independent organisations such as universities, Public Sector Research Establishments (PSREs), non-profit Research and Technology Organisations (RTOs) and Catapult Centres. Most are funded through a combination of public and private funding. It is essential that the right balance between revenue funding from these sources is maintained and that all such organisations are enabled to access core capital for the development of both their human and physical capital in a coherent way. This will enable existing organisations to bring their resources to bear on the government's innovation agenda, as well relying on entirely new Centres (such as the Catapult Centres for example).

PSREs and other non-profit RTOs in particular should be enabled to access core capital resources in a more strategic manner. Their role is to create enduring but up-to-date capability and infrastructure, and this needs coordinated and long-term investment made in both knowledge/skills/experience and physical capital. For PSREs, annualised capital (or indeed programme) budgets as currently practiced make this kind of activity very difficult. This practice can easily end up wasting money, constraining innovation and limiting their ability to address new opportunities and to support government and industry in a timely manner. Capital funding sources therefore need to be available on a multi-annual basis. Such funding needs to be strategically driven (i.e. driven by a national industry and technology strategy).

5 Where can the UK work alongside the private sector to create the deepest pool of innovation finance in Europe?

text to speech:

The UK still has a persistent problem with 'the so-called valley (or valleys) of death' for innovative ideas on their journey from inspired insight through proof of concept, and on to scaling up for growth. Aside from the difficulties of finding and developing investable management teams, accessing risk capital for pre-seed round proof of concept work, and for later stage scaling-up are the main pinch points. Particular barriers to access are to be found in the relatively lower appetite for risk displayed by managers of pooled funds compared with the risk tolerance of individual very high net worth entrepreneurs investing on their own account, of which the UK has notably fewer than are to be found in the US. The problem is compounded by the high risk of excessive dilution for early stage investors into high capital requirement, lengthy development run projects. Many aspects of life sciences and renewable energy generation fall into this category, for which significant 'patient' capital resources are required.

What can be done about this?

1. Attracting more very high net worth individuals to invest in UK based opportunities would reduce reliance on pooled investment and the need to sell on investments, typically on a 10 year cycle. This would increase risk appetite and reduce the likelihood of ownership passing into foreign hands as refinancing

inflection points are reached. UK interests frequently cannot hold on to ownership of innovative research and technology being commercialised in spin outs once early investors need to seek a first exit point and the enterprise needs to move on to more substantial growth. Vulnerability to loss of UK ownership is brought about by a combination of: a) the tendency to under-capitalise new enterprises; b) the need on the part of many investors to churn their capital and to demonstrate early returns; and c) the attitudes of UK financial institutions to risk and, for example, the inability to hedge such risks in unquoted investments.

2. The government could increase the interest of financiers and investors by increasingly promoting UK innovation, to match the profile of UK research. Promotion of a shared agenda between government and the private sector will give confidence to investors. The benefit of a shared goal approach has been demonstrated in a number of other areas, including space and automotive for example.

3. Government acting as an early adopter customer for innovative products and services will also increase private investor interest and confidence.

4. In sectors where early stage private investors into Enterprise Investment Scheme/Seed Enterprise Investment Scheme eligible ordinary shares can easily become effectively wiped out by excessive dilution during successive rounds of investment (e.g. in life sciences and energy generation as noted above), continued ongoing tax incentives for patient early stage investors at later stages when more complex financial instruments are introduced by typical venture capital funds.

5. A stronger secondary market within the UK in early stage holdings to provide greater liquidity could also reduce risks of excessive dilution for early stage investors; perhaps suitable government backed mechanisms to enable this to be achieved could be considered.

With regard to maximising the potential of IP emanating from universities, caution needs to be exercised in over-encouraging and over-promoting the spinout company route. Licensing may frequently be more appropriate as a means for translating technologies to market where there is an existing and receptive supply chain willing to take up appropriate innovations and carry them into the market. Too many poorly funded university spin outs have been created in the past when the emphasis was primarily on formation of spin-outs; this led to a significant proportion of avoidable and expensive, inappropriate and failed ventures, putting too much pressure on limited early stage funding resources. Many universities now pursue a more balanced approach and any tendency to reignite the preference for spin-outs would be best avoided. We would urge that greater use be made of the many members making up the UK's IRT Sector beyond the universities. This will help to exploit synergies and maximise the impact of publicly funded research. It is crucial that all players in the research and innovation ecosystems are involved and therefore collaboration between universities and PSREs/RTOs should be further encouraged and better supported.

PSREs/RTOs are well capable of undertaking mid technology readiness level (TRL) research, either on a self-sufficient basis or in conjunction with university partners. Many of these organisations work with academia in this manner, but approaches vary locally, and the UK could benefit from adopting a more defined, systematic framework of support. Note that BIS has already identified PSREs/RTOs as an under-utilised resource, on more than one occasion. The recently launched Catapult Centres (which are effectively new RTOs with a mission to operate at higher TRLs) are intended to provide a better match to the research needs of business in specifically identified areas of technology and application. Building new partnerships between universities and the IRT Sector would benefit academic institutions directly, through enhanced leverage for their knowledge and technology transfer by exploiting synergies in expertise, skills and research infrastructure.

6 What do we need to do to get maximum benefit to the UK economy from challenger businesses?

text to speech:

For many challenger businesses, widespread use of the internet has enabled new enterprises to flourish and drive innovation. Metrobank and others are doing this to considerable effect, challenging traditional high street banking providers. Amazon, for all its tax management practices, very effectively challenges traditional high street only retail outlets. Internet provision is therefore a key enabler. Government should ensure that the internet remains secure, efficient and as far as possible trusted to attract and enable more challenger businesses. Better regulation may be necessary to maximise returns to the UK economy e.g. around tax, so that benefits are retained for the UK where appropriate and risks mitigated.

There are certain sectors where there are levels of public dissatisfaction with service that would benefit tremendously from more challengers (and the innovation and competition that they could bring to the market) e.g. in energy, communications and rail transport. Switching suppliers remains a difficult process for many consumers to embrace on a regular basis and regulation should be used to continually improve the user experience.

Turning to potential challenger businesses in other areas, particularly where there is export potential, government should use IRT organisations, such as the Catapult Centres for example, to stimulate and support such ventures with an appropriate level of public sector funding where there is significant technical risk and particularly where government would benefit as a potential customer.

Success in attracting and driving more challenger businesses in the UK requires a strong and ambitious vision and hinges on a robust industrial strategy. The government needs good market intelligence to identify potential areas that could benefit from support, and needs to be in touch with, agile and responsive in key sectors. The UK's industrial strategy is crucial to maintaining dialogue with developing areas of our national economy. In this regard, industrial strategy must be well informed and fit for purpose with an implementation plan and shared goals that see government and industry driving towards the same objective.

7 How can we ensure that the UK's inventiveness and creativity capitalises on our strong intellectual property system to generate growth and further innovation?

text to speech:

Management of IP when poorly handled can be as much of a barrier to successful commercialisation of science from universities as it can be an enabler if well handled; and if companies retain owned IP without exploiting it, it can be 'wasted'.

Valuation of IP – because it not a physical asset - can be fraught with difficulty, and for this reason IP should not generally, in our opinion, appear as a routine balance sheet entry. Also, attempts to trade IP like an asset can be misplaced and is in many instances more costly than is justified by the income eventually obtained.

Overvaluing contributions to development of IP can be a problematic issue, particularly in academia, yielding unrealistic expectations on the part of both inventors and technology transfer professionals. Pushing universities to drive the supply of potentially exploitable IP is not always helpful and can lead to erroneous expectations and expensive and bloated IP portfolios. For this reason government needs to be very careful when setting any targets for generating IP in universities or for its commercialisation.

How can the situation be improved with help from the government?

Bringing together opportunity 'spotters' and entrepreneurs with generators of new knowledge and IP in universities is likely to be more successful than trying to push universities to go out looking for exploitable opportunities. Such networking is a probabilistic activity and should involve face to face interaction; it is a 'body contact sport' with an unpredictable outcome and will produce more results the more it is practiced. For these reasons it is rarely taken on as a self-standing commercial activity and requires government intervention and support to sustain it. The importance of such networking and connection between innovation players in what is effectively a very fluid, flexible and constantly reforming the 'innovation supply chain' should be recognised in the National Innovation Plan and resources to handle such activity should be provided for in the Plan.

Is there anything else the UK could need to do to create the best possible framework for innovation?

text to speech:

Context for AIRTO's replies:

AIRTO welcomes BIS's call for ideas on the National Innovation Plan. Organisations in the UK's IRT Sector play a pivotal role in driving economic growth and innovation, frequently acting as the aggregator of scientific and technological demand from businesses and markets. Such organisations typically work at the mid-TRLs and are well placed to understand company and sector based innovation strategies, where they are optimally positioned to facilitate interactions involving academic partners, SMEs and large organisations to approach challenge-led innovation projects. The Sector is a natural partner for InnovateUK and able to interface easily with both the academic research base and industry.

Britain has a large and thriving IRT Sector, which contributes significantly to our national capabilities(1), with the economic impact for UK plc now estimated to stand at £32-36 Billion per annum. The IRT organisations that AIRTO represents are a significant component of the UK's innovation ecosystem, but differ from universities in their primary objectives, strengths and capabilities, which are centred on commercial translation of applied research. In its 2011 'Innovation and Research Strategy for Growth', the UK government recognised the sector as an 'under-utilised asset'(2). UK IRT organisations have a vital role to play in driving economic growth.

Maximising the value obtained from the whole innovation ecosystem, including from organisations making up the IRT Sector, a large part of which has been identified by government as an under-utilised asset, is going to be essential to the success of the UK's National Innovation Plan. The need for this was recently highlighted by both:

The CBI, stating that the role of the sector is pivotal in the UK's innovation landscape (3).

and

David Willets - the former Science Minister, who recently contrasted the UK's performance with Germany and the way that it supports its IRT Sector (4).

But, to ensure success, the National Innovation Plan needs to slot together with:

- i). a national productivity/growth plan;
- ii). a national research strategy;
- iii). a clear industrial strategy – one that is set out that the government sticks to.

Strong ownership of the National Innovation Plan will be essential to oversee its implementation, which of necessity will be cross sectoral (involving the IRT Sector, industry, third sector bodies and academic representatives as well as government). Possibly formation of a National Innovation Council or perhaps a National Innovation Growth Partnership to oversee successful implementation would be appropriate and beneficial.

AIRTO considers that there is still considerable work for government to do in understanding innovation, in terms of:

- How innovation itself occurs. AIRTO's view is that innovation is not a simple linear process. There is not one universal panacea to innovation - process, scale-up, timelines and complexity vary from sector to sector.
- How the innovation ecosystem operates in the UK. This need for understanding encompasses both grasping a clearer picture of existing capabilities in key technology areas, and also acquiring a clearer understanding of 'place'.

It is important to consider carefully the parts of the overall innovation cycle where there is a need for publicly funded intervention from government, to address the challenges associated with commercially unsustainable elements of the disruptive innovation process, from original formation of ideas for example through to demonstrating viability in the marketplace. Specific essential elements required to boost innovation, which need public support are as follows:

- Bringing people from different backgrounds and disciplines together to come up with innovative solutions to problems;
- Researching, in advance, the science likely to be needed to obtain a thorough understanding of the technologies, system designs and processes being proposed, devised and adopted;
- In the light of the above, and in conjunction with business and academia, guiding formulation of academic research priorities and securing supporting financial resources for research, both within the UK and from Europe;
- Supporting that part of the UK innovation ecosystem's infrastructure aimed at stimulating and supporting disruptive innovations which are unlikely to arise naturally from existing supply chains and sectors;
- Sharing mitigation of challenging technological and non-commercial risks;
- Assisting with access to the private risk finance needed to translate and scale up for commercial market penetration;
- Dealing with any relevant regulatory, standards and legal aspects likely to impact on the chances of success;

- Acting as an early adopting customer where appropriate;
- Guiding the development of STEM and business skills needed to meet demand from a successful National Innovation Initiative.

Some important pointers within this overall agenda are:

1 - Stimulating the advancement of promising technologies, eventually requires investing in the scale-up stage to reap the benefits, and in the past the UK has lost out on or exited from such developments (e.g. advancing opportunities in semiconductors) because of uncertainty over risk/reward/and availability of finance. The value-add for the UK tends to be further along the application chain in most technology areas at present, in design, systems and application development and further away from the fundamental commoditisation of manufacturing processes, like those associated with innovation in mass market materials for example.

2 - Mobilising local authorities - via LEPs - and Devolved Administrations to take a stronger role in driving the review and re-purposing of assets for innovation will be vitally important in supporting organisations to take initiative around opportunities for urban regeneration and to make regions and institutions stronger and better positioned to deliver innovation. Facilitating thought-leadership, project inception and planning is essential for successful creation of large innovation schemes. Ensuring the UK can be ready and prepared to act swiftly to spot and realise big opportunities for innovation in key sectors (e.g. the steel sector) is vital to avoid opportunities being lost. One solution could be to establish an innovation taskforce of multi-disciplinary experts (from finance, IRT Sector, big industry and academia) to be mobilised to act fast when a major opportunity presents itself – the role of such a team being to propose new innovation initiatives for big assets that suddenly become available.

3 - By and large the UK stands to make the best impact by pursuing global challenges (within the context of an industrial strategy) and aiming to do fewer things on a more intensive scale, instead of spreading efforts too broadly. Addressing these challenges for innovation with the UK's key areas of strength in advanced and high value added science and engineering is the foundation upon which the UK should build the technology based element of its industrial strategy (in space/aerospace/high performance automotive/civil engineering and building design/life sciences/ digital design/robotics and automated systems).

4 - A key element (that we would particularly wish to emphasise) is skills development.

The government needs to invest, together with business and industry, in the skills base, specifically in the skill sets needed to work successfully on practical innovation processes. This is an area where there is a clear shortage of the multi-skilled people needed to deal with the many critically important innovation challenges for the UK. Particular shortages are being experienced in sourcing innovation leaders with the vital 'soft/people skills' needed for good management but also sound capabilities in business planning, supply chain operation and finance and at the same time familiarity with relevant technologies and new product and service development.

An apprenticeship programme to develop innovation leaders might make a useful contribution to dealing with the problem. Ideally it would comprise a series of secondments, each for a period of six to eighteen months, to academia, the finance sector, departments of government (such as BIS) and commercial industry, much along the lines of a traditional fast track graduate development scheme in a large enterprise. Such a scheme, or a suitable variation on the concept, would require financial support but would quickly produce a younger generation of multi-skilled practitioners ready to take up the challenge of capitalising on the UK's strong research and innovation base.

AIRTO members and the independent sector would be very well placed to host this kind of programme, working in conjunction with their networks of commercial enterprises, universities and government departments. This would capitalise on the vital role that the independent sector already plays in contributing to the development and retention of the UK's skills base by providing scientists, engineers and technologists with:

- professional development of talented graduates and PhDs;
- training through apprenticeships and internships;
- defined career pathways;
- job mobility.

Engaging the IRT Sector as a training partner at apprenticeship level and recognising the role the sector has to play in employability of the graduate workforce should be a central component of the government's strategy for better utilising the UK's assets for accelerating innovation.

In summary, important aspects of the National Innovation Plan should include:

1 - Skills development. The need to create a cadre of multi-skilled entrepreneurial innovation leaders with practical experience in business and industry, scientific research, finance and funding and government affairs and policy. An innovation apprenticeship scheme should be considered.

2 - Support for networking and cross-discipline/ cross-sector community building to stimulate innovation. (Innovation stems from interaction between different disciplines drawing on varied experiences responding to challenges arising from problems to be solved.) This is an activity that needs some organisation outside the framework of individual disciplines and sectors and is therefore difficult to sustain on a commercial basis. It needs positive support, both promotionally and financially, from government.

3 - The government leading by example! Bringing innovation into policy formulation and public service delivery, demonstrating also that this is actually being done and how - through case studies.

4 - A roadmap for achieving the desired objective to ensure that it is a proper 'Plan', rather than just being a collection of disparate measures. Any of the above could be worked up into 'A Big Idea'.

The National Innovation Plan will be most successful in achieving the goal of driving innovation, and ultimately growth, if it seeks to fully understand key sectors and models of innovation that apply to them at the outset.

References:

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