Science and Innovation: Working Towards a Ten-Year Investment Framework

HM Treasury, DTI, DfES

NESTA Consultation Response: April 2004

NESTA
Fishmongers' Chambers
110 Upper Thames Street
London EC4R 3TW

Background

NESTA – the National Endowment for Science, Technology and the Arts – was established by the 1998 Lottery Act to pioneer ways of supporting and promoting talent, innovation and creativity in science, technology and the arts. This was achieved through our three core programmes – Learning, Fellowship, and Invention and Innovation. To date we have made 439 awards through these programmes and invested over £27million in supporting creativity and talent across the UK.

Through the Invention and Innovation Programme we help turn ground-breaking ideas into innovative products, services or techniques. Through this almost £9million has been invested in start-ups, which has led to NESTA becoming one of the UK's biggest single sources of early-stage seed funding. Another 142 of our awards have been through the Learning programme. By way of this programme we support highly innovative approaches to learning and understanding about creativity for people of all ages. Beyond formal education, we support fresh thinking about continuous professional development and new tools for learning and lifelong learning. To date over £10million has been invested in innovative and pioneering learning projects and through this programme.

Further to these we have also sponsored a number of other projects, such as Ignite!, the Graduate Pioneer Programme, Planet Science (formally the DfES sponsored Science Year) and NESTA Futurelab. We hope to build on the knowledge gained through these and make sure that the lessons learnt have an impact on a wider UK audience.

We are keen to use our experience as an investor and supporter of science and innovation to play an active role in implementing a number of the initiatives laid out in this consultation. Against this background we welcome the opportunity to submit evidence on the *Science and Innovation: Working Towards a Ten-Year Investment Framework consultation*.

Overview

NESTA welcomes the continued emphasis being placed on science and innovation, and applauds the Government's commitment to creating a "successful and competitive science and innovation system in the UK". We are eager to feed into a number of the initiatives proposed and to act as a potential partner organisation for the delivery of certain aspects of the strategy. The bulk of this consultation response will therefore be focused on where we feel NESTA can make a valuable impact to science and innovation in the UK. We will be addressing three broad areas:

- The need for an increased emphasis on science in schools, and a more innovative approach to education, looking at more than simply the supply of science teachers;
- The focus on the role of big business and institutions and the need for more focus on SMEs and innovative individuals in the sciences; and
- Potential NESTA involvement in the development of the planned Technology Strategy.

1. Education

In order to succeed in improving the UK's science base in the long term, this strategy must increase the emphasis placed on investment in the science taught and learnt in schools – to ensure a future supply of scientists. This will require a focus on different methods and structures to those used in supporting the science base in Higher Education and in business.

While we agree with the consultation paper that the supply of science teachers is an important issue, it is not the only important issue in developing a robust approach to science education. We feel that there should be more emphasis on the role of the education curriculum in creating a culture of innovation and enterprise in the UK, and on the development of resources and professional development for teachers aimed at delivering the curriculum in an effective way. In both of these areas, NESTA has experience and a proven track record of supporting projects. We delivered Science Year (which later became Planet Science) under contract to DfES, and have supported a number of projects which are aimed at improving the take-up of sciences among currently under-represented groups of pupils.

The evaluation of the lessons from Planet Science[1] could be used to help stem the decline in the numbers of science, maths, technology and engineering graduates. Amongst other things, this highlighted that students prefer active, rather than passive, learning. This review, passed on to the DfES, also showed the importance of the methodology of teaching. It made ten recommendations. Those relevant to this consultation were:

- The Science curriculum should include more ethical and controversial issues. These should not be hived off into occasional discrete topics but included throughout the curriculum. 69 per cent of respondents wanted controversial issues to be included in the science curriculum.

[1] Science Year/Planet Science is an initiative managed by NESTA on behalf of the DfES, and involving key partners the Association for Science Education and the British Association for the Advancement of Science (BA). It aims to raise awareness of science among young people aged 10-19 years and their key influencers - parents and teachers. http://www.planet-science.com/home.html Its evaluation is available at http://www.planet-science.com/sciteach/review/Findings.pdf

- There should be more discussions in science classes. Discussions provide students with the opportunity to learn from someone other than their teacher and, healthily, to disagree with teachers and develop their own ideas.
- Learning is helped by having a teacher who can engage with students and by the use of visually stimulating material.
- In primary school, integration between science and other subjects is important. Primary science should be placed at the same level of importance as English and Maths in practice as well as in theory. Better equipment is also needed for primary teaching.

Planet Science is currently conducting research in partnership with the Institute of Physics, looking at successful classroom practice in persuading girls to continue with physics after GCSEs. NESTA is also conducting research in collaboration with the Royal Society into how effective role models are in changing young people's perceptions about scientists and engineers. Against this background of experience, we would welcome the opportunity to work closely with the Government on developing further approaches to improving science teaching.

Part of NESTA's remit is to contribute to public knowledge and participation of science, technology and the arts. To date, our efforts in this area have been focused primarily on a number of projects aimed at young people, which will enable them to engage more effectively with science, technology and the arts when they become adults.

A number of large-scale national events, delivered as part of Science Year and Planet Science, were very successful in raising awareness of science among young people. The Giant Jump and Whodunit both attracted high levels of participation from teachers and pupils. Both of these programmes were high profile national campaigns aimed at engaging teachers, pupils and parents with science. For the Giant Jump, Science Year linked up with several networks of seismometers. At around 11am on the 7th of September 2001 we asked school teachers and children from across the country to jump. Over 1,000,000 pupils participated in this activity. 140 seismometers recorded seismic activity in their locality and reported the results to the British Geological Survey's offices in Edinburgh.

In addition, we have funded projects to address the low participation rates of women in science, engineering and technology. The Planet Science campaign made science relevant to girls by having a Planet Science column in nine issues of 'Sugar' magazine. During our appraisal this was found to be one of the top three activities in engaging girls in science. NESTA has also funded projects such as *Planet Jemma* - challenging the 'white lab coat' image of science through a new online drama. The character of Jemma, a university student, interacts with her target group of 11-18 year-old female students by getting them involved in a compelling drama that focuses on what it's like to be a young woman just embarking on a life of scientific study and combining this with the usual social aspects of being a student. This site has attracted over 25,000 subscribers.

Our experience of delivering these activities may help inform the further development of the Science Strategy's proposals to improve public engagement with science more generally. We are keen to work with the Government in the implementation of these proposals.

2. Small businesses

The proposals in this consultation are focused primarily on the activities of medium-sized and large firms.

Whilst it is still the case that in the UK large firms are more likely to engage in some form of innovation activity than their small and medium counterparts we nevertheless believe that SMEs and individuals have a valuable role to play. The DTI's study of Regional Innovation Performance in the UK recognized that while large firms are currently more likely to engage in innovation activity, those that did produce new or improved products generate a lower percentage of their turnover from them than their SME counterparts. Small to medium sized businesses are the lifeblood of our economy, helping boost our productivity and prosperity. We therefore propose that their contribution to the development of the UK science and technology base be kept more in mind in the development of policy.

This consultation, coupled with the recent Lambert Review into University-Business collaboration and the DTI's Innovation Report, could have outlined more dedicated measures to support investment in small innovative companies. Through our experience as the UK's largest single source of early-stage risk capital for small businesses we recommend that the government look at introducing the following initiatives:

- The Government should seek ways of directing a higher proportion of its support, particularly business advice services, to small and medium-sized enterprises.
- As well as looking at increased sources of funding the government should also look at providing some sort of short term or part time management resource. Early support in this field is paramount; we have found that success or failure of these businesses will often hinge on the first 100 days from inception. During this period our support is increasingly focused on the development of outline business and action plans and the preparation for further funding.
- Business Links could encourage networking to stimulate innovation by SMEs. Many studies stress the collective nature of the innovation process. This should not just be limited to higher education but also including links to large corporations, public agencies and private consultants.
- Government should ensure that Business Links have an understanding of the particular needs of innovative businesses, and take these into account when offering advice to these businesses.
- The Government should make considerable efforts to simplify the existing support mechanisms. Services catering for small business, like the Small Firms Loan Guarantee, should be improved and made more accessible.
- Barriers to Business Angel syndication should be addressed as part of the government review on the Financial Promotions Order. This should be done in conjunction with the creation of a uniform code of conduct for these organisations. This will help increase the availability of equity finance for small firms, including those involved in high-tech industries.

There is, however, a broader point on innovation. This consultation chooses to focus on large firms, many of which in the UK traditionally compete by means of cost cutting and increased efficiency.[2] This approach may involve an incremental adoption of new technologies as they come to the market place, primarily through a series of mergers and acquisitions, but it is less likely to involve the investments in in-house innovation necessary to secure the long-term growth of

[2] *UK Competitiveness: moving to the next stage* by Porter, Michael E. and Ketels, Christian H.M. (2003)

science and technology in the UK. To address this the government needs to look at means of enabling a culture where enterprise and innovation grow from within.

3. Technology Strategy

NESTA would welcome the opportunity to be involved in the proposed National Technology Strategy. We have substantial experience in providing support for small businesses in the technology sectors. As stated, we have invested almost £9m in innovative start-up businesses through our Invention and Innovation Programme, making NESTA one of the UK's biggest single sources of early-stage seed funding in the UK. 83 per cent of the projects we have supported through this programme have a technological dimension. We would be keen to discuss this role with the OST Funders Forum.

In developing this strategy, and the broader strategy for creating an enterprise culture, the government should look at innovative pilots and pathfinders. NESTA has substantial experience in this field and would be eager to feed back 'what works' to help the government identify innovative practice.

Conclusion

We concur with the aims of this consultation – the desire for a financially robust economy based on a sound research base and the encouragement of science in all spheres. These are laudable ambitions. We are eager to feed our unique experience as a supporter and investor in science, technology and the arts into the development of these initiatives.