

## Response ID ANON-TP8E-9B1H-N

Submitted to **Building our Industrial Strategy**

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### About you

#### Name

**Name:**

Professor William Powrie

#### Email address

**Email:**

wp@soton.ac.uk

**Are you happy to be contacted if we have any questions about your response?**

Yes

**Are you happy for your response to be published?**

Yes

#### Comments:

#### Postcode

**Postcode:**

SO17 1BJ

**Are you answering on behalf of:**

an organisation (in an official capacity)

### About you - organisations

**What is the name of your organisation?**

**Name:**

Association of Engineering Doctorates

**Approximately how many employees are there in your organisation?**

250-999

**What type of organisation is it?**

Private sector

#### Private sector

**What is the main sector in which your business operates?**

Higher education and research

**Other (please describe):**

In collaboration with many of the other sectors listed (online form only allows one selection)

#### Public sector

**What type of public sector organisation is this?**

Education

**Other (please describe):**

The numbers specified comprise Centres embedded in universities, industrial and individual members

## Responding to this consultation

### Introduction

#### 1 Does this document identify the right areas of focus: extending our strengths; closing the gaps; and making the UK one of the most competitive places to start or grow a business?

**Free text field:**

The areas of focus identified are appropriate; however, the success of the strategy will also depend on other factors, including:

- population growth /migration
- infrastructure development plans (power, transport and IT)
- environmental and financial sustainability
- global events and the actions of key global decision makers
- the outcome of Brexit negotiations (including terms of trade, security and movement of people)

#### 2 Are the 10 pillars suggested the right ones to tackle low productivity and unbalanced growth? If not, which areas are missing?

**Free text field:**

Yes. Additional comments from the Association suggest these additional areas for consideration:

- Effective Horizon Scanning, to influence and adapt to future global trends (especially the idea that the best way of being fit for the future is to create or at least influence it)
- 'Development of Machine Learning, AI, robotics and the implications for industry and the workforce' is so important that it might deserve a 'pillar' of its own - the impact of these developments on people's personal lives (ie not just as a workforce) is also an issue.

#### 3 Are the right central government and local institutions in place to deliver an effective industrial strategy? If not, how should they be reformed? Are the types of measures to strengthen local institutions set out here the right ones?

**Free text field:**

If the industrial strategy is understood, embraced and engaged with by central government and local institutions, with clear, challenging deliverables specified and monitored, then yes.

In particular, our experience over >22 years has shown that the EngD forms the foundation for the development of robust and mutually beneficial partnerships between academia and industry through Research Engineers (as EngD students are known) being engaged in industry-driven research and personal and professional development programmes aligned with UK-SPEC competencies.

#### 4 Are there important lessons we can learn from the industrial policies of other countries which are not reflected in these 10 pillars?

**Free text field:**

### Investing in science, research and innovation

#### 5 What should be the priority areas for science, research and innovation investment?

**Free text field:**

Development and retention of talent. From the AEngD perspective, it is the importance of knowledge generation and transfer through people. While universities are geographically fixed, creating 'stickiness' for ecosystems, the people who study and work at them are free to move on. EngD graduates/postgraduates are likely to go on to work for industry or universities in UK and elsewhere, taking their knowledge with them. This is both an opportunity and a threat, so the incentives for movement / stasis require careful thought and balancing.

We would also argue that construction is one of the most fragmented industries in the UK and would encourage reference to minerals and quarrying in the consultation document. With so many of our quarrying and minerals companies owned by foreign parent companies, their UK operations are vulnerable to closure should Brexit compromise their profitability. We would recommend that such industries are approached specifically - many universities benefit from their involvement and investment in R&D.

#### 6 Which challenge areas should the Industrial Challenge Strategy Fund focus on to drive maximum economic impact?

**Free text field:**

We face major challenges in the construction and civil engineering sector. The review of the CITB is long overdue and we feel that technical education in construction particularly is behind our European counterparts. While there are examples of truly excellent and world class individuals and companies, in general at all levels across the industry, accepted standards of technical competence and performance lags both internationally and in comparison with many other engineering disciplines within the UK. (The recent debacle over the Great Western mainline railway electrification project is a shocking example of the economic and social consequences of this). The competitiveness of UK industry and its ability to provide the infrastructure upgrades needed at a price the nation can afford are questionable. While industry is active on a number of fronts, we would encourage clear government departmental oversight to improve skills and expectations in construction.

## 7 What else can the UK do to create an environment that supports the commercialisation of ideas?

### Free text field:

The AEngD endorses the Institution of Civil Engineers State of the Nation report, with an emphasis on digital transformation. Several EngD centres are engaged in relevant industry-driven research projects, but better incentives are needed for construction and infrastructure companies to engage. In this respect, construction compares poorly with (for example) aerospace, automotive and defence.

## 8 How can we best support the next generation of research leaders and entrepreneurs?

### Free text field:

Support research leaders and entrepreneurs by providing them with the network, skills and freedom from detailed regulations to allow them to innovate. In this respect, a number of distinctive features of an EngD degree, both in terms of the student experience and the substantive outcomes of the training and research undertaken, differentiate the EngD from other forms of postgraduate achievement.

The Association of EngDs suggests that the EngD should be included explicitly in the green paper on Building our Industrial Strategy. 22 years of experience shows that the EngD is the foundation for the development of robust and mutually beneficial partnerships between academia and industry through Research Engineers being engaged in industry-driven research, and personal and professional development programmes aligned with UK-SPEC competencies.

## 9 How can we best support research and innovation strengths in local areas?

### Free text field:

Through re-emphasising the difference between the EngD and an industry-sponsored PhD, which was rather lost in the most recent EPSRC round of awards for Doctoral Training centres some 3-4 years ago. This is because, as evidenced in the attached uploaded report, EngD programmes

- provide REs with experience of rigorous, leading edge research in a business context
- develop competencies which equip REs for a range of roles in industry
- provide a mechanism and framework for high quality collaboration between academic groups and a range of companies
- contribute to the body of knowledge on a particular technical discipline, industrial sector or multidisciplinary theme.

Specific features of the EngD are that

- the problem addressed by an RE during an EngD programme is identified by the sponsoring company, formalised in collaboration with academic staff
- industry engagement with an RE's research project is underpinned by an appropriate formal collaboration agreement
- EngD programmes provide opportunities for the development of leadership skills through experience and practice in industry.

The whole ethos of the EngD when established nearly 25 years ago was to provide highly educated, highly skilled future leaders for industry, rather than future academics as with a traditional PhD. This need is greater now than it ever has been. The EngD has come of age, and the AEngD network allows local strengths to be harnessed and best practice to be disseminated throughout the membership.

The attached documents are (1) a report detailing the impact of the EngD, and (2) further details of the EngD and its benefits, prepared for and submitted in evidence to the Dowling Review. The second document is uploaded in response to a later section, as it seems to be possible only to upload one document per section.

**If you would like to add any other supporting evidence relating to this section please upload document here.**

### Browse for file :

Understanding the EngD Impact v6 with cover.pdf was uploaded

## Developing skills

### 10 What more can we do to improve basic skills? How can we make a success of the new transition year? Should we change the way that those resitting basic qualifications study, to focus more on basic skills excellence?

#### Free text field:

### 11 Do you agree with the different elements of the vision for the new technical education system set out here? Are there further lessons we can learn from other countries systems?

#### Free text field:

### 12 How can we make the application process for further education colleges and apprenticeships clearer and simpler, drawing lessons from the higher education sector?

#### Free text field:

### 13 What skills shortages do we have or expect to have, in particular sectors or local areas, and how can we link the skills needs of industry to skills provision by educational institutions in local areas?

#### Free text field:

**14 How can we enable and encourage people to retrain and upskill throughout their working lives, particularly in places where industries are changing or declining? Are there particular sectors where this could be appropriate?**

**Free text field:**

The EngD is particularly relevant to high level retraining and upskilling, as a collaboration between industry and academia. The attached document describes the fundamental features and benefits of the EngD: it was initially prepared for and submitted in evidence to the Dowling Commission on links between industry and academia in engineering, which reported in July 2015.

**If you would like to add any other supporting evidence relating to this section please upload document here.**

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AEngD Dowling Review submission v5 March 2015.pdf was uploaded

## **Upgrading infrastructure**

**Call for evidence on UK infrastructure policy**

**15 Are there further actions we could take to support private investment in infrastructure?**

**Free text field:**

**16 How can local infrastructure needs be incorporated within national UK infrastructure policy most effectively?**

**Free text field:**

**17 What further actions can we take to improve the performance of infrastructure towards international benchmarks? How can government work with industry to ensure we have the skills and supply chain needed to deliver strategic infrastructure in the UK?**

**Free text field:**

**If you would like to add any other supporting evidence relating to this section please upload document here.**

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## **Supporting businesses to start and grow**

**18 What are the most important causes of lower rates of fixed capital investment in the UK compared to other countries, and how can this be addressed?**

**Free text field:**

**19 What are the most important factors which constrain quoted companies and fund managers from making longer term investment decisions, and how can we best address these factors?**

**Free text field:**

**20 Given public sector investment already accounts for a large share of equity deals in some regions, how can we best catalyse uptake of equity capital outside the South East?**

**Free text field:**

**21 How can we drive the adoption of new funding opportunities like crowdfunding across the country?**

**Free text field:**

**22 What are the barriers faced by those businesses that have the potential to scale-up and achieve greater growth, and how can we address these barriers? Where are there outstanding examples of business networks for fast growing firms which we could learn from or spread?**

**Free text field:**

**If you would like to add any other supporting evidence relating to this section please upload document here.**

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## **Improving procurement**

**23 Are there further steps that the government can take to support innovation through public procurement?**

Free text field:

**24 What further steps can be taken to use public procurement to drive the industrial strategy in areas where government is the main client, such as healthcare and defence? Do we have the right institutions and policies in place in these sectors to exploit government's purchasing power to drive economic growth?**

Free text field:

If you would like to add any other supporting evidence relating to this section please upload document here.

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### **Encouraging trade and inward investment**

**25 What can the government do improve our support for firms wanting to start exporting? What can the government do to improve support for firms in increasing their exports?**

Free text field:

**26 What can we learn from other countries to improve our support for inward investment and how we measure its success? Should we put more emphasis on measuring the impact of Foreign Direct Investment (FDI) on growth?**

Free text field:

If you would like to add any other supporting evidence relating to this section please upload document here.

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### **Delivering affordable energy and clean growth**

**27 What are the most important steps the government should take to limit energy costs over the long-term?**

Free text field:

**28 How can we move towards a position in which energy is supplied by competitive markets without the requirement for on-going subsidy?**

Free text field:

**29 How can government, business and researchers work together to develop the competitive opportunities from innovation in energy and our existing industrial strengths?**

Free text field:

Supporting commercialisation of ideas. The EngD qualification is regarded by many industrial contacts as 'the gold standard' for achieving impact by translating lower TRL, industrially relevant university research to industrial application. Our experience is that the UK SME supply chain is especially interested in the strong, fundamentally sound but industrial-context EngD research; and the quality of training making it possible for companies to acquire highly skilled staff and the know-how to implement emerging advanced technologies. The EngD is, and should continue to be, a key part of the mix of science, innovation and training to deliver the improvements in industrial productivity necessary for the UK to compete in global markets.

**30 How can government support businesses in realising cost savings through greater resource and energy efficiency?**

Free text field:

If you would like to add any other supporting evidence relating to this section please upload document here.

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### **Cultivating world-leading sectors**

**31 How can the government and industry help sectors come together to identify the opportunities for a 'sector deal' to address - especially where industries are fragmented or not well defined?**

Free text field:

In addition to the core engineering research and training activities, EngD centres frequently act as hubs that bring together industry partners both across and

beyond a particular sector, through workshops, conference events and industry advisory boards etc.

**32 How can the government ensure that 'sector deals' promote competition and incorporate the interests of new entrants?**

**Free text field:**

**33 How can the government and industry collaborate to enable growth in new sectors of the future that emerge around new technologies and new business models?**

**Free text field:**

We strongly support the commitment to increasing funding for R&D, particularly in STEM subjects. These should include doctoral studentships, especially for Engineering Doctorates. We would argue that there is a problem in the UK with respect to the talent that we lose, either when someone completes their PhD, and departs, or when they grow dissatisfied with short term post-doctoral employment. STEM is vulnerable to loss of talent, particularly amongst women. We would like to see investment in a blended portfolio of doctoral studentships, prestigious fellowships, and other tenure types, such that we can grow and retain talent more effectively in the UK system. The whole aim and ethos of the EngD, which was rather forgotten in the award of large numbers of basically traditional pattern PhD Doctoral raining centres about four years ago, was to attract the brightest and best students into a programme of industry-relevant research, that would equip them to be future leaders in industry and commerce. In contrast, the traditional PhD is largely seen as primarily to train future academics. Attractive features included the nature of the programme and the award, the collaboration with industry, and an enhanced stipend. All these were lost in the massive wave of Doctoral Training Centres established in or about 2013-14.

**If you would like to add any other supporting evidence relating to this section please upload document here.**

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**Driving growth across the whole country**

**34 Do you agree the principles set out in this section are the right ones? If not what is missing?**

**Free text field:**

**35 What are the most important new approaches to raising skill levels in areas where they are lower? Where could investments in connectivity or innovation do most to help drive growth across the country?**

**Free text field:**

It is well documented that many engineering/science disciplines are currently facing an adverse demographic. This requires the training of new, highly skilled engineers and scientists to support many strategically important industry sectors and the national infrastructure, and the supply chains upon which they rely heavily. The EngD is an ideal model to attract quality graduates to undertake higher level training and to work in these vital industrial sectors. Establishing regional EngD programmes could promote further the opportunities for the next generation of engineers and scientists to acquire the skills to maintain and modernise the national and regional/local industries.

Most EngD centres have an excellent relationship with local companies - we can provide an effective and proven vehicle for industry / academia research collaborations.

**If you would like to add any other supporting evidence relating to this section please upload document here.**

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**Creating the right institutions to bring together sectors and places**

**36 Recognising the need for local initiative and leadership, how should we best work with local areas to create and strengthen key local institutions?**

**Free text field:**

**37 What are the most important institutions which we need to upgrade or support to back growth in particular areas?**

**Free text field:**

**38 Are there institutions missing in certain areas which we could help create or strengthen to support local growth?**

**Free text field:**

**If you would like to add any other supporting evidence relating to this section please upload document here.**

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