



Understanding the EngD Impact – A Pilot study

Executive Summary

This study aims to understand the impact of the Engineering Doctorate (EngD) programmes provided by the Engineering Doctorate Centres and the more recently established Industrial Doctorate Centres (IDCs). The project set out as a short-term pilot study (March-October 2013) and was sponsored and supported by the Association of the Engineering Doctorates (AEngD) and the Engineering and Physical Sciences Research Council (EPSRC). The primary target of the study was to understand the impact of the EngD with specific focus on:

- 1) **impact on industry partners** - providing evidence of the value of EngD project sponsorship to industry
- 2) **career pathways** - identifying how the EngD experience shapes the career paths of Research Engineers (REs)/EngD graduates

Broadly, **four routes to impact from EngD** programmes were identified –

Generation of new knowledge

New knowledge from the EngD projects leads to increased in-house knowledge and research outcomes in the short/mid-term, as well as a long-term approach to technology problem solution and business change. Standard formation and policy change based on knowledge generated from the EngD projects are long-term routes to impact, leading to sector-wide and/or broad social change.

Innovation-related routes to impact

Outputs include patents, new technology and new processes from the EngD projects. Outcomes include commercialisation of the EngD outputs via licensing of patents; formation of spin-out companies; new product/service development; new market entry; improvements to business processes and accelerating time to market. Innovation related outcomes may lead to cost savings and wider economic impact.

Knowledge networks and collaboration

Knowledge generated by one firm often diffuses into the industry as a whole through *collaborative relationships, through supply chains or through movement of human capital.*

Human capital and skills development

Three forms of impact routes are identified:

- 1) individual RE career path developments;
- 2) organisational absorptive capacity development at the industry partner through enhanced skills development; and
- 3) sector-wide impacts by creating a pool of highly skilled talents and future leaders.

Impact of the EngD is found at individual, organisational and sector levels, brought by the multiple levels of inputs and activities through the EngD programmes at IDCs and through individual EngD projects. The IDCs act as a hub for these impact routes - some of them are leading to direct economic benefits.

Key Exemplars of the EngD impact found in this study

Routes to impact	Source	Exemplars of impact
Generation of new knowledge	Industry sponsor interview	<ul style="list-style-type: none"> “the delivery of necessary new scientific insights, or evaluations or development of evaluations of tools, methods and approaches; publications and getting the information out there” (Consumer Goods)
Innovation related outputs and outcomes	Industry sponsor interview	<ul style="list-style-type: none"> “The EngD can be used to kick-start new technologies.” (Geoscience start-up company related to EngD technology)
	Alumni interview	<ul style="list-style-type: none"> “technology developed through the EngD project was patented and led to the new manufacturing standard within the firm” (Manufacturing) “can definitely change business processes in industry-related standards and new approaches.” (Water)
Knowledge networks and collaboration	Industry sponsor interview	<ul style="list-style-type: none"> “a long time gain for the sector through the sponsoring firm, not just individual EngD and technical impact” (Energy) “Social and economic impact of the EngD is a very important component of the technology supply chain.” (Manufacturing)
Human capital and skills development	Industry sponsor interview	<ul style="list-style-type: none"> “Employment - most important outcome of the EngD”. (Public research organisation) “potential employees, and also managers, future leaders.” (Manufacturing) “an enhanced talent pool.” (Water) “Industrial supervisors are part of the learning cycle.” (Energy)
	Alumni interview	<ul style="list-style-type: none"> “the EngD management courses encouraged me to pursue a management career in the company” (Manufacturing) “in 5-6 years I will progress further, compared to someone who has a PhD, which is the advantage of the EngD” (Nuclear)
	HESA, DLHE 2008/9-2010/11	<ul style="list-style-type: none"> From the initial analysis (to be verified) data suggests that after the completion, 91% of EngD graduates are in full time paid work as opposed to 80% of Industrial CASE PhD graduates. For those who are in full-time employment, 33% of the EngD graduates earn more than £35K per year, as opposed to 12.6% of the CASE PhD graduates
Economic benefits and impact	IDC mid-term review	<ul style="list-style-type: none"> “£33.7 million of additional research council, industry and government funds, including research contracts over 2000-2010” An EngD project has saved (estimated) the sponsoring firm £0.9 million in 2009 and £2.4 million in 2010 One IDC states that “The total additional average declared contribution per RE is £159K,” which equates to a leverage of an additional £1.77 for every £1 invested by EPSRC One of the earlier EngD project outcomes was a therapy that had an estimated value of \$20 billion in 2009
	Industry sponsor interview	<ul style="list-style-type: none"> The EngD project outcome “has been rolled out to Asia; we’re forecasting that it will be about £3 million worth of savings this year, on top of UK figures” (Retail)

Data Sources: 18 IDCs mid-term review (May 2011); Semi-structured interviews with industry partners and EngD alumni (June-August 2013); HESA Destinations of the Leavers of Higher Education Survey (2008/9-2010/11)

Recommendations

- The nature and diversity of industry sponsors – existing and potential ones - has to be better understood, including their motivations, R&D and skills needs and perceived barriers for collaboration.
- A strategic monitoring approach and support to the RE by the sponsoring firm would help better capture the outcomes of the EngD programmes. A broader impact of EngD programmes through supply chain relationships needs further investigation.
- Career development and pathways of the former REs are diverse and need more data sets and comparative analysis with other doctoral graduates.

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