Future opportunities in engineering research for international development

Report of a roundtable for UK funders and research leaders

29 May 2014, Royal Academy of Engineering

Background

This report contains a short summary of roundtable discussions on engineering research for international development. The meeting, chaired by Professor John Perkins FREng, brought together senior research leaders from a small number of UK universities with EPSRC and DFID to discuss the current opportunities, and barriers to further activity.

Annexed to this document are:

- The agenda, short background paper and list of attendees
- The EPSRC and DFID presentations
- A UKCDS mapping of the UK engineering for development research base that underpinned the discussion.[1]

The opportunities in engineering research for development

Stephen Young, Head of Profession for Infrastructure in DFID, opened his presentation with an overview of DFID's infrastructure spending, at approximately £1bn *per annum*, 50% of which is channeled through partners. He noted that infrastructure research is currently undergoing a renaissance in DFID, with around £45m *pa* invested. This represents threefold growth since 2000, and about 14% of DFID's research budget. Rapid urbanisation and a focus on economic development are more recent drivers for investment in infrastructure research, in addition to long-standing interests in the provision of basic services.

Mr Young profiled research spend across sectors, noting that energy has seen the most significant increase in investment, rising from just over £0.5m in 2008 to an estimated £15m in 2013. Water, Sanitation and Hygiene (WASH) research has also seen a dramatic rise, from around £2m in 2008 to £11m in 2013. Transport and urban research, however, have not seen such increases in funding. Spend on transport research has flatlined at around £2m *pa*, but is set to rise with substantial new programmes in the next couple of years. Urban infrastructure research stagnated after the early 2000s and only surpassed an annual £1m spend in 2012.

Mr Young also noted that DFID infrastructure research projects are becoming larger and more multidisciplinary, integrating engineering with physical, natural and social sciences.

[1] Also available online at http://www.ukcds.org.uk/resources/ukcds-mapping-infrastructure-research-for-development

Professor Chris Whitty, Chief Scientific Advisor and Director of Research at DFID stressed that in all DFID's research funding they sought excellence *and* impact in terms of poverty alleviation. He also noted that DFID research funding, whilst globally open, can go to UK universities if these institutions win the competitive tendering processes.

Dr Kedar Pandya, Theme Leader at EPSRC for engineering, opened his presentation with reference to EPSRC's charter: this includes a mandate to "to promote and support…research…in engineering and the physical sciences" "to advance knowledge and technology…thereby contributing to the economic competitiveness of Our United Kingdom and the quality of life".[2]

Dr Pandya outlined some areas of EPSRC investment relevant to international development, including "Understanding Sustainable Energy Solutions"[3] and water and waste management. He outlined the criteria that needed to be met for EPSRC to support a project: these included "Quality" as the primary criterion, "National Interest" as the major secondary criterion, with "Impact", "Resources and management" and "Applicant(s) ability" as other secondary criteria.

He noted that EPSRC are currently scoping "Engineering Grand Challenges"[4], which will all have international relevance, and may have relevance to developing countries. This thinking will inform investment activity in 2014/15. However, whilst stimuli for research can come from anywhere, the new knowledge and benefit must accrue to the UK.

Summary of the discussion

The attendees agreed that it is a very positive time for engineering research for development, with a significant uplift in funding from DFID, and the Newton Fund[5] coming online too. The impact agenda and REF are actually an opportunity: while the REF has been criticised, development relevant research was considered a good way to demonstrate both reach and significance of impact. Research-derived solutions that scale up well can reach orders of magnitude more people in development contexts than here in the UK – because of the vast gaps in service provision, and sheer population numbers. The global dimension of engineering (some of which could be considered 'development') will only become more important too: by the end of the century nearly 40% of the global population will be African, over 40% Asian and just 6% European.[6] Lastly, anecdotal evidence suggests younger (often female) engineers are motivated by global challenges, potentially supporting retention in the profession.

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[2] See http://www.epsrc.ac.uk/about/history/Pages/royalcharter2003.aspx
[3] See http://www.epsrc.ac.uk/funding/calls/2012/Pages/energyandinternationaldevelopment.aspx
[4] This builds on http://www.raeng.org.uk/international/global_grand_challenges_summit.htm
[5] See https://www.gov.uk/government/publications/newton-fund-building-science-and-innovation-capacity-in-developing-countries/newton-fund-building-science-and-innovation-capacity-in-developing-countries
[6] Medium projection. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2013). World Population Prospects: The 2012 Revision. New York: United Nations. Available at http://esa.un.org/wpp/Documentation/pdf/WPP2012_Volume-I_Comprehensive-Tables.pdf

While there was not consensus, balance of opinion among those present suggested universities do face barriers to working more in this area: multiple soft factors accumulate to become a disincentive system for engineering for development research. These barriers vary significantly from institution to institution, and in severity (from non-existent, to perceived, to real) but include:

- The challenge of publishing applied research in prestigious journals
- Data on impact is relatively hard to find for developing countries, and as such development-focused REF case studies are not easy to put together.
- Research Council funding is seen as prestigious, and EPSRC fund very little in this space
- The 'institutional fit' for engineering for international development is not always clear: it was felt to fall between disciplines and Research Councils
- Drivers internal to universities e.g. promotion panels, may not favour international development
- Issues around potentially negative perceptions of a 'development engineer' relative to more conventional branches of engineering.

The group noted that skills pipelines ebb and flow slowly, so focusing on early career researchers is key to supporting future UK capacity for engineering research relevant to development. Defining outcome focused research challenges with significant practical impact was considered crucial to this.

Next steps

In addition to one objective of the meeting (raise awareness of increased funding opportunities with key universities), a number of follow-on actions were identified. UKCDS will continue to circulate information on funding opportunities[7], incorporating relevant individuals from the universities represented into its engineering 'community of practice'.

In addition, Professor Whitty will seek an early meeting with Philip Nelson, Chief Executive of EPSRC to discuss how DFID and EPSRC might do more together. Professor Perkins, as a member of the Council of EPSRC and Board member of UKCDS, offered to facilitate such a meeting if required.

Finally, UKCDS will meet DFID and the Royal Academy of Engineering to discuss further steps in the partnership. For updates on UKCDS' engineering work, please see the engineering pages of the website.[8]

[7] All advertised on the UKCDS website: http://www.ukcds.org.uk/funding
[8] http://www.ukcds.org.uk/our-work/23?tid=30