RSC Response to the Engineering and Physical Sciences Research Council Centres for Doctoral Training 2013 exercise.

The Royal Society of Chemistry (RSC) welcomes the opportunity to respond to the **Engineering and Physical Sciences Research Council**'s (EPSRC) 2013 exercise reviewing the network of Centres of Doctoral Training (CDTs).

The RSC is the largest organisation in Europe for advancing the chemical sciences. Supported by a network of 48,000 members worldwide and an internationally acclaimed publishing business, its activities span education and training, conferences and science policy, and the promotion of the chemical sciences to the public. This document represents the views of the RSC. The RSC has a duty under its Royal Charter "to serve the public interest" by acting in an independent advisory capacity, and it is in this spirit that this submission is made.

Royal Society of Chemistry

August 2012

Executive Summary

In order to respond to this exercise the RSC consulted widely within the chemical science community on the performance of CDTs in the UK.

The RSC recommends that project studentships be reinstated to preserve the breadth of studentship provision and the strength of the UK research base.

Recipients of research council grants must be empowered to flexibly assemble the team that they need to carry out the work.

The chemistry skills pipeline is the lifeblood of the discipline and the supply of world class doctoral students is central to the economic success of the UK.

The training component of doctoral training is important, especially the teaching of transferable or 'soft' skills, but this is not solely deliverable through CDT cohorts.

When planning a strategy for postgraduate researcher provision it is essential that supply is balanced against UK strategic requirements. Achieving this will require cross-Research Councils discussion.

PhD studentships should have a dual purpose, students' needs must of course be considered - the 'doctoral training' component of CDTs works very well in this capacity – but there is concern that the provision of a research workforce for the UK is not adequately met through the current strategy.

The RSC supports the findings of the House of Lords Science and Technology Select Committee and recommends that the EPSRC implement the associated recommendations; in particular a vareity of methods of studentship provision should be developed.

Methods should be instigated to ensure that Doctoral Training Grants are still available for broader use and not used to subsidise CDTs.

A unique selling point of the CDT experience is the introduction of 'cohorts' or tightly-knit year groups.

Interdisciplinary research in particular has benefitted from the CDT approach, with the centres acting as hubs around which researchers can coalesce.

Project Studentships

The RSC recommends that project studentships be reinstated to preserve the breadth of studentship provision and the strength of the UK research base. Project studentships provide an agile and flexible provision of research students, and are viewed very favourably by the community. Certain fields have difficulty providing justification for small CDTs that would engage only a small number of students a year. There also remains a question of where funding for students in truly paradigm shifting research could be sourced in a CDT focused studentship system.

Recipients of research council grants must be empowered to flexibly assemble the team that they need to carry out the work. The role of PhD students as primary researchers is an important one. Principle investigators should be allowed to judge the best make-up of the research team including the number and proportions of postdoctoral researchers, students and technicians.

Growth

The chemistry skills pipeline is the lifeblood of the discipline and the supply of world class doctoral students is central to the economic success of the UK. It is essential that there is an adequate flow of students moving through the system and that they emerge qualified to assist in our national growth particularly through research and innovation as highlighted in the Innovation and Research Strategy for Growth[1].

Training Across the Sciences

When planning a strategy for postgraduate researcher provision it is essential that supply is balanced against UK strategic requirements. Achieving this will require cross-Research Councils discussion. In the current system EPSRC and BBSRC CDTs provide very tightly located centres of specific research (see Appendix A). CDTs were developed in a research ecosystem that included project studentships to fill the broader need for researchers. The removal in 2011 of these project studentships left a funding landscape lacking in a national strategy and providing uneven coverage both by subject and location.

The training component of doctoral training is important, especially the teaching of transferable or 'soft' skills, but this is not solely deliverable through CDT cohorts. The Vitae report 'What do PhDs do?'[2] and its update in 2007[3] showed that approximately 40% of physical science PhDs enter a

[1] Innovation and Research Strategy for Growth, BIS, 2011
[2] 'What do PhDs do?', Vitae, 2004
[3] 'What do PhDs do?' – Trends, Vitae, 2007

research career following graduation, with 25% continuing on as postdoctoral researchers in Higher Education. The primary purpose of PhD programmes should always be to generate excellent research, though clearly students should certainly not be considered as 'slaves to the bench'. The provision of 'soft' skills training is thus becoming increasingly important in preparing students for life either in or out of research. In our consultation CDTs were seen as broadly successful in this manner, with several universities now opening this section of their CDT to all PhD students, however it was also noted that implementation of the 'Roberts Report'[4] prior to the instigation of CDTs had been widely successful also.

PhD studentships should have a dual purpose, students' needs must of course be considered - the 'doctoral training' component of CDTs works very well in this capacity – but there is concern that the provision of a research workforce for the UK is not adequately met through the current strategy. Under the current system certain research topics are supported in only one location, and certain universities are supported with studentships only for individual topics. In the worst case a university can be left without the option of any CDT studentships at all.

For example, Synthetic Organic Chemistry – a major UK strength – is represented by only one CDT, at the University of Bristol, and the University of Oxford, with traditionally strong physical sciences departments, is only supported for CDT studentships in life-science related topics ('Systems Approaches to Biomedical Science', 'Systems Biology', 'Healthcare Innovation' and 'Bio-nanotechnology, Medical Imaging and Bioinformatics'). Wales currently hosts no EPSRC CDTs, despite investing heavily in scientific infrastructure[5] and having a strong foundation in sustainable development and low carbon technologies.

The RSC supports the findings of the House of Lords Science and Technology Select Committee and recommends that the EPSRC implement the associated recommendations; in particular a variety of methods of studentship provision should be developed. The House of Lords Science and Technology Select Committee recently reported their findings upon 'Higher Education in STEM subjects'.[6] Their report echoed many of the concerns that we raised in our evidence to the committee. The Lords welcomed the strengths of CDTs, but were concerned with the decrease in breadth of UK research which could be caused (and perpetuated) by the current policy of primarily funding research studentships in that manner.

Methods should be instigated to ensure that Doctoral Training Grants are still available for broader use and not used to subsidise CDTs. CDT studentships are reputedly 60% more expensive than traditional doctoral funding models[7] – a finding echoed in our consultation. As this additional cost is not provided for in totality by EPSRC, universities are forced to make up the financial shortfall. Whilst the mid-term review did note some success in leveraging industrial funding,[8] it also reported that Doctoral Training Accounts are often being utilised to plug the financial gap. This increase in cost and redirection of funds can only have a negative effect upon research volume, whilst at the same time further decreasing the breadth of provision.

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[4] SET For Success, 2002
[5] Science for Wales, 2012
[6] House of Lords Science and Technology Select Committee, Higher Education in STEM Subjects (2012)
[7] Research intelligence - Eyes front in the 'top-down' centres, Times Higher Education, 2012
[8] EPSRC mid-term review of CDTs

To reiterate, the RSC recommends that the reinstatement of project studentships be considered. The development of students' soft skills is a matter for focus, but the CDT cohort approach is not the only method for delivering these. In particular, the excellent training provided by bodies such as Vitae, means that many institutions can guarantee a high-quality learning environment.

Centres for Doctoral Training

In order to respond to this exercise the RSC consulted widely within the chemical science community on the performance of CDTs in the UK, and whilst there were concerns regarding the network and national strategy as highlighted above, the feedback we received regarding CDTs themselves was broadly positive. It is clear for instance that CDTs provide a valuable route to instil knowledge and skills in a cohort of students, and that they have worked well to assist interdisciplinary collaboration.

A unique selling point of the CDT experience is the introduction of 'cohorts' or tightly-knit year groups. This has both champions and detractors, and quite often a combination of both. At its best, a cohort system can provide students with support allowing individuals seeking help from fellow CDT students, even across year groups. One problem that was reported was with multi-site CDTs, as the cohort would typically choose to stay together whilst there was need for students in multiple locations.

The possibility of using CDTs as a method of linking large bodies or institutions with university research was highlighted as being of interest. For instance co-locating a CDT on a healthcare issue with a Centre of Therapeutic Excellence would allow a model drug discovery pipeline to be built, from basic research to clinical testing.

Interdisciplinary research in particular has benefitted from the CDT approach, with the centres acting as hubs around which researchers can coalesce. Because of this, suggestions too were made for centres based around topics such as sustainable technologies and catalysis, and on a broader basis for cross-research council collaboration on topics such as heritage science.

Conclusion

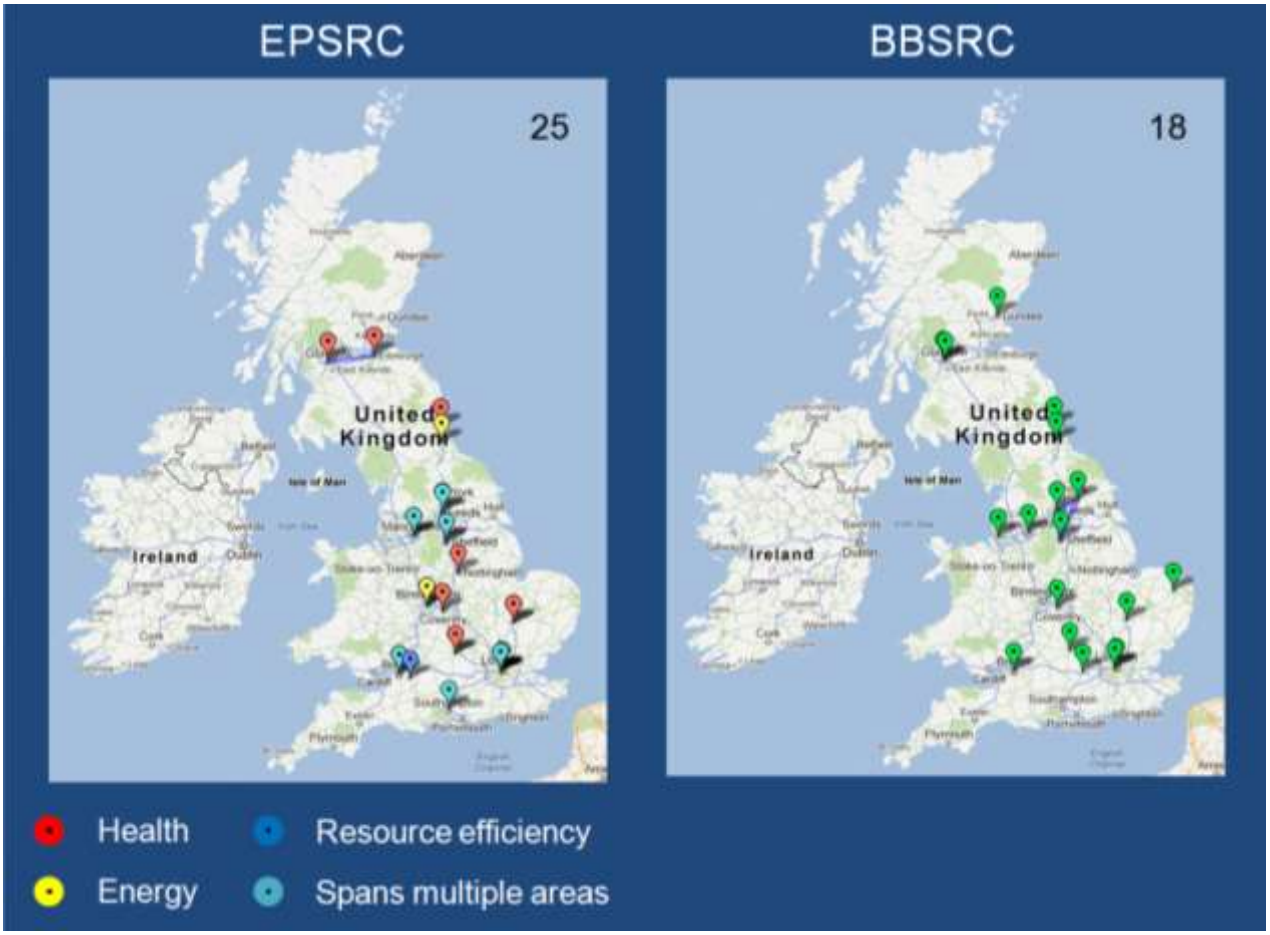
UK PhD students in chemistry routinely deliver world-class science. Allowing this hugely dynamic and talented set of researchers to tackle chemistry-related problems across the board on soundly peer-reviewed, cutting edge chemistry projects would be hugely beneficial to all.

The RSC recognises the successes of CDTs, particularly in producing well rounded researchers in interdisciplinary fields, and we support their implementation in those cases. We are concerned however that the current national strategy for postgraduate studentship provision does not serve the community adequately. As the House of Lords has recommended, a breadth of studentship provision must be preserved, and to this aim the RSC recommends that project studentships, linked to peer-reviewed grants, but not a CDT, be reinstated.

Appendix A

DTC Provision by EPSRC

The first map shows the current DTCs funded by EPSRC (colour-coded) relating to the chemical sciences. The second map shows the DTCs that are funded by the BBSRC (studentships starting in October 2012). These will focus on food security, industrial biotechnology, bioscience underpinning health and exploiting new ways of working.



List of DTCs funded by EPSRC relating to the chemical sciences:

Institution	Name	RSC Roadmap Area
University of Bath	Centre for Sustainable Chemical Technologies	Resource Efficiency
University of Birmingham	Centre for Hydrogen and Fuel Cell Research	Sustainable Energy
	Physical Sciences of Imaging in the Biomedical Sciences (PSIBS)	Human Health
University of Bristol	Bristol Chemical Synthesis	Underpinning
	Bristol Centre for Functional Nanomaterials	Human Health
University of Cambridge	Chemical Biology and Molecular Medicine	Human Health
	Nano Science and Technology Doctoral Training Centre (NanoDTC)	Underpinning
Durham University	Multidisciplinary Centre for Doctoral Training in Energy	Sustainable Energy
University of Glasgow with Universities of Edinburgh, Dundee and Strathclyde	DTC in Cell and Proteomic Technologies	Human Health
Imperial College, London	Energy Futures Lab	Sustainable Energy
	Institute of Chemical Biology	Human Health
	Plastic Electronics	
	Theory and Simulation of Materials	
University of Leeds with University of Sheffield	Molecular-Scale Engineering	
University of Leeds	Low Carbon Technologies	Sustainable Energy
University of Manchester with Lancaster University	NOWNANO	Underpinning

University of Manchester with University of Sheffield	Nuclear Fission Research, Science and Technology DTC (Nuclear FiRST)	Sustainable Energy
Newcastle University	Industrial Doctorate Centre: Biopharmaceutical Development	Human Health
University of Nottingham	From Targeted Therapeutics to Next-Generation Medicines	Human Health
University of Oxford	Industrial Doctorate Centre: Systems Approaches to Biomedical Science	Human Health
	Systems Biology	Human Health
University of Sheffield	E-Futures	Sustainable Energy
University of Southampton	Complex Systems Simulations	
University College London	Industrial Doctoral Centre: Molecular Modelling and Materials Science	
University of Warwick	Molecular Organisation and Assembly in Cells (MOAC)	Human Health