

EPSRC Institutional Sponsorship 2012-13 – Loughborough University: Final Report

1. BACKGROUND

EPSRC award of Institutional Sponsorship to Loughborough University:

Award Area	Budget
Institutional Sponsorship	£615,420
Grants Balances	£68,128
TOTAL	£683,548

2. ACTIVITY SETS

In accordance with Interim Report submitted to the EPSRC (June 2012), we have used the Institutional Sponsorship 2012-13 to support the following set of activities:

Activity Set	Cost
Developing Leaders	£127,911 plus £68,128
Shaping Capability: Bridging the Gaps	£179,799
Delivering Impact: Pathways to Impact	£184,626
Efficiency and Effectiveness: Promoting Equipment Sharing	£123,084

2.1 Developing Leaders

We have developed a programme to encourage and support *a talent pool of future research leaders*, equipping the next generation of senior researchers with research leadership skills. 'LEADeR' consisted of a structured, self-managed, experiential programme, designed to allow individuals to plan and work on their own leadership development, whilst also working on a strategically important project in close collaboration with Associate Deans for Research and/or other Champions. The purpose was to help equip participants with leadership skills to become the next-generation of leaders at School [Dean/Associate Dean] or interdisciplinary/Research School [Director] level, whilst also assisting the University's research strategy development. Our Developing Leaders Activity Set also included a complementary activities of additional, targeted mentoring support and small research development activities for those outside of the cohort, as identified by the senior research leadership team at Research Committee.

The features of the core programme were:

- Funding per participant used for: a research leadership project tailored to the needs of one or more academic School and/or the whole Institution and personal leadership development activities
- Top management [DVC/PVC(R)/PVC(E)] participation
- Action learning process throughout the programme
- Development days at Burleigh Court (non-consecutive)
- 360 analysis on management and leadership skills
- Internal management development programmes

Core Programme selected 'Champions':

LEADeR	School	Final Report Title
Dr. Donna Champion	SBE	Creating Agile Research Clusters
Dr. Darren Southee	DS	World-Leading Design Research and Invisibility Cloaks
Dr. Jonathan Folland	SSEHS	The Future of Sports Performance Research at Loughborough University: A Strategic Review
Dr. Malcolm Cook	CBE	Securing International Partners for Research Collaboration: Indoor Air Quality for Occupant Health and Productivity
Dr. Marta Mazzocco	SCI	The Mathematics of Bio-Molecules
Dr. Mel Jordan	AED	From Individual Scholar to Interdisciplinary Projects: What is collaborative research for the Arts and Humanities?
Dr. Rob Dover	SSPGS	Security in our time? Towards a Resilient University
Dr. Roger Dixon	EESE	Loughborough Centre in Control Engineering
Dr. Upul Wijayantha	SCI	Loughborough Excellence Awards in Developing Research Leadership
Dr. Wen Hua Chen	AACME	A Feasibility Study on Forming a Centre for Autonomous Systems at Loughborough

2.2 Shaping Capability: Bridging the Gaps

Funds were utilised to support *cross-disciplinary interaction and collaborative projects*. All projects initiated or embedded collaborations between researchers across and beyond the EPSRC remit; to stimulate novel approaches to collaboration between diverse disciplines; to increase the cross-fertilisation of ideas and the take-up of advances across the boundaries between disciplines; and/or encourage and embed multi-disciplinary research between Schools. 16 projects were funded in total (valued at between £9,000 and £18,000 each). All 10 Schools are involved in at least 2 projects each:

Project Title	Sum £
Flash sintering: an inherently multi-disciplinary phenomenon for collaborative research	8996
Advanced temperature control across engineering disciplines	8956
Establishing ... chemistry to support the combining of traditional photographic ...	9000
Methods for producing electromagnetic arrays in fabrics	9000
Econophysics	8980
Dial-a-pod: a paradigm shift in the transport system (Business School)	8885
Dial-a-pod: a paradigm shift in the transport system (Civil & Building Engineering, CBE)	8885
Quantifying river bed surface and sub-surface topography, focusing on Salmonid ... (CBE)	9955
Visualising data to facilitate innovative research collaborations	9000
Using practice-led methods to investigate and commercialise cross-disciplinary ...	9000
Aesthetic and arbitrary-outline antennas	8661
Opto-physiological imaging: from modelling to engineering solution	9339
A new mechanism for multi-disciplinary research collaboration across Sci, Eng and Design	9000
Compact design of a cryogen-free, high-T superconducting split magnet ...	9040
Development of an automatic suction primed micro-biopsy needle for percutaneous ...	18000
Quantifying river bed surface and sub-surface topography, focusing on Salmonid ... (Geog)	7930
Public communications: art, technology and the public sphere	9250
Economic impact of advanced machining in inhomogeneous aerospace composites	17922
Total funding awarded:	179799

Case-study from the Bridging the Gaps Project

Case-Study: Using Practice-led Methods to Investigate and Commercialise Cross-disciplinary Research Networks and Emerging Technologies. Dr Mark Evans (PI/designer).

Participating schools: Design; Arts, English and Drama; Civil and Building Engineering; Mechanical and Manufacturing Engineering

Summary of Project Achievements: The project has facilitated the development of working relationships between 8 colleagues in 4 schools. It has also exploited the advanced design/computing skills of an undergraduate design student and masters engineering student. Through the use of practice-based research methods that have resulted in 7 tangible design proposals, the potential of concrete printing as a manufacturing process has been demonstrated. The level of achievement from this process has had an additional impact through the School of Civil and Building Engineering who have made a significant additional contribution by manufacturing a full-size prototype for one of the designs. These 7 design proposals are currently being subjected to topology optimisation that has removed un-necessary material, thereby giving the 7 designers an opportunity to revise their designs. The designers will reflect on the impact of this disruptive technology on their working practices in a focus group that will take place in May 2013. Outcomes from the project will be presented as an impact case study at the International Association of Societies of Design Research Conference in August 2013. They will also be presented in a 3 month exhibition to be held in the Design School in September 2013. Due to its multi-disciplinary nature, the exhibition will be promoted by the Research School for Design.

Evidence of Outcomes (website, publications, grant applications)

Designs for Concrete Benches

- 7 x designs presented as high impact design visualisations using digital sketching (7 visualisations)
- 7 x designs presented as high impact design visualisations using 3D computer rendering
- 7 x quarter scale models
- 1 x full size concrete build

Designs for Concrete Benches following Topology Optimisation

- 7 x designs presented as high impact design visualisations using digital sketching
- 7 x designs presented as high impact design visualisations using 3D computer rendering
- 7 x quarter scale models

Dissemination

- International Association of Societies of Design Research Conference in August 2013
- Exhibition of project outcomes in Design School scheduled for September 2013
- Funds from the Design Practice Research Group will be allocated to disseminate the design outcomes via the Group's web site.

Future Plans (beyond the end of the grant)

Future opportunities will exploit the strong working relationships developed between staff and schools, seeking to maximise enhanced understanding of contrasting approaches to design and research methods. A key milestone will be the completion of the full-size concrete bench that has seized an emerging opportunity and gone some way beyond the original aims of the project. On completion of this build, opportunities for follow-on funding will be sought, with the potential for industrial collaboration facilitated by the tangible outcome as evident in the full size prototype bench.

2.3 Delivering Impact: Pathways to Impact (PtI)

We have used these funds, alongside those available from individual research grants, our EPSRC Knowledge Transfer Account, EPSRC Impact Acceleration Account and our Higher Education Innovation Fund (HEIF), to support a range of knowledge exchange, proof of concept and dissemination activities designed to boost the impact of the University's research activities.

In total, 15 projects were funded, broken down as follows:

Pathways to Impact: project breakdown				
	Proof of concept	Spin out company	Networks and relationship building	Dissemination
Number of projects	8	1	4	2
Total value £k	80	74	11	19

We give two illustrative case studies:

Impact through creation of a spin-out company: Sonobex

This project received the largest award made under this heading. It builds upon EPSRC funded fundamental research into the science of metamaterials, carried out in the Dept of Physics. The underlying physics was then scaled to work with acoustic waves, and developed, supported by an EPSRC Follow on Fund award. (EP/I029001/1 Practical Sound Attenuation using Broad Band Sound Attenuating Devices £168k Feb 2011 – Jan 2012). This was followed by a Royal Academy of Engineering Enterprise Fellowship £85k for Dr Daniel Elford, an RA who had worked on the EPSRC-funded programme.

These awards had established that there was a significant opportunity to create a novel acoustic barrier, with application in a wide range of application areas. A patent on the fundamental idea was also filed using HEIF funds. The PtI award allowed us to further develop the proposition, develop understanding of the application areas, and develop the business case for creation of a spin out company. The novel noise barrier technology enables, in a cost effective and less intrusive manner, sound attenuation systems to be deployed along noisy transport links and around machinery. This provides economic benefits in that less material is required for barrier construction, typically less than half that required in a solid barrier. Furthermore a free flow of air is available for cooling thus avoiding the need for additional cooling as would be required in a system that fully enclosed noisy machinery.

Outcome: The company was launched as Sonobex in April 2013 (<http://www.sonobex.com/>) and is based on campus in the Loughborough University Innovation Centre. It has a number of trial installations, and is targeting a range of applications from stationary machinery to rail and road sound barriers.

Impact on policy and implementation: CALEBRE

Project CALEBRE (Consumer-Appealing Low Energy technologies for Building Retrofitting) is an E.ON / Research Councils UK-funded research project involving a partnership of six leading UK universities, led by Loughborough University. Over 4.5 years, CALEBRE has investigated a selection of technologies, specifically from the perspective of domestic refurbishment. These technologies range from the well-known (heat pumps and MVHR) through to new and emerging (vacuum glazing) and on to blue skies (advanced surface treatments). Alongside these, the project has gathered important insights into consumer perspectives surrounding refurbishment. During this period, the policy framework for the Green Deal was implemented, creating very significant demand for the outputs and learning developed by the project from policy-makers

and industry. In response to this demand, Ptl funds were used to support creation of accessible “Briefing notes”, a video to publicise the scope of the project¹ and a central London event to share the draft briefing notes and debate the issues with policy makers, industry and academics (<http://www.lboro.ac.uk/microsites/calebre/>).

Outcome: The London briefing was held on Friday 15th March 2013. Attendees at the briefing included DECC, Energy Savings Trust, Energy Technologies Institute, trade press, professional bodies and a wide variety of industries including utility companies (E.ON , British Gas) , architects and equipment installers. A further Midlands follow on event is planned for Nottingham in September 2013, where the briefing notes will incorporate feedback from the initial London launch.

2.4 Efficiency and Effectiveness: Promoting Equipment Sharing

In this area we provided additional support for the University’s highly regarded, award-winning *Kit-Catalogue™* initiative (see links below). This has enabled the project team to implement the current road-map for Kit-Catalogue™, which is an open source database available to staff and students to browse, search, identify and locate research equipment and facilities across a particular university’s campus. The funds have been used to implement the road-map for new functionality.

Kit Catalogue™ has recently featured as a case-study in the report for Department of Business, Innovation and Skills, entitled ‘Making the Best Better: UK Research and Innovation More efficient and effective for the global economy’ (pp63-64).²

For more information on Kit-Catalogue™, please see: <http://kit-catalogue.lboro.ac.uk/project/>. To view the database, please see: <http://equipment.lboro.ac.uk/>.

3. Allocation of Funding

Tailored mechanisms were used to award funding under each of the 4 Activity Sets.

In the case of **Developing Leaders**, the selection procedure was based on nominations from Deans, followed by an interview panel of senior academic managers and staff development professionals, chaired by Prof. Myra Nimmo, the Pro Vice-Chancellor for Research. The complementary mentoring and development activities were analysed and identified through University Research Committee.

Selection for the **Shaping Capability – Bridging the Gaps** awards was on the basis of an internal competition within each of the 10 Schools. Staff were required to submit proposals using a template, in response to a call in April 2012. To ensure the highest possible quality of the funded projects, the selection of proposals was made by the Dean and Associate Dean – Research, with advice from other senior staff in the School, as appropriate. The assessment was made against a published set of criteria and reflecting upon the EPSRC ‘Shaping Capability’ agenda. All funds were allocated by the end of May 2012, with activities commencing from 1 June onwards.

Loughborough has well-established processes for allocating both HEIF and EPSRC KTA/IAA funding through our Enterprise Projects Group (EPG), chaired by the Director of the Enterprise Office. Responsibility for

¹ <http://www.youtube.com/watch?v=Z5AKmy9ZG6Y&feature=youtu.be>

² <http://www.n8research.org.uk/assets/files/EfficiencyReportFinal.pdf>

allocation of **Pathways to Impact** funding was delegated to EPG, allowing for consideration of routes to impact in a holistic manner. For example, a project may have received proof of concept funding through Ptl, with patenting costs funded through HEIF.

The **Sharing Equipment** monies were strategically allocated to Prof. Rachel Thomson in order to support on-going developments to **Kit-Catalogue™** (see details above).

4. The Future of Activities

As with the funds previously awarded to Loughborough, we have carefully sought to maximise the benefits from the Activity Sets for the University, the EPSRC, and the wider UK research community.

Through the **Developing Leaders** Activity Set, we have focused our efforts to prepare 'rising stars' for strategic research leadership. Given the success of the programme developed, we are actively exploring the ways in which the training can be embedded in our recurrent practices and processes. We will also continue these activities through dynamic engagement with complementary activities developed by the EPSRC, including the Future Leaders Workshops that were highlighted at the EPSRC Engineering Fellowships Meeting in May 2013.

Building on the success of the 2011 **Bridging the Gaps** call, we have seen the Bridging the Gaps projects foster a genuine sense of excitement around research that bridges the boundaries between STEM disciplines, or occurs at their interface with the Arts and Humanities and Social Sciences. This was recently acknowledged through the participation of the AHRC in an interdisciplinary sandpit at the institution. We will continue to promote and facilitate the exciting opportunities generated through inter-disciplinary working, through our emerging *Research Themes*, where our collective research energies are focused on providing distinctive, inter-disciplinary solutions to global challenges.

Loughborough is committed to supporting and encouraging the accelerated translation of research to real-world application. Through our **Delivering Impact** Activity Set, we have been able to enhance our work to embed, disseminate and promote the results of their research to end-users (mostly in industry) across our portfolio of projects. This will be further embedded through an institution-wide Impact Week, showcasing examples of innovative best-practice, during academic year 2013-14.

The **Sharing Equipment** funding has enabled the further development and refining of our award-winning Kit-Catalogue™ system. We will continue to promote its adoption and use by other universities across the UK and internationally, for example in the USA.

Each of the areas of activity supported through the EPSRC Institutional Sponsorship for 2012-13 have generated wide-ranging and celebrated benefits, upon which the University continues to build.