

## Progress and developments since the publication of the International Review of Mathematical Sciences 2010 Action Plan

Since the Action Plan was published in November 2011, the main focus of attention has been the implementation of Shaping Capability and the new fellowship framework. A cross-cutting priority has been to encourage increased connectivity – between different areas of the mathematical sciences, with the Challenge Themes and other disciplines and with a wide range of users/industrial sectors.

A summary of progress against the actions and relevant developments is presented below.

Recommendation	Progress
<p><b>R1</b> "...preserve &amp; strengthen the international excellence of mathematical sciences research funding..."</p>	<p>We continue to emphasise and encourage researchers to make use of the considerable flexibility offered by existing EPSRC funding mechanisms.</p> <p>We have encouraged applicants, in particular those applying for Programme Grants, to consider collaborations with researchers from other institutions. In 2012/13 we funded 16 cross-institutional projects with a total value of £13M.</p> <p>We have removed the financial cap from small grants to encourage applicants to apply for the resources required for a project rather than constraining proposals artificially.</p>
<p><b>R2</b> "...the establishment of a new structure for communication between EPSRC and the mathematical sciences community..."</p>	<p>During 2011/12 and 2012/13 the EPSRC Mathematical Sciences team undertook a number of visits to enable discussion with a large numbers of researchers. We also organised a workshop for representatives of the pure mathematics community, a meeting for Heads of Departments and a town meeting, jointly with STFC, with representatives of the mathematical physics community. During 2013/14 we intend to visit a number of institutions across the UK and are planning focussed workshops in a range of areas.</p> <p>Representatives from the Council for the Mathematical Sciences (CMS) were invited to attend a number of Mathematical Sciences Strategic Advisory Team (SAT) meetings to help build understanding of how EPSRC develops and implements strategy.</p> <p>To increase the transparency of the operation of the SAT, nominations for new members were invited from the CMS, university departments and the Industrial Mathematics Knowledge Transfer Network (Industrial Mathematics KTN).</p> <p>Since July 2012, full SAT minutes are published on the <a href="#">EPSRC website</a>.</p>

	<p>To keep the community informed of activities which may be of interest we have continued to send quarterly editions of the Maths@epsrc newsletter.</p>
<p><b>R3</b> "...encourage and enhance connections within the mathematical sciences, other disciplines and with industrial collaborators..."</p>	<p>With extra funding being made available from EPSRC Challenge Themes we have:</p> <ul style="list-style-type: none"> <li>• Partnered with Manufacturing the Future to stimulate and support new research (working with the Industrial Mathematics KTN to increase the involvement of industry);</li> <li>• Partnered with Healthcare Technologies to hold a sandpit on Predictive Modelling;</li> <li>• Mathematical Sciences was emphasised in the call for <a href="#">Consortia for Exploratory Research in Security</a> issued by the Global Uncertainties theme.</li> </ul> <p>To support research leaders who are able to work across disciplines fellowship opportunities include New Connections between Mathematical Sciences and ICT and New Connections from Mathematical Sciences. To help encourage connections within mathematical sciences the fellowship priorities also include Intradisciplinary Mathematics.</p> <p>The 2013 Centres for Doctoral Training (CDT) call has many priorities which in involve interfaces with the mathematical sciences, for example New Mathematics in Biology and Medicine and Big Data.</p> <p>We are in the early stages of scoping several possible activities involving the interfaces of mathematical sciences such as Living with Environmental Change, Energy and mathematical biology.</p>
<p><b>R4</b> "...ensure UK PhD training meets the highest international standards..."</p>	<p>We have initiated a people pipeline project to better understand the current environment including student, academic and employer perspectives. The people pipeline project aims to investigate the competitiveness of the UK PhD training within mathematical sciences and highlight potential actions where necessary to ensure it meets the highest international standards. We have liaised with the CMS to understand how this complements CMS activities.</p> <p>We have invited tenders for the work and intend to commission external studies during 2013, the project will be in two phases and is due to be completed by Spring 2014.</p>
<p><b>R5</b> "...consider establishing a PhD programme which begins with a Master's degree"</p>	<p>No specific actions were identified in the Action Plan. EPSRC continues to monitor the flexible use of Doctoral Training Grant (DTG) funds and the participation in the Taught Course Centres e.g. as part of the requested information from institutions seeking Mathematical Sciences Theme DTG funding.</p>

	<p>Where appropriate universities have been encouraged to support PhD students in statistics and operational research for a minimum of 4 years where the first year is a postgraduate Masters course.</p> <p>CDTs encourage broadening, particularly in the first year of training and the 2013 call provides a significant opportunity to enhance PhD training in the mathematical sciences.</p>
<p><b>R6</b> "...encourage long-term collaborations focusing on basic research driven by industrial challenges..."</p>	<p>Partnership working with the Manufacturing the Future theme and the Industrial Mathematics KTN is very much in this spirit; the recent <a href="#">Future Manufacturing with Mathematical Sciences</a> call committed £3.5M. Potential future activities with the Challenge themes would continue this.</p> <p>We will review recent activities and look to identify future opportunities where a more proactive approach may be beneficial, drawing on input from EPSRC Strategic Partners and other stakeholders as appropriate.</p> <p>Both the ICMS and the INI facilitate industry engagement as part of their activities and we are actively encouraging this.</p> <p>Encouraging and facilitating impact is a key strategy for 2013/14 and will be the focus for more attention in the coming year.</p>
<p><b>R7</b> "...create roles in academia for industry experts"</p>	<p>We are exploring this as part of our impact discussions with the SAT, the IMA, the Industrial Mathematics KTN and the community. We will continue to consider how this might be implemented.</p>
<p><b>R8</b> "...use of appropriate experts and structures to review multidisciplinary research"</p>	<p>EPSRC did not accept the recommendation to establish new panels. We continue to ensure panel members are fully briefed and monitor multidisciplinary proposals submitted and funded.</p>
<p><b>R9</b> "...[to strengthen statistics] enhance the ability of small departments to compete for statistics faculty and provide flexible research grant support"</p>	<p>The first element of this recommendation is not appropriate for EPSRC. The second element as addressed through actions in response to R1.</p> <p>Additionally, we held discussions on statistics with other research councils and funding councils to check and raise the profile of the issues flagged in the review and have been liaising regularly with the Royal Statistical Society (RSS). No need for concerted action was identified but the research councils have been working together to promote a more joined up picture of opportunities available to support statistics research.</p>

	<p>Statistics and Applied Probability has been fellowship priority across all career stages since July 2011, since then we have awarded 13 fellowships in the area from postdoctoral to established career stages.</p>
<p><b>R10</b> "...support strong statistics research and teaching at a large number of universities"</p>	<p>No EPSRC action identified.</p>
<p><b>R11</b> "...improve participation of women in the mathematical sciences"</p>	<p>Diversity issues have been discussed at RCUK and EPSRC Council level and a range of measures, not specific to mathematical sciences but recognising the need to engage at the departmental level, were debated.</p> <p>RCUK has recently published a statement of expectations:  <a href="http://www.rcuk.ac.uk/documents/researchcareers/EqualityStatement.pdf">http://www.rcuk.ac.uk/documents/researchcareers/EqualityStatement.pdf</a></p> <p>From October 2012 research grants may be extended by up to 12 months to cover periods of maternity, paternity or adoption leave for staff employed on a grant.</p>
<p><b>R12</b> "...evaluate institutes and centres intended to further collaboration..."</p>	<p>This is part of ongoing business.</p> <ul style="list-style-type: none"> <li>• The International Centre for Mathematical Sciences was reviewed in 2011 and renewed in 2012.</li> <li>• CDTs in the mathematical sciences were reviewed in 2012.</li> <li>• The Isaac Newton Institute was reviewed and renewed with cross-Council support in spring 2013.</li> </ul>