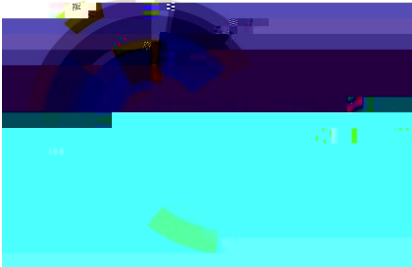


September 2018

Balance and Effectiveness of Research and





## The Link Between Fundamental and Applied Research

Support for fundamental research also delivers longer-term benefits by providing transformative leaps in knowledge and by directly enabling developments in challenge-based or applied research.

**Recommendation:** In order to ensure effectiveness through mechanisms such as the Industrial Strategy Challenge Fund (ISCF), there needs to be robust support for fundamental research to develop the knowledge and the research base to provide the ideas, theories and understanding that lead to the transformational breakthroughs to support challenge-led research.

A case study from our report *Inspirational Chemistry For a Modern Economy*<sup>2</sup> demonstrates that fundamental research undertaken many years previously can provide the basis for advances in applied research that leads to the development of technologies to address specific problems:<sup>6</sup> For example, Professor AP de Silva, Queen's University Belfast, was inspired to develop a blood analyser whilst caring for his grandmother who was suffering from hypertension. De Silva's doctor taught him that if salt levels could be monitored easily and accurately, a diuretic could be administered to remove the water and excess sodium from the system, decreasing the load on the heart. de Silva began pioneering research into fluorescent PET (photo induced electron transfer) sensors in 1985 and based on his seminal research, a blood analyser was developed which has been the market leader in point-of-care analysers ever since. Researchers at global healthcare company Roche read about de Silva's research and quickly recognised its commercial potential; the result was a collaboration with Optomedical Inc. to develop the sensor. Diagnostic cassettes worth over \$50 million were sold from 2008–2013. The device can be used in a range of settings including GP surgeries, hospital critical care units, ambulances and veterinary practises. Blood test results can be available in less than 30 seconds, enabling rapid medical responses such as administering a particular blood type with the correct salt levels. As well as being rapid, the device is also easy to use. In Japan, doctors are able to immediately provide patients with test results in their surgeries, and paramedics in Sri Lanka and Libya were able to use the device in conflict situations. Furthermore, the technology has been adapted for veterinary surgeries.

Our own research<sup>7</sup> into university-business collaborations in chemistry departments found that fundamental research is a key focus of collaborative projects between business and universities, helping to support the diffusion of fundamental research. We found that out of more than 1000 collaborations reported by 25 chemistry departments from 2012–15, 63% of collaborations with large companies (>250 employees) and 42% of collaborations with SMEs (<250 employees) focused on fundamental research.

We also found evidence of the mechanisms that universities use to share the gains from fundamental

**Recommendation: As part of UKRI's review of long-term funding allocations, there must continue to be appropriate funding for core disciplines, alongside interdisciplinary and challenge-driven research.**

Chemistry in UK university departments is funded across a number of different research councils reflecting the role of chemistry in enabling both interdisciplinary research and its role in partnering with research in other core disciplines. Data from the Higher Education Statistics Agency show that in 2015/16 over 30% of Research Council funding for UK university chemistry departments came from outside the physical sciences through, for example, Research Councils covering biological, medical and environmental sciences. See Table 1.

*Table 1 Research Council funding received by chemistry departments in UK universities in 2015/16. Source: HESA Finance Record <http://hesa.ac.uk>*

<b>Funding source</b>	<b>Funding amount (£1000)</b>	<b>Percentage</b>
Arts & Humanities Research Council	23	0
Biotechnology and Biological Sciences Research Council	15381	15
Economic and Social Research Council	6587	0

This funding is highly valued, across our community, for providing stable levels of funding over the period between research assessment exercises in a manner that can be deployed at the discretion of the university. QR funding provides a valuable baseline of support for facilities and research operations, enables long-term planning, and gives universities across the country the opportunity to support emerging research areas and new appointees.

Funding to support the long term health of science delivers results – the panel assessing chemistry submissions to the REF in 2014 stated that the percentage of research outputs receiving the highest possible rating (4\*) had increased as a result of *“the general strengthening and investment in the discipline over recent years”*.<sup>12</sup>

## **Levers for Encouraging Private Spending & Innovation**

*importantly have prior experience of leading successful collaborations culminating in four marketed drugs and a test for antimicrobial resistance.*

## **Non-financial levers**

*The publicity generated from winning the Emerging Technologies competition led to increased commercial interest in IHAT and the team were contacted by several companies interested in knowing more about the technology. As a result, the IHAT technology is currently being reviewed by a number of companies with a view to potentially licensing the technology and associated intellectual property (IP). The licensing of the technology by a medical food products company, Nemysis Ltd, was announced in July 2017<sup>18</sup>*

So whilst schemes that provide tailored funding for innovation are valued by our community, a more holistic approach to improving productivity and growth needs to harness and share more widely the knowledge and experience across the business community.

## **Contact**

The Royal Society of Chemistry would be happy to discuss any of the points raised in our response in more detail. Any questions should be directed to **Dr Clare Dyer-Smith**, Programme Manager, Science Divisions, [dyersmithc@rsc.org](mailto:dyersmithc@rsc.org) 01223 432341

## **About us**

With over 52,000 members and a knowledge business that spans the globe, the Royal Society of Chemistry is the UK's professional body for chemical scientists, supporting and representing our members and bringing together chemical scientists from all over the world.

Our members include those working in large multinational companies and small to medium enterprises, researchers and students in universities, teachers and regulators.

<sup>1</sup> - [Response to the House of Commons Science & Technology Select Committee inquiry into Science Budget and Industrial Strategy](#), Royal Society of Chemistry, October 2017

<sup>2</sup> - [Inspirational chemistry for a modern economy](#), Royal Society of Chemistry, June 2015

<sup>3</sup> - [Chemistry protects soldiers, footwear & smartphones](#), Royal Society of Chemistry, June 2015

<sup>4</sup> - [Master Chemical Mechanism](#), University of Leeds, National Centre for Atmospheric Chemistry and University of York.

<sup>5</sup> - [Every breath we take: t](#)