



**Science & Technology**  
Facilities Council

# **Economic Impact Reporting Framework 2009/10**





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**2009/10**



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## Introduction

This is the third annual Economic Impact Reporting Framework (EIRF) published by the Science and Technology Facilities Council (STFC).

These reports were implemented across all the Research Councils in 2005 and form part of the Economic Impact Framework managed by the Department for Business, Innovation and Skills.

The EIRF contains data on selected aspects of STFC performance relevant to the Government's objectives for the UK science base:

1. Overall Economic Impacts of National Significance;
2. Evidence Common to all Councils;
  - 2.1 Innovation Outputs and Outcomes;
  - 2.2 Knowledge Generation;
  - 2.3 Investment in the Research Base;
  - 2.4 Public Engagement;
3. STFC-specific Evidence.

This report has evolved from previous versions. The Research Councils have worked closely with BIS on honing the data sets and approach. Section 2 comprises a core set of data which is common to all Research Councils. Section 3 shows a range of data which demonstrates the unique contribution to economic impact of activities undertaken by STFC. The framework shows, where possible, the data for 2007/08 to 2009/10 inclusive.

The Council's EIRF should be read in conjunction with its 2009/10 Delivery Plan Report ([http://www.stfc.ac.uk/About/Stats/DP/STFC\\_DelPlan.aspx](http://www.stfc.ac.uk/About/Stats/DP/STFC_DelPlan.aspx)) and Annual Report (<http://www.stfc.ac.uk/Publications/ar/intro.aspx>), which provide detailed information about achievements over the period.



## 1. Overall Economic Impacts of National Significance

STFC sponsors fundamental research in particle physics, astronomy and nuclear physics, ensures access to large scale facilities across a range of science, builds and operates large UK science research facilities and develops the UK's Science and Innovation Campuses. STFC leverages substantial contribution to economic impact by delivering its three strategic goals of World Class Research, World Class Innovation and World Class Skills across these four functions.

### **World Class Research: Breakthrough for babies born with severe cleft palates**

STFC's ISIS facility, working in partnership with the NHS, has developed a novel material to improve the treatment of cleft lip and palate, speeding up healing times and reducing operating costs [<http://www.stfc.ac.uk/News%20and%20Events/16743.aspx>].

Scientists working on a treatment for babies born with cleft palates have made a promising breakthrough. Clefts are the most common birth defect in Britain, with one in every 700 babies affected – that is 1,000 babies per year. Babies born with cleft palates usually have problems feeding, and may have speech difficulties in later life, as well as issues with their hearing, dentition and facial growth and may fail to reach their potential because of low self esteem. In severe cases radical surgery is required, often taking up to ten expensive operations to correct the problem, and future complications can occur as the child grows into an adult.

Cleft palates are currently repaired by surgically repositioning the tissue on the roof of the mouth to cover the gap in the palate. However, if the cleft is too wide there may be insufficient local tissue available to close the gap without undertaking quite radical surgery. It is these severe cases that can cause future complications for infants as they develop into adults – particularly with speech and facial growth problems.

The preliminary results on a new material studied using the Science and Technology Facilities Council's ISIS neutron source show treatment for these severe cleft palates could be carried out without the need for complex surgery. The new treatment involves inserting a small plate made of a hydrogel material – similar to the material used to make soft contact lenses – into the roof of the patient's mouth without the need for complex surgery. The hydrogel developed using STFC's ISIS Neutron Source gradually expands as fluid is absorbed, encouraging skin growth over and around the insert. When sufficient skin has been generated to repair the palatal cleft, the insert is removed and the cleft is repaired using this additional tissue. Preliminary results using the hydrogel have been very promising and clinical trials are planned to take place early in 2011.

### **World Class Innovation: Technology for research saves lives**

Technology developed to advance STFC funded research in particle physics and astronomy has underpinned the development of MRI scanners; a £195m industry that saves lives, improves diagnosis and allows more targeted treatment.

UK advances in particle physics technology not only supported important experiments at CERN but pioneered early developments in superconducting magnets, which in turn led to the development of MRI scanners. 'Rutherford Cable' is a type of superconducting cable that was invented at STFC's Rutherford Appleton Laboratory for particle physics applications. Now that technology is used extensively in superconducting magnets and a broad range of other applications, including inside every MRI scanner worldwide. This represents a multi billion pound market for British companies such as Oxford Instruments. The MRI industry supported around 4,000 jobs in 2007, with an estimated value added contribution to UK GDP of £195 million.



MRI technology has revolutionised healthcare. There are more than 20,000 MRI scanners installed around the world performing 60 million examinations every year. Around 500 scanners in UK carry out more than a million examinations every year, making a huge contribution to government targets for the diagnosis and treatment of cancer; 700 UK women each year are saved from breast cancer alone. They can be used to look at almost any part of the body and are often used to speed diagnosis and recovery of patients suffering from conditions of the brain and nervous system, eg dementia, strokes and Parkinson's. They are also used to identify damage suffered during heart attacks, or assess damage to cartilage, tendons and ligaments sustained in sports injuries. One of the main advantages of MRI is that unlike X rays, it does not involve exposing the body to radiation and for this reason it is an important way of monitoring foetal defects in pregnancy.

Further developments in MRI scanning have evolved out of STFC funded astrophysics research. Blackford Analysis [<http://blog.blackfordanalysis.com/>] is a University of Edinburgh spinout company that uses distant star imaging techniques to stabilise MRI images of moving patients, allowing the elderly and young children to be scanned without anaesthetic. This product also aligns 3D medical scans in real time, increasing radiography throughput by 10% which has been estimated to be worth \$1.2bn in the US alone. The underlying Blackford Analysis technology is also applicable in the defence, oil & gas and security sectors and recently won the CEO THALES Scottish Technology Prize for an application of the company's technology to Improvised Explosive Device detection.

### **World Class Skills: Big science supporting small business**

STFC is providing leading edge shared laboratory space for high tech businesses at the Daresbury Science & Innovation Campus to improve the efficiency and competitiveness of UK SMEs.

Carrying out research and development can be very costly for new or growing businesses. STFC is now providing more than £3 million of state of the art laboratories at its Daresbury Science and Innovation Campus for use by small high tech start up companies.

Opened in early 2010, STFC's Innovations Technology Access Centre (I TAC) is located on the Campus and offers businesses and researchers the ideal environment to carry out high tech R&D. The Centre provides flexible and affordable access to fully equipped biological, imaging, materials and physical science laboratories. Businesses can either lease their own exclusive use laboratories or opt for access to multi user laboratories available on a daily basis.

As well as providing access to high end laboratory sample preparation and analysis facilities, I TAC uniquely offers businesses the opportunity to work alongside STFC's own highly skilled scientists and leading north west academic institutions.

Five of the 100 hi tech companies located on the Campus are already taking advantage of the I TAC facility. This includes Bioeden, an international business with an innovative process for collecting stem cells from children's milk teeth. Stem cell treatment to repair or replace damaged tissue and organs will be the cornerstone of future medical science. This process allows parents to preserve and store their children's stem cells for future use. The company is using the space within the ITAC facility for storage of their cell bank.

I TAC tenants and the other companies on the Campus have greatly benefited from co location. A recent survey reported that companies have attracted a total of £20.5m external investment, made sales of £14.9m and achieved an average turnover growth of 67% since locating onto the Campus.



## 2. Evidence Common to all Councils

### 2.1 Innovation Outputs and Outcomes

STFC maintained a steady income from consultancy and contract research over the year (2.1.1). There was a drop in co-funding, largely due to a decline in income from other government departments (2.1.2). Spending on Knowledge Transfer increased over the year. In particular, over £1m was committed to the Particle and Nuclear Physics Applied Systems (PNPAS) call. This was a successful pilot scheme aimed at generating knowledge exchange in the areas of health, security and energy applications (2.1.3).

	Metric	2007/08	2008/09	2009/10		Notes
		£m	£m	£m		
2.1.1	Income from consultancy and contract research	23	23	23		
2.1.2	Co-funding/ collaborations	24	25	5		
	• OGD/NDPB	19	13	0		
	• Business	2	8	2		
	• Third Sector	0	0	0		
	• International	3	4	3		
	• Other	0	0	0		
2.1.3	Knowledge Transfer Spend	1.50	2.82	3.77		
	• KT Partnerships	1.02	1.82	1.84		
	• KT Fellowships	0	0.07	0.26		
	• Collaborative Doctoral Awards	0.25	0.75	0.40		
	• KT Catalysts	0.10	0.17	0.14		
	• KT Other	0.13	0.01	1.13		
2.1.4	External Representation in main GB			STFC	Diamond	Data for previous years not available
	• OGD/NDPBs			8%	12%	
	• Academia			41%	25%	
	• Business			20%	25%	



## 2.2 Knowledge Generation

Publications arising from STFC's grant funding and sponsorship of astronomy and planetary sciences, particle physics and nuclear physics increased again in 2009/10 continuing the trend from 2007/08 (2.2.1a). There was also a rise in the number of publications generated by users of the three large research facilities at Harwell; Central Laser Facility, Diamond Light Source and ISIS (2.2.1b).

The number of fully-funded PIs declined over the CSR period (2.2.2). There was a decrease in the number of research fellows (2.2.3), while the number of fully funded PhDs remained stable (2.2.4). PhD submission rates in 5 years remained very high (2.2.5). There was a significant increase in the number of PhD students accessing the large facilities (2.2.6).

Recruitment and retention figures continue to demonstrate that STFC-funded PhDs remain well sought-after in the employment market (2.2.7). Diversity numbers remained at levels similar to previous years (2.2.8).

	Metric	2007/08	2008/09	2009/10	Notes
2.2.1a	Total number of refereed publications in Astronomy and planetary sciences, Particle Physics and Nuclear Physics	3521	3574	3650	Data supplied by Evidence Ltd, part of Thomson Reuters
2.2.1b	Total number of refereed publications arising from facilities	640	707	788	Refereed publications by users of CLF, Diamond and ISIS facilities at Harwell
2.2.2	Number of PI funded	519	503	459	
2.2.3	Number of Research Fellows	22	19	12	
2.2.4	Number of PhD fully funded	272	257	265	
2.2.5	Submission rates in 5 years	86%	95%	85%	
2.2.6	Number of students using large facilities	400	459	664	Students using CLF, Diamond and ISIS
2.2.7	Recruitment and Retention				Source: HESA data
	% fully funded PhDs staying in UK-HEI	42%	50%	52%	
	% fully funded PhDs into Business	29%	26%	35%	
	% fully funded PhDs into Public Sector	17%	15%	6%	
	% fully funded PhDs into Third Sector	12%	9%	7%	
2.2.8	Diversity				Source: HESA data
	% fully funded PhDs female	24%	27%	24%	
	% fully funded PhDs non-white (British or not)	7%	4%	2%	



### 2.3 Investment in the Research Base

In this, the final year of the 2007 CSR settlement, Departmental Expenditure Limit (DEL) income declined, in line with the flat-cash settlement. Other income also decreased slightly, but remains within around 2% of DEL (2.3.1). New capital spend increased, with the continuing development of ISIS TS2 (2.3.3). Income from the facilities for commercial work remained steady (2.3.4).

	Metric	2007/08	2008/09	2009/10	Notes
		£m	£m	£m	
2.3.1	Total Income	718	716	681	
	• DEL	705	700	668	
	• Other Income	13	16	13	
	% other income in total	1.8%	2.2%	1.9%	
2.3.2	Value of Responsive Mode grant funding	27	35	24.5	
2.3.3	New Capital Spend	143	151	165	
2.3.4	Income from Facilities	24	20	21	

### 2.4 Public Engagement

Funding for public engagement was maintained at roughly the same level in the previous two years (2.4.1). Data for co-funding is not available for previous years. In the current year, £0.76m was provided via partnerships with European Space Agency, Department for Education and Specialist Schools and Academies Trust (2.4.2).

Approximately 70% of STFC's events involved participation larger than 100 attendees (2.4.3). This was through public and schools lectures and events at Daresbury, Rutherford Appleton Laboratories and Swindon Office, plus off-site talks and events, along with local and regional minifestivals, public open days and site visits. Around 40% of the public engagement activity was of national scope (2.4.4), through initiatives such as Dark Skies Scotland and Dark Skies UK, and Royal Observatory Edinburgh Open Days. The Big Bang Science Fair at Manchester reached over 22,000 members of the public.

Public Engagement Fellows such as Maggie Aderin on BBC TV have reached national audiences in the order of millions. Marek Kukula, public astronomer at Greenwich has appeared on national TV (Dr Who confidential). Chris Lintott, a co-presenter on the Sky at Night programme, has reached international audiences (2.4.5).

	Metric	2007/08	2008/09	2009/10	Notes
		£m	£m	£m	
2.4.1	Funding for PE	1.7	1.5	1.6	
2.4.2	Co-funding for PE	n/a	n/a	0.76	Not available for previous years
	• ODGs/NDPBs	-	-	0.76	
	• Business	-	-	0	
	• Third Sector	-	-	0	
	• Other	-	-	0	
2.4.3	% PE participation larger than 100	n/a	n/a	70%	Not available for previous years
2.4.4	% PE of national scope	n/a	n/a	40%	Not available for previous years
2.4.5	% PE direct	n/a	n/a	20%	Not available for previous years



STFC continued to play a key role in the RCUK Public Engagement with Research (PER) activity.

The Research Councils together funded £2.5m of public engagement initiatives through the RCUK Public Engagement with Research team in 2009/10. The PER team works to complement the public engagement activities of individual Councils, in areas where cross-Council working adds value and increases impact. Its vision is to enable society to value and have confidence in research processes and outputs; and it leads a broad spectrum of activities which have research and researchers at their core.

### 3. STFC-specific Evidence

Below we present a range of metrics which demonstrate STFC's breadth of activity and unique contribution to generating economic impact.

The citation indices of publications in astronomy and planetary sciences, particle physics and nuclear physics continued to increase in 2009/10 (3.1).

During the year, the large facilities at Harwell provided access for over 1400 experiments (3.2). The increase is due to the steady rise in the number of users accessing Diamond as additional beamlines have become available.

Patent applications and patents granted continued at a steady rate in 2009/10 (3.3 and 3.4). One additional new business was created in 2009/10, bringing the total number created since 2007 to 8 (3.5).

The value of spend within the UK by the European Facilities ESA, ESO and CERN continued at a healthy level (3.6). In addition, over the past 3 years, the UK large facilities have spent in excess of £43m with high technology companies within the UK.

We are in the process of developing a range of metrics to demonstrate the breadth of activity by the Science and Innovation Campuses at Daresbury and Harwell, but until these are finalised, a subset is presented for Daresbury only (3.7). These have been derived from the annual tenants' survey conducted on behalf of the campus. The companies based at DSIC represent a healthy range of industry sectors, with over 54% from Digital ICT and 21% from Advanced Engineering and Instrumentation. These collectively employ over 300 staff, an increase of over 50 from the previous year.

	Metric	2007/08	2008/09	2009/10	Notes
3.1	Impact of Refereed Publications				
	• Astronomy & Planetary Sciences	9.99	10.06	11.37	
	• Particle Physics	n/a	8.35	8.99	
	• Nuclear Physics	n/a	6.47	6.99	
3.2	Total number of experiments carried out	562	1102	1408	Experiments carried out at CLF, Diamond and ISIS
3.3	Patent Applications by RC investments	3	7	4	
3.4	Patents Granted to RC investments	2	5	4	
3.5	Number of new businesses created	1	6	1	



	Metric	2007/08	2008/09	2009/10	Notes
3.6	Value of contracts placed with UK companies for the purchase of equipment for major facilities and research programmes				
	• ESA	48.24m€	83.9m€	134m€	
	• ESO	20.01m€	13.7m€	3.5m€	
	• CERN	11.38mCHF	7.4mCHF	11mCHF	
3.7	Daresbury Science and Innovation Campus				
	• Number of companies on campus	48	71	90	
	• Amount of infrastructure investment			£9.9m	

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