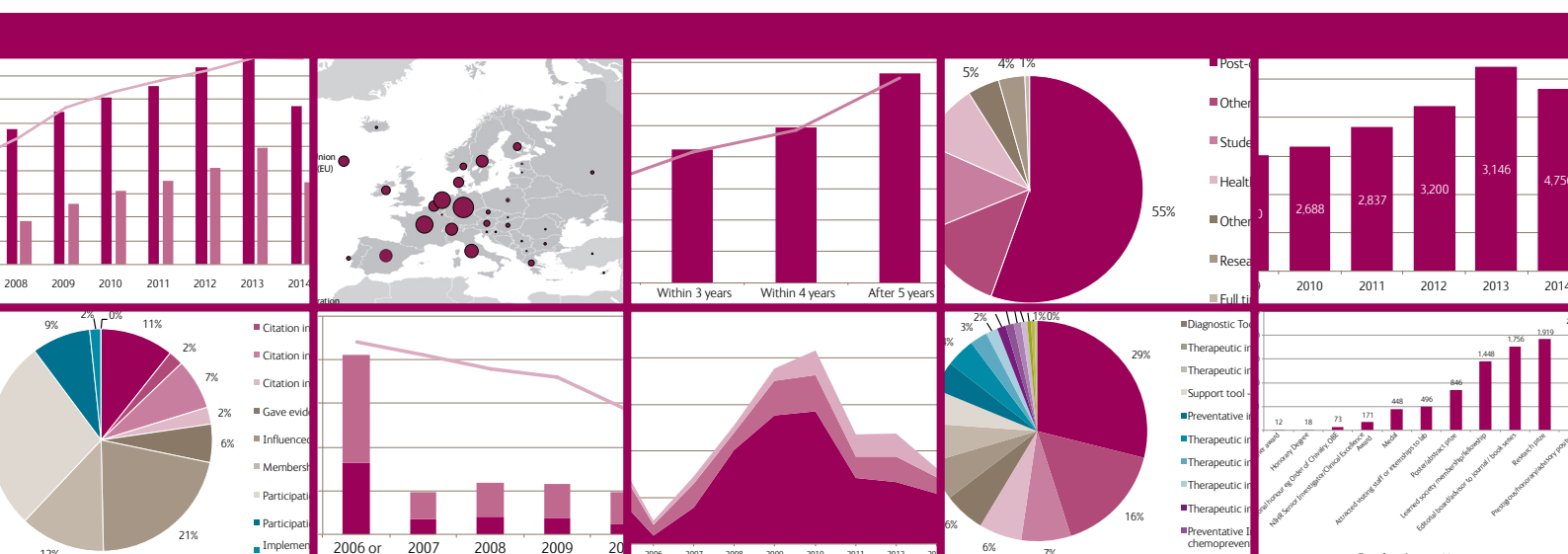




SECTION 3

Quantitative analysis



3.1 Publications

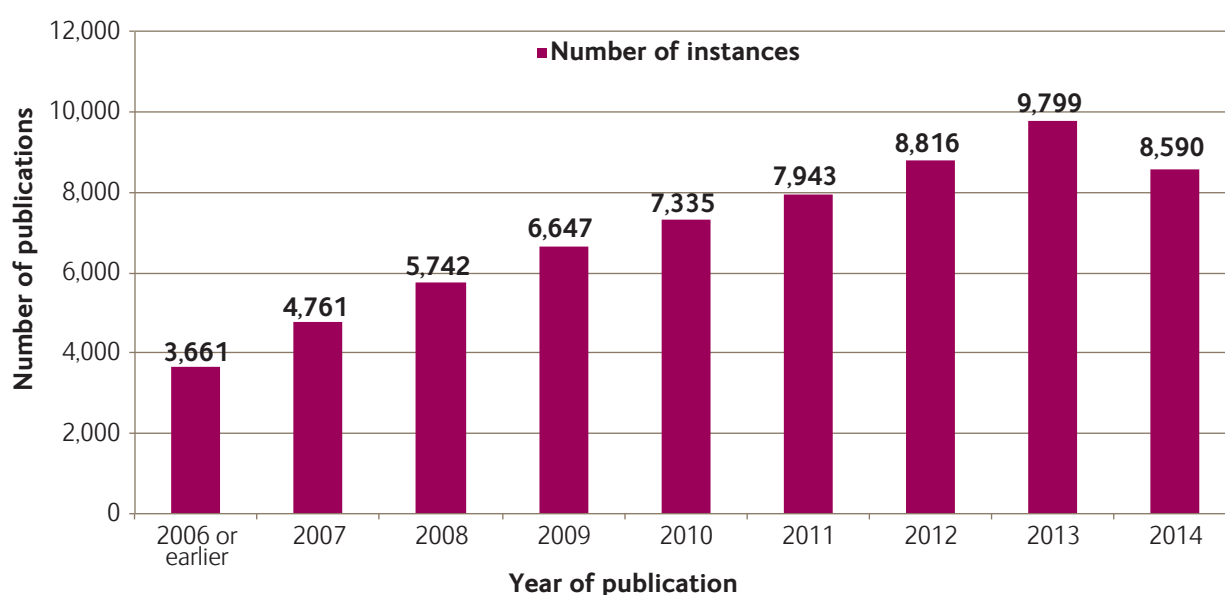
Summary

- » MRC researchers reported publications¹ resulting, either wholly or in part, from MRC funding in 85 per cent of awards².
- » There were 94,732 reports of publications, of which 63,294 are unique publications. Table 1 and figure 1 show the number of unique publications for each year since 2006.
- » The average number of publications per award reporting at least one publication was 19 (18.63).
- » More than a fifth of all awards (23 per cent) reported the generation of more than 16 publications.

Table 1: Number of unique publications for each year since 2006

Year	2006 or earlier	2007	2008	2009	2010	2011	2012	2013	2014	Total
No. of publications	3,661	4,761	5,742	6,647	7,335	7,943	8,816	9,799	8,590	63,294

Figure 1: Number of unique publications for each year since 2006



Publications by year

- » 89 per cent of awards starting in 2006 or earlier have yielded at least one publication. Publications take time to produce and recent awards will naturally be less likely to have resulted in a publication. However, two thirds (67 per cent) of awards starting in 2013 and more than one third (37 per cent) of awards starting in 2014 report the production of at least one publication so far. Table 2 and figure 2 show the distribution of publications by award start year.
- » Recipients of 29 per cent of awards reported their first publication within one year of the award starting. This had increased to 90 per cent after five years. The time between the start of the award and report of first publication is shown in table 3 and figure 3.

Table 2: Distribution of publications by award start year

Start year	Number of awards	Number with at least one publication	Number with no publications	Percentage with at least one publication
2006 or earlier	2,059	1,835	224	89%
2007	484	443	41	92%
2008	586	541	45	92%
2009	572	528	44	92%
2010	477	437	40	92%
2011	418	375	43	90%
2012	517	418	99	81%
2013	657	439	218	67%
2014	195	73	122	37%
TOTAL	5,965	5,089	876	85%

Figure 2: Distribution of publications by award start year

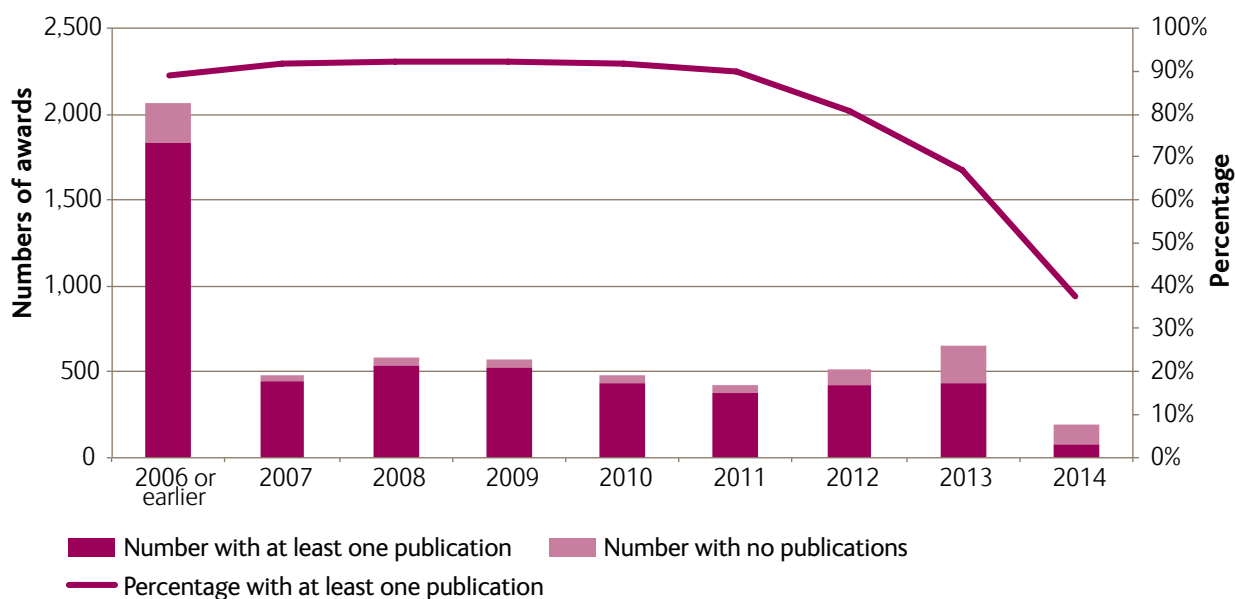
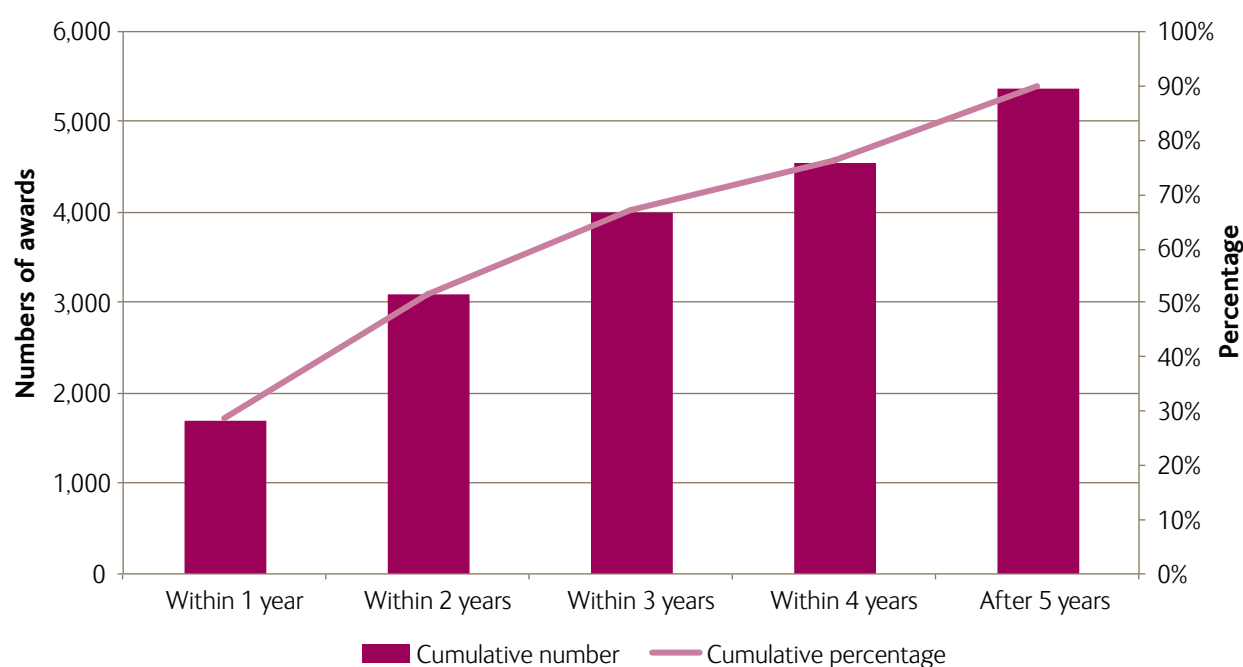


Table 3: Time to report first publication by number of awards

First publication	Number with at least one publication	Cumulative number	Cumulative percentage
Within 1 year	1,690	1,704	29%
Within 2 years	1,316	3,086	52%
Within 3 years	830	4,008	67%
Within 4 years	467	4,552	76%
After 5 years	786	5,362	90%

Figure 3: Time to report first publication by number of awards

Publications by co-author

Co-authorship of publications provides an insight into the patterns of research collaboration; it can indicate the variety and even duration of collaborations. Bibliographic information was purchased from Thomson Reuters on MRC research papers, including the names and addresses of all co-authors on a paper. The address data includes country information and this is used for basic geographic analysis.

Open Access

Figures 4-6 show the proportion of unique MRC publications produced each year that are currently available in Europe PMC (as at March 2016). The data is divided into intramural and extramural figures, as well as showing both combined. The proportion of papers reported via researchfish®, published in 2014, that are openly accessible in Europe PMC is 42 per cent. This can be divided into intramural papers (45 per cent openly accessible in Europe PMC) and extramural papers (41 per cent openly accessible in Europe PMC). It should be noted that this will include publications that are not subject to the Open Access policy (for example, books).

Due to time lags in publishing, ID assignment and Europe PMC processing, one would expect lower absolute numbers of publications and proportional compliance in the most recent year, and that these would increase with the next data gathering period.

We will work with Europe PMC to obtain further information about whether these papers were openly accessible within six months of publication, and to filter our results with respect to publication types that have to comply with the open access policy.

Figure 4: Europe PMC availability by publication year

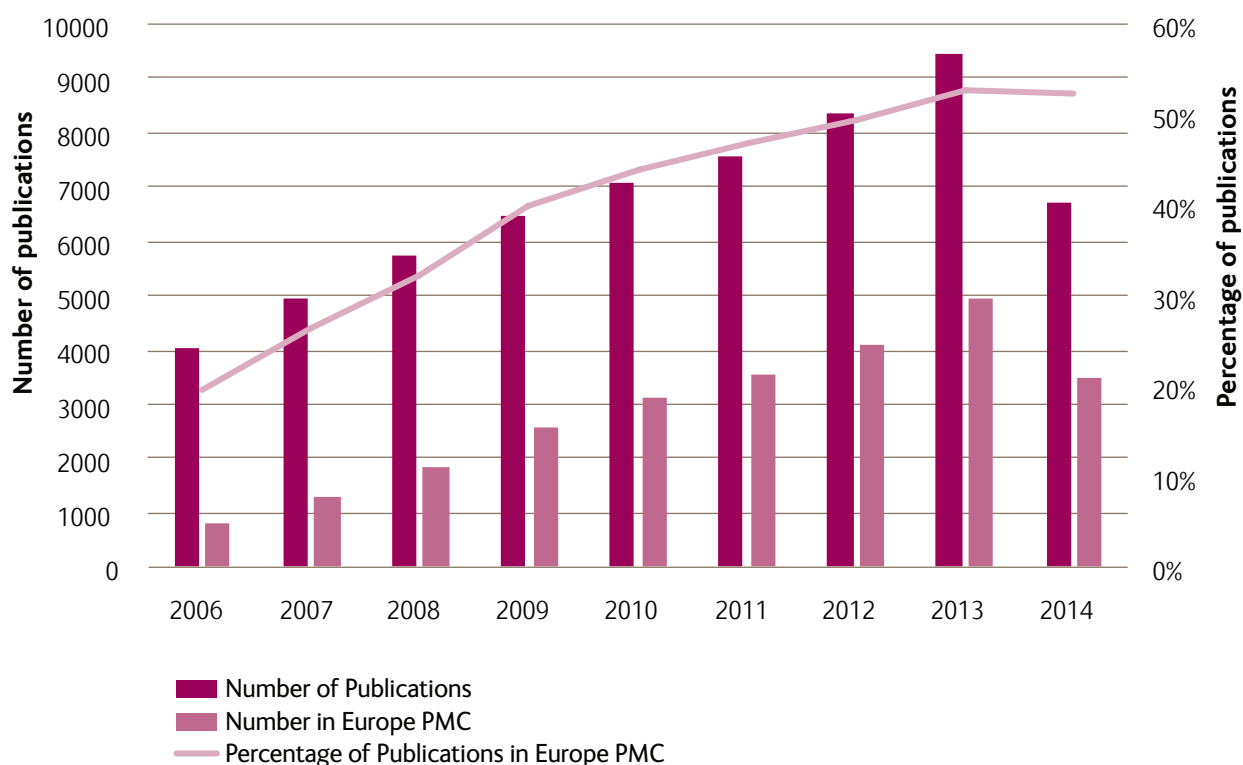
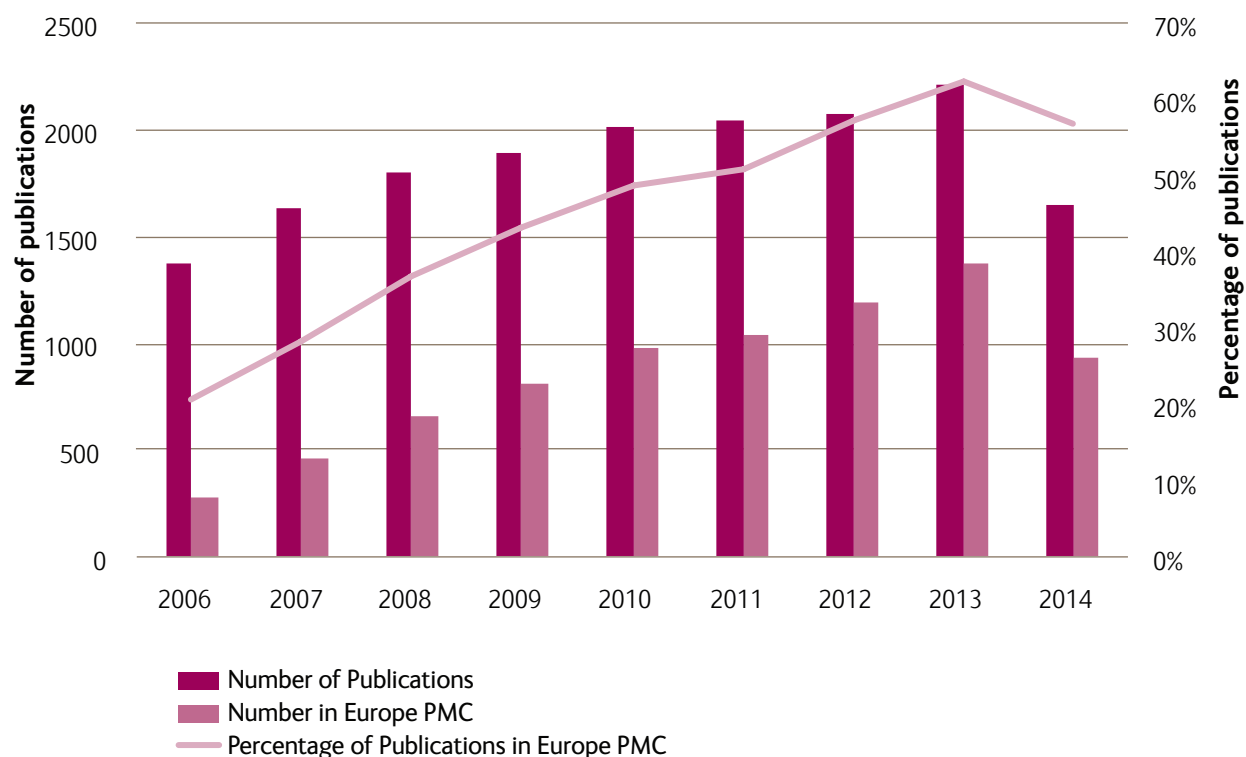
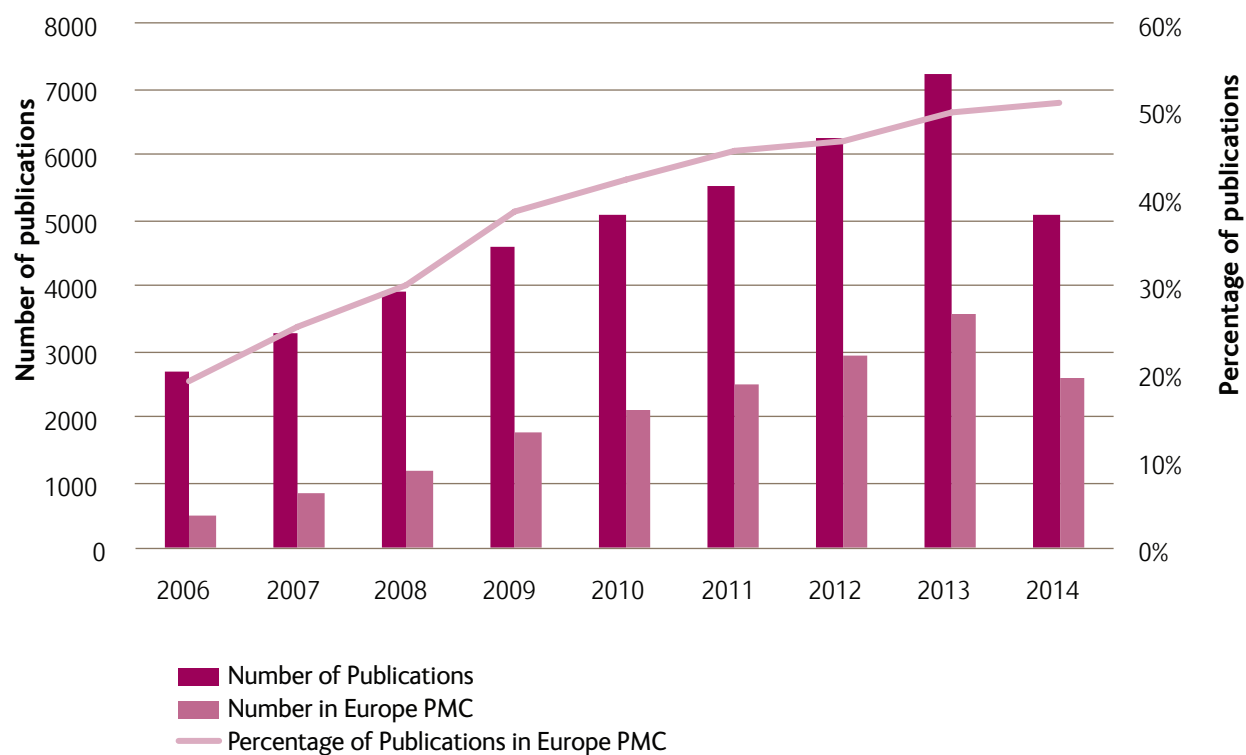


Figure 5: Europe PMC availability of intramural papers by publication year**Figure 6:** Europe PMC availability of extramural papers by publication year



3.2: Collaborations

Summary

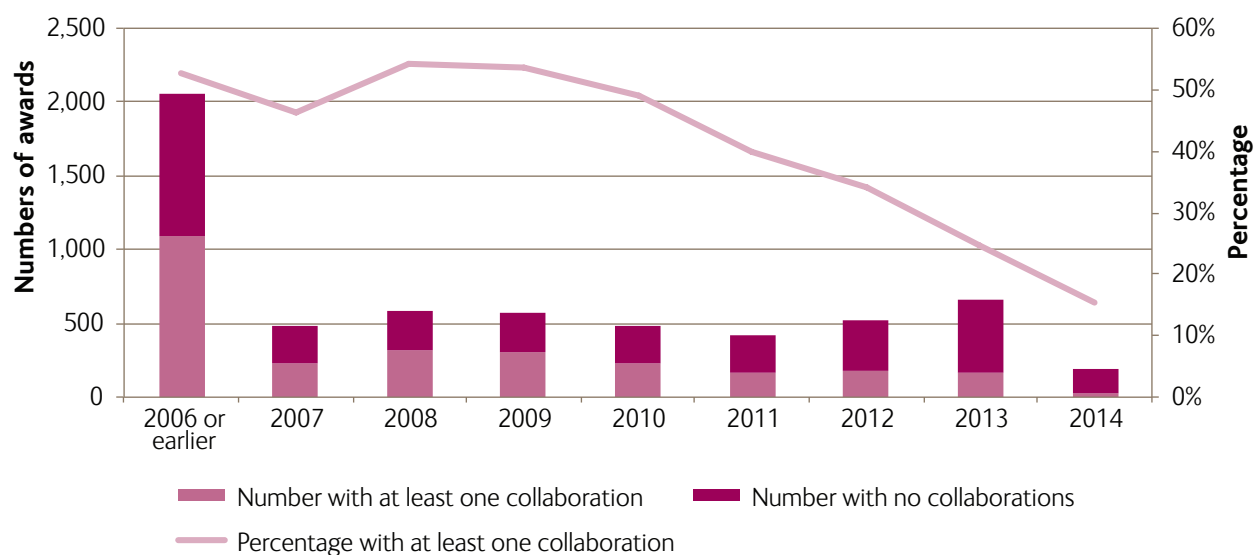
- » Recipients of 48 per cent (2,870) of awards reported that they had established a collaboration which they could evidence, for example with co-publications, co-funding or exchange of materials and expertise.
- » The average number of collaborators³ linked to awards reporting at least one collaboration was 5.86, a small change from last year's figure of 5.42.
- » Six per cent (331) of awards were highly collaborative, with these recipients reporting at least 10 different collaborators.

Collaborators by year

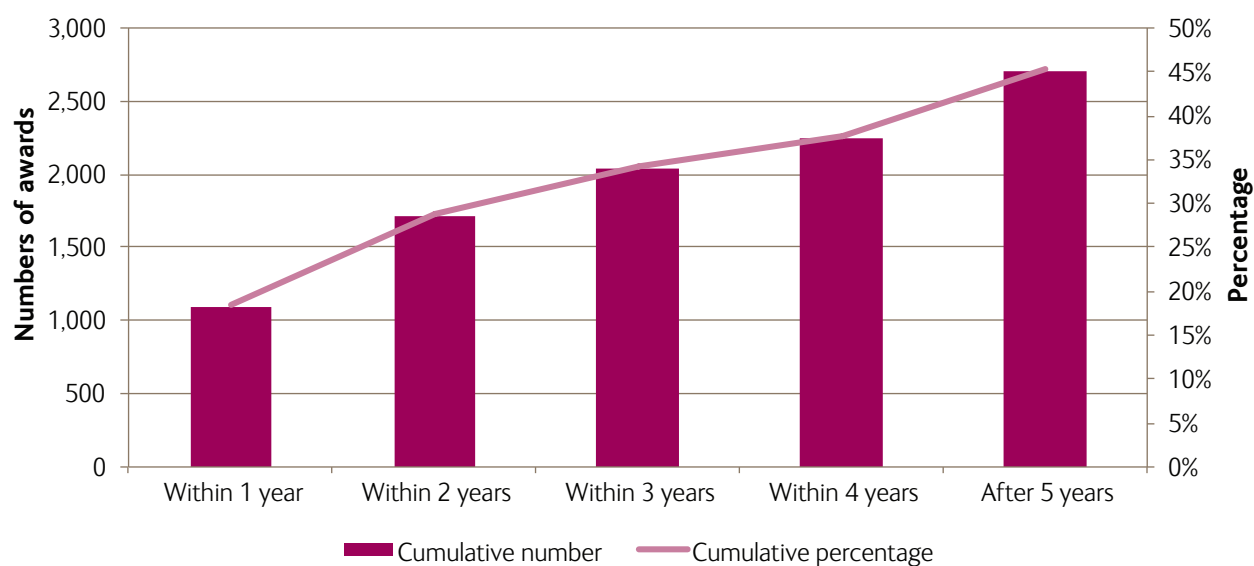
- » It takes time for researchers to set up collaborations and so there will naturally be fewer collaborations resulting from more recent awards. Recipients of 53 per cent of awards starting in 2006 or earlier had collaborations linked to them compared to 15 per cent of awards starting in 2014. The number of collaborators per award by starting year of the award is shown in table 1 and figure 1.
- » 18 per cent of awards reported at least one collaboration within one year of the award starting, compared to 45 per cent after five years. The time between the award start date and collaboration starting is shown in table 2 and figure 2.

Table 1: Number of collaborators by award start date

Start year	Number of awards	Number with at least one collaboration	Number with no collaborations	Percentage with at least one collaboration
2006 or earlier	2,059	1,087	972	53%
2007	484	224	260	46%
2008	586	317	269	54%
2009	572	306	266	53%
2010	477	234	243	49%
2011	418	167	251	40%
2012	517	176	341	34%
2013	657	163	494	25%
2014	195	30	165	15%
TOTAL	5,965	2,704	3,261	45%

Figure 1: Number of collaborators by award start date**Table 2:** Time between award start date and collaboration

First collaboration	Number reporting	Cumulative number	Cumulative percentage
Within 1 year	1,098	1,098	18%
Within 2 years	623	1,721	29%
Within 3 years	322	2,043	34%
Within 4 years	206	2,249	38%
After 5 years	455	2,704	45%

Figure 2: Time between award start date and start of collaboration

Collaborators by location

- » The majority of collaborators were from the United Kingdom (56 per cent), followed by the rest of Europe (18 per cent) and North America (14 per cent)⁴.
- » Table 3 shows the numbers of collaborators by location. Figures 3 and 4 illustrate the distribution of international (excluding Europe) and European (excluding UK) collaborators respectively⁵.
- » Figure 5 shows the top 25 location countries (excluding the UK) for number of unique collaborators. The United States remains the largest single source for collaboration with MRC research outside the UK, accounting for almost one third (31 per cent) of unique collaborations reported.

Table 3: Number of collaborators by location

Location of collaboration	Number of collaborations	Percentage of total
United Kingdom	8,583	56%
Europe	2,825	18%
North America	2,110	14%
South America	202	1%
Asia	496	3%
Africa	266	2%
Oceania	354	2%
Global	264	2%
Unknown	332	2%
Total	15,432	100%

Figure 3: Distribution of international (excluding Europe) collaborators⁶

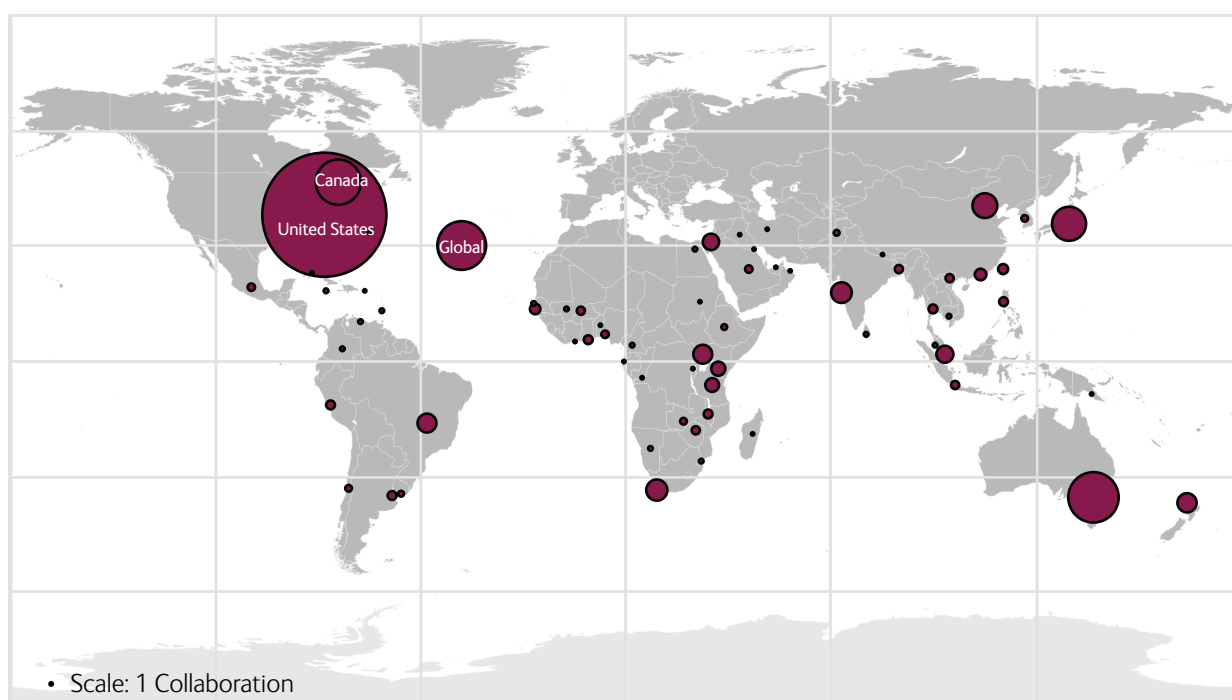
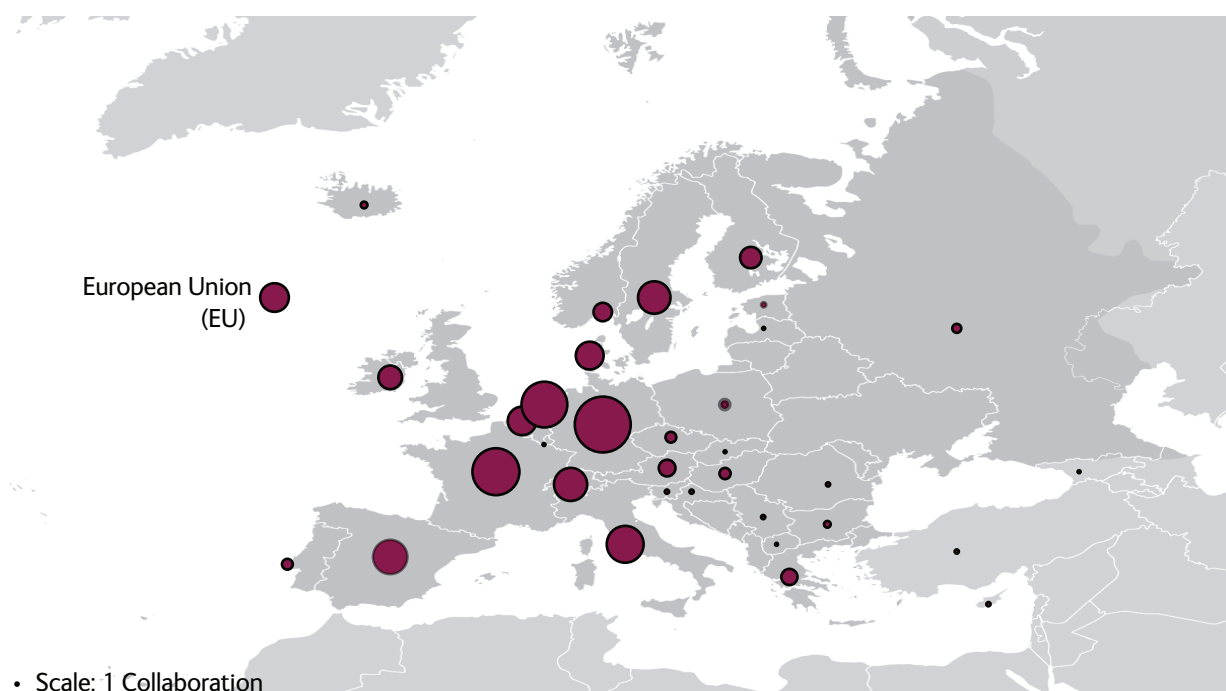
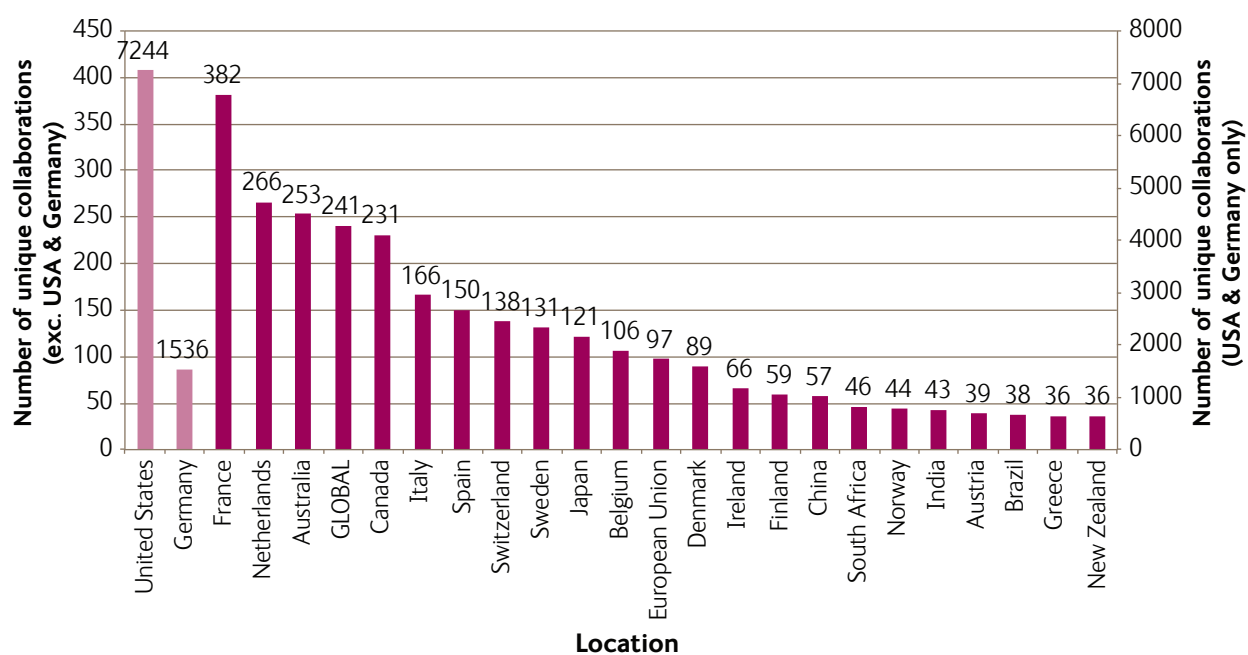


Figure 4: Distribution of European (excluding UK) collaborators⁷**Figure 5:** Top 25 countries (excluding the UK) for number of unique collaborators

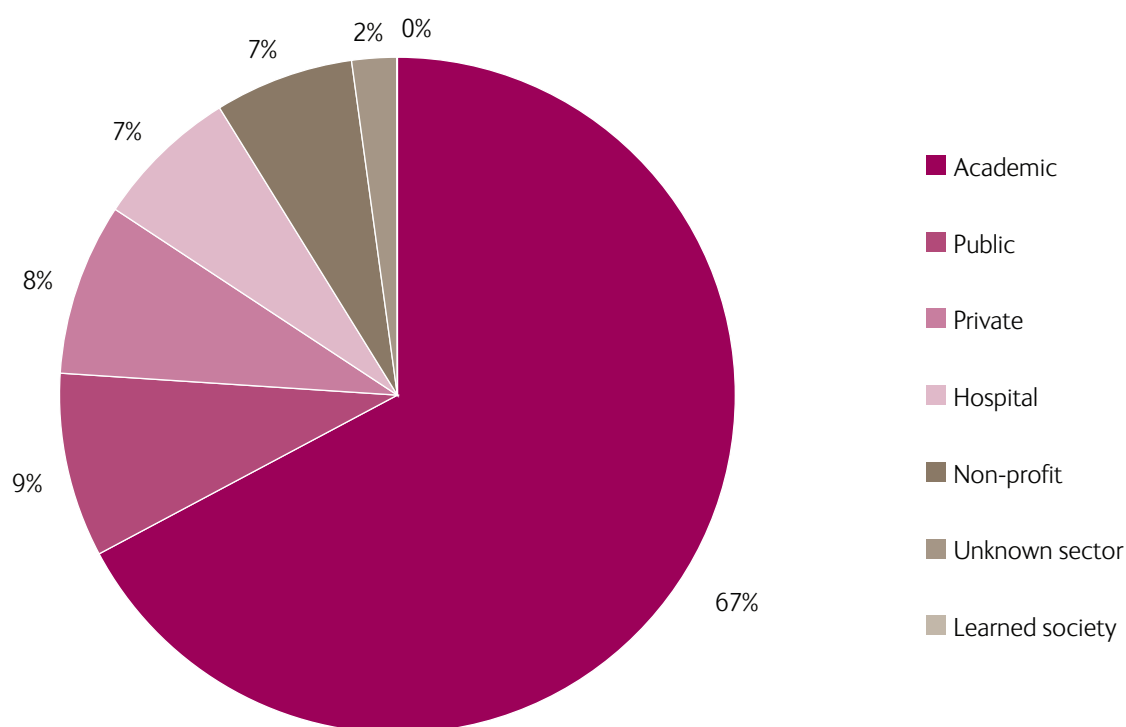
Collaborators by sector

- » researchfish® data allows us to see the extent to which MRC researchers are engaging with collaborators from different sectors, including from the private sector.
- » The majority of collaborators were from academia (67 per cent), followed by the public sector (8.8 per cent), the private sector (8.3 per cent) and hospitals (6.9 per cent). These proportions show a slight increase in collaborations in academia and the private sector (+9% and +1% respectively) and a slight decrease in collaborations in the public sector and 'unknown' (-6% and -4% respectively) compared to 2013/14 (see table 4 and figure 6).

Table 4: Collaborators by sector

Sector	Number of instances	Percentage of collaborations
Academic	10,373	67.2%
Public	1,361	8.8%
Private	1,270	8.2%
Hospital	1,066	6.9%
Non-profit	1,027	6.7%
Unknown sector	332	2.2%
Learned society	3	0.0%
Multiple	0	0.0%
Total	15,432	100.0%

Figure 6: Number of collaborators by research sector



3.3 Further funding

Summary

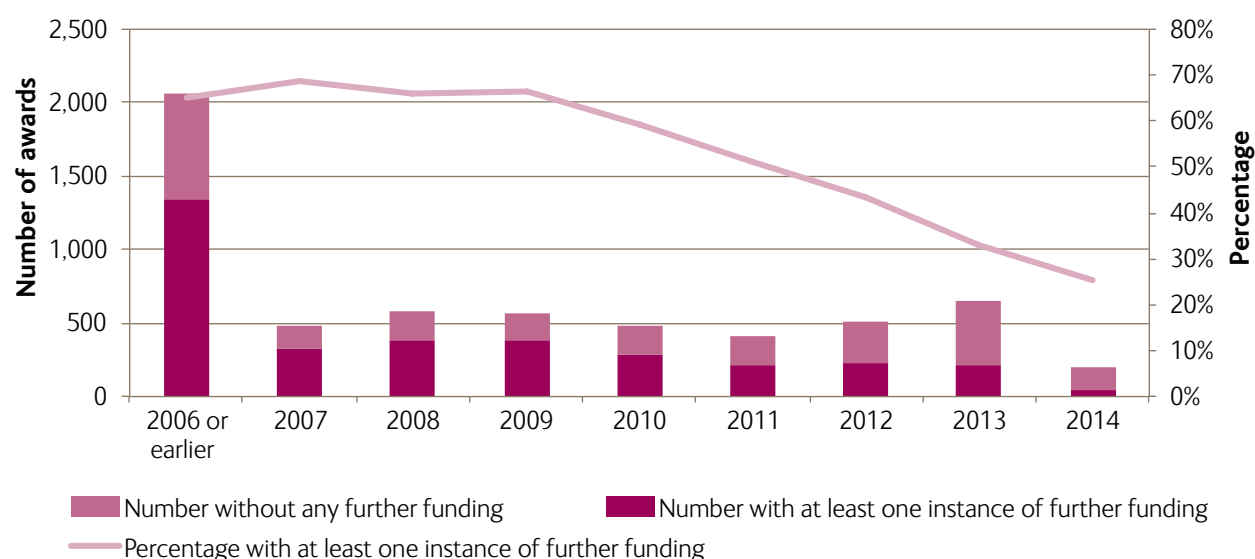
- » Researchers reported instances of further funding in 47 per cent of awards.
- » 12,140 instances of further funding were reported.
- » The average number of instances of further funding for those who had reported further funding was four (4.33).
- » Recipients of 202 awards (three per cent) reported more than 10 instances of further funding.

Further funding by year

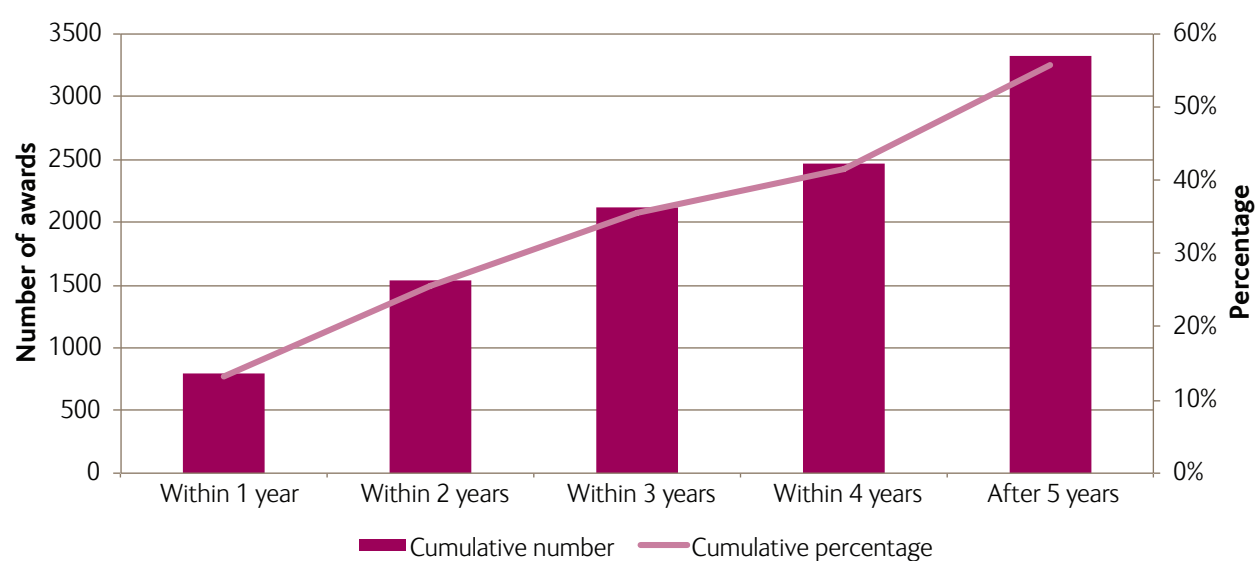
- » As with other output types, it takes time to apply for, obtain and initiate new grants and so recent awards will be naturally less likely to result in instances of further funding. Recipients of 65 per cent of grants starting in 2006 or earlier had reported further funding, compared to 25 per cent of grants starting in 2014. The number of awards reporting at least one instance of further funding by the year the award started is shown in table 1 and figure 1.
- » Thirteen per cent of awards reported instances of further funding within one year, compared to 56 per cent after five years. Table 2 and figure 2 show the time between the start of the award and when the further funding started by award.

Table 1: Number of awards reporting further funding by award start date

Start year	Number of awards	Number with at least one instance of further funding	Number without any further funding	Percentage with at least one instance of further funding
2006 or earlier	2,059	1,337	722	65%
2007	484	332	152	69%
2008	586	387	199	66%
2009	572	380	192	66%
2010	477	283	194	59%
2011	418	214	204	51%
2012	517	224	293	43%
2013	657	217	440	33%
2014	195	49	146	25%
TOTAL	5,965	3,423	2,542	57%

Figure 1: Number of awards reporting further funding by award start date**Table 2:** Time between start of the award and further funding

First instance of further funding	Number reporting at least one instance of further funding	Cumulative number	Cumulative percentage
Within 1 year	788	788	13%
Within 2 years	745	1,533	26%
Within 3 years	586	2,119	36%
Within 4 years	354	2,473	41%
After 5 years	856	3,329	56%

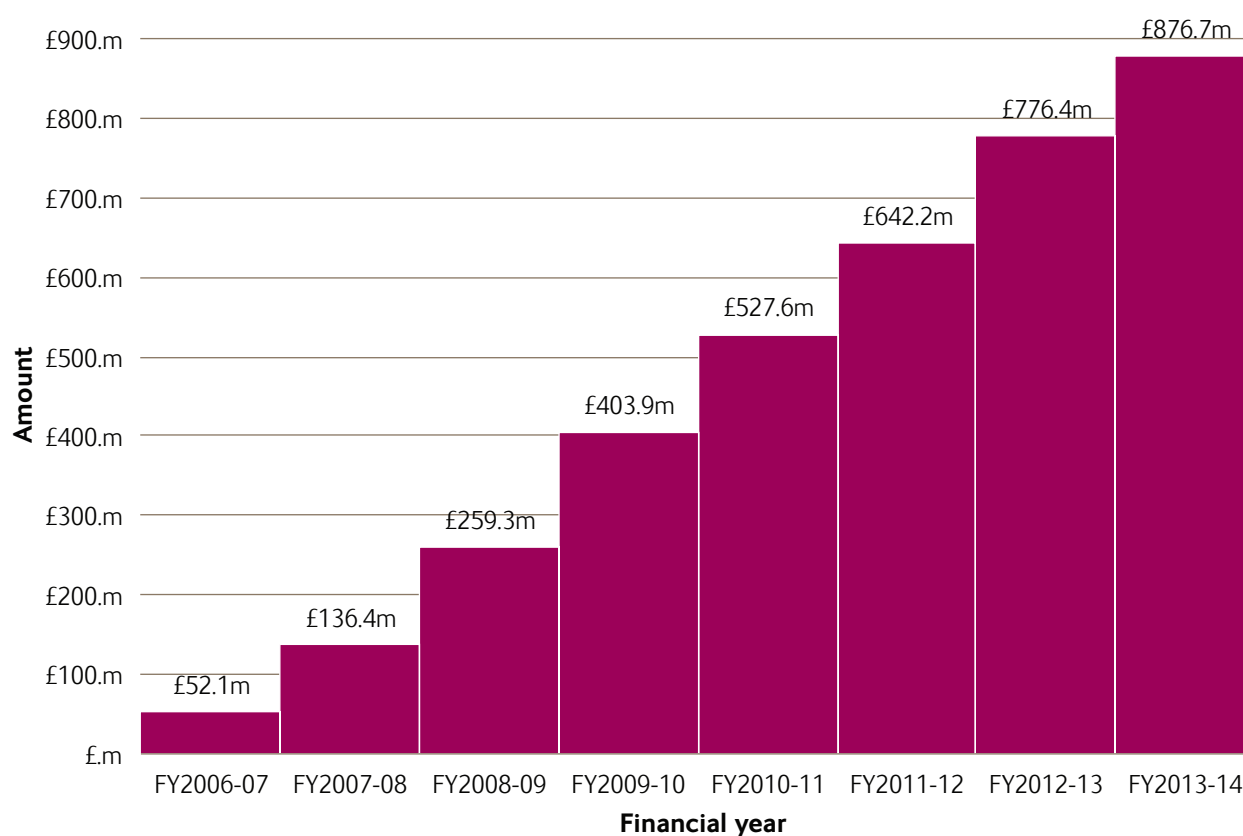
Figure 2: Time between start of the award and further funding

Further funding by value

- » Researchers reported a total value of £4.2bn in further funding⁸ since 2006, with the average total value being £1.5m amongst those reporting further funding. 12 per cent of awards received more than £1m in further funding.
- » A total value of £877m was reported to have been leveraged in 2013/2014, which is an increase on last year's total of £698m. The value of further funding by year is shown in figure 3.

In 2015 data from the MRC researchfish® dataset was used to investigate the relationship between public funding for research and private investment in science⁹. This analysis provided evidence for estimates that £1 of public funding for research leverages between £1.1 and £1.6 in private sector funding. In this study, and according to Organisation for Economic Co-operation and Development (OECD) definitions, charity funding for research was considered as part of the 'private' sector.

Figure 3: Value of further funding by year



Further funding by location and sector

- » The sources of further funding have been coded for country and sector to gain a greater understanding of the importance of other countries, governments, companies and non-profit organisations that support the same research teams as the MRC.
- » The majority of further funding reported in researchfish® was leveraged from the United Kingdom between 2006 and 2014 - 71 per cent of further funding (£2.9bn). 13 per cent of further funding (£529m) was obtained from the rest of Europe, as shown in table 3 and figure 4.
- » A further 13 per cent of further funding (£534m) was obtained from North America, with the remaining three per cent (£140m) obtained from other continents or global institutions. Table 4 and figure 5 shows the amount of further funding by global location (excluding Europe).
The largest value of further funding between 2006 and 2014 came from non-profit organisations (£1.9bn – 46 per cent of the total further funding reported), which highlights the importance of medical research charities to the funding of medical research in the UK. The next largest source of funds was the public (mainly government) sector (£1.4bn – 34 per cent of the total further funding reported). Table 5 and figure 6 show the value of further funding by sector.
- » Seven per cent of further funding (£286m) was leveraged from the private sector between 2006 and 2014. In 2013/14, this figure was £197m (six per cent). However it should be highlighted that the detail of collaborations shows that private sector contributions are mostly 'in kind'. These are difficult to monetise, but likely to represent a substantial investment in research.
- » The Wellcome Trust provided the largest value of further funding, contributing £712m between 2006 and 2014. This was followed by the National Institute for Health Research (£492m). The top 10 funders by value are shown in table 6.
- » The largest overseas funder was the European Commission, contributing £337m between 2006 and 2014, followed by the National Institutes of Health (£159m).
- » The largest single private sector funder is Merck & Co., Inc., providing around £136m in this period.

Table 3: Amount of further funding by location (European, excluding UK)

Country	Amount	Percentage
European Union (EU)	£670m	86%
France	£32m	4%
Belgium	£19m	2%
Germany	£16m	2%
Denmark	£13m	2%
Switzerland	£11m	1%
Russian Federation	£6m	1%
Italy	£3m	0%
Ireland	£2m	0%
Netherlands	£2m	0%
Spain	£2m	0%
Portugal	£1m	0%
Austria	£1m	0%
Sweden	<£1m	0%

Country	Amount	Percentage
Finland	<£1m	0%
Norway	<£1m	0%
TOTAL	£782m	100%

Table 4: Amount of further funding by location (International, excluding Europe)

Country	Amount	Percentage
United States of America	£507m	74%
Global Institutions	£100m	14%
Canada	£28m	4%
Australia	£22m	3%
Hong Kong	£11m	2%
Japan	£7m	1%
Tunisia	£4m	1%
India	£3m	0%
Pakistan	£2m	0%
Saudi Arabia	£1m	0%
China	£1m	0%
South Korea	<£1m	0%
Colombia	<£1m	0%
New Zealand	<£1m	0%
Israel	<£1m	0%
Qatar	<£1m	0%
TOTAL	£690m	100%

Figure 4: Amount of further funding by location (European, excluding UK)

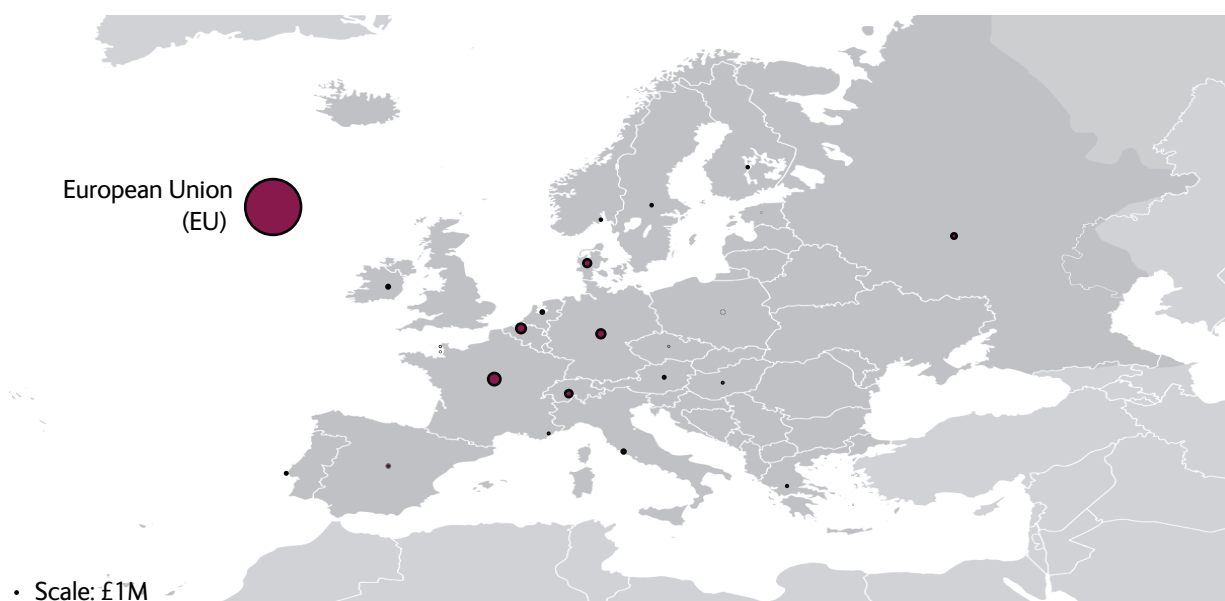


Figure 5: Amount of further funding by location (international, excluding Europe)

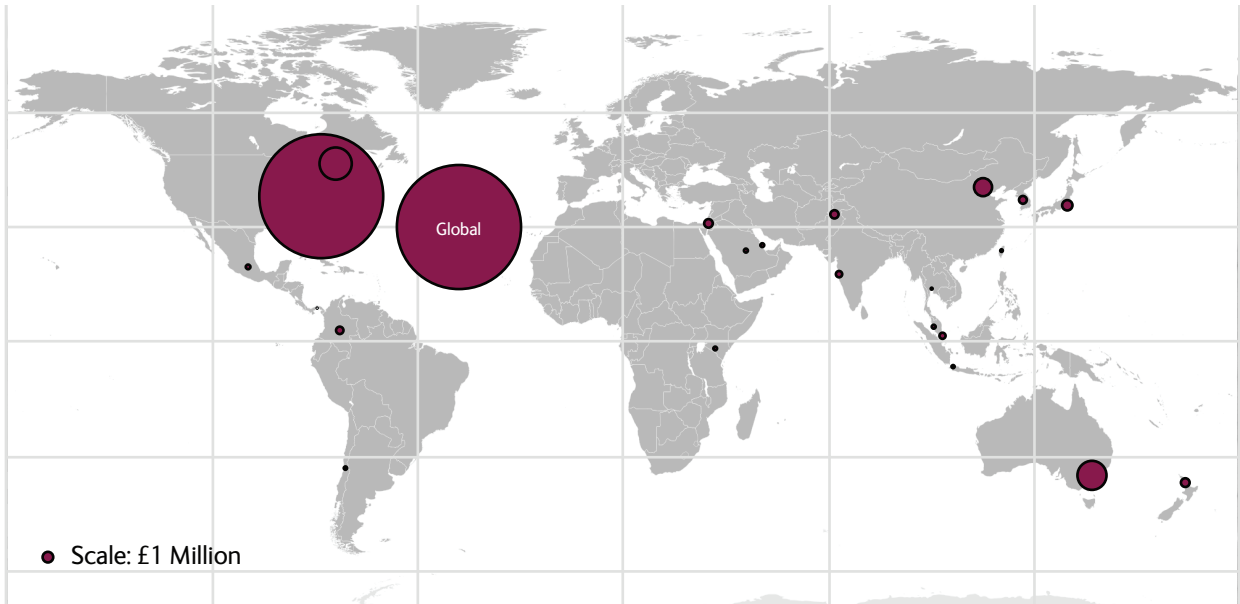


Table 5: Value of further funding by sector

Sector	Amount	Percentage
Non-profit	£1,881m	46%
Public	£1,376m	34%
Academic	£493m	12%
Private	£286m	7%
Hospital	£53m	1%
Learned society	<£1m	<1%
Multiple sectors	£0m	0%
Unknown	£0m	0%
TOTAL	£4,090m	100%

Figure 6: Percentage of further funding by sector

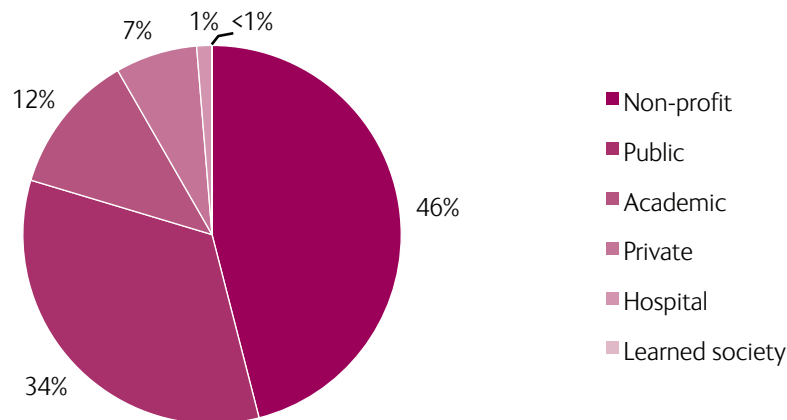


Table 6: Top 10 funders by value

Top funders	Pro-rated spending
The Wellcome Trust	£712m
National Institute for Health Research (NIHR)	£493m
European Commission (EC)	£337m
Biotechnology and Biological Sciences Research Council (BBSRC)	£184m
Cancer Research UK (CRUK)	£170m
National Institutes of Health (NIH)	£159m
Engineering and Physical Sciences Research Council (EPSRC)	£146m
Merck & Co, Inc (MSD)	£136m
British Heart Foundation (BHF)	£111m
Bill and Melinda Gates Foundation	£109m

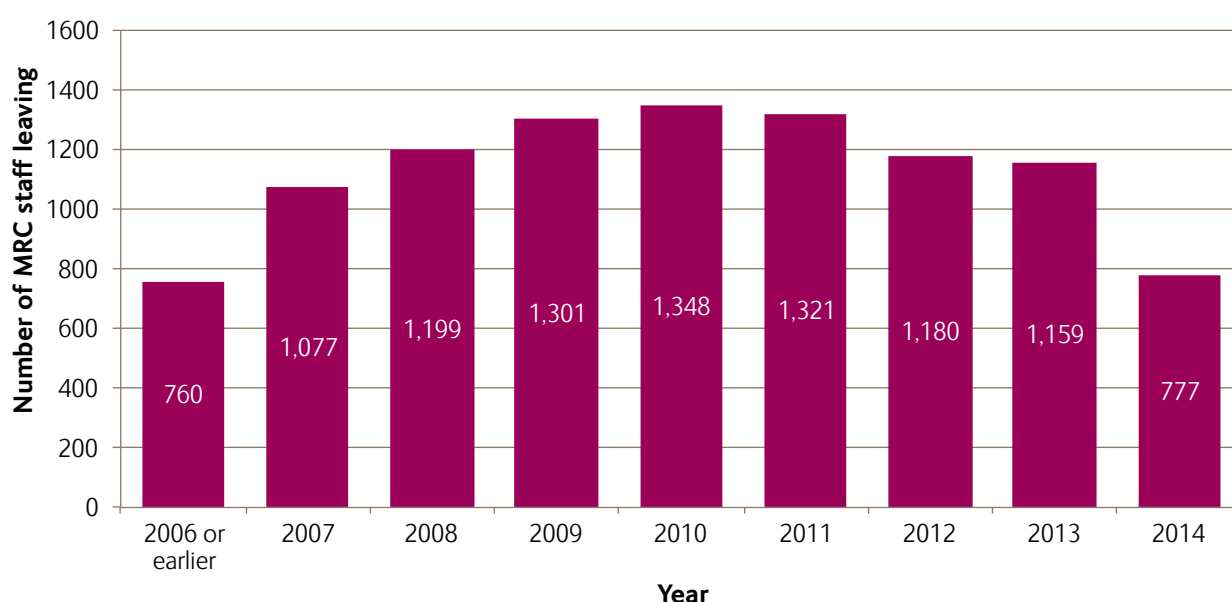


3.4 Next destination

Summary

- » Principal investigators reported details of staff who had left MRC support in 51 per cent of MRC awards, with 10,209 reports between 2006 and 2014¹⁰.
- » On average, there were three instances (3.36) reported per award (for those awards where it was reported staff had left).
- » Figure 1 shows the number of staff leaving MRC support by year, as reported in researchfish®. The data includes people leaving MRC awards that have terminated, people leaving for opportunities elsewhere or retiring, and people leaving fixed-term positions such as studentships.

Figure 1: Number of staff leaving MRC support by year



Positions held at the MRC and future positions

- » 35 per cent of staff leaving the MRC were in a post-doctoral position, 23 per cent held a researcher position, 17 per cent were research fellows and 17 per cent were research students. The distribution of all roles held is shown in figure 2.
- » The majority of next destinations for research students leaving the MRC were described as 'post-doctoral researcher' (56 per cent), followed by 'student' (13 per cent). A breakdown of next destinations of research students is shown in figure 3.
- » The majority of post-doctoral researchers left MRC support to take up a further post-doctoral position (56 per cent), followed by research fellow/project leader (18 per cent). A breakdown of next destinations of post-doctoral researchers is shown in figure 4.
- » Overall, 61 per cent of staff remained in the academic (university-based) sector. 10 per cent of leavers moved into the private sector. figure 5 shows a breakdown of next destinations by sector. These results are very similar to those published last year.

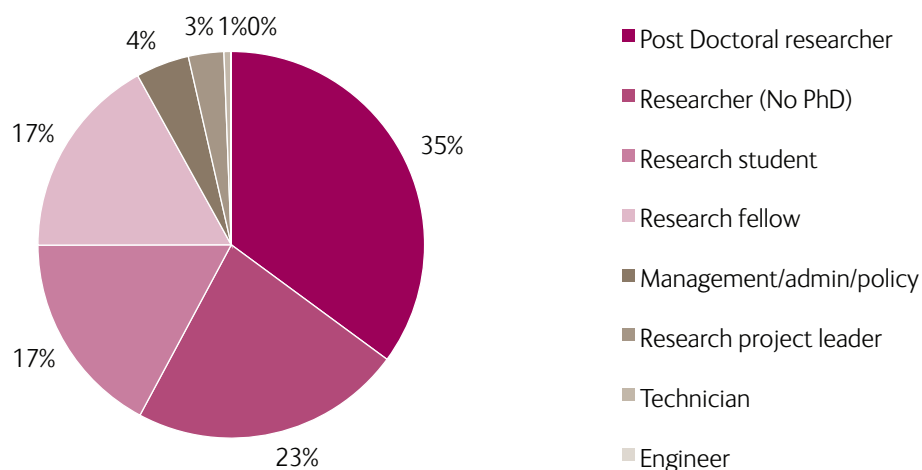
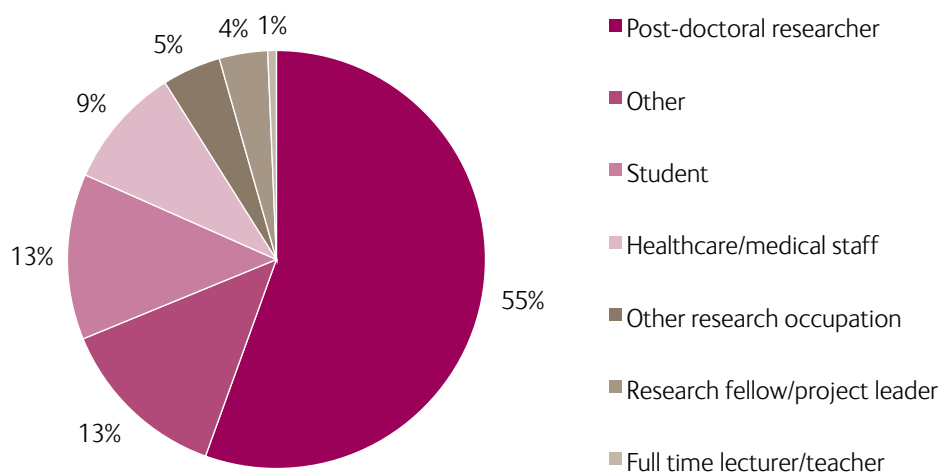
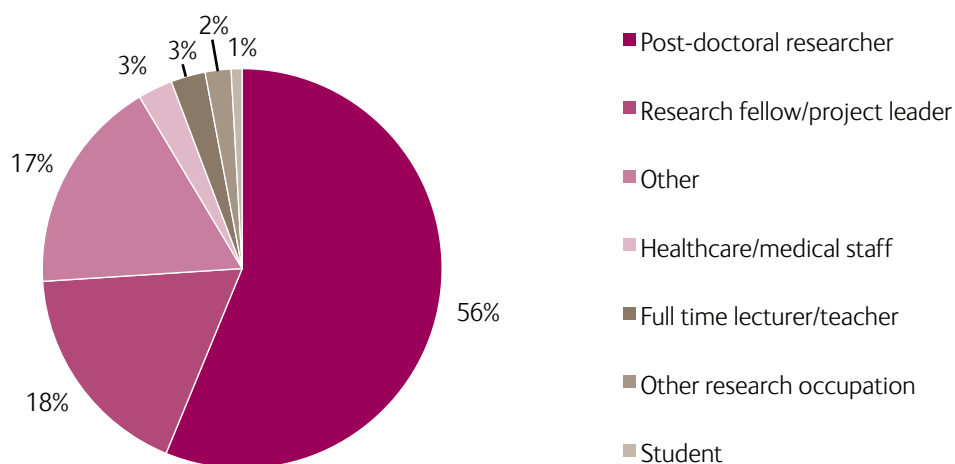
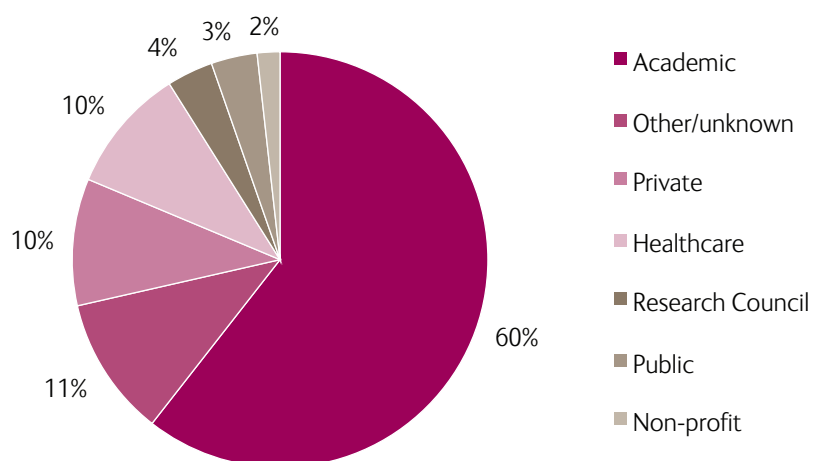
Figure 2: Distribution of roles held by staff leaving the MRC**Figure 3:** Distribution of next destinations of research students**Figure 4:** Distribution of next destinations of post-doctoral researchers

Figure 5: Distribution of next destinations by sector





3.5 Engagement activities

Summary

- » Researchers reported participating in engagement activities outside of academia in 59 per cent of awards, an increase on last year's figure of 56 per cent.
- » The total number of engagement activities reported between 2006 and 2014 was 35,765¹¹.
- » The average number of engagement activities per award (for awards reporting engagement activities) was 10 (10.05), an increase on last year's average of seven.
- » 15 per cent of all awards reported more than 10 engagement activities, again an increase on last year's figure of 11 per cent.
- » Some of the increase in reporting in this section may be due to adding the option to report scientific conferences.

Engagement activities by year

- » There were 4,756 instances of engagement activities starting in 2014. A breakdown of engagement activities per year is shown in figure 1.
- » The longer that an award has been running, the greater number of opportunities to participate in engagement activities there are. Recipients of 63 per cent of awards starting in 2006 or earlier reported at least one engagement activity, compared to 35 per cent of awards starting in 2014. The number of awards reporting at least one engagement activity by start year is shown in table 1 and figure 2.
- » Twenty two per cent of awards reported at least one engagement activity within one year of the award starting compared to 60 per cent after five years. The time between the award starting and the engagement activity taking place is shown in table 2 and figure 3.

Figure 1: Breakdown of engagement activities per year

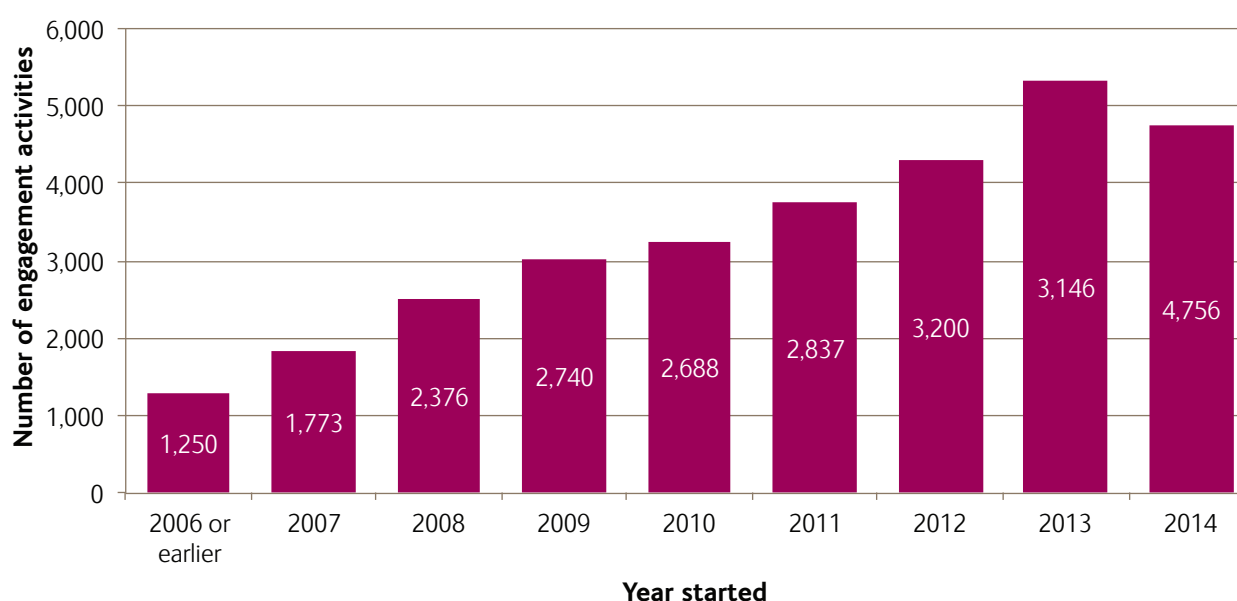
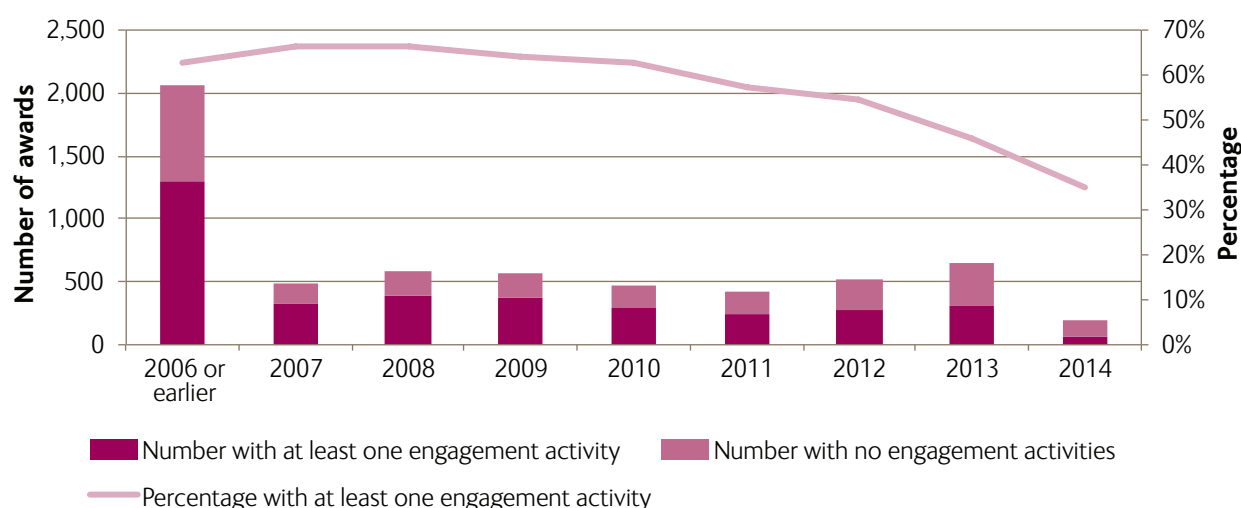
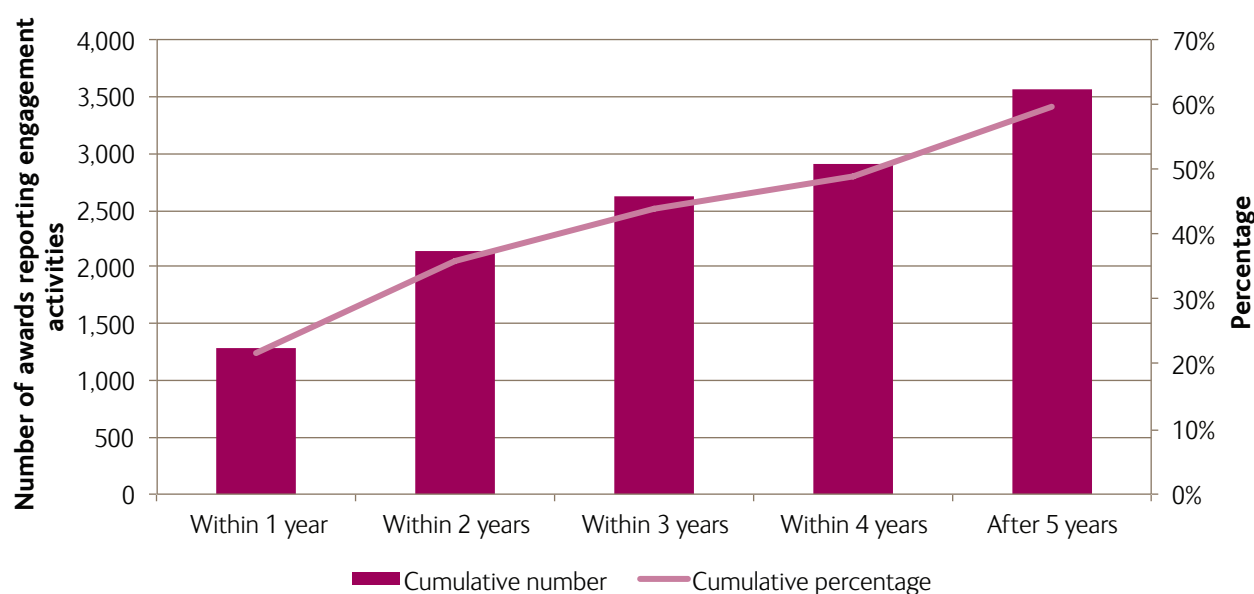


Table 1: Number of awards reporting at least one engagement activity by start year

Year	Number of instances	Number with at least one engagement activity	Number with no engagement activities	Percentage with at least one engagement activity
2006 or earlier	2,059	1,291	768	63%
2007	484	321	163	66%
2008	586	390	196	67%
2009	572	366	206	64%
2010	477	300	177	63%
2011	418	239	179	57%
2012	517	283	234	55%
2013	657	302	355	46%
2014	195	68	127	35%
TOTAL	5,965	3,560	2,405	60%

Figure 2: Number of awards reporting at least one engagement activity by start year**Table 2:** Time between the award starting and engagement activity taking place

First public engagement activity	Number with at least one engagement activity	Cumulative number	Cumulative percentage
Within 1 year	1,294	1,294	22%
Within 2 years	841	2,135	36%
Within 3 years	496	2,631	44%
Within 4 years	285	2,916	49%
After 5 years	644	3,560	60%

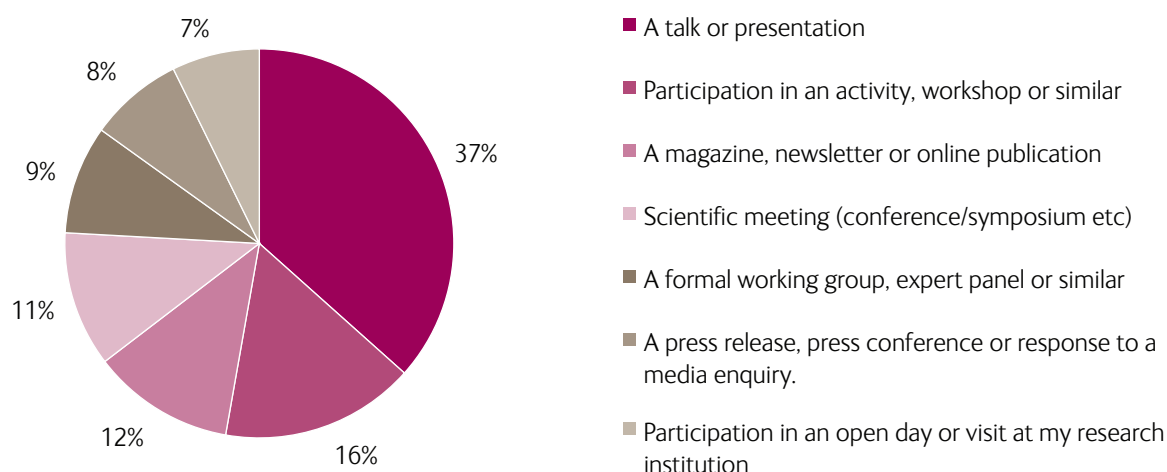
Figure 3: Time between the award starting and engagement activity taking place

Engagement activity by type and audience

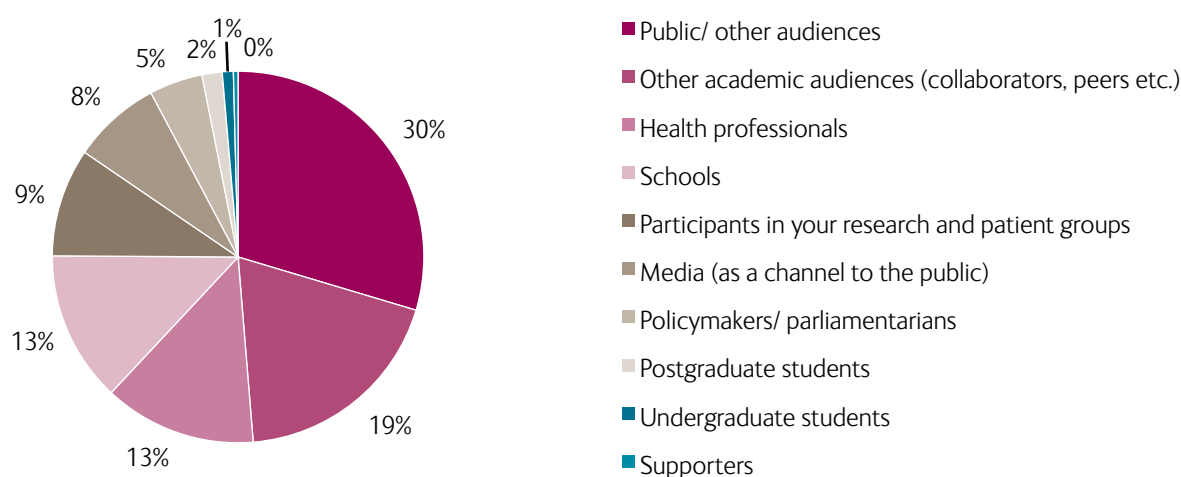
- » Engaging with audiences outside of academia¹² is an important part of the research process. It helps to enhance understanding of complex topics, communicate the importance of research carried out and inspire future careers in science.
- » The most popular method of engagement was a talk or presentation (37 per cent), followed by participation in an activity, workshop or similar (16 per cent). A full breakdown of engagement activities by type is shown in table 3 and figure 4.
- » Around a third of engagement activities were aimed at the public/other audiences (30 per cent), while 13 per cent were aimed at health professionals and 19 per cent at other academic audiences. A more detailed breakdown of engagement activities by audience type is shown in table 4 and figure 5.

Table 3: Engagement activities by type

Engagement activity	Number of instances	Percentage
A talk or presentation	11,009	37%
Participation in an activity, workshop or similar	4,864	16%
A magazine, newsletter or online publication	3,559	12%
Scientific meeting (conference/symposium etc)	3,388	11%
A formal working group, expert panel or similar	2,716	9%
A press release, press conference or response to a media enquiry.	2,347	8%
Participation in an open day or visit at my research institution	2,192	7%
Total	30,075	100%

Figure 4: Engagement activities by type**Table 4:** Engagement activities by audience type

Audience type	Number of instances	Percentage
Public/ other audiences	8,385	30%
Other academic audiences (collaborators, peers etc.)	5,400	19%
Health professionals	3,755	13%
Schools	3,718	13%
Participants in your research and patient groups	2,669	9%
Media (as a channel to the public)	2,181	8%
Policymakers/ parliamentarians	1,315	5%
Postgraduate students	497	2%
Undergraduate students	272	1%
Supporters	114	0%
TOTAL	28,306	100%

Figure 5: Engagement activities by audience type



3.6 Influence on policy

Summary

- » MRC researchers reported 5,017 examples of influences on policy between 2006 and 2014.
- » Influences on policy were reported in more than a fifth (23 per cent) of all awards. In these awards, the average number of influences on policy was three (3.64).

Influences on policy by year

- » A total of 416 policy influences started in 2014. A breakdown of policy influences by year is shown in figure 1.
- » As with other output types, there is naturally a time lag between the award being made and the influence on policy being realised. More than a quarter (26 per cent) of awards made in 2006 or earlier reported at least one policy influence, compared to just eight per cent in 2014. Table 1 and figure 2 show the number of policy influences by award start year.
- » 23 per cent of awards reported at least one policy influence within five years after the award starting, compared to five per cent within one year. Table 2 and figure 3 show the time taken to report the first policy influence.

Figure 1: Policy influence by year realised

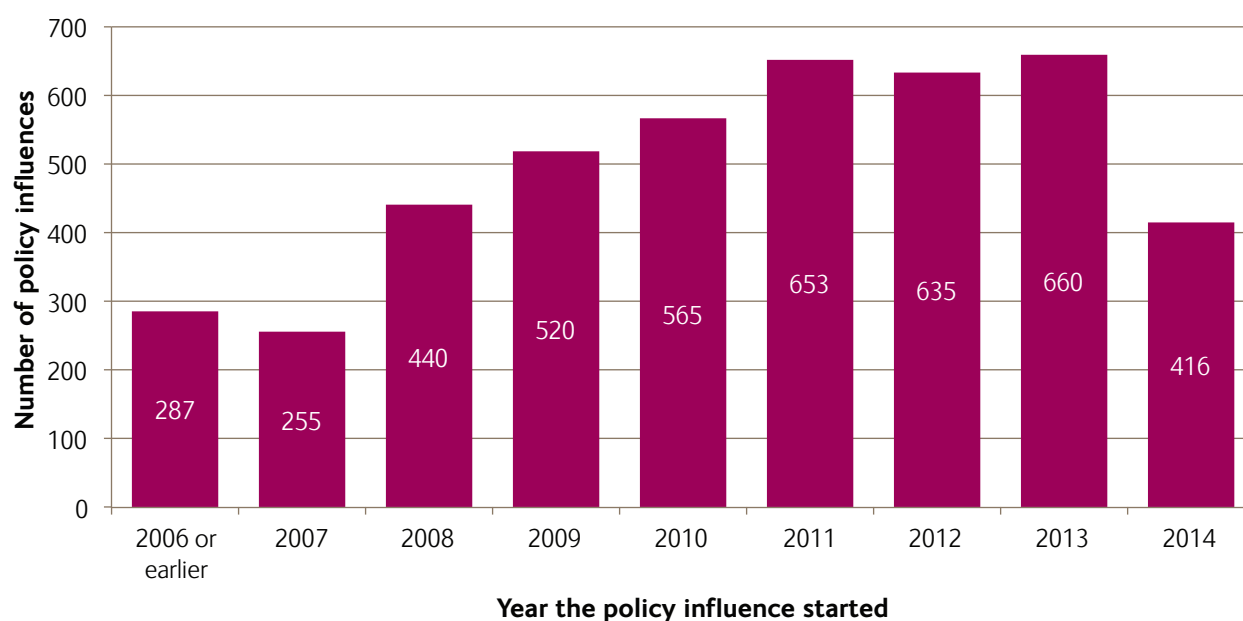
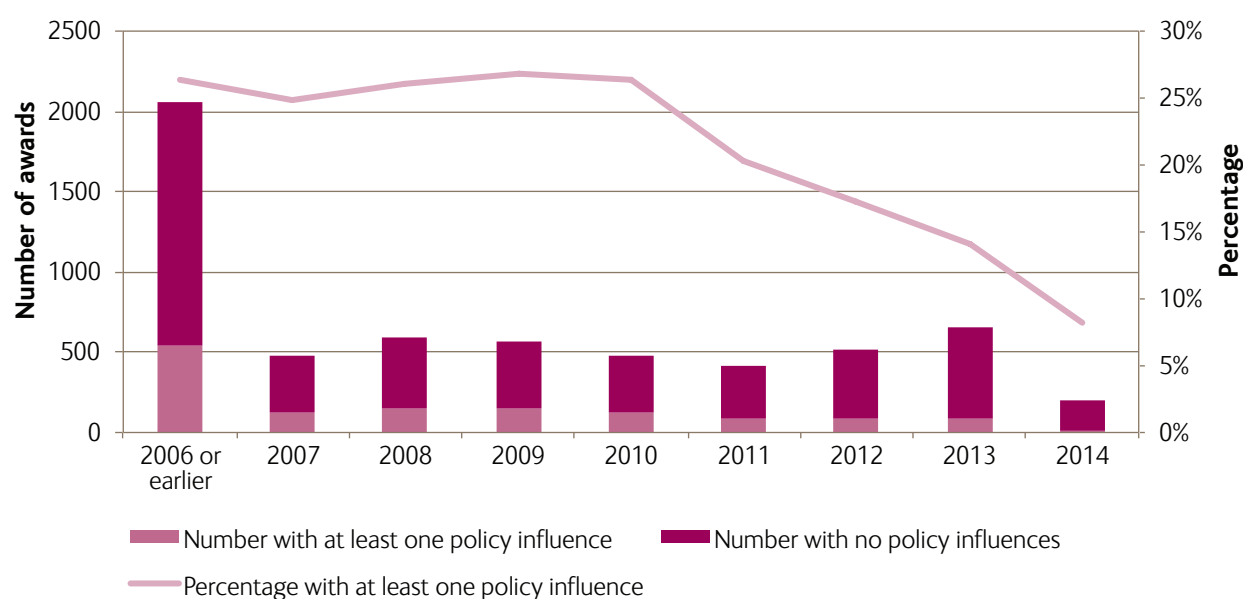
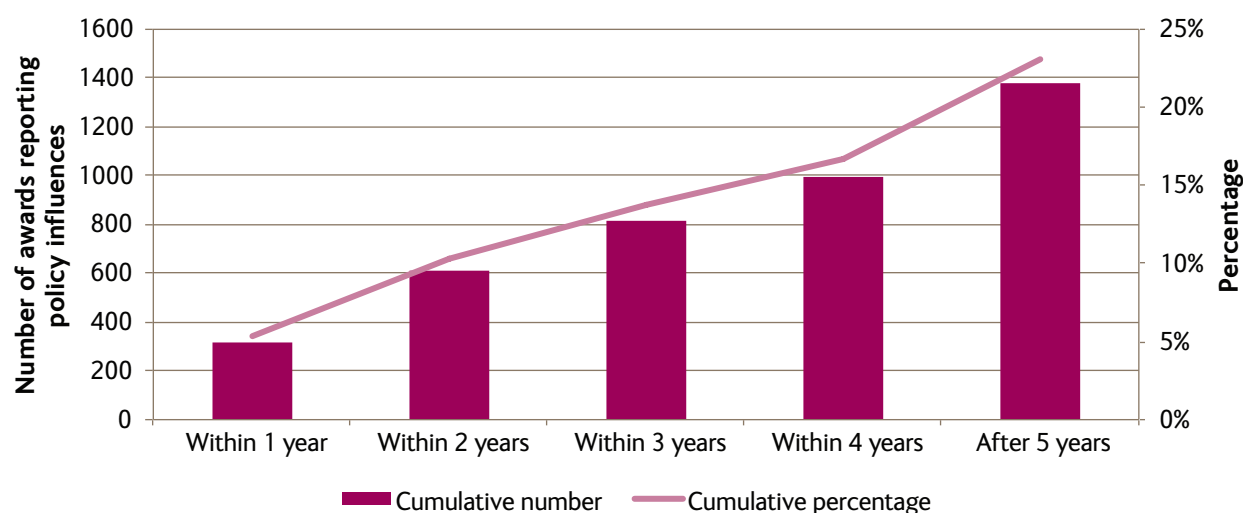


Table 1: Policy influence by award start year

Year	Number of awards	Number with at least one policy influence	Number with no policy influences	Percentage with at least one policy influence
2006 or earlier	2,059	544	1,515	26%
2007	484	120	364	25%
2008	586	153	433	26%
2009	572	153	419	27%
2010	477	126	351	26%
2011	418	85	333	20%
2012	517	89	428	17%
2013	657	92	565	14%
2014	195	16	179	8%
TOTAL	5,965	1,378	4,587	23%

Figure 2: Policy influence by award start year**Table 2:** Time taken to report first policy influence

First instance of policy influence	Number	Cumulative number	Cumulative percentage
Within 1 year	319	319	5%
Within 2 years	295	614	10%
Within 3 years	203	817	14%
Within 4 years	181	998	17%
After 5 years	380	1,378	23%

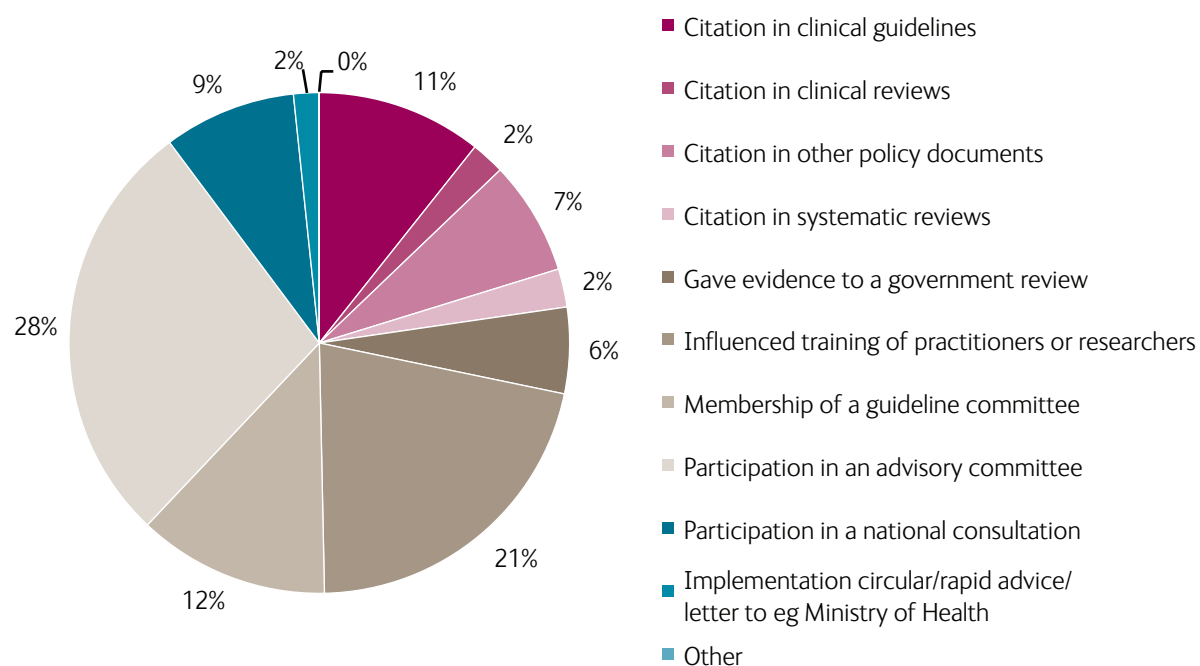
Figure 3: Time taken to report first policy influence

Policy influence by type and location

- » Once unique policy outputs have been identified, the type of policy influence can be divided into citations in key policy documents (1,003/4,419 – 23 per cent of all policy influences) and influences on policy setting processes (3,416/4,419 – 77 per cent).
- » A breakdown of policy influence by type is shown in table 3 and figure 4.
- » Just over half of all policy influences (56 per cent – the sum of UK and UK local/regional only) occurred in the UK. A further 25 per cent of policy outputs had a multiple country/international influence, and the remaining 19 per cent occurred in continental regions outside of the UK. A breakdown of policy influences by location is shown in table 4 and figure 5.

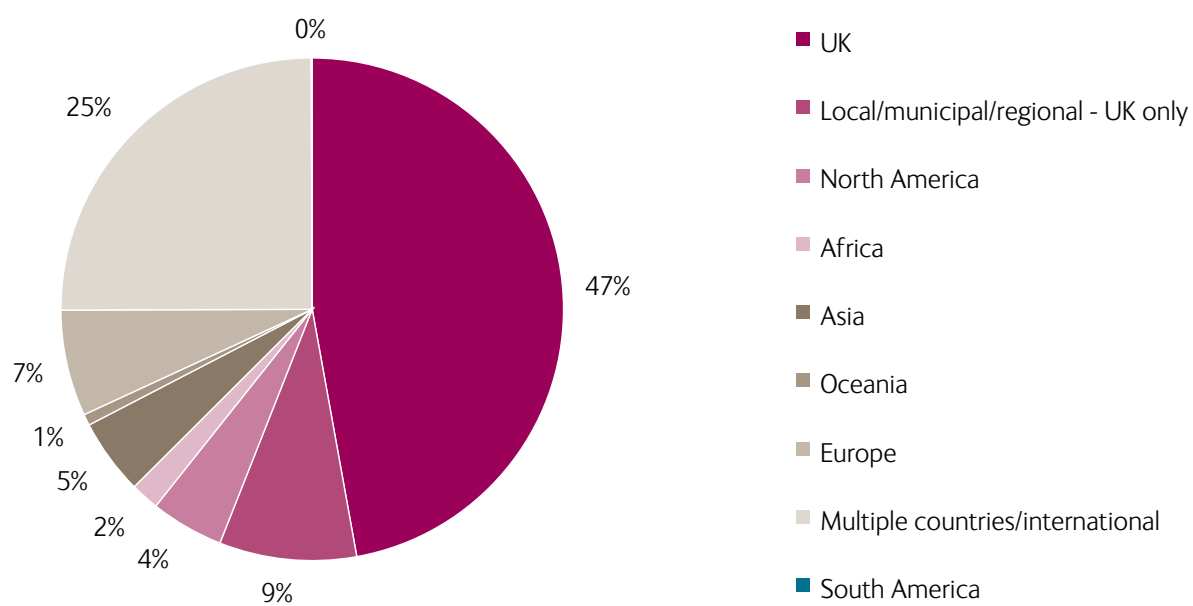
Table 3: Policy influence by type

Influence Type	Number	Percentage
Key policy documents		
Citation in clinical guidelines	472	11%
Citation in clinical reviews	96	2%
Citation in other policy documents	326	7%
Citation in systematic reviews	109	2%
Policy-setting processes		
Gave evidence to a government review	246	6%
Influenced training of practitioners or researchers	946	21%
Membership of a guideline committee	547	12%
Participation in an advisory committee	1,226	28%
Participation in a national consultation	378	9%
Implementation circular/rapid advice/letter	72	2%
Other	1	0%
TOTAL	4,419	100%

Figure 4: Policy influence by type**Table 4: Policy influence by location**

Location of policy influence	Number	Percentage
UK	2,084	47%
Local/municipal/regional - UK only	390	9%
North America	208	5%
Africa	81	2%
Asia	215	5%
Oceania	32	1%
Europe	302	7%
Multiple countries/international	1,104	25%
South America	3	0%
TOTAL	4,419	100%

Figure 5: Policy influence by location





3.7 Research materials – tools and methods, databases and models

Summary

- » researchfish® subdivides research materials into two categories; 'research tools and methods' and 'research databases and models'.
- » Recipients of 1,682 (28 per cent of total) awards reported that their work had produced research tools or methods for others to use. Research databases or models were reported in 150 (three per cent of total) awards.
- » The average number of research tools and methods for awards reporting at least one instance was two (2.3). Of the 209 reports of research databases and models, the average number reported per award was one (1.39).

Research tools and methods by year

- » Between 2006 and 2014, 3,839 reports of research tools or methods have been made. The year when the research tools and methods were first made available is shown in figure 1.
- » The longer that an award has been running, the greater number of opportunities there are to create and share research materials. 40 per cent of awards starting in 2006 or earlier resulted in the production of a research tool or method, compared to five per cent of awards starting in 2014. Table 1 and figure 2 show the number of materials reported by award start year.
- » 28 per cent of awards reported at least one research tool or method within five years¹³, compared to just five per cent within one year. Table 2 and figure 3 show the time taken to report the first research tool or method.

Figure 1: Distribution of when the research tool or method was first made available

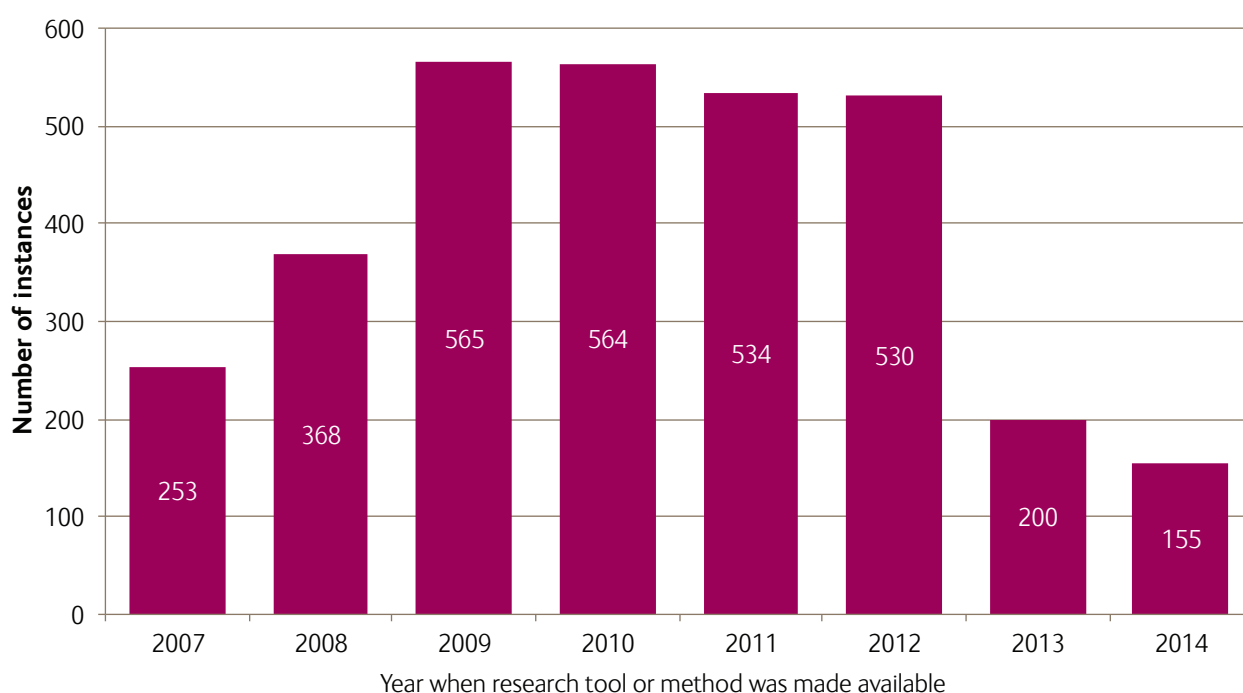
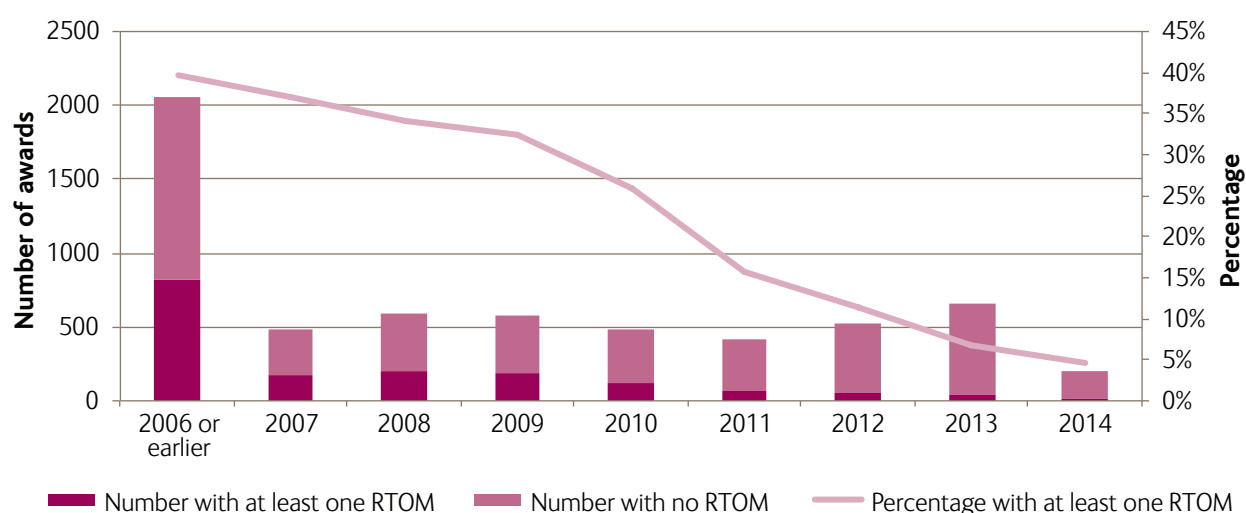
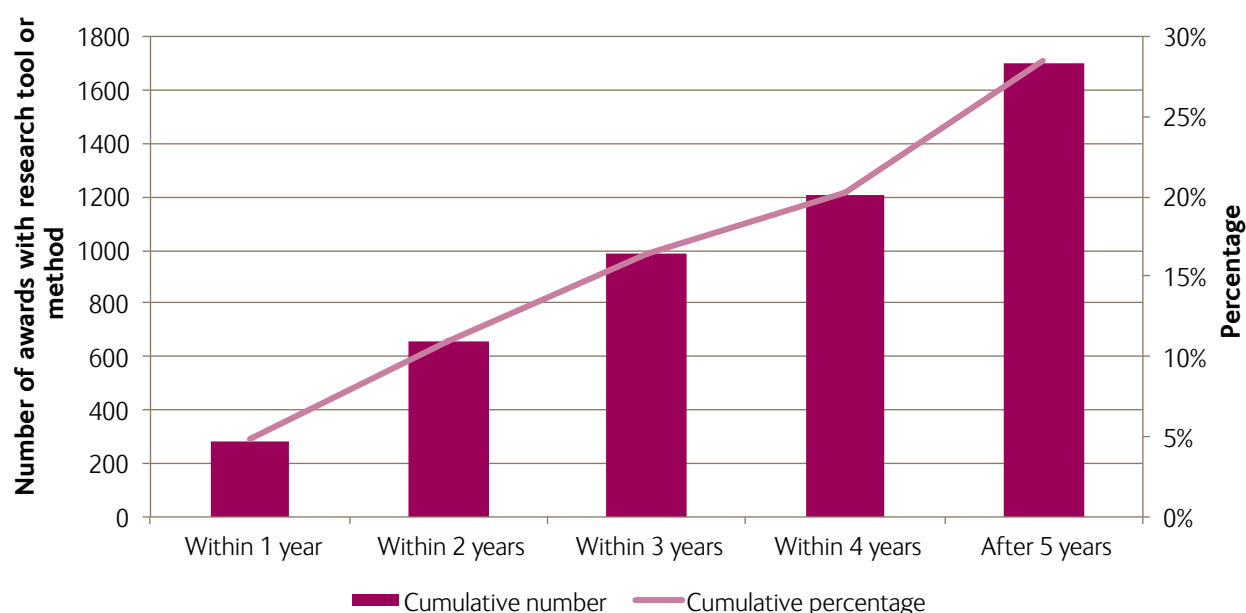


Table 1: Research materials by award start year

Year research tool or method first available	Number of awards	Number with at least one research tool or method	Number with no research tool or method	Percentage with at least one research tool or method
2006 or earlier	2,059	818	1,241	40%
2007	484	179	305	37%
2008	586	200	386	34%
2009	572	185	387	32%
2010	477	124	353	26%
2011	418	66	352	16%
2012	517	59	458	11%
2013	657	45	612	7%
2014	195	9	186	5%
TOTAL	5,965	1,685	4,280	28%

Figure 2: Research tools and methods (RTOM) by award start year**Table 2:** Time taken to report the first research tool or method

Research tool or method first available	Number reporting at least one research tool or method	Cumulative number	Cumulative percentage
Within 1 year	287	286	5%
Within 2 years	370	657	11%
Within 3 years	320	983	16%
Within 4 years	220	1,205	20%
After 5 years	488	1,698	28%

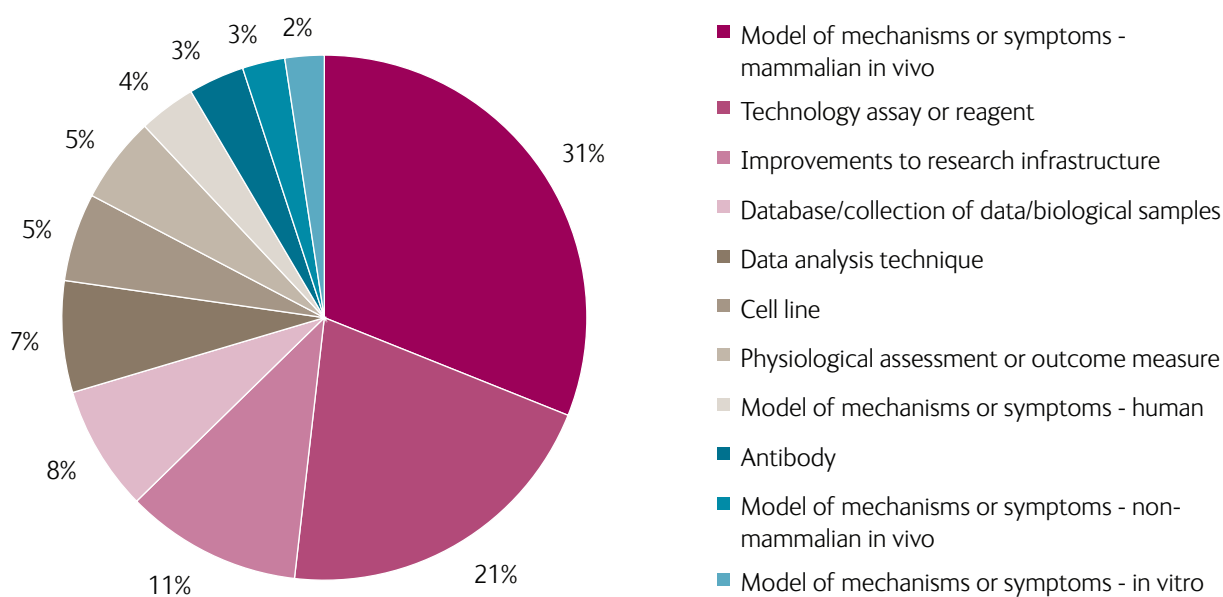
Figure 3: Time taken to report the first research material

Research tool or method by type

- » Models of mechanisms or symptoms – non-mammalian in vivo were the most common type of research tool or method reported (28 per cent), followed by database/collection of data/biological samples (19 per cent). Table 3 and figure 4 show a breakdown of the type of research tool or method reported.

Table 3: Research tool or method by type

Type of research tool or method	Number	Percentage
Model of mechanisms or symptoms - mammalian in vivo	1,018	31%
Technology assay or reagent	680	21%
Improvements to research infrastructure	356	11%
Database/collection of data/biological samples	253	8%
Data analysis technique	225	7%
Cell line	178	5%
Physiological assessment or outcome measure	174	5%
Model of mechanisms or symptoms - human	115	4%
Antibody	113	3%
Model of mechanisms or symptoms - non-mammalian in vivo	86	3%
Model of mechanisms or symptoms - in vitro	79	2%
TOTAL	3,277	100%

Figure 4: Research tool or method by type

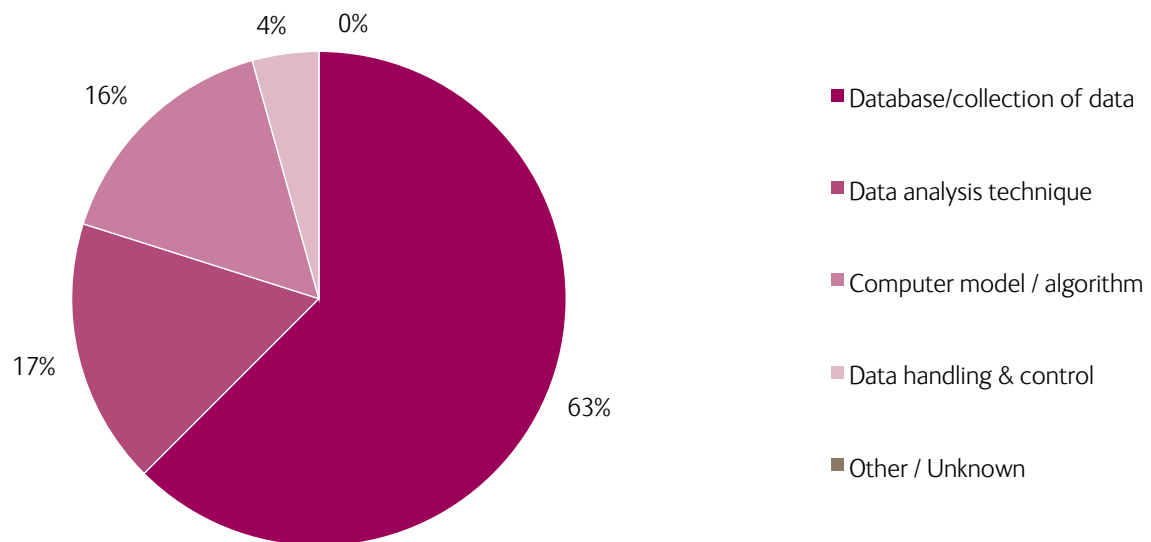
Research database or model by type

- » Database/collection of data were the most common type of research database or model reported (63 per cent), followed by data analysis technique (17 per cent). Table 4 and figure 5 show a breakdown of the type of research database or model reported.

Table 4: Research tool or method by type

Type of research database or model	Number of instances	Percentage
Database/collection of data	115	63%
Data analysis technique	32	17%
Computer model/algorithm	29	16%
Data handling and control	8	4%
Other /unknown	0	0%
TOTAL	184	100%

Figure 5: Research database or model by type





3.8 Intellectual property

Summary

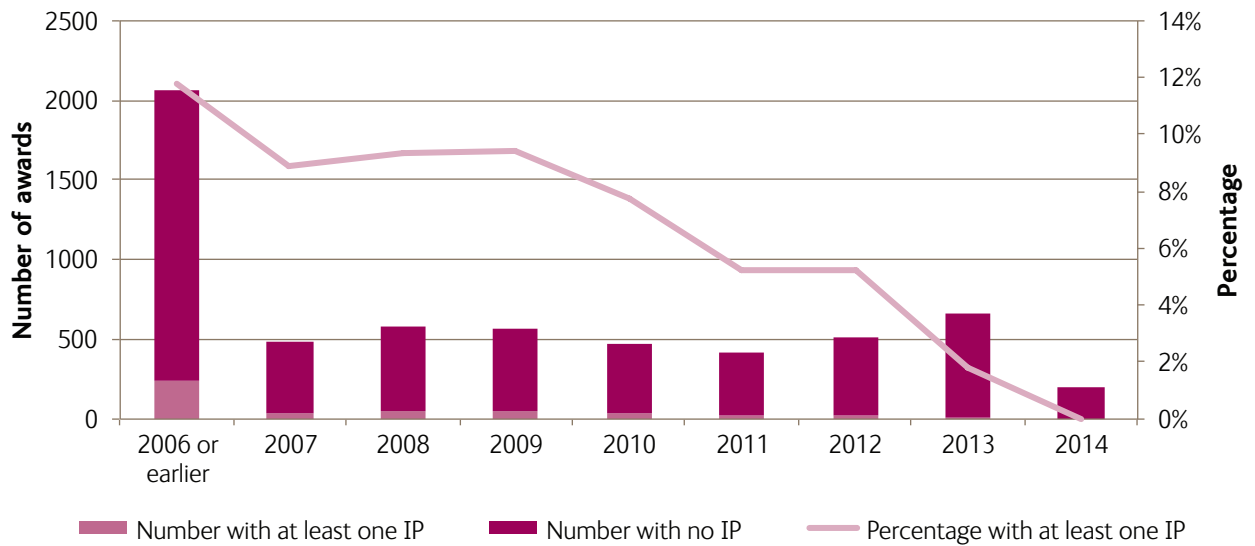
- » The MRC dataset contains details of 1,213 discoveries in the intellectual property section. These include 83 reports of copyrighted works, 309 reports of discoveries for which formal protection was not possible or required, and 661 reports relating to published and granted patents.

Intellectual property by year

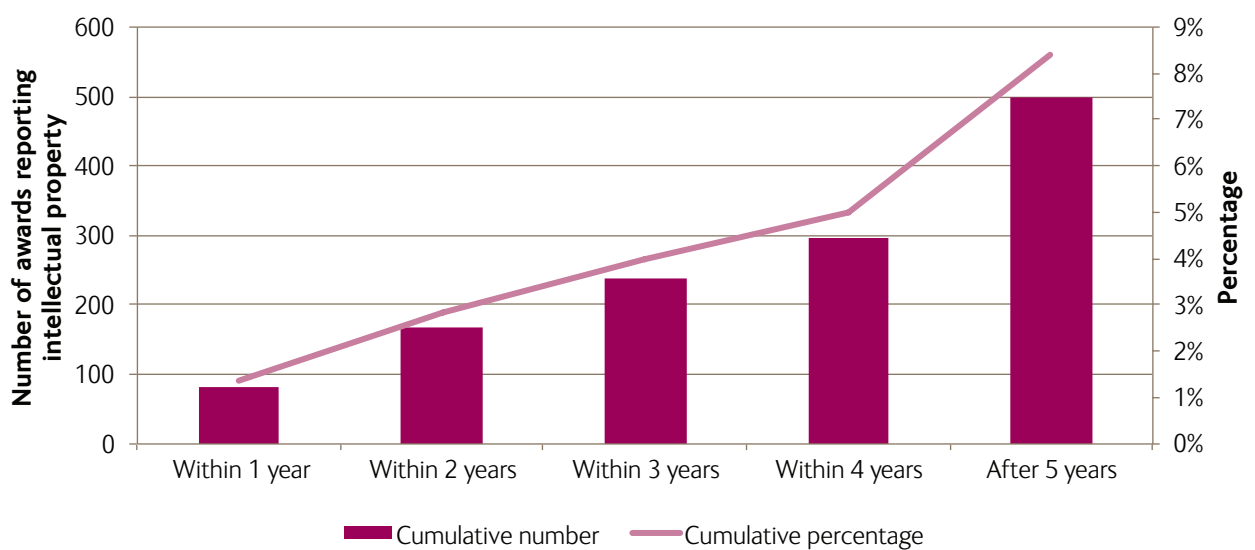
- » Creating intellectual property can take a long time and therefore the longer that an award has been running for, the greater number of opportunities there are to create a patentable idea. 12 per cent of awards starting in 2006 or earlier reported at least one item of intellectual property, compared to two per cent of awards starting in 2013 and none from awards starting in 2014. Table 1 and figure 1 show the distribution of awards by start date and whether they have reported at least one item of intellectual property.
- » Eight per cent of awards reported at least one instance of intellectual property after five years¹⁴, compared to one per cent within one year. Table 2 and figure 2 show the time taken to report the first instance of intellectual property. In future analyses we will look to see if this elapsed time is different across the different 'types' of intellectual property.
- » Supplemental analyses will be added in future to examine the way in which publicly-funded research is cited in these patents and the organisations that are noted as applicants on the patents.

Table 1: Intellectual Property by award start date

Year	Number of awards	Number with at least one IP	Number with no IP	Percentage with at least one IP
2006 or earlier	2,059	243	1,816	12%
2007	484	43	441	9%
2008	586	55	531	9%
2009	572	54	518	9%
2010	477	37	440	8%
2011	418	22	396	5%
2012	517	27	490	5%
2013	657	12	645	2%
2014	195	0	195	0%
TOTAL	5,965	493	5,472	8%

Figure 1: Intellectual Property by award start date**Table 2:** Time taken to report the first instance of intellectual property

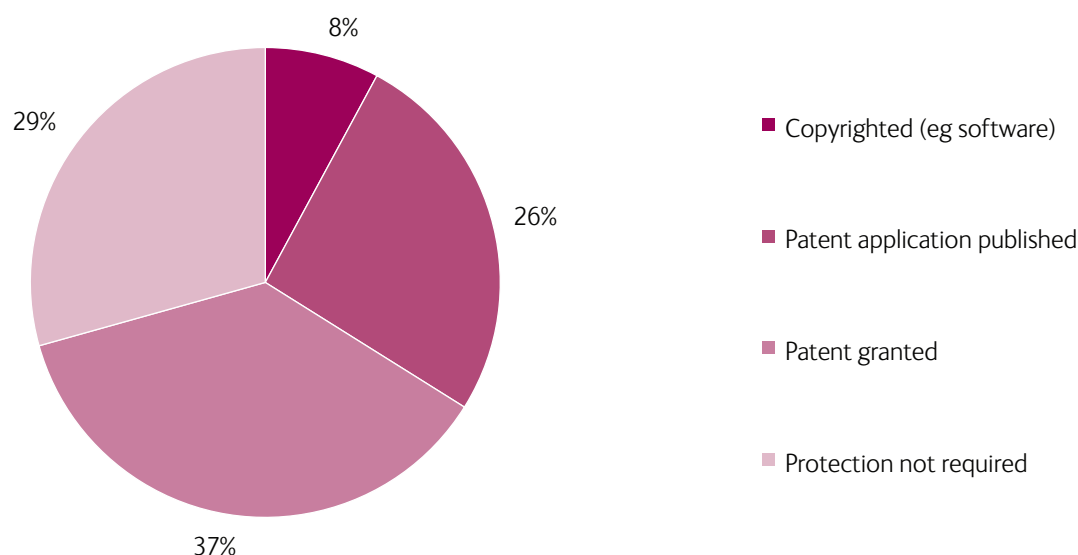
First instance of intellectual property	Number of instances	Cumulative number	Cumulative percentage
Within 1 year	80	81	1%
Within 2 years	88	168	3%
Within 3 years	68	237	4%
Within 4 years	57	297	5%
After 5 years	200	500	8%

Figure 2: Time taken to report the first instance of intellectual property

Intellectual property protection by type

- » 37 per cent of reports in this section concerned a granted patent. Figure 3 gives a breakdown of the type of intellectual property reported.

Figure 3: Type of intellectual property protection reported

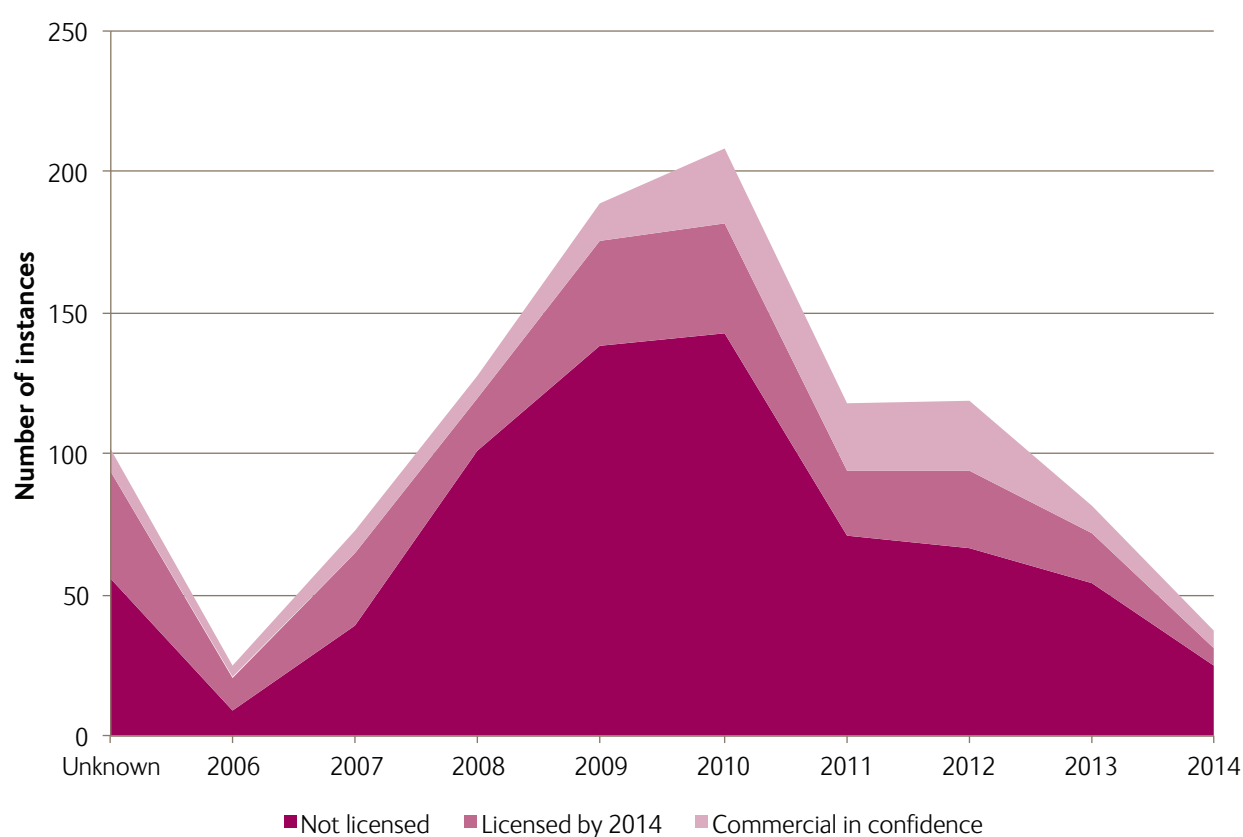


Licensing of intellectual property

- » 23 per cent of discoveries overall (246/1,081) were reported as 'licensed' by 2014. This is similar to the proportions reported in the last two years, and in our previous report from 2010, we suggested that this seemed reasonable in light of similar data from other organisations¹⁵.
- » 12 per cent of intellectual property was reported as 'commercial in confidence' so no details could be provided (132/1,081); it would be reasonable to assume that some of these cases will translate into new licenses in due course.
- » The license status of intellectual property in 2014 by the year protection was granted is shown in table 3 and figure 4.

Table 3: License status of intellectual property in 2014 by year of protection

Year	Patent status			TOTAL
	Not licensed	Licensed by 2014	Commercial in confidence	
Unknown	56	38	8	102
2006	9	12	4	25
2007	39	26	8	73
2008	101	19	8	128
2009	138	38	13	189
2010	143	39	26	208
2011	71	23	24	118
2012	67	27	25	119
2013	54	18	10	82
2014	25	6	6	37
TOTAL	703	246	132	1,081

Figure 4: License status of intellectual property in 2014 by year of protection



3.9 Products and interventions

Summary

- » Researchers reported that their work had led to the development of 1,254 medical products or interventions. This type of output was linked to 12 per cent of awards (740/5,984). The average number of medical products and interventions reported per award (of those awards reporting products or interventions) was two (1.69).
- » From 2014, researchfish® also provides researchers with the opportunity to report separately on software and technical products and artistic and creative products. In total, MRC-funded researchers reported 35 software and technical products (from 16 awards) and 112 artistic and creative products (from 68 awards).
- » As can be seen in the chapter on case studies drawn from this section, this is particularly important information with regards to research outcomes. We know from telephone surveys of MRC principal investigators that there is significant under-reporting of the developments arising from MRC research in this section, and so will be working to improve reporting in this area. A targeted effort to capture the details of trials linked to MRC research, which should be reported in this section, brought excellent results with more than 200 trials now linked to MRC research.

Medical products and interventions by type

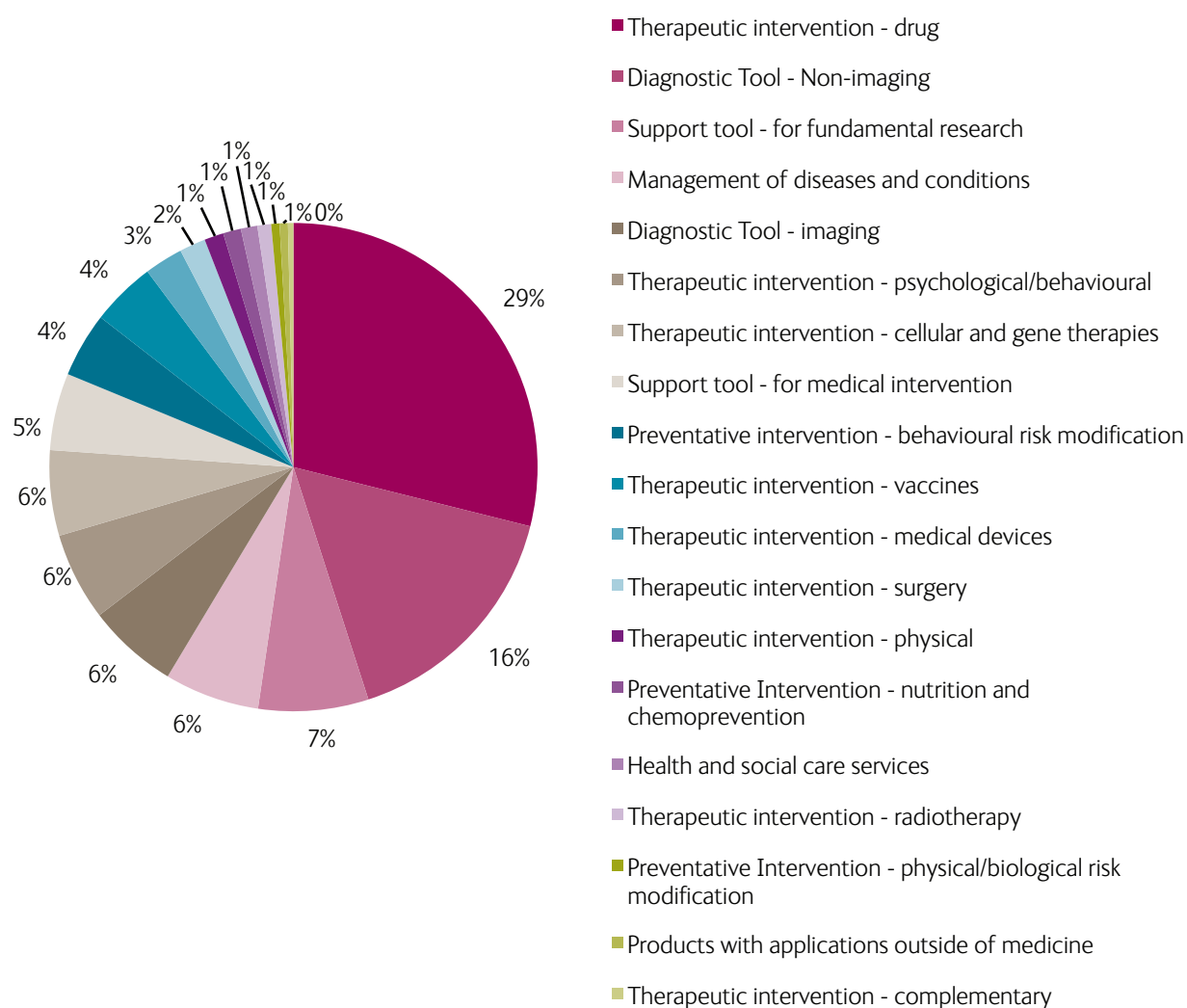
- » The most common type of medical product or intervention in development was 'Therapeutic Intervention – Drug', reported by 319 awards (29 per cent of all products and interventions reported). This was closely followed by the Diagnostic Tool – non-imaging, reported by 177 awards (16 per cent of all products and interventions). The breakdown of products and interventions by type is shown in table 1 and figure 1.

Table 1: Breakdown of medical products and interventions by type

Product type	Number of instances	Percentage
Therapeutic intervention - drug	317	29%
Diagnostic Tool - Non-imaging	177	16%
Support tool - for fundamental research	80	7%
Management of diseases and conditions	69	6%
Diagnostic Tool - imaging	66	6%
Therapeutic intervention - psychological/behavioural	64	6%
Therapeutic intervention - cellular and gene therapies	62	6%
Support tool - for medical intervention	56	5%
Preventative intervention - behavioural risk modification	47	4%
Therapeutic intervention - vaccines	47	4%
Therapeutic intervention - medical devices	28	3%
Therapeutic intervention - surgery	19	2%
Therapeutic intervention - physical	14	1%

Product type	Number of instances	Percentage
Preventative Intervention - nutrition and chemoprevention	13	1%
Health and social care services	12	1%
Therapeutic intervention - radiotherapy	10	1%
Preventative Intervention - physical/biological risk modification	6	1%
Products with applications outside of medicine	6	1%
Therapeutic intervention - complementary	4	0%
TOTAL	1,097	100%

Figure 1: Breakdown of medical products and interventions by type



Medical products and interventions by development stage

- » A total of 144 awards reported medical products and interventions as being launched onto the market since 2006, with a further 23 awards reporting products and interventions currently undergoing the process of market authorisation.
- » There were 359 reports of medical products and interventions in early- or late-stage clinical evaluation demonstrating the strengthening pipeline of developments supported via the MRC's investment in experimental medicine.
- » There were 567 reports of medical products in initial or refinement stages, demonstrating the strength of the MRC's investment in discovery and translational science. The inclusion of DPFS projects in 2011 has significantly added to the number of projects in early developmental stages.
- » Table 2 and figure 2 show the distribution of medical products and interventions by development stage. Figure 3 shows the distribution of medical products and interventions by type and development stage.

Table 2: Medical products and interventions by development stage

Product development stage	Number of instances	Percentage
Initial development	343	31%
Refinement, non-clinical	126	12%
Refinement, clinical	98	9%
Early clinical assessment	231	21%
Late clinical evaluation	128	12%
Market authorisation	23	2%
Small-scale adoption	80	7%
Wide-scale adoption	64	6%
Total	1,093	100%

Figure 2: Medical products and interventions by development stage

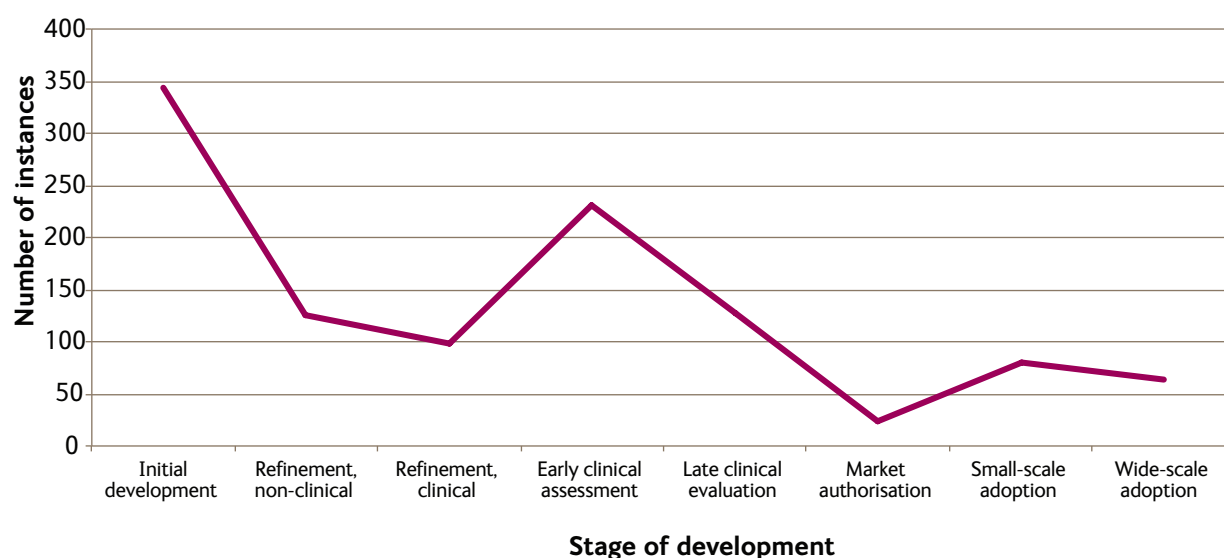
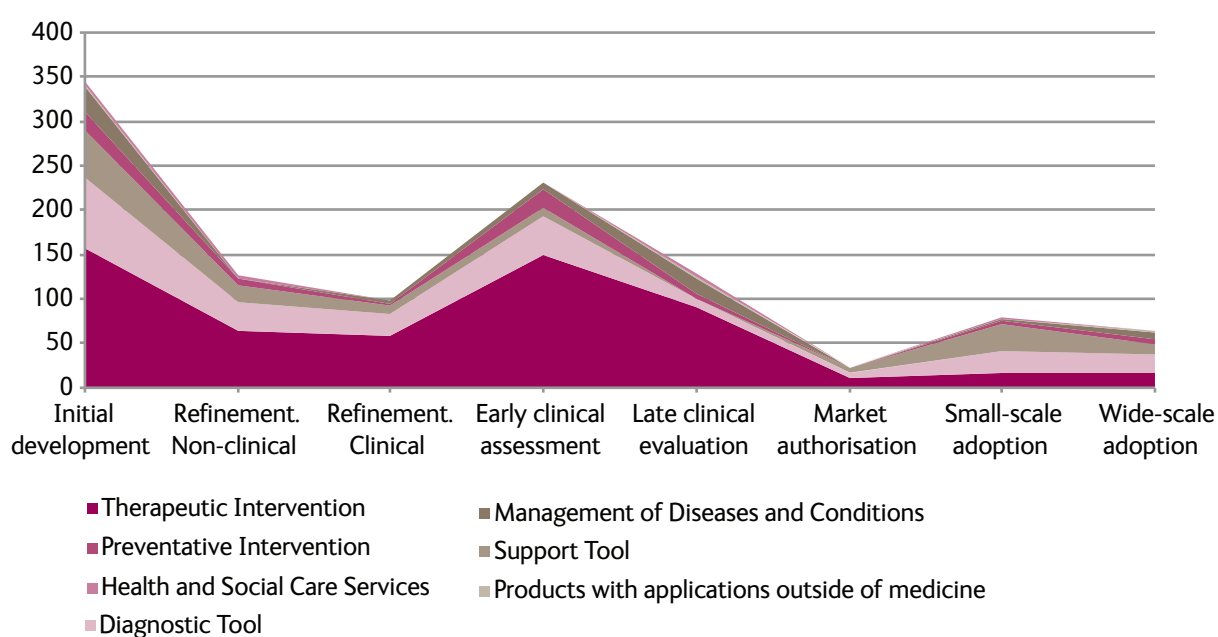


Table 3: Distribution of medical products and interventions by development stage and type

Product Development Stage	Therapeutic Intervention	Diagnostic Tool	Support Tool	Preventative Intervention	Management of Diseases and Conditions	Products with applications outside of medicine	Health and Social Care Services	Total	%
Initial development	158	79	54	20	28	3	3	345	31%
Refinement. Non-clinical	64	33	19	7	0	0	3	126	11%
Refinement. Clinical	59	25	8	2	4	0	0	98	9%
Early clinical assessment	150	43	9	22	8	0	0	232	21%
Late clinical evaluation	90	10	1	5	17	1	4	128	12%
Market authorisation	11	6	5	0	1	0	0	23	2%
Small-scale adoption	16	26	29	5	2	0	2	80	7%
Wide-scale adoption	17	21	11	5	8	2	0	64	6%
Total	568	243	136	66	69	6	12	1100	
%	52%	22%	12%	6%	6%	1%	1%		

Figure 3: Distribution of medical products and interventions by development stage and type

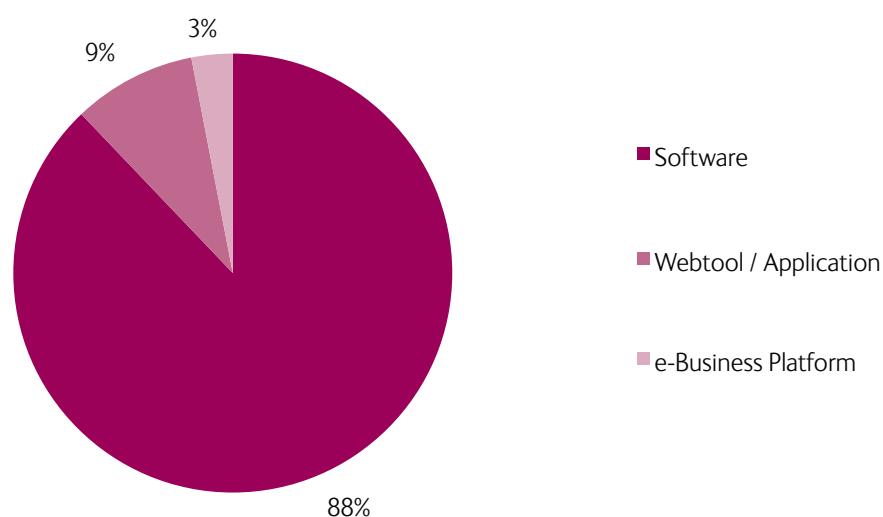
Software and technical products by type

- » The most common type of software or technical product reported was 'Software' (88 per cent of total). The breakdown of software/technical material by type is shown in table 3 and figure 4.

Table 3: Breakdown of software and technical product by type

Type of software and technical product	Number of instances	Percentage
Software	29	88%
Webtool/application	3	9%
e-Business platform	1	3%
TOTAL	33	100%

Figure 4: Breakdown of software and technical product by type

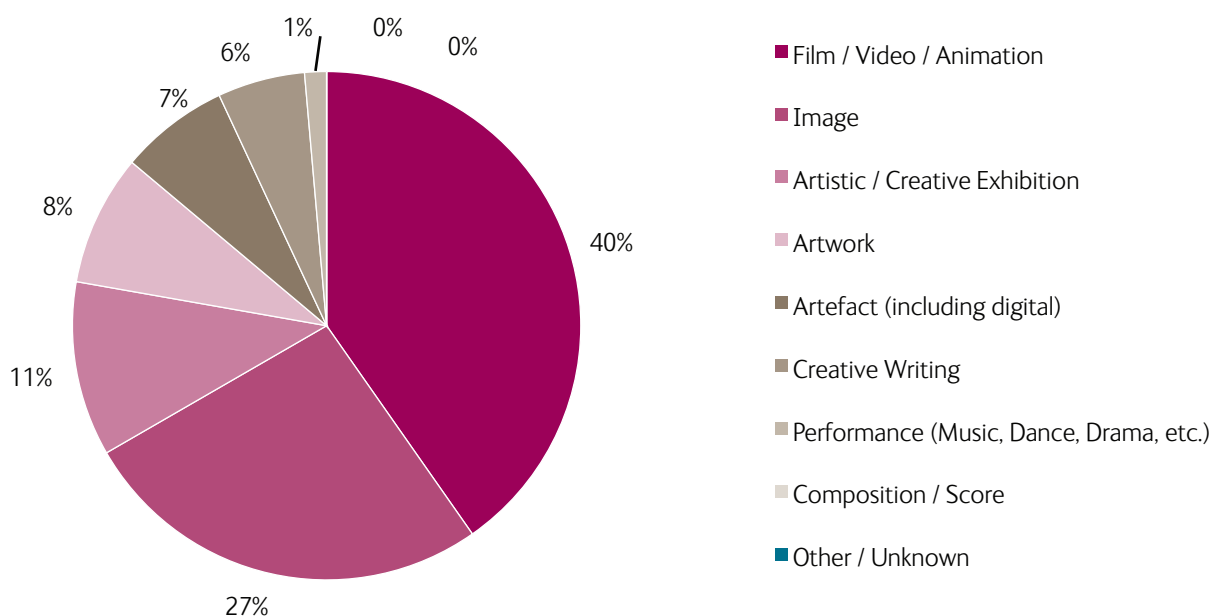


Artistic and creative products by type

- » The most common type of artistic or creative product was 'Film/Video/Animation', (40 per cent of total reported). The breakdown of artistic and creative products by type is shown in table 4 and figure 5.

Table 4: Breakdown of artistic and creative product by type

Type of artistic and creative product	Number of instances	Percentage
Film/video /animation	29	40%
Image	19	26%
Artistic/creative exhibition	8	11%
Artwork	6	8%
Artefact (including digital)	5	7%
Creative writing	4	6%
Performance (music, dance, drama, etc.)	1	1%
Composition/score	0	0%
Other/unknown	0	0%
TOTAL	72	100%

Figure 5: Breakdown of artistic or creative product by type



3.10 Awards and recognition

Summary

- » Recipients of 52 per cent of awards reported that their work had resulted in formal recognition or award for them personally or members of their team.
- » The average number of reports per award (of those reporting recognition) was seven (6.70).
- » In total, researchers made 20,790 reports in this section; a large increase on last year's figure of 16,317.

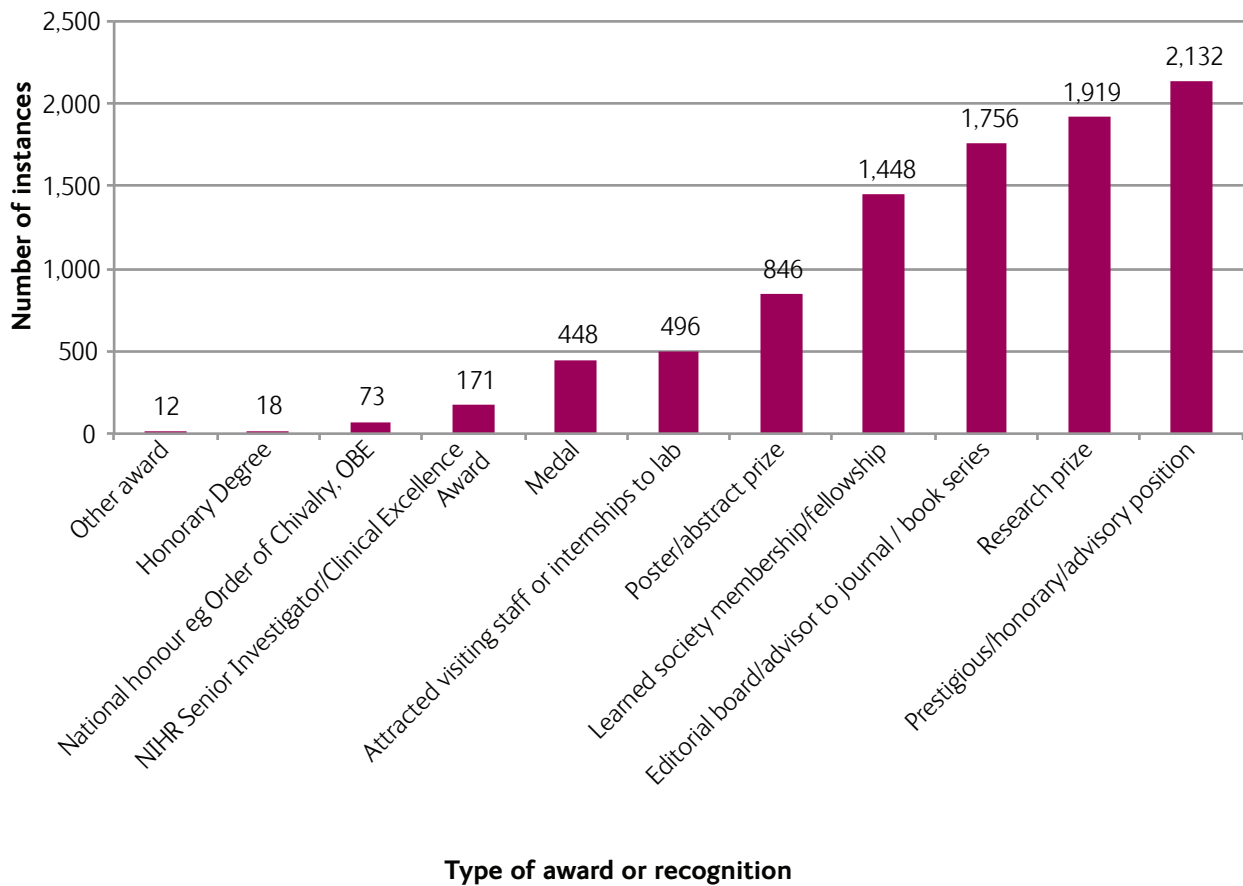
Awards and recognition by type

- » The most common form of award or recognition was being personally invited as a speaker at a conference (46 per cent), followed by being appointed to a prestigious/honorary/advisory position to an external body (12 per cent) and appointed to the editorial board of, or as an advisor to, a journal or book series (11 per cent).
- » Table 1 and figure 1 show the distribution of types of award and recognition.

Table 1: Awards and recognition by type

Type of awards and recognition	Number of instances	Percentage of total
Personally invited as speaker at a conference	7,856	46%
Prestigious/honorary/advisory position to an external body	2,132	12%
Research prize	1,919	11%
Appointed to the editorial board of, or advisor to, a journal or book series	1,756	10%
Awarded honorary membership, or a fellowship, of a learned society	1,448	8%
Poster/abstract prize	846	5%
Attracted visiting staff or internships to laboratory	496	3%
Medal	448	3%
NIHR Senior Investigator/Clinical Excellence Award	171	1%
National honour eg Order of Chivalry, OBE	73	0%
Honorary Degree	18	0%
Other award	12	0%
Total	17,175	100%

Figure 1: Distribution of type of award and recognition



Key to output types



Publications



Collaborations and partnerships



Further funding



Next destination and skills



Engagement activities



Influence on policy, practice, patients
and the public



Research tools and methods



Research databases and models



Intellectual Property and licensing



Medical products, interventions and
clinical trials



Artistic and creative products



Software and technical products



Spin outs



Awards and recognition

End Notes

1. All primary, peer-reviewed publications that were published in refereed journals from 01.01.06 onwards, in which the PI or members of their research group were named as authors.
2. Where more than one award claims to have contributed to a publication, each is credited equally. This means that several thousand publications are counted multiple times.
3. Researchers reporting a collaboration via researchfish® can list any number of partner organisations as party to that collaboration. For the purposes of this summary analysis all partners across all collaborations are referred to as 'collaborators' linked to an award. So if two collaborations, each involving two partner organisations, are attributed to an MRC award, it is noted that four 'collaborators' are linked to this award.
4. In this analysis, the occurrence of non-unique collaborators from different locations is counted, so for example, if three MRC researchers indicated that they collaborated with the same partner in North America, this would be counted three times. Collaborators with more than one location, for example, the United Nations, or multi-national companies, are categorised as 'global'.
5. Each map has a number of circles and each circle's size represents the number of non-unique collaborators reported with each particular country. Global collaborations are also listed and the scale is noted.
6. Circles are centred around the countries' capital cities.
7. Circles are centred around the countries' capital cities.
8. This is the estimated expenditure of further funding during the time frame of researchfish®, rather than a reported commitment of further funding. Estimates of expenditure are based on the assumption that the spending is distributed evenly over the period reported. For example, if a researcher reported £100k of funding from 1 December 2012 until 1 December 2014, it is estimated that 50 per cent of this award or £50k will have been spent in the period covered by the 2013 data-gathering period.
9. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf
10. Reported in researchfish®.
11. Researchers are advised to report any recurring activities only once.
12. researchfish® is a federated system with all subscribing funders able to contribute to development of the question set. The range of options in this section changed in 2012 to include activities where the audience was primarily academic although MRC researchers were advised to continue to prioritise the reporting of activities that included engagement outside of academia. In table 3 it can be seen that despite this, more than 3,000 reports of scientific meetings were added by MRC researchers to this section.
13. The time between the start of the award and the influence being reported.
14. The time between the start of the award and the intellectual property being reported.
15. A study of more than 1,200 patents published by the University of California and the University of Columbia in all disciplines between 1980 and 1994 found that 41 per cent of these were licensed by 1992. A similar study of 686 patents published by the Memorial Sloan-Kettering Cancer Centre and Dana Faber Cancer Institute between 1983 and 2003, also found that 41 per cent of these were licensed by 2007. Other studies have indicated a lower proportion of patents licensed (for example, 25 per cent of NASA patents published between 1994 and 2002 were licensed by 2007).

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