

ABPI industry-academic links survey results 2017



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Blog: Driving innovation through scientific collaboration

Malcolm Skingle CBE Director of Academic Liaison GSK and Chair of the ABPI Academic Liaison Expert Network

The UK pharmaceutical industry interacts with academia on multiple levels, from hosting undergraduate placements and PhD studentships to innovative collaborative projects involving large numbers of individuals. The Association of the British Pharmaceutical Industry (ABPI) has collected data on links between industry and academia every two years since 2003. This report presents the latest data on industry-academic links and compares it to previously collected data.

It is encouraging to see the number of apprenticeships in the pharmaceutical industry continue to grow, with a particular increase in the undertaking of higher-level apprenticeships of several years in duration. These apprenticeships provide expert training in a range of technical areas, holding a high gross value-added level and contribution to the national economy. Additionally, the growth in IT apprenticeships and undergraduate placements is important in helping to fill the skills gap in mathematical and computational abilities opened by the rise of digital data analytics in the industry.

Partnerships between industry, academia, charities and the NHS have led to the development of many innovative projects, from large-scale consortia involving several companies and universities, to specific funding agreements between individual organisations. These collaborations, such as the Division of Signal Transduction at Dundee, involve the high-level exchange of knowledge and people, which catalyses the performance of world-leading research.

The importance of the life sciences was highlighted by the Government's industrial strategy, and it is crucial that we fully exploit the inherent potential this sector holds in order to anchor the UK as a global hub of research and innovation. Links between industry and academia are fundamental to this goal, and with the upcoming departure of the UK from the European Union, increasing collaboration is imperative to further developing the UK science base as a whole.

Links between industry and academia

The UK is recognised worldwide as a leader in medical research and innovation, and the foundations for collaborations between industry and academia in the UK are exceptionally strong. The quality of the UK's scientific research institutions is ranked as the second best in the world,² while the UK pharmaceutical industry consistently ranks as the leading sector in the UK for R&D spending.¹

The evidence for the industry-academia relationship is encouraging, with the pharmaceutical industry and academia collaborating on over 16,000 publications between 2006 and 2015;³ seven of the top 15 companies for collaborative projects in the UK are found within the pharmaceutical industry.⁴

The publication of the UK Government's industrial strategy highlights the importance of the life sciences, with the aim of building the industry into 'a global hub that makes the UK the home of clinical research and medical innovation' supported through collaborations of academia, industry, the NHS and funding bodies, particularly through the announced Health Advanced Research Programme (HARP).^{5, 6, 7}

As a highly valuable two-way exchange of information, the benefits of collaboration are strong for all parties involved. Companies can access the forefront of scientific understanding through working with leading academics and are able to set specific objectives to match particular company needs at the time.

Additionally, industry is able to interact with a highly-skilled graduate pool, enhancing the efficiency of medicine development. The value that the industry-academia relationship can bring is well recognised, with some companies employing individual project management staff specifically operating on collaboration projects with individual universities.

For academics, the opportunity of exposure to cutting-edge facilities and resources is a natural attraction to working alongside companies, as well as the inherent networking and funding opportunities that industry provides. At the centre of these collaborations are patients, who benefit from this high-level knowledge exchange through greater access to novel therapeutics, and through direct involvement in certain projects, such as patient biobanks.

[Click on the links below to see up-to-date stats on industry-academic links.](#)

1. Business enterprise research and development, UK: 2016, Office for National Statistics, 2017. Available from: <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/businessenterpriseresearchanddevelopment/2016>
2. The Global Competitiveness Report, 2017-2018, World Economic Forum, 2017. Available from: <http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf>
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5. Industrial Strategy: building a Britain fit for the future, Department for Business, Energy & Industrial Strategy (BEIS), 2017. Available from: <https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>
6. Life sciences: industrial strategy, Office for Life Sciences, 2017. Available from: <https://www.gov.uk/government/publications/life-sciences-industrial-strategy>
7. Industrial Strategy: Life Sciences Sector Deal, Department for Business, Energy & Industrial Strategy and Office for Life Sciences, 2017. Available from: <https://www.gov.uk/government/publications/life-sciences-sector-deal>

About the 2017 ABPI industry-academia links survey

Now in its eighth iteration, the ABPI industry-academic links survey captures vital information from member companies on their interactions with the academic sector, from undergraduate placements to large-scale collaborative projects which bring together industry, academia, charities and the NHS. Interactions are not solely limited to R&D: there is a trend for increasing interactions in areas such as manufacturing, IT and finance.

The 2017 survey has also sought details on the specific interactions that PhD students have with member companies, allowing for a clearer picture of the collaborations between industry and academia at this level. We surveyed 15 companies, seven of them the same as in 2015. Three responses were recorded as 'nil'. The companies were:

Pharmaceutical companies (ABPI members)

Alimera Sciences Inc.

AstraZeneca Plc (inc. MedImmune)

Bristol-Myers Squibb Pharmaceuticals Limited

Boehringer Ingelheim

Eisai Limited

GlaxoSmithKline Plc

Ipsen Developments Limited

Lilly (Eli Lilly and Company Limited)

Lundbeck Limited

Pfizer Limited

Santen Pharmaceutical Co.

Shionogi Inc.

UCB Pharma Limited

Contract Research Organisations (CROs)

Ashfield Healthcare

Covance Laboratories Limited

The survey also looked at postdoctoral researchers based in the UK and compared the numbers to other countries. They were divided into two categories.

'Other' EU

Belgium

Denmark

France

Germany

Greece

Ireland

Italy

Netherlands

Norway

Spain

Sweden

Non-EU

Australia

Brazil

Canada

Uganda

China

Japan

Nigeria

Singapore

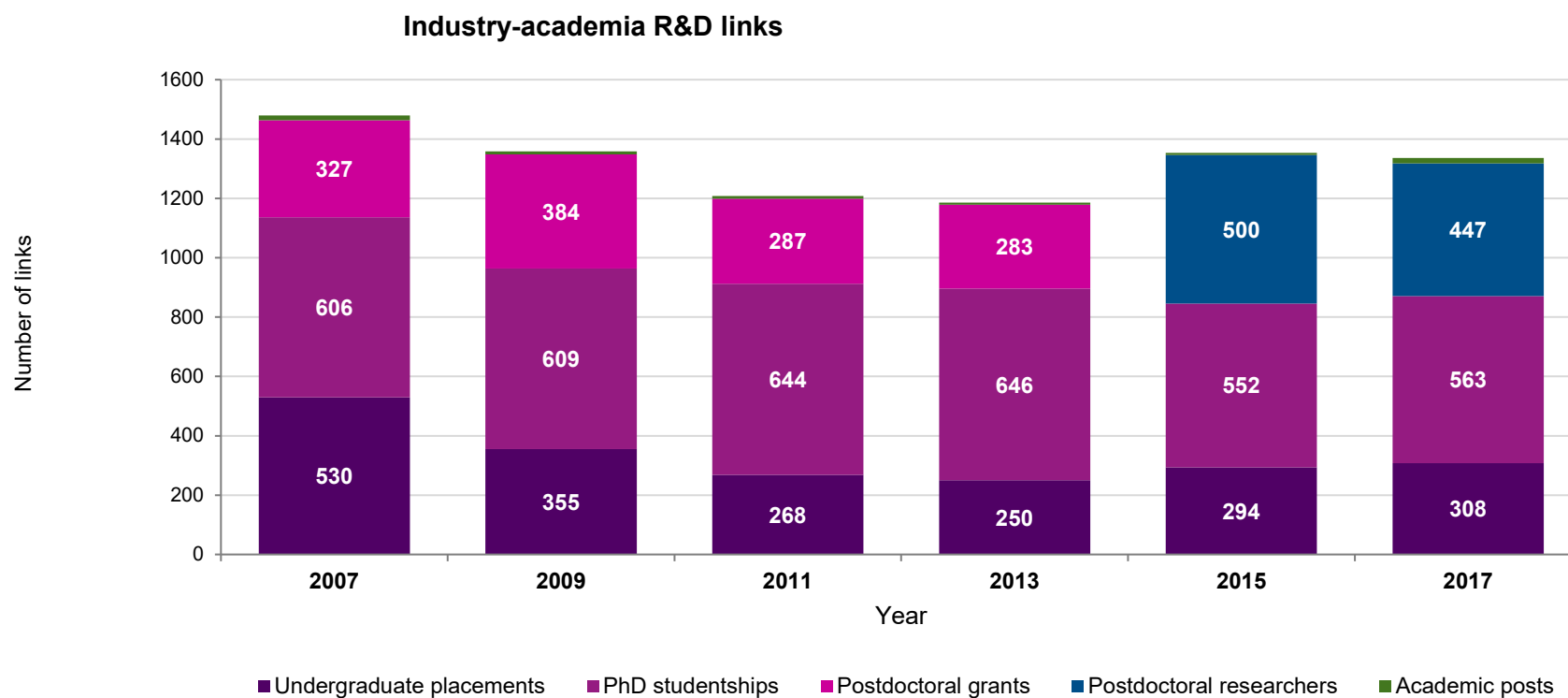
South Africa

Switzerland

Industry-academia R&D links

The number of undergraduate industrial placements (IPs) in R&D and collaborative PhD studentships has remained relatively consistent, increasing by 5% and 2% respectively since 2015, while the number of postdoctoral researchers supported by industry has fallen by 11% since 2015.

Since 2015, companies were asked to provide information about the number of postdoctoral researchers they had links with, rather than postdoctoral grants.

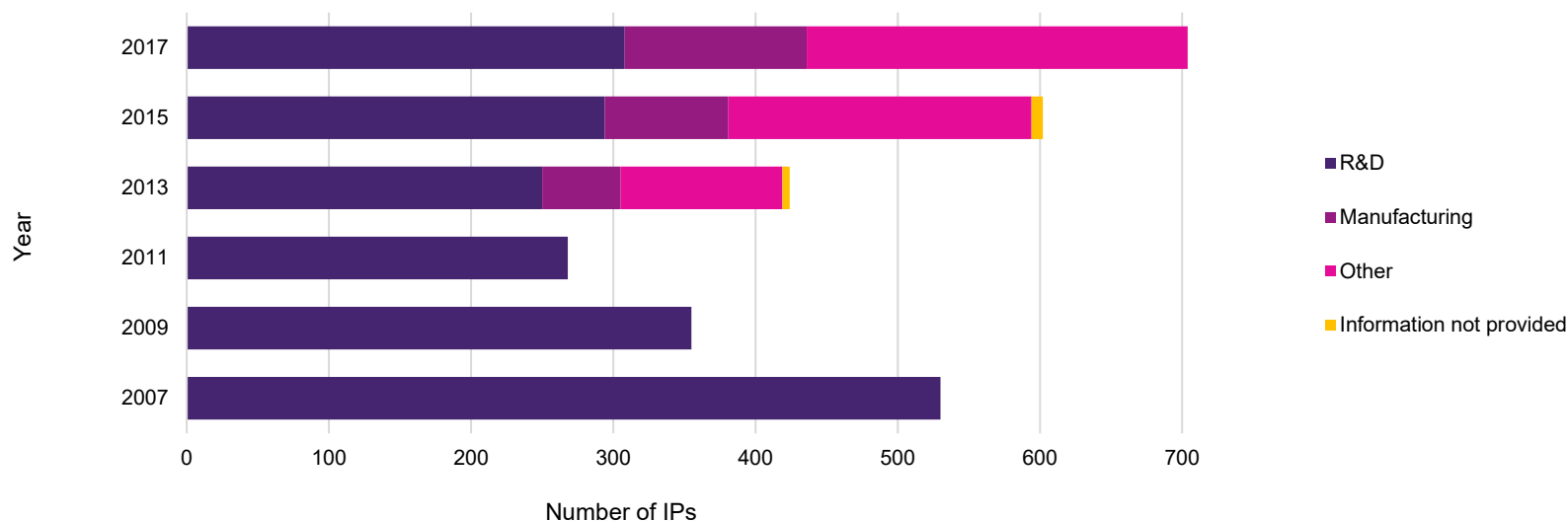


Undergraduate industrial placements (IPs)

Undergraduate placements are a great opportunity for interactions between academic institutions and companies, with a high level of mutual benefit for both. Undergraduate students can gain valuable industrial training and experience in one of the UK's leading sectors, which can often lay the groundwork for future careers, whereas companies gain access to highly-skilled talent which can add great value to their business.

With a 36% increase in the number of undergraduates starting sandwich courses (a programme that integrates a work placement, often in industry) between 2012 and 2017,⁸ it is hoped that the pharmaceutical industry continues to fully engage with this area of academia. 704 undergraduate IPs were recorded in 2017, an increase of 17% from 2015.

Undergraduate IPs

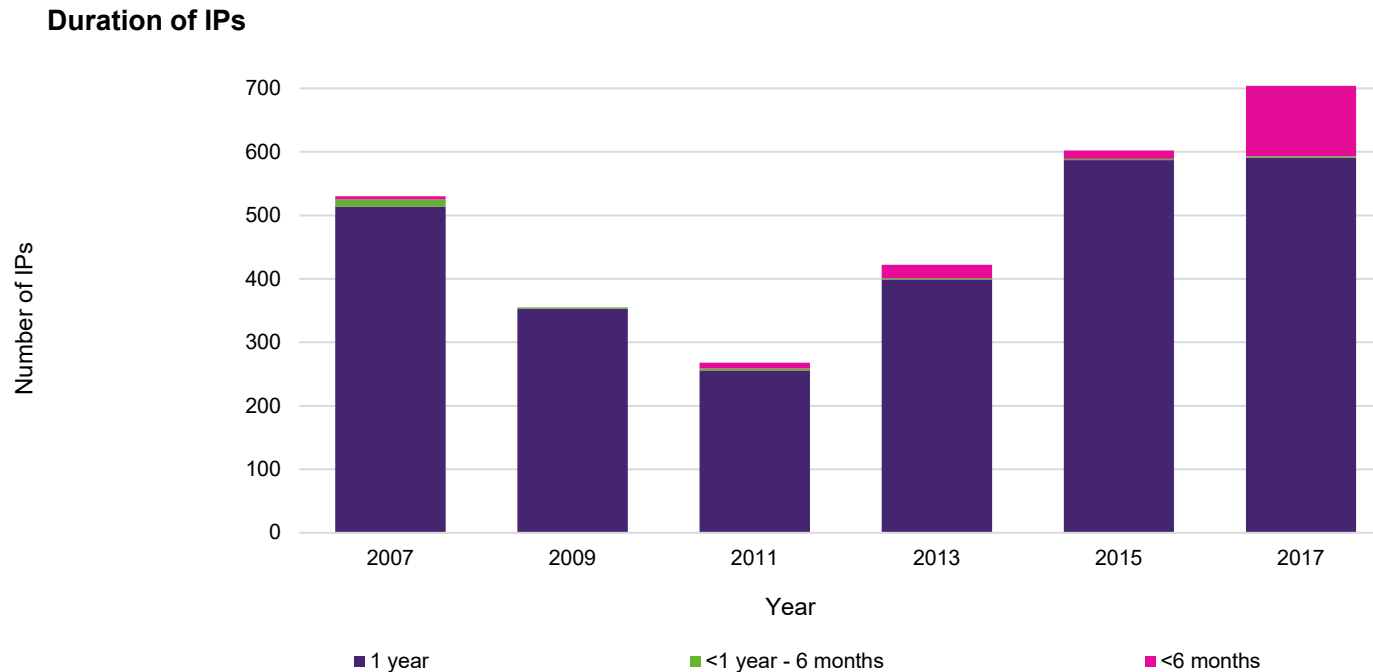


8. What do HE students study? Higher Education Statistics Agency, 2017. Available from: <https://www.hesa.ac.uk/data-and-analysis/students/what-study>

Duration of undergraduate industrial placements (IPs)

Undergraduate placements are a great opportunity for interactions between academic institutions and companies, with a high level of mutual benefit for both. Undergraduate students can gain valuable industrial training and experience in one of the UK's leading sectors, which can often lay the groundwork for future careers, whereas companies gain access to highly-skilled talent which can add great value to their business.

There has been an increase in the number of shorter, 2–3-month-long IPs, 44% of which were in manufacturing. This contrasts with the more common 12-month-long IPs, of which only 13% were in manufacturing. For IPs outside of R&D and manufacturing, there has been a 118% increase in the number of IT placements since 2015, possibly reflecting the importance placed on digital data analytics by companies. Only two placement students were registered at institutions outside of the UK, both of which were in France.

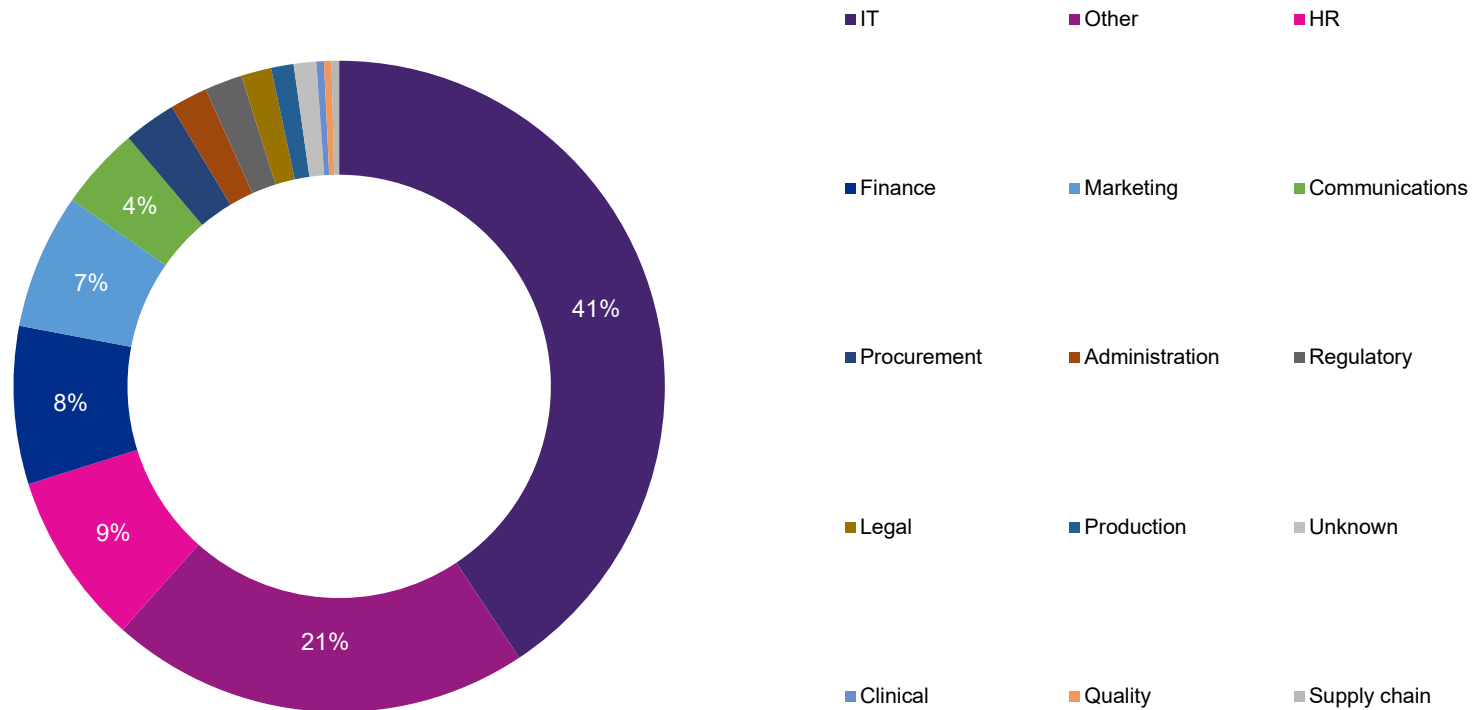


Undergraduate industrial placements (IPs) outside of R&D

Undergraduate placements are a great opportunity for interactions between academic institutions and companies, with a high level of mutual benefit for both. Undergraduate students can gain valuable industrial training and experience in one of the UK's leading sectors, which can often lay the groundwork for future careers, whereas companies gain access to highly-skilled talent which can add great value to their business.

Overall, the proportion of IPs in R&D has fallen, with a rise in IPs in other areas such as manufacturing and IT. The 2017 data differentiates between 'pre-clinical' and 'clinical' R&D, with only 6% of R&D IPs reported classed as 'clinical'.

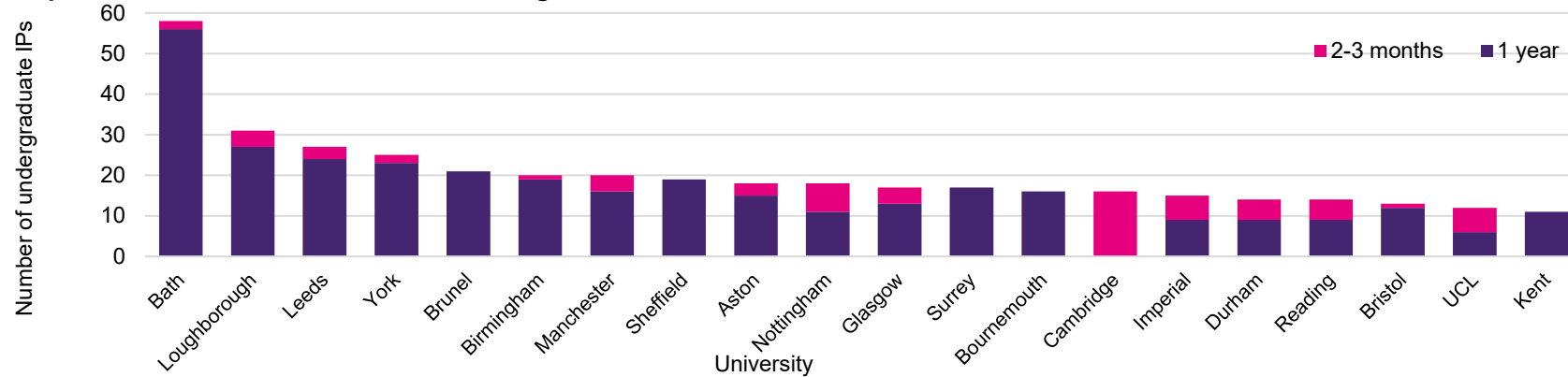
'Other' IPs



Top academic institutions for undergraduate industrial placements (IPs)

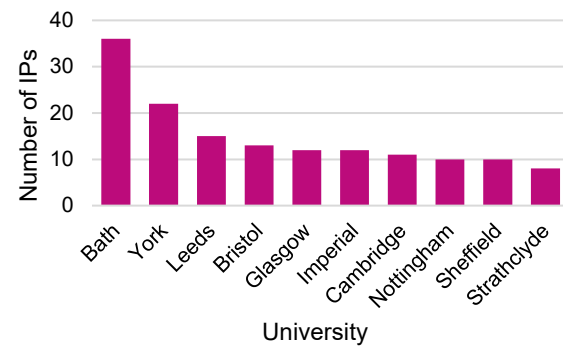
The University of Bath once again has the most undergraduates in industrial placements, having almost double the number of the next university, Loughborough.

Top 20 academic institutions for all undergraduate IPs

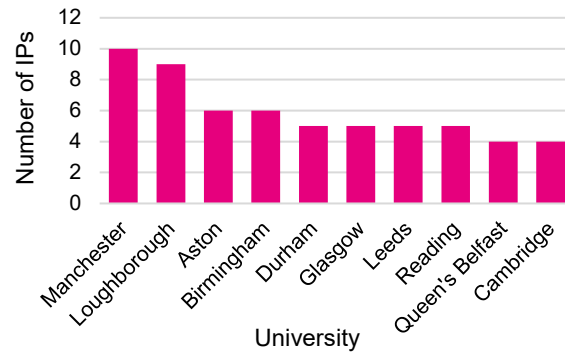


Bath also has the most undergraduate students in R&D placements, while Manchester is top for manufacturing (in contrast to 2015, where it ranked 5th). The largest increase in rank by an institution is Brunel, rising from 17th in 2015 to 5th in 2017. Compared with having no IPs with companies in 2015, Cambridge had 16 IPs in 2017, all of which were 2–3 months in duration, across a range of business areas.

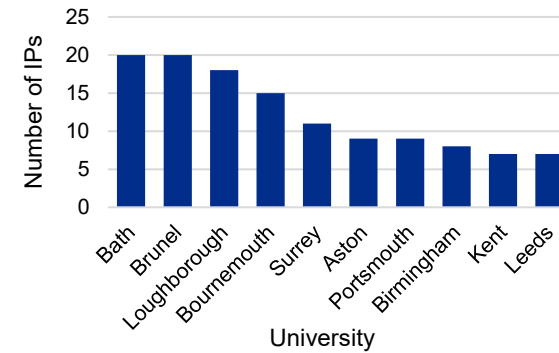
Top 10 – R&D IPs



Top 10 – Manufacturing IPs



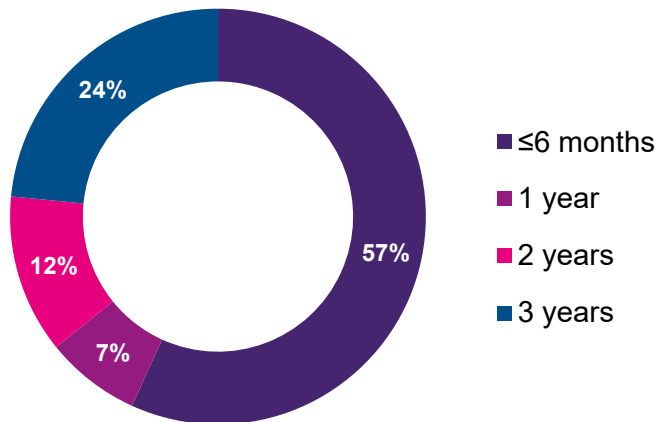
Top 10 – Other IPs



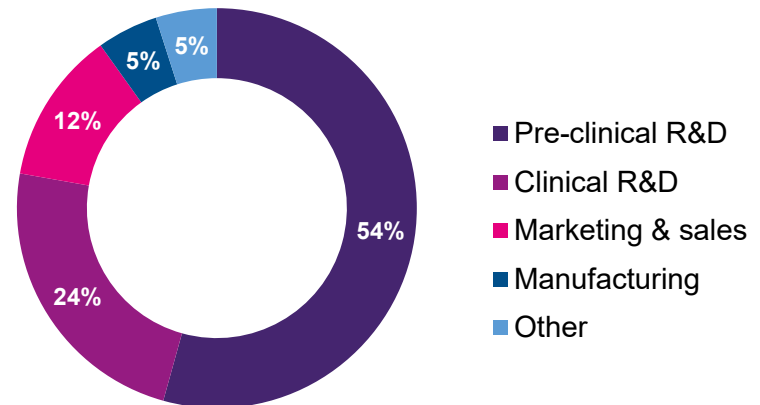
Graduate placements

Many companies offer several kinds of placements for recent graduates, the majority of which are in R&D (78%), with those placements outside of R&D mainly in marketing & sales or manufacturing roles. The number of placements in 2017 has dropped from 99 to 81, a 17% decrease. These placements had variable durations, with 43% of these placements being at least a year in length, whereas 41% lasted for three months or less. While the majority of these placements constitute company-specific programmes (such as the Future Leaders programme run by GSK), there are also a handful of MSc placements that companies host, e.g. in health economics.

Graduate placement duration



Graduate placement area

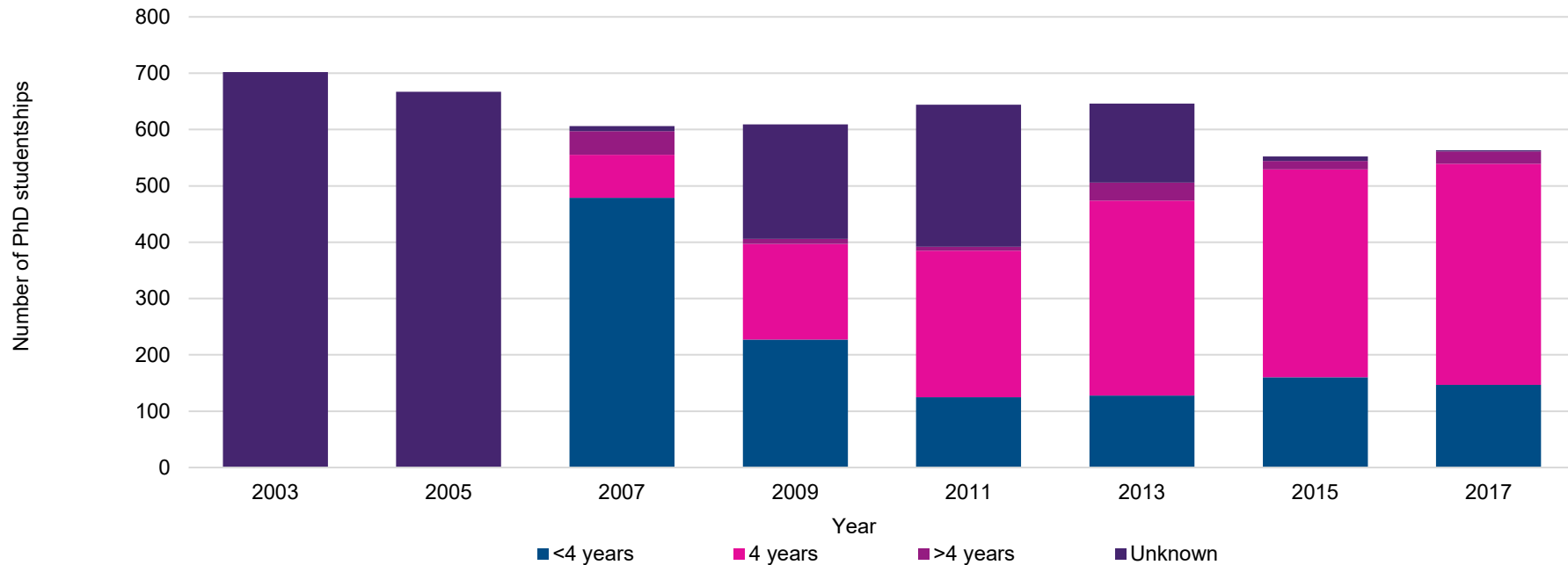


Duration of collaborative PhD studentships

The pharmaceutical industry continues to collaborate with academia through the means of sponsoring PhD studentships, with the number of PhD studentships supported by industry increasing slightly since 2015, from 552 to 563. This represents a stabilising of the total number of studentships after a drop of 15% between 2013 and 2015. Nine studentships were based outside of the UK, with four in Portugal, two in France and one each in Germany, the Netherlands and South Africa.

While there is consistency around the number of collaborative PhD studentships, concern still exists surrounding the overall decrease in number since 2013. The growing trend for research councils to award funding through Doctoral Training Partnerships (DTPs) may have led to a situation where academia is less inclined to collaborate with industry, as a greater proportion of funding is allocated directly to university departments; while companies are less attracted to academia due to the limited access to PhD students which are funded by DTPs, both in terms of number and a reduced ability to direct the research to match specific company objectives. Additionally, the number of studentships available is reliant on the R&D activities of industry and therefore on the capacity of industry to host studentships, which can lead to variance in the number of available PhD studentships in the long term.

Duration of collaborative PhD studentships

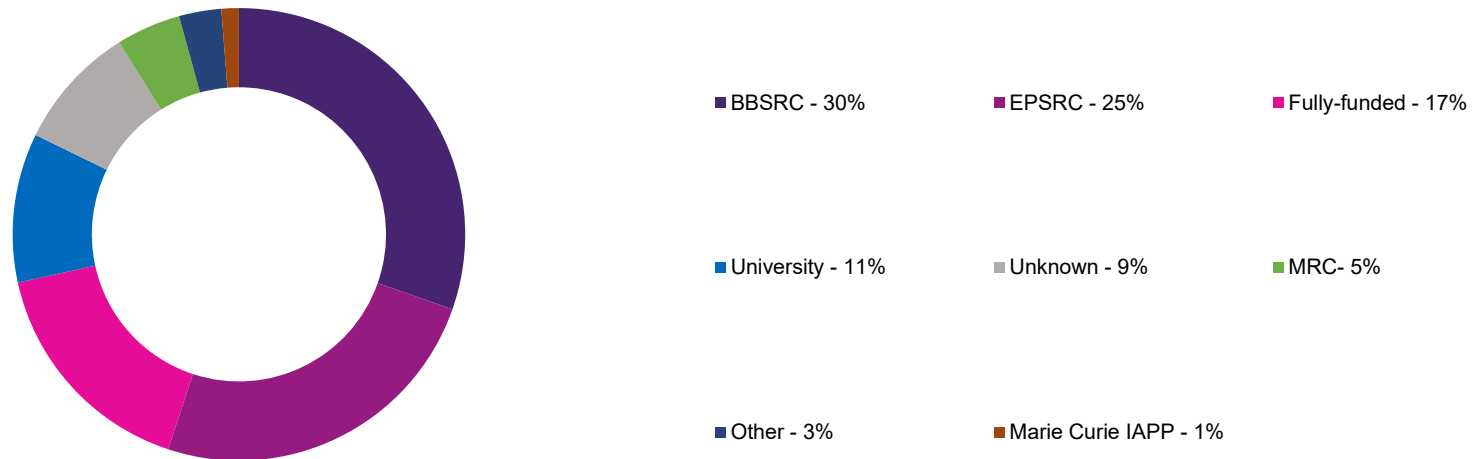


PhD studentship funding partners

30% of collaborative PhD studentships are co-funded by the Biotechnology and Biological Sciences Research Council (BBSRC), while the Engineering and Physical Sciences Research Council (EPSRC) funds 25%. This is a decrease from 2015, where the BBSRC and EPSRC accounted for co-funding of 35% and 27% of collaborative PhD studentships respectively. However, the 2017 proportion is similar to that seen in 2013 and 2011 for the BBSRC, while the EPSRC proportion is greater than in those years.

There is an increase in the number of studentships funded in part by the university partner, from 35 in 2015 to 60 in 2017, while companies are also funding 93 studentships without any other co-funder, a similar state to the 85 fully-funded PhDs in 2015. After several years of the MRC co-funding a decreasing number of PhD studentships, there is a slight increase in 2017, from 19 in 2015 to 26. It will be interesting to see whether the pattern of funding collaborative PhDs with the pharmaceutical industry by the UK research councils will be affected by the launch of UK Research and Innovation in 2018.

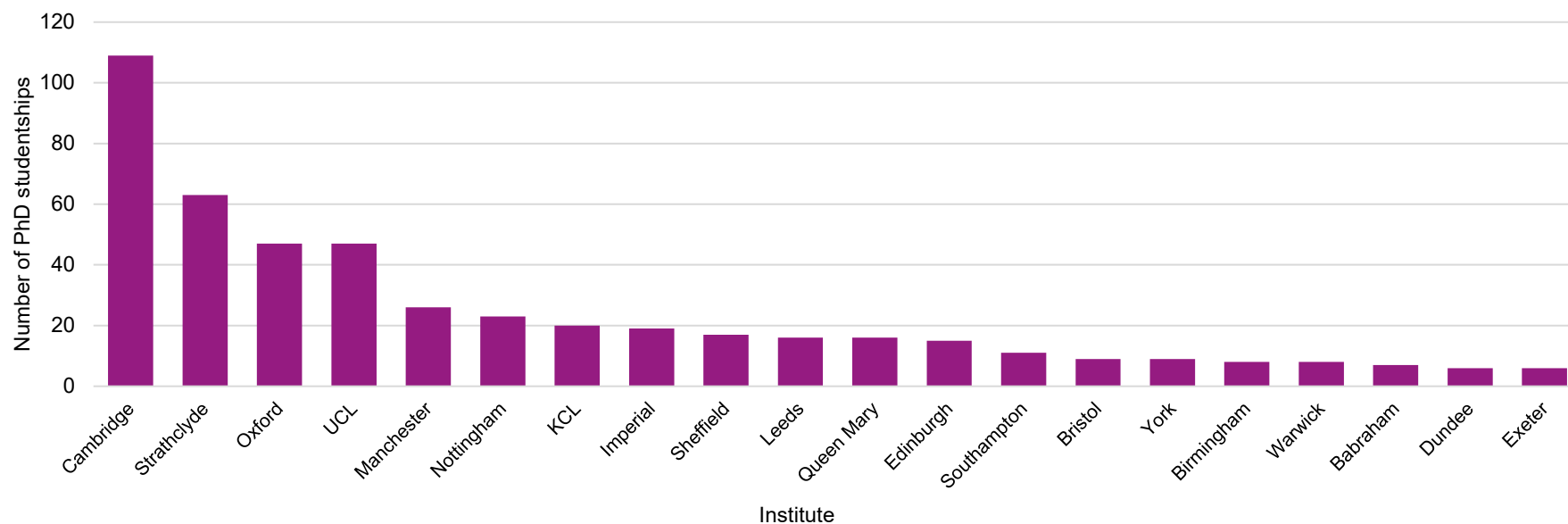
PhD studentship funding partners



Top academic institutions for collaborative PhD studentships

While the list of top 20 institutions for PhD studentships has only two new universities compared to 2015 (Birmingham and Dundee), there is a striking change at the top of the table, with Cambridge almost tripling their number of collaborative studentships in two years, from 37 to 109. This may be explained by initiatives such as the GSK-Cambridge strategic alliance, as well as the move of AstraZeneca HQ to Cambridge Biomedical Campus, the opportunities and benefits afforded by such co-location having been noted in the Industrial Strategy: Life Sciences Sector Deal.⁷ This has caused Strathclyde to fall into second place, with Oxford and UCL in joint third. Companies tend to collaborate with more research-intensive universities, for example in England there is a strong correlation (coefficient = 0.81*) between the amount of funding allocated for research to universities by the Higher Education Funding Council for England (HEFCE), and the number of collaborative PhD studentships at that university.

Top 20 UK academic institutions for PhD studentships



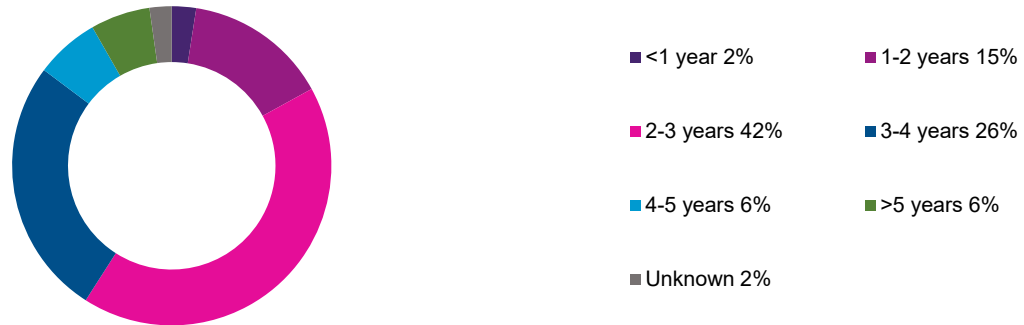
*Spearman's rank correlation coefficient

7. Industrial Strategy: Life Sciences Sector Deal, Department for Business, Energy & Industrial Strategy and Office for Life Sciences, 2017. Available from: <https://www.gov.uk/government/publications/life-sciences-sector-deal>

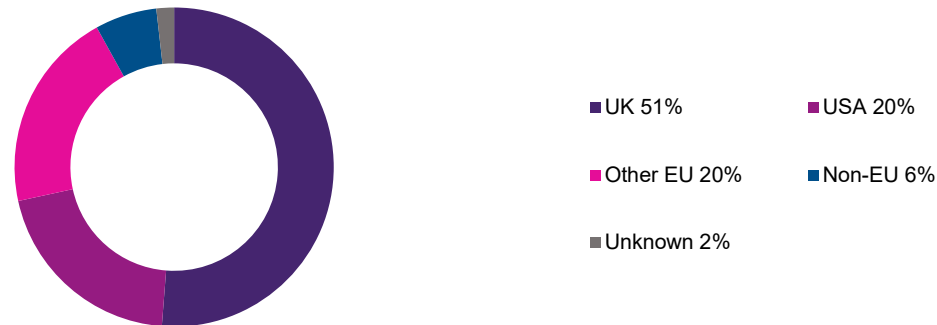
Postdoctoral researchers by duration and by country

The number of postdoctoral researchers who are collaborating with the pharmaceutical industry has fallen by 11%, from 500 in 2015 to 447 in 2017. 51% of postdoctoral researchers were based within the UK, while the number based in other EU countries rose by 69% to 91, and fell in the USA by 48% to 91. While around half of researchers reported were of 'Unknown' funding, 96% of those whose funding was known were fully-funded by the company, with the remaining researchers funded by the major UK research councils.

Postdoctoral researchers by duration

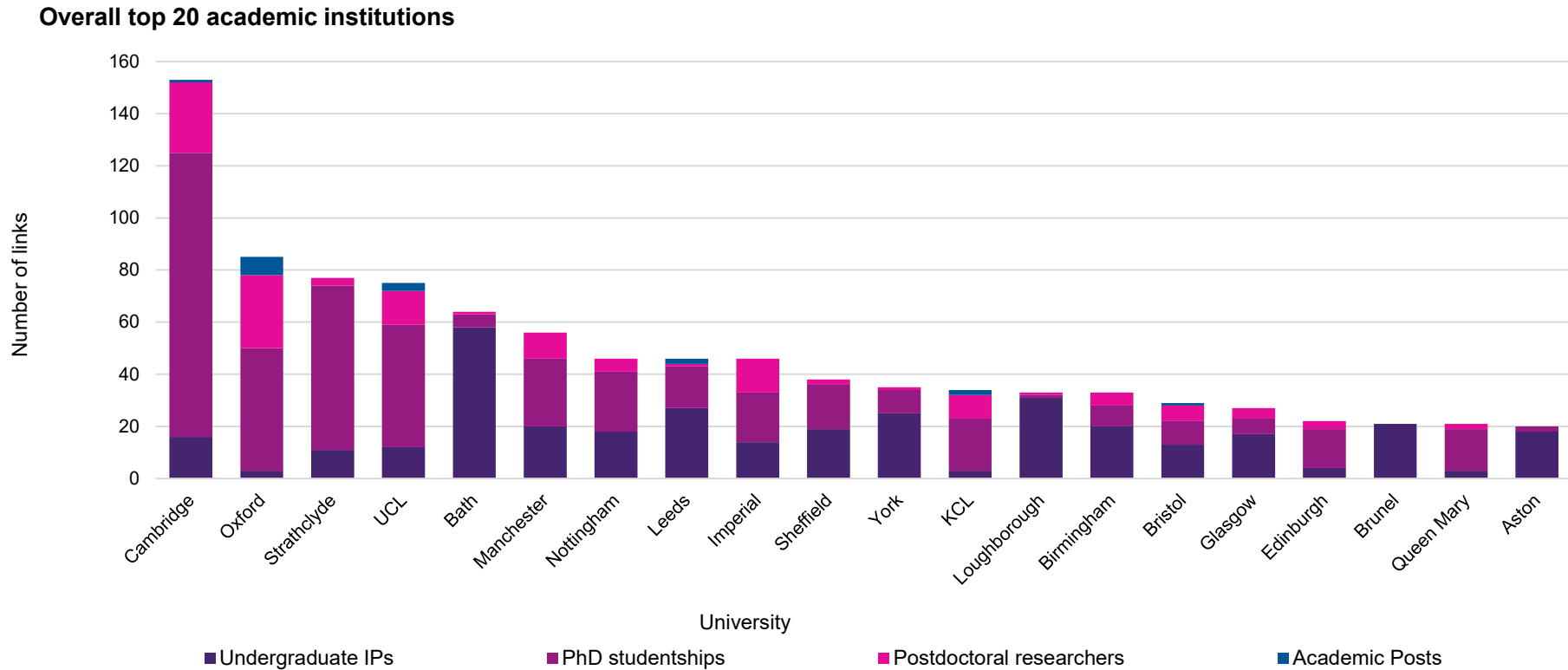


Postdoctoral researchers by country



Overall top 20 academic institutions

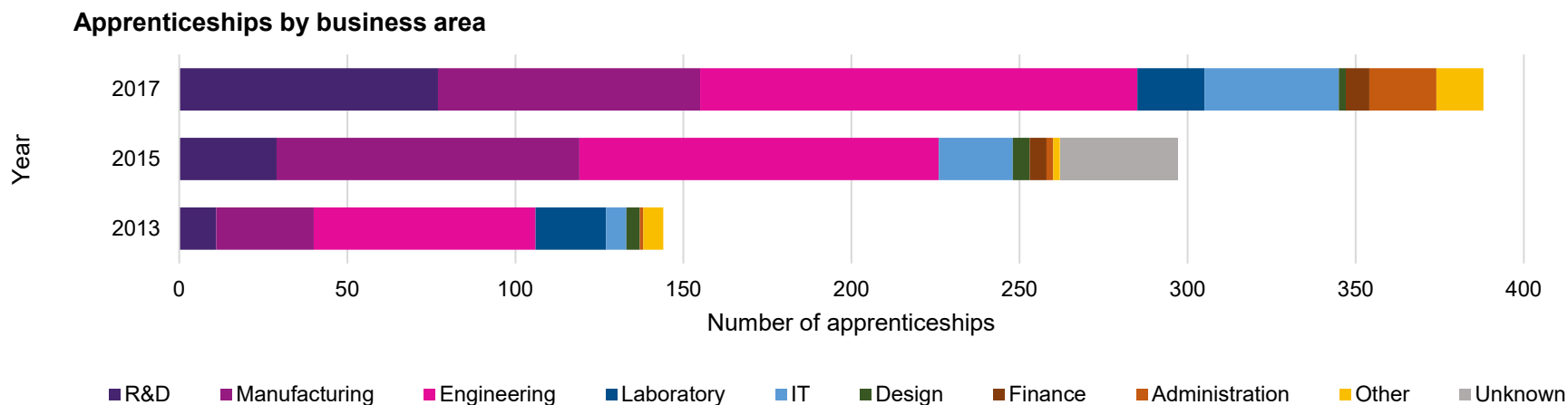
Due mainly to the sheer number of PhD students, Cambridge is by far the top academic institution for industry links in 2017, followed by Oxford in second place and Strathclyde in third. Despite a relatively low number of PhD studentships and postdoctoral researchers linked with industry, Bath and Loughborough are 5th and 13th respectively, due to their high proportion of undergraduate IPs. 17 out of the 2015 top 20 remain in 2017, with Birmingham, Brunel and Queen Mary rising into the top 20 at 14th, 18th and 19th respectively.



Apprenticeships by business area

Apprenticeships are increasingly being viewed as a valid alternative to the traditional academic career path, with more high-level apprenticeships being developed year on year. Due partly to Science Industry Partnership (SIP),⁹ the reported number of apprenticeships hosted by the UK pharmaceutical industry has increased 31% since 2015, from 297 to 388, and by 169% since 2013.

The number of R&D apprentices has increased from 29 in 2015 to 77 in 2017, which represents 20% of all apprenticeships. Outside of R&D, there has been a 13% drop in the number of manufacturing apprenticeships, and a 21% increase in the number of apprentices in engineering. Complementing the rise of IT undergraduate IPs, there has been an 82% increase in the number of IT apprenticeships. There are many other business areas that host apprentices, including in finance and administration areas.



The increase in the number of apprentices training in the UK pharmaceutical industry is encouraging, particularly due to the increase of higher-level apprenticeships. With the recent introduction of the apprenticeship levy in April 2017, and the falling number of apprentices starting in the first quarter of the 2017/18 academic year,¹¹ it is expected that the pharmaceutical industry will continue to increase its apprenticeship base, taking the lead on the development of more higher and degree-level apprenticeships, at the same time supporting the industry's ambition to reach 20,000 apprenticeships in the science sector by 2020.

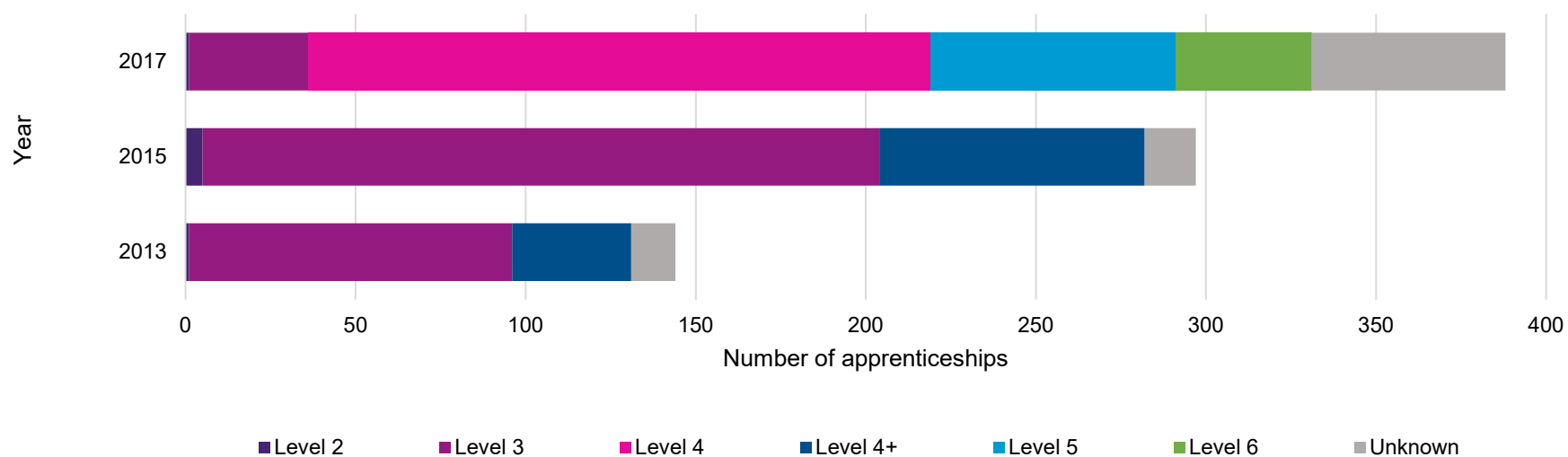
9. Science Industry Partnership (SIP). See: <http://www.scienceindustrypartnership.com/about-sip/about-the-sip/>

11. Apprenticeship and levy statistics: February 2018, Department for Education, 2018. Available from: <https://www.gov.uk/government/statistics/apprenticeship-and-levy-statistics-february-2018>

Apprenticeships by level

Interestingly, there has been a large increase in higher-level apprenticeships (levels 4 and above). Level 3 apprenticeships have dropped by 82% from 199 in 2015 to 35 in 2017, whereas apprenticeships of levels 4 and above have increased by 278%, from 78 to 295. The number of level 3 apprenticeships may have been somewhat underrepresented, as apprentices who are undertaking a level 4 qualification (such as a Higher National Diploma) as part of a level 3 apprenticeship may be internally classed as level 4 by companies. Nonetheless, there is still a significant increase in the number of higher-level, more technical apprenticeships.

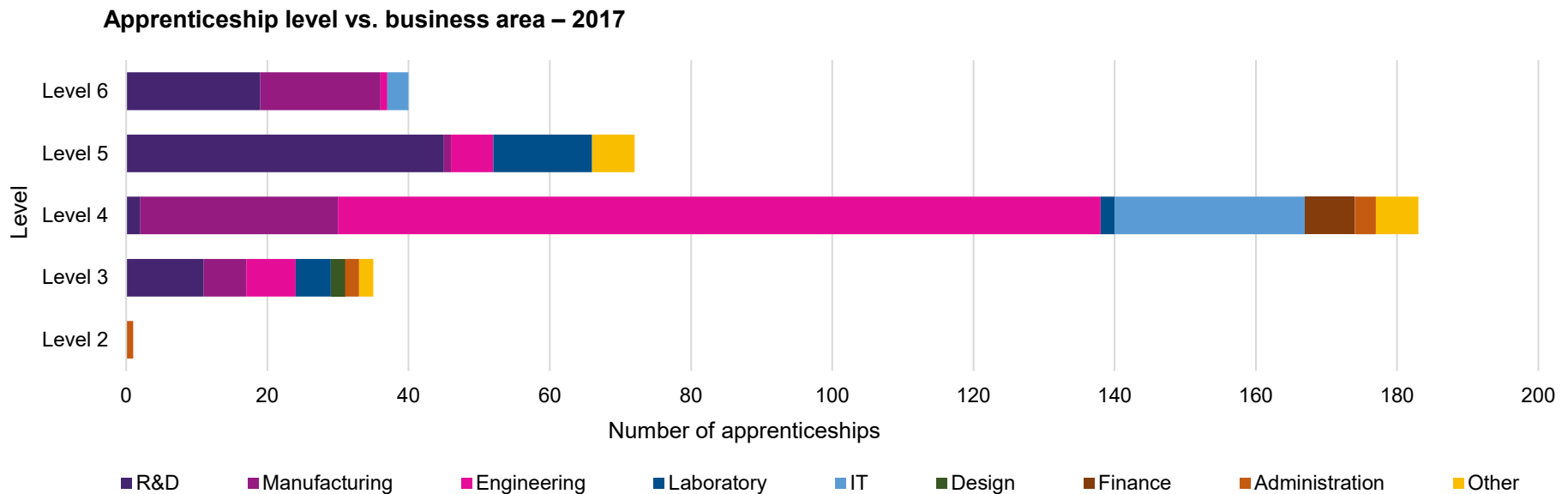
Apprenticeships by level



Apprenticeships by level vs. business area

The increase in the number of apprentices training in the UK pharmaceutical industry is encouraging, particularly due to the increase of higher-level apprenticeships. With the recent introduction of the apprenticeship levy in April 2017, and the falling number of apprentices starting in the first quarter of the 2017/18 academic year,¹¹ it is expected that the pharmaceutical industry will continue to increase its apprenticeship base, taking the lead on the development of more higher and degree-level apprenticeships, at the same time supporting the industry's ambition to reach 20,000 apprenticeships in the science sector by 2020.

83% of engineering and 54% of manufacturing apprenticeships (of known level) are level 4, while 83% of R&D apprenticeships are level 5 or level 6. Examples of these higher-level apprenticeships include highly specialised areas such as the use of robotics in cell culture, and with the high gross value added per head that the pharmaceutical industry holds,¹⁰ these apprenticeships contribute significantly to the national economy. The number of level 3 apprenticeships may have been somewhat underrepresented, as apprentices who are undertaking a level 4 qualification (such as a Higher National Diploma) as part of a level 3 apprenticeship may be internally classed as level 4 by companies. Nonetheless, there is still a significant increase in the number of higher-level, more technical apprenticeships.



10. The economic contribution of the UK Life Sciences industry, ABPI, 2016. Available from: https://www.abpi.org.uk/media/1371/the_economic_contribution_of_the_uk_life_sciences_industry.pdf

11. Apprenticeship and levy statistics: February 2018, Department for Education, 2018. Available from: <https://www.gov.uk/government/statistics/apprenticeship-and-levy-statistics-february-2018>

Apprenticeships duration

The duration of the apprenticeships has remained generally consistent since 2015. There is an increase of apprenticeships that last two years, of which 73% of known level were for advanced (level 3) apprenticeships. The 2017 data also shows for the first-time apprenticeships that last for more than four years, 13 in total, all of which were at level 6, the equivalent of a bachelor's degree. Additionally, there were 28 apprenticeships based outside of the UK, with 17 in Ireland, seven in the USA and two each in Canada and Singapore. 81% of Canada, Ireland and USA-based apprentices were in engineering, while the two Singapore-based apprentices were training as Laboratory Scientists.

Apprenticeships duration 2017



Apprenticeships duration 2015



Other industry-academic interactions

The latest data also contains information about other kinds of collaborations; for example the number of academic posts, such as visiting fellows and professors, has increased in number from seven in 2015 to 18 in 2017, while there is also increasing engagement with the use of academic consultants.

While there are over 1,000 links between the pharmaceutical industry and the academic sector in terms of placements and studentships for the individual, there are a number of longer-term, open collaborative projects between companies and institutions. These partnerships allow the exchange of knowledge and expertise, catalysing innovative, leading research in the UK.

Some collaborations have been running for a significant length of time, such as the Division of Signal Transduction Therapy (DSTT) at the University of Dundee which was created in 1998, and has secured renewed funding until 2020. There have been many collaborative projects that have formed in the last two years, and it is encouraging to see that many of the collaborations highlighted in the 2015 survey report are still being supported, such as the Alzheimer's Research UK Dementia Consortium, which has since welcomed MSD as another collaborator.

The examples below showcase the variety of projects that have arisen over the last two years, from more traditional partnerships between one company and one institution, to pioneering consortia and novel patient biobanks.

Future Targeted Healthcare Manufacturing Hub

Driven by the growing prominence of and need for personalised medicine, the **Future Targeted Healthcare Manufacturing Hub** endeavours to address the infrastructure and manufacturing challenges surrounding the development of new, targeted biological therapeutics. Led by UCL, the Hub is formed of several universities, governmental associations and over 30 pharmaceutical companies who share the common goal of bringing targeted healthcare into common usage through the development of novel manufacturing, formulation and control technologies.

Industry – Francis Crick Institute collaborations

The Francis Crick Institute continues to engage and collaborate with the pharmaceutical industry since its formation in 2015. Building on the original open science collaboration formed between the Crick and GSK in 2015, GSK have contributed significantly towards the development of the Biomedical Imaging lab at the Crick, which adds to the already vast level of facilities available at the institute.

Additionally, a five-year open science agreement between AstraZeneca and the Crick, announced in 2017, enables collaboration on early-stage research which could translate into novel insights and treatments across a range of disease areas, including cancers, cardiovascular and respiratory diseases. Funds from AstraZeneca, Cancer Research UK and the MRC will allow further innovation and knowledge exchange between these partners, maximising the impact of the scientific advances generated from the initiative.

NURTuRE

Arising due to a recommendation in the UK renal research strategy report in 2016, **NURTuRE** brings together the universities of Birmingham, Bristol and Nottingham with charities, NHS Trusts and the pharmaceutical companies AbbVie, Evotec and UCB in the aim of creating a national Kidney Biobank from patients of chronic kidney disease (CKD) and nephrotic syndrome (NS). A broad range of biological data from almost 4,000 patients will be available

to collaborators, helping to facilitate the identification of new risk factors and biomarkers of CKD, increase knowledge and understanding of NS, and ultimately provide better health outcomes for patients.

Antibody-Assisted Structure-Based Drug Discovery Consortium

Combining expertise in small molecular drug design, the **Antibody-Assisted Structure-Based Drug Discovery Consortium** links together the University of Leicester, UCB and LifeArc through the application of antibodies as tools to identify and characterise novel regulatory sites on therapeutically relevant target proteins. Ultimately, the consortium aims to guide the discovery and design of new small molecular therapeutics, in turn delivering significant benefits to the clinic.

Pfizer – University of Swansea Innovation Hub

Bringing together Pfizer and the University of Swansea, this project aims to set up an Innovation Hub based at the university's School of Management, catalysing the exchange of skills and expertise with the aim of tackling healthcare challenges across Wales. By helping to develop a health system that links together the NHS, industry and academia, the Innovation Hub will work to bring great benefits to patients in Wales. The first phase of the partnership sees the recruitment of both a Professor of Enhanced Health Innovation, Engagement and Outcomes, and a Digital Technical Consultant, which will drive the project forward into the future.

Apollo Therapeutics Fund

A unique collaboration between AstraZeneca, GSK, Johnson & Johnson Innovation and Imperial College London, UCL and the University of Cambridge, **Apollo Therapeutics** constitutes a £40 million fund to support the translation of biomedical projects within partner universities into innovative new medicines licensed by industrial partners. Launched in 2016, the venture will run for six to eight years and fund approximately 20 projects with great therapeutic potential, and with expertise in drug discovery, Apollo Therapeutics provides a world-class environment for project growth.

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