



# Transforming UK translation

Held on 31 October 2019

Conference report

THE  
ROYAL  
SOCIETY

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# Introduction

Building on previous work of the Royal Society, this conference focused on current challenges surrounding the translation of research into successful business outcomes and how they can be overcome. The meeting brought together key stakeholders across the innovation chain to discuss some of the problems, best practice and ways we can foster stronger industry-academia relationships, as well as ways in which the Society could help promote effective translation.

The Royal Society has a strong interest in the UK translation ecosystem and aims to promote the UK's exceptional research base to benefit society and the economy. This conference focused on three key areas: industry-academia engagement; partnerships that create value for both sides; and attracting, training and retaining the right talent to drive these relationships. The UK is renowned for research excellence and has many good support systems for translation in place, however, if the UK is to achieve its growth plans, improvements must be made.

This report is not a verbatim record, but a summary of the discussions that took place during the day and the key points raised. Comments and recommendations reflect the views and opinions of speakers and delegates and not necessarily those of the Royal Society.

### UK Government's Industrial Strategy: investment in R&D

The UK Government aims to increase R&D investment to 2.4% of GDP by 2027. In 2017, R&D spend was 1.68% of which 0.44% came from public funding and 0.91% from the private sector. There is a need to make tangible changes to remove the barriers to translation, in addition to much more effective marketing, making our excellence visible and telling our stories better, to help the UK attract and target the private investment needed to meet Government R&D investment goals.

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“We have a cutting edge in a number of different areas which we need to keep sharp. Research is the future of innovation – protect that.”

Dr Rupert Lewis, Government Office for Science

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Governments since 2006 have been interested in the Industrial Strategy as a way of being conscious and deliberate about the role of Government in the market, and the Government has committed £4.7 billion in innovation funds over four years. The current Industrial Strategy emphasises tackling the societal challenges of clean growth, ageing societies, the future of mobility, and AI and data. Efforts to improve research translation are geared towards these major challenges. Defining an optimal research to development funding ratio will help protect investment in research, thereby sustaining future innovation in the UK.



# Multiple routes to impact

Three contrasting perspectives on research translation were presented from a multinational organisation, an SME (small and medium-sized enterprise) and a university.

## BP plc: a multinational perspective on research translation

BP presented the perspective of a multinational corporation working with academia, emphasising the importance of movement of people between conventional organisational boundaries for successful collaboration.

Innovation occurs at the interface of different sectors, yet companies and careers tend to be organised in silos. Currently, a range of disruptive factors affecting the energy industry applies great pressure for innovation, such as climate change, digitalisation, urbanisation, geopolitics and regulation. Greater mobility of people between start-ups, academia, incubators and accelerators would help the innovation ecosystem function with less friction, allowing staff to experience the challenges and opportunities that exist in different spaces. This movement of people would increase the pace at which innovation can happen, helping the UK compete in a world of digital disruption with increasingly mobile capital. Meanwhile, there is a growing trend in which large corporates facing these disruptive threats to create entrepreneurial capability within their organisations to harness innovation and create business-building capabilities.



**Image:** Conference delegates took part in roundtable discussions to explore challenges and best practice in translation.

“The magic happens when you put different expertise together at the boundaries of traditional sectors. Huge value creation in science and technology occurs when people can make a constellation come together across different interfaces in the ecosystem.”

Dr Stephen Cook, BP plc

Translation is defined as the successful development of research into products and companies for the benefit of society and the economy. To succeed, translation requires the following components:

- Effective communication of market and societal need. Clear statements should link research with societal needs (eg UN Sustainable Development Goals). This will help attract motivated talent to work in these ecosystems.
- Connectors. People who can effectively connect people across business and industry stakeholders, between and within organisations.
- Capital and people who can pitch to investors. Public engagement skills are needed to attract investment and showcase how research might connect sectors, solve societal need and create new markets.
- Co-location. Placing people together in the same physical space increases companies' agility.
- End-to-end capability. There is a need to develop playbooks that explain in detail how to take research to market.

## Concrete canvas: an SME perspective on research translation

Three key ways in which universities could better engage with SMEs and spinouts were outlined: support for recent graduates, changing the venture capital model for university spinouts, and reducing the IP barrier to SME engagement with universities.

Recent graduates have the lowest possible personal risk, making it the ideal time to found a company. In addition, they are in a familiar environment with all the necessary resources for a technology spinout – labs, workshops and experts. Universities could better support recent STEM graduates by providing bursaries that enable selected recent graduates to incubate start-up companies with one to two years of cost-free access to university resources.

The model for investment in university spinout companies is similar to the venture capital model, but this may not necessarily provide the best outcomes for the universities, the founders and UK Plc (the taxpayer). This model can be slow and leads to fewer spinouts by increasing risk to the founders, while for universities it can result in high overhead costs and an initially high shareholding may be heavily diluted prior to an exit. This model also affects UK Plc which invests in universities but gets fewer new firms than might otherwise be the case. A preferred alternative model of a small 2-3% ‘golden share’ is easy to negotiate, ensures that the university’s stake is not diluted, and can have a minimal contract requiring little negotiation that is quick to sign with minimal legal overhead. The company is able to move faster and is therefore more likely to survive, while universities are likely to get more spinouts and attract more entrepreneurial undergraduates and staff. This model is also more likely to bring a philanthropy dividend from alumni entrepreneurs who gift money back to their institution.

Lastly, negotiating how new IP will be shared with the university is a key barrier when SMEs work with universities. As a result, work often ends up being done unofficially without a contract with the university, or the company may move to collaborate with a commercial entity. A standard model agreement for UK universities with SMEs that can be negotiated simply and quickly minimises the IP barrier to SME engagement with universities. The model should emphasise supporting the potential of open collaboration with SMEs to add value, rather than to protect IP assets that may not be commercialised by the university.



**Image:** Conference delegates took part in roundtable discussions to explore challenges and best practice in translation.

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IP is like bone, everyone thinks it’s dead but it’s actually an essential and very dynamic tissue”

Pete Hotten, NuAge Vision, Royal Society Entrepreneur in Residence at Swansea University

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“IP is not valuable if it’s not used. Even if a university doesn’t realise the IP’s full value, a small amount of something is worth a lot more than a large amount of nothing.”

Peter Brewin, Founder, Concrete Canvas Ltd

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## UCL: a university perspective on research translation

Translation is much broader than commercialisation alone, nor is it only about technologies. The range and scale of translation of knowledge and ideas into reality from UCL demonstrates the breadth of the opportunity across all subjects and the university's commitment to support this, working internationally and within the UK, and with public and private institutions. Examples include:

- Development of the NHS England online portal for patient self-management of diabetes.
- A project with the Slade School of Fine Art to create new ochre pigments from coal waste.
- Work with the Camden Clean Air Partnership to enable residents to help develop policy on clean air for Camden.
- Work with Polish universities to improve the structure of administration.

Research translation does not revolve solely around the creation of spinout companies or licence deals. Partnerships are important for several reasons, not least that some problems are simply too big to solve alone. There is a variety of partnership models that could include collaboration, bespoke short courses, contract research, licence deals (in which companies apply technologies developed in a university), non-patent models, consulting projects and social enterprises.

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“Universities undertake translation, and engage with translation, fundamentally because we want to see people benefit, societies transformed, and economies grow as a result.”

Dr Celia Caulcott, UCL

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It is vital that universities have the capacity to support turning knowledge into a reality. To do this, universities need a variety of capabilities, including:

- The ability to create partnerships, including employing individuals with connecting and technology spotting skills who can coordinate and connect ideas and people;
- A strong knowledge exchange policy environment;
- Support and assistance for consultancy;
- Nurture of entrepreneurship in students and alumni;
- The capability to commercialise technologies through varied routes;
- Access to proof of concept and investment funds;
- Contracting capabilities that can appropriately protect the university's charitable status, reputation and intellectual property;
- The ability to recognise and reward academic inventors and entrepreneurship (including in promotion criteria); and
- Do all of the above while maintaining the freedom to research and teach.

# Industry-academia engagement

The University of Liverpool Materials Innovation Factory provided a case study for successful engagement. This was followed by a panel discussion and delegate roundtables.

## Materials Innovation Factory: case study for industry-academia engagement

The Materials Innovation Factory (MIF) is an example of a successful strategic partnership between a university and a company – the University of Liverpool and Unilever. University-company partnerships can be aligned around common research outcomes or, as with MIF, around common capabilities that are important for both partners. MIF co-hosts academic and industry research teams and has helped companies dramatically accelerate the translation of their inventions into the market.

Several factors are thought to have led to the success of MIF:

- Open access to facilities, state-of-the-art labs and a low barrier to entry facilitate idea exchange and a dynamic and open innovation ecosystem.
- Continuous investment in social capital such as knowledge, networks and culture.
- Generation of 'beacon' activities that attract companies and academics based outside the UK.
- Creation of a clear framework that allows partners to see the full range of opportunities available including service, consulting, contract discovery and co-creation.

Overall, this strategic partnership helps reduce the interpretative labour (the energy put into explaining ideas plus the energy needed to understand it, Graeber 2015) and lower the barrier to translational research.

“Strategic partnerships facilitate translational research. The key is to create university partnerships that have a deliberate spill-over effect through which other universities and companies can benefit.”

Professor Matthew Reed, Materials Innovation Factory, University of Liverpool

The REF Impact Agenda for universities has changed the game, and in a very positive way. Universities are paying more attention to getting their IP out there in the real world, putting it in the hands of end users, and it is really affecting our decisions on how we interact with external organisations.”

Dr David Bembo, Cardiff University



# Roundtable and panel discussions

Two workshop sessions during the conference drew on the experience of delegates working across the value chain to discuss issues in translation and industry-academia partnerships. The discussions, which included experts from industry, academia and the investment community, reflected panel discussions throughout the day. The key points are summarised below.

## **What does value mean for an academic institution and a commercial partner?**

For universities, value involves recognition and reputation building as well as increased income to support research and teaching. Academics seek career progression, recognition, and increased reach and impact of their research. Value also comes from carrying out research with real-world relevance, bringing societal benefit. Access to industrial funding and successful grant applications are also valued, bringing potential to develop new research streams.

Companies seek to challenge established ideas in industry and bring economic value. For commercial partners, the ability to generate, test and develop new ideas and gain access to research expertise, equipment and funding that would otherwise be inaccessible is highly prized.

Access to talented individuals can add significant value for both sides. Partners can build their reputation and attract high calibre staff and students through improved finance and investment in technology, people and facilities. They can also generate apprenticeships and internships as well as move technologies to market faster.

## **What are the biggest challenges in negotiating value for both sides and how can they be solved?**

Communication was cited as the greatest challenge, particularly agreeing on priorities at the start of the partnership, and misconceptions as partners 'speak different languages'. Differences in the pace at which each partner needs to work, and differing concepts of the time and effort required to engage, pose further challenges. Overcoming these challenges requires people who understand both industrial and academic worlds. Engaging industry early in research, addressing problems or walking away from partnerships, and defining boundaries also help reduce issues.



**Image** (left to right): Panellists, Dr David Bembo, Cardiff University (Chair); Dr John Patterson; Robin Knight, IN-PART; Professor Lisa Roberts, University of Leeds; Kate Barnard, Rolls-Royce Plc.



IP negotiation is the next greatest challenge as partners often have differing conceptions of value and some delegates noted that some universities can have unrealistic valuations of their IP. People who do not fully understand the context often carry out the negotiations, which can lead to negotiations collapsing, undesirable outcomes and much greater time to negotiate a deal than originally anticipated. More experienced negotiators are needed.

Maintaining relationships between institutions following personnel change can be a problem, and failing to communicate such a change can leave the relationship in limbo. A long-term strategic relationship with universities that remains even after the academic or business contact moves on indicates success.

### **What does industry look for in an academic partner?**

Deep academic and technical expertise is the top quality sought for in an academic partner. Access to the right facilities and resources is also important, including technicians, a fair tariff and sharing of university equipment. Ease of access and a clear process to collaborate – ideally involving a standardised way to engage and do business – was also highly valued. Industry hopes the academic partner would be able to leverage interdisciplinary work and have access to additional funding, perhaps specifically for commercial projects.

Good working partnerships with both the institution and in one-to-one relationships are highly sought after. Personal relationships between collaborators should be built on trust, clarity, good communication and genuine enthusiasm. Face-to-face meetings and geographic proximity remain important even in the digital age.

For some companies, success means attracting the next generation of scientists to the organisation, for example by sponsoring PhD students. These companies benefit from good students who can be trained and assessed, while also evaluating the relationship with the university and what a potential collaboration might entail. A PhD sponsorship often leads to a job offer, benefiting all parties.



**Image:** Delegates explore key questions in translation during roundtable discussions.

### **What is the most effective way of identifying a suitable partner?**

The primary way was through networks, be they personal, academic, through *alma mater* or from repeat business. People who can act as ‘connectors’, with a good understanding of both industry and academia, can help match industry needs to relevant academic expertise and join people across sectors. It is important to clearly articulate what is wanted from a partner from the outset, including defining the scale of interaction (individual or university-wide), the type of expertise and how familiar the collaborator should be with the challenge.

At the most basic level, people need to network to understand each other’s interests, challenges and drivers. Events including conferences and academic meetings are a good way to find out about the latest academic research, industry challenges, and meet those involved. Other established routes include the Knowledge Transfer Network (KTN), Academic Industry Meeting (AIM) days and the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3RS) CRACK IT Innovation Platform that connects researchers across sectors to accelerate commercialisation. Entrepreneurs in Residence (who support and catalyse entrepreneurship in universities) and search tools including LinkedIn can also help identify relevant prospective collaborators.

## How can universities connect more effectively with potential industry partners?

How universities work may not be understood by the outside world. Universities may want to consider better marketing of their capabilities and assets, standardised pricing, and guidelines on how to connect with them, that would make it easier to identify a partner or direct business to the correct place. This marketing should include better pitching and compelling storytelling.

TTO professionals<sup>1</sup> may say they are resource constrained, while some of those in industry and academia say they lack skills not resources. Universities can reach out by clearly letting companies know how and with whom to connect. An easily identifiable single point of contact or digital 'gateway' to a university's capabilities is highly valuable. An additional platform for this could be events where companies can pitch problems to universities, and academics can give talks to industry, to identify points of mutual interest. It also would be useful for universities to have a common place to market any IP they have available for exploitation.

Collaborations need to be mutually beneficial to succeed. There is a need for more sustained meaningful engagement – from both partners – building upon a smaller relationship such as through joint doctoral

training programmes or account/relationship managers. To maximise their impact, account/relationship managers need the authority to make decisions and broker contracts. Increased mobility of both academic and industrial scientists between sectors, such as through Innovate UK's Knowledge Transfer Partnerships (KTPs) or schemes such as the Royal Society Industry Fellowships, are also beneficial.

A meeting of all those involved at the outset, including lawyers and contract specialists, allows partners to understand key drivers, any boundaries and clear any biases early. It is key to clearly define the roles of people in teams as there is often confusion about which individual from each partner performs which function. It is also important to build in reviews and milestones, celebrate successes and have a process for terminating a partnership.

Key influential factors for success include organisational support, especially buy-in and championing by senior management; the ecosystem effect, with access to local networks and infrastructure; local businesses' absorptive capacity; access to pre-seed and seed capital; and the skills and experience of university TTO professionals.



**Image** (left to right): Panellists Professor Chris Warkup, The Open University (Chair); Dr Darren Budd, BASF Plc; Dr Michael Murray, Murray International Partners; Dr Andrea Kellis, Arm Ltd; Anne Muir, University of Dundee.

1. Technology Transfer Office (TTO) professionals refers collectively to university staff who engage in any type of research translation activity including, but not limited to, licensing, spinout formation, research collaborations, KTPs, consultations, industry engagement, business development, etc.

### **What are the barriers to more successful technology transfer from universities to industry?**

The most cited barriers fall under ‘communication’: failure to understand each other’s objectives, priorities and aspirations; misalignment of industry needs and academic delivery; lack of clarity on the roles and responsibilities of stakeholders; bad signposting by academia as to when industry should engage with the technology; and the inability to present ideas accessibly. The second most pressing barrier is lack of funding, including for translation and development and support for the high cost of licenses, especially for start-ups. Thirdly, barriers can develop surrounding IP through mishandling of negotiations, lack of creativity in the IP’s application, and lack of a proper market or end-user for the IP.

Difficult and protracted IP and contract negotiations are another key issue for business-university collaborations. The lack of dedicated funds and the fact that business and academia operate on different timescales exacerbate the situation. Legal negotiation can be slow and a roadblock to collaboration. Industry legal teams are used to dealing with commercial contracts, so need to be shown how to deal with university contracts and IP. Meanwhile, university lawyers can be very risk-averse compared to their corporate counterparts.

Finally, because university metrics prioritise publishing over translation, academics are not incentivised to collaborate with industry or translate research. When collaboration is not part of the appraisal system, both industry and academic organisations do not build in sufficient time for collaboration.

### **What successful models are you aware of beyond the established routes such as IP licensing, spinouts or fee-for-service?**

Training was seen as a successful platform on which to build partnerships. This could take a range of forms:

- Undergraduate industrial placements;
- Masters projects from industry;
- Schemes in which PhD students spend their first year in industry exploring a problem before taking it into their research project;
- Centres for doctoral training that encourage PhD students to be entrepreneurial;
- Apprenticeships and Doctoral Training Programmes that bring in industry partners and provide entrepreneurial support for students;
- Internships; and
- Industrial sabbaticals for academics.

Other effective models include staff exchange, open source science and broader communication, Knowledge Transfer Partnerships and consulting projects, while industry clubs allow members to share skillsets and discuss challenges.

The academic and industry partners should be as flexible and inventive in business as they were in the science in the first place. Financing can take several forms including crowd-funding platforms, convertible loans, and shared risk in-kind partnerships. Organisations that support people to spinout such as Entrepreneur First are valuable, as are Entrepreneur in Residence style schemes that set up incubators and accelerators, help spin in, provide expertise on commercial development, and so on. Collaborations including joint ventures, not-for-profit collaborations, GSK’s Discovery Partnerships with Academia, and EPSRC Prosperity Partnerships were cited as alternative collaboration models, as well as consortia such as the UK BioBank.

# Creating value for both sides in partnerships

## Delivering impact through academic-industry collaborations

Collaboration is vital to drive innovation and national prosperity. Technology-driven companies must continue to innovate to succeed, but companies are not big enough to do all the research themselves. Collaboration with academia can help support this goal, but both sides need to benefit from the collaboration to be motivated to form a partnership. When choosing a collaborator, academia should consider:

- Will the industry scientist make a significant intellectual contribution?
- Does the company have a good track record for collaborations with academia?
- Does the industrial scientist have access to knowledge or technology that may contribute towards the aims of the proposed research?
- Is the industry partner well placed to exploit intellectual property arising from the collaboration efficiently and effectively?

Industry's high publication rate motivates academics to collaborate because this is a metric by which they are valued. The top company co-publishers with Russell Group universities are GSK, with up to 1000 publications per year, followed by AstraZeneca. Research is no longer 'cloak and dagger' and companies recognise the importance of sharing ideas with academics who could take them further. Meanwhile, industrial collaboration drives excellence in publications: the Field-Weighted Citation Impact<sup>2</sup> is highest in papers with industry collaboration, because work combines the expertise of industry scientists and academics.

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"No single tech-driven company, however large, has access to enough internal intellectual capacity to be truly innovative on their own. All companies must collaborate to survive."

Dr Malcolm Skingle, GSK

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"We spend a lot of time thinking about getting the right mechanisms and metrics to aid translation of UK research into practice, and perhaps nothing like enough time worrying about achieving the right mind-set among the people involved."

Professor Chris Warkup, Innogen Institute,  
The Open University

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2. The Field-Weighted Citation Impact (FWCI) score shows how the article's citation count compares to similar articles in the same field and timeframe in the Scopus database. A score of 1.00 means the article is cited as it would be expected, greater than 1.00 the article is doing better than expected, and less than 1.00 the article is underperforming. Source: <https://canterbury.libguides.com/impactmeasure/fieldweighted> accessed 30/1/20



The Cambridge Department of Computer Science and Technology has spawned over 270 companies founded by graduates and staff, mostly in the last 20 years. 54% of the companies are still active with revenues of \$1 billion (2016), while 18% were acquired for \$32 billion at current prices. The success of the department is thought to have helped support the development of the Cambridge cluster. The strategy leading to the success of the Department of Computer Science and Technology can be scaled-up for companies and clusters. It is based on the following:

- No barriers to simultaneous employment. Staff can consult or start their own company alongside their academic position. This creates a strong positive feedback loop as department staff have spun-out companies repeatedly, removing the need for TTOs and attracting additional entrepreneurial academics. Risk is reduced because academics still have a university job and the department supports spinout work.
- Carrying out all business dealings and IP negotiation outside the university. Keeping arguments away from the university has produced a very positive relationship with entrepreneurs and industry.
- Entrepreneurial academics who provide free mentoring, incubating and de-risking within the department.
- A departmental business club which includes mentoring by experienced entrepreneurs based in the department, annual prizes and realistic, positive role models.
- Giving academics space to publish a little less and develop companies a little more.
- Actively testing the market to see if there is interest.
- Going for volume and launching as much as possible rather than attempting to pick winners. Dealing with institutional and contractual roadblocks and reducing negotiation to zero between universities, entrepreneurs and industry to help drive the volume.

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“In my personal experience I find the REF can be distracting. I deliberately disregard the REF and disaggregate to its metrics but I advise not to be driven by it.”

Professor Andy Hopper CBE FREng FRS

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# Attracting, training and retaining the right talent

The meeting highlighted three creative ways to tackle the problem of attracting, training and retaining the right talent. Once large institutions recognise and solve this problem, it will make it easier for others to follow suit.

## LifeArc: case study

LifeArc is a British medical research charity offering technology transfer services to the MRC and supporting scientists to translate innovative research by working across pharmaceutical and biotechnology markets. LifeArc recognises the importance of delivering impact for academics and for patients and launched the Technology Transfer Fellowship scheme to develop skilled researchers into aspiring translation professionals.

The scheme is run in partnership with Imperial Innovations, Queen Mary Innovation and UCL Business. The LifeArc Technology Transfer Fellowship programme aims to train the next generation of technology transfer specialists to support translation of scientific breakthroughs from academia by developing the necessary skills, business acumen, vision and understanding.

While the fellowships are funded by LifeArc, Fellows undergo focused training in the different partner institutions through multiple rotations. In this way, Fellows receive broad training suitable for the diverse Technology Transfer Officer role (eg gaining legal expertise from one institution and spinout creation expertise from another). They get direct exposure to industry and real-life projects while building valuable networks.

## Brissynbio: case study

BrisSynBio is a multi-disciplinary Synthetic Biology Research Centre (SBRC) at the University of Bristol that focuses on the biomolecular design and engineering aspects of synthetic biology. Its mission is to be a world-leading centre for research, training, innovation and public engagement in synthetic biology.

The key to BrisSynBio's attracting skilled staff and researchers was a £15M UKRI investment in the SBRC, which included £3M for equipment for advanced computing, robotics, characterisation and bioimaging. This investment and the establishment of the Centre attracted a key synthetic-biology specialist in translation who helped to spin-out four companies from BrisSynBio alone.

These spin-outs are Cytoseek, Imorphoron, Rosa Biotech and Zentraxa, which are all based at the Unit DX Incubator near Bristol's Temple Meads Station. Unit DX is also home to Carbometrics, which is a daughter company of Ziylo which was procured by Novo Nordisk in 2018 in a deal valued up to \$800 million.

## Royal Society Entrepreneur in Residence scheme: case study

The Royal Society Entrepreneur in Residence (EiR) scheme supports entrepreneurs to go into universities and try to catalyse entrepreneurship. EiRs aim to encourage entrepreneurial thinking, catalyse commercial thoughts, and help students, academics and TTO professionals at universities.

Often students, early career researchers and professional researchers lack good tuition in commercialisation. Only some universities provide TTOs with the complete toolkit, including business skills, IP knowledge, seedcorn finance access and negotiation skills. Meanwhile, the university audience needs to understand what it takes to set up a business and what value propositions and business models are – an academic believing in an idea does not guarantee that an investor will.

Going into universities, EiRs often found a low level of understanding of commercialisation but interest in learning. This is a start for academics to build more partnerships between them and other stakeholders to take their ideas to market.

One goal of the EiR scheme is to educate academic staff and students, increasing the commercial literacy of those trying to spinout companies or enter commercially focused collaborations so that all are better informed. A small team of EiRs have created a commercial literacy course that is high level but practical, provocative, flexible, and explains the jargon of commercialisation in eight one-hour self-contained modules. The course has been well received and the presence of EiRs has helped spin out companies that otherwise would not have got off the ground.



**Image:** Delegates networking at the conference.

# How could the Royal Society help universities interface better with industry?

Key ideas raised in the meeting included championing successful partnerships through awards and prizes; promoting the provision of training; and using the Society's unique position to convene different groups at events.

## Awards

Awards, grants and prizes are a key way for the Royal Society to promote good practice in translation. The Society could recognise industry-academia partnerships through awards that recognise people who act as 'connectors', recognise companies who are exceptional partners, or "fellows of translation", "best value creation", or "Technology Transfer Officer of the year". The Society was encouraged to continue to promote its Industry Fellowship and Entrepreneur in Residence schemes and increase promotion of grants schemes and events in this space. It could also engage with the investor community to address the lack of funding for translation and development.

## Training

The Society could further promote training for researchers about industry relationships, and share knowledge by creating high profile case studies of best practice and successful collaboration. It was suggested that the Society support mobility and upskilling of people, including extending the Entrepreneur in Residence scheme to include exchange of personnel between industry and academia, rather than a one-way transfer of an individual into academia. There is scope to promote apprenticeships or mentorships where young people can learn negotiation skills and the value of collaboration. Lastly, the Royal Society could encourage the provision of training for credible IP negotiators.

## Events

The Society could use its unique convening power and independence to host industry clubs and facilitate networking events and debates. It should continue to host and promote events discussing best practice for translation, including talks, and could better promote what it can offer to industry.

## Connecting

Given the Society's unique placement between industry, academia and government, it could influence government policy to provide support for TTOs and industry engagement. It is uniquely positioned to work with key funding bodies to promote knowledge exchange between universities and its value to society, as well as to help connect people between industry and academia and signpost existing schemes (eg KTN, the National Coalition of Certification Centres (NC3), UKRI Innovation Scholar).

Its independence means the Society is able to act as a broker in conversations between sectors and could help develop a programme or tool to manage negotiations. It could explain the UK's mechanisms for translation and the translation landscape so that overseas companies can work with the UK, and to promote a cultural shift that values knowledge exchange.

## Other

Other suggestions included increasing membership of the Fellowship to include more industrial scientists and provision of translational funding. It could also champion technology transfer and knowledge exchange as a research output.



# Summary

The UK Government industrial strategy aims to increase R&D investment to 2.4% of GDP by 2027. Reaching this target will require significant input from industry and improvements to our existing practices of translation. Translation is much broader than commercialisation alone and does not revolve solely around licensing and spinout of companies: partnerships and collaborations are equally important. Technology-driven companies recognise the need to continue innovating to be successful, but are not big enough to do all the research themselves. Collaboration with academia can help support this goal as long as both sides benefit from the collaboration.

There is a need for more and sustained industry-academia interaction. Currently, collaborations rely heavily on personal networks. One way to tackle this is by hiring ‘connectors’ or creating an easily identifiable single point of contact or digital ‘gateway’ to university capabilities. Mobility of people between academia, start-ups, incubators and industry is another way to improve communication and help the innovation ecosystem function with less friction.

Nurturing long-term relationships should be prioritised as much as negotiating IP. Successful partnerships rely on trust and starting with a small collaboration helps to establish this. Training through student industrial placements, apprenticeships and PhD sponsorships, as well as knowledge exchange and small consulting projects, are a successful platform on which to build partnerships. Recruitment of talented people is a significant value-add for both sides.

The main barriers to successful research translation are lack of effective communication (including failure to understand each other’s needs and objectives, and lack of clarity on the roles and responsibilities of stakeholders) and issues surrounding IP (difficult and protracted IP and contract negotiations). The lack of dedicated funds for translation and development activities and the fact that business and academia operate on different timescales can also impede collaboration.

Finally, ensuring that university policy recognises technology transfer and knowledge exchange as research outputs, as well as supporting entrepreneurial academics who wish to pursue research translation, will help to incentivise academics to collaborate with industry and translate their research.

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“The Royal Society and its Science, Industry and Translation Committee believe that translation of research is critical for the success of the country. I hope through this conference to have continued an important discussion and helped develop solutions to promote the UK’s exceptional research base, bringing benefit to both society and the economy.”

Dame Sue Ion DBE FREng FRS

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# Key contributions

**Kate Barnard**

Rolls-Royce Plc

**Dr David Bembo**

Cardiff University

**Peter Brewin**

Concrete Canvas Ltd

**Dr Darren Budd**

BASF Plc

**Dr Celia Caulcott**

UCL

**Dr Stephen Cook**

BP plc

**Dr Georgia Glik**

LifeArc

**Professor Andrew Hopper CBE FREng FRS**

University of Cambridge

**Pete Hotten**

NuAge Vision Ltd, Royal Society Entrepreneur  
in Residence at Swansea University

**Dame Sue Ion FREng FRS**

Royal Society Science, Industry  
and Translation Committee

**Dr Andrea Kells**

Arm Ltd

**Robin Knight**

IN-PART

**Professor David Knowles FREng**

Henry Royce Institute

**Dr Rupert Lewis**

Government Office for Science

**Anne Muir**

University of Dundee

**Dr Michael Murray**

Murray International Partners

**Dr John Patterson**

Retired

**Professor Matthew Reed**

University of Liverpool

**Professor Lisa Roberts**

University of Leeds

**Dr Malcolm Skingle CBE**

GlaxoSmithKline

**Professor Chris Warkup**

Innogen Institute, The Open University

**Professor Dek Woolfson**

BrisSynbio, Bristol BioDesign Institute,  
University of Bristol



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**For further information**

The Royal Society  
6 – 9 Carlton House Terrace  
London SW1Y 5AG

T +44 20 7451 2500

W [royalsociety.org](http://royalsociety.org)

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