

## UK China Research Collaboration

Date and Location: 27th April 2022 at The Royal Academy of Engineering

Chair: Dr Mike Short CBE FREng FIET  
Chief Scientific Adviser, Department for International Trade

Speakers: Minister Yang Xiaoguang  
Minister and First Staff Member, Embassy of China in the UK  
Rt Hon Sir Oliver Letwin FRSA  
Author of "China vs America: A Warning"  
Vivienne Stern MBE  
Director, Universities UK International  
Professor Christopher Smith  
Executive Chair of AHRC and UKRI International Champion

Report Author: Gavin Costigan  
Chief Executive, The Foundation for Science and Technology

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**DR SHORT** opened the meeting. He noted the huge number of research collaboration with China, across many fields and disciplines. Collaboration with China brought many opportunities for advancing science, particularly to address key global challenges. On the other hand, concerns are sometimes expressed about R&D collaboration with China for a number of different reasons. The event would look at the opportunities going forward for R&D collaboration in the future, and how we can develop these in the best interests of both UK and China.

**MINISTER YANG XIAO GUANG** began by noting the importance of the China/UK relationship, to both countries and globally. The key to achieving a sound relationship is mutual respect, with mutual trust and mutual understanding. This will allow us to develop partnership on an equal footing. 2022 marks the 50th anniversary of China/UK diplomatic relations. Over the past half a century, bilateral trade has increased from US\$300M to US\$116B, with investment stock moving from almost zero to around US\$50B. 2021 was a new record for UK/China trade, London is the

world's biggest offshore RMB trading centre, and the UK and China were co-ordinating well on global challenges such as climate change.

China and the UK signed a science and technology cooperation agreement in 1978, and in 2017, the two sides agreed a joint strategy for Science, Technology and Innovation cooperation, the first between China and western country. China/UK cooperation on Science and Technology has achieved remarkable results in many fields, benefiting the peoples of both countries. The UK has made an important contribution to China's development and progress, and China has helped improve UK research capabilities. A recent report shows that more than a fifth of UK research in high impact subjects involve collaboration with China. In 2019, 16,000 research papers (11% of the UK total) involved collaboration with China, up from 700 papers (1% of the total) in 2000.

Chinese investment added £63B to the UK economy in 2021. China/UK cooperation on research is not optional but a must. Global challenges such as Covid-19, energy, climate change and biodiversity loss need joint international responses.

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China is now a global leader in many areas of innovation, such as telecommunications (5G and 6G), green energy technologies (producing 70% of global solar panels and 40% of wind turbines) and nuclear power. China has developed a highly efficient IP system and attaches great importance to IPR protection, and surveys of US and EU companies show a majority with positive views of Chinese IPR protection laws.

He concluded that research co-operation between China and the UK will lead to a brighter future.

**SIR OLIVER LETWIN** started by noting that in the current period, geoeconomics is driving geopolitics, rather than vice-versa. There is a strategic rivalry between the US and China. It's an economic rivalry - whose grip on the world's economy will be greater, and who will out compete whom. It's not the old Cold War with direct ideological strife, although there are different values and governing the two systems. It's similar to previous geoeconomics rivalries such as between the UK and Germany in the 19th century, or UK/US rivalry in the early 20th century.

Sir Oliver's second proposition was that certain critical foundational technologies are driving geoeconomics. Unlike the industrial revolution, these foundational technologies that are driving geoeconomics are much more concentrated. AI and big data are a clear example, and one where the US firms and Chinese firms are clear rivals. Data is at the centre of everything - the person who can control and exploit the data through AI has the capacity to transform almost every aspect of human life. And so those foundational technologies are therefore central to driving geopolitics.

His third proposition was that because of the nature of the foundational technologies that are driving geoeconomics, science, is at the heart of geoeconomics and geopolitics, to a degree and in a way that has never previously been true. Basic research, and its translation into more applied fields, is at the centre of winning the economic struggle, and hence, at the centre of geopolitics.

So the question of how far the UK and China should collaborate in R&D is not just a scientific question, it has geoeconomics and geopolitical consequences. Sir Oliver's view is that without collaboration, between the West and China, in these foundational technologies, we would see increased decoupling, and a separation of economies in which the West broadly becomes an economy, and the Chinese a separate economy. This would impoverish both sides, and the rest of the world

depends on the prosperity of both of China and the West. Such decoupling would also lead to a reduction in mutual understanding and trust. And distrust can lead to confrontation.

The only way we stand any serious chance of managing competitive rivalries (and these will continue) is to ensure that there continues to be a large amount of organised and sophisticated collaboration. Each side needs to operate with their eyes open and be realistic about the need for protection of various kinds. It's not easy to collaborate in ways that ensure that you're preserving your independence, and protecting IP and national security, but it is necessary. Instead of moving towards increasing decoupling, we must move into an era of more sophisticated and eyes open collaboration, and gradually build increasing trust.

**VIVIENNE STERN** began by highlighting the speed and the scale of improvement and increasing volume of production in Chinese research, and the rapid improvements in performance of Chinese universities. There is much that the UK should take from the long term vision and ambition that China is displaying in higher education and research. 11% of UK research outputs are co-produced with Chinese co-authors. About a third of international students in the UK are from China, and we teach around 61,000 students in China through transnational education provision, and around 6000 staff at UK universities are Chinese nationals. Given the importance of China in higher education, research, and geopolitically, we need to maintain and improve UK/China collaboration.

The best research is produced when people are able to work with colleagues irrespective of where they are, so the key is removing friction to do that. The world is so interdependent, and collaboration is the answer to the many global challenges, so the principle should be to make collaboration between the UK and China easier and not harder.

However, the UK/China relationship is moving to a different phase, and we need some long term strategic thinking of what kind of relationship we want to have. BEIS is developing a new framework for international collaboration in research, and the UK has an ambition to be a science superpower. So what do we need in order to take our relationship with China to the next level, and further reduce the friction that gets in the way of individual research collaboration? We have a few joint calls, but these are very specific and short term, and some have been constrained by ODA rules. What do we need to do to leverage our existing strengths and

develop new ones in areas where the technological and competitive advantage of the future will be found?

There are hard questions for us to ask ourselves in the research community, being clear about our goals, interests and objectives, and also what we will not and cannot do. These conversations are increasing in frequency and depth, and universities are thinking more deeply about the partnerships they are entering into.

UK institutions need to have that conversation with their Chinese counterparts, openly, frankly, without any sense of embarrassment. If we are to deepen our collaboration, we need to be able to talk about our own objectives. There will be some areas where we have to walk away – that will be part of the decision making process. But it is in all our need to have this debate, in the open.

**PROFESSOR CHRISTOPHER SMITH** began by outlining the strength of Chinese R&D, at 2.4% of GDP and with year-on-year expenditure in R&D growing by an average of 11.8%. China has 25% of the global R&D workforce, and their rising global importance means that it is more important than ever to work with China.

In 2020, the UK became China's second largest partner in joint publications after the US. Joint papers receive higher field weighted citation indices than papers written separately for both countries. Our joint collaborative research output has more than doubled over the five years from 2016 to 2020, from 9,925 in 2016 to 21,154 in 2020.

Underpinning all this is a hugely powerful set of collaborative relationships that are built from the ground up, based on mutual respect and trust between universities and individual researchers in both countries. This is underpinned the UK China joint strategy for Science, Technology and Innovation cooperation signed in 2017. There is an annual flagship challenge, where the UK and China agree to enhance levels of cooperation in a specific area, and significant advances have come from that.

2022 is the 15th anniversary of the UKRI China Office. As well as bilateral collaboration, UKRI works with Chinese partners in multilateral international initiatives, such as CERN and the Square Kilometre Array. This infrastructure, sitting underneath the research and innovation partnerships, has helped develop this strong collaborative landscape.

Collaborative research has delivered tangible benefits. Collaboration between British and Chinese institutions delivered COVID testing kits that work in as little as 15

minutes, which were used support international travel and the UK government's test release scheme. New carbon capture technology incorporated into China's existing and planned energy infrastructure reduce the energy requirements of CO<sub>2</sub> capture by 25 to 30%. A novel battery technology is leading to the development of new fleet of hybrid buses in UK and advanced charging facilities in China. Our collaboration is about both upstream research and downstream application.

Our collaboration is done through the lens of Trusted Research – which is part of good practice in research integrity essential to every partnership between every country and every other country. There is significant appetite for us to continue and develop these collaborations between the UK and China bilaterally and multilaterally, where we can together work on critical flagship challenges such as health and decarbonization.

Professor Smith concluded his talk with a short passage from the Chinese poet Du Fu.

**IN THE DISCUSSION PERIOD**, panelists were asked where there should be more, and less, collaboration. In response, potential growth areas mentioned include the creative industries, tackling the challenges of climate change, green growth, health and AI. Panelists did not see areas to reduce collaboration, but did mention the importance of spreading the culture of awareness around the potential risks in engaging in certain sorts of research where our own legislation prevents either voluntary or involuntary sharing of certain sorts of technology. The key is to enter into productive collaboration where both sides have something to offer and the whole is greater than the sum of the parts. There must be actual economic beneficial effect in both places. Striking that balance right means that there will be some things that we do do and some things we don't do. Another risk that the panel mentioned was the drive for fast publication, and whether that was in the best interests of the science.

The panel were also asked what happens if you start with a mutual economic benefit, but then get into politics instead of economics. How would we cope with that? The panel noted that this was difficult and that every case was different, but that every collaboration with an economic benefit will have a political effect. All governments therefore have an interest in economic collaboration and what is and is not done. It is legitimate for the Government to have an interest in when and how leading UK companies and universities collaborate, so that collaboration in science and

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technology does not lead to being outcompeted economically. Government needs the capacity and capability to do this in an intelligent way.

A further questions asked whether the UK needs a specific bespoke UK China Agreement - whether the rules are the same with whoever you engage with, or whether they need to be tailored them. In response, the panel favoured an agnostic approach, where each country seeks out its own interests but pays attention to those of the other side. They reiterated the opportunities of collaboration with China, and noted in passing the alarming rise in ethnically Chinese staff and students in UK universities who have suffered racist abuse.

A questioner noted that whilst China goes to some trouble to understand English speaking countries, there is a lot of ignorance in UK universities about China. The panel were asked what more could be done to help UK universities understand China better. The panel agreed that we under-invest in promoting Chinese language skills and in research mobility from the UK to China. A strategic and long term approach is needed, and a greater emphasis on mandarin as a modern language subject to be taught. The pandemic has also shown us that more can be done virtually. And specific measures can help, including collaborative PhDs with joint supervision, early career grants and fellowships.

The panel were asked to highlight some UK/ China S&D success stories. In response, the Oxford Suzhou Centre for Advanced Research (OSCAR) was highlighted, with a huge range of innovations including Covid-19 rapid testing kits. Before that, Chinese researchers who had developed relations with Western researchers passed to the Western researchers, the sequencing of COVID, hugely speeding up the development of global vaccines. We also need to get better at gathering the data telling the stories of what has worked (and not worked) with collaborations, so we are not constantly reinventing the wheel. We also need to encourage UK researchers to spend some time in China early in their careers.

Gavin Costigan