Summary

1. Imperial College London’s mission is to achieve enduring excellence in research and education in science, engineering, medicine and business for the benefit of society.

2. Collaborating across borders with people from different backgrounds, cultures and nationalities is what drives the world’s best universities. Imperial is a European university with global reach, and has consistently been named the UK’s most international university. We need certainty on access to EU programmes and collaboration, and guarantees on the rights of EU citizens.

3. Imperial generates world-class talent and research that drives productivity and growth across the UK. Investing in high-level skills for a broader cross-section of our own population and welcoming talent from across the world into the UK will supply our science, research and innovation pipeline for years to come.

4. We would be greatly concerned by the potential impact of a reduction in the number of EEA nationals able to take up academic and non-academic positions at Imperial. A new immigration system should be an opportunity to consolidate and build on our track record in research and innovation by ensuring the UK is both accessible and attractive to global talent.

EU staff mobility

5. Nearly 25% of College staff are EEA nationals\(^1\) and as the UK’s most international university, Imperial’s partnerships are underpinned by international exchange and academic mobility programmes which foster world-class science, education and innovation ecosystems.\(^2\) At an EU level this includes:

- The Marie Skłodowska-Curie Actions (MCSA) which provide training for researchers at all career stages with a major focus on both international and inter-sectoral mobility.
- The Individual Fellowships (MSCA IF) and Innovative Training Networks (ITNs) which have provided high-quality educational, research and knowledge exchange opportunities.

6. To maximise the government's investment in the UK’s world-class research base, leading universities must maintain their ability to bring together the best inventors, entrepreneurs, investors, academics, technicians and creatives from across the UK, Europe and rest of the world.

7. There is clear evidence that collaboration between academics from diverse backgrounds and nationalities produces the highest quality research.

- 58% of Imperial’s academic papers had international co-authors and these received 2.59 times more citations than the norm compared with 1.45 times more citations than the norm for those without international collaborators.

8. Our European staff make a significant contribution to our research and teaching excellence and attract valuable grant funding to tackle global challenges. 35% of our 2016/17 research grants and contracts expenditure involved Imperial academics with non-UK EEA nationality.

9. The UK has led the EU in hosting researchers funded by the European Research Council (ERC) as well as Marie Skłodowska-Curie Actions (MSCA) researchers. Over the last decade, the ERC has supported more than 100 grants across all four faculties of the College, investing €160 million and making Imperial one of Europe’s top beneficiaries of the ERC’s excellence-based funding for the most innovative, groundbreaking research.\(^3\) For example:

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\(^1\) Imperial College London data, September 2017  
\(^2\) Times Higher World’s Most International Universities 2017  
\(^3\) https://www.imperial.ac.uk/media/imperial-college/about/public/ERC10thAnniversaryEvent.pdf
Written evidence submitted by the Imperial College London (BSI0068)

- Professor Zoltan Takats (Hungarian national), developed the iKnife at Imperial, a scalpel that tells surgeons immediately whether the tissue they are cutting is cancerous or not, transforming surgery and saving lives.

- Professor Esther Rodriguez-Villegas (Spanish national) has won three European Research Council grants worth nearly €4 million. She developed the AcuPebble, a wearable breathing and cardiac monitoring device that uses innovative engineering to provide automatic assessment of respiratory and cardiac conditions including sleep apnea, COPD, atrial fibrillation and asthma.

- Professor Daniel Rueckert (German national) is the Head of the Department of Computing. His research aims to build the first ever map of brain connectivity in foetuses and newly-born children, allowing researchers to study how brain connectivity is altered in neuropsychological disorders such as autism. Professor Rueckert has received a total of €3,265,196 of funding from the European Research Council to date.

EU student mobility

10. Imperial’s international students are vital to the quality and impact of our research, education and to the UK economy. The College attracts a large number of qualified and talented students from the EU. In total, almost a fifth of our student population has EU fee status. Our European students and alumni are powerful ambassadors for British business and innovation.

- Annika Monari (Italy) and Alan Vey (UK), founded Aventus – a blockchain-based solution to ticket fraud and touting – while at Imperial. The platform aims to combat uncontrolled resale and counterfeit tickets, while improving the transparency and security of ticket sales technology. Their aim is to position themselves as the “infrastructure for the whole ticketing industry”. They have just raised $20m of investment in an Initial Coin Offering (ICO). The start-up now employs 17 people.

- Elena Dieckmann (Germany) is the co-founder of Aeropowder which has found an innovative new use for the 2,000 tonnes of chicken feather waste produced by the UK poultry industry every week. Dieckmann and her colleagues are turning waste feathers into a composite material that is lightweight, biodegradable and water repellent for home insulation. Her invention has won multiple awards – including £20,000 from the Mayor of London – and significant investment. Elena is featured in Forbes’ 30 Under 30 - Europe - Social Entrepreneurs 2017 and was one of 15 recipients of the Innovate UK Women in Innovation Awards.

- Luca Alessandrini (Italy) was named London’s most innovative international student in 2016. Whilst studying for his MSc in Innovation Design Engineering (jointly run by Imperial’s Dyson School of Design Engineering and the Royal College of Art), he invented a violin with strings made from a mixture of Australian Golden Orb spider silk and resin, which when played emits a unique sound that can be customised by altering the quantities and blend of the silk and resin. He said “…studying in London has been one of the best experiences in my life and this incredible initiative [the International Student Innovation Awards] will allow me to bring my project closer to reality. I have spent two years working full time with 38 people from 14 different countries and I couldn’t imagine a more supportive and stimulating environment than this city.”

11. The Government should negotiate continued access to the successor programme to Erasmus+ beyond 2020 as part of a future partnership agreement. UK students enjoy benefits such as enhanced communication and language skills, reinforced adaptability to new environments, and

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4 HESA Student Record 2015/16  
5 "Bitcoin of ticketing" raises $20m in ICO – Imperial College London, September 2017  
6 Imperial student start-up finds new use for waste feathers – Imperial College London, November 2016  
7 30 Under 30 Europe: Social Entrepreneurs – Forbes, 2017  
8 Imperial design engineer named London's most innovative international student – Imperial College London, 2016
boosted academic performance. In addition, UK students on exchange are ambassadors for UK universities abroad. Feedback from Erasmus students returning to Imperial includes:

- “Studying abroad definitely teaches you a lot of transferable skills, which employers value and you gain a wider perspective on research as a whole.”
- “The program gave me the perspective of achieving proficiency in two foreign languages and of having an excellent scientific training at the same time.”
- “A challenging but very rewarding experience. I am now much more confident and culturally aware than when I started.”

12. As a member of the EU, the UK benefits from rules on the recognition of professional qualifications and work experience, which facilitate the portability of professional qualifications across Europe. An ambitious new partnership will require a granular focus on the mutual recognition of professional qualifications after the withdrawal date. This is important for STEM graduates joining international companies and their ability to take on leadership position and maintain UK influence.

Priorities for post-Brexit immigration reforms

13. Progress on the rights of EU citizens currently in the UK last year was welcome but there is an urgent need to develop policies that protect and enhance academic mobility as part of the UK’s new relationship with the EU. We need the ability to recruit and retain world-class academics, post-doctoral researchers and students if we are to remain internationally competitive.

14. We continue to advocate for a range of immigration policies that will welcome and retain talented staff to support our international research collaborations, encourage innovation, attract international collaborative research funding and maintain our competitiveness:

- Linking scientific mobility with research funding where participants in EU-funded research projects, or European-collaborative grants sponsored by UK agencies (eg to under to undertake experiments at CERN through a STFC grant; to build a space instrument on an ESA mission through a UKSA grant) would automatically receive a visa for free movement between Britain and the EU. This would disentangle science from the wider immigration debate.
- Easing the Tier 1 visa route for workers with exceptional talent such as top researchers.
- Introducing a new post-study work visa for top STEMB graduates.
- Expanding the Doctorate Extension Scheme for STEM PhD students from one year to three years to match recent US reforms targeted at STEM PhDs.
- Expanding Tier 1 graduate entrepreneur visas to encourage the brightest international students to develop their business ideas and create jobs in the UK.

15. The risk of the continued uncertainty is that existing and potential international staff and students will no longer perceive the UK to be a welcoming environment and are targets for recruitment by our European and international counterparts.

- A recent survey for Elsevier by Ipsos Mori found that the UK has taken “a major reputational hit” as a place for researchers to work. We have heard from our own staff that Brexit is an important consideration when thinking of studying or working in the UK and have had a few examples of academics choosing not to join Imperial citing the referendum result – and uncertainty around immigration policy - as a factor in their thinking.

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10 Following Brexit, securing science funding is top goal, researchers tell government and academic institutions, Elsevier/Ipsos MORI survey shows, Nov 23 2017
Research collaboration

16. Collaborating across borders with people from different backgrounds, cultures and nationalities is what drives the world’s best universities. Imperial is a European university with global reach, and has consistently been named the UK’s most international university.

- One third of research collaboration at Imperial involves European collaborators.\(^{11}\)
- To date, Imperial has won a total of €185 million of funding from Horizon2020 - Imperial is the 4th most successful HEI in Europe at winning H2020 funding.\(^{12}\)
- Excellence-based ERC grants have supported research into nanomaterials and tissue engineering\(^{13}\); the development of the AcuPebble, a wearable wireless diagnostic tool for a range of illnesses\(^{14}\); and the European AIDS Vaccine Initiative led by Imperial.\(^{15}\)

17. Strong European science and innovation networks have been formed over the duration of European funding programmes, and have in turn consolidated or ignited wider global collaborative and interdisciplinary endeavours. Horizon 2020 ‘Societal Challenges’ and ‘Industrial Leadership’ grants are excellent examples of collaborative funding and involve industry (including SMEs) as well as academic partners from across Europe and beyond.\(^{16}\)

- The European Asthma Research and Innovation Partnership (EARIP) brings together scientists from across Europe, working with the pharmaceutical industry (GSK and Novartis) and patient groups to develop an ambitious roadmap for research, development and innovation. The roadmap aims to transform the lives of more than 300 million people who currently have asthma around the world and reduce asthma-related deaths by 25 per cent within the next 10 years.\(^{17}\)

- Imperial researchers, with the backing of Volkswagen, Volvo and German university partners, are working on a €6 million project to develop a new clean fuel – PhotoFuel – using Cyanobacteria, which get their energy from sunlight. The aim is to scale up the project to an industrial level, with ‘living refineries’ producing sustainable, low-carbon and cost-effective transportation fuels.\(^{18}\)

- An international team of doctors is aiming to develop a rapid test to allow medics to quickly identify bacterial infection in children. The £14 million project, which involves French biotech firm bioMérieux, and UK-based Micropathology Ltd aims to reduce the use of unnecessary antibiotics and to quickly identify deadly cases of meningitis, sepsis and other life-threatening bacterial infections.\(^{19}\)

18. We welcomed the joint announcement by the UK Government and the EU that UK researchers will remain eligible to apply for new Horizon 2020 grants for the duration of the programme.\(^{20}\) We are advocating for the UK government to prioritise an agreement on collaboration which will enable the UK access to future EU research and innovation programmes (and infrastructures) with a focus on excellence. This would also be the best route to preserve our relationships with current EU partners and to develop fruitful research collaborations with new ones.

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\(^{11}\) ERC report
\(^{12}\) UK’s participation in Horizon 2020, BEIS (September 2017)
\(^{13}\) See Nanotechnology to help rebuild bodies and detect disease, ERC (January 2013);
\(^{14}\) See www.imperial.ac.uk/people/e.rodriguez/research.html
\(^{15}\) See HIV scientists launch 23 million euro project to develop vaccine, Horizon 2020 (October 2015)
\(^{16}\) Since the current EU Framework for Research and Innovation, Horizon 2020 (H2020) began in 2014, Imperial has won 301 awards worth approximately €???m.
\(^{17}\) Asthma could be cured within a generation, say European researchers, Imperial College London, May 2017
\(^{18}\) More details on PHOTOFUEL can be accessed at: http://www.photofuel.eu/project.php
\(^{19}\) More details in PERFORM can be accessed at: http://www3.imperial.ac.uk/newsandeventsppgrм/imperialcollege/newssummary/news_19-6-2016-21-53-8
\(^{20}\) Joint report on progress during phase 1 of negotiations under Article 50 TEU on the UK’s orderly withdrawal from the EU, DExEU (December 2017)
19. The UK research community must play a full part in the consultation process for the design of Horizon 2020’s successor, Framework Programme 9 (FP9) to send a strong signal of the UK’s commitment to reaching an ambitious science and innovation agreement with the EU.

- The success of Horizon 2020 (including the ERC) and previous Framework Programmes has been the result of focusing on scientific excellence. It is essential that this remains the principal evaluation criterion of award in any future model.
- We share the view of the League of European Research Universities that Framework Programme funding has created a Europe-wide competition for the very best research, lifting European research to an even higher level.\(^\text{21}\)
- We agree that the FP9 budget should be uplifted to at least €120bn to recognise the clear EU added value that investment in research entails.

20. The Government should continue to forge new global research networks and co-fund more ambitious programmes to support collaboration with leading science powers and emerging economies. We recognise progress made to date, for example with the Rutherford Fund, the UK-China Science and Technology deal and UK-US Science and Technology Agreement.

**EU research infrastructure**

21. There is concern around the impact of Brexit upon long term, pan-European research infrastructure projects (particularly in the medical and social science spheres involving pan-European data sets and information sharing). Please note that not all collaboration mechanisms are dependent on EU membership. For example we will continue to play an active role in CERN and the European Space Agency after the UK leaves the EU.

**Uncertainty over regulatory changes**

22. Uncertainty about whether the UK will continue to participate in European regulatory frameworks can impact our interaction with academic, government and corporate partners. There are a number of sectors where divergence between UK and EU regulations might make research more complicated – for example if it became more difficult to run multi-centre clinical trials across multiple jurisdictions.

- Regulatory requirements concerning medicinal products are largely harmonised across the EU through mechanisms such as the Medicinal Products Directive, the Clinical Trials Regulation and the Regulation on Supplementary Protection Certificates. The prospect of divergent regulation post-Brexit where the UK determines and implements its own laws and regimes, including authorisation procedures for medicines and clinical trials, as well as inspection practices, may require bilateral treaties or mutual recognition agreements with the EU.

*February 2018*

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\(^{21}\) Beyond the Horizon: What LERU wants from FP9 – LERU, June 2016