

Institution: BRUNEL UNIVERSITY LONDON

1. Context and mission

Founded by Royal Charter in 1966, Brunel University London was established to tackle problems that were fundamental to the development of future economically important technologies, and to more immediate industrial needs. That core motivation remains to this day, and Brunel Vision 2030 reaffirms our focus on areas in which we can integrate academic rigour with the needs of government, industry and the not-for-profit sector, delivering creative solutions to global challenges and bringing economic, social and cultural benefit.

The institution took an inclusive approach to both RAE2008 and REF2014, submitting around 90% of eligible staff to both exercises. Our increasing research strength resulted in substantial improvements in outcomes, and saw our Research England QR income rise by 50%, so that we now receive the 33rd largest share of that funding.

Brunel is a broad-based multi-faculty institution. Our submission draws together the academic work of 659 staff across 16 units of assessment. Their work is highly cited, for instance Brunel publications from 2014 on the Web of Science have an average of 21.3 citations, evidencing our intellectual leadership across a range of disciplines. Since 2014, we have won £195.3M of research grant income, graduated 1263 PGR students and been involved in five new doctoral training centres. We have held the 33rd largest funding portfolio from the EPSRC, the 13th largest from Innovate UK and the 32nd largest share of UK institutions' funding from the EU.

Since 2014 the individual achievements of some of our professorial staff have been nationally recognised; John Sumpter was awarded the OBE for research on ecotoxicology in the aquatic environment; Valsa Koshy an MBE for research on raising educational aspirations; and Bernardine Evaristo won the Booker Prize and was awarded an OBE. In addition, three staff have been made Fellows of The Royal Academy of Engineering.

Brunel's knowledge exchange activities, including contract research, CPD, consultancy and business support and innovation programmes are supported by £5.8M of external investment annually. Our collaborative research income increased by 31% between 2013/14 and 2018/19. Our income from SMEs is, notably, the second highest of any university in London and we have the largest income from Innovate UK in our KEF peer group. Brunel is one of only five universities (Brunel, Cambridge, King's College, Manchester and UCL) to have won Research England's UKRPIF funding for three or more major capital research projects with industry.

Brunel's disciplinary-based research is organised in research centres and departments in three multi-disciplinary colleges; Business, Arts and Social Sciences; Engineering, Design and Physical Sciences; and Health and Life Sciences. The latter College was renamed as Health, Medicine and Life Sciences in August 2020 in preparation for the launch of the Brunel Medical School. In addition, we have one large independent research centre, the Brunel Centre for Advanced Solidification Technology (BCAST).

Our challenge-led research is organised into four Research Institutes; Digital Futures; Energy Futures; Environment, Health and Societies; and Materials and Manufacturing. These bring 67% of

the faculty together from across the University to address research questions aligned with the UN sustainable development goals, the UK industrial strategy or the needs of the local community.

Brunel has a vibrant, rich and dynamic academic community drawn from all parts of the world, as well as processes and a culture that drive widening participation and promote equality of opportunity. 45% of academic staff have a non-UK background, 63% of our UK PGR students have BAME ethnicity and 78% of our home/EU students are in one or more groups under-represented in HE. This unique community and culture informs many aspects of research strategy, including, for instance, our approach to social sciences research, the implementation of our GCRF strategy and the way we work with partners to maximise the impact of our research on the local and regional economy and communities.

2. Strategy

Following the creation of the Research Institutes in 2014 the University reviewed its **Research Strategy** in 2018/19. We gathered input from over 1,000 staff and students and looked at all aspects of the research life-cycle including structures, support systems, and processes and procedures to ensure a sustainable research environment. The resulting Brunel 2030 Research Strategy reiterates our commitment to challenge-led inter-disciplinary research in key areas of strength supported by strong disciplinary research centres within our Colleges. It led to the launch of a fourth Institute, Digital Futures, in 2020 to integrate and strengthen the research on digital technologies taking place across the institution, complementing the work of the three Institutes established in 2014.

Over the next five years the strategy will drive the implementation of activities to improve support to researchers, particularly ECRs and PGR students, strengthen and expand our research infrastructure and our internal peer review system, ensure that research underpins all academic activities and to develop our research communication strategy. Fundamental to the delivery of our strategy is the firm commitment to principles of equality, diversity and inclusion and to the highest levels of research integrity guided by the principles of open science.

Our **knowledge exchange strategy** is to build our KE capacity and culture, unblock barriers to effective engagement and collaboration and develop our two major KE initiatives in metal casting and processing and structural integrity.

In order to develop our KE capacity and culture our support for consultancy, business development, commercialisation and student entrepreneurship has been reinforced. The scale and ambition of our outreach activities has been expanded, with a dedicated Public Engagement Ambassador, a programme of educational and cultural activities, a new STEM Outreach Lab and an established Artist in Residence scheme which has just recruited its third artist. Many staff engage in the public communication of our research at a local, national and international level and the University funds a number of public engagement programmes to catalyse activities with specific research groups or to target particular audiences. The University has over 200 articles on The Conversation, that have attracted 2.5M readers. To further support policy research taking place across the institution we have initiated a series of policy briefs, joined the Civil Service Open Innovation Team and launched the Brunel Policy Unit to provide **policy** engagement expertise and skills to increase the use of our research by policymakers.

To overcome the barriers to engagement and collaboration with industry we support mobility and exchange of people through staff KT leave and secondments and a PGR internship scheme. Since

2014, 17 faculty members have carried out secondments in a range of businesses including Jaguar Land Rover, Ford and Sellafield Ltd. To engage with “hard to reach” organisations we introduced **Innovation Vouchers** to allow SMEs to work with our researchers. Since 2017 36 Vouchers worth £177k have been used to support projects including the design of a hand-held device for electronic document reading for visually impaired people and the development of apps for Post-Operative Patient Interaction.

Our first major KE initiative is the Advanced Metals Casting Centre, which is based in BCAST, a national facility for advanced light metals casting is being created to support light-weighting applications in the automotive and other advanced engineering sectors. This project has made important progress in the last few years. In June 2018, Constellium, a global supplier of aluminium products, established an R&D Centre at Brunel, in 2019 we secured a further UKRPIF award for a scale-up facility and we recently won an EPSRC Productivity Partnership to develop a new range of fully recyclable ultra-high strength aluminium alloys for the automotive industry.

Our second major initiative is the National Structural Integrity Research Centre (NSIRC), a national facility for postgraduate research in structural integrity for the energy and transport sectors, where Brunel is the lead academic partner. In collaboration with TWI, BP and Lloyd’s Register Foundation, NSIRC has graduated 56 PGR students, completed over 50 collaborative industrial research projects and secured £26.3M co-investment.

We have established a process to support the translation of our research outcomes into benefits for society through IP licensing and occasionally spin-outs. We maintain a pipeline of around 30 commercialisation projects, with typically 20 new disclosures a year, from which we have generated 13 active licences and launched 4 Brunel spin-outs supported by £1.2M of external commercial income.

Brunel has a strong record of **global challenges research**, with over 50 ODA-compliant research projects completed since 2016. Our approach is to address these global challenges through locally owned and created solutions. Our GCRF strategy is to build our capacity to address developing world problems, to develop research networks and partnerships and to accelerate the impact of Brunel’s research in developing countries. To realise the strategy we recruited four Global Challenges Research Fellows who are engaged in high-quality ODA-compliant research activity, leading research projects and initiatives, contributing to raising the profile of global challenges research, and building our portfolio of research activity that addresses development challenges through collaboration with colleagues and international partners. We are building our research networks and partnerships through high level visits to carefully selected strategic partners, run a lively GCRF Visiting Expert Seminar Series and provide flexible funding for KE that supports GCRF research. This approach has brought considerable success; we won the inaugural Newton Prize in 2017 (for excellent research and innovation that promotes economic development and social welfare in developing countries) and have subsequently been long-listed twice.

Much of our research is performed with international partners and 55% of our research outputs have an international co-author. The University’s international partnerships strategy supports the development of high-quality research, and has underpinned the development of a strong strategic partnership with Tampere University, Finland. This relationship has been enhanced by an I3 award of £350k from Research England to accelerate the scaling up of the partnership over the next five years by developing areas where we have complementary expertise, driven by a strong alignment to regional strategies and imperatives. The University is an active member of the **Young European Research Universities Network**, and their Mobility Fund allows junior staff to work with one of the

16 other member universities. The University also has a strategic partnership with FAPESP that has supported 5 research projects led by researchers at Brunel and collaborators in universities in Sao Paulo.

Research ethics is overseen by the University Research Ethics Committee, which has an independent chair and external representation, and reports to both Senate and Council. In 2015 the University moved to an online research ethics approval system BREO (Brunel Research Ethics On-line). All research ethics applications are managed through BREO and this has improved compliance, transparency and scrutiny as well as provided more robust management information. In 2017 the University produced a new Research Integrity Code of Practice which incorporates many policies including the Procedure for the Investigation of Research Misconduct.

Brunel has invested heavily in its research information management systems and is an open access and open data sector leader. The Brunel University Research Archive, BURA, was established in 2006 and contains over 20,000 full text articles. Brunel is 43rd in the world for the proportion of outputs in open access and 12th in the UK for gold open access (Leiden CWTS 2020). Our Open Access Policy requires that, subject to publishers' copyright permissions, all new research publications and all PhD theses should be deposited on BURA. Brunel has recently initiated a project to support the publication of open monographs.

To further facilitate and support **open science**, Brunel has developed a fully integrated Current Research Information System (CRIS) which allows the direct uploading of full text publications from its research database. Funds are available from a central budget for gold open access and 90% of staff have an ORCID identifier to facilitate open access processes.

Brunel has also invested in a **Research Data Repository and Data Registry** using Figshare. This is supported by training and on-line guides for staff and students about how to select and prepare data for publication. To date 230 datasets have been deposited and made fully accessible and discoverable.

Brunel recognises that a cornerstone to research integrity is adherence to the principles of open science and responsible research assessment. The University was one of the first UK universities to sign **DORA**, and supports the work of the 'UK Forum for Responsible Research Metrics'. Internal monitoring and measurement of research performance is aligned to recommendations produced by the Responsible Metrics Forum and applied sensitively taking account of disciplinary norms, staff circumstances and the individuals' protected characteristics. The use of journal rankings or impact factors in the assessment of research quality is not allowed.

Inter-disciplinary research is facilitated through the **four Research Institutes** that bring colleagues together from across the institution to work on challenge led projects. Outcomes of the inter-disciplinary projects are disseminated through an Institutes Annual Conference, occasional formal reports and through the website and social media. The work of each institute is overseen by a senior member of the professoriate as Director, supported by a dedicated team and co-ordinated by the Inter-disciplinary Research Board. In the last few years 70-80% of our grant income is associated with the work of the Institutes.

Brunel recognises the importance of capturing and reporting on the impact of its research. Our impact is captured and monitored using an online platform, Impact Tracker, allowing reporting on institutional impact in real time. Every funded project is by default logged into the Tracker so that from the outset, all data including dissemination events and evidence are stored in one place. Unfunded

projects are added to the Tracker in an annual data collection exercise. Currently the system has over 200 projects where impact is being recorded. In addition, Altmetric is used to track references to our researchers' online articles in public policy documents, news and social media.

The application process for all internal funding schemes, academic promotions and sabbaticals include the impact of research in their assessment criteria. By regularly reporting on and evaluating impact at both project and institutional levels, the university optimises the reach and significance of its research and ensures alignment with strategic priorities.

3. People

Staff

The University staffing policy promotes world-leading research and sustains a vibrant academic environment, including with a sustainable ratio of early-career to mid-career and senior academic staff. Close to a quarter of staff are under 40 ensuring a healthy pipeline of talented ECRs. Two thirds of the faculty are equally split between the 40-49 & 50-59 age groups progressing through mid to senior stages of their careers. The remainder 14% are over 60, of which 2% are over 70, ensuring, in line with legislation, that staff feel empowered to continue contributing beyond state pension age. Significant emphasis is placed on giving staff new to Brunel (ECRs and established) the support to ensure that they are able to be productive as soon as possible. This contributes to the sustainability and vibrancy of our research environment.

The University faculty is about the same size as in 2014, with a smaller (20FTE) professoriate and an equivalent increase in the number of lecturers and senior lecturers. All new appointments are in research areas aligned with an area of our challenge-led research, or a disciplinary centre, or, often, both. The University has benefited from the recruitment of a large group of very talented junior staff in the last few years and has been working to ensure it has the systems in place to ensure they receive the support they need to build successful academic careers.

Lecturers are now recruited onto a combined probationary and development period and are given a reduced teaching and leadership/management load to provide time to establish their research profile and build their research activity. On satisfactory completion of the two-year probation period, employment as a Lecturer is confirmed. A development period of two years then commences in order to support the Lecturer in achieving their targets and demonstrating that they meet the standards and requirements of a Senior Lecturer. If the targets and standards have been met and sustained staff are promoted automatically to Senior Lecturer. Promotions to Reader and Chair can follow with criteria for promotion that include high quality research publications, research grant income, knowledge exchange and impact. Brunel operates an annual promotion exercise and monitors success rates by gender, ethnicity and age. We run specific workshops to support applications from under-represented staff groups.

In 2015/16 we re-launched our **Personal Development Review** process with a greater focus on research careers and research leadership, and on the diversity of possible contributions to the academic mission.

The University runs a variety of competitive schemes to support different aspects of its research. These are open to all staff and structured to facilitate applications from the whole academy,

irrespective of discipline, research methodology or research topic. The schemes are developmental, with support for the preparation of applications and feedback that promotes personal development. Regular reviews ensure the schemes are supporting the development of individual staff, improving the quality of research in each discipline and operating in line with our commitment to equality and diversity.

The **Sabbatical Leave Scheme** allows academics to concentrate on a programme of work that will lead to identifiable and measurable research outcomes. The best applications are selected each year based on the proposed research programme, quality of planning and the work to be done, and the potential impact. Since 2014, 89 staff have had leave with a total investment of £800k, and many of the research outputs submitted arise from a period of research leave.

To support junior staff in the first three years of appointment **BRIEF awards** are made on the basis of an externally reviewed application covering questions about the aims, methodology, significance, originality and impact of a planned research programme. For many staff, their BRIEF application is their first attempt to secure funding in a competitive peer reviewed call. Since 2014 the university has given 73 awards to a total value of £852k and many of these projects have led to successful first external grant applications.

To increase the transparency of workload allocation, and hence ensure equality of opportunity, the University has introduced a **work-load allocation** model. This supports appropriate weighting for research activities, alongside education, managerial and administrative roles, ensuring that all responsibilities are appropriately accounted for and that all staff have equal opportunities to pursue their interests.

The University monitors the data within the model, as well as reports on other research processes, to ensure that interests of those with protected characteristics are suitably supported, reporting and recommending changes to the Equal Opportunities and Human Resources Committee. In terms of gender, in 2019/20 37.3% of the grant applications made by the university were submitted by female PIs and 31.9% of the papers produced by the University between 2015 and 2018 were authored by a female researcher from Brunel (Leiden CWTS). Since 2014 39% of staff granted sabbatical leave and 49% of those winning BRIEF awards were female. Female staff currently make up 37% of the staff eligible to apply for these awards.

Brunel was an early signatory of the **Researcher Development Concordat** and is taking forward a variety of actions impacting on the environment & culture, employment and professional & career development of research staff. In 2019 the University implemented a policy to ensure that all employees with a series of fixed term contracts totalling 4 years or more continuous service are converted to open-ended employment contracts. As a result, over 50 staff have moved from fixed term to open-ended contracts. In addition, staff on fixed term contracts who secure an external fellowship are automatically offered an open-ended academic contract. The University has held the **EU HR Excellence in Research Award** since 2011. In renewing the award for the second time in early 2020 the panel commented “..we were very impressed with Brunel’s activities to support the career development of researchers and their actions relating to this award.”

Brunel is a signatory of the **Technician Commitment** and is implementing an action plan to promote the visibility, recognition and career development of its technical staff. Part of this plan is to raise the profile of their contribution to research papers; our technicians were co-authors on 25 papers in the last 5 years.

Students

We celebrate the vital role PGRs play in sustaining research activities and stimulating adventurous new ideas. The University has graduated 1263 PhD students since 2014, and we are delighted that over 200 are co-authors of papers in our submission. The current PGR student population is 565. We receive approximately 11 applications per place. Our strategy is to attract and select PGR students with the greatest potential for high quality research, to develop their ability to apply new knowledge and their transferable skills and to have confidence in their abilities and achievements. We are working to develop more bilateral agreements with companies, research organisations and charities to support PGR, and to have more PGRs engage with those organisations, and also to enable more PGRs to gain international exposure.

In 2014 the University introduced stronger processes for the review of PGR students' progress, and changed the way in which students were allowed to continue to work on their PhD beyond the standard period of study. This, combined with strengthening of the admissions processes in 2016, has substantially improved our PGR completion rates and the academic outcomes.

The University has diversified the number and type of funding sources for the scholarships it offers, and sought to ensure that it was able to participate in more DTPs. Since 2014 the University has been a member of five new successful DTP consortia; Techne (AHRC), FoodBioSystems (BBSRC), Food Systems (BBSRC), Grand Union (ESRC), and the London NERC.

The **Graduate School** is responsible for a range of activities focused on the support and development of PGR students and postdoctoral researchers. It also provides learning and development 'spaces' for researchers that are inter-disciplinary and collaborative. To that end, training in the Graduate School is deliberately organised to bring together researchers from across the university and complement provision within Departments.

The Graduate School manages a range of awards designed to support PGR activity. This includes organisational and financial support for PGR conferences and a quarterly **Vice-Chancellor's Travel Prize**. The latter allows students to compete for funding for conference travel of up to £750 per award. Since 2014/15, 235 applications have been received for the Prizes, of which 126 were awarded. These awards supplement funding available for conference attendance from Colleges and external sponsors of PGRs. An annual **Conference and 3 Minute Thesis Competition**, attracting over 100 participants a year, showcases PGR research and improves students' communication skills.

The **Researcher Development Programme** comprises a range of workshops, sessions and activities designed to develop researchers broadly within the four domains of the **Vitae Researcher Development Framework** – a professional framework defining the skills, knowledge and attributes of effective researchers. Workshops are also mapped to the Brunel 3-D Researcher Development Tool to enable students to appropriately plan and evidence their activity for progress reviews and supervisory conversations. An annual **PhD Writing Group** provides a multi-disciplinary cohort of PGRs with a 12-week programme of support. The University Careers Service provides specialist support for both PhD students and research staff, which remains available for two years after leaving the university.

Since 2015 a group of Brunel researchers have created 40 podcasts, branded as **Research Life**, comprising interviews designed to share research experiences, drawing on the expertise of senior staff, which encourage academic interaction and collaboration as well as helping researchers reflect

on different career pathways. Recent topics include *wellbeing for researchers*, *publishing 4-star papers* and *collaboration in research*.

Equality and Diversity

The University takes a range of measures to support and promote equality and diversity (E&D) in research. The University successfully renewed its **Athena SWAN Bronze** award under the expanded Charter in 2017 as well as gaining Bronze awards in seven departments. Our E&D Strategy and Action Plan further embeds E&D in our core values and systematically mainstreams Athena SWAN principles across Brunel policies and practices.

Brunel has significantly increased the investment in staff resource for Athena SWAN activities to support departmental activities. Since 2014/15 we have also held 6 **Athena SWAN Lectures**, drawing large audiences to hear high profile women in STEM, from both academia and industry, give a mix of technical talks and personal reflections on their own careers and experiences. We invested £174k in 12 **Athena SWAN Research Awards** for maternity-leave returners to engage in an approved research project.

To support the development of particular groups of staff we have invested £81k in the **Aurora programme**, which 32 women have completed since 2017, and delivered the Women in Engineering PG scholarship scheme, supported by £1.5M from HEFCE. The University operates a mentoring scheme for female STEM postgraduates. All these initiatives strengthen the pipeline of women entering academia in disciplines where women are under-represented. 20 women have completed **SPRINT**, an international development programme for female researchers. Many maintained peer support groups beyond the events and played an active role in recruiting other Brunel researchers to the programme. Over 20 BAME members of staff have participated in Advance HE's Diversifying Leadership programme.

The University currently holds the **University Disability Standards Award** (2015) and was awarded the **Two Ticks Symbol** in 2015 for its Positive about Disabled people commitments as an employer. The University has received a Disability-smart award and Disability Confident Gold award from the Department of Work and Pensions, only the fourth university to hold this award. The University supports six Staff Network Groups (Access & Disability, Carers, Ethnic Minority, Harassment & Bullying, LGBT+ and Women) that bring like-minded staff members together to discuss important equality issues affecting staff in the workplace and then feed into the University's E&D agenda.

Brunel, as a research-intensive university, is **submitting 100% of all eligible academic staff**. We followed the processes in our Code of Practice for the fair and transparent identification of independent researchers and to ensure that the submitted outputs provided a balanced and unbiased representation of the work of our diverse academic community, their characteristics and contractual positions (age, disability, race, sex, part-time and fixed-term employees). Output selection was monitored through regular Equality Impact Assessments.

Our outputs well represent the diversity of our staff. Female staff make up 37% of our submission and contributed 36% of the outputs, BAME staff make up 32% of the submission with 32% of the outputs and 1% of staff with a declared disability also contributed the same percentage of the outputs. Of the staff submitted 22% were aged 30-39, 32% 40-49, 31% 50-59 and 14% 60 or more. The percentage of outputs submitted for each of these age cohorts was within 2% of these values. We claimed discounts in two UoAs.

4. Income, infrastructure and facilities

Since 2014 Brunel has raised £195.3M of external research income in 1124 grants, with 38% coming from UK research councils, 23% from the EC, 19% from Innovate UK and 7% from UK industry. Brunel has done considerable work to improve and strengthen its internal peer review processes to ensure that grants submitted by the institution are as competitive as possible. As a result, our success rates with the research councils have risen. We have also sought to increase the fraction of staff winning grants, using the BRIEF awards, mentoring and the personal development review process to help staff build strong proposals. The Research Institutes have provided opportunities for many staff to get involved with larger multi-disciplinary projects for the first time. We have also focussed on increasing the number of fellowships won by the institution, through a fellowship panel and mentoring process. This has seen us secure three ERC fellowships, our first UKRI Future Leaders Fellow, a Royal Society Wolfson Fellowship, two UUKi Rutherford Fellowships, two Wellcome Trust Fellowships, a Marie Curie Fellowship and five Leverhulme Trust Fellowships.

The **Research Support & Development Office (RSDO)**, with 24 staff, supports research development at both pre- and post-award stage and the internal peer review system. They support business development that builds partnerships with industry, the commercialisation and exploitation of research outcomes and the development of impact. Business development managers are aligned to areas where our research activities meet industrial need (Creative Industries, Digital, Energy, Healthcare and Manufacturing). To catalyse new GCRF activities RSDO co-ordinates a special interest group on Africa that brings together colleagues conducting African research to share experience, networks and knowledge.

A **Research Development Fund** meets the costs of developing major proposals with large numbers of collaborators. Since 2014 £279k has been used to support the development of 115 proposals. The University also provides funds for research groups to run seminar series. This is awarded on the basis of applications, to supplement funds provided by Colleges and Institutes to support such activities.

The University Information Services department maintains the CRIS system with an archive fully linked to a publications database and a data repository. The Scholarly Communications department operates these systems and supports researchers with issues associated with open science publication, copyright and the payment of author pages charges. We use a single on-line system for research ethics processes and reporting and Impact Tracker is used to capture the benefits of our research.

Brunel's computer system is internally networked at 10GB/s and connected to JANET at 40GB/s. We have strong performance and data storage capabilities; our tier 2 currently has 4500CPU cores and 2PByte of on-line storage. Brunel's researchers also benefit from an excellent centrally located campus library with an extensive range of research material combined with access to specialist on-line research resources.

The University has invested £57M in new research facilities, including scale-up and research facilities for light metal casting, equipment for structural integrity research, refurbishment of specialist biomedical laboratories and new facilities for research in both civil engineering and the sustainability of food supply chains. In addition, several research areas have been provided with new or refurbished offices, collaboration and meeting spaces including computer science, design, law and

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mathematics. We use the campus as a research tool, collecting data on building performance and installing wind turbines, photo-voltaic cells and biomass facilities.

We support a number of specialist research facilities that are available to all researchers including the Experimental Techniques Centre, that provides materials characterisation facilities, a high resolution functional magnetic resonance imaging unit, shared with the Royal Holloway and Surrey, biomedical science laboratories and the Antonin Artaud performance space.