

Institution: University of Nottingham**1. Context and mission**

The University of Nottingham (UoN) was founded on the vision and philanthropic spirit of Sir Jesse Boot, and awarded a Royal Charter in 1948. The University's core mission remains unchanged: to promote discovery, enterprise and the advancement of the human condition. Today, we are one of the largest universities in the UK with a global presence, having established overseas campuses in Malaysia (2000) and China (2004). A Midlands Innovation partner institution, we also make a significant regional contribution. A founder member of the Russell Group and Universitas 21, UoN is consistently recognised among the world's top 100 universities (QS World University Rankings).

UoN's research community comprises 1804 REF-eligible staff, 1048 research staff, and >2700 postgraduate research students (PGRs; UK's seventh highest), supported by technicians and professional services. Their activities and innovations have generated an ongoing research portfolio of c.£640m (7/2020); demonstrated a commitment to enterprise exemplified by UoN's consistent ranking of 11th or better in the *Higher Education-Business and Community Interaction Survey* (HEBCIS, **2.2(a)**); delivered a research-led curriculum and approach to teaching that contributed to UoN's Gold (the highest) rating in the Teaching Excellence Framework (2017); and supported UoN's economic contribution to the city of Nottingham (population 300k) of £760m p.a.

Our commitment to a broad and diverse research environment that fosters both mature and emergent disciplinary areas is demonstrated by submissions to 29 REF2021 sub-panels, with returns for the first time in Anthropology and Development Studies (UOA22) and Sport and Exercise Sciences, Leisure and Tourism (UOA24). Researchers are organised across five Faculties (Arts, Engineering, Medicine and Health Sciences, Science, and Social Sciences), that house 27 Schools and Departments, six transdisciplinary Beacons of Excellence, 19 Interdisciplinary Research Clusters, and >160 centres, institutes, and groups. Research Committee and Knowledge Exchange Committee have strategic oversight of all research and impact activity and are chaired by the Pro-Vice-Chancellor for Research and Knowledge Exchange. An External Advisory Group chaired by the Vice-Chancellor supports their work.

Our research environment and culture enables interdisciplinary and mission-led research with far-reaching societal impact, as exemplified by the innovations and achievements described in individual UOA submissions. Strategic initiatives in 2013-20 reflect deep, long-term commitments to: developing people, innovation in research delivery, and maximising the transformative value of research. They include:

- Sector-leading early career support through the Nottingham Research Fellowships and Anne McLaren Fellowships scheme (**3.2**)
- Leading development of the UK's Technician Commitment (**3.4**)
- Transformational focus on Equality, Diversity, and Inclusion (**3.5**)
- Transdisciplinary Beacons of Excellence directed at Sustainable Development Goals (**2.1(a)**)
- Supporting Interdisciplinary Research Clusters that drive new collaborations and innovations (**2.1(a)**)
- Delivering new ways of working through Digital Research (**2.1(c)**)
- Promoting innovative use of analytical instrumentation through the Interdisciplinary Centre for Analytical Science (**4.1(d)**)
- A focus on industry partnerships and company spin-outs (**2.2(a-b)**)

2. Strategy

2.1 Research Strategy

Since 2013 our strategic imperative has been to create a world-leading, inclusive environment that facilitates the achievements of researchers at all career stages. Key strategic goals include:

(a) Models for transdisciplinary, challenge-led, globally significant research

UoN has created six transdisciplinary research **Beacons of Excellence** (c.£22.5m investment 2013-20), each addressing a global challenge, with its work programme directed towards United Nations Sustainable Development Goals. Key features are: critical mass; breadth of disciplines; and strength of external partners, including Government departments, NGOs, multinationals, and specialist SMEs.

- Rights Lab – ending modern slavery
- Precision Imaging – transforming healthcare with pioneering imaging
- Future Food – feeding the world in the context of climate change
- Propulsion Futures – achieving net zero carbon transport
- Green Chemicals – sustainable chemical processes and materials
- Smart Products – intelligent products, production and consumer experiences

Beacons have secured £104m in external funding; generated significant impact, including 13 REF impact case studies; recruited and developed the next generation of challenge-led research leaders and researchers, with 23 Nottingham Research Fellows (**3.2**) attached to Beacons and PGRs integrated via Doctoral Training Centres (**3.3**); and brought >80 world-class researchers to UoN. These activities are designed to ensure the long-term sustainability of the Beacons' transdisciplinary approaches.

To facilitate blue skies, bottom-up, cross-disciplinary collaborations UoN invested (c.£5m, 2016-20) in five **Global Research Themes** (GRTs): Cultures and Communications; Developing Sustainable Societies; Digital Frontiers; Health and Wellbeing; and Transformative Technologies. Each GRT houses a group of focussed **Interdisciplinary Research Clusters** (IRCs; formerly Research Priority Areas; 19 currently supported). These address UKRI and international priorities and have developed the work of >800 researchers at all career stages across UoN by pump-priming new research. Key outcomes include: c.600 publications; c.500 external grant applications that have secured >£300m of external funding; and enhanced impact generation. For example, the Health Humanities IRC worked with the AHRC and Wellcome Trust to initiate a new, national award, The Health Humanities Medal. The findings of the Water Works IRC secured an invitation for UoN to be one of eight UK universities to work with UK Water Industry Research to co-create opportunities between academia and industry. GRTs' role in progressing individual research careers is exemplified by the promotion of three IRC leads to personal Chairs in 2019-20.

(b) A commitment to researchers

Our strategic commitment to researcher recruitment, retention, and development is described in **3**. While this work has applied across all levels of researchers, from professorial to PGR, a particular focus has been a flagship programme of Nottingham and Anne McLaren Research Fellowships (£15.4m awarded), the latter aimed at women in STEM, that recruits and develops a new generation of outstanding early career researchers (**3.2**).

(c) A digitally-enabled research environment

Since 2013 we have identified the importance of digital transformation as a key component of research innovation across the full range of UoN's disciplines and implemented a Digital Research Strategy. Investment (£9.3m) in people, services and systems, and development of new user-communities is described in **4.1(d)**.

(d) Strategic growth in international research and impact collaboration

UoN has prioritised international research collaboration by embedding support in Beacons and IRCS (**2.1(a)**) and by establishing the targeted strategic initiatives described in **4.1(c)**.

2.2 Impact strategy and engagement of the wider community with research

A signatory of the national *KE Concordat*, since 2013 UoN has translated its research into impact and knowledge exchange via strategic initiatives and investments that foster:

(a) Significant advances in culture and capacity to empower translational research and impact

Researcher engagement, training, and development in impact activities is enabled by the Nottingham Impact Accelerator (NIA) (>£10.4m, Research Council IAA and HEIF investment) and the ESRC Impact Leaders Programme. The Female Academic Entrepreneurs network (launched through NIA) supports the engagement of women staff from Midlands' universities who are participating in knowledge exchange (KE). Increases in professional staff numbers, including specialists in translational healthcare, have further embedded impact knowledge and skills across UoN's research ecosystem. KE and Impact Awards celebrate success and enhance awareness within our research community.

UoN has developed its approach to stakeholder engagement, thereby enhancing collaborations between UoN researchers and key multinationals, including Siemens, GKN, Teledyne e2v, Rolls-Royce, GSK, and Unilever, helping to secure one of the highest levels of industry-funded research awards (£20m, 2018-19) of UK universities. The effectiveness of these activities is demonstrated by a HEBCIS ranking of 11th or better over the REF period, with a rise in collaborative and contract research income from £68.5m (2012-13) to £102.8m (2018-19). In the most recent (2018-19) HEBCIS, UoN ranked tenth.

Collaboration with local businesses and SMEs is fostered by UoN's Innovation Park, one of four pilot University Enterprise Zones, which hosts c.60 client enterprises and has supported >350 start-ups through UoN's Haydn Green Institute for Innovation and Entrepreneurship. The ERDF-funded Enabling Innovation programme has supported researchers across UoN to collaborate with >1500 local businesses. Our strong culture of translational research, supporting organisations of all sizes, is demonstrated by UoN's founder-membership of the Midlands Technology Catapult and position as the top HEI recipient of funding from Innovate UK.

(b) Innovation-led growth to maximise the commercialisation of research and IP value

Since 2013 UoN has created >40 spin-out and related companies. Company exits yielded £16.5m (2015-2020) ranking UoN second in HEBCIS for sale of shares in our spin-out portfolio. Spin-outs are managed by a wholly-owned subsidiary company, Nottingham Technology Ventures, established in 2017 to professionalise management to exit of a maturing portfolio. This also manages investment from UoN's Pathfinder Fund and £5m Invention Fund, to secure future successes. UoN's £2.4m support for spin-outs formed during 2013-20 has leveraged £12.6m external investment that supports and accelerates spin-out growth and development. UoN leads the development of a local innovation ecosystem, working with external partners (e.g. BioCity Ltd) and external investors (e.g. IP Group plc, Mercia plc). UoN's role as a Partner HEI in the Midlands Innovation Commercialisation of Research Accelerator (MICRA), the UK's largest formal collaboration between technology transfer offices, provides proof-of-concept funding and supports academics' KE training and engagement with entrepreneurs.

(c) Improved support for policy researchers and public engagement

UoN's new **Institute for Policy and Engagement** develops local, national, and global partnerships between researchers and politicians, decision makers, organisations, and the public. Since its 2019 launch, the Institute has engaged >250 policy actors, fostered six impact case studies in four Faculties, and sponsored events attracting c.15,000 local and national participants. It harnesses UoN's wider influence by: co-leading (with Cambridge, Manchester, Northumbria, and UCL) Capabilities in Academic Policy Engagement (Research England Development-funded, £4m); and chairing the University Policy Engagement Network. UoN's founding membership of *The Conversation* (>35 articles 2013-20) further evidences our commitment to public engagement.

(d) Transformational impact that contributes to national agendas around place and levelling up by meeting and responding to the needs of diverse local communities

Our leading role in Midlands Innovation is described in **1, 2.2(b), 3.4, 4.1-4.2**. UoN's Civic and Regional Committee (launched 2018) provides strategic leadership for activities designed to increase our civic and public value contribution. UoN chairs One Nottingham (Nottingham City Council's strategic partnership board, the only such UK board with an academic chair). In 2017-18 UoN contributed £1.1 billion to the regional D2N2 economy (2.4% of Gross Value Added). Universities for Nottingham, a partnership with Nottingham Trent and key stakeholders (launched January 2020), further extends UoN's impact on the local economy, businesses, groups, and individuals.

Key interventions have included strategic partnership investment to develop collaborations with partners in the region's cultural offer and creative economy, and with local communities (e.g. Nottingham UNESCO City of Literature, hosting the British Games Institute's cultural programmes unit). UoN makes significant contributions to meeting local healthcare research needs (e.g. the £24m NIHR Nottingham Biomedical Research Centre, established 2016 as a partnership between UoN and local NHS trusts).

2.3 Open research and metrics

We are committed to an open, fair, and reproducible research environment (e.g. impact case studies feature citizen science, open databases, and open source software). Interventions to achieve this include: (i) Successful installation of the UK's fifth ESRC-funded SafePod, facilitating researchers' local access to secure datasets. (ii) Implementation of a Research Data Management Policy aligned to the *Concordat for Open Research Data* (UoN is a signatory), UKRI Common Principles on Data Policy, and FAIR guiding principles. This mandates that all researchers write a Data Management Plan before any research data is collected. As a member of the Russell Group, UoN is signed up to the *Sorbonne Declaration* on open data. (iii) Requiring researchers to acquire an ORCID ID and include it in their research outputs wherever possible (UoN is a UK ORCID consortium member). (iv) Investment (£1.5m, 2015-20) in a new, integrated Research Information System (RIS) that supports UoN's open access strategy. (v) Implementing policy that goes beyond REF2021's, requiring that, where copyright allows, from 1 January 2014 all research papers (including book chapters) are made available in open access form via RIS. (vi) Implementing institutional commitment to the principles of the *Leiden Manifesto for Research Metrics* and *San Francisco Declaration on Research Assessment*. Committing to the principle that research should be assessed on its own merits rather than on its venue of publication. (viii) Leading development of the UK Scholarly Communications Licence via participation in the UK-SCL Advocacy task and finish group.

2.4 Research integrity (RI)

UoN is a signatory of the *Concordat to Support Research Integrity*. During 2013-20 we appointed UoN's first dedicated Head of RI and Ethics, revised our policies, and created a new Research Integrity and Research Ethics Committee, with oversight of RI and research ethics governance across the institution. All UoN researchers are governed by an annually reviewed *Code of Research Conduct and Research Ethics* and *Code of Practice on Handling Allegations of Research Misconduct*, the latter aligned to UKRIO, UKRI, and AMRC requirements. UoN's Research Governance Team manages all clinical research activities that fall under statutory control (e.g. Clinical Trials, Animal Welfare).

2.5 Strategic goals for research and impact; the next five years

UoN's five-year Research Strategy enhances our long-term commitment to: developing people; innovation in research delivery; and maximising the transformative value of research by addressing significant global challenges.

An illustration of this strategy is the Net Zero research centre for future transport and energy which will be established on UoN's Innovation Park, consolidating the institution's strengths and facilities to work with large industry partners and smaller companies as they adopt novel technologies, materials, and processes. The centre will apply a co-production model to its partnerships between university research groups and business, creating an innovation cluster that will drive future research agendas.

UoN will also apply the innovation cluster approach with the City of Nottingham to drive convergence research for health and financial services, creative industries, automation and digitisation of manufacturing processes. This will draw on our disciplinary strengths in data science, artificial intelligence, the arts, and robotics in a single city-centre development. The centre will nurture a skilled workforce and provide an environment in which start-ups and commercial partners work alongside academic staff. This will be supplemented by a maker-space environment that is accessible to the public. UoN's goal is to harness our research strengths in support of Nottingham and the wider region post-pandemic and Brexit.

A major focus will be on research culture, supporting and developing individual research careers across research teams, addressing reward and recognition schemes, and reinforcing our collaborative, inclusive, and collegiate environment. UoN will concentrate on developing more stable careers and pathways for researchers to transition outside of academia into industry, start-up companies, public and private-sector businesses and other settings. Equality, Diversity, and Inclusion will be a core strategic driver throughout, with the aim to achieve 50% women Associate Professors, 30% women Professors, and 15% BAME Associate and full Professors by 2025.

UoN is committed to transdisciplinary research, building on our research Beacons of Excellence and Interdisciplinary Research Clusters programme to support next generation convergence research through large-scale collaborative facilities, structures, and innovation clusters. Our aim is to open major facilities to the world by enabling virtual access as part of our open science agenda.

3. People

3.1 Staffing strategy, staff development

Building a Culture for Success, UoN's competency framework, places people at the heart of our culture. Individuals are progressed by recruitment and induction policies, ongoing Appraisal and Development Conversations, a Rewards Scheme recognising contribution above the norm, and annual promotion rounds. 642 REF-eligible staff were promoted in the census period. The promotions' distribution (40.8% F, 59.2% M, 13.9% BAME (5% Asian, 0.5% Black, 4.7% Chinese, 1.6% Mixed, 2.2% Other), 2.2% Disability) closely matches that of UoN's REF-eligible staff (35% F, 65% M, 15% BAME, 3% Disability) indicating the success of EDI initiatives in this area. Moreover, the increase of women at Professor and Associate Professor level across the organisation has seen a narrowing of the median institutional gender pay gap for academic staff: 16.9% in 2019, compared to 18.9%, 2017. Leaders proactively identify and support those from under-represented groups to apply for promotion, and promotions criteria have been revised to take a holistic view of research, knowledge exchange, teaching and learning, and academic service. The Vice-Chancellor's mentoring programme supports senior leadership progression for academic and APM staff with protected characteristics (17 mentees, 2018-19; 9 mentees on 2020 programme, start delayed to 09/20). UoN has actively considered the impact of personal circumstances on all promotion applications since 2012-13, and phased out the use of citation metrics in promotion cases since 2018-19.

Full-time and part-time Assistant, Associate, and full Professors in the Research and Teaching job family are eligible to apply for a semester's paid study leave after every six semesters of service. Career pathways for part-time and fixed-term staff are particularly supported, with 459 REF-eligible staff moved to permanent contracts (2013-20). Disabled staff benefit from institutional policies and support, with a 2018 review implementing new guidance to support their managers. Staff also benefit from: a Mental Health First Aid scheme; Dignity Advisors; a

Wellbeing Hub; the Advance HE-accredited Nottingham Recognition Scheme; professional development service; Leadership and Management Academy training programmes (launched 2016); and UoN's Research Leaders Programme (>100 participants 2013-20), which develops those on the cusp of senior roles. Interventions arising from staff engagement surveys (2017, 2019) include: direct staff involvement in developing UoN's new strategy, with >2000 individuals and groups responding to a consultation exercise; and opening up institutional committee membership to transparent application from all levels while increasing non-professorial membership. UoN policies are subject to Equality Impact Assessment and areas of inequality identified and addressed (e.g. changes to promotions policy outlined above).

UoN has held the European Commission's *HR Excellence in Research* badge continuously since 2011. A member of Universities UK, UoN implemented the *Concordat to Support the Career Development of Researchers* (2009) via dedicated action plans coordinated by the Researcher Academy (3.2), with Research Staff Group and Research Committee oversight. UoN has signed and will implement the 2019 *Concordat*.

3.2 Early Career Researchers (ECRs)

The transformation of UoN's Graduate School into a new Researcher Academy for PGR and research staff development is part of our suite of initiatives to build the next generation of researchers.

115 outstanding ECRs (50% F, 16% BAME) have been recruited across all Faculties as Nottingham and Anne McLaren Research Fellows (£15.4m awarded). Their careers are being progressed by three years of dedicated time for research and impact, generous research funding (£25k p.a.), childcare support (£5k p.a., used by 38% of the cohort), and a clear trajectory to a permanent academic post. To date, Fellows have secured £20.7m of external funding (£11.6m as PI), published high-quality outputs (24.6% in top 10% most-cited worldwide), and generated five impact case studies. 29 have progressed to permanent positions at UoN: two to personal chairs, two to Associate Professorships, 25 to Assistant Professorships. The scheme's retention rate is 95%.

ECRs across UoN have been supported in bids to research councils, charities and institutes, and secured significant awards, including two UKRI Future Leaders Fellowships (£1.2m each), 23 Leverhulme ECR Fellowships, seven British Academy Postdoctoral Fellowships, five Royal Society Fellowships, an EPSRC UKRI Innovation Fellowship, BBSRC Discovery Fellowship, and Royal Academy of Engineering Fellowship.

ECRs' careers are additionally furthered by: annual Research Staff Development Conferences; twice-yearly writing retreats; specialist support from the Careers and Employability Service; and locally delivered training and activities.

3.3 Postgraduate Research Students

UoN's PGR community, drawn from across the globe, is an integral part of our research culture, and is developed by research-led teaching and supervision. Recruitment, funding, and support procedures that take EDI into account at all stages foster a diverse PGR community: F 47%; BAME 38% (Asian 5.2%, Black 1.1%, Chinese 5.3%, Mixed 1.3%, Other 1.8%); Disabled 9% (2019-20 intake). Since 2013 PGRs have benefitted from connected cohorts and career development opportunities provided by 44 Centres for Doctoral Training (CDTs) and Doctoral Training Programmes (DTPs) (24 UoN-led). This £97.5m DTP/CDT portfolio is unique for its breadth and interdisciplinary range, encompassing all five Faculties. It includes the UoN-led Midlands4Cities, ranked first in the AHRC's DTP2 competition, and a collaboration with Rothamsted Research to build capacity in developing countries. International students comprise 32% of UoN's PGR community and have been supported by >150 sponsors, and >500 institutionally funded scholarships.

PGRs are supported by the Researcher Academy's central leadership and management, and by five Graduate Centres that provide discipline-specific training and support. PGR training is

mapped to the *Researcher Development Framework*, the *Research Council's Statement of Expectations for Postgraduate Training*, and the *QAA Quality Code*. All PGRs (including Part-time/Distance) are supported in their research activity and future careers by: (i) Core training, including a mandatory research ethics and integrity element, delivered by the Researcher Academy (21k attendances 2013-20), with disciplinary-specific training provided locally. (ii) A Postgraduate Placement Programme, winner of the 2015 *Times Higher Award for Outstanding Support for Early Career Researchers*, that provides a range of paid placements (from SMEs to multinationals). (iii) A Public Engagement with Research programme, aligned to UoN's commitment as a signatory of the *National Manifesto for Public Engagement*, that develops PGRs' impact skills in line with best practice. (iv) Researcher Academy funding, including: Travel Prizes (c.£600k awarded 2013-20, 50%F, 35%M, 15% unknown); International Research Collaboration Awards, and Building Experience and Skills Travel Scholarships (£25k p.a.); and support for interdisciplinary projects (£15k p.a.). (v) International mobility, including via Universitas 21 and UoN's international campuses, and doctoral training partnerships with, for example, the Universities of Adelaide, Queensland, Tübingen, Virginia Tech, and Beijing Foreign Studies University.

All PGRs benefit from QAA-compliant governance mechanisms described in UoN's *Quality Manual* (including mandatory co-supervision, supervision requirements, and formal annual progress reviews), monitored by the Researcher Academy with Research Committee oversight.

3.4 Technicians

UoN is sector-leading in recruiting, developing, supporting, and retaining the world-class technicians whose work is crucial to our research ecosystem. UoN spearheaded and is a founding signatory and Steering Board member of the *Technician Commitment*. We provide national leadership via UoN's Director of Technical Skills and Strategy's role as the Science Council's Higher Education and Technician Commitment Lead. Technicians are supported locally by a strategy that ensures their status, opportunity, and sustainability. Since REF2014, this has delivered: a new *Vision for Technical Talent* (including extended career pathways, conference fund, enhanced training) aligned to UoN's wider strategic aims and objectives; a technician action plan; the national report *Equality, Diversity and Inclusion (EDI): A Technician Lens* (2019; part of a Nottingham-led EPSRC Inclusion Matters award); and the collaborative *Technicians: Providing frontline and vital support for student mental health and wellbeing* (2019). UoN leads Midlands Innovation's Research England-funded TALENT programme (£5m) and has driven national interventions to improve opportunities (e.g. creation of a UK Higher Education Technicians Summit). UoN's distinctive and important achievements were recognised in 2018's national *Technician Commitment One Year In* report.

3.5 Equality, Diversity, and Inclusion (EDI)

Since REF2014, UoN has led in developing and implementing major initiatives that ensure all our researchers (staff and PGRs), from recruitment to retirement, experience best practice in EDI. In 2018 a new, University Executive Board-level post, Pro-Vice-Chancellor for Equality, Diversity, and Inclusion, was established (one of the first such appointments in the UK). Following consultation, an ambitious EDI Strategic Delivery Plan was launched, with four themes tackling: Equality of experience for all; Strengthening diversity and improving inclusion; Excellence and ambition in delivery; and Working in partnership with our city and global community.

UoN delivers EDI engagement through our Leadership and Management Academy and Professional Development team. UoN funds formative research and innovation in practice through our Sphere Programme and Diversity and Inclusion research hub. Six dedicated EDI Coordinator roles work with individual Faculties and Professional Services teams, supported by an EDI Senior Project Manager. Each School has dedicated EDI leadership roles, with associated workload allocation, ensuring that consideration of EDI is embedded throughout their decision-making.

UoN takes a nationally leading role in EDI through activities including: EPSRC funded project work to uncover barriers to inclusivity in STEM (UoN-led, £520k); work to deliver Team Science through BBSRC; leadership of the Technician Commitment; founding membership and co-chair role in the National Network for EDI academic leads (NEDIAL); chairing the EPSRC's EDI Strategic Advisory Group; and membership of the Athena Swan Governance Board.

UoN engages with charters and external accreditations where these initiatives align with our goals. We hold Institutional Silver Athena Swan status (renewed in 2018), are a Stonewall Diversity Champion, registered Disability Confident employer, and signatory to the Working Forward pledge, signalling support for those returning from maternity/paternity leave. We have affirmed our commitment to be an anti-racist institution, and in early 2021 the institution will submit for the Race Equality Charter Bronze Award. UoN has an Athena Swan peer-support group and supports Departments and Schools in working towards local charter awards through a peer-review challenge and support team. Academic units across all Faculties hold one Gold, eight Silver and ten Bronze awards.

3.6 EDI and REF

The construction of our REF2021 submission paid close attention to EDI. All staff involved in REF2021 preparations and decision-making undertook mandatory unconscious bias training. EDI was considered in decisions about REF eligibility, output and impact case study selection, and access to supporting resources. EDI data was collected throughout and reviewed by Research Committee and the REF Steering Committee.

These actions produced a submission profile of: 34.2% F; 14.7% BAME (Asian 5.2%, Black 1.1%, Chinese 5.3%, Mixed 1.3%, Other 1.8%), 3.5% ethnicity unknown; 3.5% disability, 2.4% prefer not to say; 92.4% on permanent and 7.6% fixed-term contracts. ECRs account for 10.6% of the submission (68.2% permanent and 31.8% fixed-term contracts). The diversity of our submission profile has increased since RAE2008 (F 21.4%; BAME 9.2%) and REF2014 (F 29.1%; BAME 9.9%).

UoN followed the processes outlined in our *Code of Practice*. We took great care in inviting individuals to declare personal circumstances (282 declarations), ensuring that active encouragement was combined with protection of staff confidentiality. The PVC EDI was a member of the REF Steering Committee and chaired all appeals relating to personal circumstances. To ensure any areas with potential for imbalance were identified UoN conducted a series of Equality Impact Assessments, covering: Research Independence; Governance structures; the Personal Circumstances Process; and Selection of Outputs.

4. Income, infrastructure and facilities

4.1 Institutional strategies and supporting activities for generating research income

Our strategic interventions described below have supported research income generation in 2013-20 of £822.3m (cf. £535.7m REF2014) across a diverse portfolio: Research Councils (41%), UK Government Bodies (21%), EU sources (13%), Charities (11%), Industry (12%), Other sources (2%). UoN is the top HEI for Innovate UK funding; top five for BBSRC; top ten for EPSRC. UoN has 194 in-progress Horizon 2020 projects including 78 Marie Skłodowska-Curie Actions, 19 European Research Council grants, and 79 multi-partner international consortia projects under the Societal Challenges and Industrial Leadership programmes, coordinating 22 of these. UoN is also the largest core European University partner in Clean Sky 1 and 2. Major UK funding highlights include: leadership of the £60m Midlands Innovation Energy Research Accelerator, and two UKRPIF infrastructure awards attracting £18.9m matched funding from industry and charity partners.

Since 2013 our strategy for research income generation has concentrated on:

(a) Research pipeline investment

UoN is an EPSRC and BBSRC framework university, and our staff contribute to funding policy nationally via roles on the Councils of Research England, AHRC, ESRC, and EPSRC. Research leaders are therefore well placed to ensure the strategic alignment of UoN initiatives with emerging priorities. This knowledge informs the work of Beacons, Interdisciplinary Research Clusters (**2.1(a)**), UoN's Interdisciplinary Centre for Analytical Science (**4.1(d)**), Wellcome Prime, and HEIF Innovation and research council Impact Accelerators, which are used to grow research and impact ideas from seed-corn to fully-collaborative bids and impact. Examples include: development of bacteria-resistant coated urinary catheters; and supporting Bank of England policy-making through measurement of business uncertainty during Brexit and COVID-19. Activity is coordinated with UOA-level support (£8.2m 2013-20), where research income generation is fostered by research and impact development staff, pump-priming initiatives, and direct support for major bid development.

(b) People

Equal and diverse access to research funding for all staff groups has been fostered via the EDI Strategic Delivery Plan (**3.5**), with targeted actions including: new guidance to support proactive consideration of EDI in internal selection processes; addressing any gender bias in innovation and entrepreneurship; and ensuring diversity in UoN's Fellowship programmes.

(c) Global connections

UoN's International Collaboration Fund has fostered research partnership development, particularly in Industrial Strategy Challenge Fund, Global Challenges Research Fund, and Newton Fund areas. Over the REF period, awards totalling c.£800k have supported >250 projects across all five Faculties, with outputs including: >160 internationally co-authored publications; 49 international workshops; and £17.3m in successful external grant applications. UoN's allocation of QR ODA grant funding and Global Challenges Collaboration Fund seed corn funding has supported researchers across the institution to collaborate with Universities, NGOs, and governments in 15 DAC list countries.

Together with the international strands of the Beacon and Interdisciplinary Research Cluster programmes (**2.1(a)**) these actions have assisted UoN researchers to increase internationally co-authored publications from 41% (2013) to 60% (2020), lead 140 UKRI-funded international collaborations, and work with c.300 partners in 53 countries and the EU.

(d) Equipping researchers with new frameworks and ways of working

A commitment to innovation in research practice has been a feature of our 2013-20 strategic initiatives. For example, UoN's Digital Research Strategy provides researchers with new tools, services, and support, including: expert advice and support from a new Digital Research Service; a secure, fast, and affordable Automated Transcription Service; significantly enhanced, GDPR-compliant Performance Storage, long-term Archiving Services, and high performance computing (HPC) and cloud storage. This enhanced digital research environment has directly underpinned research across all five Faculties and has been the core enabler of >£40m of research funding and >100 publications. Its innovations have also increased breadth of engagement across our diverse research community. As an exemplar, 25% of HPC users are from non-traditional disciplines including Geography and Economics, and 22% of users are women (2019-20; c.f. 12.5% 2017-18).

Similarly, UoN's Interdisciplinary Centre for Analytical Science promotes collaborative research and use of equipment and analytical expertise through a mixture of events and networks open to all levels of researchers. Transdisciplinary working is a particular objective (e.g. investigating medieval treatments for bacterial infections combined research from English and Life Sciences and led to an APEX award).

4.2 Infrastructure and facilities

The significant capabilities and critical mass of UoN's facilities are endorsed by our success in EPSRC's strategic equipment scheme (£15.3m). They enable and underpin research and impact, and attract industry and user partners, including SMEs, HEIs, and international

collaborators from academia, industry, and government-sponsored training. Examples of UoN's 30 facilities listed in UKRI's portal include the Sir Peter Mansfield Imaging Centre, and D.H. Lawrence archive, the latter part of our National Archives-accredited Department of Manuscripts and Special Collections.

The Facilities and Equipment Management Committee provides strategic leadership in the procurement and management of UoN's research facilities. The approach is driven by researcher-need and is centred on open shared access to equipment. It aims to be future focussed through maintenance of a roadmap for new equipment that reflects strategic priorities. The EDI Strategic Delivery Plan supports all researchers to access the spaces and equipment needed for their research (3.5).

Collaboration with national and international research partners is furthered by institutional adoption of initiatives that facilitate greater external use of research equipment: UoN's Kit Catalogue, containing >1000 items, underpins a Midlands Innovation dataset and is directly linked to the national equipment.data.ac.uk dataset (>400 UoN major items). The success of this strategic approach is illustrated by UoN's EPSRC-supported nanoscale and microscale Research Centre (nmRC, launched 2016), whose globally unique facilities underpin research grants of >£100m and are utilised by >1000 users, including 40 industrial companies, and researchers from across all five Faculties. Applications include next-generation drug-delivery systems and medical devices.

Institutional research and impact are enriched and connected locally, nationally, and globally by the use of shared and collaborative facilities and major in-kind benefits. Collaboration is fostered locally by our leading role in Midlands Innovation's Research Efficiency Group and Energy Research Accelerator (4.1). The latter's investment in shared facilities includes the Trent Basin Community Energy Test Bed, the Geoenergy Testbed, and a Research, Acceleration and Demonstration Building (£12m). Globally, UoN researchers benefit from specialist facilities hosted by international partners, including the Institute of New Materials (UoN's China campus), and strategic links, including with Centro Nacional de Pesquisa em Energia e Materiais (CNPEM) in Brazil (host of the Southern Hemisphere's only Synchrotron). Major in-kind benefits (estimated value c.£16.9m), include use of ISIS Neutron and Muon Source (Rutherford Appleton), and the Hubble Space Telescope.

Between 2013-20 UoN has invested in major buildings and research facilities (£111.4m research component of large capital projects), focussing on ensuring buildings sustainably meet their researcher communities' needs (recognised by *UI GreenMetric World University Rankings*, top two 2013-8, fourth 2019). As with other facilities, investment has driven innovation in research practice. Examples include the creation of an Advanced Manufacturing building (supported by £5m investment from the D2N2 Local Enterprise Partnership via the Local Growth Fund) for research that fosters UK manufacturing by developing new technologies and systems for cost-efficient, knowledge-intensive, high-value, and environmentally friendly production; and the flagship Biodiscovery Institute (£23m, 2013-20), a world-leading, interdisciplinary research hub that is shaping the future of health and technology.