

<b>Institution: Loughborough University</b>
<b>Unit of Assessment: D32 Art and Design: Art and Design: History, Practice and Theory</b>
<p><b>1. Unit context and structure, research and impact strategy</b></p> <p><b><u>Introduction</u></b></p> <p>Loughborough University's art and design research environment was recognised as 90% 4* in REF2014. It has since strengthened significantly through strategic reorganisation, the addition of the Institute for Design Innovation on our new London campus, substantial PGR growth, an expanded Professoriate and investment in facilities. During the assessment period we consistently rose in the QS International Rankings for art and design rising from 40<sup>th</sup> in 2015 to 24<sup>th</sup> in 2020.</p> <p><b><u>1.1 Research Structure</u></b></p> <p>This submission spans three Schools:</p> <ul style="list-style-type: none"> <li>• All staff in the <b>School of Design and Creative Arts (SDCA 73.7FTE)</b> covering art, design and human factors.</li> <li>• The <b>Art History and Visual Culture</b> group (<b>AHVC 6.8FTE</b>), School of Social Sciences and Humanities (SSSH)</li> <li>• The <b>Institute for Design Innovation (IDI 5.0FTE)</b>, Loughborough University London (LUL).</li> </ul> <p>The structure underpinning our research environment has been enhanced in three significant ways since 2014:</p> <ol style="list-style-type: none"> <li>1. Established the Institute for Design Innovation on our new London campus (2015), which is the University's biggest single strategic investment since University designation in 1966.</li> <li>2. Strengthening Humanities through formation of the School of Social Sciences &amp; Humanities (2019).</li> <li>3. Formation of the School of Design and Creative Arts (2019) uniting the former Design School and School of the Arts.</li> </ol> <p>Associate Deans for Research and Enterprise are responsible for Research (ADR) and Impact and Knowledge Exchange (ADE) in each School, developing Action Plans that respond to quarterly performance data (via University Research Committee) and annual Research Quality Enhancement reviews. The SDCA <b>Research and Enterprise (R&amp;E) Committee</b> is chaired by ADR / ADE on an alternating basis, with representation from AHVC and IDI invited into strategic discussions. It is responsible for the development and implementation of a co-ordinated and ambitious research and impact strategy, benefiting from our external Advisory Board of leaders from academia, industry, professional bodies and cultural institutions.</p> <p>Our research develops effective outcomes that add value to individuals, organisations and society. This is achieved by taking a responsible view of art and design in light of aesthetic, technological and organisational possibilities, environmental challenges, societal changes and the diversity of our cultural heritage.</p> <p>Research strengths are organised as formal <b>Centres of Excellence</b> and <b>School research groups / institutes</b>, with most staff contributing to more than one group.</p> <p>Our <b>Transport Safety Research Centre</b> (Morris and Thomas lead) builds on decades of successful research in road and vehicle safety informing the development of new policies, standards and the design of vehicles and roads. Research is undertaken through international consortium projects with partners from academia, government and industry.</p> <p>Our <b>Environmental Ergonomics Research Centre</b> (Havenith leads) is renowned for research in thermal comfort and performance, complex socio-technical systems, digital human modelling</p>

and healthcare safety. Rigorous experimental research informs the design of garments, vehicles, medical devices, assistive technology and buildings. Research is typically undertaken with sportswear manufacturers, healthcare providers, the construction industry, transport providers and vehicle manufacturers.

The **Responsible Design** research group (Bhamra and Dong lead) combines and builds on our research excellence in sustainable and inclusive design, developing theory and practice through environmentally sensitive and people-centred approaches to improve environmental performance, sustainable wellbeing and quality of life for all.

The **Digital Design and Fabrication Lab** (Bibb and Campbell lead) investigates design practice enabled by digital technologies whilst exploring cultural and economic impact in areas including computer-aided design, 3D Printing, medical devices, 3D Printed electronics, design for Additive Manufacturing and smart textiles.

Our expertise in experience design comes together in the **Design for Future Living Lab** (Cain and Haines lead). This combines our extensive expertise in user-centred, graphic, service and experience design, social sciences and human factors through rigorous and creative methodologies to explore new and emerging technologies and address societal challenges.

The **Institute for Design Innovation** (Koria leads) examines the role of design and promotes the diverse contributions that designers can make as cultural intermediaries, transformational leaders, activists and critical thinkers in design management and value creation.

In **Graphic Design** (Harland leads), we pioneer research that responds to national concerns revealed by REF2014, providing a new direction for future research and shaping debates in areas such as Urban Heritage. **Textile Design** (Heinzel leads) research explores practice and technology including areas such as laser colouration, enzymes and technical weaving. Our research in **Fine Art** (Lindley and Richardson lead) encompasses practice-led research in drawing, painting and notable strengths in heritage and sculpture. The **Animation Academy** (Wells leads) creates innovative work in the interdisciplinary space between graphic design, illustration, fine art and visual practices in production and exhibition contexts.

The **Art History and Visual Culture** research group (Robinson and Meskimmon lead) delivers intersectional feminist research that addresses urgent social, political, cultural and pedagogical dilemmas confronting contemporary societies through intersectional feminisms, museology, fashion theory, transnationalism and art historiography.

### Interdisciplinary Research

We have transitioned from multidisciplinary cooperation to cohesive interdisciplinary research that exploits our critical mass, complementary expertise and shared resources. In the assessment period, we graduated 41 interdisciplinary PhDs spanning 12 Departments/Schools. We established criteria and procedures for the formation of interdisciplinary research **Labs**. Two have been formed with more in development:

- **Design for Future Living Lab** adds social sciences, geography, business and economics to complement expertise in all areas of design and human factors.
- **Digital Design and Fabrication Lab** has expanded from its roots in product design and engineering to encompass sculpture, jewellery, heritage, archaeology, materials, biology, chemistry. It includes members from four Schools and coordinates the University's Additive Manufacturing Network.

We are fully engaged in the **Global Challenges** and **interdisciplinary Beacons** (see CALIBRE framework REF5A). Our design, human factors and safety research is engaged in all four Global Challenges, **Energy, Changing Environments & Infrastructure, Secure & Resilient Societies** and **Health & Wellbeing**, and three of the five Beacons, **High Value Manufacturing, Built Environment** and **Transport Technologies**. Arts research is integral to the **Communication & Culture** Beacon.

**1.2 Review of objectives and plans since REF 2014**

Our 2014 aims were to (i) strengthen interdisciplinary research capacity and capability; (ii) enhance quality (iii) improve international reach and influence, aligning with University strategic aims *Raising standards and aspirations* and *Growing capacity and influence*.

**(i) Strengthen interdisciplinary research capacity and capability**

There has been a 58% increase in research active staff submitted to REF2021, compared to REF2014, reflecting strategic investment in capacity. We made four appointments in Additive Manufacturing, expanding further into design for Additive Manufacturing, scientific and medical applications. The **Institute for Design Innovation** was established to address social, enterprise and innovation needs. We contributed to the successful AHRC Doctoral Training Centre "Design Star" with 11 of the 63 PhD students registered at Loughborough, contributing to our rise in Doctoral enrolments and a 68% increase in completions compared to REF2014. In 2019 we became a partner in the TECHNE AHRC Doctoral Training Partnership.

**(ii) Enhance quality**

Whilst we have aimed to maintain high standards in our world-leading research environment (90% 4\*) and excellent impact (67% 4\*) in REF2014, we have also aimed to raise the quality of Unit outputs. We therefore implemented researcher training in visibility and open access publishing, developed journal selection guidance, facilitated international co-authoring, developed self-assessment guidance and introduced mentoring and internal peer review of outputs. Comparing Scopus data 2014-19 to 2008-13, the number of outputs increased from 647 to 938, and the outputs in the top 10% Journal Percentiles by SNIP increased from 10% to 26%.

**(iii) Improve international reach and influence**

Our most significant recent appointment is Professor Cees de Bont as Dean (2018), previously Dean of the Faculty of Industrial Design Engineering at TU Delft and School of Design at Hong Kong Polytechnic University. Leveraging his international network and reputation, our Directors of Internationalisation have established new international partnerships and exchanges. For example, in 2019 we established the International Research Centre to study the impacts of 'Connected and Autonomous Vehicles on Vulnerable Road Users' with Queensland University of Technology and Tongji University.

The University's **Institute of Advanced Studies (IAS)** led by AHVC member Professor Meskimmon has helped us develop international reach and influence by supporting IAS Visiting Fellows and themed events such as our 2019 **Experience Design Thought Leadership Summit**. Our research also contributed to widening engagement and visibility through IAS themes, such as *Geometry* and *Sound*. Overall, we hosted 61 international visiting academics including two Fulbright Scholars. International co-authorship of papers has risen to 33% for 2014-19 from 20% for 2008-13.

**1.3 Enabling and Facilitating the Achievement of Impact**

We build **long-term strategic partnerships with research users** including charities, governments, public bodies, healthcare providers and industry. We **work from the outset with research users** in the setting of research questions and project proposals and **build impact into research plans**. For example, since 2014:

- Our long-standing partnership with Transport for London (TfL) has yielded projects influencing EU standards, policy and legislation.
- Research partners donated equipment and provided access to world-leading facilities. A world-leading sports brand provided access to their research labs, including their textile lab for characterising materials and use of their thermal foot manikin for 6 months and Nissan donated car components including dashboards, steering wheels and seats.

We combine **adaptable agreements** with a **flexible approach to sharing outputs and intellectual property**. Methods include student projects, short term consultancy, industry

secondments, sponsored PhDs, contract research, partnering on funding applications and knowledge exchange funded by Higher Education Innovation Fund (HEIF), EPSRC Impact Acceleration Account (IAA), Innovate UK or directly by industry. For example, our work with Jaguar Land Rover has been through funded PhD students.

Impact is supported through protected workloads and reviewed in annual Performance and Development Review (PDR). Impact training and developmental activities are organised and delivered by the ADE and the Partnership Development Managers (PDMs). Staff can access comprehensive advice and support for bids at monthly Enterprise Clinics.

The University's Enterprise Projects Group (EPG) provides opportunities to bid for HEIF and EPSRC IAA funding to support impact activities. Since 2014, 9 impact projects were supported by IAA (£392,500) and 28 projects by HEIF (£285,900), (see 4.1).

We have led the way at the University in the development of a **School Partnership Strategy** to build multifaceted relationships with research users including companies on **Loughborough University Science and Enterprise Park (LUSEP)** such as BeoBia, founded by a design alumnus, INCUS Performance and Tzuka, all employing our alumni.

Our research has been shortlisted in **Loughborough's Biennial Enterprise Awards** on 10 occasions, winning four awards including the 2014 International Impact Award for 3D technologies in the restoration of invaluable artefacts in China's Forbidden City and Summer Palace and Cultural Impact Award for the Animation Academy whose collaborations showcased British animators. In 2015, the Social and Cultural Impact Award went to HEART, an animation therapy for vulnerable and marginalised groups and the iD Cards won the most downloaded App award (reaching 17,957 downloads by 2018).

We regularly engage with research users and beneficiaries through **contract research and consultancy** managed by Loughborough University Enterprises Ltd. During the assessment period 33 researchers engaged in 146 projects with 106 non-academic partners generating more than £2.3m income. These include government departments, healthcare providers, manufacturing and services companies, and sporting bodies. Notable examples include global automotive manufacturers, world-leading sport brands, the NHS (12 healthcare providers), 3 police forces, the Ministry of Defence, Home Office and Transport for London.

#### **Pathways to Impact via Competitively Funded Knowledge Transfer**

We achieve impact via knowledge transfer funded by Innovate UK, ERDF and EPSRC, with HEIF and IAA funding managed by the University's **Enterprise Projects Group**. In addition to the Impact Case Studies, notable examples include:

- £90,000 IAA + £61,068 HEIF funding to support "The Dementia House" demonstration home presenting evidence-based design solutions enabling people to age well at home working with BRE Trust, Halsall Lloyd Partnerships and Liverpool John Moores University.
- The "Direct Garment 3D printing: Additive Manufactured Clothing & Footwear" project received £146,111 from IAA + £76,789 from Yeh Textiles to progress towards commercial 3D Printed textiles.
- Working in collaboration with Granta, SCIN gallery and Material Driven, the "ENDURE" project received £46,685 IAA to increase designers' knowledge of, and literacy in, material change through development of plug-ins for CES Edupack software and SCIN Gallery's materials library, engaging the design community through two London exhibitions; Design Junction 2017 (28,000 visitors) and Surface Design Show, Business Design Centre, 2018 (5,016 visitors).
- "Healing Education Animation Research Therapy" received £27,106 HEIF enabling development of 'Cultural Rivers', an animation workshop and exhibition supporting visual and linguistic skills of first-generation immigrant children in Charnwood. Barnardo's and NHS endorsed the project and HEART, in collaboration with the University of Sunderland, became an affiliate of the Animation Academy. They then collaborated on four editions of 'Animation

& Public Engagement Symposium' 2015-2018, and a special issue of Animation Practice, Process & Production.

- The EPSRC project “Broadening Integration of Printed Power Sources with Electronic Systems: Rechargeable Printed Power Sources” proved the feasibility of making supercapacitors using mass produced printed electrodes and a patent for “Flexible Peelable Electronics” was filed (WO2017/077115A1). Working with Gwent Electronic Materials, £45,097 IAA funding enabled us to prove devices could be robust and mass-manufactured.

### **How the Selected Impact Case Studies Relate to our Approach to Achieving Impact**

Our Impact Case Studies exemplify our approaches to achieving impact through strong partnerships with research users and policy makers to co-create research agendas and implement research findings often leveraging competitively awarded knowledge transfer funding.

For example, the work with Transport for London (D32-1) was a direct response to their need to address collisions between Heavy Goods Vehicles and cyclists. Long-term partnership led to the initiation of research and delivery of safety recommendations followed by subsequent work to develop methods of implementation, informing international vehicle standards and regional transport policy. Our strong international partnerships contributed directly to our success in achieving impact in European road safety practice and policy through, for example, creating common definitions of accidents and standardised methods of data collection (D32-5). Our approach of working with international partners with particular regional challenges enabled us to effectively transfer research insights into meaningful interventions for marginalised indigenous communities in Canada (D32-7).

Our human factors Impact Case Studies (D32-2, D32-4) demonstrate the effectiveness of working with research users to define and then answer research questions and implement new practices. This has, for example, led to the development of new and improved products for major sports brands and the development and implementation of new training for healthcare professionals to improve patient safety. D32-6 shows how long-term development and sharing of design processes through co-creating with companies, charities and disabled users enabled the development of new and improved assistive technology products.

Our integrated approach to research and enterprise helped develop PhD research through knowledge transfer into implementation (D32-3). £24,478 HEIF funding enabled the PhD graduate to become an Enterprise Fellow for 12 months to develop tools and services to support the restoration of historic artefacts in the Summer Palace, Beijing. £45,675 Impact Acceleration Account funding enabled us to develop research-informed short courses for healthcare professionals and gather evidence of improvements in care delivery (D32-4). The first courses were delivered autumn 2019 to East Midlands Ambulance Trust and East Midlands Academic Health Science Network.

### **1.4 Research and Impact objectives over the next five years**

Strategic planning is informed by rigorous reviews led by the Deans, an external review by Professor Rachel Cooper OBE and an Advisory Board. Research and impact strategies have been revised in accordance with wider School strategies to address societal challenges through innovative transdisciplinary research. We will focus on new research opportunities afforded by digitalization, improved working methods to nurture research culture and new opportunities arising from our London presence. The strategy is being co-developed with a wide range of stakeholders and involves representation and consultation with all art and design constituencies at Loughborough.

Objectives for the next five years are:

1. **Invest in leadership, capability and capacity in digital technologies** across all areas of art and design. We will build on our interdisciplinary research strengths in digital design and fabrication to encompass a wider range of technologies. This will enhance synergies across

- disciplines to create leadership in areas such as heritage, sculpture and fine art practice, leading to innovative postgraduate research and research informed teaching.
2. Implement plans for c.**£30m investment** in a new building to provide new accommodation for Creative Arts and world-leading digital technologies to strengthen research in digital design and fabrication and enable entirely new forms of transdisciplinary research.
  3. Build on opportunities afforded by **our presence in London** enabling us to strengthen partnerships with the British Council, V&A East, Design Museum, our alumni and other professionals in London. Target areas include culture, heritage, fine art and theatre. We will further develop existing partnerships; for example, our research directly influenced Ford's decision to locate its new mobility innovation centre on Here East. Our transport safety research directly contributed to the £13.4m Smart Mobility Living Lab, led by TRL with Transport for London, Costain, Cisco, Cubic, DG Cities and the London Legacy Development Corporation, which will enable us to trial research findings within complex public environments leading to lasting impact. We co-founded the Global Disability Innovation Hub through which we will further develop collaborative research and impact with global reach. This includes work in and resulting from the Foreign Commonwealth and Development Office funded Assistive Technology 2030 programme.
  4. We will **train the next generation of transdisciplinary researchers** to tackle complex social problems and issues, building on our success in Design Star and TECHNE and supported by University investment in mini-CDTs in 'Feminism, Sexual Politics and Visual Culture' and recently awarded 'Harnessing Opportunities for Meaningful Environments (HOME)' which will combine design technologies with multimodal and performative methods to develop new understanding of the experience of homelessness.
  5. Building on six appointments made in 2019/20, we will **increase research capacity and leadership** by nurturing our current talent through a tailored development and mentoring programme and strategic recruitment.
  6. Develop an international centre of excellence in **Graphic Design research** building on four recent appointments.
  7. **Grow external research income** to enable sustained investment in facilities, increase in postdoctoral research capacity and strategic growth in PGR.
  8. Contribute to research in the £70m civilian **National Rehabilitation Centre** (operational 2023), in collaboration with the £300m **Defence Medical Rehabilitation Centre**, both located near Loughborough.

### **1.5 Open Research Environment**

The University has been a pioneer of the 'Open Agenda', actively supporting repositories for text-based outputs (since 2005) and data (since 2015), now unified (2019) in a single Research Repository. Our repository accommodates all outputs, including performances, exhibitions and practice-based research, to be shared (with digital object identifiers) in a manner not previously possible. Our **open access commitment** pre-dates external OA policies; shown by 76% of all journal articles since 2014 in the **RR**. From 2016, it has been our policy that all journal articles and conference papers are deposited within three months of acceptance, exceeding the REF2021 requirement. Our landmark Open Research Position Statement formally committed to depositing the full-text of 100% of our primary research outputs in our now unified (2019) Research Repository (including on closed access where unavoidable) from 2020. As of now, SDCA has deposited 100% of 2020 journal articles.

We aim to have 100% open access to all publicly funded research outputs by 2022 including contextual PDFs for practice-based outputs. Authors are encouraged to publish in green open access journals with gold preferred. We use Creative Commons licenses to ensure work is accessible with correct attribution and control. As of October 2020, the collective outputs of the School received more than 2 million downloads. For example, the **Loughborough Urban Graphic Object Archive** had 97,511 views and 24,032 downloads.

**1.6 Culture of Research Integrity**

Our research spans a diverse range of disciplines from physiology to visual culture with a common theme of addressing the individual and collective needs of people. Research integrity and underpinning ethical principles are therefore deeply embedded in practice. Ethics is overseen by an experienced senior academic and all research adheres to the rigorous principles and processes of the University's Ethical Policy Framework and Code of Practice for Research, underpinned by the principles of UUK's Concordat to Support Research Integrity.

Our researchers play an active role in the University's Ethics Committees ensuring that policies and procedures are informed from arts and humanities perspectives as well as sciences. In 2020, Haines led the University's review of ethical approval processes. Our research in Responsible Design actively explores the ethical frames for art and design research.

**2. People****2.1 Staffing and Recruitment Policy****Staffing Policy**

All Category A staff have open-ended contracts, engage in **Research, Teaching and Enterprise (RTE)** and contribute to administration and management. All academics have a minimum protected workload (28% or higher) for research and impact. Part-time working is welcome and 16 staff work part-time. Researchers working on externally funded projects (or those on temporary cover posts) are typically on fixed term contracts.

**Recruitment Strategy**

In line with our research strategy, recruitment has focused on research strengths, leadership, international reputation and establishing our London presence. Recruitment prioritises early career potential and proven research achievement; shifting from irregular reactive appointments to strategic, planned recruitment implemented through University coordinated biannual campaigns. Areas of highest teaching workload have been supported through teaching-only appointments, releasing research time to RTE colleagues. We strategically appoint **Visiting Academics** from partner organisations on **honorary contracts** to provide strong reciprocal links informing and facilitating research and impact.

Recruitment reflects our commitment to **equality, diversity and inclusivity**. We shortlist all applicants with disabilities meeting essential criteria, all members of selection panels attend mandatory recruitment and selection and unconscious bias training and panels are mixed gender. Strategic action plans are informed by annual monitoring for gender and ethnicity in recruitment, management roles, training, promotions, funding applications and applications for study leave.

**Pattern of staff recruitment over the assessment period**

We invested in early career talent with 27 new Lecturer appointments. Three strategic Senior Lecturer appointments increased capacity in Textiles, Digital Fabrication and Graphic Design. Leadership was strengthened by six Professors and one Reader (subsequently promoted to Professor). We benefited from the University **Excellence 100** campaign (2017-19), attracting three internationally renowned Professors, one Lecturer, one Vice-Chancellor's Research Fellow (for ECRs with the highest potential, five-years fixed term, permanent on successful promotion) and two Doctoral Prize Fellows (two-year posts within two-years of PhD award).

**Evidence of Effectiveness**

Staff returned have increased from 57 (69% of 83 headcount in REF2014) to 92 (100%). Appointing world-leading academics de Bont as SDCA Dean, Korja to lead the Institute for Design Innovation and Dong enhanced international reputation and leadership. We have grown from 9 to 21 Professors through recruitment (6) and promotion (6). We appointed 33 Honorary

Visiting Academics, including Prof Patrick Jordan (Middlesex University), Prof Sarah Pink (Monash University) and the former Age UK Chief Scientist Prof James Goodwin.

### **Demographic Profiles and Succession Planning**

Our profile demonstrates vitality and sustainability: 4.4% Research Fellows, 40% Lecturer, 28.6% Senior Lecturer, 27% Reader / Professor. On the census date 16 (15.6FTE) met the REF definition of Early Career Researcher. Four Readers are nearing promotion; two of whom were promoted to Reader in the assessment period. The balance of our demographics provides many opportunities for progression and succession as described in staff development below. Key leadership positions have succession plans that inform strategic recruitment and internal staff development.

### **2.2 Staff Development Strategy**

We created the role of **Director of Academic Development** in the Senior Management Team to develop strategy and actions, often with ED&I dimensions, for staff development and succession planning. Senior Lecturers are supported in developing leadership through School roles. Developmental opportunities are strategically allocated to Readers in preparation for senior roles. For example, Associate Dean Research (ADR) Bibb served 9-months as Acting Dean whilst Haines (Reader) became Acting ADR, providing two excellent developmental experiences. Haines subsequently became ADR after her promotion to Professor.

Technical staff develop through the Midlands Innovation TALENT courses, HNC, degrees, Institute of Leadership and Management (ILM) courses, Institute of Science and Technology registration and Associate Fellowship of the Advance HE (3 FTE).

We support academic colleagues from an arts or industry practice background to achieve PhD by Publications (only available to staff). Six colleagues achieved PhDs in the assessment period with two in progress.

Participation in conferences and research visits are essential career development, build international visibility and foster collaborations. Academic staff have £1,000 individual budget for research travel and conference attendance.

### **Mentoring**

The Academic Development Mentoring Scheme is open to colleagues at any grade. Formally trained mentors support promotion to Senior Lecturer and Reader, while Associate Deans support Readers preparing Professorial applications. Evidence of success is 16 promotions (8 women, 8 men) since 2014.

### **Contribution of Research Associates**

Research Associates are integral to our research community enjoying the same opportunities and facilities as RTE staff. During the assessment period, 64 fixed-term Research Associates (32 men, 32 women) contributed to more than 90 funded projects with 15 (7 men, 8 women) in post on the census date. 12 Research Associates have gone on to be appointed as Lecturers (7 at Loughborough, 5 elsewhere). This includes three researchers appointed as parental leave cover who subsequently gained permanent academic positions.

### **Researcher Development**

A proven part of our staff development strategy is retaining and nurturing early career talent, developing PhD students into Research Associates and subsequently into Early Career Lecturers within Loughborough and beyond. We encourage Research Associates to apply for parental leave cover vacancies that provide opportunities for lecturer experience. Researchers are supported according to the *Concordat to Support the Career Development of Researchers* and the Vitae framework. Full access to staff development opportunities includes the 'Recognition of Teaching for Researchers' (ROTOR) and 'Associate Teaching Pathway' (ATP) programmes, leading to Associate / Fellowship of Advance HE. Two Research Fellows have



been supported to achieve PhDs by Publications during the assessment period with one subsequently being appointed to an RTE position. We have dedicated support for applications for externally funded Fellowships. Researchers meet the ADR quarterly to discuss development needs. We participate in CROS responding to findings via annual Research Action Plan. Our research staff have been prominent in the leadership of the Loughborough University Research Staff Association (LURSA).

### **New Lecturers' Programme (NLP)**

NLP offers three-years of comprehensive training. Annually incremented teaching load (33%, 50%, 67% of norms) enables development of a balanced RTE profile, guided by an experienced and trained Advisor. NLP covers all aspects of research and impact (publication, funding, collaboration, public engagement, partnerships), guarantees supervision of a PhD student and leads to Advance HE Fellow status. During the assessment period, 20 early career academics (18.9 FTE) successfully completed NLP with 3 subsequently progressing to Senior Lecturer. 11 academics are currently on NLP.

### **Appraisal, Promotion and Reward**

A significant enhancement in the assessment period was the new annual Performance and Development Review (PDR) in which staff reflect on achievements and discuss plans with a trained reviewer. All reviewers complete mandatory ED&I training including unconscious bias. PDR recognises that the form and volume of research output and impact differ across art and design disciplines and reviewers take account of disciplinary norms. Objectives are agreed and revisited after 6 months. PDR identifies individual training needs and considers workload; especially important for ECRs, grant-holders and those with managerial responsibilities. Fairness and equity are ensured through moderation by the Senior Review Group who make final recommendations. PDR provides **fair and equal opportunity** to recognise and reward excellent performance and enables staff to seek promotion through a transparent process with clearly described criteria. PDR has particularly benefited fixed-term Research Associates for whom developmental discussion was previously sporadic and consideration for reward rare.

Performance and promotion criteria focus on quality rather than quantitative measures ensuring part-time staff are not disadvantaged and expectations recognise career stage and personal circumstances. PDR data are analysed each year through equality impact assessments. Protected characteristics, where available, are analysed and when appropriate, we have revised the PDR process or training arrangements to address issues identified.

### **Evidence of the effectiveness of staff development**

During the assessment period, 25% of eligible academic staff achieved promotion including one person promoted to Reader then Chair. By gender: 5 men / 3 women promoted to Senior Lecturer, one man / one woman to Reader, 2 men / 4 women to Professor.

### **Research and Impact Leave**

University and School Fellowships (study leave) provide up to 12 months protected time and £5k budget. This has benefited staff returning from significant managerial roles. During the assessment period, 8 Fellowships were awarded (4 men, 4 women, 3 to staff completing Associate Dean terms) amounting to 77 person-months of intensive research activity. Academics are encouraged to seek funded industry secondments. For example, Paterson received a Royal Academy of Engineering Industry Fellowship with Central Scanning Ltd. that both informed and benefited from our Digital Design and Fabrication research. Mitchell was awarded 12 months (0.4FTE) secondment to service design agency Snook as academic lead for Learning Design.

### **2.3 Postgraduate Research Students (PGRs)**

PGRs are fundamental to the vitality of our research culture and environment. 167 (148FTE) students, including 71 international students from 34 countries, graduated showing substantial growth from REF2014 (88FTE). 57 are now in academic posts: 42 full academics and 16

researchers in the UK, Botswana, China, Iran, Ireland, Malaysia, Malta, Mexico, Sweden, Thailand, UAE and USA. Graduates included 22 part-time students.

Interdisciplinary PhDs are prominent: during the assessment period Unit staff successfully co-supervised 41 PGRs (headcount) across 12 Departments / Schools. Our theses in the Research Repository had received more than 472,000 downloads at the time of writing.

PGRs are allocated a permanent desk, PC and phone in high quality office accommodation for their funded period. Arts students are allocated studio space within a community of practice-based researchers. We gain feedback from the **Postgraduate Research Experience Survey (PRES)**, which can be benchmarked nationally. For example, Design PGRs had above national average overall satisfaction (88% 2017; 86% 2019) especially with working space, computing resources and facilities. 2017 results revealed our support for conference attendance and paper submission exceeds national average. 2019 showed above national average ratings for supervisors' skills and knowledge (92%) regular contact (94%) and feedback (92%). Development of research skills was highly rated for methods (98%); critical analysis (98%); research integrity (96%) and confidence to be creative (86%).

### Funding

The University is committed to supporting a vibrant PGR population significantly investing in **Doctoral College Studentships**, funding 60% of our graduates during the assessment period. 12% were **Research Council** funded, most co-funded by industry. 15% were funded by charity, government or industry, including prestigious scholarships such as the Schlumberger Foundation. 14% were self-funded.

Our strategic support for interdisciplinary research across Schools is evidenced by our success in winning University funding for **mini-Centres for Doctoral Training** (mini-CDTs). Next Generation Prosthetics (2014 to 2020) graduated four interdisciplinary PhDs in design, materials, biology and engineering. Feminism, Sexual Politics & Visual Culture (2018) currently has 13 students supervised by a cross-disciplinary team spanning fine art, graphic design, English literature, drama, art history, gender studies, politics and sociology.

We are a partner in the £2.2m **AHRC CDT Design Star** with Reading, Open, Goldsmiths and Brighton. Design Star is committed to offering studentships to those with professional experience and promoting part-time study. 64 students in 5 cohorts were admitted from 2015. By the census date, of 11 Loughborough students, 6 had graduated, one submitted with 4 in progress. LUL is a member of the recently renewed **TECHNE AHRC DTP**. Cross-School co-supervision of science and engineering students was supported by EPSRC DTP studentships and EPSRC CDTs in Additive Manufacturing, Embedded Intelligence and the London-Loughborough Energy Demand CDT, renewed in 2019 as the CDT in Energy Resilience and the Built Environment. Our partnerships with external organisations such as Nissan, OS and Materialise resulted in partial and full **industry funded PhDs, CASE Awards** and match for CDT students.

### Recruitment

We advertise via the University website, FindAPhD, jobs.ac.uk, School and staff LinkedIn and Twitter accounts using imagery that reflects our diverse population. Rigorous selection prioritises academic achievement with decisions based on reviews and interviews by two academics and at least two references. We make particular efforts to attract and support part-time PhD candidates and have considerable success in supporting practicing professionals as well as those with caring responsibilities. Applicants with disabilities are invited to identify requirements and are supported by the University's Counselling and Disability Service.

### Support

All PGRs have two supervisors taking account of combined expertise, workload and supervisory experience. Where beneficial a third supervisor is appointed. This ensures interdisciplinary research can be comprehensively supervised and supports early career supervisors by teaming

them with experienced colleagues. To maintain a balanced workload and high-quality student experience, supervisors normally supervise a maximum of 6 PhDs.

In response to PRES feedback, we appointed 2 Deputy Directors of Doctoral Programmes (one man, one woman) to support PGR inductions and one-to-one meetings with all new students within their first month. We initiated Personal Tutors to provide pastoral support independent of the supervision relationship. We are proud that a number of our graduates with a variety of serious health and ability challenges, including unforeseen sudden serious illness and injury, have been successfully supported through their studies.

### **Monitoring**

Directors of Doctoral Programmes and Research Administrators monitor and support supervision. Quality is managed through documented monthly meetings, 6-month reviews and Annual Progression Boards. Progression is reviewed by Supervisors and an Independent Reviewer based on written reports, training plans and interviews. Progression Boards review all reports and mitigating circumstances or leave of absence requests. Those not making expected progress are given three months support to get back on track. The Associate PVC for the Doctoral College oversees quality assurance including admissions, examinations and appeals, ensuring equitable treatment. A significant improvement since 2014 has been the establishment of a highly effective termly Staff-PGR Liaison Committee attended by elected PGR representatives.

### **Skills Development**

Our PGRs contribute to research culture by organising their own annual design research conference *DesRes* and contributing to the Doctoral College's Research Conference, Summer Showcase, PhD Support & Social Network, Loughborough's Qualitative Digital Research Laboratory, Cafés Academique, and Three Minute Thesis competition. Many of our students are engaged in CDTs providing multidisciplinary cross-institutional cohort training. Our industry sponsored PGRs benefit from industry placements and opportunities to develop transferable professional skills.

Our PGRs benefit from comprehensive Doctoral College training aligned to the VITAE framework including Teaching Skills, Essential Teaching Skills and Recognition of Teaching for Researchers (ROTOR). Since its inception in 2016, 5 PGRs gained Advance HE Associate Fellowship and 6 achieved Fellow. On the census date 4 PGRs were engaged in ROTOR. The University offers support including a Statistics Advisory Service and an English Language Support Unit.

## **2.4 Equality, Diversity and Inclusion (ED&I)**

ED&I is embedded in policies and working practices at all levels. We adhere to the principles of ED&I, set out both in law and in good practice frameworks and guidance (e.g. Race Equality Charter, Athena SWAN Charter). The Design School was awarded Athena Swan Bronze in 2014 and SDCA is actively working towards Silver through a detailed Action Plan led by a Champion supported by three ED&I Directors sitting on Senior Management Team. ED&I is explicit in the terms of reference and a standing agenda item of Research & Enterprise Committee, which represents the Unit gender balance with academic membership of 6 women and 5 men (3 L, 1 SL, 7 Prof), plus Partnership and Research Development Managers (women) and Operations Manager (man). The 92 staff (headcount) in this submission show an equal gender balance. At Lecturer it is 44%/56% male/female; 52%/48% at SL and 60%/40% at Reader and Professor, showing an improving balance in the promotion pipeline. Over the assessment period, 64 fixed term Research Associates (headcount) showed an equal gender balance.

10 out of 33 women (at L/SL) are part-time compared to 2 of 30 men. We aim to eliminate barriers to promotion for women in art and design. We are working to better understand and address the needs, requirements and challenges for people working part-time.

The unit has 3.3% self-identified disabled staff. Overall, 10% self-identified as BAME, with 14% at Lecturer reflecting improving diversity in recent recruitment. 23% of staff are from 16 countries: Australia, Canada, China, Colombia, Croatia, Finland, Germany, Greece, Ireland, Italy, Lithuania, Netherlands, Romania, South Korea, USA and Zimbabwe.

Formal **flexible working** requests are submitted and approved by HR with support from Schools. Academic staff and PGRs operate with a great deal of autonomy and have the ability to work flexibly or remotely on an informal basis so long as their responsibilities are fulfilled. Our research increasingly leads to team working and sharing of roles and responsibilities. Our IT infrastructure enables effective **remote working**, much enhanced since the coronavirus pandemic. It is School policy that staff with caring responsibilities can apply for additional financial support for **increased travel or caring costs for conferences and research visits**. It is University policy to fund cover for parental leave and **support staff during and when returning from periods of leave**. During leave we use Keeping in Touch days to maintain contact with PhD students, mentors and funded projects. We allow gradual return to full-time or phased return via temporary fractional appointment and reduced responsibilities where workload allows.

We ensure that staff with **protected characteristics** can research productively. We employ our in-house expertise in Human Factors to offer workplace Display Screen Equipment assessments. Staff are supplied with alternative seating, computer peripherals and sit-stand desks as needed. Colleagues with physical needs can be accommodated in fully accessible workspaces that includes full wheelchair access, including showers and T-hearing loop. We have an excellent record of supporting staff and PGRs with health challenges and disabilities, for example, providing dyslexia software, providing viva questions in advance, scheduling viva rest breaks and having a scribe to take notes. Additionally, we provided specialised workspace and adapted office furniture in two buildings to enable cross-disciplinary working for a PhD student with mobility challenges.

We pay particular attention to **supporting mental health and wellbeing**, investing in training, including certified mental health first aiders, to recognise and address individual needs sensitively and promptly. The University Counselling Service is available for emergency meetings and long-term treatment. The University also subscribes to the Employee Assistance Programme providing 24-hour telephone counselling and repeated sessions for staff and PGRs with complex issues. We analyse Staff Survey responses to prioritise and address needs, such as recognising part-time workers when scheduling meetings, avoiding meetings at the start and end of the working day, adding comfort breaks into meetings and providing opportunities for social interaction. We hold monthly informal coffee mornings for all staff and recognise achievements with "Extra Mile Awards". A comprehensive Workload Model ensures all staff have a balanced and reasonable workload.

### **2.5 Equality & Diversity in the preparation of this Submission**

All preparations for this submission were conducted in accordance with the University's Code of Practice. The selection of outputs was conducted through internal peer review by complementary paired reviewers made up of one man, one woman with one Prof/Reader and one L/SL. 38 people engaged in internal peer review balanced for self-identified gender (19 women, 19 men) in line with the submission gender balance. 5% of our internal peer reviewers were BAME against a submission profile of 10%. This reflects increasing BAME staff numbers amongst new lecturers who were not included in reviewing to protect workload.

This submission was managed by 4 women and 3 men. Outputs selection was coordinated by 4 leads: design (woman), AHVC (woman), arts (man), IDI (man). Impact Case Studies were overseen by two leads (women) and one Team Lead (man). Everyone in the submission team attended REF-specific E&D training and all peer reviewers received unconscious bias and responsible use of metrics training. A member of this team served on the Code of Practice Working Group.

Final output and ICS selections were based entirely on quality and extensive EIAs revealed no indicators of bias in selection analysed by gender, parental leave, ethnicity and ECR status with attention to overall selection, allocation of co-authored outputs and characteristics of threshold-spanning outputs. The resulting attribution of 216 outputs was 109 women / 107 men in line with the submission population.

### 3. Income, infrastructure and facilities

#### 3.1 Research Funding Strategy

We recognise the variable availability of research funding in our different sub-disciplines and individual circumstances; therefore, academics are encouraged to focus on quality and sustained success rather than quantity of applications. Our strategy has been to encourage and support fewer but larger, more significant funding applications, improving quality and hence success rate. This has been achieved by:

- Greater focus on innovative investigator-led responsive mode and fellowship applications.
- Diversifying research income sources.
- Building interdisciplinary partnerships and consortia capable of winning large research grants.

#### **Implementation**

Strategy is implemented through annual **School Research Action Plans** responding to detailed applications and awards data presented quarterly in University Research Committee and annual Research Quality Enhancement reviews. Actions included:

- Encouraging and supporting each colleague to develop a long-term strategic funding plan.
- Using PDR to prioritise and plan short-term funding objectives, request support and manage workload.
- Prioritising School and University resources to concentrate support on substantial and strategically important funding applications.
- Rigorous internal peer review for all funding applications.

Sharing experience is resulting in a steady increase in significant large grant applications. Our increasing international visibility and reputation is leading to more invitations to join international consortia.

The importance of grant capture with **research consortia** is evidenced in the number of large consortium grants secured (*see below for project details*). Notable examples include four **EU Commission** awards in Transport Safety involved 43 unique partners from 21 nations. In Environmental Ergonomics we partnered in the Heatshield project with 19 partners from 11 European countries. In Digital Design & Fabrication, we lead the DiCoMi project with 18 organisations from 12 nations and partnered in CassaMobile involving 11 organisations from 6 nations.

We have been particularly successful in competitively awarded **UK Government**-funded consortia projects in the critical new areas of connected autonomous and electric vehicles including Smart Mobility Living Lab (6 partners); Robopilot (9 partners); Capri (16 partners) and V2Street (11 partners).

**UKRI** funded consortia include the Loughborough-led £267k EPSRC Improving customer experience while ensuring data privacy for intelligent mobility (7 partners), £5.4m EPSRC LoT-NET Low Temperature Heat Recovery & Distribution Network Technologies (14 partners), Design Star AHRC DTC (4 HEIs) and TECHNE AHRC DTP (9 HEIs). We encourage and support colleagues in applying for **funded networks** (see 4.1)

#### **Evidence of Success**

Successful implementation of our strategy is evidenced by combined value of research income during the assessment period of £12.4m and the number of major and prestigious awards. EU

Commission funding has been particularly significant at £3.4m. We have successfully diversified research resulting in £3.8m from EPSRC, AHRC, Research England, ESRC, NERC, MRC, Newton Fund, NIHR and Innovate UK including New Investigator Awards and Global Challenge Research Fund. Strong partnerships secured £3.5m from UK Government, £1.0m from industry and £0.7m from charities and other sources.

#### **Major and prestigious competitively won awards.**

Spanning **Responsible Design and Innovation**, we are a partner in: **AHRC Creative Industries Clusters** awards (one of only 9) for the £5.5m “Business of Fashion, Textiles & Technology” (£201,935); **ESRC** funded “Powering Productivity: Mapping the Role of Energy Infrastructure in UK Labour Productivity using Expert Elicitation and a Thematic Literature Review (£261,752); **AHRC** funded “Counter-framing design: Radical Design Practices for Sustainability and Social Change” (£199,296); and **EPSRC** funded “Circular Plastic: Utilising frontier technology and user-centred design to add value to plastic waste, facilitating entrepreneurship and employment” (£127,544).

In Transport Safety, we secured one of only 8 **Research England International Investment Initiative (I3) Fund** awards for “An International Research Centre to study the effects of Connected and Autonomous Vehicles on Vulnerable Road-Users” with world-leading partners Queensland University of Technology, Australia and Tongji University, China (£436,000). Loughborough led the **EU Commission Horizon 2020** funded projects “Levitate” (Societal Level Impacts of Connected and Automated Vehicles, €1,395,000) and “SafetyCube” (Safety Causation, Benefits and Efficiency, €983,220) and are partners in “i-DREAMS” (Safety tolerance zone calculation and interventions for driver-vehicle-environment interactions under challenging conditions, €961,343) and “SaferAfrica” (Innovating dialogue and problems appraisal for a safer Africa, €268,125). Loughborough secured funding from the Industrial Strategy Challenge Fund Driverless Vehicles Challenge via the **Centre for Connected & Autonomous Vehicles** and **Innovate UK** including “Robopilot” (£215,354), “Capri” (£390,871) and the “London Smart Mobility Living Lab” (£379,907).

Digital Design & Fabrication awards include the **EU Commission** funded “CassaMobile” (Flexible Mini-Factory for local and customized production in a container, €583,238), “DiCoMi” (Directional Composites through Manufacturing Innovation, €189,000) and “AMaTUC” (Boosting the scientific excellence and innovation capacity in additive manufacturing of the Technical University of Cluj-Napoca, €206,161) and **EPSRC** awards “Design for Additive Manufacturing” (£125,998) and Hybrid Additive Manufactured-Aramid fibre body armour (£100,699).

In Experience Design, notable awards include the **Innovate UK** funded project “V2Street” (£187,313) and **EPSRC** awards “Low Temperature Heat Recovery and Distribution Network Technologies” (£260,108) and “Improving customer experience while ensuring data privacy for intelligent mobility” (£266,640).

Significant **AHRC** awards include “Repositioning Graphic Heritage” (£202,384) and “Novel Digital Weaving Application Development to Innovate the current Woven Textile Coloration by developing an Optical Yarn Colour Mixing System” (£201,415).

### **3.2 Organisational Infrastructure supporting Research and Impact**

#### **Supporting research funding**

School **Research Administrators** support staff with project administration, finance and events. **Research Development Managers** (RDMs) assist academics with individual funding plans, drafting bids, responding to reviews and preparing for interviews. Academics can call on RDMs with specialist funder expertise. Fellowship applications are supported by a specialist RDM and detailed feedback from internal review panels. **Research Support Teams** provide costings, contracts and financial management.

All proposals go through rigorous internal peer review by experienced colleagues followed by review and approval by School Operations Managers and ADRs leading to measurable improvement in quality and collective success rate.

The University's **Research Data Manager** supports the writing of data management plans; especially beneficial when art and design research generates large quantities of data in challenging formats including physical artefacts, visual works, photography and video.

### Support for research outputs

**Librarians**, School **Research & Enterprise Coordinators** and **ADR** provide information, advice and support on visibility and open access publishing. Training is provided on selecting outlets and raising visibility of research outputs. We provide journal selection and publication self-assessment guidance. Where appropriate, Advisors and Mentors support the drafting of papers and internal peer review of drafts is encouraged. The Library and Research Data Manager support academics to make works open access through the Research Repository. We support the exhibition of works using the University's exhibition areas including the Martin Hall Gallery.

### Supporting Impact

**Research & Enterprise Coordinators** work with University Marketing and Research and Enterprise (REO) Offices to support communications and interactions with diverse audiences and partners. **ADE** and School **Partnership Development Managers** support academics in building collaborations and partnerships. SDCA has developed a Partnerships Strategy that will be the model for all Schools. The **Enterprise Projects Group** reviewed, selected and awarded financial support for knowledge transfer and impact activities using HEIF and EPSRC Impact Accelerator Account funding (see section 4.1).

### 3.3 Operational Infrastructure and Facilities

The formation of SDCA has enabled even better utilisation of shared resources that support research across disciplines. Art and Design occupy c.12,000m<sup>2</sup> across 5 buildings housing 1800m<sup>2</sup> of studios, workshops and labs, including 230m<sup>2</sup> of flexible reconfigurable research space. This is supported by 24 FTE technical staff who contribute to the design and construction of prototypes, experimental apparatus, art works and installations. Following £21m investment in a new Design building in 2012, we have **invested a further £3.7m** in new equipment and infrastructure since 2014. This has supported for example, digital jacquard research, a purpose-built digital embroidery lab and the "Studio of Light", a photography lab enabling novel platinum/palladium printing and archiving. In addition to the exhibition spaces within our buildings, the separate dedicated exhibition space, The Martin Hall Gallery, is operated in conjunction with LU Arts and regularly used for research informed public exhibitions (see section 4).

Notable world-leading facilities include the Environmental Ergonomics Research Centre's two large Climatic Chambers capable of creating worldwide conditions of altitude, temperature, humidity, wind and radiation for research experiments. In addition to the £1.5 million investment in the last REF period, another **£400k has been invested** since 2014 in a new thermal manikin and human physiology equipment.

We have three Driving Simulators including one in the new **Human Factors Research Laboratory** (HFRL), part of the Smart Mobility Living Lab; a **£230k investment** providing state of the art capabilities in Connected and Autonomous Vehicle safety. A high-performance workstation and secure 250Tb Network Attached Storage enables analysis of large private data sets. Our partnerships enable **collaborative use of research infrastructure** for example in transport safety research we can access resources at Queensland University of Technology and Tongji University.

Our buildings are copiously equipped with digital design facilities including Computer Aided Design labs, a variety of industry standard software, user interface hardware including haptics

and Wacom Cintiq pen displays, 3D scanners, 3D motion capture, 3D Printers, CNC milling machines and laser cutters. Since 2014, the Design Research in Additive Manufacturing research lab acquired **£123k worth** of experimental 3D Printers, a bespoke hybrid 5-axis 3D Printer, digital metrology, 3D scanners, Instron tensile testing machine and associated software.

Our machine shop includes lathes, milling machines, waterjet cutter and injection moulding machine. Multi-material fabrication and model making workshops include vacuum forming and a spray booth. Metal fabrication workshops enable cutting, brazing/welding and there are 2 Wood Preparation Workshops. The electronics lab enables the creation and testing of electrical, electronic and programmable prototypes including the manufacture of Printed Circuit Boards.

#### **4. Collaboration and contribution to the research base, economy and society**

##### **4.1 Support for Research Collaborations, Networks and Partnerships**

Strategic partnerships with world-leading organisations have been crucial to enhancing our research environment and international reach and influence.

To strengthen our partnerships we: -

- Appointed **Directors of Internationalisation**
- Recruited more international academics,
- Prioritised international consortium funding bids, including competitively funded Networks,
- Initiated and supported international thought leadership events.

Combined with support from the Partnership Development Managers and International Office, this led to successful collaborative projects. We pursued long-term agreements with world-leading Universities and joined international networks such as **Cumulux**. We focused on four strategic areas:

- consortia for competitively funded research
- strengthening our presence in London
- collaborative postgraduate research
- competitively funded research Networks

**Over the assessment period our staff contributed to funded projects involving 230 organisations in 33 countries including 57 universities.**

**Building consortia for competitively funded research** has been achieved by nurturing long-term relationships over multiple projects with long-term partners. For example, in Transport Safety we have worked across many EU funded projects with Universita Di Roma, National Technical University of Athens, Chalmers University, Hasselt University and TU Delft amongst others. The effectiveness is evidenced by the significant number and value of awards shown in section 3.

**Strengthening our presence in London** has been facilitated by hosting and engaging in numerous networking and partnership building events and initiatives. For example, working with local partners including University College London, London College of Fashion, Royal College of Art, London Legacy Development Corporation and V&A has resulted in major long-term programmes including the AHRC Creative Clusters funded Business of Fashion, Textiles & Technology (3.1.3) and the Global Disability Innovation Hub.

**Collaborative postgraduate research** has been achieved by specifically pursuing relevant competitive funding such as the recently awarded £270k Erasmus+ Strategic Partnership “Open Educational Resource to facilitate transparency, internationalisation and evidence of excellence for the European doctorate in design” in collaboration with Aalto University, University of Rome, Middle East Technical University as well as the previously mentioned TECHNE DTP and Design Star CDT (section 2.3).



**Competitively funded Networks** enable us to devote substantial time and resources to developing partnerships, new funding applications and co-authorship. We strategically targeted funding such as Marie Skłodowska-Curie Actions Research & Innovation Staff Exchange resulting in the DiCoMi project and EPSRC Network funding resulting the “Redistributed Manufacturing in Deployed Operations Network Plus” in partnership with UWE, Newcastle, Sussex, UCL, Heriot-Watt and Kings College London.

A significant benefit of our funded networking projects is **reciprocal staff exchanges**, which **enriches research culture and environment**, diversifies research teams, brings fresh international perspectives and builds long-lasting partnerships. The DiCoMi project enabled three Loughborough researchers to take 4-week secondments in companies including Kordsa (Turkey), Carboline (Ukraine) and Vaal University (South Africa); we hosted 12 visitors from companies including Kordsa, Intelligentsia (Luxembourg), Guhring and Fibrex (Romania), Central Metallurgical R&D Inst. (Egypt) and Vaal University; totalling c.340 person-days of reciprocal exchange. The AMa-TUC project enabled reciprocal week-long Additive Manufacturing summer schools with FH Aachen and University of Cluj-Napoca.

### **Selected Notable Relationships with Research Users, Beneficiaries & Audiences**

It is vital that our academics are fully engaged with their wider subjects, professions and organisations to ensure that our research remains focused on users’ and society’s needs and that organisations benefit from our research findings and leadership.

We organised research exchange meetings with **adidas, Nike, Decathlon and Mizuno** to better understand research questions, capabilities and transfer knowledge, leading to industry-funded projects and studentships producing new products (e.g. adidas clothing for under 10-year olds) or guidelines (e.g. Decathlon clothing labelling system for optimal temperature of use in children’s clothing). Our expertise in human heat exposure was called upon by HM Senior Coroner for Birmingham and Solihull to investigate and testify on suspected heat stroke deaths in the military which also informed our research into working in heat (Heat-Shield project EU). Our contribution led to the coroner sending out two ‘regulation 28 report to prevent future deaths’ for the military to change their policy guidance and procedures and to a personal invitation to provide written evidence to the Parliamentary Defence Committee: ‘Military Exercises and Duty of Care response’.

Our partnership with **Nissan Motor Company** led to five co-funded EPSRC PhD studentships including industry placements, visits to technical HQ in Japan and provision of automotive parts and research equipment. Research addressed seat concepts, thermal sensation of seating and ethnicity, and co-designing with older drivers and autonomous vehicle interior layout. Quarterly meetings with industry teams provide knowledge exchange and impact e.g. input to Nissan’s global Engineering Manuals and a patent application.

Our collaboration with **Transport for London (TfL)**, in three projects since 2014, led to the definition of new UK and United Nations Economic Commission for Europe standards to improve the design of Heavy Goods Vehicles. Eight HGV manufacturers are now using our assessment tools with our team supporting them in validating results. Through this network we gained an international reputation as the world’s leading experts in vehicle vision modelling and the definition of new standards.

Since 2014 over 20 organisations benefited from working with SAMMIE (the digital human modelling software developed, licensed and supported by Loughborough), including **Philips**, and **Ricardo**. Our researchers used SAMMIE in multiple research projects for organisations such as **TfL**, **Ipeco** (producing seats for Boeing) and the **Air Accident Investigation Branch**.

We are achieving impact through knowledge exchange and translational research in design for Additive Manufacturing through partnerships ranging from international companies such as **Grundfos** to local UK SMEs such as **Vervide** and international PGR training with **Universita Politecnico Delle Marche**. Our 3D Printed orthotics research with the **Royal Derby Hospital**,

**Kings College Hospital** and **The Nuffield Health Derby Hospital** received translational funding from **Versus Arthritis**. Similarly, our research collaboration with the **Home Office** and **DSTL** into 3D Printed body armour is delivering impact from EPSRC funded research.

IDI's partnership with **Citizens UK**, led to multiple projects addressing fair energy and citizen-centred services including the AHRC funded "Counter-Framing Design" and London Legacy Development Corporation supported Fair Energy initiative. We worked with London Campus neighbours **Here East, Change Please & BT Sports** on #Lollybin. This JOINT fund project identified, designed and tested behavioural change interventions to reduce single use coffee cup waste including a successful 1-month field trial on site.

### **Selected examples of Wider Contributions to the Economy and Society**

The Animation Academy works with museum archives on public engagement with partners such as Disney Pixar, Aardman, Sporting Heritage, Barnardo's and NHS. Audience engagement is achieved through our journal, Animation Practice, Process & Production, sponsored public exhibitions (e.g. HAFF, Utrecht; WFAF, Varna; Animated Dreams, Tallinn; Anifest, Teblice and Animafest, Zagreb), and funded workshops (e.g. CinekidScriptLab, VAF ScriptMentor and Cultural Rivers). Supported by commercial partners and working in collaboration with the Association of British Animation Archives, BFI, Halas & Batchelor Collections, BAFTA and former National Media Museum, we developed exhibitions including 'Halas & Batchelor at Studio Ghibli, Japan, 2015', 'Watch Me Move 2011-16; The Animation Show'; 'Kovasznai, Somerset House / Courtauld 2016-17'; and 'The Beautiful Frame: Animation & Sport 2017-19 National Football Museum (touring Japan, China, Australia). The Academy's public engagement includes the annual Animation and Public Engagement Symposium and an International Festival of Animated Films made by the physically disabled in partnership with the University of Texas.

We have collaborated with the Royal Society of Sculptors, National Trust for Scotland, Boughton Living Heritage Trust and Burghley Sculpture Garden and contributed to the international research infrastructure through Board membership of the *Sculpture Journal*, membership of AHRC Heritage Science team at the Smithsonian, Washington, USA and editorship of the *Journal of Visual Art Practice* and *Tracey: Drawing and Visualisation Research*.

In Art History and Visual Culture, our work with Christie's New York and Bloomsbury Academic. The Re-imagining Citizenship project united cross-School research groups with artists and researchers from outside the University, creating an online archive for its exhibit at the Venice Biennale (2019) and conducting workshops in Venice, Helsinki and Bologna.

Richardson was invited to present his research in Glasgow's Capital of Culture bid and subsequent award at a major event hosted by the National University of Ireland, Galway, November 2014. The event was devised by 126 Artist-Run Gallery in partnership with European Capital of Culture Galway 2020 Bid Team, TULCA Festival of Visual Art 2014 and Adapt Galway. His research on contemporary visual art in Glasgow informed discussions on the implications of being a 'City of Culture', initiated dialogue on wider cultural impact and contributed to Galway's successful bid for European Capital of Culture 2020.

We collaborate with LU Arts RADAR programme to link art practice and academic research. LU Arts contribute to PhD student and new staff induction and facilitate collaborative PhDs. Our academics contributed to many LU Arts events over the assessment period (too many to describe). For example, within 2018-19, research informed exhibitions and performances attracted over 700 attendees, including Institute of Advanced Studies (IAS) supported *Geometry* that featured 3D Printed sculptures designed and made in collaboration with Maths colleagues, and *To the tintinnabulation that so musically wells; Re-Imagining Citizenship* and *Assunta Ruocco*. There were also four research informed performances: *Formal Gardens; What Hope Utopia?; Wearables and Sound* (IAS supported); and *Art Education*. University, School and LU Arts social media were actively used to raise the visibility of and access to art and design research.

#### **4.2 Contribution to the Sustainability of Art, Design and Human Factors**

Unit academics make significant contributions to sustaining our disciplines through national and international professional bodies, subject associations and organisations, thereby shaping intellectual and development agendas.

Loughborough is leading change in graphic design research. Between 2014–19, Harland was the inaugural chair of the **Graphic Design Educators' Network** and oversaw 12 conferences attracting 854 attendees. He was involved in the **Graphic Design and the REF** (October 2018) and **Graphic Design Research beyond REF2021** (March 2019). In 2017 Harland edited a special issue of *Art, Design & Communication in Higher Education* titled 'Territories of Graphic Design Education'. These activities are building a research agenda that distinguishes practice and research. In 2018, Harland secured a major AHRC award "Repositioning Graphic Heritage" arguably the first grant to foreground graphic design practice as a research perspective.

Our academics have been instrumental in leadership of the **Design Research Society (DRS)**, holding positions including Executive Board Member and Vice Chair (Cain 2020 to date), Chair of Council (Bhamra 2016-19) and Honorary Secretary (Cain 2009-19), with Lofthouse, Trimmingham and Harland also serving terms on Council. Bhamra and Cain were instrumental in transforming the DRS with a more international and inclusive governance structure (approved January 2020). Cain founded and convenes the Design for Wellbeing, Health and Happiness Special Interest Group and Wilson co-leads Sustainability. Cain co-chaired the DRS 2020 Conference. Bhamra, Bibb and Dong are DRS Fellows. 24 staff are DRS members.

The Unit contributes to national and international agendas through membership of **CHEAD** (the Council for Higher Education in Art & Design), with Richardson appointed to the CHEAD Research Alliance Strategy Group, and **Cumulus**, the International Association of Universities and Colleges of Art, Design and Media. de Bont is on the scientific committee for the Cumulus 2021 conference: Design Culture(s).

Our academics have made longstanding contributions to the **Chartered Institute for Ergonomics & Human Factors (CIEHF)** fulfilling significant roles including Haslam R as President and Chair of Council 2014-15 (when the Royal Charter was granted). Staff have served as Chair and or members of the Professional Affairs Board, Education and Training Panel, Membership Committee, Honours Committee and Annual Conference Programme Committee. Hignett served on the Health Education England 'Learning to be Safer' Expert Group and Health Education East Midlands 'Human Factors Exchange Steering Group'. 17 academics are members, including 8 Fellows and 8 Chartered. Haslam R is also a Fellow of the **International Ergonomics Association**.

We provide training and experience in developing themes, calls and research events for Early Career Researchers and PGRs. This includes for example opportunities to disseminate research to international audiences at the annual **Drawing Research Network conferences** hosted by Loughborough since 2014.

We hosted the first in a series of international thought leadership events in collaboration with **Institute of Advanced Studies (IAS)**. The **Experience Design Summit** featured invited leading academics including Prof Hekkert (TU Delft), Prof Chen (TU Eindhoven), Prof Pink (Monash University), Prof Ahmed-Kristiansen (Exeter) Prof Hassenzahl (Universitat Siegen) plus 15 experts for a series of workshops, discussions, lectures and public engagements in September 2019. The outputs from the Summit are informing future research strategy at Loughborough and worldwide.

#### **4.3 Indicators of Wider Influence**

The Unit strongly supports engagement in all forms of peer review and editorial responsibility. We believe that this experience improves our academics' understanding of the procedures of

research funders, their ability to conduct rigorous peer review and ultimately their ability to write funding bids. Membership of Peer Review Colleges is encouraged and supported. Similarly, we support membership of and contributions to international, national and subject and professional bodies, advisory boards and steering committees. Our most significant and influential editorial and professional roles are highlighted below.

Our international influence is evidenced by staff holding **Visiting Professorships** including for example Morris, University of Hasselt; Campbell, Vaal University of Technology; Meskimmon, University of Gothenburg and Whiteley, VCA University of Melbourne.

We encourage and train colleagues to be **external PhD examiners**. Colleagues conducted over 172 doctoral examinations in the UK, Australia, Belgium, Brazil, Canada, China, Czech, Denmark, Finland, France, Hong Kong, Hungary, India, Italy, Malta, Netherlands, New Zealand, Norway, Romania, South Africa, Spain and Sweden.

### National and International Committees

Colleagues have been invited to join important Committees and Boards including:

- Yarrington's membership of the **Advisory Committee for Research on European Paintings** led by the National Gallery and the **Paul Mellon Centre for Studies in British Art Advisory Council**; External Academic Representative on the **Subject Specialist Network in British Art Steering Committee**; and Chair of the **UK Committee of the Comité International d'histoire de l'art**.
- Lindley served on the **AHRC Heritage Science Team at the Smithsonian**, Washington DC and Advisory Group of the AHRC Impact Fellowship.
- Our contributions to the leadership of committees include Chair of **European Society for Protective Clothing** (Havenith); Secretary of the **Fashion and Textiles Subject Association** steering group (Walton); Chair of the **Association of British Animation Collections** (Wells) and Executive Committee of the **Association of Art Historians** (Whiteley). Selection panel member, **Distinguished Feminist Award**, College Art Association USA (Robinson, 2015-2017, 2016-2017 Chair).
- Colleagues advise industry boards such as the **Adidas Research & Innovation Advisory Board** (Havenith).

### Participation on grants committees

Our support is evidenced by three Associate Member appointments to the **EPSRC Peer Review College** (Johnson, Torrens, Waterson) and two to the **UKRI International Development Peer Review College** (Escobar-Tello, Torrens). 7 are full members of the EPSRC Peer Review College (Bhamra, Bibb, Cain, Campbell, Haines, Hignett, Marshall). Bibb served on the EPSRC Healthcare Technologies Strategic Advisory Team 2014-17. During the assessment period 11 served on the **AHRC Peer Review College** (Bhamra, Bibb, Campbell, Dong, Escobar-Tello, Marshall, Porter, Richardson, Sinclair) with Bibb serving on the Technical Reviewers and Knowledge Transfer group, Bhamra serving on the PRC Strategic Review Group and Richardson Chair of the Follow-on Funding for Impact and Engagement Scheme, Chair of the Research Grants Panel and Convenor of New Peer Review College members training. During the period colleagues served on and chaired many selection and prioritisation panels for AHRC and EPSRC.

Bhamra is serving on the **REF2021 Panel D32 Art and Design: History, Practice and Theory** and was a panel member in **REF2014**.

Two staff contribute to the **Carnegie Trust for Universities in Scotland** (Bibb, Richardson). Gyi is a member of the **Dunhill Medical Trust** review panel. Collectively staff have reviewed funding applications for Horizon 2020; Australian Research Council; Estonian Cultural Forum Research Grants, Medical Research Council (MRC), Natural Sciences & Engineering Research Council Canada, Health Research Board Ireland, Technology Foundation STW (Netherlands), National Research Foundation South Africa, Wellcome Trust, Innovate UK, Leverhulme Trust, Flemish Research Council, Austrian Science Fund, National Research Foundation, South Africa,

Netherlands Institute for Advanced Study in the Humanities & Social Sciences and Icelandic Research Fund.

### Conference Keynotes and Invited Lectures

Invitations to deliver keynotes evidence the esteem Unit staff and their research are held in. Selected examples include:

- Meskimmon convened the 43<sup>rd</sup> **Annual Conference of the Association for Art History (AAH)** at Loughborough University, 2017. AAH is the largest organisation of art historians in the UK and the three-day conference attracted c.400 delegates and 200 presentations and was their most diverse in terms of presenters and participants.
- Invited lectures were delivered at **Curating Everything: Curating as Symptom**, Migros Museum für Gegenwartskunst (Meskimmon, Zurich, 2015), **International Association of Art Critics Annual Conference** (Robinson, Havana, 2016), **International Gender Studies Centre** (Robinson, University of Oxford, 2018, Universidade Nova de Lisboa 2019) and **Abu Dhabi Art Fair** (Brown, 2018).
- Colleagues gave keynote lectures at world-leading design conferences such as the **International Association of Societies of Design Research** (de Bont, Manchester 2019), **International Conference on Engineering Design** (Bhamra, Delft, 2019), **2<sup>nd</sup> International Conference on Healthcare Communication** (Dong, Shanghai, 2015), **International Forum on Innovation & Emerging Industries Development** (Dong, Shanghai 2018) and **Direct Digital Manufacturing** (Bibb, Berlin 2016).
- In human factors our world leading research has been recognised with invitations from the **American College of Sports Medicine Elsworth R. Buskirk Lecture** (Havenith 2015).

### Editorial Leadership

Loughborough academics shape their respective research fields by serving on the editorial boards of leading human factors ergonomics and safety journals. As Editor in Chief of **Ergonomics** Haslam R introduced major changes including increasing the diversity of 8 Senior Editors and encouraging content from Asia and Americas. He appointed Early Career Editors identified as future leaders (including Lloyd), a social media editor to increase visibility and commissioned State of Science Review papers from world-leading academics. Four colleagues served on the editorial board (Cain, Havenith, Hignett, Waterson). For **Applied Ergonomics** Hodder is a Scientific Editor with four staff on the International Editorial Board (Filtner, Fray, Gyi, Waterson). Havenith was Editor of **European Journal of Applied Physiology** 2014-19 and remains on the editorial board and is on editorial boards of **Journal of Sports Engineering & Technology**, **International Journal of Biometeorology** and **Journal for Occupational Safety & Ergonomics**. Jun was Associate Editor of **BMC Health Service Research** 2014-17. Frampton is Associate Editor of **Traffic Injury Prevention**.

Six colleagues serve on leading design journal editorial boards. Downs is Co-Editor of **Journal of Visual Political Communication** with Van Der Waarde on the editorial board. Kuzmina is Associate Editor of **She Ji the Journal of Design, Economics & Innovation** with three staff on the editorial board (Bhamra, de Bont, Van Der Waarde). Colleagues serve in editorial boards for **Design Studies** (Bhamra), **Design Journal** (Evans), **Journal of Design, Business & Society** (de Bont) **Design for Health** (Zitkus), **International Journal of Design** (de Bont) and **Journal of Textile Design Research & Practice** (Bhamra).

In digital design and fabrication, Campbell is Editor of **Rapid Prototyping Journal** and Bibb is on the editorial board. Bibb is also on the editorial board of the **International Journal of Bioprinting** and Mohammed is on the editorial board of **HardwareX**.

In the arts, Wells is Founding Editor of **Animation Practice, Process and Production**. The **TRACEY Drawing and Visualisation Research** was founded by Loughborough academics and edited by Harty, Marshall, Downs and Selby. Bernabei is a Senior and Founding Editor of the **Journal of Jewellery Research**. As Chief Editor of **Journal of Visual Art Practice** from 2017, Richardson extended the scope to include galleries, museums and collectives, recognising the global professionalisation of curation, arts administration and the topicality of the art market,

auctions and biennales. Meskimmon is Consultant Editor for **Open Arts Journal** and her appointment to the Editorial Board of **Art History** (the Journal of the Association for Art History) has been part of a change towards decolonising the discipline by a new Editorial Team from 2017. Robinson was on the editorial board of the **Art Journal** (2012–2016) and Brown was Editor at Large for **H-France** (2016–20). Whiteley is an Editor of **Art and the Public Sphere**.

Our academics influence and encourage new research trajectories by editing leading international book series including **Rethinking Art's Histories**, which has generated more than 40 titles over a decade, (Manchester University Press, Meskimmon); **Contextualizing Art Markets** (Bloomsbury, Brown) and **Radical Aesthetics Radical Art**, (Bloomsbury, Whiteley). In 2013, Meskimmon and Marshall and Sawdon (since left) addressed the gap in drawing research by launching the interdisciplinary book series **Drawing In**, (Bloomsbury since 2018), which has proved remarkably successful with 5 books published, 2 under contract, 2 under review and 7 proposals pending.

Since 2014, 15 staff were invited **Editors** of 21 **Special Issues** for journals including Ergonomics; Applied Ergonomics; IISE Transactions on Occupational Ergonomics & Human Factors; Safety; International Journal of Crashworthiness; Sustainability; International Journal of Sustainable Engineering; Information Design Journal; Art, Design & Communication in Higher Education; Journal of Screenwriting; Studies in Costume & Performance and the Journal of Research Practice.

### Prizes

Our excellence and esteem are evidenced by significant national and international accolades.

- In 2016, working with The Fruitmarket Gallery, Donachie won the highly prestigious inaugural **Freelands Award** for mid-career female artists worth £100,000.
- At the 2017 International Conference on Research in Design (ICoRD, Guwahati, India) de Bont was awarded the **Pahl-Beitz ICONNN Award** for outstanding contribution to design education and design research.
- Wells received the **Outstanding Achievement in Animation Studies** award at Animafest International Festival of World Animation, Zagreb (2018).
- Atkin's sculptures won awards including **Excellent Award for large-scale stainless-steel sculpture** at the International Sculpture Exhibition 2015, Fuzhou, China. In 2018 Bolewski was awarded **Prix VIDEOFORMES**, Conseil Départemental du Puy-de-Dôme.
- TSRC achieved two prestigious **Prince Michael of Kent Awards for Road Safety** for SafetyCube and SaferAfrica (2019).
- Frampton was awarded the Don Huelke Lifetime Award for Services & Achievements to Traffic Safety (2019) by the **Association for the Advancement of Automotive Medicine**.
- Acar contributed to Trafik Hayattir (a project to improve transport safety for Pregnant women and Children) which won Turkey's prestigious **Gold Compass** prize in 2016.

Recognition of our leadership in human factors is evidenced by the fact that Loughborough Design School received the **Chartered Institute for Ergonomics and Human Factors (CIEHF) President's Award 2017** in recognition of the School's unique contributions to the discipline.

Individual prestigious CIEHF awards include **Lifetime Achievement Award 2019** Hignett and **2017** Haslam R; **Innovation Award 2014** Waterson. PGR Ruby Allen won **Best Student Project Award 2016**. Haslam R received the **International Ergonomics Association Distinguished Service Award 2018**.