

Institution: University of Hertfordshire

Unit of Assessment: 32 Art and Design: History, Practice and Theory

Unit context and structure, research and impact strategy

Unit context

The Unit comprises 18.7FTE (21 staff) a 63% FTE staff increase on REF 2014. It is in the School of Creative Arts and includes 6 Professors, 2 Associate Professors, 2 Readers, 1 Senior Research Fellow, 6 Principal and 4 Senior Lecturers, of whom 2 are Early Career Researchers. Following REF 2014, music research was integrated into the Unit; it also sits in the School of Creative Arts.

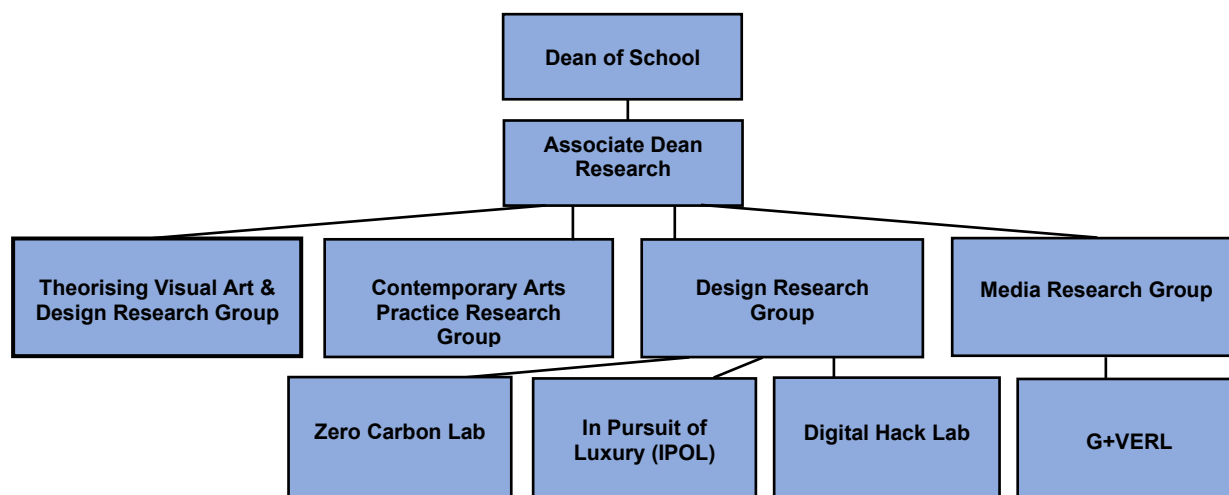
Notable improvements and successes for the Unit in comparison with REF 2014 are:

- Launch of UK first and only Doctorate in Heritage in 2015, in collaboration with the School of Humanities led by the Unit (Lees Maffei);
- Positive response to 2019 Postgraduate Research Experience Survey (PRES) with 91% satisfaction for Overall Experience, 93% for both Progress and Assessment, and Research Skills, and 86% for Supervision;
- 61% growth in enrolled doctoral students;
- 63% growth in FTE staff with 42% of Unit being women;
- 2018 AHRC Research in Film Award for *To Be Here* (Jury), a film exploring the displacement of the Sahrawi refugees in West Africa.

Research structure

The Unit contains four research groups: *Theorising Visual Art and Design (TVAD)* led by Jelinek; the *Contemporary Arts Practice (CAP)* group led by Jury; the *Media Research Group (MRG)* led by Mee; and the *Design Research Group (DRG)* led by Malizia. Three of the four groups are led by women. The groups cover main research specialisms: art and design history, visual and material culture, and heritage (TVAD), fine art (CAP), games design, film, television and media theory (MRG), and architecture and design (DRG). Research 'labs', established as a direct result of external funding, are smaller, more specialised clusters that sit within a research group. All academic staff and postgraduate students are affiliated to one research group. Research is led by School Associate Dean (Adams).

Figure 1: Research Groups and Labs



Research Groups provide a forum for developing and sharing research excellence through seminars, a mentoring programme, research-in-progress workshops and conferences. Seminars are recorded and published on the Groups' websites. Groups host a major international conference every two years. Research Labs comprise the *Games and Visual Effects Research Lab (G+VERL)*, led by Richardson as part of the MRG; established by funding from the European Regional Development Fund, it explores novel applications for the techniques and technologies of visual effects and computer games. Sitting within DRG, the *Zero Carbon Lab*, led by Jankovic, carries out research to facilitate a wider take up of zero carbon design in the built environment, and multidisciplinary lab *In Pursuit of Luxury (IPOL)*, led by Borstrock, explores the concept and experience of luxury, and its relation to self and society. The DRG also includes the Digital Hack Lab, which applies research investigating the impact of technology on creative practice to specific challenges and issues facing the business community.

Research strategy

In 2014, the Unit planned to increase both the size and quality of its submission by fulfilling specific strategic aims.

Since 2014, the Unit has grown by 7.25FTE staff including new professorial appointments in architecture and sustainability (Jankovic) and user-experience design (Malizia) and a Senior Research Fellow (Jelinek). The Unit also integrated elements of music research into CAP as part of its commitment to increasing interdisciplinary research.

The Unit's achievements over the REF period partly result from a competitive peer-reviewed sabbatical leave scheme to enable staff to carry out a programme of research. This led to a growth in high-quality outputs and deeper engagement with stakeholders that increased the reach and significance of the research impact. Between 2014 and 2020, 24 research sabbaticals were awarded. Since 2014, the School has also funded 9 staff to undertake part-time doctoral study, 3 of whom Mee, Walden and Goodbrey are now Unit staff.

The Unit produced 11 research monographs by increasing research workload allocations and supporting travel and production costs for publication. University Research Theme Champions (see 'Interdisciplinary research' below) were instrumental in identifying Unit research synergies between staff not located in Creative Arts therefore associating the work of Parham, Garland and Magerstadt with the Unit. In addition, Unit and University central financial support facilitated the production of Jury's *Slow Violence*, a film exploring the third world impact of climate change, and Nelson and Godman's impact case study, a UCL and Wellcome Trust-funded collaboration into the representation of biological and cosmological structures.

The Unit established several interdisciplinary research Labs: G+VERL, initially funded by a £1.1M EU project on convergent media and its applications outside the entertainment industry; the Zero Carbon Lab, undertaking research into advanced computer modelling methods for sustainable buildings; IPOL, focused on the role of luxury in society; the Digital Hack Lab exploring the impact of technology on creative practice.

Closer collaboration between CAP and UH Arts (curates University's art collection and gallery) enabled the Unit to secure additional research income of £228,000 from the Arts Council to develop a programme of public engagement in the arts through collaborative work with local museums and cultural organisations. These include St Albans Museum and Gallery, The Henry Moore Foundation, Letchworth Garden City and the International Garden City Institute, the Contemporary Arts Society, East Contemporary Visual Arts Network and the Hayward Gallery.

Finally, the Unit's strategy to deepen stakeholder engagement resulted in a portfolio of 6 impact case study areas. In addition to the 2 impact case studies selected for submission, Jury's work on the climate emergency, Malizia's work on interface design (the use of design to facilitate human interaction with emerging technologies and workflow processes), Jankovic's research into zero carbon design and Borstrock's research into the changing concept of luxury are all examples of impactful research.

Interdisciplinary Research

In 2015-16 research in the University was centrally restructured around 6 Research Themes: (1) Information and Security; (2) Health and Wellbeing; (3) Food; (4) Space; (5) Global Economy and (6) Heritage, Cultures and Communities. These global-challenge-focused themes were created specifically to foster interdisciplinary research across research centres and groups. Each theme is led by a Theme Champion who interacts with the other Theme Champions and Associate Deans (Research) to stimulate new interdisciplinary initiatives internally and externally. Theme Champions design and implement operational plans, arrange networking activities and organise workshops to exploit interdisciplinary research funding opportunities.

The Unit works closely within three Themes: Heritage, Communities and Culture, Information and Security, and Space. Over the last five years the Themes have facilitated cross-School collaboration including research by Jankovic, Carta and Parham, in which Parham's work on food and urbanism integrated with Jankovic and Carta's research into architecture, sustainability and data. Theme Champions were instrumental in fostering connections between research in art and science, as evidenced by Jury's 2018 conference *Slow Violence*, hosted by the Theme Champion for Heritage Cultures and Community, and Nelson and Godman's collaborative work on art, science and music hosted by the Theme Champion for Space. Furthermore, Carta was appointed leader of the Climate and Urban Systems strand of the University's newly designated Centre for Climate Change Research.

Further interdisciplinary collaborations include:

- The case study *Connecting Art and Science in Sculpture, Light and Sound* brought together researchers from fine art and music (Nelson & Godman), the UCL Centre for Advanced Biomedical Imaging; the Ogden Centre for Fundamental Physics, Durham University, the Inorganic Chemistry Laboratory at Oxford University, and psychologist Monia Brizzi, to examine the representation of macro cosmological and micro quantum concepts in visual and aural form and their implications for human perception;
- Jury's research which includes two interdisciplinary projects *Climart* and *Disasters of Peace*, undertaken with musician Godman (UH), the Norwegian University of Science and Technology, the Harvard University School of Environmental Science, and film theorist Kamilla Kuch. The project brought together multidisciplinary teams to use film as a means of communicating the effects of climate change, mass displacement and war. The collaborative research was exhibited to audiences in the US, Ireland, Syria, China and Mexico. A component part of the project, the film *To Be Here*, won the AHRC Research in Film award in 2018. Jury and Godman also worked with Stephen Morris, professor of physics at Toronto University on *Faraday Waves*, a musical piece giving sonic form to Michael Faraday's 1831 experiment;
- the interdisciplinary research Lab G+VERL, led by Richardson, is part of the £1.1M *Interreg*-funded project with Tayscreen, Screen South Media Evolution and FilmbyArhus, to examine ways in which gaming and animation technologies can be applied to sectors outside entertainment. The collaboration developed new and more cost-effective production workflows, new means of conceptualizing data and novel methods for visualising quantum scale. The Lab collaborated with Merit Moore, Oxford University and choreographer Darren Johnson, and held six symposia with stakeholders in Denmark, Germany, Sweden and the UK. This research was presented at the EU Council of Ministers in 2019 and underpins one of the Unit's impact case studies;
- the interdisciplinary Zero Carbon Lab, led by Jankovic, brings together a range of cross-disciplinary perspectives in architecture and advanced computer modelling methods to seek design solutions to carbon consumption in the urban environment. Part of the research has been undertaken in collaboration with the architect John Christopher's *Zero Carbon House* in Birmingham, to explore ways in which computer simulations of materials used in building can aid real-world design and fabrication;
- working with with Letchworth Garden City Heritage Foundation and the Université de Paris-Est, as Academic Director of the *International Garden Cities Institute*, Parham has explored

an expanded understanding of the concept of urbanism including sustainable concepts of food production and consumption;

- combining the disciplines of psychology and design, Malizia worked with asset finance company Alfa Systems to develop a better understanding of psychological responses to changing technology and ways in which design can redress them. Malizia is collaborating with Jaguar-Landover to examine how innovations in interface design can be used to understand and improve users' responses to autonomous vehicles;
- the Doctorate in Heritage programme, underpinned by interdisciplinary research, led by Lees Maffei. It draws upon a wide range of research supervisory experience from history of art and design, visual and material culture, urban studies, philosophy and history to support research by doctoral students from across the museums and heritage sector.

Impact strategy

In 2014, the Unit revised its impact strategy to place a greater emphasis on:

- engaging audiences at the intersections of art and science by i) using sculpture and sound performance to aid public appreciation of advanced scientific concepts in cosmology (Nelson and Godman), and ii) using film as a means to raise awareness of the societal impact of climate change (Jury);
- engaging with cultural industries in virtual reality, film, convergent media and interface design to aid workflow innovation and greater access to film networks;
- increasing cross-disciplinary research into architecture, urbanism, sustainability and zero-carbon design;
- using 'sandpit' projects to explore the future impact potential of new concepts and activities including architecture and data, zero carbon design, and the visual representation of climate change.

The Unit has deepened its stakeholder engagement through a series of informal seminars and symposia, as well as large international conferences with broader networks to explore its research impact. It also used QR funding to offer nine competitive bursaries totalling £18k to develop underpinning research that had the potential to deliver significant impact. The Unit also benefited from seven University impact grants totalling £22k to facilitate engagement with external partners and research users. In addition, between 2015 and 2018, a further £44k of the Unit's QR funding was used to support impact, funding exhibitions and symposia in the UK and abroad. The Unit also hosted annual workshops with invited speakers on methods for developing impact alongside seminars run centrally by the University's Research Office.

Examples of the Unit's support for developing impact include Jury's work on the climate emergency. Through funding of £5k, the research was presented to the public at events in the US and Norway and to refugee communities in Syria and Tunisia. Richardson's Interreg-funded Create Converge project hosted a series of local and national symposia from which emerged the Random Acts Ignition Network established with the Arts Council and Channel 4, and New Creative Interactive with the BBC and the Arts Council, both facilitating widening access to the film industry for young people. The Connecting Art and Science in Sculpture, Light and Sound project began with two symposia with a range of academic and non-academic stakeholders within the Contemporary Arts Practice Group. The Unit funded two £2,400 awards for key external presentations with the ONCA Centre for Art and Ecology and Artichoke, an Arts Council-funded cultural organisation to bring art to large public audiences.

Finally, the Unit made two professorial appointments to support future research impact: Jankovic and Malizia focused on zero carbon and interface design respectively, both areas that have demonstrable societal and economic benefit.

Open research environment and integrity

The Unit both supports and facilitates Open Access (OA) publishing. Publishing plans and OA requirements are discussed by staff with the Associate Dean Research at their appraisals each

year. Although the University encourages green OA it also provides central funding for article process charges for gold OA outputs and applications for a share of this fund are peer-reviewed at Unit level. All peer-reviewed publications and theses are made available through the University's Research Archive. Practice-based outputs are also shared on the Archive and examples feature on the Research Group blogs and websites. The Unit funds websites with links to the University Research Archive for staff involved in non-text-based research.

UH Arts also has a remit to share practice-led research with the local community, devoting one quarter of its programme to exhibiting research. Over the last REF cycle, CAP's members contributed to UH Arts' programme through exhibitions and symposia, including Godman and Nelson's sound and light sculpture *Cosmoscope*, Jury's *Slow Violence* and the University 2020 *Festival of Ideas*, an online event celebrating research and scholarship in the community.

The University is a signatory to the Concordat on Research Integrity. There is centrally provided mandatory training on research integrity for all researchers through the Doctoral College's Researcher Development Programme. Both the University centrally and the Unit have an annual workshop focused on research integrity that Unit staff attend, which includes both the responsible use of data and ethics.

Future strategy

During the next REF cycle, the Unit will:

- Establish two new interdisciplinary Research Labs on Human Interface Design and Art and Science. The *Human Interface Design Lab* will build on established projects (Malizia and Richardson) with the automotive and food industries, University of Northumbria and others to increase research income, make post-doctoral appointments, fund studentships, co-author interdisciplinary research outputs and generate research impact. The *Art and Science Lab* (Nelson, Godman, Jury & Jelinek) will build on established research in the use of fine art, performance and film to articulate scientific and natural phenomena to the general public; it will aim to secure a 50% increase in research funding by 2025 from current partners and funders to consolidate existing research networks in the US, Norway and West Africa. QR will be used for the appointment of funded studentships;
- Fully integrate UH Arts into the Unit to build on its programme of research-led public engagement. Funded centrally by the University, UH Arts recently became part of the School of Creative Arts with a remit to showcase the work of research staff and expand its programme of exhibitions in order to maximise the impact of the Unit's research. The Unit will build on UH Arts' longstanding links with local museums and galleries to generate additional external funding opportunities;
- Expand the number of doctoral students through funded studentships attached to professional doctorate programmes in Fine Art (DFA in Design (DDes) and Heritage (DHeritage), and PhD scholarships building on demonstrable areas of research strength in art and design history, and film. In line with the university-level strategy, the Unit aims to increase research student enrolment by 40% by 2025. To support this objective the Unit will develop a further professional doctorate in film;
- Increase overall research income by 30% by 2025 in line with the University strategic plan. This will be led by senior staff who will target larger funding applications in excess of £200k and deepen their engagement with future EU research programmes. The Unit will make key post-doctoral appointments to specific Research Labs to drive forward funding applications;
- The Unit will provide active support for the recently approved cross-university, interdisciplinary *Centre for Future Societies Research*, led by Jankovic. The Centre will bring together research expertise and activities currently embedded in several of the University Research Themes to focus on key societal challenges. The Centre will also align with the new doctoral training provision to be launched by the University Alliance, Doctoral Training Alliance in Autumn 2021.

2. People

Staffing strategy

The Unit's submission comprises: 21 staff (18.7 FTE): 29% Professors; 19% Readers, and Associate Professors; 5% Senior Research Fellow; 29% Principal Lecturers 19% Senior Lecturers with 10% being ECRs providing a balance for expertise and sustainability. All staff are on permanent contracts excepting one five-year appointment.

Staff development strategy

The Unit implements the *Concordat to Support the Career Development of Researchers* at every career stage for all academic staff. The *Framework* is used in annual staff appraisals and reviewed every six months. All Unit staff are appraised or co-appraised by the Associate Dean Research (ADR) and prepare a longer three-year strategy including plans for publications, contributions to the discipline base together with the recruitment and supervision of research students. The Unit actively facilitates development through supporting staff to join and play key roles within professional networks by funding membership, attendance at conferences, symposia, performances and exhibitions; all Unit staff also peer-review for academic journals and/or publishers (see section 4).

Senior research staff play a key role in mentoring the research community. Lees Maffei leads the Unit's mentorship programme and the University-wide Network of Women+ Professors (NW+P). All post-doctorate staff, ECRs and lecturers are paired with a senior researcher to assist in planning their career development. Mentoring informs appraisals out of which formally agreed action plans are implemented and reviewed by line managers and the ADR. Evidence of the effectiveness of this policy can be seen in the career trajectories of ECRs Goodbrey and Walden, graduates from the University PhD and professional Doctorate in Design respectively. Both are Unit members and supervise research students. Similarly, Brownie, a graduate of the doctoral programme in 2012, directed the School's professional doctorates in 2015-2019 and is now Associate Dean for Academic Quality with a remit for promoting research-informed teaching.

The Unit has an ECR representative (Goodbrey) on the University's Researcher Development Group. Unit staff are also required to undertake research student supervisor and examiner training and are typically named as a second supervisor in an experienced supervisory team. The Unit's ECRs participate in the University-wide Researcher Development Programme, comprising over 120 themed workshops and seminars. Adams and Lees Maffei contribute extensively to the Programme.

Within the Unit, Research Group Leaders host monthly seminars. These comprise work-in-progress workshops typically led by senior research staff and include ECRs, doctoral students and presentations from external speakers. In instances where external speakers contribute substantively to the research environment and meet the necessary criteria, they can be appointed as visiting professors. Academic staff joining the School from industry are required to register for a doctoral degree. As part of research staff development since 2014 the School has supported 12 academic staff (equally split between men and women) to undertake part-time doctoral degrees. The development of less experienced staff is also supported towards research independence.

All Unit staff have a minimum research workload allocation of 0.2FTE pro rata, excluding time allocations for research degree student supervision. Professors have research allocations of between 0.3 and 0.8FTE. The Unit also has an annual competitive round of sabbatical awards which has provided additional support throughout the cycle.

The ADR holds regular meetings for all School staff. In instances where staff identify an interest in research, a plan is negotiated for the staff member to undertake doctoral training, if beneficial, and receive mentoring. The School pays tuition fees for doctoral study and appropriate

remission from teaching for the full duration of the programme. In the final year before submission, short sabbaticals are awarded for the write-up of theses. Additional funding awards facilitate staff to engage with their research user stakeholders. This approach has facilitated further Unit membership since 2014 with a corresponding growth in the Unit's research culture as evidenced by the 2019 PRES results (see next sub-section).

Research students

There are four doctoral programmes in the Unit. They comprise the PhD degree and professional Doctorates in Fine Art (DFA), Design (DDes) and Heritage (DHeritage). Professional doctorates, which recognise prior professional experience, have structured research training in the first year and enable a contribution to knowledge in professional practice. The Unit also leads the innovative Doctorate in Heritage programme (Lees Maffei), which also operates across the School of Humanities. Supervisory teams are drawn primarily from staff in the two Schools. The Unit funds two fees-only bursaries for the DHeritage programme and three each for the DDes and DFA doctorates.

There are currently 29 doctoral students in the Unit; 12 are undertaking PhD degrees and 17 are engaged in professional doctorates: 4 on DFA; 4 on DDes and 9 on DHeritage. This represents an increase of 61 percent in doctoral students over the REF 2014 submission which will result in future growth in doctoral awards for the Unit as these predominantly part-time students complete their awards. Since 2014 the Unit has 6 doctoral awards and 2 awards for masters by research. Fully funded PhD studentships and fees only bursaries are offered by the Unit to support the growth in number of research students. In addition, a research student is currently ERDF-funded through the Create Converge project.

Research supervisory teams comprise a minimum of two supervisors who must have successfully supervised at least 2 doctoral students to awards between them. Led by the School Research Tutor (Simpson), students receive both a central and local induction enabling their integration into the Unit's research environment. At induction supervisors address students' specific learning needs, cultural and religious requirements, alongside academic support and resources. These are recorded on a centrally held checklist in an online Research Student management System (RSMS). All students are offered a dedicated workspace alongside the School's taught postgraduate students. All are attached to one of the Unit's four research groups and attend - and contribute to - weekly seminars. In the latter period of study, students are strongly encouraged to contribute to internal and external conferences in preparation for publication and final examination. All final-year students are awarded a £1000 travel bursary to present at conferences and have annual opportunities to bid for travel/conference funding to the University Doctoral College. Typically, students complete their doctoral research having produced outputs in their final year.

Research degree progression comprises two formal assessment points at 8 months and 22 months at which experienced independent external assessors review students' progress through a viva to enable them to move onto the next phase of study; all research students are subject to a process of annual monitoring. Communication between students and supervisors and records of overall progress are held in the online RSMS operated by the Doctoral College.

The Unit holds an annual symposium where research students present their work. The Unit's Research Tutor leads a termly *Meeting of Minds* seminar where students meet informally to discuss academic and pastoral needs. The ADR holds drop-in sessions for all research students throughout the year. The ADR also chairs the Doctoral College *Research Student Forum* with student representation from doctoral students in all Schools across the University. Research students have access to the Researcher Development Programme delivered by the Doctoral College. This delivers intensive Spring and Summer schools together with seminars throughout the year. Research students have access to a Level 7 research skills common module for taught Masters students in art and design, film and media. The module provides subject-specific

research training and is valuable for research students' integration into the social and cultural life of the Unit.

The 2019 Postgraduate Research Experience Survey ranked the University 4th for its research culture, 15th for supervision and 21st for overall satisfaction out of 103 UK HEIs (62% local participation rate). At Unit level the responses were similarly positive with 91% of research students expressing satisfaction with their overall experience, 93% expressing satisfaction with research skills, and progression and assessment, and 86% satisfaction for supervision.

As a stepping-stone to an academic career, research students are provided with opportunities to teach on undergraduate or postgraduate degree programmes and to also take advantage of teacher training support and CPD available through the Researcher Development Programme. All research fellowship and lecturer posts are advertised internally to the Unit's research students.

Equality and diversity

The School embraced both Athena Swan and Race Equality Charter Mark principles following the University-level bronze awards first achieved in 2015. Kate Kinninmont, who is well known for her work on women's careers in the Film and TV industries, was appointed as a Visiting Professor to the Unit in 2015. The School of Creative Arts obtained the Athena Swan Bronze award in 2017 at which time it also established an Equality Diversity and Inclusion Team (EDIT), chaired by the Dean with a diverse representative membership from across the School, including both Unit members and research students. Also, in 2017, the Unit appointed its first woman professor (Lees Maffei) through her promotion from reader and the Unit has 42% women FTE staff. At the end of 2019, three of the Unit's four Research Group Leaders (Jelinek, Mee and Jury) and the Research Tutor (Simpson) were women.

To address the under-representation of BAME staff in the Unit, positive action has been taken to secure a diverse pool of applicants from the initial stages of staff recruitment. This takes the form of, for example, targeted advertising within the Unit's ethnically diverse postgraduate research student population, where over 40% identify as BAME. The University has recently implemented anonymous shortlisting to ensure that any potential bias is eliminated at recruitment stage. The University Equality Office, which is represented on the Unit research management group, supports a BAME staff network and the ADR is currently reverse mentored by a BAME member of staff as part of a University programme to address under-representation.

The Unit ensures that all research events avoid school and religious holidays and are held well before sunset during winter in response to requests from Islamic women research students in the Unit. All posts within the School are promoted internally and gender-balanced interview panels are convened to ensure fair selection processes. External posts and studentships are advertised nationally along with the School's Equal Opportunities Policy. All staff in the School who have responsibility for appraisal and doctoral supervision have EDI training, including Unconscious Bias training, provided centrally by the University's Equalities Office. This training was instrumental in expanding the remit of the Meeting of Minds seminars to address student wellbeing, gender and race alongside academic matters. Staff are also active in University staff networks; Women+ and Professors (chair: Lees Maffei), Academic Women's Action Group (chair: Jelinek), BAME staff, LGBTQ+, Disability and Wellbeing, Carers, Parents and Menopause.

3. Income, infrastructure and facilities

Research income

The Unit and its staff members have generated external research income of £1.14M over the seven-year period, equating to an average of £163,444 per annum, a growth of 36.8% over the

average annual income figure over the REF 2014 cycle of £119,518. Of the £1.14M total, £1.06M was awarded to the University and expended on new projects involving Unit members since January 2014. The remaining £82,111 represents awards from funding bodies that were made directly to individual staff rather than to the University. These awards are identified in the bullet points below.

As part of the strategy for improving the quality and volume of funding applications, experienced senior research staff peer review all applications irrespective of their value. The Unit also reviews new grant applications through informal workshops hosted by staff with experience of successful awards from both in and outside the School. The Unit recognises that funding applications constitute a significant additional workload, and these are facilitated by increased time allocations for research. During the current REF cycle, the Unit set out to diversify its potential sources of income, encouraging staff to both seek small awards for single high-quality outputs while seeking to secure larger awards to develop areas of research specialisation. The Unit also identified charities and cultural organisations to support public art projects and sponsors who made in-kind contributions to the production of public artworks.

Key research income successes include:

- Richardson's £164,000 ERDF Interreg North Sea Region award for *Create Converge*, a research programme focused on developing new commercial products and technologies for the creative and digital technology industries, enabled the Unit to appoint a Research Fellow and establish G+VERL. The Lab has since made a sustained contribution to the field of animation and gaming technologies, and the application of these technologies outside of the entertainment industries. It has won additional awards totalling £98,000 from New Creatives Interactive, BBC R&D and Audiences of the Future, as well as Create Converge follow-on funding. In addition, Parham through her participation in the Zero Carbon Lab, delivered a second research contract for £150,000 with Tarmac (following one which was completed in 2015), which has a focus on the supply of sustainable materials, for a project entitled, 'Supporting innovation and best practice in the materials supply chain', over the period 2016-19.
- Nelson's 2014 artist's residency at Guy's Hospital (£15,000) was instrumental in sharing research into sculpture as a means of articulating aberrant organic forms with the public.
- Nelson and Godman's *Meanwhile Gardens Art Commission* (The Canal & River Trust, £33,000) formed part of a public engagement programme exploring the confluence of natural and cultural structures in the urban landscape. Jury's *Disasters of Peace* award (£4,000) enabled the development of research into a much larger project on the representation of Climate Emergency. It was disseminated to venues in Europe and the US, forming new research links with universities in the US and Norway.
- Lees Maffei's AHRC Fellowship (£15k) enabled the production of the research monograph *Design at Home* and a further British Academy/Leverhulme award (£8,438) for an on-going project on design and haptics. Goodbrey's awards from NESTA (£15,000) and *Orphans of the Storm* (£4,000) facilitated the publication of two journal articles (submitted to REF 2021), and facilitated his contribution to the *Comics Unmasked* exhibition (2014) at the British Library.

Other awards during the period include two projects undertaken for the Intellectual Property Office (£77.3k), led by Adams, on design infringement and music copyright respectively, and awards from the Arts Council, the Henry Moore Foundation and Public Monuments and Sculpture Association totalling £45,000 to facilitate public engagement with the work of Barbara Hepworth through two major exhibitions. The Unit also secured an Arts Council award of £12,000 with four other Alliance Universities for pedagogical research into the development of professional doctorates in the creative arts sector. Also, the Artichoke Trust received a Wellcome Trust, Large Arts Award of £150,000 in collaboration with Nelson to produce exhibitions and support activities associated with *Cosmoscope*, 2015-2018 which forms a substantial element in a submitted Unit research impact case study.

Since 2014, funding awarded directly to individual staff rather than the Unit comprises:

- Jelinek, (£1,750) award from Leeds Art Gallery for research on collections, 2019;
- Jelinek (£50,000) award from Arts Council England, for research in British Somali Heritage Arts, 2020;
- Jury & Godman, *To Be Here* (£3,541 in-kind support for installation funded by University of Michigan Broad Art Gallery);
- Jury, *Climart* (£18,280) award from the Norwegian Research Council, administered via Norwegian University of Science and Technology) 2014-7;
- Jury, *Disasters of Peace*, (£2,000) AHRC Research in Film Award, 2018;
- Nelson, Installation proposal (£1,500) for Magazine House, London, curated by Modus Operandi Art Consultants, 2016;
- Nelson, (£1,000) Installation proposal for Symmetry Park, Wiltshire curated by Modus Operandi Art Consultants, 2016;
- Nelson, Installation proposal (£2,800) Airport Drive Commission, Melbourne, curated by Creative Road Art Consultants, 2015;
- Nelson, Installation proposal (£2240) for 180 Brisbane Tower, Brisbane Australia, curated by Creative Road Art Consultants, 2014.

Infrastructure & facilities

Since 2014, the Unit has benefited from £3.18M of University capital funding, particularly in key research strength areas of architecture, animation, and film and television. This investment comprises funding for the following facilities:

- £507k (2020) Livesound stage facility for live music performance;
- £55k (2020) New extraction system for 3D printer workshop;
- £38k (2020) Editshare video storage expansion;
- £22k (2020) Glass and ceramic kiln, spray booth and extraction;
- £45k (2019) Upgrade to Architecture studio;
- £38k (2019) Animation drawing tables;
- £200k (2019) Music studio upgrade, digital desk and acoustic works;
- £200k (2018) Render Farm to support research into VR and film;
- £400k (2018) New roof for main Galley and social space used by researchers;
- £250k (2018) Refurbishment of performance spaces to support research in fine art and film;
- £160k (2017) Editshare system for film storage to support research into architecture, VR and film;
- £380k (2017) Camera, filming equipment and lighting to support research in fine art and film;
- £300k (2017) Two PC Labs used by research staff and research students;
- £300k (2017) VR studio enhancement and high-end computing facilities for research;
- £280k (2015 & 2017) Laser cutting and 3D printing equipment to support research into architecture.

The Unit also invested in high-end computers for research staff and research students of around £25k per annum (approximately £175k), to support the development of research into convergent media and its applications, and architecture.

The Library and Computing Service (LCS) operates two large Learning Resource Centres and maintains 50,575 journal titles, an 81% increase since 2014, with 940 relating to art, architecture and design with another 380 focused on film, music and performance. Of the 543,000 ebooks some 25,000 are in the same categories with extensive coverage of art and design history, philosophy and literature. Additionally, there are subscriptions to 220 databases of which 60 relate to the Unit with a further print collection of 417,000 books which include 20,000 books on art and design and its history together with media and film. A dedicated LCS information manager supports Unit staff and research students.

All doctoral students are allocated a specific workspace in the Unit's dedicated 450-square-metre researcher studio space. Doctoral students routinely have access to industry standard facilities in film, media, design and architecture, photography, 3D and 2D printing. The Unit's staff and research students also have access to local social spaces and catering facilities in which they can meet.

In addition to local provision, the Unit draws on the support of the Doctoral College for the training and career development of its academic staff and research students. The Doctoral College provides a central online RSMS implemented in this REF cycle (outlined under Research Students, section 2) to oversee the recruitment, training, assessment and examination of research students. The University's Research Office provides centralised training and support for Unit staff including the identification of funding opportunities, support on the preparation of grant submissions, assistance with the electronic submission of grant applications and advice on research communication and the development and evidencing of research impact through a dedicated Impact Facilitator. Finally, the Research and Scholarly Communications team both advise and provide support, particularly with green Open Access publishing while LCS have established new transformative agreements with Sage and Wiley to publish gold OA without individual payments in over 2,500 journals.

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

Research collaborations and user partnerships

Since 2014, interdisciplinary collaboration and partnerships with industry and a range of cultural organisations have been at the core of the Unit's research strategy. The Unit has worked closely with University Theme Champions in Heritage, Cultures and Communities, Space and Information and Security, together with UH Arts, to establish specialist Labs that provide a platform for academic, commercial and cultural collaboration. In 2016, the appointment of two professors, and a senior research fellow were driven by the Unit's plans to work with external partners to push disciplinary boundaries in architecture and zero carbon design, VR and gaming technologies, and public engagement with the arts. The Unit supports collaboration at all levels from speculative one-off projects that test disciplinary norms to larger EU and other externally funded projects such as the Canal and River Trust.

The Unit leads or contributes to networks in art practice, media and design as follows:

- CAP and TVAD facilitated collaborative networks in art and science around three projects. *Cosmoscope* embraced researchers from the fields of biomedical imaging (University of Durham), materials chemistry (University of Oxford) and music (University of Hertfordshire), creating new perspectives on complex scientific phenomenon from cancer to cosmology that otherwise defy visual representation. Art's place as a tool to reveal scientific and societal phenomena resulted in Jury's *Disasters of Peace*. Jury worked with environmental psychologists at Norwegian University of Science and Technology to use film as a means of articulating individuals' perceptions of climate change, later presenting the work to audiences at the Broad Art Museum in the US, at the 2015 Netherlands *Conference on Environmental Psychology* and the *Starmus Festival* in Trondheim in 2017. From this project emerged a second, *To Be Here*, a series of films on the trauma of displacement of Saharwi refugees, developed in partnership with Ben Rawlence, author of *City of Thorns*, and film-theorist Kamila Kuc.
- G+VERL's Interreg-funded *Create Converge* included project partners from Germany, UK, Netherlands and Denmark to create a network centred around the North Sea region to undertake research into convergent technologies of animation. Collaborators include the Scottish Film Agency's *TayScreen*, England's *Screen South*, VIA University (Aarhus, Denmark), *Media Evolution*, Malmo, *Film by Aarhus*, *Filmforderung* Hamburg, Dundee City Council, and *Subatomic Games* in the Netherlands and Abertay University.

- The Unit's most recent collaborative network centres around architecture, data and the built environment. The *Zero Carbon Lab* functions as a platform to develop Jankovic's research into computer simulation and complexity science in the evaluation of building efficiency. Initially carried out at Birmingham's *Zero Carbon House*, a RIBA-award winning project using computer simulation and data to better understand building performance. The research led to an Innovate UK-funded project *RetrofitPlus* and the construction of two additional houses, and subsequent collaboration with user partner *Beattie Passive* to develop off-site insulation panels. Jankovic was part of the design team for user partner GlaxoSmithKline's Elipta Building in Ware and Hempcrete Museum Store for user partner Science Museum in Wroughton. He is author of the resulting *Designing Zero Carbon Buildings Using Dynamic Simulation Methods* (Routledge, 2017).
- Further synergies were established in and outside the Unit. Parham established a user partnership with Letchworth Garden City Heritage Foundation to examine the economic, design and demographic factors that sustain Garden Cities. Parham contributed to the *Diffuse Cities and Urbanisation Network* sponsored by the research federation *LABEX Urban Futures* and Université Paris-Est. As a result of Parham's network, the Unit has an expanded view of the economic and demographic operation of urban environments in which users of Garden Cities play a formative role in the research. The University Research Themes have recently drawn on these cross disciplinary networks to establish a newly designated Future Societies Research Centre to examine major societal shifts in sustainability, health and technology.
- Malizia's research into tangible user interfaces was undertaken in collaboration with the Oslo Metropolitan University. The project investigated how interface design in everyday objects could facilitate interactions to mitigate loneliness. The work was subsequently developed with the University of Munich, the Università della Svizzera, the University of Oulu (Finland), and the German Research Centre for Artificial Intelligence, and the University of Copenhagen. In 2020, Malizia collaborated with Northumbria University on a project *Not Equal Plus* a UKRI-funded NetworkPlus on ways of revealing hidden biases in machine learning.
- The *In Pursuit of Luxury* (IPOL) partnership (Borstrock) has explored the place of luxury in modern culture. The Lab has collaborated with academic institutions that include Yale School of Management, Koppelman School of Business at Brooklyn College and the Design Department at Politecnico di Milan, and industry partners organisations including Airbus and IBM investigating issues and research questions concerning the perception and delivery of luxury.

Contributions to Economy and Society

The Unit's research has contributed to the economy and society in the following ways. Jury's *To be Here* explored how film could be used to explain climate emergency. It was exhibited at the University of Michigan's Broad Art Museum, presented to Red Cross America (2017), and to an audience of 300 in a Sahrawi Refugee Camp (2017) bringing the issue to the attention to NGOs in the US and UK. Jankovic's research with Welwyn Garden City on retrofitting building stock was undertaken with architects Rock-Townsend and Brinson-Stanisland to use new materials to attain net zero-carbon emissions on 80 buildings (2020). Parham's research with Letchworth Garden City (LGC) and the International Garden Cities Institute led to new policy on sustainable cities and food production informing the Town and Country Planning Association's *Masterplanning Report* (2017). Malizia's research with Alfa Systems and Jaguar/Land Rover led to new interface design to overcome psychological barriers to the use of autonomous vehicles. Funded by the EPSRC Not Equal Plus network, Carta and Malizia's research enabled the charity Weandl to develop greater fairness in the use of algorithm design in food distribution. Carta worked with the charity Charcoalblue on an innovate UK-funded project to develop algorithm design in a post-lockdown recovery plan for UK Theatres. Borstrock's IPOL activities have been undertaken with Virgin Hyperloop and L'Oréal to explore the sustainability and the ethics of luxury. Borstrock's Digital Hacklab developed Modeclix with Prada, Digits2Widgets and EOS to develop sustainable reusable 3d-printed fabrics in the fashion industry.

Contributions to sustainability of discipline

The Unit contributions include:

Editorships:

- Carta is head of the editorial board for the architectural journal *C3 Magazine* and editor for *Architecture, Media, Politics, Society*, published by UCL press, a journal devoted to the political interpretation of the built environment from a multi-disciplinary perspective.
- Jankovic was guest editor of a special issue of *MDPI Sustainability Journal*, May 2020, on self-organised simulation for sustainable building design, and the *Elsevier Energy and Buildings Journal*.
- Jelinek edited a special edition of *The Journal of Visual Arts Practice* (2014). She was the *Cogent Journal Humanities* editor in 2019, and edits *Writing Visual Culture* (previously *Working Papers in Art and Design*), TVAD's Research open access, peer-reviewed academic journal.
- Lees Maffei is series editor, (with Kjetil Fallan University of Oslo), for *Cultural Histories of Design* (Bloomsbury Academic) and series editor for *Writing Visual Culture*, (University of Hertfordshire). She was Managing Editor of the *Journal of Design History* (2011-17).

Keynote speaker and invited lectures:

- Jelinek keynote lectures : *Artistic Practices as Empowerment*, Musée de Quai Branly, Paris (2019), 'Radicalism and Responsibility', at the *Radicalism and the University* conference, University of Essex, (2017); the 'Art and Anthropology' exhibition convened by Jennifer Clarke, *Knowing from the Inside* an ERC-funded project with the University of Aberdeen (2017), 'Art and its Ecologies' for *Art and the Rural* curated by Elena Cologni for the Gropius Impington Power and Modernism exhibition (2015). She also contributed to 'Art in the time of Neoliberalism', *Art and Value TENT*, in Rotterdam, 2014.
- Lees Maffei invited speaker : 'Hand in Hand: Design History and Victorian Studies', MA in the History of Design and Curatorial Studies at Parsons, The New School for Design and Cooper Hewitt, Smithsonian Design Museum, 2019; 'The Modern Beauty of Italian Design', Italian Studies Department, Villanova University, 2018; 'Designing Worlds: National Design Histories in an Age of Globalization, Research Seminar School of the Art Institute of Chicago, 2015; 'Designing Worlds: National Design Histories in an Age of Globalization, Northern Illinois University, 2015; 'Playing at Home/Playing Away: Alessi and Italian Domesticity' for "The Italian Home" annual symposium of CIRN - Cambridge Italian Research Network 1 June 2015. 'Ascribing Value to Amateur Domestic Interior Design Practice as Production, Consumption and Mediation', 'Culture, Value, and Attention at Home' Expert Workshop, Arts and Humanities Research Council Cultural Value Project, Liverpool Hope University, 22 May 2014.
- Malizia was keynote speaker at the 8th ACM International Symposium on Pervasive Displays, bringing together researchers from a wide range of disciplinary backgrounds to explore interface design in public and semi-public arenas.
- Mee presented keynote lectures on American Horror film at De Montfort and Sheffield Hallam Universities, in 2109. She was conference chair for *Queer Fears*, UH, 2020.

Awards:

- Lees Maffei was awarded a 2020 Lemelson Center Fellowship at the National Museum of American History, Smithsonian Institution, Washington DC.
- Jury recipient of the AHRC Research in Film award for *To Be Here*, 2018.
- Jelinek awarded the Khaleid Best Art Book Prize for *The Fork's Tale*, 2014.

Panel/College membership:

- Carta has membership of the advisory board for the Journal of Architecture, Studies of Architecture, Urbanism and the Environmental Sciences.
- Jankovic was elected a member of the Serbian Scientific Society in 2019, and is President of London and South East Chapter of ASHRAE, a US-based global society for advancing human wellbeing through sustainable technology for the built environment.
- Lees Maffei is advisory board member for the Journal of the AIS/Design (Associazione italiana degli storici del design), The Poster (Intellect) and is a Fellow of the Royal Historical Society. She was Visiting Professor of Design History at Vrije University, Amsterdam (2013-15) and at the Institute of Art Design and Enterprise, University, Lisbon (2013-14).
- Parham is Academic Director of Letchworth's International Garden Cities Institute, established in partnership with LGC to examine the economic, design and demographic factors that sustain Garden Cities. She is a jury member for the LGC Institute design competition master-planning project and is a member of the Diffuse Cities and Urbanisation Network sponsored by the research federation "LABEX Urban Futures", at the Université Paris-Est.

Conference organisation:

- Jelinek convened *The Artists and Philosophers we Love* at UH in 2019 a conference on the boundaries between theory and practice, presenting a new agenda for research in the arts.
- Malizia chaired the *7th International Symposium on End-User Development* at UH in 2019, a bi-annual event that gathers researchers interested in extending knowledge about design end-user development technologies and their applications.
- Lees Maffei chaired 'Design and Heritage: Concepts and Contexts', and 'The Space Between: Insights from DHeritage' discussion panel, *Association of Critical Heritage Studies 5th Biennial conference*, University College London, 26th-30th August 2020; 'Design History / Design Heritage', *College Art Association Annual Conference*, New York, 13-16 February 2019. With Professor Rebecca Houze (Northern Illinois University), Authorship and Anonymous Design Strand, Tradition, Transition, Trajectories: Major or Minor Influences, *9th Conference of the ICDHS* (International Committee for Design History and Design Studies), University of Aveiro, Portugal, 9-11 July 2014. With Professor Eduardo Corte-Real (IADE, Lisbon).
- Jury's Climart project was exhibited by UH Arts in November 2017.
- Mee's research into television has led to the formation of an 80-strong special interest group in film and horror studies with the University of Northumbria and the *British Association of Film and TV*.

Peer review/panel membership:

- Adams is a peer reviewer for Taylor Francis/Routledge and was reviews editor for H-France between 2014-2016.
- Lees Maffei has been a member of the Peer Review College of the AHRC since 2012.
- Mee is a peer reviewer for Manchester University Press, Palgrave Macmillan, *Adaptation* (Oxford Academic Journals), and the *Journal of Italian Cinema and Media Studies*.
- Parham is a jury member for the Letchworth Garden City/Institute of British Architects design competition overseeing a master-planning project for LGC.
- Brownie has undertaken seminars, and radio interviews including, BBC Radio 4's *Thinking Allowed* (September 2016) and BBC's *Woman's Hour* (August 2017) and the Moscow Cosmonaut Museum (September 2019).