

Institution: University of Kent

Unit of Assessment: 13: Architecture, Built Environment and Planning

1. Unit context and structure, research and impact strategy

The Kent School of Architecture and Planning (KSAP) is a socially engaged, innovative school located within the Division of Arts and Humanities. Since its launch in 2005, KSAP has rapidly established a solid reputation for research, ranking 8th equal for Research Intensity in REF2014. In strengthening urban sustainability activities, the School expanded into Planning in 2018, now comprising 15 researchers (13.4 FTE) and a thriving postgraduate community. The sharp increase in our research capacity is a key success of this REF cycle, which has included the first graduates from our PhD programme, with 21 completions. The enhancement of our research culture has been supported by a 484% increase in research income since REF2014, as well as prestigious awards for both senior staff and ECRs (e.g. H2020 Industrial Doctorate, EPSRC, and ESRC responsive mode grants, and AHRC and Leverhulme fellowships).

KSAP's three research centres champion the core areas of our research activity:

Centre for Research in European Architecture (CREATe). This centre focuses on architectural history, theory, and urban design. It has particular expertise in the history of modernism in Britain and Germany; early modern architecture in Europe; integration of critical knowledge with creative work; early Byzantine construction and conservation; sacred architecture; and feminism.

Centre for Architecture and Sustainable Environment (CASE). This centre brings together researchers working in sustainable design and urban resilience. It has particular expertise in building performance and urban climate; the history of environmental design; post-occupancy evaluations and comfort across different operational and historical contexts; resilience planning; and urban agriculture.

Digital Architecture Research Centre (DARC). This centre focuses on creative uses of digital technologies for design and fabrication within the built environment. Its members focus on generative design and computational creativity; digital fabrication and robotics; and digital visualisation and mixed reality.

Research Strategy 2014-20

Key research objectives in the REF2021 period were: (i) consolidating our research centres and formal collaborations with external stakeholders, HEIs, and other organisations; (ii) developing a new research area in Digital Architecture; (iii) creating a PGR community; and (iv) establishing the School as an agent for change and impact in the region, nationally, and internationally. These objectives have been achieved as follows:

(i) Consolidating our research centres and external collaborations

Through our research centres, KSAP has been successful in gaining external funding for 21 projects, with over £1 million in income from research councils, trusts, and other bodies; an almost fivefold increase compared with REF2014 (£207,081). Our research centres have also contributed to the discipline with 21 books and edited volumes, 74 book chapters, 90 peer-reviewed journal articles, 107 peer-reviewed conference papers, and five creative outputs in the census period. This has been achieved through various mechanisms. We have used QR funding to: (i) strategically support the development of large grant applications via five incentivisation awards; (ii) support international visiting academics; and (iii) fund open access, public engagement, and impact-focused activities. Internal peer review, along with Individual Research Planning meetings, appraisals, effective use of a transparent Work Allocation Model, and ECR development workshops, has underpinned these successes, and has resulted in eight promotions since REF2014. The initiatives of the research centres are described below.

CREAte plays a key role in informing design and regulatory and conservation practices via partnerships with the 20th Century Society, Canterbury Archaeological Trust, and Civic Societies. It organises a diverse range of public engagement activities, including open lectures, presentations to amenity societies, Pugin celebrations, Open House Rome, and creative lighting projections enhancing the quality of the environment. The Centre has organised four bi-annual international conferences, disseminating excellence in architectural research: *Riverine* (2014); *Writing Buildings* (2016); *From Building to Continent* (2018); and *Connections: Exploring Heritage, Architecture, Cities, Art, Media for Design* (2020).

CREAte has secured funding from the Paul Mellon Centre, British Academy, and Leverhulme Trust. External fellowships have fostered extended collaborations with Dumbarton Oaks at Harvard and the British School of Rome. CREAte contributes to the sustainability of the discipline through the MSc in Architectural Conservation and MA in Urban Design.

CASE has received significant income from EPSRC, ESRC, and AHRC, as well as through awards from TSB/Innovate UK, Heritage Lottery Fund, H2020, the House of Commons, and consultancy contracts with local stakeholders, including SMEs and Canterbury Cathedral. These enabled the support of five postdoctoral researchers and three international research visitors.

The Centre engages closely with stakeholders outside HEIs, as exemplified through the long-term secondment to the House of Commons and the H2020 Marie Skłodowska-Curie ITN-European Industrial Doctorate. It also collaborates with partners beyond academia on live projects, enhancing impact (e.g. Dalby Square in Margate, Palace of Westminster) and disseminating excellence in research through co-organised international conferences (e.g. with the Royal Academy of Engineering-Frontiers of Engineering for Development, 2017; the CIBSE Heritage Group and Historic England, 2018; the Construction History Society, 2018; Social Farms and Gardens, the association representing UK community gardens and city farms, 2019).

CASE has developed significant laboratory infrastructure and simulation software through a £100k investment, and hosts the MSc in Architecture and Sustainable Environment and the new MA in Urban Planning and Resilience.

DARC was established in 2019 and has already received funding from Canterbury Cathedral, independent clients, and the University, and co-organised the 2020 *Connections: Exploring Heritage, Architecture, Cities, Art, Media for Design* international conference. Its members launched the MSc in Bio Digital Architecture, and host the established MA in Architectural Visualisation.

The outward nature of KSAP has greatly supported interdisciplinary work and activities, as evidenced by collaborations across the Faculties (now Divisions), with KSAP members in the Centre for Heritage, hosted by Kent Law School; Kent's Interdisciplinary Centre for Spatial Studies (Anthropology), and the Kent Interdisciplinary Research Centre in Cyber Security (Computing).

Such collaborations have resulted in important partnerships across Kent, including major dissemination events such as the 2014 CREAte 'Writing Buildings' Conference with English. Nikolopoulou was on the steering group of the AHRC network 'Pre-Columbian Tropical Urban Life: Placing the past in designs for sustainable urban futures' (UoA29). CASE collaborated with Psychology on the HLF-funded project to refurbish a Victorian townhouse for climate change and intergeneration living. The project, in Margate, received extensive press coverage from local and national outlets (see Section 4).

(ii) Developing a new research area in Digital Architecture

The development of Digital Architecture was a key priority in our 2014 strategic plan. It was realised in three key ways: (i) the strategic appointment of Ireland (January 2016) and other staff (see Section 2); (ii) the establishment of the Digital Architecture Research Centre (2019); and (iii)

a £180k strategic investment in new laboratory infrastructure and resources. This included laser scanning, drones, robotic arms, 3D printing facilities, oculus and VR headsets, and a dedicated lab technician (Soosaipillai). DARC has already secured external funding, co-organised an international conference, and is contributing to the sustainability of the discipline through two PGT programmes (see above).

(iii) Creating a PGR community

Creating a sense of community has been key to enhancing the performance and development of our PhD cohort. In the current REF period, our first PhDs have graduated. We have achieved 21 completions (one by publication), with 31 PGR students currently registered. 37% of our PhD students (19) have been funded via scholarships. This includes internal scholarships, two prestigious H2020-MSCA-ITN-EID, four AHRC-CHASE (Consortium for the Humanities and Arts South East England), one EPSRC, and two GCDC (Global Challenges Doctoral Centre) scholarships. PhD funding has been received from the Egyptian Ministry of Defence, the Academy of Athens, Philadelphia University-Jordan, and Turkey's Ministry of Education.

Interdisciplinary supervision is a particular strength of our research culture. We have co-supervised with colleagues from Arts, the Centre for Higher Education, Engineering and Digital Arts, English, History, Religious Studies, and Social Sciences. We have a dedicated schedule of research seminars and training events. All PGRs are members of our research centres. Mentoring, and participation in research grants and proposals further enhances PGR employability and career development (see Section 2).

(iv) Establishing the School as an agent for change and impact in the region, nationally, and internationally

This objective is discussed under the Impact Strategy below. At its heart is our research aim to address professional, environmental, and societal needs. It involves close links and collaboration with professional bodies and associations, amenity societies, cultural institutions, local government, SMEs, and other stakeholders. Our research, supported by a range of public engagement initiatives, aims to have a lasting impact through: understanding buildings in different contexts and improving their environmental performance; influencing important heritage refurbishment activities (from domestic buildings to UNESCO world heritage sites); climate change adaptation and resilience; and influencing conservation and planning.

Future Development and Strategy

Our central aim is to ensure the ongoing vitality and sustainability of our research environment, while leading developments in new thematic areas and impacting positively on the regional economy and development. To achieve this, we will:

(i) Further enhance the work of our research centres, which show a strong synergy with the new University Signature Research Theme on 'Environment, Food Systems, and Natural Resources', which Caputo co-developed. Such cross-University initiatives will foster new collaborations and interdisciplinary research. KSAP is part of the University-wide Institute of Cultural and Creative Industries (iCCi), in line with the updated Kent Cultural Strategy, 'Inspirational Creativity: Transforming Lives Everyday'. iCCi is a key element in Medway's strategic repositioning as a Creative City, building on the University's longstanding strengths in the creative and cultural industries. Working with iCCi, KSAP, through DARC, will champion digital design, visualisation, and creativity, supporting SMEs and public engagement initiatives. This will in turn enable DARC's growth. KSAP is also engaging with Creative Estuary, a £4.3 million Cultural Development Fund project focused on the Thames Estuary Production Corridor, where Bagaeen will engage with planners and other partners to contribute to and influence policy in planning.

(ii) Expand our research specialisms in design-based research. Building on KSAP's experience with design-based research, and as part of our inclusive ethos, this will extend the dialogue to staff whose investigations are predominantly developed through practice. We will also launch a Project Office, aimed at establishing partnerships with research beneficiaries, ensuring engagement and

outreach with civil society, and making design and technical skills available for participatory projects addressing local issues.

(iii) Expand the PGR research culture. We will sustain recruitment of high-quality PGRs and investment through a continuing focus on securing scholarships and on training. Capacity-building doctoral studentships and further tailored training initiatives supporting their development as researchers will be given. KSAP is engaging with doctoral training partnerships (e.g. the recent success of the H2020-MSCA-ITN-EID) and competition for scholarships (four scholarships secured last year), which will remain a priority to ensure the sustainability of our research environment.

Impact Strategy

As highlighted in Research Objective iv, a strategic aim is to establish KSAP as an agent for change and impact, and to address professional, environmental, and societal needs. This is fully aligned with the University's strategy for Public Engagement with Research. It is achieved through extended networks and collaborations with professional communities outside HEIs, including professional bodies, amenity societies, local government, and third sector organisations. Together, they offer organised and publicised access to large non-academic audiences, enhancing visibility and providing pathways to impact. These collaborations take different forms:

(i) Working with external stakeholders as partners in research projects. Examples include: CIBSE, GLA, LCCP, and various industry and SME representatives working on the EPSRC 'Urban Albedo' project; the Palace of Westminster's centrality to Schoenefeldt's AHRC fellowship; Caputo's collaboration with Social Farms and Gardens (ESRC); and the Austrian Frederick and Lillian Kiesler Private Foundation (Ireland).

(ii) Impacting on policy and practice as members of steering committees. Key examples include: Brittain-Catlin's contributions as a member of Historic England's national Advisory Committee; Bagaeeen's work as a Trustee of the Town and Country Planning Association and the Royal Town Planning Institute; Nikolopoulou's membership of the CIBSE Guide A Steering Committee; and Schoenefeldt's contributions to the CIBSE Heritage Group. Specific contributions to professional guidelines include: Brittain-Catlin's contribution to the English Heritage 'Introduction to Heritage Assets' on Nineteenth and Twentieth-Century Convents; Watkins' contribution to the CIBSE Guide A chapter on 'External Design Data'; and Nikolopoulou's co-authorship of the chapters on 'Environmental Criteria for Design' and 'Health Issues' (CIBSE Guide A).

Research activities are combined with public engagement and dissemination activities through conferences, talks to professional bodies, amenity societies, cultural institutions, contributions to professional guidelines, consultations with local government, and experiments and walks for public understanding of science and the built environment. Funding from the University (over £25k for research, impact, and public engagement activities, with £5,900 awarded from the Global Challenges Research Fund) have enabled impact-generating activities (Brittain-Catlin, Caputo, Cardellicchio, Fontana-Giusti, Fox-Godden (PGR), Haney, Karydis, Vasilikou (PDRA), Watkins).

KSAP has used KMTV, the local Kent TV station, to showcase one of our impact case studies, through a series of interviews with different stakeholders involved with the 'Restoring the Palace of Westminster's C19 ventilation system' project.

The impact achieved by research in KSAP goes beyond that documented in the two impact case studies, in terms both of significance (social, environmental, cultural) and reach (national and international), varying from recovering the knowledge of lost palaces of London Strand (Guerci), to Victorian terraced houses (Nikolopoulou, Renganathan, Watkins), to the ageing of recent iconic structures (Cardellicchio), and the digital reconstruction of historic structures (Griffin). Sustainability, refurbishment, and heritage are themes also underpinning the two impact case studies; Informing planners and architects on the design and conservation of historic settlements (Karydis); and refurbishment of a UNESCO world heritage site and one of London's most significant public buildings, the Palace of Westminster (Schoenefeldt).

Shaping policy and professional practice forms an important part of our Impact Strategy, as evidenced through development of guides (see above) and the School's impact case studies. Workshops, competitions, and debates provide additional pathways, along with the extensive range of public engagement events, as highlighted in Section 4.

Future priorities for impact will focus on heritage, sustainability, and urban resilience. These will be enabled through: (i) KSAP networks and collaborations with professional communities, associations, and other external stakeholders; (ii) the University Signature Research Theme on Environment; and (iii) iCCi and Creative Estuary, which will enhance collaborations with strategic partners such as the Creative Industries Federation and Nesta.

Open Research Environment

All staff are required to publish open access. As a minimum, journal publication outputs are published through the Green Open Access route, and a version of all articles are deposited in the Kent Academic Repository. For UKRI-funded outputs and beyond, the university has funded six article-processing charges for Gold Open Access.

KSAP's Research Committee leads on the development of the research strategy for open research data. Members of the School have pioneered open access data (EU FP5: RUROS project) and are keen to ensure transparency and access to data informing future research. Appropriate data storing and sharing agreement is in place, complying with GDPR Regulation (EU2016/679). Data sharing, not subject to IPR openly accessible for use in other research projects or for meta-analysis, is already forming a deliverable in the H2020-MSCA-ITN-EID 'SOLOCLIM'.

Research Integrity

All research activities and data collection undertaken in KSAP follow strict University procedures and guidelines, in line with the University's Research Integrity: Code of Ethical Practice for Research policy. Research and data collection undertaken by staff and PGRs involving human participation requires approval at School and Divisional level, with formal structures and training in place for this. Additionally, to comply with the GDPR Regulation (EU2016/679), all staff are required to undergo training to ensure appropriate handling of data and databases.

2. People

After a period of strategic growth between 2010 and 2013, KSAP has spent the last six years consolidating staffing expertise and development. Whilst our numbers have slightly increased since REF2014 (from 11.4 to 13.4 FTE), our primary focus has been on growing Digital Architecture and Planning as areas of strategic priority. This has been achieved through the key appointments of Ireland (2017) and Buš (2018), to lead the development of Digital Architecture, launch DARC, and introduce the MSc in Bio Digital Architecture. The appointment of Bagaeen as Professor in Planning (2018) both enabled the development of the new MA in Urban Planning and Resilience, and marked a step change in our research activity on climate change adaptation and resilience, along with the appointment of Visiting Professor Steve Quartermain CBE, the outgoing Chief Planner of the Ministry of Housing, Communities and Local Government. Succession planning around planned retirements further strengthened our research expertise around this priority area, and in 2018-19 we appointed researchers with expertise in green infrastructure, urban agriculture, and social sustainability (Caputo, Gillick).

KSAP is strongly committed to equality and diversity, and our staff base is international, with 13% BAME staff at different career stages (comparable to 17% nationally for the sector [AdvanceHE 2020 report]), and representation in key roles, including research centre directors and the KSAP REF team. Equally, female staff have held key leadership positions during the census period. The Director of Research (2014-19), REF Coordinator, Associate Dean for Graduate Studies (2015-20), Athena SWAN lead (2019-), and Deputy Head of School (2019-21) are all female, reflecting our aim of ensuring gender balance across key roles. Achieving gender balance is a priority for

the School. Although there are currently only six female staff (two E&R contracts), we have achieved a 50%-50% female/male ratio at Professor level. Recruitment is carefully monitored across all levels, and at least two female staff are included in all interview panels. This has seen positive results, with four of the five PDRAs appointed being female (one BAME).

The five fixed-term PDRAs, created through the expanding research base and external funding for projects, have made an important contribution to KSAP's research profile. Kotopouleas and Schoen are working on the EPSRC 'Urban Albedo Computation in high latitudes locations: an experimental approach' (2017-21) and the ESRC 'FEW Meter, an integrative model to measure and improve urban agriculture' (2018-21) projects, respectively. Other PDRAs in the census period have included Rueda de Watkins (2018-19) on the HLF 'Dalby Square' project (2015-19); Martin on two EPSRC projects (2014-15); and Vassilikou on EPSRC and AHRC projects (2015-16).

Staff Development Strategy

Our staff development strategy recognises staff needs at each stage of their careers. This is underpinned by our adherence to the seven principles of the Concordat to Support the Career Development of Researchers, as well as the University's renewed 2017 HR Excellence in Research award, which acknowledges our adherence to the principles of the European Charter for Researchers and Code of Conduct for their recruitment.

Research career mentoring and planning is provided through two mechanisms. The annual appraisal is a space to discuss research within the context of career and succession planning, promotions, and School priorities. The annual Individual Research Planning meeting focuses on current and future research, and project and publication goals, in the context of the Research Strategy. Beyond these formal meetings, the Director of Research plays a key role in supporting research development through ongoing informal mentoring and guidance for all staff.

Peer support and development is central to our research culture, and all staff are encouraged to take advantage of University support and development opportunities. These include the programme of training and development offered by the Graduate and Researcher College, Grants Factory workshops, funder-specific workshops and mock panels, and the annual University-wide Impact Week.

Time for research is crucial, and this is provided through a dedicated weekly research day during term-time and the provision of term-long study leave after seven full terms. In 2015, the School also revised its workload allocation model, increasing the time dedicated to research by 10% to 40%.

In addition to the strong support and opportunities available to all staff, our EDI strategy ensures additional support to emerging researchers, ECRs, and new colleagues, comprising:

- All new ECRs have KSAP mentors.
- All ECRs gain a Post-Graduate Certificate in Higher Education (PGCHE) within two years of appointment and are allocated a PGCHE mentor.
- ECRs are monitored by a three-year formal probationary system, with annual reviews overseen by the probation supervisor and the Head of School.
- All ECRs are encouraged to engage with the programme of events and workshops offered by the ECR Network. This provides tailored support on the challenges of being an early career researcher, through regular talks and workshops (e.g. career planning, coping with rejection) and opportunities for peer-mentoring.

The success of our support for ECRs and new colleagues is evidenced in the promotion of six ECRs from Lecturer to Senior Lecturer since 2016. In addition to the support detailed above, colleagues applying for promotion are given targeted promotion mentoring with a senior member of staff. The School Promotions Panel also ensures transparent and constructive support and advice on promotion applications. The impact of this support is evidenced by eight promotions

during the current REF period (compared to three in REF2014); six to Senior Lecturer, one to Reader, and one to Professor. There is also potential for colleagues to advance at an accelerated rate, and this is reflected in Schoenefeldt's promotion to Senior Lecturer in 2016, and to Professor in 2020.

As part of our EDI strategy, the School Promotions Panel is required to include BAME and female members, alongside the School's Athena SWAN lead. The SPP reviews all staff and offers mentoring to those staff who either have not submitted an application, or not been promoted, in the last five years. Inclusivity is also fostered in the School appraisal process, with 50% female/male split of appraisers.

Colleagues on Education, Scholarship, and Professional Practice (ES&P) contracts are encouraged to engage with research through a range of initiatives designed to support them in transitioning to research contracts if they wish to. These include mentoring, internal funding, reduced teaching load, and research leave. ES&P colleagues are fully included in the range of research activities within the School. This includes attendance at Research Committee meetings (Bothwell, Griffin, Street-Tarbatt), contributions to research projects (Bothwell), and leading on public engagement (Griffin).

Staff development is also supported through additional training at different levels and EDI-monitored across all initiatives. Three female members of KSAP have participated in internal and external leadership training programmes in the current REF period: Nikolopoulou (LASR and INSIGHTS), Fontana-Giusti (Senior Academic Leadership), and Street-Tarbatt (Aurora). Additionally, all KSAP staff on the REF team have undergone training for EDI and unconscious bias. The School has implemented an evidence-based and transparent REF process, following the University Code of Practice, and the work of female colleagues is prominent in the submission.

The School follows a policy of substantive fixed-term appointments for parental leave cover. Where additional entitlement has been accrued, an application for one term's study leave can be supported immediately upon return to work, enabling women to re-engage with research. This is available to all staff irrespective of contract (actioned in 2018-19 for Street-Tarbatt). The School makes use of timetabling constraints to enable all academic colleagues to work flexibly, with meetings held in core hours only.

Research Students

The University provides a rich and stimulating environment in which research students are not only beneficiaries but also key contributors. Our first doctoral students completed their PhDs in 2014, and since then a total of 21 students have graduated (13 female, 8 male), many funded through various internal and external sources. The School currently has 31 registered research students (16 female, 15 male).

PhDs	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Total
awarded	1	5	1	1	3	4	5	21
by publication					1			

Funding secured by PGRs includes three through the CHASE AHRC-funded DTP, 10 Vice-Chancellor's Scholarships for GTAs, one Alumni Scholarship, and two Global Challenges Doctoral Centre students. KSAP has also entered into cotutelles with our Erasmus partners: the University of Rome Tor Vergata and the University of Lille (one scholarship each).

As part of our drive to improve diversity and equality both within the academic field and within the architecture profession, we carefully monitor EDI. In recent scholarship rounds, we have seen significant success in this respect, with four of the five scholarships being given to female candidates (one BAME) in the final round, despite overall gender balance across applicants.

Supporting Research Students

Bespoke training is available to our PGR community. The recently secured H2020-MSCA-ITN-EID 'SOLOCLIM' enables a strengthening of the PGR cohort, through collaborations with peers in partner countries, co-supervisions with practitioners, and bespoke training on monitoring and modelling of urban environments. This complements existing offerings through wider University consortia (CHASE, SeNSS, Eastern ARC) and the Graduate and Researcher College (GRC), which deliver postgraduate research funding and training. Other bespoke training by KSAP has included: the CHASE (AHRC-funded) workshops 'Mapping Narratives' (2016, co-organised with the British Library); 'Sensory Theory, Methodology and Experience' (2016, co-organised with UoA29); and the recently acquired CHASE Cohort Development Fund 'Digital Landscape: Space, Sound Form and Morphology'. Additionally, competitions for placements at non-HEIs are available through CHASE, secured by Damiani for a three-month placement in Bibliotheca Hertziana Rome (2020).

Cross-disciplinary PG research is encouraged not only between the research centres, but also between different Schools where appropriate. Since 2014, 11 KSAP students have been co-supervised by the Schools of English, Arts, History, Law, Religious Studies, Engineering and Digital Arts, the Centre for Heritage, and the Centre for the Study of Higher Education.

Research students are closely integrated into KSAP's academic and intellectual life. They have been involved in the organisation of the CREAtE Biennial Conference (2016, 2018, 2020). A programme of weekly PGR Research Seminars and coffee meet-ups is scheduled every term, providing students with the opportunity to present and discuss their research. They are also involved with the Open Lecture Series organised by the research centres, where EDI is also monitored. This provides an effective stepping-stone for presenting at national and international conferences. To support PGRs in doing this, KSAP provides a personal research budget of £500 for three years, amplified through application to the Division's 'top-up' fund.

PhD students benefit from a range of student-facing activities offered by the GRC through the Researcher Development Programme. Architecture PGRs submit research posters to the annual Postgraduate Research Showcase; these are subsequently incorporated into the KSAP End of Year Show. PGRs are also encouraged to apply for the Postgraduate Experience Awards (up to £1,500 per student) offered by the GRC. These provide PGRs with the opportunity to gain funding to run an event or project with interdisciplinary and/or external focus, enhancing the postgraduate experience at Kent. In 2014, Chatzipoulka won this award, using it to run the Postgraduate Interdisciplinary Conference Home|Less. CASE has led the way in involving PGRs with funded research projects both directly and indirectly in applications for funding. Beneficiaries of this include Chatzipoulka, Hirbod, Tschritzis, and Yeninarçilar (who is conducting his research on the EPSRC 'Urban Albedo').

All research students on University scholarships (GTA) are contracted to do a limited amount of undergraduate teaching, while all research students are given the opportunity to teach, supported by mentoring and the opportunity to enrol in the Associate Fellowship Scheme (AFS). PGR representatives sit on the School's Graduate Studies Committee and the research centre meetings, ensuring that their experiences and views shape research policy.

KSAP has also supported external PhD graduates by encouraging applications for honorary research fellow status at Kent (da Silveira Hirashima, Brazil; Jackson, Australia; Wang, China). International visiting PhD students have also registered at Kent as Visiting Training Fellows, contributing to successful completion of their PhD theses (Rojas Fernandez, Spain).

In the current REF period, this thriving, inclusive research environment and support for our postgraduate students has contributed to their career development in academic and other professional pathways. The majority of our graduates have taken up positions in HEIs in the UK and abroad as academic members of staff (e.g. Vasilikou at Reading; Piga at Coventry; Adaji at the University of East London; Adekunle at Hardford (USA); Berstrand at Xi'an Jiaotong-Liverpool;

Badiee at Blinn College, Texas; Shuayb at the American University of Beirut; Mahdy at the Military Technical College of Egypt), or PDRA positions (e.g. Chatzipoulka at Fribourg; Kotopouleas at Oxford Brookes). Other professional paths include consultancy (e.g. Hirbod at Kingspan; Gana at Hilton Hotel; Amadei at the British Council), local authority (Dimitriou), or freelance specialists (Lesser, Tschritzis, Weston).

3. Income, infrastructure and facilities

External research income has grown very significantly since REF2014, from £207,081 to £1,004,473. We have also significantly increased the proportion of staff with externally funded projects (from 27% to 75%). These include nine UKRI-funded projects, H2020, two Innovate UK, two Leverhulme Fellowships, as well as grants from the British Academy, Paul Mellon Centre, British School of Rome, and smaller grants from Heritage Lottery, consultancies, and secondments. This growth has been driven by the consolidation of our research centres around key strategic areas and the extensive package of mechanisms that we have put in place to support grant applications, including:

- Support for applications from two dedicated research offices, at School and at University level.
- Support from the University's Knowledge Exchange and Innovation team, liaising with stakeholders outside the HE sector.
- Peer mentoring and detailed feedback on applications from the KSAP Director of Research.
- Individual Research Plans, appraisals, and internal peer reviews, providing a supportive environment for the development of ambitious grant applications.
- Seed funding – a notable example is a pilot study funded by the Division, leading to Schoenefeldt's successful AHRC Leadership Fellow application, 'Restoring the Palace of Westminster's nineteenth-century ventilation system – between sustainability and heritage' (2016-18).

Colleagues at all levels are encouraged and supported in developing funding applications. Successful ECR projects include Gillick's BA project on 'Making-Unmaking-Remaking Home in Lockdown Margate' and Schoenefeldt's AHRC fellowship. Examples of large-scale EPSRC funding, predominantly in the thematic area of sustainability, include: (i) 'Urban albedo computation in high latitude locations: an experimental approach' (2017-21; Nikolopoulou, Renganathan, Watkins; EPSRC contribution: £328,570); and (ii) the £150k Digital Economy 'Communities and Culture' Network+: Cultural Heritage and Built Environment (2012-16). The latter funded a series of smaller projects on social sustainability, which included projects on community-led regeneration and activism in Margate with local stakeholders, and a scoping study, 'Mapping the lived experience of food bank clients and volunteers' (Nikolopoulou with the PDRA Martin). This provided the opportunity for Martin to work on 'Mapping for Change' through a secondment at UCL on 'Street mobility and accessibility' (2014), funded by the EPSRC Digital Economy, 'IT as a Utility' Network+. Other key examples include the ESRC 'The FEW-meter: an integrative model to measure and improve urban agriculture (2018-21) (Caputo; £197,243).

Significant fellowships in architectural heritage include Schoenefeldt's AHRC Leadership Fellowship, 'Restoring the Palace of Westminster's nineteenth-century ventilation system – between sustainability and heritage' (2016-21; £187,068). The success of the project led to Schoenefeldt being invited by the House of Commons to undertake research for the new Conservation Management Plan, aimed at enshrining the preservation of the historic infrastructure within the conservation policy (2017-18; £15,500). It subsequently led to a long-term secondment to the House of Commons for 'Informing the Palace of Westminster Restoration and Renewal Programme' (2018-21; £127k). Other major fellowships include: (i) Cardellicchio 'Our Future Heritage: conservation issues of contemporary architecture in Rome' (2017-18, Leverhulme); (ii) Haney's 'The Gardening State: Landscape Architecture and Agriculture under National Socialism' (2014-15, Leverhulme); (iii) Guerci's Paul Mellon Mid-Career Fellowship, 'Great houses of the

Strand: the ruling élite at home in Tudor and Jacobean London' (2015-16); and (iv) Karydis' Balsdon Fellow for 'The Lost Gateways of Rome' (2019) at the British School of Rome.

Another notable project is the Heritage Lottery Fund (Thanet Heritage Initiative) 'Exemplar Climate Change Project, for the sustainable refurbishment and extensive monitoring of a heritage townhouse in Dalby Square, Margate' (2015-17, 2018-19). This was led by Nikolopoulou with Watkins and Renganathan, building on earlier building performance evaluation studies. The extensive laboratory infrastructure and monitoring equipment have been integral to the successful delivery of these projects.

Our strategic aim to strengthen our PhD cohort has been the driving force in securing PGR funding. This includes the second round of the AHRC CHASE Doctoral Training Programme, a collaboration with Goldsmiths, the Courtauld Institute of Art, SOAS, Birkbeck, UEA, Essex, and Sussex; and the H2020-MSCA-ITN-EID 'SOLOCLIM' (2019-23), a collaboration with Wageningen University, Milan Polytechnic and international architectural practices and consultancies (Zinco Green Roofs, Arcadia, Foster & Partners, Carlo Ratti Associates).

Nearly £80,000 QR funding has been invested in support of dissemination, networking activities, and small research initiatives. This has enabled our three research centres to organise their annual visiting lectures programme. Additionally, 13 Category A staff have received over £25,000 of competitive University funding to support the development of research projects, the visiting scholar programme, and public engagement. The University APC fund has also supported open access publication of six outputs: (£10,083 to Buš, Caputo, Nikolopoulou, Schoenefeldt).

Internally funded projects and events are diverse, reflecting the thematic areas of the three research centres. The Digital Humanities Fund supported Ireland's 'Realising Frederick Kiesler's Endless House', a project in collaboration with the Frederick Kiesler Foundation in Vienna, aimed at developing a 3D digital model of the physical model produced by Kiesler (2019). GCRF funds supported a workshop on 'Co-designing Green Infrastructure in Informal Settlements' in Morro de Formiga favela, Rio de Janeiro, in collaboration with Universidade Federal do Rio de Janeiro (2019, Caputo and Bagaen). The EU Partnership Fund enabled Cardellicchio to attend a workshop in Maastricht to develop research collaborations; and the Divisional Fund for Collaborative Research and Visiting Experts enabled Nikolopoulou and Chatzipoulka's (PGR) to collaborate with Professor Compagnon at the Ecole d'Ingénieurs et d'Architectes de Fribourg (2014).

The Memorandum of Understanding signed between the University and Canterbury Cathedral has also supported research activities. Via this MoU, DARC was permitted to scan the external fabric of the Cathedral to produce a rendered point cloud image as a large backdrop. DARC used digital fabrication services to help the production of a Cross Stone within Canterbury Cathedral Precincts as a memorial to the Armenian genocide, in recognition of the links between the CofE and the Armenian Church.

Further financial support for KSAP via this MoU was through the Festival of Ideas, a series of public engagement initiatives organised between the University and Canterbury Cathedral on the theme 'Questions of Space'. KSAP researchers (including PGRs) hosted four out of the 10 events, reflecting the vibrant research community: 'Hot Air', experiment (Watkins); 'Thermal Delight', walk (Vasilikou, PDRA); Bird's Eye View, installation and public lecture (Fontana-Giusti); 'Ypres to Canterbury', exhibition (Fox Godden, PGR).

Examples of additional financial support for different initiatives targeting public engagement include: (i) Karydis' three-day conservation workshop with the Technical Chamber of Greece on 'Conservation of Historic Buildings after the Earthquakes in Lesbos' (2018), which contributed to one of our impact case studies; (ii) Cardellicchio for the publication of the Guide to the Hertziana Library for the International Open House in Rome; (iii) Brittain-Catlin to host Bressani, the Sir William C. MacDonald Chair in Architecture and Director of McGill University's School of Architecture, for a range of lectures and talks at Canterbury and Ramsgate on Pugin's architecture.

Such events provided both impact and pathways to impact through enhancing public understanding of architecture.

Operational Infrastructure

KSAP has the support of a designated professional liaison librarian at the University's Templeman Library, the main information resource for staff and students at our Canterbury campus. KSAP's library budget was £29,000 per annum in the REF2021 period. The School also benefits from dedicated technical support for the laboratory infrastructure and equipment (see Section 1). The calibre of this support has been recognised by the University, with the workshop manager (Smith) and 3D CAD technician (Soosaipillai) receiving the University Technical Support Award for 2019 for exceptional contribution to research in KSAP.

Infrastructure facilities include extensive laboratory equipment sensors, and dataloggers for monitoring of microclimatic conditions and energy consumption, a thermo-camera, a materials' weathering climate chamber, computing facilities, and a range of software for thermal simulation, computational fluid dynamics, GIS, and statistical and mathematical modelling. The resources for DARC, beyond the extensive software packages, include a £180k laboratory infrastructure investment of 3D printing facilities, desktop robotic arms, 3D scanners and a drone, along with virtual reality equipment (oculus and oculus rift). These facilities have been central in enabling key research activities for CASE and DARC, as well as for PGRs: e.g. 'Rebuilding St Augustine's Abbey: real-time digital construction of heritage buildings in co-operation with English Heritage' (Griffin); thermal walks as a research tool (PGR Vasilikou); and a range of environmental sensors for monitoring of buildings by different PGRs; as well as impact-related activities (the latter varying from projections for Dreamland, Margate, to thermal walks for various stakeholders).

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

Since 2014, KSAP has significantly increased its contribution to the discipline, to the professional community, to the environment, and to wider society. This has been achieved through collaborations with national and international partners, including partners across the HE sector, professional bodies and networks, amenity societies, cultural institutions, local government, and other stakeholders. The mechanisms vary from research collaborations to contributing to processes of research assessment and evaluation, both nationally and internationally; sitting on national and international committees and advisory boards; shaping policy and professional practice; organising conferences and workshops; editing journals; and undertaking a range of public engagement events and activities. The following examples provide a sense of these rich and varied activities.

Contributions to the Sustainability of the Discipline

Beyond extensive funded collaborations detailed in Section 3 above, staff have been involved with collaborative projects, funded directly by external partners, which resulted in research outputs and subsequent funding proposals. These include:

- CLIMATEST Correlation of parameters linked to thermal attenuation in transition spaces, University of Seville, 2019-20, Andalusian government (Nikolopoulou).
- ELIDEK Research Projects for postdoctoral research: 'Urban Biometeorology and Planning', Agricultural University of Athens, 2018-20, (Nikolopoulou).
- European Regional Development Fund (2018-19): 'Dismountable pilot houses for elderly people'; funder: Veneto Region; IUAV Institute (Cardellicchio).
- Dumbarton Oaks, Washington: 'Graphic Recording and Geophysical Survey (for both resistivity and magnetometry) of a Late Antique Residence in Corinth', which led to the development of an important research output (2018) (Karydis).
- WIMEK Visiting Professor (2017-18), Wageningen Institute for Environment and Climate Research (Nikolopoulou), which led to a special issue for the *International Journal of Biometeorology* and the development of the successful H2020-MSCA-ITN-EID, 'SOLOCLIM'.

- 'Thermal Comfort in Tsunami Housing Developments in Southern Coast of Sri Lanka' (2016-17), University of Moratuwa (Renganathan).
- Tianjin University Innovation Base, Ministry of Education of China (2012-17): 'Low-carbon city and architecture' Innovation Base Introducing International Talents (Nikolopoulou). Over the last seven years, this platform has enabled exchange of ideas, development of research proposals for funding through H2020, and dissemination events.

KSAP has been outward looking and has welcomed research visitors, providing the catalyst for collaborations. Examples include:

- Juan Rojas Fernandez, University of Seville (June 2016-September 2016), for Nikolopoulou; this visit led to the development of the CLIMATEST research project above, funded by the Andalusian government and providing ongoing collaboration.
- Professor Fatang Wang, Wuhan University of Technology (2015-16), for Fontana-Giusti, collaborating on architecture by Kengo Kuma.
- Simone Queiroz da Silveira Hirashima, University of São Paulo, Brazil (June-September 2015), funded by the Science without Borders Scholarship Programme, Brazil; the collaboration with Nikolopoulou led to the development of two peer-reviewed journal articles.
- Professor Raphaël Compagnon, École d'ingénieurs d'architectes de Fribourg, Switzerland (April 2014). His collaboration with Nikolopoulou and Chatzipoulka (PGR) resulted in four peer-reviewed publications. Following the completion of her PhD, Chatzipoulka joined EIF as a PDRA.

CASE and CREAtE have (co-)organised four international conferences each over the REF2021 period. The CASE conferences, in particular, were a mechanism for engaging with new stakeholders, including RAE-FED, CIBSE Heritage Group, Historic England, Construction History Society, and Social Farms and Gardens.

Other ways in which our staff have contributed to the sustainability of the discipline are through their involvement with research assessment panels and editorial boards. Examples include:

- Adler: RIBA Research Awards panel (2012-15), Queen's Anniversary Awards for Education (2012).
- Brittain-Catlin: member of Lund Humphries editorial board for the Architectural History of the British Isles (2018-); editorial board, KADOC (University of Leuven Press) (2013-18).
- Caputo: member of the Scientific Committee of IRTA Leonardo, an Italian research institute for Regional Development and Environment within Sant'Anna Research Institute, Pisa (from 2017); member of AESOP Sustainable Food Planning (from 2016); and Editor for Cogent Social Sciences.
- Fontana-Giusti: AHRA Steering Group; reviewer on the panel for the Italian VQR 2016 for Architectural Humanities; Chair of the CHASE Consortium Panels (2015-20); Standing Review Board Member of Research Grants Council, Hong Kong (2011-); Routledge architecture books (2010-); Architecture and Culture editorial board (2010-).
- Guerci: reviewer for Paul Mellon Centre for Studies in British Art publications; Society of Architectural Historians of Great Britain Board.
- Ireland: Editorial Board Biosemiotics Journal (Springer Nature).
- Nikolopoulou: Estonian Research Council: evaluation of R&D in Estonia (2017); Hellenic Foundation for Research and Innovation: evaluation of R&D (2018); Standing Review Board Member of Research Grants Council, Hong Kong (2014-); Hong Kong University Grants Committee: Member of the Research Assessment Exercise Group (RAE 2014); EPSRC College Member (2012-).
- Powers: joint editor of the journal *Twentieth Century Architecture*; joint series editor of the monograph series 'Twentieth Century Architects'.

Since 2014, KSAP staff have been external examiners for 36 PhDs, eight for HEIs outside the UK.

The quality of our KSAP's contribution to the discipline is reflected in the various awards received by our staff. Design awards include: The 'Exemplar Climate Change Project, for the sustainable refurbishment of a heritage townhouse in Dalby Square, Margate', which was shortlisted for the regional Kent Design and Development Awards in three categories – (i) Conservation; (ii) Residential Minor; and (iii) Environmental Performance – and won 'Highly Commended' in the Environmental Performance category at the Kent Design and Development Awards (2018). It was also shortlisted for (iv) the RICS Social Impact Awards (2020) in the 'Residential' category. Gillick's design work on art and community engagement practice working in marginal communities was the winner for the Glasgow Institute of Architects (2018) Small Projects for 'The Happenstance', Venice, and was shortlisted for the RIBA Journal (2019) MacEwan Award.

Other awards include: Buš: Richard Rogers Fellowship (2018); Cardellicchio: Special mention at the 8th International Conference on Construction Research, organised by the Eduardo Torroja Institute in Madrid (2018); Guerci: Fellow of the Society of Antiquaries for contribution to the cultural and heritage sectors (2016); Nikolopoulou *et al.* commendation of their conference paper contribution at the International PLEA conference (2020); Renganathan: CIBSE Carter Bronze medal for the most highly rated paper relating to application and development (2016).

University of Kent awards were also secured: Schoenefeldt: Faculty of Humanities ECR Research Prize (2016); Smith (Workshop Supervisor) and Soosaipillai from the Digital Workshop jointly won the University Research Award for Technical Support (2019) for their collective endeavour in supporting and enabling the work of the School.

Additional international recognition of KSAP's excellence in research has been through Nikolopoulou's ranking in the top 2% of scientists in the world, according to a recent study published by Stanford University.

Contributions to Professional Beneficiaries

Beyond their contribution to the scholarly community, KSAP staff are very active within professional communities, sitting on steering committees (e.g. CIBSE, HE, TCPA, RTPi; see Section 1 'Impact'), contributing to the development of guides (CIBSE Guide A, Historic England Introduction to Heritage Assets); making regular contributions to trade journals including RICS (Bagaeen), RIBA, CIBSE (Schoenefeldt); and contributing to publications for the wider public; e.g. the *Architectural Review*, *World of Interiors*, *archdaily.com* (Brittain-Catlin), and *The Conversation* (Caputo, Schoenefeldt).

Our staff have also organised workshops for professionals, while Brittain-Catlin and Powers are regularly involved with the Twentieth Century Society's campaigns for education and conservation.

Public lectures also feature strongly in our activities. These include: on the development of design guidance at a statutory level for Canterbury (Karydis); a series of workshops for practitioners and Members of Parliament on the restoration of the ventilation system of the Palace of Westminster (Schoenefeldt); lectures at the *100 Jahre Bauhaus* events, at Pössneck Museum, Thuringia (Adler), and the Soane Museum (Guerci); lectures and discussion events at RIBA (Adler, Brittain-Catlin, Schoenefeldt), the Twentieth Century Society (Adler, Brittain-Catlin, Powers), the EDGE Debate – Urban Design Group (Nikolopoulou); the public art debate at Turner Contemporary (Fontana-Giusti); talks for art galleries, including Ditching Museum, Pallant House, Compton Verney, Brighton Museum, Arnolfini Gallery (Powers); presentations to professional exhibitions, such as the CIBSE Build2Perform, Futurebuild, EKOTECTURA Colombia, (Nikolopoulou); and invitations by the World Economic Forum, Cities team to the Forum on Future Cities events in the US and the UK (Bagaeen).

Meaningful involvement with professional societies and committees, and wider esteem, are reflected in the following memberships:

- Adler: Heinrich-Tessenow-Gesellschaft, Gold Medal Award Committee.

- Bagaeen: Relationships Manager for the 100 Resilient Cities – pioneered by the Rockefeller Foundation (2016-18); and an Academician, Academy of Urbanism.
- Brittain-Catlin has been Judge for the World Architecture Festival (2018), the Hawksmoor Prize of the Society of Architectural Historians of Great Britain (2015-), and the *Architectural Review's* 'New into Old' competition with Michael and Pattie Hopkins.
- Caputo was on the Panel for the International Urban Farm competition.
- Griffin: member of Lighting Urban Communities International network.
- Guerci established a British Council Venice Biennale Fellowship for KSAP.
- Powers: member of Fabric Advisory Committee at St Edmundsbury Cathedral; and of the Art and Architecture Committee at Westminster Cathedral.

Since 2014, KSAP staff have delivered 250 invited talks and keynotes nationally and internationally in Europe, North and Latin America, across Asia, at conferences, workshops, universities, and professional associations and practices.

Contributions to Society

Over the REF2021 period, our staff have organised a series of diverse public engagement events, enhancing the public understanding of architecture and the built environment, nationally and internationally. Examples include:

- International Open House Rome (Cardellicchio).
- Portcullis Open House London (Schoenefeldt).
- Campaign for awareness and protection of postmodern buildings (Brittain-Catlin).
- Griffin's audio-visual display in St Augustine's Church, Ramsgate, and subsequently Liminality, the Chapter House Light Show in Canterbury Cathedral.
- Pugin's celebrations in Ramsgate (Brittain-Catlin, Haney).
- Art gallery exhibition curating with associated lectures and publications at House of Illustration, Margaret Howell Ltd (Powers).
- A series of coordinated thermal walks for the public (Vasilikou and Nikolopoulou).
- Gillick's community engagement practice with marginal communities in Stoke-on-Trent and Kent.
- *Questions of Space* events organised with Canterbury Cathedral in 2016, where KSAP played an important role.

Reaching out to diverse audiences is complemented by regular participation in TV and radio broadcasts. The HLF 'Exemplar Climate Change Project, for the sustainable refurbishment of a heritage townhouse in Dalby Square, Margate' provided one of the main case studies for Historic England (2020), and has appeared at the BBC South-East Today evening news (2017), as well as the BBC2 Victoria Derbyshire programme (2019). Brittain-Catlin appeared on BBC1's *The Big Questions* on whether the Church of England should protect its historic buildings (2017) and BBC Radio 4's *The Westminster Hour* on his book *The Edwardians and their Houses* (2019). Other interviews include Fontana-Giusti on BBC News Radio on the rediscovery and installation of Packe's Chorographic map of East Kent (2016); Watkins on Euronews to discuss the European heatwave (2019); regular appearances in the Turkish TRT World's flagship arts and culture Showcase to discuss vertical forests (Nikolopoulou), the Legacy of Zaha Hadid (Fontana-Giusti), and the work of Vittorio Gregotti (Fontana-Giusti). Our impact case study 'Restoring the Palace of Westminster's C19 ventilation system' has involved extensive engagement with the media, providing content for Channel 4, BBC London and BBC South East, while Schoenefeldt has featured on German (ARD) and Canadian (CBC) TV, and in live radio interviews with the BBC and Radio New Zealand.

Beyond public lectures, radio interviews, and TV appearances, the 'Think Kent' YouTube lectures have provided an opportunity for our staff to engage with a wider audience through short video lectures, a popular medium for presenting bitesize research areas (Adler, Brittain-Catlin, Cardellicchio, Griffin, Karydis, Nikolopoulou, Schoenefeldt).

Finally, reinforcing our strategic aim to be an agent for change and impact for our various communities, we highlight the technical team's achievements, using the KSAP infrastructure during the COVID-19 pandemic together with colleagues in the Schools of Computing and Engineering and Digital Arts to design and supply 300 sets of personal protective equipment (PPE) for East Kent's largest hospice charity, Pilgrims Hospice.