

Unit-level environment template (REF5b)

Institution: University of Manchester
Unit of Assessment: 13 (Architecture, Built Environment and Planning)
<p>Section 1. Unit context and structure, research and impact strategy</p> <p>1.1 Context</p> <p>The Departments of Architecture and Planning and Environmental Management (APEM) are based in the School of Environment, Education and Development (SEED), one of four Schools in the Faculty of Humanities. Organised around three themed clusters, researchers across the two departments produce agenda-setting research of international importance which engages with multiple external audiences, locally, nationally and internationally.</p> <p>The vitality and sustainability of our research environment is reflected in:</p> <ul style="list-style-type: none"> • A consistent flow of high-quality publications, including twenty monographs and over 200 outputs included in the Social Sciences Citation Index (of which 33.2% were rated by SciVal in the top quartile for field-weighted impact). • Continuing success in generating impactful research and fostering collaboration with policy and user communities, as evidenced by three impact case studies selected for assessment, and by our research more generally. • Development of a vibrant culture for postgraduate research (PGR) and an effective system for research training and supervision, reflected in 55.4 FTE PhD completions from 2013/14-2019/20 (representing 2.0 per CatA staff). • The award of key prizes and commendations for our research (e.g. Association of European Schools of Planning (AESOP) best article prize, 2014; Wolfson Prize, 2014; Founders Award of the Society of Architectural Historians, 2016; Lize Meitner award, 2017; <i>The Planner</i> Women of Influence list, 2017, 2018; Nick Tyrrell Research Prize for best real estate paper, 2015; Harold Samuel Research Prize in real estate, 2020; Royal Institute of British Architects (RIBA) President's Award for Research in History and Theory, 2020). • Attraction of £3.44 million in research revenue, an increased proportion of which derived from blue-chip sources such as UK Research Councils (54%) and the European Commission (31%). <p>These achievements have been underpinned by a research environment that continues to support research excellence. As later sections explain, the period since REF2014 has seen the consolidation and improvement of this environment, growing our research base, enhancing the resources for research, developing PGRs and early-career researchers (ECRs), and enabling APEM to generate world-leading impactful research.</p> <p>1.2 Unit structure and organisation</p> <p>APEM sits within a multi-level structure for research support and governance. Our researchers are part of two university-wide interdisciplinary research institutes, the Manchester Urban Institute (MUI, launched in 2016) and the newly created Manchester Environmental Research Institute (MERI), which provide a mechanism for fostering collaborative cross-departmental working. At School level, SEED's research director, working alongside a research support manager, coordinates the School Research Committee, with APEM representation from the respective departmental research directors, Yaneva and Kingston. SEED provides pre- and post-award support for research projects, competitively allocated developmental funding for new research, support for impact and knowledge exchange, and monitoring of progress against</p>

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REF2014 commitments and the School and University research strategies.

Within APEM, we organise research around three clusters:

- (1) the Spatial Policy and Analysis Lab (SPA-Lab), directed by **Wong** and part of MUI;
- (2) the Manchester Architecture Research Group (MARG), directed by **Yaneva**, also part of MUI; and
- (3) the Sustainability, Resilience, Nature and Built Environments cluster, directed by **Mell** and linked to MERI.

The clusters support and mentor PGRs and ECRs, provide a conduit to non-academic stakeholders to engender impact, and input to School and University research strategies. They are designed as stable but permeable groupings rather than hard structures, thus enabling cross-cluster synergies.

1.3 Strategic aims for research and impact

Our research strategy aims to enable world-leading research, closely reflecting one of the three core goals of the University's *Manchester 2020* strategic vision and the UoM Research Strategy. Following a review of our strategy in light of REF2014, we identified five goals:

- i) generate and lead academic debates which take forward our understanding of the role of architecture and planning in creating a sustainable future;
- ii) support research which generates positive societal impacts and informs policy and practitioner agendas;
- iii) recruit, retain and develop high-quality researchers by building and maintaining an inclusive research environment and providing a research infrastructure conducive to world-leading scholarly activity;
- iv) nurture future generations of world-leading researchers by expanding and supporting our ECR and PGR communities; and
- v) attract a higher proportion of blue-chip research income to enable long-term fundamental scholarly enquiry and set international research agendas.

We have delivered fully against all five goals in the current REF cycle, as demonstrated below. These goals will continue to shape our research after REF2021.

In the remainder of this section, for each of the three research clusters, we highlight our major achievements since REF2014.

1.3.1 Spatial Policy and Analysis Lab (SPA-Lab)

Research undertaken through the SPA-Lab, part of the interdisciplinary MUI, continues a policy-relevant programme of urban scholarly enquiry, developed over the previous thirty years. The influence of SPA-Lab research on scholarly and policy agendas is evident in relation to four specialisms: (1) *infrastructure and mobility*; (2) *planning decision-support systems*; (3) *spatial development in China*; and (4) *urban governance, politics and planning*. Research across these substantive areas has attracted major research council funded grants in the UK and internationally (Europe, South America and China).

SPA-Lab specialism (1), *infrastructure and mobility*, brings together multiple projects aimed at developing new ways to explore patterns of mobility and inform emerging research and policy

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agendas. This has included ESRC-funded work on the socio-spatial equity dimensions of travel-to-work flows, which developed a new geodemographic classification of commuting patterns and produced an interactive website that challenged conventional policy thinking (**Kingston, Wong, Schulze-Baing**). New ways to conceptualize and measure mobility were also developed through **Pinto's** research on the development of indicators to assess resilience in urban mobility in São Paulo, and an associated doctoral studentship to develop a policy decision-support system for Greater Manchester Combined Authority (GMCA). Further research on urban mobility has focused on developing a new methodological framework to capture the spatial patterning, asymmetries and hysteresis of car travel (**Thanos**). Research on urban mobility also includes **Acheampong's** work, as part of an early career University Presidential Fellowship, exploring the adoption of driverless vehicles, the resultant impact on travel behaviour and land-use, and the implications for urban governance and policy. We are extending research on infrastructure and mobility through new projects (e.g. **Wong's** ongoing five-year MRC project on mobility patterns, working with GMCA to explore the relationship between transport infrastructure, mobility and planning healthy urban development; and **Nanda's** research to develop new interdisciplinary methods on forecasting the impacts of new infrastructure).

SPA-Lab specialism (2), *planning decision-support systems*, has supported, developed and critiqued existing and emerging forms of public engagement in planning-related decisions. Building on **Kingston's** long-term programme of research on public participation geographical information systems (PP-GIS), the central scholarly and policy contribution of this work has been to identify, codify and analyse multiple forms of community knowledge and expertise, and transform it into useful ways of improving policy-making. For example, by integrating data science and GIS visualisation, recent projects (e.g. RTPI's Map for England and the UK2070 Commission's Industry 4.0 report, **Baker, Schulze-Baing, Zheng, Wong**) have revealed hidden spatial relationships of development to inform planning policy and practitioner agendas. Other examples include **Black's** use of the novel Q-Method approach to explore decision-making linked to design reviews, and **Pinto's** pioneering research on the development of an innovative cellular automata model to better represent space and spatial interaction.

SPA-Lab specialism (3), *spatial development in China*, builds on APEM's long-term research strategy on international urbanization and planning. A central element has been a three-year ESRC-NSFC Newton Fund project led by **Wong** (with **Baker, Barker, Kingston, Pinto, Zheng**), working alongside the Chinese Academy of Sciences, on eco-urbanization and planning in metropolitan regions of China. This research has deepened understanding of the interrelationships between urban development, environmental impacts, and strategies to manage and plan for sustainable urbanization. To create synergy with the Newton Fund project and build capacity, a three-year Hallsworth postdoctoral fellowship explored high-speed rail development and sustainable spatial growth in the Yangtze River Delta (**Wang, Wong**); a three-year Leverhulme Fellowship is assessing spatial decentralisation and sustainable urbanization in China (**Zheng**); **Zhang** was appointed to extend our research on Chinese urbanization, through her work critiquing creativity and culture-led regeneration; and three China Scholarship Council doctoral studentships explored environmental and socio-demographic aspects of eco-urbanization.

SPA-Lab specialism (4), *urban governance, politics and planning*, challenges conventional academic understanding and policy narratives around planning and urban economic development. For instance, path-breaking critiques of agglomerationist models of city-regionalism by **Deas, Houghton and Hincks** have led to ongoing critical research on devolution experiments in northern England, including recently the emergence of alternative

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models. Also notable is **Haughton's** work on planning ideologies, exploring how central government planning policy is subject to shaping pressures from organisations like think-tanks. Agenda-setting work on planning and post-politics, evident in REF2014, continues through research exploring how local protests are 'contained' (**Haughton**), while work on soft spaces of governance has been developed via new theorizations of scalar postpolitics and spatial imaginaries (**Deas, Haughton, Hincks**). Augmenting this work on the Northern Powerhouse has been further research, undertaken as part of the UK2070 Commission, on spatial inequalities, aimed at challenging policy and influencing the 'levelling-up' agenda (**Wong**, with Sheffield, UCL). All this work has been complemented by multiple doctoral studentships.

1.3.2 International theories of architecture and design practice

The second APEM cluster is the Manchester Architecture Research Group (MARG). The overarching goal of MARG has been to develop new areas of architectural research, create new standards of architectural pedagogy, and facilitate novel ways of engaging in public debate. This has been undertaken in relation to three specialisms: (1) political agency of architecture; (2) architectural histories; (3) planning and design of urban structures and infrastructures.

MARG's first specialism has positioned theoretical understanding of the politics of architecture at the forefront of international research agendas, drawing upon conceptual and empirical investigation in multiple contexts. For example, **Yaneva's** research on environmental politics and architecture (with Princeton University) questioned the role of architectural design during the Anthropocene, scrutinizing different examples of cosmopolitically correct design. A further project, inspired by object-oriented political thought, generated original insights into the political agency of design practice based on case studies of multiple international cities. **Yaneva** also completed a major work on the role of archiving as an epistemological basis of architectural history, undertaking ethnographic exploration of archival and conservation practices at the Canadian Centre for Architecture to generate a novel agenda for exploring the politics of architectural archive-making. **Minuchin's** research has engaged conceptually and practically with the politics of construction practices, developing action-research methodologies for design interventions in deprived urban areas in the Global South (ESRC and the National Research Council of Ecuador).

The second MARG specialism has taken architectural history in new conceptual and empirical directions. **Stanek's** landmark work on modernist planning and architecture in former socialist countries has focused on multiple genealogies of architecture's globalization during the Cold War, seen through the lens of socialist internationalism and the Non-Aligned Movement. This work has uncovered and explained planning documentation which has often been dispersed and could be relevant for current planning decisions (e.g. Baghdad ex-masterplan) and conservation/preservation of post-independence architecture (e.g. West Africa, Middle East). **Stanek** also introduced an unknown manuscript of Henri Lefebvre to an audience of cross-disciplinary urban scholars. **Szacka's** work is among the first re-examinations of postmodern architecture's history and theory, opening new debates, unveiling hitherto unexplored archives, and deepening our understanding of discourses on architecture exhibitions and curating architecture. Drawing on institutional theories, **Förster's** research on the history of the New York-based Institute for Architecture and Urban Studies extends knowledge of the postmodernization of architecture, demonstrating its contribution to the wider avant-garde culture that emerged in the 1980s.

MARG's third specialism has centred on the planning and design of urban structures,

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infrastructure and spaces, across a range of settings. **Lewis's** research has investigated how building design can address the challenges and opportunities posed by an ageing population, climate change, and the growing awareness of health and wellbeing. **Iossifova** has conducted work on urban borderlands, exploring socio-spatial fragmentation, migration, coexistence and identity processes under rapid urban transformation in developing countries, including China. She has also undertaken work on Cities as Complex Adaptive Systems (ESRC), identifying innovative ways to link soft and hard systems through mixed-methods research to produce simulative models of urban systems and enable scenario-based multi-level decision-making, working with an international network of academics and practitioners. MARG's research on infrastructure is continuing through **Iossifova's** recently awarded NERC and GCRF grants on sustainable sanitation in India, Brazil and China.

This third MARG specialism has also extended into the novel area of ephemeral architecture. **Lucas's** research on marketplaces and festivals in Korea and Japan has augmented the research literature on visual ethnography, highlighting the practices of drawing and inscription in architectural work. **Walker's** work on the architecture of travelling fairs has used critical theory to re-engage with this long-overlooked area of cultural and spatial practice within architecture research.

1.3.3 Sustainability, resilience, nature and built environments

Working within MERI, research excellence in this cluster is evident in terms of grant income and the scholarly and societal impact of research findings across three specialisms. Research on *green infrastructure* is a longstanding specialism, and work in the current review period has generated new insights on planning and implementation (**Mell**), natural flood management (**Carter, Barker**), the financing of urban greening (**Mell**), green growth (**Barker**) and health, design and ageing (**Barker, Zandieh**). Funding for this work has derived from three NERC grants, the Valuing Nature Partnership, and two Horizon2020 projects, as part of two multi-organisational consortia. The green growth project (**Barker**) involves co-production with partners to develop and test a route map which translates green infrastructure scientific research into a practical user interface. **Mell** has engaged local authorities to develop a robust economic baseline for investment in green infrastructure. He worked with Defra and Natural England to create a new set of Green Infrastructure Standards. Against the backdrop of austerity, **Mell's** Valuing Nature work provides a new insight to the role of developers in providing green infrastructure.

Second, research on *resilience and the built environment* has again influenced research and policy agendas. A further Horizon2020 project, RESIN (**Carter, Hincks**), has supported the development of approaches to enhance the resilience of critical infrastructure in the face of extreme weather and climate change. The RESIN impact case demonstrates how this research has benefited external users through the development of tools and methodologies to support decision-making to plan for and respond to climate risks. This research is being developed further as part of the EU-funded IGNITION project (2019-21), which aims to increase climate change resilience by expanding green infrastructure cover in Greater Manchester (**Carter, Barker**).

The cluster's resilience and the built environment specialism has also involved work on community involvement in promoting resilience. This work includes **Stein's** research on environmental disasters in different international contexts, which demonstrates the importance of policy actors identifying and harnessing unrecognised community activity in order to manage and minimize risk more effectively. The potential and problems associated with community

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involvement in developing resilience has also featured in research on the roles of co-production and expert practice in reconciling multiple sources of flood knowledge and increasing climate change resilience (**Barker, Carter, Haughton, Jones**).

A third theme of this cluster focuses on *community environmental futures*. Unifying this work has been an emphasis on the development of practical tools to help promote community preparedness for future environmental change. This work includes the development of quantitative methods to inform practical tools for energy supply and housing demand management (**Thanos**), inclusive mechanisms for community engagement (**Tippett's** impact case), and research by **Ravetz** generating new insights into emergent practices to mobilize collective intelligence for sustainable environmental futures.

1.4 Research impact and user engagement

The APEM strategy prioritizes impactful research that benefits non-academic users and engages a wide range of stakeholders (goal 2). Impact is supported by deploying School funds (section 3.2), with the help of SEED's research and impact team (section 3.3.2). All three APEM impact cases are based on long-term multi-project research programmes, with impact developing over lengthy periods (e.g. **Tippett's** case demonstrates deepening and widening impacts over successive REF cycles).

As part of our commitment to open and inclusive access to APEM research, we disseminate findings as widely as possible, guided by the University Publications Policy (2015). An Open Access (OA) Gateway and fully mediated deposit service are available to all researchers (Section 2.5 REF5a). The University's OA Fund allows researchers to access resources to publish on a Gold OA basis. Reflecting this support, 97% of REF-eligible APEM papers are OA compliant

Alongside published outputs, we strongly encourage research data to be made more openly available, while maintaining a culture of research integrity, based on the ethical and legal standards contained in the University's Code of Good Research Conduct (see 3.3.2). To that end, APEM researchers use a Research Data Gateway developed by the Library. Alongside our commitment to making APEM research data available to other researchers, where appropriate we make data accessible to non-academic users (e.g. **Kingston and Carter's** impact cases show how a range of users have accessed data on climate change risks).

Section 2: People

2.1 Staffing strategy and staff development

Strategy for recruiting, developing and supporting researchers is overseen by the heads of department (**Baker, Walker**), informed by the departmental research directors (**Kingston, Yaneva**) and coordinators of the three research clusters (**Mell, Wong, Yaneva**).

2.1.2 Staff recruitment and development strategy

APEM's recruitment strategy has been developed in light of the wider goal of promoting world-leading research. The period since REF2014 has seen APEM's CatA staff increase from 17.6 to 27.6 FTE. 48% of staff were appointed in the current REF cycle. The staff profile is significantly more balanced in terms of ethnicity and we continue to promote equality and diversity in recruitment (section 2.3).

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The focus of recruitment has been on selective senior appointments supported by ECR posts to reinforce and extend the three clusters (goals 3, 4, section 1.3). **Nanda** was appointed as chair in 2019 to develop research capacity in relation to real estate finance and project management, linking particularly to the work of **Thanos, Wong** and others in SPA-Lab. In line with strategic goal 4 (section 1.3), we have made eight ECR appointments since REF2014 (**Acheampong, Förster, Schulze-Baing, Szacka, Wang, Zandieh, Zhang, Zheng**). Some appointments relate to anticipated or actual succession planning (e.g. appointment of **Zhang** in 2019 following **Haughton's** change to part-time status). Two ECR posts were secured via competitive funding through the University's Presidential Fellowship (**Acheampong**, appointed 2018) and Leverhulme Early Career Fellowship schemes (**Zheng**, appointed 2019).

Our promotion procedures are designed to incentivise high quality research and maximise impact. Since 2014, eleven APEM academic staff have been promoted: **Baker, Yaneva, Kingston** and **Walker** (to Chair) and **Barker, Carter, Iossifova, Mell, Szacka, Stanek** and **Thanos** (to Senior Lecturer/Fellow). Promotion criteria give weight to knowledge exchange and impact, as well as research, service and leadership and (where appropriate) teaching. A number of researchers have been promoted partly in recognition of the external impact of their work (e.g. **Carter** and **Kingston's** impact cases).

Our promotion procedures recognise and reward achievements at all levels. Reflecting our strategic commitment to nurturing future research leaders, five of six ECRs appointed in the previous REF period have secured promotions, either at Manchester (**Iossifova, Minuchin, Stanek**) or elsewhere (**Doucet** to Professor at Chalmers, **Hincks** to Reader at Sheffield, **Karvonen** to Associate Professor, KTH Royal Institute of Technology). Several APEM doctoral students have progressed to internal temporary lectureships (e.g. Koksal, Snow).

2.1.3 Support for researchers

In line with the University's overriding commitment to equality, diversity and inclusion, we support researchers at all career stages (e.g. by ensuring that research students participate in strategy discussion in clusters) and colleagues with varied work patterns (e.g. through our core hours policy of timetabling meetings to accommodate part-time researchers and colleagues with caring responsibilities, and by accommodating pressures resulting from COVID-19).

To maintain this researcher-friendly environment, colleagues participate in an annual research-focused appraisal. This opportunity for self-reflection helps individuals develop their careers by reviewing progress, agreeing short and long-term priorities, discussing ideas for securing grants, supporting publication and dissemination strategies, and ensuring that, where appropriate, external impact is maximized.

2.1.4 Support for early-career researchers

We recognise the distinct support needs of ECRs, whether appointed as lecturers (**Förster, Lewis, Schulze-Baing, Szacka, Zandieh, Zhang**) or post-doctoral fellows (**Acheampong, Wang, Zheng**). We help to fulfil their potential by ensuring rapid integration to our research community. All ECRs are allocated to a mentor, ensuring they are embedded in the research of one or more of our clusters. Mentors work closely alongside ECRs on a range of research activities, from grant applications to publications and impact (e.g. **Kingston** with **Acheampong; Wong** with **Zheng**). Mentors also ensure that ECRs are directed to appropriate training and career development resources provided by the University's Careers Service, Library, Staff Training and Development Unit, and IT services.

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Further support mechanisms for ECR career development include a reduced teaching and administrative workload. All ECRs and probationers attend the research elements of the Faculty's New Academics Programme, accredited by Advance-HE. The Faculty Researcher Development Team uses Vitae's Researcher Development Framework to plan training events and promote skills development.

We also give ECRs priority in relation to internal seed-corn funding to support career development. Conference attendance funds provide up to £1,200 per researcher, with priority and additional resources for ECRs. The annual School Research Stimulation Fund awards up to £5,000 for small-scale projects, again prioritizing ECRs. The Faculty's Strategic Investment Fund aims to pump-prime the development of larger interdisciplinary collaborative research applications; past ECR recipients include **lossifova** and **Minuchin**, both of whom went on to win larger grants and secure promotion.

2.1.5 Research leave

We use sabbatical leave in a managed and pro-active way, linked to future research achievement. All academic staff, including colleagues on fixed-term contracts, are eligible to apply for one semester of sabbatical after six semesters of normal duties (part-time staff eligibility is determined *pro rata*). Applicants submit a planned programme of research or impact and knowledge exchange activity, which is reviewed at departmental level before the School sabbatical committee decides on final approval. To help disseminate findings, promote wider impact and contribute to our research environment more generally, researchers produce post-sabbatical reports and give presentations within their respective departmental seminar series.

This managed approach to the award, monitoring and evaluation of sabbatical has opened new areas of research and important collaborations. For example, **Haughton** used sabbatical to engage in collaborative research at Waikato on environmental risks in New Zealand, and at Sydney on post-political governance, leading to published work on 'risky spaces' and major infrastructure developments. Similarly, **Yaneva** used sabbatical leave at Princeton to develop new work on cosmopolitical designs. **Wong's** sabbatical led to collaboration with researchers in China and to ESRC-funded research on eco-urbanization and associated SPA-Lab projects.

2.2 PGR support, training and supervision

APEM continues to be a leading provider of PhD training in planning, environmental management and social science studies of architecture. Over the REF period, 55.4 FTE students completed a PhD (compared to 33.5 at REF2014), representing 2.0 completions per CatA FTE staff.

Our leading status as a PhD provider is evidenced below in relation to: buoyant recruitment of new doctoral students; an effective system for training, supporting and supervising students; and the achievements of PhD students in producing publishable research, generating wider impact, and progressing their research careers.

2.2.1 PGR recruitment

At census date, 51.7 PGRs (FTE) were supervised by APEM researchers. Our recruitment strategy focuses on the intellectual calibre of students and the potential for their research topics to reinforce the core themes of our research clusters, while also benefitting from the

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interdisciplinary potential within a large research-intensive university.

We have secured external scholarships for students, as well as deploying internal resources to promote student recruitment. Nine of our post-2014 PGRs have received UKRI studentships. Our commitment to cultivating policy and practice links is evident in collaborative funding secured for multiple CASE studentships. External partners for UKRI-funded collaborative studentships have included local social housing providers (Trafford Housing Trust), land development charities (MERCi), policy think-tanks (IPPR North) and professional groups (Town and Country Planning Association). Funding from international bodies (e.g. Ford Foundation, CONACYT-Mexico and Newton-Mosharafa) has helped us to recruit high-quality international students.

APEM has been successful in applying for internal university resources to attract high-quality students. 29 APEM students have received University studentships, and a further six have been awarded the prestigious President's Doctoral Scholar Award, a £2.5m flagship scheme offering around 100 studentships annually across the University. In 2019, we secured three of ten studentships offered through a collaborative doctoral programme involving the universities of Manchester and Melbourne. We have actively utilised SEED's Teaching Assistant funding to recruit PGRs, in doing so providing training opportunities to help students engage in teaching and develop their careers. SEED funding is also being used to promote diversity among PGRs, through a new Enhancing Racial Equality Doctoral Studentship, launched in 2021.

2.2.2 Training, support and supervision

Strong support mechanisms for APEM doctoral students exist at all levels within and beyond the University.

We are active participants in the NW Social Science Doctoral Training Partnership (NWSSDTP) (ESRC), Data Analytics and Society Centre for Doctoral Training (ESRC), the North West Consortium Doctoral Training Partnership (AHRC), and EPSRC Centre for Doctoral Training in Power Networks. Longstanding arrangements with Geography and Planning at Liverpool (reciprocal attendance at research student seminar sessions, subject-specific training, and joint supervision of selected students) have been enhanced as an integral part of the NWSSDTP.

Within UoM, the Manchester Doctoral College (MDC) oversees all aspects of the University's doctoral training and researcher development, integrating PGR support with career development. APEM's newly established MSc in Research Methods with Planning and Environmental Management is part of a school-wide suite of degrees providing generic and discipline-specific foundational research training. Guided by supervisory teams, students undertake a structured training programme in methods, comprising compulsory modules (e.g. research integrity and ethics) and electives (e.g. from the Faculty's Methods@Manchester programme of methods-related courses). Reflecting their distinct needs, Architecture PGRs undertake additional methods training and writing ateliers on architectural theory and history.

Support for APEM PhD students is provided through a panel supervision structure (two supervisors and an additional panel advisor), with six-monthly and annual reviews. An online progress monitoring system records students' engagement with training and sets out critical milestones for the completion of their PhD.

All APEM research students are allocated to a research cluster to ensure they integrate with the wider research community. Doctoral students are encouraged to play an active role in the

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departmental seminar series. Students also benefit from working within a supportive interdisciplinary research environment, using shared SEED facilities and drawing upon cross-departmental peer support (e.g. MUI reading group organised by APEM students).

2.2.3 PGR researcher development

To prepare for future careers, we encourage PGRs to present their research, publish their work and promote wider impact. Supervisors help first year PGRs to present at a student-organised seminar series. PGRs also present at the annual School PhD Research Conference, a student-organised event involving around 50 participants. PGRs have organised events such as the annual conference of the Architectural Humanities Research Association (2019) with 60 international participants, and the international symposia “Planetary Urbanization and Architectural Research” (2019) and “Another Scenography for Architecture” (2019). In 2018, PGRs in the SPA-Lab used APEM funds to organise a two-day international conference on ‘China’s New Urban Agenda’, presenting findings from the ESRC-NSFC Newton Fund Collaborative project on eco-urbanization.

Experience gained through these student-focused and organised events prepares PGRs for external conferences. Students also receive financial assistance (at least £600 each) from School and Faculty conference funds (and additional support for those with caring responsibilities). This funding has allowed PGRs to present at international conferences (e.g. Royal Geographical Society, 2018, 2019; Association of American Geographers, 2019; and Assist-UK, 2019). Conference presentations have also generated articles by PGRs in leading journals: among many examples, *Antipode* (Thompson), *Environment and Planning C, E* (Bafarasat, Snow), *Urban Studies* (Martin, Kefford) and *International Journal of Urban and Regional Research* (Horn).

We also encourage students to consider the non-academic/wider impact of their research. Hjelmkog, supervised by **Deas** and **Baker**, completed an ESRC internship with GMCA. Doyle won the ESRC Celebrating Impact Prize 2015 for Outstanding Early Career Impact, following a CASE studentship with Homes England (supervised by **Deas**). PhD research by Gibbs (supervised by **Wong**) informed a BBC *Panorama* broadcast in 2018 on failed city centre housing development. Another example is a practitioner focused one-day seminar and workshop on social housing futures (2019), funded by MUI and led by three PGRs (supervised by **Deas** and **Wong**).

These examples of APEM support for doctoral research and impact, alongside career development support via MDC, have allowed PhD graduates to secure post-doctoral posts at UoM (e.g. Koksai, Shakeri, Snow, Taheri, Qiaoor) and other universities (e.g. Arnold, Crawshaw, Hayes, Hassan, Heaphy, Lawson, Miedzinski, Morrison, Moustaka, Sharif, Thompson). Others have secured lectureships (e.g. Crawshaw, Newcastle; Kefford, Leiden; Horn, Sheffield; Lecomte, Ecole Nationale Supérieure d’Architecture de Versailles; Martin, Aalborg).

2.3 Equality, diversity and inclusion

APEM research is undertaken within a broader context that prioritises equality, diversity and inclusion (EDI). SEED achieved Athena Swan bronze in 2017, and is working towards silver status. SEED was commended for its honest acknowledgement of gender diversity challenges, its evidence-based approach to monitoring, and its inclusion of EDI as a standing item on committee agendas. SEED organised a ‘Women into Leadership’ training course which the

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Athena Swan committee recognised as good practice and is now being extended across the entire University. Reflecting progress to date, UoM was ranked 47th in the 2020 national Stonewall employer rankings.

Equitable recruitment of researchers is central to the development of our research community. All members of staff appointment committees complete training on EDI and unconscious bias. This training has allowed us to improve the gender balance and ethnic diversity of APEM researchers. 30% of FTE CatA APEM researchers are women, of whom four are new recruits. For PGR students, an average of 54% of recruits annually over the REF period were women. 24% of CatA APEM researchers are of BAME heritage, increasing from two at REF2014 to six. 15 different non-UK nationalities are represented among CatA APEM researchers, including all eight ECR recruits since 2014. On average, 67% of PGR recruits annually since REF2014 are non-UK. To help offset the underrepresentation of BAME PGRs, in 2021 SEED launched a ring-fenced Enhancing Racial Equality Doctoral Studentship.

SEED produces a biannual report on progress against EDI objectives. As part of our workload allocation model, SEED monitors roles by gender and seniority. A long-established system of mentoring for probationary appointments also helps to promote equalities, as recent appointees establish and plan their future career development. In 2019, mentoring was extended to mid-career researchers, helping to promote equality in relation to promotions and academic leadership roles. Complementing this formative support, summative review via annual research performance meetings and the staff appraisal system helps to ensure that academic research managers are aware of EDI challenges.

In line with the University's REF2021 Code of Practice, SEED internal funds and coaching mechanisms help colleagues (e.g. with caring responsibilities or disabilities) to improve the quality of their published outputs, linked to the wider development of their research careers. More broadly, we accommodate caring responsibilities by encouraging flexible working patterns. The SEED core hours policy limits meetings to specific times that are less likely to impinge on caring responsibilities. This policy has supported new working patterns in response to COVID-19. In 2019, SEED launched a pilot returners scheme for carers, entitling researchers to apply for additional sabbatical and/or enhanced research support funding.

APEM has embodied EDI principles in current leadership roles (e.g. **Wong** and **Yaneva** as directors of the SPA-Lab and MARG clusters) and future ones (e.g. **Nanda's** appointment at chair level in 2019 to develop real estate research). Ensuring ethnic and gender balance in leadership roles has helped APEM to develop an inclusive REF preparation strategy, taking account of EDI principles in UoM's Code of Practice (e.g. REF preparations have been led by a gender-balanced team comprising **Deas** and **Yaneva**).

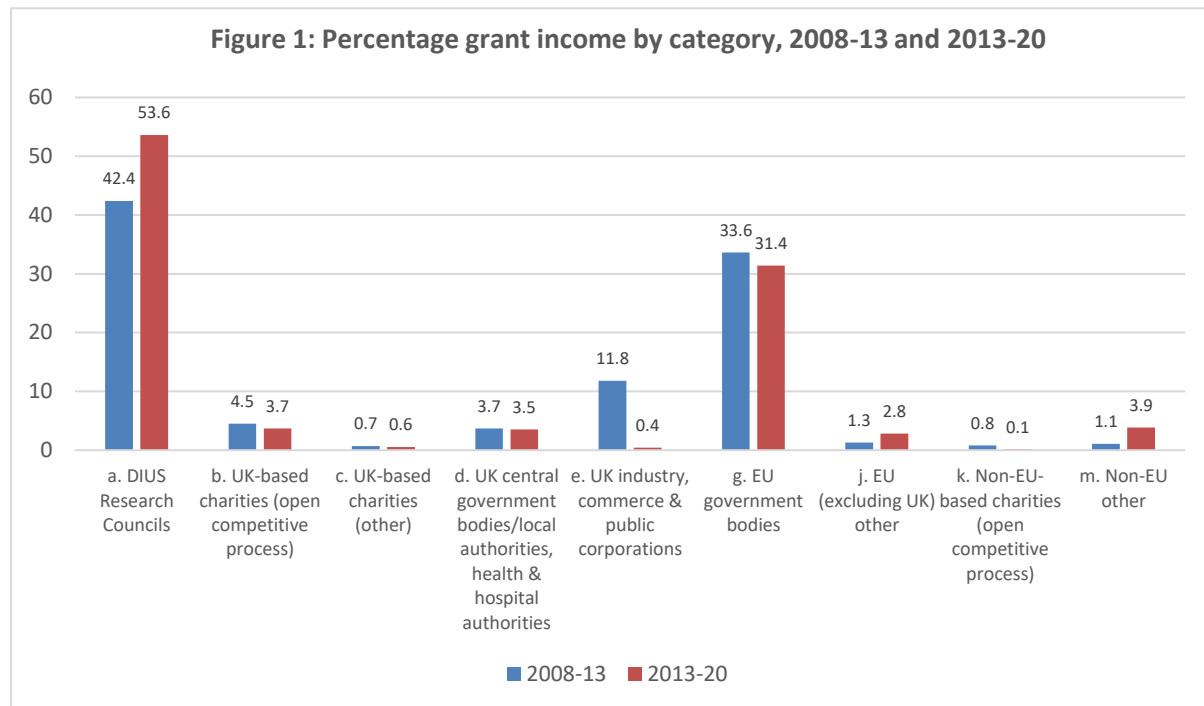
Section 3. Income, infrastructure and facilities

3.1 Research funding strategy

A strategic goal after REF2014 has been to attract a higher proportion of blue-chip research income (goal 5, section 1.3). This is partly a response to diminishing public sector research budgets, but the strategy also aims to reduce dependence on short-term contract research and generate the resources to facilitate long-term fundamental scholarly enquiry. Reflecting this strategy, over the period 2013/14-2019/20, the majority (54%) of our £3.44m research revenue derived from research councils (compared to 42% at REF2014) (Figure 1). In contrast, reliance

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on UK central and local government has remained low, at 3.5%. We have also targeted other sources, notably the European Commission (31%) and charitable trusts and voluntary bodies (4.3%), again in order to support high-quality scholarly research.



Underpinning this strategic repositioning of funding is a research grant culture that prioritises applying for and securing high-quality external income. We have supported this activity in three main ways:

- a rigorous system of *peer review* within the clusters has improved the quality of grant applications.
- *membership of interdisciplinary networks* such as MUI and MERI has provided the critical mass of research expertise and peer support to identify funding opportunities and facilitate high-quality applications.
- provision of competitively allocated *seed-corn funds* has supported external grant capture (e.g. UoM Hallsworth funding provided £20,000 to pump-prime **Iossifova's** network-building on urbanization, infrastructures and everyday life in East Asia, leading to a £440,582 Royal Society/GCRF grant and NERC funding of £323,768).

The result of this strategy has been success in attracting support from AHRC, EPSRC, ESRC, MRC and NERC. Examples of some of the more significant external grants and awards, which also reflect the diversity of our research themes and external sponsors, include:

- **Research Councils:** Grant funding from NERC includes projects on green infrastructure (**Barker**) and natural flood management (**Carter, Barker**). In 2020, **Kingston** secured a five-year NERC-funded £8m project, 'Digital Solutions Platforms and Toolkits', to develop new tools that utilise environmental data, as part of UoM's Digital Futures initiative, working with NERC data centres and government departments. Major ESRC grants include a project on transportation and the socio-spatial equity dimensions of travel-to-work flows (**Kingston, Wong**), and cities as complex adaptive systems (**Iossifova**). We have been actively involved in Newton Fund projects to promote collaborative international research,

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including projects assessing the retrofitting and rethinking of the planned city (**Mell, Barker**), eco-urbanization and sustainable development in metropolitan regions of China (**Wong, Baker, Barker, Kingston, Pinto**), and peri-urbanization and climate-environment change (**Ravetz**).

- *Major collaborative research:* **Wong** is Co-I (£1m for UoM) on a consortium led by Bristol, awarded £6.7m by the UKRI-led Prevention Research Partnership to examine how to tackle unhealthy urban development linked to non-communicable diseases.
- *European Commission:* EU funding for major collaborative projects has included four Horizon2020 grants (**Carter, Mell, Barker**) and the Urban Innovative Actions programme (**Carter, Barker**).
- *Central government:* although representing a diminishing fraction of overall income, government funding has supported major projects which reinforce long-term specialisms. These include research for Defra/Natural England on Green Infrastructure Standards (**Mell**); Innovate UK on climate change risk (**Carter, Kingston**); and Government Office of Science 'Foresight' research on the Future of Cities (**Ravetz**).

3.2 Funding support for impact

Alongside income to help generate world-leading research, we have been proactive in marshalling funds to maximise stakeholder impact (goal 2, section 1.3).

First, funding from government has helped to bolster policy impact. Among many examples, GMCA has been both funder and beneficiary of **Carter's** impact case research on flooding and transport infrastructure networks. Another example is **Mell's** work on Valuing Nature Placement, where Greater London Authority funding has supported research that has informed resultant policy. An ongoing example is research commissioned by the Local Government Association, exploring infrastructure and spatial planning in order to help the Planning Advisory Service advise local authorities about strategic plans (**Baker, Wong**).

Second, we have used internal funds to support impact. The SEED Impact Fund, available on an open call basis but also targeted at established and early-career academics, has made four awards to APEM (total value of £8,819). We have also used funding from the University's ESRC Impact Acceleration Account (IAA), which has received over £1m since 2014 and generated a further £1.9m in additional contributions. This money has supported seven projects totalling £93,393: **Iossifova** is developing impact activity related to research on the Tokyo Olympics, and is also working with the Right to Water Campaign to improve access to water in Mumbai's informal settlements; **Kingston** is building on PP-GIS research to develop Manchester's Environment Map Online; **Lewis** is working with P&HS Architects, Leeds, on building design to mitigate anti-microbial resistance in cystic fibrosis clinics; **Minuchin** is extending the community impact of research on construction systems and adaptable housing in Ecuador; **Nanda**, with Civil Engineering, is developing new interdisciplinary methods to improve benefits forecasting linked to new infrastructure; and **Ravetz** is developing MINI-LAB, an evidence base to support innovation in metropolitan governance.

The University has also provided financial and in-kind administrative support to maximise impact. The UK2070 Commission on regional inequality (led by **Wong**, with Sheffield and UCL), funded by the Lincoln Institute of Land Policy, Sykes Foundation and combined authorities, received additional University support in recognition of its potential external impact. This support facilitated direct advice to government on the national 'levelling up' agenda (e.g. the Commission's research featured prominently in consultations on revisions proposed in 2020 to the Treasury Green Book for evaluating and appraising government projects, as well as direct

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advice to government on industrial strategy and infrastructure priorities).

3.3 Infrastructure and facilities**3.3.1 Infrastructure and facilities for research**

One of our strategic priorities has been to invest in physical and digital infrastructure for research (goal 3, section 1.3). We have drawn from an ongoing £1b programme of capital investment in the Manchester campus to support bespoke research accommodation and facilities, including a base for the SPA-Lab, an architectural workshop for research and teaching, and refurbished computer labs. In addition, there is dedicated space for PGRs in a purpose-built open plan area that can accommodate up to 75 students. To enable our work on PP-GIS (**Kingston, Pinto**), we have benefited from UoM's prioritization of research computing and digital infrastructure (e.g. server space and eResearch platforms) to meet computationally intensive research needs.

3.3.2 Dedicated research and impact support services

Alongside the physical and digital infrastructure and facilities underpinning our activities, a range of School support services benefit our research:

- Administrative support is provided via a research manager and research services team, which coordinates funding applications, new researcher appointments and contracts, and post-award internal and external quality assurance.
- Support for impact, knowledge exchange and research dissemination is provided by SEED's associate research director for Impact and Business Engagement, a Knowledge Exchange and Impact Officer who advises on impact at all stages of the research process, and a Communications Officer who supports dissemination.
- SEED's research services team also helps to ensure rigour in assuring grant applications against ethical standards contained in the University's Code of Good Research Conduct (REF5a Section 2.5). Projects involving human participants must receive approval from the University Research Ethics Committee, with pre-vetting by SEED's Ethics Committee (on which **Barker** and **Wong** serve). We are also committed to best practice in relation to health and safety, and the ethics committees ensure that research fieldwork adheres to exacting requirements, including ongoing COVID-19 preparedness.
- SEED's Cartographic Unit supports web mapping, desktop publishing, graphics, photography and digitization, and help for publications and wider online and non-academic dissemination.
- A GIS and Remote Sensing Officer manages software and licenses, maintains equipment, oversees facilities and liaises with data providers. Infrastructure in this area supports the research and impact activity of researchers including **Acheampong, Kingston, Pinto, Wong**. The GIS Officer also protects researcher time by offering technical support for research (e.g. for **Kingston** and **Wong's** commute flow analysis tool, or **Kingston's** ClimateJust impact case).

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Section 4. Collaboration and contribution to the discipline or research base**4.1 Knowledge exchange and impact strategy**

Our strategy for contributing to the research base, and for impacting on economy and society, is set by the University's Strategic Vision, which prioritizes social responsibility and impact beyond academia. As departments with long-established professional links, knowledge exchange and impact are integral elements of our research. A series of actions reinforce the scholarly and societal benefits of our research:

- *Research applications*: approval of a research proposal by SEED's Research Director is contingent upon a fully developed 'Pathway to Impact' plan, requiring researchers to foster innovative approaches to co-production and engagement.
- *Funding*: we have used Faculty and School funds to support impact-related activity, both for impact cases and more broadly (see 3.2).
- *Training*: SEED knowledge exchange networking events help colleagues to embed impact activity into their research plans, share best practice and build relationships with research users and potential beneficiaries.
- *Research review*: annual performance review for individuals and clusters identifies potential and existing research impact.
- *Staff development*: impact and dissemination activities are part of our sabbatical leave system; workload models reward impact-related activities; and knowledge exchange and impact is one of the University's four promotion criteria.

All three impact cases returned under this submission have benefited from UoM and SEED financial support, enabling the authors to extend the reach and significance of their work. This type of support is available to staff at all career stages, as reflected in our three impact cases, which were led by colleagues at lecturer, senior research fellow and professorial grades. The choice of impact cases was also informed by EDI principles; cases were chosen after consultation with all researchers, linked to a stocktake to gauge collective stakeholder impact.

4.2 Research collaborations, networks and partnerships

APEM has a strong tradition of collaborative and interdisciplinary working, with staff involved in numerous research partnerships within and beyond the University. Our staff play a leading role in UoM interdisciplinary networks, notably MUI (**Wong, Yaneva**, board members; **Carter**, leadership team), Data Science Institute (DSI) (**Kingston**, board member) and Methods@Manchester (**Wong**, management board). These appointments play an important role in APEM's contribution to the wider research base, enabling us to forge interdisciplinary links and promote researcher development at all levels. For example, involvement in DSI has led to new collaborative doctoral studentships (**Kingston, Pinto**), while our contributions to Methods@Manchester have helped in relation to skills development for doctoral students, ECRs and established researchers. Interdisciplinary links are also helping us to develop new areas of research. For instance, in 2020 **Nanda** began supervising an ESRC-DTC funded student with colleagues in Civil Engineering. Collaboration within UoM between **Yaneva** and Sir Konstantin Novoselov (Nobel laureate, National Graphene Institute) led to their book, *The New Architecture of Science* (2020).

Participation in UoM networks has also provided an important platform for major collaborative research projects. Involvement in China@Manchester (**Wong**, board member), a leading interdisciplinary research centre on contemporary China, has resulted in multiple research

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projects as part of the SPA-Lab's work on Chinese urbanization (e.g. ESRC-Newton Fund research), as well as reciprocal visiting and permanent fellowships (e.g. **Wang's** appointment). **Iossifova** is Director of the University's Confucius Institute, facilitating research links and creating a foundation for GCRF research on sustainable sanitation in China. Likewise, participation in the Centre for Infrastructure Development, created by the Alliance Manchester Business School with inputs from **Baker** and **Wong**, enabled peer support which underpinned a series of related projects (e.g. **Wang's** research on high-speed rail in China, and **Carter's** impact case on resilience and critical infrastructure).

Beyond the University, we have developed collaborative partnerships, leading to a wide range of innovative, agenda-setting, interdisciplinary, multi-year projects, networks and activities, both internationally and domestically. Examples include joint working with the Chinese Academy of Sciences and Fudan University on the eco-urbanization in China project, and extensive European partnerships developed as part of the RESIN, IGNITION and URBAN GreenUP projects (**Barker, Carter, Hincks, Mell**). Within the UK, there are multiple inter-university interdisciplinary collaborations (e.g. **Mell's** Beyond the Peace Lines project, with four partner HEIs).

Some of these collaborations have emerged from earlier developmental visits by researchers, eventually leading to new projects and publications. The SPA-Lab hosted Carbonell from the Lincoln Institute, subsequently leading to funding for the unit's inclusion as one of the four partners of the UK2070 Commission to develop a new framework for city and regional development. We have supported collaboration by using competitively allocated funds from the University's Simon and Hallsworth endowments to support visiting fellows from the universities of Waikato (White), Sydney (McManus), Hong Kong (Shenjing He), Peking (Pengjun Zhao), Wuhan (Zhigang Li), Sciences Po (Latour) and the Chinese Academy of Sciences (Xiangjing Deng), all of which have led to joint research outputs.

We have also provided financial support to encourage mobility and exchange for UoM researchers, again to promote longer-term collaboration, including visiting appointments of APEM researchers at: Hong Kong and Nanjing universities (**Baker, Wong**); Sydney and Waikato (**Haughton**); Ahmedabad (**Mell**); Leibniz Institute for Research on Society and Space and Michigan (**Stanek**); Harvard (**Szacka**); Cluj-Napoca (**Walker**); National Cheng Kung, Taipei Tech and Twente (**Wong**); and Columbia, Lund, Parsons and Princeton (**Yaneva**).

4.3 Contribution to the research base

APEM's contribution to the research base has also included invited inputs as expert reviewers for many national and international bodies, including: chair (**Wong**) and assessor (**Yaneva**) for REF2021 Panel UoA13; ESRC Grant Assessment Panel and Chair of ESRC Urban Big Data Centre's Research Approvals Committee (**Wong**); ESRC and AHRC Peer Review Colleges (**Walker, Yaneva**); British Academy (**Iossifova, Yaneva**); commissioning member for ESRC Research Seminar Competition (**Wong, Yaneva**); European Research Council (**Ravetz, Yaneva**); trustee, Urban Studies Foundation (**Iossifova**); Hong Kong Research Grants Council Humanities and Social Sciences Panel (**Wong**); and European Science Foundation (**Deas, Wong, Yaneva**). **Yaneva** has acted as expert reviewer for the Austrian Science Fund, Fonds de la Recherche Scientifique (Belgium), Canadian Social Science and Humanities Research Council, Netherlands Research Council, WOTRO Science for Global Development, Vienna Science and Technology Fund, Swiss National Science Foundation, Leverhulme Trust, National Council for Research and Development of Romania, the Israel Science Foundation, and the Irish Research Council.

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APEM researchers contribute to the editorial functions of numerous journals, including key management roles (e.g. **Wong**, Editor, *Town Planning Review* (until 2020); **Yaneva**, Managing Director, *Museum and Society*). Alongside established researchers' membership of editorial boards (among many examples: **Barker**, *Journal of Environmental Assessment Policy and Management*; **Haughton**, *European Planning Studies*; **Wong**, *Planning Theory and Practice*), we also encourage ECRs to contribute to the research base via guest editorships (e.g. **Acheampong** is editing a *Cities* special issue on autonomous mobility and urban planning).

Our contribution to scholarly communities is further evidenced by multiple awards. **Haughton** was awarded the AESOP 2014 prize for best paper (with Allmendinger, Cambridge, and Oosterlynck, Antwerp). **Yaneva** was awarded the Lize Meitner Visiting Professorship in Lund, Sweden (2017-2019). **Stanek** won the 2016 Founders Award of the Society of Architectural Historians, and the 2020 RIBA President's Award for Research in the category History and Theory. **Szacka** won the 2017 Society of Architectural Historians of Great Britain Alice Davis Hitchcock Medallion for her book, *Exhibiting the Postmodern*. **Wong** was named one of *The Planner's Women of Influence* (2017, 2018). **Nanda** was joint winner of the Harold Samuel Research Prize (2020) and co-authored the winning paper for the Annual Nick Tyrrell prize in real estate (2015).

4.4 Collaboration and contribution to professional practitioner and policy communities

We have employed three main mechanisms to broaden and deepen APEM's contribution to professional and policy agendas:

- We have actively targeted policy user groups via participation in UoM interdisciplinary networks, allowing us to extend and intensify dissemination and reach practitioner beneficiaries. For example, Policy@Manchester (**Wong**, board member), as one of the world's largest collections of scholars engaged in public policy research, has enabled us to showcase our work and develop policy user links, e.g. through blogs (**Deas**, **Haughton**, **Pinto**) or participation by many researchers in the annual Manchester Policy Week event.
- Externally-targeted and user-friendly engagement activities such as articles for professional journals, like *Town and Country Planning* (**Haughton**, **Pinto**), have helped to reach practitioner users.
- We have targeted high-profile international conferences that bring together academic researchers and policy communities. For example, in 2018 **Carter's** impact case research to develop a climate risk typology was presented at key agenda-setting events such as the UN Climate Change Conference (COP24) and the IPCC Cities and Climate Change Science Conference. APEM research for the UK2070 Commission on regional inequality will feature as part of COP26 in 2021.

Alongside these indirect mechanisms for engaging external users, we have also had a direct impact on professional and policy agendas through *local*, *national* and *international* advisory roles:

- At *local* level, **Mell** has advised the Liverpool Mayoral Commission on Green and Open Space, drawing on research on alternative funding options for green infrastructure, co-produced with business and resident stakeholders, to inform Liverpool's local plan and strategic framework for sustainable urban drainage. **Carter's** impact case details work advising the Manchester Climate Change Board and the Greater Manchester Natural

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Capital Group, drawing on his RESIN and IGNITION projects to support GMCA policies on transport, green infrastructure and civil contingencies. Local impact is also developing through projects involving embedded researchers (e.g. **Wong's** ongoing research, funded by MRC, involves a GMCA-based researcher for five years) or collaborative doctoral studentships (e.g. a GMCA-based PhD student as part of an ESRC Data Analytics and Society studentship, supervised by **Deas** and **Pinto**).

- At *national* level, our contribution to economy and society has involved advice to professional bodies such as the RTPI (**Baker, Kingston, Wong**) and RIBA (**Walker, Yaneva**). We have also advised high-profile national policy reviews (e.g. **Wong's** role as expert adviser to the Lyons Review of Housing, and as part of the UK2070 Commission, drawing on SPA-Lab research on housing and spatial policy agendas). We have also advised government. For example, **Lewis** has advised the Government Office for Science by drawing upon research on building design and ageing. **Wong** served on the Ministry of Housing, Communities and Local Government's Independent Panel on the Evaluation of Local Growth Interventions Framework, 2017-20.
- At *international* level, **Minuchin** has advised Ecuador's Ministry of Urban Development and Housing on the 'Right to the City' agenda. Members of the SPA-Lab and MUI agreed in 2019 to develop links with UN-Habitat China (**Wong, Zheng**). **Wong** is international expert member of Taiwan National Development Council's National Spatial Development Strategy board.

Our engagement with policy communities is longstanding, and applied policy research undertaken in previous REF cycles continues to have an important impact (e.g. the REF2014 impact case on RTPI-funded research on quantitative indicators and spatial policy-making is highlighted in the Scottish Government paper, *Monitoring the Outcomes of Planning* (2018, **Baker, Wong**).

Alongside these contributions to government and quasi-public organisations, we undertake research collaborations with multiple private sector organisations (e.g. **Nanda's** work with WiredScore to examine the impact of digital connectivity on commercial real estate, and with Investment Property Forum on ESG benchmarking in real estate).

Complementing these expert advisory roles, we have developed professional practice and other non-academic links by hosting visiting and honorary appointments. Our honorary fellows and professors from practice (Carbonell, Goodstadt, Grilli, Handley, May, McInroy, Rudlin) make active contributions to our research (e.g. Goodstadt's involvement, with **Wong**, in the UK2070 Commission). The effectiveness of these contributions has been recognised via prestige awards. Rudlin, with contributions from **Ravetz**, was awarded the Wolfson Economics Prize 2014 for work on a new generation of garden cities.

4.5 Engagement with diverse communities and networks

Alongside these contributions to professional practice, our impact and engagement strategy also recognises the importance of engaging non-professional beneficiaries. We do so, for example, via blogs in *The Conversation* (**Acheampong, Deas, Kingston, Mell, Nanda, Pinto, Stein**), helping to raise awareness of research findings among the general public (e.g. recent blogs on COVID-19 implications). We have also used creative and innovative methods to disseminate research beyond professional networks and widen the social contribution of our research. For example, **Acheampong** participated in 'Meet the Neighbours', an event in 2019 exploring dimensions of contemporary urban neighbourliness, using his research findings on transport as part of performance art led by a local theatre company, Quarantine. Findings from

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Wong's research on planning and brownfield regeneration were used in a poem by Caron Freeborn as part of 'Connections: Science, Poetry and the Brain', a 2019 event at Lucy Cavendish College, Cambridge, pairing researchers and poets to engage children, students and the public.

In these ways, APEM has developed a vibrant and sustainable environment that facilitates world-leading research, as evidenced by the agenda-setting work highlighted across our three research clusters. APEM's research environment is one that embraces a diverse range of scholars, supports a growing cohort of early-career researchers and provides doctoral training of the highest quality. This environment underpins a dynamic research community, enabling a wide-ranging portfolio of research activities and advisory roles that generate positive scholarly and societal impacts.