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| Institution: University of Liverpool |
| Unit of Assessment: 16 - Architecture, Built Environment and Planning |
| <p>a. Overview</p> <p>The Liverpool School of Architecture is part of the School of the Arts within the Faculty of Humanities and Social Sciences. It focuses its research within two thematic areas:</p> <p>History and Theory contains three groups: <u>Architectural and Urban History</u> (Swenarton, with Neil Jackson, Pepper, Crompton, Iain Jackson, Chen, Buchanan, Malathouni and Calder) investigates historic and contemporary architecture, in relation to cities and urban situations, with a developing emphasis on heritage. <u>Architecture and the Visual Arts</u> (Koeck, with Iain Jackson, Kronenburg and Iuliano) investigates the interaction between architecture and film, photography and the performing arts. The Centre for Architecture and the Visual Arts (CAVA) is the driving link with the culture industries. <u>New Architectures</u> (Kronenburg, with Schmiedeknecht, Agkathidis and Urbano-Gutiérrez) investigates emerging building typologies and the technological forces on innovation in design.</p> <p>Technology and Process (previously Environment and Process) also contains three groups: <u>Acoustics and Lighting</u> (Hopkins, with Gibbs, Carter and Urbano-Gutiérrez) is recognised for research into building acoustics (within the Acoustics Research Unit) and also into lighting design. <u>Computer-Mediated Design</u> (Brown, with Kocaturk and Agkathidis) researches digital technologies, which enhance the design process, from conceptualisation to end use. <u>Sustainability, Complexity and Uncertainty in Building Assessment</u> (SCUBA) (Sharples, with Boussabaine and Lewis) explores the risks and uncertainties associated with adaptation and mitigation strategies for future changes in climate and energy supplies.</p> |
| <p>b. Research strategy</p> <p>Research, by the groups within the two thematic areas, is directed towards providing knowledge for the architectural, engineering and cultural professions, and for community needs, with an increasing international dimension. Core to our strategy is a plan to increase the role of non-academic sectors in giving steers to our research directions and activities, and to employ this driver constructively, including in research areas which previously were primarily directed to the academic sector. These aims are being achieved in three ways:</p> <p>Shared good practice takes place at all levels of research activity. Research centres, units and networks provide opportunities for experienced staff to mentor Early Career Researchers (ECRs), contract researchers and postgraduates on methodologies and publication strategies. Through the School of the Arts Research and Knowledge Exchange Committee, experiences and practices are shared with colleagues in the creative disciplines: Music, English and Communications Studies. Improved support services and expertise, provided by the University, relating to research and business collaboration, intellectual property, consultancy and knowledge transfer partnerships, is also benefiting our research.</p> <p>Professional engagement presents staff and groups with the opportunity for new research directions with impact. Of the 23 members of staff returned, 19 are trained architects or chartered engineers. In their professional capacity, they selectively undertake consultancies. These establish contacts with clients and communities, which then gives support and steers to our research.</p> <p>Promotion of outreach events and networking initiatives is through the departmental research committee and the corresponding research and knowledge exchange committee of the School of the Arts, which provide funding for collaborative initiatives, under a competitive application process.</p> <p>The research strategy, outlined in RAE 2008, was to focus on external funding initiatives and to promote collaborative and multidisciplinary research.</p> <p>Under external funding initiatives, the then reported AHRC award, 'City in Film' (2008: Kronenburg,</p> |

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£195,460), formed the basis for the later AHRC award, 'Mapping the City in Film' (2008-10: Kronenberg, £377,188). Feedback from the completed EPSRC award, 'Structure-borne source model' (2009: Gibbs [#3], £79,931) was incorporated into the successful EPSRC award, 'Reception plate method' (2010-13: Gibbs [#4] and Hopkins). The application to AHRC for a collaborative project with the Royal Northern College of Music, (2010-13: 'Interactive performance for musicians with a hearing impairment', Hopkins, £238,000) was selected as one of the 100 ground-breaking pieces of research at the RCUK 'Big Ideas for the Future' launch event in 2011. The completed work has been short-listed for The Times Higher Education Research Project of the Year (outcome awaited). The AHRC award, 'Culshaw and Summers' (2008-09, Neil Jackson, £93,000), was for investigation of this important architectural practice and led to a digital repository of all of their schemes now available to the public.

Under promotion of collaborative and multidisciplinary research, the following initiatives led to long-term research projects. Film screening events, such as of the Mitchell and Kenyon Collection in 2008, resulted in the British Film Institute *Screenonline* project (Liverpool, 2008), the UK's first web-based film archive dedicated to a city, and was a significant factor in obtaining the North West Vision and Media grant award, 'Lumière and the Liverpool Overhead Railway' (2009, Koeck, £20,290). Our conferences, such as those organised by the Society of Architectural Historians of Great Britain (2009) and on Architectural Heritage (2013), have provided networking opportunities and collaborative initiatives. Swenarton's conference on Architecture and the Welfare State (2012) was an important factor in his subsequent British Academy Senior Research Fellowship award in 2013.

Overall, this strategy of seeking and winning external funding has resulted in expenditure of approximately £1.4M on research in the assessment period.

For the five years following submission to REF 2014, we aim to provide leading research, through dynamic group structures that provide a flexibility of response to future imperatives and collaborative links outside the Department. Well-established centres and units such as CAVA and the Acoustics Research Unit, are being joined by developing groupings in the areas of heritage, and in the study of colonial and post-colonial architecture. Recently confirmed appointments have been made to add research strength to SCUBA (Sustainability, Complexity and Uncertainty in Building Assessment), Computer-Mediated Design and the Acoustics Research Unit.

Key research initiatives:

- The Centre for Architecture and the Visual Arts (CAVA) is focussing on EU and RCUK-funded cross disciplinary research in film, photography and digital media, now with cartography. It will build on its existing collaborations with culture partners: the Foundation for Art and Creative Technology (FACT) and Tate Liverpool, to extend the research nationally and internationally. The AHRC project, 'Cinematic Geographies of Battersea' (2012-13: Koeck, £196,395, total award value across all partners) involves new partnerships with English Heritage, University of Cambridge and National Museums Liverpool. The research will concentrate on how digital media (e.g. locative, databases, mapping, geo-referencing) can inform communities and enhance and sustain our urban and architectural heritage.
- New Architectures is focussing on three areas: portable architecture as a distinct genre of building design with specific practical renewable benefits; the investigation of flexible architecture as an important aspect of all building design; the design of buildings specifically for popular music performance. The funded research of Kronenberg (2012-13: 'Popular Music Architecture', £39,000, [#2]) is providing the basis for the third area of research.
- Architectural and Urban History is extending to transnational connections and influences in the post-1945 period. The Leverhulme funded research of Iain Jackson (2011-13: 'Fry and Drew', £101,771, [#3]), along with his UKIERI (UK India Education and Research Initiative) award (2013-15: 'Envisioning the India City', £60,000, total award value across all partners), is bringing a stronger international perspective to British architects and architecture. Working with the Twentieth Century Society, Malathouni is focusing on methods of heritage evaluation and management, the research for which is linking with heritage and architectural organisations in

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the UK and abroad.

- The Acoustics Research Unit will focus on noise mitigation in the latest generation of timber-frame and timber composite multi-occupancy buildings. It will develop measurement methods to characterise the structure-borne sound power input from mechanical installations. The imminent revision of European and International Standards will provide a focus for the research and activities will be expanded towards sound and vibration in automotive, aeronautic and white goods industries. The existing collaboration with Boeing, Seattle, is to be funded and extended into 2014. The lecturer appointed after the census date will bring new research in the areas of psycho-acoustics and soundscapes, with a concomitant increase of PhD students, from the present cohort of 10.
- Computer-Mediated Design will increase the emphasis on social, creative, collaborative and technological aspects. The group already is developing research grant proposals under the themes of *digital transformations* and *digital economy*. It has networks with some of the best European architectural and engineering practices, and will initiate joint research programmes and other collaborative activities. The group is a key contributor to the new Design Institute at Liverpool, set up to promote initiatives across design and engineering, e.g. in rapid prototyping, digital fabrication and virtual engineering.
- The recent Senior Lecturer appointment (beyond the census date) in Sustainability, Complexity and Uncertainty in Building Assessment will widen the methods of assessing the risk, uncertainty and performance associated with new sustainable designs. This new area is attracting a strong postgraduate cohort (presently 10 PhD students with Boussabaine and Lewis, and seven PhD students with Sharples) and the recently launched taught MSc in Sustainable Environmental Design promises future PhD admissions.

c. People, including:

i. Staffing strategy and staff development

The staffing strategy can be characterised as one of ensuring and developing balances. The first balance is between the two main research themes. Members of staff, in the two areas, have been equally productive. In the assessment period, 13 staff in History and Theory published: 22 books and edited books, and 103 book contributions, peer-reviewed journal articles and conference proceedings. 10 staff in Technology and Process published: 18 books and edited books, and 215 book contributions, peer-reviewed journal articles and conference proceedings. With one exception (Pepper on a 0.2 FTE Professorial Fellowship), all returned staff are permanent full-time appointments, with teaching and administrative duties typical of a large architectural department. This is providing stability and sustained research directions.

The second balance is between senior and junior staff, and has partly resulted from the significant expansion in undergraduate student numbers, particularly in the second half of the assessment period. This expansion has been supported by the university in the recruitment of senior staff, staff on developing career curves and also early career appointments. The present balance of research active staff, eight Professors, three Readers, five Senior Lecturers and six Lecturers (five are ECRs), is providing both experience and vitality.

Architectural departments are professionally accredited and we work towards the third balance, by the recruitment of members of staff who are both professionally qualified (e.g. RIBA and C. Eng.) and also are active researchers. The Department is successful in this; of the 23 staff returned, 19 are trained architects or chartered engineers. These appointments accord with our strategy of increasing research relevance through shared good practice and professional engagement.

The fourth balance is seen in the mix of international staff, with appointments, at all levels, from Algeria, China, Germany, Greece, Italy, Spain and Turkey, reflecting the strength of our international connections and networks. This brings exciting perspectives and innovation to the research and has opened doors to international collaborations, which are highlighted in section e.

Gender balance is important to us and the current number of female staff (Lecturers: Buchanan, Chen, Urbano-Gutiérrez, Malathouni with Kocaturk, Reader) represents a significant increase on past gender ratios. Notable are the leading roles being taken by Kocaturk in Building Information Modelling (BIM), by Malathouni in heritage studies and Chen in urban studies.

In 2011, the Department made two strategic chair appointments, to provide leadership and expand the research scope in Architectural and Urban History, and in Sustainability, Complexity and Uncertainty in Building Assessment. Swenarton's appointment to the former has brought research on the relationship between architecture and politics, with reference to housing and the welfare state [#2]. From his background as an architectural critic and publishing editor (*Architecture Today*), he provides valuable mentoring, particularly of ECRs, on quality and dissemination of published work.

The appointment of Sharples to the latter has brought an integrated research approach to the technology and design for climatic adaptation [#2, 4], which stems from his EPSRC funded research ('COPSE', £81,564, in 2011) and his collaborative EPSRC project ('URSULA', £2,546,175, in 2012). His recently launched MSc programme in Sustainable Environmental Design is providing important skills to our existing PhD students and promises future PhD applications.

Koeck's Personal Chair in 2012 was in recognition of his successful directorship of CAVA. His expertise in film, digital media and architecture [#1] complements CAVA's research in: art and design, critical studies, photography and media. Crompton was appointed Senior Lecturer in 2010. His AHRC funded research (2010-12: 'Multi-faith Spaces', £81,000) is bringing interesting insights into these spaces in Europe and the US [#1]. Iain Jackson (appointed 2009 and promoted to Senior Lecturer in 2012) has introduced important research on British architects in the British Empire and Commonwealth [#1, 3]. The research of Chen (appointed 2010) into traditional Chinese cities is giving a new perspective on sustainable urban development [#1].

In 2012, the University supported the appointment of five additional research active staff. Kocaturk (Reader) brings research on the role of digital technology on knowledge exchange in architectural and urban design practices [#1, 3]. Iuliano (Senior Lecturer) has expanded the focus of CAVA by adding cartography and architectural photography to its areas of interest. Calder specialises in British architecture since 1945 [#2, 3, 4]. He is writing a book on British Brutalism and publishing on the complete works of Denys Lasdun, in collaboration with the RIBA Drawing Collection. Malathouni's contribution is in 20th Century heritage, through her exploration of the notion of 'architectural space' [#1]. Agkathidis focuses on the effect of computational technologies on form, material, sustainability and construction [#1]. These appointments are giving continuity and critical mass to established research areas, whilst providing innovation and energy to the research agenda of the school as a whole.

Under staff development, the Department provides funds for pilot studies and conference attendance and pump-primes international collaborative research initiatives. It also guides and supports staff to external funding opportunities. The research-leave programme allows replacement teaching and administrative support for a period of one semester. Members of staff applying for leave give clearly stated aims and deliverables, such as outputs and completed grant applications. In particular, consideration is given to colleagues whose teaching and administrative loads are seen to be slowing an otherwise promising and developing research profile. Thus, study leave for Iain Jackson in 2011 allowed him to conduct field-work, which provided the basis of his successful Leverhulme grant application (2011). Study leaves have allowed staff to complete important publications: Lewis in 2010 [#1, 4]; Koeck in 2011 [#1]. Our previous Head of Department (Kronenburg) was able to use sabbatical leave in 2009 for new research on popular music architecture [#2, 4]. Schmiedeknecht was able to complete his Doctorate in 2011 and also publish from it [#1, 3]. In the assessment period, ten members of staff were awarded study leave or were allocated lightened teaching and administrative loads, for completion of research projects or for research initiatives.

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The research groups provide support to staff by mentoring and partnerships, through shared research topics, methodologies and experiences. Mentoring particularly helps in developing the research profiles of ECRs, by securing publications in quality outlets, formulating grant application strategies, and advising on potential collaborations. Examples are: Chen [#3] and Malathouni [#1] by Swenarton; Urbano-Gutiérrez [#1, 2] by Sharples; Agkathidis [#1] by Brown. Joint postgraduate supervision (at least two supervisors to a student) also fosters collaboration. ECRs share supervision with more established members of staff. The Department lies within the School of the Arts, which has in place procedures to maintain and improve the quality of grant applications. Proposals are read at departmental level and reviewed by senior staff from other departments in the School, which also provides administrative support. The University provides supervision workshops for new staff, which they attend within one year of appointment. As a result of these support processes, all of the 23 staff returned in this REF have supervised PGRs and 22 currently are doing so.

ii. Research students

We currently have 35 PhD students; around half are UK/EU and half from outside the EU. One third of students are supported by UKRC and University of Liverpool Scholarships, one third are supported by their national funding organisations or universities, one third are self-funded. Noteworthy are the current studentships: two supported by EPSRC, four by the AHRC Block Grant, two by German BMBF "FHprofUnt" 2012, two by the Swiss Funding Council. As part of their induction, new postgraduates are introduced to the postgraduate research hub, where the students are clustered by research interest. This provides important support and identity for students, and arrivals from abroad particularly benefit from such early contact. Postdoctoral researchers are either integrated into the postgraduate spaces or are in close proximity. Clustering also takes place in and around technical resources; the Acoustics Research Unit provides laboratory space for typically 10 students. Research students contribute to the annual departmental research seminar series, as evidence of progress in their thesis studies. Again, although groups can present together on topics of mutual interest, cross-fertilisation is encouraged, to foster good practice and often to provide interest and fun in the clash of cultures. Supervisory meetings are regular (at least eight formal meetings a year), after which students electronically record the agreed actions. This is particularly useful for part-time (and off-campus) postgraduates and promotes increased communication and involvement. Postgraduates also organise the Student-Staff Liaison committees. Preliminary (dry-run) presentations, of conference papers, and as preparation for vivas, allow timely feed-back and a confidence boost. All second-year research students present at the annual university-wide poster competition. The Department and the School of the Arts together provide bursaries for travel and registration for presentation at one national or international conference during the student's second or third year of study. The School also provides cross-departmental induction, research events and training. The University PGR Development Team coordinates a comprehensive skills training menu of modules, which provide specialist skills (e.g. on data acquisition, statistical analysis) and transferable skills. Postgraduates can attend departmental masters modules on research methods and on specialist courses, such as in CPD courses on environmental noise. We provide our postgraduates with opportunities for tutoring and assessment of undergraduates, both in the design studios and in lecture and assignment delivery, as part of their career development. Of our PhD graduates, two are included in this submission (Iain Jackson and Schmiedeknecht) and two more have been appointed as full-time lecturers, after the census date. Three have taken up lectureships in China, Germany and Ghana, and one resumed his Headship of the School of Architecture in Malta.

d. Income, infrastructure and facilities

The strategy for creating research income is through:

Promotion of engagement with outside bodies, which are potential providers of direct funding, indirect funding, or supporters of grant applications to the Research Councils and other major funders. Collaborative funded research is often the result of earlier contact made through consultancies and research and development projects. For example, in 2008, the Acoustics

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Research Unit was approached by the R&D group of the major European manufacturer of domestic combined heating and power units, which provide both heating and electricity. Regular interaction with the company resulted in an EPSRC grant (2010-13: 'Reception plate method', £172,000), to develop test procedures for structure-borne sound sources. Collaboration with government bodies has resulted in funded postgraduate studentships and post-doctoral researchers, such as those funded by Her Majesty's Government Communication Centre (2012-13: 'Acoustics for speech confidentiality', Hopkins, £130,000); and by the Swiss National Foundation for research on the sound insulation of timber-frame constructions, (2013-15: 'Lightweight floors with optimum sound insulation', Hopkins, £20,000). In 2008, CAVA organised a graduate student conference, at the invitation of the Architecture Humanities Research Association. A notable outcome was the AHRC Collaborative Doctoral Awards with Liverpool's cultural centres. This has seen the phased appointments of four postgraduates (three have successfully completed), who combined their thesis studies with on-site contributions to the work of, and interaction with staff in Tate Liverpool and FACT (the Foundation for Art and Creative Technology).

Positioning of research groups, in order to adapt to external funding initiatives and identified external needs. For example, public interest in film and digital media as disseminators and repositories of our cultural heritage has significantly expanded. In response to this, CAVA is now drawing on the technical expertise in the Computer-Mediated Design group. Another example is the research on portable and transportable architecture, which is responding to the significant increase in investment into large popular music venues.

Development of research infrastructure. In the period of assessment, the Department committed approximately £250,000 to the upgrade of research facilities and postgraduate study spaces. The departmental networked computing system has been upgraded (£40,000), with additional dedicated software and hardware (£60,000), and is supported by an experimental officer, three full-time technicians, and two interns. Specialist laboratory facilities are concentrated in the Acoustics Research Unit and in the Lighting Laboratory. The Acoustics Research Unit consists of a laboratory complex with anechoic and reverberant chambers, and specialized chambers for vibration measurements. The Unit was refurbished in 2008 as part of a major capital investment programme in Engineering (£32 million). In 2010, an audiometric chamber (worth £45,000) was donated by the Royal Liverpool University Hospital to coincide with the AHRC funded research on vibro-tactile perception. Within the Lighting Laboratory, the artificial sky is one of the largest in the UK. The Department's dedicated physical modelling workshop is supervised by a full-time technician, with specialised assembly and prototyping equipment (3-D printers and laser cutters, £100,000).

The result of this strategy is highlighted by the external funding awards, previously described, and by the increasing contribution to our funded research by our ECRs: Iain Jackson (Leverhulme, £102,000, in 2011, and UKIERI, £60,000 in 2013) and Urbano-Gutiérrez (Spanish Association of Ceramic tile Manufacturers (ASCER), £37,000, in 2012).

Prestigious/competitive personal research fellowships: Neil Jackson was awarded a Leverhulme Major Research Fellowship (2009 -11) for research into the history of the architectural links between Japan and the West [#2]. He was also awarded a residential scholarship at the Getty Conservation Institute in Los Angeles in 2013, to write a guide for the conservation of steel-framed houses in California. Kronenburg was awarded a British Academy/Leverhulme Senior Research Fellowship (2012-13) and a Paul Mellon grant (2013) for the project, 'Architectural History of Popular Music Performance Space' [#2]. Iain Jackson was funded by the Paul Mellon Centre, for preliminary field studies of the architecture of Fry and Drew, and then continued this study through his Leverhulme award in 2011 [#3]. Calder received a Graham Foundation award (2012, \$10,000) for research on the complete works of Denys Lasdun. Urbano-Gutiérrez received financial support from the Fondation Le Corbusier for completion of two publications [#1, 2]. In 2013, Swenarton was awarded both a Leverhulme Fellowship and a British Academy Senior Research Fellowship, and accepted the latter for, 'The housing programme of the London Borough of Camden under Sydney Cook'. All these feed directly into the area of History and Theory: Jackson N, Jackson I, Calder, Malathouni, Swenarton into Architectural and Urban History; Kronenburg into New Architectures.

e. Collaboration and contribution to the discipline or research base

In addition to the role of the research groups in promoting and sustaining research, the Department encourages the establishment of structured national and international collaborations.

Under **Architecture and Urban History**, **Swenarton** leads an international network on 'Architecture and the Welfare State'. He co-convened, with Avermaete and van den Heuvel (TU University, Delft) the 'Architecture and the Welfare State' session at the European Architectural History Network (EAHN) international conference (Brussels, 2012). He organised the symposium (Liverpool, 2012) with speakers from the UK, USA and Europe which is leading to a co-edited book 'Architecture and the Welfare State' (Taylor and Francis, 2014). **Neil Jackson's** book *Saltaire: The Making of a Model Town* [#1] was in collaboration with Lintonbon (Sheffield University) and Staples (architect, Shropshire County Council). **Crompton** was PI, in collaboration with Brand (Planning) and Hewson (Sociology) at The University of Manchester, on the Multi-faith Project for the AHRC Religion and Society Programme. **Chen** is a founder member of the Urban Morphology and Representation Research Network, under the umbrella of the International Association for People-Environment Studies, which attracts researchers from Europe in landscape, environmental physiology-psychology, urban design and architecture. In 2013, she was Listed Expert in the research exchange between the Institute of Public Policy and Practice, University of Liverpool, and the Chinese Academy of Governance, Beijing. **Iain Jackson** is co-investigator on the project, 'Envisioning the Indian City: spaces of encounter', funded by the UK India Education and Research Initiative (UKIERI), with Chaudhuri at Jadavpur University, Kolkata, with Urquhart-Irvine at the British Library and colleagues in the departments of English, French and Architecture at Liverpool. His Leverhulme funded research is towards a larger project on British colonial architecture in Ghana, with a co-authored publication with Opong at KNUST, Ghana, expected 2014. He is member of the EU funded networking project, 'Architecture Beyond Europe', which launched the journal of the same name in 2012 and he is to co-author two papers with members of the network: Uduku at Edinburgh University and Lagae at Ghent University. **Pepper's** book [#1] resulted from work with co-holders of an AHRC funded project: Black, University of Illinois at Urbana-Champaign; also Bagshaw, when at the RIBA. **Malathouni** has strengthened her link with The Twentieth Century Society, one of the seven National Amenity Societies (Heritage Third Sector). Her work relates to heritage as a key area of development, as proposed at the symposium (Liverpool, 2013), with Universities of Lancaster and Manchester. **Buchanan** is active in two AHRC funded partnerships (2012-13: 'Memories of Mr Seel's garden', £6,865, and 'Sustaining time', £4,829) with researchers at Liverpool, in Philosophy, Archaeology, Architectural History, Archival Science, Women's Studies and Art. She is member of the network on design archives, with Breakell (Brighton University), Helfrich (RIBA Drawings Collection), Marsden (Victoria and Albert Museum) and Gawne (National Maritime Museum). **Calder** collaborated with the architectural practice Howarth Tompkins, which commissioned his main output [#1], also with the RIBA on *Lasdun Online*, the complete works of Denys Lasdun, to be completed in 2014.

Under **Architecture and the Visual Arts**, CAVA collaborates with Tate Liverpool, National Museums Liverpool, the Foundation for Art and Creative Technology (FACT), North West Vision and Media (NWVM), the British Film Institute (BFI) and English Heritage. **Koeck** is a member of the 'Silent Rupture' research network, with Alves Costa and Urbano (University of Oporto, FAUP), funded by the Foundation of Science and Technology of Portugal. **Iuliano's** recent work is on the impact of image has on architectural theory and practice. His grant from the Paul Mellon Centre for British Art was for his conference *The Wrong Architecture* with Ray (Cambridge University, 2012).

In **New Architectures**, **Kronenburg's** AHRC-funded projects on 'City in Film' (completed 2009) and 'Mapping the City in Film' (2010) were with the Department of Communication Studies at the University of Liverpool. From this, he organised international conferences: *City in Film: Architecture, Urban Space and Moving Image* (with Koeck, 2008) and *Mapping Memory and the City* (2010), resulting in two edited books and exhibits at the new Museum of Liverpool, with National Museums Liverpool (2010). His funded research on popular music architecture (British Academy/Leverhulme Trust Senior Research Fellowship (2012-13)) engages with the Live Music Exchange Hub, Universities of Edinburgh and Glasgow. **Schmiedeknecht's** research stems from

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his network of academics and architects in Europe. Two volumes on Rationalism have been co-edited with Peckham at Westminster University: *Rationalist Traces* (with Rattray at Dundee University) and *The Rationalist Reader* [#2] with contributors: Bullock, Cambridge; Engel, Delft; Hilpert, Wiesbaden; Moravanszky, Zurich; Abram, Nancy; Durth, Darmstadt; and practitioners, Kollhoff (Berlin/Den Haag/Zug), van der Heijden (BIQ, Rotterdam) and Krier (France and London). The appointment of **Agkathidis** (2012) brought links with research groups in Greece and Germany, through networks including: *Emergent fabrication technologies and their application to architectural construction*, with Vyzoviti at the University of Thessaly; *Form finding strategies using digital tools and material properties*, with Lada and Alexopoulou at the Aristotle University of Thessaloniki, Schillig at the University of The Arts Berlin; *Revitalisation of abandoned buildings in Frankfurt upon Main*, with Hasenpflug at the Wuestenrot Foundation and Schmal, Director of the German Architecture Museum (DAM), Frankfurt upon Main. The research of **Urbano-Gutiérrez** on the environmental design strategies of Le Corbusier is in collaboration with the Fondation Le Corbusier, Paris. In 2012, she initiated a collaborative project with the Universidad Pontificia de Madrid on sustainable design, and will co-author the book *Elements of Sustainable Architecture* (Lawrence King, 2015).

Under **Acoustics and Lighting**, **Hopkins** heads International Standards groups on sound transmission in buildings, particularly the next generation of timber-based lightweight buildings. His AHRC funded project on interactive performance for musicians with a hearing impairment is with the Royal Northern College of Music and combines engineering acoustics and music psychology. His collaboration with the Universities of Applied Sciences at Stuttgart and Rosenheim (2013), funded by the German Research Council, provided two PhDs at Liverpool (2013). His award by the Swiss National Foundation with the Swiss Federal Laboratories for Material Science and Technology, funded a MPhil student at Liverpool (2013). **Gibbs** is co-author of EU standards, within the European working group WG7. As well as publications [#2,3], his work with staff at the Hochschule für Technik Stuttgart has resulted in four fully funded PhDs for staff members there, registered at Liverpool (two completions in 2009, two previously). His work with the R&D group at Boeing, Seattle, will lead to co-authored papers and is an example of how research in building acoustics is informing research in aero-engineering. **Carter's** work on hybrid lighting systems [#3, 4] was in collaboration with companies in Sweden and the UK and now informs their respective in-house design methods. His network links include appointments as Editorial Chair of the International Journal of Lighting Research and Technology, and as Member of the CIBSE Society of Light and Lighting Executive Committee and Council. **Urbano-Gutiérrez's** research on light-interacting technologies was with Andersen (MIT), 2008-9, and the École Polytechnique Fédérale de Lausanne (2009 till present). Since 2011, she has headed the *Illuminating through Ceramics* project, with groups in Spain, Germany and USA. Results of this work were presented at the seminar for architects: *Facades Ceramics Face the Future* in Liverpool (2012), Valencia (2013) and Athens Institute for Education and Research (2013).

Under **Computer-mediated Design**, **Kocaturk's** appointment in 2013 has brought research networks of theoreticians and practitioners on distributed intelligence in design: Front Inc., ARUP, Gehry Technologies, and researchers at: Hong Kong Polytechnic University and Queensland University of Technology. She co-organized the symposium *Distributed Intelligence in Design* (2009), which has resulted in partnerships with: Foster and Partners, and Zaha Hadid Architects, and has led to a joint project [#3].

Under **Sustainability, Complexity and Uncertainty in Building Assessment (SCUBA)**, **Sharples** undertook EPSRC funded research on: urban rivers in sustainable environments, with the Archaeological and Environmental Sciences Division, University of Bradford (2008-12) [#1]; and probabilistic weather data for future climates, with the Meteorological Office's Hadley Centre (2008-11) [#2]. **Boussabaine** is collaborating with Airbus, EADS, Manchester and Fachhochschule Köln Universities, to explore company performance using complexity analysis tools. His research on health assets is in collaboration with NHS and French institutions. **Lewis's** membership of the University's Institute for Risk and Uncertainty involves joint PhD supervision with the School of Engineering, on risk in PPP/PFI projects, and he is actively involved in the bid to the EPSRC for the Doctoral Training Centre on Risk (initial bid accepted, 2013).