

eCAADe 2014

Fusion

Volume 2

Editor

Emine Mine Thompson
Department of Architecture and Built Environment
Faculty of Engineering and Environment
Northumbria University

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eCAADe 2014

Fusion - Data Integration at its best

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Proceedings of the 32nd International Conference on Education and research in
Computer aided Architectural Design in Europe

10-12 September 2014
Newcastle upon Tyne, England
Department of Architecture and Built Environment
Faculty of Engineering and Environment
Northumbria University

Edited by
Emine Mine Thompson

Theme

Fusion- Data Integration at its best

This is the second volume of the conference proceedings of the 32nd eCAADe conference, held from 10-12 September 2013 at the Department of Architecture and Built Environment, Faculty of Engineering and Environment, Northumbria University in Newcastle upon Tyne, England. Both volumes together contain 130 papers that were submitted and accepted to this conference.

The theme of the 32nd eCAADe conference is Fusion- data integration at its best.

All quests for data integration in architecture and the construction industry lead ultimately to FUSION, a synthesis of knowledge that transcends mere combination. FUSION is the dream of a knowledge system that will enable multiple sets of data, in manifold formats, to be presented in a unified view. This conference is exploring the possibilities for advanced levels of data integration in the service of the representation and management of the natural environment, and the design, visualisation and making of the built environment. These proceedings are presenting the contributions which explore the elusive goal of FUSION in architecture and related fields.

The second volume of the proceedings contains 65 papers grouped under nine sub-themes (*Generative Design- Parametric Modelling, Material, Collaboration and Participation, VR, Spatial Analysis, Shape, Form and Geometry 2, BIM, Design Tool 2 and Smart and Responsive Design*).

Emine Mine Thompson

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Acknowledgements

Welcome to the 32nd proceedings of eCAADe in Newcastle upon Tyne, England - exactly fifteen years after the last eCAADe conference in England we are very happy to welcome you back.

The idea of bringing the eCAADe conference to Newcastle dates back to October 2010. Since then there have been many structural changes at Northumbria University and although many unexpected things took place, the conference organisation was one of the constant threads of life's tapestry during this time.

Over the last four years many people helped to make this conference possible and it is my pleasure to acknowledge and thank them here. First of all, I would like to thank all Associate Deans for Research and Innovation, initially Prof David Greenwood, and later on Prof Fary Ghassemloooy, and then Prof John Woodward who supported the idea very enthusiastically. Also a huge thanks goes to Margaret Horne (*Director of Built Environment Visualisation Centre*), Peter Beacock (*Director of Architecture*), Ruth Dalton (*Head of VRV Group*) and Kevin Thomas (*Head of Architecture and Built Environment*) for allowing time and space so that the organisation process runs smoothly and for their trust and understanding.

Secondly, the previous conference organisers Henri Achten and Rudi Stouffs passed on their experience and knowledge without hesitation - Thank you! Financial support was generously provided by Autodesk and Bentley Systems and Northumbria University.

I would also like to thank to eCAADe council. The Council was very supportive from beginning to the end and gave help with many aspects of the organisation. Both Presidents José Duarte (until 2013) and Johan Verbeke (since 2013) encouraged and gave full support during the organisation. Also, Bob Martens, as liaison with the conference host, and Nele De Meyere,

as administrative support, provided vital input.

This year, authors were *challenged* with the use of two different submission systems. Initially, for the abstract submissions we utilised the OpenConf system which ran smoothly and we thank Martin Winchester for his support on this. For the full paper submissions, Gabriel Wurzer and his team allowed us to test-drive the ProceeDings tool in its Beta version. This has been a learning curve both for the ProceeDings team and for the organisation team. Although there might still have some little issues to iron out, ProceeDings tool is a fantastic aid to the conference organiser. *A huge thanks* goes to Gabriel Wurzer, Wolfgang E. Lorenz and Gerda Hartl who worked so hard to put together these proceedings; your efforts are highly appreciated.

The call for extended abstracts generated 240 submissions. With the help of the eighty-five international reviewers, each submission was double-blind reviewed by three reviewers. 152 extended abstracts were accepted for full paper submission. Regrettably some authors withdrew from submitting the final paper and eventually 130 papers made it to publication and presentation. I thank and congratulate all the authors for their hard work and support on using the ProceeDings tool and finalizing their papers. I also owe a huge thanks to the reviewers (see the reviewers list), who volunteered their time in order to assess the submissions.

For the third year in a row eCAADe is publishing two volumes of proceedings. We believe this shows the growing interest for the eCAADe in general and also the continuing development of computing and its reflection in architecture and design education and research. This year another new approach with regards to the proceedings was evaluated: an option to provide the proceedings as either electronic copy only or both hard and electronic copy. It is our belief that this was a successful trail with the almost 50/50 divide on the request for the proceedings (*42% requesting electronic copy and 58% requesting both*).

As the chair, I had support from the organisation committee, especially James Charlton, Ruth Dalton, Andy Dunhill, Julie Clarke, Sara Walker, Bob Giddings, Minnie Fraser, David Green-

wood, Brian Agnew, and Oliver Jones. I further want to give my thanks to the Faculty Resources Team, in particular Sue Ralph and the University Event's team Shelley Brunson and Marta Pyrek for their great assistance. Since 2010 the NewcastleGateshead Convention Bureau, part of NewcastleGateshead Initiative provided excellent assistance for the conference as well.

During the conference we had session chairs who led the twenty-five presentation sessions and the student volunteers who assisted everybody throughout the conference - Thank you all!

I am also very grateful to our Keynote Speakers; Christian Derix (*Director of the Computational Design Research group of Aedas Architects*), Dr Andrew Hudson-Smith (*Director of the Centre for Advanced Spatial Analysis – CASA at The Bartlett, University College London*) and Professor Stephen Lockley (*Chair of Building Modelling at Northumbria University and Research and Education director of the BIM Academy*).

A further special thanks also goes to Robert Aish (Bartlett School of Architecture and Visiting Professor, University of Bath) and Professor Tom Maver (*Research Professor, Mackintosh School of Architecture and Emeritus Professor, University of Strathclyde*) who arranged and co-chaired the Roundtable Session on “Design Computation in Practice” with the roundtable participants; Shajay Bhooshan (*Zaha Hadid Architects*), Cobus Bothma (*Kohn Pedersen Fox*), Christian Derix (*Aedas Architect*), and Francis Aish (*Foster and Partners*) who deserves my sincere thanks and acknowledgements.

Finally I want to thank to my family for their understanding, patience and support over the last four years while I was busy with the organisation of this conference.

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Keynote Speakers

Christian Derix

Christian Derix is director of the Computational Design Research group of Aedas Architects, which he founded in 2004 in London, UK. CDR develops computational simulations for generative and analytical design processes with an emphasis on spatial configurations and human occupation. Derix studied architecture and computation in Italy and the UK and has researched and taught the subject at various European universities since 2001. Currently he is associate professor at IE University Madrid and visiting professor at the University of Sheffield. The work of CDR has recently won award commendations for their Spatial Simulation framework at awards such as the 2010 Presidents Medal for Research in Practice of the Royal Institute of British Architects (RIBA), the 2011 Italian Compasso d'Oro for algorithmic design and user participation in industrial design for the VITA Shelving System or the Centre for Tall Buildings and Urban Habitat's (CTBUH) 2012 Innovation award for the computer-activated responsive façade of the Al Bahar towers.

Andrew Hudson-Smith

Dr Andrew Hudson-Smith is Director of the Centre for Advanced Spatial Analysis (CASA) at The Bartlett, University College London. Andy is a Reader in Digital Urban Systems and Editor-in-Chief of Future Internet Journal, he is also an elected Fellow of the Royal Society of Arts, a member of the Greater London Authority Smart London Board and Course Founder of the MRes in Advanced Spatial Analysis and Visualisation at University College London. He is also course founder of the new MSc in Smart Cities and Urban Analytics and the MRes in Smart Cities. His research focus on location based digital technologies and he has been at the forefront of web 2.0 technologies for communication, outreach and developing unique contributions. His research can be found at Digital Urban website. Finally, he is Editor of the Open Journal of the Internet of Things.

Stephen Lockley

Professor Stephen Lockley is currently chair of Building Modelling at Northumbria University. From 1998-2002 he was the director of the Construction Informatics Research Centre and Chair of Architectural Informatics at Newcastle University and has worked in industry as research and development director for the RIBA (Royal Institute of British Architects) Enterprise division between 2002-2007. He has returned to academia and his work now is in the area of the next generation of computer aided construction, Building Information Modelling (BIM), in particular researching and developing innovative software tools for construction and design. He is a director of BuildingSmart UK and Ireland and sits on the British Standards Committee B555 for Construction Information. He is also research and education director of the BIM Academy.

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