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## Managing Complex Social Housing Urban Redevelopment Through Improved Project Management And Value Generation

Managing Complex Social Housing Urban Redevelopment  
Through Improved Project Management And Value Generation  
Book Of Abstracts

© Innovative Design Lab, University of Huddersfield, United Kingdom & Building Innovation Research  
Unit (NORIE), Federal University of Rio Grande do Sul, Brazil, 2016

Federal University of Rio Grande do Sul, Brazil  
16<sup>th</sup> - 20<sup>th</sup> May 2016

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Edited by:  
Patricia Tzortzopoulos  
Yufan Zhang  
Carlos Torres Formoso

# **MANAGING COMPLEX SOCIAL HOUSING URBAN REDEVELOPMENT THROUGH IMPROVED PROJECT MANAGEMENT AND VALUE GENERATION**

## **Book of Abstracts**

*Edited by*

Patricia Tzortzopoulos

Yufan Zhang

Carlos Torres Formoso

Federal University of Rio Grande do Sul - UFRGS

Porto Alegre, Brazil

16<sup>th</sup> - 20<sup>th</sup> of May 2016

Patricia Tzortzopoulos, Yufan Zhang, Carlos Torres Formoso

*(edited by)*

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# Forward

There is significant evidence that urban redevelopment programmes for social housing are often inappropriate for users' needs and fail to deliver the expected socio-economic benefits. Issues in managing such complex programmes set back economic development and directly affect the most vulnerable in society. Causes include inadequate planning; limited collaboration and excessive focus on low initial cost solutions. Improvement strategies are needed to enable better housing, infrastructure, safety and job opportunities. Better platforms for knowledge sharing will enable stakeholders to collectively understand these challenges, to improve integration between different projects, and to critically reflect on existing experiences.

This workshop will bring together Brazilian and UK early career researchers to build capacity, contributing to innovative research on such issues. The workshop will stimulate long-term collaboration to tackle this critical challenge by sharing results of previous studies and devising a research roadmap. The workshop will be focused on the complexity of social urban redevelopment programmes and social housing provision. A research roadmap for the management of complex urban redevelopment programmes and for the evaluation of social housing projects will be developed, setting out the major challenges and opportunities for improvement and better value creation for users. This includes considering the needs of target communities, which today live in conditions below minimum standards. Also, the need for a framework to support the integration of programmes that are fragmented into different projects will be discussed, including considerations of how tools such as Building Information Modelling can support the visualisation of complex urban level data.

Features of the workshop include:

- \* Keynote presentations by leading academics and by practitioners involved in the management of social housing projects and urban redevelopment programmes
- \* Early career researcher presentations on current and emerging research
- \* Group work and activities aimed at sharing knowledge and promoting international and multi-disciplinary research
- \* A collection of abstracts published as the workshop proceedings
- \* Development of outline action plans for immediate, short-term and long-term research work
- \* A research road map based on the working group discussions, inter-disciplinary work required and major challenges and opportunities.
- \* All materials delivered during the workshop will be made available as open education resources permitting no-cost access, use, adaptation and redistribution by others.

The workshop is being coordinated by Professor Patricia Tzortzopoulos Fazenda (University of Huddersfield, UK) and Professor Carlos Formoso (Federal University of Rio Grande do Sul, Brazil) and will have contributions from other leading researchers, including Professor Mike Kagioglou and Professor Lauri Koskela (University of Huddersfield, UK), Dr Luciana Miron and Dr Eduardo Isatto (Federal University of Rio Grande do Sul, Brazil).



# Acknowledgements

As the coordinators of this International Workshop, we would like to acknowledge the support received from different organisations and individuals. The funding received from the British Council Newton Researcher Links Programme was essential to enable the realisation of the workshop. This element of the Newton Researcher Links is designed to provide financial support to bring together a UK and a partner country bilateral cohort of early career researchers to take part in workshops, focussing on building links for future collaboration and enhancing the researchers' career opportunities. The programme is supported by the UK government and partner country funding, and forms part of the Newton Fund. We extend our deepest gratitude towards them in supporting this exciting activity. Our thanks also go to the members of the British Council Researcher Links team for their timely responses for all our queries and being supportive whenever we needed advice.

We also would like to thank FAPERGS (Foundation for the Support of Research in the State of Rio Grande do Sul), Brazil, which is the Brazilian funding agency that provided support from the Brazilian side for the Research Links Workshop.

We want to acknowledge the support we received from our mentors during the development of the workshop and its implementation phases: Prof. Mike Kagioglou & Prof. Lauri Koskela from the Innovative Design Lab at the University of Huddersfield, UK, and, Dr Luciana Miron and Dr Eduardo Luis Isatto from NORIE, Federal University of Rio Grande do Sul, Brazil. Their commitment towards the workshop activities and for being mentors during the forthcoming post workshop phase is particularly acknowledged.

Further, we want to acknowledge the support and encouragement that was received from Prof. James Barlow, Chair in Technology and Innovation Management at Imperial College London, and Prof. Luiz Carlos P. Silva Filho and Prof. Luiz Bressani, from the Department of Civil Engineering at UFRGS, who provided keynote speeches at the event. We would also like to acknowledge the support received from Prof Marcio Valença, from the Department of Public Policy at the Federal University of Rio Grande do Norte, for his support during the workshop activities.

We would also like to thank the following people who have given their time in supporting a panel discussion during the workshop: Tiago Holzmann, from IAB/RS (Institute of Brazilian Architects – State of Rio Grande do Sul); Jair Fernando Niño Porto Alegre, Coordinator of the Executive Management of Housing in Porto Alegre / RS from Caixa Econômica Federal (National Savings Bank); representatives from Porto Alegre City Council (PMPA) and DEMHAB (Municipal Department of Housing), and Nívea Oppermann from WRI Brasil Cidades Sustentáveis.

We have received help and support from a number of people and organisations. The efforts involved with a workshop of this scale are significant and it would not have been possible to organise this workshop without their assistance. We particularly would like to extend our appreciation to Dr. Yufan Zhang from the Innovative Design Lab at the University of Huddersfield - UK, for leading all organisational aspects of the workshop including the logistical and other administrative activities around the workshop. We want to thank our colleagues who worked very hard for the professional undertaking of the work involved in the tasks that are so often unseen and unrewarded for an international workshop of this scale. For that we thank Sharon Baines and Sophie Phillips from University of Huddersfield, and Rosana Dal Molin, from NORIE/UFRGS.

Finally, we would like to thank all the participants from Brazil and the UK for their active participation at the workshop and for their positive commitments towards the post workshop activities. Without the enthusiasm of its participants, workshops will never be successful.

**Professor Patricia Tzortzopoulos Fazenda & Professor Carlos Torres Formoso**  
*Coordinators of International Workshop the Managing complex social housing urban redevelopment through improved project management and value generation*

# Workshop Organisation

## Organised by

British Council Newton Fund Researcher Links

Innovative Design Lab, University of Huddersfield, United Kingdom;

Building Innovation Research Unit (NORIE), Federal University of Rio Grande do Sul, UFRGS, Brazil

## Organising committee

*Innovative Design Lab at School of Art Design and Architecture, University of Huddersfield*

Professor Patricia Tzortzopoulos

Professor Mike Kagioglou

Professor Lauri Koskela

Dr Yufan Zhang

Ms Sharon Baines

*Building Innovation Research Unit (NORIE) at School of Civil Engineering, Federal University of Rio Grande do Sul*

Professor Carlos Torres Formoso

Dr Luciana Miron

Dr Eduardo Luis Isatto

Ms Rosana Dal Molin



## British Council Newton Fund Researcher Links

The Newton Fund promotes the economic development and welfare of poor people in partnering countries, through science and innovation partnerships. It aims to strengthen science and innovation capacity and unlock further funding to support poverty alleviation. It is managed by UK's Department of Business, Innovation and Skills, and delivered through 15 UK delivery partners in collaboration with 15 partner countries. The Newton Fund was launched in 2014 and originally consisted of £75 million each year for 5 years. In the 2015 UK Spending Review it was agreed to extend and expand the Fund. The Newton Fund was extended from 2019 to 2021 and expanded by doubling the £75 million investment to £150 million by 2021, leading to a £735 million UK investment to 2021, with partner countries providing matched resources within the Fund. The funding covers activities in three broad categories:

- \* People: increasing capacity for science and innovation in partner countries.
- \* Research: research collaborations on development topics.
- \* Translation: creating collaborative solutions to development challenges and strengthening innovation systems.

For more information visit: [www.newtonfund.ac.uk](http://www.newtonfund.ac.uk) and follow via Twitter: @NewtonFund

### BRITISH COUNCIL/HIGHER EDUCATION INTERNATIONAL UNIT PROGRAMMES

The Newton Fund is working with the Higher Education International Unit and national co-funders to run programmes in the six areas outlined:

- \* **Researcher Links** (under an overarching Researcher Mobility programme run alongside the Academies)  
Workshops and travel grants for research visits, with a focus on early career researchers.
- \* **Institutional Links**  
Grants for establishing links between higher education, research institutions and businesses with the aim of translating research to drive economic development and social welfare in partner countries.
- \* **PhD programme**  
Facilitating the capacity building of individuals, and the building of sustainable, long-lasting links between UK and overseas institutions, through PhD scholarships, placements, and partnerships.
- \* **Professional development and engagement**  
Building the skills of researchers in areas such as communication and research management, as well as supporting good research governance, community and policymaker engagement.
- \* **Science, Technology, Engineering and Mathematics (STEM) education**  
Supporting STEM education through a variety of mechanisms such as the development of teaching resources or piloting new initiatives.
- \* **Technical training and employability**  
Workforce planning and development for technical and vocational training in the research and innovation sector.

# *University of* **HUDDERSFIELD** **School of Art, Design and Architecture**

## **About the Innovative Design Lab**

The Innovative Design Lab (IDL) is an interdisciplinary research centre/laboratory at the University of Huddersfield. The lab conducts theory based and applied research generally into product design, and especially in the built environment, pushing the impact of design thinking and practice to new areas. It cuts across the areas of architectural design, construction management, interior design, new product development, engineering, social sciences and healthcare.

Our research focuses on solving real world problems through design innovation, mobilising the underlying theories as well as the enabling processes and technologies needed to deliver value to users and the society at large. Our research is developed closely with diverse public and private sector organisations to propose novel solutions to design challenges and project based problems. We offer Undergraduate, Masters and PhD programmes that are future focused and informed by the state of the art in research and practice.

### **Vision**

Our vision is for increasing the value of design whilst reducing costs, enabling the society to benefit from high quality environments and products that are supportive of users needs and activities. This vision will be achieved through scholarly research and industrial engagement. More specifically, the potential of design innovation, collaboration, co-design and lean strategies to improve design and production processes and products will be examined.

### **Objectives**

- \* To advance theory and methods of design and of cognate areas
- \* To undertake solution-driven research with a global reach, addressing current challenges and enabling ideas to flow across disciplinary boundaries
- \* To produce outcome driven, internationally leading research outputs of relevance, impact and rigour
- \* To become an external relations centre for strategic partnership building, developing networks for collaboration in research and teaching, sharing expertise nationally and internationally

### **Contacting IDL**

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**School of Civil Engineering**

## About the Building Innovation Research Unit (NORIE)

Núcleo Orientado para a Inovação da Edificação (NORIE) is a research unit that is part of the Postgraduate Program in Civil Engineering, School of Engineering, at the Federal University of Rio Grande do Sul (UFRGS), located in Porto Alegre, State of Rio Grande do Sul. NORIE was founded in 1978, and is currently one of the most prestigious research groups in the field of Construction Engineering and Management in Brazil. Around 70 researchers work at NORIE, including academic staff, research fellows, doctorate and master students, and undergraduate research trainees.

The Construction Management and Economics Group (GEC) is part of NORIE, and currently has over 20 researchers. The research developed by GEC involves a wide range of topics, which are concerned with improving the performance of the Construction Industry in a comprehensive way, such as design and management of production systems, value management, social housing, health and safety, and health care infrastructure. In recent years several research studies on the management of value in social housing projects have been developed, including assessments of existing housing projects and programs. A major concern at GEC is to build a robust theoretical framework which can enable learning of new management concepts developed in other sectors (e.g. manufacturing, health care), as well as the transfer of knowledge between different contexts. Most research projects are carried out in partnership with external partners, such as government departments, construction companies, design offices, material and component manufacturers and industrial organizations. GEC has participated intensively in several research networks, including the International Group for Lean Construction (IGLC) and ANTAC (National Association of Built Environment Technology).

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# Meet the Team

## Coordinators

*Professor Patricia Tzortzopoulos Fazenda*, Director of Innovative Design Lab, Head of Department Architecture and 3D Design, University of Huddersfield, United Kingdom

*Professor Carlos Torres Formoso*, Post Graduate programme in Civil Engineering, School of Civil Engineering of Building Innovation Research Unit (NORIE), Federal University of Rio Grande do Sul, Brazil

## Mentors

*Professor Mike Kagioglou*, Member of Innovative Design Lab, Dean of School Art, Design and Architecture, University of Huddersfield, United Kingdom

*Professor Lauri Koskela*, Member of Innovative Design Lab, Lead of Lean Construction, University of Huddersfield, United Kingdom

*Dr Luciana Miron*, Member of Building Innovation Research Unit (NORIE), Associate Professor of School of Architecture, Federal University of Rio Grande do Sul, Brazil

*Dr Eduardo Luis Isatto*, Member of Building Innovation Research Unit (NORIE), Associate Professor of Federal University of Rio Grande do Sul, Brazil

## Coordinator



### **Professor Patricia Tzortzopoulos Fazenda**

**Position:** Head of Architecture and 3D Design

**Institution:** School of Art Design and Architecture, Huddersfield University

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### ***Biography***

Patricia Tzortzopoulos Fazenda is an architect with industrial experience in collaborative design integration and management. Her career encompasses design, architecture, new product development and the built environment, with a focus on multidisciplinary, integration between design and construction and collaborative working, and value generation through design development. Patricia's PhD was awarded in 2004 by the University of Salford, and focused on the design and implementation of product development process models in construction companies. She has developed and lead the MSc BIM and Integrated Design, launched in 2011. Following, she became Director of the Design and Property Management Directorate at the School of the Built Environment.

Patricia has been engaged in a number of funded research projects examining the design process, focusing on healthcare design and value generation, design front-end issues, requirements management, and the effects of design into health outcomes. She has also developed research in collaborative and integrated design, the synergies of lean and BIM, and on the adoption of BIM in design and construction firms. Patricia's more recent work focuses on the adoption of BIM to support better design decision making and value generation through design.

Patricia is a member of the International Group for Lean Construction (IGLC), and has been engaged in the organisation and editorship of its conferences. Patricia has an international network of academic collaborators and close links with Brazilian Higher Education Institutions. She has authored over 100 research publications including one book, book chapters, refereed journal papers, research reports and conference papers. Patricia has successfully supervised a number of PhD students, and has acted as examiner for a number of PhD and master thesis in diverse institutions in the UK and overseas. She also acts as a referee in diverse scientific journals and international conferences.

## Coordinator



### **Professor Carlos Torres Formoso**

***Position:*** Professor of Construction Management

***Institution:*** School of Civil Engineering, UFRGS

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### ***Biography***

Carlos Torres Formoso, Ph.D. is a Professor in Construction Management at the Federal University of Rio Grande do Sul (UFRGS), Brazil. He has a degree in Civil Engineering (UFRGS, 1986), M.Sc. in Construction Management (UFRGS, 1986), and Ph.D. (University of Salford, 1991). He has been a senior advisor of the Brazilian Ministry of the Cities for the National Program for Quality and Productivity in the Habitat for eleven years. In addition, his main research interests are production planning and control, performance measurement, safety management, and clients requirement management in housing. Also, he has developed several research projects in partnerships with construction companies on the implementation of Lean concepts and tools. This includes the Last Planner System, performance measurement, production system design, safety management, and mass customization. Professor Formoso is a member of the editorial boards for the following journals: Architectural Engineering and Design Management, Journal Built Environment Project and Asset Management, Construction Economics and Building, Engineering Construction and Architectural Management, Journal of Construction in Developing Countries, Lean Construction Journal, and Ambiente Construído (Brazil).

## Mentor



### **Professor Michail Kagioglou**

***Position:*** Dean of Art Design and Architecture

***Institution:*** School of Art Design and Architecture, Huddersfield University

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### ***Biography***

Dean of Art, Design and Architecture at the University of Huddersfield since November 2013. He was previously the Head of the School of Built Environment at Salford University. Michail (Mike) was the Director of the £8M EPSRC (Engineering and Physical Sciences Research Council) Salford Centre for Research and Innovation (SCRI) in the built and human environment and the Academic Director for the £11M EPSRC funded interdisciplinary IMRC in Health and Care Infrastructures Research and Innovation Centre (HaCIRIC) for Salford University. He has published more than 150 academic referred papers, many industrial reports and two books. Mike has taken part in international evaluations and consultancy activity. Mike was the international lead for New Product Development for the International Group for Lean Construction and he is recently researching Benefits Realisation in a number of sectors. He is a Fellow of the Higher Education Academy (HEA), Fellow of the Royal Institute of Chartered Surveyors (RICS) Fellow of the Chartered Institute of Building (CIOB) and Senior Associate of the Royal College of Medicine (RAM).

## Mentor



**Dr Luciana Miron**

***Position:*** Associate Professor

***Institution:*** School of Architecture, UFRGS

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### ***Biography***

Graduated in Architecture and Urbanism at the Federal University of Rio Grande do Sul (1994), master's (2002) and doctorate (2008) at the Graduate Program in Civil Engineering from the Federal University of Rio Grande do Sul. Associate Professor at the School of Architecture (since 2006) and the Graduate Program in Urban and Regional Planning (since 2011) of the Federal University of Rio Grande do Sul, Postdoc at the University of Huddersfield / UK under the guidance of Professor Lauri Koskela (2014-2015). She served as a counselor in the Council for Economic and Social Development of the State of Rio Grande do Sul (2013-2014). She has experience in the area of Architecture, Engineering and Construction, with emphasis on Design Process Management, acting on the following topics of research: marketing applied to the construction, client requirements management, value generation, perceived value, evaluations of social housing projects, development process product, management and development of urban and regional projects.

## Mentor



### **Professor Lauri Koskela**

**Position:** Professor of Construction and Project Management

**Institution:** School of Art Design and Architecture, Huddersfield University

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### ***Biography***

Professor Lauri Koskela is an expert in lean construction, an area he has advanced since 1991. He is a founding member of the International Group for Lean Construction. His research has focused especially on the underlying theories of production management, design management as well as project management.

Since 2005, he has researched theory of design. He has promoted the view that design theorizing started already in Antiquity, with the method of analysis (from geometry) and rhetoric as the first models of design by analogy. It is contended by him that these two models still provide a superior understanding on design.

Lauri joined the University of Huddersfield in October 2014. Previously he worked at the University of Salford as Professor of Lean, Theory Based Project and Production Management. Prior to that he was involved in applied research at VTT Technical Research Centre of Finland.

With more than 7800 citations according to Google Scholar, Lauri is one of the most cited scholars in construction management and allied fields.

Lauri Koskela's current research interests cover:

- Lean construction
- Target value design
- Visual management
- Construction production management
- Design management
- Theory of design
- Theory of production
- Relevance of managerial research

## Mentor



**Dr Eduardo Luis Isatto**

***Position:*** Associate Professor

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### ***Biography***

Professor Eduardo Isatto is Associate Professor at the Federal University of Rio Grande do Sul and a member of the Building Innovation Research Unit (NORIE/UFRGS) since 1997. During this time he has been deeply involved in research on the application of lean production to the context of construction industry. His research have included a wide range of different fields as project management, production systems design, procurement and supply chain management, production processes development, quality and cost management, and ICT/BIM. Eduardo has taken part in a number of national and international research projects aiming at productivity and quality improvement of the built environment, and published about 50 academic referred papers, 4 book chapters, and co-authored two books. His teaching experience includes post graduate courses in Brazil, Uruguay, Paraguay and Colombia, as well as international courses on construction project management to students from USA, Turkey, Israel and Brazil. He is the Finance Director of the National Association of the Built Environment (ANTAC), in Brazil.

# Features of the Workshop

## Keynote speakers

The workshop includes the following keynote speeches:

Prof Lauri Koskela:	The Management of Complex Projects
Prof. Márcio Valença:	Social Housing and Urban Development in Brazil
Prof. Carlos Formoso:	Value Generation in Social Housing Developments
Prof. James Barlow:	Lessons Learned from Healthcare Complex Projects
Prof. Mike Kagioglou:	Benefits Realization
Prof. Luiz A. Bressani &	
Prof. Luiz C. P. Silva Filho:	Disaster Risk Management in Urban Areas in Brazil
Prof. Patricia Tzortzopoulos:	Evidence-based design

## Site visit to PIEC and Minha Casa Minha Vida

The workshop programme includes a site visit to PIEC which is a Porto Alegre's City Entrance Integrated Programme. This urban development programme has been ongoing for over 10 years with extensive research by NORIE. The second part of the day will involve a visit to a Minha Casa Minha Vida project.

## Facilitated participant presentations sessions

Each participant will present their work to the other delegates and provide an overview regarding their current research interest and expertise. The presentation will be based on the abstract submitted and included within this book. The session will also be an opportunity to identify links to other work, and get constructive feedback from the participants. All presenters will use the PechaKucha format for their presentation. This is a simple presentation format where you show 20 images, each for 20 seconds. The images advance automatically and you talk along to the images.

## Development of the research roadmap

A research roadmap for the management of complex urban development programmes and for the evaluation of social housing will be developed, setting out the major challenges and opportunities for improvement and better value creation for users. This includes considering users needs for social change in communities which today live in conditions below minimum standards. The roadmap will set out actions for the short, medium and long-term research work and capacity building. It will also establish specific measurement criteria e.g. health improvement; safety which will be discussed with practitioners and funding agencies. Also, the need for a framework to support the integration of fragmented projects will be discussed, including considerations of how tools such as Building Information Modelling can support the visualisation of complex urban level data.

## Skills development sessions

*Skills development:* This session will encourage ECRs to consider challenges associated with multi-discipli-



nary working, as well as the advantages and issues in prescriptive and descriptive research

*Obtaining funding and support for research:* Good practices that need to be adhered to when applying for research grants will be discussed.

## **Panel discussions**

*Challenges and current landscape of urban development projects in Brazil:* an expert panel to lead a discussion about the recent development of social housing and urban projects in Brazil. Tiago Holzmann, from IAB/RS (Institute of Brazilian Architects – State of Rio Grande do Sul); Jair Fernando Niño Porto Alegre, Coordinator of the Executive Management of Housing in Porto Alegre / RS from Caixa Econômica Federal (National Savings Bank); representatives from Porto Alegre City Council (PMPA) and DEMHAB (Municipal Department of Housing), and Nívea Oppermann from WRI Brasil will join an expert panel discussion.

*Pathways to impact:* There will be discussions on pathways to impact led by Prof Formoso and Prof Kagioglou.

*Developing your research profile:* Individuals will outline their career stage, what their aspirations are and how they aim to develop their career. Mentors will facilitate focusing on how ECRs can improve their profile.

## **Open educational resources**

All information delivered at the workshop will be made available as open resources through a dedicated project website, which will permit no-cost access beyond the workshop members. This will support the access and use of the information by a much wider community of ECRs, as well as other interested parties.

## **Social events**

An important aspect of the workshop is getting to know different people working in this research area, in particular to encourage future UK and Brazil collaboration. The workshop programme includes several social events. Participants will have the opportunity to taste a typical *a churrasco* (Brazilian Barbecue), and experience some of the 'gaúcho' culture.



## **PARTICIPANT BIOGRAPHIES AND ABSTRACTS**



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### ***Biography***

Dr. Amal Abuzeinab is VC2020 Lecturer in Architecture with specialism in low/ passive energy design at the Leicester School of Architecture. Funded by EPSRC, Amal has awarded her PhD in 2015 from University of Salford. Her thesis title was Implementing Green Business Models in the UK Construction Industry: Opportunities and Challenges. Amal has MSc in Architecture from the Robert Gordon University (2010) and BSc Hons in Architecture (2004) from University of Khartoum. Prior to this appointment, Amal was a KTP associate at University of Bradford to develop an innovative, multi-criteria analysis and decision framework for sustainable social housing. Amal current research focuses on low/passive design in architectural education, green business models, health and wellbeing in relation to housing, and performance-in-use of social housing. Amal enjoys teaching and organising events for students specially PhD students.

## **UNDERSTANDING SOCIAL HOUSING BUSINESS MODELS IN RELATION TO SUSTAINABILITY**

### **Abstract**

The social housing sector has a major role to play in contributing to the UK social, environmental, and economic sustainability because it contains the largest number of professionally managed properties. Previous studies have focused on drivers and barriers to sustainability including regulation, market, and financial issues. However, studies investigating the role of business models in delivering sustainability within the social housing are rare. The aim of this study is thus to examine the role of business models on sustainable housing and to explore innovative business models that can stimulate the uptake of sustainable housing within the sector. The study uses the business model as an analytical tool to understand the current practices of sustainability within the social housing sector. Five elements of the business model are identified: green value proposition; target group; key activities; key resources; and financial logic. Evidence will be collected from housing associations addressing sustainability across the UK to substantiate the arguments through case studies. The research findings will help to demonstrate to housing practitioners the business potential of sustainable housing and to guide how innovative business models can help hasten the uptake of sustainable housing within the sector.

**Keywords:** Business model, innovation, social housing, sustainability, UK

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**Biography**

Caterina studied Design History as an undergraduate, Cultural Studies as a postgrad and has taught history, theory and studio in Art & Design departments for over 20 years. Currently writing up her PhD, looking at the 1951 Festival of Britain celebrations in York and Liverpool. These cities used the festival as a catalyst to consolidate their post-war identities of place, by restoring, preserving or designing buildings of significance.

She is a member of the following Research Groups at Huddersfield; IDL Innovative Design Lab, CUDAS Centre for Urban design, Architecture & Sustainability and ABIS Academy for British and Irish Studies She is currently working on a Collaborative Venture with Dr Ertu Unver and Healthy Step (Sensograph).

**WHAT DO THEY THINK? A POTENTIAL RESEARCH METHODOLOGY  
FOR UNDERSTANDING IDENTITIES OF PLACE  
FROM A COMMUNITY PERSPECTIVE****Abstract**

This research speculates that bringing together established and emerging research methodologies from brand ethnography, product design and community history could be beneficial to researchers working to understand communities' relationships to place making and the unmaking of place.

The user as consultant or subject for observation is not new. Sensorial ethnographic data capture (Pink, 2013) and user-centered research methodologies for co-design are rich, efficient ways of capturing, interpreting and applying real-world strategies for responsive design iterations; work by Cooper & Press, IDEO, RCA and Huddersfield University Product Design students and staff attest to this.

In the field of community history, collaboration known as co-production enables data capture strategies and their outcomes to become anterior to the historian (Lloyd & Moore and Pente et Al, 2015). A given community can negotiate what the outcome of their participatory research will be, e.g. digital oral histories, an exhibition, a publication.

So what might this hybrid methodology look like? Researcher(s) could brief the user-community as to what they need to find out, but the methodology and output be negotiated between the parties involved. Researchers may need to re-present the data in alternative formats for post research analysis, for clients and other audiences.

Academics and agencies working with(in) any community bring ethical parameters in to play. Some ethical and social issues can be anticipated but others may emerge and will need to be responsively negotiated and reflected upon (Banks & Manners, 2012).

Within a built environment context where place making or unmaking data is sought from a user-community, a research methodology that melds co-design and co-production might be more efficacious than more common methodologies such as observations, questionnaires, focus groups or interviews. It is hypothesized that this hybrid methodology could empower the subject to communicate with less constraints, allowing for richer and thicker meanings to emerge.

*Keywords:* Identity of place, co-production, participatory research, communities



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### Biography

Reader in Urban Design in the School of Art, Design and Architecture of the University of Huddersfield and Departmental Leader for Internationalisation. I've got the PhD (2006) in Building Engineering/Architecture EU at the University of Pavia (Italy), where I previously graduated. Assistant Professor in Architecture and Urban Design at the University of Pavia (2008-2014), I mainly lectured in the PGT Double Degree Programme jointly organised with Tongji University of Shanghai (2009-2014). Adjunct Professor at Politecnico di Milano (2010-2014) and Visiting Professor at the University of Seville (2014). I have been co-investigator and PI in research projects (Prin2007, Prin 2009, Ergon) and other international activities including international design workshops (China, UAE, Poland, Brazil), Erasmus+ exchanges, EU Long Life Programmes etc. I have authored a number of publications in the area of architecture and urbanism, and I have co-curated exhibitions as the one on Chinese architecture at La Triennale of Milan (2012) as well as the East-West China exhibition at Huddersfield Art Gallery (2016). Referee for a number of journals and research bodies, I am Associate Editor of the Urban Planning and Development Journal (ASCE) and Member of the British Council Science Research Reviewer Panel.

## URBAN QUALITY ASSESSMENT AND SOCIAL HOUSING: THE PIEC CASE STUDY IN PORTO ALEGRE

### Abstract

The paper deals with measuring quality in planning. It specifically refers to methodological frameworks for assessing planning outcomes in terms of urban design and the built environment features, set in the broader context of urban sustainability.

As a matter of fact many newly built social housing neighborhoods are not fitting dwellers' needs and aspirations, even if there is not a lack of "urban sustainability" as currently defined through most accredited assessment tools. Moreover, there is large evidence of "poor design" quality and other issues in housing units and/or neighborhood scale. The research goal is to define a methodological framework and an adaptive tool to assess urban quality, so that to find potential connections with dwellers' preferences and well-being.

A number of researches/best practices have been already delivered to support planning process and its implementation, especially at the quarter/neighborhood scale (Socco, 2003; Scussel, 2007; Delsante and others, 2007). The research refers to those based on a number of indicators, usually grouped in different categories/dimensions, and including quantitative and qualitative features. The evaluation of each indicator

is based on scores that can be then aggregated and weighted into indices. The overall Urban Quality index corresponds to the weighted sum of indicators and indices (OCS et al., 2002).

The presentation highlights the conceptual and methodological framework the research refers to, together with challenges and potential for improvement.

The computation methodology allows the intersection of expert led assessment (top-down process) and community led consultations (bottom-up process): dwellers' perception and preferences can be taken into consideration through indices weighting (Scussel, 2007). Post Occupancy Evaluation data (Miron et al., 2008; Delsante and Miron, 2016) could be also used with a similar goal: that is why the methodology has been adapted and tested on PIEC social housing interventions in Porto Alegre (Brazil).

*Keywords:* Urban Design, Social Housing neighborhoods, Urban Quality assessment



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**Biography**

Nuwan is a Researcher at the Global Disaster Resilience Centre, School of Art, Design and Architecture, University of Huddersfield. Nuwan completed his PhD in Urban Design at the School of Art, Design and Architecture, University of Huddersfield in 2015. Before begin his PhD, he completed his MSc. in Urban Design at the University of Salford, UK in 2011. He obtained his first degree from University of Moratuwa, Sri Lanka in Town & Country Planning. Nuwan has actively engaged in several EU funded projects which addressed disaster resilience and management issues in post disaster reconstruction and disaster resilience education. Prior to that Nuwan worked as a Project Coordinator at the Faculty of Architecture, University of Moratuwa, Sri Lanka and engaged in several urban development projects.

**DEVELOPMENT OF A COMMUNITY EMBEDDED  
SUSTAINABLE URBAN DESIGN PROCESS FRAMEWORK  
FOR NEIGHBOURHOOD CONTEXT, UK****Abstract**

Today, urban design plays a key role in the creation of sustainable urban environments in terms of the ‘triple bottom line’, that encompasses the three dimensions of life—economics; social and environmental sustainability. Even though urban design has a wider scope for achieving sustainability on all its three fronts, the current process of urban design has often become an obstacle to attaining this scope.

The current urban design process is top-down, i.e., generally the urban designers or planners design the urban environment and at a later stage the community may have some involvement. There are serious criticisms of this process, as it may not touch the “ground” level community, and therefore, there is a serious risk these projects will fail to create sustainable environments. Accordingly, in order to overcome the drawbacks of the current top-down process, researches have discussed implementing a bottom-up process. A bottom-up urban design process will give prominence to the local community in the urban design process. However, it is found that the bottom-up urban design process has its own negative features, which can adversely affect the creation of sustainable urban designs.

In the meantime, it is discovered that the current top-down urban design process has many positive features which can positively assist for the creation of sustainable urban designs. Accordingly, it is illustrated that neither the current top-down process nor the suggested bottom-up process will address the critical issues for achieving the current scope of urban design and, therefore, a ‘balanced’ community embedded urban design

process was required to overcome the current research gap. Accordingly, based on two live neighbourhood urban design projects in North West England this research developed a new community embedded urban design process framework to replace the current standard top-down process to produce sustainable urban design solutions in a neighbourhood context in UK.

*Keywords:* Community embedded, top-down, bottom-up, sustainable urban design

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**Biography**

Dr Effiness Chipiliro Mpakati Gama is a lecturer and researcher at Edinburgh Napier University in the School of Engineering and the Built Environment specialised in Construction Management Practice and Theory. She teaches undergraduate and postgraduate modules (Strategic Management, Construction Project Management, Production Management and Construction Management) covering a number of contemporary issues affecting the construction industry. Effie studied Architecture at University of Malawi and attended several postgraduate studies on Urban Housing Management at the Institute for Housing Studies in Rotterdam (Netherlands), Organised Self Help Housing Management in Costa Rica conducted by Swedish Lund University, Environment and Development Masters programme at University of Edinburgh and a PhD programme at Edinburgh Napier University. Her research interest in promoting use of economically, environmentally and socially friendly building materials and processes for urban social housing production led to her PhD research to analyse embodied energy and carbon emissions of urban housing materials and processes in Malawi. Her research and other works are evidenced in various journals and conference proceedings. Before joining the academia, Effie worked for the Malawi Housing Corporation for over 10 years designing and supervising construction of social housing. She also worked with private consultants and run her own ALPRI construction company.

**SUSTAINABLE CONSTRUCTION IN SUB-SAHARAN AFRICA:  
LIFE CYCLE EMBODIED ENERGY AND CARBON ANALYSIS OF  
URBAN RESIDENTIAL BUILDINGS IN MALAWI****Abstract**

Urban population increase due to urban-rural migration as well as natural population rise has led to escalated urban shelter and materials' demand in developing countries. Malawi, statistics indicate that houses built of kiln baked bricks (KBBs) are escalating, hence, consumption of wood for baking the bricks despite policy maker's proposals to use alternative materials and curb deforestation. Evidence shows that wood depletion is associated with environmental effects including global climate change. Ironically, the proposed alternatives (solid cement blocks (SCBs), stabilised soil-cement blocks (SSBs) and concrete blocks (CBs)) also contribute to environmental impacts due to raw materials' production processes involved. Considering few studies have been conducted in this area in Malawi, embodied energy and carbon emissions were used as parameters for evaluating and comparing environmental impacts to aid selection of materials and processes for social housing development. A process inventory analysis method, whose data was obtained from empirical and desk surveys, was used to obtain inventories of conventional (burnt bricks) and alternative

masonry materials and their processes. While a functional unit of 1m<sup>2</sup> wall was used to calculate unit energy and carbon emissions, a 70m<sup>2</sup> standard social house was used to compare the impacts of an entire house. Based on the findings, a KBB house had a highest value of 10.5tCO<sub>2</sub> while the SSB house had the lowest (4.7tCO<sub>2</sub>) when using cement mortar. Contrary, a CB house has the highest value of 105.5tCO<sub>2</sub> compared to 96.2tCO<sub>2</sub> of a KBB house when using lime mortar. The results demonstrate that carbon emissions of urban dwellings vary extensively due to masonry materials and binder used. Accordingly, both factors need to be considered when addressing global warming impacts. The study established a basis for decision making for designers and policy makers but also calls for further investigations on other building materials' impacts in Malawi and beyond.

*Keywords:* Building materials, Embodied carbon and energy, Malawi, Social housing

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**Biography**

Ezri is a Research Assistant in the Global Disaster Resilience Centre, University of Huddersfield, UK. He finished his PhD in Disaster Management and Infrastructure Reconstruction at the University of Salford in 2015, under the supervision of Professor Dilanthi Amaratunga and Professor Richard Haigh.

His thesis, entitled as 'Evaluation of the Local Government Capacity in the Maintenance of Post-disaster Road Reconstruction Assets', highlights the need to maximise the value of investment made in the reconstruction of road infrastructure sector in a post-disaster context through preparation of proper maintenance plan and improving the capacity of the local government. He also holds a master degree in Construction Management from the University of New South Wales, Australia, and a Bachelor degree in Civil Engineering from Trisakti University, Indonesia.

Ezri's research interests include disaster management, infrastructure reconstruction and international development. He seeks the opportunity to have a joint collaboration with other researchers and professional from the industry. Prior to his academic career, Ezri spent his professional time working with various international donor organisation including GTZ and UN HABITAT in a number of post-disaster reconstruction project in Aceh and West Sumatra, Indonesia.

**EVALUATION OF LOCAL GOVERNMENTS CAPACITY  
IN THE MAINTENANCE OF POST-DISASTER ROAD  
RECONSTRUCTION ASSETS****Abstract**

Road infrastructures play an important role in the economic improvement of the community in the surrounding area. Road transport disruptions are also suggested as the critical constraints to providing effective and efficient responses in an emergency, which may result in high transport costs and procurement lead times. As road infrastructure is amongst the top priority in a post-disaster recovery and require a significant value of investment, the study evaluates the capacity of the local government in maintaining the road reconstruction assets. Three districts in Aceh were included as the case studies. Semi-structured interviews were conducted with high-level officials, policy makers, and the stakeholders of post-disaster road infrastructure reconstruction at the national, provincial, and the local level as the primary data collection methods. The findings suggest that the road infrastructure was generally neglected from maintenance. The local governments of the case studies lacked the preventive maintenance culture, and their general responses to

preserve the road infrastructure were to postpone the maintenance need by using the more expensive high standard pavement types (HMA) and to repair the roads when they have broken. This condition was affected by a number of internal and external factors. The local political condition, the socio-economic condition, the conflict of authorities between government agencies involved in road maintenance, and the poor financial capacity of the districts, were exacerbated by the poor capacity of the road authorities' personnel. A framework for the reconstruction and maintenance of road infrastructure assets was also suggested indicating the different phases of road infrastructure life cycle in a post-disaster context.

*Keywords:* post-disaster, infrastructure reconstruction, local government, road maintenance

**Dr. Helena Rivera**

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**Biography**

Dr Helena Rivera is a Research Assistant at ESALA University of Edinburgh and Visiting Lecturer at Greenwich University. Helena studied Architecture at the Bartlett, UCL (BSc) and The Royal College of Arts (MA). She is a professionally qualified in Architecture (ARB, RIBA) and worked for over four years at Alsop Architects on the Rotterdam Masterplan and the West-Bromwich Lottery-funded arts centre, 'The Public'. Helena is founder and Director of A Small Studio, an architecture and planning practice based in London working on a range of built and speculative projects.

Helena's research focuses on large-scale housing projects and sustainable communities. She obtained her PhD in Planning in 2015 at the Bartlett School of Planning (UCL) with a Collaborative Doctorate Award (CDA) funded by the Arts and Humanities Research Council (AHRC). She taught Landscape Architecture and Urbanism in Kingston University between 2006-2013 and is currently leading an Undergraduate Architecture Unit at Greenwich University. Helena has received funding for research from the Arts and Humanities Research Council, the National Endowment for Science Technology and Arts (NESTA) and is currently a member of the International research team Medellín Urban Innovation working within a Newton Institutional Links Grant from the British Council.

**MEDELLIN URBAN INNOVATION #MUI****Abstract**

In 2013 Medellín, Colombia was acclaimed the most innovative city in the world by the Urban Land Institute. The city has pioneered innovative forms of planning and management. However, initial studies of this planning approach shows there are areas in critical need of further studies. In relation to the core theme of this workshop I propose to present a discussion focused on issues related to equity in terms of habitat conditions.

In Medellín, low-income developments are replicating high-rise models which failed worldwide. Ongoing development has little regard for topography, ecological considerations, and the quality of the public realm. Although Colombia is experiencing a period of rapid economic growth and urbanisation, it remains one of the most socially unequal countries in Latin America, a condition evident throughout Medellín.

This research questions to what extend environmental and urban policies and citizen empowerment are helping to increase social equity and wellbeing in the city, addressed through meeting the following objectives:

1. Identify policy, institutional and socio-economic constraints and barriers that affect the development of the city
2. Identify instruments in the current planning legislation and guidance that allow the issues identified to be addressed
3. Identify and engage the appropriate stakeholders and forms of partnership that may implement pilot projects in each of the areas of concern
4. Conduct issue-specific scoping studies into: city centre renewal including management of heritage and cultural values; environmentally and socially appropriate location of new developments; appropriate forms of housing; public realm improvement, accessibility and connectivity; and informal area upgrading and social integration

A key objective of MUI is to establish a knowledge exchange and training programme. It will build capacity in Colombian universities through the upskilling of existing and new staff on the themes structuring this proposal and strengthening of their research infrastructures in conservation, landscape architecture, housing, and urban design and planning.

*Keywords:* Medellín, Social-Equity, Urban, Innovation, Global-South



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**Biography**

I am a Senior Lecturer in construction management. I moved to the Department of Built Environment, Faculty of Engineering and Technology, LJMU after working as a researcher and part-time lecturer at Teesside University. I have more than ten years of professional experience in construction industry and nine years of academic experience, particularly in research and teaching. I worked as a Project Control Manager in Qatar and in Sri Lanka as a Project Manager. I also worked as a District Engineer in the department of water supply and sanitation, government of Nepal, and ran my own consultancy business in Nepal. Currently, I am teaching at all levels as a module leader and also involving in both internal and external events associated with learning and teaching. My research interest areas are project planning, scheduling and controlling; delay analysis, risk management, sustainable construction; IT applications in construction: 4DBIM, modelling, virtual reality; visualisation and simulation, earthwork planning and resource optimisation. I have supervised more than 30 postgraduate student's dissertations, one PhD student and also examined a PhD student as an External Examiner. I have an excellent record of accomplishment of research projects in aspects of construction project management and civil engineering. I have published 25 research papers in the reputed journals and conference proceedings. I am also engaged as a reviewer in the international conferences such as CONVR, ARCOM and peer review journals like ECAM, CME, AIC. I am an incorporate member of Chartered Institute of Building (CIOB), a Certified Civil Engineer (CEng) from Nepal Engineering Council, and the Fellow member of the Higher Education Academy (FHEA).

**PUBLIC CONSULTATION AND VISUAL SIMULATION OF ROAD AND TRAFFIC PLANNING IN THE HOUSING DEVELOPMENT- A CASE OF MIDDLEHAVEN REGENERATION PROJECT****Abstract**

Visual communication is a key method for engaging and getting public consent in a new development or regeneration project. Virtual Reality (VR) is evolving technology that aids to communicate and visualise the project information in 3D view and surrounding landscape including social and environmental impact in the virtual environment. The construction managers have to depend on the subjective decisions and elusive imagining for the construction process, resources planning, workspace congestion and progress monitoring. This has caused uncertainties in planning and scheduling of projects, and consequently delays and cost overruns. To overcome these issues, a VR model was developed to improve communication among stakeholders and get public consent by providing visual information of Middlehaven project and its impact on existing road traffic congestion and surrounding landscape. The visual simulation aids to identify conflicts in

work activities and space congestion, thus improving the site productivity and reducing the idle of equipment, carbon emission, and waste in construction projects. Moreover, a prototype model was also developed with road design data, sectional quantities, variable productivity data, unit cost, site access points, and arithmetic algorithms. A cut-fill algorithm was developed to optimise earthwork quantities and costs. Weekly progress profiles, location-based congestion plans, and cost profiles are the key outputs. Case study experiments from road projects were used to demonstrate the functionalities of the model, which aids to visualise the earthwork scheduling information, workspace congestion, and cut-fill positions on a weekly basis. Evaluation of the model from professionals found that the model is a decision supporting tool, which is useful in improving site productivity and reducing the production cost in mass earthwork planning. The study concludes that the model is a valuable tool for visualising scheduling information, optimising resources, and improving the communication gap amongst stakeholders on the complex housing and infrastructure projects in a more efficient and effective way.

*Keywords:* Communication, Earthwork planning, Public consent, Simulation, Visualisation, Workspace congestion



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### ***Biography***

Martin holds a PhD in construction project management from the University of Hong Kong, in which he examined empowerment and control dynamics in project teams from multilevel and integrative perspectives. He had earlier obtained his B.Sc. in Building Technology (First Class Honours) from Kwame Nkrumah University of Science and Technology (KNUST), Kumasi-Ghana. Following his role with Taysec Construction Ltd (then Taylor Woodrow Company) as Quantity Surveyor and Manager of the Batching Plant/Pre-cast Department, and after successfully completing his PhD in 2009, Martin held positions at the University of Hong Kong as Research Assistant and University of Westminster, London, as Senior Lecturer in Construction Commercial Management. He joined the School of Civil and Building Engineering, Loughborough University, UK, in 2010 as Lecturer in Quantity Surveying and has been Senior Lecturer since March 2014. Martin is also Honorary Assistant Professor at the Department of Real Estate and Construction of The University of Hong Kong since July 2010. His research to date have focused on sustaining the efficiency and effectiveness of project and project-based organisations through the development and advancement of theories of, and the empirical verification and validation of strategies/mechanisms for effective teamwork and project delivery. He has published over 50 papers in academic journals and conferences and is co-author of two book chapters.

## **RESILIENT INFRASTRUCTURE DELIVERY**

### **Abstract**

My current research portfolio focuses on three broad strategic areas in the management of projects and provision of resilient infrastructure: empowerment & control dynamics in project teams, high performing work systems and human factors in project management. This focus has gelled into three broad areas; Organising Systems for BIM-enabled Projects; Building Resilience in Critical Infrastructure Delivery, and Resilient Project Governance Systems. The main thrusts of this research focus are to: identify the dimensions of resilience at the human/individual level (resilience competencies) and organisational/institutional level (resilience capabilities); develop effective strategies for embedding the resilience competencies and capabilities in different cultural contexts and project business settings (i.e. different business models – e.g. integrated service provision; technological platforms – e.g. BIM); and identifying the procurement/contractual communications/mechanisms required to give proper effect to these resilience competencies and capabilities in project business. This puts capacity building at the centre of this research thrust, to examine the capacity building and skill development issues necessary at individual, organisational/institutional and industry levels to ensure the delivery of sustainable projects.

**Keywords:** Capacity Building; Competencies; Empowerment; Infrastructure; Resilience



## **Dr. Gayan Wedawatta**

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### **Biography**

Dr Wedawatta is a lecturer in Construction at Aston University. He has a PhD from the University of Salford and is a graduate in Quantity Surveying from University of Moratuwa, Sri Lanka. He is a Chartered Construction Manager and a Fellow of Higher Education Academy. Gayan has wider research interests including disaster resilience, extreme weather events and construction SMEs, resilience of small businesses, adaptation to flooding, and sustainability in construction. He has contributed to a number of externally funded research projects addressing above issues and is currently the principal investigator of a project investigating long-term performance of post disaster housing schemes funded by the CIOB Bowen Jenkins Fund.

## **LONG TERM PERFORMANCE OF POST DISASTER HOUSING: WHAT CAN BE LEARNED FOR PLANNING AND MANAGING POST DISASTER HOUSING PROJECTS**

### **Abstract**

Devastating natural disasters result in wide-scale property damage and extensive reconstruction programmes. How such housing provisions perform in the long-term is yet to be explored in detail and has received limited attention as the emphasis is often on short to medium term recovery during the aftermath. By investigating current performance and occupant satisfaction of post disaster housing projects that have been completed and occupied for a reasonable length of time (for e.g. 10-15 years), valuable lessons can be learned for planning and managing such schemes in the future. By studying the case of 2005 post tsunami housing projects in Sri Lanka, current research seeks to explore how the post-disaster housing reconstruction projects have performed in the long-term; against the requirements of the occupants and housing providers and make recommendations for future practice and policy-making on post-disaster housing re-construction. Although the research will be undertaken in Sri Lanka, the findings will be relevant to other countries where post-disaster housing reconstruction projects will be required following a disaster event (flooding [including the floods in the UK], cyclones, earthquakes etc.). Findings will have particular relevance to other South Asian countries (including Nepal, Bangladesh, India) - a region which consists of countries highly vulnerable to devastating natural disasters such as tsunamis, cyclones and flooding. Construction professionals working in these contexts will be able to advise appropriately in the context of post-disaster housing aimed at long term performance and sustainability.

**Keywords:** Disaster, Housing, Performance, Reconstruction, Resilience

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**Biography**

My research focus is to take a holistic view of healthcare buildings and its impact on occupants' wellbeing, building up the theory foundation why we need a holistic view of the healing environment; identifying the buildings, spaces and environments characteristics that relate to people's wellbeing; and then proposing a holistic framework to explore future research. When I was at Salford University, my work was to conduct on a variety issues related to primary school design. The latest project HEAD (Holistic Evidence and Design, EPSRC funded) focused on the school and classroom environmental design and its impact on pupils' learning progress. The findings of all projects have been presented to the city councils, school clients and designers etc. so that they can take these ideas into their practice and to experiment with them. Also the papers published in many peer reviewed academic journals. I finished my Ph.D at School of Architecture, Sheffield University. The research project was attempted to develop a deep understanding of the environmental factors that influence the occupants' perception and behaviour through two building case studies. One was a conventional high-rise office block and another one was a contemporary environmentally-concerned office building.

I have a strong research background and an excellent record of accomplishment of research in aspects of building design and its impact on occupants. I've conducted many live projects on the built environment design and its impact on occupants' performance. The findings of all projects have been published in many peer reviewed academic journals. One of them turned out to be the most downloaded article in Journal 'Building and Environment' and won the 'Best Paper Award' in 2013.

**A HOLISTIC VIEW OF HEALTHCARE BUILDINGS AND ITS IMPACT ON OCCUPANTS' WELLBEING****Abstract**

There has been extensive research since the 1980s to understand the effects of the physical environmental on the health and wellbeing of people in hospital settings. However, there is scarce investigations focusing on the whole building perspective. The purpose of this study is to discuss the importance of evidencebased healthcare design from a holistic point of view, aiming to contribute to providing a positive impact on occupants. The methods adopted include: (1) analysing the recent research that focus on the links between the built environment and health outcomes on hospital settings; (2) from the literature review, identifying the building characteristics that relate to people's wellbeing; and (3) proposing a holistic framework to explore future research. The framework developed will provide the means by which better understanding and action-

able knowledge can be generated for future hospital design. The implication of this research is, from the design point of view, the study takes an integrated approach of the built environment (hospital) within which staff, patients, visitors live, seeking to explain the impacts of the environment on human well being and performance; from the end-user point of view, the research looks at design strategies with an intention to maximize the occupants' benefits and minimize buildings' maintenance and management. The identification of the impact of the built environment factors on staff and patient will be a new finding for healthcare buildings' research, highlighting the importance of the design challenge for policy makers, designers and users.

*Keywords:* holistic framework, healthcare building, design, occupant



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### **Biography**

Raquel was born in Campinas-SP, Brazil. After education and practice in architecture and urban design, she has since been dedicated to academic research and teaching activities. Bachelor's degree in Architecture and Urbanism from Universidade de Brasília-UnB, 1990; M.Arch. degree from University of Minnesota-UMN, 2002; Ph.D. degree in Civil Engineering in the area of Architecture and Construction from Universidade Estadual de Campinas-UNICAMP, 2008. Carried out research and teaching activities within a post-doctoral program from 2009 through 2013 at UNICAMP. Professor of architectural design and representation in the Civil Engineering and the Architecture and Urbanism courses at the FEAU/ UNIMEP since 02/2014. Coordinator of the Civil Engineering Course at FEAU/ UNIMEP since 01/2016. Contributes to the following research groups: Cultura, tecnologia e cidade (UNIMEP); Cultura, arquitetura e cidade na America Latina (FAUUSP); Metodologia de projeto em arquitetura (UNICAMP). Academic advisor of works of completion for graduation and of scholarship scientific initiation research projects. Participates in examination boards of: course completion works, design competition and professor selection judging commissions. Develops scientific and technical production works.

## **HOUSING DESIGN AND THE ENVIRONMENT'S CAPACITY OF TRANSFORMATION**

### **Abstract**

Housing design can play an important role in the promotion of more sustainable urban environments. But a considerable portion of Brazilian affordable housing production does not reveal the broad range of qualitative aspects to be considered, failing to deliver the expected quality, especially for the most vulnerable people. Even though the advances in regulatory context of civil construction in Brazil in the last decade, normative references and the wide range of instruments applicable to housing projects has not been sufficient to guarantee housing design quality. So far, such references and instruments do not fully incorporate the necessary requirements for the improvement of quality of life of their inhabitants. The ongoing research aims to potentialize the content of humanisation studies in order to enable better affordable housing design. The object of research is the humanising content from the field of studies related to the typology – of housing unit, modes of aggregation and urban design – and to its physical and sociocultural capacity of transformation. Current national and international normative references and instruments applicable to housing design are being collected and analysed with regards to encouraging and facilitating the consideration of flexibility; Examples of housing design that enable flexibility are being searched for and its design and constructional principles extracted; Literature review on the aspects of technology and culture in affordable housing architecture are

being conducted, with a special focus in the Latin American context. Expected results include a design process framework that highlights the environment's physical and sociocultural capacity of transformation, thus the ability of design and construction to improve value generation for future users, towards more humane and sustainable urban housing.

*Keywords:* Housing design quality, Humanisation, Flexible housing, Housing typology, Constructional principles





### **Dr. Dayana Bastos Costa**

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### ***Biography***

Dayana Bastos Costa has a BSc in Civil Engineer (Federal University of Bahia, Brazil, 2001), and MSc and PhD in Civil Engineering - Construction Management (Federal of Rio Grande do Sul, Brazil, 2003 and 2008, respectively). She has industrial experience in the Brazilian construction sector and international experience in research, being visiting researcher at Salford University-UK (2006) and Georgia Institute of Technology-USA (2014-2015). Since 2008, Dr. Costa joined the Structural and Construction Engineering Department of the School of Engineering at Federal University of Bahia–Brazil and, currently she is Associate Professor of Construction Management. She is also permanent professor in the Post Graduation Program in Civil Engineering (Academic Master and PhD) since 2010.

Dr. Costa's research area involves construction management, especially lean construction, production management, performance measurement and benchmarking, as well as sustainable management in construction, focusing on reducing environmental impacts on construction site. More recently, she is seeking to integrate technology based systems, such as Unmanned Aerial Vehicles and Building Information Modeling for construction managerial tasks. Since 2009, Dr. Costa is principal investigator in several research projects granted by the Brazilian governmental agencies and industry partnerships. From these projects, 15 journal papers, 13 book chapters, 1 edited conference proceedings, over 69 conference papers, and 6 research reports were published so far.

## **APPLICATION OF UNMANNED AERIAL SYSTEM (UAS) FOR CONSTRUCTION MANAGEMENT TASKS**

### **Abstract**

The potential use of emergent technology as Unmanned Aerial System (UAS) has called the attention of the construction industry. However, the use of UAS for construction project still demands investigations for a better understanding of how this technology can be fitted to construction management task, such as safety monitoring, project visualization and progress, including its benefits and risks. The aim of this research is to evaluate the application of UAS for safety inspection and project visualization and progress. Two case studies were carried out in Salvador City-Brazil. A UAS protocol for construction management inspection from previous studies in the United States was adapted for the Brazilian context and applied during the case studies. Specific data collection protocol for safety inspection was developed. Data were collected from a set of flight tests on site for visual assets (pictures and movies) gathering and regular meeting with project personnel for feedbacks. The safety inspection analysis was based on the visualization of the safety

requirements in the visual assets collected and possible management decisions that would be made based on this. Document analysis and interviews with project personnel and workers were performed in order to collect their perception about the information gathered. In addition, 3D models with UAS visual assets were produced using PIX 4D software in order to explore the potential of those models for project visualisation and progress. A set of criteria for UAS performance evaluation was developed, including utility for safety inspection and project visualization and progress, technology performance, and risks associated with the technology. As a result, the visual assets collected by the UAV could provide detailed information for safety inspection on jobsites, especially in large jobsite and areas with difficult access. The evaluation shows the UAS technology would potentially reduce safety time inspection, increases the level of transparency of activities and detecting shortcomings in the safety system.

*Keywords:* Unmanned Aerial System (UAS), construction management, safety inspection, 3D models

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**Biography**

Civil engineer since 1997, Master in Civil Engineering from UFRGS (1999) and PhD in Production Engineering from the Federal University of Rio Grande do Sul (2008). He was responsible to built in the last 15 years more than 50,000 m<sup>2</sup> of vertical buildings. He is currently coordinator of the Professional Master in Technology and Innovation Management of Universidade Comunitária da Região de Chapecó (Regional Community University Chapecó - Unochapecó) and teaches courses in Occupational Safety and Health Engineering specializations in various institutions in southern Brazil. He is also research professor of the Master in Civil Engineering at Faculdade Meridional (South College - IMED). He researches in Civil Engineering in the area of Civil Production Management and Production Engineering with emphasis on Work Safety.

**DESIGN MAINTENANCE AND BUILDING SYSTEMS SPECIFICATION  
IN THE PERFORMANCE STANDARD SCOPE (NBR 15575)****Abstract**

The study and proper use of life information materials and building components allows achieve buildings of better quality, which contribute to the sustainability of the construction industry , making it the most economical and benefiting a large number of people. The NBR 15575-1 (ABNT, 2013) it is for the designer responsible for determining the design life of each building system, so it's your job to establish what materials, products and processes meet the minimum performance. It is true that the established minimum design life will be made from the full implementation of routine maintenance activities and design maintenance within the procedures laid down in NBR 5674 (ABNT, 1999), otherwise your real life will be compromised, which can only be proven over the property's use of time. The aim is to provide guidelines for the designers as regards the specification of the design and construction systems maintenance within the performance standard (NBR 15575). The research method consists of a survey with designers through electronic form to ascertain in practice the real need to establish system maintenance over its lifetime and design maintenance concepts that should be being specified in the descriptive memorials. Based on the results, will be defined and determined the best practices of design maintenance, ideal for the proper functioning of the building. It will produce a management book design maintenance, in order that the maintenance is properly performed and that is the correct procedure to achieve the projected useful life. Also specification guidelines will be developed for building systems.

**Keywords:** Design maintenance, performance standard, specification guidelines



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### ***Biography***

I am an Architect and, currently, I am developing a postdoctoral research at the Department of Architecture and Building Construction, University of Campinas. My academic appointments and research fellowships include a postdoctoral research at Institute of Architecture and Urbanism, USP; PhD in Architecture, Technology and City, obtained from University of Campinas; master's degree in Art from State University of Campinas (2008), MBA in Project Management at IBTA (2004), Web Publishing Certificate at Langara College - Vancouver (2003) and bachelor's degree in Architecture and Urbanism from Federal University of Viçosa (1999). My research centres upon the creative and collaborative use of digital technology in architectural and urban design. I have taught, conducted research, and published in the areas of IT impact on design and construction, specially studying Augmented Reality and Building Information Modelling (BIM). My thesis-by-publication covers the conceptual constructs underlying Augmented Reality use in Architectural Participatory Design applied to the design of a leisure area in Social Housing. My ongoing research efforts include a focus on BIM adoption by São Paulo public universities.

## **AUGMENTED REALITY IN THE ARCHITECTURAL PARTICIPATORY DESIGN PROCESS: SYSTEM DEVELOPMENT AND GUIDELINES**

### **Abstract**

The general objective of this research was to verify the use of Augmented Reality (AR) applied in a Participatory Design (PD) in the process of conception of the architectural design. The proposition was that both designers and non-specialists could use the AR as a support tool for viewing and communicating during a PD workshop. In order to contextualize the research and allow experimentation, the evaluations were applied to the design of a leisure area in Social Housing. This was an applied research, with an investigative character, and its basic scientific method was the Design Science Research. This research consisted of five stages: motivation; objectives of a solution definition; design & development; demonstration and evaluation. In the Motivation stage, the problem to be solved and its limits were defined and formalized, providing the theoretical basis, addressing issues related to the state of the art of the AR technology and the PD applied to architecture. In the Objectives of a Solution Definition stage the aim was to search for an AR tool that could be used in the proposed context, assessing the operation of various systems and display devices. This step showed the need for developing a specific application that could support a PD workshop. Therefore, in the Design & Development stage, there was the development of the AR application called "equipAR!". In the Demonstration stage a PD workshop was designed with support from mobile AR. In the Evaluation stage, the perception and viability of using AR in PD were evaluated. Thus, user evaluations were conducted making

use of subjective measures and qualitative analyzes. This research main contributions are a PD workshop method using mobile AR that was conceived, experimented and evaluated in order to facilitate the communication between designers and non-specialists during the conception phase of the architectural design.

*Keywords:* Participatory Design, Augmented Reality, Citizen participation, Architectural Design, User Evaluation



## **Dr. Jocelise Jacques**

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### ***Biography***

Prof. Jocelise Jacques holds a Bachelor's degree in Architecture (with research on urban development and architectural design), a Master's degree in Civil Engineering (with work focused on the communication of technical information during building design), and a PhD in Industrial Engineering (on the study of sustainable product development initiatives), with all degrees awarded by the Federal University of Rio Grande do Sul (UFRGS). She also spent two years working as a visiting scholar at the University of California, in the Berkeley Energy and Sustainable Technologies (BEST) Lab. Currently Jocelise Jacques works as an Adjunct Professor of Design at UFRGS, teaching design classes at both undergrad and graduate levels, and so far has published over 30 peer-reviewed articles.

## **SUSTAINABLE PRODUCT DEVELOPMENT INITIATIVES BASED ON THE CRADLE TO CRADLE CONCEPT**

### **Abstract**

The redesign of products and production processes is a key aspect in the large-scale economic, social and environmental co-evolution required to enhance living conditions in less developed countries while maintaining the progress already achieved by developed nations. In this context, this research has focused on the study of sustainable product development initiatives from a perspective based on the cradle-to-cradle concept. Proposed initially by William McDonough (an architect) and Michael Braungart (a chemist), the cradle to cradle design approach focuses on five main areas – namely materials use, reutilization, water use, energy consumption and social responsibility – and it can be used as a strategy or goal in product development and production processes. The cradle to cradle concept is adopted as an umbrella under which a number of other related concepts discussed in several fields – such as civil engineering, industrial design and architecture – can be found. Like other rapidly developing nations, Brazil currently faces serious environmental challenges as population growth, combined with rising living standards, lead to increased demand for natural resources, products and services. However, the current development model – which follows a linear cradle-to-grave logic – must not be simply replicated, and an alternative model firmly rooted on sustainability concepts should be embraced as soon as possible. In this context, a series of sustainable product development initiatives are presented and discussed in this presentation.

**Keywords:** Sustainability, design, product development, cradle to cradle

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**Biography**

Milena Kanashiro is the Director of Academic Affairs of Londrina State University and an Associate Professor at the Department of Architecture and Urbanism, Center of Technology and Urbanism. She is a fellow researcher from *Fundação Araucária de Apoio ao Desenvolvimento Científico e Tecnológico-FAADCT/PR*. Her main research interest includes the way the urban environment affects people's well-being focusing primarily on areas of low-income population. In recently years, she has held research grants from CNPq to analyze those areas and establish design guidelines to improve the spatial qualities of Social Housing Projects. Now she is developing a research focusing on healthy cities, understanding the overlapping of urban environment, social capital and healthy issues.

**DESIGN GUIDELINES FOR SOCIAL HOUSING PROJECT****Abstract**

Despite the advancement of research in relation to social housing units, their recent production in Brazil has been criticized regarding the spatial organization and the continuity of the latest public housing subsidies program, called PMCMV (Programa Minha Casa Minha Vida). The recent evaluation of the program shows analysis strands among them in relation to urban design: peripheral set up, distant from commercial areas, services and public community facilities, vertical of the peripheries, adopted compound models and construction of walled enclaves, monofunctionality, standardization of constructions, among others. This practice is guided by quantitative criteria and the minimum standards established by urban legislation end up becoming the standards used by designers. Three approaches were developed from research to improve the spatial quality of these social housing projects: 1. spatial arrangements considering the role of the open spaces, 2. the analysis of the emergence of informal retail and 3. the diagnostic of the sense of community. Thus, spatial guidelines were formatted for social housing projects aiming at achieving qualitative improvement of these areas. A simulation was projected in one of the recent developments of PMCMV with the challenge to maintain the number of 2,714 housing units. The provision of areas of open spaces is added - squares and community services area, non-existent in the current project. Thus, this research contributes to a discussion and re-evaluation of the form of production of these social housing projects and indicates possibilities for significant improvements in the outcome of spatial quality.

**Keywords:** PMCMV, Urban Qualities, Social Housing Project



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### ***Biography***

Adjunct Professor at FEEVALE University in Architecture Course since 2011. She is an architect graduated at Federal University of Pelotas in 2001. From 2001 to 2005 she worked in different architect offices as a member of design team developing different projects, such as commercial areas, housing, hospitals, shopping centers, industries, etc. She has an Academic Master degree in 2007 and Doctoral degree in 2014 in Civil Engineering at Building Innovation Research Unit (NORIE), Federal University of Rio Grande do Sul (UFRGS). She has experience in design management focused on product development process, client requirements (managing and processing), value generation, evidence-based design and systematic literature review. Their main investigated research contexts included low-income housing and care homes. Along the master and doctoral period, she was involved in four different research projects regarding low-income housing and value generation. Most papers were developed in this area of knowledge. Nowadays she is involved with architectural design and drawings disciplines, and she is a collaborator professor in an University Extension Program focused to help low income elderly person to have more accessibility in their housing.

## **EVIDENCE-BASED DESIGN AS A NEW METHOD FOR DESIGN ACTIVITY**

### **Abstract**

Along the design activity, architects typically draw on their experience, intuition, and previous work of professional contacts, but they rarely measure the performance of the buildings they design, they do not routinely measure the results of their work to verify if their promises were fulfilled, and most firms maintain minimal connections to academy. Consequently, there is no explicit knowledge database to support their decision-making during the design process.

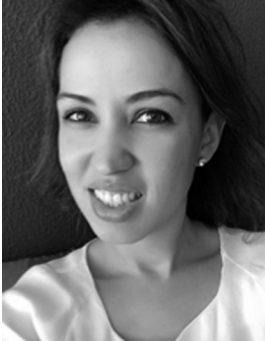
In contrast, there are a lot of available research articles with relevance produced by the academia. This kind of knowledge is very important to architects in order to guide their creativity to achieve solutions that are successful in meeting the needs of clients, resulting in more credibility to their profession instead of being based only on their considerable expertise. However, although the great amount of studies with electronic resources much more accessible and friendly, the connection between the outcomes from these studies and its application to support new projects do not exist in practice. Research is often conveyed in journal articles and reports written for researchers, not for designers, and architects have little time to “translate” these or to stay abreast of current research.

Then, whilst architects use their repertoire of design knowledge to support the design process, the problems



pointed out in different studies are not properly considered to support the development of new projects. As an alternative to this problem, EBD is a process that attempt to base building decisions on the best available evidence with the goal of improving outcomes and of continuing to monitor the success or failure for subsequent decision-making. But despite the emerging relevance of EBD, the process of embedding evidence within design process as well as the concept of evidence itself are not clear within the design literature. In this way, there is a need to contribute with this area of knowledge.

*Keywords:* Evidence-based design; systematic literature review; value generation; affordable housing; care homes



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### ***Biography***

Mariana Lima is an architect with experience in design methodology and design management. Mariana is Professor at Department of Architecture and Urbanism of Federal University of Ceara (UFC). She joined the UFC in 2013, and her role combines research, administration and teaching activities. She is now Vice-Coordinator of the Graphic and Product Design Course and Co-Coordinator of the Laboratory for Teaching, Research and Extension in Digital Design. She teaches in the area of Product Design and develops research projects on information technology applied to design.

Mariana finished her Master Course on Civil Engineering in 2012, when she developed a research focused on value generation at design process. Recently, she worked at her PhD research titled: "Implementation of a multi-criteria decision aid approach for multi-performance integration in architecture design". She studied how to integrate different performance dimensions of architecture design with support of a multicriteria decision aid approach in conceptual design phase.

She has published papers in areas such as lean design, performance evaluation and design process management. Her research interests are design methodology, design management and digital design, including parametric modelling, Building Information Modelling and digital fabrication.

## **IMPLEMENTATION OF A MULTI-CRITERIA DECISION AID APPROACH FOR MULTI-PERFORMANCE INTEGRATION IN ARCHITECTURE DESIGN**

### **Abstract**

The building overall performance involves a complex network of interrelated variables that integrate different fields of interest. Integrating performance dimensions involves the decision making based on the interests of various stakeholders. Therefore, it is important the participation of such players systematically and collaboratively since the early stages of design. The research deals with the following research question: how to integrate multiperformances in early stages of design? It has as main objective to develop a mechanism for integrating multiperformances in early stages of architectural design. It is understood that the process of structuring a multicriteria decision aid model (MCDA), to be incorporated into the design process, promotes collaborative work and systematize the integration of performance objectives. So, we start from the assumption that from the structuring of a MCDA model, through a constructivist view, one can integrate multiperformances in early stages of design. According to this view, decision-making is a process over time involving

the interaction between the actors endowed with its own value system, building a model that represents this value system in order to obtain recommendations that are useful to support decision. This research was developed following the methodology of Design Science Research. The artifact developed was the mechanism for integrating multiperformances, comprising a metamodel and a dynamic of application. As a practical contribution, we propose a model of how to incorporate the construction of a MCDA model to the design process as a means to integrate multiperformances. An important contribution of this thesis lies in the structure of socialization of project agents promoted by the mechanism. Thus, in addition to allowing multiperformance integration, the mechanism contributes to the realization of integrated design. As a theoretical contribution, this research has identified how occurs the interaction between the decision-aid process and the design process.

*Keywords:* Performance-based Design, Multicriteria Decision Aid, Integrated Project, Value-focused Thinking, Design Science Research



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### ***Biography***

Holds a Bachelor's Degree in Architecture and Urbanism (1991) and a Master's Degree in Architecture (1998) from the Federal University of Rio Grande do Sul – UFRGS. Got a PhD Degree in Civil Engineering (2009) from Campinas State University, in São Paulo. Was a teacher in the course of Architecture and Urbanism at the University of Vale do Rio dos Sinos from 1996 until 2010 and a professor at Master's Degree Program in Strategic Design from the School of Design at the same university. Since 2007, is a guest researcher in the Chronobiology Group at Clinicas Hospital. She had also run her own office from 1993 until 2010 that was oriented toward interior and lighting design. In the meantime, is a professor from the Architecture Department at Faculty of Architecture of Federal University of Rio Grande do Sul and a permanent professor of Architecture Research and Graduation Program. Her studies are focused on the influence of lighting on people (user based research) and she is the head of "Quality, Efficiency and Technology of the Built Environment" research group. In 2014, was a guest professor for "Human-centered Lighting Design" at Detmolder Schule für Architektur und Innenarchitektur, University of Applied Sciences, in Germany.

## **THE CITY THAT NEVER SLEEPS: IMPACTS OF LIGHT POLLUTION ON HEALTH AND WELL-BEING OF RESIDENTS OF URBAN BUILDINGS**

### **Abstract**

This project aims to analyze and identify the real state of bedrooms windows elements and the presence or not of dimming devices, focusing on the relationship between the urban light pollution conditions and the health and well-being of building residents. The study will be held in Porto Alegre, a city with over one million inhabitants. The project will be developed in the Architecture Research and Graduation Program (PROPAR) with collaboration of researchers from the Chronobiology Laboratory of Clinicas Hospital. It will be developed through empirical research of phenomena in their real context, with multiple sources of evidence (variables), using cross-sectional study as a research strategy. The hypothesis involves the possibility that the restriction of dark phase - by excessive electrical lighting - resulting from the absence of the buildings darkening elements in bedrooms could be associated with circadian rhythm alterations. The expected results can contribute to improve public lighting systems guidelines taking into account the health of inhabitants with respect to the circadian system synchronization. Therefore, the study intend to generate knowledge and staff training related to the integration of knowledge of areas such as architecture and medicine, whose relevance increases as the latest medical findings point to the great influence of the environment on the health condition or disease of users of buildings. The results will be presented to the academic and technical community through publications in scientific journals and participation in conferences related to the topic.

*Keywords:* electric lighting, light pollution, circadian rhythms, control devices, residential buildings



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### ***Biography***

Civil Engineer (Universidade Federal de Alagoas, 1997), Master in Urban Environment Engineering (Universidade Federal da Bahia, 2002) and Ph.D. at Civil Engineering (Universidade de São Paulo, 2008). Expert in Urban and Regional Planning, with emphasis on social housing, acting on the following subjects: dweller perception, sustainable development, appropriate technology and evaluation methods. Professor of Construction at Universidade Federal de Alagoas. I have worked with urban evaluation methods using Fuzzy logic for improving dweller evaluation data. With a thesis "Data analysis method for urban upgraded area using Fuzzy Logic" better understand dweller perception about environment. Among published papers "Dweller perception using fuzzy logic for slum upgrading" at Proceedings of the Institution of Civil Engineers and "Urban upgrading interventions and engaging residents in fuzzy management: Case studies from Novos Alagados, Salvador, Brazil" at Habitat International are highlighted. Recently I coordinated two research projects funded by National Counsel of Technological and Scientific Development about tools and study cases on social housing programmes and extension project about social housing and technical support. Leader of the Research and Extension Group "Quality of Built Environment".

## **EVALUATION OF SOCIAL HOUSING IN ALAGOAS: METHODOLOGICAL ASPECTS AND APPROACHES BETWEEN MY HOUSE, MY LIFE PROGRAMME AND URBAN UPGRADING PROGRAMME**

### **Abstract**

Large cities in Brazil currently present a picture of inequality and segregation resulting from decades of conflict over the occupation of urban land. A number of initiatives - including slum clearance and upgrading - have been undertaken over the years in an effort to ameliorate the problems arising from informal occupation in urban environments. From past actions, criticism has been developed towards slum clearance and towards the pattern of periphery housing schemes built by the Housing National Bank (BNH). Little is known about the performance outcome of the current actions, including slum upgrading. Post-Occupancy Evaluation (POE) and indicator systems have been used as important tools for the provision of information on the built environment in different scales. Although these methods recognize the importance of the views of users in the evaluation process, they fail to adequately reflect the prevailing subjective concepts of quality. If on the one hand, the uncertainties in this type of information have imposed limitations on the traditional analysis, on the other hand, the emergence of new theories and models that seek to incorporate analyses of uncertainty creates new knowledge fields: Fuzzy Logic is one of these new fields. This research aims to establish a method of data analysis for environmental quality evaluation of urban areas, taking into account the

views of dwellers using Fuzzy Logic. Post-Occupation Evaluation and indicator systems were combined with Fuzzy Logic to develop analysis tools that formally represent vague and ill-defined information presented in this kind of evaluation. Results were satisfactory and it was possible to add more information into analyses. Studies carried out in My House, My Life Programme and Urban Upgrading Programme in Alagoas-Brazil allowed identify strongness and weakness of these programmes and stablish guidelines for improving new projects.

*Keywords:* Housing, evaluation, dweller perception, post-occupancy evaluation, fuzzy logic



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Degree in Civil Engineering by the Federal University of Rio Grande do Sul – UFRGS (2001), master's degree in Civil Engineering, also from UFRGS (2004) and doctorate in Materials Engineering by the Università Politécnica delle Marche – Italy (2009). Developed the doctorate in partnership with the ENCO laboratory (Italy) and a sandwich degree with the Center for Advanced Cement-Based Materials at Northwestern University (USA). Since 2002, participates in a group of researchers inside the Laboratory of Tests and Structural Models of UFRGS, acting in the area of special concretes, new materials and construction pathology. Post-doctorate researcher since 2009 on the Federal University of Rio Grande do Sul, with a research theme focused towards disaster risk reduction, classification and disaster vulnerability mapping, qualification of risk perception and resilience. Manager and lead researcher of the Disaster Risk Management Group (GRID), also contributing in the managing of the University Center of Disaster Studies and Research (CEPED/RS). Part of the REDULAC/RRD network (Red Universitaria de América Latina y el Caribe para la Reducción de Riesgo de Desastres) and the Brazilian Network of Research in Disaster Risk Reduction.

## **REMARKS OF A LAND REGULATION PROCESS IN AREAS OF RISK – CASE OF CAXIAS DO SUL/RS**

### **Abstract**

The occupation of Brazilian urban territory generally settled without proper planning, especially seeking to avoid disaster risks. The consolidated areas of risk are partially associated to the occupation of lands susceptible to hazardous processes and lack of knowledge concerning its fragility when facing impacts caused by natural phenomena, especially those of hydrometeorological origin, triggering floods and mass movements. The deranged and unregulated urban sprawl process, with inappropriate interventions to field natural conditions, tends to aggravate or generate risk circumstances in areas where natural susceptibility could be reduced. In addition, uncontrolled rapid urbanization, combined to irregular settlements on the outskirts of most cities, marked by constructions without appropriate technical conditions and habitability, ended up bringing main features of precarious settlements, term adopted by the Ministry of Cities to describe irregular areas. These sites usually concentrate risks, are vulnerable and low resilient to the impact caused by disasters. The Brazilian federal law, through instruments such as Statute of the City, has been seeking to establish legal and urban planning guidelines to mitigate this problem. This scope aims to encourage public administration to promote urban rehabilitation processes, targeting safer, healthier and sustainable dwelling (guidance concept evolved from the REDE FINEP MORAR TS). The alternative proposals involve from the occupation maintenance with corrective actions to bigger interventions, reaching partial or whole resettle-



ment, in cases of technical infeasibility to mitigate risks. Regardless the solution to be adopted, it is essential to work with community involvement. Development models of encouragement and collective construction of action plans are needed and the University Center of Disaster Studies and Research (CEPED/RS) of the Federal University of Rio Grande do Sul (UFRGS) has been strongly acting on the identification, testing and consolidating strategies for this purpose. One reference case occurred in the municipality of Caxias do Sul, where, between 1997 and 2004, it was established and implemented a process of land regulation and qualification of 4 precarious settlements marked by recurrent records of damages related to floods and mass movements. The process was conducted by a municipal public management team, which constructed a successful partnership of low-impact intervention in the social dynamics, involving dwellers, university experts and other support organizations. The analysis of this experiment, described in this research, provided fundamental insights to modelling strategies of mobilization and community engagement, aiming to create a better risk management process at the local level. Recommendations for intervention in precarious settlements were extracted, symbolic and operational actions developed during the program were rescued, which supported workshops with dwellers, to comprehend if the process achieved in those areas could be characterized as social technology. The results point out the potential and weaknesses of the experiment carried out, highlighting the importance of agreeing on ways of action, especially non-structural ones, to increase the perception of risk, establishing of community commitments and comprehension of natural limitations of the occupied territory. These are essential factors to promote a positive interlocution between the actors involved with the search of socially validated and technically suitable solutions to the urban requalification and promotion of safer, healthier and sustainable dwellings.

*Keywords:* Areas of risk, irregular settlements, vulnerability, recommendations for urban rehabilitation processes



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### ***Biography***

Patricia Cezario Silva, PhD (2015) from the School of Architecture and Urbanism of the University of São Paulo, fellow researcher at the Institute of Applied Economic Research - IPEA (2014-2015) and visiting scholar at the Department of Urban Studies and Planning, Massachusetts Institute of Technology (2012-2013). Architect and urban planner with more than thirteen years of experience in urban and housing development, slum upgrading and land tenure regularization. Holds a Bachelor's and a Master's Degree in Architecture and Urbanism from the University of São Paulo and specialization in Land Management and Informal Settlement Regularization from the Institute of Housing and Urban Studies - IHS. At the moment is consultant of UNESCO in a joint project with the City Hall of São Paulo on developing indicators for evaluation and monitoring of the Master Plan of São Paulo, as well as Assistant Professor at the University São Judas Tadeu.

## **URBAN LAND AND HOUSING DEVELOPMENT: PLANNING AND MONITORING**

### **Abstract**

The paper will present an overview on two different empirical researches developed since 2014 and try to build up possible connections for further research.

One is an empirical study concluded in 2015 on the implications of a planning tool launched in the 2014 São Paulo Master Plan, with the objective of breaking up with spatial segregation by providing social housing by private developers in good locations. The research question was "what is the numerical and locational potential of the 'Solidarity Quota' for social housing provision?" The conclusions point out that the instruments proposed to do not reverberate in land restructuring, but exclusively in market housing production. Instead of addressing the segregated pattern of housing production, its application enables the reproduction of spatial segregation by conservative market practices.

The other research is currently under development, and aims the development of indicators for monitoring the application of the 2014 São Paulo Master Plan, specifically on issues such as social function of land, social housing development and land tenure regularization. The research counts with six phases, out of which three have been already accomplished. At the moment, there has been developed a matrix of proposed indicators and identified data sources. The next phases consist on accessing specific data, calculating the proposed indicators and developing possibilities of visualization. The biggest challenge so far is access to

data collected by different departments within the municipal administration.

The 2014 Master Plan has consolidated planning tools proposed by the City Statute in 2001. Monitoring the implementation of those planning tools is fundamental for evaluating their impacts on the implementation of the urban policy as well as enables adjustments and changes towards better and more effective planning tools.

*Keywords:* Master Plan, Planning Tools, Indicators, Monitoring, Housing Production



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### ***Biography***

I was graduated in architecture and urbanism in 2008 from the Federal University of Rio Grande do Sul. My master was in Civil Engineering, it was held from 2009 to 2011, in the same university. My main research topic was construction management, focusing on the understanding of how commitments were managed in production planning and control systems based on the Last Planner System. The main publications from this period was “a survey on the Last Planner System: impacts and difficulties for implementation in Brazilian companies”, published at the 18th Annual Conference of the International Group for Lean Construction (IGLC) in 2010, and the “Modelling the network of commitments in the Last Planner System”, published in the Lean construction Journal in 2012. From 2011 to 2015, I developed my PhD, focusing on the integration of the production planning and control systems of the design, fabrication, and site assembly in Engineer-To-Order (ETO) building systems. The three main publications of this period was (1) the “Guidelines for integrated planning and control of Engineer-To-Order prefabrication systems” published at the 21st Annual Conference of the IGLC in 2013; (2) the “Core requirements for the development of a planning and control model for Engineer-To-Order in construction industry” published at the: Encuentro Latino Americano de Gestión y Economía de la Construcción, in 2013; and (3) “The role of visual management in collaborative integrated planning and control for engineer-to-order building systems”, published at the 22nd Annual Conference in 2014.

## **INTEGRATED PRODUCTION PLANNING AND CONTROL MODEL FOR ENGINEER-TO-ORDER PREFABRICATED BUILDING SYSTEMS**

### **Abstract**

The industrialization of construction work is one of the ways it is possible to achieve better quality and productivity in this competitive environment. The development of building systems according to the customer needs brings to the traditional prefabrication process the complexities of an engineer-to-order system. A common problem in this environment is to manage the production system as a simple and predictable make-to-stock production. This research aims to develop an integrated planning and control production planning and control model for ETO prefabricated systems, integrating design, manufacturing and site assembly. The research is part of a partnership with a steel fabricator company. The research method is grounded in the design science research, in which there is an effort from the researcher to develop an artefact, here a production planning and control model. The implementation adopted some strategies from the action-research, since some solutions needed to be collectively constructed with the company. After the main empirical study on the steel fabricator, two studies were carried out abroad in order to understand a different contexts. Most

of the processes proposed in the final model were assessed. Although there is still a need to improve the production planning and control system of that company, the implementation enhanced the communication between the operational and tactics level and also promoted a systematic way to collect information for each level of the production planning and control system. The theoretical contributions of the research were the development of a framework to understand the complexity of this kind of production system; the identification of the main requirements for developing a planning and control system for this environment; and the adaptation of the concept of WIP using the status of the product.

*Keywords:* Production Planning and Control systems, Engineer-to-order, complex production systems



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**Biography**

Andrea Naguissa Yuba received her B.S degree in Architecture and Urbanism from Universidade de São Paulo, São Carlos, Brazil, in 1997. M.S. degree from Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil, in 2001, in Civil Engineering, and the Ph.D. degree from Universidade de São Paulo, São Carlos, Brazil, in 2005, in Environmental Engineering Science.

Since 2006, she is a Faculty Member in the College of Engineering, Architecture and Urbanism and Geography (FAENG) at the Federal University of Mato Grosso do Sul, Campo Grande, Brazil and serving as Associate Dean for Academic Affairs since 2013. Also she served as the Undergraduate Committee Chair of the Architecture and Urbanism Course from 2011 to 2013. Since 2012, she is member of the Master's Program on Energy Efficiency and Sustainability, of FAENG.

She is the founder and coordinator of the Experimental Construction Site ("Canteiro Experimental"), which is an R&D and teaching laboratory. In this lab, which was built from the ground using rammed earth, are being developed projects related to earthen construction systems, public policies for social housing, bamboo structures, all of them under sustainability principles, by a research group with about 20 researches.

For six years, she served as member of the National Association for Built Environment Technology (ANTAC) Board and organizer of national and international conferences, related to sustainability and non-conventional construction techniques. Currently, coordinator of ANTAC's Working Group on Sustainable Development and the technical secretary of the committee responsible for preparing the Earthen Based Constructions Standards.

**SOCIAL TECHNOLOGY FOR HOUSING PRODUCTION WITH  
HIGHER SUSTAINABILITY INDEXES: IMPROVEMENT OF  
STABILIZED RAMMED EARTH WALLS  
CONSTRUCTION TECHNIQUE**

**Abstract**

Rammed earth buildings have been built worldwide since ancient times, using soil, a highly available raw material, associated to ramming, a simple technique. The primitive way of production has evolved, by the aggregation of new products, tools and machinery, enabling current stabilized rammed earth (SRE) construction system. In South America, only in Brazil the earthen techniques did not succeed and their application

in housing, social ones or not, are inexpressive. Similarly, there are very few initiatives that ally low energy materials with other sustainable principles. Therefore, there is potential for innovation and technology transfer on SRE as a humanitarian technology because of raw material low cost, manufacturing facilities cost effectiveness, and the construction process is easy to teach. Such features could lead to a massive rural and urban housing production. Research projects developed in UFMS had identified some formwork weaknesses and absence of devices for “in situ” technological control, among other issues. In order to assess the conditions to enable the technique to housing production, this project aims to get a technological artifact, ie rammed earth walls, that combine aesthetic quality, high productivity and competitive cost, for social housing. It will consist of 1. Designing and implementing formwork for SRE, 2. Planning and constructing rammed earth walls, 3. Gathering data during and after construction, 4. Feedbacking for initial steps, and 5. Proposing devices parameters for improvement of production activities. The expected results are high quality formworks and rammed earth walls, besides tested and validated design processes. It is also expected to get performance, quality, cost, productivity and sustainability reliable data in order to build models to compare stabilized rammed earth to conventional materials systems. The reproduction of a real construction site is essential to understand technological transfer issues. These data, which are lacking in Brazilian literature, will contribute to publicize the technique and its purpose for housing production.

*Keywords:* Stabilized Rammed Earth, Sustainability, Social Housing, Humanitarian Technology





