

DESIGN & INTERNAL ENVIRONMENT

Improving the therapeutic design of healthcare environments



For many years, there has been a prevailing belief that higher investment in the initial phases of healthcare infrastructure projects not only reduces the life cycle costs but also improves, in the long term, service delivery and patient experience. The project *Improving the therapeutic design of healthcare environments through modelling, simulation and visualisation* commenced in 2007 and has been funded for three years by the Engineering and Physical Sciences Research Council (EPSRC) as part of a HaCIRIC (Health and Care Infrastructure Research and Innovation Centre) award. It was aimed at improving the therapeutic design of healthcare environments by developing an environmental design framework that supports assessments and improvements within multiple variable parameters.

ts progress to date has included a wide range of activity.

- Collaborative work with a Special Issue of the *Journal of Building Performance Simulation* disseminating research of authors from almost every continent in the area of “*Optimising Healthcare Building Design and Performance through Modelling, Simulation, and Visualisation (MSV)*”.
- Collaborative work with Purdue University in the USA through three of its centres – the Regenstein Center for Healthcare Engineering, the Envision Centre for Data Perceptualization, and the Division of Construction Engineering and Management. The work has been evaluating the potential of digital mock-ups in improving healthcare facility design and performance.
- Consultations with VTT Technical Research Centre of Finland and STAKES (now part of the Finnish National Institute for Health and Welfare) with agreement in principle to explore undertaking funded research related to digital mock-ups for improvement in healthcare facility design and performance, and patient well-being.
- Collaborative work with MJ Medical Healthcare Consultancy that includes the enhancement of Building Information Modelling (BIM) with performance data, including those related to healthcare facility equipment planning.
- The adoption of BIM, but also the enhancement of this approach by developing purpose-built models and digital mock-ups that are a product of the interface of Activity DataBase (ADB) with BIM and parametric modelling and environmental simulation software. The aim was to assess healthcare environment-related issues, and develop a parametric environmental design framework. The benefits inherent in such an integrated approach have included the reduction in the cost and time required for various aspects of the healthcare building design and development process.

A wide range of deliverables and notable achievements have so far been delivered.

- Development of a Parametric Environmental Design Framework.



The Inspiring Design Excellence and Achievements (IDEAs) web pages on the Department of Health's website (www.ideas.dh.gov.uk/) contain a wide range of suggestions for improvements in built environments.

- Development of a Healthcare Digital Mock-Up Facility.
- Determination of the human aspects related to the use of modelling, simulation, and visualisation.
- The Special Issue of the *Journal of Building Performance Simulation*.
- Seven journal papers, five conference papers, two articles and six reports. One of these reports is *Impact of the Built Environment on the Healing Environment*, which was authored by Loughborough University's Emeka Efe Osaji, and co-authored by Professor Andrew Price and Dr Peter Demian. It is a 2008 HaCIRIC Informing Study Report that reviewed relevant literature and case studies, and identified the impact the built healing environment has on the patient experience and patient well-being, medical staff productivity, and clinical outcomes.
- Successful Expression of Interest (EoI) in the Technology Strategy Board (TSB) competition for funding *Design and Decision Tools for Low Impact Buildings*.
- Successful completion of the Centre of Excellence in Customised Assembly (CECA) and HaCIRIC Proof of Concept (PoC) project *Integrating Digital Tools in the Built Environment and Healthcare Sectors for Improved Hospital Performance*.
- Invited lectures to disseminate the project's findings and outputs.

For further information please contact Emeka Efe Osaji at Loughborough University (01509 222814; E-mail: e.e.osaji@lboro.ac.uk) or Professor Andrew Price (a.d.f.price@lboro.ac.uk) or visit <http://www.haciric.org/>.