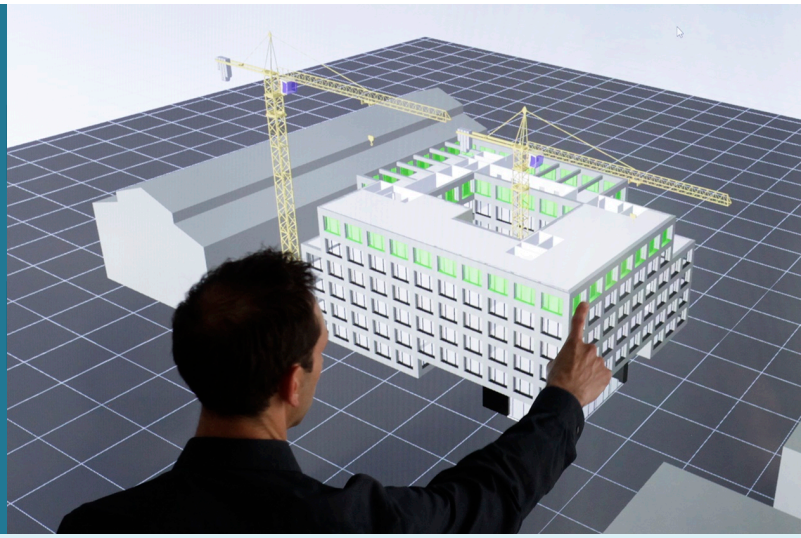
RESEARCH GROUP

www.list.lu/fr/recherche/environment/environmental-sustainability-assessment-and-circularity/groupe/sustainable-urban-and-built-environment/

Sustainable Urban and Built Environment



The Sustainable Urban & Built Environment research group focuses its activities on developing decision-making tools and delivering science-based data enabling policymakers and industrial organizations to make informed decisions related to sustainable urban and built environment.
Amongst these activities, the group contributes to:

- producing prototypes to demonstrate the technical and organizational feasibility of the solutions in order to convince stakeholders of the need to co-create sustainable solutions in urban and built environments, as well as pushing new services on the market;
- developing measures and instruments to empower an equipped, qualified and fit-for-purpose workforce to ensure the transition towards sustainable construction and operating activities / processes;
- supporting stakeholders in the construction value chain in the transition of their business frameworks to European & Luxembourgish policies/regulations and standards in terms of sustainable urban and built environment.

MAIN COMPETENCES

The main fields of expertise are the following:

- Production of digital models to support the management of built environment (from buildings to districts) and the development of buildings' digital twins
- Use of 4D/5D models and parametric modelling to support participative design and architectural programming
- Post-occupancy evaluation for comfort performance analysis
- Assessment of building intelligence thanks to the Smart Readiness Indicator
- Development of methods and tools to support demolition waste inventory and management
- Development of methods and tools enabling the industrialization of construction in order to improve on-site productivity
- Improvement of urban logistics by setting up Construction Consolidation Centres (CCC)
- Geoanalytics & 3D visualization to enhance citywide sustainable management tools
- Space-time uncertainty propagation analysis of complex modelling chains based on Geographical Information Systems (GIS) and 3D/4D Geospatial Simulation

MAIN ASSETS

- Poesy: a web-application for the Post-Occupancy Evaluation (POE) of buildings based on:
  1. Feedback campaigns to get a perceived qualitative evaluation of the spaces from occupants
  2. Consolidation of human results with measured data retrieved from sensors
- 4DCollab: method and software technologies addressing planning and collaboration in the preconstruction activities of an Architecture, Engineering and Construction (AEC) project, thanks to 4D computer-aided design (CAD) and BIM technologies.
- Smart Construction Planner: based on the idea of the connected construction site, the Smart Construction Planner is a construction site container equipped with various interactive technologies connected with sensors deployed on-site, allowing the centralization and visualization of real-time data control for the construction site while focusing on the logistics, quality and planning.
- TwiSCo: software solution to ensure on-site logistics provided by a Construction Consolidation Centre to enable delivery of materials to the site just-in-time and at the right place and limit waste on construction site
- iGuess®: geocomputation platform integrating visualization and computational modules to efficiently handle spatio-temporal data.

SELECTED PUBLICATIONS

- Towards a semantic Construction Digital Twin: Directions for future research, Boje C., Guerriero A., Kubicki S., Rezgui Y. (2020), Automation in Construction 114, 103179
- Identifying stakeholders' roles and relevant project documents for 4D-based collaborative decision making, Bolshakova V., Guerriero A., Halin G. (2020) Frontiers of Engineering Management 7: 104–118
- Assessment of synchronous interactive devices for BIM project coordination: Prospective ergonomics approach, Kubicki S., Guerriero A., Schwartz L., Daher E., Idris B. (2019), Automation in Construction 101: 160-178;
- Review of building energy performance certification schemes towards future improvement, Li Y., Kubicki S., Guerriero A., Rezgui Y. (2019), Renewable and Sustainable Energy Reviews 113, 109244
- Collective decision-making with 3D and 4D. A digital collaboration pedagogical experiment with wooden construction, Bolshakova V., Guerriero A., Halin G. (2019), 36th CIB W78 2019 Conference, ICT in Design, Construction and Management in Architecture, Engineering, Construction and Operations (AECO), September 18-20, 2019, Northumbria University at Newcastle, United Kingdom
- Short-term and regionalized photovoltaic power forecasting, enhanced by reference systems, on the example of Luxembourg, Koster D., Minette F., Braun C., O'Nagy O. (2019), Renewable Energy 132: 455-470
- A scalable approach for spatio-temporal assessment of photovoltaic electricity potentials for building façades of entire cities, Braun C. (2019), The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, vol. XLII-4/W14: 17-22
- A novel 2.5D shadow calculation algorithm for urban environment, Bhattacharya S., Braun C., Leopold U. (2019) in Proceedings of the 5th International Conference on Geographical Information Systems Theory, Applications and Management (GISTAM 2019): 274-281

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