Integrative design: Key to deliver high performance buildings to clients

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Viewpoints and attributes of building performance

A pathway to create high performance buildings is an integrative design, which is a collaborative design-based approach intended to promote collective theories and disciplines. It is an interdisciplinary, collaborative, and iterative process. Creating high performance buildings require various stakeholders to collaborate in various stages of the life cycle of the buildings. Complete clarity of the goals at the initial idea conception of the building is important for design progression. These common goals should be communicated clearly among design team members and the client. The design team members need to be very clear about what they are striving to achieve for the client. Members of the design team may have their own interpretation of building performance depending on the background professional training and experience. There are various viewpoints of the concept of building performance. Pieter de Wilde (2018) defined building performance as a tripartite concept that can relate to an engineering, process or aesthetic perspective. Table 1 presents the viewpoints and generic attributes of building performance.

Table 1.
Viewpoints and attributes of building performance.

Perspective	Engineering	Process (Construction)	Aesthetic (Architecture)
View of buildings	An object	An activity	An art
Concerned with	How well a building performs its tasks and functions	How well the construction process delivers buildings	The success of buildings as an object of presentation or appreciation
Attributes	Distinguishing quality, capacity, resources saving	Cost, time, quality, safety, waste reduction, customer satisfaction	Creativity, interpretation, communication, embodiment, enchantment, movement

Adapted from de Wilde (2017 & 2018)

More details about building performance attributes regarding engineering perspective may be found in (Mahdavi & Wolosiuk, 2019). The generic attributes of building performance presented in Table 1 could be used for analysing client briefs to identify building occupiers' needs and requirements, and to clearly communicate among the design team members.

Building performance in scientific landscape

Keyword ("building performance") search in Web of Science Core Collection (webofscience.com) we found 2,596 documents published between 1900 and 2020. To construct a map to visualize co-occurrence networks of important terms associated with "building performance" from these documents VOSviewer software tool (van Eck & Waltman, 2010) was used. Minimum number of occurrences of a term was chosen to be 10. Of 45,267

terms within these documents, 1,321 met the threshold. The 60% most relevant terms based on the relevant score calculated by the tools (739 terms) were selected to create a network map. We found four main clusters of these selected terms dominated by 'structure', 'performance simulation', 'HVAC terms (heating, ventilation)' and 'design process' (Fig. 1). First three clusters are related to engineering perspective and the last cluster is related to process (construction) perspective. It could be interpreted that the aesthetic perspective of building performance has not been well documented in the current scientific knowledge base.

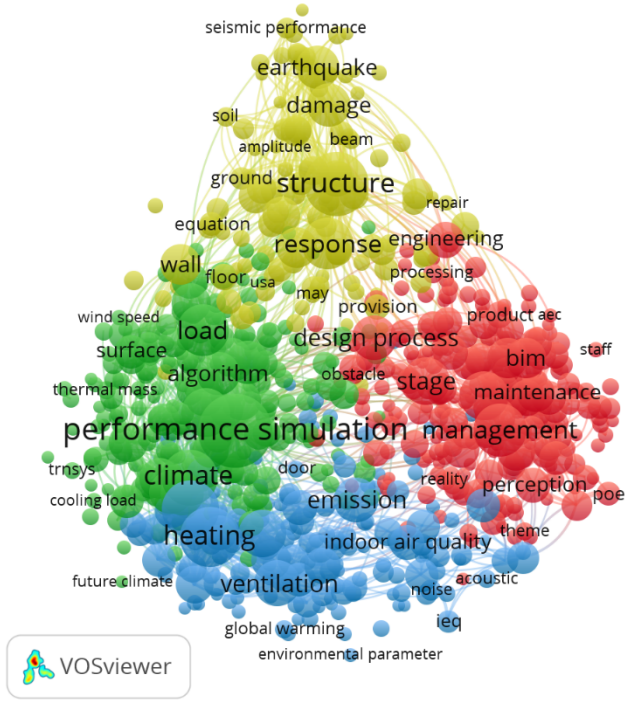

Fig. 1. Networks of important terms associated with "building performance".

Future tasks

The client briefs of seven building typologies (including healthcare: hospital and aged care, education, data centre) planned within Integrated Design Studios (one of the activities streams in Affordable Heating and Cooling Innovation Hub (i-Hub)) will be analysed and reported in due course. This task is expected to be completed in 2022. Literature recommends principles of how we should design building to achieve better performance. Putting into practice is not always clear or straightforward, these case studies help to demonstrate the applications of the principles.

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More information about participating in Integrated Design Studios[♠] (i-Hub, an initiative led by AIRAH) please contact Prof. Brendon McNiven <brendon.mcniven@unimelb.edu.au>.

[♠]Integrated Design Studios for real building projects, to build industry knowledge and competence in early design strategies for maximising the utilisation of onsite renewable energy in conjunction with HVAC&R.

If you have projects you consider may benefit from integrated design or wish to be involved in the programme in other capacities please make contact through AIRAH or refer to the website http://www.ihub.org.au.