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Editorial: Adaptive design solutions for buildings and the built environment after the COVID-19 pandemic

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Editorial on the Research Topic
Adaptive design solutions for buildings and the built environment after the COVID-19 pandemic

This editorial aims to summarize the main findings of the Research Topic "*Adaptive Design Solutions for Buildings and the Built Environment after the COVID-19 Pandemic*". The collected works have provided perspectives on how adaptive design solutions in the built environment can contribute to influence health, comfort, performance and wellbeing during and after a major pandemic such as COVID-19. Some critical aspects have been particularly highlighted by the contributors to the Research Topic, who have considered the effects of COVID-19 and how it can help change our approach to the design and management of indoor environments, facilities, spaces, and complementary infrastructure in the built environment. As the editors of this Research Topic, we believe that the approaches and solutions offered are promising and can be used to improve our knowledge of the impact of COVID-19 on building design and beyond. In addition, thanks to such novel approaches, the effectiveness of the available control strategies can be improved, and some new ones can be developed to enrich users' experience and improve their quality of life.

The first article, by Shepley et al., focuses on how the COVID-19 will change the design in healthcare, hospitality and senior living facilities, with an emphasis on healthcare facilities that will require additional space, outdoor access, service hubs, and additional infrastructure for any conversion of garages for emergency use. It discusses hospitality settings that would employ new cleaning methods, use of robotics, improved HVAC, wellness programs, workspace options, and flexible food service operations to tackle highly contagious conditions such as the COVID-19 pandemic. The second article by Kahn et al. presents a measure to extract the optimal Ultraviolet Subtype C (UVC) requirements to improve facility management while ensuring compliance with ventilation guidelines at lower energy costs through the Kahn–Mariita (KM) model, which considers the air quality of shared enclosed spaces over time by supplementing the existing mechanical ventilation with localized UVC air treatment and includes variables such as room size, occupancy,

existing ventilation, and target equivalent air changes per hour (ACHs). The third article Raveendran et al. reported on the difference in radiation level inside a wired, hybrid, and wireless smart home through Computer Simulation Technology (CST) simulation, where such quantification can help designers develop strategies to design smart buildings that cause low radiation for its occupants. The antenna field source was imported into CST to create the wireless and hybrid design scenario. The fourth article by Salonen et al. aims at establishing a solution for infection prevention and control (IPC) in built environments by introducing a new indoor hygiene concept (IHC) and providing a tool for implementing necessary IPC actions during the life cycle of a building to construct or renovate hygienic indoor environments. The fifth article by Buonanno et al. presents a study with validation of a recently developed predictive theoretical approach that can estimate the SARS-CoV-2 infection risk of susceptible individuals via the airborne transmission route in school buildings. In such cases, the need for mechanical ventilation systems to protect students in classrooms from the airborne transmission was found to be significant, as protection is greater when ventilation rates are higher than those needed to ensure indoor air quality. Finally, the sixth article by Maki et al. described the use of antimicrobial surfaces (AMC) and how they can reduce the total number of microbes on a surface, but carry the risk of dysbiosis, microbial imbalance, such as the polarized growth of metallophilic, metal- and antimicrobial-resistant, and other surviving bacteria, and an overall reduction in microbial diversity.

To summarize what type of adaptation they are referring to and their particular contributions:

- Modifying hospital design for healthy and healing environments;
- Approaching an alternative way to the air quality problem by using localized Ultraviolet Subtype C (UVC) for air treatment that is converted to equivalent ventilation;
- Determining the difference in radiation levels inside a wired, hybrid, and wireless smart home through Computer Simulation Technology (CST) to help designers develop strategies to design smart buildings that cause low radiation for their occupants;
- Proposing a comprehensive indoor hygiene approach to infection prevention and control in the built environment;
- Increasing ventilation rates is an important measure to remove inhalable virus-laden respiratory particles and reduce the risk of infection in school buildings.
- Approaching the use of metagenomic sequencing prior to large-scale implementation of Antimicrobial Coatings (AMCs).

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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