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Editorial

The Adaptability of Residential Planning and Design to World-Changing Events

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History has witnessed several events with different magnitudes that have served as catalysts for drastic changes in society, impacting people's lifestyles and reshaping the prevailing civilizational paradigm. The fields of architecture, design, and engineering have consistently played key roles in developing original and adaptive solutions to the challenges presented by extreme events, thereby leaving an indelible mark on the history of civilization. This mark is evident in the built structures in today's cities, ranging from buildings to bridges.

Therefore, it is important to frame the current moment, as the world is emerging from a pandemic (COVID-19) [1] that has left profound marks on the population; dealing with armed conflicts, occurring in Middle East [2] and at the very heart of Europe [3]; struggling with devastating seismic events, such as those witnessed in Turkey and Syria [4]; and amidst a climate crisis [5], with its far-reaching consequences, including, among others, heatwaves, forest fires, and extreme rainfall and floods.

In this way, this Special Issue presents a selection of the latest developments from the scientific community to address the issues raised by some of these events. It is focused on residential contexts, with the goal of enhancing the readiness and resilience of buildings, neighborhoods, and cities in the face of new upcoming threats. It contains fifteen original studies (fourteen articles and one revision) conducted by researchers from Italy, Poland, Portugal, Brazil, Spain, Turkey, India, China, and the Republic of Korea, showcasing its global reach. Despite the common denominator of 'World-Changing Events', the contributions vary in scope and nature, ranging from fields such as civil engineering, architecture, and urbanism to social sciences, environment, and health.

If there were any doubts regarding the disruptive effects of the COVID-19 pandemic on established concepts and paradigms, the work of Moreira and Farias [6] unequivocally clarifies it. Their study discusses the pandemic's impact on the use of residential spaces in Lisbon, drawing from an inquiry conducted during the lockdown period. The authors state that the pandemic, particularly the confinement measures, led to significant shifts in the utilization of domestic spaces, carrying enduring implications for future house designs. Furthermore, they observe that homes have begun to serve purposes for which they were not originally intended, which, in turn, underscores the need for additional spaces to accommodate these evolving requirements. Ultimately, the authors advocate for the reevaluation of post-COVID home design.

An example of the latter is the studies conducted by Kim and Kim [7] and Kim et al. [8] in South Korea, which offer valuable insights into the design of apartment spaces and minimum housing standards improvements as a direct response to the challenges posed by

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Citation: Duarte, C.C.; Cortiços, N.D.; Stefańska, A.; Mateus, D.; Monticelli, C. The Adaptability of Residential Planning and Design to World-Changing Events. *Buildings* **2024**, *14*, 9. https://doi.org/10.3390/buildings14010009

Received: 4 December 2023
Accepted: 15 December 2023
Published: 20 December 2023

the last years. The first employed a mixed-method approach, combining questionnaires and photovoice, to assess the population's experiences during the pandemic period, offering valuable contributions to the prevention and management of infectious diseases within home environments. Some of the key recommendations emphasize the need for flexible layouts to effectively manage and balance work efficiency and privacy. Additionally, they propose the implementation of a storage facility at the house entrance for contaminant removal [7]. The second addresses the need to update South Korea's minimum housing standards, as the existing ones no longer reflect the evolving housing situation. The proposed standards categorize households by size and incorporate specific criteria for areas, facilities, and locations. Directly related to COVID-19 was the behavioral shift in people that resulted in the inclusion of a "dining space" and an "additional room" for one and two-person households, respectively. Furthermore, the introduction of criteria such as "hot water in bathing facilities" and "private entrance door" is also a consequence of the pandemic's impact on the population, particularly over the restrictions on access to public bathing facilities and privacy issues [8].

Likewise, the research conducted by Daglio et al. [9] underscores the need for incorporating new typological and technological strategies into post-pandemic housing design. Their study offers a fresh perspective on seamlessly integrating fixtures and furnishings into interior design, with a focus on the industrialization potential of certain components through a flexible and modular approach. The authors emphasize the importance of downsizing house areas while upholding high-quality living standards, where design is framed by sustainable and circular economy principles.

Also focusing on the exploration of residential architectural concepts is the study conducted by Racha-Pacheco et al. [10], which delves into the design of smart homes. This study focuses on the integration of cutting-edge technologies into small-scale residential units, including smart thermostats, sensors, surveillance systems, remote devices, and mobile apps, among others. The authors have developed and presented an adaptable intelligent home prototype, with the aim of raising awareness about the potential and limitations of merging these technologies while emphasizing the importance of thoughtful design in this context.

On an urban scale, Zeng et al. [11] investigate how wind patterns may contribute to the spread of the COVID-19 virus within urban areas using machine learning algorithms. The findings show that various wind patterns and building layouts can influence the spread of the virus. Areas with higher population density are more susceptible to retaining virus concentrations, thus increasing transmission rates. This study offers valuable insights for urban planners and health authorities seeking to develop strategies for preventing and controlling epidemics in urban areas.

With a different scope but still related to the pandemic, the study conducted by Ding et al. [12] analyzes the impact of COVID-19 on the utilization of self-service facilities in residential areas, particularly smart parcel lockers. Their study employs an analytical framework to evaluate over 2000 residential communities in Tianjin, China. The primary findings highlight a notable inequity and a supply–demand mismatch in accessing these facilities, leading to significant resource waste and underutilized public space. Furthermore, the authors call for the attention of stakeholders to address this issue and emphasize the need for further studies regarding the supply and demand dynamics in this context.

Events on the scale of the COVID-19 pandemic often lead to the emergence of new concepts and perspectives. In this context, the study by Quesada-Garcia et al. [13] introduces and defines a novel concept known as "healthy architecture". Furthermore, it also discusses a set of principles referred to as the "Decalogue", where buildings and environments must adhere to each other to be considered healthy. This study contributes to raising awareness that spaces in urban and building contexts should not only be guided by sustainable, functional, and aesthetic standards but also prioritize comfort, health, and safety.

The climate crisis is also a topic covered in this Special Issue, primarily through the work of Starzyk et al. [14], which addresses the efforts made to face forthcoming chal-

lenges within an urban and architectural context in Poland. In addition to referencing the consequences of climate change and the necessity for developing programs to address climate-related issues in urban development, the authors discuss the formulation of guidelines and standards aimed at mitigating adverse effects in existing buildings. Furthermore, they emphasize the incorporation of sustainable development principles into the adaptation process, highlighting the significance of integrating environmental sustainability with urban transformation and adaptation.

Climate-related issues have certainly raised awareness for the need for more studies relating outdoor thermal comfort with urban space configuration. This is the case of the work of Song et al. [15], which provides insights into the design of optimal residential block forms and layouts with the goal of enhancing thermal comfort during the hot season in Jinan, China. Their study reveals that the number of building rows affects outdoor thermal comfort, particularly on north-oriented streets. It suggests reducing the number of rows and considering a two-building column configuration or other block layouts instead.

Climate change mitigation can also occur through targeted interventions, particularly in the context of improving building energy performance. In this regard, Mateus and Henriques [16] employed computational methods to apply a parametric energy-based design model to 1940s modern buildings in Rio de Janeiro, Brazil, by upgrading and optimizing the existing external shading systems. The main goal of this improvement is to decrease the overall building energy consumption while envisioning the generation of renewable energy through solar harvesting. Iturralde et al. [17] introduce the ENSARE project, which proposes energy retrofits for residential buildings by adding automated prefabricated modules that combine RES and insulation into the building facade. The present study is centered on developing two solutions concerning automation with the potential to save time in the module's layout drafting phase, thereby accelerating the entire renovation process. Both studies contribute to a sustainable approach by integrating passive strategies with RES, aiming to reduce the overall energy consumption of residential buildings. This marks a significant step towards mitigating climate change and promoting energy efficiency.

In the wake of the devastating earthquake that occurred in Turkey and Syria, Turkish authors Yanik and Ulus [18] present a study aimed at developing a method for incorporating the combined effects of base isolation and soil–structure interaction into the mass, damping, and stiffness matrices of a structure, considering different scenarios. Their study highlights that the performance of the base isolation system may vary depending on local soil properties. Its contribution to simplifying the analytical process makes it easier for engineers to work on earthquake-resistant design and retrofitting.

In a world of rapid changes and transformations, lightweight, flexible, and easily assembled/disassembled solutions will certainly have a role in the times ahead. In this context, Cui et al. [19] developed the "Weaving Octopus", a lightweight architectural prototype that seamlessly combines textiles and hybrid structures. Highly versatile and scalable, it can function as a single unit or in aggregate configurations and is flexible enough to swiftly adapt to various scenarios, ranging from public space pavilions to facade shading mechanisms and even furniture. The authors employed a three-stage methodology, starting with conceptual design, followed by parametric simulation and optimization, and culminating in the development of physical scale models. We must underscore this study's contribution to the existing knowledge in lightweight construction design and its potential applicability range across the AEC sector.

Lastly, Vijayan et al. [20] present a comprehensive review that discusses the application of carbon fiber-reinforced polymers (CFRP) in building structural elements. The review covers various topics, including the properties and performance of CFRP, the advantages and disadvantages of their use, their potential to replace traditional construction materials, current trends, prospects, emerging materials, and their role in environmental impact within structural applications. The latter aspect holds great relevance, as these evaluations are essential for creating more resilient and sustainable building structures.

In conclusion, this Special Issue titled 'The Adaptability of Residential Planning and Design to World-Changing Events' offers a selection of studies addressing crucial challenges emerging from the most recent world-changing events. These studies, covering topics related to health, architectural design, urban planning, climate change, and structural engineering, highlight the importance of innovation, adaptation, and sustainability in our ever-evolving world. Together, they not only contribute to our collective understanding but also provide the tools to create resilient and environmentally conscious buildings, neighborhoods, and cities for the generations ahead.

The editors wish to congratulate and express their gratitude to the authors for their valuable work, to the peer reviewers for their thorough analysis, and to the assisting editors of Buildings, with a special mention of Ms. Evie Ouyang, all of whom greatly contributed to the success of this Special Issue.

Funding: This research was funded by FCT-Fundação para a Ciência e a Tecnologia, I.P., grant number UIDB/04008/2020.

Conflicts of Interest: The authors declare no conflict of interest.

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