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Commentary on 'The Silicon Architect: Transformation towards a Data-Centric Mindset' Article

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1. Introduction

Throughout the history of mankind, the emergence of new technology has always produced a question of whether it can replace human beings or whether it can become a new norm. From science-fiction movies to real world innovation, it requires a thorough understanding of the current status quo and a logical prediction of the future to accurately answer such a question. The mobile phone, the universal language translator, tablets, driverless cars, smart home technologies, and Artificial Intelligence (AI) are among some examples of the past fantasy technologies that became real today.

The article 'The Silicon architect: Transformation towards a data-centric mindset' (Kemkomnerd & Tirapas, 2025) shares a similar notion of future new norm prediction with the new computation technology available today that includes Data Science, Big Data, and Machine Learning. The article examines the history of the past architectural design processes, studies three new archetypal cases, and suggests that this data-centric approach using these new technologies can re-direct architectural design processes. The new human-machine fusion approach helps architects create novel forms beyond human imagination and thus may shape the future of architectural design.

Whether the data-centric approach actually becomes practical in current and future architectural processes or not remains to be seen. This writing explores the application of the data-centric approach to architectural practice today and the research work that might imply the application in the near future. In the end, this commentary identifies the areas for which the data-centric approach may be more feasible than others and what this approach might bring to the world of architecture.

2. Application of the Data-Centric Approach to Architectural Design Practice

The article begins by exploring the areas where data-centric approaches replaced conventional approaches in current architectural practice in design, construction, and operation phases. Then it explores the idea that through time in modern history, architectural design processes have evolved from a human-centric approach to a data-centric approach. The authors implied that a data-centric approach provides many benefits including increased speed and efficiency, exploration of design variations, and solutions that exceed human limits of

imagination. Case studies are presented to demonstrate that the objectives of using the data-centric approach are twofold: for performance-based purpose and for aesthetic novelty. This Commentary explores the potential of both objectives in real-life application.

2.1 Performance-based purpose

In the article's first case study, the House of Clicks exhibited a fascinating use of big data by analyzing 200 million clicks from Swedish properties' websites. The data revealed that most people prefer fireplaces, an open plan kitchen, a tiled bathroom, a balcony, and an average of four rooms (Meier, 2015). The architects of the project consequently benefited from the data analysis and designed houses that accommodate these features. This shows that a data-centric approach has an impact on building design although it did not directly affect the architectural design process. Rather, it changed the users' requirements that are normally given by the project owner or the marketing team. In fact, this case should be a part of the marketing research process. In any case, it proves that quantifiable quality can be handled by the current technology, which represents the foundation of the approach for performance-based purpose.

As AI has been rapidly developed in the past few years, there are many current commercial tools and software that can aid architects during the design process. For performance-based purpose, there are tools for generative design and space planning (e.g. TestFit), site feasibility analysis (e.g. Archistar), and sustainability (e.g. Cove). These tools are very useful to architects because they can save a large amount of time when undertaking tedious work such as car parking, retail, and residential unit arrangement. With real-time response of these AI-integrated tools, such work can be completed within a matter of hours instead of days if it is otherwise done using conventional human labor.

Recent research papers agree on the benefit of a data-centric approach for the performance-based purpose in terms of increasing speed and efficiency and exploration of design alternatives. Aside from the examples in the article, advanced studies using Machine Learning (ML) and/or AI tools reveal that they can help analyze and optimize buildings in terms of carbon footprints (Ploszaj-Mazurek et al., 2020), fire safety (Su et al., 2021), energy efficiency (Ahmad et al., 2024), and energy retrofit (Seyedzadeh et al., 2020). Although the tools used in these studies differed (e.g. Gradient Boosting Regressor, Artificial Neutral Network and Genetic Algorithms), all of the work share one common aspect that they produce results that are quantifiable. These developments will help the speed and efficiency in the design process as well as help create design alternatives for the architects to consider.

2.2 Aesthetic novelty

In comparison to the performance-based purpose counterpart, there also are many current commercial tools for aesthetic novelty. However, the purpose is limited to image generation from sketches and prompt commands (e.g. Midjourney and PromeAI). As the article suggests that these tools do not incorporate three-dimensional quality of architecture, their usage in the current architectural design process therefore is insignificant. These tools might help save time and provide design alternatives but they might not be able to create solutions that exceed human limits of imagination because they use the information from available existing databases.

In research, the article praises Andrasek's work as standing out for the purpose of aesthetic novelty. It incorporated ML to create new forms unimaginable by architects. There is no doubt regarding the originality of the creation. While it is clear that architects will have a final decision on the design, how they choose from

numerous solutions provided by the machine is still questionable. Unlike the performance-based purpose where results are objectively quantifiable, the aesthetic novelty relies on human's subjective evaluation, which needs a higher degree of human's understanding and interpretation. In addition, there are many other aspects in architectural design for architects to be concerned with apart from form creation such as function, site, climate, and context. Consequently, while this novel method can create solutions that exceed human limits of imagination, it would require considerable effort from the architects to effectively apply the method into their design process.

3. Conclusion

In general, we should agree with the article that a data-centric approach is now and will be practical in the architectural design process in the future. It already has replaced the conventional approach in many areas, some of which simply use building simulation tools without advanced AI technologies in the scope of architectural design and consultancy. This is especially true for the performance-based purpose because there is a large volume of building needs for commercial use. The method is rather straightforward because parameters are quantifiable (e.g. salable area, cost, energy). A large number of tools have been developed because of the high demand. For the performance-based purpose, a data-centric approach likely will 'redirect the design process' as the article suggests, especially with further development of more powerful computers.

On the other hand, the potential for the purpose of aesthetic novelty is more limited because there should be a smaller volume of needs, maybe for design competition or the avant-garde who yearn to search for artistic originality as the article suggests. The nature of the results that are not quantifiable means the method is more complicated to use. The related tools also could be less commercialized due to lower demand, thus, requiring higher user-knowledge. As a result, not so many architects would be ready to learn the technical subjects required to use this approach, such as coding, as they already have so many other issues to study. In conclusion, machines already have replaced human beings in many areas in the architectural design process, especially for the performance-based purpose. For aesthetic novelty, however, machines eventually may work with human beings in co-creating architecture with artistic quality in some iconic buildings. When that happens, it will be the first time in the history of mankind to record that a machine plays an important role in human's artistic creation.

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