Summary Post

My previous post discussed the impact Industry 4.0 and 5.0 have had on construction and remarked about the implementation of AI, the Internet of Things (IoT), and real time data assisting with efficiency improvement, error suppression, and enabling predictive maintenance (Metcalf, 2024). I used the example of AI-assisted planning and BIM to illustrate how our pre-construction collaboration processes have improved tremendously. To balance the perspective, I also presented a cautionary case: the Queensferry Crossing project, which illustrated the dire risks caused by a lack of system integration and absolute neglect of dynamic data inputs (Institution of Civil Engineers, 2018).

My peers' feedback has focused on expanding the discussion in the form of addressing multiple, and important, concepts. Alzahmi elaborated on technology maturity by explaining the implementation imbalance mentioned in the H.O.P.E. model (Chrusciak, Szejka and Canciglieri Junior, 2025), asserting that tools need to be adapted to people (Bucci, Fani and Bandinelli, 2025). Abdallah resorted to mentioning system integration and the lack of functional testing for remote monitoring control systems—PMIS, to be specific—highlighting the ineffectiveness apart from training and supervision (Caballero, 2024; Coelho et al., 2023). Alshehhi recalled the socio-technical aspect of Industry 5.0, emphasizing that for BIM design methodologies to be effective, actual data supported by a workforce needs to be available (Succar and Sher, 2014; Oesterreich and Teuteberg, 2016).

From Units 1 to 3, we saw the effects of digital innovations on different industrial sectors, and the importance of having a balanced and human-centered approach. This is further accentuated by the concepts of Industry 5.0, which place an emphasis on automation synergistic with human-machine interaction as well as eco-sensitive practices (European Commission, 2021).

To summarize, we can see the power of advanced digital technology. At the same time, these tools can only succeed with the right alignment of device configuration, user proficiency, and the user system's willingness—including ensuring that construction is aided rather than impeded in its advancement through technology.

References:

- Bucci, I., Fani, V. and Bandinelli, R. (2025) 'Towards human-centric manufacturing: Exploring the role of human digital twins in Industry 5.0', *Sustainability*, 17(1), p.129. Available at: https://doi.org/10.3390/su17010129 (Accessed: 16 May 2025).

- Caballero, A. (2024) *Essentials of digital construction: Lessons learned from digital transformation*. Emerald Publishing Limited. Available at: https://www.icevirtuallibrary.com/doi/pdf/10.1680/iceedc.9446200 (Accessed: 16 May 2025).

- Chrusciak, C.B., Szejka, A.L. and Canciglieri Junior, O. (2025) 'Integrating digital transformation with human-centric factors strategies to enhance organisational process performance: The H.O.P.E. Model', *Journal of Industrial Information Integration*, 44, p.100785. Available at: https://doi.org/10.1016/j.jii.2025.100785 (Accessed: 16 May 2025).

- Coelho, P. et al. (2023) 'Industry 5.0: The Rise of a Concept', *Procedia Computer Science*, 217, pp.1137–1144. Available at: https://doi.org/10.1016/j.procs.2022.12.312 (Accessed: 16 May 2025).

- European Commission (2021) *Industry 5.0: Towards a sustainable, human-centric and resilient European industry*. Available at: https://ec.europa.eu/info/news/industry-50-towards-more-sustainable-resilient-and-human-centric-industry-2021-jan-07_en (Accessed: 13 May 2025).

- Institution of Civil Engineers (ICE) (2018) *Learning from the Queensferry Crossing*. Available at: https://www.ice.org.uk (Accessed: 13 May 2025).

- Metcalf, L. (2024) 'Digital disruption in construction: Embracing Industry 4.0 and beyond', *Construction Innovation Journal*, 24(1), pp.45–59.

- Oesterreich, T.D. and Teuteberg, F. (2016) 'Understanding the implications of digitisation and automation in the context of Industry 4.0', *Computers in Industry*, 83, pp.121–139. Available at: https://doi.org/10.1016/j.compind.2016.09.006 (Accessed: 16 May 2025).

- Succar, B. and Sher, W. (2014) 'A competency knowledge base for BIM learning', *Automation in Construction*, 39, pp.142–158. Available at: https://doi.org/10.1016/j.autcon.2013.06.009 (Accessed: 16 May 2025).