A framework to assess the maturity level of digital twins.

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Résumé

Despite the growing popularity of digital twin (DT) developments, there is a lack of common understanding and fundamental definition of DT. This issue creates even more challenges in evaluating the applicability and maturity of existing DT frameworks. A shared understanding of DT based on unambiguous characterization is required to be developed to mitigate the challenge of both research and commercial communications. With these in mind, the objective of our study is to assess the existing DT models from various domains to unify the knowledge and understanding of DT developers and stakeholders. We conducted a systematic literature review and analyzed 25 selected papers out of 107 to identify and discuss the characteristics of existing DTs. The review shows an inconsistency in the characterisation of the existing DT models, mostly influenced by case-specific focus of the developers. Therefore, this article proposes a three-phase evaluation framework to assess the maturity of digital twins across different domains, focusing on the characteristics of digital models. The four identified dimensions in this model are Capability, Cooperability, Comprehensiveness, andLifecycle. Based on that, a maturity score is calculated with a implemented weight mechanism to adapt the importance of each dimension for different application requirements. Several case studies are devised to validate the proposed model in general, industrial and scientific cases

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