Assessing Spatial Digital Twin Model Using ISO/IEC 25010 Framework: A Case Study of Oil and Gas Project in Australia

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SUMMARY

The ISO/IEC 25010 framework, an extended version of ISO/IEC 9126 series is widely accepted to evaluate the system/model/software as it encompasses all the necessary metrics such as functional suitability, performance efficiency, compatibility, usability, security, reliability, maintainability, and portability. The main objective of this study was to assess the spatial digital twin model using ISO/IEC 25010 framework. A case of oil and gas project which is located at the Queensland, Australia was selected, and the field design of this project was based on land survey data model (LSDM) based digital twin. LSDM is developed by the Geomatics Committee of International Association of Oil and Gas Producers (IOGP) which serves as a geodatabase data template and a guiding principle of data dictionary for all the projects around the world for various purposes including the field design. This study has utilised all the eight metrices to evaluate the spatial digital twin model except "Security" because most commonly security parameters of the prototype are evaluated when the prototype/system/software is deployed to the market for real business purposes since the prototype used in this study was just in a beta version. Eight assessments were carried out separately against respective metrices of the framework through self-argument approach. Due to time constraints, regulatory requirements, and limited resources, oil and gas stakeholders' inputs were not incorporated during the assessment. The results generated from the evaluation indicate the prototype has successfully achieved functional completeness, correctness, and appropriateness within the scope of this study. Further, in terms of rendering time and resource utilisation, the prototype was able to achieve standard performance. In addition to this, evaluation signifies that the prototype was compatible when assessing it against the Digital Twin Victoria (DTV) platform. Similarly, usability assessments verified its suitability for oil and gas projects in the field design process. The prototype was successfully able to execute essential field design functionalities based on LSDM. Further, the evaluation indicates that the prototype is portable as it enables its replication in the field design processes of O & G projects. In a nutshell, the prototype encompasses a standard

level of all parameters in the ISO/IEC 25010 framework within the scope of the study. The key significance of the study is it explores and developed the approach to evaluate the spatial digital twin models when there are limitations in regulatory requirements and information accessibility. Perhaps, it is recommended that to achieve a more comprehensive assessment, employing additional evaluation methods, such as conducting interviews with SMEs, is crucial for achieving broader industry acceptance and implementation.