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Towards a Readiness Assessment for Wireless Technologies for Highway Construction and Infrastructure Asset Management

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Abstract

The demand for safe, reliable, and higher-quality infrastructure systems often increases transportation construction projects' complexity and necessitates more comprehensive evaluation methods leading to the incorporation of technologies. With a focus on effective implementation of technology, this research stretches beyond simply evaluating technology to include investigating the technology integration with personnel and policy at Departments of Transportation (DOTs). Drawing from an extensive literature review and a survey of DOT personnel, this study applies and evaluates maturity models for people, processes, and technologies combined with technology-task fit models. The findings support a need for understanding people, process, and technology maturity before the technologies can be successfully implemented. This paper presents an assessment tool and an approach for DOTs to improve understanding and performance by moving to higher maturity levels. The study includes analysis of Automatic Identification and Data Capture (AIDC) technologies, Radio Frequency Identification (RFID), barcoding and readers, object-recognition devices, Global Positioning System (GPS) or Global Navigation Satellite System (GNSS); Geographic Information System (GIS), Unmanned Aerial Systems or Vehicles (UAS/UAV), Ground Penetrating Radar (GPR), Light Detection and Ranging (LiDAR), Electronic ticketing, and Infrared Sensing (IR). The main objective of the research is to develop guidelines for the applications of wireless technologies for highway construction and infrastructure asset management and to develop a technology readiness methodology for implementing technologies. The assessment tool introduced within this paper is useful for DOTs as it provides a readiness assessment for technology implementation. The research will further explore changes in maturity levels and how technology implementation's effectiveness varies with people, process, and technology maturity models.