

Federal Register Notice: 89 FR 51554, [Federal Register :: Networking and Information Technology Research and Development Request for Information on Digital Twins Research and Development](#), June 18, 2024.

Request for Information on the National Digital Twins R&D Strategic Plan

Texas Department of Transportation

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July 23, 2024

Ms. Suzanne H. Plimpton
Reports Clearance Officer
National Science Foundation



RE: Docket No. NSF-FRDOC-0001-3352

Dear Ms. Plimpton:

The Texas Department of Transportation appreciates the opportunity to respond to the National Science Foundation’s (NSF) Request for Information (RFI) regarding “Networking and Information Technology Research and Development Request for Information on Digital Twins Research and Development.”

TxDOT views digital twinning as a vital component in achieving our goal of being a forward-thinking leader delivering mobility, enabling economic opportunity, and enhancing quality of life for all Texans. Recently, TxDOT awarded the University of Houston’s (UH) Cullen College of Engineering a three-year, \$505,286 grant to advance research on digital twinning to “digitize” bridges using robots, data, and artificial intelligence (AI). UH’s project, “Development of Digital Twins for Texas Bridges,” seeks to use this technology to help solve complex issues related to highway bridge safety.

As the NSF seeks public comments on the creation of a “National Digital Twins R&D Strategic Plan,” (the Plan) TxDOT has provided suggestions, and potential questions for consideration, below for how the Plan may provide guidance for “government investments in digital twins related research... to help guide further federal R&D coordination to advance technology and accelerate the use and early adoption of the digital twin models.”

<u>Topic</u>	<u>Suggestions/Questions to Consider</u>
Asset Management	This includes managing assets that are used in different parts of a project lifecycle, including planning, design, maintenance, and operations. Examples of these assets include pavement design, signage, utilities, etc.
Work Zone Safety	How can a digital twin be used with a traffic control design to ensure safe traveling for the public?

	Can alerts be sent out to a GPS mapping application to reroute motorists to avoid work zones?
AI	What data should be generative and what can be reactive machines? For example, if a crash occurs on an interstate, what can be done on side streets for signal timing and other integrations to mitigate traffic while improving safety?
Data	What is the MVP (minimum viable product) for database structure (normalization) and the levels of AI it gives?
Data Security	What data will be open source and what data will be withheld? Additionally, what data can state Departments of Transportation share and allow connections to?
Return on Investment	This will help different agencies and stakeholders justify requests for additional funds to obtain digital twin infrastructure.
Tracking Real-time Bathymetric Conditions on Navigable Waterways	<p>A considerable issue concerning the Gulf Intracoastal Waterway (GIWW) is shoaling of the channel where sediment flows into the GIWW and decreases channel depth, causing barges to be light-loaded and decreasing the efficient transportation of commodities.</p> <p>A digital twin could support near real-time monitoring, predictive modeling (including short-term forecasts and longer-term scenario modeling), and optimization of vessel operations.</p>
Integration	Integrating roads, ports, and airports and identifying inefficiencies (such as bottlenecks) for current and future projects. For example, a larger harbor could mean more freight traffic and might require additional considerations such as rail or roadway expansion.

TxDOT welcomes the opportunity to provide suggestions and questions to consider in response to this RFI as the NSF drafts its Plan. If you have any questions, please call me at [REDACTED] or you or your staff may contact Melanie Alvord, Director, Federal Affairs, at [REDACTED] or Melanie.Alvord@txdot.gov.

Sincerely,



Marc D. Williams, P.E.
Executive Director

cc: Steven Pryor, Chief Information Officer, Information Technology
Jason Pike, Director, Design
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Humberto "Tito" Gonzalez, Director, Transportation Planning and Programming
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