SMART GRANTS PROGRAM APPLICATION

SMART METRO

Systems Integration

October 2023

CONTENTS

A. OVERVIEW/PROJECT DESCRIPTION

The Broward Metropolitan Planning Organization (BMPO) is pleased to present its proposal seeking an investment of $2 million in SMART grant funding to develop SMART METRO, an innovative regional application of Systems Integration to develop and implement a foundational digital twin planning tool. The SMART METRO digital twin will provide a virtual representation of the region's transportation network and travel behavior, facilitating real-time monitoring, analysis, and optimization for improved decision-making and performance. SMART METRO will integrate data sets and models used by our partners, enabling effective and cost-feasible evaluation of alternatives for existing and future complex transportation issues for the region. **BMPO is currently developing a Concept of Operations (ConOps) for this digital twin, and the Stage 1 grant will enable us to implement a prototype**.

Broward is built out, facing daunting safety issues that disproportionately affect our disadvantaged residents. The County **was ranked in the top three most climate vulnerable regions in the country by the Union of Concerned Scientists; and grapples with the potential displacement of up to 664,000 disadvantaged residents by 2100**[1].

Current regional planning processes and tools are limited in their ability to quickly and easily compare disparate alternatives and their multi-dimensional impacts and inter-relationships. BMPO currently relies on existing single-use models, each with their own exclusive data dependencies and implementation schedules which increase he cost and timeframes associated with any complex planning effort (e.g. assessing the impacts of major storm events on mobility.) BMPO will use SMART METRO to **plan smart and holistically** to (a) support informed investment of resources; (b) sustain equitable multi-modal mobility that is resilient to climate change; and (c) foster workforce development and concurrent economic growth in the region. By bringing data together into one platform, SMART METRO will save considerable resources, provide the ability to compare disparate alternatives, and make more effective, data-driven decision making.

SMART METRO is a transformative approach to regional modeling that leverages our current effort to develop a digital twin ConOps. Advances in digital twins, data visualization, and data analytics are expected to address the key problems of fragmented data and modeling by providing BMPO with faster, more holistic sketch-planning tools than those currently in use within the region. Through this integration, the BMPO and its regional partners will be empowered to rapidly model scenarios that comprehensively anticipate interactions and externalities arising from both the built and natural environment. By establishing a central "single source of truth" for data capture, analysis, and dissemination, SMART METRO will deliver the following significant benefits to the region:

- Establish Common Standards and Data Protocols: The platform will establish a shared set of standards, data protocols, and tools that can be applied across multiple planning and operational applications.
- Immediate Use and Future Adaptability: The digital twin will support present transportation modeling requirements and be able to adapt to the evolution of future

1 National Oceanic and Atmospheric Administration

use cases, emerging technologies, and artificial intelligence (AI) simulation.

- **Workforce Development Tool:** SMART METRO will become a workforce development tool, enabling our regional education partners to expose students to real-world scenarios in transportation systems and prepare them to use data analytics and tools to assess the complex interaction among transportation, public health, and the environment. We are also asking our partners for their feedback and ideas for expanding SMART METRO functionality to serve their workforce development needs. SMART METRO will also make it possible to analyze and improve access to jobs.

In preparation for the Stage 1 SMART grant, **the BMPO is currently working with our partner Deloitte Consulting and its subconsultants on the development of a detailed ConOps** to guide the design and sustained implementation of SMART METRO. We are using industry guidelines to: (a) develop a robust architecture for secure data management and AI; (b) create a regional data management framework for interagency data sharing; (c) desig(e) a publicly accessible dashboard; d) prepare an inclusive public engagement plan with technology-enabled approaches for community feedback; (e) develop innovative strategies for public awareness and input; (f) identify partner roles and responsibilities (e.g. data stewardship); and (g) identify partner resources needed to sustain and evolve SMART METRO. The ConOps will be augmented with a documented, structured approach to defining and achieving SMART METRO scalability. This approach will reflect proven techniques such as the Florida Department of Transportation's Change Management Board used to evolve its SunGuide software platform for traffic management. The SMART grant award will allow BMPO to more effectively build upon this initial work and transition into the prototype phase of the project.

The SMART METRO includes two main elements: a data steward and a digital twin. The **data steward** element will extract, transform, and load data from multiple sources into a centralized repository (or data warehouse). Using this data warehouse, transportation partners can share data in a safe, secure environment, providing the region with a "single source of truth" for planning and decision-making.

Figure 1. SMART METRO

Data Stewardship

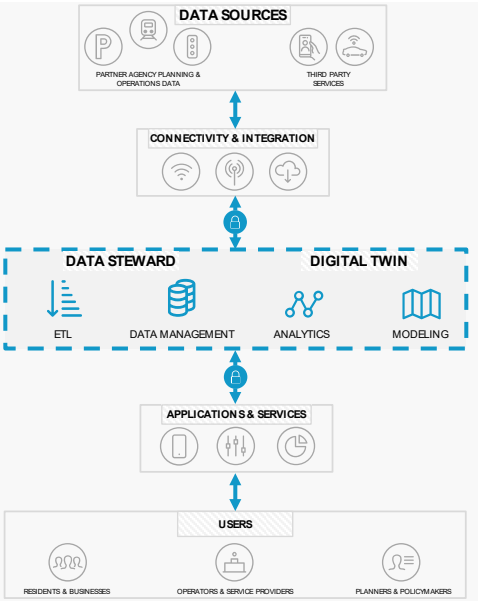
Harness cross-agency data and uncover regional insights with improved data sharing and access; enable new data sharing models.

Digital Twin & AI Models

Simulation-based sketch-planning to rapidly evaluate the impact of a proposed project or policy according to priority transportation, economic, climate, & equity metrics.

Regional Governance

Unlock planning and operational siloes across the regional transportation landscape; supported and overseen by regional agency leaders.



The warehouse will feed data into the digital twin allowing multiple users to analyze and model scenarios and rapidly understand how transportation decisions would affect equity, sustainability, and resiliency considerations at the local and regional levels.

BMPO will use the SMART METRO prototype to test and evaluate scenarios where multimodal transportation improvements and technologies (e.g. microtransit, micromobility) can improve connections between equity areas and employment centers such as the Port Everglades/Broward Convention Center complex. BMPO will also use SMART METRO to analyze connections between disadvantaged communities and education and training facilities that support community workforce development. These applications of SMART METRO are scalable to all equity areas across the region and will used to proactively plan for sustained workforce development under scenarios where populations in South Florida may be displaced by redevelopment and/or climate change.

BMPO will also collaborate with the City of Miramar to use SMART METRO to study potential future scenarios related to sea-level rise or coastal flooding in the low-lying community. Like other communities in Broward County, Miramar's disadvantaged communities are already suffering from flooding events and need to find solutions to improve resiliency.

We are preparing our future workforce through our SMART METRO partnerships. The BMPO will collaborate with Broward County Public Schools (BCPS) and the Museum of Discovery and Science (MODS). These partners lead Science, Technology, Engineering, and Mathematics (STEM) programs that educate students, teachers, and others about real-world scenarios where skills developed around data and new technologies lead to careers within transportation systems and beyond. Our partnership will introduce our future workforce to the complex interaction among transportation, effects on human wellbeing, and the environment. Collaborating with BCPS and MODS will also allow low-income students to engage with SMART METRO's innovative technology and become advocates for sustainable practices and future leaders in the transportation planning field.

At the end of Stage 1, we will measure the effectiveness of the SMART METRO transportation digital twin model by its: (1) **Compatibility of results** with existing models, (2) **Cost and speed** of preparing and analyzing scenarios compared to existing models, (3) **Utility of results** to stakeholders, and (4) Utility as a workforce development tool.

B. PROJECT LOCATION

The project is in Broward County, within the Miami-Fort Lauderdale, FL 2020 Census-designated urban area. Broward County is home to over 1.9 million residents, of which 36% live in a Census tract flagged by the Council on Environmental Quality (CEQ) Climate and Economic Justice Screening Tool (CEJST.) SMART METRO will serve the entire County. The Stage 1 development use cases focus on systemic inequities affecting the mobility, equity, resiliency, and safety issues faced by our CEJST communities. The City of Miramar use case will use SMART METRO to identify flood prone areas to facilitate evacuation and inform capital planning of storm drainage projects in this CEJST area.

C. COMMUNITY IMPACT

A digital twin that integrates our disparate transportation, infrastructure, community, and environmental data will enable us to evaluate multimodal and environmental alternatives in Broward County. Our CEJST communities

will benefit, as they are the most vulnerable users of our multimodal system and victims of past transportation and climate injustices.
Table 1 summarizes how we anticipate SMART METRO benefiting the disadvantaged communities throughout Broward County.

Table 1: Benefits to Disadvantaged Communities

Justice40 Issue	SMART METRO benefit
Transportation insecurity	Ability to model transit access and improvements in travel time. Ability to identify transportation barriers and model solutions (such as improved access to jobs for the City of Miramar's residents and employees).
Environmental burden	Ability to superimpose data on legacy pollution and assess this in conjunction with health data, proximity to traffic, and air quality data.
Social vulnerability	Ability to evaluate model results in relation to communities experiencing social disinvestment, low income, or linguistic isolation.
Health vulnerability	Ability to superimpose health data over transportation and climate data to assess immediate and long-term potential to improve air quality, transportation safety, and vulnerability to health hazards or to prioritize active transportation strategies that can improve public health.
Climate and disaster risk burden	Ability to visualize how investments in transportation and emergency response may be affected by changes in flood risk, coastal erosion, and migration due to building loss. Ability to anticipate climate change impacts on travel patterns and resources in CEJST communities (such as the historic areas of the City of Miramar, which are subject to flooding).
Workforce development	Ability to use SMART METRO to train the future workforce by exposing agency staff, as well as local students (especially low-income or at-risk students) to the complex interaction between transportation, effects on human wellbeing, and the environment.

D.TECHNICAL MERIT OVERVIEW

Identification and Understanding of the Problem to Be Solved

There is a threefold problem facing the BMPO—and all other regional planning agencies.

1. **The existing models supporting the planning process are single-use.** They were designed to estimate impacts related to one aspect of the built, natural, or cultural environment without considering externalities related to the inter-related dimensions of a region. For example, in Broward County, the Southeast Florida Regional Planning Model (SERPM) is used for travel demand forecasting, Signal 4 Analytics for safety, the Sea Level Scenario Sketch Planning tool for resiliency, and the BMPO's Title VI Transportation Planning Equity Assessment tool for equity considerations.
2. **Each model relies on different, solved data sets, many of which are not updated frequently.** This reduces a given model's effectiveness to test scenarios reflecting short-term disruptive events on population distribution and travel patterns; the impacts of storm events on floodplains; coastal erosion; and other issues affecting the safety and utility of facilities.

3. **It is difficult and time-consuming for decision-makers to fully visualize solutions, articulate them to their constituents, and execute them in a timely manner.** Due to the soiled nature of models and the data they depend on, it is not easy to gather all relevant analyses to tell one story that cohesively compares alternatives.

SMART METRO seeks to address these problems by developing a single, high-fidelity model (digital twin) of the Broward region, integrating data from multiple sources, time periods, and levels of detail. Multiple stakeholders can use the digital twin model to develop rapid sketch-plans based on multidimensional scenarios. Our goal is to provide decision-makers with ready access to the information they need to make timely decisions to support our communities.

For example, consider how these challenges could lead to suboptimal emergency response to a major storm event. Travel demand forecasts relying on out-of-date population and employment numbers may not accurately assess evacuation needs. If changes in floodplains and coastal erosion have not been updated and incorporated into evacuation simulations, roadways needed for evacuation may be flooded or emergency response facilities may be located too far away from the communities that need the most help. Most importantly, the time necessary to run multiple models in parallel may not generate meaningful results in time to provide actionable information to residents and emergency response teams.

Appropriateness of Proposed Solution

The technologies needed to implement the Stage 1 SMART METRO prototype are already available on the market. BMPO ran an initial pilot of a digital twin in 2021 to demonstrate how it could enable more flexible planning, stakeholder alignment, and communications. By the start of Stage 1, we will have already established the data governance and stewardship practices necessary to stand up our data warehouse. And we have ***Data Infrastructure Lead Monali Shah of Google and Tom Batz of Kisnn*** on our team to provide state-of-the-practice guidance on such practices in our prototype. The requirements needed for our digital twin to serve multiple sketch planning needs are currently being documented by our partner ***Deloitte Consulting***, such that BMPO will be able to develop a prototype that can provide faster, higher-quality modeling results than any of the individual models BMPO currently uses.

Broward County offers an excellent test bed for using a digital twin to solve the challenges of a complex, dense, urban environment. We are a diverse community of 1.9 million residents with a complex transportation network, multiple disadvantaged communities, and one of the most climate-vulnerable regions in the country. A successful prototype of SMART METRO will provide BMPO with a transformational approach to modeling accelerated environmental or situational changes. SMART METRO will provide BMPO and other MPOs across the country with lessons learned on how to continue to evolve and scale a digital twin to integrate new use cases and technologies.

Expected Benefits

Our prototype of SMART METRO will generate immediate value as a sketch-planning tool. A fully scaled-up version of SMART METRO will be able to ingest data from additional data sources, such as the new "smart" mobility sensor networks BMPO is currently implementing. Moreover, by engaging with our national, regional, and local partners we will get feedback on how applicable, repeatable, and scalable SMART METRO is in meeting the needs of both local and national organizations.

Table 2 summarizes the performance metrics we will apply to our prototype to measure its effectiveness against existing data and modeling practices.

Table 2: Performance Metrics

Issue	Performance Metric	Proposed Metric
Integration	Ability to integrate multiple data sets into the digital twin	Number of data sources successfully used by SMART METRO.
Quality of results	Compatibility of results with observed data	Accuracy of results from SMART METRO vs. validation data.
Cost effectiveness	Cost and speed of preparing and analyzing scenarios compared to existing models	Comparison of time to prepare data and calibrate model scenarios in SMART METRO vs. existing single-use models.
Scalability and repeatability	Utility of efficiently and effectively evaluating multiple disparate alternatives.	Number of studies/use cases informed by SMART METRO.
Equity	Insights into addressing Justice40 issues	Amount of investment in Justice40 areas resulting from SMART METRO informed decisions.
Engagement	Number of people engaged	Number of students and other stakeholders that have used or interacted with SMART METRO as part of MODS exhibit or other planned stakeholder engagement activities.
Workforce development	Utility as a workforce development tool	Quantitative survey administered to BCPS, MODS, FAU, and other workforce development programs in Broward evaluating the extent to which SMART METRO contributes to the skills development, training, and knowledge enhancement of low-income students and other practitioners.

E. PROJECT READINESS OVERVIEW

BMPO has been preparing for this grant award since 2020 when BMPO defined a Strategic Business Plan framework that called for improved data collection for decision-making, regional interoperability, and the intergovernmental partnership model necessary to make our data warehouse feasible. In 2021, BMPO piloted an initial digital twin to simulate three transit and infrastructure projects and gain valuable insight as to how such a twin would function if supported with enriched data and enhanced capabilities.

Feasibility of Workplan

The BMPO recognizes that stakeholder buy-in and a defined operational plan are as important for success as any technical innovation. Building upon our earlier pilot studies, the BMPO is now investing in the Concept of Operations and systems design for SMART METRO, to be completed by June 2024. With these in place, our Stage 1 activities will build upon a thorough definition of user needs, platform functionality, and systems architecture, as well as an inventory of regional data and systems. Partner roles, responsibilities and resource contributions will be defined as part of this effort to ensure the SMART Metro is sustainable.

As outlined in Appendix II, our 12-month, Stage 1 project schedule consists of three parallel work streams that will deliver the SMART METRO prototype. Project Manager Mark Plass will lead the **Regional Strategy & Governance** activities, identifying privacy and legal requirements and coordinating the partnership agreements that will enable effective user adoption by our local agencies. In the **SMART METRO Platform** work stream, our technology partner Google will deploy an interoperable, federated data platform that can allow local agencies and the public to access, combine, and analyze data from across the region. We will also integrate climate, land-use, and travel demand models for rapid scenario analysis in the SMART METRO digital twin. These include models offered by our project partners, such as Deloitte's FutureScape agent-based transportation model, Kisnn's T-REX multimodal analytics suite, and the Southeast Florida Regional Climate Change Compact sea level projections. Finally, Deloitte and our other partners will calibrate and apply these models in the **Applied Modeling & Analytics** work stream to focus on the pilot study areas with the City of Miramar and other locations within the region.

Community Engagement and Partnerships

Our workplan includes a robust community engagement and partnership strategy with national, regional, and local experts, agencies, and communities. We have formed a national advisory committee consisting of AMPO (providing perspective from other MPOs), SANDAG (providing perspective from another coastal region with similar challenges), Dr. Sandy Pentland at the MIT Media Lab, and NYU. We have also formed a group of regional educators from BCPS and MODS who will help us understand how SMART METRO could be used as an educational or workforce development tool.

Our local community partner is the City of Miramar who represents the use case we will study to test the Stage 1 prototype.

We envision at least four workshops with both the advisory committee and our regional partners to: (1) kick off the project and level-set on requirements; (2) provide an update on the development of SMART METRO and seek input on initial issues uncovered during development of the data warehouse (such as data governance, data security, and interoperability); (3) provide an initial demonstration of the digital twin evaluating scenarios in our City of Miramar use case to assess its ability to replace existing models for alternatives evaluation; and (4) report back on how SMART METRO performed against our initial performance metrics.
We also anticipate one-on-one meetings with our regional partners to support their efforts to use SMART METRO for localized planning efforts, workforce development, and education.

Leadership and Qualifications

Appendix 1 provides the resumes of our experienced project delivery team. Greg Stuart, the MPO's Executive Director, is actively involved in preparing for SMART METRO's implementation, continuing our efforts to incorporate equity, safety, and climate considerations into regional planning. Mark Plass, our Project Manager, has a strong engineering background in technology and traffic operations. Mark will lead a team of consultants, software developers, and data scientists. The SMART METRO project team has extensive expertise working with the data sets and models needed for integration, allowing us to articulate the prototype's requirements, governance, and cybersecurity standards, leverage advanced cloud capabilities and transportation analytics, and ensure SMART METRO's accurate and reliable outputs.

Appendix I - Resumes

Greg Stuart Executive Director, Broward MPO

Education: MPA - Florida State U. MUP - Florida State U. BS, Urban Studies - U. of Pittsburgh BS, Architectural Design - U. of Pittsburgh

Overview: Mr. Greg Stuart is BMPO's Executive Director serving a 38-member Board of Directors responsible for a FY 2021-26 budget that allocates $5.1 billion in Federal, State, and Local resources for regional planning, services, operations, and capital initiatives. Greg is responsible for coordinating with BMPO Member Governments, two Florida Department of Transportation Districts, and four Transit Providers to collaboratively plan, prioritize, and fund delivery of diverse transportation options.

Administered TIGER grant award for complete streets providing access in environmental justice communities and administered FHA Grant creating integrated corridor management on our coastal interstate and the adjacent arterials.
Incorporated climate change studies into criteria for the selection of transportation projects and created nationally recognized communication infrastructure, Speak Up Broward, as an interactive public engagement tool.

Monali Shah Global Head of Industry Solutions, Google

Education: MBA - U. of Chicago B.S., Engineering - U. of Michigan

Overview: Monali Shah is a Strategic Business Executive for Public Sector at Google. In this role she drives the creation of 'smart cities' and mobility solutions that address the needs of public sector agencies. She is passionate about leveraging Google Cloud's AI capabilities to drive both operational efficiency for agencies and better citizen experiences.

She previously served as the Director of Intelligent Transportation at HERE Technologies and led the company's work with transportation agencies in the areas of smart cities, connected and automated driving, and traffic management. She started off her career as an Environmental Engineer and Six Sigma Blackbet at Avery Dennison.

Ms. Shah is a sought-after expert on transportation and mobility. She serves as an advisor to transportation commissioners, serves on industry boards, has been quoted extensively in the media, and has served as a plenary speaker at industry events across the world.

Sandy Pentland Ph.D Professor, MIT Media Lab, MIT Sloan

Education: B.G.S. (Mathematics, Statistics) - U. of Michigan M.I.T., Ph.D., AI and Psychology - MIT Full List of Published Work

Overview: Prof. Alex Pentland was co-creator of the MIT Media Lab, founder of the MIT Connection Science and Human Dynamics Labs, and leads the Media Lab Entrepreneurship Program. His work focuses on using "big data" and advanced analytics to understand human behavior at scales from individual to countries. One of the most cited authors in the computational sciences and a member of the US National Academies, he is also influential in national policy and is currently advising the EU, the US, and several developing countries, and is a member of the Board of the UN Global Partnership for Sustainable Development Data.

In 2012 Forbes named Sandy one of the `seven most powerful data scientists in the world', along with Google founders and the CTO of the United States.

He is among the most-cited computational scientists in the world, and a pioneer in computational social science, organizational engineering, wearable computing (Google Glass), image understanding, and modern biometrics.

Prof. Pentland is on the Board of the UN Foundations' Global Partnership for Sustainable Development Data, co-led the World Economic Forum discussion in Davos that led to the EU privacy regulation GDPR, and was one of the UN Secretary General's "Data Revolutionaries" helping to forge the transparency and accountability mechanisms in the UN's Sustainable Development Goals.

Steve Hardy Ph.D Managing Director, Deloitte Consulting LLP

Education: Ph.D. - Virginia Tech M.S. - Virginia Tech B.S. - Virginia Tech

Overview: Dr. Steve Hardy is a Managing Director in Deloitte's Artificial Intelligence & Mission Analytics practice with over 15 years of experience in advanced analytics and simulation.

Dr. Hardy leads some of the Deloitte's most advanced analytics and product development within the Defense and National Security sector. He leads the development of Deloitte's FutureScape platform, an industry-first tool for analyzing the largest, most complex, "What If?" questions for a wide variety of clients and use cases.

Dr. Hardy and his teams have published extensively in the fields of simulation, data science, and behavioral modelling. Their work on distributed simulation received a U.S. patent in 2020.

Dr. Hardy has overseen multiple transportation analytics projects leveraging Deloitte's patented FutureScape platform to bring the power of distributed cloud computing to transportation agencies.

Tom Batz Project Manager, Kisnn Associates

Education: B.S. - U. of Pittsburgh

Overview: Tom Batz has over 45 years of experience in transportation and Intelligent Transportation Systems (ITS) and is a graduate of the University of Pittsburgh.

As Deputy Executive Director/Chief Technology Officer at TRANSCOM, a consortium of the 16 major highway, transit, and public safety agencies in the New York/New Jersey/Connecticut metropolitan area, he has extensive experience working with and coordinating the efforts of key transportation professionals from these traffic, transit, public safety, and law enforcement agencies.

He was responsible for overseeing the planning, development, implementation, and maintenance and operation of TRANSCOM's multi-million dollar federally funded Intelligent Transportation Systems program. These programs dealt with transportation data collection, sharing, integration, and analysis for transportation management and traveler information systems throughout the region.

He has also served on the ITS New Jersey and ITS New York Boards and has been honored by both organizations by being selected to their respective Halls of Fame.

John Renee Ph.D, AICP Director, CUES - Florida Atlantic U.

Education: Ph.D - Rutgers University M.S. - FAU MURP - UC-Denver B.E.D - UC-Boulder

Overview: John Renne, Ph.D., AICP, is the coordinator of FAU's Regional and Urban Planning Department's two undergraduate programs, Bachelor of Urban and Regional Planning and Bachelor of Urban Design and Director of the Center for Urban and Environmental Solutions.

He holds a Ph.D. in Urban Planning and Policy Development from Rutgers University, a Master of Urban and Regional Planning from the University of Colorado at Denver, and a Bachelor of Environmental Design from the University of Colorado at Boulder.

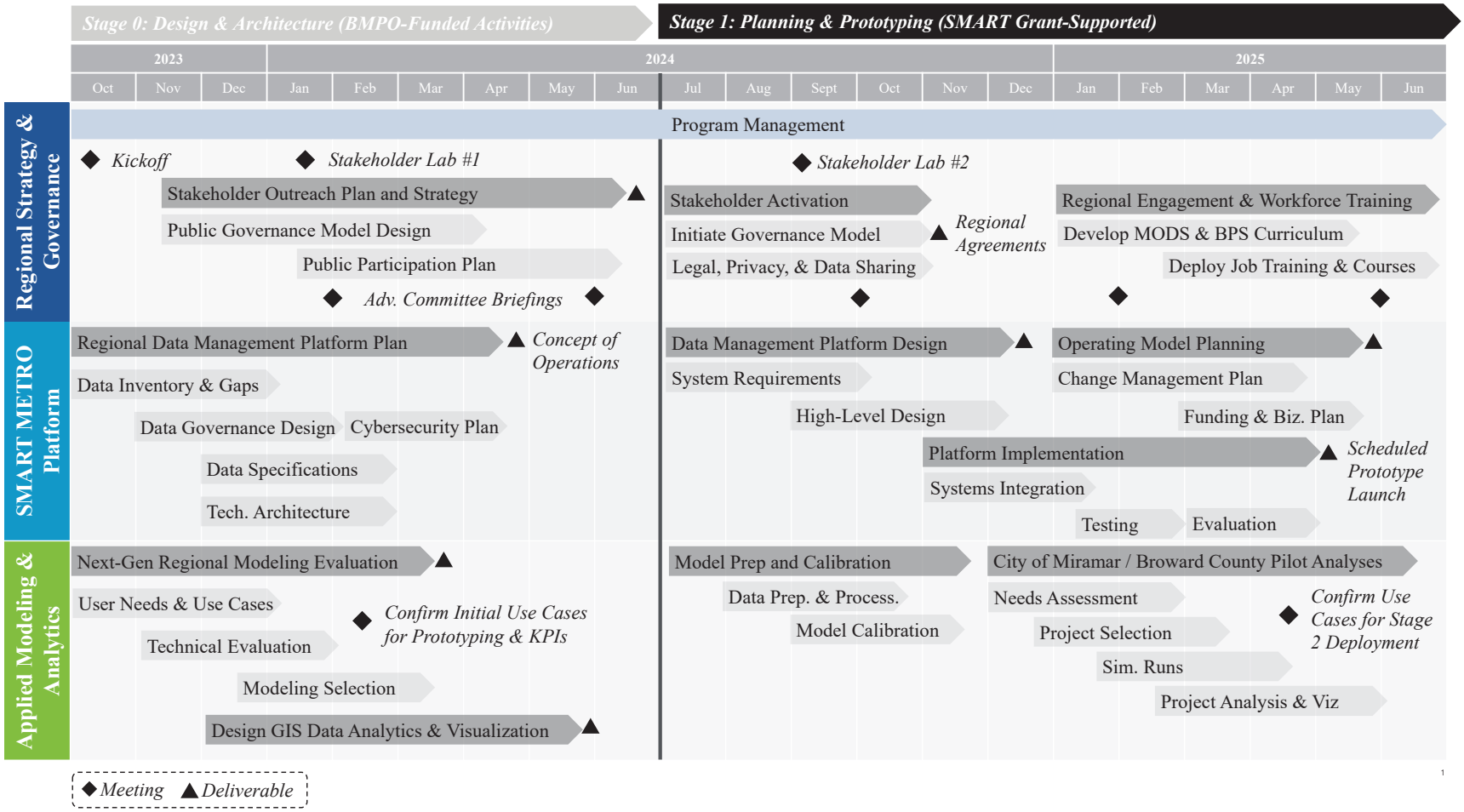
His research focuses on creating sustainable, resilient, and livable cities. He is an author and editor of Transit-Oriented Development: Making It Happen (Ashgate, 2009) and Transport Beyond Oil: Policy Choices for a Multimodal Future (Island Press, 2013) and over 100 papers, book chapters, and professional reports. Dr. Renne has extensive work experience across North America, Europe, and Australia.

Appendix II - Summary Budget Narrative

The BMPO is requesting $2,000,000 in SMART Grant funding to develop the SMART METRO project to develop the digital twin, regional data steward, and two use cases at two locations (prototypes). Our phased workplan for the project is designed in a crawl-walk-run approach to account for necessary stakeholder involvement and support. The project team will proceed with three concurrent workstreams over 12 months – Strategy and Stakeholder Engagement, Data Stewardship, and Simulation and Modeling of two Use Cases – as displayed below.

The project team will deploy proof of concept of both the technical data repository and the model components of our solution. After kickoff, we will host our first of two interactive stakeholder labs to align on regional vision with local agency partners. Based on lab outcomes, the BMPO will implement the data stewardship strategy, which will include the appropriate governance structure for the data stewardship entity, decision rights, and technical specifications for how it will function. The second lab will be an opportunity to review initial modeling and scenario analyses, identifying areas of improvement and building consensus on how to scale to the full region. We will also communicate the final plan with our partners and solicit additional feedback during this second lab. At the same time as the stakeholder labs, we will calibrate the digital twin and run near- and medium-term use cases around equity, safety, resiliency, climate risks, and transit alternatives to test the digital twin. The BMPO will use the digital twin to bring high-fidelity modeling and scenario analysis into its planning approach. As shown below, if awarded, the total cost of this 12-month project will be $2,000,000.

Project Management & Grant Administration	$200,000
Project Delivery Management	$75,000
Stakeholder Workshops (2)	$50,000
Initial Advisory Committee Coordination	$50,000
Regional Data Repository Development	$175,000
Technical Architecture & Systems Integration	$225,000
Digital Twin Model Development & Calibration	$275,000
Simulation, Modeling, and Analytics Focused on Equity, & Resiliency, Safety, Transit	$250,000
Host Training Workshops w/ Partners	$50,000
Secondary Advisory Committee Coordination	$50,000
Data Steward Cloud Storage / Hosting	$200,000
Simulation and Scenario Testing	$75,000
Simulation, Modeling, and Analytics Focused on 2 Use Case Locations (In Broward County/ Miramar)	$275,000
Recommendations Delivery and Next Steps for Stage 2 Grant	$50,000
Total	**$2,000,000**


Stage 0: Design & Architecture (BMPO-Funded Activities)
Stage 1: Planning & Prototyping (SMART Grant-Supported)
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Regional Strategy & Governance
SMART METRO Platform
Applied Modeling & Analytics
Program Management
Kickoff
Stakeholder Lab #1
Stakeholder Lab #2
Stakeholder Outreach Plan and Strategy
Public Governance Model Design
Public Participation Plan
Adv. Committee Briefings
Stakeholder Activation
Initiate Governance Model
Legal, Privacy, & Data Sharing
Regional Agreements
Regional Engagement & Workforce Training
Develop MODS & BPS Curriculum
Deploy Job Training & Courses
Regional Data Management Platform Plan
Concept of Operations
Data Inventory & Gaps
Data Governance Design
Cybersecurity Plan
Data Specifications
Tech. Architecture
Data Management Platform Design
System Requirements
High-Level Design
Platform Implementation
Systems Integration
Testing
Evaluation
Operating Model Planning
Change Management Plan
Funding & Biz. Plan
Scheduled Prototype Launch
Next-Gen Regional Modeling Evaluation
User Needs & Use Cases
Technical Evaluation
Modeling Selection
Design GIS Data Analytics & Visualization
Confirm Initial Use Cases for Prototyping & KPIs
Model Prep and Calibration
Data Prep. & Process.
Model Calibration
City of Miramar / Broward County Pilot Analyses
Needs Assessment
Project Selection
Sim. Runs
Project Analysis & Viz
Confirm Use Cases for Stage 2 Deployment
Meeting
Deliverable

Appendix III - Letters of Commitment

Deloitte. Google Cloud Kisnn Associates Inc

October 4, 2023

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Avenue SE
Washington, DC 20590

Dear Secretary Buttigieg,

On behalf of Deloitte Consulting LLP, Google Public Sector, and Kisnn Associates, we are proud to share our commitment to collaborate with the Broward Metropolitan Planning Organization (BMPO)'s "SMART METRO" digital twin project.[1] Collectively, our firms are focused on advancing the use of shared data, advanced analytics, and digital infrastructure to improve long-range planning and transportation systems management and operations. As project partners with the BMPO, we will collaborate by providing global systems integration experience, data science and modeling expertise, and best-of-breed cloud platform technology to the pioneering SMART METRO effort.

Our team is familiar with many of the challenges that have long faced regional planners, including the distinct datasets, systems, and institutional priorities that vary across local agency landscapes. We applaud the BMPO for addressing these root cause issues with the SMART METRO platform, especially as South Florida prepares for accelerating climate change and extreme weather events. Our firms have elevated sustainability as a core business imperative, from net-zero emission commitments to historic investments in sustainability-related services. We offer global consulting services, industry-leading technology, and local transportation experience to the BMPO as it designs and implements SMART METRO, including:

- Interoperable data management approaches, federated architecture, and cloud technology that can provide useable – not just accessible – data to agency partners and the public.
- Application of cutting-edge data science and modeling tools to analyze infrastructure and resiliency projects for a more efficient, resilient, and equitable transportation system.
- Advisory services and best practices on regional partnerships, data governance, and public governance structures to enable interagency coordination and decision making.

We are excited about this project's impact in Southeast Florida and other regions across the country, and we are proud to commit to serving in the BMPO's SMART METRO team.

Sincerely,

Anant Dinamani
Principal
Sustainability, Climate, & Equity
Deloitte Consulting LLP

Mike Williams
Director
State & Local
Google Public Sector

Sanjay Patel
President
Kisnn Associates Inc.

[1]*The support outlined in this letter is not connected to or contingent upon any past, present, or future sale of products or services.*

The Media Laboratory

Massachusetts Institute
of Technology
E15-387
20 Ames Street
Cambridge, MA 02139

Alex. P. Pentland
Toshiba Professor of Media Arts and Sciences
http://media.mit.edu/~pentland
pentland@media.mit.edu

October 5, 2023

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Avenue SE
Washington, DC 20590

Dear Secretary Buttigieg,

On behalf of the Human Dynamics laboratory at the Massachusetts Institute of Technology (MIT) Media Lab, I am excited to share our commitment to the Broward MPO's "SMART METRO" regional digital twin platform and corresponding data stewardship approach. We recognize the transformative potential of this digital initiative to create a smarter, more sustainable, and more resilient physical infrastructure environment in South Florida – and to serve as an example for other regions around the country. As an advisor to BMPO and its partners, we hope to actively contribute technical assistance, research collaboration, and global best practices to the SMART METRO digital twin project.

Our Human Dynamics laboratory works with leading governments, nonprofits, and corporations to explore how data and computational science can improve society. We have been at the forefront of defining new approaches to responsible data sharing across organizations, from the European Union's General Data Protection Regulation (GDPR) to emerging data cooperatives that empower citizens and workers. Our Open Algorithms project is pioneering new open, auditable methods to query secure data. In transportation and many other fields, we are researching applications for artificial intelligence to make human systems more efficient, fair, responsive, and inclusive, including through the systematic evaluation of public policy and investment decisions using the best available data and analytical methodologies.

The BMPO's digital twin project is a critical opportunity to demonstrate how new data sharing and modeling technologies can improve transportation planning processes and outcomes, particularly in the face of accelerating climate change. Importantly, the BMPO and its partners are also considering what public governance models will be needed for the data and systems that will power the platform.

Given the high stakes, potential impact, and ambitious vision, Human Dynamics laboratory at the MIT Media Lab is proud to help Broward MPO on this SMART grant application. We look forward to helping the project advisory committee as it addresses questions of technical data integration, modeling of complex transportation systems and human behavior, and overarching public governance approaches.

Sincerely,

Alex “Sandy” Pentland
Founder and Director, MIT’s Human Dynamics Laboratory, MIT Media Lab;

MIRAMAR
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CITY OF MIRAMAR

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"We're at the Center of Everything"

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2200 Civic Center Place
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September 28, 2023

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Dear Secretary Buttigieg:

I am writing this letter on behalf of the City of Miramar (City) to convey our steadfast commitment and excitement for the SMART METRO digital twin project. We firmly believe that this initiative has the potential to provide invaluable insights into both present and future real-world transportation scenarios, by leveraging a systems integration approach to thoroughly analyze the intricate relationship between transportation, the built environment, and climate change.

In both 2021 and 2022, the City was honored to receive the prestigious Smart 50 Award by the Smart Cities Connected Foundation. This accolade recognizes cities worldwide for their groundbreaking and influential work in various aspects of innovation. The City is renowned for its diverse population and central location, attracting major employment centers to establish roots in our vibrant community. However, like many other cities in our region, we are grappling with transportation challenges that hinder safety, sustainability, and climate resilience.

The City is genuinely excited about the prospect of utilizing the SMART METRO digital twin to evaluate scenarios that foster transportation improvements and integrate smart technologies, thereby bolstering resilience and livability in the eastern quarter of our City, where significant redevelopment activities are taking place within a climate vulnerable area. By establishing SMART METRO, the City and the Broward MPO aims to pave the way for continued leadership in the realm of Smart Cities, where innovative solutions are used to tackle challenges through cutting-edge approaches. We understand and embrace the significance of SMART METRO and are fully committed to actively working with the project team. Our esteemed Engineering and Strategic Development Department stands ready to contribute its technical expertise and share relevant data to ensure the resounding success of this endeavor. We firmly believe that this collaborative partnership will prove instrumental in addressing and overcoming the complex transportation challenges faced by our residents and visitors, ultimately contributing to Miramar's prosperity in the future.

Thank you for considering the grant application and recognizing the immense potential of the SMART METRO digital twin project. We eagerly anticipate the opportunity to work hand in hand with the Broward MPO to bring this vision to fruition.

Sincerely,

Salvador Zuniga, P.E.
City Engineer

THEGOVLAB

October 5, 2023

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Avenue SE
Washington, DC 20590

Dear Secretary Buttigieg,

On behalf of the New York University (NYU) Governance Laboratory (The GovLab), I am happy to share our commitment to the Broward MPO's "SMART METRO" project. This project uniquely aligns with The GovLab's mission to strengthen the ability of institutions and people to work more openly, collaboratively, and effectively to make decisions and solve public problems.

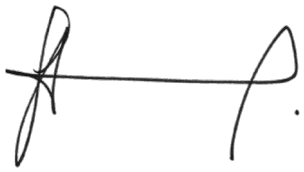
As a member of BMPO's advisory committee in this effort, we look forward to offering perspective not just on technical aspects of data stewardship and data science, but also workforce-related topics that will be key to the success of the program. This includes bringing an innovative training curriculum to the project team and their partners, supporting the objective of long-term job growth in the growing field of data stewardship in transportation and local government.

A number of our research initiatives directly align to the BMPO's project proposal. We look forward to bringing our research and methodologies to the South Florida region as the BMPO demonstrates how data sharing and governance can improve collaboration in regional planning processes and outcomes, particularly in the face of accelerating climate change. We will offer perspective and best practices on such critical topics such as:

- Pioneering and establishing new "Data Collaborative" public-private partnerships
- Developing ethical "Data Responsibility" policy frameworks that can enable trusted and responsible data re-use for decision making (especially as it relates to vulnerable populations)
- Establishing a new "Data Steward" workforce training curriculum that can provide the human infrastructure for data-driven decision making

BMPO's vision highlights the importance of a human-centered approach to data sharing and advanced analytics platforms in order to build trust, engagement, and more effective public administration. We are excited to support BMPO through regular project consultations, advisory Committee meetings, and the development and leadership of its data steward training approach.

Sincerely,



Stefaan Verhulst
Co-Founder, Chief of R&D, and Director of the Data Program of NYU's Governance Laboratory NYU

thegovlab.org info@thegovlab.org @thegovlab

Established 1915
BROWARD
County Public Schools

Office of the Superintendent
Dr. Peter B. Licata,
Superintendent of Schools
600 S.E. Third Avenue
Fort Lauderdale, Florida 33301
phone: 754-321-2600
superintendent@browardschools.com

September 21, 2023

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Ave SE
Washington, DC 20590

Dear Secretary Buttigieg:

As the superintendent of the Nation's sixth-largest school district and the second largest in the state of Florida, I fully support working with Broward Metropolitan Planning Organization (MPO) on the Smart Metro Project to equip students with the skills and knowledge needed to navigate a rapidly advancing world. Broward County Public Schools (BCPS) offers a comprehensive STEM program with emphasis in computer science (STEM+CS). Kindergarten through 12th grade students learn through applied interdisciplinary experiences in areas such as Computer Science, Engineering and Robotics, Esports, and Environmental Stewardship. These initiatives help support students to become critical thinkers, problem-solvers, and future leaders.

BCPS is extremely excited to support the Smart Metro digital twin to teach students using real-world scenarios, enabling understanding of the complex interplay between transportation and human impacts. With guidance from the Smart Metro team and trained BCPS teachers, students will experience designing and simulating transportation, developing innovative solutions, and predicting their potential outcomes. The SMART Metro grant empowers teachers and students to analyze complex transportation systems, devise innovative solutions, and advocate for sustainable practices as leaders in the field.

In conclusion, I proudly support Broward MPO's proposal for the USDOT Smart Metro Project.

Sincerely,

Dr. Peter B. Licata,
Superintendent of Schools

PBL/JMM/EM/JE: sm

MUSEUM OF DISCOVERY & SCIENCE
AUTONATION IMAX THEATER

401 SW Second Street
Fort Lauderdale, FL 33312
Phone: 954.467.6637
mods.org

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Dear Secretary Buttigieg:

I am writing on behalf of the Museum of Discovery and Science (MODS), a non-profit organization and primary educational resource for Science, Technology, Engineering, and Mathematics (STEM) for over 45 years in Broward County. MODS provides education and experiences for over 450,000 visitors annually from all 50 states, 48 Florida counties, 20 foreign countries and all 31 municipalities in Broward County. MODS community outreach initiatives also includes "STEMobiles" which is our Mobile Makerspace that delivers free, inquiry-based experiences to schools, organizations, community centers, and other locations throughout the region led by MODS educators, impacting over 40,000 individuals annually, with a minimum of 25,000 individuals in low-income communities.

MODS commits to working with the Broward MPO on the SMART METRO project. MODS is enthusiastic about the SMART METRO digital twin and using it to teach students and visitors about real-world scenarios in transportation systems, enabling them to understand the complex interaction between transportation, effects on human wellbeing, and the environment. Through SMART METRO project, we will have a performance metric in place to quantitatively measure the extent of low-income students' engagement with this innovative technology. This measurable outcome will serve as an indication of our success in broadening access and engagement for these students. Furthermore, the expansive scope of MODS will generate a ripple effect, amplifying the impact and reach of SMART METRO.

The SMART METRO digital twin platform is relevant for students, as it aims to increase the percentage of students who have a comprehensive understanding of transportation modeling. As a result, these well-trained students, prepared with the ability to analyze complex transportation systems and devise innovative solutions, can become advocates for sustainable practices and leaders in the field. As they continue to grow and excel, they can inspire future generations of students to pursue innovative technologies and make a positive impact on transportation systems, leading to a continuous cycle of progress and innovation.

In conclusion, MODS is committed to the SMART METRO project with its immense power in equipping students with the skills and knowledge needed to navigate a rapidly advancing world.

Sincerely,

Joe Cox
President & CEO

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Dear Secretary Buttigieg:

On behalf of the Association of Metropolitan Planning Organizations (AMPO) and our Board of Directors, I would like to express our support and commitment for the Broward MPO's SMART METRO regional digital twin and data governance project. AMPO is a nonprofit organization established to provide members agencies with technical assistance, federal policy advocacy, topical research, and forums for collaboration with peers. With this letter, AMPO commits to advising Broward MPO as it develops the SMART METRO that we believe could transform metropolitan and regional planning for the 21st century.

Across AMPO's extensive network, we strive to identify innovative and scalable approaches to common transportation challenges affecting our members' communities. Our diverse membership shares no more urgent need than the development of multimodal projects that make a near-term impact on safety and climate change. In many regions, however, the fragmented nature of transportation governance and decision-making results in project timelines that exceed the window to meaningfully reduce adverse impacts from transportation. A lack of shared data and modern analytics tools contributes to this dynamic. Transportation modeling is often the purview of MPOs, for example, while roadway, traffic, transit, and resilience data are siloed with other agencies. Many smaller MPOs lack the technical and human resources needed to better leverage data in their own plans.

The Broward MPO's SMART METRO can help overcome this regional fragmentation, using a shared digital twin and integrated data to provide an understanding of our common challenges and the benefits of collective action. AMPO leadership will advise the Broward MPO as it develops its proof of concept, and to encourage broader adoption, we will provide related education and training to our members as the Broward MPO's SMART METRO project matures.

We are excited about this project's impact in Southeast Florida and the other regions across the country, and we are proud to support Broward MPO's SMART application.

Sincerely,

William Keyrouze

William Keyrouze
Executive Director
Association of Metropolitan Planning Organizations

SANDAG

September 25, 2023

Secretary Pete Buttigieg
United States Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Subject: Support of Broward MPO's SMART METRO Regional Digital Twin and Data Governance Project

Dear Secretary Buttigieg:

On behalf of the San Diego Association of Governments (SANDAG), I would like to express our support and commitment for the Broward MPO's SMART METRO regional digital twin and data governance project. SANDAG is the San Diego region's Metropolitan Planning Organization, representing the interest of 19 local governments in transportation planning, funding allocation, and project development. As a major coastal metropolitan area, we face similar demographic and environmental trends to the Broward region, and SANDAG is interested in exploring new technology platforms for more flexible transportation planning and project development.

SANDAG is a leader in advanced travel modeling and data science. Our team developed the activity-based model that many peer agencies have adopted to inform their own planning and investment decisions, including Broward MPO. As SANDAG prepares to develop its next-generation transportation modeling tools, we are focused on innovative methodologies and technical capabilities that would allow rapid alternatives analysis, for SANDAG and other partners in the region. With California's state mandates to greenhouse gas emissions reduction, the intersection between climate and travel demand modeling is taking on increased importance, as is the need for more sophisticated analysis of project impacts on our most vulnerable populations.

SANDAG is committed to collaborating with Broward MPO to develop and use the SMART METRO digital twin and data management to improve our analysis of these dynamic issues. Beyond technical advances, we also recognize the potential to build a common basis for engagement with the public and agency partners on transformative infrastructure investments. Despite our difference, our regions face similar challenges in accelerating needed investments in transportation and built environment. SANDAG is thrilled to support this project and to encourage a scalable and replicable approach that can be adopted by peer MPOs around the United States.

Sincerely,

HASAN IKHRATA
Chief Executive Officer

401 B Street, Suite 800
San Diego, CA 92101-4231
(619) 699–1900
SANDAG.org