PRESIDENTIAL TRANSITION: PRIORITY TOPIC MEMO
JULY 2024

MITRE | Center for Data-Driven Policy

A GUIDE FOR CREATING AN EFFECTIVE RESILIENT TRANSPORTATION SYSTEM

Enhancing the resilience of U.S. transportation systems, in line with national security and resilience efforts, can strengthen U.S. capacity to efficiently and effectively respond to and recover from major transportation disruptions. This, in turn, protects national security, economic stability, and the health and safety of the public.

The Case for Action

The U.S. transportation system, a key sector of the nation's critical infrastructure as outlined in national security efforts,[1,2] is pivotal to our economic stability, security, and societal prosperity. The recent collapse of Baltimore's Francis Scott Key Bridge, along with the subsequent ripple effects, underscores the vital importance of transportation resilience. This incident highlights our current challenges in efficiently and effectively responding to and recovering from large-scale transportation disruptions. Given the undeniable impact of transportation resilience on the nation—and considering the multiple stakeholders across the private and public sectors, each with their unique capabilities, regulations, and priorities—we recommend that the next administration provide leadership, direction, and support in aligning policies based on data-driven analysis and providing a framework and expertise to execute upon these plans. This will ensure these stakeholders are better equipped and coordinated to fortify our transportation infrastructure against future disruptions, in line with the shared responsibility and risk-based approach emphasized in current national efforts.

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Key Challenges and Opportunities

Enhancing the resilience of the U.S. transportation system presents both significant challenges and opportunities. These stem from the complexity of the system, the diverse array of stakeholders involved, and the need for a comprehensive risk assessment, all of which are recognized in current national security and resilience efforts.

Clarification of Stakeholder Roles and Responsibilities

One of the primary challenges is the need for further refinement, clarification, and empowerment of the roles and responsibilities of the many stakeholders. Real-world events, such as potential freight rail disruptions,[3] and simulated exercises have revealed that roles, responsibilities, and authorities among these

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stakeholders are unclear, hindering a rapid response to transportation disruptions. This underscores the urgent need for a clear delineation and comprehension of the roles and responsibilities associated with such situations, which presents an opportunity for the incoming administration to provide much-needed leadership, direction, and empowerment.

Comprehensive Risk Assessment for Infrastructure Resilience

Another significant challenge is the need for a comprehensive, evidence-based, and data-driven risk assessment to identify, assess, and prioritize the resilience of critical infrastructure. Current legislation requires planners to consider enhancing the resilience of critical infrastructure, but it does not provide specific guidance on prioritization or how to incorporate resilience into the planning process. This gap presents an opportunity for the incoming administration to lead the way in focusing efforts on identifying vulnerabilities, quantifying risk, and strategically allocating resources to plan responses to a range of transportation disruption scenarios. These efforts should include a clear definition of prioritization of critical transportation infrastructure, including critical nodes and interconnection points, and should use a data-driven approach to facilitate decision making regarding response and recovery from an incident.

Consistent Experience for Stakeholders

There is also a need to ensure a consistent experience for all essential stakeholders who collaborate with the federal government. The diverse range of stakeholders, each with unique capabilities, regulations, and priorities, can lead to coordination challenges. This presents an opportunity for the incoming administration to ensure a consistent and coordinated approach to collaboration, thereby enhancing the overall effectiveness of efforts to strengthen our transportation infrastructure against future threats.

Data-Driven Recommendations

The challenges and opportunities identified call for strategic, data-driven recommendations that can guide the incoming administration in strengthening the resilience of the U.S. transportation system, building on the risk-based approach and emphasis on information exchange in current national efforts.

Align Policies and Establish Effective Regulatory Frameworks and Playbooks

To address the confusion related to roles and responsibilities among stakeholders, we recommend the incoming administration lead an interagency/public-private initiative to align policies and establish effective regulatory frameworks. This initiative should aim to clarify and empower the roles and responsibilities of federal, state, local, and private entities involved in critical infrastructure security, resilience, and risk management. This alignment and clarification will not only alleviate confusion but also enhance coordination. This can be achieved by mapping the authorities and procedures of various programs and directives. Additionally, developing a series of "playbooks" can foster a shared understanding of policies and procedures. Conducting national-level exercises can ensure the effectiveness and validity of these playbooks, further enhancing coordination and enabling a more rapid and effective response to transportation disruptions.

Create a Framework of Transportation Data-Driven Tools and Analysis

In response to the need for a comprehensive risk assessment, we recommend creation of a framework of transportation data-driven tools and analysis. This framework should focus on standardizing the definition and process for assessing risk and the requirements for escalation in response to transportation disruptions. Conducting objective evaluations of critical responses to real-life and simulated events can inform updates of standard operating procedures. This data-driven approach can facilitate decision making regarding response and recovery from an event, driving an appropriate set of actions.

Leverage Expertise in Transportation and Technical Resources for Effective Collaboration

To ensure a consistent experience for all stakeholders who collaborate with the federal government, we recommend leveraging expertise in transportation and technical resources for effective collaboration. Applying tools that can prioritize infrastructure holistically would help anticipate interlinked and cascading failures, as was seen in the 2023 Maui wildfires. Better prioritization could help identify critical or interconnected nodes and develop mitigation strategies, such as redundancy, fast recovery and response capabilities, or investment grants. Organizing a regular "red team" conference involving government and industry

emergency response coordinators and leaders, facilitated by independent third-party organizations, would promote ongoing dialogue and collaboration. This approach can enhance the overall effectiveness of efforts to safeguard our transportation infrastructure.

Implementation Considerations

Implementing the above recommendations to enhance the resilience of the U.S. transportation system necessitates a robust collaboration among multiple stakeholders, underpinned by strong leadership from the Executive Office of the President (EOP).

Interagency and Public-Private Collaboration

The alignment of policies and establishment of effective regulatory frameworks involve a diverse range of stakeholders. The Department of Transportation (DOT) and Department of Homeland Security (DHS) should play significant roles, each department focusing on its areas of expertise. The DOT can lead efforts related to transportation infrastructure and systems, while the DHS can focus on security, resilience, and risk management aspects. Existing Transportation Sector Coordinating Councils should be leveraged to facilitate this collaboration, given their established roles and networks. State and local government agencies, as well as private sector entities involved in transportation infrastructure, should also be integral parts of this collaboration. To ensure their active involvement, the incoming administration could establish dedicated task forces or committees and regular communication platforms within the first 100 days. EOP-level coordination will be crucial in driving this collaboration and ensuring alignment across all stakeholders.

Resource Allocation

Creation of a framework of transportation data-driven tools and analysis will require strategic use of existing resources. The incoming administration should focus on maximizing the value and impact of existing funding, and identifying any critical areas that should be strategically prioritized. This strategic resource allocation should be a key focus in the first year of the administration.

Timeline Considerations

Given the urgency of enhancing the resilience of the U.S. transportation system, the incoming administration should establish a clear timeline for the implementation of these recommendations. Within the first 100 days, the administration should initiate interagency and public-private collaboration and start assessing strategic resource allocations. By the end of the first year, the administration should have a fully operational collaboration platform, a strategic resource allocation plan, and a framework of transportation data-driven tools and analysis.

MITRE Resources and Support

MITRE, with its mission-driven teams and public-private partnerships, is uniquely positioned to support the incoming administration in enhancing the resilience of the U.S. transportation system, in line with the principles of shared responsibility, risk-based approach, and information exchange outlined in national security and resilience efforts.

Expertise and Knowledge

MITRE brings a wealth of expertise in transportation, infrastructure resilience, risk management, and data-driven decision making. Our teams can provide valuable insights and guidance in aligning policies, establishing effective regulatory frameworks, conducting comprehensive risk assessments, and facilitating effective collaboration operations. MITRE's unique standing as a non-profit organization serving the public interest equips it well to support whole-of-nation initiatives such as the development of new policies and comprehensive playbooks for the players involved in responding to and recovering from large-scale transportation disruptions.

Data-Driven Tools and Analysis

MITRE has extensive experience in developing and applying data-driven tools and analysis. We can assist in creating a framework of transportation tools and analysis, helping identify vulnerabilities, quantify risk, and strategically allocate resources. Our Multimodal U.S. Transportation Analytic (MUST) Environment integrates models and data sources from various government and industry sectors, offering comprehensive insight into the nation's integrated transportation system.[4] When MUST is paired with optimization and game theory, the Contested Logistics Infrastructure Resilience (CLIR) tool can provide a powerful analysis creating a robust and effective approach to identifying critical infrastructure within the

network.[5] Furthermore, MITRE possesses a wide array of data analytics platforms that can play a pivotal role. By leveraging commercial, government, and publicly accessible data sets, MITRE can promptly develop impact assessments in the aftermath of transportation disruptions.

Collaboration Facilitation

MITRE has a strong track record of facilitating collaboration among diverse stakeholders. We can support the incoming administration in establishing and managing the recommended interagency and public-private collaboration, ensuring a consistent experience for all stakeholders. We have a range of immersive capabilities[6] to support such activities, including human-centered simulation and experimentation (SIMEX),[7] rapid assembly of 3-D digital models for transportation and logistics chokepoints (e.g., ports), and Environmental Systems Research Institute (ESRI) geospatial tools and data layers.

About the Center for Data-Driven Policy

The Center for Data-Driven Policy, bolstered by the extensive expertise of MITRE's approximately 10,000 employees, provides impartial, evidence-based, and nonpartisan insights to inform government policy decisions. MITRE, which operates several federally funded research and development centers, is prohibited from lobbying. Furthermore, we do not develop products, have no owners or shareholders, and do not compete with industry. This unique position, combined with MITRE's unwavering commitment to scientific integrity and to work in the public interest, empowers the Center to conduct thorough policy analyses free from political or commercial pressures that could influence our decision-making process, technical findings, or policy recommendations. This ensures our approach and recommendations remain genuinely objective and data-driven.

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Endnotes

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[3] March 20 Exploratory Workshop Preliminary Findings – Unified Response to Transportation Disruption. April 2024. MITRE https://www.mitre.org/news-insights/publication/unified-response-transportation-disruption-march-20-exploratory-workshop.

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[5] Billingham, Samuel, and Michael Martinez. Network Interdiction: A Game Theory Approach. May 17, 2022. Defense Technical Information Center, https://apps.dtic.mil/sti/citations/AD1173415.

[6] The MITRE Immersion Lab. 2023. MITRE, https://www.mitre.org/sites/default/files/2023-10/PR-23-3531-The-MITRE-Immersion%20Lab-Factsheet.pdf.

[7] SIMEX Overview. 2024. MITRE, https://www.mitre.org/news-insights/publication/seal-and-simex-overview-briefing