



INNOVATIONS ON THE HORIZON

Research Needs for the Marine Transportation System of the Future

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Marine transportation activities generally take place over the horizon of most people's daily lives—how many of us have been stopped in traffic by a container ship or grain barge on the way to the office? Without the marine transportation system (MTS), however, the quality of life, economy, and security enjoyed by modern society would be at risk.

Marine Transportation System

The MTS consists of several systems working together to meet the nation's needs of prosperity, sustainability, resilience, safety, and security. The articles in this special issue of *TR News* introduce some high-priority areas that merit research focus to achieve the necessary innovative strides in emissions reduction, automation, big data, and resiliency by 2050. The research needed to transform the MTS is substantial, challenging, and urgent.

The issues facing the MTS demand a cross-cutting approach from the research community—everything from information technology and cybersecurity to human and intellectual capital to ship, vehicle, and offshore platform design, construction, and safe operation. Their complex interactions and interdependencies—both internally and with other transportation systems—must be understood.

You can have the world's most efficient port, but if the marine, land, and air transportation systems are not properly integrated, the delivery of goods and services can be severely disrupted. This is where the Transportation Research Board (TRB) is uniquely positioned to advance the knowledge necessary for timely and effective innovation.

Marine Group and Marine Board

The five committees in TRB's Technical Activities Division Marine Group propose and share research and provide forums for transportation professionals to address



Photo: PANYNJ/CMA CGM Group

In September 2020 the CMA CGM *Brazil*—then (at 15,072 20-foot equivalent units, or TEUs) the largest container ship to call on the East Coast of the United States—arrived at the Port Authority of New York & New Jersey’s APM Terminal. This record was surpassed in May 2021, when the even larger CMA CGM *Marco Polo* called on APM Terminal. The research needs of the marine transportation system are diverse, from cybersecurity to safety to ship design and construction.

issues related to ports and channels, inland water transportation, marine environment, marine safety and human factors, and ferry transportation.

Internationally recognized, the TRB Marine Board provides a forum for the exchange of knowledge relating to new technologies, laws and regulations,

economics, the environment, and other issues affecting the MTS. Marine Board members apply their expertise to identify research needs and support the National Academies of Sciences, Engineering, and Medicine Consensus and Advisory Studies’ efforts related to MTS challenges, working in partnership with federal agency

sponsors fulfilling stewardship missions related to the nation’s waterways, coastal ports, offshore waters, and the global maritime commons.

The committees in the Marine Board and Marine Group depend upon TRB affiliates from industry, government, and academia with expertise across all components of the global supply chain. The global maritime commons, our waterways, and coastal ports—our marine highways—accommodate a wide range of vessel types and uses, just as a highway must accommodate trucks, buses, cars, and motorcycles.

Marine transportation services must be performed efficiently, effectively, and profitably in the harshest conditions with high priority for the environment and safety. In addition, experts serving marine-related TRB entities must be flexible to address rapidly emerging research needs—like those arising from the COVID-19 pandemic and its impacts on the MTS.

In preparation for this issue, members of the Marine Board and Marine Group committees chose five critically important topics for innovation and research in the MTS. The articles in this issue reflect these priorities. The knowledge the authors share will advance the field as they identify what gaps must be addressed and the timelines that are necessary for future research and innovation.

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