



# CENTER OF EXCELLENCE

on New Mobility and Automated Vehicles

## Request for Information (RFI)

Center of Excellence on New Mobility and Automated Vehicles (Mobility COE)

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## About the Mobility COE

Public Law 117-58, the Infrastructure Investment and Jobs Act, also known as the Bipartisan Infrastructure Law, November 15, 2021, amended 23 U.S. Code §503(c), and directed the US Department of Transportation (USDOT) Secretary to "...establish a Center of Excellence to collect, conduct, and fund research on the impacts of new mobility and highly automated vehicles on land use, urban design, transportation, real estate, equity, and municipal budgets." The Federal Highway Administration (FHWA) in partnership with the University of California, Los Angeles (UCLA), has established the Center of Excellence on New Mobility and Automated Vehicles (Mobility COE).

The COE seeks to develop an understanding of how new mobility and automated vehicles may impact the evolving transportation system when deployed at scale. It will collect, fund, and conduct research on how behaviors of emergent new technologies aggregate over time with increased market penetration and geographic scale, including system-level impacts on (1) land use, real estate, and urban design; (2) transportation system optimization (e.g., system-level efficiencies, travel demand and associated energy use, system resilience, security, and reliability), (3) equitable access to mobility and job participation; and (4) municipal budgets and cost-effective allocation of public resources.

In coordination with the Federal Highway Administration (FHWA), the Mobility COE will publish and release research results, datasets, and tools that empower state and local governments,

metropolitan planning organizations, and commercial operators to work together to make informed decisions that will achieve their shared desired outcomes and promote the Department of Transportation's (DOT) goals.

## Purpose of the RFI

The Mobility COE is currently conducting a thorough gap analysis to identify unexplored and underexplored areas of knowledge that can significantly benefit from further study. Based on the identified research gaps, the COE will craft a dynamic five-year research agenda, with annual reviews, to adapt to the rapid evolution of mobility technologies.

The COE will issue multiple RFIs in the coming years. The intent of this RFI is to engage with a diverse range of stakeholders to identify potential research gaps and solicit detailed project ideas or proposals that can be considered for the first round of funded projects, performed either by scholars from the six COE core members or external, contracted researchers.

Participants are encouraged to focus their research ideas and proposals on one of the following key areas or other open categories of relevance. Please see the [Appendix](#) for an introduction to an initial list of COE research gaps and interest of this solicitation.

- [Land Use, Urban Planning, and Policy](#)
- [Systems Analysis and Optimization](#)
- [Equitable Use, Access, and Impacts](#)
- Open category for other pertinent topics

When developing and submitting ideas and proposals, please consider the **potential impact of** new mobility and automated vehicles on societal structures, urban and rural landscapes, environmental health, and organizational frameworks. **“At Scale”** is one key idea of the COE, meaning that we are particularly interested in ideas and proposals that relate to the impacts and solutions when new mobility and highly automated vehicles are deployed together and at scale or strategies to maximize the public benefits from that transition.

## Who May Submit

Submissions are welcomed from diverse groups, including public agencies, academic or research institutions, non-profit organizations, and advocacy groups.

Note that the person or entity submitting responses to this RFI does not necessarily need to perform the research. Public agencies with urgent or emergent knowledge needs are encouraged to submit responses to leverage the COE team expertise and funding to perform the actual research. We also welcome ideas for sponsored research from public agencies or other entities as the COE seeks to use program revenues to maximize the impacts of its research expertise. .

# Submission Instructions

Participants can submit their proposed research questions and ideas based on three different categories:

## **Knowledge Gaps**

A knowledge gap is an area within your professional area of practice where you lack sufficient information or understanding to proceed effectively.

Identifying knowledge gaps helps formulate targeted questions to get the specific data, insights, or expertise that you and your colleagues need to make decisions in the public's interest. No study methods are proposed.

## **Initial Ideas**

This category welcomes early-stage ideas, which may have some proposed study methods.

If your ideas aren't fully formed, that's fine! Submit a brief description (around 100 words) to inform COE researchers of these needs.

Anyone can participate, even if not funding the research, as the COE team benefits from your insights and may contact you for more details.

## **Developed Ideas**

This category includes developed ideas with one or more specific research methods in mind. Participants should include an idea title, an abstract (detailing the motivation for the research and potential research directions), short description of proposed research methods, and expected outcome.

Researchers interested in receiving funding from the COE should submit Developed Ideas. Those whose concepts are selected and who are interested in conducting the research will be subsequently invited to submit a comprehensive research plan.

# Critical Dates

- RFI Release: March 6, 2024
- [RFI Webinar](#): March 19, 2024 [*Registration required*]
- [Submission](#) Deadline for Year 1&2 Project Ideas: April 26, 2024
- Engagement and Idea Selection: May to August 2024
- Detailed Research Plan Submission: June to September 2024
- Commencement of Selected Projects: September to December 2024

# Selection and Development Process

The [COE Steering Committee](#), [COE Leadership](#), and the FHWA will oversee the process to select ideas. This RFI plays a critical role in the COE's efforts to identify gaps and formulate a

strategic roadmap. Should an idea be chosen, COE leadership will proactively engage with the individual who submitted it, working closely to enhance and align the idea more closely with the COE's primary objectives. In instances where it is beneficial, the COE may combine several research concepts to launch collaborative projects that leverage strengths from all parties. The COE is committed to adopting a highly collaborative and interactive approach and will engage closely with stakeholders and researchers to clearly define and initiate each project.

## **Submission Portal**

All entries must be submitted through the designated [Airtable Form provided for this RFI](#).

<https://airtable.com/appMSftR6yvT3kKiO/pagFCvCHTqVI9z9Hs/form>

# Appendix: Introduction to Three Research Thrusts

In this Appendix, we begin by offering a summary of the focal areas of the COE's three research thrusts. Subsequently, we present additional prompts and example research gaps currently under discussion within the COE. It's important to note that while RFI participants are encouraged to propose research aligned with these example areas, the COE is particularly interested in identifying additional research gaps NOT listed in this introduction.

In this RFI, new mobility is a 'system of systems,' encompassing both manual and automated, personally owned and shared mobility, as well as emerging green transportation. The RFI is interested in focus on the three cardinal technological trends shaping "new mobility": connectivity, automation, and electrification, as well as innovative shared-use models.

## Thrust 1. Land Use, Urban Planning and Policy

### Introduction

The first research thrust examines the interplay between new mobility, including both connected and automated vehicles and other emerging mobility options, and urban development. It aims to understand how these emerging transportation technologies can catalyze shifts in urban landscapes, real estate markets, and public infrastructure demands (or vice versa) to align with sustainable, efficient, and equitable futures.

- **Land Use:** This topic explores the potential of new mobility to stimulate and enable mixed-use development and different [geo-types](#), enhancing environmental performance and determining their suitability for high-density versus low-density developments. For example, one might ask how (C)AVs could reshape land use patterns through changes to zoning and urban planning/urban design that leverage technological advancements to promote environmental sustainability or improved accessibility.
- **Real Estate:** This topic considers the impact of new mobility on parking demand and real estate by investigating how reduced parking needs and altered transportation preferences might affect real estate pricing and premiums. It considers the opportunities new mobility systems present for increasing density without adverse environmental effects, and how (C)AVs implementation could redefine building configurations, pushing beyond traditional parking requirements to encompass a broader range of new mobility infrastructures.
- **Urban Design:** This area focuses on the demands new mobility places on urban design, including increased curb usage and its repercussions on goods delivery and urban functions. It assesses the effects on green spaces, pedestrian areas, and human activities, questioning how new mobility might lead to increased travel distances and environmental impacts. Furthermore, it explores how (C)AVs could influence future urban forms, suggesting a proactive approach to leveraging these technologies for optimized city planning and design.

- **Public Investments and Costs:** This topic evaluates the extent to which new mobility necessitates new public infrastructure investments and how shifts in mobility use may impact municipal budgets. It probes the anticipated changes in maintenance and other public costs due to new mobility and seeks equitable solutions for managing these increased expenses.
- **Reversed Focus:** Lastly, it considers the reverse relationship, examining how alterations in land use planning processes could reduce congestion, travel time, vehicle miles traveled (VMT), etc. by new mobility and (C)AV fleets, regardless of the fleet ownership model (personal, private, or public). This perspective underscores the importance of proactive urban planning and policy adaptation to enable new mobility services that are more convenient, sustainable, and accessible. New land use and urban forms that de-emphasize cars could offer travelers and businesses more realistic, competitive options when it comes to mode choice.

## Prompts for New Ideas

To encourage the generation of innovative research proposals by potential RFI participants, we've crafted prompts within two primary dimensions of Thrust 1. Each dimension encompasses a range of subareas that, when combined, reflect the multifaceted challenges and opportunities presented by advancing urban mobility solutions. Participants are encouraged to propose research gaps and proposals that cover multiple dimensional areas as discussed below.

### 1st Dimension: Land Use, Design, Travel Behavior

This dimension describes the intricate relationship between a place's urban form, the behavior of its inhabitants, and the overarching zoning and planning frameworks that guide its development. With the advent of new mobility technologies, the existing paradigms of land use and urban design that reflect traditional mobility systems are being challenged, necessitating innovative approaches to accommodate these changes. Some of examples of identified research gaps include:

- **Mixed-Use Development and Environmental Performance:** How can (C)AVs and new mobility solutions encourage mixed-use developments that both enhance environmental performance and cater to the evolving needs of urban populations?
- **Activity and Travel Behavior:** In what ways can urban design and policy adapt to and influence the changing travel and activity behaviors resulting from the widespread adoption of (C)AVs and new mobility solutions?

### 2nd Dimension: Governance, Land/Resource Management, Public Finance and Administration, Private Businesses

The second dimension addresses the governance structures, resource management strategies, financial mechanisms, and the role of private companies in shaping the future of urban mobility. This dimension seeks to uncover how governance, policy, and public administration can adapt to and facilitate the beneficial integration of new mobility systems. Some of examples of identified research gaps include:

- **Governance and Policy Innovation:** What approaches to governance models and policy interventions would be most effective in a fast-evolving mobility landscape to anticipate and shape the potential of (C)AVs and new mobility services?
- **Land and Resource Management:** How can the transition to new mobility and automated vehicles help local and regional governments manage land and resources more effectively including through higher-density developments and sustainable urban growth?
- **Public Finance and Private Sector Involvement:** What financial models and partnerships between the public sector and private companies could improve public benefits from the development and implementation of new mobility infrastructure and services?
- **Public Administration:** How can public administration evolve to effectively manage the transition towards a new mobility paradigm, ensuring equitable access and sustainability?

## Thrust 2. Systems Analysis and Optimization

### Introduction

This thrust delves deeply into system-level efficiencies, travel demand, energy use, and the resilience and security of transportation systems amidst the integration of (C)AVs and new mobility solutions. The aim is to enhance operational tools for commercial and freight applications, facilitate multimodal systems, and ensure the safety and reliability of the system. Special emphasis is placed on developing tools, datasets, and methods that enable comprehensive research into these topics. This means not only analyzing planned scenarios but also identifying transition strategies that explore and navigate unintended consequences to achieve more sustainable, equitable outcomes when these technologies and services are deployed at scale. Moreover, the datasets and tools generated from this thrust are expected to inform and enable deeper analyses for Thrusts 1 and 3, ensuring a cohesive and integrated approach to understanding the impacts of new mobility systems.

We aim to transcend conventional metrics like travel time or system throughput, focusing instead on assessing and optimizing network resilience, service reliability, operational efficiency, and changes in traffic patterns through a mixed-methods quantitative and qualitative approach.

### Prompts for New Ideas:

To encourage the generation of innovative research proposals by potential RFI participants, we've crafted prompts within primary dimensions of our research thrust. Participants are encouraged to propose research gaps and proposals that cover multiple dimensional areas as discussed below.

- **System-level Efficiencies:** Exploring the impact of (C)AVs and transportation network companies (TNCs) on demand, activity choices, traffic congestion, flow, energy

consumption, emissions, reliability, vehicle usage, transit, and communities' accessibility to essential services.

- **Travel Demand and Energy Use:** Assessing how shared mobility platforms affect travel demand and land use, and their influence on vehicular energy use.
- **System Security:** Evaluating how (C)AVs and new mobility solutions respond to hazards, disasters, and system-level disruptions, including the effects of cyberattacks and system outages on multimodal transportation systems.
- **System Safety, Resilience, Reliability:** Examining the safety impacts of increased curbside activity and vehicle miles traveled (VMT) by (C)AVs on pedestrians, cyclists, and other road users, and how infrastructure, technologies, and policies can mitigate conflicts.
- **Commercial and Freight Operational Tools:** Investigating the extent to which (C)AVs can improve access to goods and services, especially in disadvantaged areas, and the business models that either facilitate or hinder these improvements.
- **Mode Switching and Transfers:** Determining the role of (C)AVs and new mobility options in multimodal transportation networks and their potential to complement or replace public transit.
- **Policy/Context Case Studies:** Conducting case studies to understand the policy and contextual frameworks that support or inhibit the effective deployment of new mobility solutions.
- **Data Strategy/Data Quality:** Developing an understanding of the data requirements for analyzing system impacts and informing policy decision making; exploring the role of big data and AI in enhancing system-level decision-making and predictive analytics for transportation.

The following example research gaps are being discussed within the COE and provided solely for reference:

1. Understanding network resilience with (C)AVs and electric vehicles under natural disasters.
2. Defining operational safety and system requirements for highly automated vehicles in Mobility-As-A-Service applications.
3. Developing scalable digital infrastructure and enhancing infrastructure perception and management strategies for new mobility.
4. Assessing and optimizing the impact of emerging mobility programs and policies on the urban transportation ecosystem.
5. Investigating the specific impacts of (C)AVs on urban freight and distribution systems (e.g., hub-to-door delivery, door-to-hub pickups, hub and spoke, etc.).
6. Exploring the data standards and data sharing best practices for new mobility solutions.



# Thrust 3. Equitable Use, Access, and Impacts

## Introduction

Thrust 3 is dedicated to navigating the complexities of integrating new mobility and automated vehicle technologies in a manner that promotes equitable benefits across all segments of society. Recognizing the transformative potential of these technologies, this thrust aims to ensure that their deployment does not exacerbate existing inequalities but instead contributes to a more inclusive and equitable urban mobility landscape. This involves a deep dive into the multifaceted aspects of equity in realms of health, environmental sustainability, economic vitality, service provision, and governance.

Central to this thrust is researchers' and practitioners' expansion of equity considerations beyond conventional metrics of service availability. By employing a broad spectrum of socio-economic and mobility data, this effort seeks to develop comprehensive equity indices, evaluate the distribution and affordability of new mobility services, and understand the nuanced impacts of these technologies on different community groups. It is expected analytics in Thrust 3 will also build on the data and tools (e.g., system models) developed in Thrust 2.

Key inquiries under this thrust include examining the necessary policies, incentives, and structures to make new mobility technologies accessible to all, especially those with reduced mobility, disadvantaged communities, and residents of rural areas. It addresses the digital divide in access to new mobility options, evaluating the interplay between the disparities in digital connectivity and the banked/unbanked/digitally-banked divide, particularly how both factors impact individuals' ability to access these emerging transportation services. It identifies potential changes in job types and distribution, and explores the potential for new mobility and AVs to become exclusive or lead to adverse equity impacts. Additionally, this thrust investigates how new mobility can enhance job quality, access to benefits, job security, and healthcare access, particularly in underserved areas. Finally, it evaluates the distribution of environmental benefits and burdens brought about by new mobility services and seeks ways to remediate past harms caused by infrastructure development.

## Prompts for New Ideas

To encourage the generation of innovative research proposals by potential RFI participants, we've crafted prompts within four primary dimensions of our research thrust. Participants are encouraged to propose research gaps and proposals that cover multiple dimensional areas as discussed below.

### **1<sup>st</sup> Dimension: Equitable Use of New Mobility/Automated Vehicles**

The equitable use of new mobility and AV technologies centers on the principle of inclusive design and human-centered engineering. This dimension delves into the nuances of designing new mobility systems and AVs that are inherently accessible and user-friendly for all, particularly focusing on individuals with disabilities and disadvantaged groups. It explores how these technologies and systems can be tailored to accommodate a wide range of needs, ensuring that everyone, regardless of their physical abilities or socio-economic status, can benefit from the advancements in mobility. Example research gaps include:

1. **Designing for Accessibility in New Mobility and AVs:** Investigating how new mobility solutions and AVs can incorporate universal design principles from the outset, ensuring that vehicles and services are accessible to people with a wide range of disabilities. This includes research into adaptable interfaces, vehicle entry and exit mechanisms, and onboard systems that cater to various physical, sensory, and cognitive abilities.
2. **Human-Centered Design for Integrated Mobility Services:** Exploring the development of integrated mobility platforms that intuitively cater to the needs of disadvantaged groups to enable easier use of a variety of mobility services. This research gap focuses on understanding the specific mobility challenges faced by these groups and designing systems that address these challenges through user-friendly interfaces, personalized journey planning, monitoring of technical and social structures to ensure traveler safety, and support mechanisms that ensure a seamless, safe travel experience for all users.

## **2<sup>nd</sup> Dimension: Equitable Access to New Mobility/Automated Vehicles**

This dimension assesses the availability and accessibility of new mobility and AV services to ensure that they do not exacerbate existing disparities. The work will involve exploring the infrastructure, policies, and programs necessary to provide equitable access to these technologies, especially in areas traditionally underserved by public transportation. Example research gaps include:

- **“Equitable Mobility for All” Program:** A multimodal accessibility framework that caters to diverse income groups to ensure the benefits of new mobility are distributed equitably across society.
- **Developing Equity Focused Planning Tools:** Tools and methodologies to enhance first and last-mile mobility options through micromobility services to make new mobility accessible to a broader segment of the population.

## **3<sup>rd</sup> Dimension: Equitable Impacts from New Mobility/Automated Vehicles**

This dimension explores the broader societal impacts of new mobility and AV technologies, particularly their effects on equity, workforce dynamics, and community well-being. It aims to understand how these technologies can be leveraged to produce positive societal outcomes and mitigate any potential negative impacts on vulnerable populations. Example research gaps include:

- **Leveraging New Mobility to Improve Healthcare Access:** Focusing on how new mobility solutions can improve access to healthcare services in marginalized and rural areas, and addressing critical gaps in service provision.
- **Investigating the Long-term Health Outcomes:** Studying the health impacts associated with the shift towards new mobility and AVs, especially focusing on underserved communities to ensure that these technologies do not lead to unintended negative health consequences.
- **How New Mobility Disrupts Active Modes of Travel:** Examining the implications that new mobility has on active transportation modes and healthcare access, ensuring that advances in mobility technology do not undermine public health outcomes.

- **Anticipating Labor Transitions:** Identifying the potential sources of job creation and anticipated skill sets, as well as industries and job functions that may decline as a result of new mobility and (C)/AVs.
- **Analysis of the Environmental Justice Implications:** Assessing how the adoption of new mobility solutions impacts air quality and urban heat islands, with a focus on ensuring environmental benefits are equitably distributed.
- **Understanding Externalities from New Mobility:** Understanding and averting a potential “tragedy of the commons” wherein some users disproportionately deplete public resources for which they pay no cost or engage in activity that creates new public costs.

#### **4<sup>th</sup> Dimension: Economics, Service Provision, Politics, and Governance:**

Introduction: This comprehensive dimension covers the wide-ranging effects of new mobility and AV technologies on economic development, service provision or business models, and the political and governance frameworks that support equitable urban mobility ecosystems.

Example research gaps include:

- **Community Self-Determination:** Emphasizing community self-determination in new mobility initiatives to ensure that projects are developed with direct input from those they aim to serve, fostering equitable outcomes.
- **The Shared Mobility Business Model:** A deeper investigation into the governance, political, and budgetary aspects that influence the viability and structure of shared mobility business models; how governance frameworks can enable or restrict shared mobility solutions and what changes are needed to promote inclusivity; the role of political will in shaping policies that support sustainable and equitable shared mobility business models, including the allocation of public resources and incentives.