



SURFACE TRANSPORTATION RECOMMENDED PRACTICE

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Taxonomy and Definitions for Terms Related to Shared
Mobility and Enabling Technologies

RATIONALE

Standardizing definitions of shared mobility and supporting terms serves several purposes:

- It will help reduce traveler uncertainty regarding shared mobility services, confusion about terminology used by the media, and discrepancies in terminology used internationally that contribute to public confusion and misperceptions.
- It will allow public agencies to clarify policies related to shared mobility, such as insurance, taxation, rights-of-way, parking, and zoning.
- It will help unify public and private sector definitions and aid in the development of services, as well as the formation of public-private partnerships.

This document has been developed according to the following guiding principles. It should:

- Be descriptive and informative rather than normative;
- Provide functional definitions;
- Be consistent with current industry practice;
- Be consistent with existing literature to the extent practicable;
- Be useful across disciplines including: engineering, planning, law, and journalism;
- Be clear and cogent and, as such, it should avoid or define ambiguous terms;
- Address inconsistencies in overlapping work and competing definitions in the field of shared mobility to achieve standardization; and
- Not provide any competitive advantage for any particular shared mode or service provider.

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1. SCOPE

This Recommended Practice provides a taxonomy and definitions for terms related to shared mobility and enabling technologies. Included are functional definitions for shared modes (e.g., carsharing, bikesharing, ridesourcing, etc.). Public transit services and other incumbent services—such as car rentals, shuttles, taxis, paratransit, ridesharing (carpooling/vanpooling), and pedicabs—are also included in the ecosystem of shared mobility services. This Recommended Practice also provides a taxonomy of related terms and definitions (e.g., station-based roundtrip, free-floating one-way, etc.). This Recommended Practice does not provide specifications or otherwise impose requirements on shared mobility.

NOTE: At the time of this writing, Mobility on Demand (MOD) and Mobility as a Service (MaaS) are evolving concepts that could be defined in a future revision.

2. REFERENCES

2.1 Applicable Documents

The following publications form part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J3016 Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles

2.1.2 American Planning Association

Available from the American Planning Association, 205 North Michigan Avenue, Suite 1720, Chicago, IL 60601, Tel: +1 312-431-9100, www.planning.org.

[1] Cohen, Adam, and Susan Shaheen. 2016. Planning for Shared Mobility. Available at <https://www.planning.org/publications/report/9107556/>.

2.1.3 U.S. Department of Transportation

Available from the U.S. Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC, 20590, Tel: +1 202-366-4000, www.transportation.gov.

[2] Shaheen, Susan, Adam Cohen, Balaji Yelchuru, and Sara Sarkhili. 2017. Mobility on Demand Operational Concept Report. Available at: <https://rosap.ntl.bts.gov/view/dot/34258>.

[3] Shaheen, Susan, Adam Cohen, and Ismail Zohdy. 2016. Shared Mobility: Current Practices and Guiding Principles. Available at <https://ops.fhwa.dot.gov/publications/fhwahop16022/fhwahop16022.pdf>.

[4] Shaheen, Susan, Adam Cohen, Ismail Zohdy, and Beaudry Kock. 2016. Smartphone Applications to Influence Travel Choices: Practices and Policies. Available at <http://www.ops.fhwa.dot.gov/publications/fhwahop16023/fhwahop16023.pdf>.

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 Bikesharing

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2.2.2 Carsharing

Ballús-Armet, Ingrid, Susan Shaheen, Kelly Conits, and David Weinzimmer. 2014. "Peer-to-Peer Carsharing: Exploring Public Perception and Market Characteristics in the San Francisco Bay Area, California." *Transportation Research Record* 2416: 27–36.

Dill, Jennifer, Anais Mathez, Nathan McNeil, and Steven Howland. 2015. "Who Uses Peer-to-Peer Carsharing? An Early Exploration." Report Number 15-3881, TRB 94th Annual Meeting Compendium of Papers.

Firnkor, Jörg and Martin Müller. 2012. "Selling Mobility Instead of Cars: New Business Strategies for Automakers and the Impact of Private Vehicle Holdings." *Business Strategy and The Environment* 21 (4): 264–280.

Millard-Ball, Adam, Gail Murray, Jessica Ter Schure, and Christine Fox. 2005. Car-Sharing: Where and How It Succeeds. TCRP Project B-26, Transportation Research Board. Available at <http://www.trb.org/Publications/Blurbs/156496.aspx>.

Shaheen, Susan, Nelson Chan, and Helen Micheaux. 2015. "One-Way Carsharing's Evolution and Operator Perspectives from the Americas." *Transportation* 42: 519–536.

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Shaheen, Susan, Adam Cohen, and Darius Roberts. 2006. "Carsharing in North America: Market Growth, Current Developments, and Future Potential." *Transportation Research Record* 1986: 116–124.

Shaheen, Susan, Mark Mallery, and Karla Kingsley. 2012. "Personal Vehicle Sharing Services in North America." *Research in Transportation Business and Management* 3: 71–81.

2.2.3 Ridesharing

Chan, Nelson, and Susan Shaheen. 2012. "Ridesharing in North America: Past, Present, and Future." *Transport Reviews* 32 (1): 93–112.

Deakin, Elizabeth, Karen Trapenberg Frick, and Kevin Shivley. 2012. "Dynamic Ridesharing." *Access Magazine* 40: 23–28.

2.2.4 Ridesourcing and Taxis

Daus, Matthew W., and Jasmine K. Le Veaux. 2014. *The Disruptive Transportation Technology Movement—A Litigation Primer and Roadmap*. Available at [http://www.windelsmarx.com/resources/documents/The%20Disruptive%20Transportation%20Technology%20Movement%20\(10990519\).pdf](http://www.windelsmarx.com/resources/documents/The%20Disruptive%20Transportation%20Technology%20Movement%20(10990519).pdf).

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3. ABBREVIATIONS

B2B	Business-to-Business
B2C	Business-to-Consumer
B2G	Business-to-Government
CNS	Courier Network Services
P2P	Peer-to-Peer
P2P-GDM	Peer-to-Peer Goods Delivery Marketplace
P2P-MM	Peer-to-Peer Mobility Marketplace

4. SHARED MOBILITY

Shared mobility is defined as the shared use of a vehicle, motorcycle, scooter, bicycle, or other travel mode; it provides users with short-term access to a travel mode on an as-needed basis [3].

NOTE 1: Shared mobility includes various travel modes and service models that meet the diverse needs of users. Shared mobility can include station-based roundtrip services, station-based one-way services, and free-floating one-way services.

NOTE 2: Shared mobility services that employ motor vehicles may also include vehicles equipped with automation, as described in SAE J3016.

NOTE 3: Sharing can include (1) sequential sharing (i.e., different users sharing the same transportation vehicle or equipment, one after the other), and (2) concurrent sharing (i.e., sharing of the same transportation vehicle or equipment by multiple non-household users for the same trip).

NOTE 4: Shared mobility services may be membership-based, non-membership-based, peer-to-peer (P2P), and for-hire.

NOTE 5: Shared mobility also includes public transit services and incumbent services, such as car rentals, shuttles, taxis, paratransit, ridesharing (carpool/vanpool), and pedicabs.

NOTE 6: Shared mobility also includes business-to-consumer (B2C), business-to-government (B2G), business-to-business (B2B), and peer-to-peer mobility marketplace (P2P-MM) business models.

5. TRAVEL MODES

Shared mobility includes various travel modes to meet the diverse needs of users. This section describes an array of shared travel modes that are a part of the shared mobility ecosystem.

5.1 Alternative Transportation Services

“Alternative transportation services” is a broad category that includes multi-occupant modes such as shuttles, vans, and small busses, as well as paratransit and microtransit services. Alternative transportation services are differentiated from public transit services by the lower volume of individuals moved on average per trip. In some contexts, alternative transportation services may also be referred to as “demand responsive transport” [1].

NOTE: See below for definitions of microtransit and shuttles.

5.2 Bikesharing

Bikesharing provides users with on-demand access to bicycles at a variety of pick-up and drop-off locations for one-way (point-to-point) or roundtrip travel. Bikesharing fleets are commonly deployed in a network within a metropolitan region, city, neighborhood, employment center, and/or university campus.

NOTE: Definition of “bikesharing” is partially amended from [1] and [3].

5.3 Carsharing

Carsharing offers members access to vehicles by joining an organization that provides and maintains a fleet of cars and/or light trucks. These vehicles may be located within neighborhoods, public transit stations, employment centers, universities, etc. The carsharing organization typically provides insurance, gasoline, parking, and maintenance. Members who join a carsharing organization typically pay a fee each time they use a vehicle [3].

NOTE: The term “car club” is often used in the United Kingdom and New Zealand to refer to a carsharing organization.

5.4 Courier Network Services (CNS)

CNS provide for-hire delivery services for monetary compensation using an online application or platform (such as a website or smartphone app) to connect couriers using their personal vehicles, bicycles, or scooters with freight (e.g., packages, food, etc.) [3], [4]. CNS are also referred to as flexible goods delivery.

5.5 Microtransit

Microtransit is defined as a privately or publicly operated, technology-enabled transit service that typically uses multi-passenger/pooled shuttles or vans to provide on-demand or fixed-schedule services with either dynamic or fixed routing [1].

NOTE 1: Between January and February 2018, the SAE Shared and Digital Mobility Definitions Task Force (hereinafter referred to as “Task Force”) received feedback from Members and industry stakeholders, including two presentations regarding the definition and use of the term “microtransit” (or on-demand transit). Based on these presentations, it was determined by consensus of the Task Force that the term “microtransit” could include both private-sector and public-sector services and either (1) fixed-route or flexible-route/dynamic coverage, or (2) fixed-schedule or on-demand operations.

NOTE 2: The term “flexibus” is a colloquial term that can be used to describe a microtransit service that includes a fixed route but can flexibly modify its route to pick-up or drop-off passengers at locations near but not directly on its route when demand and operations permit.

5.6 Pedicabs

Pedicabs are for-hire services in which a cyclist (or “pedaler”) transports users on a cycle containing three or more wheels and a passenger compartment [3].

5.7 Personal Vehicle Sharing

Personal vehicle sharing is defined as the sharing of privately owned vehicles, where companies broker transactions between vehicle hosts and guests by providing the organizational resources needed to make the exchange possible (e.g., technology, customer support, driver and motor vehicle safety certification, auto insurance, etc.). This model also includes P2P carsharing, P2P marketplace, hybrid B2C and P2P models, and fractional ownership [3].

5.8 Ridesharing

Ridesharing (also known as carpooling and vanpooling) is defined as the formal or informal sharing of rides between drivers and passengers with similar origin-destination pairings. Ridesharing includes vanpooling, which consists of 7 to 15 passengers who share the cost of a van and operating expenses, and may share driving responsibility [1], [3].

NOTE: Between January and February 2018, the Task Force received feedback from Members and industry stakeholders including three presentations regarding the legal definitions and use of the term “ridesharing.” Based on these presentations, it was determined by the Task Force that the term “ridesharing” should not be used to describe for-hire vehicle services (e.g., ridesourcing services and taxis), at present, even when pooled due to the commercial nature of the services. The Task Force discussed differences pertaining to the compensated and non-compensated pooled trips and the existing legal definitions for carpooling and vanpooling. It was acknowledged that this space is evolving rapidly, and the Task Force will continue to monitor developments and adjust definitions, as appropriate, in the future.

5.9 Ridesourcing

Ridesourcing services are prearranged and on-demand transportation services for compensation in which drivers and passengers connect via digital applications. Digital applications are typically used for booking, electronic payment, and ratings. [1], [3].

NOTE 1: Ridesourcing services are not allowed to street hail (on-demand does not include street hail).

NOTE 2: Please see note on ridesharing in 5.8.

NOTE 3: The term compensation shall denote a service that charges a fare above the actual cost of driving.

5.10 Scooter Sharing

Scooter sharing allows individuals access to scooters by joining an organization that maintains a fleet of scooters at various locations. Scooter sharing models can include a variety of motorized and non-motorized scooter types. The scooter service provider typically provides gasoline or charge (in the case of motorized scooters), maintenance, and may include parking as part of the service. Users typically pay a fee each time they use a scooter. Trips can be roundtrip or one way.

NOTE: Definition of “scooter sharing” is partially amended from [1] and [3].

5.11 Shuttles

Shuttles are shared vehicles (typically vans or buses) that connect passengers from a common origin or destination to public transit, retail, hospitality, or employment centers. Shuttles are typically operated by professional drivers, and many provide complimentary services to the passengers.

5.12 Taxis

Taxi services provide prearranged and on-demand transportation services for compensation through a negotiated price, zone pricing, or taximeter (either traditional or GPS-based). Passengers can schedule trips in advance (booked through a phone dispatch, website, or smartphone app), street hail (by raising a hand on the street, standing at a taxi stand, or specified loading zone), or e-Hail (by dispatching a driver on-demand using a smartphone app).

NOTE: Definition of “taxi” is partially amended from [1] and [3].

6. MOBILITY APPLICATIONS

Mobility apps include an array of services that assist users in planning or understanding their transportation choices and may increase their access to alternative travel modes. There are eight subcategories of mobility apps, including:

6.1 Business-to-Consumer (B2C) Sharing Apps

B2C sharing apps sell access to shared transportation vehicles, equipment, and services from a business to an individual consumer, including one-way and roundtrip sharing [4].

6.2 Mobility Tracker Apps

Mobility tracker apps track a traveler’s speed, direction, and elapsed travel time. These apps often include both wayfinding (guided directions) and fitness functions that are colored by metrics, such as caloric consumption while walking [4].

6.3 Peer-to-Peer (P2P) Sharing Apps

P2P sharing apps enable private owners of transportation vehicles or equipment (e.g., vehicles, bicycles, scooters, etc.) to share with other users generally for a fee [4].

6.4 Public Transit Apps

Public transit apps enable users to search public transit routes, schedules, near-term arrival predictions, and connections. These apps may also include booking, ticketing, and payment features for public transit services and other shared modes. Public transit apps that provide public transit information may be operated by a public transit agency or by a private sector provider [4].

6.5 Real-Time Information Apps

Real-time information apps provide users with up-to-date travel information across multiple modes, including current traffic data, public transit wait times, carsharing, bikesharing, and parking availability [4].

6.6 Ridesourcing Apps

Ridesourcing apps provide a platform for sourcing rides. This category is expansive in its definition and includes “ridesplitting” or “pooling” services, in which fares and rides are split among multiple strangers who are traveling in the same direction (see 5.9 for the definition of ridesourcing) [4].

6.7 Taxi e-Hail Apps

Taxi e-Hail apps provide Internet-based, location-aware, on-demand hailing of regulated city taxis (see 5.12 for a definition of taxis) [4].

6.8 Trip Aggregator Apps

Trip aggregator apps route users by considering multiple travel modes and providing users with optimal travel times, connection information, distance, and trip cost [4].

7. SERVICE MODELS

Shared mobility includes multiple service models designed to meet diverse user needs. Shared mobility services may be public or private, membership-based or non-membership-based, peer-to-peer (P2P), for-hire, or public transit systems. These service model definitions are intended to describe how each mobility service is delivered to the traveler. Shared mobility service providers may offer more than one service type [3].

7.1 Membership-Based Service Models

Membership-based service models require that an individual or group of users sign up for membership to use a service. Examples include carsharing and membership-based bikesharing access [3].

7.2 Non-Membership Service Models

Non-membership service models do not require membership to use a service. Examples include casual bikesharing access, car rental, and casual carpooling [3].

NOTE: A number of shared modes (e.g., bikesharing) may offer both membership-based and non-membership service models.

7.3 Peer-to-Peer (P2P) Service Models

In P2P service models, private companies manage transactions (for a fee) between hosts and guests of an asset (e.g., a vehicle, bicycle, or other mode) by providing the organizational resources needed to make the exchange possible (i.e., customer support, driver and motor vehicle safety certification, auto insurance, and technology, etc.). One way that P2P services differ from membership-based services is that an individual owns the private asset being shared, rather than a business or organization.

NOTE: Definition of “P2P service models” is partially amended from [3].

7.4 For-Hire Service Models

For-hire service models transport passengers for a fare (either predetermined by distance or time traveled, or dynamically priced based on a meter or similar technology). For-hire services include ridesourcing, taxis, limousines, liveries, or pedicabs. The fundamental basis of for-hire services involves a passenger hiring a person operating an asset (e.g., a driver or cyclist) for a ride. For-hire services can be prearranged through a reservation, or they can be booked on-demand through phone dispatch, street hail, or e-Hail using a website or smartphone app.

NOTE: Definition of “for-hire service models” is partially amended from [3].

7.5 Public Transit Services

Public transit services include a variety of public transportation modes, such as buses, subways, ferries, light and heavy rail, high speed rail, and alternative transportation services [3].

8. OPERATIONAL MODELS

The terms defined above inform the taxonomy of shared mobility. Central to this taxonomy are three operational models:

8.1 Station-Based Roundtrip

Vehicle, bicycle, or other travel mode is returned to its origin [1], [3].

8.2 Station-Based One-Way

Vehicle, bicycle, or other travel mode is returned to a different designated station location [1], [3].

8.3 Free-Floating One-Way

Vehicle, bicycle, or other travel mode can be returned anywhere within a geographic area [1], [3].

9. BUSINESS MODELS

Shared mobility includes a variety of business models that are characterized by the different methods of commercial transactions used, such as marketing shared mobility directly to consumers, businesses, public agencies, or other institutions and user groups.

9.1 Business-to-Consumer (B2C) Services

B2C services provide individual consumers with access to business-owned and -operated transportation services, such as a fleet of vehicles, bicycles, scooters, or other travel modes. These services are typically provided through memberships, subscriptions, user fees, or a combination of pricing models [2].

9.2 Business-to-Government (B2G) Services

B2G services offer business-owned and operated transportation services to a public agency. Pricing may include a fee-for-service contract, a per-transaction option, or some other pricing model [2].

9.3 Business-to-Business (B2B) Services

B2B services allow businesses to purchase access to business-owned or government-owned and -operated transportation services, either through usage fees or a fee-for-service. This type of service is typically offered to employees to complete work-related trips [2].

9.4 Peer-to-Peer Mobility Marketplace (P2P-MM)

P2P-MM services offer a marketplace—usually as an online platform—to facilitate transactions among individual buyers and sellers of personally owned and operated mobility services, in exchange for a transaction fee [2].

9.5 Peer-to-Peer Goods Delivery Marketplace (P2P-GDM)

P2P-GDM services include courier network services, such as apps providing for-hire delivery for monetary compensation using an online application or platform (such as a website or smartphone app) to connect couriers using their personal vehicles, bicycles, or scooters with goods (e.g., packages, food, etc.) [2]. This can include two types of services:

9.5.1 Peer-to-Peer (P2P) Delivery Services

P2P delivery services are apps that enable private drivers to collect a fee for delivering cargo using their private vehicles [2].

9.5.2 Paired On-Demand Courier Services

Paired on-demand courier services are apps that allow for-hire ride services (as described in 7.4) to also conduct package deliveries [2].

9.6 Fractional Ownership

Fractional ownership allows individuals to sub-lease or subscribe to access a motor vehicle or other travel mode owned by a third party. These individuals have “rights” to the shared service in exchange for taking on a portion of the ownership expense [3].

10. DEPRECATED TERMS

This section identifies certain deprecated terms that are clarified in this Recommended Practice, either because they are frequently misused, and/or they are functionally imprecise (and therefore misleading).

10.1 Ridesharing

Certain terms are sometimes used inconsistently or confusingly to characterize ridesourcing and ridehailing services. A for-hire vehicle service with one paid driver and one paying passenger is not considered ridesharing (or carpooling). While some ridesourcing services offer shared rides for more than one traveler, these services are referred to as “ridesplitting,” “pooling,” and “taxi sharing,” the latter used to describe sharing a taxi cab.

NOTE: Between January and February 2018, the Task Force received feedback from members and industry stakeholders, including three presentations regarding the legal definitions and use of the term “ridesharing.” Based on these presentations, it was determined by consensus of the Task Force that the term “ridesharing” should not be used to describe for-hire transportation services (ridesourcing and taxis), even when pooled. Task Force consensus emerged around differences based on the compensatory and non-compensatory nature of pooled trips and existing legal definitions for carpooling and vanpooling.

11. NOTES

11.1 Revision Indicator

A change bar (|) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

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