Technical Specification

ISO/TS 24315-1

Intelligent transport systems — Management of electronic traffic regulations (METR) —

Part 1:
Vocabulary

Systèmes de transport intelligents — Gestion des règles de circulation sous forme électronique —

Partie 1: Vocabulaire

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Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 24315 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 System overview

The ISO 24315 series on the management of electronic traffic regulations (METR) is intended to provide users access to geo-specific, trustworthy, timely, authoritative and machine-interpretable rules relating to traffic and transport, enacted by jurisdictional entities, including those who define rules for campuses (i.e. private grounds). This is conceptually shown in Figure 1.


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01001101 01000101
01010100 01010010
01100100 01100001
01110100 01100001
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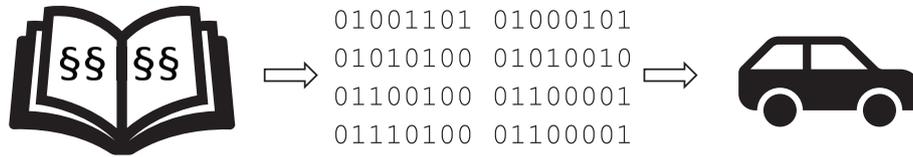
Figure 1 — METR concept

0.2 Purpose

METR is designed to assist developers and manufacturers of driving automation systems (i.e. automation Levels 1 – 5) and driver information systems (including those at automation Level 0) to electronically obtain traffic rules to better enable them to:

a) interact safely with other road users;

b) follow instructions from law enforcement organizations and those authorized to direct traffic;

c) maintain smooth and safe flow of traffic; and

d) comply with other rules enacted to support legislative policies (such as environmental protection, noise, height and weight restrictions, and societal aspects such as market days, fiestas, pedestrian zones, etc.).[1]

METR is designed to provide a reference framework for the trustworthy distribution of electronic versions of legal traffic rules. The content and application of these traffic rules is outside of the scope of standards and specifications on METR.

0.3 Flow of information

The general flow of METR information is illustrated in Figure 2 and is described below the figure.
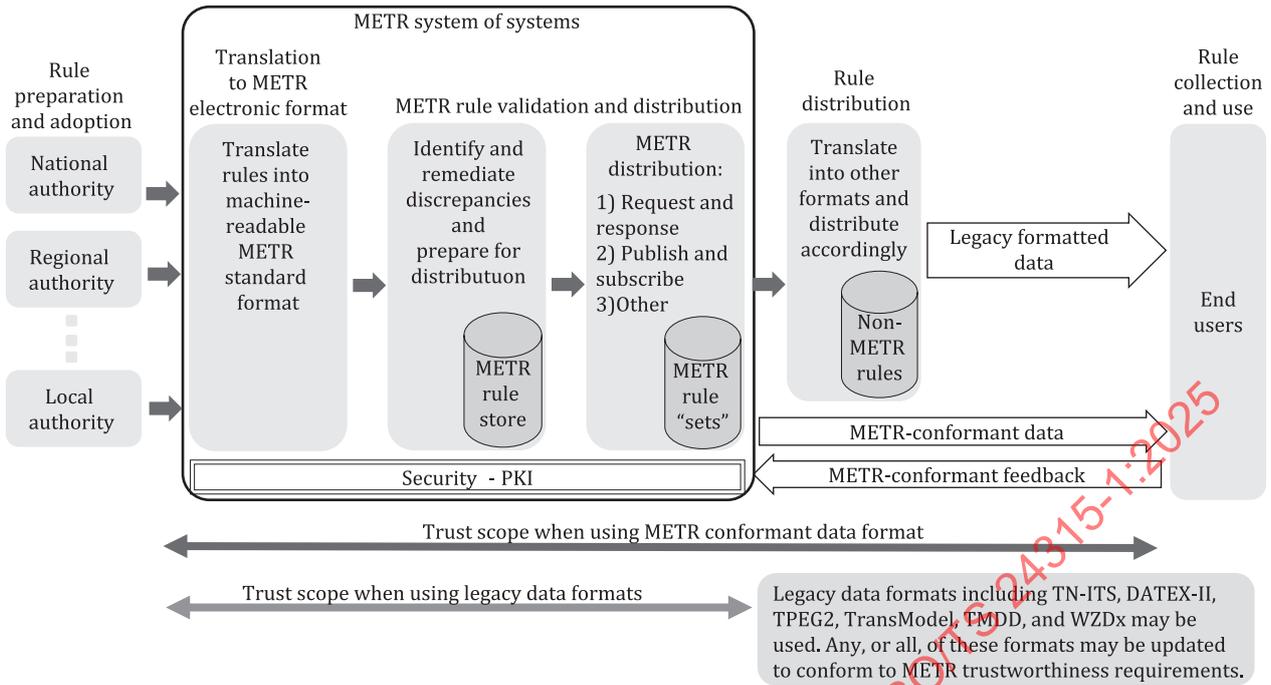
Figure 2 — METR flow of information

a)   METR starts with rule makers defining and enacting rules that are relevant to transport users.

b)   Each legal rule is translated into a METR rule, which is a secure, standardized electronic representation that includes a digital signature of the rule signing organization.

c)   METR rules are collected for a geographic area(s) and specific scope(s).

d)   Rules are distributed to METR users based on their needs.

e)   METR users become aware of the METR rules, verify their authenticity and respond appropriately.

f)   As needed, METR users can submit discrepancy reports to a discrepancy handler for investigation and correction.

0.4   Graphical overview

Figure 3 provides an overview of the data and devices included within the scope of the METR environment.
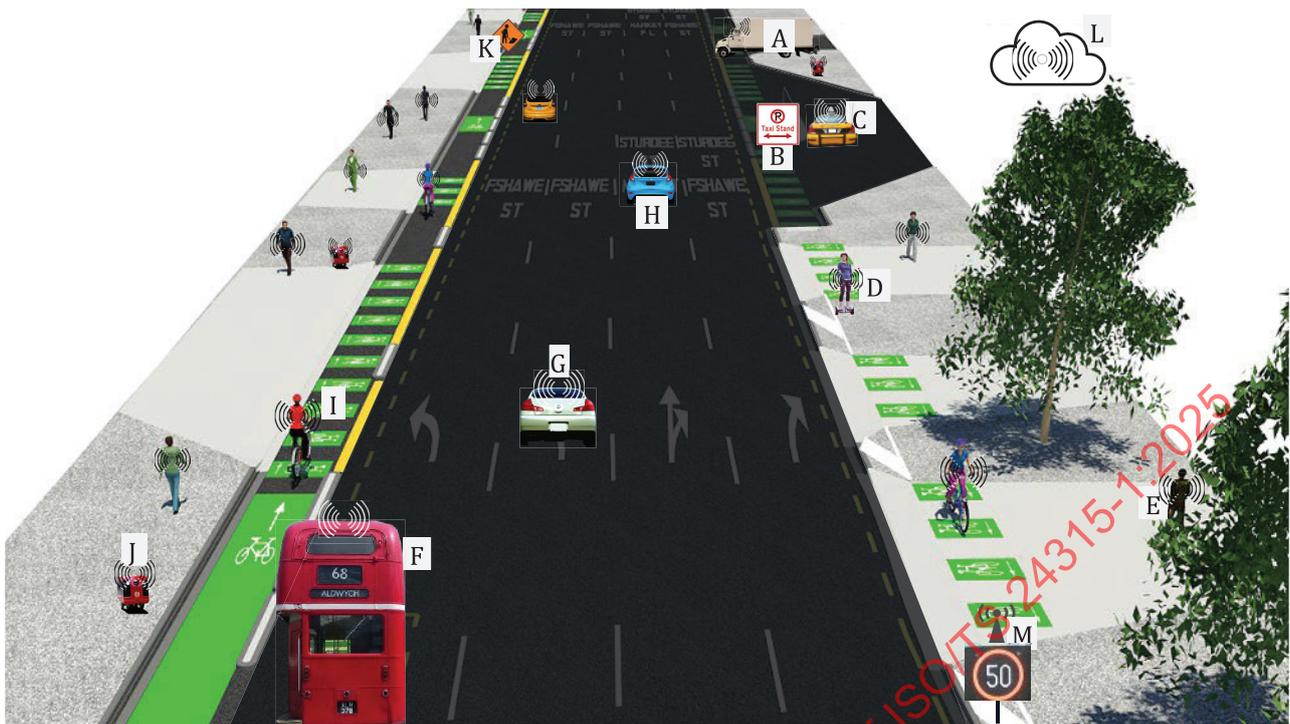
Key

A   freight rules

B   kerbside usage rules

C   ride sharing rules

D   micromobility rules

E   vulnerable road user (VRU) rules

F   public transport rules

G   rules for automated driving systems

H   driving rules

I   lane use rules

J   public-area mobile robot rules

K   road work rules

L   pre-announced rules with subset of emergent rules and/or supporting data

M   emergent rules and/or supporting data

🌐   various communications and networks infrastructure

📡   roadside communication unit

📶   METR user system

Figure 3 — METR streetscape

0.5 Rule distribution

Electronic traffic rules and their distribution have three orthogonal characteristics that are often confused with one another.

a)   Electronic rules can be pre-announced (i.e. known and publicized well in advance of the user's need) or emergent (i.e. publicized and needed while previously obtained pre-announced rules are still considered fresh).

b) Electronic rules can be distributed through a wide-area distribution mechanism or a local distribution mechanism.

c) Electronic rules can be pulled by users well in advance of their need or pushed to users as special conditions necessitate.

It is expected that the characteristics of METR users and the limitations on data capacities for local distribution mechanisms will lead to virtually all persistent rules being pre-announced and distributed from a wide-area distribution source, likely using a pull mechanism. However, any emergent rule that is activated while previously distributed pre-announced rules are still considered fresh will require a push mechanism, often from a local distribution source.

These two combinations are typical use cases only. METR supports every possible combination of characteristics a) – c) and addresses how discrepancies can be reported and resolved.

In addition, supporting data can provide context to the rules and can be transmitted by wide-area communication systems, roadside units, other vehicles or on-board devices.

The rules cover virtually any rule related to surface transport systems; Figure 3 depicts rules for freight vehicles, kerbside usage, ride sharing, micromobility operations, vulnerable road users (VRUs), public transport usage, driving (i.e. human-in-the-loop, including driver support systems, which represent Levels 1 – 2 of automation), automated driving systems (ADS, i.e. Levels 3 – 5 of automation), lane usage, public-area mobile robots (PMRs), and road works. This information needs to be available and conveyed to all transport users including nomadic devices, PMRs and vehicles equipped with driving automation systems (i.e. Levels 1 – 5 of automation). Although not shown in Figure 3, METR is also intended to be flexible enough to support rules relating to the use of ferries, passenger rail (e.g. trams, subways, and inter-city rail) and off-road environments.

0.6 Framework adaptation

METR is defined through the ISO 24315 series, which provides a comprehensive framework for the interoperable digitalization, distribution and management of electronic traffic regulations. Within the ISO 24315 series, this framework will be defined at a relatively high level and will support both regional adaptation and customization, as well as the use of legacy protocols and data formats, as depicted in Figure 4.

International Standards
ISO documents define terminology, basic principles, overall framework, reference architecture and system requirements.

Regional interoperability
Agreements (formal or informal) to ensure cross-border operations; supported by technical standards defining the data model, electronic protocols and cybersecurity as needed for interoperability.

National and local policies
Policies for implementing International Standards and regional interoperability agreements within the confines of national and local legislation and organizational structures. This can include revisions to national or local legislation.

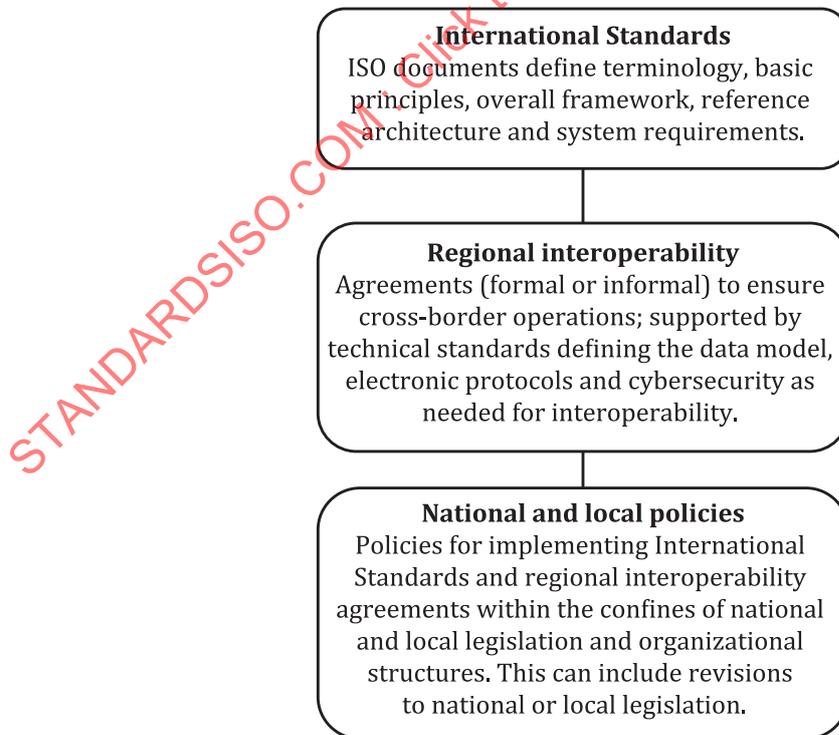**Figure 4 — METR three-tier framework**

a) International Standards: ISO documents are developed to address global stakeholder needs. Other international organizations (e.g. UNECE) also play a role in standards development and implementation policies. The first edition of the ISO 24315 series provides a framework based on the ISO-specified systems engineering methodology, as defined by ISO/IEC/IEEE 29148. It consists of a Vocabulary (this document), a concept of operations, a reference architecture and requirements for the METR system of systems (SoS). Subsequent documents in the ISO 24315 series will define requirements for each component system within the METR SoS and other requirements common to all component systems. The ISO 24315 series will promote semantic interoperability, but will need to be interpreted and adapted for regional use to provide complete interoperability (i.e. including syntactic interoperability).

b) Regional interoperability: Each region (e.g. EU, Japan, Republic of Korea) may extend and adapt the ISO 24315 series based on their specific needs and environment to provide cross-border interoperability within their region. The METR reference architecture is refined to provide regional implementation guidance. For example, in the EU, METR can eventually become part of the National Access point (NAP). Furthermore, legacy data formats including TN-ITS,[3] DATEX II,[4] TPEG2,[5] TransModel,[6] TMDD,[7] and WZDx[8] can be refined to support METR requirements or used as-is to deliver METR information to the extent that the data can be supported (i.e. non-METR distribution). The preferred solution is to update these formats to conform to the full set of METR trustworthiness requirements (i.e. the whole ISO 24315 series).

c) National and local policies: Translating and adapting International Standards and regional interoperability agreements is achieved at the national level and can even be handled at local levels. Operations, funding and governance are determined nationally, locally, or both. Legal implications of electronic rules provided through METR are defined nationally or locally. Many locations are starting this digitalization of the rules at an informative supplemental level, rather than at a regulatory level.

0.7 Document overview

The purpose of this document is to define METR-specific terms used throughout the ISO 24315 series. This document has been prepared according to the rules set forth in ISO 704.

This document has been developed by ISO/TC 204, *intelligent transport systems*, in coordination with many experts from countries around the world. It is designed to be sufficiently generic to be applicable to any national or regional authority that wishes to adopt its processes.

System developers and system operators within authorities that adopt the METR model are advised to become familiar with this document and use it as guidance in their operations.

For additional terms relevant to the ITS domain, which can help in the understanding of this document, see ISO/TS 14812 and ISO/IEC/IEEE 24765.

Intelligent transport systems — Management of electronic traffic regulations (METR) —

Part 1:
Vocabulary

1 Scope

The management of electronic transport regulations (METR) provides a means for METR users to obtain trustworthy, authoritative, machine-interpretable, publicly available and transport-related information for the use of the road network, in order to provide safer and more efficient, sustainable, comfortable, and equitable transport services.

The scope of METR includes both rules that are relatively static (e.g. static speed limits) as well as those that are dynamic (e.g. variable speed limits, signalized intersections). Where appropriate, METR incorporates existing documents (e.g. ISO/TS 19091 for signalized intersections).

This document defines terms specific to the ISO 24315 series on the management of electronic transport regulations.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Jurisdictional terms

3.1.1
campus
private campus
private grounds
jurisdictional area (3.1.5) with a *jurisdictional entity* (3.1.7) who is the owner of the area but excluding *transport facilities* (3.4.4) managed by the local government

EXAMPLE 1   A point of interest (e.g. airport, university, business park, industrial area, shopping centre) that manages its own *transport infrastructure* (3.4.5) separately from that managed by the local government. In this case, the point of interest and its own transport system are a part of the campus.

EXAMPLE 2   A point of interest (e.g. airport, university, business park, industrial area, shopping centre) that includes transport infrastructure that is managed by the local government. In this case, the government-managed transport infrastructure is a *governmental area* (3.1.3) while the campus is represented by the remainder of the area.

Note 1 to entry: The term "private grounds" is used in some countries; however, since campuses can be owned by governmental entities (especially airports, military bases, public universities, etc.), the term "campus" is preferred.

3.1.2
defined area
jurisdictional area (3.1.5) or *sub-area* (3.1.9)

3.1.3
governmental area
transport-related, *jurisdictional area* (3.1.5) whose only *jurisdictional entities* (3.1.7) are governmental entities

EXAMPLE   A subway station owned by a governmental entity is a governmental area.

Note 1 to entry: The boundaries of a jurisdictional area can include or exclude geofenced areas to indicate which jurisdictional entities have authority over *transport facilities* (3.4.4) as necessary.

3.1.4
jurisdiction
legal power to issue *rules* (3.2.1.13) of behaviour for a *defined area* (3.1.2)

Note 1 to entry: An entity of a jurisdiction that has competency over a particular subject matter is called a "responsible legal authority".

3.1.5
jurisdictional area
territory for which a *jurisdictional entity* (3.1.7) has the power to define *rules* (3.2.1.13) of behaviour

Note 1 to entry: A jurisdictional area can include non-contiguous locations.

3.1.6
jurisdictional boundary
territorial limit associated with a *jurisdictional area* (3.1.5)

Note 1 to entry: A geofence can be used to electronically represent a *jurisdictional boundary*.

3.1.7
jurisdictional entity
jurisdictional authority
person or organization who has *jurisdiction* (3.1.4)

EXAMPLE   A city government.

Note 1 to entry: In the case of a geopolitical jurisdiction, the jurisdictional entity is typically the recognized government for the territory; in the case of a *campus* (3.1.1), the jurisdictional entity is typically the landowner.

Note 2 to entry: A jurisdictional entity assigns its authority to one or more *rule makers* (3.3.1.23), which may be itself (e.g., the individual owner of a campus) or other divisions of the entity (e.g., police department, traffic department).

Note 3 to entry: For a definition of the term "person", see ISO/TS 14812:2022, 3.1.1.6.

3.1.8
region
territory within which *METR users* (3.3.1.16) expect to operate relatively seamlessly

EXAMPLE   European Common Market, North American Free Trade Area, Japan.

Note 1 to entry: Regions are typically bounded by physical, political or other boundaries that limit the flow of traffic.

3.1.9
sub-area
defined area (3.1.2) entirely within a *jurisdictional area* (3.1.5)

Note 1 to entry: Sub-areas can be defined as their own distinct jurisdictional areas or as areas that have a consistent level of support for METR data throughout.

3.2 Data terms

3.2.1 General data terms

3.2.1.1
advisory
rule (3.2.1.13) that provides a safety recommendation as established by a *regulator* (3.3.1.21)

Note 1 to entry: While not having the full force of law, violating an advisory can have legal implications, especially in the case of vehicular collisions.

3.2.1.2
crowd-sourced data
supporting data (3.2.1.17) from multiple external sources that are not signed by any *jurisdictional entity* (3.1.7) associated with the current location

EXAMPLE 1   Ice detected by multiple sources that are not signed by the local *jurisdictional entity* (3.1.7).

EXAMPLE 2   Data reported from sensors near the roadside but not signed by the local *jurisdictional entity* (3.1.7).

Note 1 to entry: Crowd-sourced data can include any combination of *infrastructure-sourced* (3.2.1.7) and *peer-sourced* (3.2.1.11) data.

3.2.1.3
data category
class of data that is described by a set of specified characteristics

EXAMPLE   Speed limit *rules* (3.2.1.13) for motor vehicles within a specified *jurisdictional area* (3.1.5).

Note 1 to entry: A data category is described by a set of characteristics. The term "*rule set*" (3.2.1.15) is used to describe the rules that are currently contained in the data category.

Note 2 to entry: For a definition of the term "data", see ISO/IEC/IEEE 24765:2017, 3.985.

3.2.1.4
discrepancy
detected inconsistency in *METR information* (3.2.1.10)

3.2.1.5
guidance
rule (3.2.1.13) that provides valuable information as established by a regulator

Note 1 to entry: Regulators sometimes wish to provide additional information to travellers to ensure efficient operations. For example, a regulator can adopt a detour and provide information about the detour route to travellers.

3.2.1.6
highway code
vehicle code
set of legislation that defines general transport-related *rules* (3.2.1.13) and assigns specific authorities to *rule makers* (3.3.1.23) and *enforcers* (3.3.1.12)

Note 1 to entry: The highway code includes rules for vehicle operation [e.g. *rules of the road* (3.2.1.16)], driver licencing, vehicle registration, vehicle inspection, insurance, etc. as well as establishing the legal basis for other rule makers to issue *regulations* (3.2.1.12), *advisories* (3.2.1.1), warnings and *guidance* (3.2.1.5).

Note 2 to entry: The term used for the highway code varies by *jurisdictional area* (3.1.5) but is frequently "highway code" or "vehicle code".

3.2.1.7
infrastructure-sourced data
supporting data (3.2.1.17) from an external source that has a fixed or portable location, including Internet servers

EXAMPLE 1   Current speed limit for a variable speed limit system as transmitted by a central or roadside system.

EXAMPLE 2   Time of dusk as reported by a source from the Internet.

EXAMPLE 3   Data reported from roadside sensors (authorized or not).

Note 1 to entry: Infrastructure-sourced data can be *jurisdiction-sourced* (3.2.1.8) or *crowd-sourced* (3.2.1.2).

3.2.1.8
jurisdiction-sourced data
supporting data (3.2.1.17) that is from an external source and is signed by a *jurisdictional entity* (3.1.7) associated with the current location

EXAMPLE 1   Current speed limit for a variable speed limit system.

EXAMPLE 2   Notice from an emergency vehicle that it is responding to a call.

EXAMPLE 3   Data reported from authorized roadside sensors.

Note 1 to entry: Jurisdiction-sourced data can be *infrastructure-sourced* (3.2.1.7) or *peer-sourced* (3.2.1.11).

3.2.1.9
jurisdictional vocabulary
listing of key terms used within *rules* (3.2.1.13) issued by a *jurisdictional entity* (3.1.7) along with their associated definitions

3.2.1.10
METR information
any information provided by a *METR distribution system* (3.3.2.7) to a *METR consumer system* (3.3.2.5)

3.2.1.11
peer-sourced data
supporting data (3.2.1.17) from an external source that is designed to operate when mobile

EXAMPLE 1   Notice from an emergency vehicle that it is responding to a call.

EXAMPLE 2   Ice detected by another vehicle.

Note 1 to entry: Peer-sourced data can be *crowd-sourced* (3.2.1.2) or *jurisdiction-sourced* (3.2.1.8).

3.2.1.12
regulation
rule (3.2.1.13) having the force of law that is established by a *regulator* (3.3.1.21)

3.2.1.13
rule
information regarding allowed or recommended behaviour as established by a *rule maker* (3.3.1.23) for its *jurisdictional area* (3.1.5)

Note 1 to entry: The jurisdictional area can be a *campus* (3.1.1).

Note 2 to entry: The primary focus of *METR* (3.3.2.3) is to provide rules that relate to transport users.

Note 3 to entry: Rules include *rules of the road* (3.2.1.16), *regulations* (3.2.1.12), *advisories* (3.2.1.1) and *guidance* (3.2.1.5).

3.2.1.14
rule order
traffic regulation order
legally recognized document that officially specifies one or more *rules* (3.2.1.13)

Note 1 to entry: A rule order can be associated with meta-data that activates or de-activates all rules defined within the order. For example, a *rule maker* (3.3.1.23) can define an order containing multiple rules that can be made *active* (3.2.4.1) or *inactive* (3.2.4.4) as a single unit.

3.2.1.15
rule set
aggregation of *rules* (3.2.1.13) coupled with shared meta-data

Note 1 to entry: Meta-data can identify the *freshness period* (3.2.5.2), a unique identifier, and other useful information.

Note 2 to entry: The term "rule set" can be applied to *legal rules* (3.2.6.2), *electronic rules* (3.2.6.1) sent from a *METR regulation system* (3.3.2.9) to a *METR distribution system* (3.3.2.7), electronic rules distributed by a METR distribution system, or other scenarios, each defining different sets for its own purposes.

3.2.1.16
rules of the road
component of the *highway code* (3.2.1.6) that specifies foundational *rules* (3.2.1.13) for the operation of vehicles

3.2.1.17
supporting data
data provided by a source other than the *METR system of systems* (3.3.2.10) that can impact the interpretation of a *rule* (3.2.1.13)

Note 1 to entry: Supporting data can be categorized into *vehicle-sourced* (3.2.1.19), *infrastructure-sourced* (3.2.1.7), *crowd-sourced* (3.2.1.2) and *user-sourced* (3.2.1.18) data.

Note 2 to entry: Supporting data often changes more frequently than the *freshness periods* (3.2.5.2) defined for *METR information* (3.2.1.10).

Note 3 to entry: Supporting data can affect the applicability of a rule (e.g. the current time affects the applicability of a time-based rule), can provide parameters for a rule (e.g. the current speed limit for a variable speed limit rule), or provide additive, redundant, or inconsistent information (e.g. an on-board system can detect road signs that the interpreter needs to consider in addition to the METR information).

Note 4 to entry: For a definition of the term "data", see ISO/IEC/IEEE 24765:2017, 3.985.

3.2.1.18
user-sourced data
supporting data (3.2.1.17) provided by the human user of the system

EXAMPLE   Reporting that snow tires are installed.

3.2.1.19
vehicle-sourced data
supporting data (3.2.1.17) provided by built-in equipment

EXAMPLE 1   Current time.

EXAMPLE 2   Windshield wiper status.

3.2.2   Discrepancy state terms

3.2.2.1
confirmed discrepancy
discrepancy (3.2.1.4) that has been investigated with the result that a change in *METR information* (3.2.1.10) and/or *traffic control device(s)* (3.4.1) were deemed to be warranted

3.2.2.2
detected discrepancy
discrepancy (3.2.1.4) that has been identified but not detected

Note 1 to entry: Discrepancies can be detected by users or by any of the component systems of *METR* (3.3.2.3).

**3.2.2.3
rejected discrepancy**
discrepancy (3.2.1.4) that has been investigated but with the result that no change was deemed to be warranted

Note 1 to entry: A *discrepancy report* (3.3.1.9) can be erroneously caused by a temporary vehicle obstruction of a *conventional traffic control device* (3.4.1).

**3.2.2.4
reported discrepancy**
detected discrepancy (3.2.2.2) that has been transmitted to a *discrepancy handler* (3.3.1.8)

**3.2.2.5
resolved discrepancy**
confirmed discrepancy (3.2.2.1) that has been fully corrected

**3.2.2.6
suspected discrepancy**
discrepancy (3.2.1.4) that has been reported to a *METR regulation system* (3.3.2.9) for investigation

3.2.3   Rule publication terms

**3.2.3.1
observable rule**
rule (3.2.1.13) that is *posted* (3.2.3.2) and able to be perceived by those affected

**3.2.3.2
posted rule**
rule (3.2.1.13) that is *publicized* (3.2.3.4) to those affected using *conventional traffic control devices* (3.4.1)

**3.2.3.3
public record**
information that travellers are expected to know without *posted rules* (3.2.3.2)

**3.2.3.4
publicized rule**
rule (3.2.1.13) that is announced to the public

**3.2.3.5
unobservable rule**
rule (3.2.1.13) that is *posted* (3.2.3.2) but not able to be perceived by a significant portion of those affected

Note 1 to entry: An unobservable rule can potentially not be perceived properly for a number of reasons, for example damage, fading, snow accumulation, obstructions, graffiti or removal.

**3.2.3.6
unposted rule**
rule (3.2.1.13) that is *publicized* (3.2.3.4) to those affected primarily through means other than *conventional traffic control devices* (3.4.1)

Note 1 to entry: Unposted rules are documented within the *public record* (3.2.3.3).

3.2.4   Rule state terms

**3.2.4.1
active rule**
rule (3.2.1.13) that is *implemented* (3.2.4.3) and presently in effect

Note 1 to entry: A rule can be active during certain hours of the day or upon other defined conditions.

Note 2 to entry: Rules are only enforced when active.

3.2.4.2
approved rule
rule ([3.2.1.13](#)) that has been approved by a *rule maker* ([3.3.1.23](#)) with a future *inception time* ([3.2.4.5](#))

3.2.4.3
implemented rule
rule ([3.2.1.13](#)) that has an *inception time* ([3.2.4.5](#)) in the past and a *termination time* ([3.2.4.10](#)) either undefined or in the future

Note 1 to entry: An implemented rule can be *active* ([3.2.4.1](#)), *inactive* ([3.2.4.4](#)) or *overridden* ([3.2.4.6](#)).

Note 2 to entry: Responsible legal authorities can define transition periods [e.g. as required for the installation of *conventional traffic control devices* ([3.4.1](#))] when rules are implemented or *rescinded* ([3.2.4.8](#)) and the enforceability of the rules during these transition periods.

3.2.4.4
inactive rule
rule ([3.2.1.13](#)) that is *enacted* ([3.2.4.3](#)) but not presently in effect

Note 1 to entry: A rule can be not in effect during certain hours of the day.

Note 2 to entry: A rule cannot be enforced while it is inactive.

Note 3 to entry: *Guidance* ([3.2.1.5](#)) information that is not applicable at certain times (e.g. detour that is in effect during certain hours) can be designated as "inactive" during those times.

3.2.4.5
inception time
point in time at which a *rule* ([3.2.1.13](#)) can first become applicable whenever all defined conditions are met

Note 1 to entry: After the inception time, the rule becomes implemented and may be *active* ([3.2.4.1](#)), *inactive* ([3.2.4.4](#)) or *overridden* ([3.2.4.6](#)).

Note 2 to entry: Rules can be associated with grace periods that occur after the inception time.

3.2.4.6
overridden rule
rule ([3.2.1.13](#)) that is *enacted* ([3.2.4.3](#)) but temporarily nullified or replaced

Note 1 to entry: It is expected that an override will eventually terminate, even if the expected *termination time* ([3.2.4.10](#)) is unknown.

Note 2 to entry: The item that is temporarily nullified is termed to be "overridden" and the item that it is replaced with is termed to be "overriding".

Note 3 to entry: The replacement can be null.

3.2.4.7
proposed rule
rule ([3.2.1.13](#)) that is not yet approved by the *rule maker* ([3.3.1.23](#))

3.2.4.8
rescinded rule
rule ([3.2.1.13](#)) that has a *termination time* ([3.2.4.10](#)) in the past

3.2.4.9
revoked rule
rule ([3.2.1.13](#)) that has been retroactively designated as never being legally enforceable

EXAMPLE   An electronic no parking rule can be revoked if it is discovered that the electronic version incorrectly identified the applicable times to be 03:00 to 20:00 when the actual rule identifies the applicable times to be 08:00 to 20:00.

Note 1 to entry: A rule that is revoked indicates that the rule ought never to have been enacted.

Note 2 to entry: There can be a period of time after a rule is revoked during which associated *conventional traffic control devices* (3.4.1) are still present.

3.2.4.10
termination time
point in time at which a *rule* (3.2.1.13) became or is expected to become unenforceable

EXAMPLE   A temporary daily parking restriction that is intended to be in effect daily from 07:00 to 19:00 and ending 31 July would require a termination time of no earlier than 19:00 on 31 July.

3.2.5   METR information state terms

3.2.5.1
fresh METR information
METR information (3.2.1.10) that has a *freshness period* (3.2.5.2) that has not expired

EXAMPLE   A *rule set* (3.2.1.15) that is downloaded can be designated as being fresh for one week. The data would be considered *outdated* (3.2.5.3) after the one-week period.

Note 1 to entry: *Emergent rules* (3.2.7.1) can impact how fresh *rules* (3.2.1.13) are interpreted, including overriding them.

3.2.5.2
freshness period
duration during which an element of *METR information* (3.2.1.10) is considered accurate

Note 1 to entry: *Receivers* (3.3.1.20) can refresh their data prior to their expiration to avoid *outdated METR information* (3.2.5.3).

3.2.5.3
outdated METR information
METR information (3.2.1.10) that has a *freshness period* (3.2.5.2) that has expired

3.2.6   Rule representation terms

3.2.6.1
electronic rule
representation of a *rule* (3.2.1.13) in a structured, digital format that can be readily processed by a computer to determine the intent of the rule

3.2.6.2
legal rule
representation of a *rule* (3.2.1.13) as recorded in official records of the *jurisdictional entity* (3.1.7)

3.2.6.3
METR rule
electronic rule (3.2.6.1) that is produced and distributed in a trustworthy manner

Note 1 to entry: Digitized images do not meet this definition of electronic.

3.2.6.4
physical rule
representation of a *rule* (3.2.1.13) as presented in the field

EXAMPLE   The speed limit as displayed on a speed limit sign.

3.2.7 Rule announcement terms

3.2.7.1
emergent rule
METR rule ([3.2.6.3](#)) created and implemented while previously distributed, pre-announced *rule sets* ([3.2.1.15](#)) are still *fresh* ([3.2.5.1](#))

EXAMPLE   Immediately after downloading the current pre-announced rule set, the *jurisdictional entity* ([3.1.7](#)) issues a new *METR rule* ([3.2.6.3](#)) that closes a lane on a road due to a vehicular collision.

Note 1 to entry: Emergent rules typically require alternate distribution mechanisms to ensure that *METR users* ([3.3.1.16](#)) are notified in time to allow for operational decisions.

Note 2 to entry: Emergent rules can include both *temporary* ([3.2.8.2](#)) and *persistent* ([3.2.8.1](#)) *rules* ([3.2.1.13](#)).

3.2.7.2
pre-announced rule
METR rule ([3.2.6.3](#)) distributed through the normal periodic update mechanism

Note 1 to entry: Pre-announced rules do not require low-latency communications because they are distributed well enough in advance so that all users with up-to-date *rule sets* ([3.2.1.15](#)) will have a copy of the *rule* ([3.2.1.13](#)).

Note 2 to entry: Pre-announced rules typically have relatively long *freshness periods* ([3.2.5.2](#)) but can be impacted by *emergent rules* ([3.2.7.1](#)).

3.2.8 Rule projected longevity terms

3.2.8.1
persistent rule
rule ([3.2.1.13](#)) that does not have any expectation of a *termination time* ([3.2.4.10](#))

Note 1 to entry: A *variable rule* ([3.2.9.3](#)), such as a variable speed limit, often consists of a persistent rule (e.g. a variable speed limit applies to a specified stretch of a road) that is supplemented with *supporting data* ([3.2.1.17](#)) that identifies the current speed limit in effect.

3.2.8.2
temporary rule
rule ([3.2.1.13](#)) that has or is expected to have a specified *termination time* ([3.2.4.10](#))

3.2.9 Rule terms related to supporting data

3.2.9.1
condition-based rule
rule ([3.2.1.13](#)) that becomes *active* ([3.2.4.1](#)) based on explicitly stated conditions

EXAMPLE 1   "When workers present".

EXAMPLE 2   "Dusk".

EXAMPLE 3   "08:00 – 12:00".

Note 1 to entry: Condition-based rules can be based on multiple conditions.

Note 2 to entry: *Time-based rules* ([3.2.9.2](#)) (e.g. a parking rule that is only in effect during certain hours) are one type of condition-based rules.

3.2.9.2
time-based rule
condition-based rule ([3.2.9.1](#)) where at least one condition is dependent on time

EXAMPLE 1   "08:00-12:00".

EXAMPLE 2   "Every Tuesday".

EXAMPLE 3   "June through July".

3.2.9.3
variable rule
rule (3.2.1.13) that contains a parameter whose value is dependent upon *supporting data* (3.2.1.17) issued by a *rule maker* (3.3.1.23)

EXAMPLE 1   A speed limit that changes based on responsible legal authority decisions

EXAMPLE 2   A traffic signal, which changes states as determined by a traffic signal controller

Note 1 to entry: The supporting data can be generated by an automated system under the authority of the responsible legal authority.

3.2.10 Rule relevancy terms

3.2.10.1
non-relevant rule
rule (3.2.1.13) that is not applicable to the *METR user* (3.3.1.16) within present circumstances

3.2.10.2
relevant rule
rule (3.2.1.13) applicable to the *METR user* (3.3.1.16) within present circumstances

3.2.11 Distribution terms

3.2.11.1
cyber location
set of one or more parameters that allow an electronic resource to be accessed in a secure manner through indicated communication mechanisms

EXAMPLE 1   A universal resource locator (URL) with a public key.

EXAMPLE 2   A radio frequency and protocol details used for broadcasting information and authentication credentials.

3.2.11.2
dissemination plan
plan for providing data to user systems

Note 1 to entry: A dissemination plan includes identification of the data covered by the plan, the mode of delivery (e.g. via a centralized distribution system, local beacons, RSS feed) and the geographic area for dissemination.

3.2.11.3
localized distribution
dissemination of *METR information* (3.2.1.10) using wireless technologies with less than a 1-km range

EXAMPLE 1   WiFi.

EXAMPLE 2   LTE-V2X.

3.2.11.4
pulled distribution
dissemination of *METR information* (3.2.1.10) to a user based on a request or subscription

3.2.11.5
pushed distribution
dissemination of *METR information* (3.2.1.10) to a user based on general user registration or as a broadcast to all users within range

3.2.11.6
wide-area distribution
dissemination of *METR information* (3.2.1.10) using wireless technologies with a range of greater than 1 km

3.3 METR architectural terms

3.3.1 METR role terms

3.3.1.1
adapter
role that is responsible for interpreting, fusing and adapting data provided by the *receiver* (3.3.1.20) and *supporting data providers* (3.3.1.27) into a format that the *METR user* (3.3.1.16) can support

Note 1 to entry: Adapting data can result in another electronic format (e.g., translation among different electronic interface standards) or to a human-machine interface format, as might be performed by a driver support system.

Note 2 to entry: The adapter can also provide discrepancies to a *discrepancy reporter* (3.3.1.9).

Note 3 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

Note 4 to entry: For a definition of the term "data", see ISO/IEC/IEEE 24765:2017, 3.985.

3.3.1.2
adjudicator
role that is responsible for making formal judgements on disputed matters related to *rules* (3.2.1.13)

Note 1 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.3
ancillary user
METR user (3.3.1.16) that is not a *transport-related user* (3.3.1.29)

EXAMPLE 1   Insurance company.

EXAMPLE 2   Lawyer.

EXAMPLE 3   Police officer.

Note 1 to entry: Ancillary users typically provide verification of the system or support transport users in their transport needs.

3.3.1.4
authorized actor
rule implementer (3.3.1.22) that has received permission from a *rule maker* (3.3.1.24) to enable and disable specific *rules* (3.2.1.13) as necessary

EXAMPLE   A construction contractor can be granted the authority to close a specific lane of traffic at a specific location within specified time constraints as the contractor deems necessary to ensure the safety of the public during construction activities.

Note 1 to entry: Depending on the rule, legal environment, etc. "enabled" and "disabled" can equate to either *implemented* (3.2.4.3) and *rescinded* (3.2.4.8) or *active* (3.2.4.1) and *inactive* (3.2.4.4).

3.3.1.5
consumer system developer
role that is responsible for developing the software for the *receiver* (3.3.1.20) and optionally the *discrepancy reporter* (3.3.1.9)

Note 1 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.6
crowd-sourced data provider
supporting data provider (3.3.1.27) that provides *crowd-sourced data* (3.2.1.2)

3.3.1.7
data provider
role that is responsible for providing trustworthy information

Note 1 to entry: The required degree of *trustworthiness* (3.5.8) can vary based on the intended use of the data as well as applicable legal requirements (e.g. certification requirements).

Note 2 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.8
discrepancy handler
role that is responsible for receiving reports from *discrepancy reporters* (3.3.1.9) and passing the information to associated *translators* (3.3.1.28) in an aggregate and anonymous form for resolution

Note 1 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.9
discrepancy reporter
role that is responsible for reporting variances between *rules* (3.2.1.13) previously received via METR and information detected in the field

Note 1 to entry: The information can be detected using vehicle-based sensors or through manual observations.

Note 2 to entry: Within METR enterprise view, the discrepancy reporter is considered to be a part of the *METR consumer system* (3.3.2.5).

Note 3 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.10
distributor
METR distributor
role that is responsible for gathering *rules* (3.2.1.13) from one or more *translators* (3.3.1.28) and distributing them to *METR users* (3.3.1.16) via *receivers* (3.3.1.20) and *adapters* (3.3.1.1)

Note 1 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.11
emergent rule distributor
distributor (3.3.1.10) that is responsible for distributing *emergent rules* (3.2.7.1)

Note 1 to entry: Emergent rule distributors are envisioned to include broadcast sites with a short transmission range. Such sites are likely to distribute emergent rules that are applicable to the broadcast area, which is likely a subset of all emergent rules within a METR network coverage area.

3.3.1.12
enforcer
role that is authorized to and responsible for compelling compliance with a *rule* (3.2.1.13)

Note 1 to entry: An enforcer can be authorized to enforce rules for multiple *jurisdictional entities* (3.1.7). For example, a police officer can be authorized to enforce national laws.

Note 2 to entry: An enforcer can be from an independent organization. For example, a *campus* (3.1.1) can contract with a private enforcement agency or have its own enforcement agency.

Note 3 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.13
infrastructure-sourced data provider
supporting data provider (3.3.1.27) that provides *infrastructure-sourced data* (3.2.1.7)

3.3.1.14
installer
role that is responsible for posting *rules* (3.2.1.13) for a *jurisdictional area* (3.1.5) using *conventional traffic control devices* (3.4.1)

Note 1 to entry: Installer responsibilities include installing signs, signals, markings, physical barriers, etc. to properly reflect the rules established by the *rule maker* (3.3.1.23).

Note 2 to entry: The installer can leave the conventional traffic control device in an *unobservable* (3.2.3.5) state (e.g. the conventional traffic control device can be covered or in the case of a message sign left blank). In this case, a separate *rule implementer* (3.3.1.22) can be made responsible for implementing the rule (e.g. removing a cover or posting a message on a sign). Alternatively, a single entity can serve as both the installer and rule implementer.

Note 3 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.15
issuing authority
rule maker (3.3.1.23) that established a specific *rule* (3.2.1.13)

3.3.1.16
METR user
user
role that is responsible for using applicable *rules* (3.2.1.13) to fulfil a need

Note 1 to entry: METR users include transport users and *ancillary users* (3.3.1.3).

Note 2 to entry: The need being fulfilled is often the performance of the dynamic driving task or similar action (e.g. the task of walking in a safe manner that complies with local rules) but can also be trip planning, rule verification, etc.

Note 3 to entry: For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

Note 4 to entry: For a definition of the term "need", see ISO/TS 14812:2022, 3.5.1.4.

Note 5 to entry: For a definition of the term "transport user", see ISO/TS 14812:2022, 3.5.2.3.

3.3.1.17
non-METR distributor
role that is responsible for distributing *rules* (3.2.1.13) in manners that do not conform to METR

EXAMPLE 1   Distribution system that provides rules using protocols that do not meet METR security requirements.

EXAMPLE 2   For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.18
peer-sourced data provider
supporting data provider (3.3.1.27) that provides *peer-sourced data* (3.2.1.11)

3.3.1.19
pre-announced rule distributor
distributor (3.3.1.10) that is responsible for distributing all *pre-announced rules* (3.2.7.2) requested by a *METR user* (3.3.1.16) and within the publicized *data categories* (3.2.1.3) supported by the distributor

Note 1 to entry: The pre-announced rule distributor is primarily envisioned to use a central system but can use a mobile unit dispatched to a location without internet connectivity.

Note 2 to entry: A pre-announced rule distributor can also distribute *emergent rules* (3.2.7.1) but does not bear the responsibility for doing so.

3.3.1.20
receiver

role that is responsible for retrieving, receiving, processing and maintaining a local store of *METR information* (3.2.1.10)

Note 1 to entry: The material entity hosting the receiver is typically a vehicle, but can be a personal information device, such as a smartphone.

Note 2 to entry: Within METR enterprise view, the receiver is considered to be a part of the *METR consumer system* (3.3.2.5).

EXAMPLE   For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.21
regulator
competent authority

rule maker (3.3.1.23) appointed by a *jurisdictional entity* (3.1.7) to create and maintain *rules* (3.2.1.13) within a defined scope

EXAMPLE   A *private campus* (3.1.1) can be granted authority by a local government who has been granted authority by the national government to make such assignments.

Note 1 to entry: The term "competent authority" is used in many European contexts.

3.3.1.22
rule implementer
implementer

role that is responsible for enabling a *rule* (3.2.1.13)

Note 1 to entry: Enabling the rule includes ensuring *unposted rules* (3.2.3.6) are properly captured within the *public record* (3.2.3.3) and *posted rules* (3.2.3.2) are installed and *observable* (3.2.3.1).

Note 2 to entry: The rule implementer is responsible for notifying the associated *translator* (3.3.1.28) when *conventional traffic control devices* (3.4.1) have been implemented so that electronic records can be updated.

EXAMPLE   For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.23
rule maker

role that has the responsibility for creating and maintaining *rules* (3.2.1.13) for a geographic and operational scope as defined by the parent *jurisdictional entity* (3.1.7)

Note 1 to entry: Rule makers include legislative bodies, which often establish the *rules of the road* (3.2.1.16), and regulators, which are typically responsible for location-specific rules, such as speed limits and stop signs.

Note 2 to entry: A simple jurisdictional entity can have a single entity that fulfils multiple roles. For example, the owner of a small shop can act as the jurisdictional entity, the rule maker, the *translator* (3.3.1.28), and the *rule signer* (3.3.1.24) for issuing accessible parking restrictions for the small parking lot.

Note 3 to entry: A complex jurisdictional entity can designate multiple rule makers, each assigned for different areas, different purposes, or both. For example, the State of New York can adopt a *highway code* (3.2.1.6) that assigns its department of transportation the responsibility of creating and maintaining rules for motorways and allows local *jurisdictions* (3.1.4) to create and maintain additional rules. Based on its authority, New York City can assign its department of transportation the responsibility of creating and maintaining static and temporary stop sign locations throughout the city; each precinct of its police department with the authority to create and maintain temporary stop sign locations only within their respective precincts; and land owners the responsibility of designating parking spaces for travellers with disabilities.

EXAMPLE   For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.24
rule signer
role that reviews and formally confirms the accuracy and integrity of an *electronic rule* ([3.2.6.1](#))

Note 1 to entry: METR uses non-repudiation to permanently associate the rule signing organization with the electronic rule (e.g. using an electronic signature). This can result in the assignment of legal responsibility for the accuracy and integrity of the *rule* ([3.2.1.13](#)). The association to the specific responsible individual can be achieved through a multi-step process. For example, the *METR regulation system* ([3.3.2.9](#)) can associate the individual rule signing agent to the rule via an internal database entry while the electronic rule is associated with a rule signing organization through the use of an electronic signature.

Note 2 to entry: Ideally, the rule signing organization is the rule making organization but it can be a separate entity (e.g. if the rule making organization does not provide electronic rules).

EXAMPLE   For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.25
rule verifier
role that is responsible for independently verifying that each *electronic rule* ([3.2.6.1](#)) accurately represents the *legal rule* ([3.2.6.2](#))

EXAMPLE   For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.26
stored data provider
supporting data provider ([3.3.1.27](#)) that is built into the user's material entity hosting the *receiver* ([3.3.1.20](#)) and provides *supporting data* ([3.2.1.17](#)) that has been previously configured within the device

EXAMPLE 1   Data store that provides configured information such as vehicle characteristics, e.g. engine size, fuel type, vehicle width, length and height.

Note 1 to entry: Stored data can change, but changes tend to be infrequent. Example changes can include a parking permit being added, a cargo carrier being attached that changes the vehicle's effective dimensions, or snow chains being installed on tires.

EXAMPLE 2   For a definition of the term "material entity", see ISO/TS 14812:2022, 3.1.1.3.

3.3.1.27
supporting data provider
data provider ([3.3.1.7](#)) that is responsible for distributing *supporting data* ([3.2.1.17](#)) to *METR users* ([3.3.1.16](#)) via *installers* ([3.3.1.14](#))

Note 1 to entry: Supporting data providers include in-vehicle data providers and external data providers.

3.3.1.28
translator
role that is responsible for translating *rules* ([3.2.1.13](#)) defined by *rule maker* ([3.3.1.23](#)) into an electronic format for *METR* ([3.3.2.3](#))

EXAMPLE   For a definition of the term "role", see ISO/TS 14812:2022, 3.1.12.3.

3.3.1.29
transport-related user
METR user ([3.3.1.16](#)) that is either a transport user, a driver, a driving automation system, or a driver information system

EXAMPLE 1   For a definition of the term "transport user", see ISO/TS 14812:2022, 3.5.2.3.

EXAMPLE 2   For a definition of the term "driver", see ISO/TS 14812:2022, 3.6.2.3.

EXAMPLE 3   For a definition of the term "driving automation system", see ISO/TS 14812:2022, 3.7.3.6.

3.3.1.30
user-sourced data provider
supporting data provider (3.3.1.27) that provides *user-sourced data* (3.2.1.18)

3.3.1.31
vehicle-sourced data provider
supporting data provider (3.3.1.27) that provides *vehicle-sourced data* (3.2.1.19)

EXAMPLE   GNSS positioning data (i.e. GNSS positioning data is determined by an on-board algorithm that analyses multiple GNSS signals to produce an estimate of a geographic position).

Note 1 to entry: In-vehicle *data providers* (3.3.1.7) can produce *supporting data* (3.2.1.17) that is derived from external data sources, for example by using sensors, clocks, GNSS receivers, and/or other devices with its own algorithms.

Note 2 to entry: The "user device" is nominally a vehicle, but can be a smartphone if it hosts the *METR receiver* (3.3.1.20), e.g. in the case of a pedestrian.

3.3.2   METR system terms

3.3.2.1
central distribution system
METR distribution system (3.3.2.7) where the provisioning of data is from a central system

EXAMPLE   For a definition of the term "central system", see ISO/TS 14812:2022, 3.2.1.1.

3.3.2.2
field distribution system
METR distribution system (3.3.2.7) where the provisioning of data is from a field system or *vehicle system* (ISO/TS 14812:2022, 3.2.1.5)

EXAMPLE 1   For a definition of the term "field system", see ISO/TS 14812:2022, 3.2.1.2.

EXAMPLE 2   For a definition of the term "vehicle system", see ISO/TS 14812:2022, 3.2.1.5.

3.3.2.3
METR
management of electronic traffic regulations
collection of ITS services that provide for the distribution of *electronic rules* (3.2.6.1) for the road network in a manner that satisfies *trustworthiness* (3.5.8) principles

EXAMPLE   For a definition of the term "ITS services", see ISO/TS 14812:2022, 3.5.3.1.

3.3.2.4
METR component
ITS component designed to assist a *translator* (3.3.1.28), *rule verifier* (3.3.1.25), *rule signer* (3.3.1.24), *distributor* (3.3.1.10), *adapter* (3.3.1.1), or *discrepancy handler* (3.3.1.8) in performing its duties

EXAMPLE   For a definition of the term "ITS component", see ISO/TS 14812:2022, 3.1.8.2.

3.3.2.5
METR consumer system
consumer system
ITS component developed to fulfil the data processing responsibilities assigned to the *receiver* (3.3.1.20) and optionally the *discrepancy reporter* (3.3.1.9)

EXAMPLE   For a definition of the term "ITS component", see ISO/TS 14812:2022, 3.1.8.2.

3.3.2.6
METR discrepancy handling system
discrepancy handling system
ITS component developed to fulfil the data processing responsibilities assigned to the *discrepancy handler* (3.3.1.8)

EXAMPLE   For a definition of the term "ITS component", see ISO/TS 14812:2022, 3.1.8.2.

3.3.2.7
METR distribution system
distribution system
ITS component developed to fulfil the data processing responsibilities assigned to the *distributor* (3.3.1.10)

EXAMPLE   For a definition of the term "ITS component", see ISO/TS 14812:2022, 3.1.8.2.

3.3.2.8
METR environment
aggregation of the *METR system of systems* (3.3.2.10), *supporting data providers* (3.3.1.27) and other systems contained in the *METR* (3.3.2.3) physical view diagrams

3.3.2.9
METR regulation system
regulation system
ITS component developed to fulfil the data processing responsibilities assigned to the *translator* (3.3.1.28)

EXAMPLE   For a definition of the term "ITS component", see ISO/TS 14812:2022, 3.1.8.2.

3.3.2.10
METR system of systems
system of systems (3.3.2.12) representing the aggregation of all *METR components* (3.3.2.4) currently connected within a network

3.3.2.11
METR user system
ITS component developed to fulfil the data processing responsibilities assigned to the *adapter* (3.3.1.1)

Note 1 to entry: A METR user system often includes other end user functionality as well. For example, it can include a vehicle offering other driver and passenger services.

EXAMPLE   For a definition of the term "ITS component", see ISO/TS 14812:2022, 3.1.8.2.

3.3.2.12
system of systems
set of operationally and managerially independent systems that interoperate for a period of time to achieve one or more stated purposes

Note 1 to entry: The operational and managerial independence of each component system complicates the operation and management of these systems. For example, the systems within a system of systems are upgraded and maintained on different schedules and the design of the system of systems is more complex as a result.

3.3.3   METR services

3.3.3.1
rule discovery service
ITS service where one or more *METR user systems* (3.3.2.11) enhance the accuracy of the *METR distribution system* (3.3.2.7) by reporting *rules* (3.2.1.13) observed in the field

Note 1 to entry: The data can be sent through and summarized by an intermediary, such as a vehicle manufacturer.

Note 2 to entry: The reported rules can be used as the initial source for data.

Note 3 to entry: The reported rules can be used to update *METR* (3.3.2.3) to reflect real-time changes, such as those due to natural disasters.