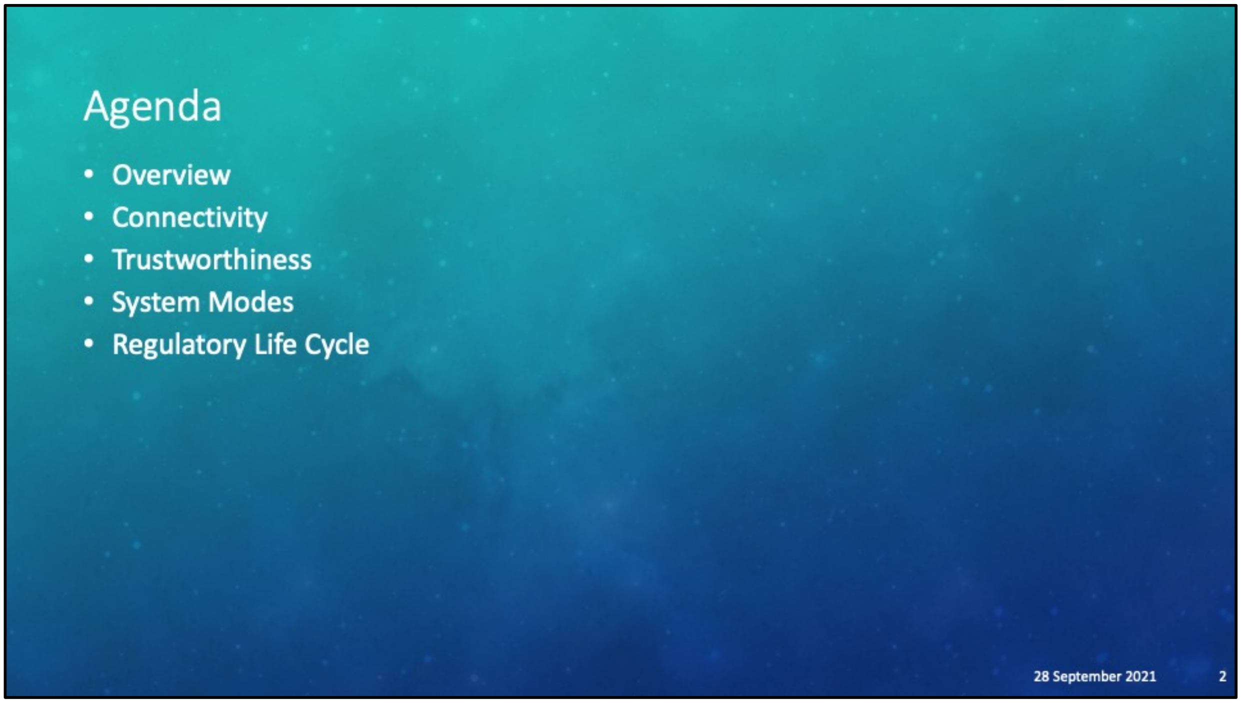
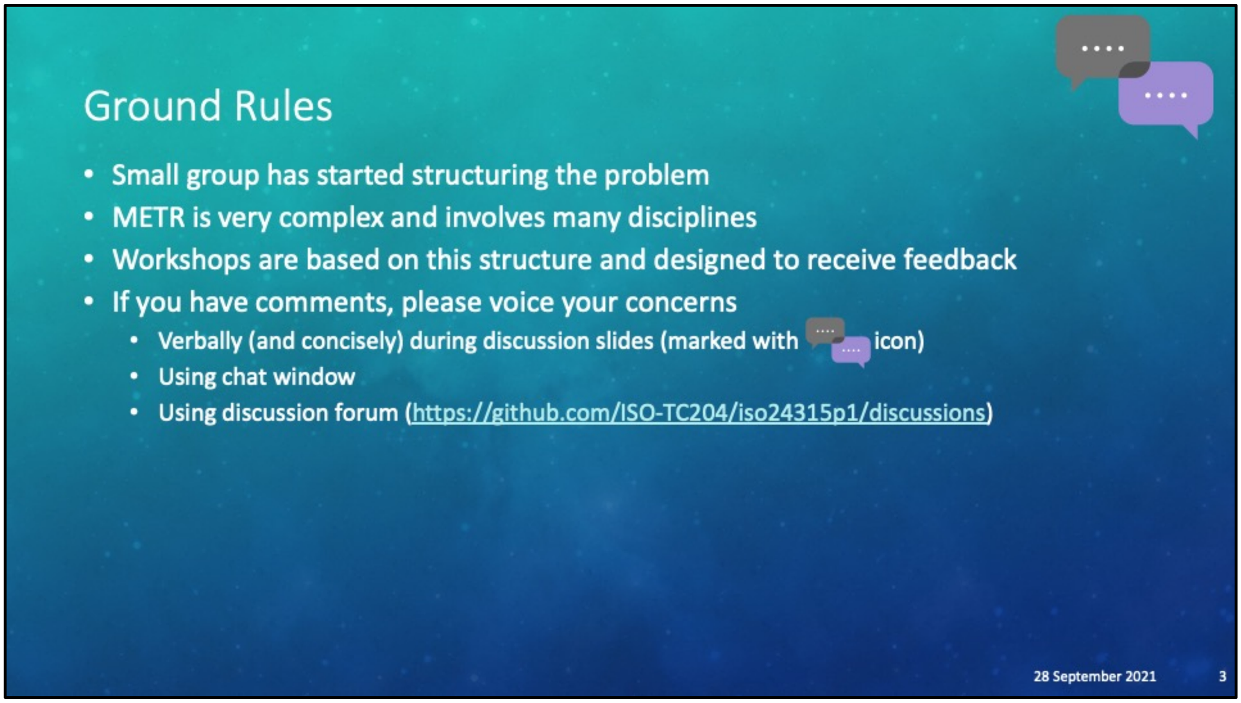
Welcome to the first Stake holder workshop for the development of the METR Operational Concept (ConOps)



Our discussion today will start with providing an overview of what METR is and then discuss various topics related to the overall operations of METR, including connectivity, trustworthiness, system modes, and the regulatory lifecycle.



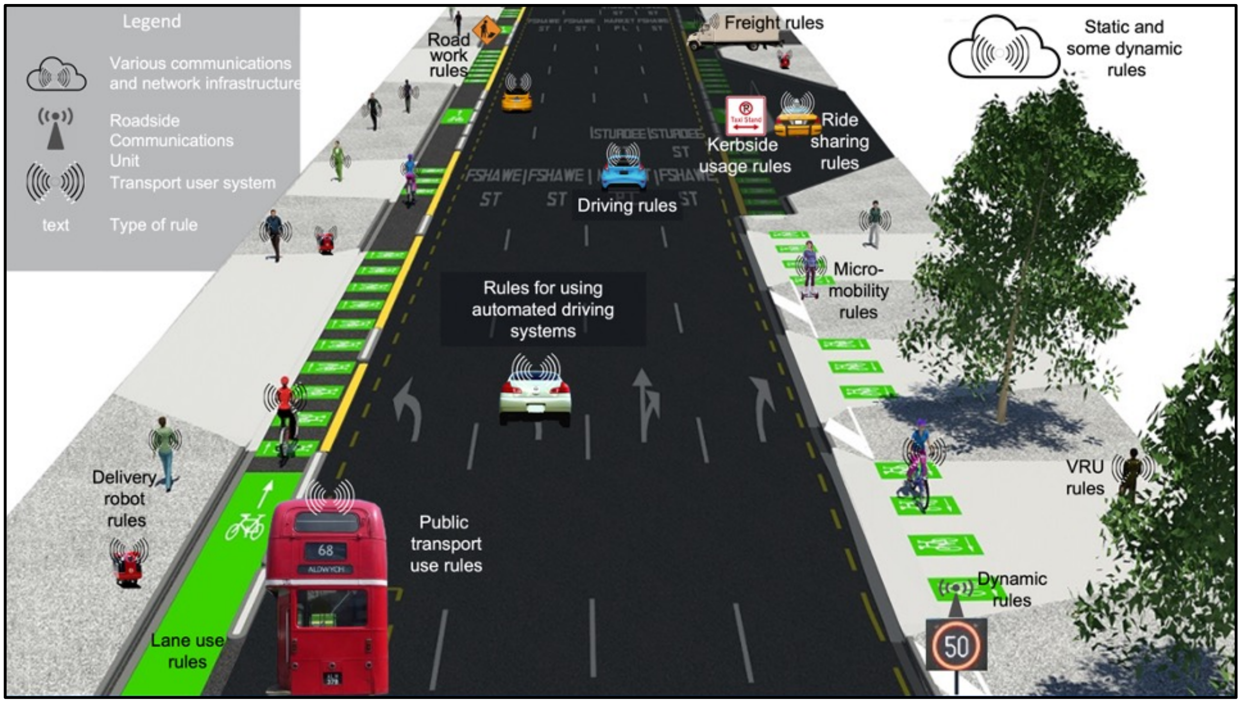
Before we begin, it is useful for everyone to understand the ground rules of our conversation. The development of the ConOps is intended to be a cooperative effort that reflects the input from stakeholders from different perspectives. To facilitate this process, a small group has already started investigating the issues and has prepared the workshops to gain feedback from stakeholders – but your feedback does not have to be limited to the topics presented.

The workshops are generally structured to present a topic and then gain feedback. Participants are welcome to voice their concerns during the workshop presentations, either verbally or using the chat window, but we request that verbal feedback is made when we are on discussion slides. We also recognize that our workshops are time limited and comments should be kept fairly concise. If major topics of discussion arise we can schedule additional meetings to focus on specific points, as needed. We have also established a discussion forum on the Github site to promote off-line conversations and encourage everyone to use the facility,

After we complete the workshops, we expect to prepare a draft ConOps early next year, and there will be ample opportunity for additional comments on the document once distributed.

Now that we understand the rules, let's consider the scope of METR. The working draft of the scope is shown on this slide. A slightly simplified version of this statement is provided at the bottom of the slide, but the full text is intended to provide a more precise definition.

Let's consider what this means by looking at an example streetscape, in this case a site in Auckland, New Zealand.

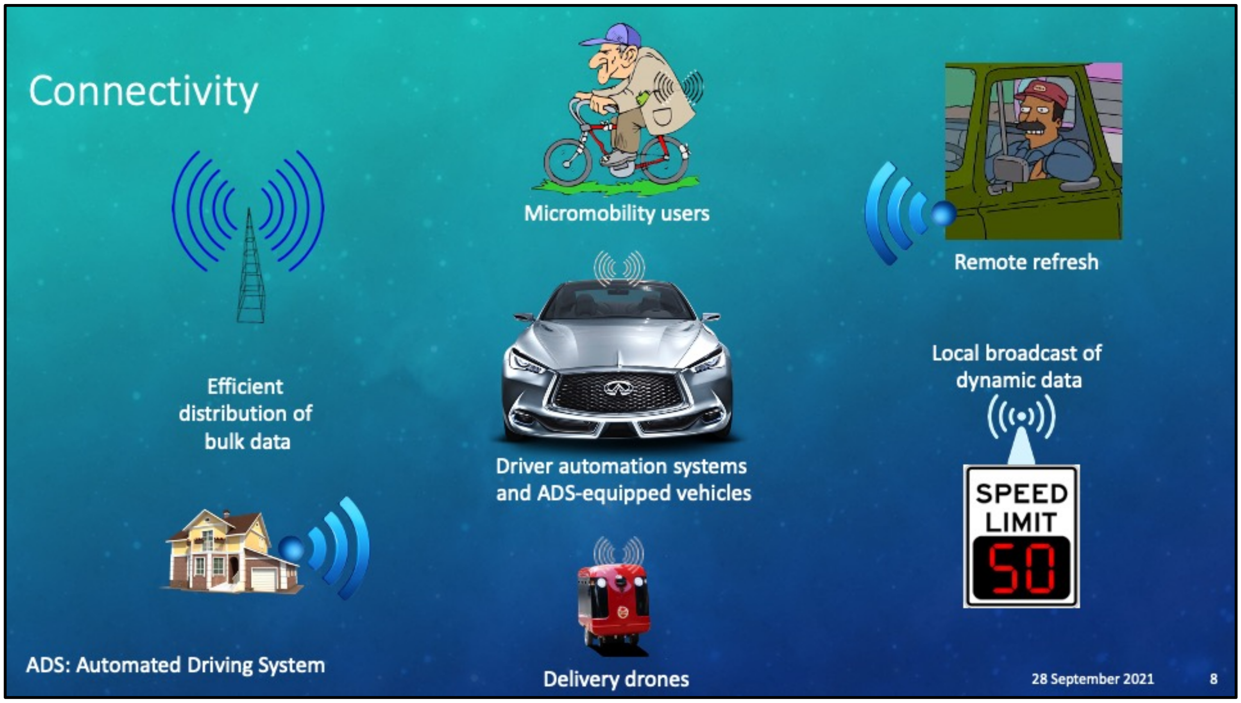


METR is intended to support all transport user systems. This includes: vehicle systems (e.g., automated driving systems and driver support systems), sidewalk delivery robots, and other devices such as smartphones used by pedestrians and perhaps units on-board micromobility devices (e.g., e-scooter interfaces)

The information provided to these users would potentially include all rules related to using the transport facilities, such as (from top and proceeding clockwise) any special rules for freight delivery or for the operation of heavy vehicles, kerbside usage rules (e.g., bus stop, taxi stand), ride sharing rules (e.g., what forms of ride sharing are allowed), micromobility rules (e.g., are e-scooters allowed in cycle lanes), VRU rules (e.g., is the sidewalk closed to pedestrians), dynamic rules (e.g., variable speed limits, lane control signals), public transport use rules (e.g., does my ticket quality me for a transfer, what are the fare zones), lane use rules (e.g., bike only, bus only, HOV-2), delivery robot rules (e.g., what is the maximum speed for a delivery robot for this sidewalk), road work rules (e.g., speed limit for the work zone). METR is intended to be flexible enough to address all of the transport rules, these are just a few examples that demonstrate the breadth of the effort.

Importantly, in order to cover all rules, the scope must include rules that can change or be imposed in a dynamic fashion. For example, temporary lane closures due to unplanned incidents and signal timing information need to be considered and handled in a trustworthy way, even when long-range communications may not be available. Thus, the full scope of METR will likely need to rely on both cloud based delivery mechanisms as well as local broadcast of exceptional data.

So let's consider connectivity a bit more



This slide provides a different overview that explicitly identifies four common ways that user systems are likely to connect to METR to obtain information about regulations and other rules.

Perhaps the most common form of access will be via the use of cellular data exchanges, such as 5G communications. However, there are potential cost implications of using this type of service. As a result, users might also wish to have an option to download data via Wi-Fi when it is available. But neither cellular nor Wi-Fi connections can guarantee full coverage. Thus, it is envisioned that METR will also need to use short-range wireless communications, especially for more dynamic rules.

Finally, we also need to consider the possibility that an ADS-equipped vehicle might be parked outside of cellular or Wi-Fi coverage for a prolonged period where its previously downloaded regulations are no longer considered valid. In this case, there will be a need for a remote refresh capability (e.g., the ability to capture the most recent regulations on an interim device and then download the regulations to the remote vehicle when the interim device is in range).

Cell tower - https://cdn.pixabay.com/photo/2012/04/12/20/39/cell-tower-

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House - https://pngimg.com/uploads/house/house_PNG74.png
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Bike -
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Infinity - https://pngimg.com/image/39948
Sidewalk Drone - https://grendz.com/wp-content/uploads/2017/07/zmp-15015021768n4kg.jpg
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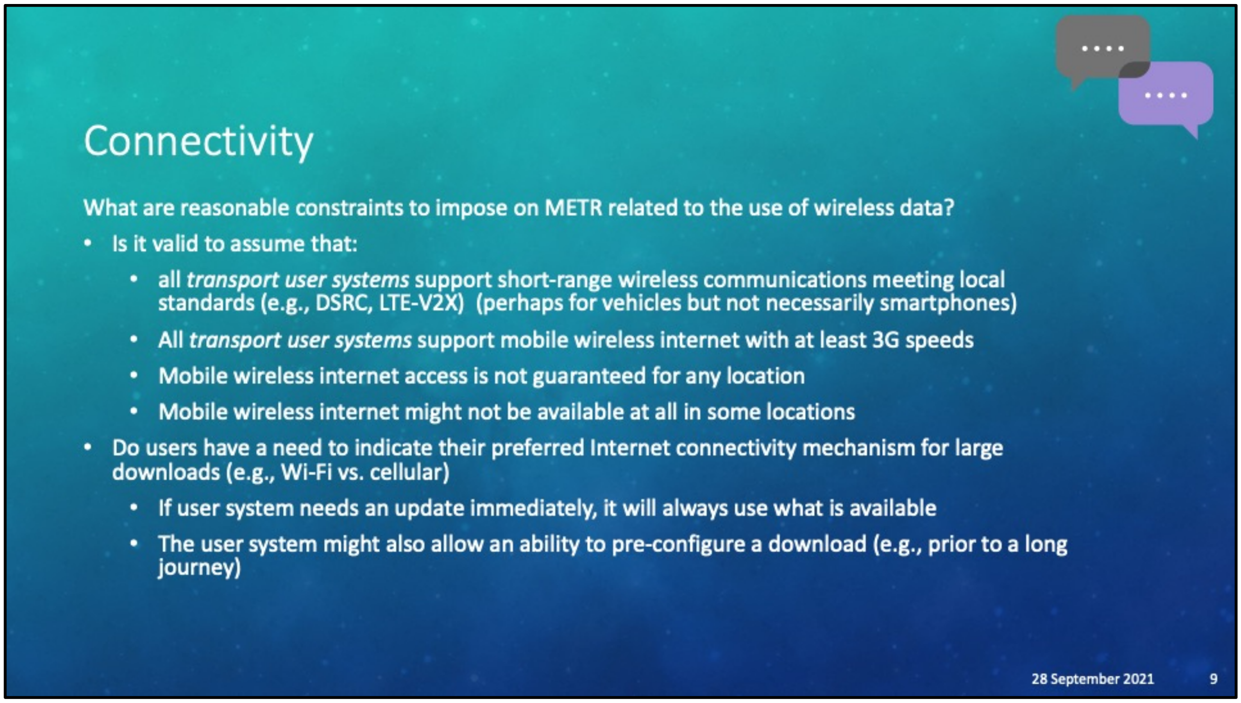
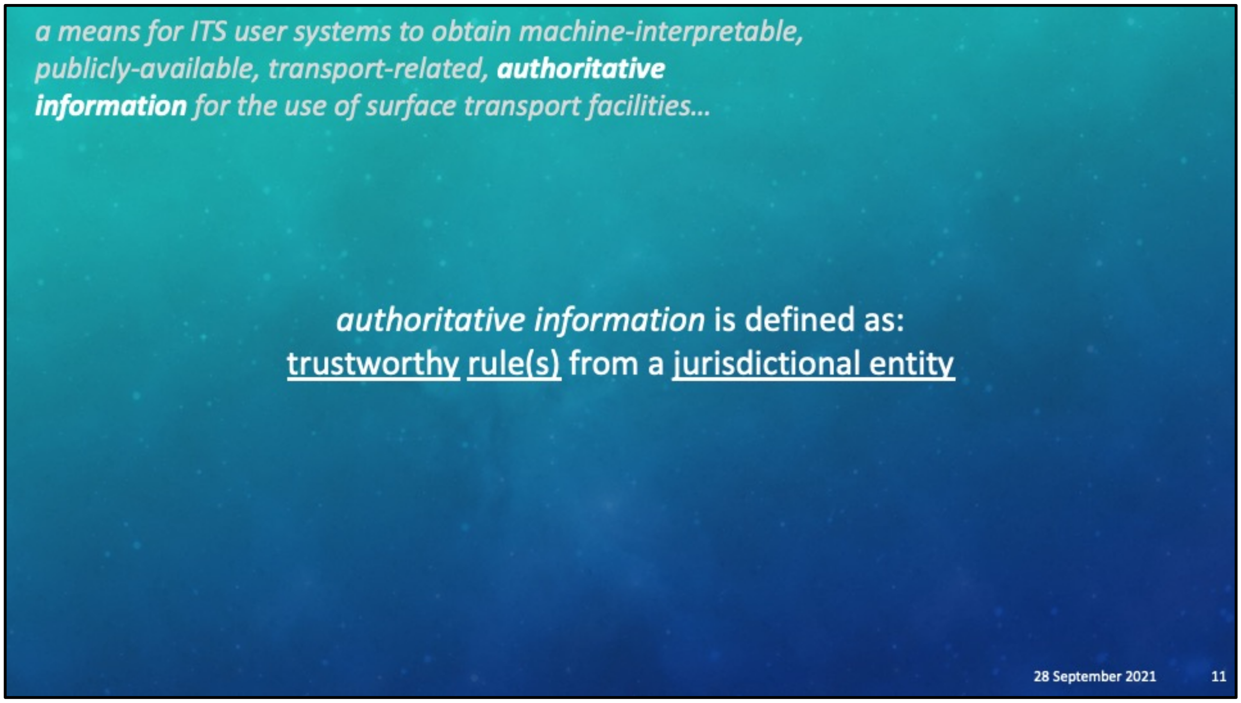


That brings us to our first set of questions for the group.

- Is it valid to assume that all transport user systems (e.g., ADS) support short-range wireless communications? It might be difficult to guarantee delivery of dynamic rules in a timely manner without this capability
- Is it valid to assume that (virtually) all transport user systems will support mobile wireless internet with at least 3G speeds? We recognize that coverage likely will not be universal, but if systems do not have this capability, it will likely place some operational constraints on how the system operates
- Is it valid to assume that mobile wireless internet is not guaranteed for any location? In other words, the system needs to support outages of the cellular network in areas that are normally covered (e.g., after a natural disaster)
- Is it valid to assume that mobile wireless internet might not be available at all in some locations? For example, in remote areas or in canyons.
- Do users need the ability to indicate their preferred internet connectivity mechanisms for large downloads? In other words, do we need to consider that cellular networks and Wi-Fi networks might have different costs, etc. such that individual users might wish to set different preferences as to when to download rules?

Draft ConOps Section 6.6.1 (Items 2-5)
6.3.2.1.1 Connectivity Preference

Our next topic is “trustworthiness” and considers a deeper look at our defined scope



The METR scope statement includes the term “authoritative information”. The definition of that term is given on this slide

METR is intended to provide a trustworthy source of regulatory information and other rules in an authoritative manner that can be used for enforcement purposes.

To be trustworthy, the information must be communicated in a secure manner, signed by a trusted source, and be 100% complete, at least for the information that is claimed to be supported. For example, for an ADS-equipped vehicle to know the current speed limit, it might have to know its vehicle classification per the vehicle code, which requires knowledge of its own vehicle characteristics as well as the what the local vehicle code considers a truck. Perhaps even more challenging, if a vehicle is to determine its permission to park in a spot reserved for people with disabilities, it must know whether it currently qualifies, which might require linkage with an electronic pass.

METR is responsible for ensuring that the vehicle is able to download all applicable rules, METR does not directly define the process to identify vehicle characteristics, but it recognizes that this is part of the complete solution.

Rules that are within the scope of METR include:

- Posted regulations, including
  - Regulations established by traffic engineers that require studies (e.g., stop signs)
  - Regulations activated as needed (e.g., evacuation orders, road closures)
- Unposted regulations: These are typically contained in the vehicle code or similar legislation (e.g., whether e-scooters are allowed in cycle lanes, seat belt laws)
- Other rules, including
  - Advisories, which might be enforceable or entirely informative
  - Guidance

The METR ConOps does not intend to

mandate the deployment of any of this information; rather these are the types of rules that METR will be designed to support and it will be up to implementations to determine the exact scope of rules that should be provided within an implementation as well as the timeline used to provide different types of information. Nonetheless, METR will likely define categories of information so that implementations can advertise what is available and users will be able to make informed decisions about how to operate within the region.

For example, if a METR disseminator claims to provide speed limit information for a location, it needs to support the capability to accurately publicize any variations that might occur to the speed limit. For example, it needs to publicize all reduced speed limits due to road work, variable speed limits, etc. Otherwise, the information that it advertises loses trustworthiness.

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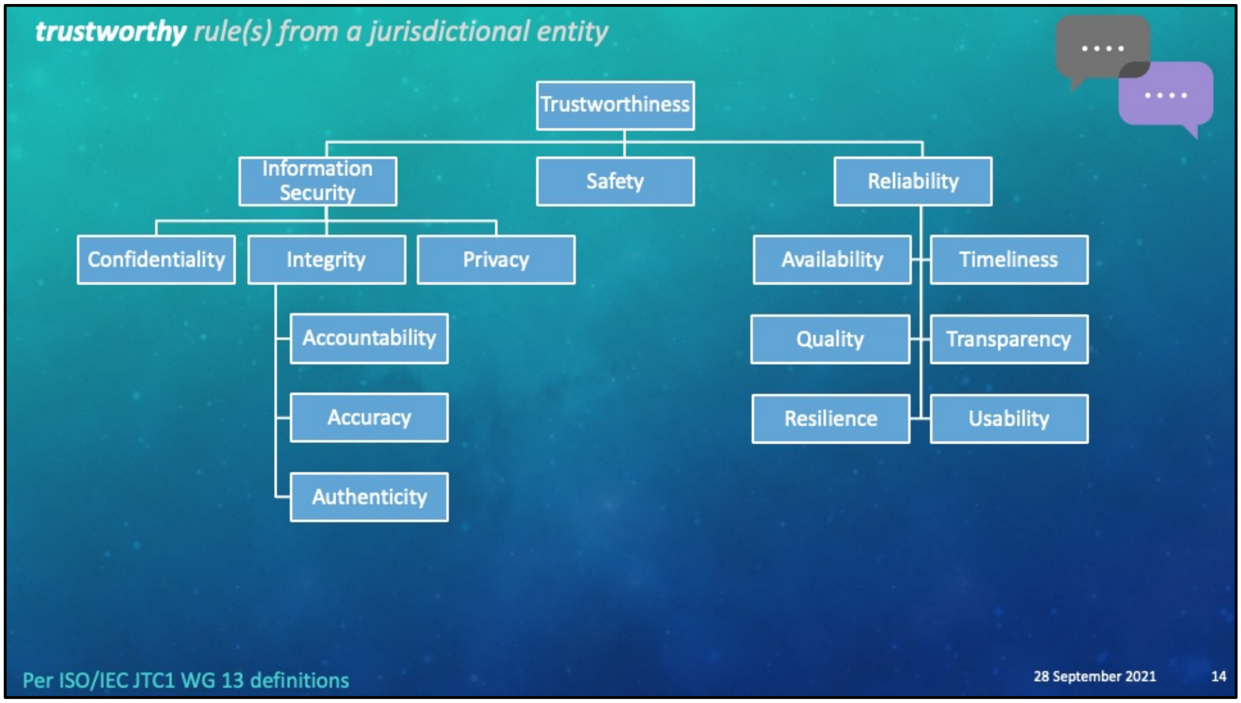
50 - https://upload.wikimedia.org/wikipedia/commons/thumb/7/7b/Mauritius_Road_Signs_-_Prohibitory_Sign_-_Speed_limit_50.svg/600px-Mauritius_Road_Signs_-_Prohibitory_Sign_-_Speed_limit_50.svg.png
Congestion Zone - https://upload.wikimedia.org/wikipedia/commons/e/e1/London_CC_12_2012_5045.JPG
Handicap - https://upload.wikimedia.org/wikipedia/commons/thumb/3/36/Handicap_parking_sign%2C_canada_2008.jpg/1200px-Handicap_parking_sign%2C_canada_2008.jpg
Work Zone 50 - https://upload.wikimedia.org/wikipedia/commons/thumb/4/4f/MUTCD_Sign_Assembly_-_R2-1_with_G20-5aP.svg/60px-MUTCD_Sign_Assembly_-_R2-1_with_G20-5aP.svg.png
Texas Driver Handbook - http://dps.texas.gov/internetforms/forms/dl-7.pdf
Snow Advisory - https://upload.wikimedia.org/wikipedia/commons/thumb/3/38/UK_traffic_sign_554.2.svg/869px-UK_traffic_sign_554.2.svg.png
Detour - https://c1.staticflickr.com/1/52/177246951_a289e12660_z.jpg?zz=1

It should also be noted that most physical locations will fall under the jurisdictions of multiple entities. For example, within the US, almost all locations are subject to national, state, and county rules and populated areas are often subject to city rules. In addition, campuses often impose their own rules. For example a corner store might have a parking space reserved for accessible parking. A large university might have its own street network with stop signs and speed limits.

In order for METR to provide trustworthy information, the user system has to be confident that it has all of the applicable rules for the current location – or be aware that it does not have all rules. Serious problems can arise if a system believes it has all rules when it does not.



That brings us to our key question of what trustworthiness measures will METR need to satisfy? Rather than attempting to define trustworthiness as a part of this project, METR relies upon the work of ISO/IEC JTC1 WG13, which is focused on trustworthiness. They have categorised trustworthiness with the following attributes; We plan to define user needs for each of these characteristics within the METR ConOps. For now, we are mainly interested in seeing if anyone believes that we should be tracking more (or less) of these characteristics. Detailed user needs will be provided in future drafts.

Confidentiality: METR should not leak information (e.g., requests, account info) to third parties
Accountability: All transactions should be subject to non-repudiation
Accurate: The data provided by METR should reflect truth at all times
Authenticity: The data received should be proven to be from the source that is claimed
Private: The data from users (e.g., request history) should not be used for other purposes
Safety: The data provided by METR should not lead to endangerment of life or property

A*vailability:* Accessible on demand

METR users should be aware of the local availability of information based on type of rule

METR users should be aware of local METR capabilities

METR users should be aware of the current, local operational status of the involved METR components

METR users should be aware of the local geographic limits of connectivity

Quality: The data provided by METR should be designed to meet known user needs

Resilient: Being able to accommodate change

METR should be able to quickly respond to changes in data (e.g., roadway moves due to earthquake)

METR should be able to quickly respond to changes in the system (e.g., METR component goes offline)

Timeliness: Delivered within time limits that meet user needs, including:

METR users need to be aware of when rules are intended to be active (e.g., hours on parking regulations)

METR users need to be aware of the validity period of downloaded rules (how often are refreshes needed)

METR users need to be informed of updates that occur prior to required refreshes

Transparency: METR data needs to be open, comprehensive, understandable

Usability: Users can achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use

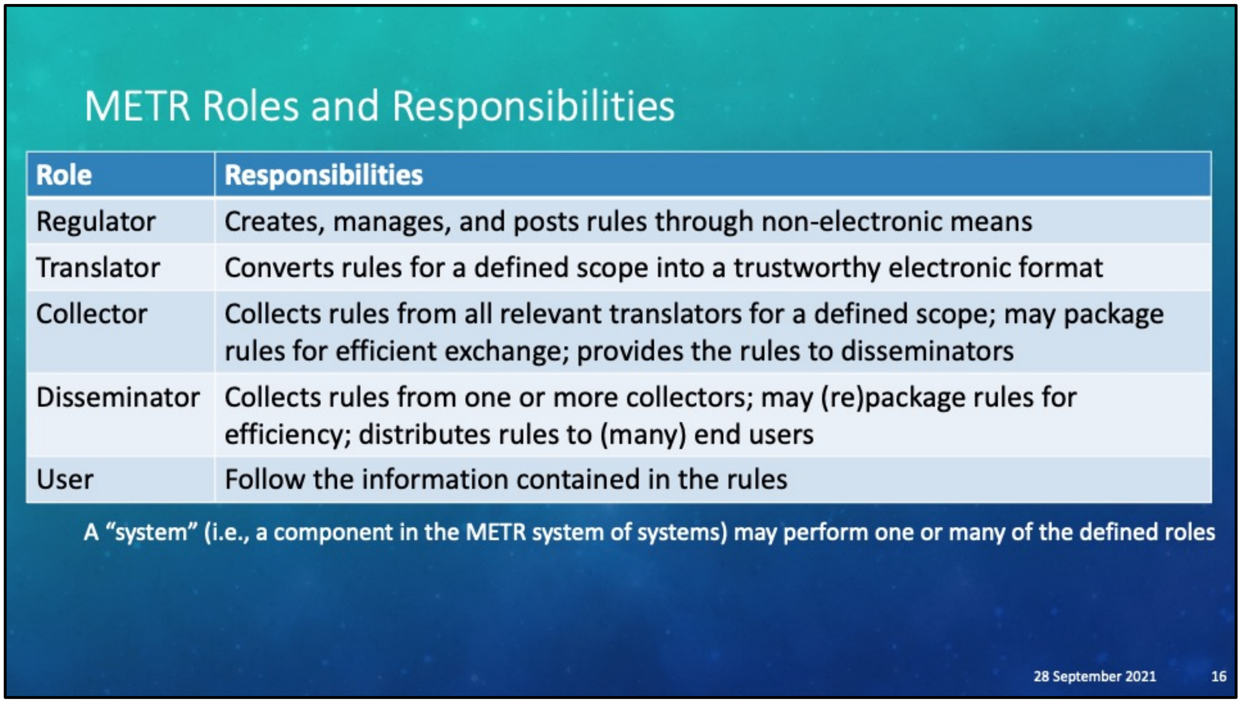
METR needs to be able to identify vehicle classifications and applicability of each rule

METR needs to be able to identify facility classifications

METR needs to be able to identify traffic control devices and correlate to meaning

ConOps 6.3.1.1

Now that we understand what data will be provided, lets look at the roles and responsibilities within the envisioned system



METR Roles and Responsibilities

Role	Responsibilities
Regulator	Creates, manages, and posts rules through non-electronic means
Translator	Converts rules for a defined scope into a trustworthy electronic format
Collector	Collects rules from all relevant translators for a defined scope; may package rules for efficient exchange; provides the rules to disseminators
Disseminator	Collects rules from one or more collectors; may (re)package rules for efficiency; distributes rules to (many) end users
User	Follow the information contained in the rules

A "system" (i.e., a component in the METR system of systems) may perform one or many of the defined roles

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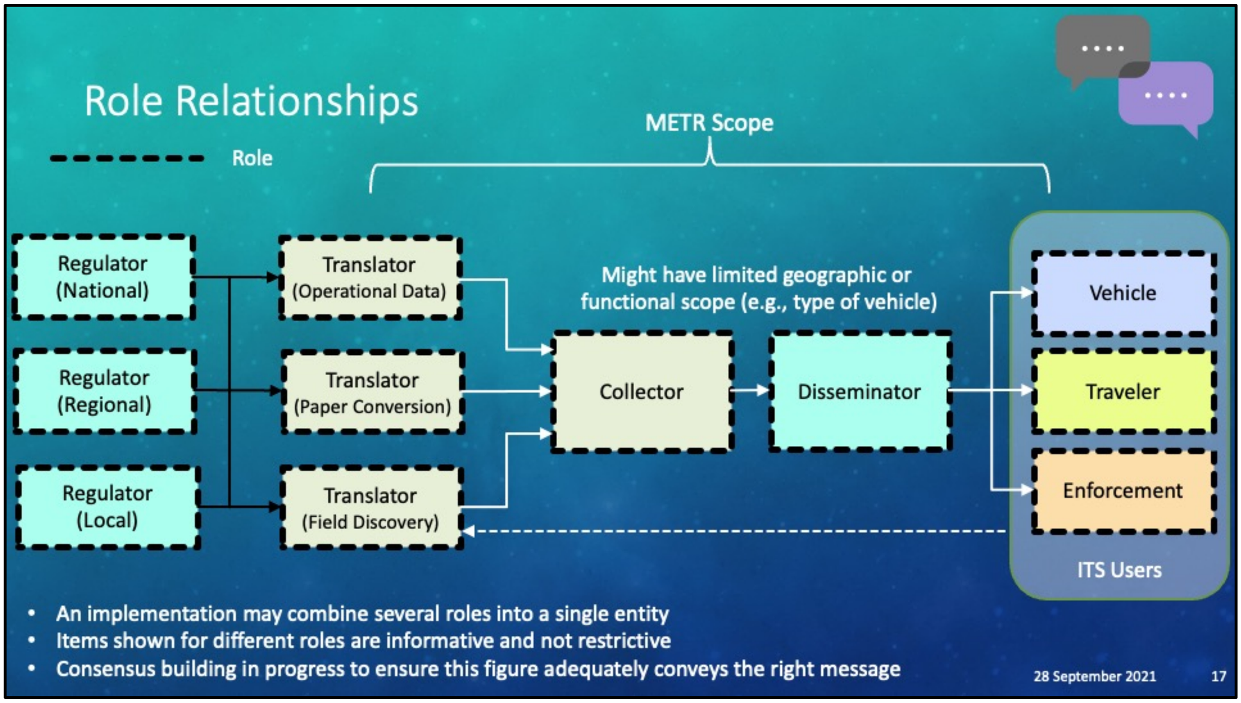
This table identifies the five major roles that we envision within the system



This image provides a little more context to the roles identified on the previous slide by showing relationships. The regulators (largely) operate outside of the METR process; they establish the rules of the road and METR provides one mechanism to publicize these rules. As mentioned before, for any location, there might be multiple jurisdictional entities – and each jurisdictional entity (e.g., city) might have several regulators (e.g., city council, road authority, police officer).

Once the rules have been established, they need to be converted into the approved electronic format; this is the job of the translator. Three major types of translators have been identified. For rules that are defined in real-time (e.g., variable speed limits, lane control signals), the translation may be included in the system where the rule is entered (e.g., the Traffic Management Centre might simultaneously electronically notify METR as it is posting a new variable speed limit for a section of road). Other rules are likely to be produced by processes that do not directly provide an electronic feed. In this case, a translator will be required to perform a manual translation of the (e.g., paper) rule into electronic format. Finally, in order to minimize the amount of manual translation, some systems might allow for systems to discover posted rules in the field and to provide that information back to a translator. This mode might be especially useful during initial population of the METR database.

Once the data exists (somewhere) in electronic form, the collector role is responsible for gathering all of the information for the particular use cases that it claims to support. For example, a collector might have a limited geographic scope and/or set of user systems that it supports.

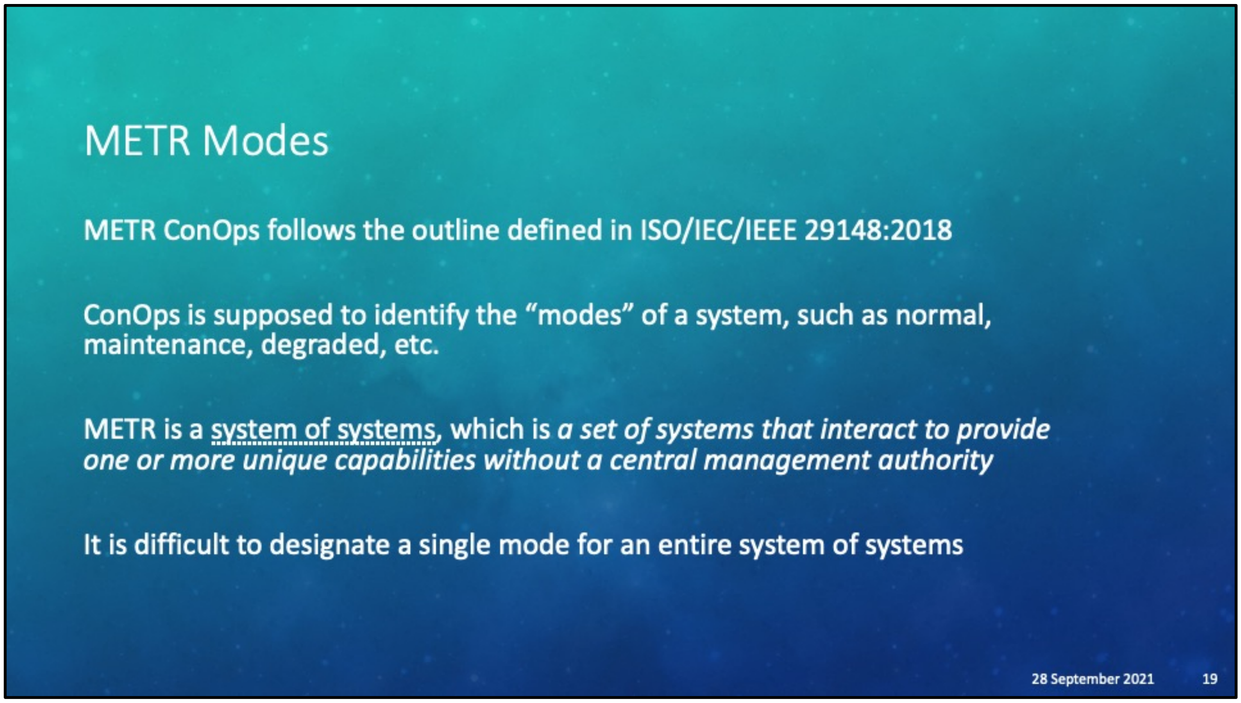
The disseminator is responsible for collecting data from a collector and disseminating it to the user systems. Once again, a disseminator might have limited geographic scope and/or user types.

Finally user systems are responsible for connecting to disseminators and obtaining rules per their agreement

It is important to note that these are just roles; specific implementations might group several roles into one system.

Are there any questions or concerns about this proposed structure?

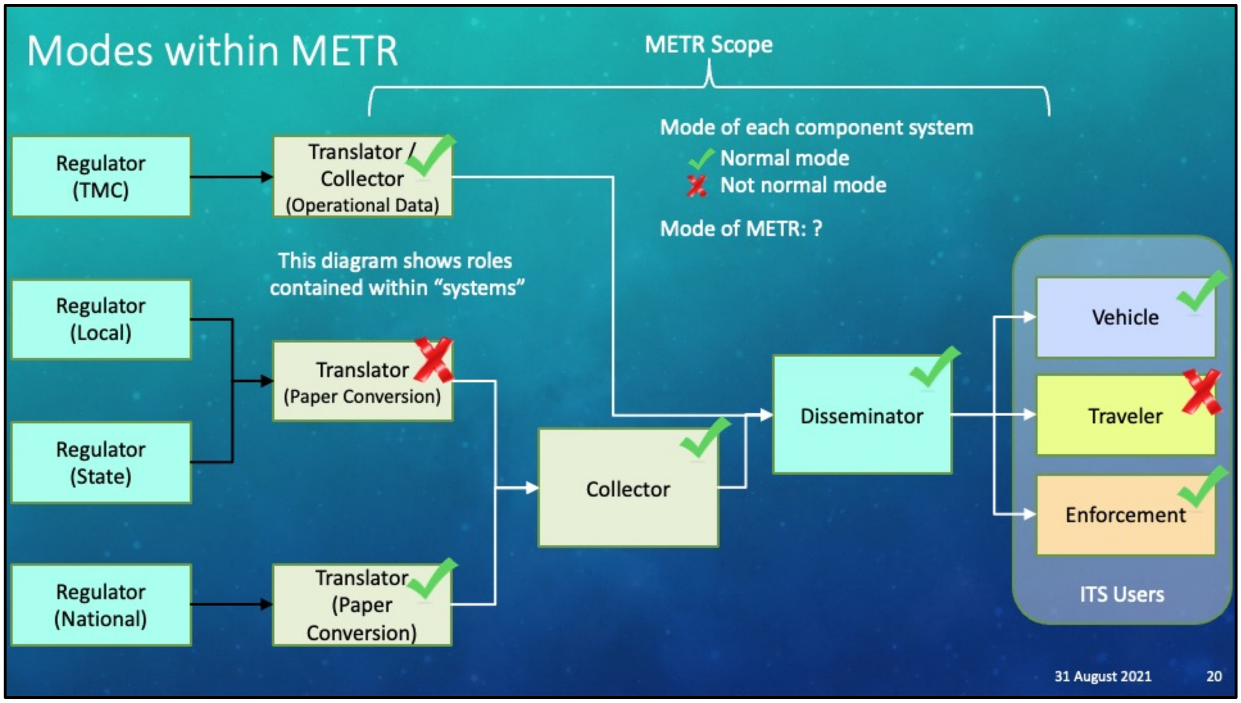
Now that we understand how the system is envisioned to work, let's consider the system modes.



The METR ConOps plans to follow the outline for an operational concept as defined in ISO/IEC/IEEE 29148:2018. A standard part of this outline is the definition of the operating modes of a system.

However, METR is a system of systems; in other words, it is a set of systems that interact to provide one or more unique capabilities without a central management authority.

It is very difficult to designate a single mode for such complex systems. For example, what is the current mode of the cellular network? At any point in time, there are likely users who are disconnected either because they are out of range or have their phones turned off, but this does not mean the system is in a particular mode. Likewise, individual cell towers might be experiencing problems, but that does not mean the system is "degraded" – if it did, the system would almost always be in a degraded mode because there is almost always a problem somewhere in such a large, complex system.

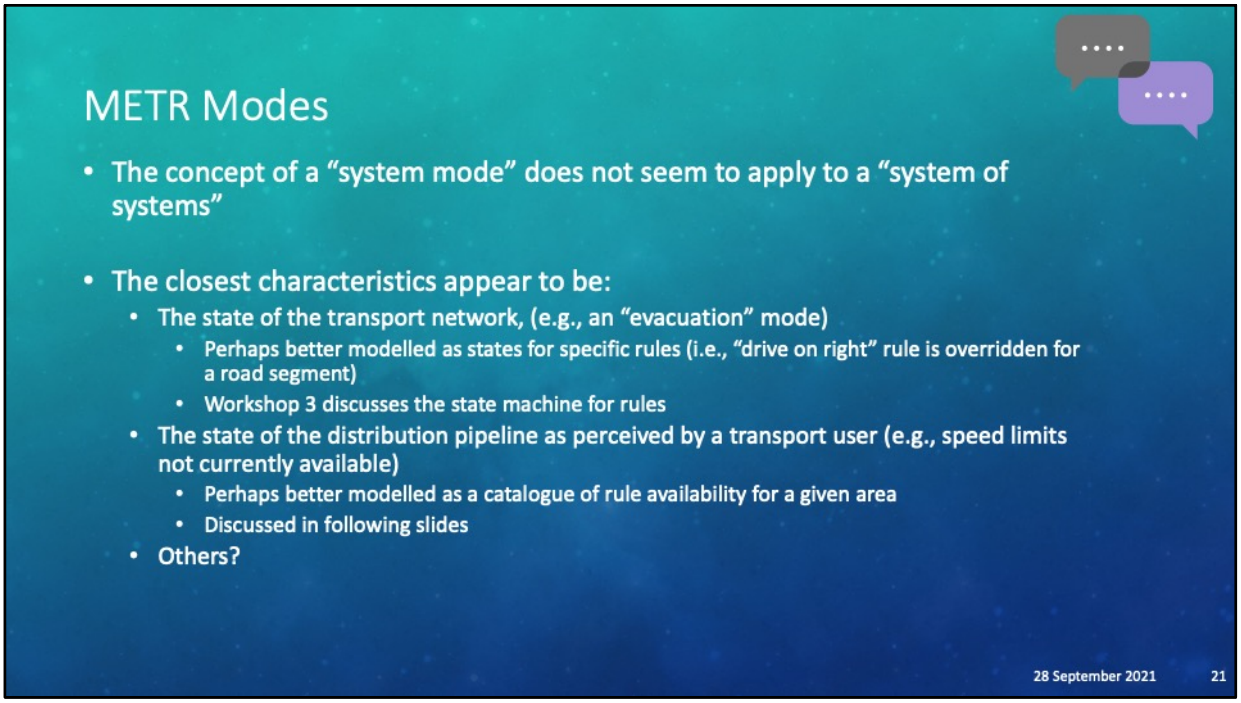


The same holds true for METR for any given location.

The given location is subject to national, state and local regulations. In addition, the local TMC implements variable rules based on current conditions. The disseminator relies upon one collector that is responsible for all static rules and a separate connection to the local TMC to collect dynamic rules.

During early stages of deployment it might be that the translators have not yet implemented trustworthy local and state regulations, but the disseminator is able to access national regulations and real-time dynamic regulations from the TMC. Likewise, at any point in time, some users might be operational while others are not.

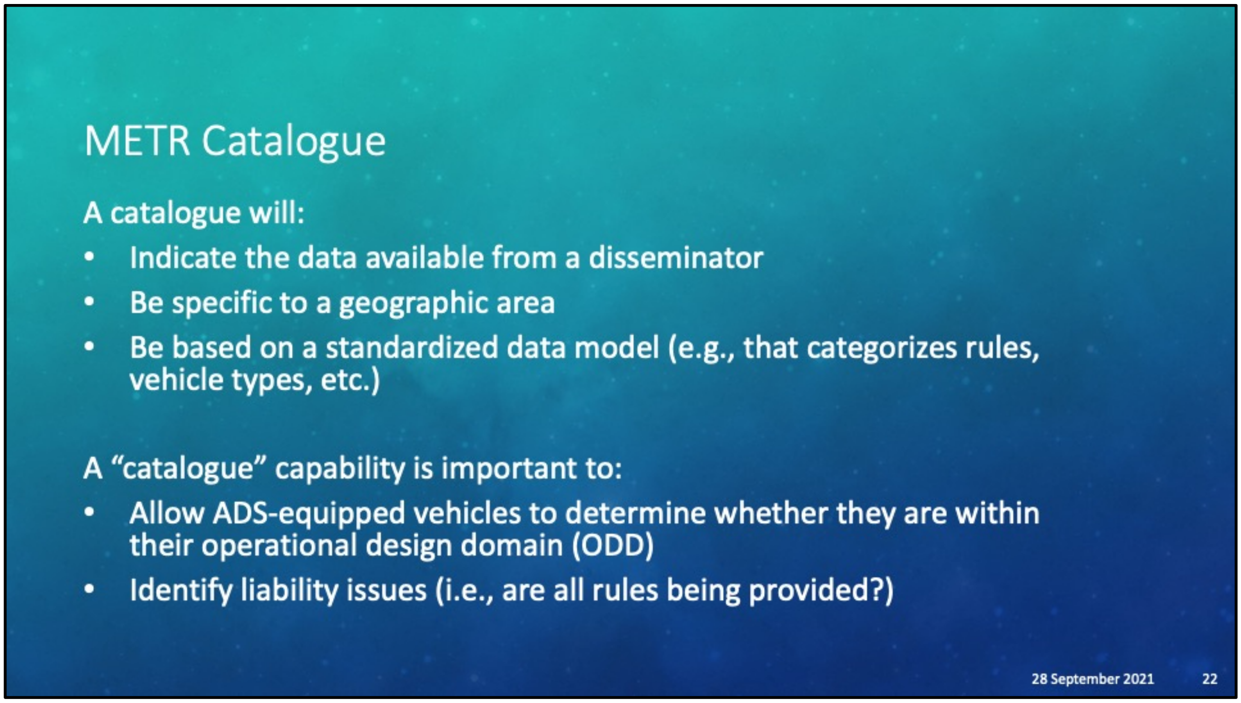
How can one define an operational mode for the entire system?



We conclude that the concept of a "mode" does not really apply to a system of systems and that the outline defined in ISO/IEC/IEEE 29148 should be used as guidance rather than a rigid structure. But in recognition of that guidance, we should consider what issues related to mode should be considered.

We have identified two characteristics that we believe should be addressed within the ConOps. One is to consider that the state of the rules within the transport network will change over time. For example, during an evacuation, vehicles might be allowed to drive on the opposite side of the road and disregard signs and markings that normally inform drivers that they are travelling in the wrong direction. However, this is not really a "system mode" as much as it is a "state" (e.g., overridden) for specific "rules". We will discuss issues related to rule states as a part of Workshop 3.

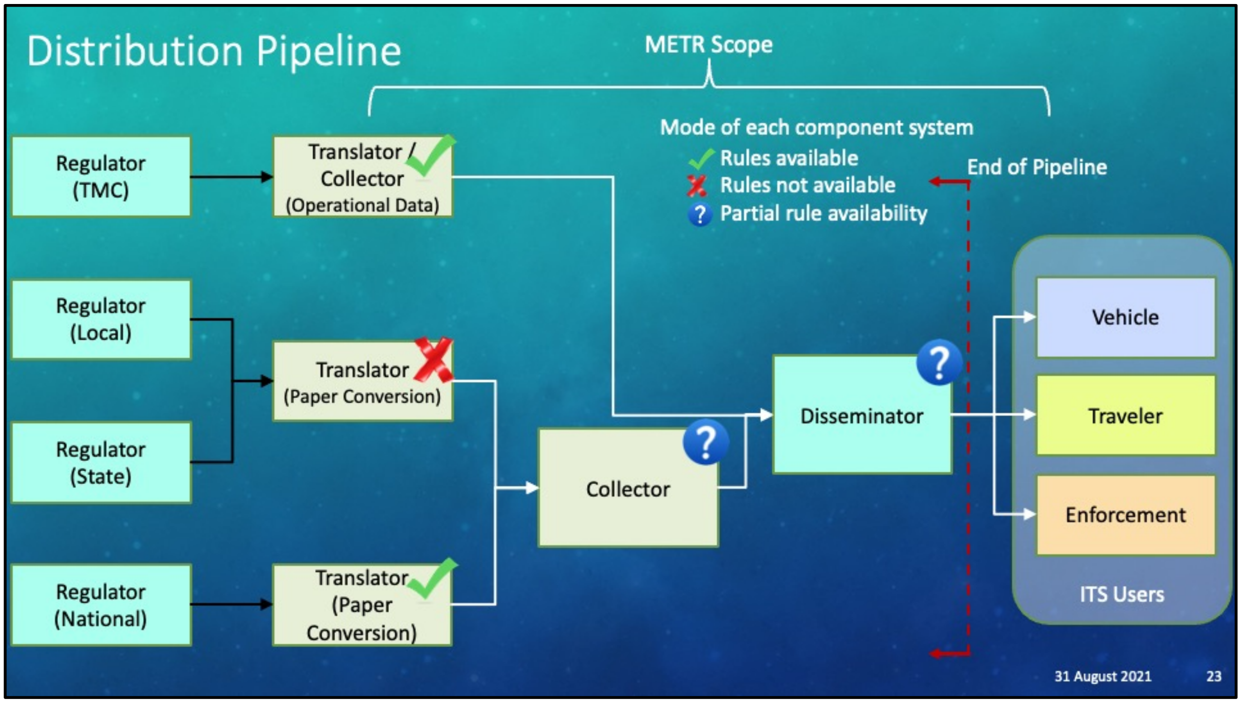
The other key characteristic is the state of the distribution pipeline as perceived by a user (i.e., from a working user system such as an ADS). For example, speed limits for one jurisdiction might not be currently available. Once again, this is not really so much of a "system mode" of METR as a whole, instead, we are proposing that we treat this issue as part of a catalogue of rules supported by the system. We will discuss this on the following slides.



We propose the definition of a METR catalogue to define:
- The information that is claimed to be available from a disseminator
- In a specific geographic area
- Based on a standardized set of terminology

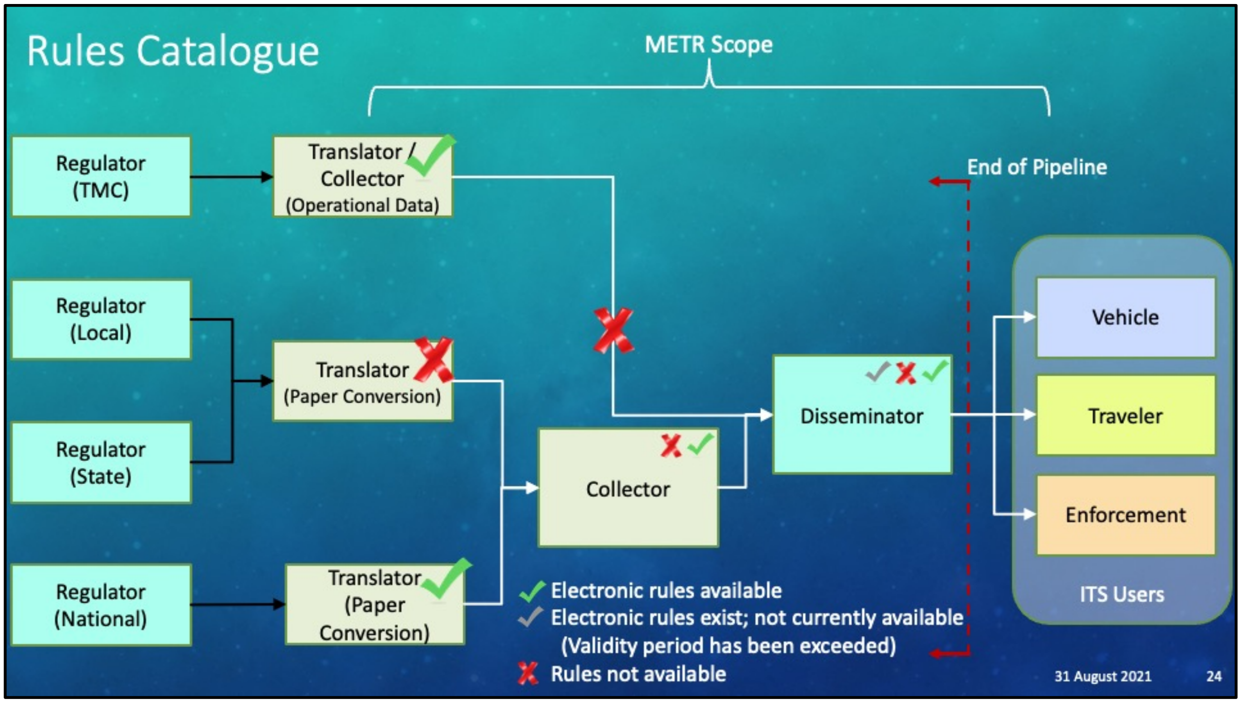
We propose that this information is needed by users (especially ADS-equipped vehicles) to properly understand the trustworthiness of information being received and to determine if ODD requirements are being met. It also seems to be needed so that proper liability can be assigned. For example, if some speed limit data might be missing, the system needs to inform the user so that the user knows not to rely solely on the information received from METR.

Are there any concerns about this approach?



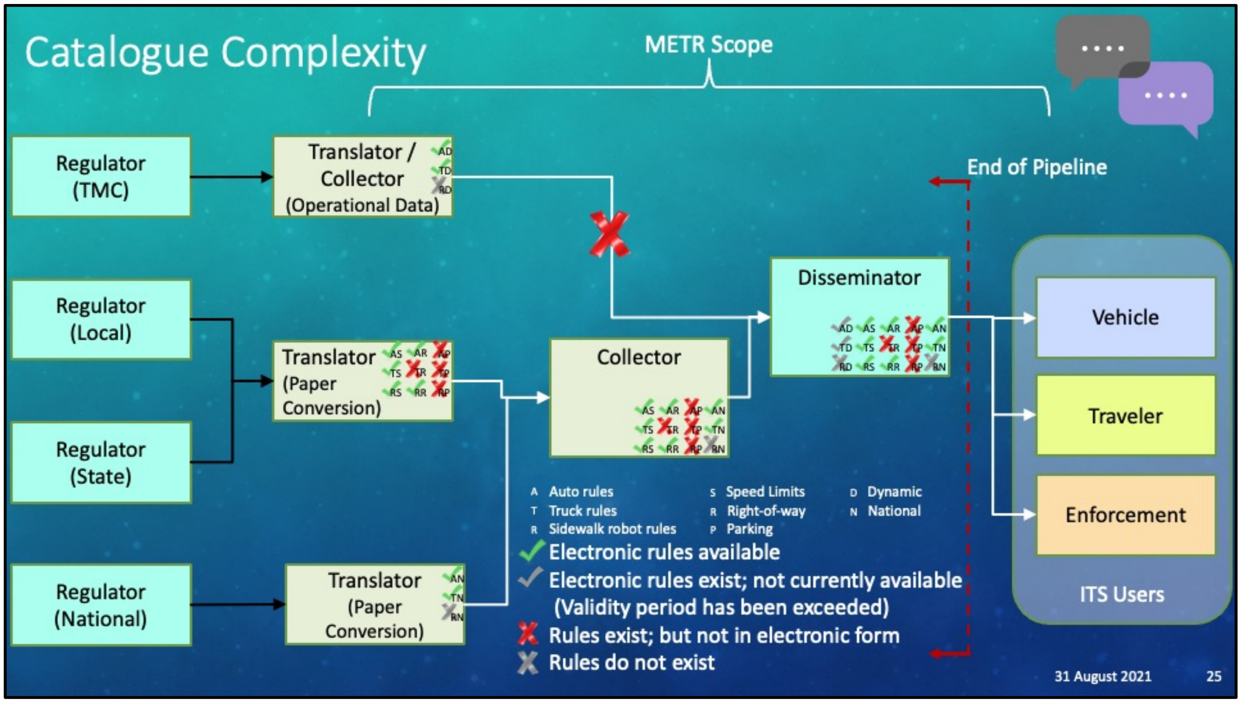
Let's consider our previous example system, but this time we will consider the information available at the end of the METR pipeline.

How do the collector and disseminator report their status?



By using a catalogue the systems are able to reflect the status of all inputs, available or otherwise. Even when a component system is operating, there may be problems with communications. As such, a disseminator needs to be able to indicate to its users:

1. The rules it proclaims that it does not publicize
2. The rules it claims to be able to publicize
3. Whether the rules that it claims to publicize are currently available

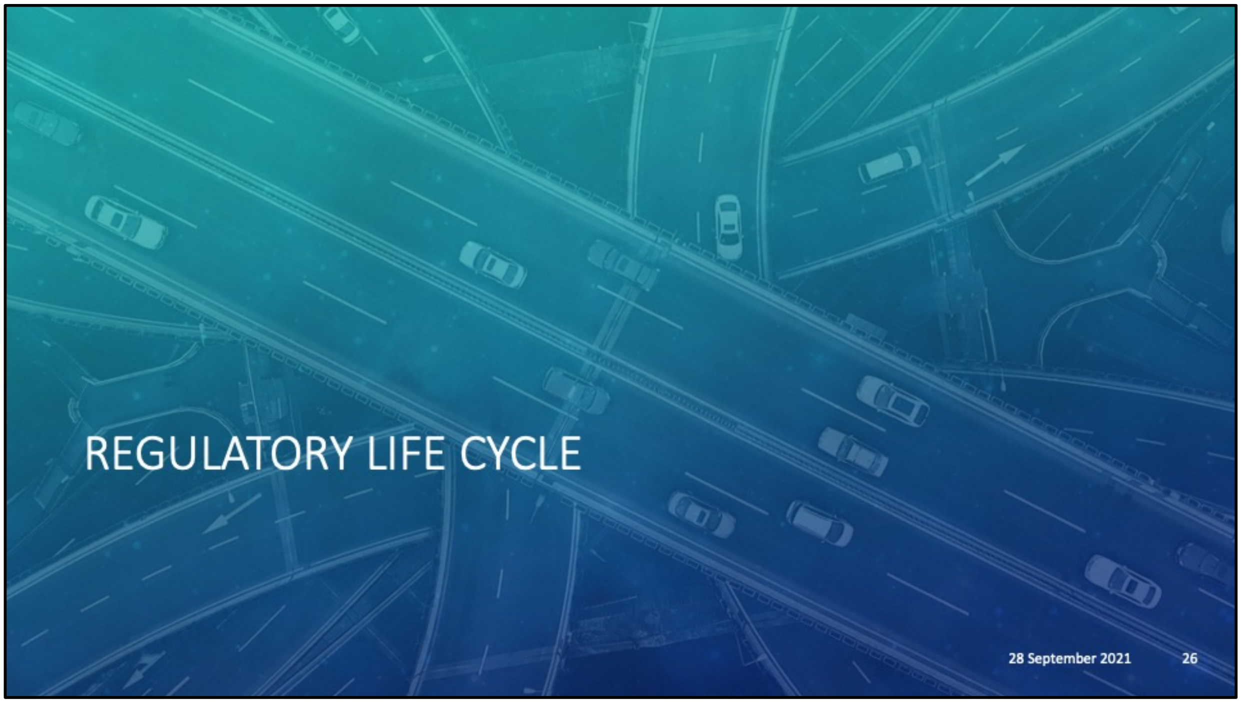


The catalogue is likely to become very complex. For the various systems to interoperate, there needs to be an understanding of what items can exist in a catalogue. In the example above, we see that the rules are grouped into a matrix of categories where one dimension of the matrix indicates the type of vehicle (e.g., automobile, truck, or sidewalk robot) and the other dimension indicates the type of rule (e.g., speed limit, right of way (such as Stop), parking, dynamic (such as variable speed limit), and national)

The grouping of rules shown here are just for example, but eventually METR will likely need to standardize the categories to be used.

Any comments, questions, or concerns on this approach?

ConOps Section 6.3.1.1.4.1.3 Discover Rule Availability



Our final topic today is the overall regulatory lifecycle.

In general, we assume that all METR rules will follow the same basic process

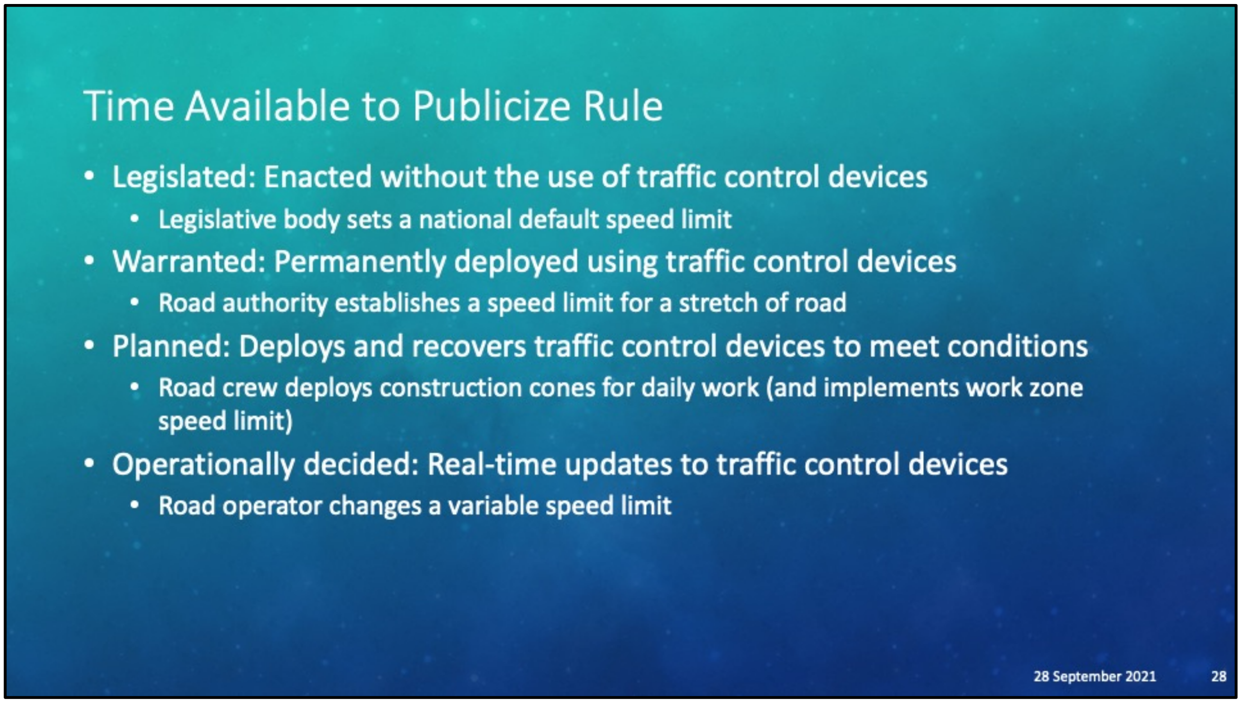
- A rule is proposed and approved
- The rule is entered into the METR system
- METR publicizes the rule
- The rule take effect but is only enforced with a warning
- The rule becomes enforceable

The duration of each step will often vary for different rules; but each phase can conceptually exist, even if for a zero duration.

For example, when legislatures pass laws, they often do not go into force for months; by comparison variable speed limits go into effect as soon as they are posted.

The key is that **all** METR users need to be informed of applicable rules before they go into effect (i.e., before the warning period begins) and they cannot be informed prior to the data being electronically entered into METR.

The amount of time spent in the publicize stage of this process has huge implications on the design of METR.



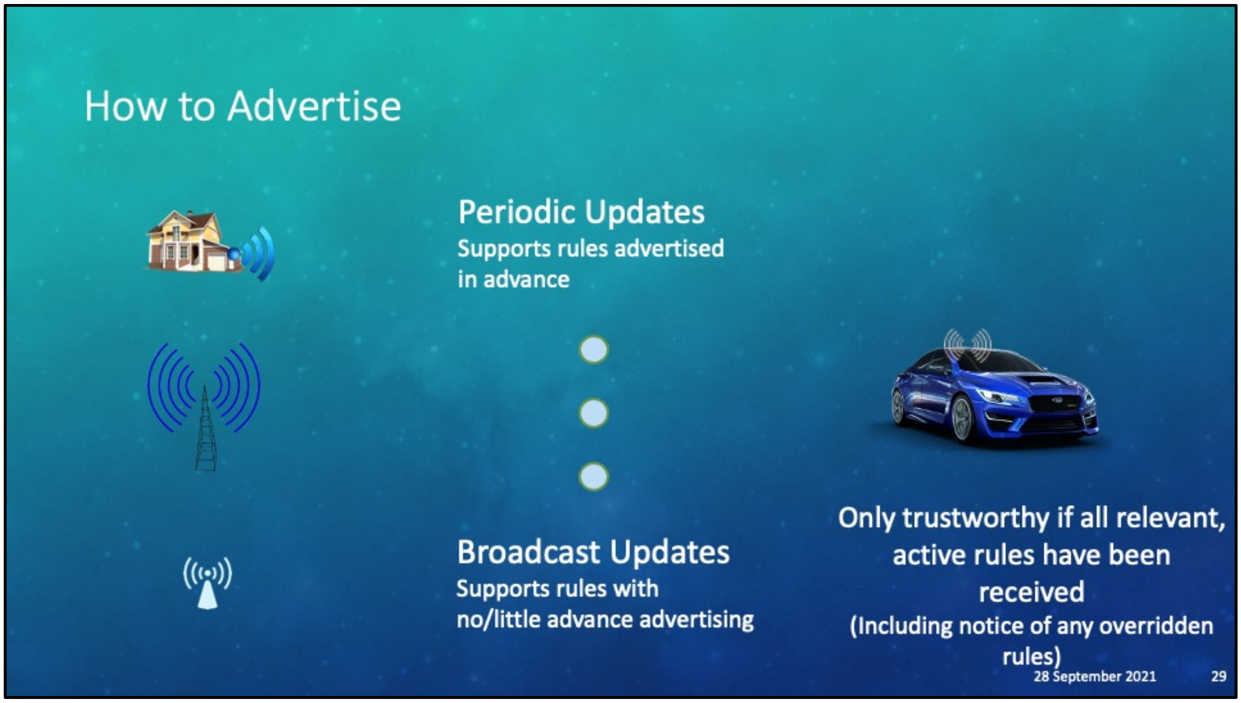
The amount of time available for to publicize rules is somewhat dependent upon the type of data; we identify four types on this slide.

For example, legislated rules are often enacted months before they are enforced (at a defined date and time) and have traditionally been publicized through media outlets. The METR system should have ample time to implement these electronically with a notice of when the rules will go into effect.

Warranted rules are implemented based on studies that document that conditions have been met to "warrant" the imposition of a traffic control device. The deployment of a traffic control device requires scheduling and field crews to install; which provides a window of opportunity for the rule to be translated into METR and for the network to propagate the information. However, these rules typically go into effect once the traffic control device (e.g., stop sign) is installed. The METR system will need to coordinate the timing of the METR rule with the installation of the traffic control device.

Planned rules that are temporary in nature, but are known in advance. For example, road works are often associated with lower speed limits, but these might be approved well in advance and thereby offer plenty of time for user systems to be notified prior to the rules going into effect. Alternatively, planned rules are sometimes more dynamic, such as a reduced speed limit “when workers are present”. These rules would likely need to be associated with broadcast/pushed information that informs users of the current state of the rule.

Operationally decided rules are those rules that are decided and implemented in real (ish) time. In cases, operationally decided rules are natively electronic and control previously installed traffic control devices (e.g., a traffic management centre changing a variable speed limit). In other cases, the rule might be imposed in the field by authorized personnel (e.g., directing traffic onto an emergency shoulder to bypass a collision by using cones, officer directing traffic at an intersection). In both cases, transport user systems (e.g., driver support systems, ADS) must be able to understand the rules that are currently in force (or at least be able to safely transition to a fallback mode where the human operator understands the limited support being provided). This will likely require the use of broadcast/push notifications to users since the publicize window is so narrow.



The differences in the type of data will likely result in a METR system that relies on different communication technologies. When a user system enters a new area it will need to be aware of all applicable rules. When crossing major boundaries, this likely includes information about vehicle classifications and other codes; which might require considerable tie to download. However, most of this information is highly static. Rather than waiting until the user approaches a boundary, the system can download this “static data” well in advance and only worry about periodic updates and updates as it approaches a boundary.

By comparison, real-time operational data (e.g., variable speed limits, states of traffic signals) change frequently enough that accessing this data days, or even hours in advance is pointless. This “dynamic data” must be updated in real-time as the vehicle approaches the applicable road section. And rather than endless polls, it probably makes sense to achieve this through a broadcast.

Since almost all static data can be overridden in the field with dynamic data (e.g., detours), it is critical that METR has a solution to provide end user systems with a complete picture (or at least clearly defines the boundaries of what it is able to achieve)

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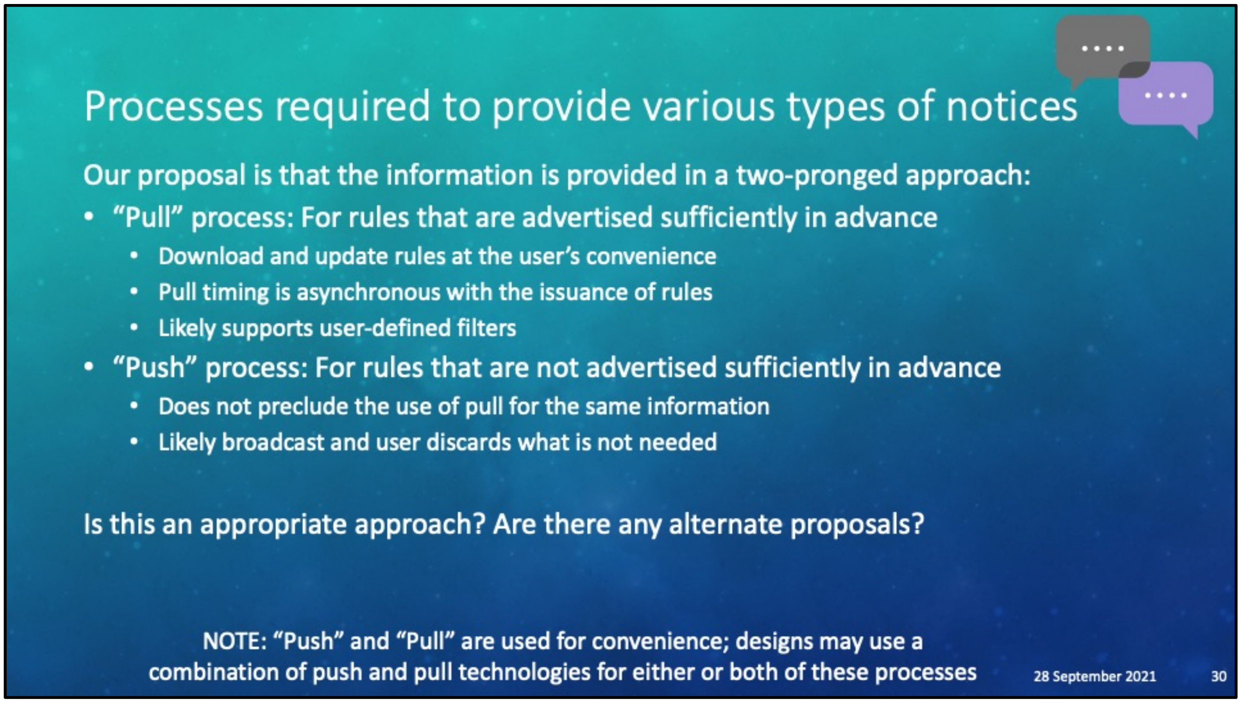
Cone radio - https://cdn.pixabay.com/photo/2012/04/15/19/13/tower-34981_960_720.png
WiFi - https://svgsilh.com/svg_v2/310568.svg
Radio Waves - https://cdn.pixabay.com/photo/2014/03/25/16/27/radio-297183_960_720.png
Car - http://www.pngall.com/wp-content/uploads/2016/03/Subaru-Free-PNG-Image.png



The result is that we are proposing a two-pronged approach for providing METR information:

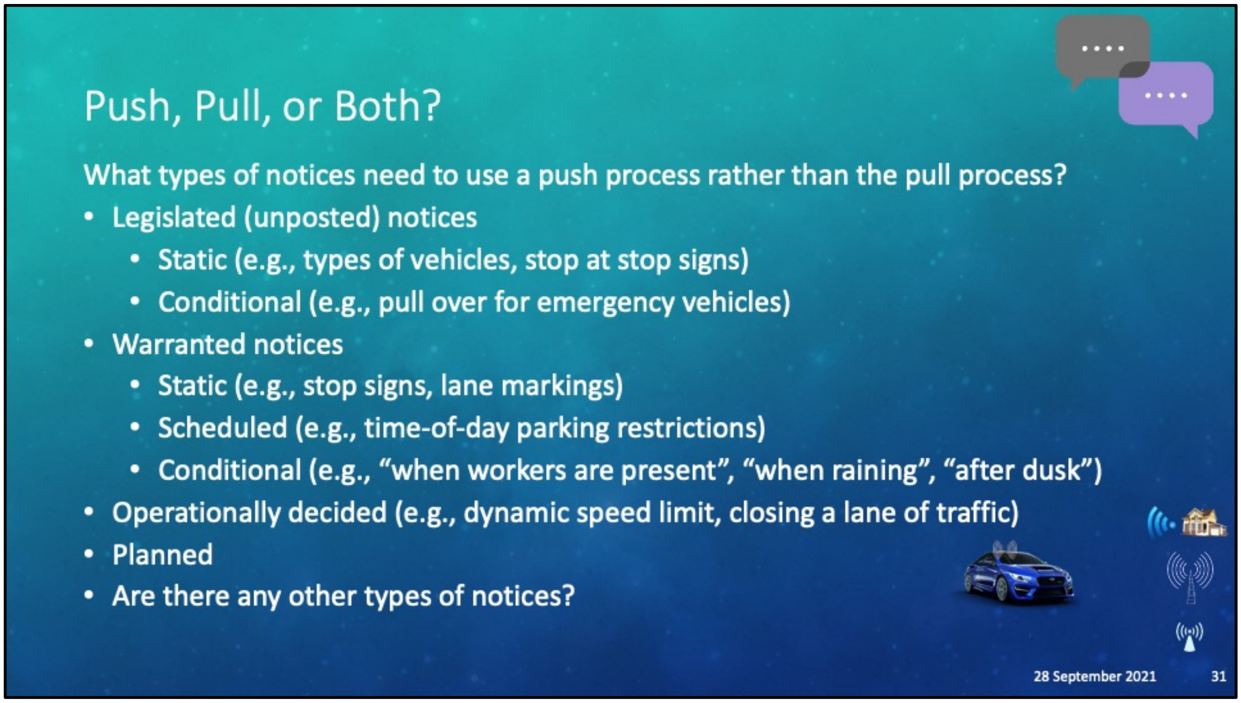
- A "pull" process that will provide users with rules that are known sufficiently in advance such that they can be downloaded at the user's convenience. User's will likely be able to request only the download of those rules that meet its interests
- A "push" process that cannot be publicized sufficiently in advance. Any rule that is entered into METR and is expected to go into effect prior to the end of the user-agreed download window for the "pull" process, will have to be pushed. Pushed messages might be sent to all users and force recipients to discard unnecessary information.

For example, the allowed window to update rules might be one week. A vehicle system might attempt to update its rules every time that the vehicle is started (or once it enters a coverage area). If a vehicle is started in an area without internet connectivity and its rules are older than the agreed one-week window; it will need to be updated prior to providing trustworthy support (i.e., either a remote update or (mostly) unsupported, manual driving until internet coverage is available).

- Any concerns, questions or comments?

NOTE: The ConOps does not attempt to dictate “broadcast”, “push”, “pull”, or other technical mechanisms; the terms are used here in an informal way to provide a vision of what will likely be defined in later documents and to describe the overall vision to the users.

ConOps 6.3.1.1.4.5. 1-4
Obtain pull frequency
Obtain pull data
Obtain push data
Obtain active times for each rule



If we agree on the two-pronged approach, are their opinions on how different rules should be handled? For example, basic static rules and dynamic rules fit clearly into the the two defined categories. But how should the following be handled:

- Legislated conditional rules (e.g., pull over for vehicles), perhaps this suggests a need to define a rule that can be associated with the real-time availability of cooperative ITS data provided by other standards
- The coordination of METR with the installation of new traffic control devices
- The coupling of METR rules and external information (e.g., time of day, weather, workers/children present)
- Operationally decided rules that are implemented in the field without electronic beacons

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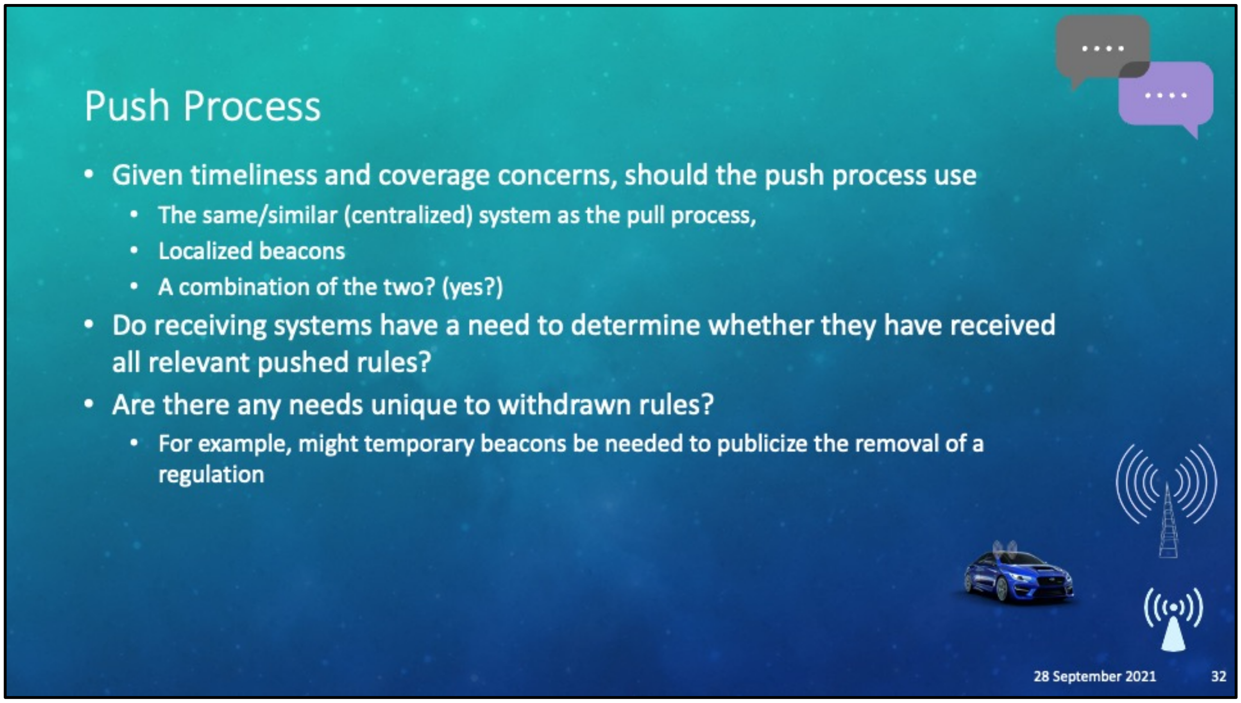
WiFi - https://svgsilh.com/svg_v2/310568.svg

Radio Waves - https://cdn.pixabay.com/photo/2014/03/25/16/27/radio-297183_960_720.png
Car - http://www.pngall.com/wp-content/uploads/2016/03/Subaru-Free-PNG-Image.png



Does the ConOps need to constrain the design of the communication network? For example, do we believe that the cellular coverage is adequate to handle all dynamic rules; conversely are short range solutions adequate to handle the data transfer required for static rules. Is it appropriate for the ConOps to explain the likely need for both technologies.

Do receiving systems need positive verification that all rules have been received, to what extent?

What happens when rules are withdrawn? Are there any unique needs?

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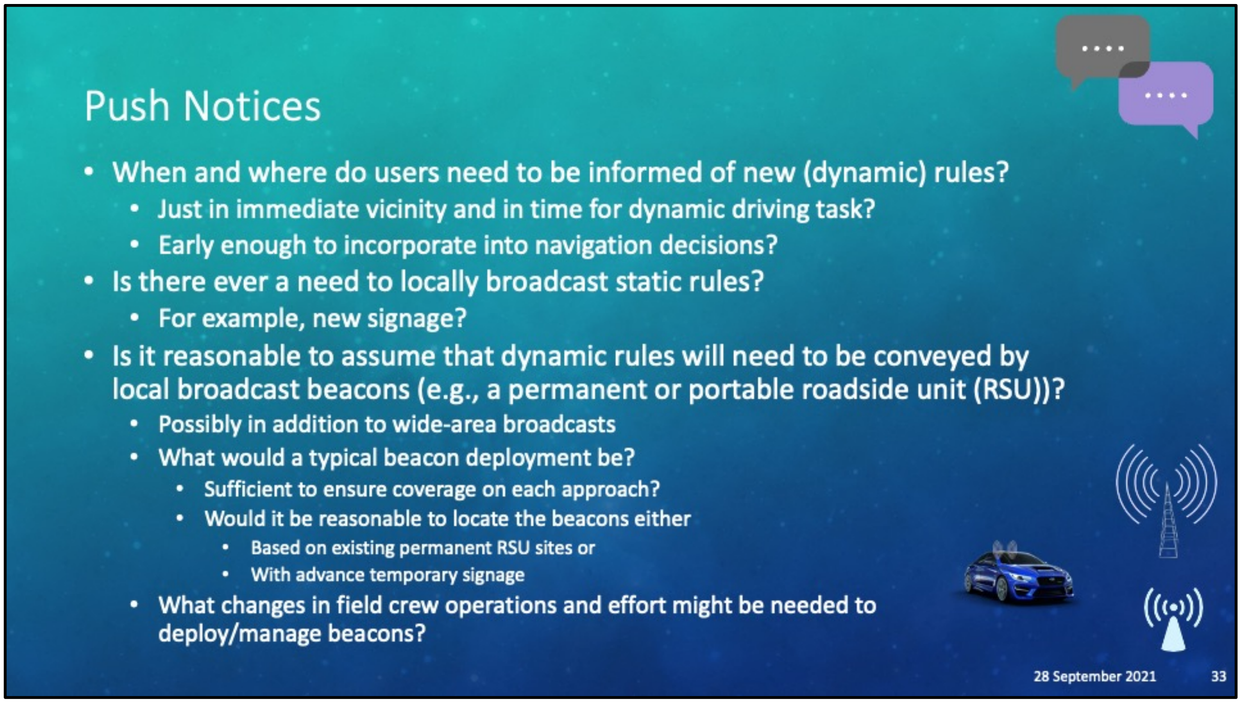
6.3.1.1.4.4 Ensure system is resilient



See slide text

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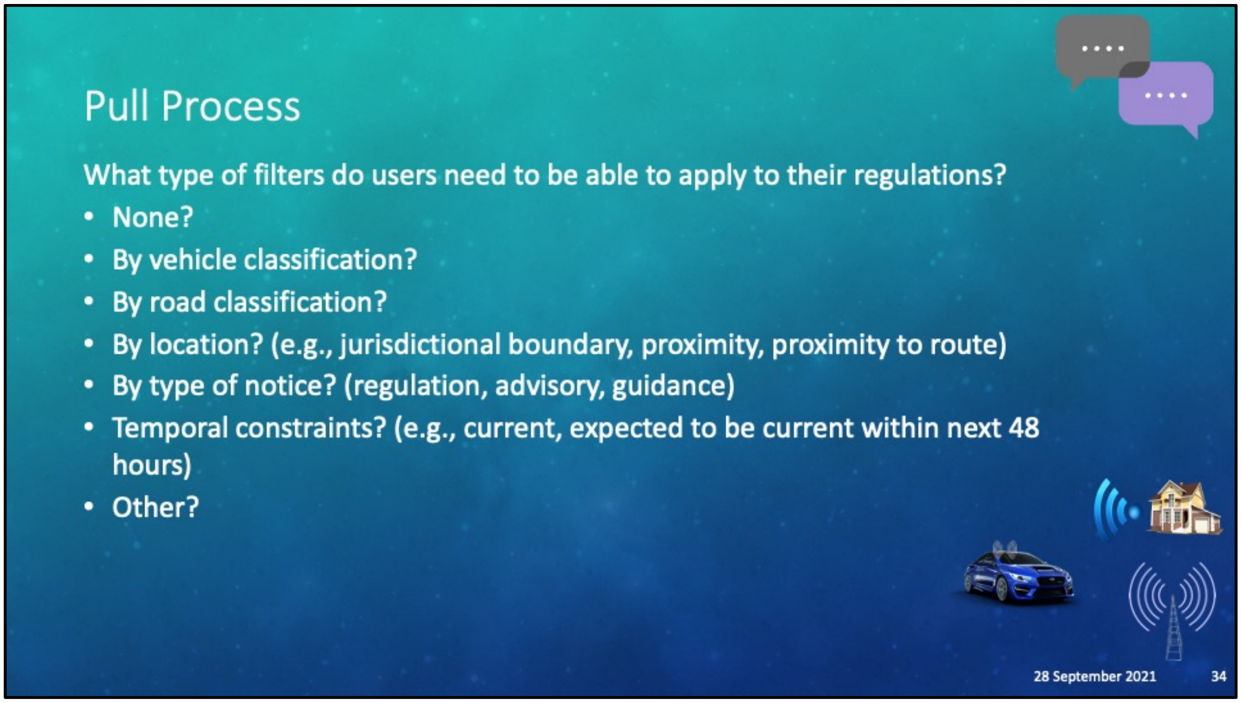
Radio Waves - https://cdn.pixabay.com/photo/2014/03/25/16/27/radio-297183_960_720.png
Car - http://www.pngall.com/wp-content/uploads/2016/03/Subaru-Free-PNG-Image.png



Other types might include:

- User type (e.g., vehicle classification might be passenger car; user type might be police)
- Exceptional exemptions (e.g., military)
- Nature of load (e.g., hazardous materials)
- Possession of a permit (e.g., parking decal)
- Type of drivers license
- Etc
- Etc

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Cell tower - https://cdn.pixabay.com/photo/2012/04/12/20/39/cell-tower-30565_640.png
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A final issue for discussion is to plan ahead for future versions of METR. Are there any other concerns besides those listed on this slide for planning ahead?

Different authorities use different terms and one of our challenges will be to develop a way that we can properly capture these terms and how they are defined in an interoperable maner.

ConOps 7.3


NEXT STEPS
28 September 2021
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Workshop Schedule

Date	Topic
28 September	METR operations
5 October	METR operational structure
12 October	Electronic regulation life cycle
19 October	Electronic regulation conflicts
26 October	Vehicle operations
2 November	Vehicle information needs
9 November	Campus governance
16 November	Campus regulations
23 November	Roadwork and emergency operations
30 November	Multimodal and micromobility operations
7 December	Local engagement
14 December	Legal issues

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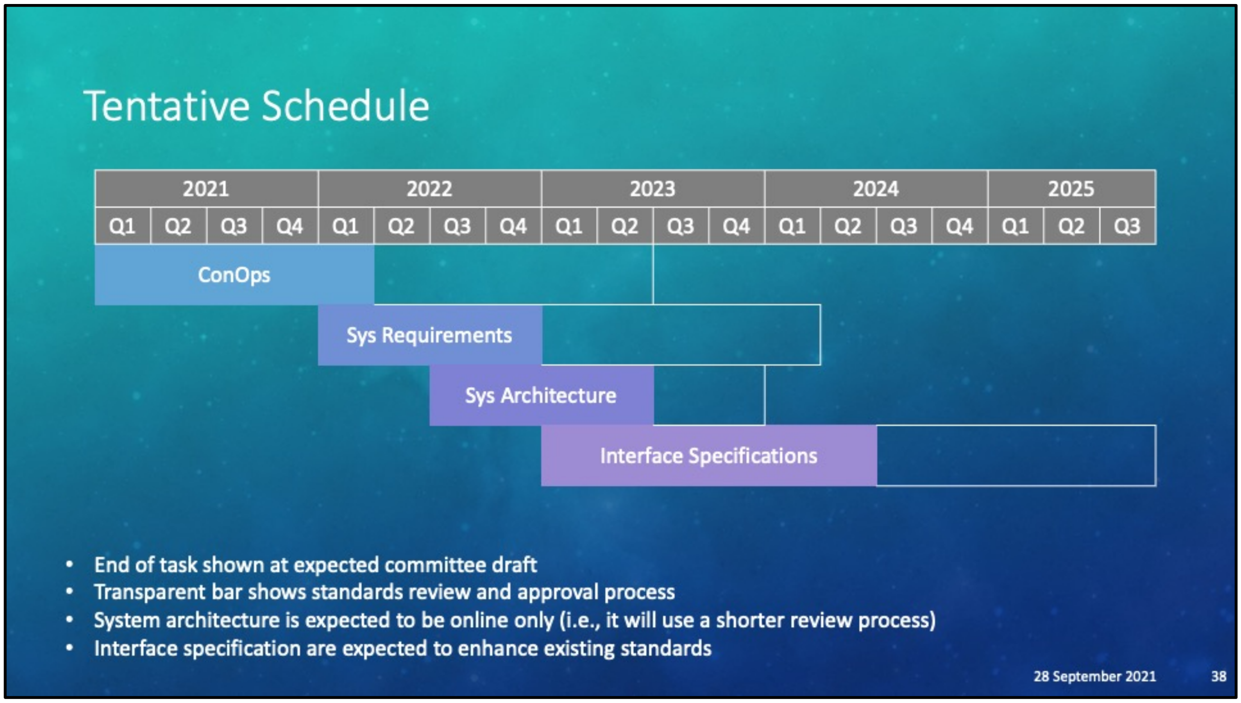
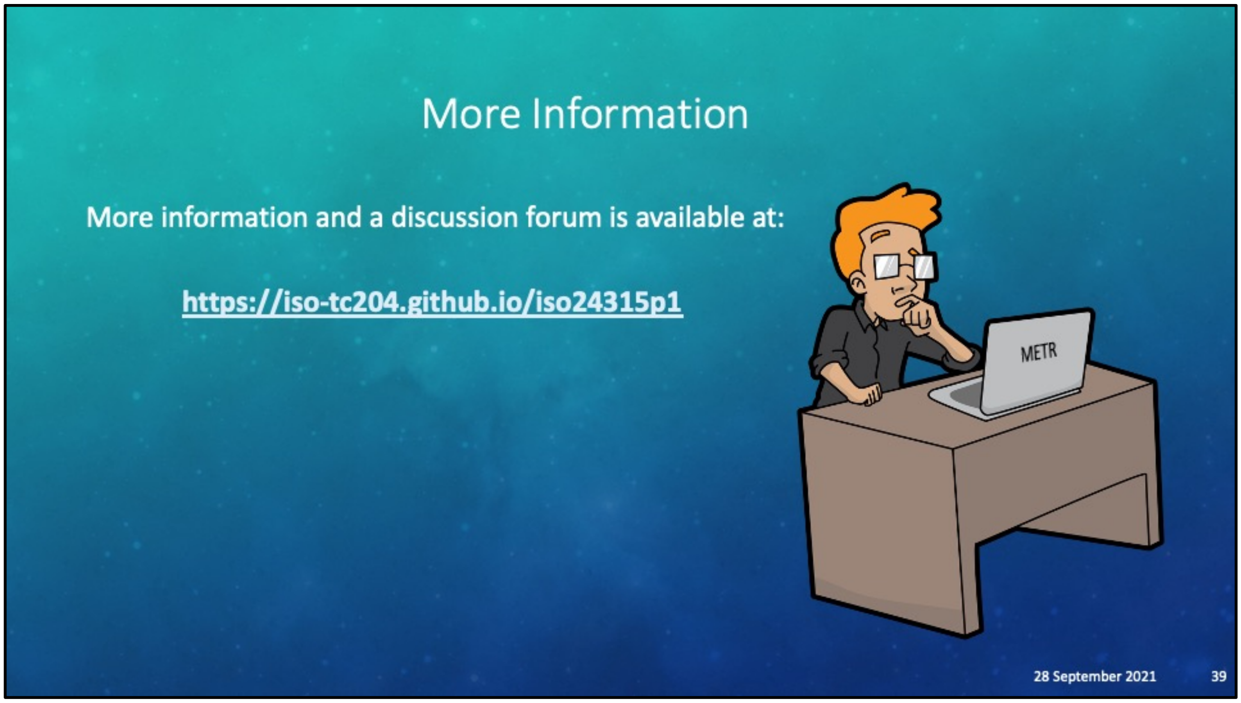
Thank you for your participation today. We have completed the first of 12 workshops and look forward to seeing you again next week for the discussion of METR operational structure.



As a reminder our current expected timeline is shown here. We hope to have a ConOps draft in early 2022, whereupon it will start the standardization process (of multiple reviews prior to standardization)



More information about the project and the latest developments will be posted on our GitHub site. This will include a PDF of weekly presentation files to be posted after our meetings each week.

https://upload.wikimedia.org/wikipedia/commons/thumb/2/24/Cartoon_Guy_In_Deep_Thought_Using_A_Computer.svg/1200px-Cartoon_Guy_In_Deep_Thought_Using_A_Computer.svg.png