



ASSESSMENT
VEHICLE
INSPECTION
SYSTEMS



25/08/2023 | MANUAL | VERSION 1.0

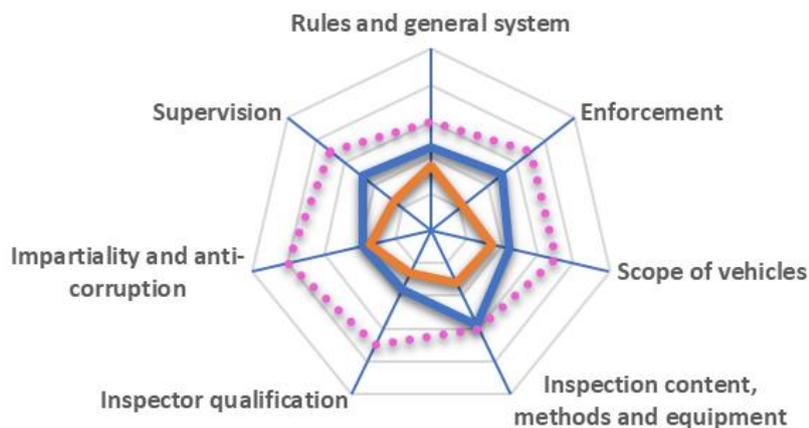
CITA AVIS SCORING

ASSESSMENT OF VEHICLE INSPECTION SYSTEMS

MANUAL

Avis Scoring

— Theoretical framework — Implementation ••••• Target for the future



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EXECUTIVE SUMMARY

BENEFITS

A good Periodic Technical Inspection (PTI) system is an essential tool in ensuring that vehicles on our roads are roadworthy and safe, to help reduce the 1.35 million deaths that occur annually on our roads. The challenge for many countries is how to implement a vehicle inspection system from scratch, or how to develop an existing system so that it is more robust/impactful.

CITA, the International Motor Vehicle Inspection Committee, in collaboration with TRL, has been developing a tool to help countries to evaluate their existing systems, and guide them in areas for improvement.

It is designed to be used by inspection authorities around the globe in their own in-country assessments, or by a CITA expert/team for an independent CITA-authorized assessment. It can be used as a tool for the setup of new inspection systems, for the continuous improvement of existing systems, or at the start and end of a project to demonstrate the progress made.

CITA hopes that the AVIS will be used extensively around the globe to make improvements to the safe-running and operation of vehicles. It is offered as an open-access Tool & Manual so that it can be put into use. It builds upon the extensive experience of the CITA membership and offers an invaluable aid to any authority looking to develop their inspection system.

DEVELOPMENT OF THE AVIS TOOL

CITA's work began with projects in Togo and Cameroon that examined the development possibilities for inspection systems. Both projects concluded that there was a reasonably strong framework in place for the inspections, but that in practice, the implementation was challenged. Specific and practicable recommendations were made for each country. The wider challenge for CITA was how to build upon this experience and develop an assessment system that could be used by any other country?

CITA formed a Task Force to develop the AVIS Tool (a spreadsheet-based scoring system) and its associated Manual (guidance protocol with a fuller description of the assessment aims and practical information about the scoring). TRL was commissioned to provide independent technical support to CITA. The AVIS tool assesses the type, quality, and effectiveness of the PTI systems in place within a country. This includes an evaluation of what is mandated by regulations/standards, how well they are implemented in reality, and the goals for future development. It covers seven main topic areas including: the rules and general systems; scope of vehicles; inspection content & methods; inspector qualifications; impartiality & anti-corruption; enforcement; and supervision.

The AVIS Tool has been through many iterations and refinements during its development. It has been put through a country validation exercise, where CITA members from across the globe have used their experience to complete the assessment for their countries. The resulting revised AVIS is now ready for launch and use.

IMPLEMENTATION

The AVIS Tool and Manual can be used by an authority to help development their PTI system. The focus is on improving road safety and reducing environmental impact. The AVIS can help achieve these goals. The elements of the PTI system are complex, and so each of the seven section is assessed separately. But the overall information is presented as a spider diagram to easily show these complex and diverse aspects in a simple and visual way – especially for the policy level and decision makers.

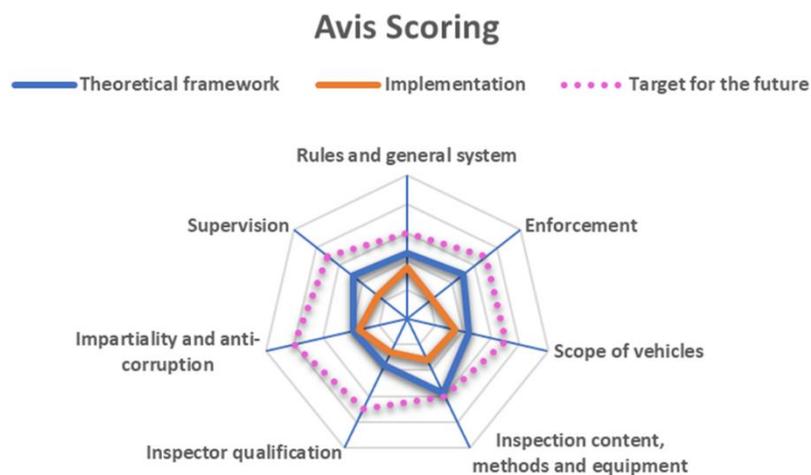


Figure 1: Example AVIS spider diagram

The goal is to achieve a balanced diagram, with progress made on each of the sections/legs of the spider. The effectiveness of a high quality PTI system will be completely undermined, for example, if the enforcement is neglected. The most important rating is the orange

implementation ratings, which represents what is happening in reality across the country. For instance, a high-quality PTI system could be designed and launched, but there is a risk that it is too complex to implement and over time falls out of use. The development of PTI requires continuous monitoring and support to gain traction, and in particular the enforcement and supervision must be upheld. Small feasible steps are perhaps a more balanced approach to the development of PTI, and the AVIS Tool can help authorities to plan and evaluate different options to achieve this type of sustained and effective change.



G1 INTRODUCTION

This document is the Manual to accompany the Assessment of Vehicle Inspection Systems (AVIS) Tool. It is provided to guide users of the AVIS tools in how to use it, what data is required, and as an explanation of why and how the AVIS Tool uses that data to make an assessment of the inspection systems in a country.

PART 1: THE AVIS PROCESS

The challenge and purpose

The AVIS Tool has been developed by CITA, the International Motor Vehicle Inspection Committee, using the extensive experience and expertise of its membership, which includes various types of inspection systems implemented in many countries and regions around the world. This international outlook has enabled the development of an impartial assessment tool for vehicle inspection systems, that can be used in any country.

Initially, the Tool was developed as a concept for Low- and Middle-Income Countries (LMICs), to assess their inspection systems and provide guidance on which areas were in need of development, so that efforts to improve them could be prioritised. At this time the tool was used to provide guidance to national authorities so that funding, such as that received in loans from Development Banks, could be effectively spent.

The goal of the AVIS tool is to provide a transparent procedure to assess the vehicle inspection system(s) of a country, based on criteria that are made publicly available. This involves the evaluation of both the theoretical/legislated framework, and its application/implementation. The criteria used are primarily based upon recognised international regulations, standards, recommendations and studies; and are refined using the extensive experience of the CITA membership.

The AVIS Assessment can be carried out in two ways:

- Formal assessment, made directly by CITA, which is the only one allowed to use the CITA brand.
- Informal assessment – any other party using the AVIS Tool and Manual to make an assessment of its current status.

Examples of when the assessments can be made include at the start and end of an investment/development project (such as one funded by a Multilateral Development Bank), in order to show the progress made during the project. Alternatively, assessments can be made at any time by a country that is planning and evaluating options for improving the inspection processes, as part of a continuous improvement process, prior to starting a project, or applying for funding.



The current status

Vehicle inspection system assessments were first carried out in projects in Togo (Khalifi and Subit, 2018) and Cameroon (Khalifi *et al.*, 2020). These projects demonstrated the potential value of the AVIS tool to identify and prioritise the areas of a country's inspection system that require further development. Since then, CITA has continued the development of the AVIS Tool, and this Manual to accompany it, with technical support from TRL.

At the time of writing, the AVIS Tool and Manual are presented as Version 1.0. CITA anticipates that the Tool, Manual, and criteria used, will be updated over time. This will be needed to reflect the latest developments in vehicle technology and inspection systems, and to respond to new user needs identified.

Scope

The scope of the AVIS tool is the assessment of vehicle Periodic Technical Inspection (PTI) systems in terms of their theoretical / legislated framework and how well that framework is implemented in practice. It also assesses future planned updates to the theoretical / legislated framework. Type approval and Construction and Use regulations and their implementation are NOT within the scope of the AVIS tool. It should also be noted that the AVIS tool was not primarily designed to score operators.

The process

The AVIS Tool assesses the following aspects of vehicle inspection systems of a country:

- Requirements; the theoretical framework i.e. the national regulations and standards that are set out
- Implementation; the application/implementation i.e. the reality of how the system is used and followed (or not)
- Future; the goals and plans for the development of the inspection systems; i.e. the steps that will be implemented within the next five years

The value is gained from the comparative assessment of these three aspects. For example, a country might have only a few regulated items at the time of assessment but be able to demonstrate forthcoming implementation of new regulations within the next five years, which will make substantial steps forward. In this case the **Future rating** would exceed the **Requirements rating**. In another example, a different country might have reasonably strong national rules and standards for the PTI systems, but they are very poorly implemented in reality, so the **Implementation rating** would be lower than the **Requirements rating**. Conversely, the country might reassess ten years later following various projects to make improvements, and find that their **Implementation rating** has

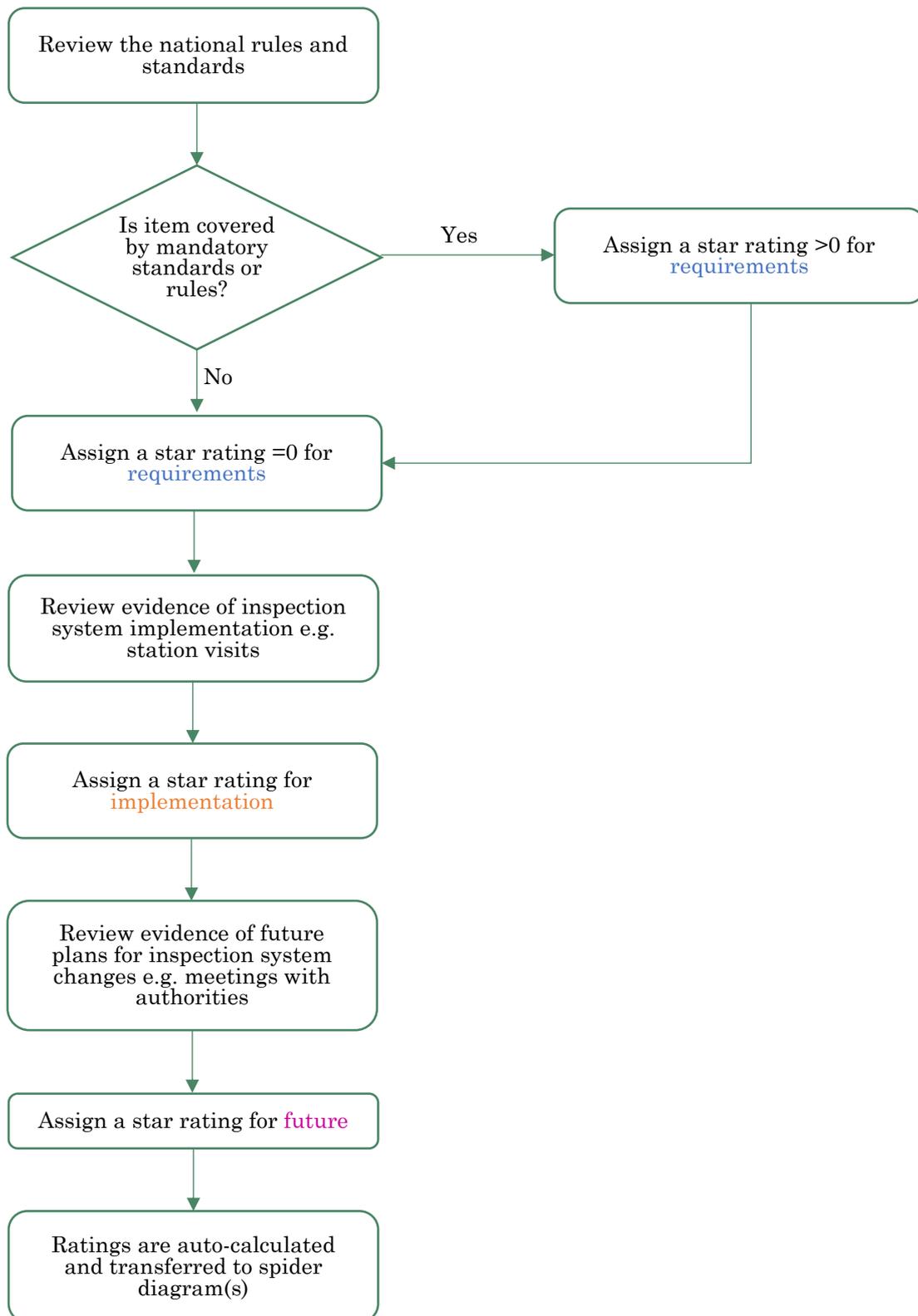


improved to the point of exceeding the [Requirements rating](#), because on-the-ground practices have made substantial improvements and the national rules have not kept pace.

The approach is to first review the national rules and standards that are in place within the country. The first question is whether any rules/standards exist, and then the second question is how good they are. The quality of the rules and standards is assessed against star levels, which range from 0* to 5*. The star levels are additive; to achieve a 5* rating the requirements to meet to 0* to 4* levels. The assessment team reviews the evidence and assigns a star level for the [Requirements rating](#).

Next the star levels are similarly used to assess the [Implementation rating](#) and [Future ratings](#). These are independent to the Requirements rating. For example, it is unlikely, but not impossible, that the inspections being implemented are of greater quality than the regulated requirements, and in this case the good practice can be recognised in the scoring. Similarly, the Future rating is also independent from the current requirements in the regulations/standards. Part of the future improvements might be to increase the regulatory requirements, and in this case these plans can be reflected separately in the Future rating.

In general, each of the AVIS assessment sections is based on a range of items (and sub-items) which are scored, weighted according to their importance, and averaged. The scores are recorded in each of the Sections (tabs) in the AVIS Tool (MS Excel spreadsheet). This calculates the overall scores from assessments of individual items / sub-items which are input. However, there are exceptions to this general process which are explained in more detail in the relevant manual section below. Figure 2 illustrates the general approach to making an assessment of a PTI system using the AVIS tool.



*Figure 2: Flow diagram of the general approach to completing the AVIS sections**

* Noting that vehicle scope has a different methodology, and a few sections have additional parts to allow extra scoring points or optional tools to help estimate values for the scoring. Full details in each section of the manual.

The Sections (elements) that are assessed by the AVIS Tool are described in Figure 3. Each of these sections is further broken down into Parts of the assessment, and the specific items being assessed. All of these are described in more detail under each relevant section.

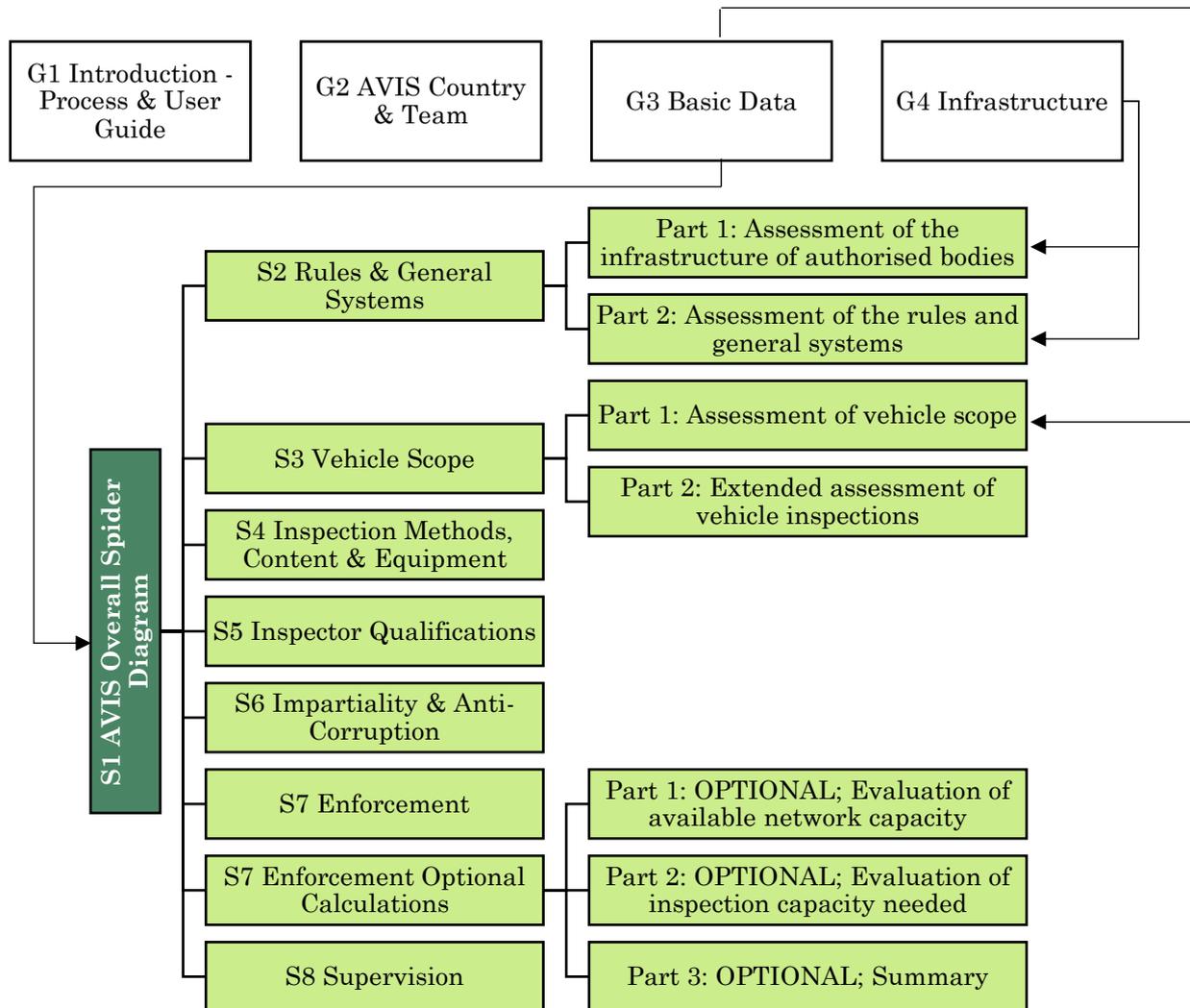


Figure 3: Sections of the AVIS Tool

Automatic calculations are used to generate the ratings used in the Overall Spider Diagram. The ratings are compiled from each of the sections, and then scaled by the coverage of the rules and standards to generate the final ratings for **Requirements** and **Implementation**. The **Future** rating remains as per the raw scores, to reflect that future changes are not tied to the existing situation of regulations.

The final ratings are presented as a spider diagram, with each section rating shown on each individual spider 'leg'. The **Requirements**, **Implementation** and **Future** ratings are shown in different coloured rings.



The ultimate goal would be to achieve a 5* score on every section for all three ratings. However, a perfect system is perhaps unlikely. Instead, CITA encourages the use of the spider to achieve a balanced approach. For example, a strong system that is scoring 3* or 4* on every aspect apart from a 1* for enforcement will find that its work is undermined; then future activities should focus on developing the enforcement to even up the scoring.

The timescales

Gathering the input data required may take some time. Assessments shall be completed within a reasonable timeframe. This is to ensure there are no changes to the inspection regulations and systems within the duration of the Assessment that might cause confusion. As an indication, the Assessment should be completed within 3-6 months.

Definitions

This section sets out the key definitions and acronyms used in the document. Any specific technical terms that form part of the AVIS are defined in the relevant sections that follow.

Term	Definition
ARSO	African Organisation for Standardisation; www.arso-oran.org
AVIS	Assessment of Vehicle Inspection Systems
CITA	International Motor Vehicle Inspections Committee; www.citainsp.org
ILO	International Labour Organization; www.ilo.org
ISO	International Standards Organisation; www.iso.org
KPI	Key Performance Indicator
LMICs	Low- and Middle-Income Countries
PTI	Periodic Technical Inspection
TRL	Transport Research Laboratory; www.trl.co.uk
UNECE	United Nations Economic Commission for Europe; www.unece.org

PART 2: USER GUIDE

The section heading is at the top of each page.

A reference to the manual section is given after the title. This is where to find a more descriptive explanation of why the section of the assessment is important, and how it is used. It includes a detailed description of the assessment items (and sub-items where relevant), with examples and formulae where relevant.

Each section is split into parts if necessary. The first part is always the main body of the assessment. Some sections have additional parts to describe either additional scoring sections, or tools that might help the assessor/user.



If you find that a score is not calculated, it is probably because a cell is blank somewhere. Go back and check the table is fully complete. There are often warning messages indicating if items need completion.

Table 1: Key

Table headings
Cells that are definitions or auto-calculated
<i>Extra guidance on the data that is needed / instructions for data entry.</i>
User input required.

Simply type your country assessment data for individual items / sub-items into the cells, and the ratings and spider diagram will auto-calculate. Extra information and examples are given in the Manual to help guide you. For individual items / sub-items record notes about data sources, evidence assessed and rationale for score applied in the spaces provided. This will act as a record of the data and evidence used in the assessment and allow a comparison with developments in the PTI system that might happen in future years. There is an extra worksheet provided if you want to record data or develop some analysis in order to make additional calculations informing the scoring. The sheets are locked to protect the formulas for the calculations from being corrupted. You should be able to click on all the cells, but only make edits in the cells where input is needed. If you want to adjust column widths to fit your screen you can. You can use the column width buttons (shown by a + at the top of the sheet) to hide the columns that are not necessary during data input. An alternative is to use the hide/unhide function for the columns. You can also use the 'freeze frames' function, if you prefer to keep certain rows/columns visible.



G2 AVIS COUNTRY AND TEAM DETAILS

This section of the AVIS Tool records the country in which the inspection system is being assessed, the details of the team making the assessment, the relevant contact people, and the meetings that were held to provide the input for the assessment. It is needed as a record of the assessment, so that if a review is taken some years later, then the relevant people can be identified and contacted if necessary.

This section is formed of three parts:

- Part 1: Country details
- Part 2: Assessment Team details
- Part 3: Assessment Meeting details

An important aspect to consider is data protection. The names and contact details of individuals will be recorded in this section, so that data must be kept in accordance with the relevant data protection laws. These include the laws of the country being assessed, as well as the relevant laws for members of the Assessment Team that may be international. CITA recommends that an agreement should be reached as to which laws take precedence, and this should generally be the most stringent/demanding set of laws.

A data share agreement should be signed by all parties involved and this shall include the timeframe for how long data, including the personal details, shall be stored for.

PART 1: COUNTRY DETAILS

This part aims to record the details of the Country being assessed and the contact details of the key people involved.

Input data required

Country

Aim: To record the name of the Country being assessed.

Data required: Enter the country name. This is the most important field to fill in the entire Tool.

Country Contact

Aim: To capture the relevant details of the Country contact.

Data required: The Country Contact is the key contact in-country for organisation of the AVIS assessment (e.g. a manager or team leader who can support with provision of data, arranging meetings etc). Record their name, organisation, address, telephone number and email address in the table.



Sponsor

Aim: To capture the relevant details of the Sponsor.

Data required: The Sponsor is the sponsor / person who the results are to be delivered to (e.g. a Director within a Vehicle/Transport Authority).

Record their name, organisation, address, telephone number and email address in the table.

Reference and calculated parameters

None.

PART 2: ASSESSMENT TEAM DETAILS

The Assessment is typically made by a team. There shall be one Team Leader that takes overall responsibility for the quality and timely delivery of the Assessment. That Team Leader shall select the Team members according to the skills needed to cover all aspects of the Assessment.

The Team may consist only of the Team Leader if that person has all the relevant skills and experience to make the entire Assessment covering all sections.

For an Assessment to be officially approved by CITA, the Assessment Team composition shall be approved by the CITA AVIS Task Force.

Competencies to cover within the team include:

- Administrative abilities to lead the project
- Competence and experience of management, quality assurance and supervision of PTI (or similar activities). This should include the ability to identify risks in the organisation or operation of the PTI scheme
- Technical competence and experience from PTI inspection, preferably personal practical experience as vehicle inspector

There are three tables in this part, including:

- Team Leader details
- Other team members
- Team roles

Input data required

Team Leader details

Aim: To capture the relevant details of the Team Leader.

Data required: This is the person with overall responsibility for the AVIS Scoring for the country (including organisation, leadership of the work, quality and timeliness of completion), and liaison with the Country Contact. Record their name, organisation, address, telephone number and email address in the table.



Note that the Team Leader may be the same person as the Country Contact if the assessment is being informally made by the country for purpose of continuous improvement, and it is not a CITA authorised assessment.

Other team members

Aim: To capture details for any other members of the AVIS Assessment Team.

Data required: List any other team members that are working on the AVIS assessment. They might be responsible for one or multiple sections of the assessment. Record their name, organisation, telephone number and email address in the table.

Note that one person may be delivering the entire AVIS assessment. That person may also be the Team Leader.

Reference and calculated parameters

None.

PART 3: ASSESSMENT MEETING DETAILS

The purpose of this part is to capture a few basic details about the meetings held in the process of carrying out the AVIS assessment. For best practice all meetings should have an agenda circulated to attendees in advance, and minutes with actions and attendees list circulated after the meeting. However, it is useful to also list the meetings in the AVIS Tool in a simple manner, so that key dates can be identified easily if assessment input/data/scorings need to be traced.

Input data required

Meeting purpose

Aim: To briefly describe the purpose of the meeting.

Data required: A short sentence to describe the meeting purpose / description.

Example: Visit to [insert name of inspection station] to examine implemented inspection practices.

Meeting type

Aim: To categorise the meeting type.

Data required: Select the meeting type from the list:

- Kick-off = initial meeting between the AVIS Assessment Team and the Country Contact (and sponsor) to initiate the AVIS project.



- Inspection station visit = a visit to an inspection station to gather input evidence/data for the assessment
- Progress meeting = an update meeting to discuss progress on the assessment, usually involving the Assessment Team and the Country Contact
- Final meeting = final presentation of the assessment results to the Sponsor. The Assessment Team Leader and Country Contact in attendance as a minimum.
- Other

Example: A visit to [insert name of inspection station] to examine implemented inspection practice would be recorded as an *Inspection station visit*.

Meeting details

Aim: To briefly capture the meeting details so that events and attendees can be traced at a later date if necessary.

Data required: Enter the meeting date, time and location. List the meeting attendees, noting that the names should ideally match those in Part 1: Country details and Part 2: Assessment Team details for consistency and so their contact details are available.

Meeting notes

Aim: To briefly capture any additional notes about a meeting.

Data required: Enter any relevant additional notes about the meeting.

Reference and calculated parameters

None.

PART 4: CITA APPROVAL OF AVIS ASSESSMENT

This Part is used to capture the details of the CITA representative who approved the AVIS assessment, if an approval was given. The AVIS Assessment can be carried out in several ways:

- Informal assessment - a country using the AVIS Tool and Manual to make an assessment of its current status, to inform planning for future developments.
- Officially approved by CITA:
 - an assessment made directly by CITA members, or
 - an informal assessment, which is later reviewed and approved by CITA members.
 - Note: the scoring will only have the CITA brand when CITA undertakes/reviews the assessment.



It is only these officially approved assessments that will need details completed for Part 4.

Input data required

CITA representative giving approval

Aim: To capture the relevant details of the CITA approver.

Data required: This is the person from CITA who has either been directly responsible for the assessment, or who has reviewed and approved it.

Details filled for this person indicate they have the authority on CITA's behalf to issue approvals for the AVIS assessments. Record their name, organisation, address, telephone number and email address in the table. The date of the approval is an essential piece of data to act as proof of the approval.

Reference and calculated parameters.

None.



G3 BASIC DATA

This section of the AVIS aims to capture basic data about the country, and about its vehicle fleet. This section of the Assessment is divided into two parts:

- Part 1: Country data
- Part 2: Inspection data per vehicle category

PART 1: COUNTRY DATA

Reference and calculated parameters

Country

Aim: To reference the name of the country under assessment, based on the entry in G2 AVIS Country and Team details.

Data required: None; auto-calculated.

Description: This is a reference/reminder of the country name entered in the G2 AVIS Country and Team details section.

OPTIONAL Suggested data

Aim: To reference any relevant data or calculations that are generated in other AVIS Sections for use in cross-checking or suggestion of values.

Data required: None; auto-calculated.

Description: This is a reference to data values from other AVIS Sections. They may or may not be already completed. A description is given for the 'source' (name of the data item) and section from which the reference is taken, so that it can be traced and reviewed/used if desired.

Use of the data is entirely optional. It is provided with two purposes:

- If the data is populated first in the G3 Basic data Part 1 Country data table, and the other sections of the AVIS filled later, then the Country data table can be used for cross-checking. For example, the data value entered can be compared to the data from elsewhere in the AVIS that are references as suggested values, and if there are substantial differences these can be investigated as it might indicate an error or that some piece of data has been overlooked.
- If the data is populated first in the referenced AVIS section and a value is available, then it can **OPTIONALLY** be entered as the value for use in the Part 1 country data table.

Since these values are references only, and each is labelled as to where it is referenced from, then please see those sections other for more details about the data values.

The suggested data sources and their respective sections are summarised in Table 2. If there is no other reference to the data, and it is only entered in G3 Basic Data, then the source/section is 'n/a'.

Table 2: OPTIONAL Suggested data

Basic data needed to describe the country situation	Source	Section
Total vehicle fleet size	Total country fleet	G3 Basic Data; Part 2: Inspection data per vehicle category
Dominant vehicle type	n/a	
Inspection Stations (centres)	n/a	
Number of inspection lanes	Number of lanes	S7 Enforcement OPTIONAL Calculations
Number of inspectors	Number of inspectors	S7 Enforcement OPTIONAL Calculations
Geographical area	n/a	
Population	n/a	
Vehicles per capita	Total vehicle fleet size / population	G3 Basic Data
Average vehicle age	n/a	

Input data required

Total vehicle fleet size

See G3 Basic Data Part 2: Inspection data per vehicle category.

Dominant vehicle type

Aim: To describe the main vehicle type found in the country.

Data required: Select the main vehicle type from the list.

Description: This a descriptive reference to the dominant/main vehicle type found in the country to help provide context for the type of PTI system required.

Example: A country which mainly has powered 2 & 3 wheelers would select 2&3 wheelers.

Number of inspection Stations (centres)

Aim: To describe the number of inspection stations (centres) found in the country.

Data required: Enter the number of inspection stations found across the country.

Description: This a reference to the number of inspection stations to help provide context for the type of PTI system required.

Number of inspection lanes



Aim: To describe the number of inspection lanes found in the country.

Data required: Enter the number of inspection lanes found across the country.

Description: This a reference to the number of inspection lanes to help provide context for the type of PTI system required.

Number of inspectors

Aim: To describe the number of inspectors found in the country.

Data required: Enter the number of inspectors found across the country.

Description: This a reference to the number of inspectors to help provide context for the type of PTI system required.

Geographical area

Aim: To describe the geographical area of the country.

Data required: Enter the geographical area of the country in km².

Description: This a reference to the country's area to help provide context for the type of PTI system required. It can be used to indicate where vehicle owners might have a longer distance to travel to an inspection station.

Population

Aim: To describe the population of the country.

Data required: Enter the country's population in millions of people.

Description: This a reference to the population to help provide context for the PTI system required. A larger population is likely correlated to a larger fleet, and therefore a greater demand for inspections.

Vehicles per capita

Aim: To describe the vehicles per capita of the country.

Data required: Enter the vehicles per capita; the number of vehicles per 1,000 people.

Description: This a reference to the population to help provide context for the PTI system required. A larger population is likely correlated to a larger fleet, and therefore a greater demand for inspections.

Formula:

$$\text{Vehicles per capita} = \frac{\text{total vehicle fleet size}}{\text{population}}$$

Average vehicle age

Aim: To describe the average vehicle age of the vehicles in the country.

Data required: Enter the average (mean) vehicle age of the vehicles.

Description: This a reference to the vehicle fleet to indicate how long the vehicles are in use for. A greater length of service will indicate a greater need for PTL.

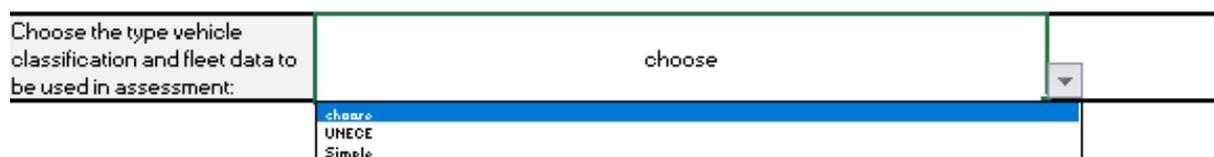
Example: Many Low- and Middle-Income Countries (LMICs) have much older vehicles in their fleet.

PART 2: INSPECTION DATA PER VEHICLE CATEGORY

The main purpose of this section is to assess the volumes of each vehicle category that are assessed. There are two methods to choose from, depending upon what level of quality of data is available:

- **UNECE classification.** An internationally recognised categorization of vehicles, and the greater level of detail known about the vehicle fleet.
- **Simple classification.** A smaller number of vehicle categories that are more descriptive. This is to be used if the UNECE category data is not available.

The first step is to select which type of data will be used, and select it using the drop down:



Choose the type vehicle classification and fleet data to be used in assessment:	choose
	<ul style="list-style-type: none"> choose UNECE Simple

Figure 4: Vehicle category data selection drop down

Each data type has a separate table to fill; UNECE data goes in the upper table, and the simple classification data goes in the lower one. The selection will grey out the table that is not in use, but will not delete any values. If you are using the simple classification for the AVIS Scoring but want to review the UNECE categories for reference of how to make improvements, you can simply select the UNECE table and have a look without losing any of the Simple Classification data already entered.

UNECE vehicle categories

The categories of vehicle are defined by the UNECE (2017). They are summarised in Table 3 below. An additional distinction between private and commercial M1 vehicles is made because commercial vehicles will likely have a much higher mileage meaning that an increased frequency of inspection is required.

Table 3: UNECE vehicle categories and descriptions

Main vehicle classes	UNECE Classification	UNECE Description
Passenger Cars and Buses	M1 Private	Private motor vehicle; Passengers \leq 8
	M1 Commercial	Motor vehicle; Passengers \leq 8
	M2 Small Bus	Motor vehicle; GVM \leq 5000 kg; Passengers $>$ 8
	M3 Bus or Coach	Motor vehicle; GVM $>$ 5000 kg; Passengers $>$ 8
Trucks	N1 Van	Motor vehicle; Cargo carrying; GVM \leq 3500 kg
	N2 Medium Goods Vehicle	Motor vehicle; Cargo carrying; 3500 kg $<$ GVM \leq 12000 kg
	N3 Heavy Goods Vehicle	Motor vehicle; Cargo carrying; GVM $>$ 12000 kg
Trailers	O1 Very Light Trailer	Trailer; GVM \leq 750 kg
	O2 Light Trailer	Trailer; 750 kg $<$ GVM \leq 3500 kg
	O3 Medium Trailer	Trailer; 3500 kg $<$ GVM \leq 10000 kg
	O4 Heavy Trailer	Trailer; GVM $>$ 10000 kg
Mopeds, Motorcycles and Quadricycles	L1 Light Two-Wheel Powered Vehicle	Two wheels; Max speed \leq 50 Km/h; Engine \leq (50 cm ³)
	L2 Three-Wheel Moped	Three wheels; Max speed \leq 50 Km/h; Engine \leq (50 cm ³)
	L3 Two-Wheel Motorcycle	Two wheels; No sidecar; Max speed $>$ 50 Km/h; Gas Engine $>$ 50 cm ³
	L4 Two-Wheel Motorcycle with Side-Car	Two wheels; With sidecar; Max speed $>$ 50 Km/h; Gas Engine $>$ 50 cm ³
	L5 Powered Tricycle	Three wheels; Max speed $>$ 50 Km/h; Gas Engine $>$ 50 cm ³
	L6 Light Quadricycle	Quads; Max speed \leq 45 Km/h; Engine \leq (50 cm ³ / 4 kW)
	L7 Heavy Quadricycles	Other quads; GVM \leq 400 kg or Engine \leq 15 kW

If the data is available, but the categories do not exactly match these definitions, then use the best fit. Estimation of the fleet size, e.g. to split between M1 private and commercial, is acceptable if there is no other better source of data; in this case the estimation data should be recorded / referenced in the *Source data* column.

Simple Classification of vehicle category

The simple classification vehicle categories have been selected to represent the broad vehicle categories that are relatively easy to identify and count. They are shown in Table 4.

If absolutely no data is available, then a roadside survey could be used to indicate the proportional distribution between vehicle types, and then a scaling up method used to estimate the total volumes in the country.

As with the UNECE M1 category, distinction between private and commercial M1 vehicles is made because commercial vehicles will likely have a much higher mileage meaning that an increased frequency of inspection is required.

Table 4: Simple Classification vehicle category data

Simple classification of (estimated) vehicle fleet
2 & 3 wheelers
Light duty private vehicles
Light duty commercial vehicles
Heavy duty passenger vehicles
Heavy duty freight vehicles

If the data is available, but the categories do not exactly match these definitions, then use the best fit. Estimation of the fleet size is acceptable if there is no other better source of data; in this case the estimation data should be recorded / referenced in the *Source data* column.

Input data required

Average time (inspector)

Aim: This is average time per inspection for that vehicle category, measure per inspector.

Data required: Enter the average (mean) time taken by an inspector to complete an inspection on that vehicle category. Only count the time affecting the inspector because this data is used to help assess the capacity available. Only count the time for the actual vehicle inspection,

Example: An M2 small bus inspection might take an inspector an average of 40 minutes. If another team handles bookings and greeting customers, then this should be excluded. If the inspector handles greeting customers, paperwork and payment, as well as the actual inspection, then this should all be included and the average time might be 60 minutes.

Average time (lane)

Aim: This is average time per inspection lane for that vehicle category, measure per lane.

Data required: Enter the average (mean) time taken by a vehicle category on an inspection lane. Only count the time affecting the inspection lane because this data is used to help assess the capacity available. Only count the time for the actual vehicle inspection.

Example: An M2 small bus inspection might spend 40 minutes on an inspection lane.

Type of lane

Aim: This is the type of lane that is typically used for the vehicle category.

Data required: Enter the type of lane that is typically used for the vehicle category:

- Light vehicles
- Heavy vehicles
- 2&3-Wheelers

Example: It is possible to assume that certain vehicle categories can only be inspected on certain types of lane, as shown in Table 5. However, in reality this depends on the actual lanes available in the country, so only enter the data to match the real situation.

Table 5: Suggested lane types per vehicle category

Vehicle categorisation	Vehicle categories	Suggested lane type (if available and in use in country)
UNECE vehicle categories	M1 Private	Light vehicles
	M1 Commercial	Light vehicles
	M2 Small Bus	Heavy vehicles
	M3 Bus or Coach	Heavy vehicles
	N1 Van	Light vehicles
	N2 Medium Goods Vehicle	Heavy vehicles
	N3 Heavy Goods Vehicle	Heavy vehicles
	O1 Very Light Trailer	Light vehicles
	O2 Light Trailer	Light vehicles
	O3 Medium Trailer	Heavy vehicles
	O4 Heavy Trailer	Heavy vehicles
	L1 Light Two-Wheel Powered Vehicle	2&3-Wheelers
	L2 Three-Wheel Moped	2&3-Wheelers
	L3 Two-Wheel Motorcycle	2&3-Wheelers
	L4 Two-Wheel Motorcycle with Side-Car	2&3-Wheelers
	L5 Powered Tricycle	2&3-Wheelers
	L6 Light Quadricycle	2&3-Wheelers
L7 Heavy Quadricycles	2&3-Wheelers	
Simple vehicle categories	2 & 3 wheelers	2&3-Wheelers
	Light duty private vehicles	Light vehicles
	Light duty commercial vehicles	Light vehicles
	Heavy duty passenger vehicles	Heavy vehicles
	Heavy duty freight vehicles	Heavy vehicles

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Failure rate

Aim: This provides evidence of the average failure rate for the vehicle category.

Data required: Enter the average failure rate of inspections. Note that this is considering failed inspections, not a failure to attend for the inspection. This should be entered as a % of all the vehicles of that category.

Example: If there are 100,000 small buses in the country's vehicle fleet, and 90,000 of them attend inspections, then 10,000 fail to attend. However we are only concerned with the 90,000 that do attend in this case. If 85,000 of those pass, and 5,000 fail, then the failure rate is 5.5%.

Country market fleet

Aim: This data provides a measure of the vehicle fleet per category, and allows a prioritisation between categories.

Data required: Enter the size of the entire fleet in the country, per vehicle category at the time of the inspection. This can be rounded to nearest 1000 vehicles if greater detail is unknown. This fleet data is used to weight the proportion of the vehicle segment against others. For example, if a vehicle category has a very large share of vehicles, then it may be prioritised for improvements in inspections.

Example for a Simple Classification of vehicle categories, which can be used in the absence of more detailed UNECE data.

Table 6: Example of country market fleet data

Simple classification of (estimated) vehicle fleet	Estimated number of vehicles:
2 & 3 wheelers	50,000
Light duty private vehicles	2,500
Light duty commercial vehicles	6,900
Heavy duty passenger vehicles	3,100
Heavy duty freight vehicles	7,400

Reference and calculated parameters

Total country fleet

Aim: It is used to help weight the proportion of each vehicle category.

Data required: None; auto-calculated.

Description: The sum of the vehicles in each vehicle category to represent the total country fleet. If the UNECE vehicle categories are used then these rows are summed, or if the Simple Classification of vehicle categories are used then these rows are summed instead.



Example: The total fleet for the country example in Table 6 is 69,900 vehicles.

Formula:

$$\sum_{\text{Vehicle categories}} \text{Number of vehicles in the vehicle category}$$

G4 INFRASTRUCTURE

This section of the AVIS covers infrastructure of the PTI system in the country, at the time of the assessment. The purpose is to fully understand the infrastructure because this can influence other elements of the assessment indirectly.

Infrastructure of Authorised Bodies

Infrastructure of Authorised Bodies

Aim: To assess the infrastructure model, or mix of models, of the authorised bodies/organisations involved in the PTI within the country.

Description: Vehicle periodical inspection is an Authority activity that can be managed in several different ways but always requires the appropriate arrangements on the governmental side. It is crucial to take into consideration which Authority bodies are involved. The body assigned to administer or manage vehicle inspection will often be an agency. That agency shall be accordingly empowered to manage supervisors, operators and promote good practices between stakeholders, vehicle owners and drivers. There may be one or models used for the infrastructure of the authorised PTI bodies in a country:

- **Public organisation:** a central authority. This may be suitable for countries setting up a PTI system.
- **Monopoly:** a single provider (other than a public organisation). This typically provides the greatest level of uniformity of standards and consistency in the application of the test.
- **Hybrid system (limited number of specialised operators):** the service supervisor determines that they will execute the service as well as authorise a number of franchisees to operate, perhaps, giving each of their franchisees a defined territory.
- **Competitive market:** a liberalised market of specialised PTI operators
- **Competitive market:** a liberalised market of repair shops

There is a fuller discussion of the pros and cons of these models in CITA Recommendation 20 (CITA, 2017).

Example: A country might have a monopoly in place for inspection of heavy vehicles, but also allow light vehicles to be inspected in repair shops (Competitive market: a liberalised market of repair shops). This model might be selected because heavy vehicles represent a greater risk; they are more difficult to inspect, and there is a greater risk of severe outcomes should they fail. In this case there is a combined scheme, but with clear boundaries according to vehicle type.



Example: A country with a less stable political situation might use a monopoly across all vehicle types due to instability in society.

Input data required

Infrastructure/system in use

Aim: To assess the infrastructure model, or mix of models, of the authorised bodies/organisations involved in the PTI within the country.

Data required: Enter a Yes or n/a according to the type of authorised body is in use. This is assessing the presence/absence of the system in place; it does not assess how well the authorised body is operating. It is recorded for the current situation at the time of the Assessment.

Yes = the infrastructure of authorised bodies is in place.

n/a = Only used to identify any models that are not in use in the country and should not be included in the assessment.

Example: A country that has a public organisation to deliver the inspections will have a Yes against public organisation, and n/a against the other four sub-items if they are not in use at all in the country.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the Assessors to make notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, for example outlining plans to add the process of banning PTI companies if poor-quality inspections are found. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important



to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).
Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

None.



S1 AVIS OVERALL SPIDER DIAGRAM & RESULTS

This section of the AVIS presents the overall scores and spider diagram, by compiling the raw ratings from each section and converting them to final ratings/spider. This section of the Assessment is divided into two parts:

- Part 1: Overall spider & results
- Part 2: Key metrics about the country PTI system

It is designed to be a simple one- or two-page summary of the situation in the country, similar to an executive summary, but of data instead of text. It is designed with Executive Leadership teams in mind.

PART 1: OVERALL SPIDER & RESULTS

Input data required

None.

Reference and calculated parameters

AVIS Scoring

Aim: To summarise the raw AVIS Scorings from Section 2 to 8 inclusive.

Data required: None; auto-calculated.

Description: This copies the values from the other sections and summarises them in the table. This includes the raw ratings for the *Requirements Rating*, *Implementation Rating*, and the *Future Rating*. These are average ratings, extracted from each of the main AVIS Sections 2 to 8. The source of the score used for each section is shown in Table 7. The exception is the vehicle scope, which uses a sum of the weighted average. This is because it only has a 4* scale, but an additional scoring point is available from the second part of the vehicle scope assessment to make it a five point scale and be comparable to all the other sections.



Table 7: Scores used from each AVIS section.

Section		Source of score data
S2	S2 Rules & General Systems	Averages (weighted and normalised)
S3	S3 Vehicle Scope	Weighted averages from Part 1: Assessment of vehicle scope + Weighted averages from Part 2: Extended assessment of vehicle
S4	S4 Inspection Content & Methods	Averages (weighted and normalised)
S5	S5 Inspector Qualifications	Averages (weighted and normalised)
S6	S6 Impartiality & Anti-Corruption	Averages (weighted and normalised)
S7	S7 Enforcement S7 Enforcement OPTIONAL Calculations S7 Enforcement	Averages (weighted and normalised)

S 8	<p>S8 Supervision S7 Enforcement OPTIONAL Calculations</p> <p>This section provides additional OPTIONAL calculations to support finding answers for S7 Enforcement. They do not have to be used.</p> <p>It is provided in 3 parts:</p> <ul style="list-style-type: none"> • Part 1: OPTIONAL; Evaluation of available network capacity • Part 2: OPTIONAL; Evaluation of inspection capacity needed • Part 3: OPTIONAL; Summary <p>PART 1: OPTIONAL; EVALUATION OF AVAILABLE NETWORK CAPACITY</p> <p>This section is entirely optional. It may be used to help estimate figures to be used in the scoring for the Inspection capacity sub-item. These tables are intended to assist the assessor to evaluate the network capacity AVAILABLE.</p> <p>It may also be used as a tool to help the assessor, and the inspection representatives of the country, to consider options for future development of the inspection network.</p> <p>The calculations are split into two steps, depending on whether the inspectors or the lanes are the most limiting factor on capacity:</p> <ul style="list-style-type: none"> • Calculation of annual capacity available, based on INSPECTORS • Calculation of annual capacity available, based on LANES <p>The data is recorded per inspector/lane capability:</p> <ul style="list-style-type: none"> • Combined Light & Heavy Vehicles • Only Light Vehicles • Only Heavy Vehicles • Only 2&3-wheelers • Other <p>Later these are combined to only light, heavy and 2&2-wheelers, in order to simplify and to match against G3 Basic Data Part 2: Inspection data per vehicle category. To achieve this, the Assessor must select the best fit for the 'other' inspectors/lanes. The drop-down selector can be used to make this choice, and the calculations will update. For example, if the 'other' lanes are most similar in use to the light vehicles, then light vehicles should be</p>	Averages (weighted and normalised)
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selected. If no selection is made, the 'other' inspectors/lanes will be excluded entirely.

Input data required

Number of Inspectors

Aim: To quantify the number of inspectors available according to their different capabilities.

Data required: Enter the number of each type of inspector.

Example: 200 inspectors that can work on light & heavy vehicles, and another 300 that can work only on light vehicles.

Time allocation

Aim: To quantify the percentage of time spent by each type of inspector that is spent working on the vehicle inspections.

Data required: Enter the percentage of time spent on vehicle inspections for each type of inspector.

Example: If the inspectors are also carrying out repair work, they might only spend 20% of their working time on inspections.

Hours per day

Aim: To quantify the average working day for Inspectors by number of hours.

Data required: Enter the number of hours worked on average by an Inspector.

Example: 8 hour working day for an inspector.

Example: 10 hours per day available for the inspection lane on average.

Working days per year

Aim: To quantify the average working days per year.

Data required: Enter the number of days worked on average by an Inspector. This should exclude annual leave and public holidays.

Example: 220 working days per year.

Average time allocated per inspection (hours)

Aim: To quantify the average allocated per inspection.

Data required: Enter the average amount of time allocated per inspection in hours.

Example: 0.5 hours.

Number of lanes

Aim: To quantify the number of inspection lanes available according to their different capabilities.

Data required: Enter the number of each type of lane.

Example: 10 lanes that are capable for handling light & heavy vehicles, and another 200 that can handle only on light vehicles.

Opening hours per day

Aim: To quantify the average open working day for an inspection lane by number of hours.

Data required: Enter the number of hours worked on average by an open inspection lane.

Example: 10 hours per day available for the inspection lane on average.

Opening days per year

Aim: To quantify the average opening days per year for the inspection lanes.

Data required: Enter the number of days open and working on average by the inspection lanes.

Example: 320 opening days per year.

Reference and calculated parameters

Inspection capacity (hours/year)

Aim: To quantify the average inspection capacity available in terms of hours/year.

Data required: None; auto-calculated.

Description: This quantifies the average inspection capacity available in hours per year.

Formula:

$$\begin{aligned} & \textit{Inspection capacity available} \\ & = \textit{Number of inspectors} \times \textit{time allocation} \\ & \quad \times \textit{hours per day} \times \textit{working days per year} \end{aligned}$$

Example: 200 inspectors working 70% of their time for 8 hours a day over 320 days in the year will have an inspection capacity of 358,400 hours per year.

Inspection capacity (inspections per year)

Aim: To estimate the annual number of inspections that are available/possible.

Data required: None; auto-calculated.

Description: This describes the average number of inspections that can be completed on an annual basis.

Example: For an inspection capacity of 358,400 where the inspections take 0.3 hours each, then the inspection capacity per year is 1,194,667.

Formula:

$$\text{Inspection capacity (hours per year)} = \left(\frac{\text{Inspection capacity (hours per year)}}{\text{Average time allocated per inspection (hours)}} \right)$$

Total capacity of inspectors per year (full time equivalent)

Aim: To estimate the annual total capacity of inspections that are available/possible, as full-time equivalent.

Data required: None; auto-calculated.

Description: This estimates the total capacity of inspectors per year in terms of full-time equivalent staff. Note that this is grouped per light vehicles, heavy vehicles, or 2&3-wheelers, so requires that the Assessor selects which group to add the 'other' inspectors to.

Example: For only 2&3-wheelers, if there are 200 inspectors, allocated at 95% of their time, this is equivalent to 190 inspectors as a full-time equivalent.

If there are also 50 other inspectors, working at 50% of their time allocation, then this adds 25 more full-time equivalent inspectors. As a total, this would give 215 full-time equivalent inspectors.

Formula:

$$\text{Total capacity of inspectors per year (full time equivalent)} = \text{number of inspectors} \times \text{time allocation}$$

Annual inspections

Aim: To re-group the *Inspection capacity (inspections per year)* for inspectors/lanes and simplify.

Data required: None; auto-calculated.

Description: This re-groups the data for *Inspection capacity (inspections per year)* from 6 different types of

inspectors/lanes down to just 3 for the sake of simplicity and matching the data in other sections. The 3 categories resulting are light vehicles, heavy vehicles, and 2&3-wheelers.

Example: The *Inspection capacity (inspections per year)* for light vehicles within the *combined light & heavy vehicles* are added to the *only light vehicles* data. If selected, the data for *other* will also be added.

PART 2: OPTIONAL; EVALUATION OF INSPECTION CAPACITY NEEDED

This section is entirely optional. It may be used to help estimate figures to be used in the scoring for the Inspection capacity sub-item. These tables are intended to assist the assessor to evaluate the network capacity NEEDED, and is based on the vehicle category data from G3 Basic Data Part 2: Inspection data per vehicle category and S3 Vehicle Scope Part 1: Assessment of vehicle scope.

It may also be used as a tool to help the assessor, and the inspection representatives of the country, to consider options for future development of the inspection network.

Input data required

None.

Reference and calculated parameters

The calculations start by referencing various parameters from other sections and compiling them to a table. These parameters are listed in Table 29. There is one table for if the UNECE classification is used, and a second for if the simple classification is used, according to the selection made in G3 Basic Data Part 2: Inspection data per vehicle category.

Table 29: Parameters referenced for Part 2: OPTIONAL; Evaluation of inspection capacity needed

Parameter	Source	
	AVIS section	Part
Type of lane	G3 Basic Data	Part 2: Inspection data per vehicle category
Failure rate	G3 Basic Data	Part 2: Inspection data per vehicle category

Country market fleet	G3 Basic Data	Part 2: Inspection data per vehicle category
Country specific capacity; annual requirement	S3 Vehicle Scope	Part 1: Assessment of vehicle scope
Theoretical capacity required annually	S3 Vehicle Scope	Part 1: Assessment of vehicle scope

Average failure rate

Aim: To re-group the *Failure rate* for into the three categories.

Data required: None; auto-calculated.

Description: This re-groups the data for *Failure rate* for the different vehicle categories down to just 3 for the sake of simplicity and matching the data in other sections. The 3 categories resulting are light vehicles, heavy vehicles, and 2&3-wheelers. An average failure rate is then calculated per each of the three new groups.

Sum of regular vehicle inspections (regular inspections per year)

Aim: To sum the regular inspections required each year under various groupings.

Data required: None; auto-calculated.

Description: This calculates the regular inspections each year based upon the country market fleet and inspection requirements. Various groupings are used:

- Country specific capacity: annual requirement
 - Light vehicle lane
 - Heavy vehicle lane
 - 2&3-wheelers
 - All
- Theoretical capacity required annually
 - 2*, 3* and 4* levels

Estimated inspection capacity needed (regular + re-inspections per year)

Aim: To sum the regular inspections required each year, plus the re-inspections needed due to failures, under various groupings.

Data required: None; auto-calculated.

Description: This sums the regular inspections required each year with the re-inspections needed due to failures. Various groupings are used:

- Country specific capacity: annual requirement
 - Light vehicle lane
 - Heavy vehicle lane
 - 2&3-wheelers
 - All
- Theoretical capacity required annually
 - 2*, 3* and 4* levels

Formula:

*Estimated inspection capacity needed (regular plus reinspection)
Sum of regular vehicle inspections (regular inspections per year)
re-inspections*

Where:

Reinspections

*= Sum of regular vehicle inspections (regular inspections per year)
× Average failure rate*

PART 3: OPTIONAL; SUMMARY

This section is entirely optional. It may be used to help estimate figures to be used in the scoring.

It may also be used as a tool to help the assessor, and the inspection representatives of the country, to consider options for future development of the inspection network.

Four groups of data are used: light vehicles, heavy vehicles, and 2&3-wheelers; and 'All' is the sum of these.

Input data required

Inspection capacity available

Aim: To quantify the inspection capacity available annually (inspections per year).

Data required: Enter the inspection capacity available annually (inspections per year). You can use Part 1: OPTIONAL; Evaluation of available network capacity if desired.

Description: This is to quantify the inspection capacity available annually (inspections per year).

Inspection capacity needed

Aim: To quantify the inspection capacity needed annually (inspections per year).

Data required: Enter the inspection capacity needed annually (inspections per year). This can be derived from a vehicle and inspection database, or you can use Part 2: OPTIONAL; Evaluation of inspection capacity needed if desired.

Description: This is to quantify the inspection capacity needed annually (inspections per year).

Reference and calculated parameters

Total vehicle fleet

Aim: To reference the total vehicle fleet figures.

Data required: None; auto-calculated.

Referenced: from G3 Basic Data Part 2: Inspection data per vehicle category.

Description: This is used as an indicator of the total volume of vehicles to be inspected.

Capacity available vs need (lack of inspections per year)

Aim: To indicate the lack of inspections per year, by comparing the availability and the need.

Data required: None; auto-calculated.

Description: This is a comparison of the availability and the need for inspections. In cases where the availability exceeds the need, there is over-supply. In cases where the need exceeds the availability, this indicates a problematic lack, and the Assessment team should work with the in-country team to discuss possible solutions. The optional calculations in Part 1: OPTIONAL; Evaluation of available network capacity Part 2: OPTIONAL; Evaluation of inspection capacity needed might help these discussions.

Formula:

Capacity available vs need (lack of inspections per year) = Inspection capacity needed – Inspection capacity available

Capacity provided (inspection per year, %)

Aim: To indicate the capacity of inspections per year that are actually provided, as a percentage.

Data required: None; auto-calculated.

<p>Description: This is a calculation of the inspection capacity provided, but as a percentage of the need.</p> <p>Formula:</p> <p><i>Capacity provided (inspection per year, %) = 1 – Capacity available vs need (lack of inspections, %)</i></p> <p>Capacity available vs need (lack of inspections,%)</p> <p>Aim: To indicate the lack of capacity of inspections per year as a percentage.</p> <p>Data required: None; auto-calculated.</p> <p>Description: This is a calculation of the gap or lack of inspection capacity provided, but as a percentage of the need.</p> <p>Formula:</p> $= \frac{\text{Capacity available vs need (lack of inspections, \%)} - \text{Capacity available vs need (lack of inspections per year)}}{\text{Inspection capacity needed}}$ <p>S8 Supervision</p>	
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Regulation and standards coverage

Aim: To summarise the share of items covered by regulations from Section 2 to 8 inclusive.

Data required: None; auto-calculated.

Description: This references the values from the other Sections and summarises them in the table. It describes the proportion of items covered by the regulations as a percentage indicator and can be used to encourage progress towards 100%. Any remaining percentage represents the *potential to improve coverage of missing items*.

The slight exception is with S3 Vehicle Scope, which is coverage of inspections for each vehicle category instead. It is also weighted by the volume of vehicles in each vehicle category. This is a more relevant measure in this case, because if there are only a handful of vehicles in a category, it might be less important to implement regulation of PTI inspections for them in comparison to a vehicle category with millions of vehicles.

Example: The *share of items covered by regulations* is 90%, then the *potential to improve coverage of missing items* is the remaining 10%.

Formula:

$$\begin{aligned} & \text{Potential to improve coverage of missing items} \\ & = 100 - \text{Share of items covered by regulations} \end{aligned}$$

AVIS final rating

Aim: To scale the requirements and implementation ratings by the regulation and standards coverage to represent the need for improvement.

Data required: None; auto-calculated.

Description: For the requirements rating and implementation rating they are multiplied by the *share of items covered by regulations*. This represents the reality of the current situation in the country, and this scaling back also indicates the room for improvement to be made.

The Future rating remains unmodified since it represents future plans and not the current situation with regulations/standards.

Formula:

$$\begin{aligned} & \text{Requirements rating} \times \text{share of items covered by regulations} \\ & = \text{AVIS final requirements rating} \end{aligned}$$

Or

$$\begin{aligned} & \text{Implementation rating} \times \text{share of items covered by regulations} \\ & = \text{AVIS final implementation rating} \end{aligned}$$

PART 2: KEY METRICS ABOUT THE COUNTRY PTI SYSTEM

Input data required

None.

Reference and calculated parameters

Key metrics

Aim: To summarise the key descriptive measures that help to describe the situation for PTI in the country.

Data required: None; auto-calculated.

Description: This section summarises data from other Sections, in a simple table that could be referenced for a high-level overview. The metrics are listed in Table 8.



Table 8: Key metrics about the PTI system

Metric	Referenced from	
	Section	Part
Country	G2 AVIS Country and Team details	Part 1: Country details
Total country fleet	G3 Basic Data	Part 2: Inspection data per vehicle category
Dominant vehicle type	G3 Basic Data	Part 1: Country data
Number of inspection Stations (centres)	G3 Basic Data	Part 1: Country data
Number of inspection lanes	G3 Basic Data	Part 1: Country data
Number of inspectors	G3 Basic Data	Part 1: Country data
Geographical area	G3 Basic Data	Part 1: Country data
Population	G3 Basic Data	Part 1: Country data
Vehicles per capita	G3 Basic Data	Part 1: Country data
Average vehicle age	G3 Basic Data	Part 1: Country data
Infrastructure of Authorised Bodies	G4 Infrastructure	

S2 RULES & GENERAL SYSTEMS

This section of the AVIS covers the assessment of the rules and general systems for inspections. The purpose is to assess the overall structures, responsibilities, and authorised parties for the vehicle inspection systems. This section of the Assessment is divided into two parts:

- Part 1: Assessment of the infrastructure of authorised bodies
- Part 2: Assessment of rules and general systems

PART 1: ASSESSMENT OF THE INFRASTRUCTURE OF AUTHORISED BODIES

This section aims to assess the infrastructure of the authorised bodies in the country. It builds upon the data captured in G4 Infrastructure.

Infrastructure of Authorised Bodies

Aim: To assess the infrastructure model, or mix of models, of the authorised bodies/organisations involved in the PTI within the country.

Description: Vehicle PTI is an Authority activity that can be managed in several different ways but always requires the appropriate arrangements on the governmental side. It is crucial to take into consideration which Authority bodies are involved. The body assigned to administer or manage vehicle inspection will often be an agency. That agency shall be accordingly empowered to manage supervisors, operators and promote good practices between stakeholders, vehicle owners and drivers. There may be one or models used for the infrastructure of the authorised PTI bodies in a country:

- **Public organisation:** a central authority. This may be suitable for countries setting up a PTI system.
- **Monopoly:** a single provider (other than a public organisation). This typically provides the greatest level of uniformity of standards and consistency in the application of the test
- **Hybrid system (limited number of specialised operators):** the service supervisor determines that they will execute the service as well as authorise a number of franchisees to operate, perhaps, giving each of their franchisees a defined territory.
- **Competitive market:** a liberalised market of specialised PTI operators
- **Competitive market:** a liberalised market of repair shops

There is a fuller discussion of the pros and cons of these models in CITA Recommendation 20 (CITA, 2017).

Input data required

Future: Infrastructure / system in use

Aim: To assess the infrastructure model, or mix of models, of the authorised bodies/organisations involved in the PTI within the country for the future planned situation.

Description: Enter a Yes or n/a for each of the infrastructure types, according to the future plans within the next five years.

- Yes; the system will be in place in the future
- n/a; the system will not be in place and should be excluded from subsequent ratings.

Reference and calculated parameters

Current: Infrastructure / system in use

Aim: To assess the infrastructure model, or mix of models, of the authorised bodies/organisations involved in the PTI within the country at the time of assessment.

Description: None; auto-calculated.

This is referenced from the table in G4 Infrastructure that records either:

- Yes; the system is in place at the current time
- n/a; the system is not in place and should be excluded from subsequent ratings.

Weighting of sub-items

Aim: To calculate a weighting of the infrastructure types based upon the responses to *Infrastructure /system in use*.

Description: None; auto-calculated.

The purpose is to assign a 'n/a' weighting to any types that are not in use, and therefore exclude them from the ratings.

The weighting is calculated by counting the number of infrastructure types in use, and then dividing by that count. This is calculated separately for both the current situation and the future plans.

Formula:

Weighting of subitems

$$= \frac{1}{\sum_{\text{Infrastructure of authorised bodies}} \text{Infrastructure in use (yes)}}$$

PART 2: ASSESSMENT OF THE RULES AND GENERAL SYSTEMS

There are a number of items involved in the Assessment. The rules and general systems items are described in the following sections:

- Legal framework for vehicles

- Import restrictions
- Authorisation scheme for PTI operator
- Infrastructure of authorised bodies
- Minimum service requirements and Key Performance Indicators (KPIs) for service and quality
- Responsibility for PTI programme
- Responsibility for road safety policy and programme
- Vehicle database

It is important to note that examples mentioned in the description for each item are to be used as indicative examples, for inspiration, and are not an exhaustive list of how an item might be achieved. The specific requirements are listed under the star levels.

Rules & general systems items

Legal framework for vehicles

Aim: To assess the technical requirements and legal framework for vehicle inspection.

Description: This concerns the legal definition of vehicle categories, and how those vehicles should be inspected; i.e. the national or international regulations that are used. It also includes assessment of small series production vehicles, and the handling of changes. The purpose is to encourage a wider adoption of international regulations in order to achieve a standardised global approach.

Examples include the Motor Vehicles Act in India (MoRTH, 1988), as well as work on roadworthiness standards by the African Organisation for Standardisation (ARSO) to which CITA has contributed¹.

Requirements:

- 1*: Local regulation covers minimum technical requirements to use the vehicle (no reference to international standard/legislation)
- 2*:
 - Technical requirements checked in national approval system;
 - Certificate to allow sale in the market
- 3*: Local regulation requires WP29 (1958 agreement) type approval regulations or Certificate of Conformity (CoC)
- 4*:
 - WP29 (1958+1998 agreements) type approval regulations;
 - Procedures for approval of small series;
 - Procedures for handling changes

¹ <https://www.arso-oran.org/>

- 5*: Each model is inspected to check compliance with PTI procedures and tests

Import Requirements

Aim: This is to provide some vehicle roadworthiness checks on vehicles that are imported to ensure their fitness in use.

Description: It is important to ensure that any vehicles imported are fit for use on the road, both for new and used vehicles. The import restrictions that may be used by a country include regulation for imported vehicles (the rules around what vehicles can be imported), and port of entry inspection (the inspection process as part of the import). These are both assessed separately.

Requirements: Defined in Table 9.

Example: Europe is a common market so that import of vehicles between countries within the European market, are not really import. Therefore, for Europe, the scoring will only describe the regulation and procedures for vehicles imported from countries outside Europe.

Table 9: Import requirements

Sub item	1*	2*	3*	4*	5*
Regulation for imported vehicles	Almost no rules on fitness of the vehicle	Some rules based on age or emissions levels	Certification of Conformity (CoC)	PTI prior to import or part of the import process	Anti-fraud measures (mileage, etc.)
Port of entry inspection	- Customs documentation check; - Simple port of entry inspection.	Valid PTI from exported country	Advanced port of entry inspection, including identification (modifications, history)	PTI prior to export and port of entry inspection/PTI	Regulation to prevent import of used vehicles

Authorisation scheme for PTI operator

Aim: To ensure that vehicle inspections are only carried out by authorised operators.

Description: There is a need for the operators providing PTI services to be authorised by some external independent process, to help provide impartiality and avoid risks of corruption. This item assesses that authorisation of PTI operators.

Requirements:

- 1*: External authorisation required only for operators (self-certification of stations and employees)
- 2*: External authorisation required for stations (self-certification of employees)

- 3*: External authorisations required for inspectors & stations & operators & other bodies (training, supervision, etc.)
- 4*: Real-time confirmation granted to perform an inspection
- 5*: Centralised monitoring of authorisations and external certification by authorised/accredited or governmental body

Infrastructure of Authorised Bodies

Aim: To assess the infrastructure model, or mix of models, of the authorised bodies/organisations involved in the PTI within the country.

Description: Vehicle periodical inspection is an Authority activity that can be managed in several different ways but always requires the appropriate arrangements on the governmental side. It is crucial to take into consideration which Authority bodies are involved. The body assigned to administer or manage vehicle inspection will often be an agency. That agency shall be accordingly empowered to manage supervisors, operators and promote good practices between stakeholders, vehicle owners and drivers. There may be one or models used for the infrastructure of the authorised PTI bodies in a country:

- **Public organisation:** a central authority. This may be suitable for countries setting up a PTI system.
- **Monopoly:** a single provider (other than a public organisation). This typically provides the greatest level of uniformity of standards and consistency in the application of the test
- **Hybrid system (limited number of specialised operators):** the service supervisor determines that they will execute the service as well as authorise a number of franchisees to operate, perhaps, giving each of their franchisees a defined territory.
- **Competitive market:** a liberalised market of specialised PTI operators
- **Competitive market:** a liberalised market of repair shops

There is a fuller discussion of the pros and cons of these models in CITA Recommendation 20 (CITA, 2017).

This item of the assessment helps to identify which of those are used, and their quality against the star levels.

Any sub-items/systems that are not in use in the country, for example because their implementation would not suit the local conditions/market, can be marked as n/a so that they are not counted as part of the scoring. In this way, only the systems that are actually required/implemented are actually assessed.

Requirements: Defined in Table 10.

Table 10: Infrastructure of authorised bodies

Sub item	1*	2*	3*	4*	5*
Public organisation	Enough capacity for the market fleet	Benchmark on quality and production system	Development of competences (new vehicle technologies)	Opportunity to request a second opinion	n/a
Monopoly (other than a public organisation)	Selection process with clear requirements (competence, experience, financial, technical capacity, etc.).	Supervision from the authority; Benchmark on quality and production system	Development of competences (new vehicle technologies)	Operator and authority cooperate on improvements to inspection content or methodology	Impartial confirmation of quality management, similar to ISO 17020 accreditation
Hybrid system (limited number of specialised operators)	Area coverage rules	Supervision from the authority; Common inspection methods	Development of competences; Rejection rate uniformity	Operator and authority cooperate on improvements to inspection content or methodology	Accreditation to ISO 17020 type A
Competitive market (specialised PTI operators)	Limited set of rules about equipment and inspection content; Area coverage rules	Complete set of rules and common inspection methods; Basic supervision	Development of competences (inspection methodology, new vehicle technologies); Rejection rate uniformity	High involvement of national authority in supervision	Accreditation to ISO 17020 type A
Competitive market (repair shops)	Limited set of rules about equipment and inspection content; Area coverage rules	Rules for impartiality (e.g. separate persons for inspection and repair) and common inspection methods	Maintenance/improvement of competences in inspection methodology; Rejection rate uniformity	High involvement of national authority in supervision	Accreditation to ISO 17020 type B or C

Responsibility for PTI programme

Aim: To ensure that every inspection is performed well by giving the inspectors and stations the accountability for inspections.

Description: This concerns who has the responsibility that every inspection is performed well and the responsibility for the supervision system. The basic requirement (1*) is providing the inspectors the accountability/responsibility for the inspections. At higher levels the responsibility is also taken by supervising bodies, reporting to a central authority or being assessed against an accreditation scheme.

Requirements:

- 1*: Operators are responsible for the inspections
- 2*:
 - Stations are responsible;
 - Local authorities are in charge of supervision
- 3*:
 - Inspectors are personally responsible;
 - National authority defines the supervision scheme
- 4*: Supervising body(ies) reporting to the central authority
- 5*: Accreditation scheme

Minimum service requirements and Key Performance Indicators for service and quality

Aim: To ensure that there are appropriate performance measures in place to provide the PTI services to the required quality standards

Description: This aims to assess the resources and procedures used to assess the PTI services against relevant minimum requirements / KPIs. The KPIs are essential to provide monitoring of the services and to help identify quality problems in order to take appropriate corrective actions.

Requirements:

- 1*: Service and quality requirements and appropriate KPIs defined
- 2*: Resources and procedures in place for periodic follow-up of requirements and KPIs
- 3*: Something between 2* and 3*
- 4*: Resources, procedures and mandate in place to ensure efficient corrective actions from operators
- 5*: Resources and procedures for continuous improvements of the PTI programme

Responsibility for road safety policy and programme

Aim: to ensure that the roadworthiness of vehicles is integrated with the road safety policy and plans for the country, in particular that responsibilities are defined.

Description: The parties with the responsibility for the roadworthiness system, its different parts, and their improvements, should be clearly defined. Since vehicle inspection should be part of a comprehensive road safety and environmental protection approach, these are typically the departments and agencies involved, as well as those related to such activities. The departments involved have relationships with the following activities:

- Vehicle registration
- Road police
- Customs control related to the entering of both new and used vehicles into the country
- Taxation department
- Departments in charge of Workshops, to ensure that identified vehicle defects can be repaired
- Departments related to big-fleet management and operators
- Governmental communications
- Transport policy and regulation, particularly for safety and emissions
- Training
- IT

Requirements:

- 1*: Defined responsibility for some parts
- 2*: Defined responsibility for most parts
- 3*: Defined responsibility for all parts
- 4*: Inter-governmental periodical follow-up and KPIs assessment about roadworthiness policy
- 5*: Procedures for continuous improvements of the PTI scheme

Vehicle database

Aim: To assess the quality of the database about vehicles and their PTI status and ensure that good quality data is being used to manage the PTI system.

Description: This concerns the central database of vehicles with data related to each vehicle. At the basic level (1*) the database may exist, but is perhaps poorly filled.

The database can include a lot more data that is practical for other stakeholders. Examples include: insurance, vehicle taxes and if they are



paid, ownership, detailed history, number of previous owners etc. All this is only informative (for PTI-oriented people) and is not be a requirement for 3*.

At the higher level (5*) this is a high-quality, well-filled and accurate database containing a wealth of information about the vehicles and their PTI status/needs, which can form the basis for reporting and planning for the future.

Requirements:

- 1*: Database exists, but noticeable proportion of vehicles not registered
- 2*: National centralised database, "all" vehicles registered
- 3*: Database includes technical data, modifications
- 4*: - PTI results integrated in the registration database;
- Check of the vehicle/registration data prior to PTI
- 5*: Database records PTI history (owners, origin, modifications, collisions, PTI results, milage, participation of recalls, etc)

Input data required

Requirements

Aim: This rating aims to assess how well the item is addressed in the mandatory standards or national rules/regulations as a set of requirements.

Data required: Enter the star level against each item according to the current requirements of the mandatory standards or national rules. The Assessment Team review the information about national rules, regulations, and standards regarding the item. These are rules/standards as defined or agreed/authorised by the government. The Assessment Team makes an assessment of what star level the item scores. Sometimes there is evidence from documentation of what is achieved, and sometimes an element of interpretation and expert judgement is required if the documentation does not exactly match the requirements of the star levels. The star levels define the required standards to be achieved for each star level rating, and are listed above against each item individually. At least some or all of these items must be achieved to score at each given star level; it should be treated as AND/OR. If there is insufficient evidence to indicate an inspection system is providing at least 1* performance, then it scores 0. If there are no regulations or standards in place at all, then it should score 0.

Progression to the next star level is additive; all the prior star levels must be fulfilled first. For example, to achieve a 5* score this requires the 1* to 4* items are fulfilled, plus new requirements for 5* in addition.



Example: A country that has *requirements* for a national, centralised database of all vehicles will score 3*.

Implementation

Aim: This rating aims to assess the implementation of the rules for the item in reality.

Data required: Enter the star level against each item according to the current implementation in reality of the national rules. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the reality of implementation (what is actually carried out), not on what the rules state.

Example: A country that has requirements for a national, centralised database of all vehicles will score 3* for *requirements*. However, if in reality it is not well implemented and a large portion of the vehicles are missing, the *Implementation* will be 1*.

Future

Aim: This accounts for any future plans to make enforcement changes that are not yet implemented. It allows a representation of the future goals.

Data required: Enter the star level against each item according to the future (within five years) implementation of the national rules. In general, the improvements should demonstrate changes in both the requirements/standards and in their actual implementation. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out, and evidence recorded.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the future plans and changes, not on what the rules state.

Example: A country that has requirements for a national, centralised database of all vehicles will score 3* for *requirements*. If there are future plans to improve the database by adding more fields (owners, origin, modifications, collisions, PTI results, milage, participation of recalls, etc) and a registration check, then the score for *Future* would be 5*.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the assessor to make notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, for example outlining plans to extend and improve the central vehicle database. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Total number of items filled

Aim: To record the number of items entered in the *Requirements*.

Data required: None; auto-calculated.

Description: This is used as check that all items are completed with a score in the *Requirements* column.

Example: The *total number of items* should be 13 to achieve a completed table.

Items marked N/A

Aim: To record the number of items entered in *Current: Infrastructure / system in use* marked only as N/A.

Data required: None; auto-calculated.

Description: This is used to count the number of infrastructure sub-items that are marked as N/A. This option is only allowed to be selected in the *infrastructure of authorised bodies* sub-items.

Example: If all *infrastructure of authorised bodies* sub-items are marked as N/A, apart from the public organisation (1 item) marked as yes, then the *Items marked N/A* would be 4.

Items with standards/rules (scoring >0)

Aim: To record the number of items entered in *Requirements* marked with a score greater than zero, indicating that a regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score greater than zero, indicating that a regulation/standard is in place.

Example: If all items score greater than 0, apart from the Authorisation scheme for PTI operator, then the *Items with standards/rules* would be 12.

Items with no standards/rules (or scoring 0)

Aim: To record the number of items entered in *Requirements* marked with a score equal to zero, indicating that no regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score equal to zero, indicating that no regulation/standard is in place.

Example: If all items score greater than 0, apart from the Authorisation scheme for PTI operator (1 item), then the *Items with no standards/rules* would be 1.

Share of items covered by regulations

Aim: To describe the proportion of items covered by the regulations as a percentage indicator, and to encourage progress towards 100%.

Data required: None; auto-calculated.

Description: This describes the proportion of items with regulations/standards, or scoring greater than zero in the *Requirements* column, as a percentage of the *Total number of items*.

Example: The *total number of items* should be 13 to achieve a completed table. If all items score greater than 0, apart from the awareness campaigns, then the *Items with standards/rules* would be 12. The *share of items covered by regulations* is 12 out of 13 as a percentage.

Formula:

$$\text{Share of items covered by regulations} = \left(\frac{\text{Items with standards/rules}}{\text{Total number of items}} \right) \times 100$$

The above parameters are summarised in a short table in the Tool, and an example is given in Table 11.

Table 11: Example summary table to check coverage of the rules and general systems items.

	Example
Total number of items	13
Items with standards/rules (scoring >0)	8
Items with no standards/rules (or scoring 0)	1
Items marked N/A	4
Share of items covered by regulations	61.5%

Importance weighting

Aim: This is to weight/prioritise the items under assessment for rules and general systems according to CITA experience.

Data required: None; reference values.

Description: This is a weighting of the different items. This is to weight/prioritise the items in terms of their impact and importance. It is a reference for the current situation at the time of the Assessment.

The importance weighting gives rise to a scalar used in the ratings, to allow for the maximum possible score that is possible throughout the range of items/sub-items for the section.

Example: All items are currently weighted equally with 1 point, because all items have an equal part to play in the rules and general systems.

Weighting of sub-items

Aim: To allow grouping of sub-items to be weighted, so that the correct balance is achieved for the main items.

Data required: None; auto-calculated.

Description: This is a weighting of the sub-items to allow a group at the level of the main items. If there are multiple sub-items that relate to one main item then this weighting can allow a proportional sharing between them to sum to the one main item. It prevents an over representation of the importance of a main item if it is broken down into multiple sub-items. The exception is the infrastructure of authorised bodies. Because it is perfectly allowed that only one, or a combination, of these items is actually used, then an n/a option is allowed. In this case, if the sub-item is marked as n/a, then no weighting is assigned, which effectively removes it from the scoring; it would be unreasonable to score against a sub-item that would not suit the local situation of the country.

Example: For the rules and general systems items most rows are equally important, so most sub-items have a *weighting of sub-items* of 1. The two sub-items under import restrictions are both weighted as 0.5. If only the hybrid system and competitive market of repair shops are used, then they will be rated as 0.5 each. The other three options for *infrastructure of authorised bodies* (public organisation, monopoly, and competitive market of specialised operators) will be marked as n/a in Current: Infrastructure / system in use and then scored as n/a for the *weighting of sub-items*, removing them from the scoring entirely.

Maximum possible score for the item

Aim: To record the maximum star rating possible for each item (or sub-item) of the assessment of rules and general systems.

Data required: None; auto-calculated.

Description: This is the maximum star rating possible for each item of the assessment of rules and general systems.

Example: For *vehicle database* the possible star ratings can be 1*, 2*, 3*, 4*, or 5*. 5 is the *maximum possible score for the item*.

Normalise to 1-5 scale

Aim: To normalise the scales up to five, for any items that can only score less than 5*.

Data required: None; auto-calculated.

Description: This normalisation is used to make sure every item in the assessment can be assessed on a scale up to 5, to allow them to be equally treated. If the items can only score less than 5*, then it is more important that these lower scores are achieved, so they are scaled up to ensure comparability with items that can score up to 5.

If the maximum possible score is 5, then the normalisation is 1, which is the case for the majority of items.

Example: For port of entry inspection there is only 4* available to score, so the normalisation value is set to 1.25 to scale the score up to make the scale match the other items.

Requirements Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale* of the item to the *requirements score*.

Data required: None; auto-calculated.

Description: The *requirements score* is used, and is multiplied by the factors for importance *weighting, weighting of sub-items*, and *normalise to*

1-5 scale. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 3 for the *requirements* against *vehicle database*, then the *Requirements Rating (weighted and normalised)* will remain 3. This is because the *importance weighting* of the item is 1, the *weighting of sub-items is 1*, and the *normalise to 1-5 scale is 1*.

Implementation Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale* of the item to the *implementation rating*.

Data required: None; auto-calculated.

Description: The *implementation* score is used, and is multiplied by the factors for importance *weighting, weighting of sub-items*, and *normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 1 for the *implementation rating*, then the *Implementation Rating* will remain 1 given that the *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale* of the item are all 1.

Future Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale* of the item to the *future rating*.

Data required: None; auto-calculated.

Description: The *future* score is used, and is multiplied by the factors for importance *weighting, weighting of sub-items*, and *normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 5 for the *future rating*, then the *Future Rating* will remain 5 given that the *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale* of the item are all 1.

Rows correctly filled

Aim: To provide an indicator of the number of rows correctly filled.

Data required: None; auto-calculated.

Description: This counts the number of rows correctly filled in each of the tables in:

- Part 1: Assessment of the infrastructure of authorised bodies
- Part 2: Assessment of the rules and general systems

If there are blanks, then an error message is displayed above the table.

The purpose is to ensure that all rows are correctly filled, so that the ratings calculations will work.

Averages (weighted and normalised)

Aim: To average the scores per item of the rules & general systems section.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the assessment by summing the points scored for each item. Each is then scaled by dividing by the maximum available points.

There are three averages calculated:

- *Requirements rating*; for whether the items are required or not and used to show the standards/legislated requirements. It contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\text{Average requirements rating} = \frac{\text{Sum of Requirements Rating scores}}{\text{Number of items}}$$

Where:

$$\begin{aligned} &\text{Sum of Requirements Rating scores} \\ &= \sum_{\text{items}} \text{Requirements rating score} \end{aligned}$$

- *Implementation rating*; for whether the items are regularly implemented in reality. It contributes to the 'orange' *Implementation rating* in the spider diagram.

Formula:

$$\begin{aligned} &\text{Average implementation rating} \\ &= \frac{\text{Sum of Implementation Rating scores}}{\text{Number of items}} \end{aligned}$$

Where:

$$\begin{aligned} &\text{Sum of Implementation Rating scores} \\ &= \sum_{\text{items}} \text{Implementation rating score} \end{aligned}$$

- *Future rating* (within 5 years); used to show whether there are plans to implement the items in the future, even if not currently implemented. It contributes to the 'purple' *Future rating* in the spider diagram.

Formula:

$$\text{Average Future rating} = \frac{\text{Sum of Future Rating scores}}{\text{Number of items}}$$

Where:

$$\text{Sum of Future Rating scores} = \sum_{\text{items}} \text{Future rating score}$$

S3 VEHICLE SCOPE

This section of the AVIS covers the scope of vehicles that are assessed. The purpose is to encourage the greatest possible volume of vehicles to be assessed for each vehicle category, so that the inspections can help to ensure the fleet is well maintained in terms of safety, emissions, security for example. The section of the Assessment is divided into two parts:

- Part 1: Assessment of vehicle scope
- Part 2: Extended assessment of vehicle scope

PART 1: ASSESSMENT OF VEHICLE SCOPE

The main purpose of this section is to assess the volumes of each vehicle category that are assessed. There are two methods to choose from, depending upon what level of quality of data is available:

- **UNECE classification.** An internationally recognised categorization of vehicles, and the greater level of detail known about the vehicle fleet. The full 4 points are available.
- **Simple classification.** A smaller number of vehicle categories that are more descriptive. This is to be used if the UNECE category data is not available. The scoring in this method is capped to 2 points to encourage an improvement in the fleet data available, because a good understanding of the national fleet is the basis for inspection and enforcement.

Input data required

Required inspections for 20-year period

Aim: This is used as the key measure of how often vehicle inspections are required.

Data required: Enter the number of required inspections in a 20-year period, per vehicle category at the time of the inspection. These may be required by regulations or standards. The pattern of the inspections is irrelevant. Which body/company carries out the inspections is also irrelevant (e.g. whether it is PTI companies, garages, workshops etc).

Example: A country that requires a vehicle inspection after three years, and then annually thereafter, would have 17 inspections in the 20-year period. Please see Annex 1 for more examples.

Market fleet absenteeism

Aim: This is an important measure of how many vehicles are inspected in reality.

Data required: Enter the percentage of the fleet that do not get inspected regularly, per vehicle category at the time of the inspection. This can be

rounded to the nearest 5% if more accurate data is not available. If the data is unavailable (e.g. from a database) then an appropriate estimation method may be used.

Example: If there are 50,000 2 & 3 wheelers, and only 40,000 of them are inspected at the time required, then the absenteeism is 20%.

Relevant formulae:

$$\begin{aligned} \text{Market fleet absenteeism} \\ = 100 - \text{Inspection attendance for the vehicle category} \end{aligned}$$

Where:

$$\begin{aligned} \text{Inspection attendance for the vehicle category} \\ = \left(\frac{\text{Number of vehicle attending for inspection}}{\text{Total vehicles in the vehicle category}} \right) \times 100 \end{aligned}$$

Future market fleet absenteeism

Aim: This is designed to assess any future changes to vehicle inspections within the next five years, in order to reflect any plans to improve/decrease market fleet absenteeism that are not yet implemented.

Data required: Enter the percentage market fleet absenteeism from inspections for the future, per vehicle category.

Example: If there is currently absenteeism of 20% in the 2 & 3 wheelers category, this might be reduced by an enforcement program to be implemented in a year's time. This program will have been planned and its effectiveness estimated, for example in a cost-benefit analysis. This might demonstrate that it will reduce absenteeism from 20% to 5%. In this example the future market fleet absenteeism would be 5% for the 2 & 3 wheelers category.

Example: The study by the European Commission on the inclusion of light-trailers and two- or three-wheel vehicles in the scope of periodic testing is a good example of an evaluation of different options using a cost-benefit analysis (European Commission, 2019).

Future inspections for 20-year period

Aim: This is designed to assess any future changes to vehicle inspections within the next five years, in order to reflect any plans to improve/increase frequency of inspections that are not yet implemented.

Data required: Enter the number of required inspections for the future, per vehicle category.

Example: If there is currently a requirement for an inspection every five years in the 2 & 3 wheelers category, this might be improved by increasing the number of inspections required. For example, it might increase to annual inspections from now, starting in two years' time. This program will have been planned and its effectiveness estimated, for example in a

cost-benefit analysis. In this example the future inspections for 20-year period would be 20 for the 2 & 3 wheelers category.

Example: The study by the European Commission on the inclusion of light-trailers and two- or three-wheel vehicles in the scope of periodic testing is a good example of an evaluation of different options using a cost-benefit analysis (European Commission, 2019).

Importance weighting

Aim: This allows the Assessor to enter an importance weighting representing the scale of casualties per vehicle category.

Data required: A weighting value based upon a relevant source of casualty data. This can be any integer (e.g. number of casualties), or a percentage (e.g. share of total casualties).

Description: This importance weighting allows the assessor to weight based on casualty data. This is important because it may be that one particular vehicle category is most commonly found on the roads, but has least casualties associated. Or conversely, perhaps there is a rarer vehicle category that has the highest casualties.

Fatalities, Killed and Seriously Injured casualties (KSIs), or all casualties including slight injuries are all appropriate measures. The best fit for describing the situation in the country and the focus of future action on improving vehicle roadworthiness should be selected and the source data should be recorded.

An appropriate source of data should be used. Some examples of data sources, in prioritised order, are:

- National casualty statistics specific to the country under assessment
- National casualty statistics for another country with a similar vehicle fleet and road casualty distribution
- National casualty statistics for another similar high/middle/low-income country
- National casualty statistics for another country in the same geographical region (e.g. from the same continent)
- Regional casualty statistics (e.g. European statistics instead of the individual country)

Annex 3 contains some relevant casualty data examples. In the absence of any specific national data, the closest match from Annex 3 could be used. The importance weighting gives rise to a scalar used in the ratings, to allow for the maximum possible score that is possible throughout the range of items/sub-items for the section. Given that the data used could be large integers, or a percentage, this scalar is designed to allow for this variation.

Example: For the example each vehicle category is assumed to be equally weighted at 1. In reality, there are likely to be variations, e.g. motorcycle casualties being more frequent than other vehicle categories.

Requirements

Aim: This is the rating of the required inspections for each vehicle category.

Data required: Enter the star rating according to the number of inspections required by standards/rules by selecting from the *Reference values for number of required inspections in 20-year period for each type of vehicle*.

Description: This allows the assessor to enter the star rating, focusing on the regulations/standards that make requirements for inspection of each vehicle category. The *Required inspections for 20-year period* should be compared to the *Reference values for number of required inspections in 20-year period for each type of vehicle* to select the correct star level. Zero points are given if the 1* level is not met. The points are then assigned when each threshold is passed for the star level. The *country market fleet* is not yet incorporated at this stage.

Example: If a Two-Wheel Motorcycle is required to be inspected annually after it is five years old, then it will be required to have 15 inspections in a 20-year period. 15 inspections is greater than the 3* value (12), but not yet exceeding the value for 4* (16 inspections). The *Requirements* rating for a Two-Wheel Motorcycle in this example would be 3.

Implementation

Aim: This is the rating of the inspections for each vehicle category that are actually implemented in reality.

Data required: Enter the star rating according to the number of inspections that are actually implemented by selecting from the *Reference values for number of required inspections in 20-year period for each type of vehicle*.

Description: This allows the assessor to enter the star rating, focusing on the reality of implementation in the country for inspection of each vehicle category. The number of inspections actually implemented per vehicle category should be compared to the *Reference values for number of required inspections in 20-year period for each type of vehicle* to select the correct star level. Zero points are given if the 1* level is not met. The points are then assigned when each threshold is passed for the star level. The *country market fleet* is not yet incorporated at this stage.

Example: If a Two-Wheel Motorcycle is required to be inspected annually after it is five years old, then it will be required to have 15 inspections in a 20-year period. However, if the evidence indicates that only 5 inspections are actually carried out regularly, then the *Implementation* rating for a Two-Wheel Motorcycle would be 1.

Future

Aim: This accounts for any future plans to make inspection changes that are not yet implemented, such as by reducing absenteeism, and/or increasing inspection frequency. It allows a representation of the future goals for the country's inspection systems.

Data required: None; auto-calculated.

Description: This records the score per vehicle category based on the future situation within the next five years. The points are calculated using the same method as the Requirements, but instead uses the future values instead of the values for the current situation. It uses the *Future market fleet absenteeism* and *Future inspections for 20-year period*.

Example: Continuing the same example for 2 & 3 wheelers, because they are by far the largest market share (50,000 of 69,000 vehicles; 72%) the country has decided to prioritise inspection efforts on this vehicle group. They have evaluated various proposal using a cost-benefit analysis and have selected firstly to decrease absenteeism to 5% by using an enforcement program starting in one year, so *future market fleet absenteeism* is 5%. Secondly, they will increase the required inspections from 15 to annually from new, so *future inspections for 20-year period* is 20. The fleet of 50,000 2 & 3 wheelers scores the full 4* level for future required inspections.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the assessor to makes notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, for example outlining plans to extend and improve the central vehicle database. The time and date of the meeting, and the name of the representative should be



noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Choice of type of vehicle classification and fleet data to be used in assessment:

Aim: To remind the assessor which vehicle classification was selected.

Data required: None; reference values.

Description: This is a reference to G3 Basic Data Part 2: Inspection data per vehicle category. It serves as a reminder to the Assessor of which classification was selected. The choice can be changed in G3 Basic Data Part 2: Inspection data per vehicle category.

Country market fleet

Aim: To reference the fleet data entered in G3 Basic Data.

Data required: None; reference values.

Description: This is a reference to G3 Basic Data Part 2: Inspection data per vehicle category. The fleet data can be edited in G3 Basic Data Part 2: Inspection data per vehicle category.

Market share of vehicle categories

Aim: To weight the ratings according to their market share per vehicle category, to help weight the ratings according to these vehicle categories that are most commonly found on the roads.

Data required: None; auto-calculated.

Description: This is a calculation of market share per vehicle category, out of the Total country fleet. It is used to weight the ratings according to the volumes of vehicles on the road, so that, for example, the largest vehicle category could be identified and focused upon.



Example: If there are 50,000 2 & 3 wheelers from a total fleet of 69,900 vehicles in a country, then this is a 72% market share.

Reference values for number of required inspections in 20-year period for each type of vehicle

Aim: The reference values for a 1*, 2*, 3*, or 4* number of required inspections in a 20-year period for each vehicle category are presented for reference.

Data required: None; reference values.

Description: The reference values are given in Table 12 below. These indicate the number of required inspections in a 20-year period per vehicle category. This may be used as an indicator of the target number of inspections needed to progress to the next star* level and increase the score in the overall spider diagram.

The basic 1* level is for an inspection to occur at some time within the 20 years. The 2* and 3* then increase that requirement, working up to 4* at a higher level, which is more in line with that required in the European Directive.

The values are derived from the CITA General Questionnaire 2020/21 (CITA, 2021). This is a survey covering the most relevant topics for Periodic Technical Inspection. Once collected and consolidated, these data provide an overview of the PTI system in the participating countries. The available data are presented in the form of a country card containing the information received for each country. See Annex 2 Reference inspection data from CITA survey for more information about the survey and how the star reference values were derived.

For the Simple Classification the same reference values were used as the UNECE Classification by selecting the best matching vehicle category. For example, the heavy-duty passenger vehicles use the same reference values as M3 Bus or Coach.

Table 12: Reference values for number of required inspections in 20-year period for each type of vehicle

UNECE Vehicle category		Reference values for number of required inspections in 20-year period for each type of vehicle			
		*	**	***	****
Passenger Cars and Buses	M1 Private	inspected	8	12	16
	M1 Commercial	inspected	8	19	30
	M2 Small Bus	inspected	13	26	38
	M3 Bus or Coach	inspected	17	28	39
Trucks	N1 Van	inspected	8	14	20
	N2 Medium Goods Vehicle	inspected	17	24	32
	N3 Heavy Goods Vehicle	inspected	17	24	32
Trailers	O1 Very Light Trailer	inspected	6	11	16
	O2 Light Trailer	inspected	9	16	23
	O3 Medium Trailer	inspected	9	16	23
	O4 Heavy Trailer	inspected	9	16	23
Mopeds, Motorcycles and Quadricycles	L1e Light Two-Wheel Powered Vehicle	inspected	8	12	16
	L2e Three-Wheel Moped	inspected	8	12	16
	L3e Two-Wheel Motorcycle	inspected	8	12	16
	L4e Two-Wheel Motorcycle with Side-Car	inspected	8	12	16
	L5e Powered Tricycle	inspected	8	12	16
	L6e Light Quadricycle	inspected	8	12	16
L7e Heavy Quadricycles	inspected	8	12	16	
Simple Classification of vehicle categories		*	**	***	****
2 & 3 wheelers		inspected	8	12	16
Light duty private vehicles		inspected	13	26	38
Light duty commercial vehicles		inspected	8	14	20
Heavy duty passenger vehicles		inspected	17	28	39
Heavy duty freight vehicles		inspected	17	24	32

Requirements rating weighted by fleet volume

Aim: This takes the proportion of the vehicle type in the overall fleet into account.

Data required: None; auto-calculated.

Description: This is a calculated field, showing the number of points scored per vehicle category at the time of the assessment. It takes the *Requirements* and weights by the *Market share of vehicle categories* and the *Importance weighting*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If there are 50,000 2 & 3 wheelers from a total fleet of 69,900 vehicles in a country, then this is a 72% share. The score of 3 from the



Requirements rating is scaled down by that 72% weighting to 2.15, and then multiplied by 1 for the *Importance weighting*. A scalar is then used to allow for the maximum possible scores achievable by all the different vehicle categories, and the resulting rating is 10.75. This is higher than 5 because the motorcycles represent the majority of the vehicles in use; other categories will have ratings less than 5.

Formula:

$$\begin{aligned} & \text{Requirements rating weighted by fleet volume for a vehicle category} \\ &= \text{Requirements by vehicle category} \\ & \times \text{market share of vehicle categories} \times \text{importance weighting} \\ & \times \text{scalar} \end{aligned}$$

Implementation rating weighted allowing for absenteeism

Aim: This is a representation of the reality of how often vehicles in each category are actually inspected and takes both the market share and the market absenteeism into account.

Data required: None; auto-calculated.

Description: This is a calculated field, showing the number of points scored per vehicle category at the time of the assessment. It takes the *Implementation* and weights by the *Market share of vehicle categories*, the *Importance weighting*, and the *Market fleet*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items. Example: If there are 50,000 2 & 3 wheelers from a total fleet of 69,900 vehicles in a country, then this is a 72% share. The score of 1 from the *Implementation* rating is scaled down by that 72% weighting to 0.72, and then multiplied by 1 for the *Importance weighting*. This is multiplied by the market share of 72%, and then a scalar is then used to allow for the maximum possible scores achievable by all the different vehicle categories. If the market fleet absenteeism is 10% then the resulting rating is 3.2.

Formula:

$$\begin{aligned} & \text{Implementation rating weighted allowing for absenteeism for a vehicle category} \\ &= \text{Implementation by vehicle category} \\ & \times \text{market share of vehicle categories} \times \text{importance weighting} \\ & \times \text{market fleet absenteeism} \times \text{scalar} \end{aligned}$$

Example: Continuing the same example for 2 & 3 wheelers, because they are by far the largest market share (50,000 of 69,000 vehicles; 72%) the country has decided to prioritise inspection efforts on this vehicle group. They have evaluated various proposal using a cost-benefit analysis and have selected firstly to decrease absenteeism to 5% by using an enforcement program starting in one year, so *future market fleet absenteeism* is 5%. Secondly, they will increase the required inspections from 15 to annually from new, so *future inspections for 20-year period* is 20.

The calculation steps above are repeated, but use the future values instead of the values for the current situation.

Future rating

Aim: This accounts for any future plans to make inspection changes that are not yet implemented, such as by reducing absenteeism, and/or increasing inspection frequency. It allows a representation of the future goals for the country's inspection systems.

Data required: None; auto-calculated.

Description: This is a calculated field, showing the number of points scored per vehicle category for the future planned vehicle scope within 5 years. It takes the *Future* score and weights by the *Market share of vehicle categories*, the *Importance weighting*, and the *Future market fleet absenteeism*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: The fleet of 50,000 2 & 3 wheelers scores the full 4* level for future required inspections. This is scaled by 72% to represent the weighting by fleet volume, then by 95% to allow for the future absenteeism being reduced to 5%, which gives a *future rating* score of 1.36.

Formula:

$$\begin{aligned} & \textit{Future rating for a vehicle category} \\ & = \textit{Future inspections for 20 year period} \\ & \times \textit{market share of vehicle categories} \times \textit{importance weighting} \\ & \times (1 - \textit{Future market fleet absenteeism}) \times \textit{scalar} \end{aligned}$$

Weighted averages

Aim: To average the scores per vehicle category, which will form a part of the vehicle scope score.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the rating by summing the points scored for each vehicle category. If the UNECE vehicle categories are used then these rows are averaged, or if the Simple Classification of vehicle categories are used then these rows are averaged instead.

The averages are calculated for:

- *Requirements rating weighted by fleet volume*; it contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\begin{aligned} & \textit{Requirements weighted average} \\ & = \frac{\sum_{\textit{vehicle category}} \textit{Requirements rating weighted by fleet volume}}{\textit{Number of vehicle categories}} \end{aligned}$$

- *Implementation rating weighted allowing for absenteeism*; it contributes to the ‘orange’ *Implementation rating* in the spider diagram.

Formula:

Implementation weighted average

$$= \frac{\sum_{\text{Vehicle category}} \text{Implementation rating weighted allowing for absenteeism}}{\text{Number of vehicle categories}}$$

- *Future rating*; it contributes to the ‘purple’ *Future rating* in the spider diagram

Formula:

$$\text{Future weighted average} = \frac{\sum_{\text{Vehicle category}} \text{Future rating}}{\text{Number of vehicle categories}}$$

A maximum of four points is available for countries making the assessment based on UNECE vehicle categories. A maximum of two points is available for countries making the assessment based on the Simple Classification. The reason for this is to encourage a move towards a more detailed knowledge of the vehicle fleet, which is needed to apply enforcement and decrease the absenteeism. The final step, if using the simple classification, is to divide the ratings by 2.

Table 13: Available points per star level for Requirements rating by vehicle category

Reference value for number of inspections	Points available	
	UNECE Classification	Simple Classification
4*	4	2
3*	3	1.5
2*	2	1
1*	1	0.5
<1*	0	0

Country specific capacity

Aim: This calculates how many inspections are needed annually, based on the vehicle fleet per category. It is used to help estimate the total number of inspections needed (capacities).

Data required: None; auto-calculated.

Description: The size of the fleet, per vehicle category, is multiplied by the inspections required annually. To find the annual requirement this is divided by 20. Note that this is only concerning ‘regular’ inspections; no re-inspections following a failure are included.

Example: In the simple classification of vehicle categories, if there are 3,000,000 2&3-wheelers, that have 8 inspections over a 20-year period, then 1,200,000 inspections are required annually.

Formula:

$$\text{vehicle fleet size per category} \times \left(\frac{\text{number of inspections}}{20} \right)$$

Theoretical capacity required annually

Aim: This calculates, per star level, theoretically how many inspections are needed annually, based on the vehicle fleet per category. It is used to help estimate the total number of inspections needed (capacities).

Data required: None; auto-calculated.

Description: The size of the fleet, per vehicle category, is multiplied by the inspections required annually. The inspection requirements over a 20-year period are defined in the star levels, so to find the annual requirement this is divided by 20. Note that this is only concerning 'regular' inspections; no re-inspections following a failure are included.

Example: In the simple classification of vehicle categories, if there are 50,000 2&3-wheelers, that have 16 inspections over a 20-year period at the 4* level, then 40,000 inspections are required annually.

Formula:

$$\text{vehicle fleet size per category} \times \left(\frac{\text{number of inspections required at a given star level}}{20} \right)$$

Sum of regular vehicle inspections

Aim: To estimate the total regular vehicle inspections required on an annual basis for the total country fleet.

Data required: None; auto-calculated.

Description: This is used as an indicator of the total volume of vehicles to be inspected regularly. It does not include any re-inspections due to failures. It is calculated by summing the *Average capacity of inspections per year* for each vehicle category.

It is calculated for:

- Country specific capacity (the actual situation)
- Theoretical needs per star level

Formula:

$$\text{Sum of regular vehicle inspections} = \sum_{\text{vehicle category}} \text{Average capacity of inspections per year}$$

PART 2: EXTENDED ASSESSMENT OF VEHICLE INSPECTIONS

This section extends the basic assessment of vehicle scope made in Part 1, by adding assessment of any additional elements that might be included in the PTI. It allows recognition of these extra elements being assessed in the form of additional points. This encourages a greater development of the PTI system to cover a broad range of topics, or improved inspections on certain vehicle types.

Extra scoring points for extended assessment of vehicle inspections

For each of the items listed some additional points may be scored if the country is making inspections in accordance with these topics. A brief summary for each of the items follows.

ADR (Carriage of dangerous goods)

Specific inspections process for vehicles that carry dangerous goods. For more information about the ADR see <https://unece.org/about-adr>. Due to the nature of the dangerous goods being carried by these vehicles, it is important that additional inspections are carried out, without replacing the regulatory inspections of the specific equipment.

Key inspection features:

- Approval documents
- Electrical equipment
- Security controls
- Fire protection (thermal protection, extinguishers, etc.)
- Tank and related equipment (hoses, valves, etc.)

Agricultural vehicles (tractors and their trailers)

To ensure that these heavy and often bespoke vehicles are covered by an appropriate type and amount of inspections, To guarantee the safety of road users when this vehicles circulate on public roads due to their specific characteristics.

Key inspection features:

- Frequency of inspections shall be at least 4 in a 20-year period, and preferably 38 (see Annex 2).
- Tyres
- Coupling (hook, drawbar, connectors, hydraulic hoses, etc.)
- Mirrors
- Specific additional equipment (lifting forks, torque transmission, etc.)

Ambulances

Due to the nature of the vehicle, its equipment and the passengers it carries in unusual positions, it is important to have improved inspection frequency and content.

Key inspection features:

- Frequency of inspections shall be at least 17 in a 20-year period, and preferably 40 (see Annex 2)
- **Signs and flashing lights**
- **Audible warning device**
- **Doors, ramps and lifts**
- **Hand barrow restraint system**

Import vehicle inspection for registration

Inspection of imported vehicles is an essential step in ensuring a safe and environmentally friendly fleet. This type of inspection aims to limit the entrance of imported vehicles in the country that do not fulfil the established legal requirements on safety and emissions.

Key inspection features:

- **Form check of a very recent inspection report from a country with mutual recognition**
- **Up to a complete inspection according to the local regulation**

In-use vehicle inspection registration change (owner related)

In-use inspections at the point of ownership changes are beneficial in keeping unfit vehicles off the road. In-use inspections are used to guarantee the roadworthiness of the vehicle for the new owner and avoid fraud in the secondhand market

Key inspection features:

- Prior to the selling in order to inform the buyer
- Not necessary in case of positive inspection less than 6 months before
- Shall cover at least identification (VIN marking) and mileage to reduce fraud
- Preferably, shall be a complete inspection

Micromobility vehicles

Inspections added to cover Personal Light Electric Vehicles (PLEV) are an important step for the future of micromobility because these vehicle types are often much smaller and lighter with a potentially greater injury risk. For further information see CITA's position paper on micromobility (CITA, 2020).



Key inspection features:

- Frequency of inspections shall be at least 17 in a 20-year period, and preferably 40
- Maximum speed limitation
- Deceleration device and test
- Lighting and reflectors
- Audible warning device
- Specific characteristics (folding system, seat, batteries and switch, etc.)

Off-leasing inspection

Off-leasing inspections occur when the vehicle is taken out of service as a lease vehicle and are an important component in ensuring it's safe continued use. These inspections are used as a measure to guarantee the roadworthiness of the vehicle for the new owner and avoid fraud in the secondhand market. They help to provide a real and fair value of the vehicle in the secondhand market. The intensive use of the vehicles, often by multiple drivers (resulting in less care) represents a higher risk of deterioration.

Key inspection features:

- Shall cover at least identification (VIN marking) and mileage to reduce fraud
- Preferably, shall be a complete inspection

Post-collision inspection

After a collision an inspection can be an important tool to check that the vehicle has been returned to a roadworthy state, however these are not often a mandatory requirement. Post-collision inspections are more important as vehicles are increasingly fitted with Advanced Driver Assistance Systems (ADAS), however the ADAS inspections themselves are still developing, hence these inspections can only be included in the extended assessment.

Key inspection features:

- At least the replaced parts and their related impact on roadworthiness shall be inspected
- An additional braking test is recommended
- A complete inspection would ensure the confidence on the status of the vehicle with regard to safety and environment.

School buses



Buses carry high volumes of passengers so it is essential that inspections are used to ensure their safety in use. These vehicles require specific measures due to the type of passengers. Inspections should have increased frequency and improved content. For further information see CITA's Recommendation (CITA, 2011)

Key inspection features:

- Increased frequency of inspections; frequency of inspections shall be at least 17 in a 20-year period, and preferably 50.
- Seat belt checks on all seats
- Signage for whether areas are designated for standing/not
- Fire equipment (extinguisher and hammer) available and usable
- Interior lighting (including safety lighting and destination to emergency exits)

Shared vehicles

When vehicles have share usage or ownership they will benefit from an increased inspection frequency, in order to reduce the risk of becoming unfit for use. This is because in cases of shared use the responsibility over the vehicle safety and emissions maintenance is diluted.

Key inspection features:

- Increased frequency of inspections; frequency of inspections shall be at least # in a 20-year period, and preferably #.
- Should be a complete inspection
- In case of "lightened inspection" in addition to the normal frequency applicable to the vehicle category, at least the main safety items (brakes, lights, belts) shall be inspected as well as the emissions and the "consumables" (tyres, wipers)

Tachographs / trip recorder

The tachographs and trip recorders on vehicles are essential tools for monitoring distance travelled and usage over time as an indicator of performance degradation. Inspections of these components are essential to ensure proper maintenance of the vehicle in use.

Key inspection features:

- Tyres (dimension, fitness)
- Compliance with maximum acceptable deviation
- Seals

Type approval modification authorisation (after technical modification)

Vehicles often undergo modifications whilst entering use for the first time or during the life of the vehicle. Inspections after any technical

modification are important to ensure the safe and environmentally friendly vehicle performance. This is because these modifications break the rules that are required to the vehicle manufacturers in order to sell the vehicles in the market, affecting the compliance with the safety and emissions regulations.

Key inspection features:

- At least the modified parts and their related impact on roadworthiness shall be inspected
- An additional braking test is recommended
- A complete inspection would ensure the confidence on the status of the vehicle with regard to safety and environment.

Input data required

Yes/No

Aim: To help record whether the extra scoring item is assessed by the country or not.

Data required: Enter **Yes** or **No** according to whether the item is included or not. Fill this in three columns for three different purposes:

- *Requirements*; for whether the inspection item is required or not and used to show the standards/legislated requirements.
- *Implementation*; whether the inspection is regularly implemented in reality.
- *Future planned* (within 5 years); used to show whether there are plans to implement the inspection item in the future, even if not currently implemented.

This is repeated per extra scoring item.

Example: Many countries have an extra set of inspections for their ambulances, over and above that of the requirements of their vehicle category, due to the sensitive usage of the ambulances. In this case it would be recorded as Yes.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the assessor to makes notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.



Example: A future rating may be based upon a presentation made by a representative from the relevant government department, outlining plans to add inspection of environmental protection and emissions items, which are not currently assessed at all. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Weighting

Aim: To give a relative weighting of importance to each of the extended assessment items.

Data required: None; reference values.

Description: This gives the reference weighting per item. Each item is weighted as 1 or 2, to indicate their relative importance. For example, it would be more important to make improvements in the inspection of vehicles that carry dangerous goods (due to the nature of their use) than to improve off-leasing inspections, which is reflected by the 2 and 1 weighting respectively.

The weightings are given in Table 14.

Table 14: Extra scoring points for extended assessment of vehicle scope

Extra scoring points for extended assessment of vehicle scope	Weighting
ADR (Carriage of dangerous goods)	2
Agricultural vehicles (tractors and their trailers)	2
Ambulances	2
Import vehicle inspection for registration	2
In-use vehicle inspection registration change (owner related)	2
Micromobility vehicles	1
Off-leasing inspection	1
Post-collision inspection	1
School buses	2
Shared vehicles	2
Tachographs / trip recorder	1
Type approval modification authorisation (after technical modification)	2

Points

Aim: To convert the *Yes/No* response into points that can be used in numerical scoring.

Data required: None; auto-calculated.

Description; The *points* are calculated based on the *Yes/No* response per item. *Yes* scores a point, whereas a *No* scores zero. This is repeated per extra scoring item.

Example: If the country has an improved inspection scheme for ambulances it will be recorded as a *Yes*, which would score 1 point.

Weighted points

Aim: To weight the points according to their *Weighting* or importance.

Data required: None; auto-calculated.

Description: The *points* are then weighted using the *Weighting* values. This is repeated per extra scoring item.

Example: If the country has an improved inspection scheme for ambulances it will score 1 point, which is weighted by 2. The weighted points will be 2.

Weighted averages

Aim: To average the scores per extra scoring item form a part of the vehicle scope score.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the extended assessment by summing the points scored for each item. Each is then scaled by dividing by the maximum available points; 20. There is a total of 1 scaled point available for each:

- *Requirements*; for whether the inspection item is required or not and used to show the standards/legislated requirements. It contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\begin{aligned} & \textit{Weighted average for requirements rating} \\ & = \frac{\sum_{\textit{Extra scoring points}} \textit{Requirements weighted points}}{\textit{Number of extra scoring items}} \end{aligned}$$

- *Implementation*: whether the inspection is regularly implemented in reality. It contributes to the 'orange' *Implementation rating* in the spider diagram.

Formula:

$$\begin{aligned} & \textit{Weighted average for implementation rating} \\ & = \frac{\sum_{\textit{Extra scoring points}} \textit{Implementation weighted points}}{\textit{Number of extra scoring items}} \end{aligned}$$

- *Future planned* (within 5 years); used to show whether there are plans to implement the inspection item in the future, even if not currently implemented. It contributes to the 'purple' *Future rating* in the spider diagram.

Formula:

$$\textit{Subtotal for future rating} = \frac{\sum_{\textit{Extra scoring points}} \textit{Future planned points}}{\textit{Number of extra scoring items}}$$



S4 INSPECTION CONTENT & METHODS

This section of the AVIS covers the assessment of the inspection content & methods being used. The purpose is to ensure minimum standards of vehicle safety and environmental protection, and to encourage higher standards.

The approach taken by CITA in this section of assessment is to base upon the European Directive ECE/RCTE/CONF/4/Add.2/Rev.1 (UNECE, 2018), and the adoption by WP.29 that aims to achieve greater uniformity and harmonisation (UNECE, 2020). The European Directive lists the huge array of items to be inspected, the method of that inspection, reasons for failure, and indicates whether the failure would be minor, major or dangerous. In addition to these regulatory standards, CITA and its membership have a huge experience to build in additional expertise and knowledge. This is published in the form of CITA recommendations, which represent the state-of-art in inspections, and may be over and above the regulation requirements. This section of the AVIS is based on a combination of best practice from both the Directive and CITA recommendations.

For example, in section 1. Braking Equipment in the Directive, this lists the multitude of braking tests; 33 items in total. The AVIS does not aim to replicate this entire set of inspection items, because the Directive can be referenced by any country needing further information, and it would be too onerous for an AVIS evaluation. The AVIS assessment instead aims to summarise the inspection content and uses the experience of CITA membership to achieve that.

In another example, section 4.1.2 of the Directive sets out the requirements for headlamp alignment. The alignment inspection method is to use an aiming device, or the on-board diagnostic interface. In reality, CITA is aware that this may reflect a huge variation of methods, ranging from aiming the lights at a wall, through to simulation of different situations/patterns for complex and advanced assistance systems and safety systems (such as adaptive beam patterns), and several star levels in between. Thus the AVIS method reflects this level of experience in the different star levels, and allows a clear target of progression in the future.

PART 1: ASSESSMENT OF INSPECTION CONTENT & METHODS

This section covers the assessment of various safety and environmental items implemented on vehicles. The approach is for the assessor to review the national rules and regulations in place and assess them against star levels. The scores are recorded against each item.

Reference is made to the vehicle categories, which are the same as in S3 Vehicle Scope. For ease, there is an additional reference table provided in the AVIS Tool, as shown in Table 15.

Table 15: Vehicle categories (short summary for reference in the inspection content & methods assessment)

Vehicle category	Description
All L	Mopeds, Motorcycles and Quadricycles
M1	Passenger cars
M2	Small Bus
M3	Bus or Coach
N1	Van
N2	Medium Goods Vehicle
N3	Heavy Goods Vehicle
O1	Very Light Trailer
O2	Light Trailer
O3	Medium Trailer
O4	Heavy Trailer

This section is also subject to the additional definitions in Table 16.

Table 16: Additional definitions for Inspection Content & Methods section

Acronym	Term
ADAS	Advanced Driver Assistance System
AVAS	Acoustic Vehicle Alerting System
CALID	Calibration Identifier
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO2	Carbon Dioxide
CVN	Calibration Verification Number
DTC	Diagnostic Trouble Code
EBS	Electronic Braking System
EPS	Electronic Power Steering
ESC	Electronic Stability Control
EV/HV	Electric Vehicle / Hybrid Vehicle
HC	Hydrocarbon
lambda λ	Air–fuel equivalence ratio
LNG	Liquefied Nitrogen Gas
LPG	Liquefied Petroleum Gas
NOX	Nitrogen Oxide
O2	Oxygen
OBD	On-Board Diagnostics
OBM	On-Board Monitoring
PN	Number of particles
RD Method	Road Decelerometer Method
SOCE	State-of-Certified-Energy
SOCR	State-of-Certified-Range

SoH	State of Health
TPMS	Tyre Pressure Monitoring System
VIN	Vehicle Identification Number

Inspection content & methods items

There are a number of inspection content & methods items involved in the Assessment. The inspection content & methods items are described in the following sections:

- Identification
- Braking equipment
- Steering
- Visibility
- Lighting and parts of electrical system
- Axles, wheels, tyres, suspension
- Chassis and chassis attachments
- Other equipment
- Additional inspections of vehicles for commercial carriage of passengers
- Environmental protection
- Emissions
- General

It is important to note that examples mentioned in the description for each item are to be used as indicative examples, for inspiration, and are not an exhaustive list of how an item might be achieved. The specific requirements are listed under the star levels.

Identification

Aim: To ensure the vehicle being inspected is the one expected, and that the documentation matches.

Description: Every vehicle has its unique Vehicle Identification Number, often called VIN-number. The VIN is read visually and compared to the registration data of the vehicle. This is to check the identification of the vehicle under inspection and check against its documentation. It applies to all vehicles.

Requirements:

- 1*: - Conformity of vehicle - documents with registration data;
- Visual VIN check
- 2*: something between 1* and 3*
- 3*: Identification by actual database
- 4*: Picture or film of the car; Check of VIN with OBD reader

5*: Additional actual software versions and detectability for other vehicles

Braking equipment

Aim: To ensure the vehicle being inspected has a safe and working braking system, which is essential to help prevent collisions.

Description: This is to check the braking system:

- Mechanical and hydraulic condition and operation
- Mechanical, hydraulic and/or pneumatic condition and operation
- Efficiency and performance (for both light and heavy groups of vehicles)

Requirements: Defined in Table 17.



Table 17: Braking equipment inspection items

Vehicle category	Sub item	1*	2*	3*	4*	5*
M1, N1 and L when applicable	Mechanical and hydraulic condition and operation	Completeness and condition of basic features	Completeness and condition of installed features (ABS, etc.) even if non-mandatory	Additional correctness of settings	Additional correctness of settings for non-mandatory features, testing brake fluid for water content/ contamination; - ABS/EBS DTC's with OBD reader	DTCs ADAS brake related systems detected with an OBD reader
M2, M3, N2, N3, O2, O3, O4	Mechanical, hydraulic and/or pneumatic condition and operation	Completeness and condition of basic features	Completeness and condition of installed features (ABS, etc.) even if non-mandatory	Additional correctness of settings	- Additional correctness of settings for non-mandatory features, testing brake fluid for water content/ contamination; - ABS/EBS DTC's with OBD reader	DTCs ADAS brake related systems detected with an OBD reader
M1, N1 and L when applicable	Efficiency and performance	Function test brake system by driving test	Function test brake system by driving test using decelerometer	Brakes evaluated by roller brake tester (instead of decelerometer); checking brake forces, imbalance, fluctuation	Braking ratio with reference to the maximum authorised mass	Simulation of different situations for safety systems and assistance systems or ; Regenerative braking test for EV/HV
M2, M3, N2, N3, O2, O3, O4	Efficiency and performance	Function test brake system by driving test	Function test brake system by driving test using decelerometer	Checking brake forces, imbalance, fluctuation	Braking ratio with reference to the maximum authorised mass following ISO 21069 or equivalent methods like road decelerometer method or Reference brake forces	Simulation of different situations for safety systems and assistance systems or ; Regenerative braking test for EV/HV

Steering

Aim: To ensure the vehicle being inspected has a safe and working steering system, which is essential to to guarantee that the vehicle takes the path desired by the driver, safely and precisely.

Description: This is to check the condition and operation of the steering system. This applies to all vehicle categories.

Requirements:

- 1*: Completeness, condition and function test (visual evaluation)
- 2*: something between 1* and 3*
- 3*: Visual and function test including assistance systems, wheel play detector, use of turntables
- 4*: Visual and function test including assistance systems, wheel play detector, use of turntables
- 5*:
 - Electronic Power Steering (EPS) Diagnostic Trouble Codes (DTCs) via On-Board Diagnostics (OBD) **to inform the client (NOTE: the DTCs should only be used as reason for failure when industry standards for DTCs are agreed)**
 - Wheel alignment system with camera (drive though) or; Wheel play device that measures slip angles or; DTCs for Advanced Driver Assistance System (ADAS) steering related systems detected with an OBD reader or; Simulation of different situations for safety systems and assistance systems

Vision

Aim: To ensure the driver's direct field of vision forward, to the right and to the left allows clear visibility over the entire road on which they are driving.

Description: This is to check the condition and operation of the windscreen in terms of visibility for the driver. This covers the view forward, right and left; as well as the view of the wing mirrors which are needed for rearward vision. This applies to all vehicle categories.

Requirements:

- 1*: Completeness, condition and function test of windscreen and wipers, mirrors
- 2*: something between 1* and 3*
- 3*: Completeness, condition and function test of windscreen and wipers, mirrors, demisting system
- 4*: Light transmittance of windscreen

5*: Condition and function of ADAS mounted on/in the windscreen

Lighting system

Aim: To ensure the vehicle being inspected has a safe and working lighting system, which is essential to allow safe driving and identification of vehicle positioning in low light conditions.

Description: This is to check the lighting system:

- Condition and operation of the lighting and low-voltage electrical system
- Lighting alignment

This applies to all vehicle categories.

Requirements: Defined in Table 18.

Table 18: Lighting system inspection items

Sub item	1*	2*	3*	4*	5*
Condition and operation of the lighting and low-voltage electrical system	Completeness, condition and performance	<between>	- Completeness, condition and performance; - Compliance with requirements (number, colour, position, brightness, etc)	<between>	- Completeness, condition and performance; - DTCs in accordance with lighting via OBD; - Simulation of different situations for safety systems and assistance systems
Lighting alignment	Horizontal alignment of headlamps with beam against wall	Horizontal alignment of headlamps with device	Horizontal alignment of headlamps with calibrated devices	Horizontal alignment of front fog lamps	- Lateral deviation; - Beam intensity; - Simulation of different situations for assistance systems and safety systems

High voltage powered system

Aim: To ensure the electric or hybrid vehicle being inspected has a high-voltage battery that is safe.

Description: This is to check the condition and operation of the high-voltage powered system and its ventilation. This applies only electric and hybrid vehicle types (HV/EV).

Requirements:

- 1*: General Safety:
- Visual checking of wiring and connector points, labelling and protective shields;
 - Functional check of AVAS, Active driving mode and State of drive indicator
- 2*: Electrical Safety Inspection:

- Verification of the vehicle inlet charging connection;
- Testing of the charging cable and vehicle charging immobilisation interlock;
- DTC: Check of operational readiness function of the systems by an applicable interface (OBD)
- 3*: Rechargeable energy storage system:
 - Charging and Charging communication test;
 - DTC: Check of operational readiness function of the battery by an applicable interface (OBD)
- 4*: Advanced high voltage systems checking:
 - Isolation resistance measurement and equipotential bonding testing;
 - Detailed OBD check (hardware and software versions and devices activation);
 - Traction battery life status parameters (SOCE and SOCR)
- 5*: Drive performance under load mode and electric energy consumption:
 - Regenerative braking system efficiency test;
 - Electric drive efficiency test;
- REESS traction battery performance test

Axles, wheels, tyres, & suspension

Aim: To ensure the axles, wheels, tyres and suspension of the vehicle being inspected are safely allowing the connection of the vehicle body with the road through the wheels and affecting the stability, the consumption, the acceleration and the braking capacity of the vehicle..

Description: This is to check the axles, wheels, tyres and suspension of the vehicle for:

- Condition and operation (all vehicle categories)
- Efficiency of damping (M1 and N1 vehicles categories)

Requirements: Defined in Table 19.

Chassis and chassis attachments

Aim: To ensure the chassis and chassis attachments of the vehicle being inspected guarantee the minimum structural safety requirements.

Description: This is to check the condition and operation of the chassis and chassis attachments of the vehicle for:

- All vehicle categories
- Some additional checks for vehicles running on Compressed Natural Gas (CNG), Liquefied Petroleum Gas (LPG), Liquefied Nitrogen Gas (LNG) and hydrogen

Requirements: Defined in Table 20.

Other equipment

Aim: To ensure other equipment of the vehicle being inspected is safe and operational.

Description: This is to check the completeness and condition of other equipment in the vehicle. This may include, but is not limited to, the speedometer, restraint systems, odometer, Electronic Stability Control (ESC), tachograph, and/or speed limitation device. It applies to all vehicles.

Requirements:

- 1*: Completeness and condition; speedometer by driving
- 2*: something between 1* and 3*
- 3*: Speedometer testbench (L-category vehicles)
- 4*:
 - DTC restraint systems;
 - DTC systems odometer;
 - DTC ESC;
 - Odometer reading by On-Board Monitoring (OBM)
- 5*: Simulation of different situations for the other equipment like tachograph, speed limitation device, odometer; or speedometer testbench (M, N-category vehicles)



Table 19: Axles, wheels, tyres, and suspension inspection items

Vehicle category	Sub item	1*	2*	3*	4*	5*
All	Condition & operation	Completeness, condition and function test (visual evaluation)	<between>	Visual and function test including assistance systems, wheel play detector	<between>	Additional simulation different driving status, automatic tyre tread wear measurement, TPMS evaluation by OBD
M1, N1	Efficiency of damping	Manual test	Test drive by experienced driver to evaluate damping	<between>	Suspension test bench with relative criteria	Suspension test bench with relative and absolute criteria

Table 20: Chassis and chassis attachment inspection items

Vehicle category	Sub item	1*	2*	3*	4*	5*
All	Condition & operation	Completeness and condition, corrosion	<between>	Completeness and condition, corrosion. Use of play detector and auxiliary lift	n/a	n/a
Vehicles running on CNG, LPG, LNG and hydrogen	Condition & operation	Visual inspection of completeness, condition + LPG Tank level gauge limit of 80% of the tank capacity readability	Conformity of vehicle documents with registration data, tank lifespan	Leak test with device + labels presence and position	<between>	DTC check with OBD reader + Traction Battery hydrogen fuel cell SoH

Additional inspections of vehicles for commercial carriage of passengers

Aim: To ensure that vehicles used for the commercial carriage of passengers have relevant additional inspections due to the importance of safety in their use.

Description: This is to check the completeness and condition of relevant items for vehicles that carry passengers commercially, such as M2 minibuses and M3 bus or coach category vehicles.

Requirements:

- 1*: Completeness and condition of the vehicle
- 2*: something between 1* and 3*
- 3*: Completeness and condition according to homologated vehicle (# emergency exits, # seats, ...)
- 4*: n/a
- 5*: n/a

Environmental protection

Aim: To ensure that vehicles provide sufficient environmental protection.

Description: There are multiple elements of inspections that are for environmental protection, including noise, electromagnetic interferences, engine emissions, fluid leaks etc.

The relevant reference is ECE/RCTE/CONF/4/Add.2/Rev.1 (UNECE, 2018)

Requirements: See Table 21.



Table 21: Environmental protection assessment items for inspection content & methods

Vehicle category	Sub item	1*	2*	3*	4*	5*
Positive ignition engines	Emissions	Tailpipe 4 gas test	<between>	Tailpipe 4 gas with thresholds + OBD	Tailpipe 4 gas with more severe thresholds + OBD	Evaluation of other components like Nitrogen Oxide (NOX), Particulate Number (PN) or sensor OBM evaluation
Compression ignition engines	Emissions	Tailpipe opacity test	Tailpipe opacity test with adopted procedure to protect people (extraction), and cars (fast pass, fast fail, ...)	Tailpipe opacity test with adopted procedure + OBD	Replacement of opacity by PN-counting + OBD	Evaluation of other components like NOX or sensor OBM evaluation
All	Obvious manipulation	Visual inspection of aftertreatment system	<between>	Specific visual inspection in order to detect suspected fraud. Reference: UTAC-OTC: IT PL F8 (2019) point 8.2.23	OBD scan of aftertreatment system in order to detect fraud. Reference: UTAC-OTC: IT PL F8 (2019) point 8.2.23	Software check by CALID and CVN
All	Noise	Measurement by subjective impression	<between>	If suspicious: perform measurement of stationary noise	Measurement of stationary noise (all vehicles)	Measurement of stationary and driving noise
All	Fluid leaks	Obvious leaks	<between>	<between>	<between>	Hidden leaks
All	Electromagnetic interference suppression	Subjective impression	n/a	n/a	n/a	n/a

Input data required

Requirements

Aim: This rating aims to assess how well the item is addressed in the mandatory standards or national rules/regulations as a set of requirements.

Data required: Enter the star level against each item according to the current requirements of the mandatory standards or national rules. The Assessment Team review the information about national rules, regulations, and standards regarding the item. These are rules/standards as defined or agreed/authorised by the government. The Assessment Team makes an assessment of what star level the item scores. Sometimes there is evidence from documentation of what is achieved, and sometimes an element of interpretation and expert judgement is required if the documentation does not exactly match the requirements of the star levels. The star levels define the required standards to be achieved for each star level rating, and are listed above against each item individually. At least some or all of these items must be achieved to score at each given star level; it should be treated as AND/OR. If there is insufficient evidence to indicate an inspection system is providing at least 1* performance, then it scores 0. If there are no regulations or standards in place at all, then it should score 0.

Progression to the next star level is additive; all the prior star levels must be fulfilled first. For example, to achieve a 5* score this requires the 1* to 4* items are fulfilled, plus new requirements for 5* in addition.

Example: A country that has evidence of national rules requiring lighting alignment inspections that assess the horizontal alignment of headlamps with calibrated devices will score a 3.

Implementation

Aim: This rating aims to assess the implementation of the rules for the item in reality.

Data required: Enter the star level against each item according to the current implementation in reality of the national rules. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the reality of implementation (what is actually carried out), not on what the rules state.

Example: A country that has evidence of national rules requiring lighting alignment inspections that assess the horizontal alignment of headlamps with calibrated devices will score 3 for the *Requirements*. If in reality this

is actually implemented at a lower level, e.g. only horizontal alignment assessed with the headlamp beam against a wall, then the score for *Implementation rating* would be 1.

Future

Aim: This accounts for any future plans to make impartiality and anti-corruption changes that are not yet implemented, such as by increasing the number of technological tools used to safeguard against corruption. It allows a representation of the future goals.

Data required: Enter the star level against each item according to the future (within five years) implementation of the national rules. In general, the improvements should demonstrate changes in both the requirements/standards and in their actual implementation. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out, and evidence recorded.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the future plans and changes, not on what the rules state.

Example: A country that has evidence of national rules requiring lighting alignment inspections that assess the horizontal alignment of headlamps with calibrated devices will score 3 for the *Requirements*. If there are future plans to increase this to include lateral deviation and beam intensity within the next five years, then the score for *Future* would be 5.

Priority for future road safety or environmental protection

Aim: This is to prioritise the items under assessment for inspection content & methods according to the future needs of the country.

Data required: Enter rating of 1 to 5, where 1 is the lowest priority, and 5 is the highest priority. This is to rank the items in terms of their safety and environmental protection, and will differ from country to country depending on the local conditions. It is recorded for the future needs of the country, within five years. The rankings may be derived from extrapolations or modelling of evidence such as the casualty and emissions data for the country.

Example: A country that sees pollutions levels rising sharply may choose to emphasise the important of the environmental protection and emissions items in the future.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.



Data required: Free text field for entering findings and rationale. This is space for the assessor to make notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, outlining plans to add inspection of environmental protection and emissions items, which are not currently assessed at all. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Total number of items filled

Aim: To record the number of items entered in the *Requirements*.

Data required: None; auto-calculated.

Description: This is used as check that all items are completed with a score in the *Requirements* column.

Example: The *total number of items* should be 22 to achieve a completed table.

Items with standards/rules (scoring >0)

Aim: To record the number of items entered in *Requirements* marked with a score greater than zero, indicating that a regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score greater than zero, indicating that a regulation/standard is in place.

Example: If all items score greater than 0, apart from the additional inspections of vehicles for commercial carriage of passengers, then the *Items with standards/rules* would be 21.

Items with no standards/rules (or scoring 0)

Aim: To record the number of items entered in *Requirements* marked with a score equal to zero, indicating that no regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score equal to zero, indicating that no regulation/standard is in place.

Example: If all items score greater than 0, apart from the additional inspections of vehicles for commercial carriage of passengers (1 item), then the *Items with no standards/rules* would be 1.

Share of items covered by regulations

Aim: To describe the proportion of items covered by the regulations as a percentage indicator, and to encourage progress towards 100%.

Data required: None; auto-calculated.

Description: This describes the proportion of items with regulations/standards, or scoring greater than zero in the *Requirements* column, as a percentage of the *Total number of items*.

Example: The *total number of items* should be 22 to achieve a completed table. If all items score greater than 0, apart from the additional inspections of vehicles for commercial carriage of passengers, then the *Items with standards/rules* would be 21. The *share of items covered by regulations* is 21 out of 22 as a percentage.

Formula:

$$\text{Share of items covered by regulations} = \left(\frac{\text{Items with standards/rules}}{\text{Total number of items}} \right) \times 100$$

The above parameters are summarised in a short table in the Tool, and an example is given in Table 27.

Table 22: Example summary table to check coverage of the inspection content & methods.

	Example
Total number of items	22
Items with standards/rules (scoring >0)	21
Items with no standards/rules (or scoring 0)	1
Share of items covered by regulations	96%

Importance weighting

Aim: This is to weight/prioritise the items under assessment according to CITA experience.

Data required: None; reference values.

Description: This is a weighting of 1 to 5, where 1 is the lowest priority, and 5 is the highest priority. This is to weight/prioritise the items in terms of their safety and environmental protection. It is a reference for the current situation at the time of the Assessment.

The importance weighting gives rise to a scalar used in the ratings, to allow for the maximum possible score that is possible throughout the range of items/sub-items for the section.

Example: The braking inspection items are prioritised by the weighting, in order to give drivers the best chance to be in a vehicle that can avoid a collision if an imminent threat arises.

Weighting of sub-items

Aim: To allow grouping of sub-items to be weighted, so that the correct balance is achieved for the main items.

Data required: None; auto-calculated.

Description: This is a weighting of the sub-items to allow a group at the level of the main items. If there are multiple sub-items that relate to one main item then this weighting can allow a proportional sharing between them to sum to the one main item. It prevents an over representation of the importance of a main item if it is broken down into multiple sub-items.

Example: For the inspection content & methods items there are two sub-items related to Lighting systems, so each of these sub-items has a *weighting of sub-items* of 0.5.

Maximum possible score for the item

Aim: To record the maximum star rating possible for each item (or sub-item) of the assessment of inspection content & methods.

Data required: None; auto-calculated.

Description: This is the maximum star rating possible for each item of the assessment of inspection content & methods .

Example: For *Lighting system: lighting alignment* the possible star ratings can be 1*, 2*, 3*, 4*, or 5*. 5 is the *maximum possible score for the item*.

Normalise to 1-5 scale

Aim: To normalise the scales up to five, for any items that can only score less than 5*.

Data required: None; auto-calculated.

Description: This normalisation is used to make sure every item in the assessment can be assessed on a scale up to 5, to allow them to be equally treated. If the items can only score less than 5*, then it is more important that these lower scores are achieved, so they are scaled up to ensure comparability with items that can score up to 5.

If the maximum possible score is 5, then the normalisation is 1, which is the case for the majority of items.

Example: For electromagnetic interference suppression there is only 1* available to score, so the normalisation value is set to 5 to scale the score up to make the scale match the other items.

Requirements Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *requirements score*.

Data required: None; auto-calculated.

Description: The *requirements score* is used, and is multiplied by the factors for importance *weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 3 for the *requirements* against *lighting alignment*, then the *Requirements rating (weighted and normalised)* will be 1.63. This is because the *importance weighting* of the item is 4, the *weighting of sub-items* is 0.5, and the *normalise to 1-5 scale* is 1.

Implementation Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *implementation rating*.

Data required: None; auto-calculated.

Description: The *implementation* score is used, and is multiplied by the factors for importance *weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 1 for the *implementation rating*, then the *Implementation Rating* will be 0.54 given that the *importance weighting* of the item is 4, the *weighting of sub-items* is 0.5, and the *normalise to 1-5 scale* is 1.

Future Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *future rating*.

Data required: None; auto-calculated.

Description: The *future* score is used, and is multiplied by the factors for importance *weighting, weighting of sub-items*, and *normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 5 for the *future rating*, then the *Future Rating* will be 5.42 given that the *importance weighting* of the item is 4, the *weighting of sub-items* is 0.5, and the *normalise to 1-5 scale* is 1.

Future rating differential

Aim: To show the difference between the *Implementation* rating at time of assessment, and the *Future* rating within the next five years; the number of star levels to be increased.

Data required: None; auto-calculated.

Description: This future rating differential represents the amount of progress in star levels that is needed to achieve the *future rating* from the reality of the implementation today as shown by the *Implementation rating*.

Formula:

$$\text{Future rating differential} = \text{future rating} - \text{implementation rating}$$

Future target indicator

Aim: To use the priority for future road safety or environmental protection to generate an indicator of future work based on the current situation and weighting.

Data required: None; auto-calculated.

Description: This is a scoring of future work needed to improve from the current situation to the future, according to the road safety and environmental protection priorities. This is used to derive the *ranking of future priority actions*.

Formula:

$$\text{Future target indicator} = \text{future rating differential} \times \text{priority for future road safety or environmental protection} \times \text{importance weighting}$$

Example:

- 1) We may find a scenario with two items being assessed with the same *importance weighting*, the same *Requirements rating*, the same *implementation rating*, the same *future rating*, but one is a higher priority. In this scenario that item with the higher *priority for future road safety or environmental protection* will score higher for the *future target indicator* because more effort should be put into achieving it for the future.

- 2) We may find a second scenario with two items being assessed with the same *importance weighting*, the same *Requirements rating*, the same *future rating*, the same *priority for future road safety or environmental protection*, but one is starting from a higher *implementation rating*. In this scenario that item with the lower *implementation rating* will score higher for the *future target indicator* because more effort should be put into achieving it for the future.

Ranking of future priority actions

Aim: To rank the inspection content & methods items, according to their *future target indicator*, to help prioritise future actions on improving the inspection content & methods.

Data required: None; auto-calculated.

Description: This is a ranking of items according to their important based on the current and future priorities. It helps to identify the actions that will have the greatest impact on improving the inspection content & methods. Rank 1 = highest priority, marked in red.

Total number of items filled

Aim: To provide an indicator of the number of rows correctly filled.

Data required: None; auto-calculated.

Description: This counts the number of rows correctly filled. If there are blanks, then an error message is displayed above the table. The purpose is to ensure that all rows are correctly filled, so that the ratings calculations will work.

Averages (weighted and normalised)

Aim: To average the scores per item of the assessment of inspection content & methods.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the assessment by summing the points scored for each item. Each is then scaled by dividing by the maximum available points.

There are three averages calculated:

- *Requirements rating*; for whether the inspection content & methods items are required or not and used to show the standards/legislated requirements. It contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\text{Average requirements rating} = \frac{\text{Sum of Requirements Rating scores}}{\text{Number of items}}$$

Where:

Sum of Requirements Rating scores

$$= \sum_{\text{items}} \text{Requirements rating score}$$

- *Implementation rating*; for whether the inspection content & methods items are regularly implemented in reality. It contributes to the ‘orange’ *Implementation rating* in the spider diagram.

Formula:

Average implementation rating

$$= \frac{\text{Sum of Implementation Rating scores}}{\text{Number of items}}$$

Where:

Sum of Implementation Rating scores

$$= \sum_{\text{items}} \text{Implementation rating score}$$

- *Future rating* (within 5 years); used to show whether there are plans to implement the inspection content & methods items in the future, even if not currently implemented. It contributes to the ‘purple’ *Future rating* in the spider diagram.

Formula:

$$\text{Average Future rating} = \frac{\text{Sum of Future Rating scores}}{\text{Number of items}}$$

Where:

$$\text{Sum of Future Rating scores} = \sum_{\text{items}} \text{Future rating score}$$



S5 INSPECTOR QUALIFICATIONS

This section of the AVIS covers the assessment of the inspector qualifications. Inspection organizations or national mandated supervising bodies should establish a documented training/examination program. The aim is to ensure that competences of its personnel, both technical and administrative, are relevant, aligned with industry standards and have achieved certification from an authorised body. In addition, competences shall be kept up-to date in accordance with corporate policies and requirements of the Authority.

Technical and administrative skills of inspectors are important but not enough. It is also crucial that inspection activities are performed properly and in an unbiased way. Therefore, it is highly recommended to communicate a Code of Conduct that covers ethics and impartiality to anyone involved in or depending on inspection activities, including authorities, employees and customers. The purpose of this section is to assess the overall requirements, training and licensing of the inspectors.

ASSESSMENT OF INSPECTOR QUALIFICATIONS

There are a number of items involved in the Assessment. The inspector qualification items are described in the following sections:

- Basic requirements (selection criteria, experience & technical knowledge, and impartiality)
- Training (content, programme, examination, access to further training)
- Licensing (permission, suspension or withdrawal)

It is important to note that examples mentioned in the description for each item are to be used as indicative examples, for inspiration, and are not an exhaustive list of how an item might be achieved. The specific requirements are listed under the star levels.

Inspector qualification items

Basic requirements

Aim: To ensure the inspector meets the minimum requirements so they can deliver the inspections to the required standard and impartiality.

Description: The inspector needs profound knowledge of vehicle technology and of technical deterioration caused by age and use. Especially, the inspector needs a good understanding of aspects related to road safety and of environmental aspects. The knowledge should cover all types of vehicles inspected. Inspectors also need good knowledge of inspection methods and of pass/fail criteria applicable in the region.

This item assesses the criteria used to select inspectors as eligible for the work, their experience and technical knowledge, and proof of their impartiality. It may include, but is not limited to:

- Selection criteria
 - References from previous employers
 - Certificate of good conduct
 - Medical clearance certificate
 - Certificate of school completion
 - Full curriculum vitae (expected as a minimum)
- Experience & technical knowledge
 - Evidence of technical education
 - Proof of capability in a technical profession
 - Diploma
 - Own a valid driving license for the vehicles they are qualified to test/inspect
- Impartiality
 - Independence from other businesses related to vehicle sales, repair, maintenance, rental and commercial use.
 - See also S6 Impartiality & Anti-Corruption.

Requirements: Defined in Table 23.

Training

Aim: To ensure that training of the inspectors is sufficient to give them the skills and knowledge required to deliver the inspections.

Description: Before being approved as inspector, a candidate should undertake an initial training programme. The contents and length of the training programme can be uniform or adapted to the experience and prior knowledge of each candidate. The training programme should be followed by an examination with pass/fail criteria, covering practical skills as well as relevant theoretical and administrative knowledge. Basic training modules and examination should contain at least:

- Vehicle technology
- Inspection methods and assessment of deficiencies
- Legal requirements and administrative provisions relating to vehicle inspection
- Integrity and Code of Conduct

All inspectors should regularly undertake training, exchange of experience and professional development, to enable them to maintain and continuously refresh the knowledge and skills they require to perform inspections competently. This further training may be a mix of format, including e-learning and self-directed learning. Each vehicle inspector

should also undergo supervision and a periodic re-examination to ensure that their skills and knowledge is up-to-date and properly practiced. This examination could be by the employer, an external training centre, or an official committee/authorised body.

Requirements: Defined in Table 24.

Licensing

Aim: To ensure that inspectors are licensed, and their licenses are controlled appropriately to discourage poor performance or behaviours.

Description: This concerns the mechanisms for awarding and controlling permissions to carry out the inspections, as well as how licenses are suspended and even withdrawn in cases of poor performance or misconduct.

Requirements: Defined in Table 25.



Table 23: Basic requirements for inspection qualifications

Sub-item	1*	2*	3*	4*	5*
Selection criteria	<ul style="list-style-type: none"> - Full reliable for actions, no criminal records, driving licence, able to communicate in relevant national language; - Good health relevant for inspection; - Basic competences in reading and writing. 	<ul style="list-style-type: none"> - Absence of any previous unrehabilitated bankruptcy record; - Relevant evidence of the income as a Vehicle Examiner being sufficient to support their living standard. 	n/a	n/a	n/a
Experience & technical knowledge	Has graduated from a general school and a minimum proven technical experience.	Min 3 years of working related to any technical domain or any technical degree.	<ul style="list-style-type: none"> - Proven qualification in any vehicle related (practical) business or 3 years proven vehicle related technical experience; - During a written test, be able to display adequate technical knowledge. 	Certified knowledge (ECE WP29 2017/ Directive 2014/45/EU Annex 4)	<ul style="list-style-type: none"> - Demonstrable experience of Directive 2014/45/EU; - Technical related, engineer experience
Impartiality	A check or a proof of the employer based on a self-statement, that the inspector is free from any conflict of interests.	<between>	Frequently renewed proof	<between>	Official certificate of checked impartiality, or positive result from very high frequency quality controls

Table 24: Training requirements for inspector qualifications

Sub-item	1*	2*	3*	4*	5*
Content	Testing methods, assessment of deficiencies, legal requirements applicable for approval, mostly 'yes or no' decisions based on PTI equipment, integrity and Code of Conduct	Special vehicle technology and physics	- Inspection methods and assessment of deficiencies, legal requirements and administrative provisions relating to vehicle; - Knowledge of vehicle deterioration caused by age and use for all inspected types of vehicle.	- ECE WP29 2017 or Directive 2014/45/EU Annex 4; - Able to simulate and calculate special situations.	- Directive 2014/45/EU and more; - Able to simulate and calculate special situations.
Programme	Initial training theoretical or practical	- Initial training theoretical and practical; - Frequently further training	Content in relation to WP29 R.E.6	Executed by an authorised (training-) institute	Examination
Examination	- Knowledge of inspection methods and fail/pass criteria; - Practical or verbal exams covering all training subjects (internal).	Basic knowledge of relevant rules and regulation	External examination made by impartial expert	- Fundamental knowledge of relevant rules and regulation; - Advanced technical knowledge of all vehicle categories the examination is valid for	Independent and authorised external examiner, decision made by a committee. This is a requirement if inspectors are certified according to ISO 17024, "certifications of persons".
Access to further training	Theoretical + practical training with a mentor	<between>	Theoretical + practical training with professional trainer on a regular basis, e.g. annually	<between>	Initial training and further training available depending on the individual needs.



Table 25: Licensing of inspectors

Sub-item	1*	2*	3*	4*	5*
Inspectors licence / certificate	General licence, unlimited, central database	<between>	- Divided for different vehicle types and / or time limited; - Renewable	<between>	Divided for different vehicle types and time limited
Suspension or withdrawal	Time limited suspension in case of severe violation of inspection regulation or not fulfilling preconditions to get or renew inspector license.	<between>	Registration of suspension in official database.	<between>	- Final suspension if inspector is inactive for a long time. - No new licence within a specified number of years or more following the withdrawal (e.g. 5 years)

Input data required

Requirements

Aim: This rating aims to assess how well the item is addressed in the mandatory standards or national rules/regulations as a set of requirements.

Data required: Enter the star level against each item according to the current requirements of the mandatory standards or national rules. The Assessment Team review the information about national rules, regulations, and standards regarding the item. These are rules/standards as defined or agreed/authorised by the government. The Assessment Team makes an assessment of what star level the item scores. Sometimes there is evidence from documentation of what is achieved, and sometimes an element of interpretation and expert judgement is required if the documentation does not exactly match the requirements of the star levels. The star levels define the required standards to be achieved for each star level rating, and are listed above against each item individually. At least some or all of these items must be achieved to score at each given star level; it should be treated as AND/OR. If there is insufficient evidence to indicate an inspection system is providing at least 1* performance, then it scores 0. If there are no regulations or standards in place at all, then it should score 0.

Progression to the next star level is additive; all the prior star levels must be fulfilled first. For example, to achieve a 5* score this requires the 1* to 4* items are fulfilled, plus new requirements for 5* in addition.

Example: A country that has a central database for tracking permission/suspension of inspector licenses will score 3 for *suspension or withdrawal*.

Implementation

Aim: This rating aims to assess the implementation of the rules for the item in reality.

Data required: Enter the star level against each item according to the current implementation in reality of the national rules. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the reality of implementation (what is actually carried out), not on what the rules state.

Example: A country that has a central database for tracking permission/suspension of inspector licenses will score 3 for *suspension or*

withdrawal. However, if in reality the database is not well populated, and not consistently used, then the *Implementation* will be 1*.

Future

Aim: This accounts for any future plans to make enforcement changes that are not yet implemented. It allows a representation of the future goals.

Data required: Enter the star level against each item according to the future (within five years) implementation of the national rules. In general, the improvements should demonstrate changes in both the requirements/standards and in their actual implementation. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out, and evidence recorded.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the future plans and changes, not on what the rules state.

Example: A country that has a central database for tracking permission/suspension of inspector licenses will score 3 for *suspension or withdrawal*. If there are future plans to also track final suspensions so that, for example, no new license can be granted within 5 years of a withdrawal, then the score for *Future* would be 5*.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the assessor to make notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, for example outlining plans to track final suspensions centrally using a database. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years

later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Total number of items filled

Aim: To record the number of items entered in the *Requirements*.

Data required: None; auto-calculated.

Description: This is used as check that all items are completed with a score in the *Requirements* column.

Example: The *total number of items* should be 9 to achieve a completed table.

Items with standards/rules (scoring >0)

Aim: To record the number of items entered in *Requirements* marked with a score greater than zero, indicating that a regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score greater than zero, indicating that a regulation/standard is in place.

Example: If all items score greater than 0, apart from the access to further training, then the *Items with standards/rules* would be 8.

Items with no standards/rules (or scoring 0)

Aim: To record the number of items entered in *Requirements* marked with a score equal to zero, indicating that no regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score equal to zero, indicating that no regulation/standard is in place.

Example: If all items score greater than 0, apart from the access to further training (1 item), then the *Items with no standards/rules* would be 1.

Share of items covered by regulations

Aim: To describe the proportion of items covered by the regulations as a percentage indicator, and to encourage progress towards 100%.

Data required: None; auto-calculated.

Description: This describes the proportion of items with regulations/standards, or scoring greater than zero in the *Requirements* column, as a percentage of the *Total number of items*.

Example: The *total number of items* should be 9 to achieve a completed table. If all items score greater than 0, apart from the awareness campaigns, then the *Items with standards/rules* would be 8. The *share of items covered by regulations* is 8 out of 9 as a percentage.

Formula:

$$\text{Share of items covered by regulations} = \left(\frac{\text{Items with standards/rules}}{\text{Total number of items}} \right) \times 100$$

The above parameters are summarised in a short table in the Tool, and an example is given in Table 26.

Table 26: Example summary table to check coverage of the inspector qualifications items.

	Example
Total number of items	9
Items with standards/rules (scoring >0)	8
Items with no standards/rules (or scoring 0)	1
Share of items covered by regulations	89%

Importance weighting

Aim: This is to weight/prioritise the items under assessment according to CITA experience.

Data required: None; reference values.

Description: This is a weighting of the different items. This is to weight/prioritise the items in terms of their impact and importance. It is a reference for the current situation at the time of the Assessment.

The importance weighting gives rise to a scalar used in the ratings, to allow for the maximum possible score that is possible throughout the range of items/sub-items for the section.

Example: All items are currently weighted equally with 1 point, because all items have an equal part to play in the assessment of the inspector qualifications.

Weighting of sub-items

Aim: To allow grouping of sub-items to be weighted, so that the correct balance is achieved for the main items.

Data required: None; auto-calculated.

Description: This is a weighting of the sub-items to allow a group at the level of the main items. If there are multiple sub-items that relate to one

main item then this weighting can allow a proportional sharing between them to sum to the one main item. It prevents an over representation of the importance of a main item if it is broken down into multiple sub-items. Example: For the inspector qualifications there are three main items, each with different numbers of sub-items. Each of these sub-items is weighted so that the main items are equally weighted. The training item has four sub-items, so each of these is weighted as 0.25.

Maximum possible score for the item

Aim: To record the maximum star rating possible for each item (or sub-item) of the assessment of inspector qualifications.

Data required: None; auto-calculated.

Description: This is the maximum star rating possible for each item of the assessment of inspector qualifications.

Example: For *permission* the possible star ratings can be 1*, 2*, 3*, 4*, or 5*. 5 is the *maximum possible score for the item*.

Normalise to 1-5 scale

Aim: To normalise the scales up to five, for any items that can only score less than 5*.

Data required: None; auto-calculated.

Description: This normalisation is used to make sure every item in the assessment can be assessed on a scale up to 5, to allow them to be equally treated. If the items can only score less than 5*, then it is more important that these lower scores are achieved, so they are scaled up to ensure comparability with items that can score up to 5.

If the maximum possible score is 5, then the normalisation is 1, which is the case for the majority of items.

Example: For selection criteria there is only 2* available to score, so the normalisation value is set to 2.5 to scale the score up to make the scale match the other items.

Requirements Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale* of the item to the *requirements score*.

Data required: None; auto-calculated.

Description: The *requirements score* is used, and is multiplied by the factors for *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 3 for the *requirements* against *suspension or withdrawal*, then the *Requirements rating (weighted and normalised)* will be 1.51. This is because the *importance weighting* of the item is 1, the *weighting of sub-item* is 0.5, and the *normalise to 1-5 scale* is 1.

Implementation Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *implementation rating*.

Data required: None; auto-calculated.

Description: The *implementation* score is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 1 for the *implementation rating*, then the *Implementation Rating* will be 0.5 given that the *importance weighting* is 1, *weighting of sub-items* is 0.5, and *normalise to 1-5 scale* is 1.

Future Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *future rating*.

Data required: None; auto-calculated.

Description: The *future* score is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 5 for the *future rating*, then the *Future Rating* will be 2.51 given that the *importance weighting* is 1, *weighting of sub-items* is 0.5, and *normalise to 1-5 scale* is 1.

Total number of items filled

Aim: To provide an indicator of the number of rows correctly filled.

Data required: None; auto-calculated.

Description: This counts the number of rows correctly filled. If there are blanks, then an error message is displayed above the table. The purpose is to ensure that all rows are correctly filled, so that the ratings calculations will work.

Averages (weighted and normalised)

Aim: To average the scores per item of the inspector qualification assessment.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the assessment by summing the points scored for each item. Each is then scaled by dividing by the maximum available points.

There are three averages calculated:

- *Requirements rating*; for whether the inspector qualification items are required or not and used to show the standards/legislated requirements. It contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\text{Average requirements rating} = \frac{\text{Sum of Requirements Rating scores}}{\text{Number of items}}$$

Where:

$$\begin{aligned} \text{Sum of Requirements Rating scores} \\ = \sum_{\text{items}} \text{Requirements rating score} \end{aligned}$$

- *Implementation rating*; for whether the inspector qualification items are regularly implemented in reality. It contributes to the 'orange' *Implementation rating* in the spider diagram.

Formula:

$$\begin{aligned} \text{Average implementation rating} \\ = \frac{\text{Sum of Implementation Rating scores}}{\text{Sum of Maximum possible scores}} \end{aligned}$$

Where:

$$\begin{aligned} \text{Sum of Implementation Rating scores} \\ = \sum_{\text{items}} \text{Implementation rating score} \end{aligned}$$

- *Future rating* (within 5 years); used to show whether there are plans to implement the inspector qualification items in the future, even if not currently implemented. It contributes to the 'purple' *Future rating* in the spider diagram.

Formula:

$$\text{Average Future rating} = \frac{\text{Sum of Future Rating scores}}{\text{Sum of Maximum possible scores}}$$

Where:

$$\text{Sum of Future Rating scores} = \sum_{\text{items}} \text{Future rating score}$$



S6 IMPARTIALITY & ANTI-CORRUPTION

This section of the AVIS covers the assessment of the impartiality and anti-corruption measures in place. The purpose is to encourage development of inspection systems and bodies that are independent and resistant to corruption in order to ensure the fair and impartial inspection of vehicles.

ASSESSMENT OF IMPARTIALITY AND ANTI-CORRUPTION

This section covers the assessment of various impartiality and anti-corruption items. The approach is for the assessor to review the national rules and regulations in place and assess them against star levels. The scores are recorded against each item.

Impartiality and anti-corruption items

There are a number of different impartiality and anti-corruption items involved in the Assessment. The impartiality and anti-corruption items are described in the following sections:

- Transparency for the Customer
- Transparency for Society
- Transparency for Authorities
- Conflict of Interest
- Payment of Inspection Fee
- Motivation of Inspectors
- Consequences in Case of Fraudulent Behaviour
- Quality Assurance of Inspection Report and Inspection Result
- Fraud prevention: Technological Tools
- Fraud prevention: Human-based Measures
- Fraud prevention: Organisational Measures

It is important to note that examples mentioned in the description for each item are to be used as indicative examples, for inspiration, and are not an exhaustive list of how an item might be achieved. The specific requirements are listed under the star levels.

A key reference for this section is ISO 37001 about anti-bribery management systems (2016). Transparency and trust are the building blocks of any organisation's credibility. Nothing undermines effective institutions and equitable business more than bribery. It helps organisations of all types to prevent, detect and address bribery by adopting an anti-bribery policy, appointing a person to oversee anti-bribery compliance, training, risk assessments and due diligence on projects and business associates, implementing financial and commercial controls, and instituting reporting and investigation procedures.

Transparency for the Customer

Aim: To provide information to the customer in order to build their confidence that the inspection system is impartial. Customers need to know that they can rely on the inspection stations and their procedures.

Description: The basic examples (1*) are that there should be an official public reference or national legal framework to help inform the customers about the system. Similarly, the inspection centre manuals need to be publicly available. There should be an official complaints bureau or public appeals board, to help customers understand where and how to report differences or variances on the technical appraisals, and that they will get a response that follows a published appeals and complaints investigation system.

For bookings there should be a formal system, whether online or a call centre. A public list of prices, fees and payment methods should be available because the fees need to be clear to the customer to prevent them from being overcharged.

At a higher level (3*) there should be communication and awareness campaigns so that customers are aware of the need for the inspections and where to find information. At the higher levels there should be a whistle-blowing system available for customers to be able to report any misconduct.

Requirements:

- 1*: The payment/fee totally independent from the result of the inspection
- 2*: Conditions known before the inspection (official station, fees, procedures, timeframe, etc.)
- 3*: Professional liability insurance requirement
- 4*: Whistle-blowing system
- 5*: Online inspection manual publicly available

Transparency for Society

Aim: To provide information to society about the inspection system so they are reassured that the systems are effective and reliable, and vehicles roadworthiness guaranteed.

Description: This concerns the information made available to society about the outcomes of inspections and their independence. As a basic example (1*) some information about the remuneration of the independent inspectors should be available to demonstrate that the inspectors are not likely to be corrupt. Information should also be available to demonstrate that the national centres' have a uniformity of operation requirements. At

a higher-level example (5*) there should be periodic IT statistical analysis to demonstrate reporting about the inspections.

Requirements:

- 1*: Outcomes (pass/fail) of the vehicle inspection for the individual vehicles publicly available in a secure way, for instance by a sticker or available register/database
- 2*: Rejection rates publicly available, normally as mean values for each vehicle category of the country (rather than by region)
- 3*:
 - Outcomes (pass/fail) of governmental or third-party supervision of inspection centres publicly available
 - The methods or system requirements (governmental, ISO 17020, ISO 9001 etc) for monitoring of inspections companies and of inspectors are publicly available
- 4*: Whistle-blowing system
- 5*:
 - Vehicle inspection reports publicly available in a secure way
 - Public benchmarking analysis

Transparency for Authorities

Aim: To demonstrate clearly to other relevant authorities that the inspection system is impartial, and they can be assured that the vehicles inspected are of the standard required.

Description: This concerns the relevant information being kept securely and available to authorised bodies, about inspections and Inspector qualifications. There are two relevant ISO standards as reference:

- ISO 9001:2015 Quality management systems (ISO, 2015)
- ISO/IEC 17020:2012 Conformity assessment — Requirements for the operation of various types of bodies performing inspection (ISO, 2012)

For example, there may be other authorities interacting with the inspection system, including a Department for Transport, governmental supervision or auditing systems, and third-party auditing and accrediting bodies such as ISO.

Requirements:

- 1*: Basic information about inspection kept in a secure database and available
- 2*: Relevant information and inspection report kept in a secure database and available
- 3*:
 - Statistics available for authorised bodies
 - ISO 9001 implementation requirement
 - Information available on Inspector qualification certification
- 4*: ISO 17020 implementation requirement

5*: Additional data for evaluation

Conflict of Interest

Aim: To prevent a conflict of interest from corrupting the independence of the inspections, both at individual and organisational levels.

Description: A conflict of interest occurs when a person is in a position to derive personal benefit from actions or decisions made in their official capacity, leading to an increased risk that an Inspector will not act professionally. This item therefore concerns the independence of the inspectors during the vehicle inspections, and that risks to impartiality should be identified and actions taken to avoid or minimise them. For example, at a basic level (1*) the salary and employment of the inspectors should not be dependent on inspection result because this might cause the inspectors to become biased. Similarly, the hiring requirements should be independence and not linked to any organisations involved in the design, manufacture, supply, installation, purchase, ownership, use or maintenance of the vehicles inspected. There are two relevant references:

- ISO/IEC 17020:2012 Conformity assessment — Requirements for the operation of various types of bodies performing inspection (ISO, 2012).
- Section 4 of CITA Recommendation 9: Quality requirements for inspection bodies and supervising bodies involved in vehicle inspection (CITA, 2015)

Requirements:

- 1*: According to section 4.1. Impartiality and independence of ISO17020 inspection activities shall be impartial and not allow commercial, financial or other pressures to compromise impartiality. The inspection body shall identify risks to its impartiality and take actions to avoid or minimise those risks.
- 2*: something between 1* and 3*
- 3*: According to Annex 1, Type C of ISO17020 the inspection body shall provide safeguards to ensure adequate segregation of responsibilities and accountabilities. The design, manufacture, supply, installation, servicing and/or maintenance and the inspection of the same item shall not be undertaken by the same person.
- 4*: something between 3* and 5*
- 5*: According to Annex 1, Type A of ISO17020 the inspection body shall be independent and without conflict of independence. In particular, they shall not be engaged in the design, manufacture, supply, installation, purchase, ownership, use or



maintenance of the items inspected, either directly or via a linked separate legal entity.

Payment of Inspection Fee

Aim: To minimise the risk that the customer is asked to give extra money to the inspector, or that the customer tries to give extra money to the inspector, in order to influence the outcome of the inspection in a corrupt way. Also to prevent drivers from withholding fees if the result does not meet their expectations, which might result in corrupt behaviours. The payment mechanisms are important to provide the customers and authorities with the confidence that inspections are not corrupt.

Description: It is important to make it difficult for additional monies to be paid in either direction. This concerns the methods by which payment for inspections are made, and how they should ensure independence from the Inspector. Examples of payment methods include:

- Cash
- Credit card
- Online payment
- Third party payment
- Public office payment

The basic requirement is to avoid the inspector having to personally handle payments. This includes where inspections are free, other staff handle payments, and payments are made via other taxes.

Requirements:

- 1*: No payment handled by the inspector (includes free inspections, or payments handled via other taxes)
- 2*: Payment occurs before the inspection
- 3*: Only electronic payment and/or through third party solutions
- 4*: n/a
- 5*: n/a

Motivation of Inspectors

Aim: To provide conditions of employment that support Inspectors income safely and adequately to help attract and retain the right talent, and to discourage the need to take bribes.

Description: The focus is on working in an unbiased manner, and providing the employment to support the inspectors in delivering their work without taking bribes. It concerns the conditions that the vehicle Inspectors are employed in so that the right employees are attracted and retained, and so that pressure or risk of corruption is minimised.



In general, the employment of the Inspectors should align with international conventions such as International Labour Organisation (ILO): Standards on Freedom of Association (ILO, 2022). At a basic level (1*) the Inspectors' employment should be safe and secure if they are following their Code of Conduct, and there should be insurance in place to cover them in case of mistakes. Similarly, the outcome of inspections should not be linked to remuneration, as this might provide a source of bias. At a higher level (3*), the volume of inspections should also not be aligned to remuneration, since this might affect the quality of their work. At the highest level (5*) the employment package should include a career plan, and retirement and health care programs, in order to provide the security of employment to the inspectors and help to reduce the risk of their corruption.

Requirements:

- 1*: Safe employment conditions
- 2*: something between 1* and 3*
- 3*: Salary must be adequate and paid in time
- 4*: something between 3* and 5*
- 5*: To attract skilled and honest people to make the employment as an Inspector seem attractive in the society

Consequences in Case of Fraudulent Behaviour

Aim: To make the people working in the inspection system understand that corruption and fraudulent behaviour is wrong. People cannot be a vehicle Inspector if the conduct, impartiality, objectivity and independence of criteria has been violated.

Description: This concerns the proportionate responses if fraudulent behaviour is identified and verified, in order to ensure that such behaviour is discouraged. If an abnormality is identified, then the Inspector qualification should be withdrawn whilst there is an investigation. If fraudulent behaviour is confirmed, then the Inspector's license should be revoked. Depending on the circumstances, the fraud may spread more widely, for example through multiple Inspectors, or an entire station. It may result in the inspection centre having their authorisation/accreditation withdrawn too, and possibly could involve a legal process investigation too.

Requirements:

- 1*:
 - Suspension during investigation
 - Loss of licence and employment when fraudulent behaviour is confirmed
 - Report to the police if necessary

- 2*: n/a
- 3*: n/a
- 4*: n/a
- 5*: n/a

Quality Assurance of Inspection Report and Inspection Result

Aim: That there is a structured process and documentation system in place to control access and quality of the inspection reports and results.

Description: This concerns the controls and documentation systems in place for ensuring the independent quality of the inspection reports and results. The relevant reference is section 7 of CITA Recommendation 9: Quality requirements for inspection bodies and supervising bodies involved in vehicle inspection (CITA, 2015). This item also aligns with the ARSO standards.

The more difficult it is to change a report, the better the system is, because it will help to prevent fraudulent behaviour. Data may be analysed to help identify abnormalities, for example by looking at odometer, load admission or brakes data. If the odometer reading is lower than the previous year's reading, this is likely an indication that it has been tampered with, so the inspection database should not accept the reading and should flag a warning to the Inspector.

Requirements:

- 1*:
 - Documentation of all mandatory items
 - Only designated Inspector can issue report
 - Only authorised person can modify the results
 - Good explanation in the report for all failed items
- 2*: Complete documentation of all relevant items
- 3*: Warning system for detection of potential abnormalities
- 4*: something between 3* and 5*
- 5*:
 - The data is automatically sent to Periodic Technical Inspection (PTI) and central authority server.
 - The inspection report is issued automatically and the thresholds are set by the authority.

Fraud prevention: Technological Tools

Aim: To provide the electronic traceability of activities in databases using technological tools to provide evidence records and to use for analysis of abnormalities.

Description: CITA Recommendation 19 on Anti-Fraud Measures is the relevant reference (CITA, 2017). Some examples of these technological tools include:

- Camera systems
- Alert systems
- Access systems
- Stock management
- Inspection equipment
- Reporting
- Intelligent detecting / confirmation systems

Example: In some countries the data protection laws mean that surveillance by a camera system is subject to considerable conditions (e.g. in Germany), or even de facto prohibited. A measurement for the other subsections is regulated by the German accreditation body (DaKKS) and by the ISO 9001 at least 2 times per year. The safeguarding of the corresponding measures must be permanent and depends on the respective institution. Proof must be possible on request at any time and for any period. Even if the camera system is not feasible due to laws that restrict its use, it is still possible to score 5* by the other measures.

Requirements:

- 1*: 1 measure from CITA Recommendation 19, Chapter 7.1
- 2*: something between 1* and 3*
- 3*: 3 measures from CITA Recommendation 19, Chapter 7.1
- 4*: something between 3* and 5*
- 5*: 5 measures from CITA Recommendation 19, Chapter 7.1

Fraud prevention: Human-based Measures

Aim: This concerns the human elements of fraud prevention by actions of the body and influencing perceptions of the mind.

Description: CITA Recommendation 19 on Anti-Fraud Measures is the relevant reference (CITA, 2017). Some examples of these human-based measures include:

- Employee assistance programs
- Performance management
- Authorisation restrictions
- Disciplinary and arbitration practice
- Audits
- Effective communication
- Hiring
- Awareness

Requirements:

- 1*: 1 measure from CITA Recommendation 19, Chapter 7.2
- 2*: something between 1* and 3*
- 3*: 3 measures from CITA Recommendation 19, Chapter 7.2



4*: something between 3* and 5*

5*: 5 measures from CITA Recommendation 19, Chapter 7.2

Fraud prevention: Organisational Measures

Aim: This concerns the prevention of fraudulent actions by individuals or groups within an organisation.

Description: CITA Recommendation 19 on Anti-Fraud Measures is the relevant reference (CITA, 2017). Some examples of these organisational measures include:

- Complaint management
- Fraud department
- Impartial and cross-control assessments

Requirements:

1*: 1 measure from CITA Recommendation 19, Chapter 7.3

2*: something between 1* and 3*

3*: 2 measures from CITA Recommendation 19, Chapter 7.3

4*: something between 3* and 5*

5*: 3 measures from CITA Recommendation 19, Chapter 7.3

Input data required

Requirements

Aim: This rating aims to assess how well the item is addressed in the mandatory standards or national rules/regulations as a set of requirements.

Data required: Enter the star level against each item according to the current requirements of the mandatory standards or national rules. The Assessment Team review the information about national rules, regulations, and standards regarding the item. These are rules/standards as defined or agreed/authorised by the government. The Assessment Team makes an assessment of what star level the item scores. Sometimes there is evidence from documentation of what is achieved, and sometimes an element of interpretation and expert judgement is required if the documentation does not exactly match the requirements of the star levels. The star levels define the required standards to be achieved for each star level rating, and are listed above against each item individually. At least some or all of these items must be achieved to score at each given star level; it should be treated as AND/OR. If there is insufficient evidence to indicate an inspection system is providing at least 1* performance, then it scores 0. If there are no regulations or standards in place at all, then it should score 0.



Progression to the next star level is additive; all the prior star levels must be fulfilled first. For example, to achieve a 5* score this requires the 1* to 4* items are fulfilled, plus new requirements for 5* in addition.

Example: A country that has evidence of national rules requiring three technological tools from the list in CITA Recommendation 19 section 7.1 will score 3.

Implementation

Aim: This rating aims to assess the implementation of the rules for the item in reality.

Data required: Enter the star level against each item according to the current implementation in reality of the national rules. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the reality of implementation (what is actually carried out), not on what the rules state.

Example: A country that has evidence of national rules requiring three technological tools from the list in CITA Recommendation 19 section 7.1 will score 3 for the *Requirements*. If in reality this is actually implemented at a lower level, e.g. only 1 item, then the score for *Implementation* would be 1.

Future

Aim: This accounts for any future plans to make impartiality and anti-corruption changes that are not yet implemented, such as by increasing the number of technological tools used to safeguard against corruption. It allows a representation of the future goals.

Data required: Enter the star level against each item according to the future (within five years) implementation of the national rules. In general, the improvements should demonstrate changes in both the requirements/standards and in their actual implementation. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out, and evidence recorded.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the future plans and changes, not on what the rules state.

Example: A country that has evidence of national rules requiring three technological tools from the list in CITA Recommendation 19 section 7.1 will score 3 for the *Requirements*. If there are future plans to increase this

to five tools within the next five years, then the score for *Future* would be 5.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the assessor to make notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, for example outlining plans to track final suspensions centrally using a database. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Total number of items

Aim: To record the number of items entered in the *Requirements*.

Data required: None; auto-calculated.

Description: This is used as check that all items are completed with a score in the *Requirements* column.

Example: The *total number of items* should be 11 to achieve a completed table.

Items with standards/rules (scoring >0)

Aim: To record the number of items entered in *Requirements* marked with a score greater than zero, indicating that a regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score greater than zero, indicating that a regulation/standard is in place.

Example: If all items score greater than 0, apart from the last three items covering fraud prevention, then the *Items with standards/rules* would be 8.

Items with no standards/rules (or scoring 0)

Aim: To record the number of items entered in *Requirements* marked with a score equal to zero, indicating that no regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score equal to zero, indicating that no regulation/standard is in place.

Example: If all items score greater than 0, apart from the last three items covering fraud prevention that are marked as No, then the *Items with no standards/rules* would be 3.

Share of items covered by regulations

Aim: To describe the proportion of items covered by the regulations as a percentage indicator, and to encourage progress towards 100%.

Data required: None; auto-calculated.

Description: This describes the proportion of items with regulations/standards, or scoring greater than zero in the *Requirements* column, as a percentage of the *Total number of items*.

Example: The *total number of items* should be 11 to achieve a completed table. If all items score greater than 0, apart from the last three items covering fraud prevention, then the *Items with standards/rules* would be 8. The *share of items covered by regulations* is 8 out of 11 as a percentage.

Formula:

$$\text{Share of items covered by regulations} = \left(\frac{\text{Items with standards/rules}}{\text{Total number of items}} \right) \times 100$$

The above parameters are summarised in a short table in the Tool, and an example is given in Table 27.

Table 27: Example summary table to check coverage of the impartiality and anti-corruption items.

	Example
Total number of items	11
Items with standards/rules (scoring >0)	8
Items with no standards/rules (or scoring 0)	3
Share of items covered by regulations	73%

Importance weighting

Aim: This is to weight/prioritise the items under assessment according to CITA experience.

Data required: None; reference values.

Description: This is a weighting of the different items. This is to weight/prioritise the items in terms of their impact and importance. It is a reference for the current situation at the time of the Assessment.

The importance weighting gives rise to a scalar used in the ratings, to allow for the maximum possible score that is possible throughout the range of items/sub-items for the section.

Example: All items are currently weighted equally with 1 point, because all items have an equal part to play in the assessment of impartiality and anti-corruption.

Weighting of sub-items

Aim: To allow grouping of sub-items to be weighted, so that the correct balance is achieved for the main items.

Data required: None; auto-calculated.

Description: This is a weighting of the sub-items to allow a group at the level of the main items. If there are multiple sub-items that relate to one main item then this weighting can allow a proportional sharing between them to sum to the one main item. It prevents an over representation of the importance of a main item if it is broken down into multiple sub-items.

Example: For the impartiality items all the items are equally important, so each has a *weighting of sub-items* of 1.

Maximum possible score for the item

Aim: To record the maximum star rating possible for each impartiality and anti-corruption item.

Data required: None; auto-calculated.

Description: This is the maximum star rating possible for each impartiality and anti-corruption item.

Example: For *Fraud prevention: technological* tools the possible star ratings can be 1*, 3*, or 5*. 5 is the *maximum possible score for the item*.

Normalise to 1-5 scale

Aim: To normalise the scales up to five, for any items that can only score less than 5*.

Data required: None; auto-calculated.

Description: This normalisation is used to make sure every item in the assessment can be assessed on a scale up to 5, to allow them to be equally treated. If the items can only score less than 5*, then it is more important that these lower scores are achieved, so they are scaled up to ensure comparability with items that can score up to 5.

If the maximum possible score is 5, then the normalisation is 1, which is the case for the majority of items.

Example: For consequences in case of fraudulent behaviour there is only 1* available to score, so the normalisation value is set to 5 to scale the score up to make the scale match the other items.

Requirements Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *requirements score*.

Data required: None; auto-calculated.

Description: The *requirements score* is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 3 for the *requirements* against *fraud prevention: technological tools*, then the *Requirements rating (weighted and normalised)* will be 3. This is because the *importance weighting* of the item is 1, the *weighting of sub-item* is 1, and the *normalise to 1-5 scale* is 1.

Implementation Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *implementation rating*.

Data required: None; auto-calculated.

Description: The *implementation* score is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 1 for the *implementation rating*, then the *Implementation Rating* will be 1 given that the *importance weighting* is 1, *weighting of sub-items* is 1, and *normalise to 1-5 scale* is 1.

Future Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *future rating*.

Data required: None; auto-calculated.

Description: The *future* score is used, and is multiplied by the factors for importance *weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 5 for the *future rating*, then the *Future Rating* will be 5 given that the *importance* weighting is 1, *weighting of sub-items* is 1, and *normalise to 1-5 scale* is 1.

Total number of items filled

Aim: To provide an indicator of the number of rows correctly filled.

Data required: None; auto-calculated.

Description: This counts the number of rows correctly filled. If there are blanks, then an error message is displayed above the table. The purpose is to ensure that all rows are correctly filled, so that the ratings calculations will work.

Averages (weighted and normalised)

Aim: To average the scores per impartiality and anti-corruption item.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the assessment by summing the points scored for each item. Each is then scaled by dividing by the maximum available points.

There are three averages calculated:

- *Requirements rating*; for whether the impartiality and anti-corruption items are required or not and used to show the standards/legislated requirements. It contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\text{Average Requirements rating} = \frac{\text{Sum of Requirements Rating scores}}{\text{Number of items}}$$

Where:

$$\begin{aligned} & \text{Sum of Requirements Rating scores} \\ &= \sum_{\text{items}} \text{Requirements rating score} \end{aligned}$$

- *Implementation rating*; for whether the impartiality and anti-corruption items are regularly implemented in reality. It contributes to the 'orange' *Implementation rating* in the spider diagram.

Formula:

$$\begin{aligned} & \textit{Average implementation rating} \\ &= \frac{\textit{Sum of Implementation Rating scores}}{\textit{Number of items}} \end{aligned}$$

Where:

$$\begin{aligned} & \textit{Sum of Implementation Rating scores} \\ &= \sum_{\textit{items}} \textit{Implementation rating score} \end{aligned}$$

- *Future rating* (within 5 years); used to show whether there are plans to implement the impartiality and anti-corruption items in the future, even if not currently implemented. It contributes to the ‘purple’ *Future rating* in the spider diagram.

Formula:

$$\textit{Average Future rating} = \frac{\textit{Sum of Future Rating scores}}{\textit{Number of items}}$$

Where:

$$\textit{Sum of Future Rating scores} = \sum_{\textit{items}} \textit{Future rating score}$$



S7 ENFORCEMENT

This section of the AVIS covers the assessment of the inspection system enforcement. The purpose is to ensure minimum standards of vehicle inspection are complied with. This section is complemented by additional OPTIONAL calculations to support the Assessment Team in finding answers to fill in S7.

ASSESSMENT OF ENFORCEMENT

There are a number of enforcement items involved in the Assessment. The enforcement items are described in the following sections:

- Responsibilities
 - Authority responsibility
 - Certificate of approved vehicle
 - Owner responsibility
 - Re-inspection / Re-test
 - Driver responsibility
- Accessibility
 - Network accessibility
 - Inspection capacity
 - Inspection fees
- Motivation
 - Information and awareness campaigns
 - Absenteeism

It is important to note that examples mentioned in the description for each item are to be used as indicative examples, for inspiration, and are not an exhaustive list of how an item might be achieved. The specific requirements are listed under the star levels.

Enforcement items

Authority responsibility to ensure that only approved vehicles are used

Aim: To ensure the authority is using appropriate measures to measure and enforce that only approved vehicles are used.

Description: This is to help ensure that only approved vehicles, with a valid PTI certificate, are used. The authority must use appropriate means to track, evaluate and enforce the use of approved vehicles, so this items is assessing the measures used by the authority.

Requirements:

- 1*: Track absenteeism
- 2*: Evaluate and enforce absenteeism
- 3*: Roadside inspection to detect and enforce vehicles without valid certificates

- 4*: something between 3* and 5*
- 5*: Automatic process (cameras, remote sensing, etc) to efficiently detect and enforce vehicles without valid certificates

Certificate of approved vehicle

Aim: To ensure that appropriate means are used to certify vehicles as approved on successful PTI inspection.

Description: It is essential for authorities and owners to know if a vehicle is approved after a PTI inspection, and there are different methods to certify the vehicle. This item assesses the different methods for certification of vehicles, to help ensure that appropriate means are used.

Requirements:

- 1*: Certificate/sticker of proof for vehicle owner
- 2*: something between 1* and 3*
- 3*: Centralised tracking in vehicle database with batched/periodic updates
- 4*: something between 3* and 5*
- 5*: Centralised tracking in vehicle database with live/current updates

Owner responsibility to keep vehicle in safe and approved status (valid PTI certificate)

Aim: To ensure the owner/driver will face appropriate sanctions if they fail to have the vehicle inspected as required by national rules.

Description: This is to assess the level of sanctions applied in the event of an owner/driver failing to have a vehicle inspected when required to according to the national rules. For example, this might include a driving sanction or ban as a basic (1*) requirement. Other measures may include losing or limitation of vehicle insurance, or penalising/limiting score system for driving license or vehicle registration. A higher-level example (5*) could be further consequences for the owner (e.g. fine).

Requirements:

- 1*: Driving sanction or ban without valid inspection
- 2*: something between 1* and 5*, but closer to 1*
- 3*: something between 1* and 5*, midway
- 4*: something between 1* and 5*, but closer to 5*
- 5*: Further consequences for the owner (e.g. fine)

Re-inspection / Re-test

Aim: This is to ensure the vehicle does not remain in use for too long a period before being brought back to the required standard, or being taken off the road.

Description: To ensure there is a legal period defined for re-inspection / re-test activities if a vehicle should fail its inspection.

Requirements:

- 1*: Repair complete within 3 months \geq period $>$ 2 months
- 2*: Repair complete within 2 months \geq period $>$ 1 month
- 3*: Repair complete within 1 month \geq period $>$ 2 weeks
- 4*: Repair complete within 2 weeks \geq period $>$ 1 week
- 5: Repair complete within period \leq 1 week

Driver responsibility: Consequence when driving without valid PTI certificate

Aim: To ensure there are suitable consequences for the driver if driving without a valid PTI certificate.

Description: This concerns the consequences for the driver of driving without a valid PTI certificate. Without a PTI certificate the driver shall only allowed to prepare for repair or go to a repair shop.

Requirements:

- 1*: Fine for the driver
- 2*: something between 1* and 3*
- 3*: Temporary loss of driving permission
- 4*: something between 3* and 5*
- 5*: Loss of driving licence

Network accessibility

Aim: To assess if it is easy enough for a vehicle owner/driver to reach an inspection station.

Description: This concerns the general distance for vehicle owners/drivers to get to an inspection, or the time taken to get to an inspection. It is of particular importance for rural/remote areas, where distance/time might be prohibitive and lead to absenteeism. The values used are intended for the majority of vehicle owners, including those in remote cities, but note that people from extremely remote areas may have to travel further. Due to variations in geography and infrastructure between countries it is difficult to identify a general indicator / star levels for this item. There will be some variation between vehicle categories, e.g the accessibility for heavy vehicles or tractors may be very different from cars. At this stage of development of the AVIS Tool, CITA has chosen a high-level approach, feeling that taking all vehicle categories into account is too complex.



National authorities need to take different vehicle categories into account when deciding about the general systems for inspection, and when defining the regulation and/or tender requirements. This aspect is assessed S2 Rules & General Systems Part 1: Assessment of the infrastructure of authorised bodies.

The outcomes should also be supervised over time by relevant Key Performance Indicators (KPIs) to help ensure that the accessibility is actually implemented adequately in practise. Although note that in this version of the AVIS, CITA do not yet explicitly assess network accessibility in S7 Enforcement.

Requirements:

- 1*: Up to 200 km (OR up to one working day travel time 2 ways) in general for persons in rural/remote areas
- 2*: something between 1* and 3*
- 3*: Up to 100 km (OR up to 5 hours travel time 2 ways) in general for persons in rural/remote areas
- 4*: something between 3* and 5*
- 5*: Up to 20 km (OR up to 3 hours travel time 2 ways) in general for persons in rural/remote areas

Inspection capacity

Aim: To assess the capacity of the inspectors available for inspections in relation to the number required according to the *total country fleet*.

Description: This concerns the total capacity for inspections across the country as a percentage of the total country fleet. Ideally, the capacity for inspections should be at least 100%.

To define the inspection capacity some data collection might be needed and then some complex calculations, especially if there is a mix of types of inspection station, working hours of inspectors etc. It is anticipated that this evidence is calculated offline, and only the final answer need be entered into the Tool. In addition, S7 Enforcement OPTIONAL

Calculations is provided as a complementary tool to support the analysis, if needed.

Requirements:

- 1*: Total capacity / Total no' inspections (from scope of vehicles for this country) = at least 50%. NOTE allowed to take absenteeism into account, for reasonable productivity
- 2*: something between 1* and 3*
- 3*: At least 75% (not taking absenteeism into account)
- 4*: something between 3* and 5*

- 5*: At least 100% of the full fleet (not taking absenteeism into account)

Inspection fees

Aim: To make an assessment of the inspection fees and whether they are proportionate to the inspection costs, and also discourage corrupt behaviour.

Description: Inspection fees need to be affordable for the vehicle owners, but also high enough to represent the value and importance of the inspection. To prevent fraudulent behaviour, the fees also need to be high enough so that there is no need to for inspectors to supplement their work with bribes. The fees should cover the basic costs for the inspection (minus subsidiaries) OR be related to price for similar services in the country. There is no need to define price in the legislation if the market for inspections works well, with prices applied that are both affordable and serious.

Requirements:

- 1*: Affordable maximum price defined/applied (equal to a full tank or x % of average wage)
OR
Reasonable minimum price defined/applied (equal to expected costs for the PTI operator)
- 2*: n/a
3*: n/a
4*: n/a
5*: n/a

Information and awareness campaigns

Aim: To make clear to the owner/driver their responsibility for inspection of the vehicles.

Description: This concerns the awareness campaigns needed to ensure that drivers/owners know and understand the requirements for inspection of vehicles, and the potential sanctions that may be incurred if they do not comply.

Requirements:

- 1*: Awareness campaign about requirements of inspections and the conditions (official station, fees, procedures, timeframe, etc..)
2*: something between 1* and 3*
3*: Awareness campaign about enforcement schemes
4*: n/a



- 5*: Holistic "Vision Zero" road safety and environmental awareness campaigns

Absenteeism

Aim: To encourage a greater attendance for vehicle inspections, and quantify the percentage that do not attend.

Description: Percentage of vehicles not submitted to the inspection process when obliged to. This is an average across all vehicle categories, and optionally can be derived from market fleet absenteeism in section S3 Vehicle Scope Part 1: Assessment of vehicle scope.

Requirements:

- 1*: Absenteeism is 25 % or less
- 2*: $20 \% > \text{Absenteeism} \geq 15 \%$
- 3*: $15 \% > \text{Absenteeism} \geq 10 \%$
- 4*: $10 \% > \text{Absenteeism} \geq 5 \%$
- 5*: $5 \% > \text{Absenteeism} \geq 0 \%$

Input data required

Requirements

Aim: This rating aims to assess how well the item is addressed in the mandatory standards or national rules/regulations as a set of requirements.

Data required: Enter the star level against each item according to the current requirements of the mandatory standards or national rules. The Assessment Team review the information about national rules, regulations, and standards regarding the item. These are rules/standards as defined or agreed/authorised by the government. The Assessment Team makes an assessment of what star level the item scores. Sometimes there is evidence from documentation of what is achieved, and sometimes an element of interpretation and expert judgement is required if the documentation does not exactly match the requirements of the star levels. The star levels define the required standards to be achieved for each star level rating, and are listed above against each item individually. At least some or all of these items must be achieved to score at each given star level; it should be treated as AND/OR. If there is insufficient evidence to indicate an inspection system is providing at least 1* performance, then it scores 0. If there are no regulations or standards in place at all, then it should score 0.

Progression to the next star level is additive; all the prior star levels must be fulfilled first. For example, to achieve a 5* score this requires the 1* to 4* items are fulfilled, plus new requirements for 5* in addition.

Example: A country that mentions in the national rules about losing insurance coverage for a failed inspection and regular roadside inspections, in addition to a ban for driving without a valid inspection in place for their vehicle will score 3.

Implementation

Aim: This rating aims to assess the implementation of the rules for the item in reality.

Data required: Enter the star level against each item according to the current implementation in reality of the national rules. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the reality of implementation (what is actually carried out), not on what the rules state.

Example: A country that has evidence of national rules requiring loss of insurance coverage for a failed inspection and regular roadside inspections, in addition to a ban for driving without a valid inspection will score 3 for the *Requirements*. If in reality the only part that is actually implemented is at a lower level, e.g. the driving ban only, then the score for *Implementation* would be 1.

Future

Aim: This accounts for any future plans to make enforcement changes that are not yet implemented. It allows a representation of the future goals.

Data required: Enter the star level against each item according to the future (within five years) implementation of the national rules. In general, the improvements should demonstrate changes in both the requirements/standards and in their actual implementation. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out, and evidence recorded.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the future plans and changes, not on what the rules state.

Example: A country that has evidence of national rules requiring loss of insurance coverage for a failed inspection and regular roadside inspections, in addition to a ban for driving without a valid inspection will score 3 for the *Requirements*. If there are future plans to increase this to include an automatic process to detect non-valid inspection within the next five years, then the score for *Future* would be 5.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the assessor to make notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, for example outlining plans to add an automatic process to detect non-valid inspection by using a camera-based system. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Total number of items filled

Aim: To record the number of items entered in the *Requirements*.

Data required: None; auto-calculated.

Description: This is used as check that all items are completed with a score in the *Requirements* column.

Example: The *total number of items* should be 7 to achieve a completed table.

Items with standards/rules (scoring >0)

Aim: To record the number of items entered in *Requirements* marked with a score greater than zero, indicating that a regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score greater than zero, indicating that a regulation/standard is in place.

Example: If all items score greater than 0, apart from the awareness campaigns, then the *Items with standards/rules* would be 6.

Items with no standards/rules (or scoring 0)

Aim: To record the number of items entered in *Requirements* marked with a score equal to zero, indicating that no regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score equal to zero, indicating that no regulation/standard is in place.

Example: If all items score greater than 0, apart from the awareness campaigns (1 item), then the *Items with no standards/rules* would be 1.

Share of items covered by regulations

Aim: To describe the proportion of items covered by the regulations as a percentage indicator, and to encourage progress towards 100%.

Data required: None; auto-calculated.

Description: This describes the proportion of items with regulations/standards, or scoring greater than zero in the *Requirements* column, as a percentage of the *Total number of items*.

Example: The *total number of items* should be 7 to achieve a completed table. If all items score greater than 0, apart from the awareness campaigns, then the *Items with standards/rules* would be 6. The *share of items covered by regulations* is 6 out of 7 as a percentage.

Formula:

$$\text{Share of items covered by regulations} = \left(\frac{\text{Items with standards/rules}}{\text{Total number of items}} \right) \times 100$$

The above parameters are summarised in a short table in the Tool, and an example is given in Table 28.

Table 28: Example summary table to check coverage of the enforcement items.

	Example
Total number of items	7
Items with standards/rules (scoring >0)	6
Items with no standards/rules (or scoring 0)	1
Share of items covered by regulations	86%

Importance weighting

Aim: This is to weight/prioritise the items under assessment for enforcement according to CITA experience.

Data required: None; reference values.

Description: This is a weighting of the different enforcement items. This is to weight/prioritise the items in terms of their impact and importance. It is a reference for the current situation at the time of the Assessment.

The importance weighting gives rise to a scalar used in the ratings, to allow for the maximum possible score that is possible throughout the range of items/sub-items for the section.

Example: All items are currently weighted equally with 1 point, because all items have an equal part to play in the enforcement of inspections.

Weighting of sub-items

Aim: To allow grouping of sub-items to be weighted, so that the correct balance is achieved for the main items.

Data required: None; auto-calculated.

Description: This is a weighting of the sub-items to allow a group at the level of the main items. If there are multiple sub-items that relate to one main item then this weighting can allow a proportional sharing between them to sum to the one main item. It prevents an over representation of the importance of a main item if it is broken down into multiple sub-items.

Example: For the enforcement items all rows are equally important, so all sub-items have a *weighting of sub-items* of 1.

Maximum possible score for the item

Aim: To record the maximum star rating possible for each item (or sub-item) of the assessment of enforcement.

Data required: None; auto-calculated.

Description: This is the maximum star rating possible for each item of the assessment of enforcement.

Example: For *inspection capacity* the possible star ratings can be 1*, 2*, 3*, 4*, or 5*. 5 is the *maximum possible score for the item*.

Normalise to 1-5 scale

Aim: To normalise the scales up to five, for any items that can only score less than 5*.

Data required: None; auto-calculated.

Description: This normalisation is used to make sure every item in the assessment can be assessed on a scale up to 5, to allow them to be equally treated. If the items can only score less than 5*, then it is more important that these lower scores are achieved, so they are scaled up to ensure comparability with items that can score up to 5.

If the maximum possible score is 5, then the normalisation is 1, which is the case for the majority of items.

Example: For inspection fees there is only 1* available to score, so the normalisation value is set to 5 to scale the score up to make the scale match the other items.

Requirements Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *requirements score*.

Data required: None; auto-calculated.

Description: The *requirements score* is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 3 for the *requirements* against *certificate of approved vehicle*, then the *Requirements rating (weighted and normalised)* will be 0.6. This is because the *importance weighting* of the item is 1, the *weighting of sub-item* is 0.2, and the *normalise to 1-5 scale* is 1.

Implementation Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *implementation rating*.

Data required: None; auto-calculated.

Description: The *implementation score* is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 1 for the *implementation rating*, then the *Implementation Rating* will be 0.2 given that the *importance weighting* is 1, *weighting of sub-items* is 0.2, and *normalise to 1-5 scale* is 1.

Future Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *future rating*.

Data required: None; auto-calculated.

Description: The *future* score is used, and is multiplied by the factors for importance *weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 5 for the *future rating*, then the *Future Rating* will be 1 given that the *importance* weighting is 1, *weighting of sub-items* is 0.2, and *normalise to 1-5 scale* is 1.

Total number of items filled

Aim: To provide an indicator of the number of rows correctly filled.

Data required: None; auto-calculated.

Description: This counts the number of rows correctly filled. If there are blanks, then an error message is displayed above the table. The purpose is to ensure that all rows are correctly filled, so that the ratings calculations will work.

Averages (weighted and normalised)

Aim: To average the scores per item of the enforcement assessment.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the assessment by summing the points scored for each item. Each is then scaled by dividing by the maximum available points.

There are three averages calculated:

- *Requirements rating*; for whether the enforcement items are required or not and used to show the standards/legislated requirements. It contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\text{Requirements rating} = \frac{\text{Sum of Requirements Rating scores}}{\text{Number of items}}$$

Where:

$$\begin{aligned} &\text{Sum of Requirements Rating scores} \\ &= \sum_{\text{items}} \text{Requirements rating score} \end{aligned}$$

- *Implementation rating*; for whether the enforcement items are regularly implemented in reality. It contributes to the ‘orange’ *Implementation rating* in the spider diagram.

Formula:

$$\text{Implementation rating} = \frac{\text{Sum of Implementation Rating scores}}{\text{Number of items}}$$

Where:

$$\begin{aligned} \text{Sum of Implementation Rating scores} \\ = \sum_{\text{items}} \text{Implementation rating score} \end{aligned}$$

- *Future rating* (within 5 years); used to show whether there are plans to implement the enforcement items in the future, even if not currently implemented. It contributes to the ‘purple’ *Future rating* in the spider diagram.

Formula:

$$\text{Future rating} = \frac{\text{Sum of Future Rating scores}}{\text{Number of items}}$$

Where:

$$\text{Sum of Future Rating scores} = \sum_{\text{items}} \text{Future rating score}$$



S7 ENFORCEMENT OPTIONAL CALCULATIONS

This section provides additional OPTIONAL calculations to support finding answers for S7 Enforcement. They do not have to be used.

It is provided in 3 parts:

- Part 1: OPTIONAL; Evaluation of available network capacity
- Part 2: OPTIONAL; Evaluation of inspection capacity needed
- Part 3: OPTIONAL; Summary

PART 1: OPTIONAL; EVALUATION OF AVAILABLE NETWORK CAPACITY

This section is entirely optional. It may be used to help estimate figures to be used in the scoring for the Inspection capacity sub-item. These tables are intended to assist the assessor to evaluate the network capacity AVAILABLE. It may also be used as a tool to help the assessor, and the inspection representatives of the country, to consider options for future development of the inspection network.

The calculations are split into two steps, depending on whether the inspectors or the lanes are the most limiting factor on capacity:

- Calculation of annual capacity available, based on INSPECTORS
- Calculation of annual capacity available, based on LANES

The data is recorded per inspector/lane capability:

- Combined Light & Heavy Vehicles
- Only Light Vehicles
- Only Heavy Vehicles
- Only 2&3-wheelers
- Other

Later these are combined to only light, heavy and 2&2-wheelers, in order to simplify and to match against G3 Basic Data Part 2: Inspection data per vehicle category. To achieve this, the Assessor must select the best fit for the 'other' inspectors/lanes. The drop-down selector can be used to make this choice, and the calculations will update. For example, if the 'other' lanes are most similar in use to the light vehicles, then light vehicles should be selected. If no selection is made, the 'other' inspectors/lanes will be excluded entirely.

Input data required

Number of Inspectors

Aim: To quantify the number of inspectors available according to their different capabilities.

Data required: Enter the number of each type of inspector.



Example: 200 inspectors that can work on light & heavy vehicles, and another 300 that can work only on light vehicles.

Time allocation

Aim: To quantify the percentage of time spent by each type of inspector that is spent working on the vehicle inspections.

Data required: Enter the percentage of time spent on vehicle inspections for each type of inspector.

Example: If the inspectors are also carrying out repair work, they might only spend 20% of their working time on inspections.

Hours per day

Aim: To quantify the average working day for Inspectors by number of hours.

Data required: Enter the number of hours worked on average by an Inspector.

Example: 8 hour working day for an inspector.

Example: 10 hours per day available for the inspection lane on average.

Working days per year

Aim: To quantify the average working days per year.

Data required: Enter the number of days worked on average by an Inspector. This should exclude annual leave and public holidays.

Example: 220 working days per year.

Average time allocated per inspection (hours)

Aim: To quantify the average allocated per inspection.

Data required: Enter the average amount of time allocated per inspection in hours.

Example: 0.5 hours.

Number of lanes

Aim: To quantify the number of inspection lanes available according to their different capabilities.

Data required: Enter the number of each type of lane.

Example: 10 lanes that are capable for handling light & heavy vehicles, and another 200 that can handle only on light vehicles.

Opening hours per day

Aim: To quantify the average open working day for an inspection lane by number of hours.



Data required: Enter the number of hours worked on average by an open inspection lane.

Example: 10 hours per day available for the inspection lane on average.

Opening days per year

Aim: To quantify the average opening days per year for the inspection lanes.

Data required: Enter the number of days open and working on average by the inspection lanes.

Example: 320 opening days per year.

Reference and calculated parameters

Inspection capacity (hours/year)

Aim: To quantify the average inspection capacity available in terms of hours/year.

Data required: None; auto-calculated.

Description: This quantifies the average inspection capacity available in hours per year.

Formula:

$$\begin{aligned} & \textit{Inspection capacity available} \\ & = \textit{Number of inspectors} \times \textit{time allocation} \times \textit{hours per day} \\ & \quad \times \textit{working days per year} \end{aligned}$$

Example: 200 inspectors working 70% of their time for 8 hours a day over 320 days in the year will have an inspection capacity of 358,400 hours per year.

Inspection capacity (inspections per year)

Aim: To estimate the annual number of inspections that are available/possible.

Data required: None; auto-calculated.

Description: This describes the average number of inspections that can be completed on an annual basis.

Example: For an inspection capacity of 358,400 where the inspections take 0.3 hours each, then the inspection capacity per year is 1,194,667.

Formula:

$$\begin{aligned} & \textit{Inspection capacity (hours per year)} \\ & = \left(\frac{\textit{Inspection capacity (hours per year)}}{\textit{Average time allocated per inspection (hours)}} \right) \end{aligned}$$

Total capacity of inspectors per year (full time equivalent)

Aim: To estimate the annual total capacity of inspections that are available/possible, as full-time equivalent.

Data required: None; auto-calculated.

Description: This estimates the total capacity of inspectors per year in terms of full-time equivalent staff. Note that this is grouped per light vehicles, heavy vehicles, or 2&3-wheelers, so requires that the Assessor selects which group to add the 'other' inspectors to.

Example: For only 2&3-wheelers, if there are 200 inspectors, allocated at 95% of their time, this is equivalent to 190 inspectors as a full-time equivalent.

If there are also 50 other inspectors, working at 50% of their time allocation, then this adds 25 more full-time equivalent inspectors. As a total, this would give 215 full-time equivalent inspectors.

Formula:

$$\begin{aligned} & \textit{Total capacity of inspectors per year (full time equivalent)} \\ & = \textit{number of inspectors} \times \textit{time allocation} \end{aligned}$$

Annual inspections

Aim: To re-group the *Inspection capacity (inspections per year)* for inspectors/lanes and simplify.

Data required: None; auto-calculated.

Description: This re-groups the data for *Inspection capacity (inspections per year)* from 6 different types of inspectors/lanes down to just 3 for the sake of simplicity and matching the data in other sections. The 3 categories resulting are light vehicles, heavy vehicles, and 2&3-wheelers.

Example: The *Inspection capacity (inspections per year)* for light vehicles within the *combined light & heavy vehicles* are added to the *only light vehicles* data. If selected, the data for *other* will also be added.

PART 2: OPTIONAL; EVALUATION OF INSPECTION CAPACITY NEEDED

This section is entirely optional. It may be used to help estimate figures to be used in the scoring for the Inspection capacity sub-item. These tables are intended to assist the assessor to evaluate the network capacity NEEDED, and is based on the vehicle category data from G3 Basic Data Part 2: Inspection data per vehicle category and S3 Vehicle Scope Part 1: Assessment of vehicle scope. It may also be used as a tool to help the assessor, and the inspection representatives of the country, to consider options for future development of the inspection network.

Input data required

None.

Reference and calculated parameters

The calculations start by referencing various parameters from other sections and compiling them to a table. These parameters are listed in Table 29. There is one table for if the UNECE classification is used, and a second for if the simple classification is used, according to the selection made in G3 Basic Data Part 2: Inspection data per vehicle category.

Table 29: Parameters referenced for Part 2: OPTIONAL; Evaluation of inspection capacity needed

Parameter	Source	
	AVIS section	Part
Type of lane	G3 Basic Data	Part 2: Inspection data per vehicle category
Failure rate	G3 Basic Data	Part 2: Inspection data per vehicle category
Country market fleet	G3 Basic Data	Part 2: Inspection data per vehicle category
Country specific capacity; annual requirement	S3 Vehicle Scope	Part 1: Assessment of vehicle scope
Theoretical capacity required annually	S3 Vehicle Scope	Part 1: Assessment of vehicle scope

Average failure rate

Aim: To re-group the *Failure rate* for into the three categories.

Data required: None; auto-calculated.

Description: This re-groups the data for *Failure rate* for the different vehicle categories down to just 3 for the sake of simplicity and matching the data in other sections. The 3 categories resulting are light vehicles, heavy vehicles, and 2&3-wheelers. An average failure rate is then calculated per each of the three new groups.

Sum of regular vehicle inspections (regular inspections per year)

Aim: To sum the regular inspections required each year under various groupings.

Data required: None; auto-calculated.

Description: This calculates the regular inspections each year based upon the country market fleet and inspection requirements. Various groupings are used:

- Country specific capacity: annual requirement

- Light vehicle lane
- Heavy vehicle lane
- 2&3-wheelers
- All
- Theoretical capacity required annually
 - 2*, 3* and 4* levels

Estimated inspection capacity needed (regular + re-inspections per year)

Aim: To sum the regular inspections required each year, plus the re-inspections needed due to failures, under various groupings.

Data required: None; auto-calculated.

Description: This sums the regular inspections required each year with the re-inspections needed due to failures. Various groupings are used:

- Country specific capacity: annual requirement
 - Light vehicle lane
 - Heavy vehicle lane
 - 2&3-wheelers
 - All
- Theoretical capacity required annually
 - 2*, 3* and 4* levels

Formula:

Estimated inspection capacity needed (regular plus re-inspections per year)
 = *Sum of regular vehicle inspections (regular inspections per year) + re-inspections*

Where:

Reinspections

= *Sum of regular vehicle inspections (regular inspections per year)*
 × *Average failure rate*

PART 3: OPTIONAL; SUMMARY

This section is entirely optional. It may be used to help estimate figures to be used in the scoring.

It may also be used as a tool to help the assessor, and the inspection representatives of the country, to consider options for future development of the inspection network.

Four groups of data are used: light vehicles, heavy vehicles, and 2&3-wheelers; and 'All' is the sum of these.



Input data required

Inspection capacity available

Aim: To quantify the inspection capacity available annually (inspections per year).

Data required: Enter the inspection capacity available annually (inspections per year). You can use Part 1: OPTIONAL; Evaluation of available network capacity if desired.

Description: This is to quantify the inspection capacity available annually (inspections per year).

Inspection capacity needed

Aim: To quantify the inspection capacity needed annually (inspections per year).

Data required: Enter the inspection capacity needed annually (inspections per year). This can be derived from a vehicle and inspection database, or you can use Part 2: OPTIONAL; Evaluation of inspection capacity needed if desired.

Description: This is to quantify the inspection capacity needed annually (inspections per year).

Reference and calculated parameters

Total vehicle fleet

Aim: To reference the total vehicle fleet figures.

Data required: None; auto-calculated.

Referenced: from G3 Basic Data Part 2: Inspection data per vehicle category.

Description: This is used as an indicator of the total volume of vehicles to be inspected.

Capacity available vs need (lack of inspections per year)

Aim: To indicate the lack of inspections per year, by comparing the availability and the need.

Data required: None; auto-calculated.

Description: This is a comparison of the availability and the need for inspections. In cases where the availability exceeds the need, there is over-supply. In cases where the need exceeds the availability, this indicates a problematic lack, and the Assessment team should work with the in-country team to discuss possible solutions. The optional calculations in Part 1: OPTIONAL; Evaluation of available network capacity Part 2: OPTIONAL; Evaluation of inspection capacity needed might help these discussions.



Formula:

$$\begin{aligned} & \textit{Capacity available vs need (lack of inspections per year)} \\ & = \textit{Inspection capacity needed} - \textit{Inspection capacity available} \end{aligned}$$

Capacity provided (inspection per year, %)

Aim: To indicate the capacity of inspections per year that are actually provided, as a percentage.

Data required: None; auto-calculated.

Description: This is a calculation of the inspection capacity provided, but as a percentage of the need.

Formula:

$$\begin{aligned} & \textit{Capacity provided (inspection per year, \%)} \\ & = 1 - \textit{Capacity available vs need (lack of inspections, \%)} \end{aligned}$$

Capacity available vs need (lack of inspections,%)

Aim: To indicate the lack of capacity of inspections per year as a percentage.

Data required: None; auto-calculated.

Description: This is a calculation of the gap or lack of inspection capacity provided, but as a percentage of the need.

Formula:

$$\begin{aligned} & \textit{Capacity available vs need (lack of inspections, \%)} \\ & = \frac{\textit{Capacity available vs need (lack of inspections per year)}}{\textit{Inspection capacity needed}} \end{aligned}$$

S8 SUPERVISION

This section of the AVIS covers the supervision methods used in the inspection systems. This includes the proper execution of inspections and their reports, as well as the right preconditions such as the technical competence of inspectors and management, relevant inspection procedures, and well-maintained calibrated equipment. It also includes methods to reveal/prevent any corrupt behaviour. The purpose is to use appropriate supervision methods to ensure the quality and impartiality of the inspections and inspectors.

ASSESSMENT OF SUPERVISION

There are a number of supervision items involved in the Assessment. The supervision items are described in the following sections:

- Responsibility for supervision
- Methodology
- Scope
- Capacity allocated and used for supervision
- Consequences
- Supervision profile

It is important to note that examples mentioned in the description for each item are to be used as indicative examples, for inspiration, and are not an exhaustive list of how an item might be achieved. The specific requirements are listed under the star levels.

Supervision items

Responsibility for supervision

Aim: To ensure the governmental agency is fully involved in the design and/or performance of the supervision, and to ensure the supervision is undertaken holistically and by authorised bodies.

Description: This is to ensure that a suitable body is involved in the supervision activities. The supervision body has to be governmental, or authorised by the government, in order to ensure it has the right level of influence and power. For example, the basic requirement (1*) is for a governmental supervision, or a body appointed by the government. Higher-level requirements include following internationally recognised independent standards, such as ISO 9001, and ISO 17020. This can be to a certified level, or full accreditation which is more demanding and therefore receives a higher score.

Requirements:

- 1*: Governmental supervision (or appointed by government)
- 2*: Company has a quality management system in place (e.g. ISO 9001; quality management)
- 3*: Quality management system (typically ISO 9001) that is certified by a third party.
- 4*: Accreditation ISO 17020; inspection (can replace the certification on the quality management system)
- 5*: Certification ISO 37001; Anti-bribery

Methodology

Aim: To assess the methodologies used for supervision to ensure they are of sufficient quality and independence. The knowledge of the quality of the inspections being undertaken is a very important driver for quality improvement, the elimination of errors and the promotion of confidence in vehicle inspection.

Description: This covers the supervision methods used, and the quality of the measurements. There three sub-items:

- Evaluating the inspections – using indirect methods.
- Evaluating the inspections – using direct methods.
- Evaluating the quality management system. This includes the preconditions, internal audits, corrective and preventive actions, performance etc.

The evaluation of the quality of vehicle inspections is complex. Direct measurement using re-inspections is a reliable approach but has some issues that may need to be resolved, for instance that undertaking statistically valid numbers of re-inspections can be disproportionately expensive. As a complement to re-inspections, various indirect methods can be employed, either with or without some direct measurements, to provide a more complete evaluation of the quality. However, the limitations of indirect methods need to be fully understood and the results interpreted and used accordingly.

The most important reference for Supervision is CITA Recommendation 13 (CITA, 2006). CITA Recommendation 9 (CITA, 2015) are also designed to complement Recommendation 13.

Requirements: Defined in Table 30.

Table 30: Supervision methodology sub-items

Supervision Methodology: sub-items	1*	2*	3*	4*	5*
Evaluating the inspections - indirect methods	<p>Audits on site to approve the opening of the station (focusing on the vehicle inspection and inspector competence);</p> <p>After the opening: simple statistical analyses (only pass/fail, mean values of all inspection items etc) and/or analyses of inspection reports</p>	<between>	Real time monitoring of inspections on site, focusing the vehicle inspection and inspector behaviour - All stations	<p>1 method for continuous monitoring of inspections. Possible methods include:</p> <p>a) cameras (focusing on the inspector behaviour and the procedures/methods for vehicle inspection)</p> <p>b) advanced in-depth statistical analyses, taking vehicle age (or mileage) into account, for instance 6-sigma approach</p>	Additional method to cover blind spots / weak points
Evaluating the inspections - direct methods	Re-inspections in stations, announced	<between>	Re-inspections as part of investigations after accidents or complaints	Re-inspections in stations, unannounced	Unannounced additional activities, such as re-inspections out of the stations, mystery shopping
Evaluating the quality management system	Audits on site to approve the opening of the station (includes all Quality Management System (QMS) items, both related to inspection and management)	Periodical audits, normally on site, announced in advance (not limited to the inspection, includes all QMS items both inspection and management)	Frequent periodical audits of all stations	Unannounced periodical audits, including all QMS items, normally on site	Additional audits (risk based, third parties)

Scope

Aim: To encourage supervision of the entire vehicle scope and inspection items, to ensure that all areas of the inspection system have suitable quality checks.

Description: This is to assess the scope of the quality measurements and supervision in a quantitative manner. The aim is to ensure at basic level that the major vehicle categories (as defined by the higher frequencies in the star levels in section S3 Vehicle Scope) and inspection items (as defined the importance weighting in section S4 Inspection Content & Methods) are covered. At a higher-level the assessment encourages supervision measurements in all vehicle categories and for all inspection items. This is to encourage a more robust supervision system, that is less likely to allow inconsistencies in coverage.

The methodology (including volumes) and detailed procedures of the supervision should be based on risk assessment for the different stations, vehicle categories and inspection items and this should be evaluated regularly as part of the audit planning.

Requirements: Defined in Table 31.

Capacity allocated and used for supervision

Aim: To ensure an appropriate portion of the inspection activities are allocated to supervision tasks to help encourage that the supervision systems are actually implemented in reality.

Description: This is to assess, in a quantitative manner, the frequency of supervision of the inspection stations and the inspectors themselves. If the supervision allocation is insufficient, then the supervision activities will be ineffective at providing the quality of inspection required. At the lower levels the supervision contact may be indirect, such as using statistical or indirect methods. At the higher requirement levels the supervision should be more frequent and should have direct on site assessment.

Requirements: Defined in Table 32.

Table 31: Supervision scope sub-items

Scope: sub-items	1*	2*	3*	4*	5*
Vehicle classes covered by the quality measurements and supervision	Covers only the most prioritised vehicle category/-ies	<between>	Includes all vehicle types to some extent AND gives a clear view of the inspection quality for the most prioritised vehicle category/-ies	<between>	Covers all vehicle categories in depth, gives a clear view of the inspection quality for all vehicle categories
Inspection items covered by the quality measurements and supervision	Covers only the basic / most prioritised items	<between>	Covers all inspection items to some extent + gives a clear view of the inspection quality and need for improvement for the most prioritised inspection items	<between>	Covers all items and aspects of the inspection, gives an in-depth view of the inspection quality and need for improvements regarding the performance and/or inspection methods and criteria

Table 32: Capacity allocated and used for supervision: sub-items

Capacity allocated and used for supervision: sub-items	1*	2*	3*	4*	5*
Inspection stations	All stations are supervised to some extent every year, at least by simple statistical analyses	<between>	All stations are supervised every 5 years on site AND supervised off site (by statistical analyses or cameras etc) every year. The supervision needs to cover both quality management and vehicle inspection.	<between>	All stations are supervised, both by direct methods on site every year AND by indirect methods (statistics and/or cameras) every year , covering all vehicle categories of the station. The supervision needs to cover both quality management and vehicle inspection.
Inspectors	All inspectors are supervised every year by indirect or direct methods	<between>	All inspectors are supervised every 5 years by direct methods AND every year by statistical methods or by cameras	<between>	All inspectors are supervised by indirect and direct methods every year , covering all vehicle categories



Consequences

Aim: To ensure there is an appropriate decision on the consequences of poor-quality inspections, along with relevant interaction of the government/authorised body. This strengthens the importance of high-quality inspections, in order to avoid such consequences.

Description: The government (or authorised body) has to demonstrate that there are consequences for poor-quality inspection, so that high standards are maintained at the inspector and PTI levels. Poor quality inspections may include many problems, such as incorrect inspection results, incomplete inspections, not physically seeing the vehicle, or not using an authorised inspector etc. The level of corrective measures, their number and seriousness, has to be clearly understood by the PTI operators and inspectors. This also has to be combined with relevant support (such as training packages and resources) to help correct the behaviours. The decision or judgement on the consequences has to be made by the government (or authorised body) in order to support the credibility and impact of the consequence.

Requirements:

- 1*: Graded corrective measures related to number and seriousness of failure, known to PTI operators
- 2*: Provide support (training packages, resources) to correct
- 3*: Withdrawal of approval for the inspector
- 4*: Withdrawal of approval for the PTI company
- 5*: Banning the PTI company for a defined period (banned from inspections or to tender for the next calls)

Supervisor profile

Aim: To ensure there is an adequately qualified set of supervisors to deliver the supervision program.

Description: The purpose is to assess the skills of supervisors. The skills/requirements to deliver the supervision have to be achieved by EACH supervisor OR (if several supervisors perform the supervision together as a team) within the TEAM of supervisors.

It is important, at the basic (1*) level that the supervisor skills are both specifically in vehicle inspection so that they have the technical capability, and in quality management systems too. At the higher (5*) level, it is important that the team of supervisors rotates over time, so that they do not become over familiar with a particular station / inspection team.

The supervisor profile item relates to *Responsibility for supervision*, 1* requirement. It is necessary to define “who” and “what” to monitor or



supervise, to make sure all aspects are covered. Linked to each mandate there should be procedures, frequencies, competence criteria, etc.

Requirements:

- 1*: Supervisor basic skills are equal to the vehicle inspection skills (normally extensive experience). Plus the supervisors have specific auditing skills (training/ knowledge of vehicle inspection criteria of the country and of QMS)
- 2*: Auditor/supervisor independent from the supervised station/inspector
- 3*: Third party auditor with special acknowledgement / certification
- 4*: something between 3* and 5*
- 5*: Team with several auditors rotating over time

Input data required

Requirements

Aim: This rating aims to assess how well the item is addressed in the mandatory standards or national rules/regulations as a set of requirements.

Data required: Enter the star level against each item according to the current requirements of the mandatory standards or national rules. The Assessment Team review the information about national rules, regulations, and standards regarding the item. These are rules/standards as defined or agreed/authorised by the government. The Assessment Team makes an assessment of what star level the item scores. Sometimes there is evidence from documentation of what is achieved, and sometimes an element of interpretation and expert judgement is required if the documentation does not exactly match the requirements of the star levels. The star levels define the required standards to be achieved for each star level rating and are listed above against each item individually. At least some, or all of these items must be achieved to score at each given star level; it should be treated as AND/OR. If there is insufficient evidence to indicate an inspection system is providing at least 1* performance, then it scores 0. If there are no regulations or standards in place at all, then it should score 0.

Progression to the next star level is additive; all the prior star levels must be fulfilled first. For example, to achieve a 5* score this requires the 1* to 4* items are fulfilled, plus new requirements for 5* in addition.

Example: A country that has mandatory standards that describe for PTI operators the corrective measures to be implemented in the case of



failures, and provides a package of training to help make corrective changes, and withdraws the inspectors approval if proven that their inspections are poor quality, will score 3.

Implementation

Aim: This rating aims to assess the implementation of the rules for the item in reality.

Data required: Enter the star level against each item according to the current implementation in reality of the national rules. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the reality of implementation (what is actually carried out), not on what the rules state.

Example: A country that has mandatory standards that describe for PTI operators the corrective measures to be implemented in the case of failures, and provides a package of training to help make corrective changes, and withdraws the inspectors approval if proven that their inspections are poor quality, will score 3 for the *Requirements*. If in reality the only part that is actually implemented is at a lower level, e.g. the training only and not the withdrawal of approval for the inspector, then the score for *Implementation* would be 2.

Future

Aim: This accounts for any future plans to make enforcement changes that are not yet implemented. It allows a representation of the future goals.

Data required: Enter the star level against each item according to the future (within five years) implementation of the national rules. In general, the improvements should demonstrate changes in both the requirements/standards and in their actual implementation. A variety of evidence should be reviewed by the Assessment Team and interviews with stakeholders carried out, and evidence recorded.

The star level scoring is treated in the same manner as the *Requirements*. However, the focus is on the future plans and changes, not on what the rules state.

Example: A country that has mandatory standards that describe for PTI operators the corrective measures to be implemented in the case of failures, and provides a package of training to help make corrective changes, and withdraws the inspectors approval if proven that their inspections are poor quality, will score 3 for the *Requirements*. If there are future plans within the next five years to increase this to include banning



the PTI company for a period as a consequence of poor-quality inspections, then the score for *Future* would be 5.

Assessors' findings

Aim: To record the Assessors' findings and rationale for the ratings for reference.

Data required: Free text field for entering findings and rationale.

This is space for the assessor to make notes and comments describing the evidence assessed, and rationale for the rating applied. It serves as a reminder of the thought process in case the assessment is reviewed again in the future and provides a record of decisions taken. These findings will be the basis for formal approval by CITA of the overall scoring.

Example: A future rating may be based upon a presentation made by a representative from the relevant government department, for example outlining plans to add the process of banning PTI companies if poor-quality inspections are found. The time and date of the meeting, and the name of the representative should be noted, as well as the title of the presentation. Ideally, a copy of the presentation should also be saved as additional evidence.

Source data

Aim: This provides a record of the source data used in the assessment.

Data required: Enter the source of the data used. It should allow a reviewer of the Assessment to look back at the Tool, perhaps some years later, and understand what data was used for the values. This is important to act as a record of the evidence assessed, and to allow later assessments to use a comparable data source. If the data is too large to fit in the cell, consider including it in an extra worksheet (see E1 Extra Workspace).

Example: Vehicle database, observations taken at stations, meeting notes, hyperlinks, reports etc.

Reference and calculated parameters

Total number of items filled

Aim: To record the number of items entered in the *Requirements*.

Data required: None; auto-calculated.

Description: This is used as check that all items are completed with a score in the *Requirements* column.

Example: The *total number of items* should be 10 to achieve a completed table.

Items with standards/rules (scoring >0)



Aim: To record the number of items entered in *Requirements* marked with a score greater than zero, indicating that a regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score greater than zero, indicating that a regulation/standard is in place.

Example: If all items score greater than 0, apart from the supervisor profile, then the *Items with standards/rules* would be 9.

Items with no standards/rules (or scoring 0)

Aim: To record the number of items entered in *Requirements* marked with a score equal to zero, indicating that no regulation/standard is in place.

Data required: None; auto-calculated.

Description: This is used to count the number of items/sub-items in the *Requirements* column that are marked with a score equal to zero, indicating that no regulation/standard is in place.

Example: If all items score greater than 0, apart from the supervisor profile (1 item), then the *Items with no standards/rules* would be 1.

Share of items covered by regulations

Aim: To describe the proportion of items covered by the regulations as a percentage indicator, and to encourage progress towards 100%.

Data required: None; auto-calculated.

Description: This describes the proportion of items with regulations/standards, or scoring greater than zero in the *Requirements* column, as a percentage of the *Total number of items*.

Example: The *total number of items* should be 10 to achieve a completed table. If all items score greater than 0, apart from the awareness campaigns, then the *Items with standards/rules* would be 9. The *share of items covered by regulations* is 9 out of 10 as a percentage.

Formula:

$$\text{Share of items covered by regulations} = \left(\frac{\text{Items with standards/rules}}{\text{Total number of items}} \right) \times 100$$

The above parameters are summarised in a short table in the Tool, and an example is given in Table 33.



Table 33: Example summary table to check coverage of the supervision items.

	Example
Total number of items	10
Items with standards/rules (scoring >0)	9
Items with no standards/rules (or scoring 0)	1
Share of items covered by regulations	90%

Importance weighting

Aim: This is to weight/prioritise the items under assessment according to CITA experience.

Data required: None; reference values.

Description: This is a weighting of the different items. This is to weight/prioritise the items in terms of their impact and importance. It is a reference for the current situation at the time of the Assessment.

The importance weighting gives rise to a scalar used in the ratings, to allow for the maximum possible score that is possible throughout the range of items/sub-items for the section.

Example: All items are currently weighted equally with 1 point, because all items have an equal part to play in the assessment of supervision.

Weighting of sub-items

Aim: To allow grouping of sub-items to be weighted, so that the correct balance is achieved for the main items.

Data required: None; auto-calculated.

Description: This is a weighting of the sub-items to allow a group at the level of the main items. If there are multiple sub-items that relate to one main item then this weighting can allow a proportional sharing between them to sum to the one main item. It prevents an over representation of the importance of a main item if it is broken down into multiple sub-items.

Example: For the supervision section there are six main items, each with different numbers of sub-items. Each of these sub-items is weighted so that the main items are equally weighted. The scope item has two sub-items, so each of these is weighted as 0.5.

Maximum possible score for the item

Aim: To record the maximum star rating possible for each item (or sub-item) of the assessment of supervision.

Data required: None; auto-calculated.

Description: This is the maximum star rating possible for each item of the assessment of supervision.



Example: For *consequences* the possible star ratings can be 1*, 2*, 3*, 4*, or 5*. 5 is the *maximum possible score for the item*.

Normalise to 1-5 scale

Aim: To normalise the scales up to five, for any items that can only score less than 5*.

Data required: None; auto-calculated.

Description: This normalisation is used to make sure every item in the assessment can be assessed on a scale up to 5, to allow them to be equally treated. If the items can only score less than 5*, then it is more important that these lower scores are achieved, so they are scaled up to ensure comparability with items that can score up to 5.

If the maximum possible score is 5, then the normalisation is 1, which is the case for the majority of items.

Example: All items assessed can score up to 5* in the supervision section, so all normalisation values are set to 1.

Requirements Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *requirements score*.

Data required: None; auto-calculated.

Description: The *requirements score* is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 3 for the *requirements* against *supervisor profile*, then the *Requirements rating (weighted and normalised)* will be 3. This is because the *importance weighting* of the item is 1, the *weighting of sub-item* is 1, and the *normalise to 1-5 scale* is 1.

Implementation Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items, and normalise to 1-5 scale* of the item to the *implementation rating*.

Data required: None; auto-calculated.

Description: The *implementation score* is used, and is multiplied by the factors for *importance weighting, weighting of sub-items, and normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 1 for the *implementation rating*, then the *Implementation Rating* will be 1 given that the *importance weighting* is 1, *weighting of sub-items* is 1, and *normalise to 1-5 scale* is 1.



Future Rating (weighted and normalised)

Aim: To apply the *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale* of the item to the *future rating*.

Data required: None; auto-calculated.

Description: The *future* score is used, and is multiplied by the factors for *importance weighting, weighting of sub-items*, and *normalise to 1-5 scale*. A scalar is then used to allow for the maximum possible scores achievable across all the items/sub-items.

Example: If the country scores a 5 for the *future rating*, then the *Future Rating* will be 5 given that the *importance* weighting is 1, *weighting of sub-items* is 1, and *normalise to 1-5 scale* is 1.

Total number of items filled

Aim: To provide an indicator of the number of rows correctly filled.

Data required: None; auto-calculated.

Description: This counts the number of rows correctly filled. If there are blanks, then an error message is displayed above the table. The purpose is to ensure that all rows are correctly filled, so that the ratings calculations will work.

Averages (weighted and normalised)

Aim: To average the scores per item of the assessment of supervision.

Data required: None; auto-calculated.

Description: The averages are calculated for each part of the assessment by summing the points scored for each item. Each is then scaled by dividing by the maximum available points.

There are three averages calculated:

- *Requirements rating*; for whether the supervision items are required or not and used to show the standards/legislated requirements. It contributes to the 'blue' *Requirements rating* in the spider diagram.

Formula:

$$\text{Requirements rating} = \frac{\text{Sum of Requirements Rating scores}}{\text{Number of items}}$$

Where:

$$\begin{aligned} & \text{Sum of Requirements Rating scores} \\ &= \sum_{\text{items}} \text{Requirements rating score} \end{aligned}$$

- *Implementation rating*; for whether the supervision items are regularly implemented in reality. It contributes to the 'orange' *Implementation rating* in the spider diagram.



Formula:

$$\begin{aligned} & \textit{Average implementation rating} \\ &= \frac{\textit{Sum of Implementation Rating scores}}{\textit{Number of items}} \end{aligned}$$

Where:

$$\begin{aligned} & \textit{Sum of Implementation Rating scores} \\ &= \sum_{\textit{items}} \textit{Implementation rating score} \end{aligned}$$

- *Future rating* (within 5 years); used to show whether there are plans to implement the supervision items in the future, even if not currently implemented. It contributes to the 'purple' *Future rating* in the spider diagram.

Formula:

$$\textit{Average Future rating} = \frac{\textit{Sum of Future Rating scores}}{\textit{Number of items}}$$

Where:

$$\textit{Sum of Future Rating scores} = \sum_{\textit{items}} \textit{Future rating score}$$



E1 EXTRA WORKSPACE

This is an extra work area that can be used as per the Assessment Team's needs.

For example:

- Records of data/evidence used in other sections
- Data analysis and manipulation to find answers needed for other sections
- Project plans and task breakdowns
- To do lists
- Others...

The cells are not locked on this tab, and you can edit freely.

If you need another sheet, just duplicate this one, or insert a new one.



ANNEX 1. REFERENCES

Certification India (1989). *Central Motor Vehicle Rules (CMVR)*. Certification India, MPR International GmbH.

CITA (2006). *Quality measurement methods for vehicle inspection* (Recommendation 13). International Motor Vehicle Inspection Committee, CITA: Brussels.

CITA (2011). *Vehicles carrying passengers (Categories M2 and M3)* (Recommendation 2). CITA International Motor Vehicle Inspection Committee: Brussels.

CITA (2015). *Quality requirements for inspection bodies and supervising bodies involved in vehicle inspection* (Recommendation 9). International Motor Vehicle Inspection Committee, CITA: Brussels.

CITA (2017). *Anti-fraud Measures* (Recommendation 19). International Motor Vehicle Inspection Committee, CITA: Brussels.

CITA (2017). *New inspection schemes* (Recommendation 20). International Motor Vehicle Inspection Committee, CITA: Brussels.

CITA (2020). *Micromobility: The inclusion of personal light electric vehicles in road traffic*. CITA International Motor Vehicle Inspection Committee: Brussels.

CITA (2021). *CITA General Questionnaire 2020/21*. CITA International Motor Vehicle Inspection Committee: Brussels.

European Commission (2019). *Road traffic fatalities in the EU in 2019*. European Commission, EC: Brussels.

European Commission (2019). *Study on the inclusion of light trailers and two- or three-wheel vehicles in the scope of the periodic roadworthiness testing : final report*. European Commission, Publications Office: Brussels.

European Union (2021). *Regulation (EU) 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles*. European Union: Brussels.

Eurostat (2022). *Road accident fatalities by category of vehicles, 2020*. European Commission, EC: Brussels.

Government of India (2019). *Road accidents in India*. Government of India, Ministry of Road Transport & Highways: New Delhi.

Held M, Rosat N, Georges G, Pengg H and Boulouchos K (2021). Lifespans of passenger cars in Europe: empirical modelling of fleet turnover dynamics. *European Transport Research Review*, 13(9), viewed 22nd February 2022,



<<https://etrr.springeropen.com/articles/10.1186/s12544-020-00464-0>>.

doi:<https://doi.org/10.1186/s12544-020-00464-0>.

ILO 2022, *Freedom of association.*, viewed 2nd March 2022,

<<https://www.ilo.org/global/topics/freedom-of-association-and-the-right-to-collective-bargaining/lang--en/index.htm>>.

ISO (2012). *ISO/IEC 17020:2012 Conformity assessment — Requirements for the operation of various types of bodies performing inspection (17020)*. International Standards Organisation, ISO: Geneva.

ISO (2015). *ISO 9001:2015 Quality management systems (9001)*. International Standards Organisation, ISO: Geneva.

ISO (2016). *ISO 37001: Anti-bribery management systems (ISO 37001)*. International Standards Organisation, ISO: Geneva.

Khalifi A and Subit D (2018). *Vehicle Type-Approval and Road Worthiness Test in Togo*. World Bank Group, GRSF, CITA, International Motor Vehicle Inspection Committee (CITA): Brussels.

Khalifi A, Subit D and Sogodel V (2020). *Vehicle inspection and approval in Cameroon; Assesment Vehicle Inspection Systems (AVIS)*. CITA, GRSF, World Bank Group, International Motor Vehicle Inspection Committee (CITA): Brussles.

MoRTH (1988). *The Motor Vehicles Act*. Ministry of Road Transport and Highways, MoRTH: New Delhi.

National Highway Traffic Safety Adminstration (2020). *Vehicles Involved in Crashes, by Vehicle Type and Crash Severity, 2019*. National Highway Traffic Safety Adminstration, NHTSA: Washington DC.

Road Traffic Management Corporation (2021). *South African fatal crashes in context*. RTMC, Road Traffic Management Corporation.

UNECE (2017). *Consolidated Resolution on the Construction of Vehicles (R.E.3)*. United Nations Economic Commission for Europe: Geneva.

UNECE (2018). *Agreement concerning the adoption of uniform conditions for periodical technical inspections of wheeled vehicles and the reciprocal recognition of such inspections*. United Nations Economic Commission for Europe, UNECE: Geneva.

UNECE (2018). *Uniform provisions for periodical technical inspections of wheeled vehicles with regard to their roadworthiness (ECE/RCTE/CONF/4/Add.2/Rev.1)*. United Nations Economic Commission for Europe, UNECE: Geneva.



UNECE (2020). *Consolidated text of the 1997 Agreement on Periodic Technical Inspection of wheeled vehicles* (ECE/Trans/WP.29/2020/38). United National Economic Commission for Europe, UNECE: Geneva.



ANNEX 2. REFERENCE INSPECTION DATA FROM CITA SURVEY

The *reference values for number of required inspections in 20-year period for each type of vehicle* are derived from, and used in S3 Vehicle Scope Part 1: Assessment of vehicle scope. This information is used to define the reference values for a 1*, 2*, 3*, or 4* number of required inspections in a 20-year period for each vehicle category. The 20-year period was based firstly on CITA expert judgement following analysis that a ten year period was too short due to the longevity of many vehicles in the fleet, and secondly using example data that the average life of a car in Western Europe is 18.5 years, and in Eastern Europe is 28.4 years (Held *et al.*, 2021); therefore 20 years should have good available data for the assessment purposes and is reasonably representative.

The values are derived from the CITA General Questionnaire 2020/21 (CITA, 2021). This is a survey covering the most relevant topics for Periodic Technical Inspection. Once collected and consolidated, these data provide an overview of the PTI system in the participating countries. The available data are presented in the form of a country card containing the information received for each country. There were 21 participating countries in the survey, including:

- Andorra
- China
- Côte Ivoire
- Croatia
- Estonia
- France
- Germany
- Lithuania
- Portugal
- Republic of Kosovo
- Serbia
- Singapore
- Slovakia
- South Africa
- South Korea
- Spain
- Sweden
- Switzerland
- Tunisia
- United Kingdom
- USA

The country, or countries, with the minimum or maximum frequency of inspections were selected and noted, for each of the vehicle categories. These were then used to determine the star levels. For example, the minimum and maximum for private cars were used for M1 private vehicles 1* and 4* levels respectively, and the 2* and 3* levels were equally spaced in between them. In some cases, the values were rounded/adapted in order to make the spacings more consistent, for example the minimum for motorcycles was 8 and the maximum was 19, so a value of 20 was used for the 4* level so that the star levels could be evenly spaced; 1* = 8, 2* = 12, 3* = 16, 4* = 20.



Table 34: CITA survey data as a reference to inform the star level thresholds for Part 1: Assessment of vehicle scope

List of inspection in 21 Countries from CITA General study 2021	Minimum number of inspections		Maximum number of inspections		In twenty year period		Main vehicle classes based on UNECE classification	Reference values for number of required inspections in 20-year period for each type of vehicle			
	Pattern	Country	Pattern	Country	Minimum	Maximum		*	**	***	****
Private cars	5/3/2/2	Switzerland	1/1/1/1	Côte D'Ivoire	8	20	M1 Private	8	12	16	20
Passenger vehicle ≤ 8 Persons	5/3/2/2	Switzerland	0.5/0.5/0.5	Côte D'Ivoire	8	40	M1 Commercial	8	19	30	40
Passenger vehicle > 8 Persons ≤ 5,000 kg	6/2/2/1/1	China	0.5/0.5...(15y)...0.25/0.25	Andorra	13	50	M2 Small Bus	13	26	38	50
Passenger vehicle > 8 Persons > 5,000 kg	4/1/1/1/1	Republic of Kosovo	0.5/0.5...(15y)...0.25/0.25	Andorra	17	50	M3 Bus or Coach	17	28	39	50
Goods vehicle GVM ≤ 3,500 kg	5/3/2/2	Switzerland	1/1/1...(15).. 0.5/0.5	Andorra	8	25	N1 Van	8	14	20	25
Goods vehicle 3,500 kg < GVM ≤ 12000 kg	4/1/1/1/1	Republic of Kosovo	1/1/0.5/0.5	Singapore	17	38	N2 Medium Goods Vehicle	17	24	32	38
Goods vehicle GVM > 12,000 kg	4/1/1/1/1	Republic of Kosovo	1/1/0.5/0.5	Singapore	17	38	N3 Heavy Goods Vehicle	17	24	32	38
Taxis/Ambulances	4/1/1/1/1	Republic of Kosovo	0.5/0.5/0.5	Côte D'Ivoire	17	40	Not used				
Trailer GVM ≤ 750 kg	3/3/3/3	Croatia	1/1/1/1	China/ Singapore/ Côte D'Ivoire	6	20	O1 Very Light Trailer	6	11	16	20
Trailer 750 kg < GVM ≤ 3500 kg	4/2/2/2	South Korea	1/1/1...(10y)...0.5/0.5	Spain	9	30	O2 Light Trailer	9	16	23	30
Trailer 3500 kg < GVM ≤ 10000 kg	4/2/2/2	South Korea	1/1/1...(10y)...0.5/0.5	Spain	9	30	O3 Medium Trailer	9	16	23	30
Trailer GVM > 10000 kg	4/2/2/2	South Korea	1/1/1...(10y)...0.5/0.5	Spain	9	30	O4 Heavy Trailer	9	16	23	30
Caravans	5/3/2/2	Switzerland	1/1/1/1	China/ Singapore/ Côte D'Ivoire	8	20	Not used				
Mopeds Engine ≤ 50 cm ³	3/2/2/2	Lithuania/ Spain	2/1/1/1	Serbia/ Croatia	9	19	L1e Light Two-Wheel Powered Vehicle	9	12	16	20
Tricycles and Quads	5/3/2/2	Switzerland	2/1/1/1	Serbia/ Croatia	8	19	L2e Three-Wheel Moped	8	12	16	20
Motorcycles excluding mopeds	5/3/2/2	Switzerland	2/1/1/1	Serbia/ Croatia	8	19	L3e Two-Wheel Motorcycle	8	12	16	20
Motorcycles excluding mopeds	5/3/2/2	Switzerland	2/1/1/1	Serbia/ Croatia	8	19	L4e Two-Wheel Motorcycle with Side-Car	8	12	16	20
Tricycles and Quads	5/3/2/2	Switzerland	2/1/1/1	Serbia/ Croatia	8	19	L5e Powered Tricycle	8	12	16	20
Tricycles and Quads	5/3/2/2	Switzerland	2/1/1/1	Serbia/ Croatia	8	19	L6e Light Quadricycle	8	12	16	20
Tricycles and Quads	5/3/2/2	Switzerland	2/1/1/1	Serbia/ Croatia	8	19	L7e Heavy Quadricycles	8	12	16	20
Tractors	5/5/5/5	Switzerland	1/1/0.5/0.5	South Korea	4	38	Not used				



ANNEX 3. EXAMPLE OPTIONAL REFERENCE CASUALTY DATA FOR IMPORTANCE WEIGHTING OF VEHICLE CATEGORIES IN S3 VEHICLE SCOPE

This Annex provides some example casualty data that might be used as a reference for the Importance weighting in S3 Vehicle Scope Part 1: Assessment of vehicle scope.

It is OPTIONAL. The assessor should use country-specific data if available, but in the absence of that, other references may be used as a proxy, and these are some examples.

The examples provided include casualty data from:

- European Union
- India
- South Africa
- USA



EUROPEAN UNION

Adapted from (European Commission, 2019)

Table 35: Road traffic fatalities in the EU in 2019, by road user and (other) 'main vehicle' involved in the crash

Fatalities	In a collision with...										Total
	Pedestrian	Bicycle	Moped	Motorcycle	Car	Light Goods Vehicle <3.5T	Heavy Goods Vehicle >3.5T	Bus or Coach	Other vehicle / Unknown	Single vehicle Incident	
Pedestrians	0	19	17	108	3,200	508	401	150	225	-	4,628
Cyclists	14	42	8	33	1,024	162	217	31	87	417	2,035
Moped Riders	5	2	5	10	289	33	45	10	21	193	613
Motorcyclists	14	15	5	84	1576	231	191	37	120	1280	3,553
Car Occupants	22	7	2	26	3,076	584	1,557	148	286	4,400	10,099
Light Goods Vehicle <3.5T Occupants	0	0	1	0	141	70	211	18	36	289	766
Heavy Goods Vehicle >3.5T Occupants	0	0	0	0	26	17	171	4	11	124	353
Bus or Coach Occupants	0	0	0	0	11	16	24	2	7	51	111
Other / Unknown	0	3	3	5	191	36	42	7	36	319	642
Total	55	88	41	266	9,525	1,657	2,859	407	829	7,073	22,800

Methodological note: the data cover fatalities in single-vehicle crashes and crashes involving one or more traffic units. For the majority of fatal crashes, only one other vehicle is involved in the crash. For multi-vehicle crashes, the 'main vehicle' is the heaviest of the vehicles involved as this tends to be responsible for the most serious consequences. As a result, the figures in each column likely underestimate the number of cases a particular vehicle was involved in a crash. Source: EU CARE database on road crashes.



Adapted from (Eurostat, 2022)

Table 36: Road collision fatalities by category of vehicles, 2020

	Pedestrians	Bicycles	Mopeds	Motorcycles	Passenger cars	Goods vehicles	Buses & coaches	Other	Total
Austria	51	40	4	74	146	23	1	5	344
Belgium	65	85	13	78	221	31	1	3	497
Bulgaria	94	19	5	32	260	21	8	24	463
Croatia	38	9	5	44	126	12	0	3	237
Cyprus	13	1	0	14	18	2	0	0	48
Czechia	95	51	4	58	269	35	3	3	518
Denmark	23	19	8	11	80	10	0	4	155
Estonia	14	1	0	3	7	4	0	30	59
Finland	22	31	2	20	127	18	0	3	223
France	388	162	100	479	1,243	102	3	38	2,515
Germany	379	426	53	499	1,170	144	12	36	2,719
Greece	76	12	24	188	205	74	0	5	584
Hungary	109	40	16	42	219	29	2	3	460
Iceland	0	0	0	3	5	0	0	0	8
Ireland ⁽²⁾	35	10	-	22	106	8	0	1	182
Italy	409	169	59	586	1,018	129	1	17	2,388
Latvia	43	17	2	6	64	6	0	1	139
Liechtenstein	0	0	0	0	0	0	0	0	0
Lithuania	52	12	1	17	78	8	0	5	173
Luxemburg	4	3	0	7	9	3	0	0	26
Malta ⁽³⁾	5	0	0	4	7	0	0	0	16
Netherlands	35	158	26	44	198	25	0	29	515
Norway	15	3	1	18	41	10	1	4	93
Poland	631	249	71	244	1,162	107	9	18	2,491
Portugal	101	19	26	116	198	63	1	12	536
Romania	587	191	21	64	617	92	4	68	1,644
Slovakia	49	24	10	0	128	11	1	24	247
Slovenia	7	8	6	16	29	3	0	11	80
Spain	260	71	32	313	544	117	3	22	1,362
Sweden ⁽³⁾	27	17	6	29	103	31	0	3	221
Switzerland	36	44	6	52	71	7	0	10	227
EU ⁽¹⁾	3,612	1,844	494	3,010	8,352	1,106	49	373	18,842

⁽¹⁾ Estimated.

⁽²⁾ 2016 data instead of 2020.

⁽³⁾ 2019 data instead of 2020.



INDIA

Adapted from (Government of India, 2019)

Table 37: Road accidents, fatalities and injuries by type of impacting vehicle - 2018

Vehicle type	Number of collisions	Fatalities	Injuries
2-wheeler	164,313	47,560	153,585
Bicycle	3,811	1,822	2,666
Cycle rickshaw	891	451	701
Auto rickshaw	27,385	6,624	33,457
E-Rickshaw	1,470	621	1,361
Hand drawn cart	355	201	209
Animal drawn cart	1,155	522	692
Light passenger vehicle / light goods vehicle	113,490	30,811	123,517
Heavy Articulated Vehicle/Trolley	9,303	4,167	7,786
Tempo/tractor	23,480	10,203	23,205
Heavy Goods Vehicle	57,411	23,868	51,166
Bus	30,746	10,507	42,940
Others	33,204	14,060	28,133
Total	467,044	151,417	469,418

SOUTH AFRICA

Adapted from (Road Traffic Management Corporation, 2021)

Table 38: Fatal crashes per vehicle category

Vehicle category	Fatalities
2&3-wheelers & quads	657
Light passenger vehicle <12 persons	17,232
Light goods vehicle ≤3.5T	8,021
Heavy passenger vehicle >12 persons	3,089
Heavy goods vehicle >3.5T (equip to draw)	2,532
Heavy goods vehicle <3.5T (not to draw)	482

Note: Special Vehicle & Unknown (2.02%) not comparable to crash hence, omitted



USA

Adapted from (National Highway Traffic Safety Administration, 2020)

Table 39: Vehicles Involved in Crashes, by Vehicle Type and Crash Severity, 2019

Vehicle Type	Crash Severity			
	Fatal	Injury	Property Damage Only	Total
Motorcycles	5,146	81,000	25,000	111,000
Passenger Cars	19,804	1,958,000	4,583,000	6,561,000
Light Trucks	19,945	1,377,000	3,450,000	4,847,000
Large Trucks	5,033	119,000	414,000	538,000
Buses	235	14,000	60,000	74,000
Other	611	7,000	7,000	15,000
Unknown	849	-	-	1,000
Total	51,623	3,555,000	8,539,000	12,146,000

Sources: FARS 2019 ARF, CRSS 2019

National Highway Traffic Safety Administration's Traffic Safety Facts Annual Report



ANNEX 4. AUTHORS AND CONTACT DETAILS

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