

Status report to the 12th Session of the TF-VS (July 2023)

Task Force Vehicle Sound

NB: previous name of this TF was TF-SL for Sound Limits

TF Vehicles' Sound

Reminder

- “The experts from EC, ETRTO and OICA reported on their studies on sound level limits (GRBP-73-23, GRBP-73-11 and GRBP-73-25, respectively). To coordinate such initiatives, GRBP decided to establish a taskforce (TF) and sought a volunteer among the experts from Contracting Parties to take the leadership of TF, while OICA agreed to act as secretary. GRBP considered that **TF should address the sound level limits** of UN Regulation No. 51 and, at a later stage, No. 41. To kick-off the TF activities without delay, the Chair pointed out that he could take the lead of TF on a temporary basis, if needed.”

Roles

- Chair: France
- Secretariat: OICA

TF-VS homepage

[Task Force on Sound Limits \(TF SL\) - Transport - Vehicle Regulations - UNECE Wiki](#)

TF Sound Limits / Vehicles' Sound: Facts and Figures

Meetings were held in
hybrid or virtual



11

Number of Meetings

01st TF SL: March 24, 2021 (TFSL-01-07)
02nd TF SL: May 26, 2021 (TFSL-02-12)
03rd TF SL: July 12-13, 2021 (TFSL-03-08)
04th TF VS: September 13-14, 2021 (TFVS-04-16)
05th TF VS: October 26-27, 2021 (TFVS-05-07)
06th TF VS: December 17, 2021 (TFVS-06-04)
07th TF VS: February 07, 2022 (TFVS-07-15)
08th TF VS: April 04, 2022 (TFVS-08-10)
09th TF VS: May 24, 2022 (TFVS-09-08)
10th TF VS: July 12, 2022 (TFVS-10-08 *in progress*)
11th TF VS: September 09, 2022 (TFVS-11-09)
12th TF VS: July 10, 2023



~60-70

**Participants
(Contracting Parties, NGOs, Guests)**

-
- **CPs:**
China, European Commission, France, Germany, India, Italy, Japan, Spain, Switzerland, The Netherlands, United Kingdom
 - **NGO's:**
CLEPA, ETRTO, EUWA, IMMA, ISO, OICA
 - **GUESTS:**
Aristotle University, ATEEL, BRUITPARIF, FEDRO, FEV, HS Data analysis & Consultancy, IDIADA, JARI, TNO, Brussels Env., ...

TF VS – in addition to the discussions to be continued, main works done & ongoing

Guidelines of this Task Force:

- From 1st discussions at the 01st Session, a subgroup was decided to build a proposal
- The proposal has been approved at the 03rd Session & updated at the 04th session
 - Change of the name of this TF from TF-SL (Sound limit) to TF-VS (Vehicle Sound)



Informal document
GRBP-74-03 Rev.1

Need to identify where the noise issues lie e.g. through a **cross-matrix** to get a reference scenario as close as possible of real life

On going

- Agreement of the TF group for a **subgroup for Cross-matrix** of this TF accordingly
- Volunteers:
 - CPs: EC, France, Germany, The Netherlands, UK, Japan, China
 - NGO: IMMA, OICA, ETRTO, ISO



TFVS-02-07	TFVS-06-03	TFVS-08-06
TFVS-04-14	TFVS-06-05	TFVS-09-06
TFVS-05-06	TFVS-07-05	TFVS-12-06
TFVS-07-08	TFVS-07-13	

Impact of AVAS (UN-R138) on Noise Emissions (UN-R51) at low speeds

- Thoughts from some Noise experts related to UN-R138 & UN-R51 matching
 - Actions to be defined through the documents related to the UN-R138
- To be followed with the new TF-QRTV (UN-R138-02)

*On going with the
UN TF-QRTV*



TFVS-04-12
TF-QRTV (UN-R138-02)

TF VS – in addition to the discussions to be continued, main works done & ongoing

EC study on sound level limits of M, N, L-cat. Veh. → Analysis & comparison between the different studies :

- A lot of different points have been discussed and highlighted (for details see [UNECE TF-VS Website](#)) → work to be continued
→ GRBP-76-14 Uploaded on the UNECE Website as « Doc. for Ref. only »



[EC Report for M/N](#)
[EC Report for L](#)
[ATEEL\(OICA\) Report \(GRBP-75-16\)](#)
[GRBP-76-14 ATEEL/OICA Comparison](#)
[TFVS-11-06 ETRTO comments](#)

A lot of material about vehicles, tyres, roads, methods, enforcement ... presented during the 11 sessions of the TF-VS (see [UNECE TF-VS Website](#)) with a potential to improve the noise in real life

Agreement of the TF group for a **subgroup to prepare a Report** to give an overview and a common view of what is the situation

- Volunteers: CPs with France, The Netherlands, Japan, and NGO with IMMA, OICA, ETRTO



TFVS-11-09 (report TFVS 11th)

TF VS – in addition to the discussions to be continued, main works done & ongoing

Topics still open for the next Sessions:

- Update of national presentations (EC, Japan, UK, China, Germany, Belgium ...) and others (OICA, IMMA, ETRTO ...)
- Cross-matrix
- Report from the 11 TF-VS Sessions
- Next steps to be decided
- ...

On going



To be continued

To be followed with the next 12th Session on July 10, 2023

Work done by the sub-group

REPORT OF THE 11 TF-VS SESSIONS

TF Sound Limits / Vehicles' Sound: Facts and Figures



Other Meetings **SUBGROUP** on the report of the 11 sessions

01st Subgroup: October 21, 2022	11 th Subgroup: April 11, 2023
02nd Subgroup: November 04, 2022	12 th Subgroup: April 26, 2023
03rd Subgroup: November 29, 2022	13 th Subgroup: May 16, 2023
04th Subgroup: December 14, 2022	14 th Subgroup: May 30, 2023
05th Subgroup: January 16, 2023	15 th Subgroup: June 20, 2023
06th Subgroup: January 26, 2023	
07th Subgroup: February 15, 2023	
08th Subgroup: March 02, 2023	
09th Subgroup: March 10, 2023	
10th Subgroup: March 29, 2023	



Volunteers (Contracting Parties & NGOs)

-
- **CPs:**
 - **France:** Serge FICHEUX, Romain BARBEAU,
 - **Japan:** Takehiro ITO, Yoshihiro SHIRAHASHI, Yoshihisa TSUBURAI,
 - **The Netherlands:** Jan Sybren BOERSMA,
 - **NGO's:**
 - **ETRTO:** Michael STEFFAN,
 - **IMMA:** Edwin BASTIAENSEN, Alex DESPLENTER,
 - **OICA:** Klaus NEUHAUS, Per-Uno STURK, Françoise SILVANI.

GENERAL GUIDELINES OF THE SUB-GROUP

1. **Target:** full report ready by June 2023 to be ready for next TF-VS Session

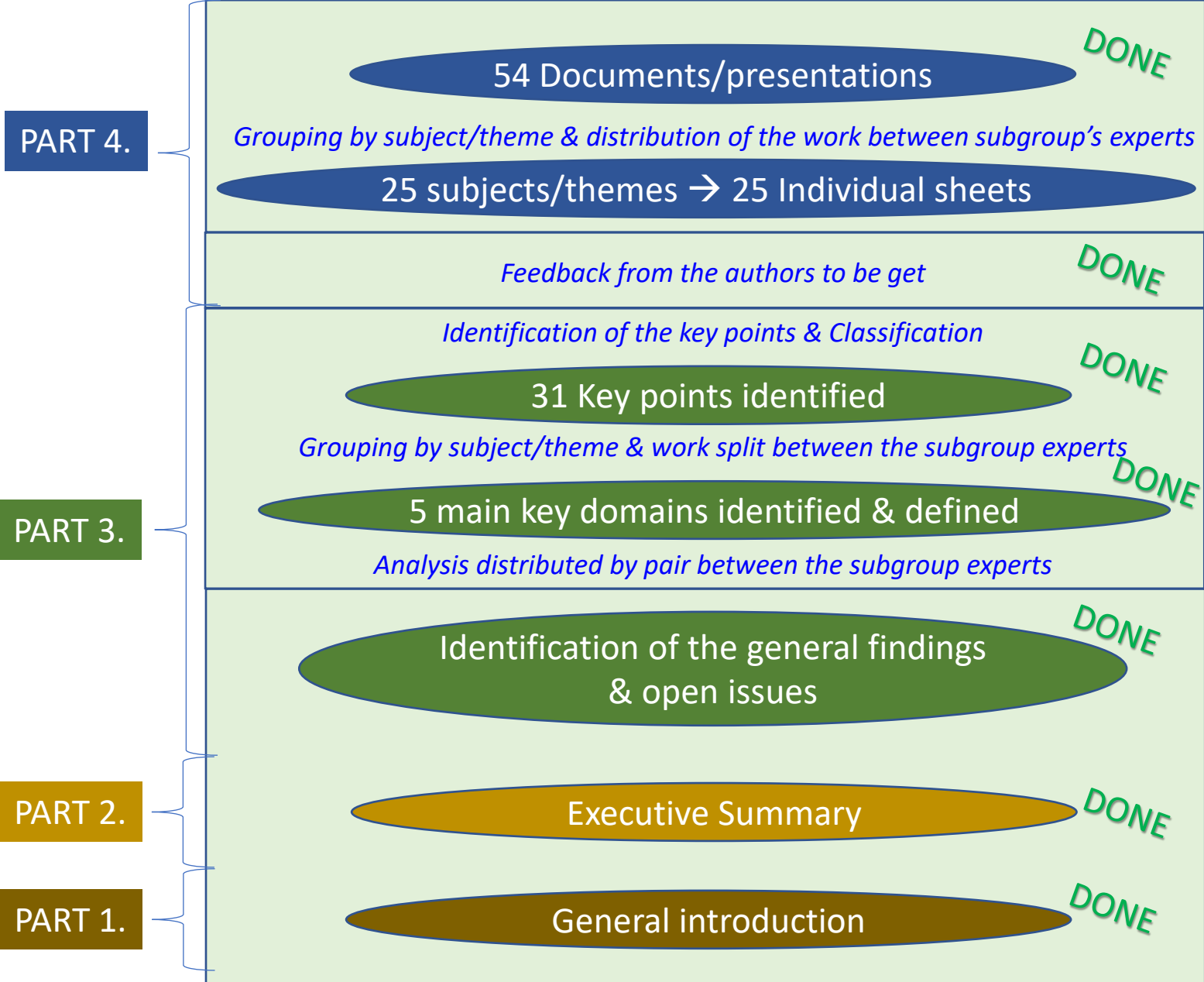
2. **“Rules”:**

Need to remain factual, objective & neutral + take care for having the same ‘level’ of information in each document:

- a) cross-reading of the different documents between the members of our subgroup, and then
- b) getting feedback from the authors of the various TFVS presentations

STRUCTURE OF THE REPORT & APPROACH

- 1. General introduction
- 2. Executive summary
- 3. Analysis to identify the general findings/ statements for further consideration
- 4. Identification of the
 - Main messages,
 - Summary &
 - Open issuesof the 54 documents/ presentations

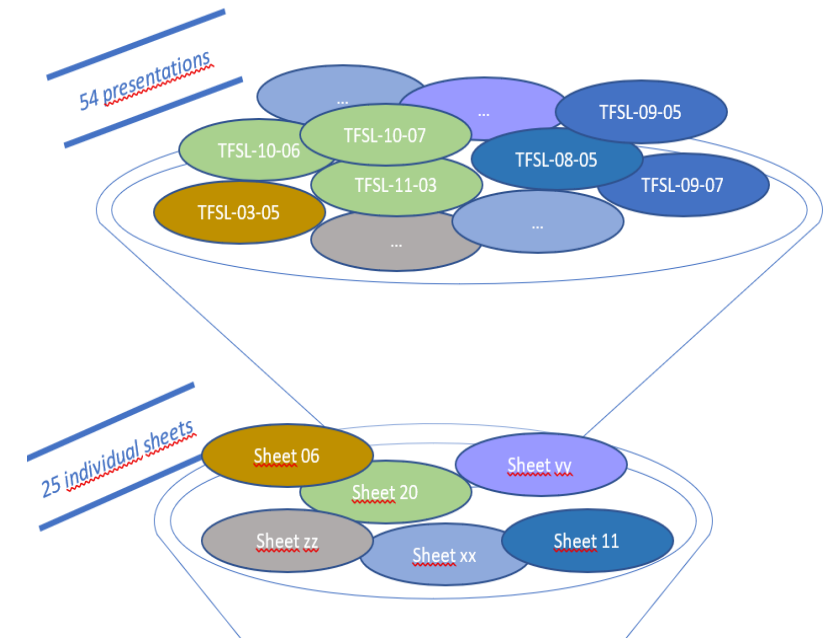


PART 4. 'Individual sheets » x 25

1. During the 11 sessions of the TF-VS, there were 54 presentations on different topics such as:

- Road surfaces,
- Studies on noise emissions of M/N/L vehicles,
- Test methods,
- Noise mapping
- Noise camera/sonar experimentation,
- Test campaigns,
- General ideas, studies & considerations,
- Cross matrix to improve traffic noise scenario and test procedures.

From these 54 presentations, the subgroup decided to combine them as much as possible by subject/theme. This step led to 25 subjects/themes.



PART 4. 'Individual sheets » x 25

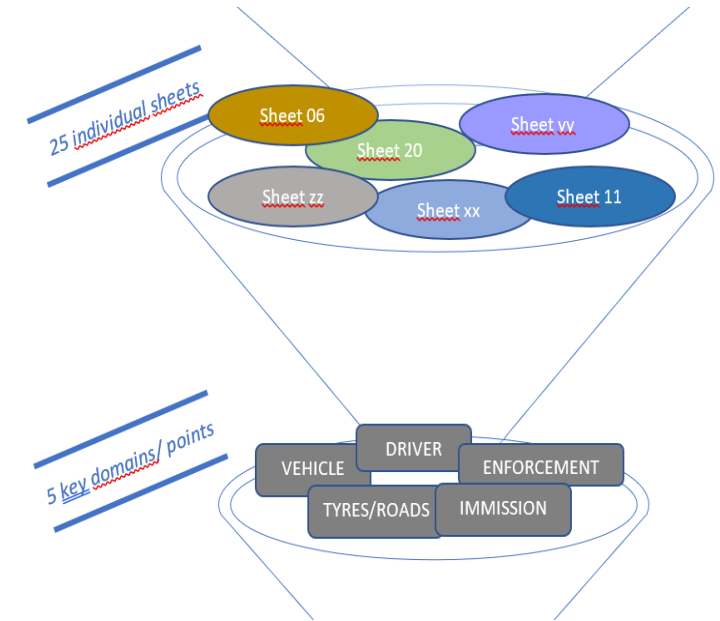
2. An 'individual sheet' (targeted in 2 pages) was built for each of these 25 subjects/ themes to:

- Identify the main messages shared during the different sessions of the TF-VS,
- Make a summary of the presentation(s),
- Add points discussed at the TF-VS,
- Identify the references related to the concerned subject/theme.

→ **The result is the Part 4. of this report.**

Through this exercise, the subgroup identified several key points.

In the next step, these key points were combined and led to **5 key domains**: vehicle, driver, enforcement, immission, tyres/roads.



PART 3.

Identification & Definition of the main key-domains

- For each of the **5 key domains fixed**, the subgroup created a sheet to:
 - Define/describe them
 - Identify the general findings/statements explained during the presentations/ reports to the TF-VS, and
 - Identify the needs & questions for potential further considerations by the TF-VS.

→ **The result is the Part 3 of this report.**

NB: These 5 key-domains and their associated sheets have to be considered together, in parallel.

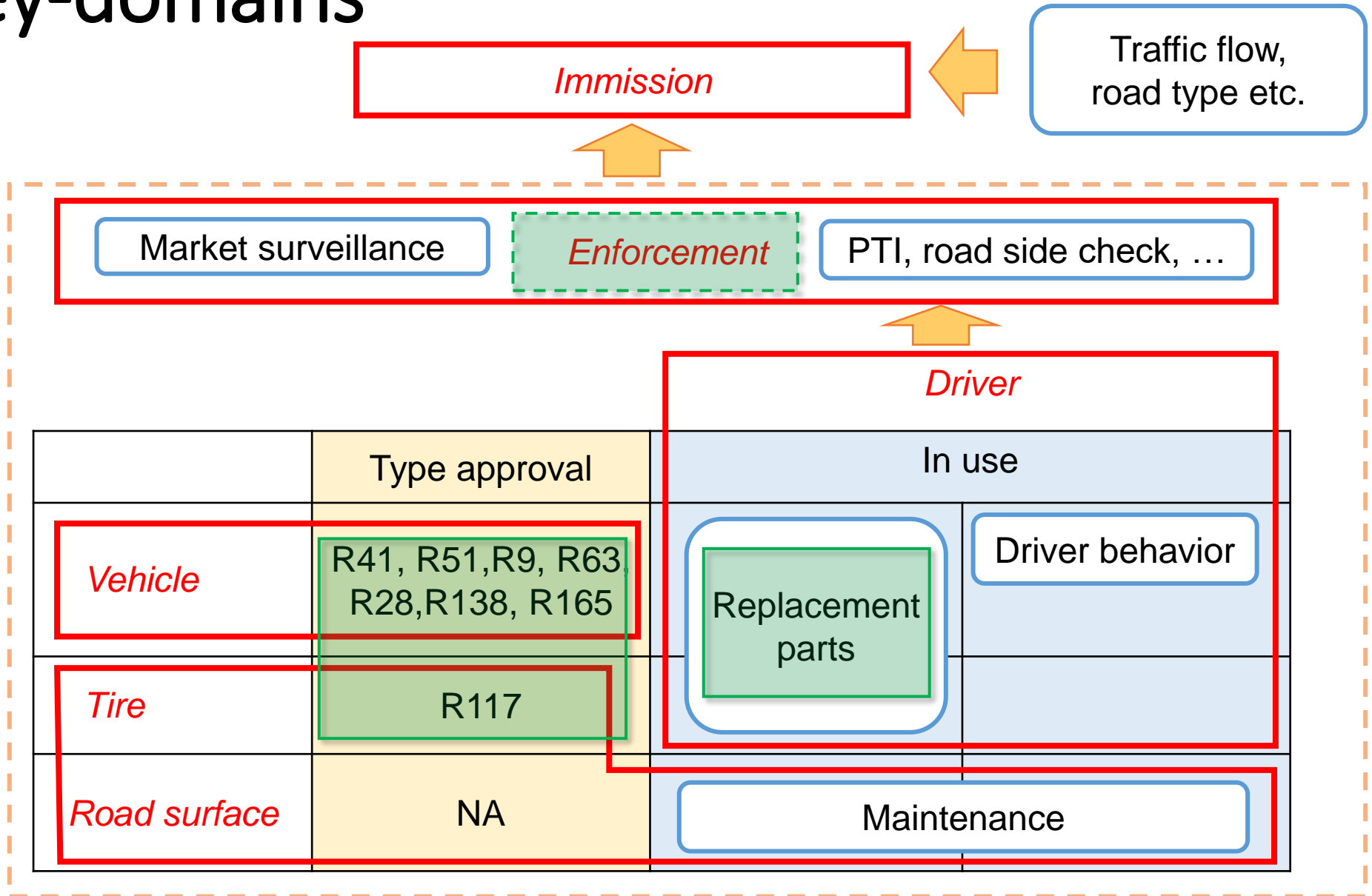
- **“DRIVER”** means a person having the care and control of a motor vehicle on the road. He or she operates the vehicle's controls whether or not the motor vehicle is in motion. The driver is responsible for the safe, daily use of the vehicle including the after-market components in accordance with rules of the road.
- **“ENFORCEMENT”** (in the context of sound) means the activities to ensure vehicles are and remain compliant to the regulations.
 - The applicable regulations are related to bringing-vehicles-into-the-market (type approval, market-surveillance) and to use of vehicles in the jurisdiction (roadworthiness, Periodic Technical Inspection, roadside inspection, sound radar, manipulation).
- **“IMMISSION”** means the sound recorded or predicted at receiver point, caused by the road vehicle fleet in continuous traffic flow or as single vehicle events, however potentially mitigated by abatement measures of various effect and efficiency (social impact and CBA).
- **“TYRES_ROADS”** have a recognized influence on vehicle sound emissions. Different aspects have to be considered as the road surface itself, the tyre rolling sound, the interaction between the tyre and the road, but also the different tools available to classify them (e.g., the tyre labelling) taking into account the performances and impacts of tyres/roads on health, safety and environment.
- **“VEHICLE”** (in the context of sound) means the sound produced by any means of transport resulting from its operation in traffic, including effects from alterations over its lifetime (NB: for tyre, see the other sheet related to tyre/road component).

Five Key-domains

PART 3.

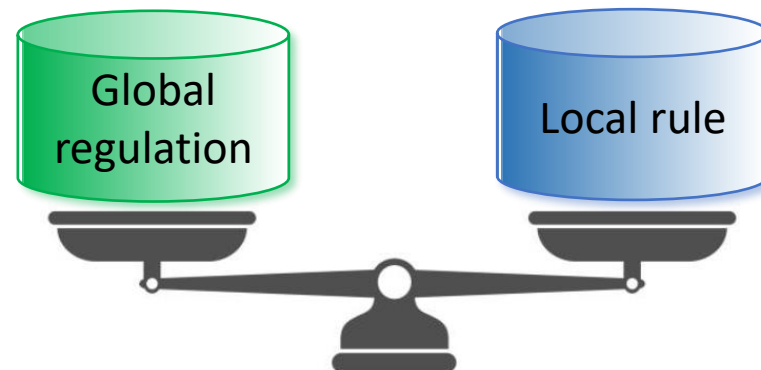
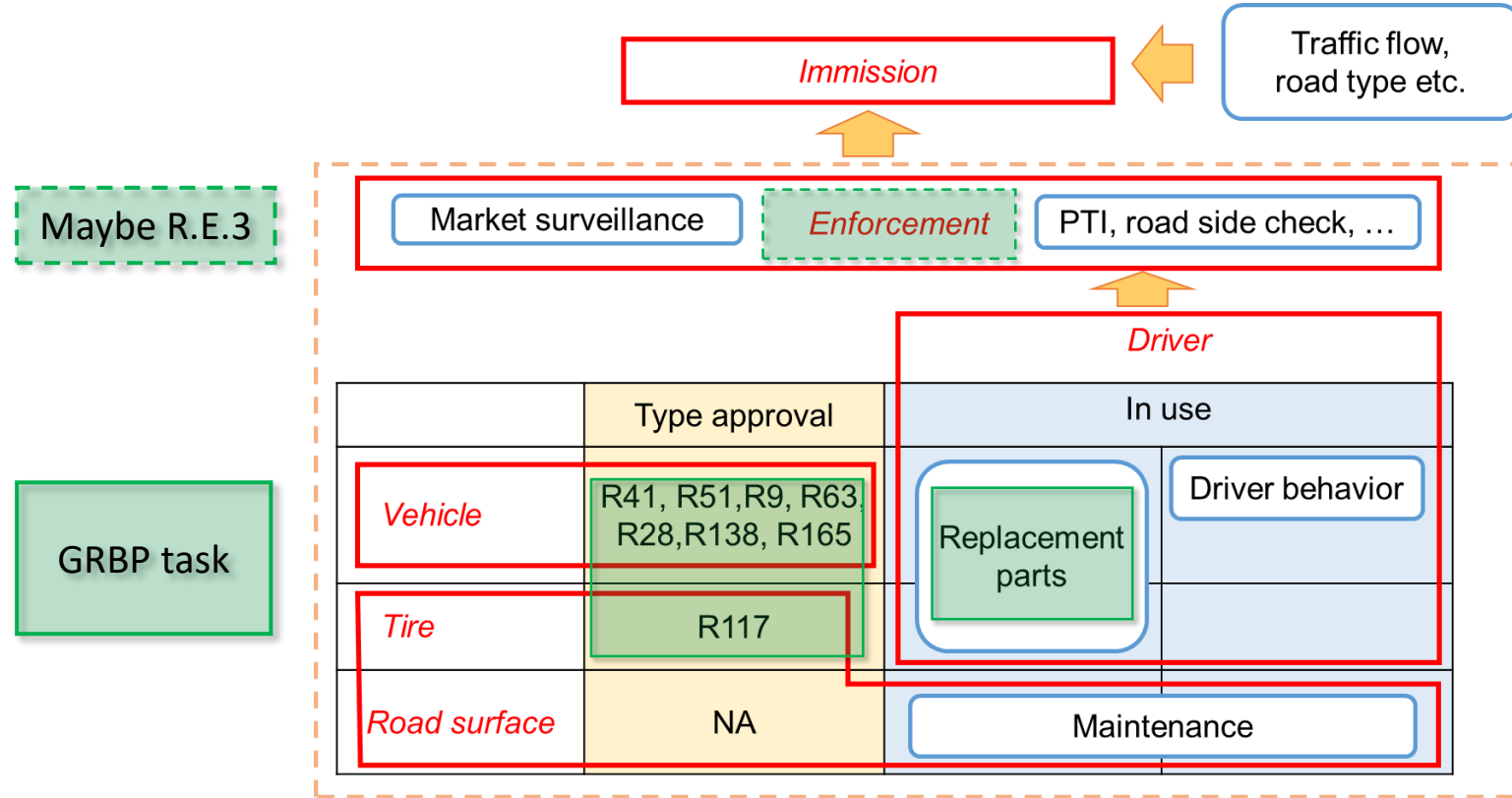
Maybe R.E.3

GRBP task



Five Key-domains

PART 3.



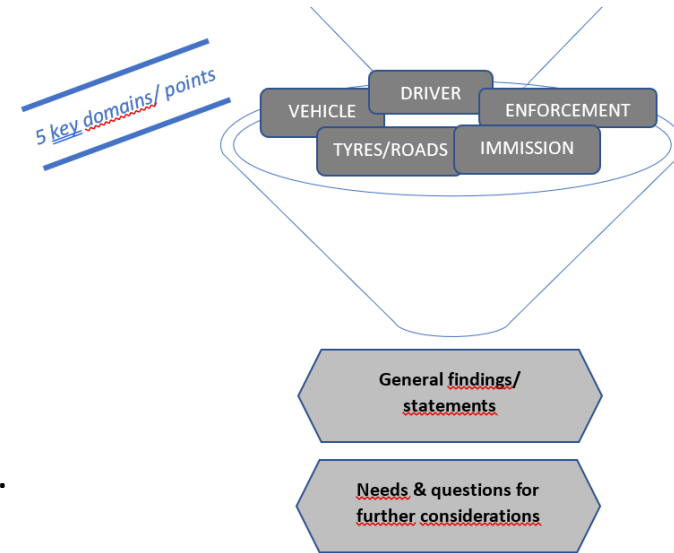
Need balance

PART 2.

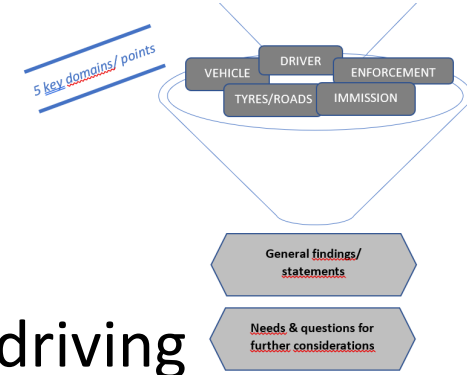
General findings from the 5 Key-domains

Noise issues in the (urban) environment have to be considered in a holistic way (combination of complementary measures necessary) and are mainly linked to:

- the **manipulation** of vehicles and components
- the **maintenance** of the vehicles
- the **driver behaviour and awareness**
- the **single events**
- the 'organisation' of the **vehicle fleet** (traffic flow, vehicles distribution, speed, bumps, ..)
- the **tyres contribution** to the vehicle's sound emissions and their interaction with
 - the road surfaces which is becoming still more important with electrified vehicles
 - the environmental & safety tyres performances and their inter-dependency
- the **road surfaces** including the road maintenance to maintain their performances regarding the noise
- the **interaction** between the environmental noise and the type-approval tests
- the **sound assessment modelling** tools to estimate sound from road traffic
- the **various usages** of the vehicles – private and commercial

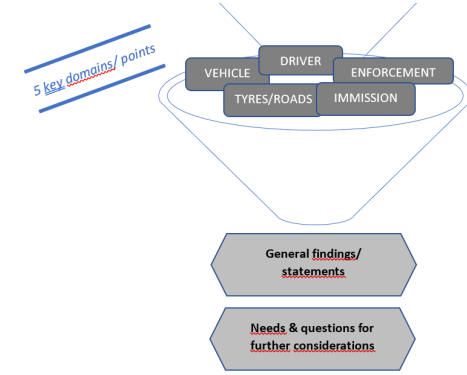


Needs & questions for further consideration



- **Education of the drivers** to make them aware of the impact of their driving behaviour
 - information's display (roadside information, noise information inside the vehicle, ...),
 - prevention campaigns,
 - roadside checks,
 - sanction systems supported for instance by noise sonars/cameras including vehicle license plate detection, speed, acceleration, ...
- Development of **solutions against manipulation of vehicles**
 - better control of aftersales component,
 - periodical technical inspection,
 - market surveillance,
 - detection of illegally modified vehicles, for example by noise cameras

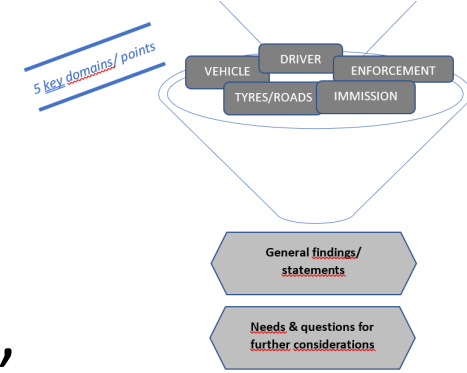
Needs & questions for further consideration



- **Arrangement of traffic fleet** to provide more ‘relaxed’ driving conditions and reduce noise by
 - optimizing traffic flow,
 - adding low speed areas,
 - avoiding speed bumps,
 - traffic flow distribution especially for the future with growing electrified vehicle part ...
- Improvement of the **knowledge of vehicles impacts on noise** including
 - Future worldwide automotive electrification including AVAS and impact on environmental noise
 - Data from real life for all categories of vehicles and not only for M1 & N1 categories of vehicles to be considered through test campaigns

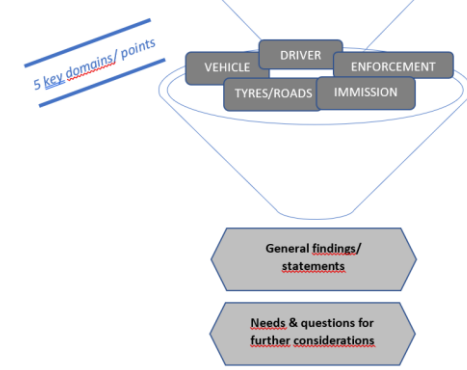
PART 2.

Needs & questions for further consideration



- Definition of a **cross-matrix** between the traffic noise situations, contributing factors and major complaints
- Update and improvement of the **understanding of the environmental noise in real life** concerning:
 - CBA (Cost-Benefit-Analysis) to assess the potential health benefits of noise reduction to be improved
 - Noise mapping tools including single events
 - Traffic scenarios

Needs & questions for further consideration



- Further improve **knowledge of tyres** for:
 - their performances and their inter-dependency regarding noise and other environmental aspects (as particles), and safety (as handling & braking of vehicles)
 - their interaction with the road surfaces
 - their test methods (indoor in addition to outdoor)
- Further research on **low-noise road surfaces** with a focus on their acoustic behaviour, their maintenance with the associated costs, and their safety performances
- Amend the **UN Regulation no.51**
 - after assessment of previous steps and measures
 - to expand the various potential uses of the vehicles (RD-ASEP and its assessment in real life in the future)

SUMMARY of potential for the future

- **Topics for potential future works of GRBP:**

- Education of the **drivers** and their awareness
- Development of solutions against **manipulation** of vehicles
- Arrangement of **traffic fleet**
- Improvement of the knowledge of **vehicles' impacts on noise**
- **Cross-matrix**
- Improvement & update of the **understanding** of the environmental noise in real life
- Improvement of the knowledge of **tyres**
- Further research on low-noise **road surfaces** and their maintenance
- Future for UN-**R51-03**.

- **Main messages**

- Limited possibilities in further sound reduction on TA
- Improve relevance of TA test for in use (RD-ASEP) for both vehicles & tyres
- Tyre/road noise and technology challenge
- Other measures to reduce immission (speed reduction, road surface, ...)
- Driver awareness
- Contribution of enforcement

Next steps for the TF-VS ?

- Work on the cross matrix,
- Follow-up of the different studies in progress everywhere
- Potential actions/opportunities and prioritization:
 - Experience (forum) to be continued to share various information linked to noise topics for as much as possible promote worldwide harmonization,
 - Consider the needs and questions highlighted in the report for potential future work of the TF-VS.

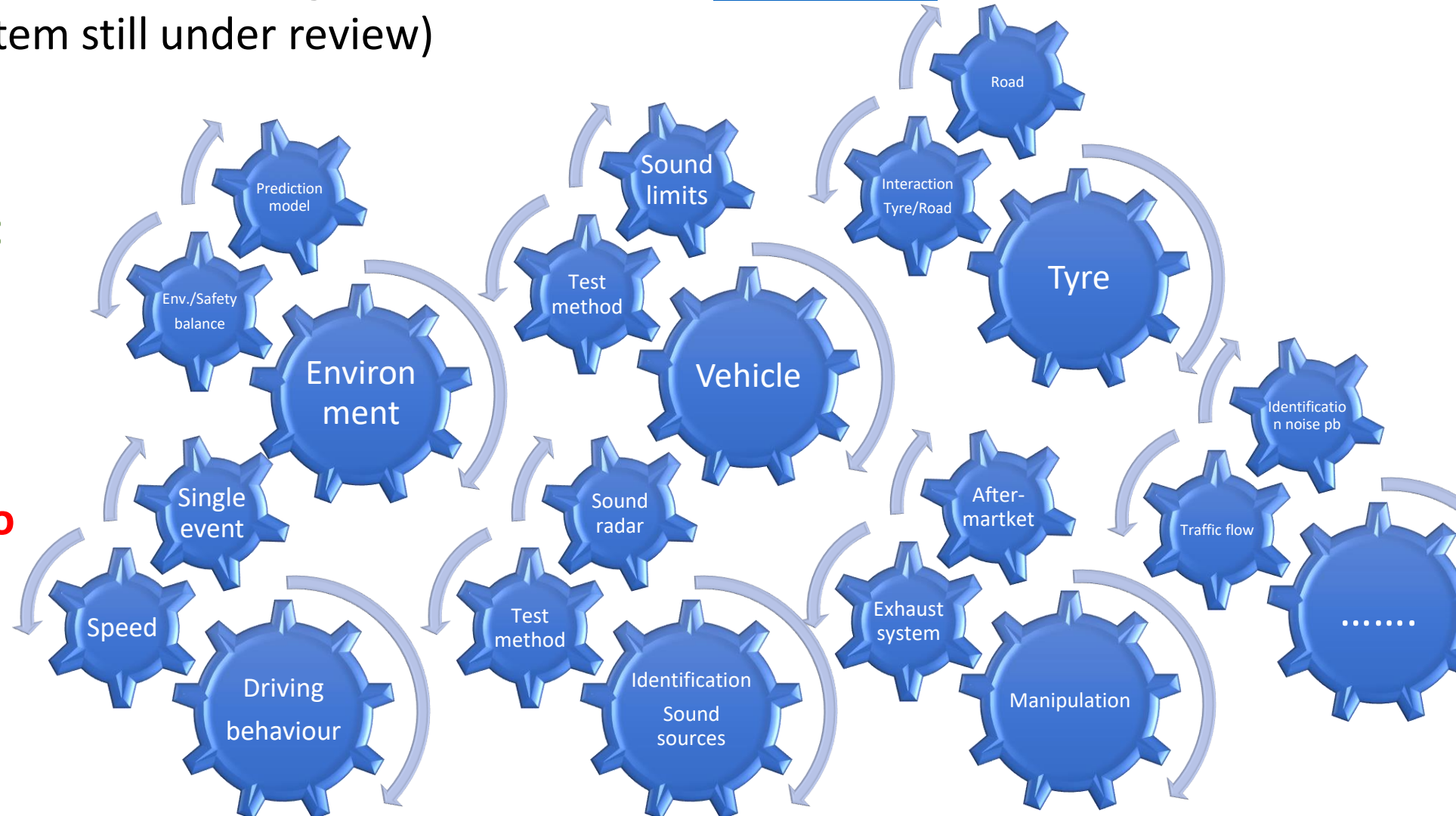
Agreed for consideration? How to consider them?

Full report to be made as “GRBP Document for Ref.”?

TF Sound Limits / Vehicles' Sound: Presentations

Table of Presentations done during the 10 Sessions → [TFVS-11-07](#)
(classification per item still under review)

A lot of interdependency between the different parameters
→ Need for a holistic approach
→ **Study(ies) & evidence associated to a technical report needed before any new decisions**



Grouping of the topics/themes → FOR SHARING THE WORK

[TFVS-11-07 Rev.2](#) - Table of the 54 documents/presentations

One color per subgroup's expert

GENERAL IDEAS:

- [TFSL-01-05 Rev.1](#) (Germany)
- [TFSL-01-06](#) & [TFSL-02-09](#) (Japan)

ROAD SURFACE Studies:

- [TFVS-04-04](#) & [TFVS-04-09](#) (FEDRO)
- [TFVS-11-04](#) (STEER)

TEST METHOD: [TFSL-05-05](#) (ISO)

NOISE MAPPING & SONAR:

- [TFSL-03-05 Rev.1](#) (Bruitparif)
- [TFSL-04-08](#) (Japan)
- [TFSL-04-06](#) & [TFVS-08-03](#) (UK)
- [TFSL-05-04](#) (SIA)
- [TFVS-07-07 Rev.1](#) (France)
- [TFVS-08-05](#); [TFVS-09-05](#) & [TFVS-09-07](#) (Brussels Env.)

GENERAL CONSIDERATIONS:

- [TFVS-02-10 Rev.2](#) (OICA)
- [TFVS-04-12](#) R51 vs. R138 (OICA)
- [TFVS-04-11 Rev.1](#) (ETRTO)

GENERAL Studies:

- [TFSL-03-04](#) (TNO) & [TFSL-05-03](#) (EC DG/ENV.) (PHENOMENA)
- [TFVS-08-08 Rev.1](#) (LEON-T)

EC/IDIADA Study (L-cat.)

- [TFVS-04-15](#), [TFVS-09-03 Rev.1](#), [TFVS-09-04](#), [TFVS-10-03](#), [TFVS-11-08](#)

IMMA Study/ Analysis:

- [TFSL-03-06](#), [TFVS-07-09 Rev.1](#), [TFVS-07-10](#), [TFVS-07-12](#), [TFVS-08-07](#), [TFVS-08-09](#)

EC/EMISIA Study

- [\(GRBP-73-23\)](#), [TFSL-02-08](#), [TFVS-07-11](#), [TFVS-09-03 Rev.1](#)
- [TFVS-10-06](#) (Japan) & [TFVS-11-03](#) (Emisia)

Other Studies linked to Emisia:

- [TFSL-03-06](#) (Japan – Ph.3) & [TFVS-08-04 Rev.1](#) (Japan)
- [TFVS-04-10](#); [TFVS-07-03](#) & [TFVS-07-04](#) (OICA/ACEA/ATEEL)
- [TFVS-10-04 Rev.1](#) & [TFVS-11-05](#) (Comparison Emisia vs. ATEEL)
- [TFVS-11-06](#) (ETRTO)
- [TFVS-10-07](#) (Japan/N2)

CAMPAIGN: [GRBP-76-27](#) (Germany)

CROSS-MATRIX:

- [TFVS-05-06](#), [TFVS-06-03](#) (Japan), [TFVS-06-05](#), [TFVS-07-05](#), [TFVS-07-08](#), [TFVS-07-13](#)

→ 25 Individual Sheets

- All finalized
- Cross-reading done
- **Ongoing:** Feedback by the authors

→ target mid/end-Feb.

		OCTOBRE				NOVEMBER				DECEMBER				JAN
PART 4. FOR INDIVIDUAL SHEET PER TOPIC/PRES.														
GENERAL IDEAS:														
01	-TFSL-01-05 Rev.1 (Germany)					X								
02	-TFSL-01-06 & TFSL-02-09 (Japan)					X								
ROAD SURFACE Studies:														
03	-TFVS-04-04 & TFVS-04-09 (FEDRO)					X								
04	-TFVS-11-04 (STEER)											X		
TEST METHOD														
05	TFSL-05-05 (ISO)											X		
NOISE MAPPING & SONAR:														
06	-TFSL-03-05 Rev.1 (Bruitparif)					X								
07	-TFSL-04-08 (Japan)					X								
08	-TFSL-04-06 & TFVS-08-03 (UK)					X								
09	-TFSL-05-04 (SIA)											X		
10	-TFVS-07-07 Rev.1 (France)											X		
11	-TFVS-08-05; TFVS-09-05 & TFVS-09-07 (Brussels Env.)		X											
GENERAL CONSIDERATIONS:														
12	-TFVS-02-10 Rev.2 (OICA)					X								
13	-TFVS-04-12 R51 vs. R138 (OICA)					X								
14	-TFVS-04-11 Rev.1 (ETRTO)					X						OK		
GENERAL Studies:														
15	-TFSL-03-04 (TNO) & TFSL-05-03 (EC DG/ENV.) (PHENOMENA)													
16	-TFVS-08-08 Rev.1 (LEON-T)											X		
EC/IDIADA Study (L-cat.)														
17	-TFVS-04-15, TFVS-09-03 Rev.1, TFVS-09-04, TFVS-10-03, TFVS-11-08											X		
IMMA Study/ Analysis:														
18	-TFSL-03-06, TFVS-07-09 Rev.1, TFVS-07-10, TFVS-07-12, TFVS-08-07, TFVS-08-09											X		
EC/EMISIA Study														
19	-(GRBP-73-23), TFSL-02-08, TFVS-07-11, TFVS-09-03 Rev.1					X								
20	-TFVS-10-06 (Japan) & TFVS-11-03 (Emisia) & TFVS-10-07 (Japan/N2)					X								
Other Studies linked to Emisia:														
21	-TFSL-03-06 (Japan – Ph.3) & TFVS-08-04 Rev.1 (Japan)					X								
22	-TFVS-04-10; TFVS-07-03 & TFVS-07-04 (OICA/ACEA/ATEEL)											X		
23	-TFVS-10-04 Rev.1 & TFVS-11-05 (Comparison Emisia vs. ATEEL)									X				
24	-TFVS-11-06 (ETRTO)											X		
CAMPAING:														
25	GRBP-76-27 (Germany)											X		

Identification of the key points

			GERMANY Gal.Ideas	JAPAN Gal. Overview	CH low-noise road surfaces	STEER CEDR Noise & Nuisance	(ISO) COAST-BY DRUM INDOOR	France/BRUITPARIF Road noise in Env.	JAPAN Dvlppt. Auto. Illegal NORESS	UK research projects	« AUTOMOTIVE IN SOUNDSCAPE »	France – national update:	Brussels env.	OICA Cons. Future noise regulations	OICA Mngt. Noise R51 vs.R138	ETRO Potential tyres & road traffic	Phenomena study	LEON- T low particle and noise emission	EU/IDIADA Study on L-Cat. Noise level	IMMA analysis of EC/Idiada Study	EMISIA	JAPAN Q&A + Comments on Emisia	JAPAN Results simul. On ducing	OICA/ACEA/ATEEL Study on sound	OICA/ACEA/ATEEL Comparison	ETRTO On the CBA by EMISIA	GERMANY Campaign on noise	
			M1	M-N	M-N- L	M-N- L	M-N	M-N		M-N- L	M-N	M-N	M-N- L	M-N	M-N	M-N- L	M-N- L	M-N- L	L	L	M-N	M-N		M-N	M-N	M-N	M-N- L	M1- L3
A	DRIVING BEHAVIOUR	Vehicle usage, speed, driving behaviour, ...	X							X			X									X						
B	VEHICLE AGE, PWT, MASS, POWER	tbc.											X															
C	VEHICLE CATEGORY [& AGE]	tbc.																				X	X					
D	NORESS & MANIPULATION	\	X	X					X	X									X	X							X	
E	SINGLE EVENTS	Horn, sirens, loading & unloading operations, excessive behaviour, ...		X				X	X	X				X		X									X			
F	DRIVER AWARENESS									X																		
G	TYRE ROAD NOISE				X	X	X	X			X			X	X	X		X			X		X	X	X	X	X	
H	VEHICLE SOUND	How the sound is generated - the composition of the sound														X					X			X				
\	ROAD SURFACE / TYRE SOUND				X																X							
J	ROAD SURFACE 'itself'				X			X			X			X		X						X			X			
\	ROAD															X												
K	PREDICTION MODEL	Noise roadmapping		X																		X	X		X			
L	TRAFFIC FLOW/CONDITION	Number of lanes, roundabout, trafic light ...							X													X	X		X			
M	CROSS-MATRIX	\																				X	X					
N	VEHICLE FLEET	Distribution of vehicles type, market penetration												X		X						X	X					
O	SOUND LIMITS	For environment purposes / noise emission	X	X										X	X	X	X		X	X	X		X	X	X	X	X	X
P	ASEP	\	X											X	X				X	X							X	
Q	ENFORCEMENT	PTI, roadside check, noise/sound radar, ...	X	X					X	X		X							X	X								
R	GREY ZONES	topics in regulations which need to be clarified	X								X				X													
S	xEVs													X														
T	MINIMUM SOUND linked to AVAS	For safety purposes												X	X													
U	MEASUREMENT UNCERTAINTIES	\				X	X							X		X												
V	TYRE LABELLING	\				X										X												
W	TYRE PARTICLES EMISSION	Abrasion																	X									
X	SOCIAL IMPACTS	Social costs, health, safety, ...						X			X	X																
Y	CBA	Balance between product & society costs															X								X			
??	MARKET PENETRATION																							X				
??	ALTERNATIVE ABATMENT																							X				
	POLICY DOCUMENTS	Legislations, Noise action plans															X											
	ABATMENT MEASURES																X							X				

Identification of the key points → classification in 5 key-domains

			PROPOSAL OF 5 MAIN DOMAINS			
A	DRIVING BEHAVIOUR	Vehicle usage, speed, driving behaviour, ...	Romain	DRIVER	driving Behaviour	single events
B	VEHICLE AGE, PWT, MASS, POWER	tbc.	Françoise		driver Awareness	Roadside equipment policy ?
C	VEHICLE CATEGORY [& AGE]	tbc.			Manipulation	
D	NORESS & MANIPULATION	\	Alex	VEHICLE	Age, PWT, Mass, Power	
E	SINGLE EVENTS	Horn, sirens, loading & unloading operations, excessive behaviour	Klaus		vehicle fleet?	
F	DRIVER AWARENESS				Category & market penetration	
G	TYRE ROAD NOISE				sound	Abatement measures
H	VEHICLE SOUND	How the sound is generated - the composition of the sound			noress	
\	ROAD SURFACE / TYRE SOUND				xEVs	minimum sound
J	ROAD SURFACE 'itself'		Michael/ Franço	TYRE/ROAD	tyre labeling	
\	ROAD				tyre particle emission	
K	PREDICTION MODEL	Noise roadmapping			Tyre road noise	
L	TRAFFIC FLOW/CONDITION	Number of lanes, roundabout, traffic light ...		road surface		
M	CROSS-MATRIX	\	Per-Uno	IMMISSION	single events	Abatement measures
N	VEHICLE FLEET	Distribution of vehicles type, market penetration	Shirahashi-san		prediction model	
O	SOUND LIMITS	For environment purposes / noise emission			traffic flow / condition	
P	ASEP	\			vehicle fleet	
Q	ENFORCEMENT	PTI, roadside check, noise/sound radar, ...			cross-matrix	
R	GREY ZONES	topics in regulations which need to be clarified			social impacts	
S	xEVs				cba	
T	MINIMUM SOUND linked to AVAS	For safety purposes			alternative abatement	
U	MEASUREMENT UNCERTAINTIES	\	Jan Sybren	ENFORCEMENT	sound limits	Policy documents
V	TYRE LABELLING	\	Ito-san		PTI, roadside check/sound radar	
W	TYRE PARTICLES EMISSION	Abrasion			grey zones	Roadside equipment policy ?
X	SOCIAL IMPACTS	Social costs, health, safety, ...			minimum sound	
Y	CBA	Balance between product & society costs			measurement uncertainty	
??	MARKET PENETRATION				ASEP	
??	ALTERNATIVE ABATMENT				Manipulation?	
	POLICY DOCUMENTS				Market surveillance	