

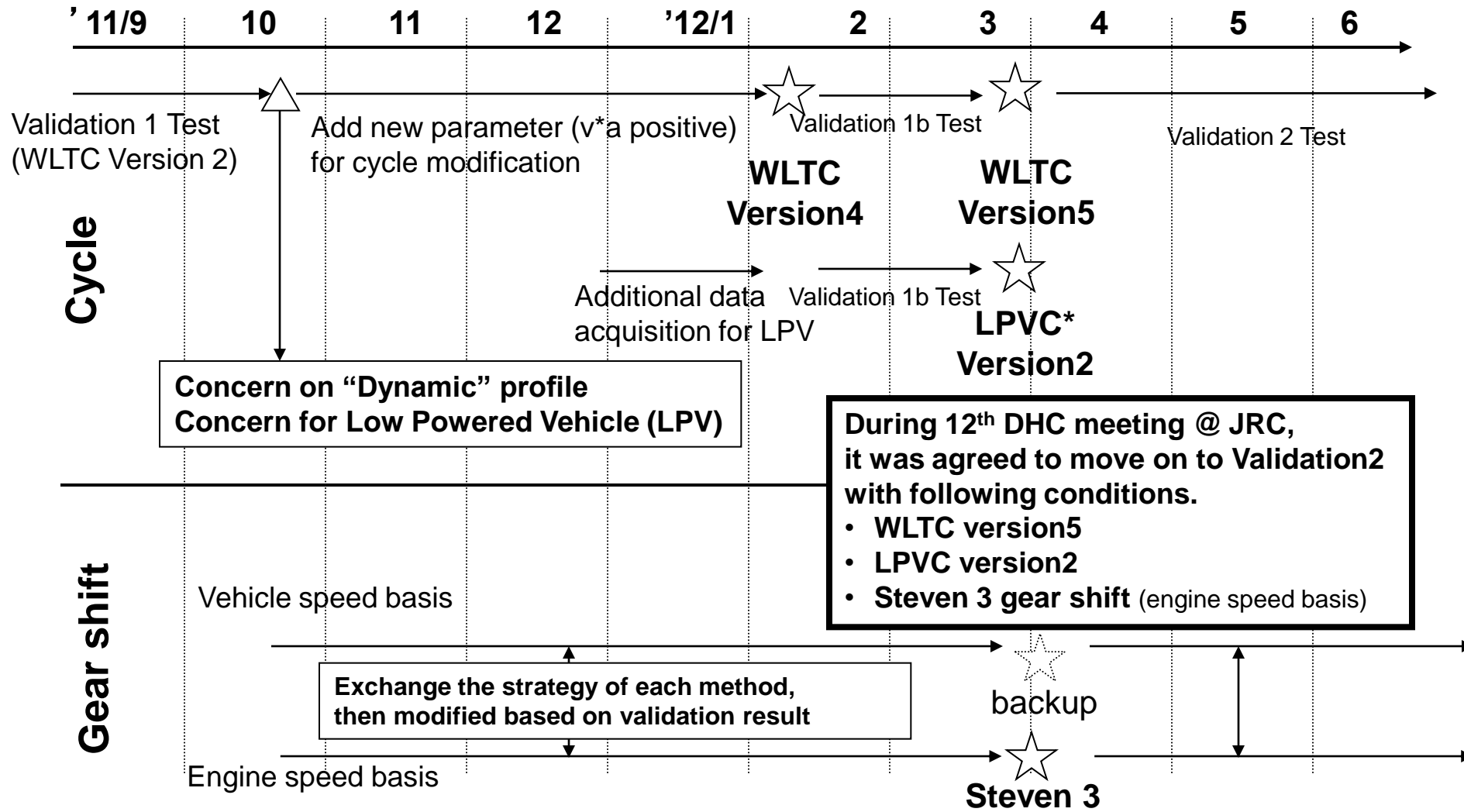
Progress Report of World-wide Light-duty Test Cycle

Prepared by WLTP-DHC
under GRPE/WLTP informal group

64th GRPE
7th June 2012
Palais des Nations, Geneva

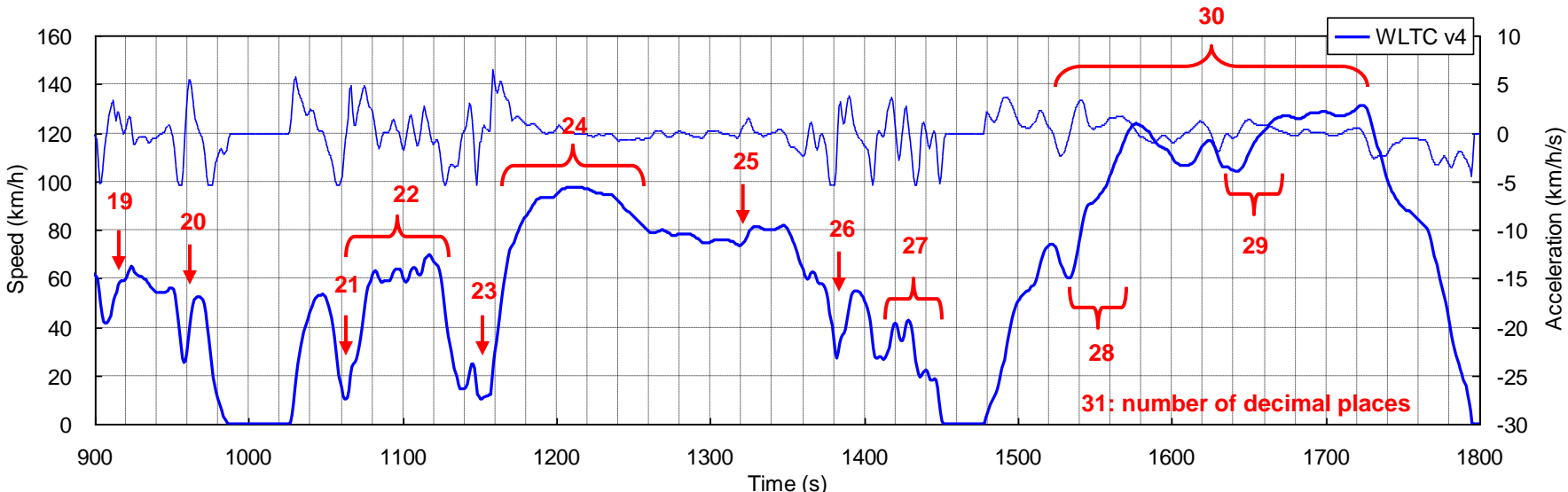
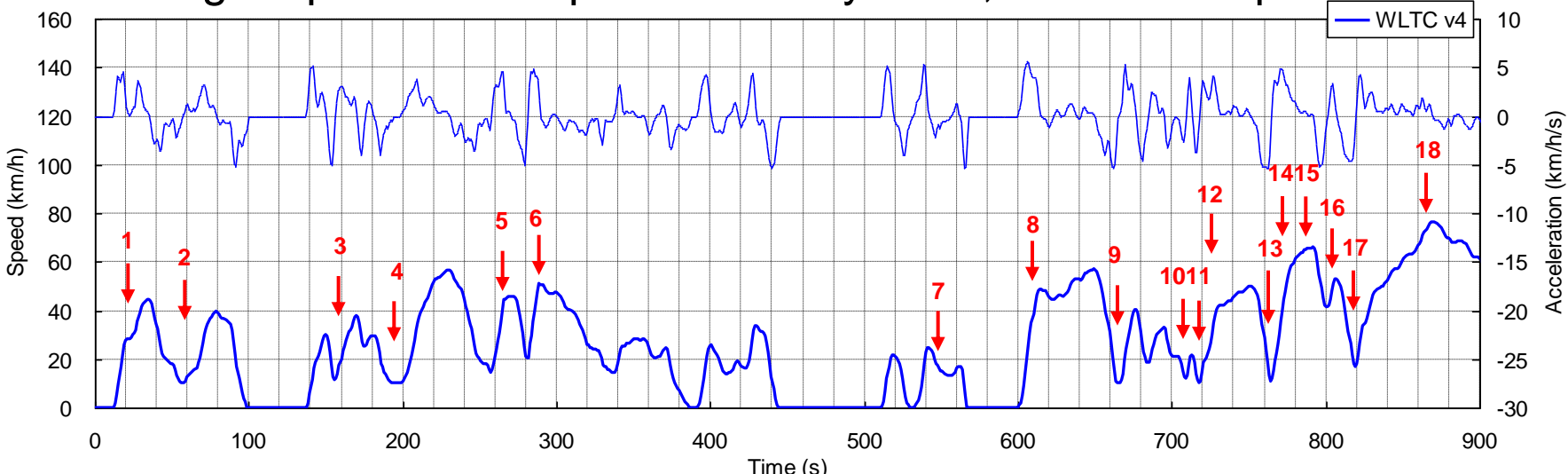
1. Progress since last GRPE meeting
2. Summary of Validation 1b
3. Profile of WLTC ver.5
4. Gear Shift Prescription
5. Open Issues Lists
6. Discussion on Open Issue (Cycle modification)
7. Discussion on Open Issue (Regional WF)
8. Next actions
9. Next meeting

1. Progress since last GRPE meeting



2. Summary of Validation 1b

From the viewpoints of drivability, traceability and reproducibility, the following 31 portions are pointed out by India, JRC and Japan.



→ It was agreed to modify 16 points out of 31 during 12th DHC meeting

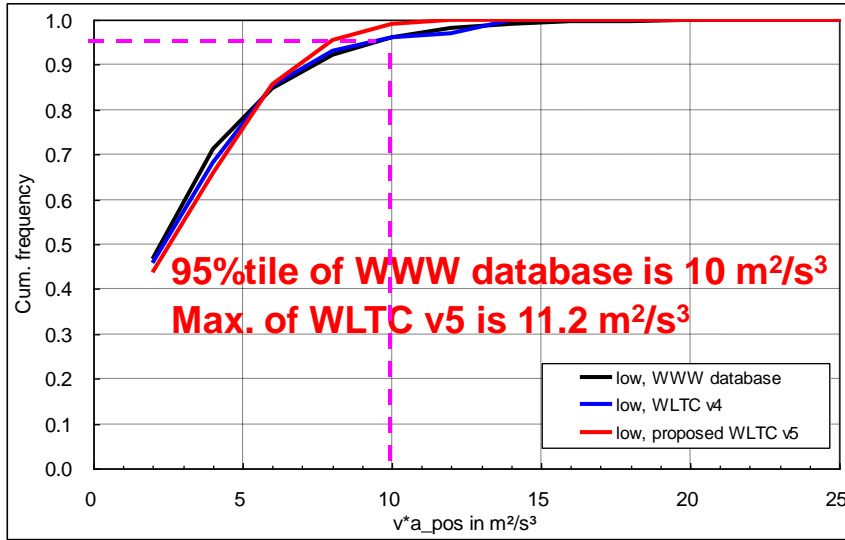
3.1. Profile of WLTC ver.5

Parameter		Cycle duration	Driving distance	Average speed	Max. speed	Max. acceleration	Max. Deceleration	RPA	Acceleration ratio	Deceleration ratio	Cruise ratio	Idling ratio	χ ² value	Normalized χ ² value
		s (h)	km	km/h	km/h	km/h/s	km/h/s	m/s ²	%	%	%	%	V-A distribution	V-A distribution
LOW	WWW database	(6107)	114440	19.8	60.0	-	-	0.192	27.5	25.4	22.7	24.5	-	-
	WLTC v2	589	2.98	18.2	50.9	5.3	-5.3	0.165	26.3	27.8	19.5	26.3	0.244	0.0008
	WLTC v3	589	3.19	19.5	56.5	5.9	-5.3	0.176	25.1	29.2	20.9	24.8	0.289	0.0009
	WLTC v4	589	3.08	18.8	56.5	5.3	-5.3	0.209	27.0	31.1	17.1	24.8	0.608	0.0019
	Proposed WLTC v5	589	3.09	18.9	56.5	5.3	-5.3	0.205	28.4	31.1	15.8	24.8	0.586	0.0019
MID	WWW database	(3136)	120162	38.4	80.0	-	-	0.188	31.4	27.5	28.8	12.2	-	-
	WLTC v2	433	5.01	41.6	72.5	5.4	-7.4	0.155	37.0	24.2	27.7	11.1	0.629	0.0015
	WLTC v3	433	4.95	41.1	76.6	5.7	-5.3	0.184	33.7	29.6	26.1	10.6	0.613	0.0014
	WLTC v4	433	4.74	39.4	76.6	5.6	-5.3	0.198	36.0	30.3	23.1	10.6	0.649	0.0015
	Proposed WLTC v5	433	4.76	39.5	76.6	5.7	-5.4	0.196	36.0	30.3	23.1	10.6	0.650	0.0015
HIGH	WWW database	(3358)	192595	58.0	110.0	-	-	0.156	31.3	27.2	35.5	6.0	-	-
	WLTC v2	455	7.01	55.5	97.4	6.5	-7.7	0.144	29.0	28.8	35.2	7.0	0.962	0.0017
	WLTC v3	455	7.05	55.8	97.4	6.5	-5.3	0.143	28.8	28.8	36.0	6.4	0.869	0.0015
	WLTC v4	455	7.06	55.9	97.4	6.5	-5.3	0.137	27.0	27.3	39.3	6.4	1.065	0.0018
	Proposed WLTC v5	455	7.16	56.6	97.4	5.7	-5.4	0.135	26.8	27.9	38.9	6.4	1.113	0.0019
Ex-HIGH	WWW database	(3144)	282188	86.8	194.7	-	-	0.108	25.7	23.4	48.9	2.0	-	-
	WLTC v2	323	7.72	86.0	132.0	7.4	-6.8	0.127	25.4	25.4	47.7	1.5	5.312	0.0060
	WLTC v3	323	7.67	85.4	130.4	6.1	-5.3	0.126	26.9	25.7	45.8	1.5	4.413	0.0050
	WLTC v4	323	8.25	92.0	131.3	3.7	-4.4	0.125	36.2	31.6	30.7	1.5	2.779	0.0031
	Proposed WLTC v5	323	8.25	92.0	131.3	3.7	-4.4	0.125	37.2	32.2	29.1	1.5	2.678	0.0030

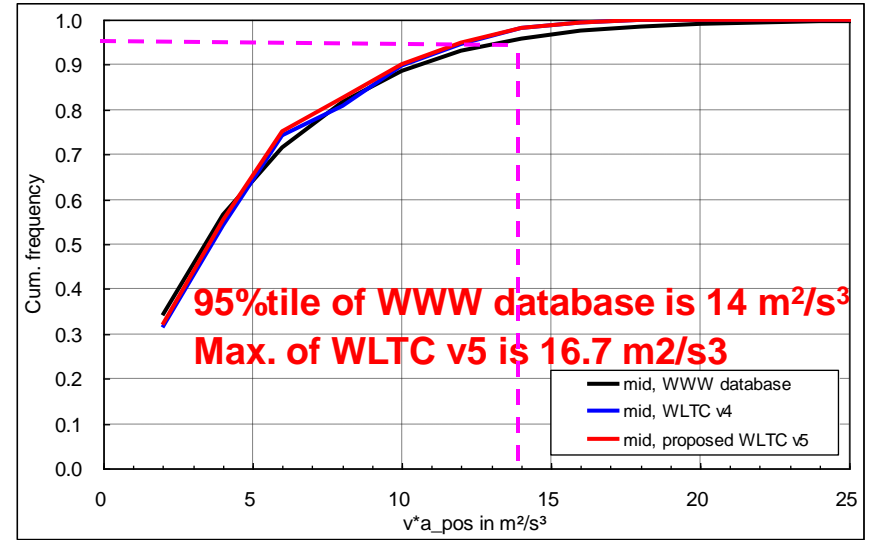
Chi squared value of proposed WLTC v5 is identical to that of WLTC v4

3.2. Profile of WLTC ver.5

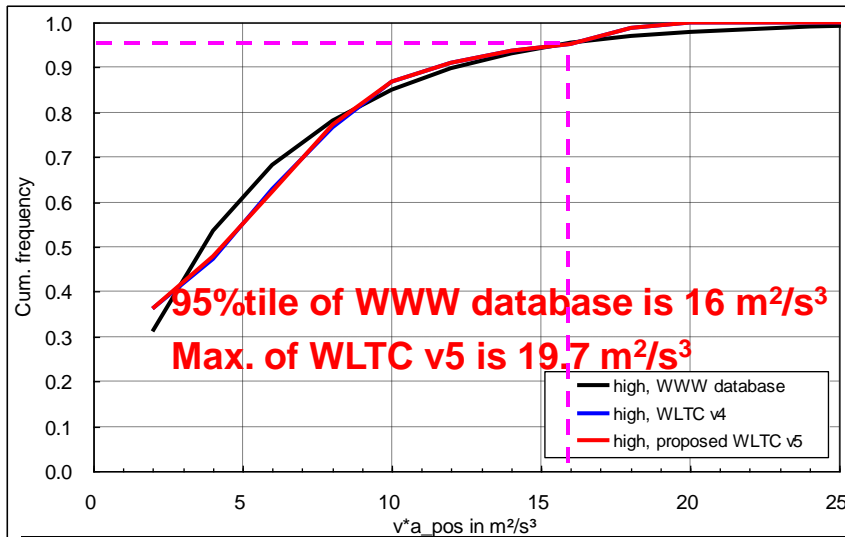
◆ LOW



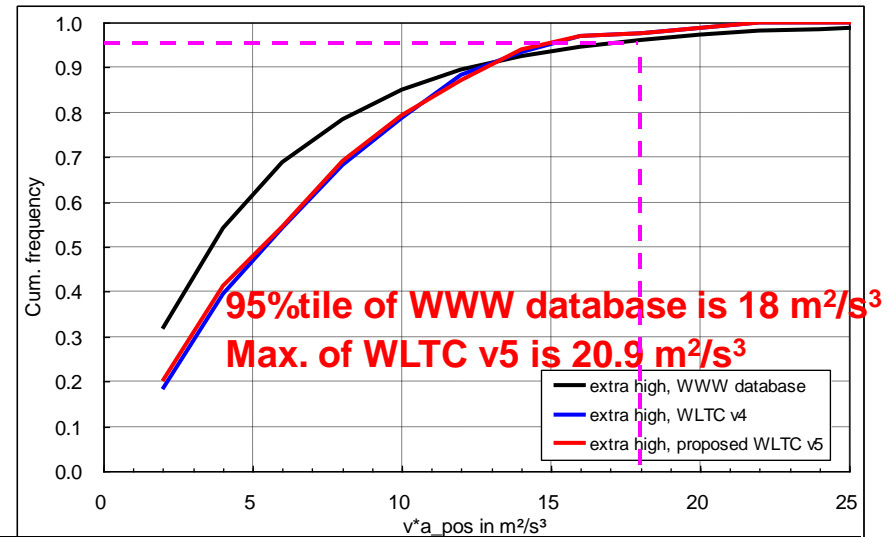
◆ MIDDLE



◆ HIGH

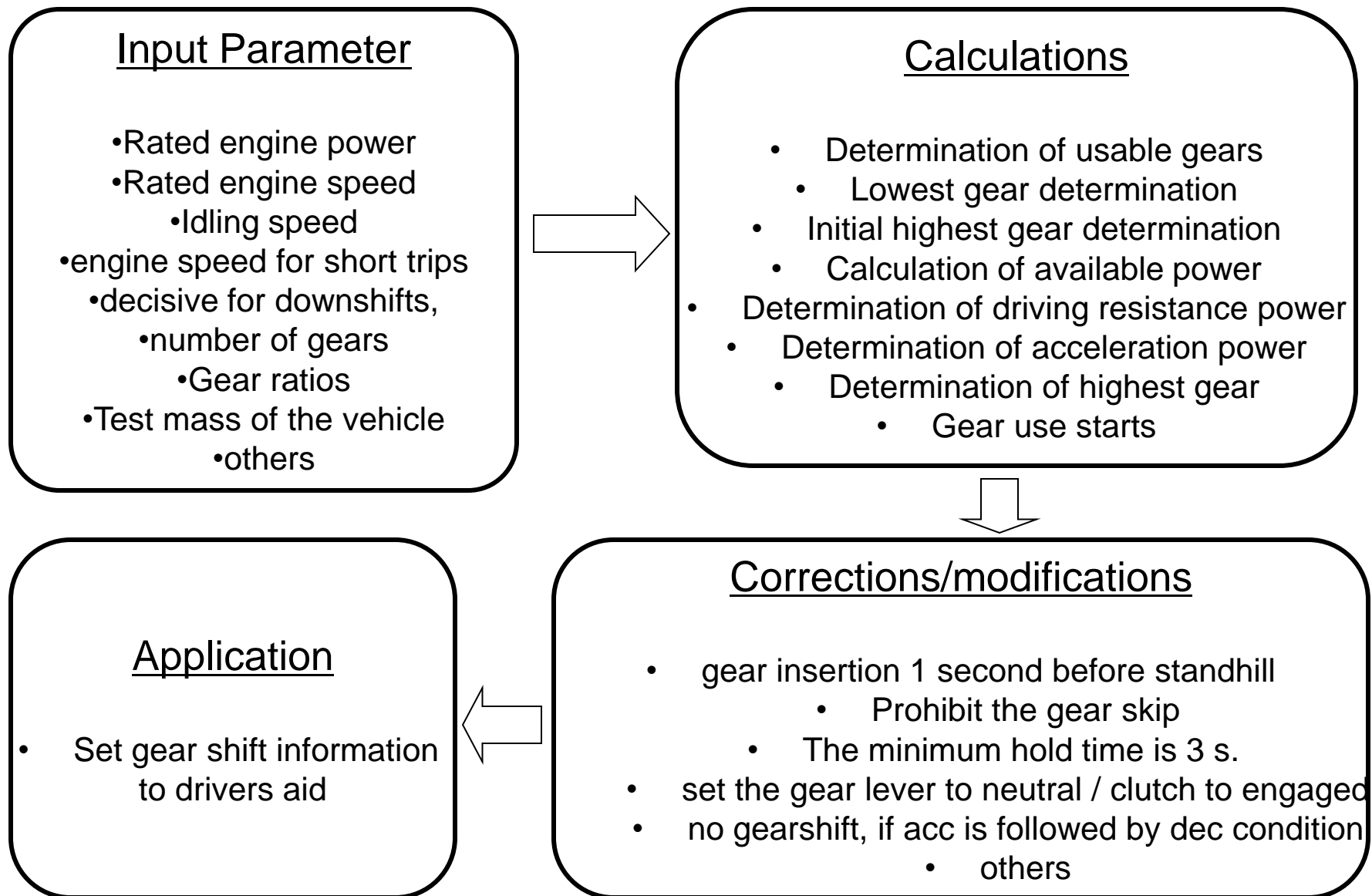


◆ Extra-HIGH



The maximum v^*a of WLTC ver.5 exceed 95%tile of WWW database

4. Gear Shift Prescription (Steven3)



5.1. Open Issues -1

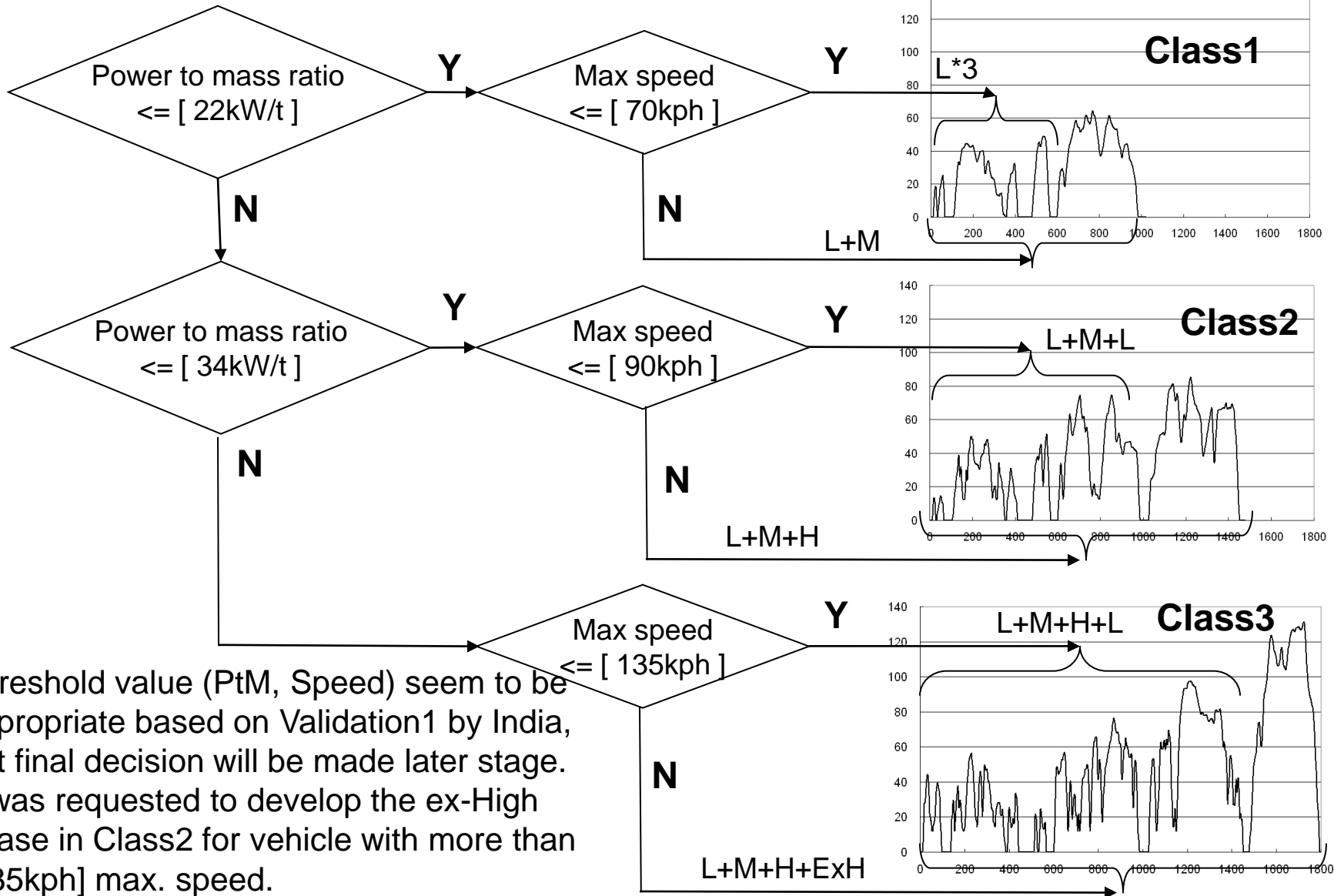
	Issues	Discussion points	Status
1	Deadline for submission of driving data CLOSED	a) India and China requested deadline be extended to May	Decided to start development of new cycle after 8 th DHC meeting. Later data submission is still open for analysis.
2	Regional Weighting when developing the WLTC CLOSED	a) traffic volume b) same weighting c) compromised weighting	It was agreed to adopt the traffic volume ratio during the 8 th DHC meeting
3	Threshold Speed for L/M/H CLOSED	a) according to DHC-06-03 b) CP's requirement	Threshold speeds of 60, 80 and 110km/h were agreed for the cycle phases during 7 th DHC meeting
4	High Phase Cycle Construction (US&EU versus other regions) CLOSED	a) only ONE unified cycle b) possess TWO types of High phase cycle	It was agreed to possess two (2) types of HIGH phase cycle during 7 th meeting.
5	Mode Construction	a) cold start test only b) cold start & hot soak start	Base mode construction was provided for Validation 2. Based on validation2 results, final decision will be discussed.

5.2. Open Issues -2

	Issues	Discussion points	Status
6	Weighting Factor for L/M/H/Ex-H Phase	<ul style="list-style-type: none"> a) harmonized weighting factors b) permit regional weighting factors 	Refer document DHC-13-05 for further discussion
7	Gear Shift Points	<ul style="list-style-type: none"> a) fixed points b) based on vehicle specification c) others 	Vehicle specific shift points (b) was provided for Validation 2.
8	How to treat the vehicles which are not able to follow the prescribed cycle	<ul style="list-style-type: none"> a) continue to drive with wide-open-throttle b) exempt the Ex-H (or M&H) phase (s) c) others 	Refer document DHC-13-03, DHC-13-04 for further discussion
9	Check the driving profile based on the vehicle characteristic CLOSED		Analyze the in-use data based on vehicle characteristic (i.e. power to mass ratio)

6.1. Discussion on Open Issue #8 (64th GRPE, 5-8 June, 2012, agenda item 3(a))

Flow chart for test cycle selection



Threshold value (PtM, Speed) seem to be appropriate based on Validation1 by India, but final decision will be made later stage. It was requested to develop the ex-High phase in Class2 for vehicle with more than [135kph] max. speed.

for Class1&2 cycles

- India presented the Validation test result on Class1 & 2 cycles (DHC-13-03)
- No major concern was observed on both cycles with the following suggestions to improve the traceability.
- Gear shift
 - The Low powered vehicles show a deviation at the beginning of the cycle ~ 10-20 sec, where there is a shift at ~ 12 km/h
- Cycle smoothing
 - Smoothing transient profile of the cycle and during gear shift change from 1st to 2nd
 - Vehicles up to PMR 22 kW/t – engine response to speed change is sluggish.

→ The above suggestion will be taken into account before starting the Validation 2.

6.3. Discussion on Open Issue #8 (64th GRPE, 5-8 June, 2012, agenda item 3(a))

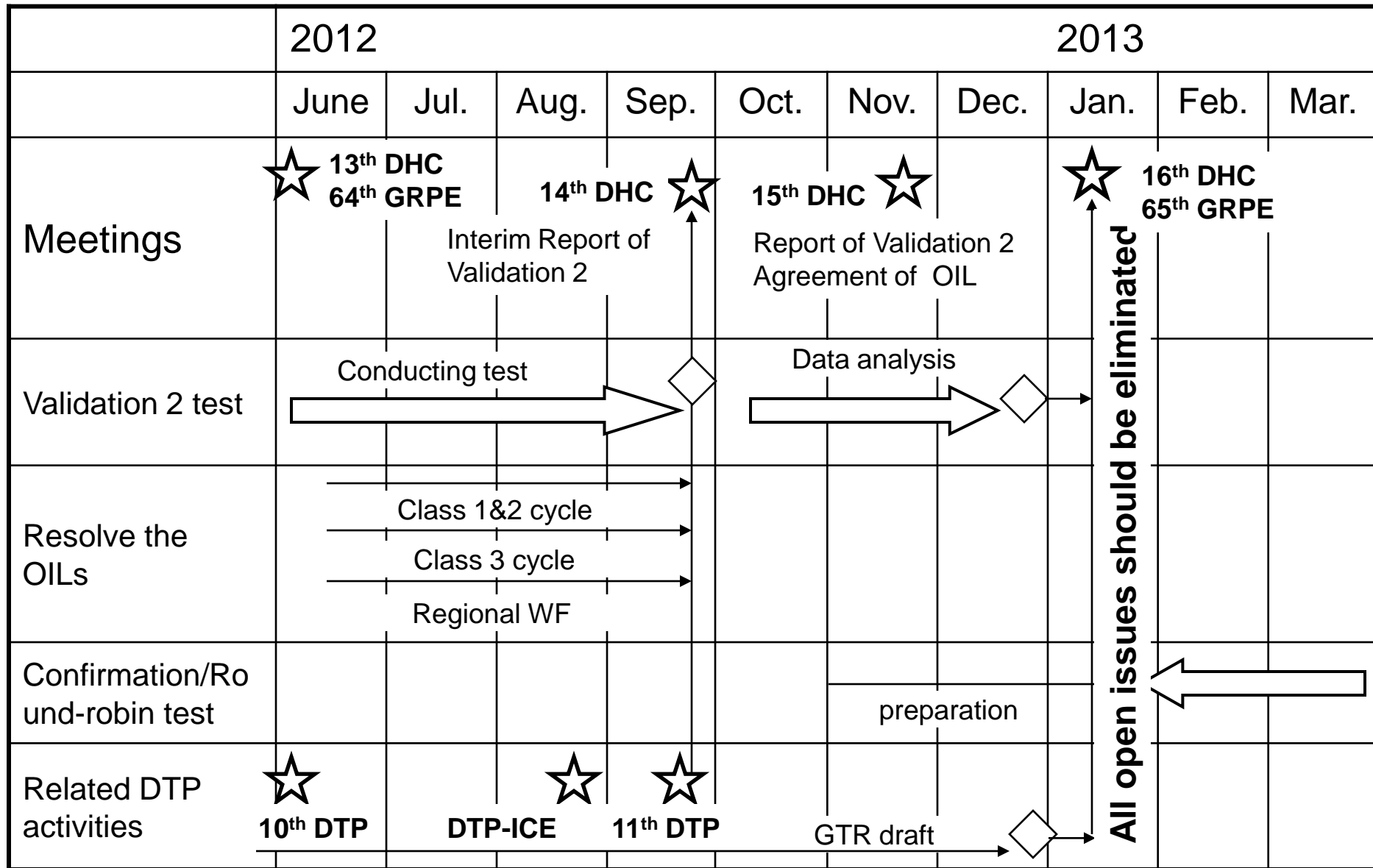
for Class 3 cycle

- Japan (DHC-13-04) and India (DHC-13-03) presented the validation test results on Class3 cycle.
- It was reported that some major vehicles in Japan are forced to drive the cycle under the engine protection operation which is rarely happened in real driving conditions.
- Japan proposed the modification of the WLTC ver.5 to eliminate the points in where some major vehicles come under the engine protection operation maintaining the amount of CO₂.
- India proposed the slight modification on M&H phases and that vehicles with max. speed up to 155 – 160 km/h in Class 3 are exempted to drive ex-High phase.
- Some CPs have raised the concerns on above proposal since these modification may loose the representativeness of world-wide driving condition.
- **Continue to have further discussion through Validation2 test program to find out the appropriate solution.**

Adoption of regional Weighting Factor

- Japan presented the needs to apply regional weighting factor in each phase to minimize the gap between WLTC and regional unified driving pattern. (DHC-13-05)
- Chi-square value of India, Korea and Japan are relatively large (means that gap is bigger) compared with that of EU and US.
- India / Korea have reserved their positions since internal discussion is not taken yet.
- Some of CPs have claimed Japanese proposal from the view points of world-wide harmonization.
- It was proposed to analyze the chi-square value when eliminating the ex-High phase for these regions.
- **Continue to have further discussion with possible solutions to accommodate the regional representativeness and world-wide harmonization.**

8. Next Actions



9. Next Meetings

Next 14th DHC meeting will be set during next DTP meeting in September at JRC.

Main agenda will be

1. Interim report of Validation² test results for all cycles
2. Discussion on Open Issues

(15th DHC meeting will be set around November 2012)