MITSUBISHI ELECTRIC
Changes for the Better

Status report of Dynamic Map Field Operational Tests

14th, November, 2017

MITSUBISHI ELECTRIC CORPORATION

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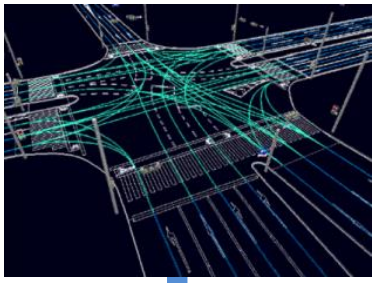
1.Positioning of field operational test

Test details

a. Validation of specifications and precision of static, high-accuracy 3D map data
b. Validation of data updating and distribution systems
c. Validation of linkage of dynamic data delivered from infrastructure, etc.

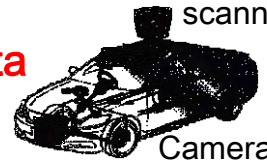


a.Specifications and precision of map data

GNSS

b. Updating and distribution of data

Laser scanner



Camera

Milliwave radar

c. Use of dynamic data

Information on road regulations
Information on traffic congestion
Road update information
Information on falling objects, etc.

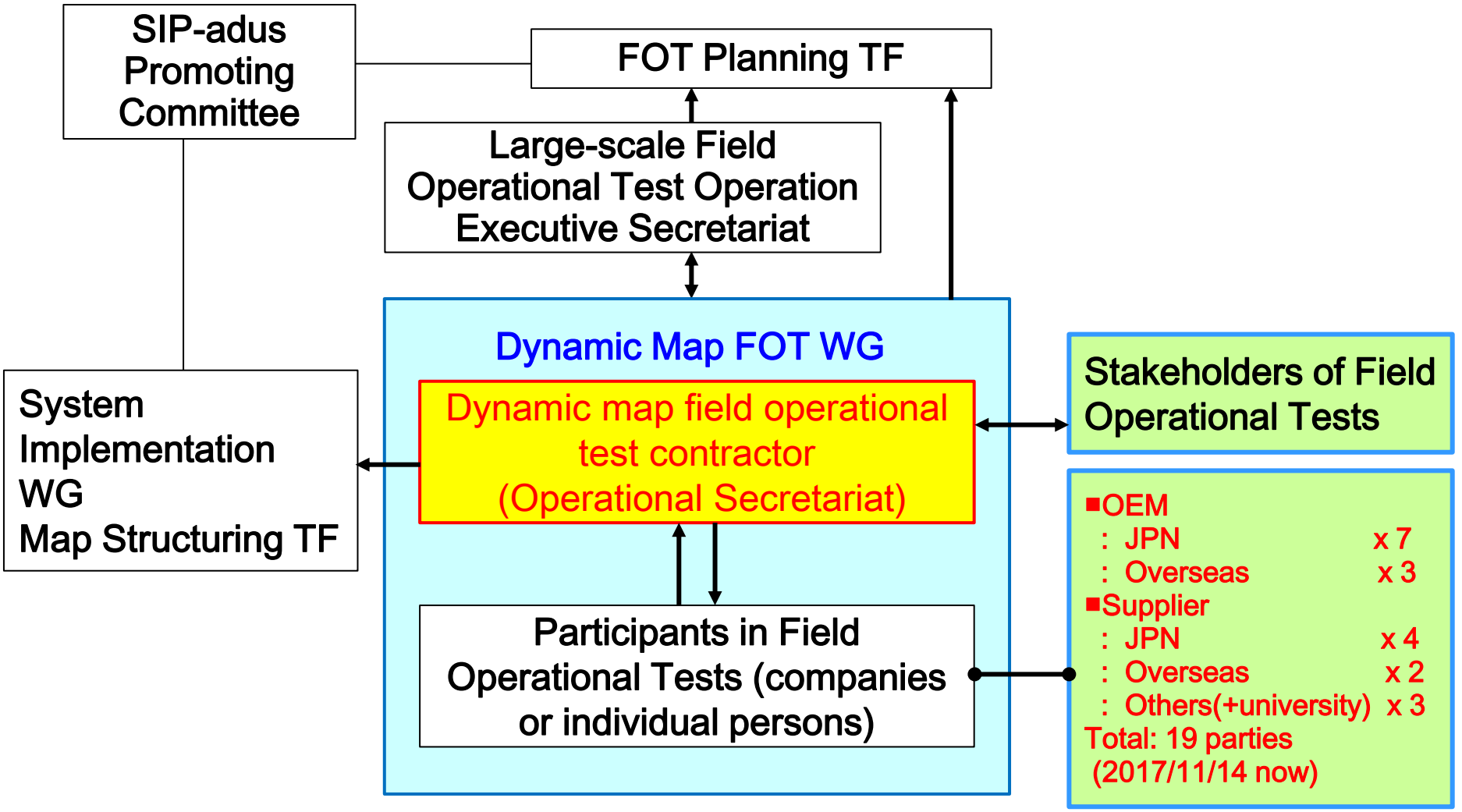
Functions of the Dynamic Map Center

・Linking of dynamic data from public information and infrastructure with the dynamic map

* Dynamic Map Field Operational Test Briefing (Material created by NEDO)

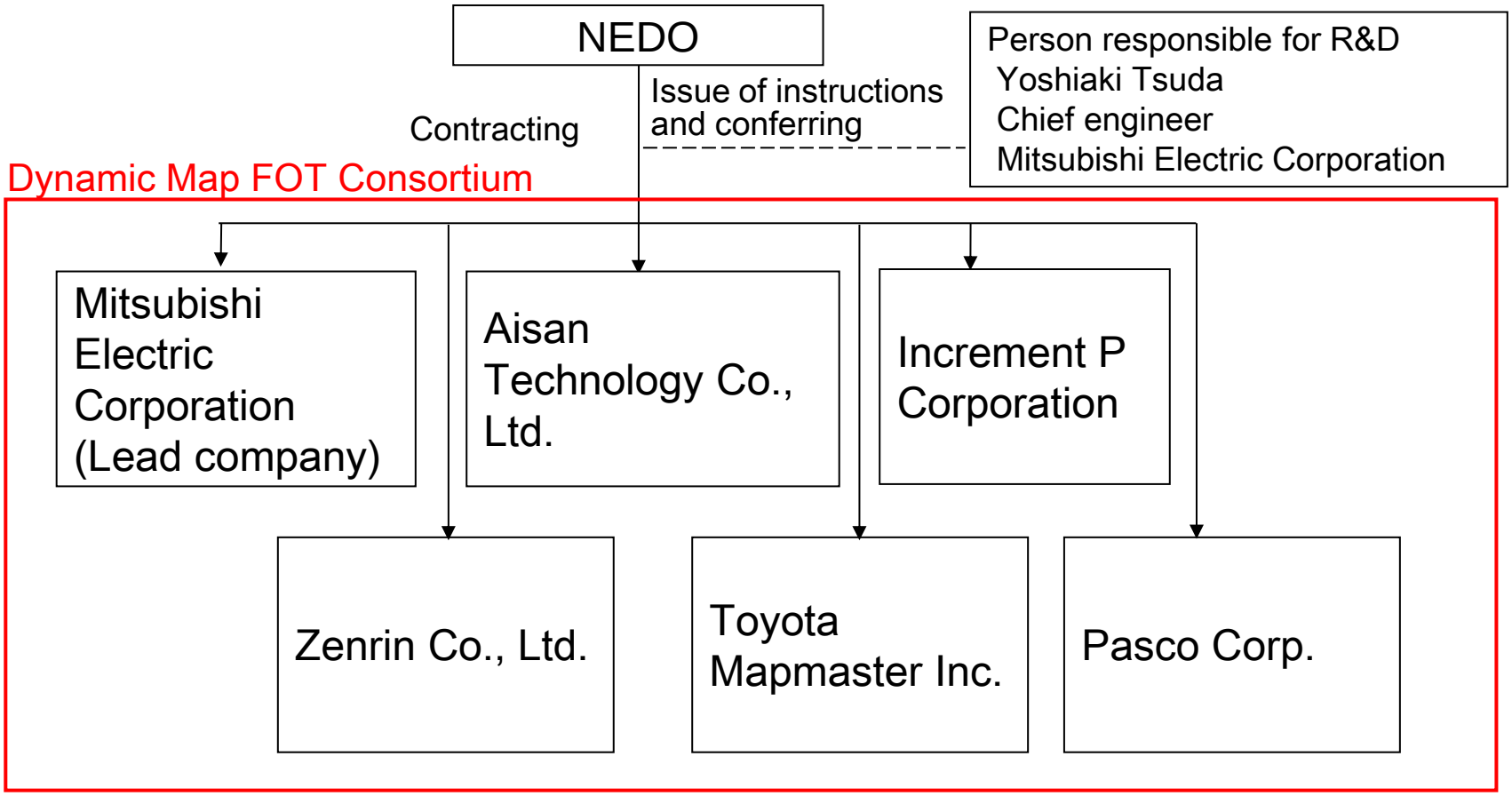
2.Framework of Dynamic Map FOT

The Field Operational Tests are implemented using the following framework.



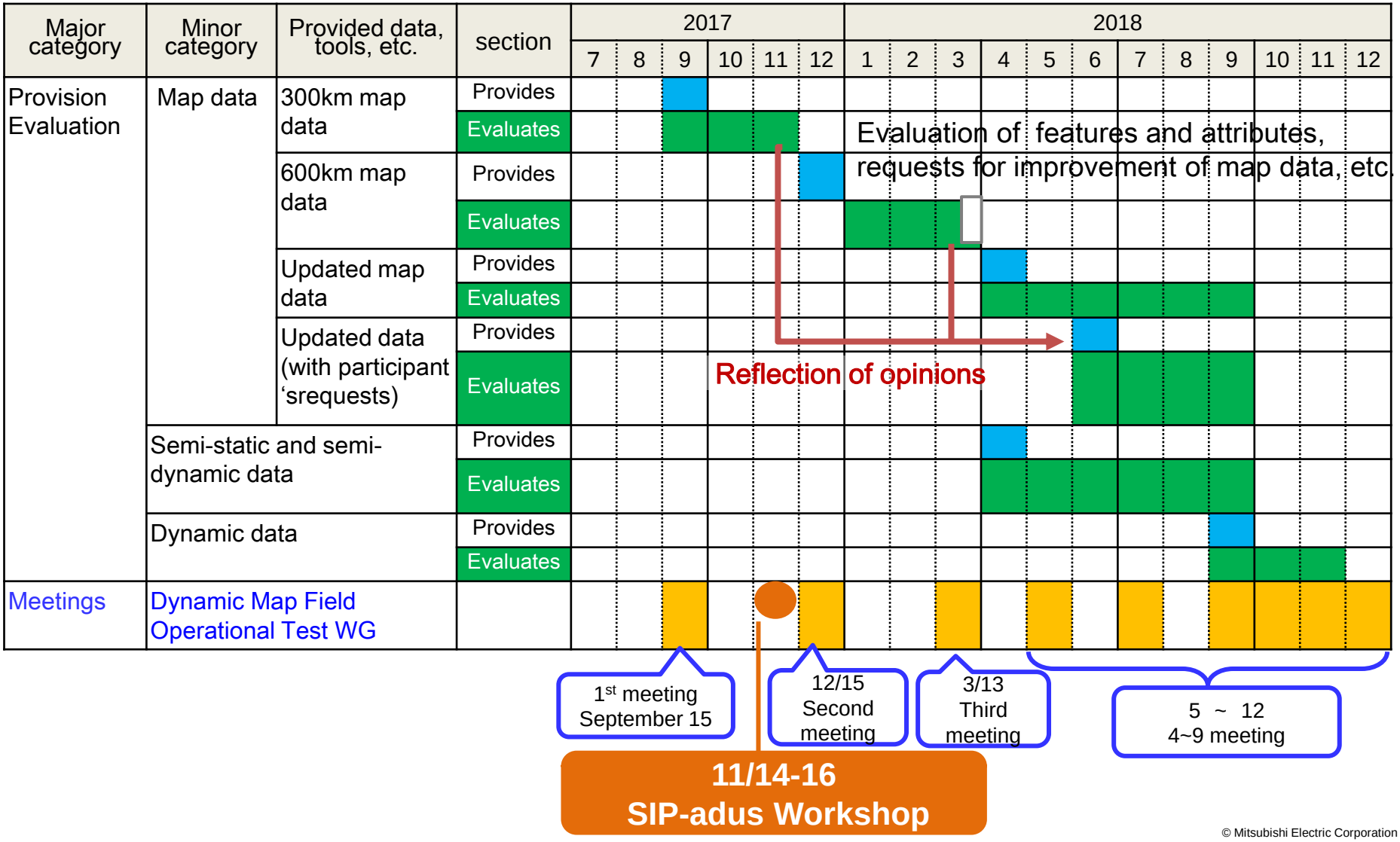
3.Framework of Dynamic Map FOT

The management of the dynamic map field operational test is conducted under the following organization.



4.Schedule of Dynamic Map FOT

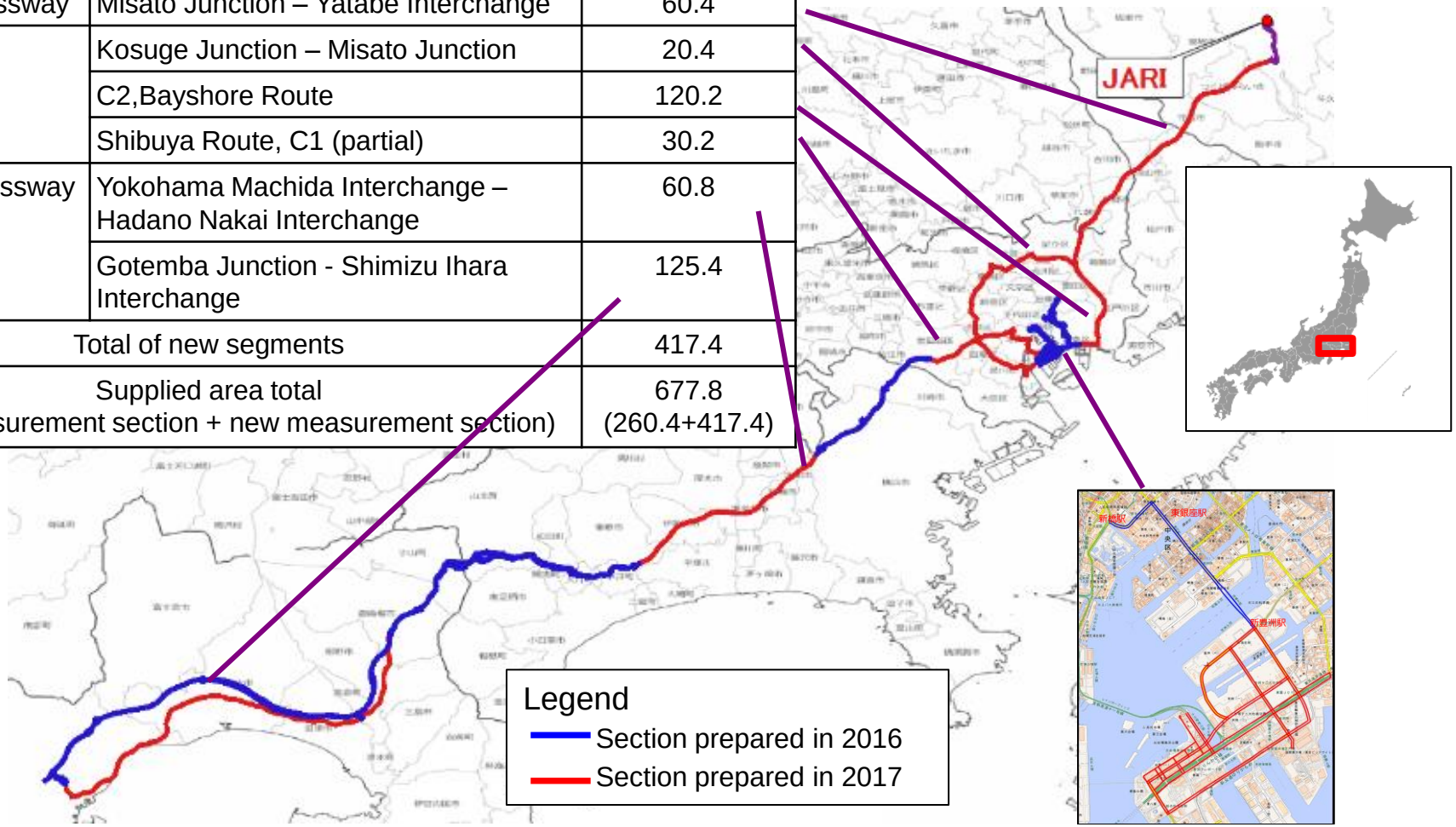
The overall schedule for the dynamic map field operational test is shown below.
September 15, 2017, to December 28, 2018, weekdays from 9:00 a.m. to 5:00 p.m.



5.Scheduled test area of Large-Scale FOT

about 677km in each direction

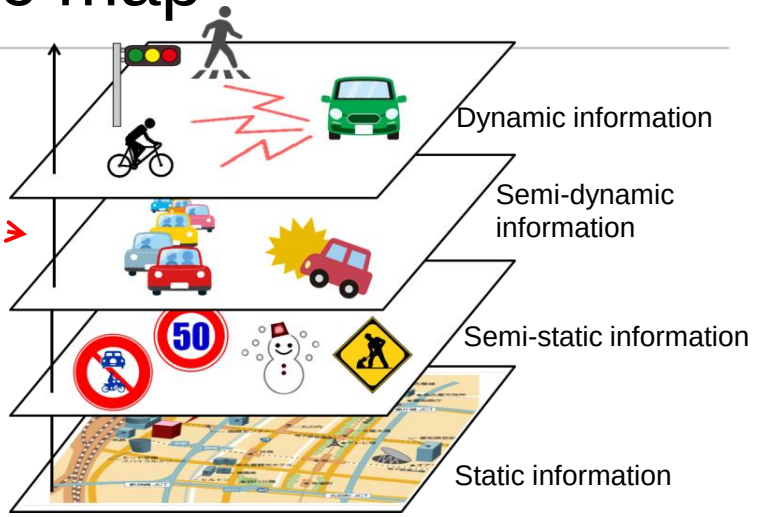
Route name	Section	Link length(km)
JobanExpressway	Misato Junction – Yatabe Interchange	60.4
Metropolitan Expressway	Kosuge Junction – Misato Junction	20.4
	C2,Bayshore Route	120.2
	Shibuya Route, C1 (partial)	30.2
Tomei Expressway	Yokohama Machida Interchange – Hadano Nakai Interchange	60.8
	Gotemba Junction - Shimizu Ihara Interchange	125.4
Total of new segments		417.4
Supplied area total (2016 measurement section + new measurement section)		677.8 (260.4+417.4)



Source: Excerpted from Cabinet Office press release (November 15, 2016)

6.Data model for dynamic map

Location reference method



Dynamic map

Dynamic information
(nearby vehicles, pedestrians, signal information, etc.)

Semi-dynamic information
(accident information, traffic congestion information, short range weather information, etc.)

Semi-static information
(traffic restriction information, road construction information, long range weather information, etc.)

* Traffic congestion information
* Road construction restriction information
* Traffic restriction information, etc.

Distribution of the above information is currently being coordinated

Basic maps supplied by SIP adus (essential features as stipulated in the data specifications)

Static information
(road surface information, lane information, etc.)

Collaborative area
(features used by many OEMs)

* Road shoulder
* **Center line**
* **Lane line**
* **Lane edge**
* **Stop line**
* **Pedestrian crossing**
* Road marking
* Traffic signal
* Road sign
* **Carriageway link**
* Lane link
* Intersection lane link
* Area-formed intersection
* CRP node

underline features are cooperative area with foreign map suppliers

Competitive area
(features designed by individual OEMS for product differentiation purposes)

Additional data prepared by test participants based on test contents and functions to be implemented

Navigation map

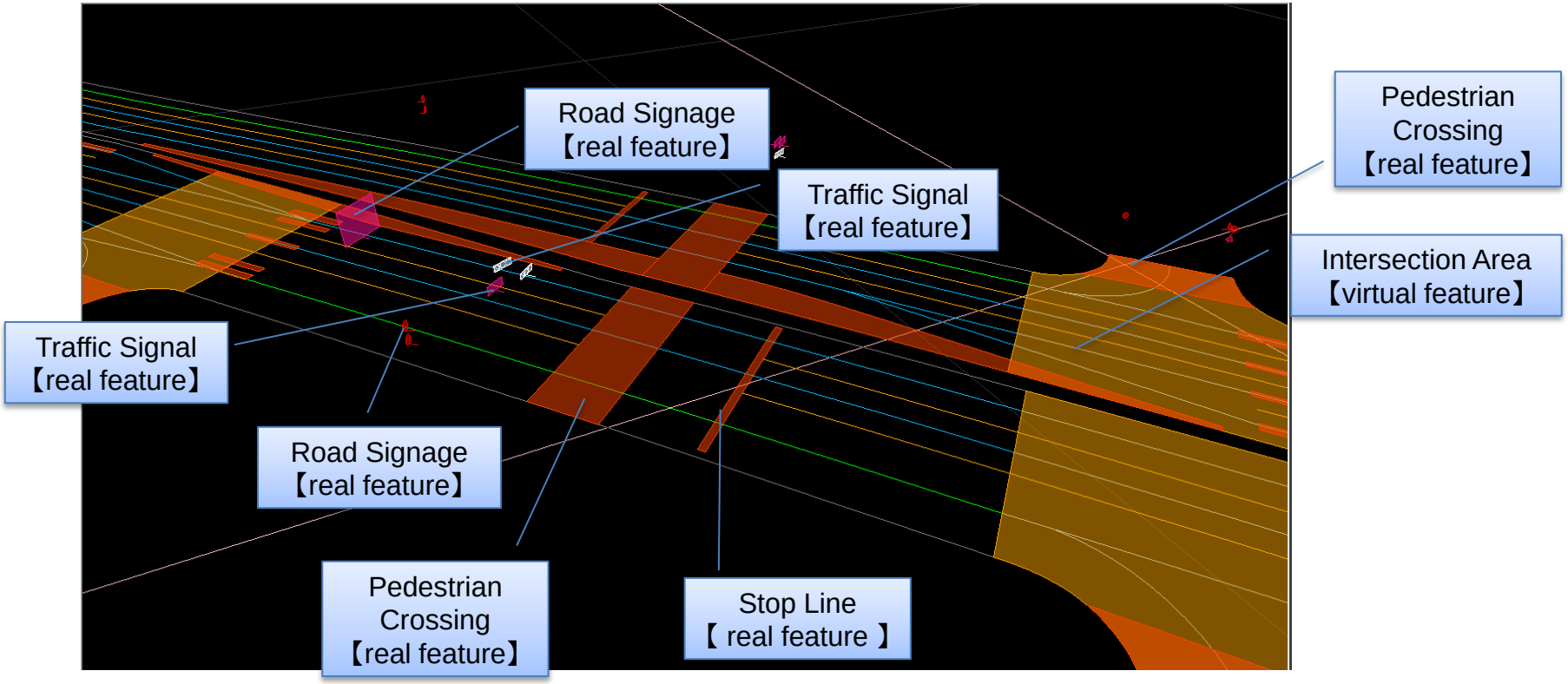
7.Real features and virtual features

Data model for dynamic map =Real & Virtual features

- **Static high-accuracy 3D map data is composed of real features and virtual features.**
- **They are defined as indicated below.**

Category	Definition	Supplied Feature	
Real feature	The shape of the real-world feature was acquired	Road Shoulder Center Line Lane Line Lane Edge	Stop Line Pedestrian Crossing Road Marking Traffic Signal Road Signage
Virtual feature	Features which do not exist in the real world but can be created from real features	Carriageway Link Lane Link Comon Location Reference Node	Intersection Lane Link Intersection Area

8.Example of Real & Virtual features



Legend

- : Lane Link [Virtual feature]
- : Carriageway Link [Virtual feature]
- : Carriageway Line [real feature]
- : Intersection Area [Virtual feature]
- : Road Marking (instruction) [real feature]
- : Road Shoulder [real feature]

9.Overall System Architecture for DM FOT

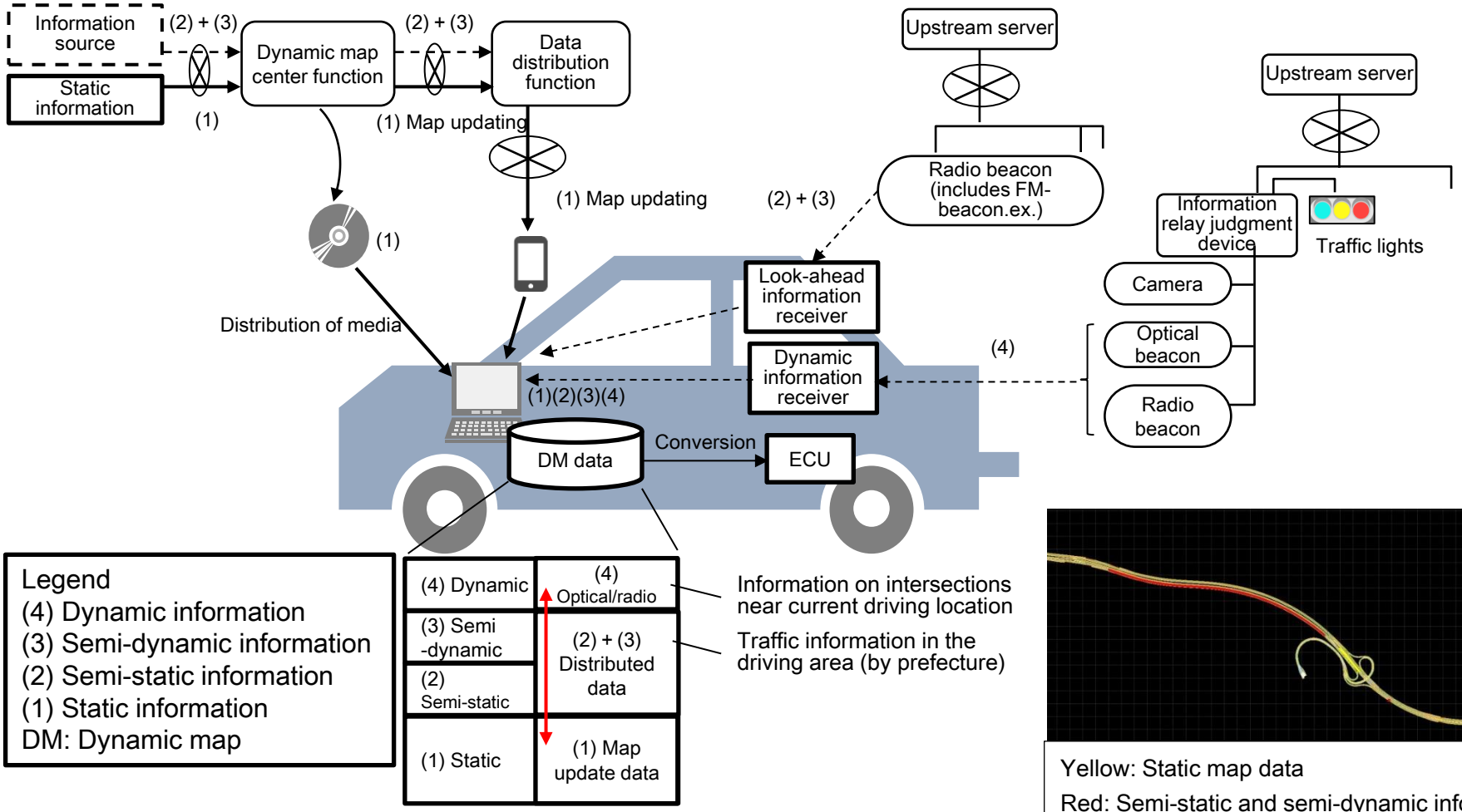


Figure: Overall composition of the system for the Dynamic Map Field Operational Test (preliminary draft)

Yellow: Static map data
Red: Semi-static and semi-dynamic information

Figure: Display in the dynamic map viewer (draft)

Note: The composition shown above includes some items currently being negotiated with related parties.

10.System Architecture for Dynamic Map FOT

Overall system configuration is as follows.

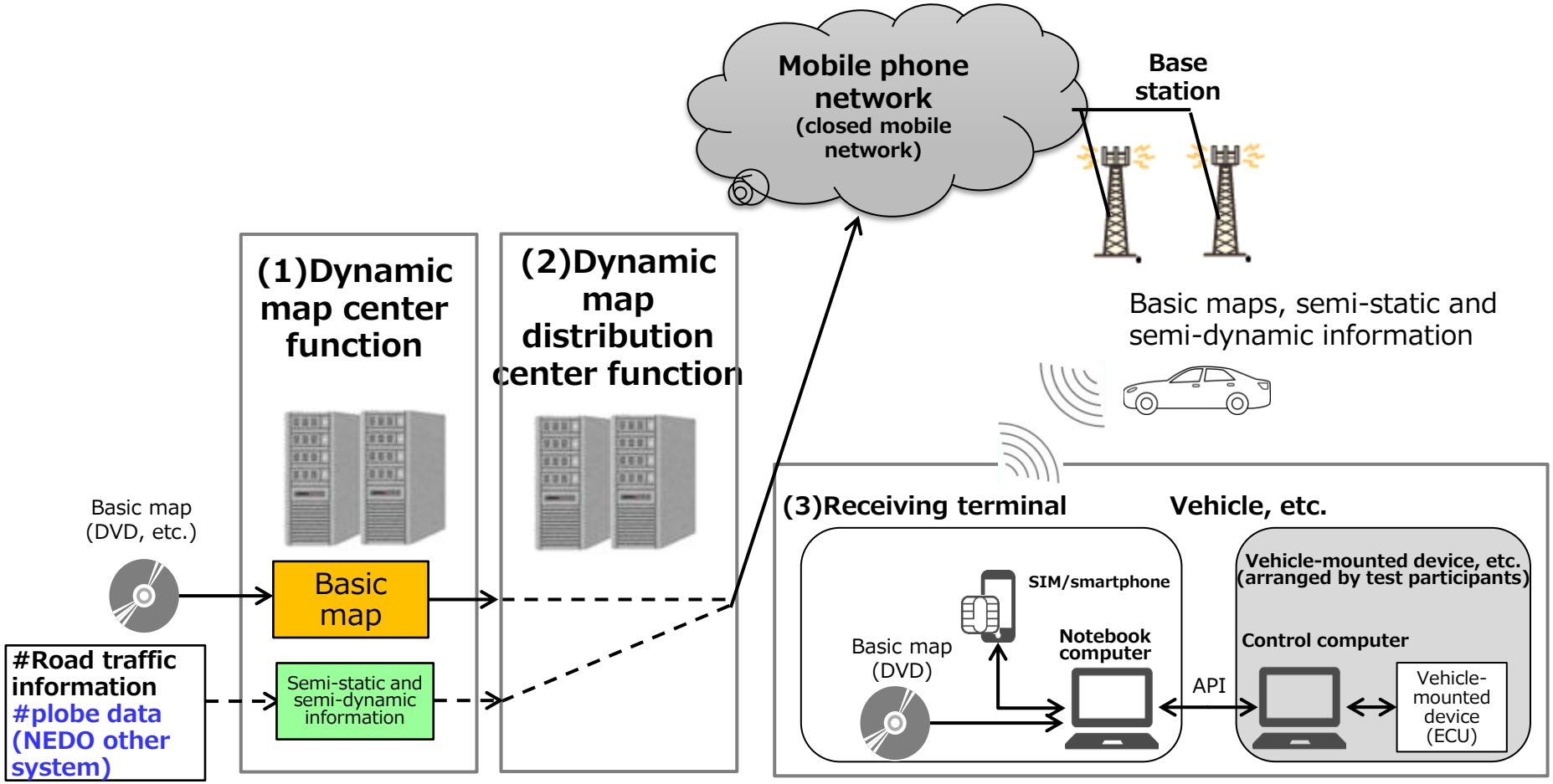
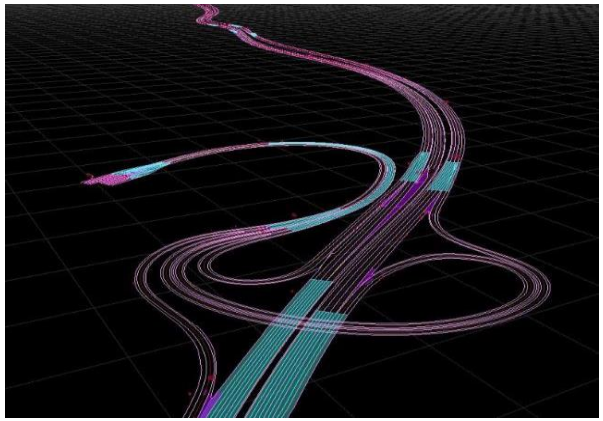


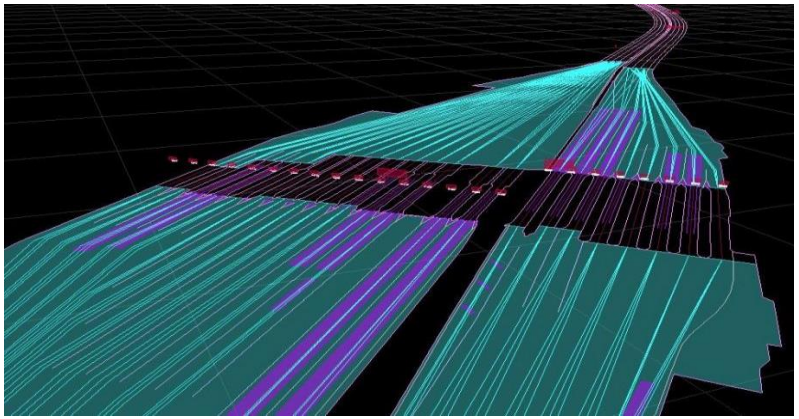
Figure: Dynamic Map Large-Scale Field Operational Test system configuration plan (overall image)

11.Example of Dynamic Map FOT

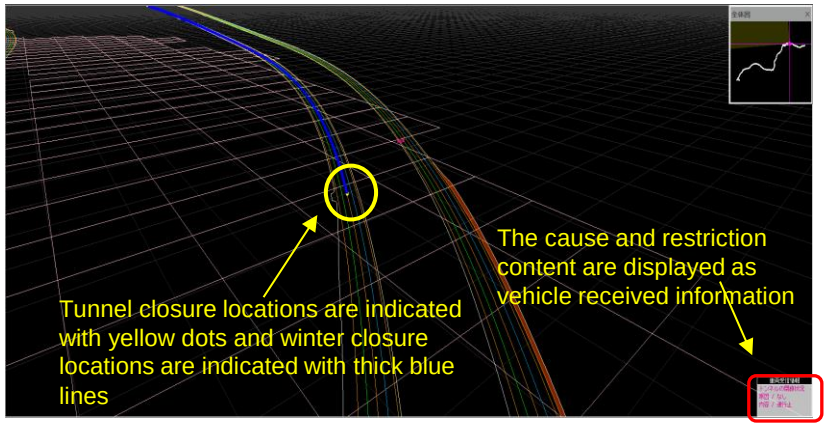
In this dynamic map FOT, high-accuracy 3D Map Data is provided to experimental participants.



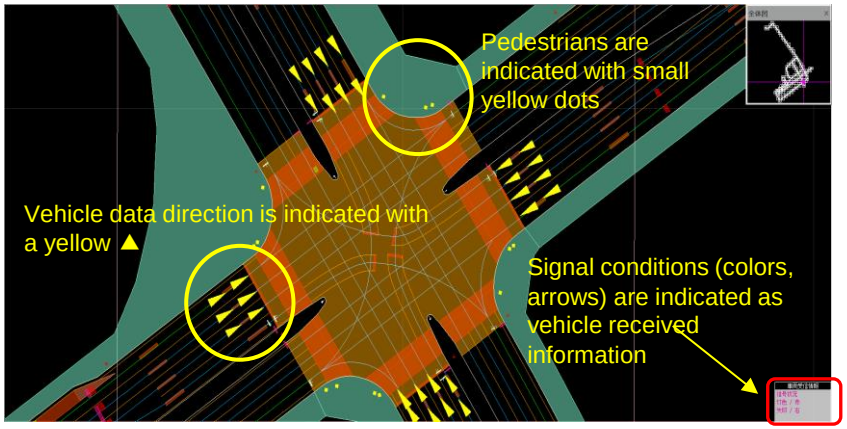
(1)Dynamic Map:Basic maps supplied(Highway)



(2)Dynamic Map:Basic maps supplied(example Tokyo IC)



(3)Dynamic Map(Highway):tunnel closure information and winter closure information



(4)General road vehicle, pedestrian, and traffic signal information(Intersection before the Big Sight)

12.Objectives of participation in the DM FOT

Category	Participation objective	No. of responding companies (including overlapps)
Data evaluation	Desire to evaluate dynamic map accuracy	13
Specification/standardization	Desire to confirm dynamic map specifications and identify issues	12
	Desire to reflect company's own needs in dynamic map specifications	4
	Desire to contribute to dynamic map standardization	3
Technical confirmation	Desire to use dynamic maps in own company’s systems and verify them	6
	Desire to confirm compatibility of dynamic maps with autonomous vehicles	7

13.Contents of field operational test

Test driving on public roads	Vehicle type	No. of responding companies (including overlaps)
Scheduled	Autonomous vehicle (equivalent to level 3)	2
	Autonomous vehicle (equivalent to level 2)	2
	Autonomous vehicle (equivalent to level 1 or unknown)	5
	Autonomous vehicle not to be used (ordinary vehicle to be used)	8
	Undecided	2
Not scheduled or undecided	-	2

* Automated driving level is sorted by SIP-adus R&D plan (April 2017).

14.Conclusion

Thank you for your kind attention !

We hope to report the results of Dynamic Map FOT in the next year.