

Strategic Innovation Promotion Program
(SIP) Automated Driving Systems / Large-scale Field
Operational Test / Dynamic Map / Utilization of
Vehicle Probe Information (FY2017-FY2018)
FY2017 Annual Report

PIONEER CORPORATION

2018, March 31

Purpose of this activity

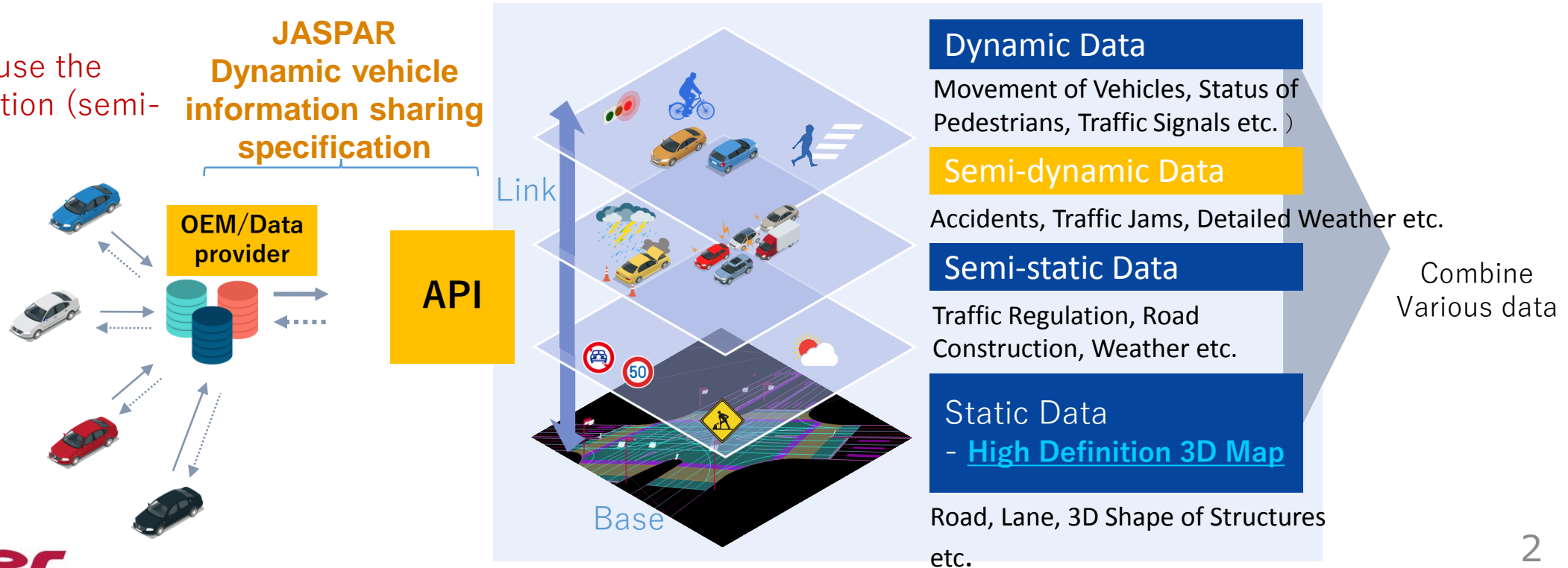
(Background)

- ✓ It is expected that the vehicle probe information will be shared among industries to realize more efficient/safety automated driving vehicle enabled society.

(Purpose)

- ✓ Evaluate subjects in order to share probe information through demonstrating experiment.
 - Evaluate data set formats and APIs that need for sharing probe data.
 - Implement “JASPAR Dynamic vehicle information sharing specification” as a specification for sharing.

In this activity, we use the traffic flow information (semi-dynamic data)

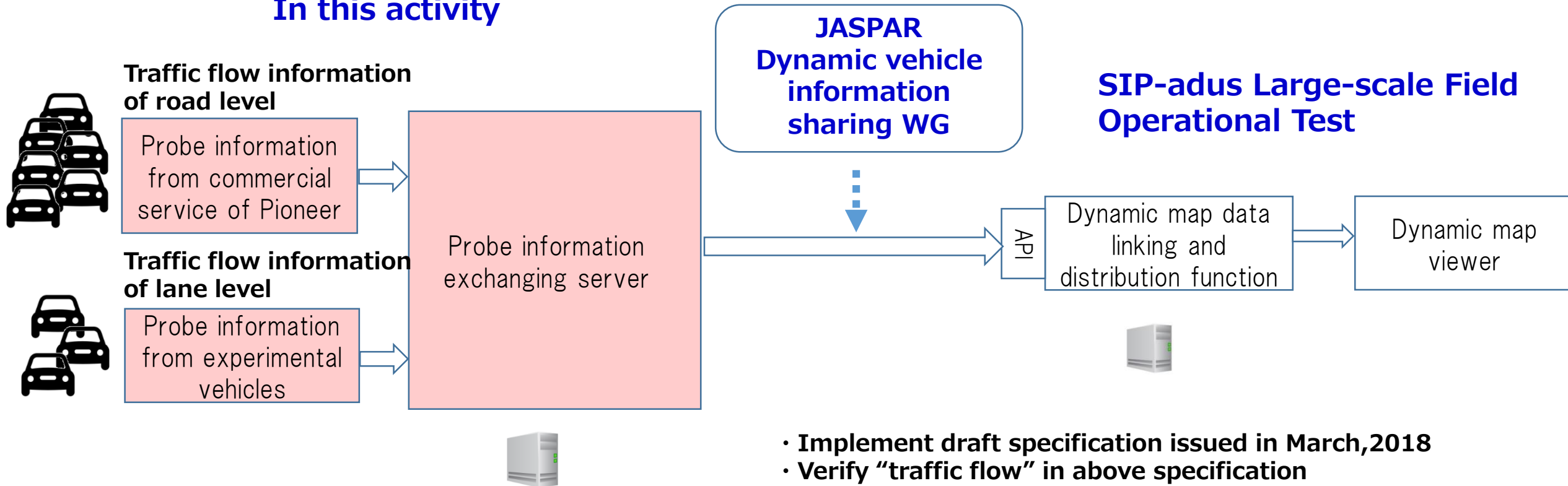


Overview of working items

Working Items	2017-2018		2018-2019			
	10-12	1-3	4-6	7-9	10-12	1-3
Study the probe information to utilize A) Prepare probe data B) Check compatibility with dynamic vehicle information sharing specification C) Visualize probe information						
Design probe information exchanging server A) Implement basic functions B) Implement JASPAR specification						
Confirm cooperation with Dynamic map data linking and distribution function server A) Check connectivity and operational functions						
Develop viewer to check real time probe information A) Develop viewer for real time probe information						
Demonstrating experiment A) Demonstrating experiment in SIP FOT B) Demonstrating experiment with SIP dynamic map service platform C) Evaluation						

Scheme of demonstrating experiment

In this activity



- Implement draft specification issued in March,2018
- Verify “traffic flow” in above specification
- Feed back for Ver1.0 that will be issued in March,2019

Result of activity (1/5)

Select probe data

- ◆ Probe information as a target and use cases that we assume

Use case	Probe information	Explanation
In case of route planning, select a route to avoid congestion road.	Traffic flow information of road level	Traffic flow information that is analyzed probe information from consumer vehicles periodically in order to utilize for car navigation systems.
In case of behavior planning, select a lane to avoid congestion lane.	Traffic flow information of lane level	Traffic flow information that is analyzed probe information from test vehicles periodically in order to utilize for demonstrating experiment. It is simulative data, and is based on the assumption that the driving lane of the test vehicles are known.

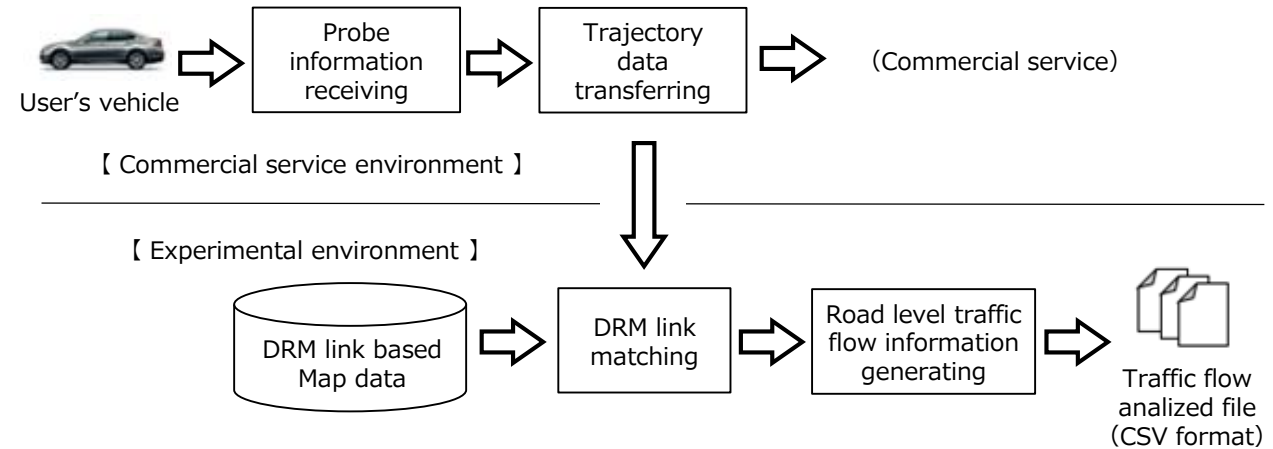
Result of activity (2/5)

Prepare probe data

◆ Load level traffic flow information :

Preparing road level traffic flow information based on commercial use

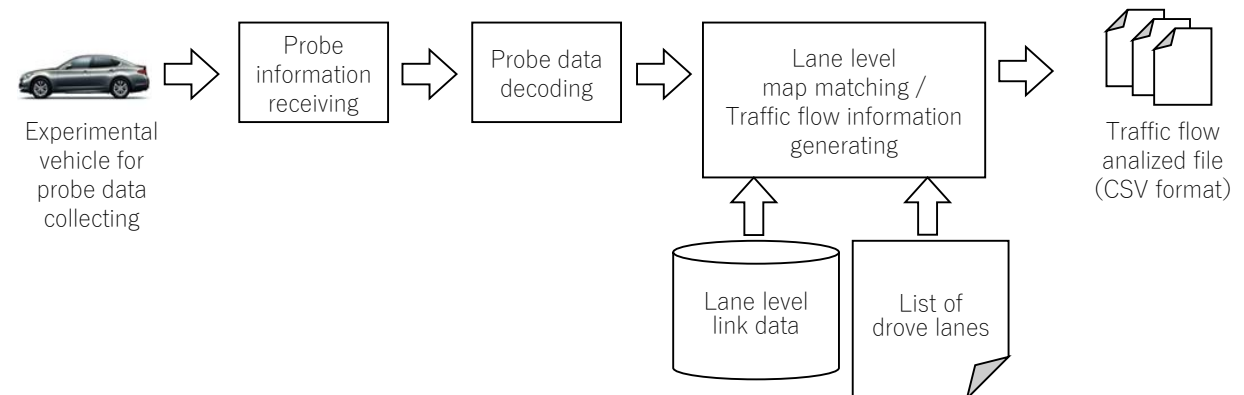
- ✓ Utilizing vehicle trajectory data based on commercial use
- ✓ Changing link matching data with DRM link to care about the rights
- ✓ Confirming traffic flow files, and then checking quality on the dynamic map viewer



◆ Lane level traffic flow information :

Preparing lane level traffic flow information based on test vehicles

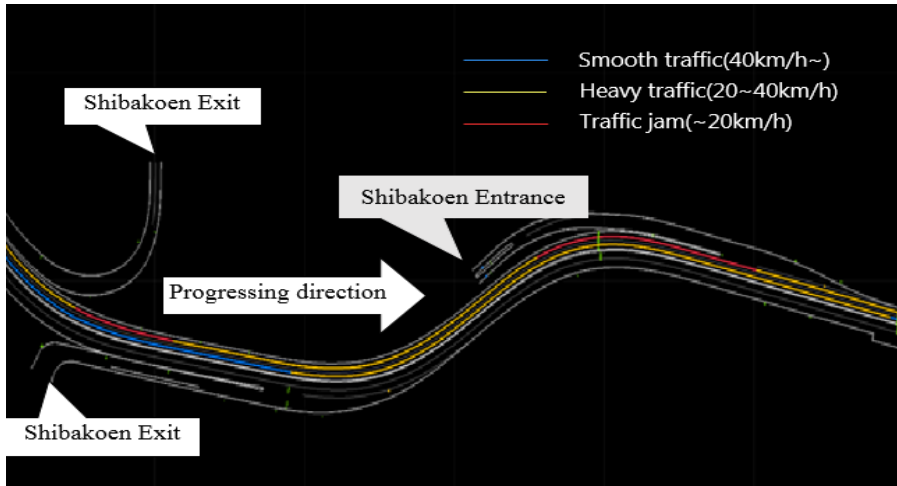
- ✓ Developing data collecting function by remodeling of car navigation system
- ✓ Developing link matching function for SIP high definition map
- ✓ Confirming traffic flow files, and then checking quality on the dynamic map viewer



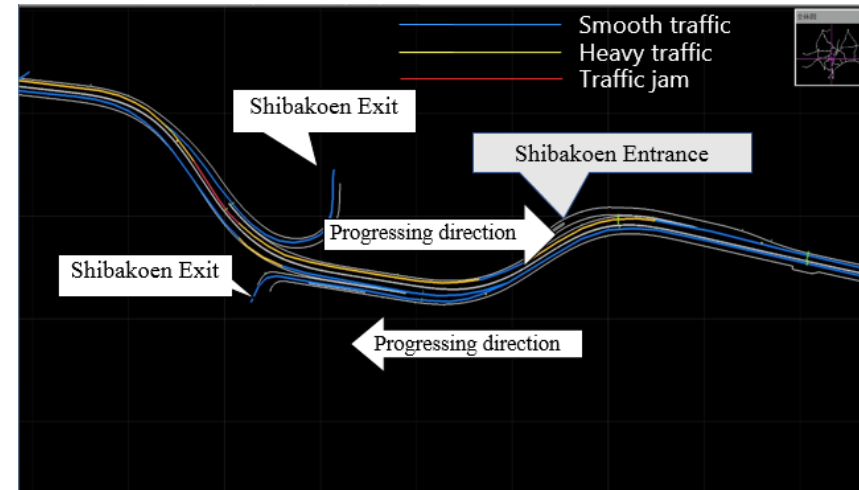
Result of activity (3/5)

Check traffic flow information (On the dynamic map viewer)

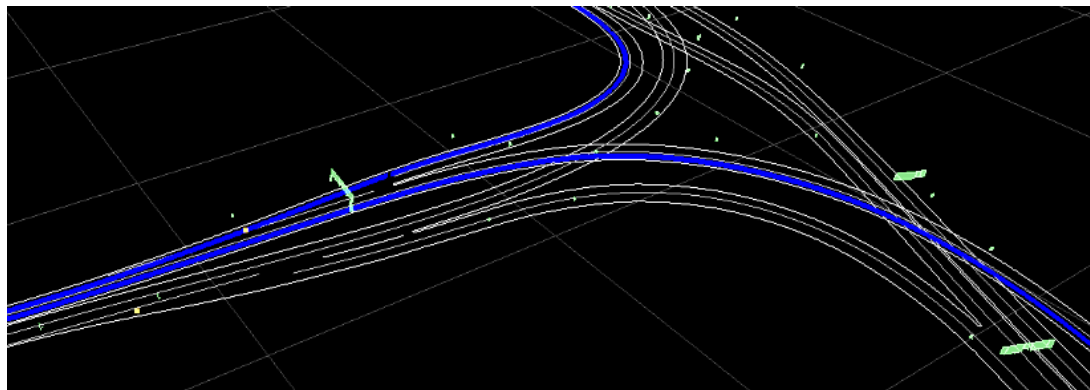
Display traffic flow information **of lane level** on SIP Dynamic map Viewer



Display traffic flow information **of road level** on SIP Dynamic map Viewer



We confirmed that the traffic flow information with road level (2D Level) for car navigation system is approximately matched with SIP high definition maps.



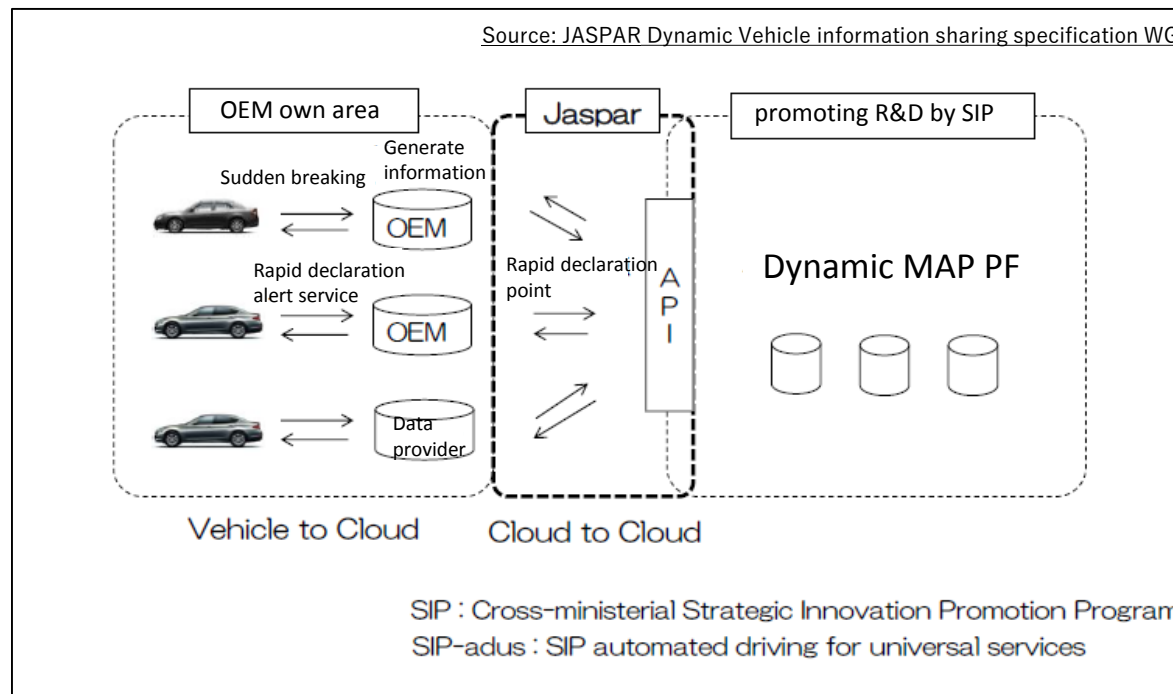
Confirmation of the altitude information (traffic flow information **of lane level**)

We'll prepare the road level traffic flow information that **includes the altitude information** in the next step.

Result of activity (4/5)

Confirm compatibility with dynamic vehicle information sharing specification

- ◆ Confirm compatibility with JASPAR specification
 - ✓ Checking compatibility for “traffic flow” defined by dynamic vehicle information sharing specification
 - ✓ Considering operating items to deliver the data to the server that is implemented as Dynamic map data linking and distribute function.
 - ✓ Considering necessary arrangements out side of the specification



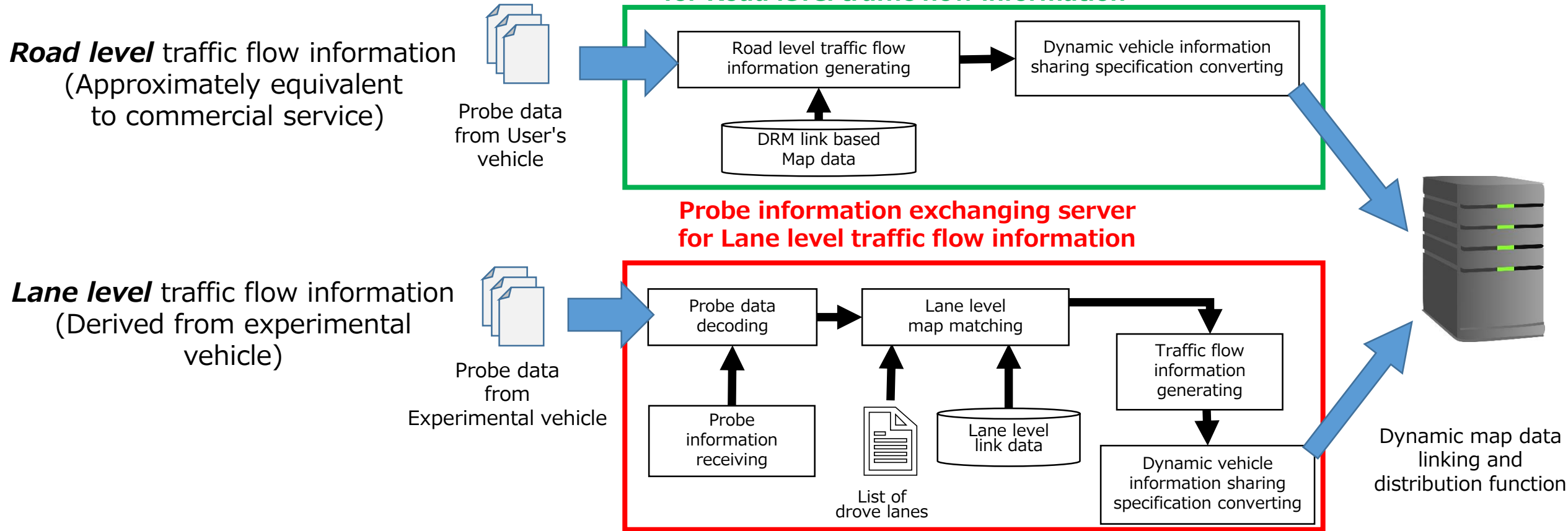
Concept Specification
Dataset Specification
API Specification

**JASPAR Dynamic
vehicle information
sharing specification**

- ◆ Dataset specification
 - ✓ We have not found any fatal problems utilizing for traffic flow information
- ◆ API specification
 - ✓ We will check it on the experiment of connectivity

Result of activity (5/5)

Design probe information exchange server and implement basic functions (~June 2018)



- We have confirmed the overall configuration about probe information generation and JASPAR specification converting server
- In consideration of the data generation process, we have decided to prepare servers for generating traffic flow information with road level and lane level, respectively.

Summary (1/2)

- ◆ We have achieved working items as scheduled from October 2017 to March 2018.
 - ✓ Prepare and check probe information
 - We have created both road level and lane level traffic flow information, and then checked on SIP dynamic map viewer
 - We understand that we need to apply altitude information for road level traffic flow information. We will create it in the next step.
 - ✓ Confirm compatibility with dynamic vehicle information sharing specification
 - We have not found any fatal problems about data set specification.
 - We will check it on the experiment of connectivity about API specification.
 - ✓ Consider the operation and connection to server that is implemented as Dynamic map data linking and distribute function.
 - We have not found fatal problems at this time.
 - We will check them through the preparation of demonstrating experiment in autumn 2019.
 - ✓ Design probe information exchanging server and implement basic functions
 - We have finished the negotiation with participants, developing functional specification, implementing basic functions.

Summary (2/2)

- ◆ We have summarized the issues we discovered in considering process of applying the dynamic vehicle information sharing specification.
 - ✓ Communication overhead of the Traffic-flow contents during data transmission.
 - ✓ The Altitude information is defined as optional but it would be mandatory in the case of Traffic-flow contents to distinguish a road such as underpass and a road on the ground surface at a same location.
 - ✓ An interpretation of lane number assignment is ambiguous if a corresponding map has no lane number definition.

We will feed back them for JASPAR dynamic vehicle information sharing WG. And then we will use considering material to make official version which is planned in Mar 2019