

# Activity Plan of Dynamic Map Study for SIP-adus

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Dynamic Map Study Consortium

MITSUBISHI ELECTRIC CORPORATION  
AISAN TECHNOLOGY CO.,LTD.  
PASCO Corporation  
MITSUBISHI RESEARCH INSTITUTE,INC.  
INCREMENT P CORPORATION  
ZENRIN Co., Ltd.  
TOYOTA MAPMASTER INCORPORATED

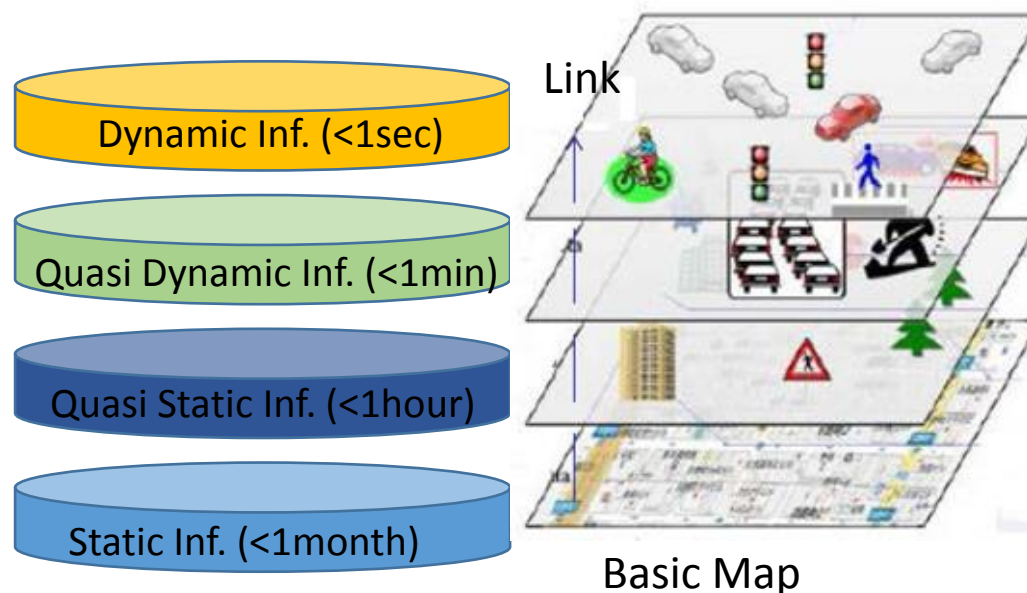
# Dynamic Map Study Consortium

- “Dynamic Map Study Consortium” consists from representative Japanese companies in map generation, survey, electronics and consulting areas.
- The consortium has proposed “Dynamic Map Study Plan “ to the SIP-adus and got award for this study.
- Following table shows formation of the consortium and role of each company .

Consortium Member	Major Role
Mitsubishi Electric Corporation	-Representative of the consortium - Investigation of data structure of the dynamic map - Investigation of utilization of dynamic data - Investigation of method for updating dynamic map
Aisan Technology Co., LTD.	-Development of dynamic map viewer
Increment P Corporation	- Investigation of data information structure from user point of view
Mitsubishi Research Institute, Inc.	- Investigation of data structure of the dynamic map - Investigation of utilization of dynamic data - Investigation of method for updating dynamic map
PASCO Corporation	-Prototyping of dynamic map
TOYOTA Mapmaster Incorporated	- Investigation of data information structure from user point of view
Zenrin Co., LTD.	- Investigation of data information structure from user point of view

# Concept of Dynamic Map

- For automated driving, dynamic information is also required in addition to static information.
- According to required update interval, there exist several information layer as shown in the following figure.
- “**Dynamic Map**” is so called “**One Stop**” information source that can provide necessary information for automated driving.



## Information through V to X

- surrounding vehicles
- pedestrians
- timing of traffic signals

## Traffic Information

- accidents
- congestion
- local weather

## Planned and forecast

- traffic regulations
- road works
- weather forecast

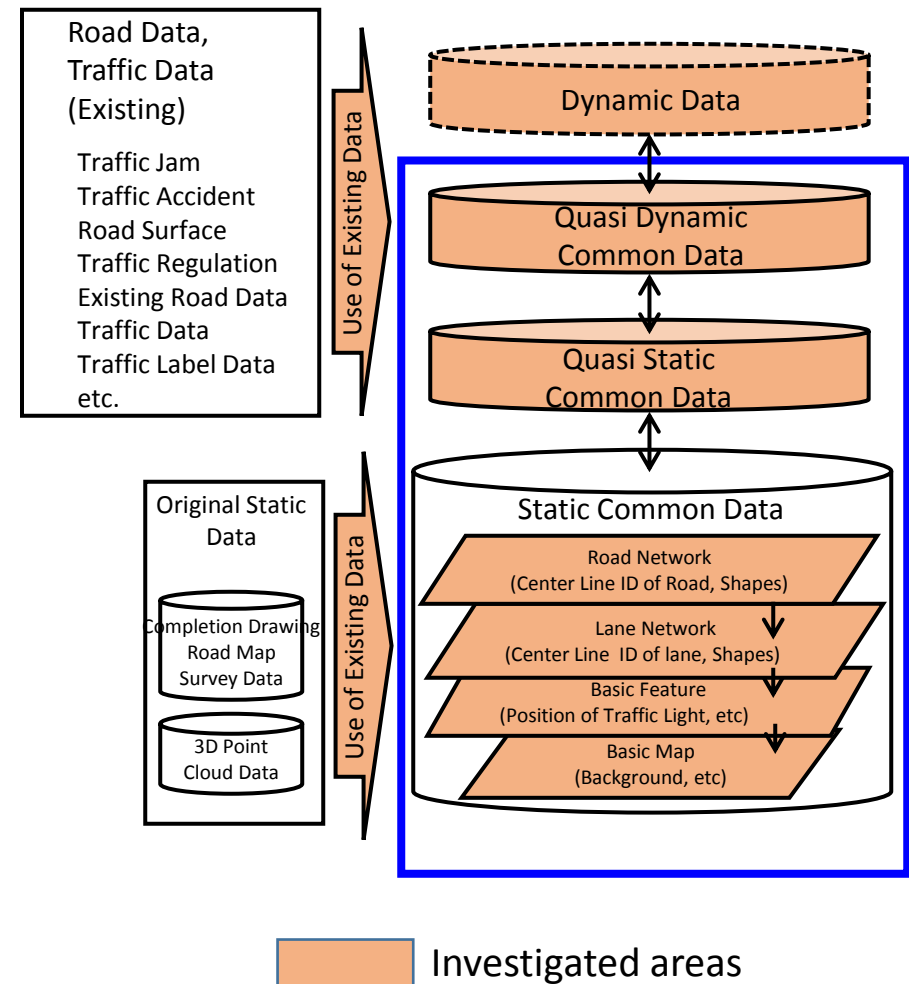
## Basic Map Database

- digital cartographic data
- topological data
- road facilities

# Overview of Dynamic Map Study Plan(1)

## 2015 Study plan – Dynamic Map Data Structure

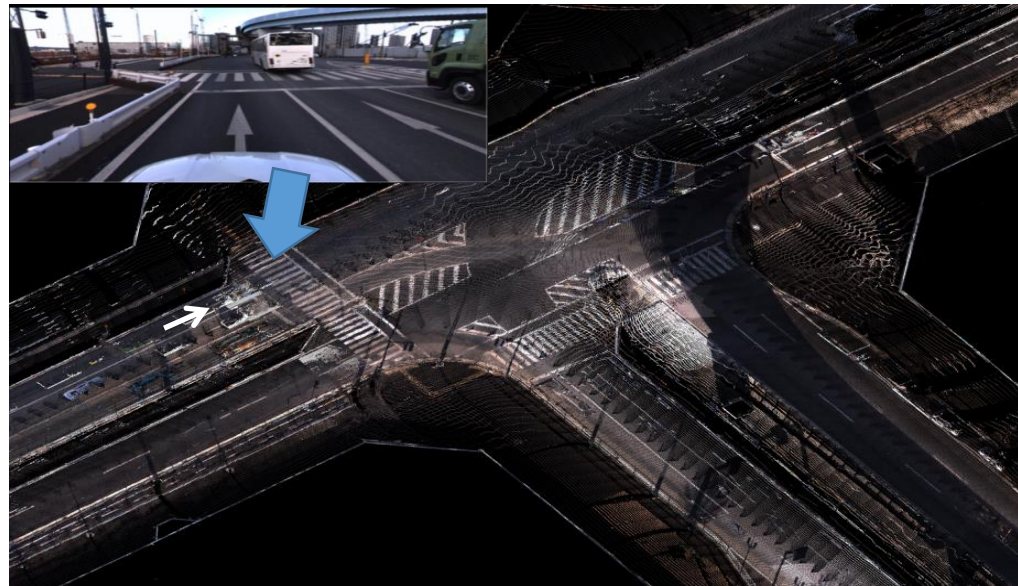
- Requirements for Dynamic Map is defined by analyzing provided “Use Case” from SIP.
- Data structure of Dynamic Map is investigated based on the defined requirements.
- Followings are also investigated
  - Interface to acquire dynamic data
  - Standardization data structure
  - utilization of Lane ID and etc.



# Overview of Dynamic Map Study Plan(2)

## 2015 Study plan – Dynamic Map Data Updating

- Update procedure of Dynamic Map Data is investigated.
- Followings are data sources for update
  - Existing data(such as traffic data hold by public sector and etc.)
  - Measured 3D information by MMS(Mobile Mapping System)
  - Probe information

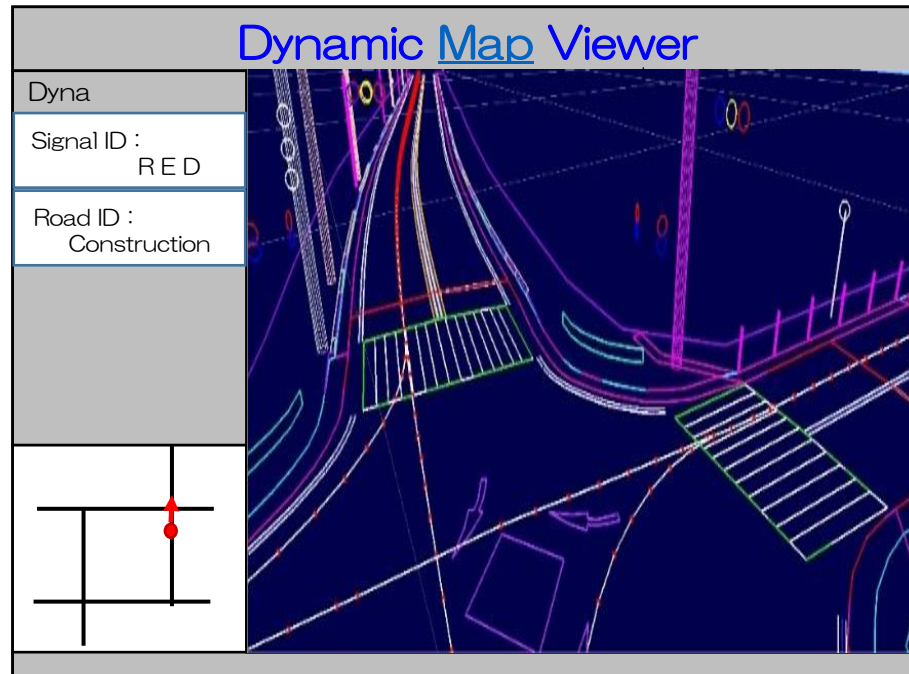


Example of updated 3D information by MMS

# Overview of Dynamic Map Study Plan(3)

## 2015 Study plan – Dynamic Map Prototyping

- Prototyping of Dynamic Map is planned based on the defined investigation results.
- 3D map information around “Odaiba” is used for this purpose.
- To evaluate the behavior of the Dynamic Map, “Dynamic Map Viewer” is also designed and prepared.



Dynamic Map Viewer

# Overview of Dynamic Map Study Plan(4)

■ Candidate areas for Dynamic Map Prototyping are shown in the following figure.

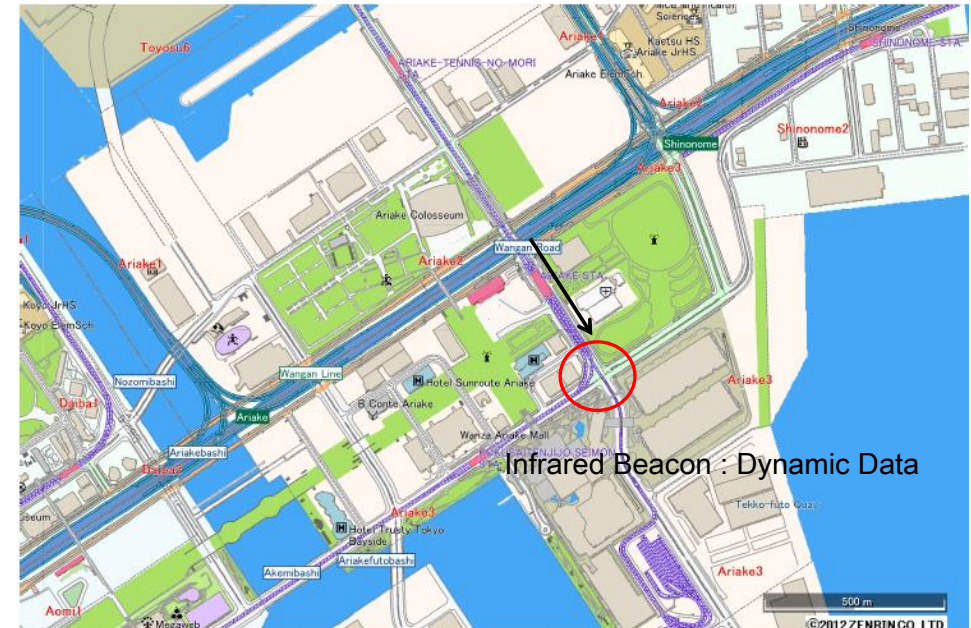
## Candidate Area 1

- Area  
Metropolitan Expressway, Bay shore Route from “Ooi” to “Ariake JCT”
- Evaluation Item  
Superposition of construction regulatory information



## Candidate Area 2

- Area  
General road near Tokyo Bigsite
- Evaluation Item  
Superposition of signal information from DSSS



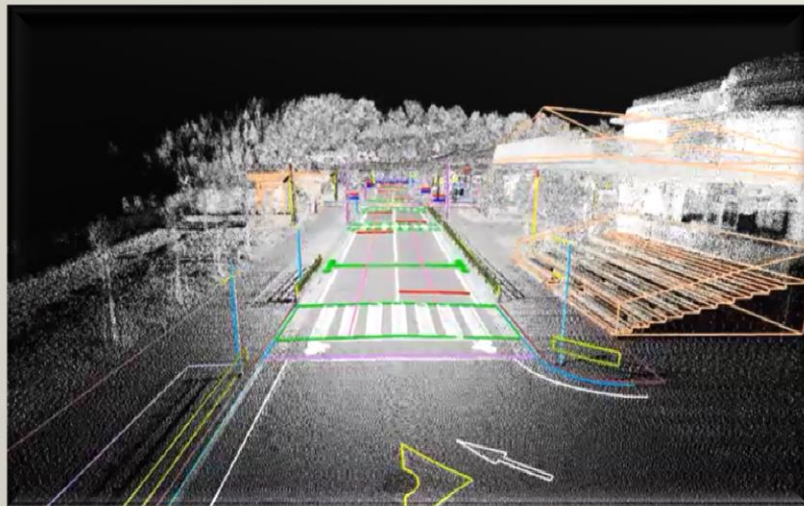
# Examples of Output Images of 2015 Activities



Automatic Map Generation



Example of Dynamic Map #1.



Example of Dynamic Map #2.

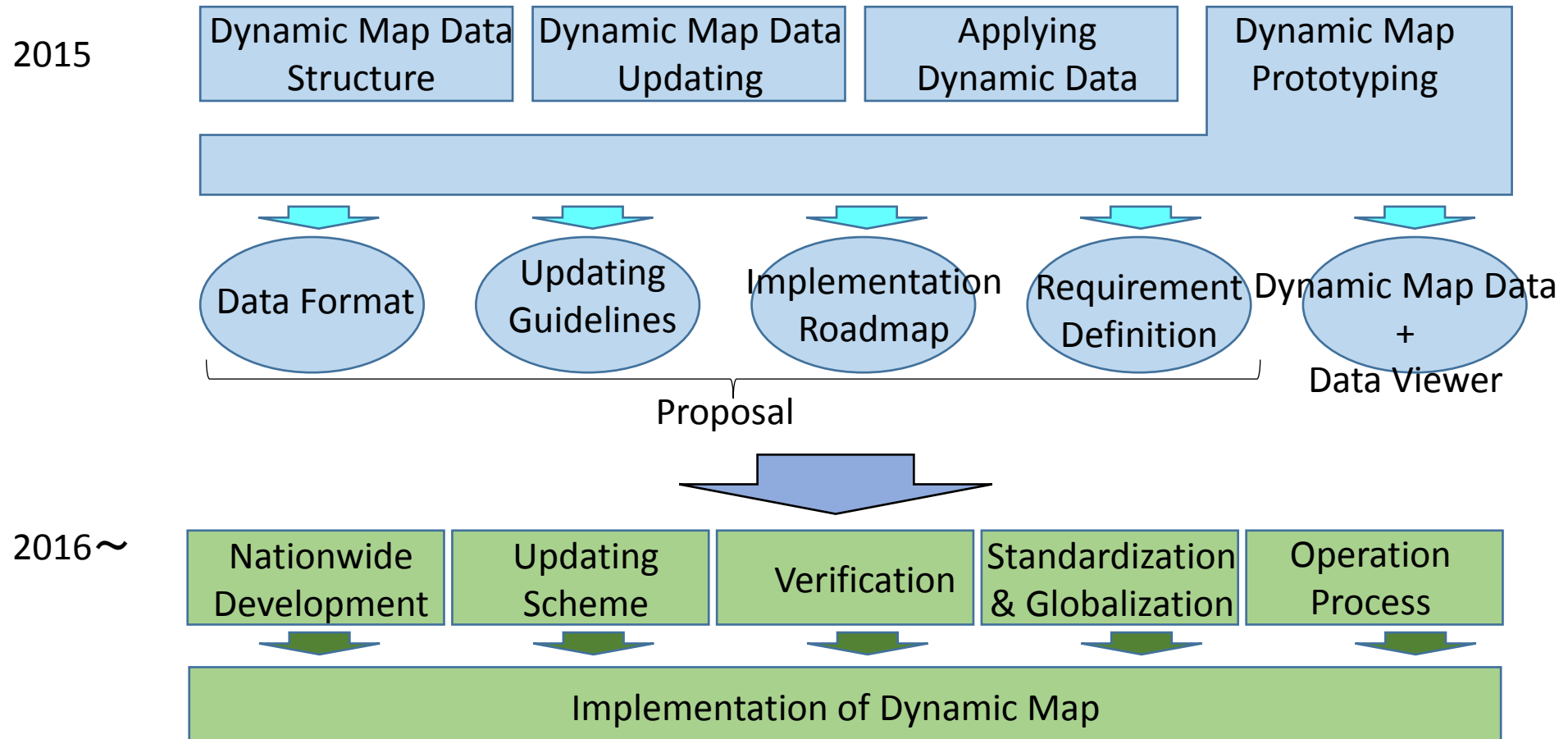


Example of Dynamic Map based Automatic Driving



# Future Plan for Automated Driving

- Following figure show future development and demonstration plan of Dynamic Map

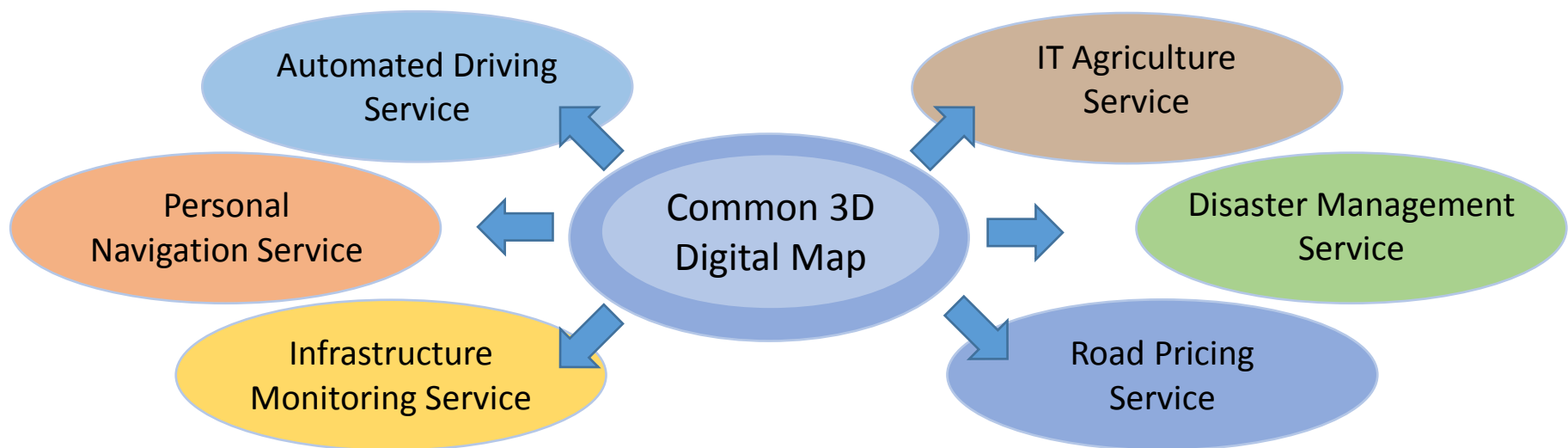


- (1) Showcase of Automated Driving in Tokyo
- (2) Automated Driving on various road

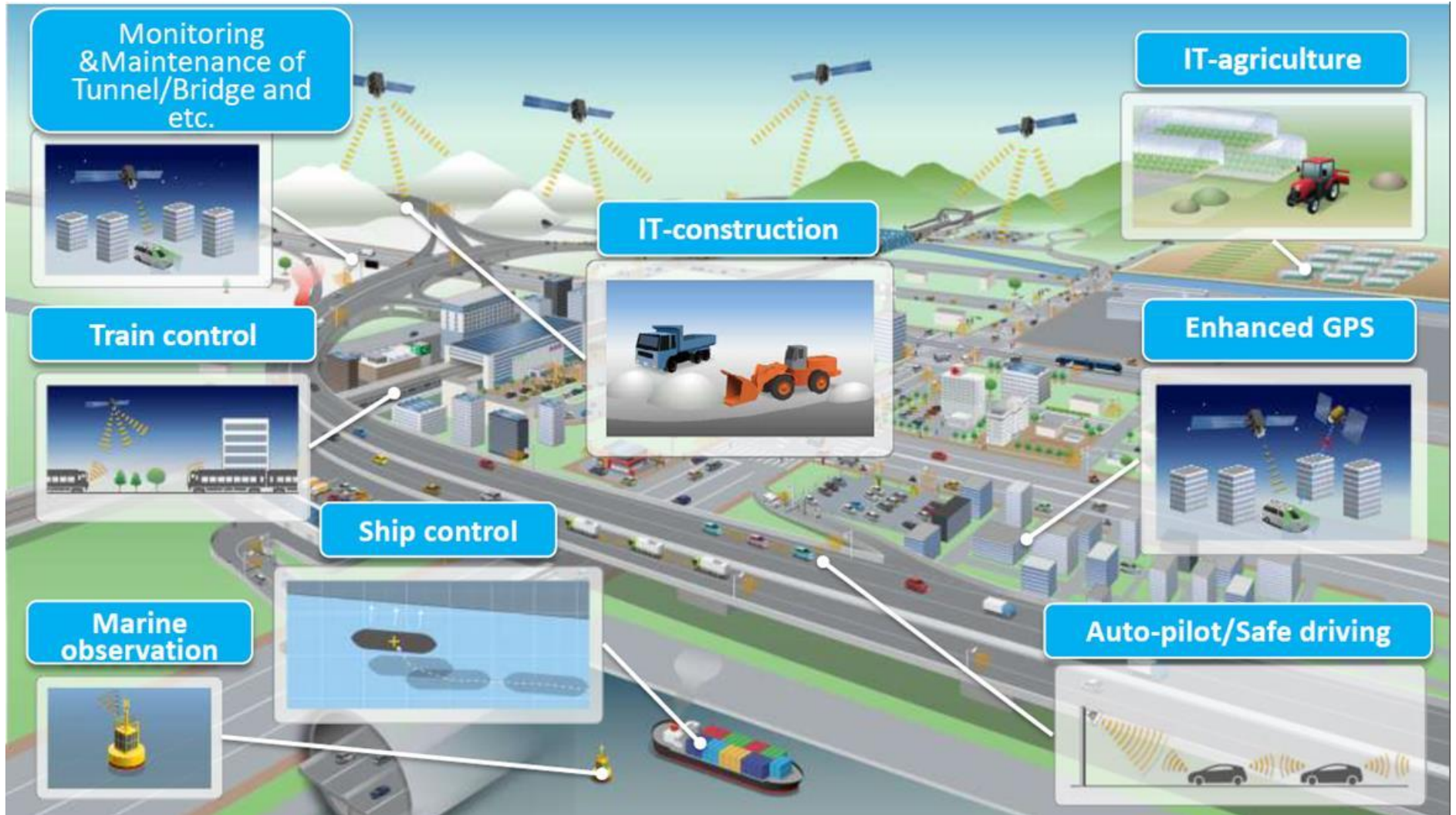
# Related Activity

## Common 3D Digital Map Concept

- Various application businesses are under planning using high precision 3D navigation information using **QZSS (Quasi Zenith Satellite System)**, Japanese regional satellite positioning system.
- To use high precision 3D navigation results, 3D map having same level positioning accuracy is required.
- It is more efficient and beneficial to develop 3D map that can be used for various application areas.
- From this point of view, “**Common 3D Digital Map Concept**” has been investigated through “**COCN(Council on Competitiveness-Nippon) activities**”



# Application Areas using High Precision 3D information



# Common 3D Digital Map Concept

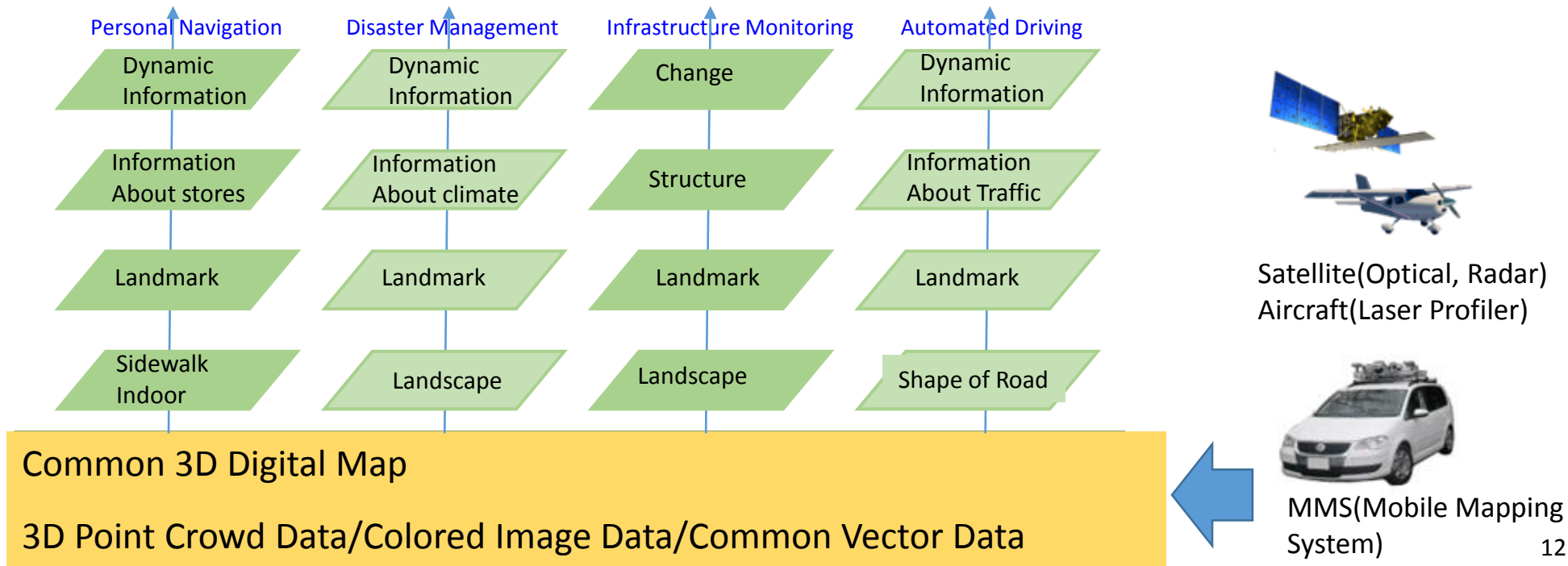
- Concept of “**Common 3D Digital Map**” has been investigated through COCN activities
- Following Table shows accuracy requirement for “Common 3D Digital Map” from each application area.
- **10cm-30cm accuracy is required for “Common 3D Digital Map”.**

Accuracy Requirements for Common 3D Digital Map(from COCN report, 2014)

	Automatic Driving	Road Pricing	Maintenance of Infrastructure	Disaster Management	IT agriculture	Personal Navigation
Required 3D Map Data	Road	Road	Road (incl. Surface) Tunnel Bridge	Road	Road	Road
Accuracy 1m						
10cm-30cm						
1cm-mm-						

# Common 3D Digital Map Concept

- “Common 3D Map” will be commonly used as a basis for various application area.
- “Common 3D Map” will be consist from following digital data
  - 3D Point Crowd Data/Colored Image Data/Common Vector Data
- 3D Point Crowd Data can be obtained by MMS(Mobile Mapping System) and Laser Profiler, Satellites and etc.
- Utilization of the “Common 3D Digital Map” is promoted to various application field through COCN activities.



## Summary

- Activity plan of “Dynamic Map Study Consortium” is introduced
- This year, the consortium is dedicated to study of “Dynamic Map Data Structure”, “Dynamic Map Data Updating” and “Applying Dynamic Data” . Based on the study, “Dynamic Map Prototyping“ is planed.
- For this activity, concept of “Common 3D Digital Map” is also introduced.
- The consortium would like to propose adoption of the implemented “Dynamic Map” to showcase of Automated Driving in Tokyo and also Automated Driving on various environments.