# 3. Future development

- In order to realize a society of smart mobility, the following should be actively promoted.
  1) Steadily promoting the realization of ITS services by 2007.
  2) Developing various new services on the platform, with an eye to future development beyond 2007 as well.
  3) Further development of the platform, in order to promote all areas of ITS.

## 1)  Realization of ITS services by 2007

## 2)  Developing new services on the platform

## 3)  Further development of the platform

# 3. Future development

## 1) Realization of ITS services by 2007

- Steadily promoting government-private joint studies toward the realization of ITS services by 2007.
- In fiscal 2005, beginning work on the formulation of standards and specifications when future directions are identified regarding systems.
- In fiscal 2006, actively promoting installation of roadside units and the manufacture of ITS on-board units.

Note: Careful consideration is also needed regarding ways to provide users with security, such as a common symbol, and ways to ensure security and protect personal information.

**Joint research**

**Development of standards and specifications**

**Installation of roadside units and manufacture of on-board units**

**Commencement of services**

*2004*    *2005*    *2006*    *2007*

Smartway Project Advisory Committee

Commencement of services

Establishment of cooperative research office

Development of standards and specifications

Installation of roadside units and manufacture of on-board units

Urayasu to Makuhari: 2 km congestion due to an accident

Congestion 2 km ahead due to an accident between Urayasu and Makuhari.
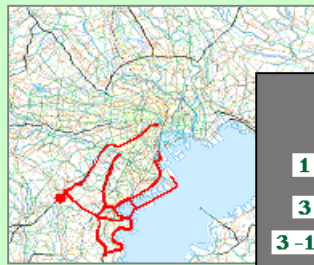
# 3. Future development

## 1) Realization of ITS services by 2007

### (1) Information provision services along roadways
### [Future directions for services]

- With VICS, using 5.8 GHz DSRC to handle broad-band telecommunications, a wide range of information will be provided than was previously possible.
- Timely information by voice provide comprehensible information and warnings to drivers, including senior citizens.

**[Wide range of information]**



**[Information by voice]**

Urayasu to Makuhari: 2 km congestion due to an accident

Congestion 2 km ahead due to an accident between Urayasu and Makuhari.

Urayasu to Makuhari: 2 km congestion due to an accident

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# 3. Future development

## 1) Realization of ITS services by 2007

### (1) Information provision services along roadways

**[Future directions for services]**

- Static images of road surfaces and other scenes taken by roadside cameras will be used to provide much more easily understandable information than in the past.
  (Methods for providing images will be studied separately, with attention to safety.)
- Probe data* which is uploaded from vehicles will be used to provide information on greater numbers of routes than in the past. (Specific methods will be studied in the future.)

\* Data on a vehicle's location, time, etc. is stored in the on-board unit. This data can be processed to determine traffic congestion, etc.

**[Information by static image]**

**[Information on greater numbers of routes]**



Icy road surface ahead.

Icy road surface ahead.

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## 1) Realization of ITS services by 2007

### (1) Information provision services along roadways

**[Future directions for services]**

- The VICS Probe Council was established as a venue for collaboration among industry, academia, and government concerning matters such as the gathering of probe data using VICS on-board units in order to make available more accurate road traffic information. It will develop standards and specifications during fiscal 2005.
- Collaborative study will be promoted with regard to the joint research as well.

IT Policy Package 2005 (excerpt)

(February 2005 decision by IT Strategic Headquarters)

(2) Improvement in the convenience and safety in movement of people and transportation
 a) Measures towards the advanced Intelligent Transport Systems (ITS)

iii) Promotion of the provision of highly accurate road traffic information (NPA, MIC, MLIT)
An infrastructure for gathering road traffic information will be established in order to make available more accurate road traffic information. In addition, in order to supplement the information obtained from such infrastructure, standards and specifications will be established during fiscal 2005 through cooperation among industry, academia, and government relating to the gathering of information (probe information) from automobiles that have been equipped with a vehicle information and communication system (VICS).

Members of the VICS Probe Council

Masao Kuwahara (chairman)   Professor, University of Tokyo
Hirokazu Akahane                  Professor, Chiba Institute of Technology
Kiyoshi Mizui                          Professor, Kanto Gakuin University
Takayuki Morikawa                 Professor, Nagoya University
Automobile manufacturers (3 companies), navigation system manufacturers (3 companies),
commentators and journalists, NPA, MIC, MLIT, and other related organizations, etc.
Secretariat:  Vehicle Information and Communication System Center (VICS Center)

# 3. Future development

## 1) Realization of ITS services by 2007

### (1) Information provision services along roadways

**[Steps for realization]**

- FY2005 :Preparation of technical materials and development of standards and specifications through joint research.
- FY2006 :Installation of roadside units and manufacture of on-board units.
- FY2007 :Various services to be launched in succession.

**Joint research** | **Development of standards and specifications** | **Installation of roadside units and manufacture of on-board units** | **Commencement of services**

*2004*     *2005*     *2006*     *2007*

Development of expressway bus location systems

Commencement of services

Field trials

IT Policy Package 2005

Field trials

Installation of roadside units and manufacture of on-board units

Urayasu to Makuhari: 2 km congestion due to an accident

Congestion 2 km ahead due to an accident between Urayasu and Makuhari.

Photograph: Services to support safe driving
Field trial in the Sangubashi area
August 1 to November 28, 2003

Photograph: Services to support safe driving
Field trial in the Sangubashi area
March 1 to May 31, 2005
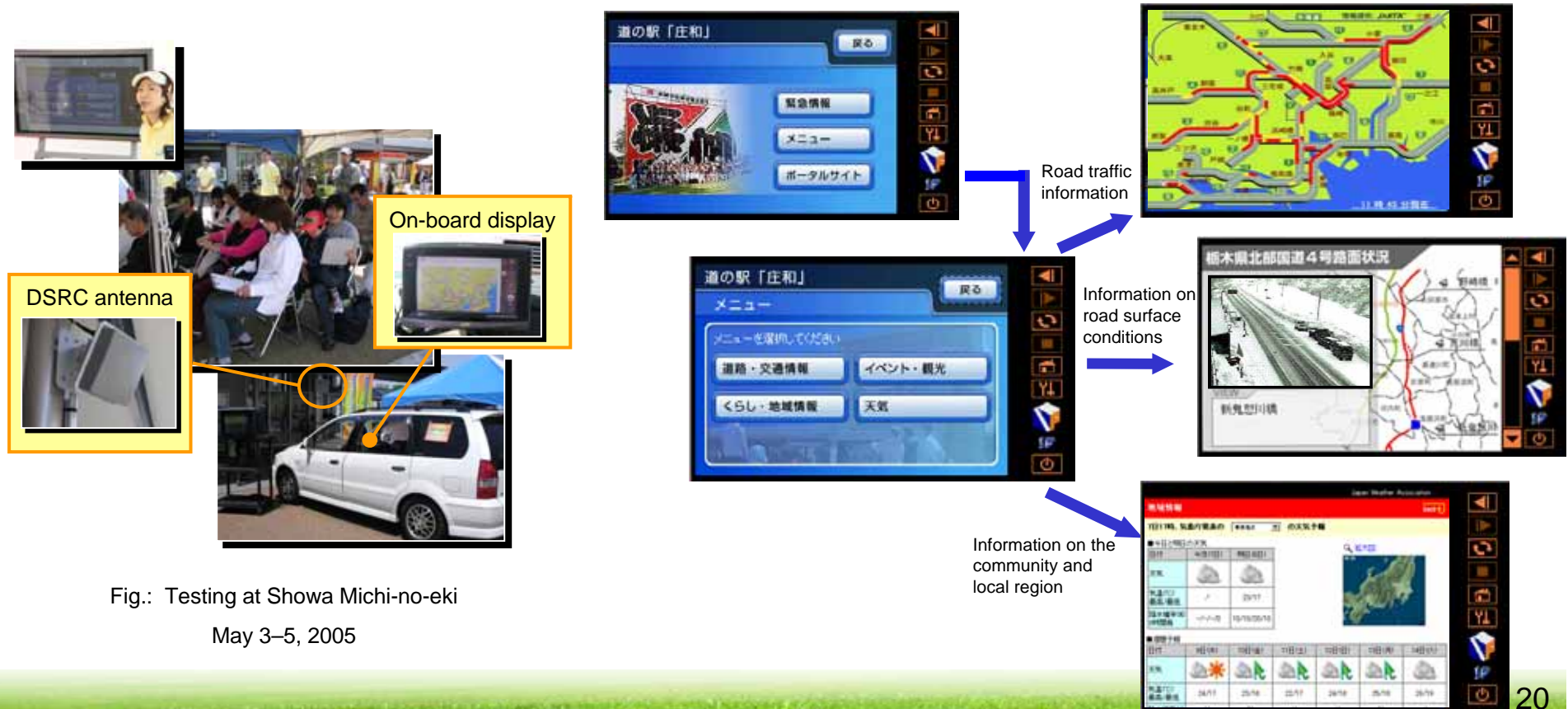
# 3. Future development

## 1) Realization of ITS services by 2007

### (2) Information connection services such as at roadside rest areas

**[Future directions for services]**

- When requested by users who have stopped at Michi-no-Eki, service areas, and parking areas, information on road traffic conditions, etc. is provided for safety and safe driving.
- Understandable information on the local region and tourist information presented.



On-board display

DSRC antenna

Fig.: Testing at Showa Michi-no-eki

May 3–5, 2005

Road traffic information

Information on road surface conditions

Information on the community and local region
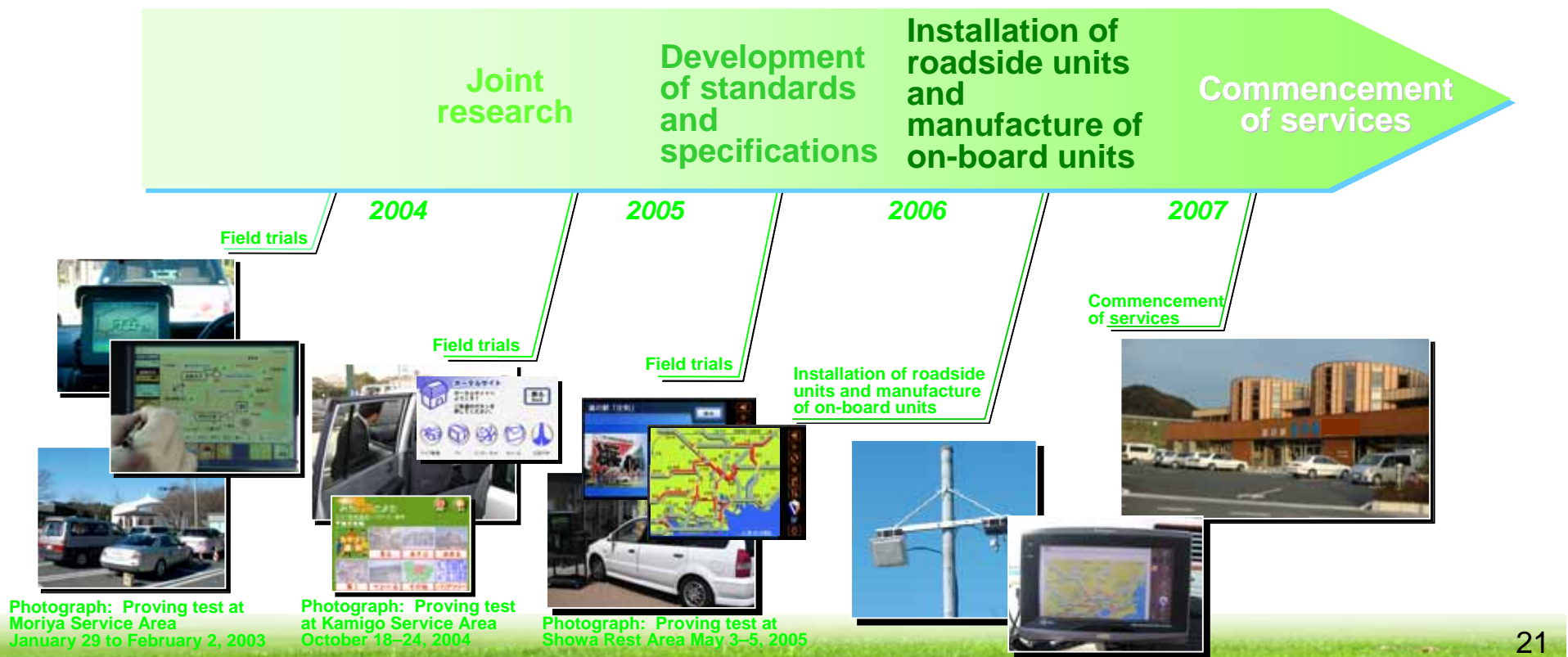
20

# 3. Future development

## 1) Realization of ITS services by 2007
### (2) Information connection services such as at roadside rest areas
**[Steps for realization]**

- FY2005 : Preparation of technical materials and development of standards and specifications through joint research.
- FY2006 : Installation of roadside units and manufacture of on-board units.
- FY2007 : Various services to be launched in succession.

Note:  To enable the participation of many service providers for the sake of users, support will be offered for the introduction of private sector services, etc.

**Joint research** | **Development of standards and specifications** | **Installation of roadside units and manufacture of on-board units** | **Commencement of services**

*2004* | *2005* | *2006* | *2007*

Field trials

Field trials

Field trials

Installation of roadside units and manufacture of on-board units

Commencement of services

Photograph:  Proving test at Moriya Service Area January 29 to February 2, 2003

Photograph:  Proving test at Kamigo Service Area October 18–24, 2004

Photograph:  Proving test at Showa Rest Area May 3–5, 2005

# 1) Realization of ITS services by 2007

## (3) Public parking lot settlement services

### [Future directions for services]

- Smooth passage by cashless fee payment at public parking lot.
- A new mode of cashless payment, using an ITS on-board unit along with a general IC type credit card*, will be deployed in addition to the existing ETC on-board units.
- Flexible pricing services such as point systems or discount for customers.

  \* Credit card with IC (Integrated Circuit) chip.
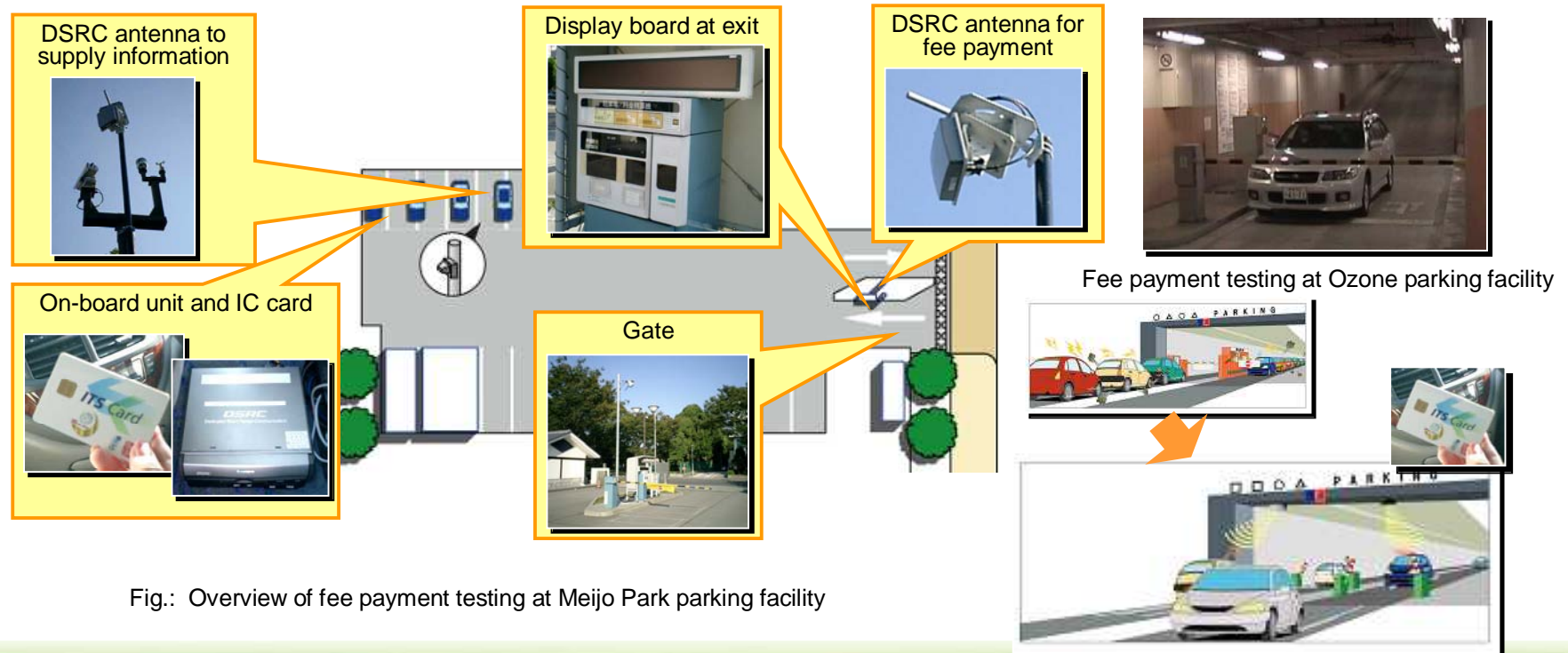


DSRC antenna to supply information

On-board unit and IC card

Display board at exit

Gate

DSRC antenna for fee payment

Fee payment testing at Ozone parking facility

Fig.: Overview of fee payment testing at Meijo Park parking facility
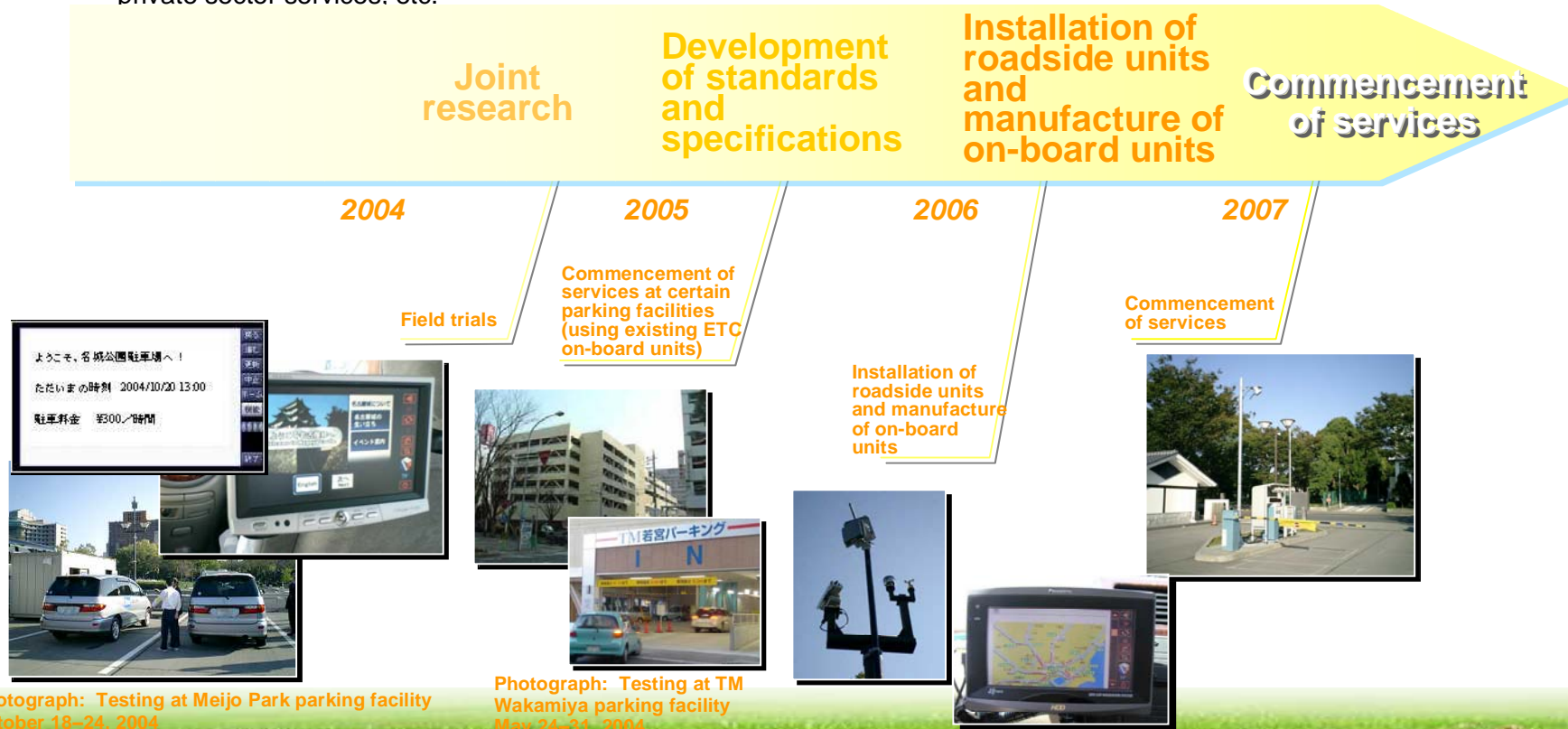
# 3. Future development

## 1) Realization of ITS services by 2007

### (3) Public parking lot settlement services
### [Steps for realization]

- FY2005 : Preparation of technical materials and development of standards and specifications through joint research.
- FY2006 : Installation of roadside units and manufacture of on-board units.
- FY2007 : Various services to be launched in succession.

Note: To enable the participation of many service providers for the sake of users, support will be offered for the introduction of private sector services, etc.

**Joint research**

**Development of standards and specifications**

**Installation of roadside units and manufacture of on-board units**

**Commencement of services**

| 2004 | 2005 | 2006 | 2007 |

**Field trials**

**Commencement of services at certain parking facilities (using existing ETC on-board units)**

**Installation of roadside units and manufacture of on-board units**

**Commencement of services**

Photograph: Testing at Meijo Park parking facility
October 18–24, 2004

Photograph: Testing at TM Wakamiya parking facility
May 24-31, 2004

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# 3. Future development

## 2)Developing new services on the platform

- Developing various services on the platform with an eye to future development beyond 2007 as well.

### (1)Safety and safe driving

**[Systems to support safe driving (Advanced Cruise-Assist Highway Systems, AHS)]**

- Promoting research and development on driving support systems, using vehicle control functions as well as road-vehicle communications, to contribute to safety and safedriving.

**[Testing the supply of information on congestion beyond a curve]**

Test site: Sangubashi curve on the Metropolitan Expressway, No. 4 Shinjuku Line

Toward central Tokyo

Toward Hachioji

Source: Advanced Cruise-Assist Highway System Research Association

**[Testing the supply of information on road surface conditions and congestion beyond a curve]**

Test site: Maiya area on National Highway 25

In this area, road conditions and stopped or slow-moving vehicles are detected.

Toward Osaka

The locations of slow-moving vehicles are transmitted.

The locations and speeds of slow-moving vehicles are transmitted.

Audio: Beep, beep. Caution. Vehicles stopped in the road 300 meters ahead.
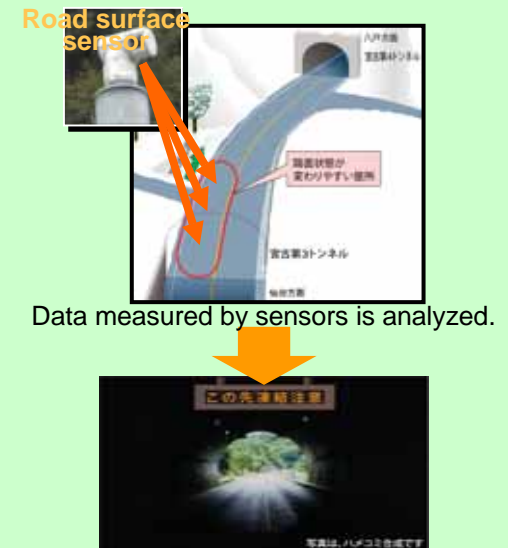
● Base point beacon
● Information beacon
■ Information sign

Base point information is transmitted.

Toward Yokkaichi Bound for Tokyo

Bound away from Tokyo

Source: ITS Handbook

**[Testing the supply of information on road surface conditions at tunnel exit]**

Test site: Miyako Tunnels on National Highway 45

Road surface sensor

Data measured by sensors is analyzed.

Information on road surface conditions is provided near the tunnel exit.

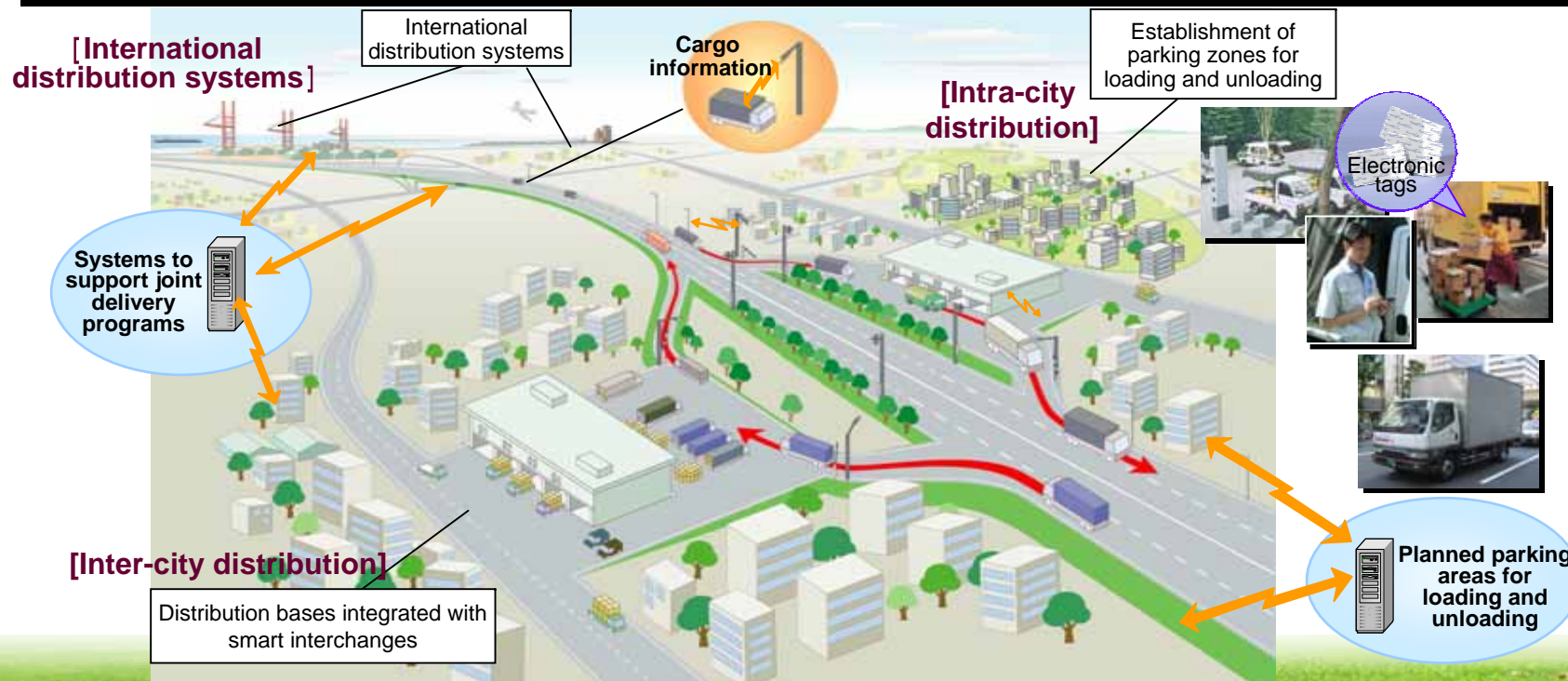Source: Advanced Cruise-Assist Highway System Research Association

## 2)Developing new services on the platform
### (2) Affluence and the environment
**[Advanced freight transport systems]**

- Contributing to efficient and environmentally friendly freight transport, as a result of higher expressway utilization rates, by distribution bases integrated with smart interchanges, coordination with international freight transport, and support for efficient transport using IT.
- Contributing to reduced congestion in urban areas and a lower environmental burden along roads, through the establishment of parking zones for loading/unloading, efficient lane operations, joint delivery systems, and advanced operation and management of those systems.



International distribution systems

International distribution systems

Cargo information

Establishment of parking zones for loading and unloading

[Intra-city distribution]

Electronic tags

Systems to support joint delivery programs

[Inter-city distribution]

Distribution bases integrated with smart interchanges
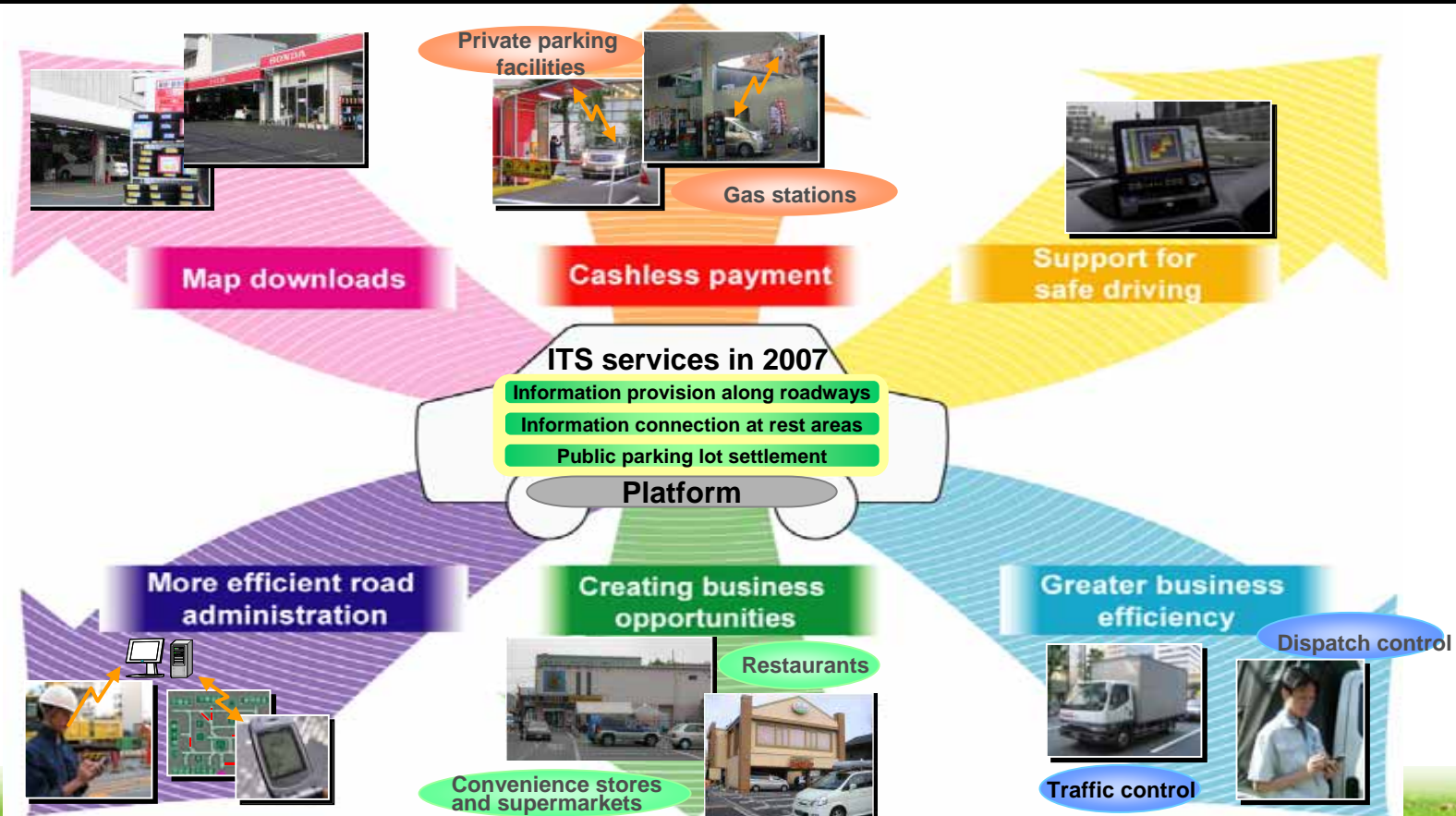
Planned parking areas for loading and unloading

## 2)Developing new services on the platform

### (3)Comfort and convenience

- Awakening a variety of private sector services, in addition to the three road services which are to be realized by 2007, through the combination of common functions of the platform.
- Giving thorough consideration to promoting the widespread adoption of ITS on-board units, by ensuring security and protect personal information, and by establishing mechanisms that provide users reliance, such as common symbol.



**Private parking facilities**

**Gas stations**

**Map downloads**

**Cashless payment**

**Support for safe driving**

**ITS services in 2007**
- Information provision along roadways
- Information connection at rest areas
- Public parking lot settlement

**Platform**

**More efficient road administration**

**Creating business opportunities**

**Restaurants**

**Convenience stores and supermarkets**

**Greater business efficiency**

**Dispatch control**

**Traffic control**

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## 3) Further development of the platform

- Further development of the platform in order to promote all areas of ITS.

### (1) Platform for collection, storage, and distribution of data from probes and roadside

- Collection of data from probes, open access and sharing of the collected data.
- Unifying data structures, concentrating data into comprehensive, and facilitating the utilization of information through system coordination and the development of more advanced services.
- Infrastructure to allow utilization of detailed statistical data for more advanced road administration.



Roadside sensor A

Temperature
Road surface temperature
Road surface conditions
Travel speed

Roadside sensor B

Temperature
Road surface temperature
Road surface conditions
Amount of snowfall
Humidity ＿ %

Probe car C

Road surface temperature
Road surface conditions
Latitude and longitude
ABS:1

To servers in various locations

A nationally unified data structure makes it easy to handle data and achieve system coordination.

More advanced services are made possible by the concentration of data.

Database servers

The use of information is facilitated by system coordination.

**[System for the sharing of information on traffic congestion]**

**[System for the sharing of road management data]**
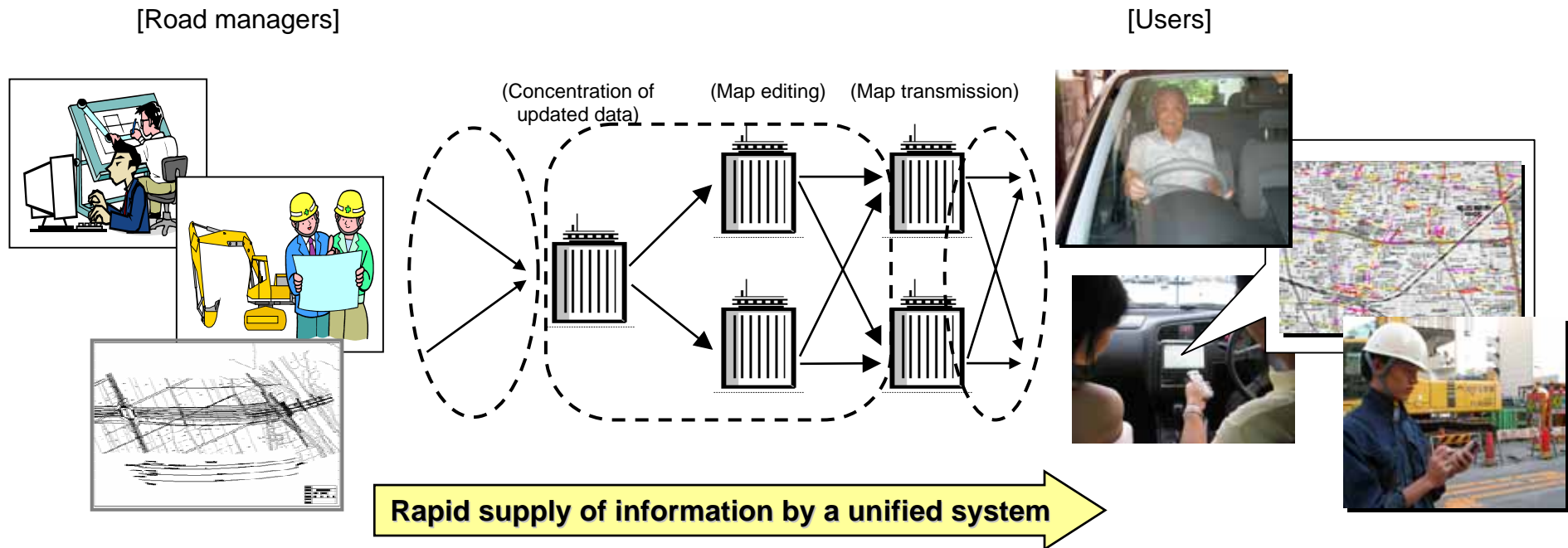
**[Tools for performance evaluation and monitoring]**

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## 3) Further development of the platform

(2)Development of digital road map databases

- Constructing a mechanism to rapidly supply updates of the latest detailed road information to everyone from road managers to general users (car navigation systems, etc).
- Developing more detailed, easy-to-use digital road map databases to support safe driving.
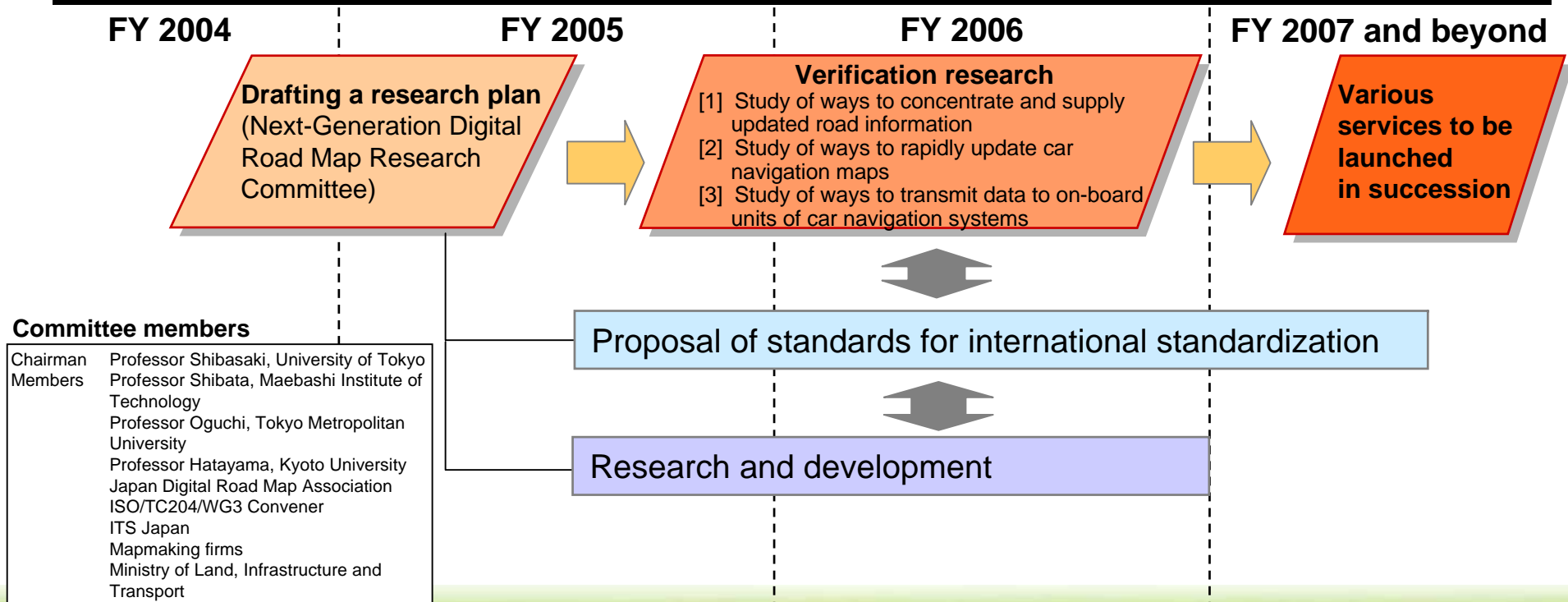
[Road managers]                                                                 [Users]



(Concentration of updated data)   (Map editing)   (Map transmission)

**Rapid supply of information by a unified system**

## 3) Further development of the platform

(2)Development of digital road map databases

- Next-Generation Digital Road Map Research Committee established based on growing demand from the private sector.
- Conducting research and development in collaboration with various private firms (in the fields of maps, navigation systems, and automobile manufacturing) for the deployment of services in 2007 and beyond.
- Actively participating in the international standardization (ISO/TC204/WG3) to ensure an international edge for Japan.

| FY 2004 | FY 2005 | FY 2006 | FY 2007 and beyond |
|---|---|---|---|

**Drafting a research plan**
(Next-Generation Digital Road Map Research Committee)

**Verification research**
[1]  Study of ways to concentrate and supply updated road information
[2]  Study of ways to rapidly update car navigation maps
[3]  Study of ways to transmit data to on-board units of car navigation systems

**Various services to be launched in succession**

**Committee members**

| | |
|---|---|
| Chairman | Professor Shibasaki, University of Tokyo |
| Members | Professor Shibata, Maebashi Institute of Technology |
| | Professor Oguchi, Tokyo Metropolitan University |
| | Professor Hatayama, Kyoto University |
| | Japan Digital Road Map Association |
| | ISO/TC204/WG3 Convener |
| | ITS Japan |
| | Mapmaking firms |
| | Ministry of Land, Infrastructure and Transport |

Proposal of standards for international standardization

Research and development

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## 4) Developing new road-vehicle cooperation systems

- Developing a variety of road-vehicle cooperation services to make society of smart mobility, by means of more advanced networks linking people, roads, and vehicles based on coordination with various types of media.



Road management networks

Road surface sensors and CCTV

Roadside beacons

Push-type data transmission

Internet connection

VICS

GPS

Advanced cruise-assist Highway System (AHS)

Probes

Traffic information supply service

Electronic toll collection (ETC)

FM broadcasting

Traction control system
Steering control system

Payment of parking fees

Digital tachographs

ITS on-board unit

Braking control system

Gas stations

Vehicle maintenance

Mobile phones
Personal computers
Mobile terminals

While out and about

External memory

Smart cards

Home

Linkage and sharing

Personal computers

**[Safety and safe driving, Affluence and the environment]**

| Service objectives | | Related measures |
|---|---|---|
| **Safety and safe driving** | Timely driving support information (Information provision services along roadways) | **Standards and specifications to be formulated in fiscal 2005. (Planned)** **VICS Probe Council held in June 2005.** **Standards and specifications to be formulated in fiscal 2005 for the collection of probe information, toward the provision of highly accurate road traffic information. (Planned)** **VICS data to be supplied under a new format beginning in fiscal 2007. (Planned)** |
| | Cautions and warnings to support safe driving on motor highways | Study meeting held in December 2004 on field trials in the Sangubashi area for services to support safe driving.   Field trials conducted from February through May 2005. |
| | Stronger management of special vehicles | Automated measuring devices to be installed at 30 locations along national highways under direct government control, beginning in fiscal 2004. (Planned) Operations to begin at some locations in fiscal 2005. (Planned) |
| **Affluence and the environment** | Smart interchanges | Field trials at 29 locations, beginning in fiscal 2004 Full-scale deployment to begin in fiscal 2005. (Planned) |
| | Bus location systems, on-demand buses, and support for taxi operations | Expressway bus location system to be deployed nationwide in fiscal 2005. (Planned) |
| | Support for pedestrians | Proving tests conducted in October 2004 at the Nagoya World Congress on ITS. Support for trial introduction in Kobe commenced in fiscal 2004. Proving tests conducted at Expo 2005 Aichi. |
| | Systems for more efficient distribution using ITS | Joint delivery system tested in Akihabara in fiscal 2004. |

**[Comfort and convenience]**

| Service objectives | | Related measures |
|---|---|---|
| Comfort and convenience | Regional guides according to location and needs (Information connection services such as at roadside rest areas) | Proving tests conducted in October 2004 at the World Congress on ITS.<br>Proving tests conducted at Expo 2005 Aichi.<br>Standards and specifications to be formulated in fiscal 2005. (Planned)<br>Some services to be provided at rest areas, etc. beginning in fiscal 2007. (Planned) |
| | Smooth passage through all types of gates (Public parking lot settlement services) | Proving tests conducted in October 2004 at the World Congress on ITS.<br>Proving tests conducted at Expo 2005 Aichi.<br>Standards and specifications to be formulated in fiscal 2005. (Planned)<br>Some services to be provided at public parking facilities, etc. beginning in fiscal 2007. (Planned) |
| | Various fee-based measures using ETC | Beginning in fiscal 2004, JH reduced the average tolls for ETC users by 10%.<br>Discounts introduced in April 2005 based on mileage and high volume or frequency of use.<br>Leasing system for ETC on-board units introduced in April 2005. |
| | Effective use of road space and provision of information on road construction | Under study by a committee on improving road construction management from the user's standpoint. |
| | Enhanced data collection from probe cars | Basic data is collected and used to evaluate losses due to congestion.<br>Used in the 2005 Road Traffic Census. |

## [Establishing a common infrastructure]

| Establishing a common infrastructure | Making ITS on-board units and roadside units a reality (equipment specifications, common symbol, security, cards, etc.) | Government-private joint research commenced in fiscal 2004 based on public recruitment. Aspects such as standards, specifications, common symbol, security, and cards to be studied in fiscal 2005. (Planned) Beginning in fiscal 2006, establishment of roadside units and manufacture of on-board units to be promoted. |
|---|---|---|
| | Unified data structure, open access and sharing | Promoting a unified data structure including definitions and methods of expression. |
| | More advanced digital maps | Next-Generation Digital Road Map Research Committee established in March 2005. Detailed digital maps of expressways to be prepared in fiscal 2005. (Planned) Application in smart cruise systems. Development of rapid updating mechanisms. |
| | Establishment of optical fiber network and sensors | As proposed in the e-Japan Priority Policy Program, the optical fiber network was basically complete by fiscal 2003. Spaces housing fiber-optic cables are being successively made available for use by the private sector, etc. |

## [Mutual cooperation and collaboration]

| Mutual cooperation and collaboration | Promoting technical research and development | Joint public-private research on next-generation ITS services was begun in fiscal 2004 based on public recruitment. |
|---|---|---|
| | Collaboration with communities and residents | Supporting the activities of Okayama ITS Forum, Aomori ITS Club (NPO), etc. Proposal issued in October 2004: "NPO contributions to realization of ITS for communities and residents" (Study group on future directions in ITS for communities and residents) |
| | Promoting international cooperation | Promoting the adoption of DSRC technology developed in Japan (T75, T88) in international standardization by ISO. Regular exchange of information in bilateral talks with the U.S., EU, etc. Technical cooperation using the World Bank's ITS Toolkit. |