



2. ITS in the Second Stage

(1) Effects of ITS Beginning to Emerge

- The effects of ITS are beginning to be felt, including the availability of sophisticated road traffic information, safe and smooth road transportation, an improved living environment, and effective utilization of infrastructure.

- 1) Greater convenience and safety due to car navigation systems and VICS
- 2) Access to road information on web sites
- 3) Expansion of added value information including road surface conditions
- 4) Greater use of buses due to bus location systems
- 5) Reduced congestion at toll gates due to the spread of ETC
- 6) Development of diversified fee schedules
- 7) Establishment of smart interchanges
- 8) Local efforts for ITS

2. ITS in the Second Stage



(1) Effects of ITS Beginning to Emerge

1) Greater convenience and safety due to car navigation systems and VICS

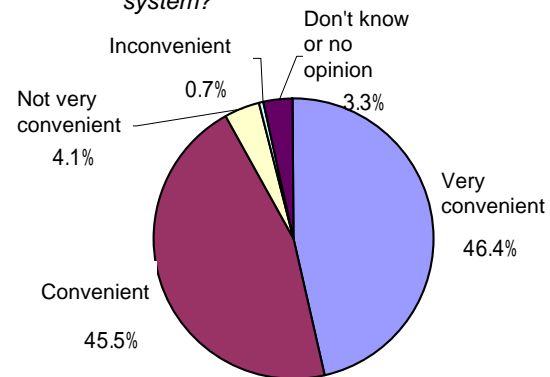
- 80-90% of users find convenience of the driving route guidance and real-time road traffic information.
- 80% of elderly drivers say that the systems help them drive safely.



Detailed indication of driving route (with intersection details)

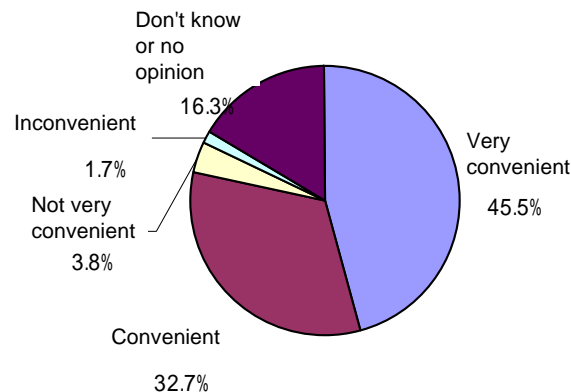
Source: Sony NV-XYZ

Question: What is your opinion on the convenience of having your driving route pointed out by a car navigation system?



Real-time information by VICS

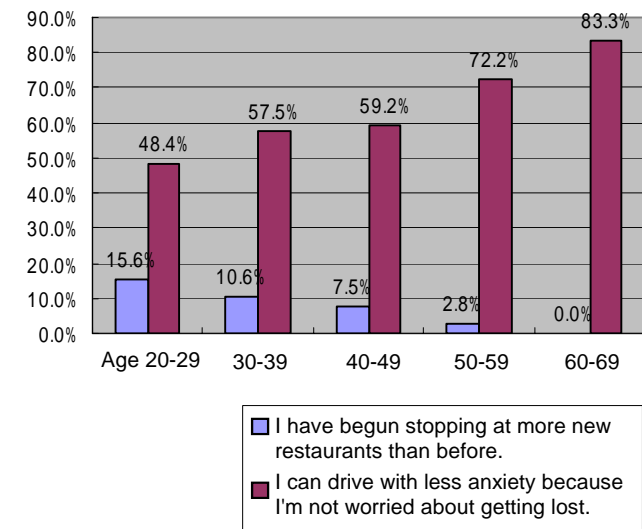
Question: What is your opinion on the convenience of having real-time road traffic information provided by a car navigation system?



Questionnaire on the convenience of car navigation systems

Source: Survey by the Ministry of Land, Infrastructure and Transport

Question: Have you experienced these changes in your driving since you began using a car navigation system?



Source: Survey by the Ministry of Land, Infrastructure and Transport

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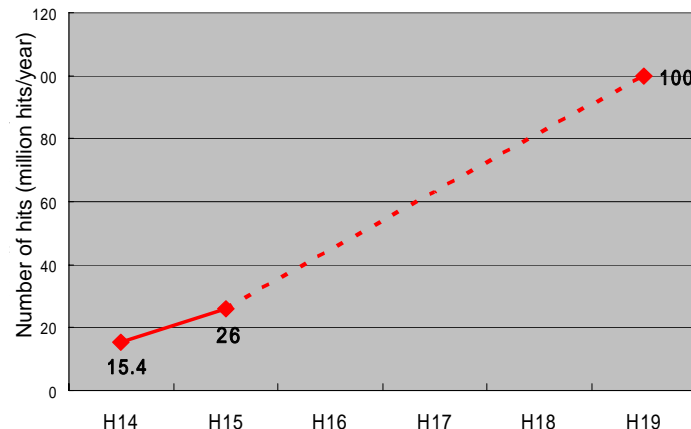
2) Access to road information on web sites

- In the north region usage increases sharply from November to February.
- In the regions, where rainfall often causes traffic restrictions, usage increases sharply during the rainy season and typhoon season.

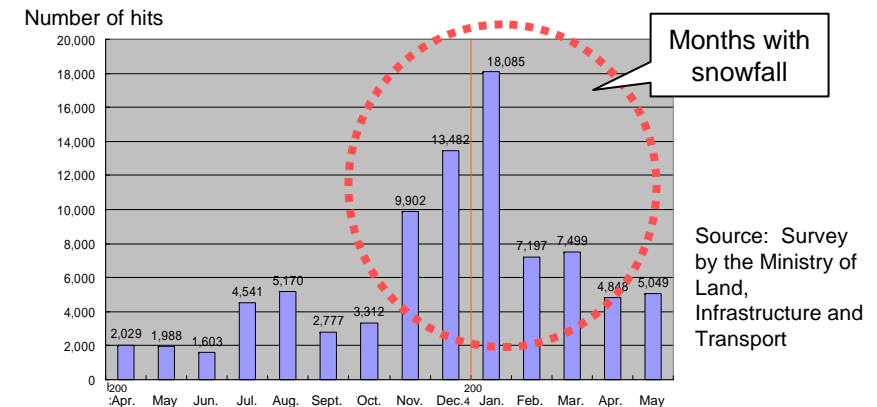


Web site on traffic restrictions and road weather (road information system)

Source: Web site of the Ministry of Land, Infrastructure and Transport

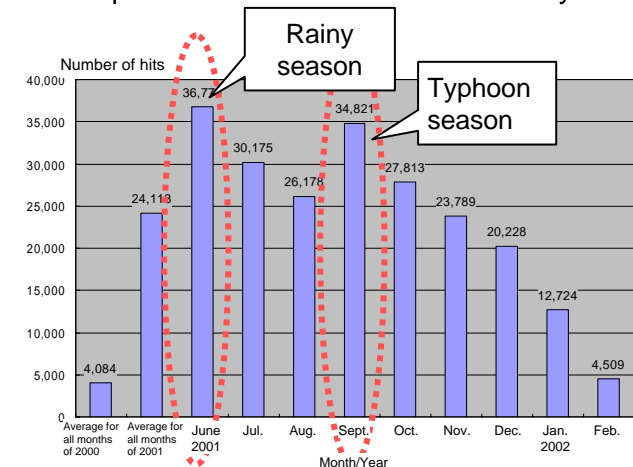


Target number of hits to the Road Bureau's web site (outcome index)



Source: Survey by the Ministry of Land, Infrastructure and Transport

Number of hits to the web site of the Hokuriku Regional Development Bureau's road information system



Source: Survey by the Ministry of Land, Infrastructure and Transport

Number of hits to the web site of the Okayama National Highway Office

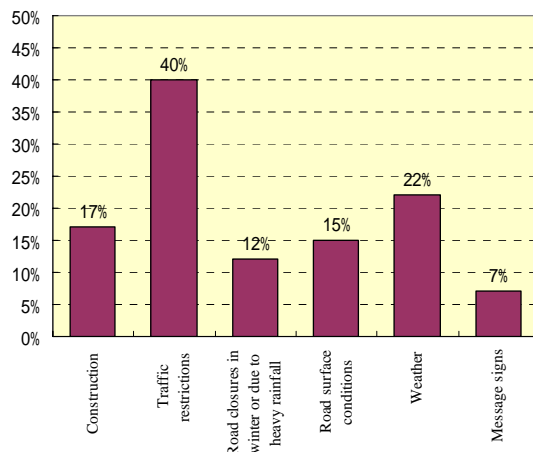
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3) Expansion of added value information including road surface conditions

- In many regions, information is provided on road conditions according to regional characteristics.



Added value information provided by regional development bureaus and offices

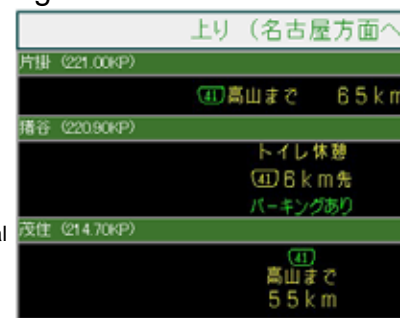
Source: Survey by the Ministry of Land, Infrastructure and Transport



Linkage of parking facility information signs with car navigation systems and cell phones

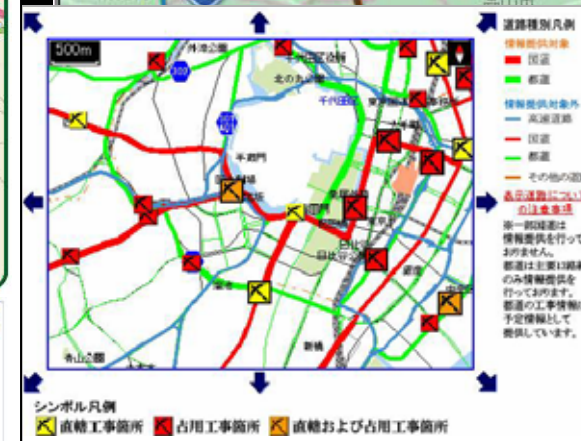
Road information signs

Source: Web site of the Takayama National Highway Office



Information on road surface conditions

Source: Web site of the Sobu National Highway Office



Construction information

Source: Web site of the Tokyo National Highway Office

2. ITS in the Second Stage



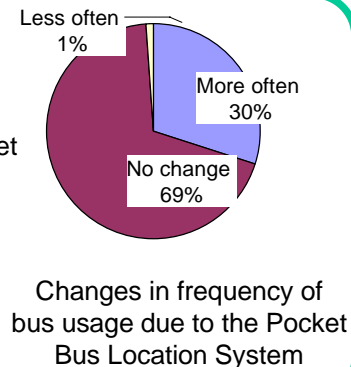
(1) Effects of ITS Beginning to Emerge

4) Greater use of buses due to bus location systems

- With advances in technologies that use location information, bus location systems are rapidly becoming more widespread.
- Bus location systems improve convenience for users, especially in cities.

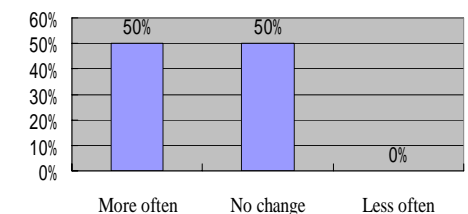
Kyoto Municipal Transportation Bureau

- 30% of users said they began using municipal buses more often after the Pocket Bus Location System was introduced.
- The web site gets an average of 15,000 to 20,000 hits per day.
- Users welcome the service because it lets them use their time more effectively while waiting for the bus.



Tokyu Bus

- The web site which provides information on bus operation gets an average of 1,000 hits per day.
- 76% of users said they spent less time waiting for the bus than before.
- 50% of users said they began using buses more often.

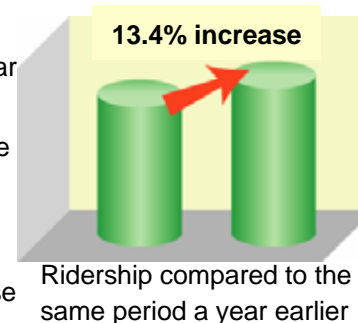


On-demand bus
(Kochi Prefecture)



Iyo Railway

- Ridership increased by 13.4% compared to the same period a year earlier.
- Although communications costs are incurred, large cost savings are realized through more efficient scheduling.
- Users welcome the service because they no longer feel impatient while waiting for the bus.



Iyo Railway (Ehime Prefecture)

Source: Web site of the Ministry of Land, Infrastructure and Transport

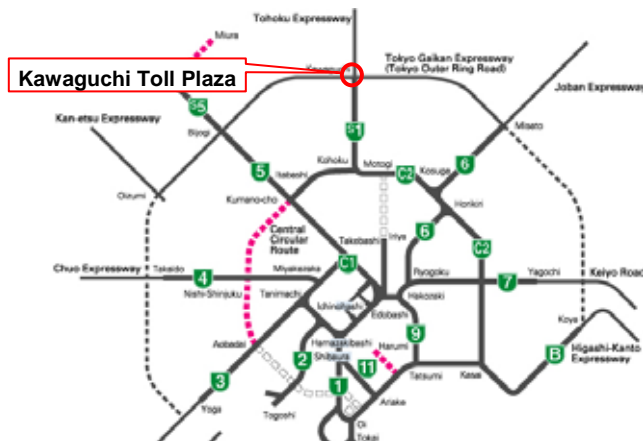
2. ITS in the Second Stage

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5) Reduced congestion at toll gates due to the spread of ETC

- Over 20% of vehicles use ETC, and growing numbers of vehicles are using the ETC-only lane.
- congestion has decreased while traffic volume through the toll plaza has increased.

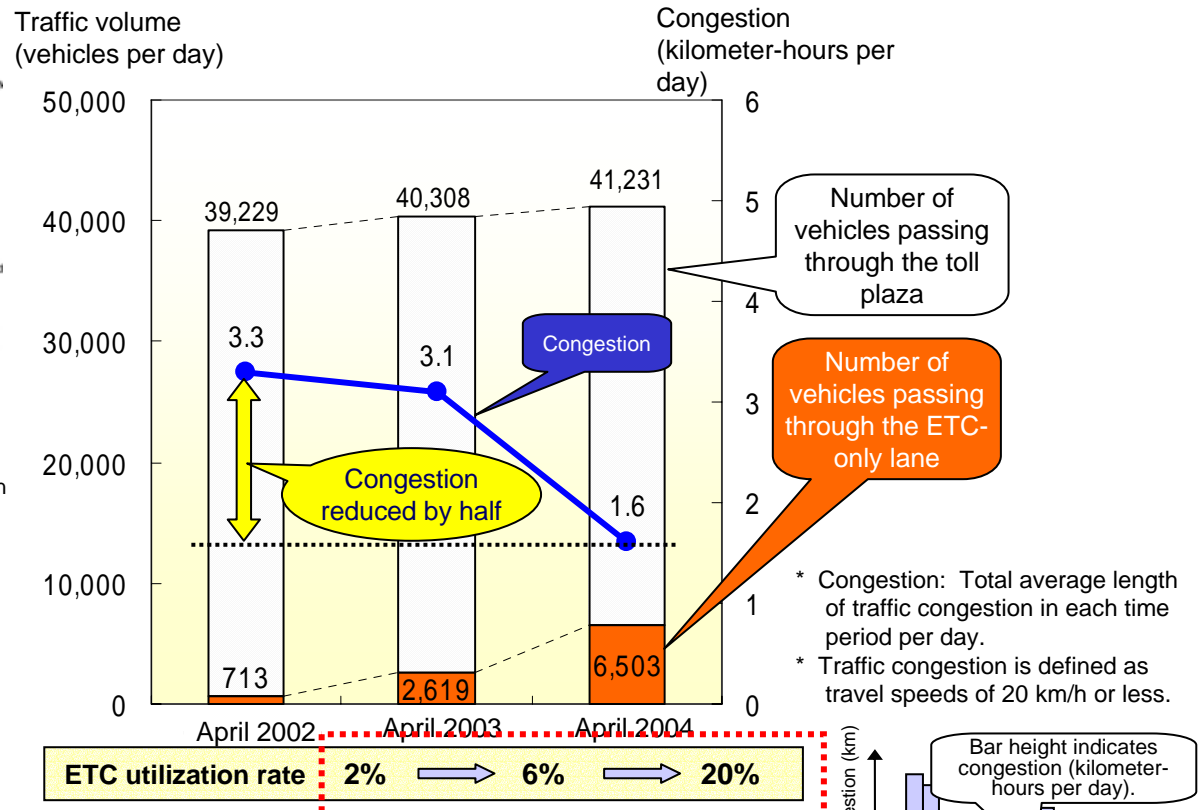


Location of Kawaguchi Toll Plaza

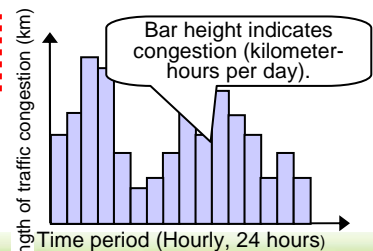
Source: Web site of the Metropolitan Expressway Public Corporation



Kawaguchi Toll Plaza



Trends in traffic volume and congestion
(Kawaguchi Toll Plaza on the Metropolitan Expressway)



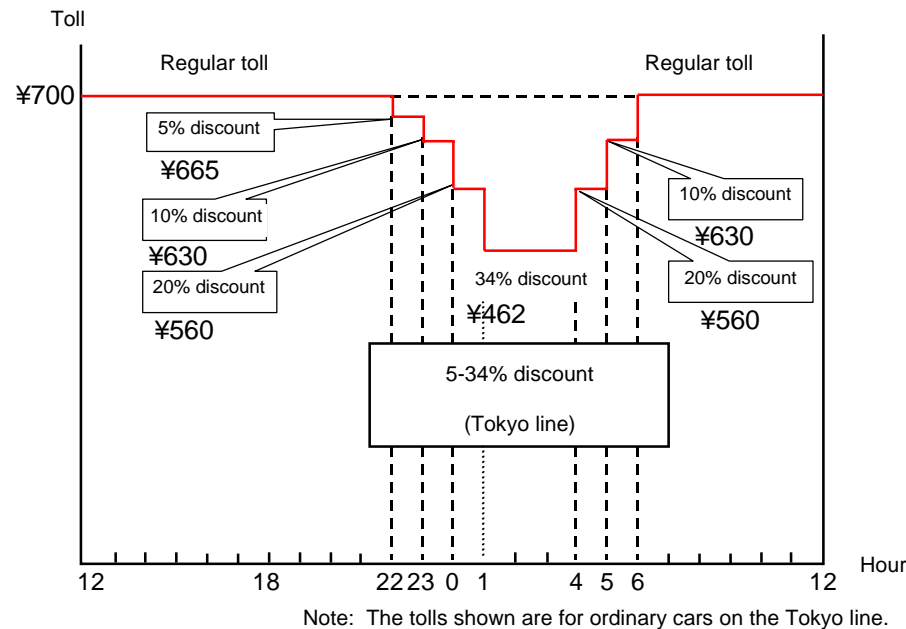
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6) Development of diversified fee schedules : trial of nighttime discounts

- Various types of toll discounts have been established for ETC users.
- The number of vehicles using ETC has increased by about 20% (6,000 vehicles).



Toll system in a trial of nighttime discounts for ETC users on the Metropolitan Expressway

Source: Metropolitan Expressway Public Corporation

Changes in traffic volume during discount hours (10 PM to 6 AM)

	Without the trial*1	During the trial *2	Change
All vehicles	194,793	196,798	2,005 (1.0%)
ETC vehicles	29,399	35,253	5,854 (up about 20%)
Cars	25,929	30,442	4,513 (up about 17%)
Trucks	3,470	4,811	1,341 (up about 40%)

*1) Estimated traffic volume without the trial of nighttime discounts.

*2) Actual average value during the trial of nighttime discounts.

Source: Data from the Metropolitan Expressway Public Corporation

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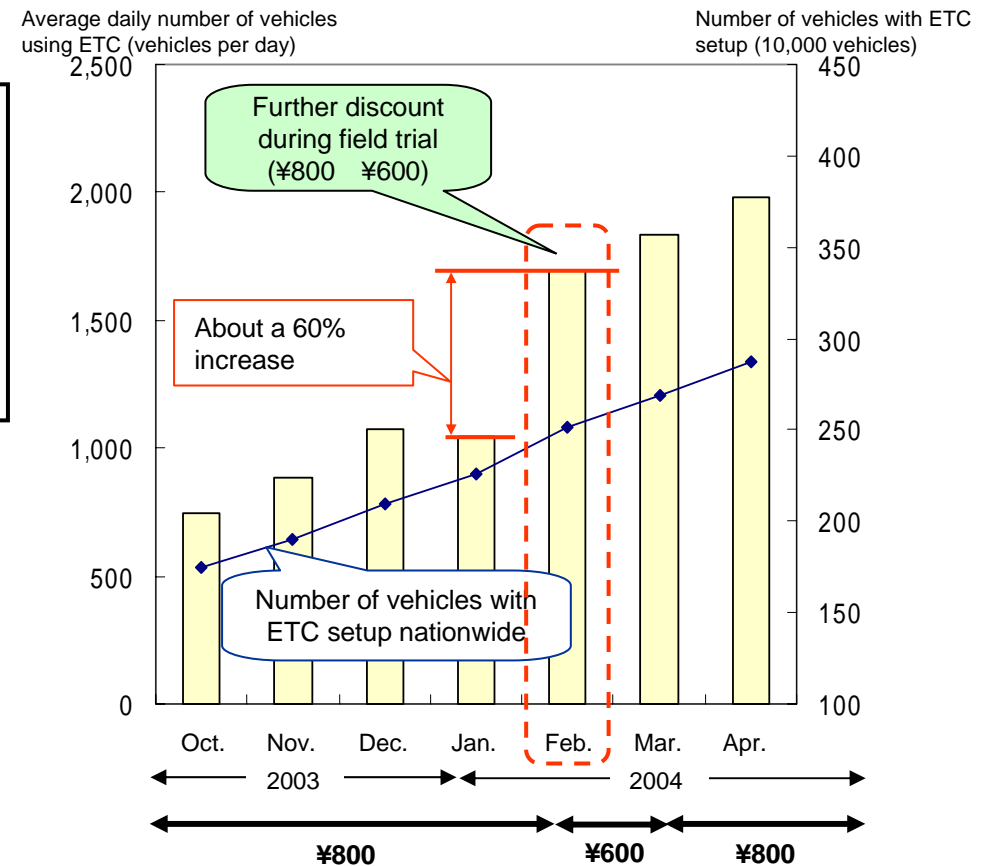
6) Development of diversified fee schedules : Environmental road pricing

- Usage of the coastal line has risen along with the spread of ETC.
- By ETC, it is easy to establish discounts for specific time periods
- Even greater diversification is possible with flexible toll pricing.



To improve the environment in the area of Hanshin Expressway 3 (Kobe line), trucks are given a discount (¥1000 → ¥800) for using ETC on Hanshin Expressway 5 (coastal line).

Zones of the Hanshin Expressway with discounted tolls for ETC users



The number of vehicles using ETC on the Hanshin Expressway after discounts were introduced

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(1) Effects of ITS Beginning to Emerge



7) Establishment of smart interchanges

- Smart interchange contributes to improving the life of a community and revitalizing its economy.
- Doubling the number of interchanges will bring benefits of ¥3 trillion to communities.

- Number of interchanges:	705
- Average distance between interchanges:	About 10 km
	▶ Twice as long as in Europe and North America (4-5 km)
- Number of municipalities with interchanges:	553
	▶ About 60% of municipalities along expressways

2004 field trial: Preparations are underway for 35 interchanges.



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(1) Effects of ITS Beginning to Emerge



8) Local efforts for ITS

- As ITS becomes more widespread, regional efforts to promote ITS are also intensifying.
- Regional ITS promotion groups are supporting the introduction of ITS in a manner suited to the unique issues facing each region.

<Examples of regional ITS promotion groups:>

- Aichi Prefecture ITS Promotion Council
- Aomori ITS Club
- Okayama Prefecture ITS Promotion Council
- Kansai ITS Promotion Association
- Niigata Prefecture IT & ITS Promotion Council
- Hokkaido ITS Promotion Forum

<Example of regional ITS organizations based on industry-government collaboration:>

- i-TREK
(Chugoku ITS Society - Chugoku Economic Federation)

<Examples of regional academic efforts for ITS:>

- Regional ITS Social Study Center, Graduate School of Engineering, Kochi University of Technology
- "Sustainable ITS," industry-government collaboration project by the Center for Collaborative Research, University of Tokyo



2. ITS in the Second Stage

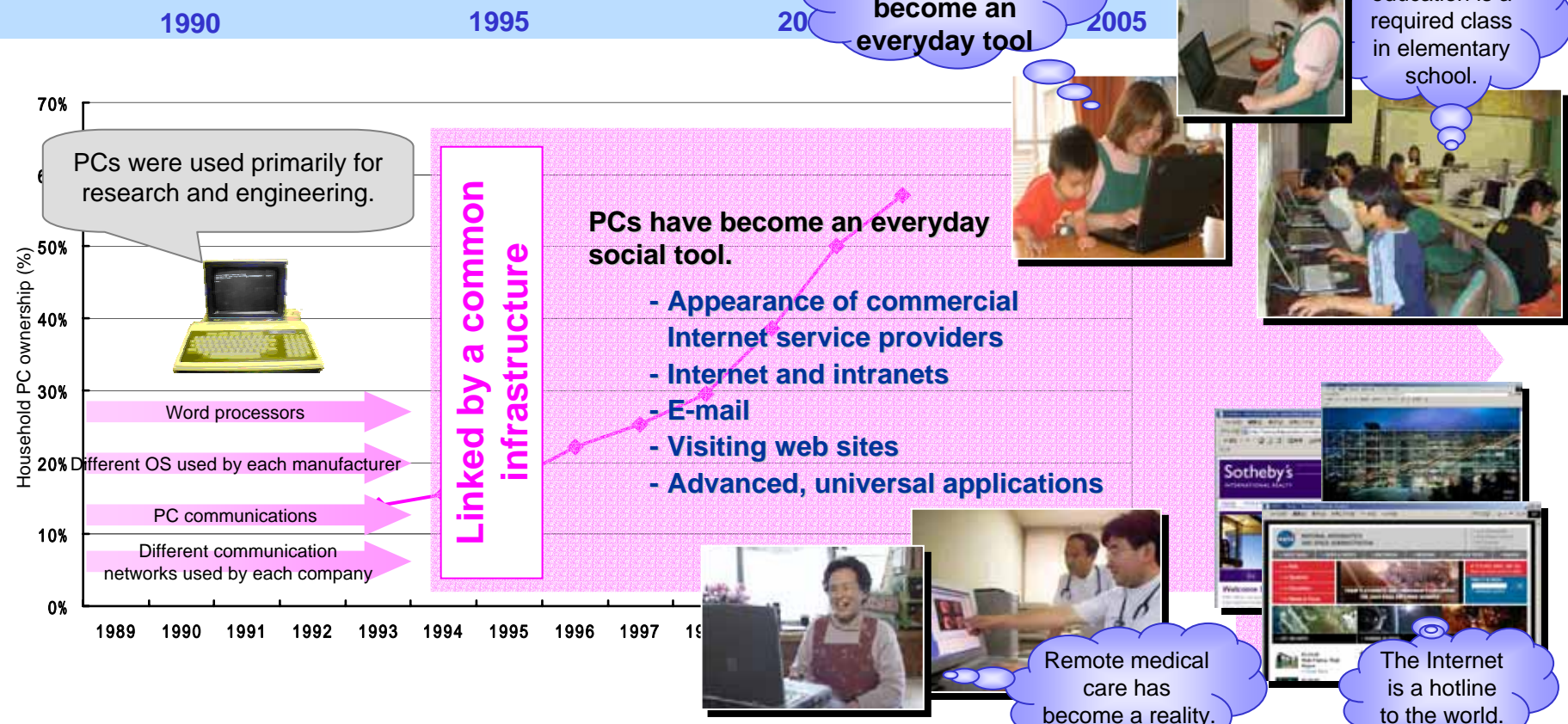
(2) Second Stage of ITS



1) Second stage in fields of information and telecommunications

- Personal computers, cell phones are no longer seen as cutting-edge and trendy but as a well-rooted part of life and society.
- PCs are not only used for information media but used for an ordinary tool.

< Household PC ownership >



2. ITS in the Second Stage

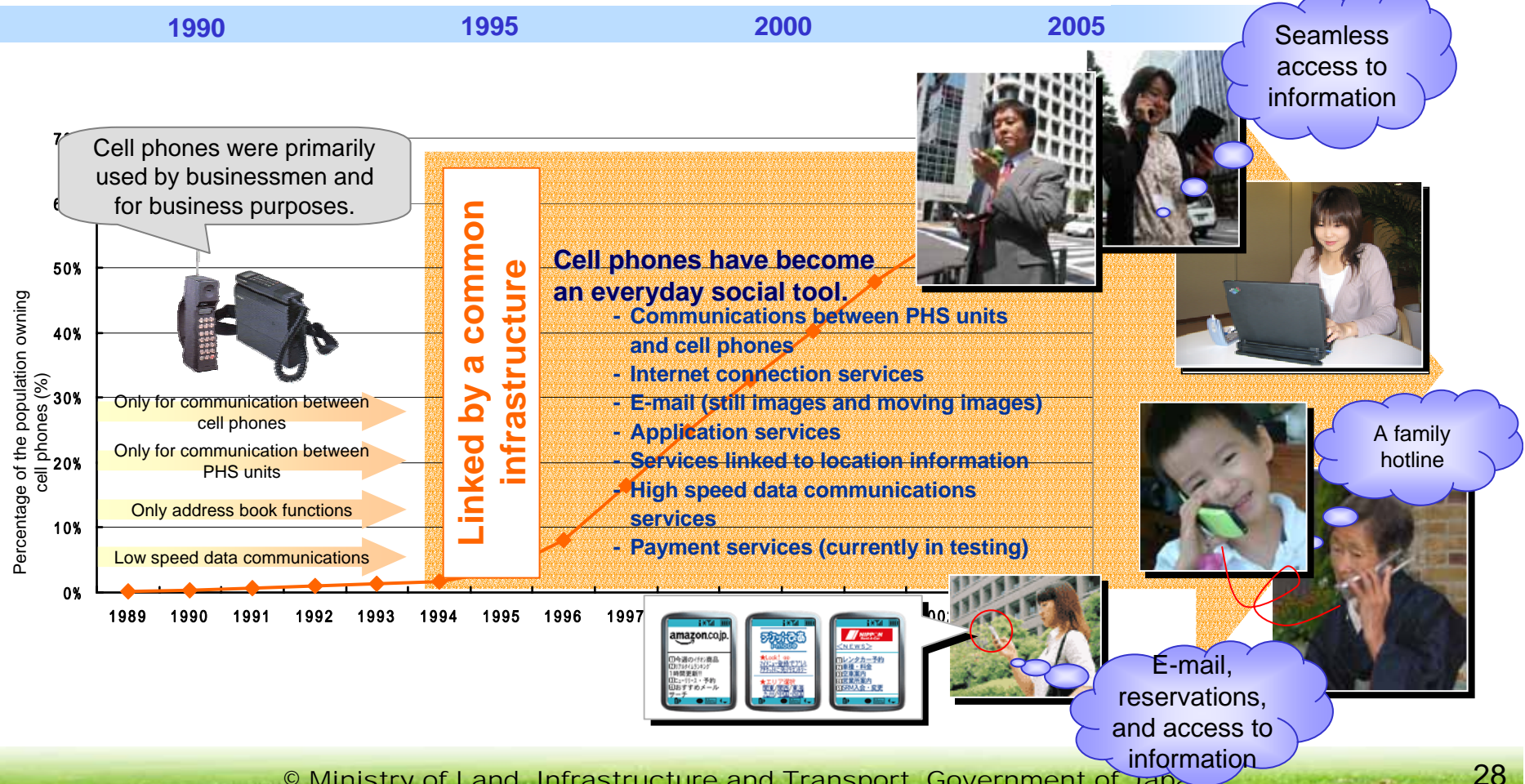
(2) Second Stage of ITS



1) Second stage in fields of information and telecommunications

- Cell phones now have various functions.
- Cell phones are a tool that everyone uses on a daily basis.

< Spread of cell phones >



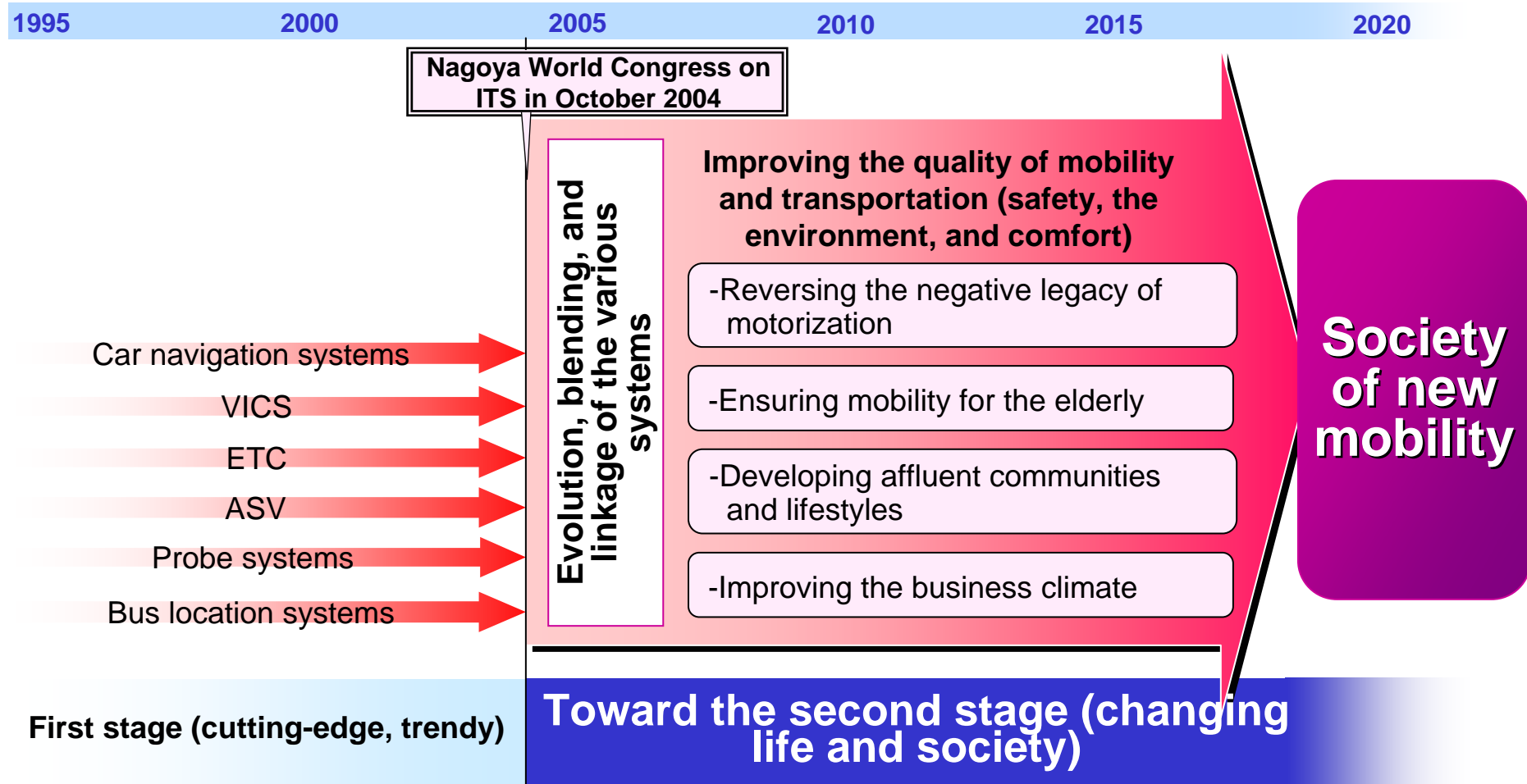
2. ITS in the Second Stage

(2) Second Stage of ITS



2) Second stage of ITS

- In the second stage of ITS, ITS will become a part of life and society, contributing to the resolution of social issues and promoting social change.



2. ITS in the Second Stage

(3) Development of Smart Mobility



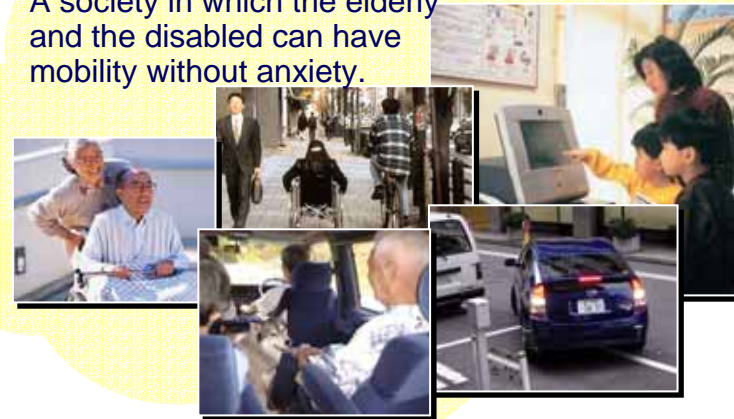
Reversing the negative legacy of motorization

Reducing accidents, environmental burden, and congestion



Ensuring mobility for the elderly

A society in which the elderly and the disabled can have mobility without anxiety.



Developing affluent communities and lifestyles

Making effective use of expressways and public transport to promote affluence and a more dynamic



Improving the business climate

Improving the business climate with seamless access to information and more efficient distribution.



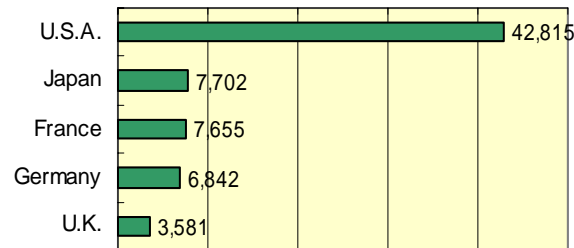
2. ITS in the Second Stage



(4) Social Changes to be Effected by ITS

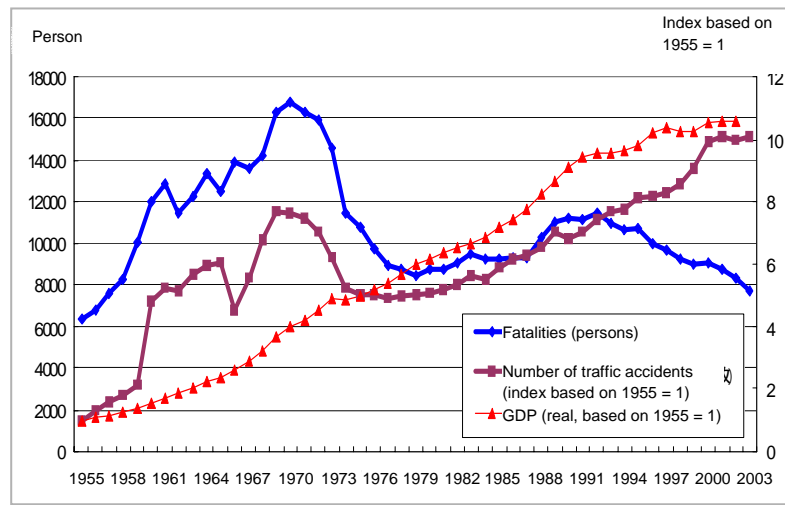
1) Reversing the negative legacy of motorization: Reducing traffic accidents

- Although motorization brought about rapid economic growth, traffic accidents cause 120,000 deaths every year.
- Most accidents are caused by errors on the part of the driver.



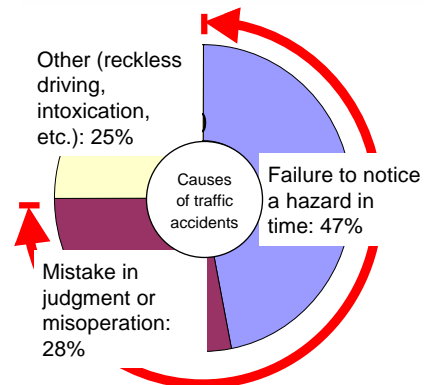
International comparison of traffic fatalities

Source: 2002 figures from IRTAD. 2003 figures for Japan only.



Trends in economic growth and number of accidents in Japan

75% are caused by the driver's actions just before the accident (human error).



Source: "Statistical data on traffic accidents in FY 2000," Institute for Traffic Accident Research and Data Analysis

Causes of traffic accidents

2. ITS in the Second Stage



(4) Social Changes to be Effected by ITS

1) Reversing the negative legacy of motorization: Reducing traffic accidents

- Some of the advanced vehicle control technology has become commercially available.
- Steady progress is being made toward the cruise-assist systems.



Field operation test of a cruise-assist system



Product development for vehicle control technology

Source: Nissan Motor Co., Ltd.

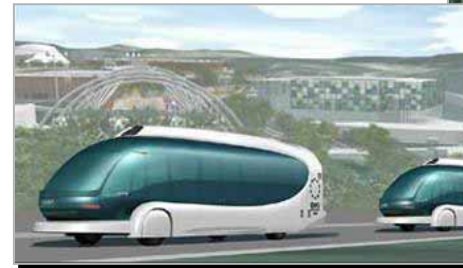


Automated driving into a garage



Proving test of collision avoidance

(Left: Drawing of a new transport system for Expo 2005 Aichi. Right: Awaji Farm Park.)



In these new transportation systems, vehicle location is determined according to data from buried magnets, and the data is used to control operation and provide

Source: Web sites of Expo 2005 Aichi and the National Traffic Safety and Environment Laboratory

Goal: To eliminate all fatal traffic accidents

2. ITS in the Second Stage

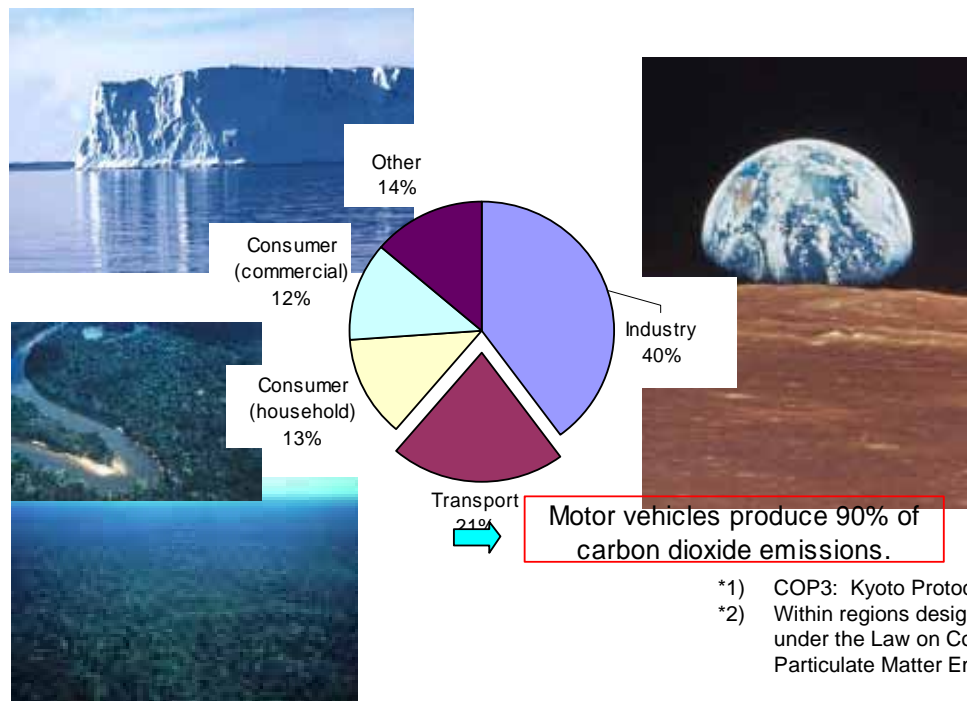


(4) Social Changes to be Effected by ITS

1) Reversing the negative legacy of motorization : Reducing the environmental burden

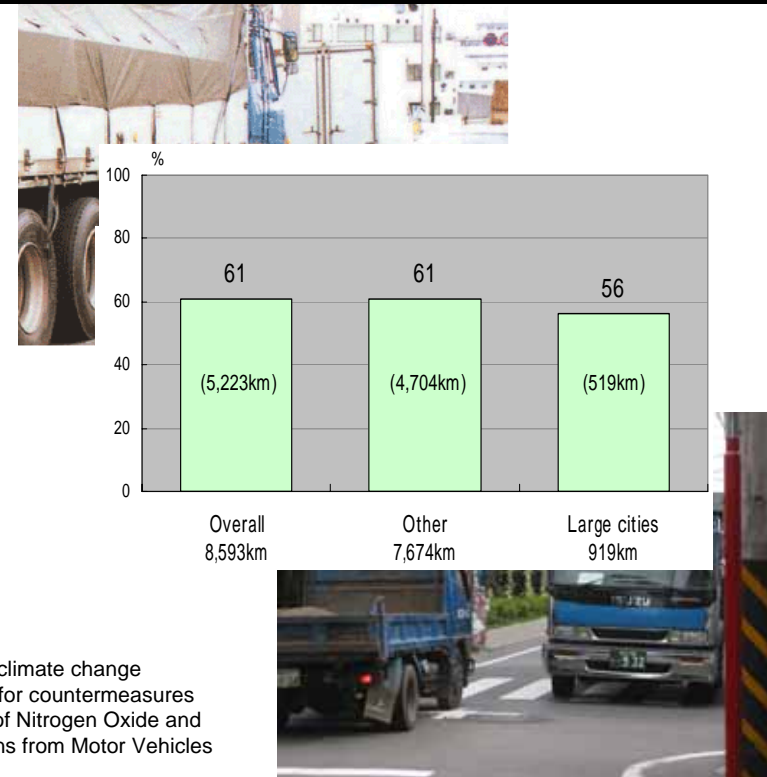
- Under COP3,*¹ Japan has to reduce its emissions by 6% of its 1990 level.
- The transport sector accounts for 20% of the country's emissions, with 90% of that amount coming from motor vehicles.

- Clean air standards are met at 60% of measurement stations for the roadside environment.*²
- Nighttime noise standards are met at 60% of measurement stations on national highways



Carbon dioxide emissions in Japan (2000)

Source: 2002 White Paper on the Environment



Percentage of total road length where nighttime noise standards are met, comparing large cities to other regions

Source: Data from the Ministry of Land, Infrastructure and Transport

2. ITS in the Second Stage



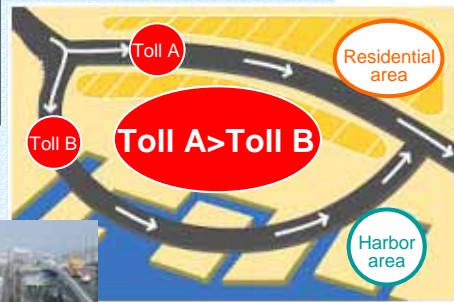
(4) Social Changes to be Effected by ITS

1) Reversing the negative legacy of motorization : Reducing the environmental burden

- Improving the global environment and roadside environment by ensuring appropriate traffic volumes and travel speeds
- ITS as a policy tool, including multi-modal measures and fee measures for traffic guidance



ETC enabled to introduce diversified fee schedules.



Environmental road pricing



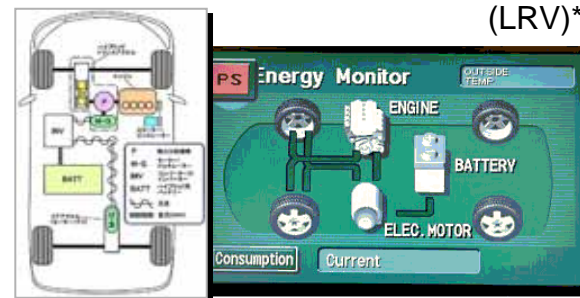
Trucks on a coastal expressway line



Low-floor, non-stop electric bus



Electric tramway in Japan (LRV)*



Eco-drive meter (hybrid car)

* LRV (light rail vehicle): In Japan, high-performance vehicles with low floors and other features used in LRT are utilized as a new kind of electric tram.

Helping to reduce the burden on the global environment and the roadside environment

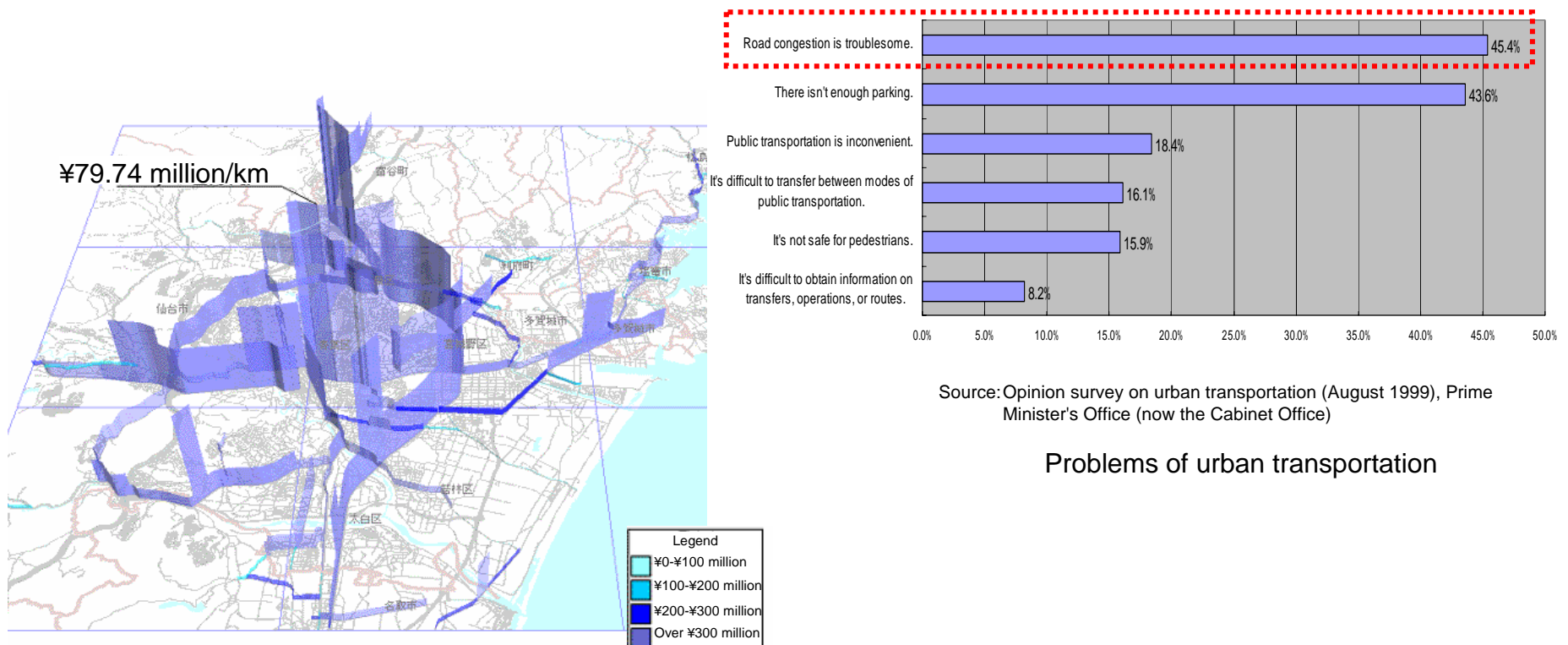
2. ITS in the Second Stage



(4) Social Changes to be Effected by ITS

1) Reversing the negative legacy of motorization : Relieving traffic congestion

- Congestion causes the loss of 3.81 billion every year, the equivalent of about ¥12 trillion.
- In an opinion survey, road congestion was cited most frequently as a problem of urban transportation.



3D map of losses due to congestion in Sendai

* In a 3D map of congestion, the extent of losses due to congestion per kilometer of the surveyed area of a region or city is represented by band height. Higher bands indicate greater losses due to congestion per kilometer, and wider areas indicate greater losses due to congestion.

2. ITS in the Second Stage

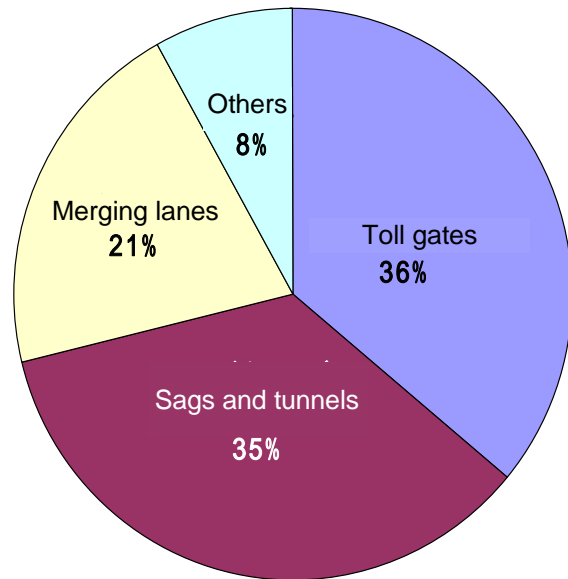


(4) Social Changes to be Effected by ITS

1) Reversing the negative legacy of motorization : Relieving traffic congestion

- Congestion at toll gates, sags*, and tunnels accounts for 70% of expressway congestion.
- Congestion on expressways will be reduced through measures such as ETC.

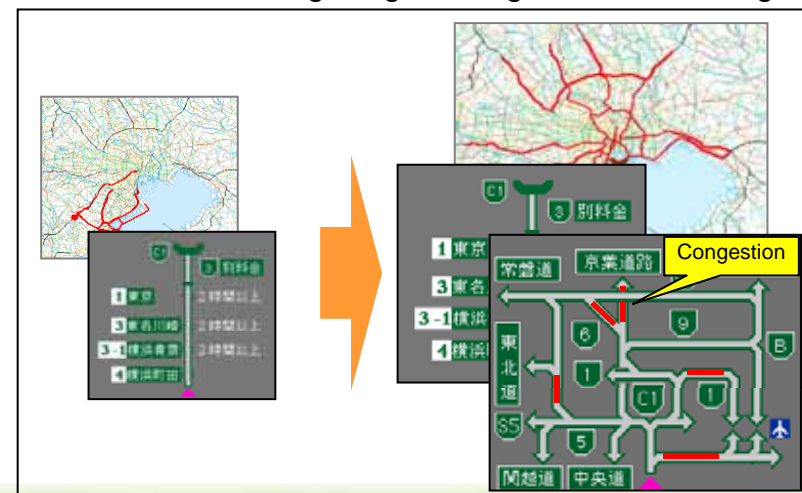
* Sags: the points where the slope changes from downward to upward.



Causes of congestion on expressways



Eliminating toll gate congestion with ETC gates



Detailed information provided by VICS

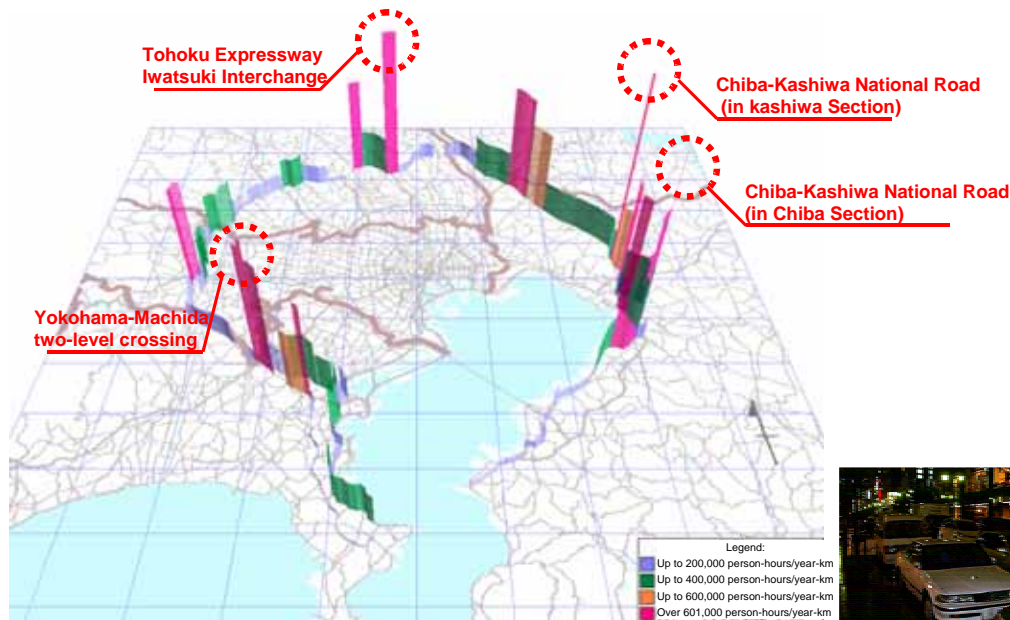
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(4) Social Changes to be Effected by ITS

1) Reversing the negative legacy of motorization : Relieving traffic congestion

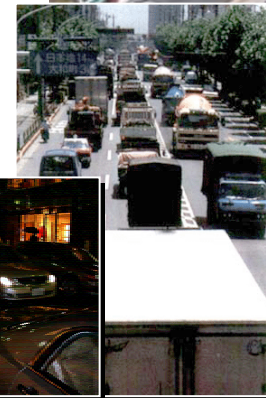
- 3D maps based on probe data to quantify congestion can be used to develop effective measures focused on specific points.
- The diversified fee schedules can guide traffic onto expressways and reduce congestion on ordinary roads.



3D congestion map of National Highway 16



Example of measures to relieve congestion that are focused on specific points



Using ETC to guide traffic onto expressways

Relieving congestion by developing measures focused on specific points and making ETC standard equipment

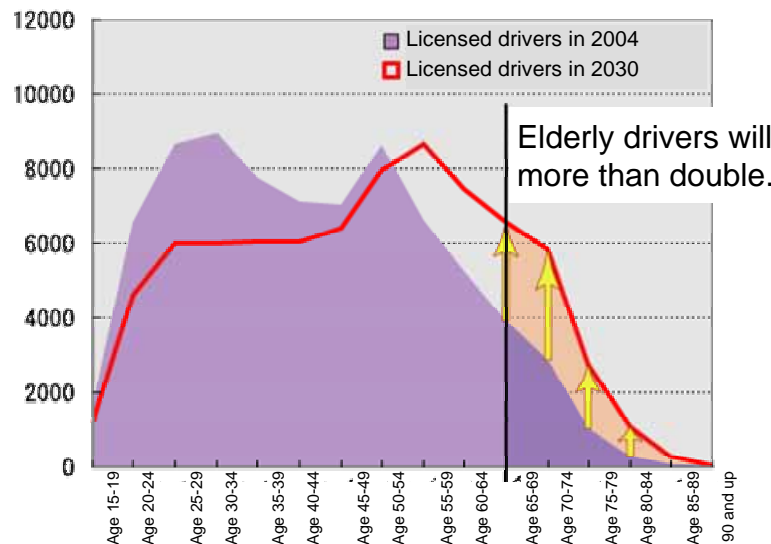
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(4) Social Changes to be Effected by ITS



2) Ensuring mobility for the elderly

- At present, one out of ten licensed drivers is a senior citizen. By 2030, this will more than double to one in five drivers.

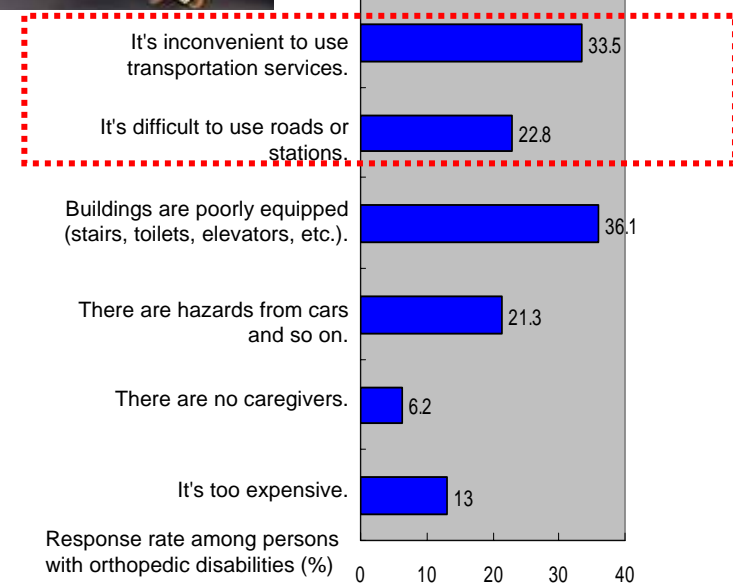


Predicted population and licensed drivers in 2030



Source: Population figures are estimates issued by the National Institute of Population and Social Security Research, an independent administrative agency. Numbers of licensed drivers are estimated according to the percentage of each age group with driver's licenses.

- A great deal of dissatisfaction among the disabled with regard to the use of various means of transportation.



Responses of persons with specific disabilities concerning difficulties when traveling or wishing to travel

Source: Disabled Adults and Children in Japan, Daiichi Hoki

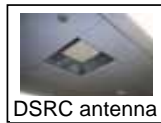
2. ITS in the Second Stage

(4) Social Changes to be Effected by ITS



2) Ensuring mobility for the elderly

- The burden on the elderly and disabled can be reduced by cashless payment, driving support, and access to information.
- Safe driving is promoted for elderly drivers.



Managing entry and exit from a parking garage with ETC



Payment using DSRC at a gas station



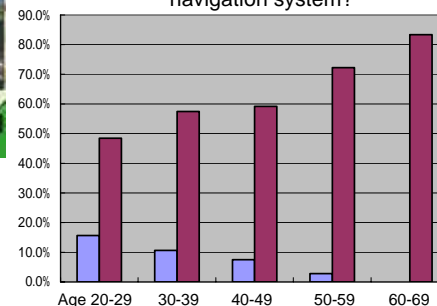
Parking guidance and information service for the disabled



Source: SONY NV-XYZ

- I have begun stopping at more new restaurants than before.
- I can drive with less anxiety because I'm not worried about getting lost.

Question: Have you experienced these changes in your driving since you began using a car navigation system?



Map of barrier-free toilets (Fukuoka Prefecture)

Questionnaire on the effectiveness of car navigation systems

Source: Survey by the Ministry of Land, Infrastructure and Transportation

Source: Web site of the Fukuoka National Highway Office

Ensuring safe, comfortable driving by elderly drivers

2. ITS in the Second Stage



(4) Social Changes to be Effected by ITS

3) Developing affluent communities and lifestyles: Stimulating and revitalizing communities

- Smart interchanges will contribute to regional economic revitalization.
- Doubling the number of interchanges nationwide will bring ¥3 trillion to communities.

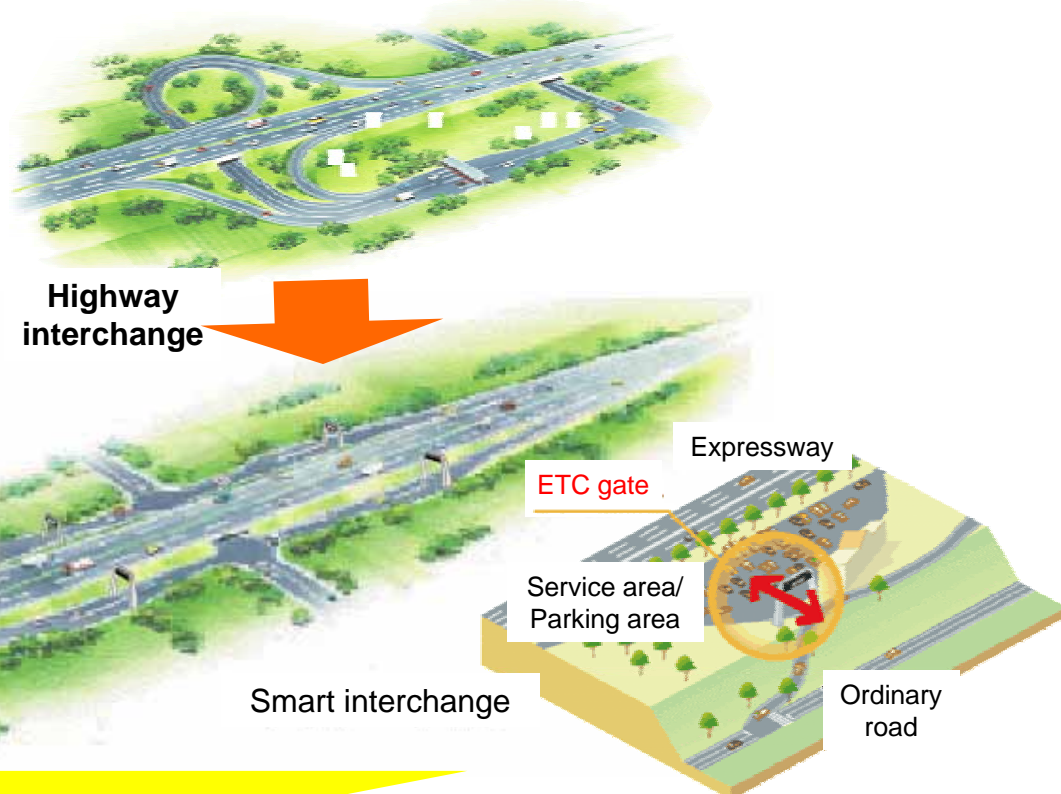
-Number of interchanges: 705

-Average distance between interchanges: About 10 km
 ▶ Twice as long as in Europe and North America (4-5 km)

-Number of municipalities with interchanges: 553
 ▶ About 60% of municipalities passed by expressways

▶ Doubling the number of interchanges will contribute to affluent communities and lifestyles.

Source: Based on "Main points in the 2004 road policy: Toward a more effective road policy," Road Bureau.



Depiction of smart interchange

Doubling the number of expressway interchanges nationwide

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(4) Social Changes to be Effected by ITS

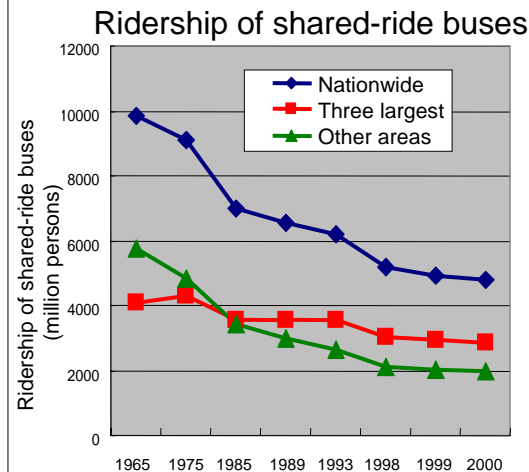
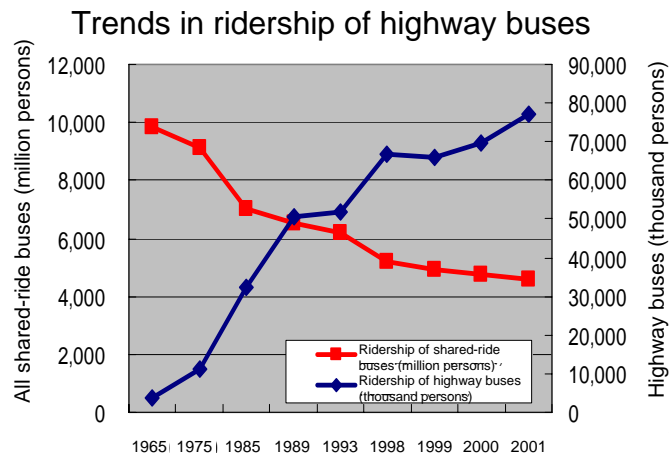


3) Developing affluent communities and lifestyles: Making local public transportation more convenient

- Highway bus ridership is increasing, although bus ridership is declining nationwide.
- On-demand buses using ITS contribute to mobility in small-town communities.



Local shared-ride bus



Highway bus

Source: "Bus Operations in Japan,"
Nihon Bus Association



Source: Web site of the Japan Institute of
Construction Engineering

Ridership of shared-ride buses

On-demand bus in Nakamura, Kochi Prefecture

© Ministry of Land, Infrastructure and Transport, Government of Japan

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(4) Social Changes to be Effected by ITS

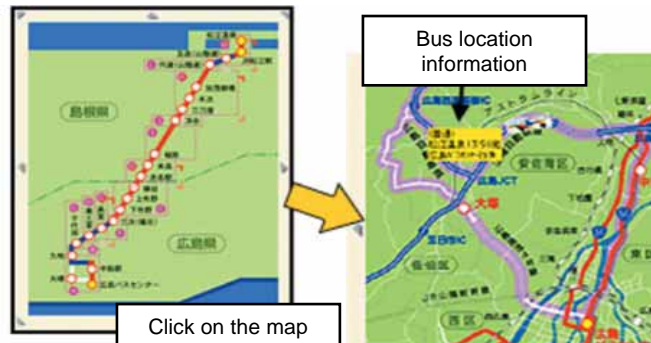


3) Developing affluent communities and lifestyles: Making local public transportation more convenient

- Location information systems for buses and trams contribute to greater convenience in public transportation.



Service providing information on long-distance bus operation
(Hiroshima to Matsue)



Source: Web site of the Hiroshima National Highway Office



Bus location system screen, Niigata Nishi-Kobari line

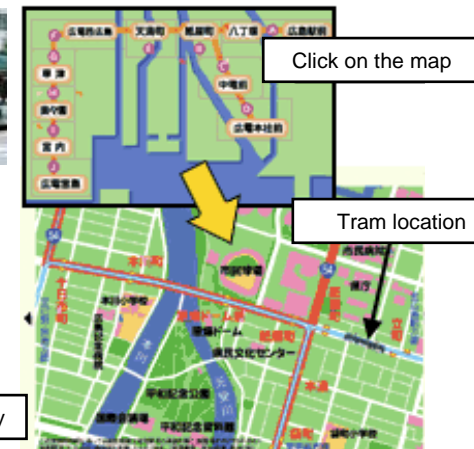


Source: Web site of the Niigata National Highway Office



i-mobility center

Source: Web site of the Japan Institute of Construction Engineering



System providing information on electric tramway (LRV) locations and expected times of arrival

Source: Web site of the Hiroshima National Highway Office

**Contributing to greater convenience in public transportation
as the "legs" of community life**

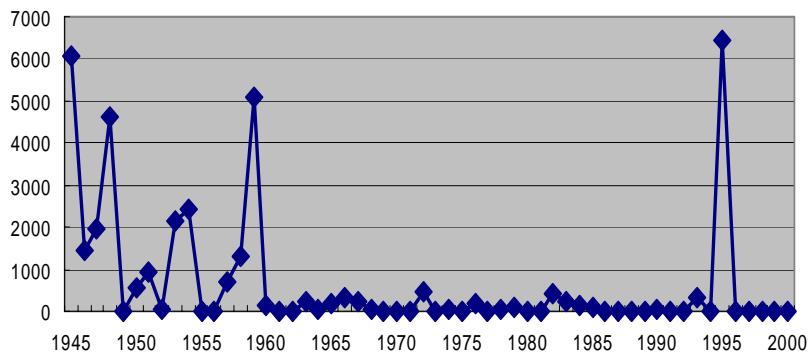
2. ITS in the Second Stage

(4) Social Changes to be Effected by ITS

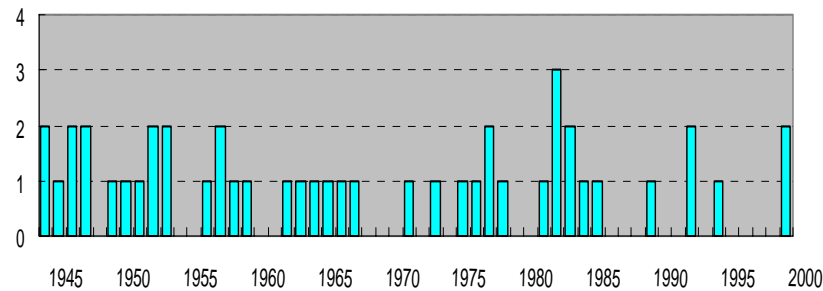


3) Developing affluent communities and lifestyles: Safety

- Disasters still occur frequently, although fewer people are killed by disasters.
- ITS services are used to promote safe, reliable road transportation by providing appropriate information to road users at times such as disasters.



Total number of fatalities and missing persons



Frequency of large-scale disasters

Source: 2003 White Paper on Disasters, Cabinet Office

Advance information accessed by personal computers

Source: Web site of the Ministry of Land, Infrastructure and Transportation

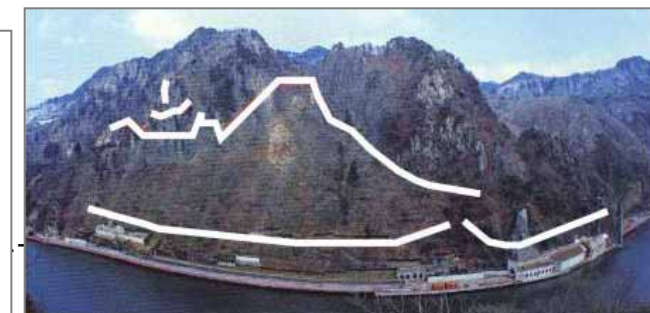


(落石検知)
 (センサー) (センサー)
 落石検知装置

(補助計測器)
 温度計 弾性計

傾斜計 雨量計

岩盤変位計 AEセンサ



Rockfall detection system

Source: Niigata National Highway Office

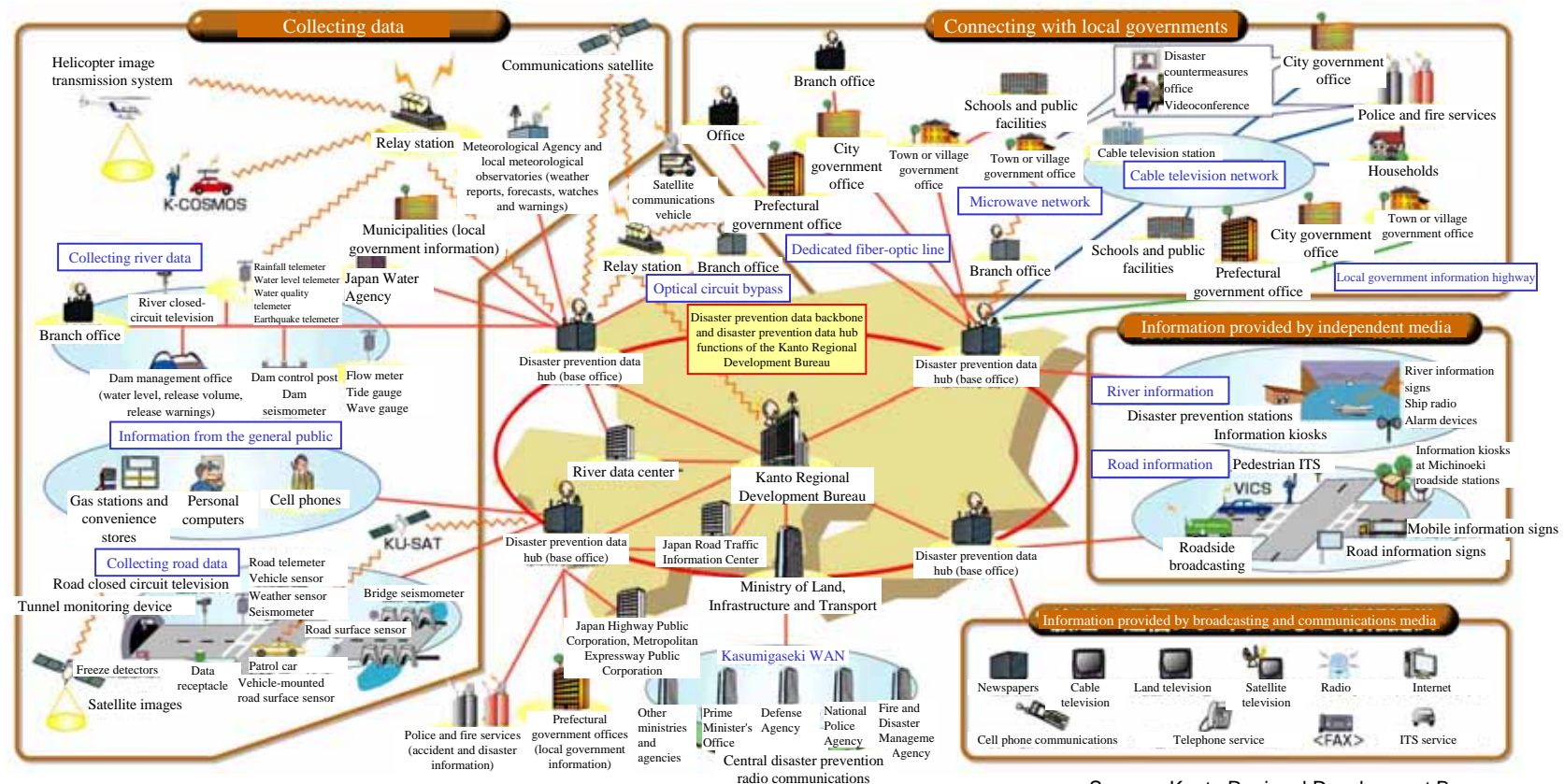
2. ITS in the Second Stage

(4) Social Changes to be Effected by ITS



3) Developing affluent communities and lifestyles: Safety

- A broad-area information network share information among all related organizations and conduct efficient facility management.



Kanto broad-area information network

Source: Kanto Regional Development Bureau

Ensuring highly safe and reliable road transportation

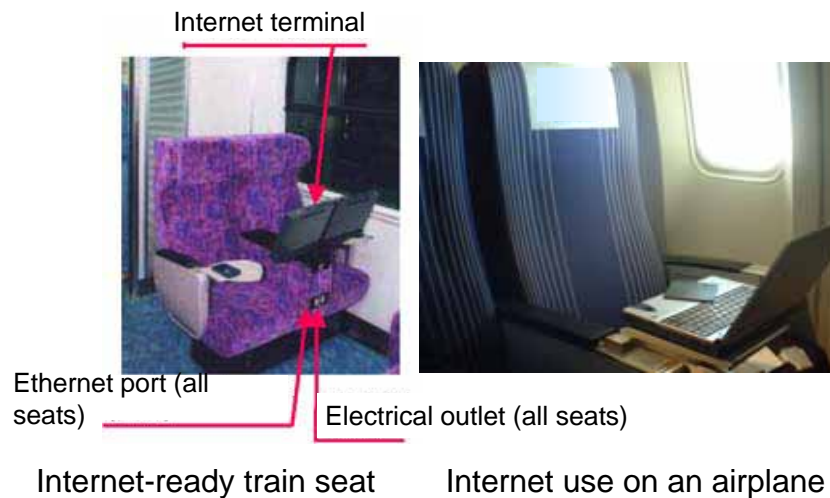
2. ITS in the Second Stage



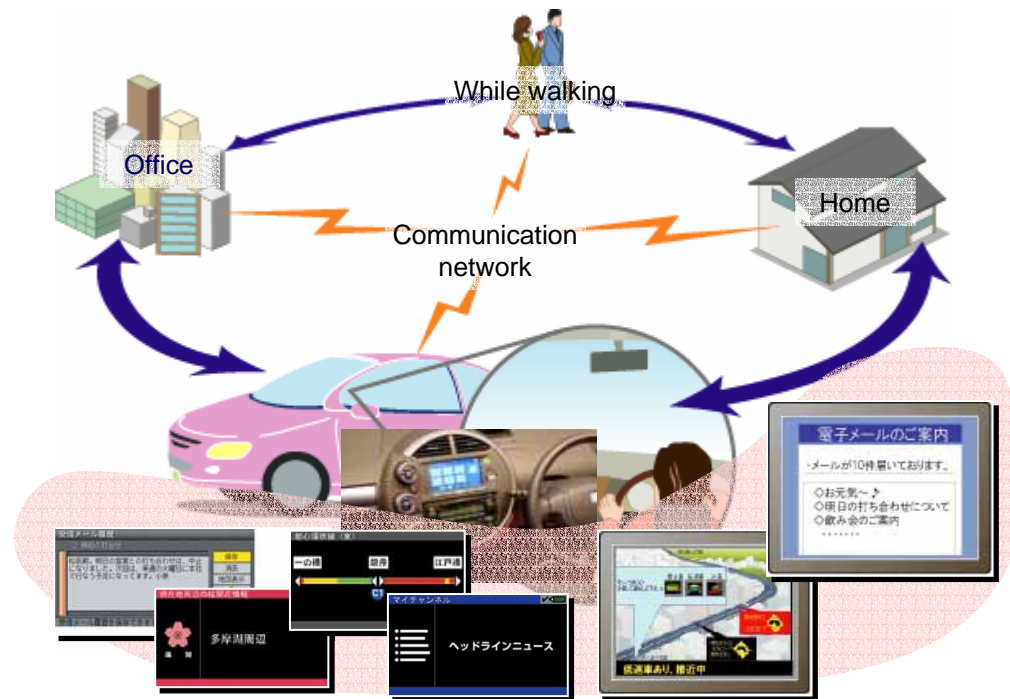
(4) Social Changes to be Effected by ITS

4) Improving the business climate

- Car navigation systems provide seamless access to information services, integrated with cell phones and personal computers. Cars function as spaces integrated with our life.
- Productivity can be improved through effective utilization of time spent in transit.



Source: Press release issued by East Japan Railway Company



**Higher added value in automotive spaces
through seamless information and telecommunications**

2. ITS in the Second Stage



(4) Social Changes to be Effected by ITS

4) Improving the business climate

- Logistics become more efficient through well-planned pickup and delivery and cargo location data management.

- Higher quality of transportation and mobility improves the working environment of the fields of roads and motor vehicles.



More efficient road construction



Precise delivery times



Improved working environment

Promoting greater efficiency in business