Traffic data collected from probe cars

collected by a

taxi operator and

three automakers

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ICT that supports ITS

appropriate spot to pick up passengers.

11, 2011, ITS played a very big role in

putting together data from probe cars

Automakers gather data such as where

those drivers went and at what speed.

Honda Motor Co. collects information on

sudden braking. These data are collected

and sent to information centers and the

service of informing drivers about traffic

The Cabinet Office started a project

jams and safer routes began.

accelerating the speed of turning

(vehicles installed with equipment

transmitting road information to

disseminating information on evacuation

sites and transportation of aid supplies by

Moderator: In the aftermath of March

japan times forum on ITS

Safely moving people more efficiently can help society

Intelligent Transport System, or ITS, is a general term referring to a system that, simply put, makes everything about traffic better through the use of information technology. Examples of ITS that are already commercially available and familiar to many consumers are car navigation systems, which show drivers directions to destinations, traffic information and other information via GPS, and the electronic toll collection, or ETC, system, with which drivers do not have to stop and pay cash at toll booths of expressways

In more "intelligent" ITS technology, probe cars in which drivers provide their driving data were very useful in finding roads that were not damaged by the disasters of March 11, 2011, making it smoother to transport people and aid supplies to disaster-stricken areas.

To discuss the past and future of ITS, The Japan Times earlier this month brought together three prominent figures involved in the industry. They were Hiroyuki Watanabe, senior technical executive of Toyota Motor Corp.; Masao Sakauchi, director general of the National Institute of Informatics; and Kazumasa Fujie, chairman of the Information-Technology Promotion Agency,

Akira Takahashi, an editorial writer and senior feature writer of Kyodo News, served as moderator of the discussion, excerpts of which follow.

General thoughts

Moderator: First, will you tell us some general thoughts on your respective fields? Masao Sakauchi: The National Institute of Informatics is similar to a university. In information technology, we create a platform (basis) and universities turn it into a practical form. The mission of information—security issue from a consumer point of technology is changing and is in the third

In the first paradigm, the mission was to make computers. In the second, it was to create the Internet and a cyberworld and make use of them. Nowadays, we are in the third paradigm to involve the cyberworld in daily life and create a new value. Cars can be exactly that and ITS (Intelligent Transport System) is the typical example

For example, the cyber and physical worlds must integrate in fields where information technology has the potential to play a main role, such as energy environment and agriculture. I call it a "cyber physical system." However, it would not be enough to create what we are told to create efficiently, and thus we must continue to do new research and train people to help the system evolve.

Hiroyuki Watanabe: I have been developing cars. The first ITS product was the car navigation system and Toyota Motor is necessary. Corp.'s CROWN luxury sedan was the first

Cars will change dramatically. Just as Mr. Sakauchi said, the value of cars will change dramatically. I like the word "the third paradigm" a lot. I also think cars can demonstrate a real "cyber physical system." turning point at which cars can become very different products.

Kazumasa Fujie: In the information technology field, security and training people engaged in security is a very big issue that I want to talk about.

History of ITS in Japan view. I also have high expectations that we

First, let's cover the history of ITS. The first stage is from the 1970s to 2004, when the ITS World Congress was held in Nagova and the second stage is from 2004 to now. I would also like to ask why Japan has become the leader, or pioneer, of ITS in the world, as can be seen in Japan's car

Fujie: Traffic accidents cause a lot of njuries and deaths today. In front of the police station at Sakuradamon in Tokyo is displayed the number of deaths from traffic accidents. It was about 10,000 across Japan per vear. I still remember Toyota's Honorary Chairman Shoichiro Toyoda at the time had said at many car industry meetings that he wanted to reduce that number to fewer than 5,000. From a safety point of view, ITS

navigation systems.

Moderator: Mr. Watanabe, what Watanabe: The annual death toll from traffic accidents was 16,000 in the 1970s. Newspapers then used the word "traffic wars." In short, it was worse than wars, and reducing accidents and making cars safer were urgent issues. ITS is the technology Nowadays young people don't drive cars as that is good for people and society, and to much as before, but, simply put, now is the solve social problems such as safety, the environment and traffic jams. When we first



Japan Times forum in Tokyo on the Intelligent Transport System, or ITS, on Nov. 19. YOSHIAKI MIURA

was to enhance customers' convenience and safety Why did we become successful? There

can create new value via ITS. I think it is are three reasons. The first reason is that important to position ITS as a growth small and high-performance models were developed by Japanese makers. As far as navigation systems go, the navigation system in the CROWN in 1987 used a bulky, cathode-ray tube for the display. Because the monitor is bulky, it was really difficult to design cars with navigation systems. However, four years later, the monitor was replaced by an LCD flat panel. Such advancement in technology has reached

made car navigation systems, the purpose

Sakauchi: I also think there are two regardless of cost-performance or cost-

supported the industry then. After the bubble economy burst, the government economy. The money was spent on

components, including displays, has advanced, with LCD displays becoming standard technology. Even if there are consumer needs, nothing will happen unless there is technology to realize the needs. Japan undoubtedly has that

Japanese technology on electronic

Fujie: I can imagine designing a car with

'No other country has experienced the commercialization of ITS as fast as Japan. There are 1,600 ITS spots across Japan. Nowhere else can you find expressways with such a level of IT installation.'

HIROYUKI WATANABE, SENIOR TECHNICAL EXECUTIVE OFTOYOTA MOTOR CORP.

maturity and we have entered the new

phase of evolution. The second reason is that Japan was in to the peak of the bubble economy. I was in charge of designing the CROWN then, but sales of the CROWN exceeded that of the COROLLA (a reasonable family-type car). It would be unbelievable now. There were three models of MARK II: MARK II. CHASER and CRESTA. That is unthinkable now. Retail prices of the car navigation system were then more than ¥1 million and

still people bought it. Monthly sales were

infrastructure that enhances safety and is eco-friendly. Those were very easy for taxpayers to understand, and thus, many Government ministries and agencies were each proposing to establish such infrastructures. Such a background was very much appreciated as well as created some challenges for the next generation in the second stage.

I think the electronic toll collection, or ETC, system and other ITS products became successful because of the technological excellence as well as the role navigation systems, we (engineers) said we wanted it because it enables us to look at a map and drive safely. But salespeople told

However, the system then used geomagnetism. That, the angle of the steering wheel and driving distance (are information necessary for the system to navigate drivers). Therefore, railroad crossings caused malfunctions in

geomagnetic sensors. But engineers in electronics and car

Cumulative sales of ITS products Cumulative sales as of March 2012 Car Navigation: 50.3 million units VICS: 33.7 million units ETC: 37.6 million units Car Navigation Duration in which reached 10 million 1997 '98 '99 2000 '01 '02 '03 '04 '05 '06 '07 '08 '09 2010 OURCE: MINISTRY OF LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM



The new version of Pioneer Corp.'s Carrozzeria car navigation system allows drivers to change the display with hand movements without touching the screen. KYODO

industries worked hard during the four years after that and developed the system using the global positioning system, or GPS, instead of geomagnetism. Map matching, digital maps and all other things

information centers to share it with other cars) owned by individuals and data from were integrated with GPS. That is why the fixed sensors owned by the government. navigation system that came out in 1991 How do you assess this? Watanabe: There used to be only fixed was not very different in functionality from the system sold now. The precision level equipment collecting various data from was also not much different. cars. Nowadays, we have probe cars. Each Navigation systems came out of many car maker has in-house probe systems.

things developed in the 1980s. Research on those other than navigation systems had been in progress, but commercialization had not. Those have finally become visible to the public since 2004. Simultaneously, the government came up with the IT innovation strategy, in which driving safety support systems, or DSSS, ITS spots and many other ideas were proposed. Also,

investment into something practical and useful to society. The nation's R&D investment was budgeted at something like ¥5 trillion a year when Taro Aso was the prime minister, but was not really turned into practical use. The government chose realization of practical use, and ITS was one and milliwave radars will enable on including ITS in the five projects included issues of safety, reduction of carbon dioxide emissions, local revitalization and creation of a new

> probe data came from NEC Corp., which Mr. Fujie was working for, and the University of Tokyo. If we collected a lot of probe data, it would be extremely useful. Therefore, each carmaker should compile the data. Then, if that data and data from taxi operators and the government are combined, we can do something really big. Let's create an information base on a national level. I don't think such discussions take place anywhere but Japan. If you talk about this to people around the world, they will be really surprised It's the prelude to what is now "big data."

Companies understood and agreed to this. Companies said they would cooperate in data collecting. But they said they would compete in providing services using the data. Companies took this proposal to the government. But the government said there were difficulties. The government wondered whether such data were trustworthy. Since January 2011, companies have begun working together to create government, "Look, we can do this much."

Four companies — a navigation information company and three carmakers **Sakauchi:** Some 500,000 people visited — provide data. They collect probe data 24 hours a day. On a map of Japan, the data will give information on every little remote road. We were saying we could do something magnificent with this.

Then March 11 happened. If we do it 24 hours a day, we will know what roads are not damaged. By using this, people in Tohoku went to evacuation venues, police could function and the transport ministry could transport aid supplies. The transport ministry said this project had no problem showing its achievement, but the roads used may not have been roads allowed to be used. The ministry thus requested that navigation systems add information such as at an initial stage of design and traffic restrictions, road blockage due to landslides and other information. Meeting that request, the system will come to near perfection

ITS Japan currently says in consultation with the government that we must create maps for each city that can be used by residents and rescue teams in case of

Core of the new infrastructure

Sakauchi: As Mr. Watanabe said, after March 11 people began to recognize the ossibility that ITS information and technology can develop into social infrastructure with bigger value for disaster prevention and other activities, instead of only for easing traffic. Cars are very important factors in the concept of a smart grid. Information is useful in case of

Traffic plays a very big role in societies o cities. Traffic must be integrated with infrastructure and other information. We shall call it the third stage. Things should be that way after the ITS World Congress in Tokyo next year. We shall call that "Open

Watanabe: Regarding the third stage that Mr. Sakauchi mentioned, one point is the relation between energy and ITS. Cars' ability to generate and store electricity comes very useful at the time of disast It can be used as an emergency power source for households. For example, a nextgeneration fuel cell will have the capacity to provide power to evacuees in a school gym or about five days. ITS and cars will supply energy efficiently. Such a time will come. ITS and cars will contribute to a demand supply balance of energy. That is one of the

The second point is automated driving, which may sound too radical. Cars installed of them. ITS is good for society. Discussion collaborative driving with other cars, preventing collisions, enhancing mileage and easing traffic jams. Beyond that, we can foresee automated driving. Thus, innovation will take place in these kinds of fields. Things like this, as I mentioned at In such discussions, the idea of collecting the beginning, will change the value of

> Fujie: That is possible technologically. But making rules on how to use the technology is necessary. The pace of innovation is really fast, and thus we must make rules. We must ensure security and safety. Especially on security, ordinary people are using smartphones, tablets and other devices on a daily basis. Ordinary people are beginning to understand rules on security, such as locking such devices. We should also make ordinary people understand rules on ITS For that. government ministries and agencies should work together. The idea that security equals police work only is very short-sighted. In making rules, every related ministry and agency must work together. **Moderator:** A framework in the

government is necessary **Fujie:** If you tell the government, they say, "The Cabinet Office does it". I expect The Cabinet Office to take a leadership to build a framework. Otherwise, Japan will something about which they can say to the fall behind even though we have the technology.

> Further evolution of ITS **Sakauchi:** Large Asian cities share the same problems. ITS Japan now has alliances with the Asian Development Bank and many other organizations in Asia. We will make contributions in solving the

problems as a senior partner in Asia, or

grow together through solving problems. **Fujie:** Regarding security, cyber-attacks and other related problems still exist. We as an information hub work on various information with many companies with which we have signed nondisclosure agreements. In discussions on security, the first thing to make sure is not to create vulnerabilities. Do not create vulnerabilities development. My people and I work in this

Some experts say to me, "Oh, you say it because the results of your work prove it so." That may be true, but I would say it is important to make it easy to come up with intermeasures if we find vulnerability in a later development phase. On security of smartphones and other devices, security

be competition in personal services. Safety is one of a car's most important considerations, but service is another be able to come up with countermeasures

Cyber-attackers enjoy themselves so calling. I believe there will be fierce competition, such as with a pike and a shield, between cyber-attackers and cyber-

It is possible that cyber-attacks may develop to be life-threatening to some people. Coverage of ITS may broaden and we may have to think about this. Thus, we will have to set thorough rules. Also, we must strictly follow rules if we decide to

Sakauchi: But in fact, Japanese worry too much about Internet security. The scale of damage (due to Internet attacks) in Japan is 10 times smaller than that in the U.S. **Fujie:** But the degree to which Japan

times as much as the U.S. **Sakauchi:** That is why we need to calm be expected. But we sometimes become too themes Mr. Fujie compiled: "proposing emotional, and the amount of risk always necessary for the whole of Japan, including

Watanabe: I agree. We have taken on challenges all the time. We have already with the world, I believe we can create a world beyond imagination.

Fuile: The fact that we can obtain information we could never obtain until now means creative people can come up able to. Life will become very convenient. Watanabe: In the information and

much doing what they do. There are people who think causing chaos to society is their

prohibit something and strictly crack down

down. It may be difficult, but we must becomes all or nothing. I think it is the government, to take on risks or challenges with good intentions.

achieved innovations that do not have risks.

japan times forum on ITS

In ITS products, there will be various new services from now on. There will especially mportant factor. And then it is important to

measures are added after vulnerabilities are

when vulnerabilities are found.

makes a big deal out of cyber-attacks is 10

When cars that have mobility are connected focuses on proposing the idea of an ITS

with business ideas nobody has ever been

ITS Congress in Tokyo Watanabe: One of the themes of the ITS World Congress in Tokyo is that of the world's eighth largest country in gross

domestic product. We are operating traffic and industries this smoothly in such conditions. This will become a good role model for Shanghai and other megacities.

share a target. I am thinking we can share a target on how to create value in cities, society and residents' lives. I want to contribute to Asian countries in urban areas with high population densities and other social infrastructures, a feature shared in Asia and not found in Europe or North America. That will end up being a business

Fujie: Japanese, Chinese and South Korean relations are said to be worse than ever now. But in Northeast Asia, these three countries will be very strong if they team

concrete measures tackling issues of environment, energy and traffic," lives and active economic activities."

and "proposing the future of an ITS The Tokyo Metropolitan Government megacity to Asia and measures against

Moderator: The Tokyo government

Sakauchi: Also, data on cars driven by individuals are useful to society, but we neighboring prefectures. Also, an important should also protect privacy for people who

ales in the U.S. are more than double in Sakauchi: Looking back through history,

the U.S. conducted growth strategies on finance and information as cars and other industries became big. The strategy proved successful. Thinking about how we should live our lives and how the society should be, you cannot live in a cyber-world, only sitting in front of a monitor. You will move. You will interact with people. You can make money through business but will also go sightseeing. You will also want to help people in society. IT must be integrated into ordinary lives. In the word "cyber physical," physical means something similar to the pasics of human life. We empower it in the cvber-world.

ommunications technology (ICT) field,

Watanabe: Automakers also have to

Sakauchi: In terms of business, companies can integrate into the local places in which they do business. Japan should create IT systems acceptable in such local places and global standards on which they can base the system. **Fujie:** Lately, Japanese companies and

cademia are aiming to establish nternational standards. International standards are important, but we say Asia is mportant. In Asia, some new cities may be created, but in most cases, cities develop by adding something new to existing things. In that, Asia is in a situation very similar to Japan. I think Japan should appeal this

Sakauchi: ITS Japan has two faces. In the Asia-Pacific, it has to be the leader in technology and experience. In Japan, it represents Japanese companies. ITS Japan acts like that. In traffic, energy and urban development, ITS is deeply connected and can contribute. In such fields, large cities in apan and Asia share the same issues. So we set ourselves in the right direction on providing appropriate services in appropriate areas and creating a growing system that can develop in the areas.

megacity. The Tokyo metropolitan area has 36 million people. That is equivalent to the

Sakauchi: This is a good opportunity for Japan to deepen cooperation with Asia and

Watanabe: One last thing. I would like to "proposing a future society with rich civil "promoting development of ITS globally"

assumes an earthquake right underneath

important. ITS will evolve around these **Watanabe:** Of course. Tokyo wants to do it in cooperation with municipalities and

The Meishin Expressway, connecting Nagoya with Kobe, is jammed with cars as people return to their hometowns for the Obon holiday, in this photo taken from a copter above Oyamazaki, Kyoto Prefecture, on Aug. 11. KYODO Road traffic fatalities per 100,000 population IRTAD: International Road Traffic and Accident Database (OECD

point is to reduce traffic accidents to zero. This also is related to Asia. The World Health Organization said traffic accidents are about the ninth biggest cause of death. The WHO warns traffic accidents will rise to use personal data and maintain privacy at fifth place by 2030.

safety. Also, another thing I find memorable

is the discussion on how to lead into the

third stage. Discussion on security is also

Conclusion

cannot be identified no matter how deep **Moderator:** ITS is for people, society and someone digs into the data. These pages have been produced with the support of the Ogasawara Foundation for the Promotion of Science and Engineering. which was founded by Toshiaki Ogasawara,

the chairman and publisher of The Japan

Times and the chairman of Nifco Inc.

do not want their data to be used. That is

why the concept of safeguarding privacy,

technology, is important. It is technology to

the same time. We must use data in a way

that the person from whom the data comes

which is said to be a new information

Brief profiles of the participants in The Japan Times forum on Intelligent Transport Systems



Hiroyuki Watanabe: Watanabe, senior technical executive of Toyota Motor Corp., joined Toyota in 1967. In 1989, Watanabe became the chief

engineer responsible for the Toyota CROWN. Named to the board of directors in 1996, Watanabe directed Toyota's R&D work on hybrid and fuel-cell vehicles. In 1999, he was made a managing director, and in 2001, a senior managing director. During those years, he was responsible for R&D, product development, IT and ITS development and other operations. In June 2005, he became a senior

technical executive, and since June 2009,

he has been the chairman for ITS Japan.



Masao Sakauchi: Sakauchi is the director general of the National Institute of Informatics, Japan, since 2005. He serves as the vice chairman of the Information and Communications Council of the Ministry of Internal Affairs and Communications, and was a member of the Science Council of Japan from 2005 to

Before then, he was a professor at the Institute of Industrial Science at the University of Tokyo and the director general of the Institute of Industrial Science at the University of Tokyo. He has written more than 450 refereed papers in the research fields of multimedia database and ITS.



the Information-Technology Promotion Agency, Japan. He obtained a bachelor's degree in commercial science at Keio University in March 1967 and began working for NEC Corp. in April that year.

mainly engaged in sales of defense systems and other equipment to the member of the board.

as a board member at NEC. He was the executive adviser when he left NEC to take



writer and senior feature writer of Kvodo News, entered the newswire after graduating from Waseda University. He was assigned to the Toyama and Nagoya branches and then moved to the business news section in Tokyo He spent almost his entire career at NEC, covering the Bank of Japan, the Finance Ministry and other organizations.

He was transferred to Washington, D.C., government. He became an NEC executive from 2000 to 2003, experiencing the Sept. member in 1998 as the vice president and a 11, 2001, terrorist attacks. Back in Tokyo, he attained various managerial positions. Since then he assumed various positions

He has extensive experience reporting

on the banking sector and financial politics and has a keen interest in automobiles and



Japanese electronics maker Pioneer Corp. unveils a new car navigation system in May that allows the driver to see information

projected on the windshield as demonstrated in Tokyo. KYODO

From left, Hiroyuki Watanabe, senior technical executive of Toyota Motor Corp.; moderator Akira Takahashi, an editorial writer and senior feature writer of Kyodo News; Kazumasa Fujie, chairman of the Information-Technology Promotion Agency, Japan; and Masao Sakauchi, director general of the National Institute of Informatics meet at a

reasons why car navigation systems became a navigation system using a cathode-ray tube must have been really difficult. But a success in Japan. As Mr. Watanabe said, business became sustainable in the initial stage because people back then bought cars with full options, including car navigation,

issued many deficit bonds to stimulate the

Watanabe: The third reason is engineers

demonstration experiments began. No other country has experienced the commercialization of ITS as fast as Japan There are 1,600 ITS spots across Japan. Nowhere else can you find expressways with such a level of IT installation.

baseball. They think being able to watch TV think they were triggered mainly by the fact in a car is very valuable. We agreed to that. that the ITS World Congress was held in Japan in 2004. Since then, collaboration between industry and academia has begun on ITS spots and other areas. The best success story is, I think, ITS spots. Various information is collected from cars to the spots and sent from the spots to cars. I

> **Sakauchi:** Since a few years before 2004, while infrastructure building has gone well, the increase in prevalence of ITS products has slowed. I wasn't sure if ordinary people understood the significance of ITS. It was then that we needed to reconstruct the ITS industry in reparation for the second stage. The ITS Global Congress in Nagoya in 2004 was an appropriate target for that, and we had planned to announce the "Japan ITS"

don't think any other countries have done

Declaration." Thus, we worked really hard compiling the declaration. Watanabe: The number of cars with navigation systems is more than 50 million. It took 15 years to get to 10 million and the pace accelerated around 2004. It took seven years for the number of cars with the availability of the Vehicle Information and Communication System, or VICS, to reach 10 million and four years for ETC. Now the numbers for VICS and ETC are more than 30 million each. The fact that this many people have these ITS products means they are developed from the viewpoint of

the ITS Global Congress in Nagoya.

companies can give taxi drivers proper

They really liked this feature. Probe

information on rain will come to taxi operation centers, which will come up

instructions when, for example, it rains.

with an instruction to deploy a cab in an

International conferences with some serious subjects attracted 5,000 people other events including exhibitions had 50,000 people and other related events elsewhere in Japan attracted 500,000. **Fujie:** It was like a prelude to the Aichi Expo in 2005. We thought about various events with the idea that we needed consumers to participate otherwise people would never buy ITS equipment. I went to a taxi company to talk about how to make use of information from probe cars (vehicles installed with equipment transmitting road information to information centers to share it with other cars). By using the information, taxi