Feature

Technical Development at JR East

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JR East R&D Targets

As part of its vision for the future based on its *New Frontier 21* medium-term business plan until 2005, the JR East and its subsidiary companies adopted the slogan 'Innovation of Business through the Creation of Technologies' with the aim of establishing the world's No. 1 railway system based on safety, convenience, promotion of advanced technologies, efficiency and comfort.

To achieve these aims, the R&D focus is on improving safety performance and reliability of transportation by developing a new railway system '**e@train**' that will offer customers new value-added services at lower costs. Our vision for the future is to create a railway system based on new technologies centred on a variety of new services that can be offered at each station interface. Clearly the **e@train** service contents will change as technology progresses but at present, the significance of the e in **e@train** stands for railways offering ease-of-use, economy, entertainment, enjoyment, excitement, environment-friendliness, etc.

Concrete Research Targets and Important Development Themes

Six concrete themes have been targeted around the main items of safety, service, cost reduction and environment as described below.

No injury to passenger & no fatality to employees

To increase the safety levels of the entire railway system, we are promoting R&D focused on establishing a revolution in railway safety systems through positive adoption of new technologies such as IT, as well as fundamental railway technologies and theories. The concrete themes are discussed elsewhere in the other four articles in this issue of *JRTR* written by directors at the Research and Development Center of JR East Group.

One example is the next-generation ATACS train control system being developed to slim down the number of track circuits and track-side equipment by using radio technology to determine train position; final prototyping is underway with the intention of putting ATACS into service.

Quicker restoration of transportation services in a delay & accurate information service to customers

Sometimes and for a variety of causes, train services slip from the timetable and it is very important to get services back on time and also to offer waiting passengers up-to-date and accurate information about what is happening. As a result, we are progressing with development of an Train Traffic Reacheduling System that performs efficient adjustment of operations using dispatch orders, along with an Operational Changes Transmission System. In addition, we are also developing in-station equipment for visual display of information about alternative routes as well as trying to

Figure 1 Concept of e@train

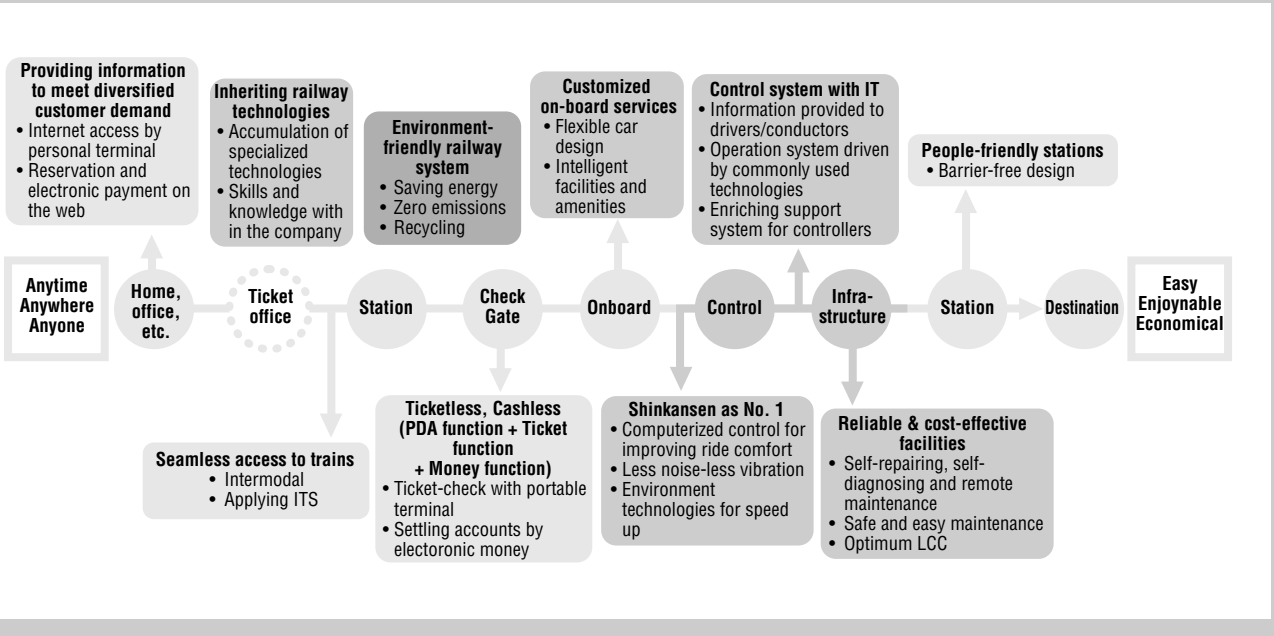
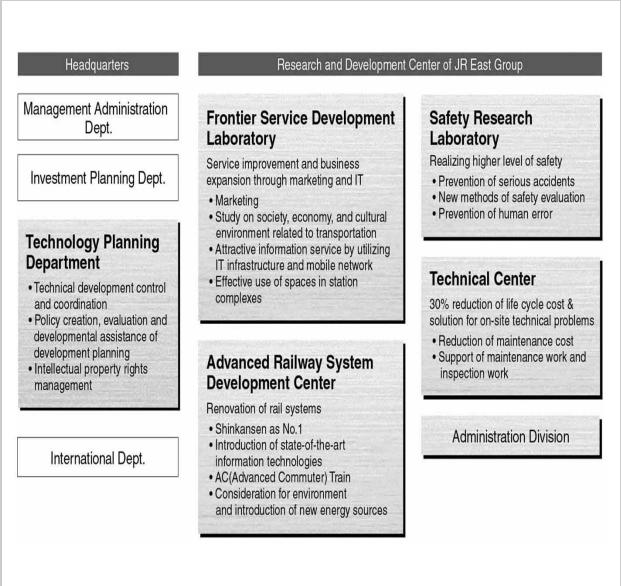


Figure 2 Development Targets

Figure 3 R&D Organizations



offer information available from other information channels.

Pursuing customer satisfaction by fulfilling diversified needs

We have created a new service vision based on market research and predictions for future society; our aim is to adopt the best mobile environment using the latest technologies. Some concrete examples are described on page xx to xx in this issue of *JRTR*.

In addition, our latest prototypes of the next-generation Advanced Commuter (AC) Train now have an on-board Information System supporting Internet access and email services. We are also testing ramps for passengers who use wheelchairs as well as movable seating that can be changed from a bench configuration to a cross configuration to increase the number of seats. Moreover, we are researching overhead structures to reduce noise and vibrations under elevated structures and improve the track-side environment.

Shinkansen as No.1

In addition to speed, we are also undertaking R&D into other aspects of building the world's No. 1 shinkansen, such as in-carriage comfort, environmental impact, etc. Some concrete examples are described on pages 32 to 41.

More reliable and cost-effective rolling stock and facilities

An important theme in the railway maintenance field is Optimization of Intersectional Technology. In concrete terms, this means developing low-maintenance high-reliability facilities and some good examples are described on pages 48 to 53.

The AC Train mentioned earlier is a good example; the carriage structure has been simplified by using articulated bogies and a double-panel skin structure. Manufacturing costs have also been reduced by cutting the amount of on-board wiring through use of common commercially available transmission technologies.

In addition, we are also conducting R&D into civil engineering technologies and design methods that will cut construction costs and shorten work terms.

More environment-friendly railway system

At present, we are developing the so-called new energy (NE) train with a hybrid drive system combining an engine and batteries. In the future, we also expect to be introducing fuel-cell technologies.

In the field of stations and high-efficiency energy supply technologies, we are making progress with new power-supply systems (solar, fuel cell, etc.) and storage systems (capacitor, flywheel, etc.)

As an example of environment friendly policy adoption, the AC Train mentioned above uses components that can be easily recycled with the aim of achieving zero emissions.

R&D Organizations

Research and Development Center of JR East Group

The R&D Center was established in Saitama City (Saitama Prefecture) in December 2001 as the R&D base for the JR East group of companies. This reorganized the previous R&D bodies in one locality with four separate laboratories each based on an individual mission. Figure 3 shows the names of the parts of the Center and their main missions and roles.

The Center has extensive test facilities to fulfill its main role as a principal support

Attendees at R&D Symposium (JR East)

for railway operations. In addition to promoting basic R&D for this purpose, it also aims to strengthen JR East's fundamental technologies and evaluation abilities.

Another main reason for opening the Center is to develop human R&D resources and to form links both inside and outside the group for disseminating information about railway-related research.

Cooperation with other bodies

Railway R&D is not just about harvesting the fruits of JR East's know-how and human resources—it is also very important to form links with other research organizations and companies to exchange information and ideas about leading -edge technologies and know-how. In system and hardware research, there is a long history of joint and contract R&D with other manufacturers, but in addition to this work, we are also considering methods of perfecting better links with universities and national research bodies.

Moreover, to further relationships outside the JR East group, we have started publishing *JR EAST Technical Review* (in Japanese and English) from Autumn 2002 with the intent of actively disseminating information about our R&D requirements and results.

JR East's 9th R&D Symposium

In addition to explaining our R&D strategy and results to other people via our *JR EAST Technical Review*, we also hold an annual R&D Symposium with the aim of promoting R&D worldwide by explaining our latest technologies.

The most recent (9th) symposium was held on 17 December 2002. The main theme was 'Building the World's Number-One Railway' and some 500 participants enjoyed a wide range of presentations about safety, efficiency, promotion of advanced technologies, comfort, etc.

The symposium was opened by Mr Matsuda, JR East Chairman, followed by a keynote presentation on the theme of Honda's Dream for the Future presented by Mr Takeo Fukui who is now President and CEO of Honda Motor Co., Ltd.

The other four articles in this issue of *JRTR* are by the following four directors at the R&D Center:

- Mr Takashi Endo—Director of Advanced Railway System Development Center
- Ms Setsuko Egami—Director of Frontier Service Development Laboratory
- Mr Minoru Arai—Director of Safety Research Laboratory
- Mr Hiroaki Inazu—Director of Technical Center

Summary

The JR East R&D Center is working hard towards strengthening its inherent basic R&D abilities for the railway industry and is also positively promoting dissemination of information about new technologies to people outside the JR East group of companies. I hope that the articles about the work of the Center in this issue of *JRTR* will further these aims. More details of e@train, our R&D activities and *JR EAST Technical Review* can be found on links from our home page at http://www.jreast.co.jp/development/english/index.html. ■

Masataka Ushijima

Mr Ushijima was the Deputy General Manager of the Technical Development and Research Department of JR East. After graduating in engineering from the University of Tokyo, he joined the Operations Department of JNR in 1978. He has also held various positions in the train operations and sales departments. He is now the Director of Driver Training Division, JR East General Education Center.