Deployment of the Shinkansen and the high-quality railway service

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East Japan Railway Company

October 14 , 2015

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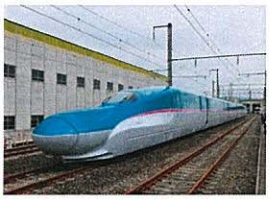
OUTLINE OF JR EAST

▶ Operates All Kinds of Railway Transport

High Speed (Shinkansen)



Metropolitan

Regional

Network: ***7,458*** **km**

No. of Passengers: ***17 million*** **/day**

No. of Trains: ***13,130*** **/day**

Annual Operating Revenue: ***$ 23.0 billion***
(No subsidies from the government)

Net Annual Income: ***$ 1.5 billion***

No. of Employees: ***58,550***

**Numbers are as of FY ended March 31 , 2015* ***Calculated by 1 $ = 120 JPY*

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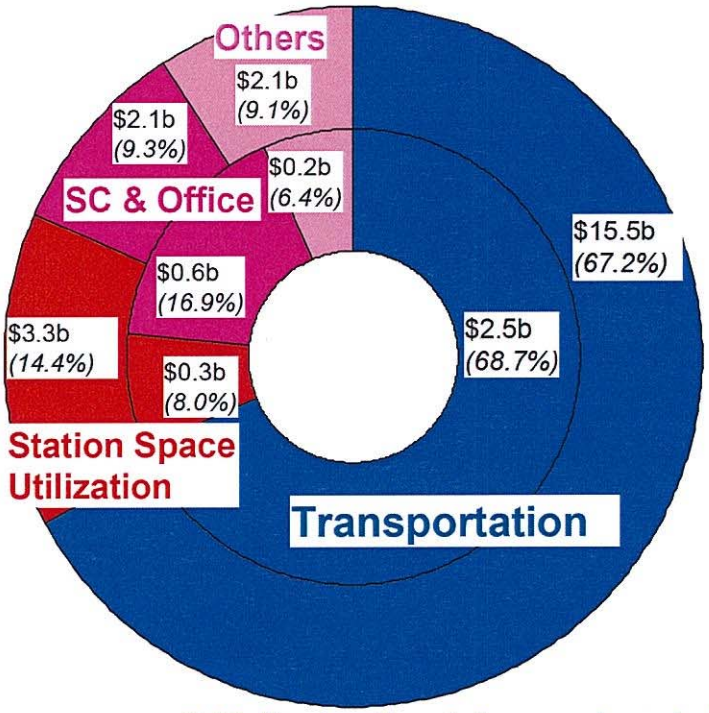
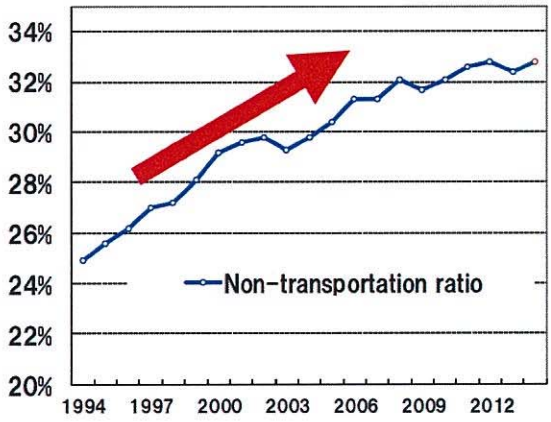
Consolidated Settlement of Accounts

Structure of revenues and incomes

*Outer circle : Operating **revenues***
*Inner circle : Operating **incomes***

FY2014, 72 consolidated subsidiaries





Profit rates are about 15% on both rail business and non-rail business

$ = ¥120

"b" following the dollar numbers indicates "billion".

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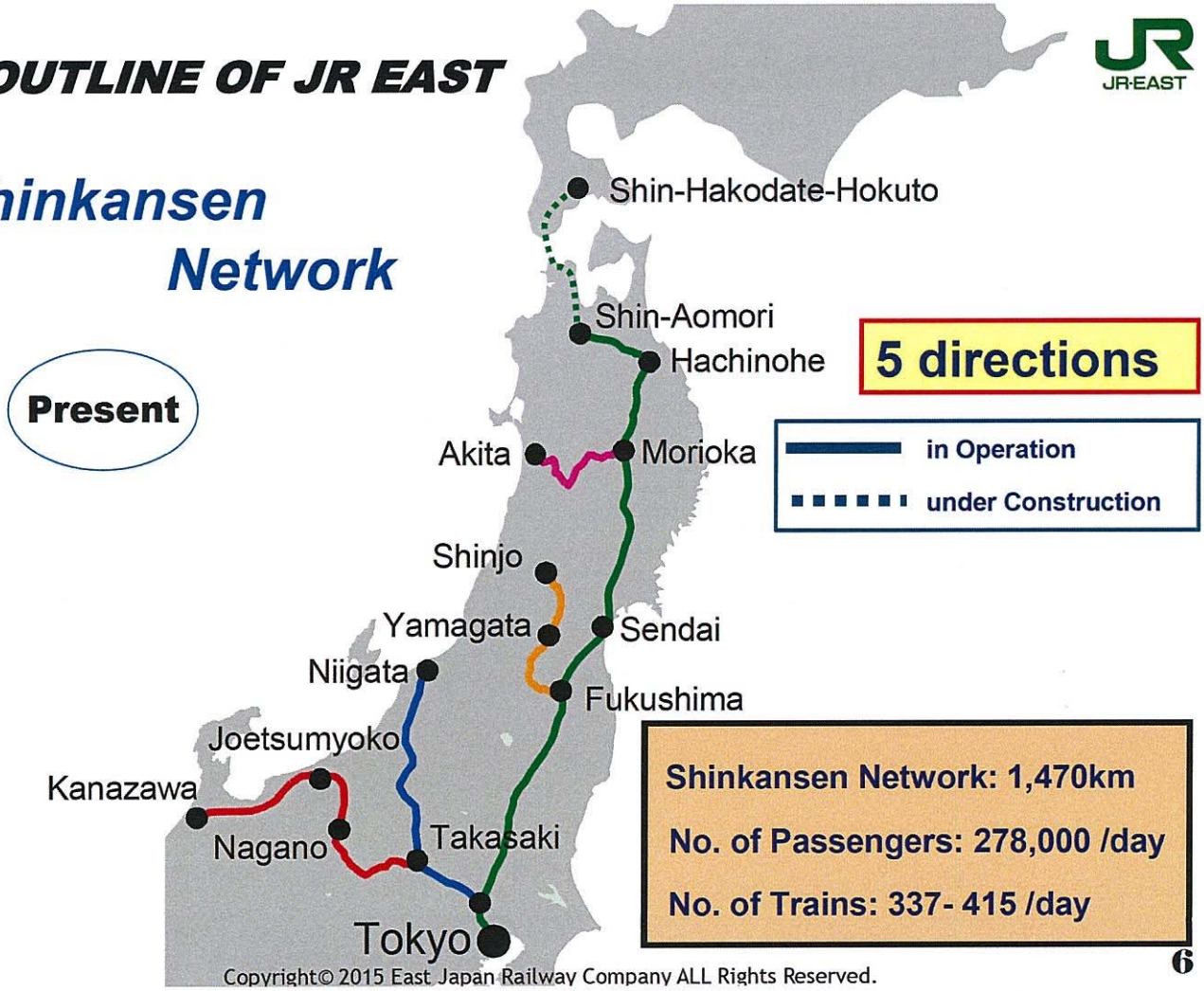
OUTLINE OF JR EAST

Shinkansen Network



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HIGH SPEED OPERATION

March 2015

Hokuriku Shinkansen Extension

Segment between Nagano and Kanazawa has been opened

Number of Passengers in summer (Thousand)

	2015 HSR	2014 Conventional lines	Year-on-year
Hokuriku Shinkansen	933	354	263%

(Joetsumyoko-Itoikawa) July 17 to August 17 (32 days)

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Features of Shinkansen (HSR) (1)

High-speed
Max. test speed : 425km/h
Max. commercial speed : 320km/h
⇒ Shorter trip time

High-frequency Large-capacity
15 trains per hour
1,634 (maximum) passengers per train
⇒Solution for dense traffic

Safety
No. of passenger fatalities: 0 since opening in 1964
Emergency countermeasures against earthquakes, snow, heavy rainfall, etc.

Reliability
Average delay:
Less than 1 min. per train
⇒Punctuality

Environmentally-friendly
Controlling Noise from Rail Car
Less CO_2 emissions
⇒ Contribution to society

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Features of Shinkansen (HSR) (2)

Fast Ticketing
Mobile Suica
⇒ No more queues for ticketing

Comfort
GranClass (more deluxe than Green Car first class; first introduction on our railroad)
No ticket inspection
⇒ Easier for passengers
Through service

Profitability
Revenue from Shinkansen: US$4.3billion (FY 2014)
No support from the government
⇒ Contribution to the nation

Efficiency
Operation
Maintenance
⇒ Low OPEX & CAPEX

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Safety of Shinkansen (HSR)

Safety is the top priority of railway operation, especially for HSR.

1 **Reliable System**

2 **Maintenance System**

3 **Disaster Countermeasures**

4 **Education and Training**

0 fatalities since opening in 1964

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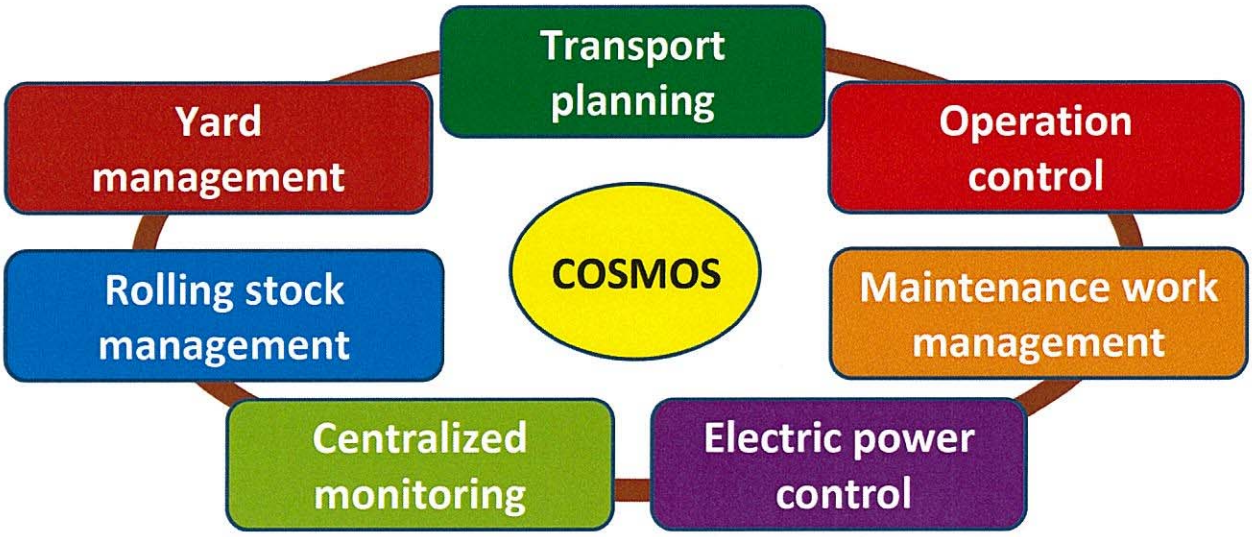
Integrated System for Shinkansen "COSMOS"

7 subsystems working effectively and efficiently to operate the Shinkansen



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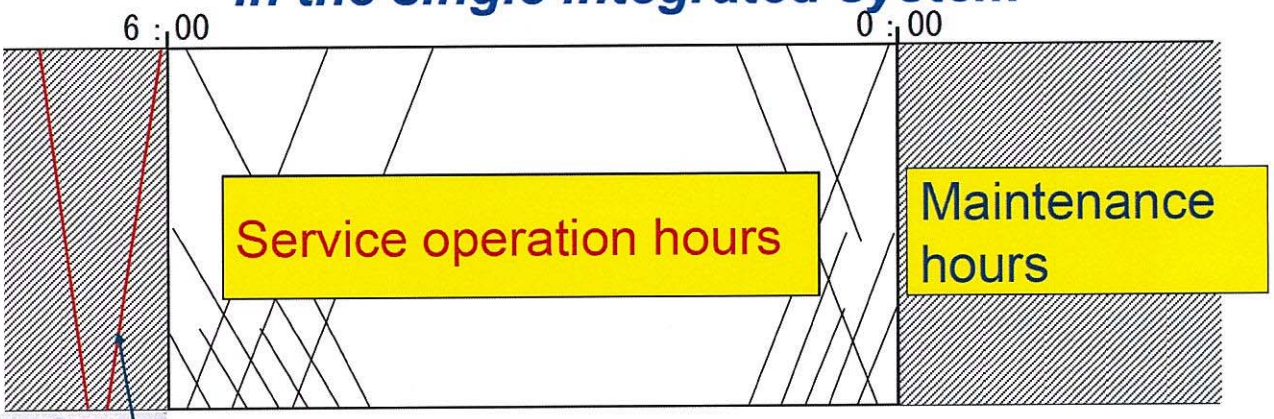
Service operation and Maintenance in the single integrated system



Confirmation car

This is the car that runs on the track after maintenance work is finished, to confirm safety for the first commercial train

- Maintenance work is done during midnight hours, between the arrival of the last commercial train and the departure of the first one. This provides a period of several hours for maintenance increasing the level of safety.

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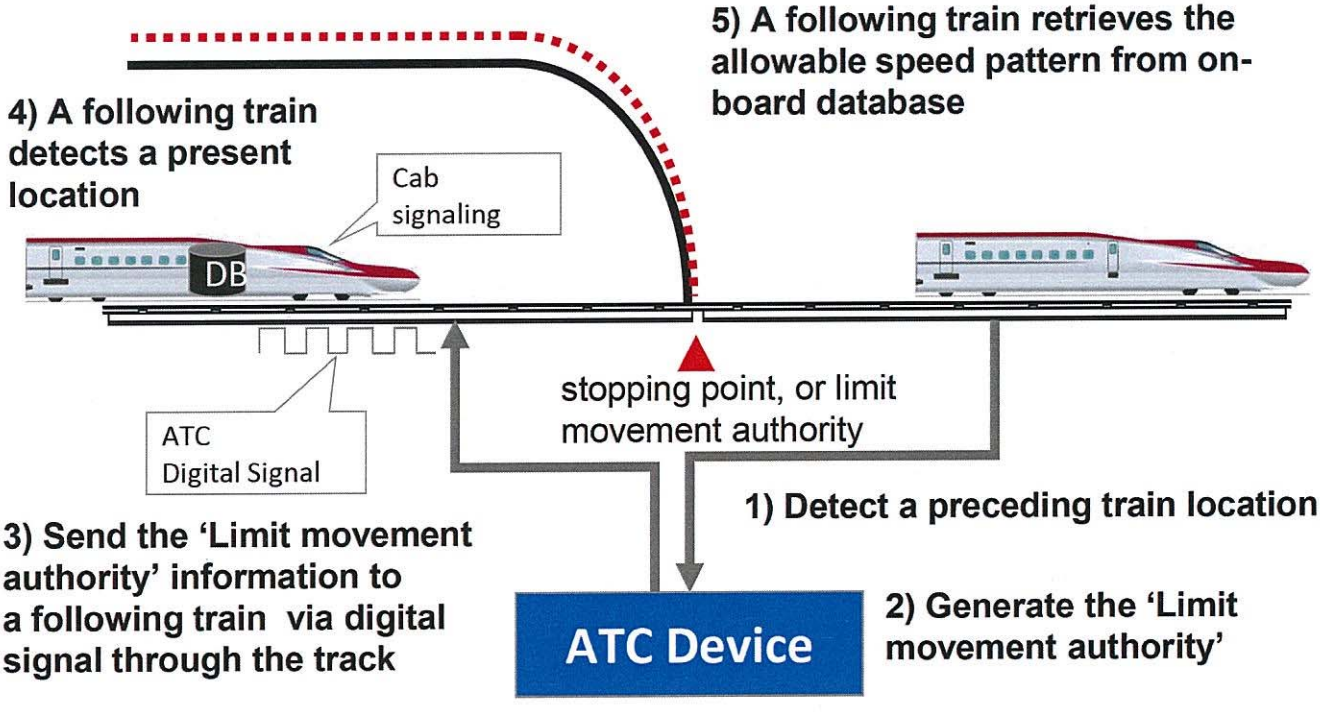
CONTINUOUS SPEED CONTROL BY DIGITAL ATC



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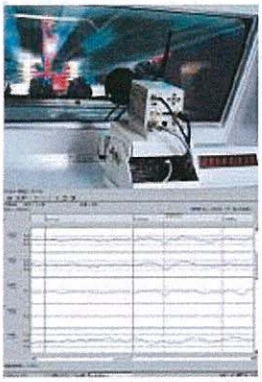
MAINTENANCE SYSTEM

Infrastructure Maintenance



East-i (Shinkansen inspection car for electric equipment and track)

Rail grinding machine

Inspectors in action on the East-i

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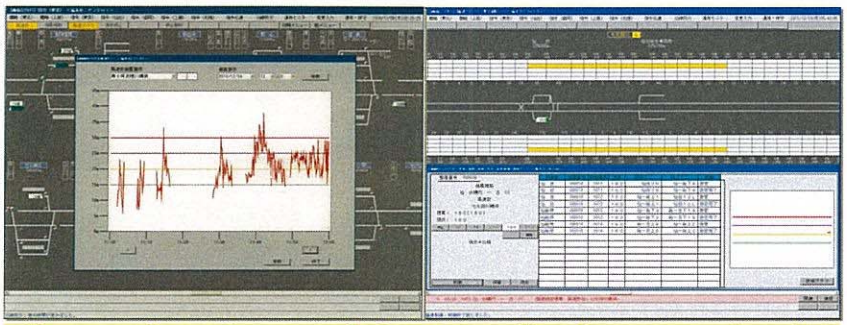
DISASTER COUNTERMEASURES

CENTRALIZED MONITORING SYSTEM

constantly monitoring
on-site measuring information
to prevent disasters

Wind gauge

Rain gauge



Operation Control Center display terminal

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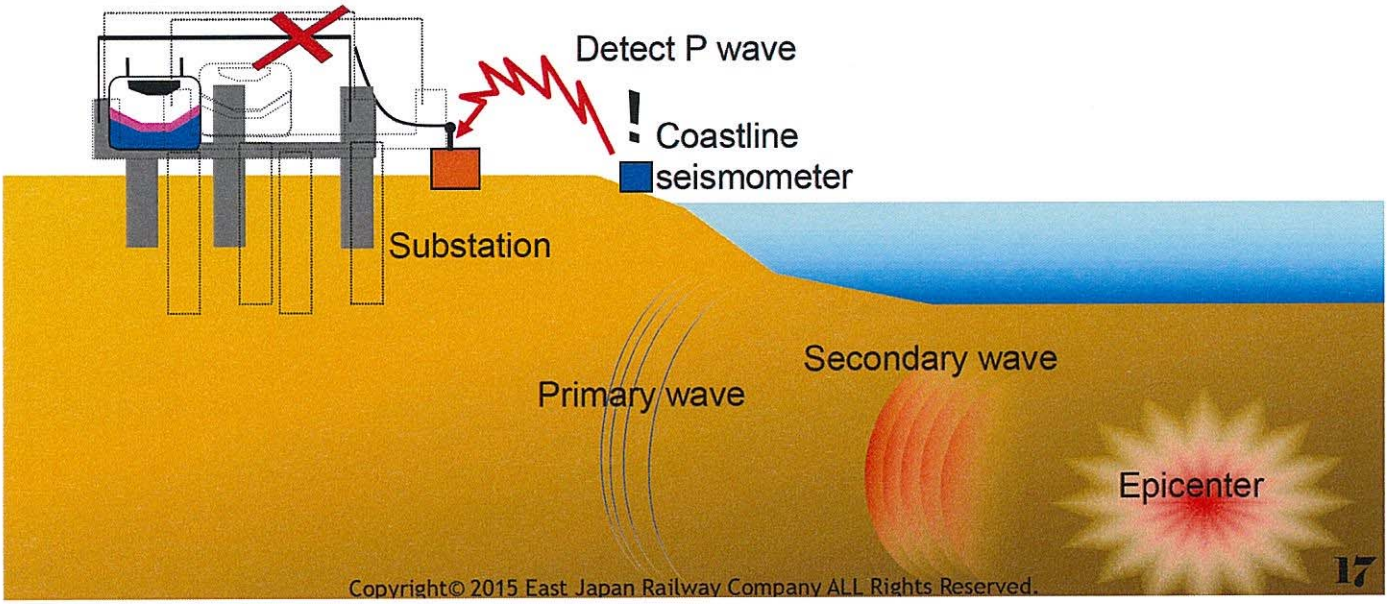
"Early Earthquake Detection System"

Whenever coastline seismometer detects Primary wave.

Power shutdown

Emergency brakes



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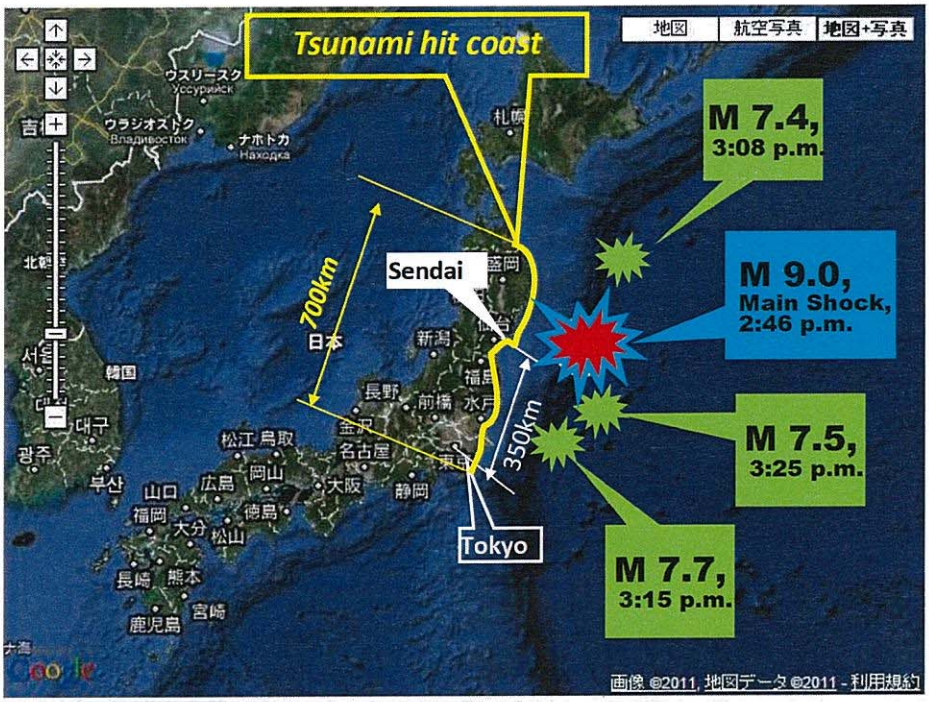
OUTLINE THE GREAT EAST JAPAN EARTHQUAKE

■ **Occurred at 14:46 on 11th March, 2011**

Earthquakes over M7 hit our area 4 times within around 30 min.



■ **Scale**

Magnitude: 9.0 M

Aceh quake, Dec. 2004 : **9.2 M**

Depth below sea level: 24 km

Height of Tsunami wave: 10 to 25 m

■ **Damage**

Dead : 19,636 people

Missing: 3,481 people

Lost Houses: 19,953

as of 19th Dec. 2011

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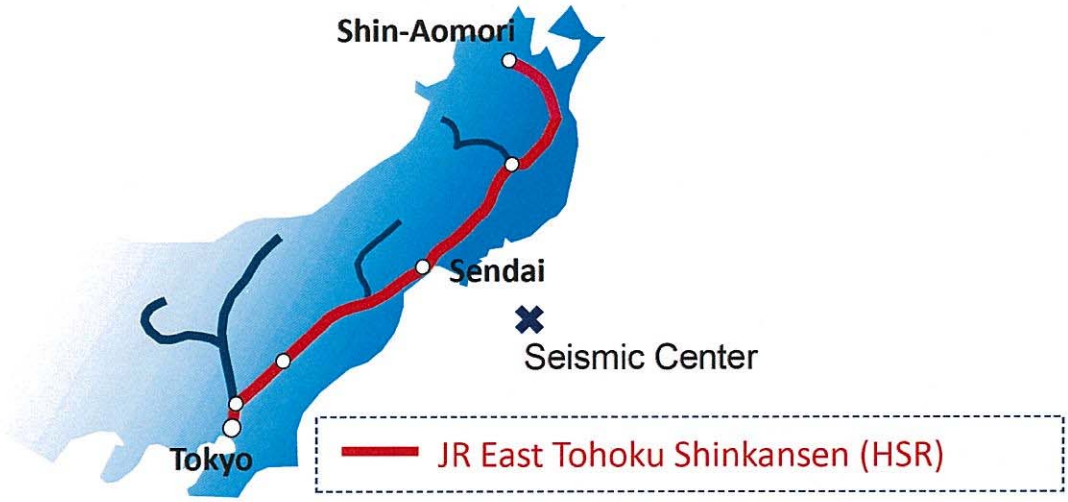
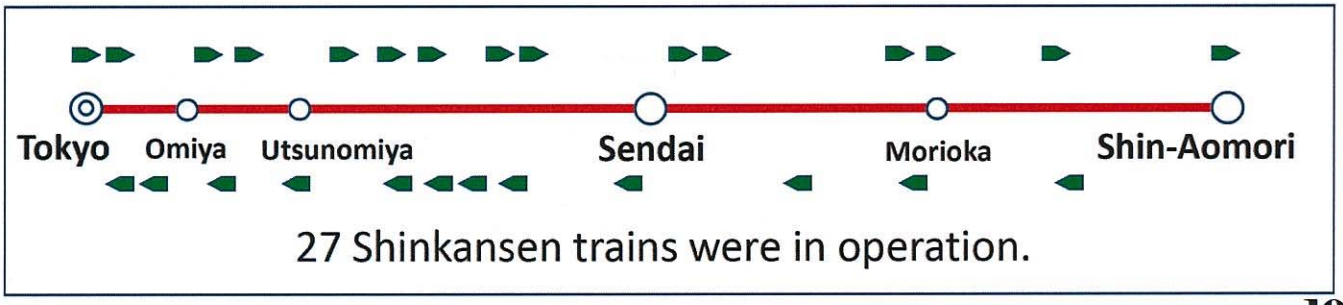
LOCATION OF SHINKANSEN TRAINS WHEN THE EARTHQUAKE OCCURRED





27 Shinkansen trains were in operation.

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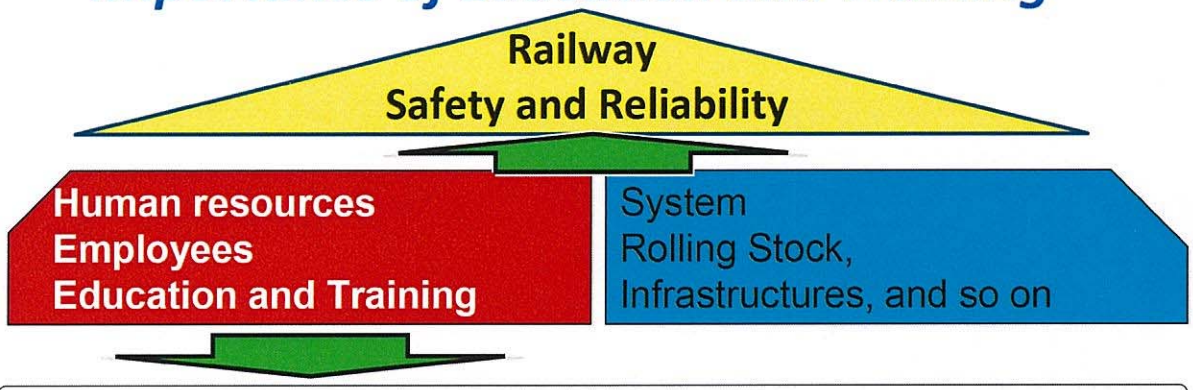
EDUCATION AND TRAINING

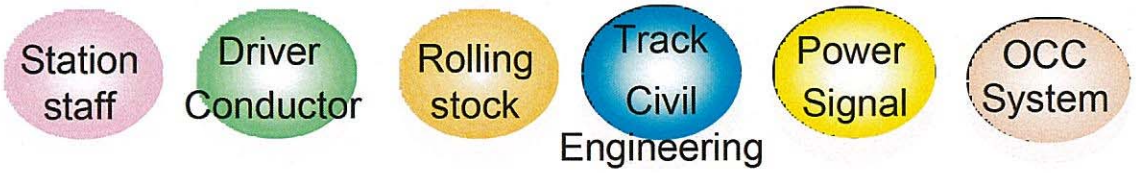
Importance of Education and Training



To start HSR operation

1) starting the education and training in the early stage.

2) carrying out the education and training continuously and repeatedly



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TOTAL LIFE CYCLE COST

Important points in considering the total life cycle cost

1. Total Life Cycle Cost = OPEX + CAPEX
2. OPEX and CAPEX are not independent. They interact with each other.

OPEX : Operating expenditure

CAPEX: Capital expenditure

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TOTAL LIFE CYCLE COST

- Railway systems consist of various components, such as rolling stock, signals, tracks …
- Minimization of the cost of each components is important.
- So is minimization of cost considering the relationship among the components

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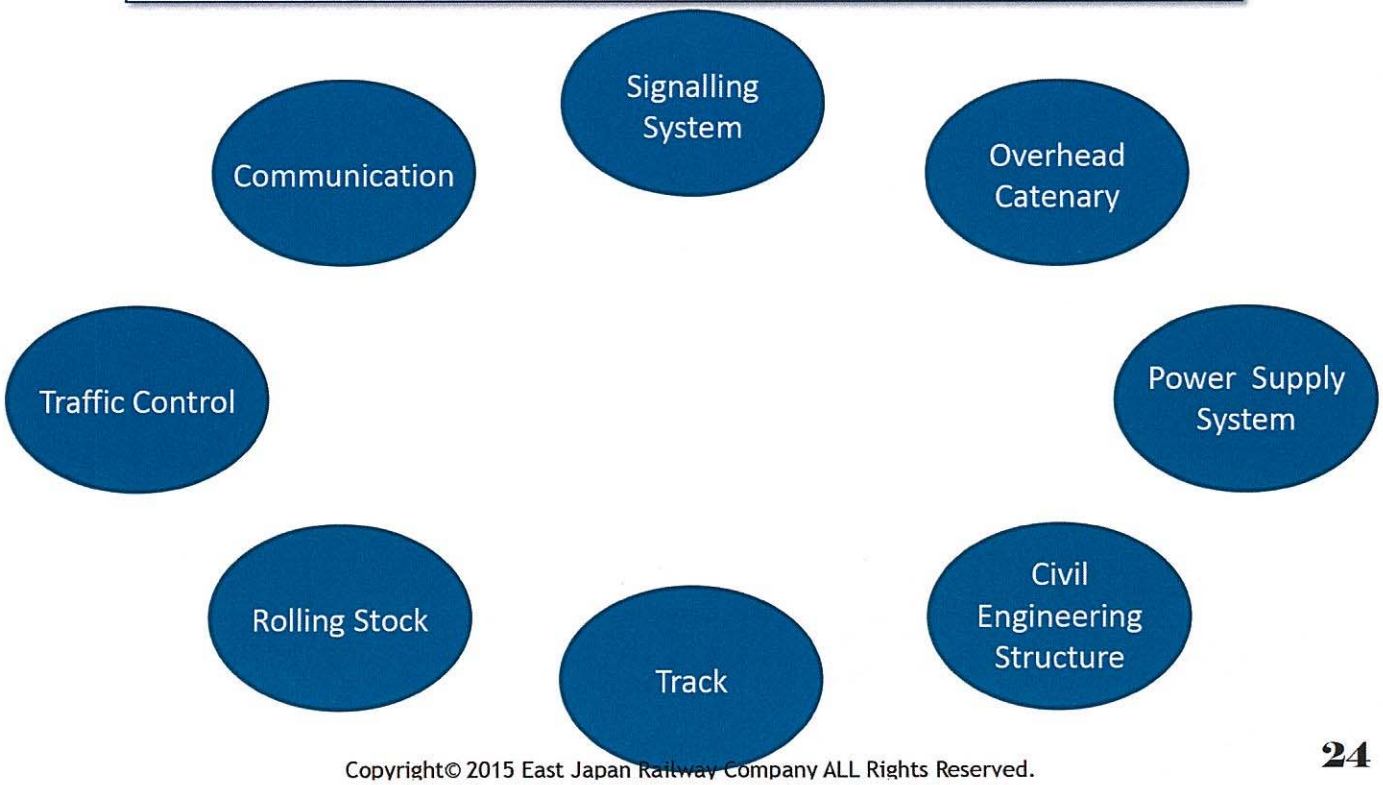
TOTAL LIFE CYCLE COST

Components of Railway System

Minimize the cost of each component



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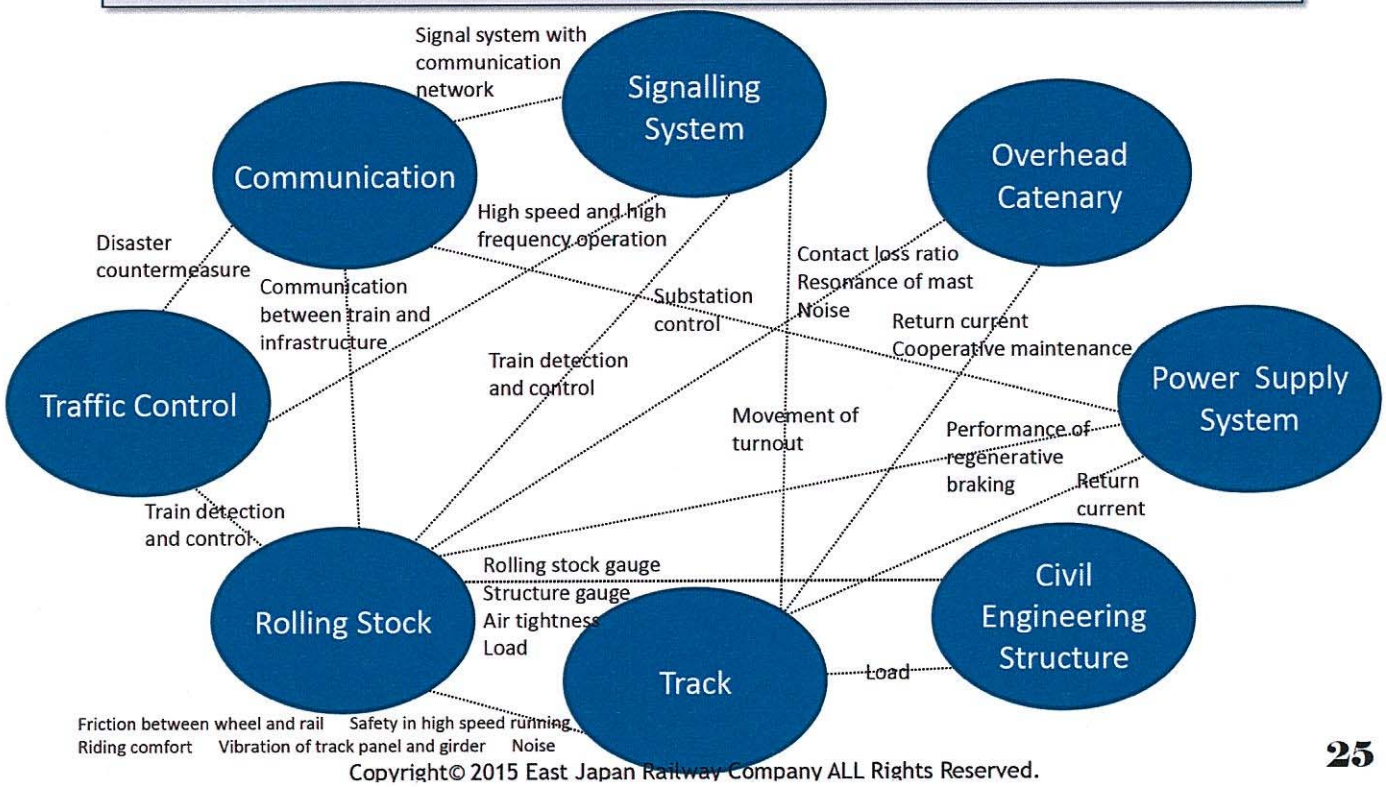
TOTAL LIFE CYCLE COST

Many interfaces between components of Railway System

The best interfaces can minimize the cost.



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OPTIMIZING OF OPERATION

- Safe and reliable operation can lead to the most efficient operation with the minimum infrastructures and minimum rolling stock.
- Punctuality is very important also from the viewpoint of operation and maintenance cost.

The train delays increase operation and maintenance cost.

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OPTIMIZING OF OPERATION

EFFICIENT O & M

Quick turnaround at Tokyo terminal station

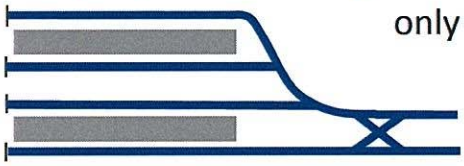
With a 12-minute turnaround, we can

✓ **provide very frequent service with minimum rolling stock**

4 minute headways = high frequency
400 trains per day

=> Minimum rolling stock (CAPEX)

✓ **simplify station layout and infrastructure**



only 2 platforms with 4 tracks

=> Minimum infrastructure(CAPEX)

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LOW OPEX & CAPEX

Essence of HSR management

Safety — The top priority for HSR management

Shortened total trip time

Punctuality

Cost efficiency

Increase in ridership

Low OPEX *(Operation & Maintenance)*

Low CAPEX

More feasible plan

Mutual relationship

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LOW OPEX & CAPEX

Shinkansen technology and experience can minimize the need for facilities, rolling stock, and operating personnel.

OPEX: 1) Efficient Operation

Higher efficiency

Punctual operation, well-designed train schedule and train control, quick turnaround

2) Efficient Maintenance

Maintenance for reliable, dependable operation, including rolling stock, overhead catenary, and signaling

Needs high efficiency of O&M

needs only

CAPEX: 1) Minimum Infrastructure

2) Minimum Rolling Stock

CAPEX will be saved as well!

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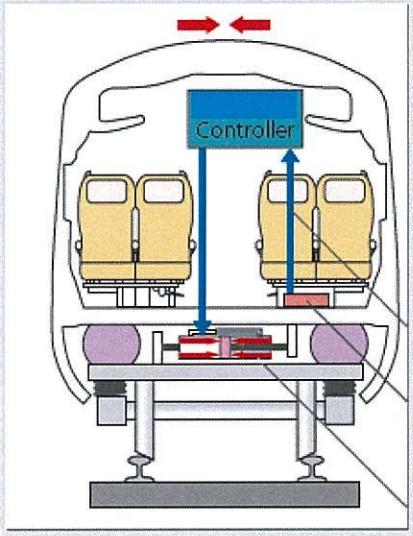
CUSTOMER SATISFACTION

Full-active Suspension / Car Body Tilting System

- Improved Running Performance
- Improved Ride Quality

Full-active Suspension System

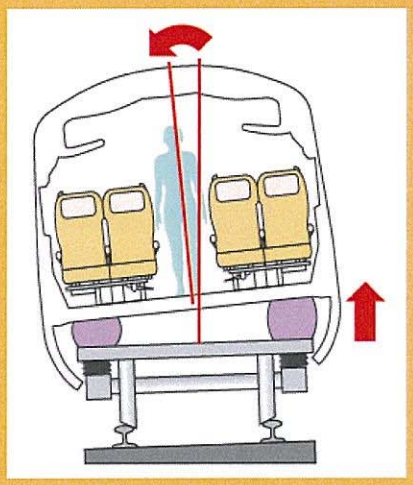
Electric actuators with high responsiveness



Car Body Tilting System

Maximum of 1.5 Degree

can navigate curves of 4,000m in radius at 320km/h



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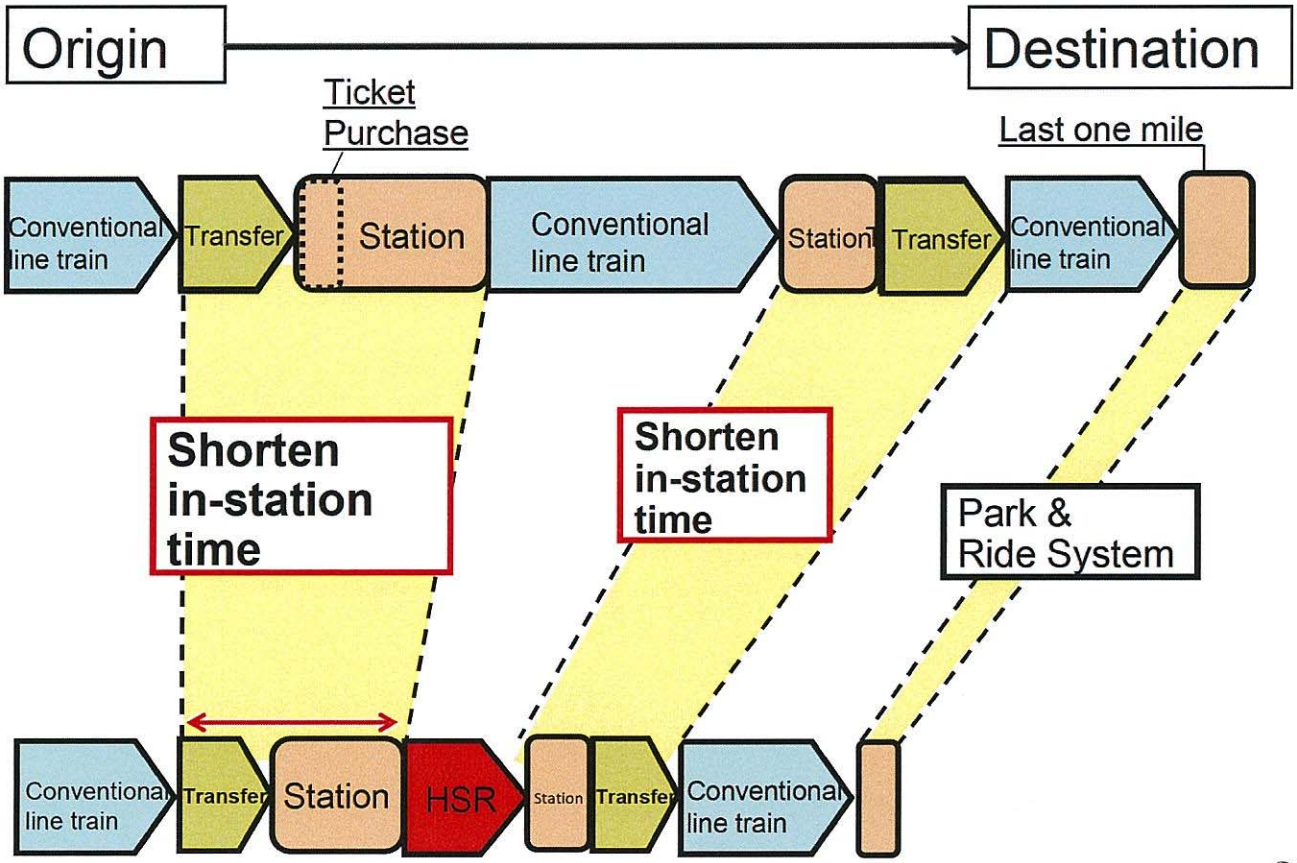
RAPID TRANSFER



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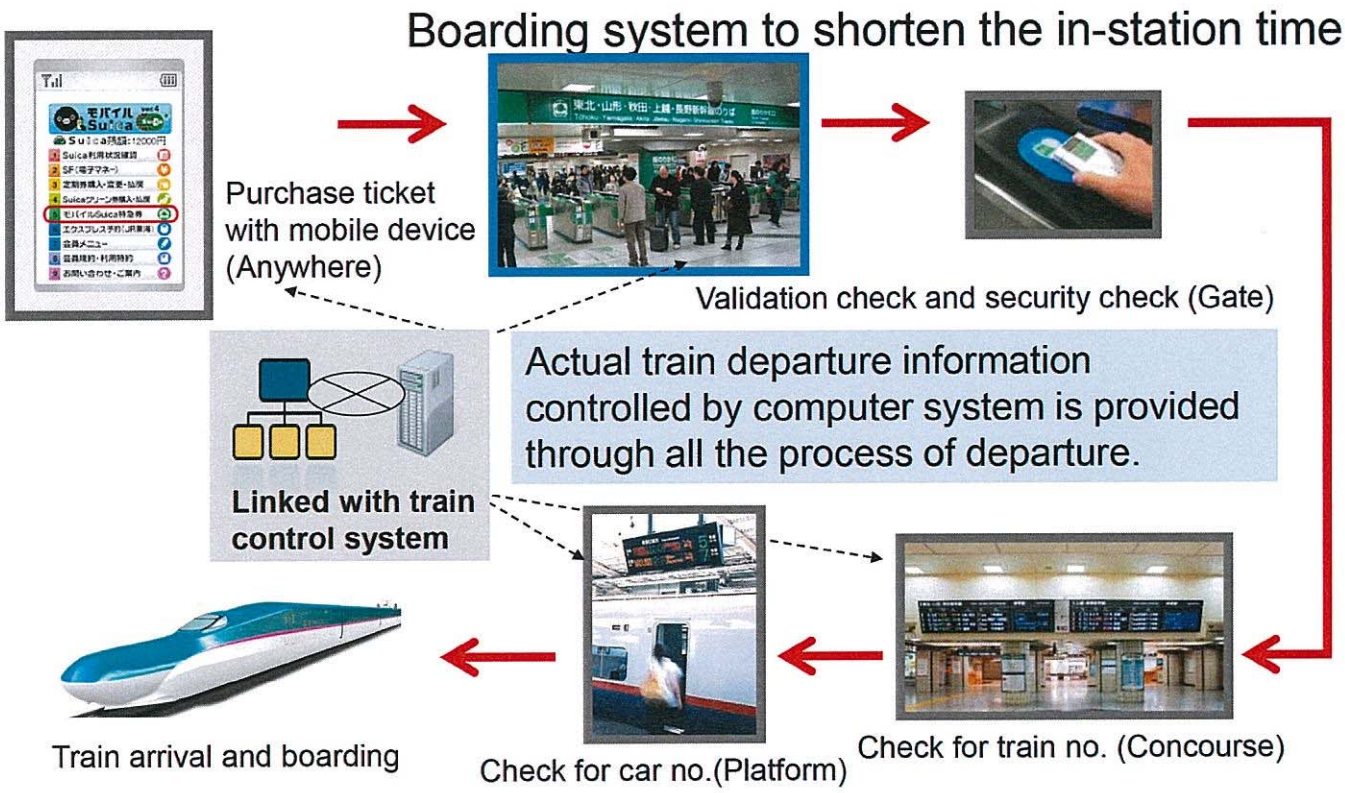
RAPID TRANSFER



Turn up yourself on the platform 2 min. before departure.

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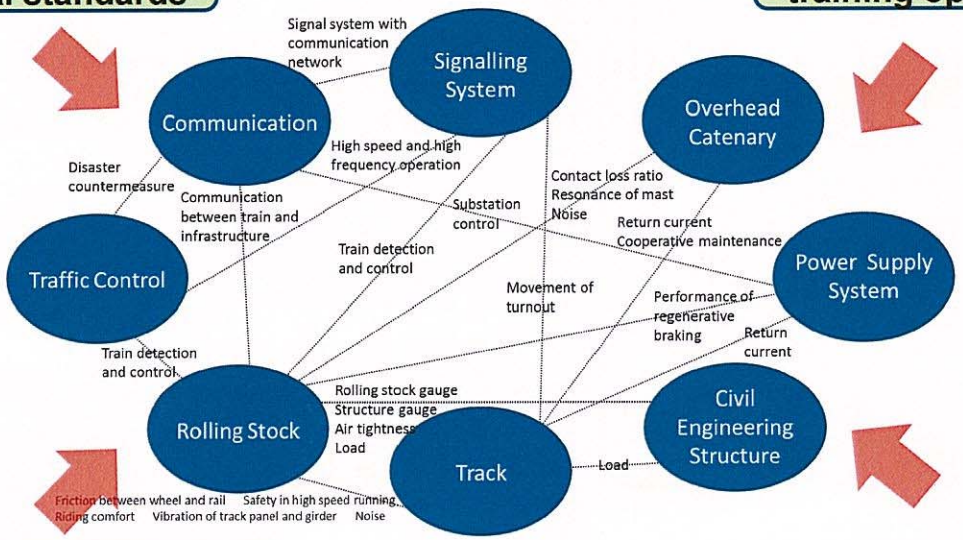
Contribution to Mumbai-Ahmedabad HSR

JR-EAST

Optimal system integration of India HSR

Development of technical standards

Inspection and training operation



Design books・ Creating specifications

construction supervision

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Contribution to Mumbai-Ahmedabad HSR

JR-EAST

Support to O & M

Technology transfer

- Technology transfer to the HSR construction engineers
- Technology transfer of Shinkansen O & M

Human resource development

- Human resource development in India HSR Training Center
- Human resource development in Japan

Education and training

- Staffing to India HSR Education Center
- Support of Indian engineers in Japan

		1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
Outline		Study tour to Japan			Construction of test track					★ Start of commercial operation	
STEP1	Key Persons				Construction of all sections						
	Key Staff			Training in Japan							
	Regulations and Manuals										
STEP2	Construction technologies										
STEP3	Training in classroom										
	Test runs and on-site training (test track)										
STEP4	Test runs (all sections)										
Training Center				Construction			Training at the Training Center				

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CONCLUSION

The high time to make HSR in India happen!

■ We are very happy to support India to build the excellent system that meets Indian needs in many aspects such as construction, operation, maintenance and so on.

→We will support India to introduce the concept, plan, and design of HSR as the optimum system for India, as well as "in-station development", based on our management, technology, experience and so on.

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Thank you very much for your attention!

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