



HITACHI
Inspire the Next

Shinkansen – or why Trains can be on time!

8. September 2015

Jürgen A. Krebs

Hitachi Data Systems GmbH

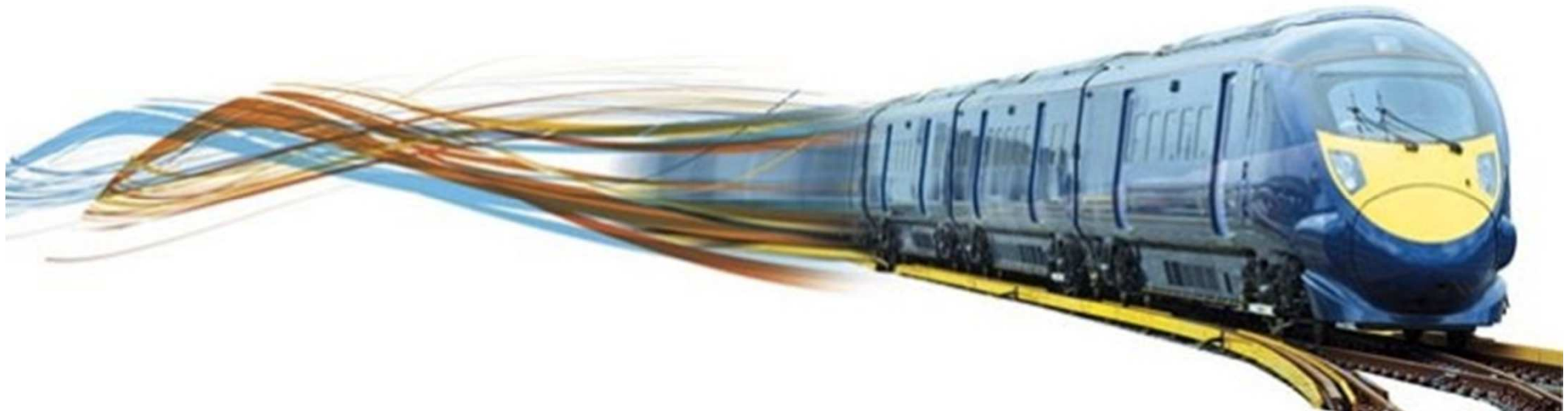
 **Hitachi Data Systems**

© Hitachi Data Systems Corporation 2015. All rights reserved.

Agenda

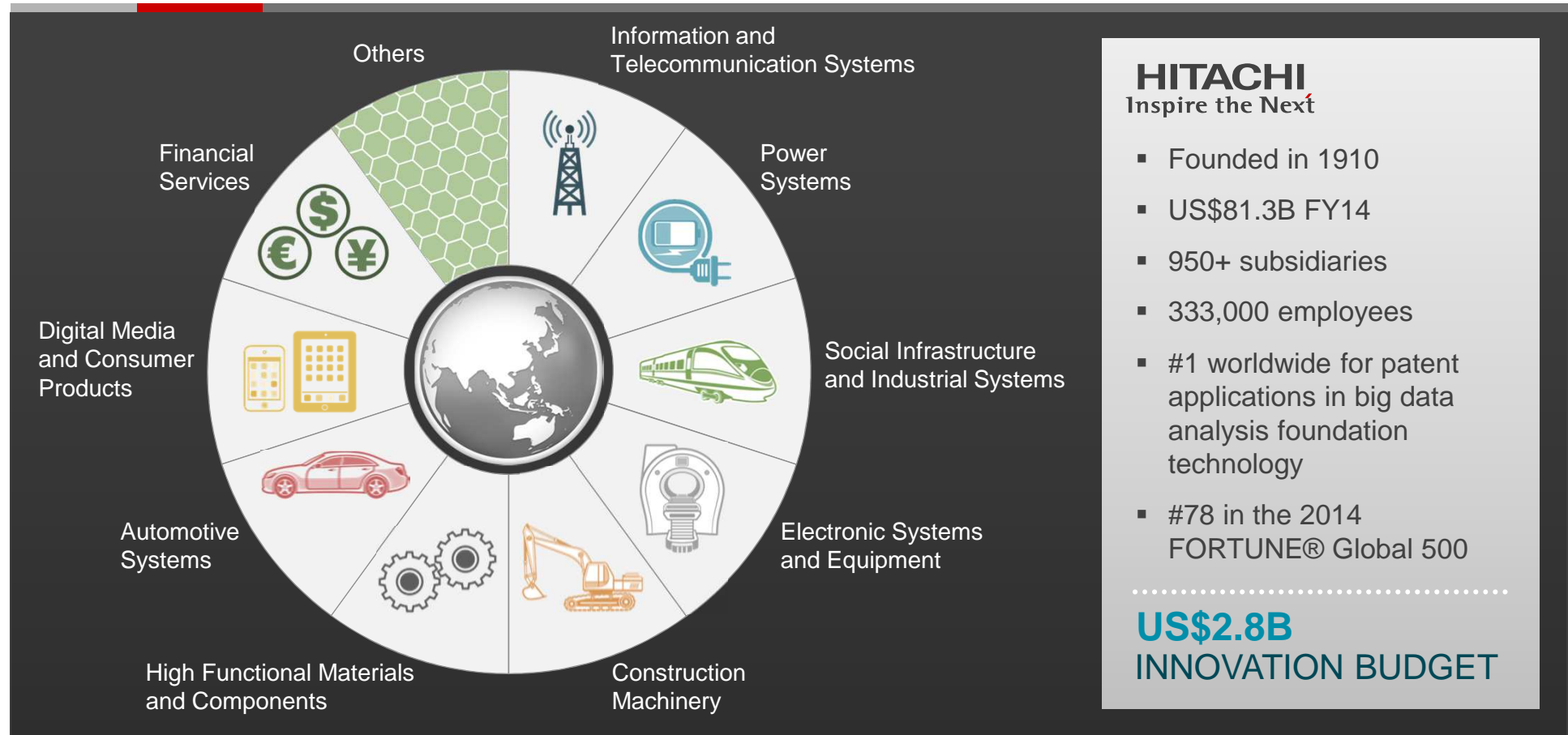
HITACHI
Inspire the Next

- About Hitachi & Social Innovation
- Hitachi Big Data Analytics Strategy
- Shinkansen and what we do with Big Data



Deep Innovation Resources

HITACHI
Inspire the Next



HITACHI
Inspire the Next

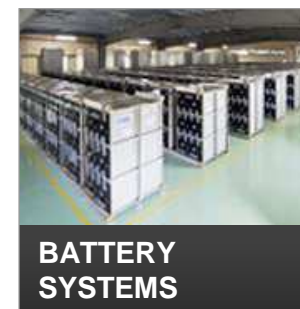
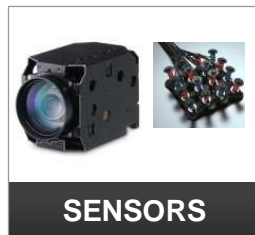
- Founded in 1910
- US\$81.3B FY14
- 950+ subsidiaries
- 333,000 employees
- #1 worldwide for patent applications in big data analysis foundation technology
- #78 in the 2014 FORTUNE® Global 500

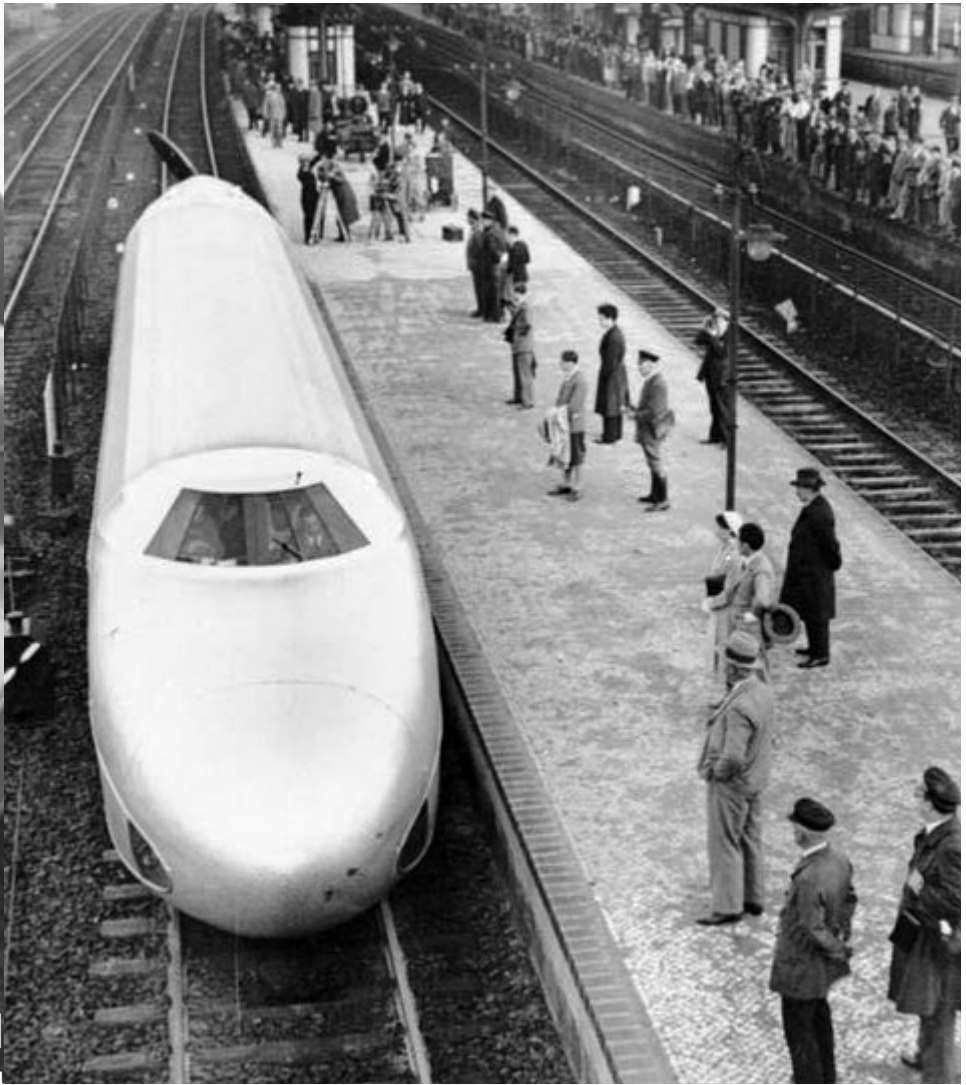
US\$2.8B
INNOVATION BUDGET

How We Achieve Social Innovation Through Big Data

Machine data is in our DNA. We think like users because we are users.

HITACHI
Inspire the Next





Franz Kruckenberg's Schienenzeppelin (Rail
Quellen: Bundesarchiv, Bild 102-11902 / Georg Pahl / CC-BY-SA 3.0 / Bi

Designed by Alexander Neumeister / Approx. Price per Unit 5B¥



Hitachi Social Innovation

HITACHI
Inspire the Next

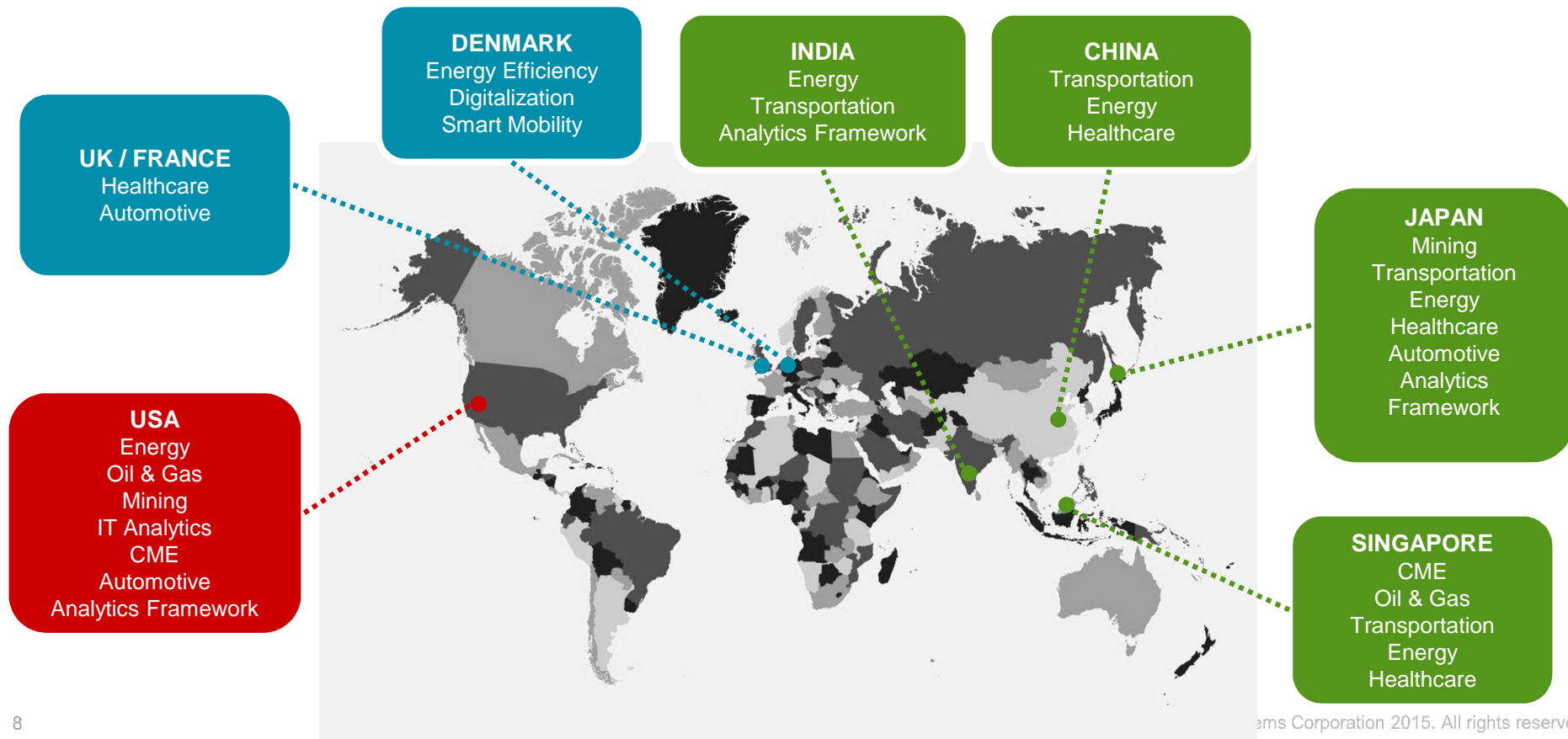
We integrate IT and infrastructure technologies
for a healthier, safer, sustainable world



© Hitachi Data Systems Corporation 2014. All rights reserved.

Hitachi Global Centers for Innovative Analytics

HITACHI
Inspire the Next

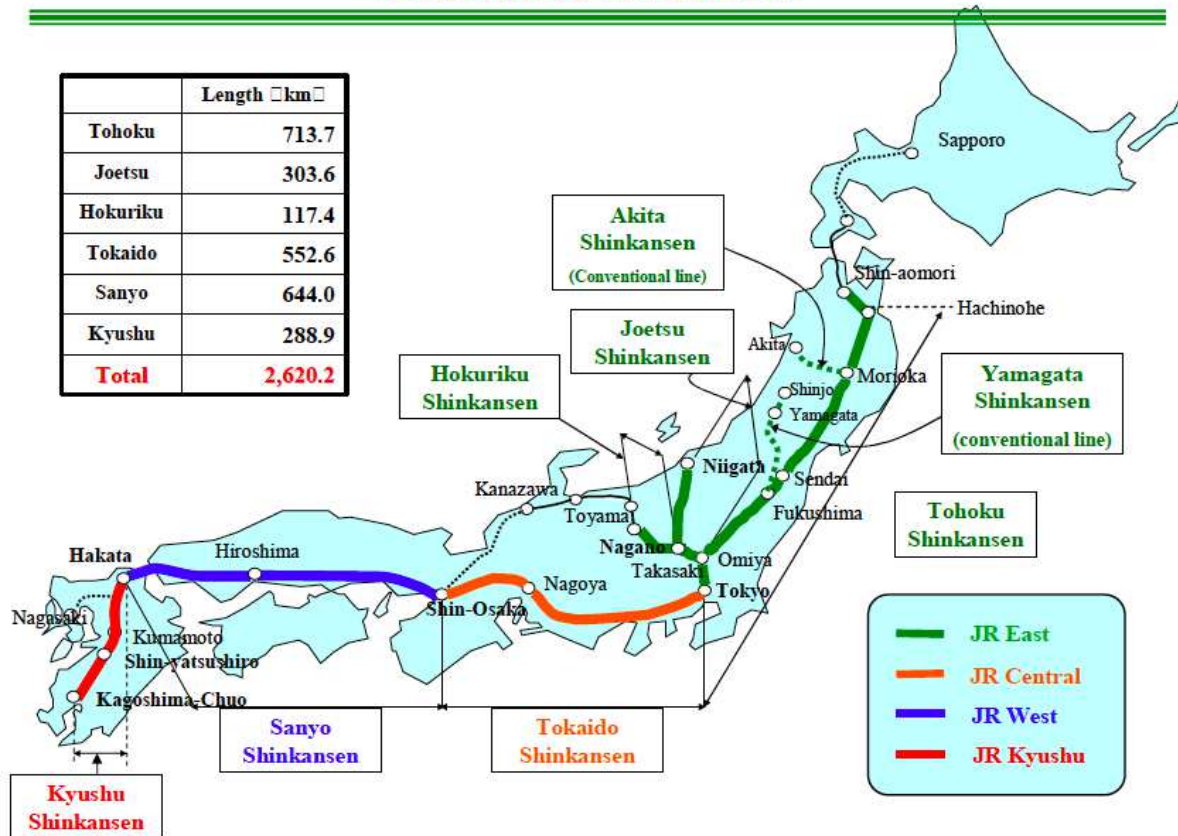


© Hitachi Data Systems Corporation 2015. All rights reserved.

Shinkansen in Japan – some Facts

Shinkansen Network

	Length □km□
Tohoku	713.7
Joetsu	303.6
Hokuriku	117.4
Tokaido	552.6
Sanyo	644.0
Kyushu	288.9
Total	2,620.2



- 51 Years of operations (since 1964)
- Zero fatalities
- 346 million passenger per year
- Average delay less than 1 minute (incl. bad weather conditions)

Shinkansen Technologies

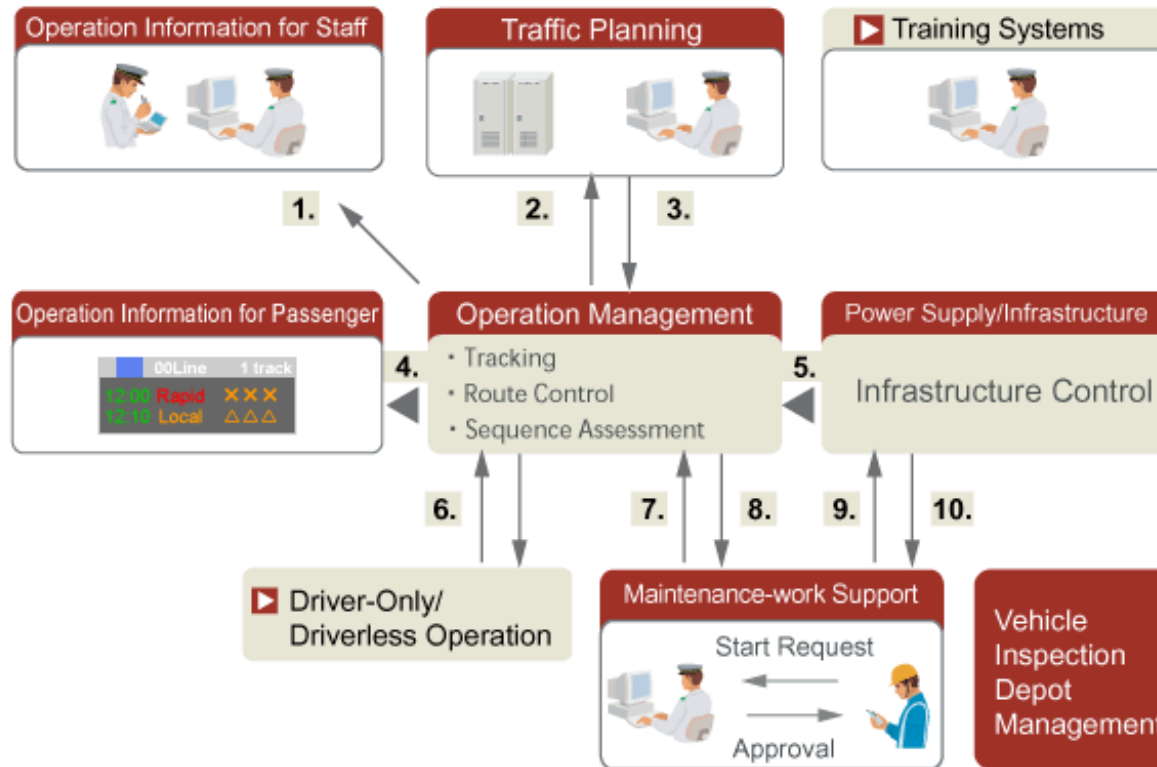
HITACHI
Inspire the Next



ATP – Automatic Train Protection System (ATC-1 / ATC-NS)

- Services
 - Predictive Maintenance for longer and more reliable fleet operation
 - Automated rail-track control
- Traffic planning and operations
 - Traffic planning and operations (i.e. Olympics 2020 in Tokyo)
 - Train detection and distance
 - Emergency signals and control
 - Temporary speed limit information
 - Combination with other systems (Weather, Seismic information, etc.)
- Power Solutions
 - Energy efficiency
 - Automatic control and maintenance

Smart Operation and Control



1. Current Train Status
2. Actual Diagrams
3. Implemented Diagram
4. Operation Information
5. Power-supply Status
6. Implemented Diagram Approaching Train Information
7. Train Control Status
8. Maintenance-work Input (Plan, start, finish)
9. Infrastructure Status Information
10. Maintenance-work Input (Plan, start, finish)

Hitachi & BIG DATA – real life use case

Hitachi train link program in the uk

HITACHI
Inspire the Next



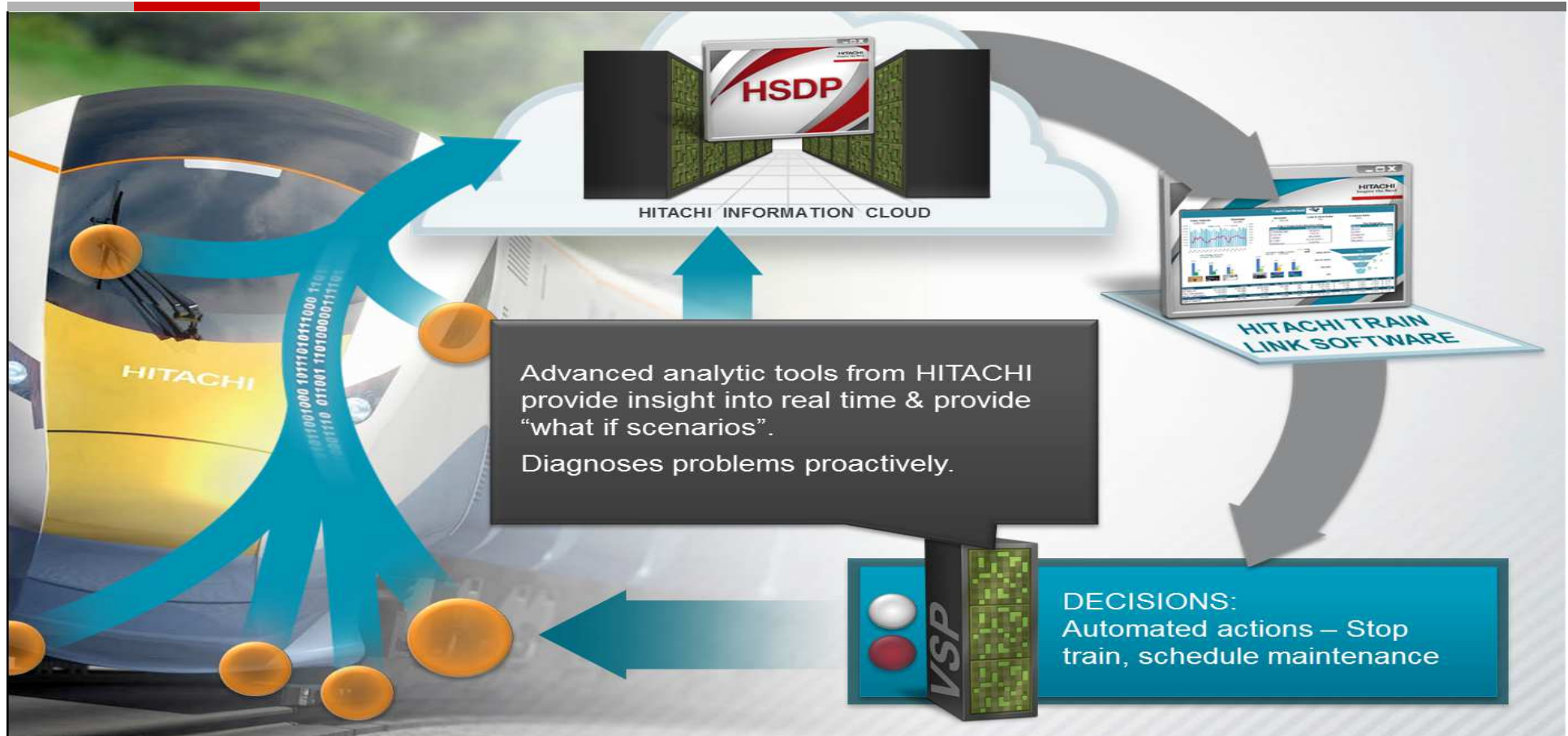
- UK contract with Hitachi Rail
 - Build & supply 100 train sets + 27 years maintenance & support coverage
 - Predictive maintenance based on innovative Big Data Analytics (Hitachi Train Link program / project)

- **The business goal of the Hitachi Train Link Program / project:**

1. Quality of Maintenance Service Improvement
2. Increased safety – early warning systems
3. Reduced traffic downtime
4. Therefore, optimized & reduced maintenance costs
5. As well as contribute in increasing / optimizing the revenue

Smarter business service model for railways

HITACHI
Inspire the Next



Train link program in details

- Capture the performance status of the train and infrastructure assets
 - Real-time sensor data of the Hitachi C395 train fleet
 - Streaming 1TB / day from 100s of sensors (per train) providing real time metrics on: speed, hydraulic pressure, weight, temperature, ...
- BIG DATA sets and engineering knowledge from the Hitachi Train research labs.
 - Analysis produces dashboard allowing to monitor & diagnose bottlenecks
 - Preventive maintenance and identify other issues in real time
 - Predict failures of assets
 - Advanced analytic tools provide insight into real time & provide: "what if scenarios";
- Predict the required pro-active maintenance
 - Automated actions – stop the train and schedule maintenance

DELIVERING HITACHI VISION FOR SOCIAL INNOVATION AND BIG DATA TOMORROW

HITACHI
Inspire the Next

TRANSPORTATION



Conversion of Intercity Train System from diesel to electric

INNOVATIVE ANALYTICS

OF: Real-time sensor, ticket data, diagnostics

BENEFIT: Active machine maintenance reduces costs and increases safety for passengers



**INTEGRATED STRATEGY
ACROSS HITACHI**

**DECADES OF VERTICAL
INDUSTRY EXPERIENCE**

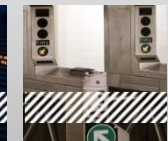
**GLOBAL GO-TO-MARKET
FOR BIG DATA OF
TOMORROW SOLUTIONS**

INFRASTRUCTURE SYSTEMS GROUP

RAIL
SYSTEMS



TRANSPORTATION AND
CONTROL SYSTEMS



INFORMATION AND TELECOMMUNICATIONS DIVISION

SMART INFORMATION
SYSTEMS



IT PLATFORM
DIVISION



**SEARCH,
STORE AND
ACCESS**

TRAIN AS A SERVICE FOR UK INTERCITY EXPRESS TRAINS

Big Data in Real Life

HITACHI
Inspire the Next

Erdbeben in Japan

Starkes Erdbeben erschüttert Großraum Tokio

04.09.2013, 11:35 Uhr | dpa

Quake jolts southern Japan, felt in Tokyo

TOKYO, Sept 4 2013

(Quelle: Reuters)

Der Betrieb der Hochgeschwindigkeitszüge Shinkansen in der Region war durch die Erschütterung kurzzeitig unterbrochen.

The national broadcaster NHK said some train lines stopped briefly for safety checks as a precaution.

(Quelle: AP)

Der Großraum Tokio ist von einem Erdbeben erschüttert worden. (Quelle: dpa)



„Wir blicken so gern in die Zukunft, weil wir das Ungefähre, was sich in ihr hin und her bewegt, durch stille Wünsche so gern in der Gegenwart zu unseren Gunsten heranleiten möchten.“

Frei nach

[Johann Wolfgang von Goethe](#)

(1749 - 1832), deutscher Dichter der Klassik, Naturwissenschaftler und Staatsmann



HITACHI
Inspire the Next

Thank You

 **Hitachi Data Systems**

© Hitachi Data Systems Corporation 2015. All rights reserved.

More information

- http://www.hitachirail-eu.com/projects-products-and-services_28.html
- <http://social-innovation.hitachi.com/en/>
- <http://www.hitachirail-eu.com/>
- <https://www.youtube.com/watch?v=7M7HOR0eU9I&feature=em-uploademail>
- http://www.hitachi.com/products/it/software/prod/cosminexus/pdf/cosmi_sdp.pdf
- <http://www.hitachi.com/products/it/software/prod/cosminexus/doc.html>
- <http://www.hitachi.com/products/it/software/documents/eur.pdf>