

# Collaborative Creation with Customers

## Visualization of end user value

By planning rail construction using digital visualization, this simulates how much would passengers switch to riding a train from driving a car and how road congestion would be reduced as a result

Users



Service system

## Validation of the feasibility of operation

The railway line is generated to simulate rail operation and its power supply during operation

Businesses

## Analysis of return of investment

The initial cost, operation cost, and revenue forecast of planned rail line are calculated in this simulation

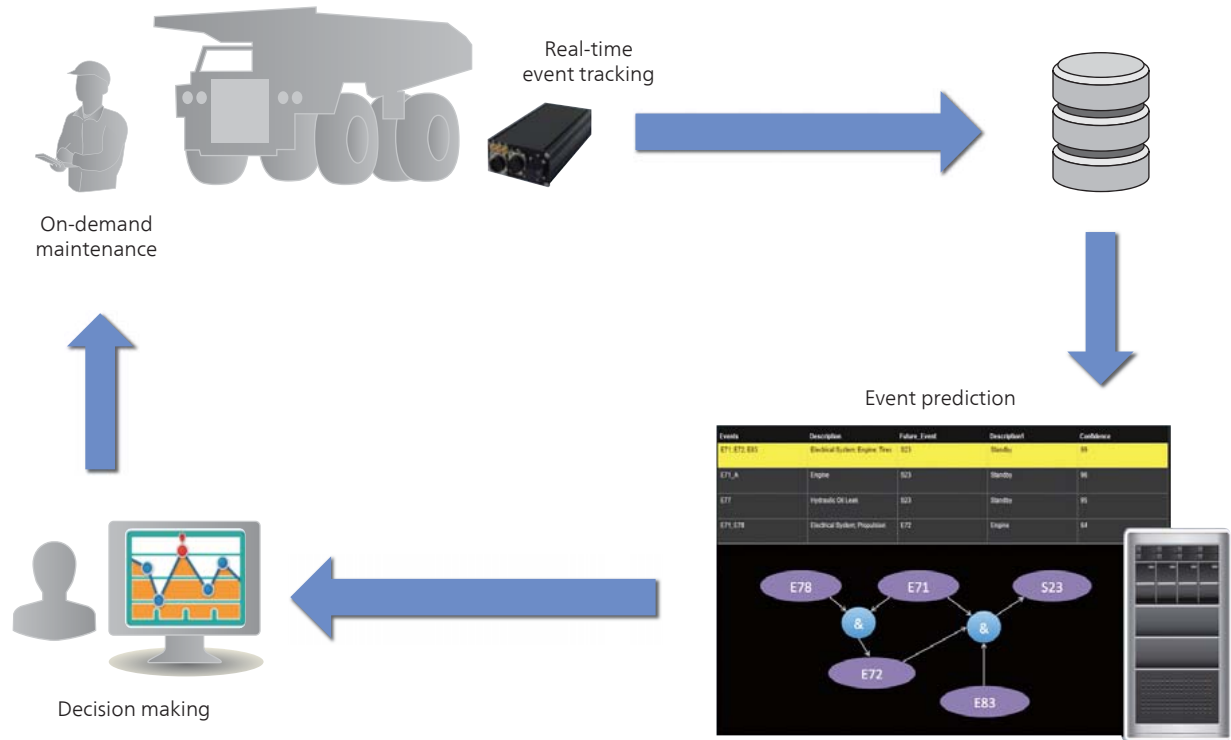
### 1 Example of Cyber-Proof of Concept for rail business

#### 1 Service Value Simulator NEXPERIENCE/ Cyber Proof of Concept

The digital transformation triggered by artificial intelligence (AI), robotics, and Internet of Things (IoT) has been changing the exiting industrial structure radically while complicating issues that faced by corporations and communities. As to create new services in such era, it is required to plan acceptable businesses with a consideration of stakeholders' profitability and businesses' feasibility.

Hitachi has systematized the approaches, IT tools, and space, which are used for extracting issues, creating

ideas, and validating hypothesis with customers and partners, as NEXPERIENCE for conducting customer co-creation. One of these features is Cyber-Proof of Concept that is a service value simulator to analyze the effectiveness of service intuitively and quantitatively. This allows customer's management team to make investment decision efficiently. This service value simulator is capable of letting users to interactively modify the value of design parameter and simultaneously simulate the operation costs of required investment and service, behaviors change of end-user along with service, and revenue differences from customized service charge plan.



2 Overview of the event-based fault prediction system

## 2 Predictive Maintenance Solutions through Collaborative Creation with Customers

Through the proliferation of sensors, smart machines, and instrumentation, industrial operations are generating an ever increasing volume of data of many different types.

Hitachi can use our decades of experience in equipment manufacturing and marry it with our expertise in analytics to bring predictive maintenance solutions that solve some hard and important customer problems, such as increasing equipment availability, reducing the cost of unexpected failures and making operations more predictable. Our interactions with customers across verticals have given us deep insight into customer problems, types and properties of customer data. Exploiting these insights, Hitachi has developed a common analytics framework for predictive maintenance solutions that can meet the needs of multiple customers in the same vertical as well as to customers across different verticals.

This framework provides the ability to manage, process, and analyze different types of data from structured to unstructured data, and from stored to streaming data. Our predictive maintenance framework is geared towards processing sensor and event data, and provides a rich library of predictive maintenance solution components. This allows for reducing the efforts needed for building repeatable predictive

maintenance solutions, reducing the cost of deployment and increasing the reliability of analytics.

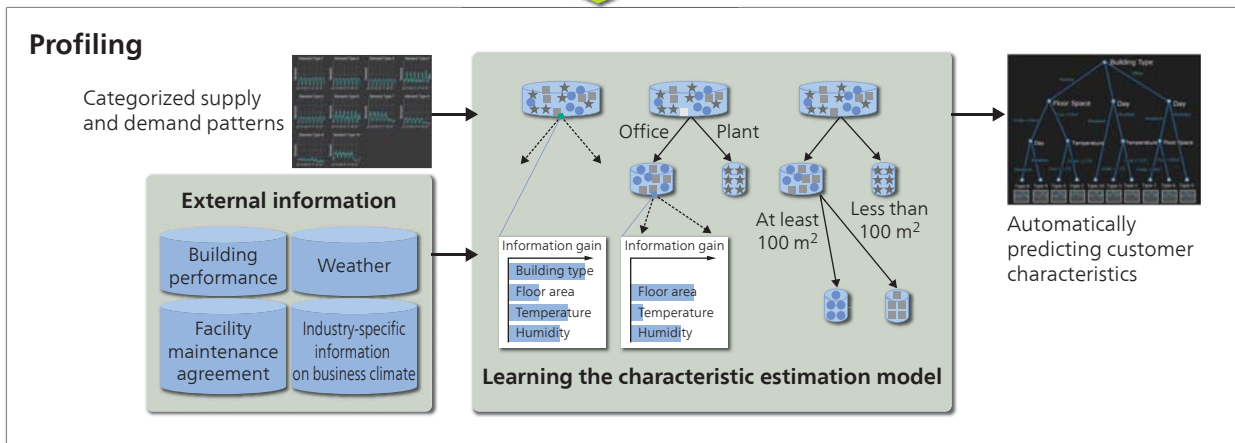
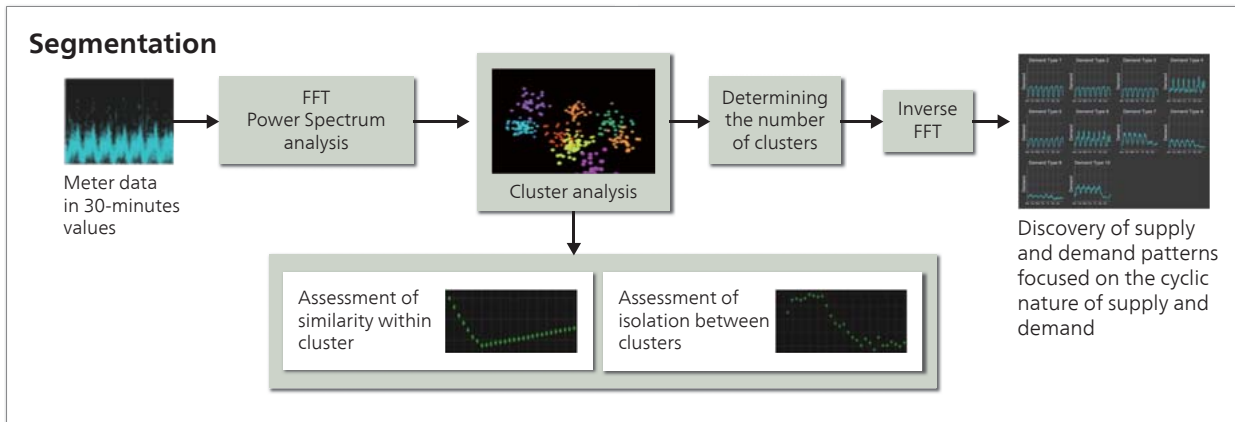
## 3 Power Supply-demand Management Solutions in the Era of Fully Deregulated Electricity Markets

With the full liberalization of electricity retailing in April 2016, all electricity retail markets in Japan, including low voltage categories such as regular households, have been deregulated. Moreover, the separation of power generation from distribution and transmission, which prohibits electricity retailing and generating businesses from concurrently operating, is moving towards 2020. To prevail against the competition in this environment, it is important to ascertain supply and demand trends with great accuracy. Independent electricity retailers that do not distribute or transmit electricity themselves each need to procure the electric power they supply to satisfy the planned value-based load balancing system, the new rule governing the use of electricity transmission and distribution networks. Amid competition with other companies, supply and demand management that allows these operators to engage in business activities with appropriate price setting remains an issue.

Leveraging its unique supply-demand cluster analysis technologies that obtain high-quality supply and demand patterns based on actual supply-demand data, Hitachi has developed a supply-demand management

solution that supports various tasks associated with supply-demand management, and is pursuing collaborative creation with customers to verify the technology. Hitachi has confirmed supply-and-demand clusters based on provided test data, verified the

accuracy of supply-demand predictions under different conditions such as various times of day, identified issues in procurement plans, sales and marketing, and verified the effects of its solutions.



FFT: fast Fourier transform

### 3 Overview of supply and demand cluster analysis techniques