

Social and Public Sector Systems

1 Improving Cold Chain Businesses Using Remote Monitoring and Remote Control

Hitachi Global Data Integration (HGDI) is a service for leveraging Internet of Things (IoT) data that recently started providing IoT device remote controlling functionality in addition to monitoring functionality. Lately, opportunities to use data remotely via the Internet have been increasing. Such data are used for streamlining business, increasing the value of services, and tackling social issues; leading to greater demand for remote monitoring and controlling in various business domains. This article covers HGDI's use case concerning remote monitoring and control in the cold chain business for the logistics industry.

Temperature management in cold chains requires changing of refrigeration temperature settings and recording of actual temperatures. The usual way in which temperature management is performed involves truck drivers manually changing temperature settings according to environmental changes and recording measured temperatures. This way of temperature management has led to challenges regarding quality management, driver workload, and safety. To overcome such challenges, HGDI enables centralized temperature management of multiple trucks and their cargo (remote monitoring, control, and operation history) through a web portal from a monitoring and control center. The cargo's temperature can be

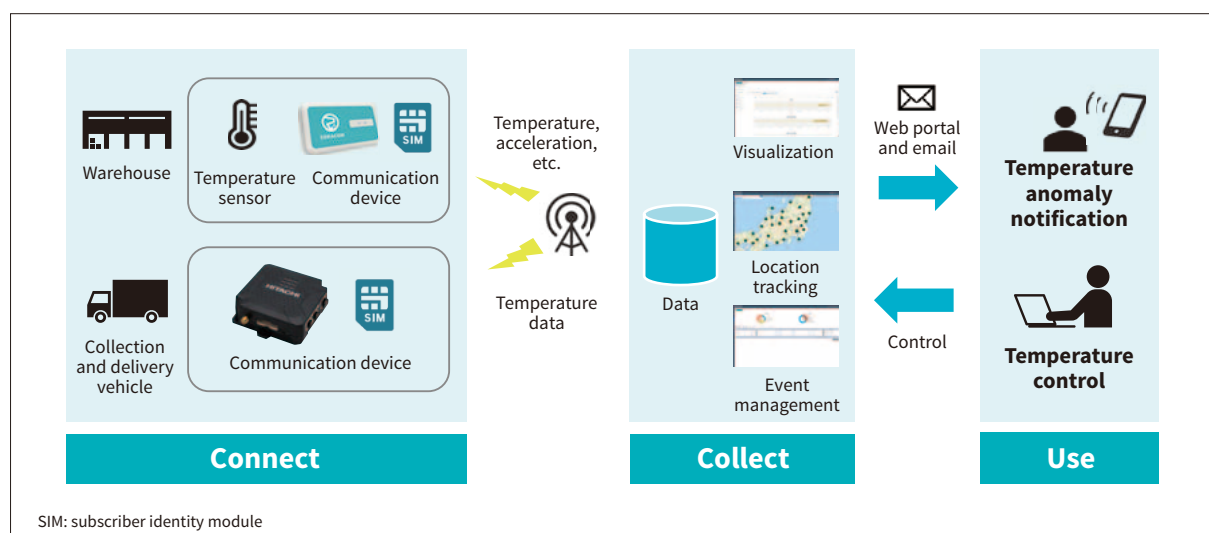
monitored from when the cargo is in the warehouse until it arrives at the point of delivery.

Hitachi aims to contribute to solving customer challenges and business expansion efforts through HGDI by expanding its applications to other business domains in the future.

2 Efforts to Enhance Social Infrastructure Maintenance and Reduce Environmental Impact

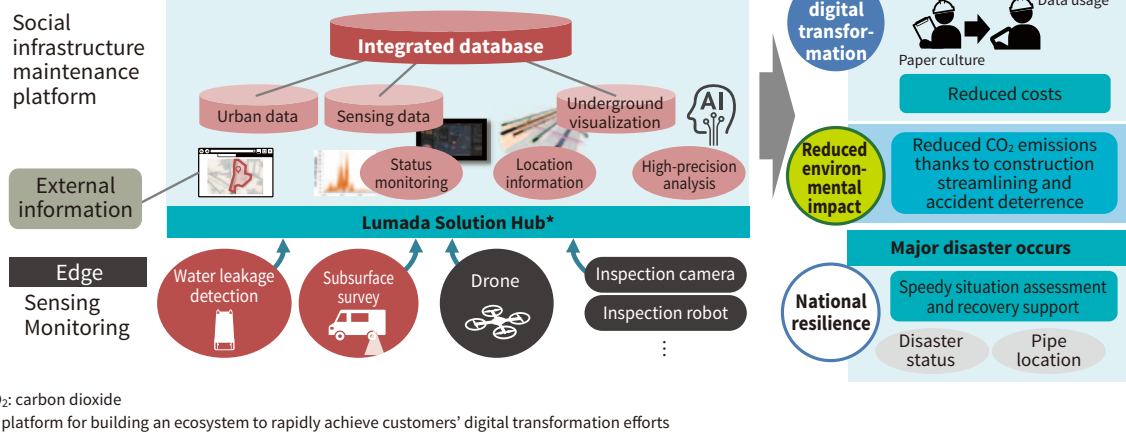
Social infrastructure underpins people's life, so stable, normal operation is required. However, in addition to social issues such as the deterioration of facilities and a lack of skilled workers, there is an increasing demand to reduce environmental impact.

One solution to such issues is the goal of providing water leakage detection service (to automatize the detection of water leakage using Hitachi's original ultra-sensitive vibration sensors), subsurface visualization service [using artificial intelligence (AI) analyze radar imaging and provide visual information about subsurface piping], and other solutions that deliver social infrastructure maintenance in terms of both service level and cost. Hitachi has already contributed to customer business in the field by collecting and analyzing data. Also, the



1 HGDI use case for cold chain remote monitoring and remote control

Build an ecosystem that links social infrastructure-related industries digitally and updates information



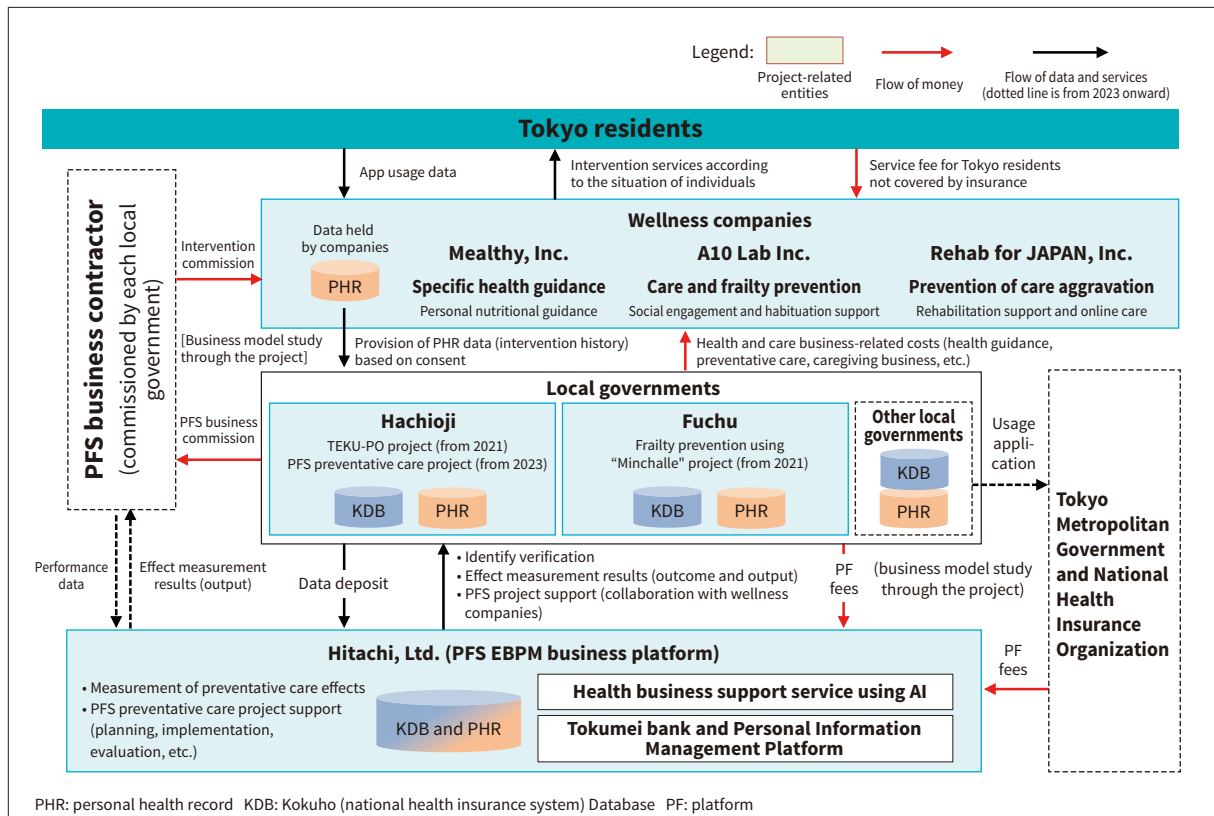
2 Concept of social infrastructure maintenance service

service is expected to reduce environmental impact, with efforts to provide visualization of reduced environmental impact level (reduce CO₂ emissions and waste) conducted in FY2022.

Going forward, the entire Hitachi Group aims to promote social infrastructure digital transformation efforts that contribute to social infrastructure maintenance management, national resilience (preparation for large-scale disasters), and reducing the environmental impact.

3 EBPM Business Platform via Co-creation between Local Governments and Startups

The government estimates that it can save JPY3.2 trillion annually in long-term care expenses through preventative care for senior citizens. In terms of both improving quality of life (QoL) over an individual's lifetime, and financial suitability, quality preventative services are highly significant, socially speaking. Contribution from



3 Overview of target final project

the private sector is counted on in order for the government to effectively use business resources while providing a wide range of services to citizens. However, the inability to grasp preventative care cost effectiveness is a barrier to introducing private services and establishing appropriate market prices. Sharing the results of preventative care beneficiaries to accelerate the proliferation of services, and social implementation of a new framework has become an urgent matter.

With this in mind, Hitachi is now working on creating an evidence-based policy making (EBPM) business platform as part of the Tokyo Metropolitan Government's Project Support for Creating Next-generation Wellness Solutions for FY2022.

In the project, a new EBPM business platform utilizing a Hitachi secure personal data base and elderly care, health, and medical big data AI analysis technology is being created as part of efforts to verify the outcome evaluation of preventative care projects in Hachioji and Fuchu. By contributing to the promotion of local governments' evidence-based pay for success (PFS) preventative care projects, the initiative aims to achieve preventative senior citizen care that contributes to improved QoL for Tokyoites.

shops, making it difficult to provide face-to-face services, and driving digitalization with a focus on smartphone usage. On the other hand, to alleviate age and regional digital divides (information inequality), sluggish use of online applications, and heavy workloads at contact points, digital services that are easy for everyone to use are in demand.

One approach to such issues is installing booths in familiar places, such as local branch offices, community centers, banks, train stations, and mobile kiosks, along with development of various features that can access both local government and private enterprise contact point services online even in remote locations. The goal is to create a new form of service delivery that allows anyone to enjoy the same level of service as a manned contact point in a familiar place, with a large, immersive display and a digital user interface and user experience (UX) that can be easily operated even by the elderly and others unfamiliar with digital technology.

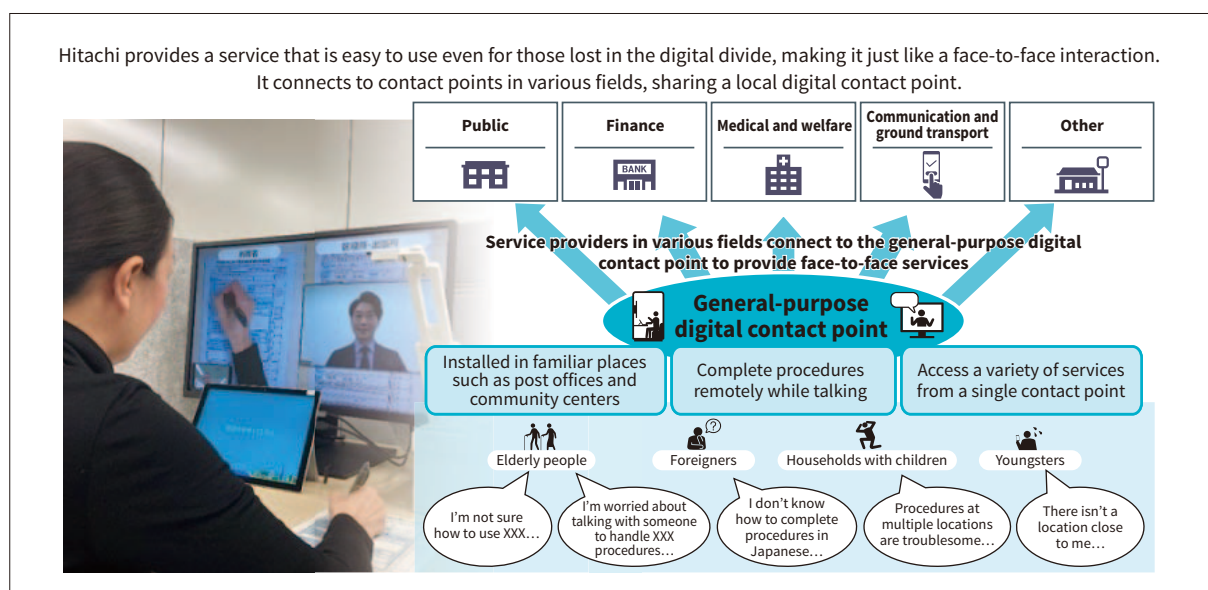
In the future, Hitachi aims to help achieve a digital society where no one is left behind, to expand the service to different industries as part of a new community service infrastructure in cooperation with the public and private sectors, and to help solve local issues and improve residents' QoL.

4 General-purpose Digital Contact Point for Use with Public and Private Contact Services

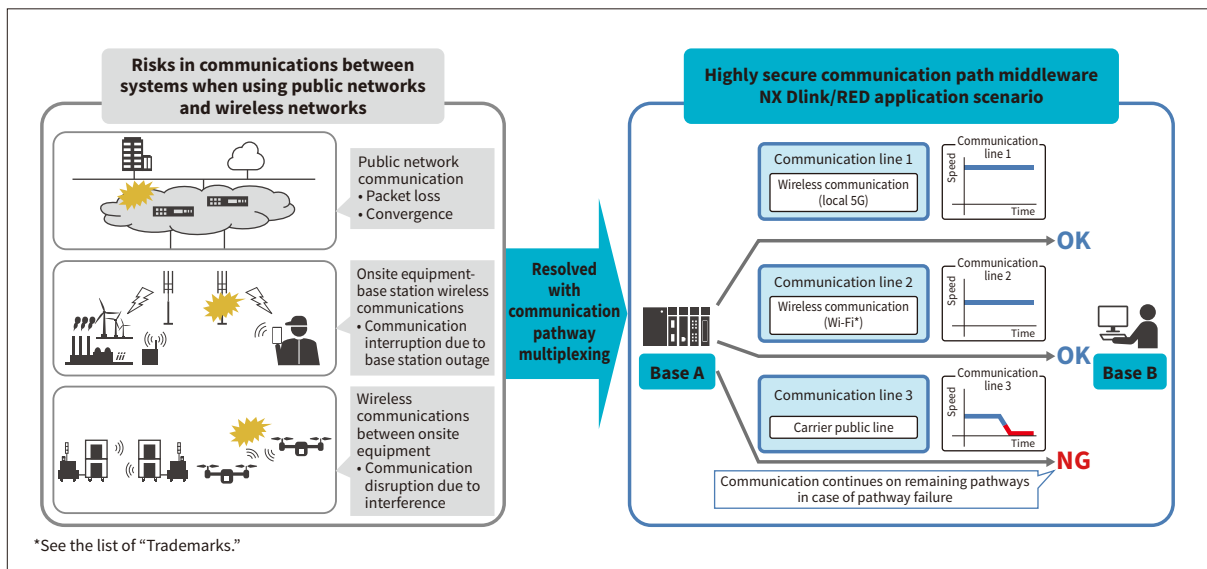
The low birthrate and aging population in recent years has resulted in a lack of workers, leading to consolidation of local government and private contact points and manned

5 Highly Reliable Communication Path Middleware NX Dlink/RED

Hitachi has developed NX Dlink/RED (Reliable Enhanced multipath Distribution) communication



4 General-purpose digital contact point



5 NX Dlink/RED application scenario

middleware that incorporates symbiotic evolution architecture concepts to achieve mission-critical IoT.

The greatest feature of NX Dlink/RED is that it provides multiplexing and redundancy of multiple network pathways without changing existing applications so that data on another system can instantly be selected to minimize communication downtime even when faults occur on a single pathway. Additionally, the system supports communication pathway protection via encryption, providing communication reliability and security, elements that are essential to mission-critical IoT.

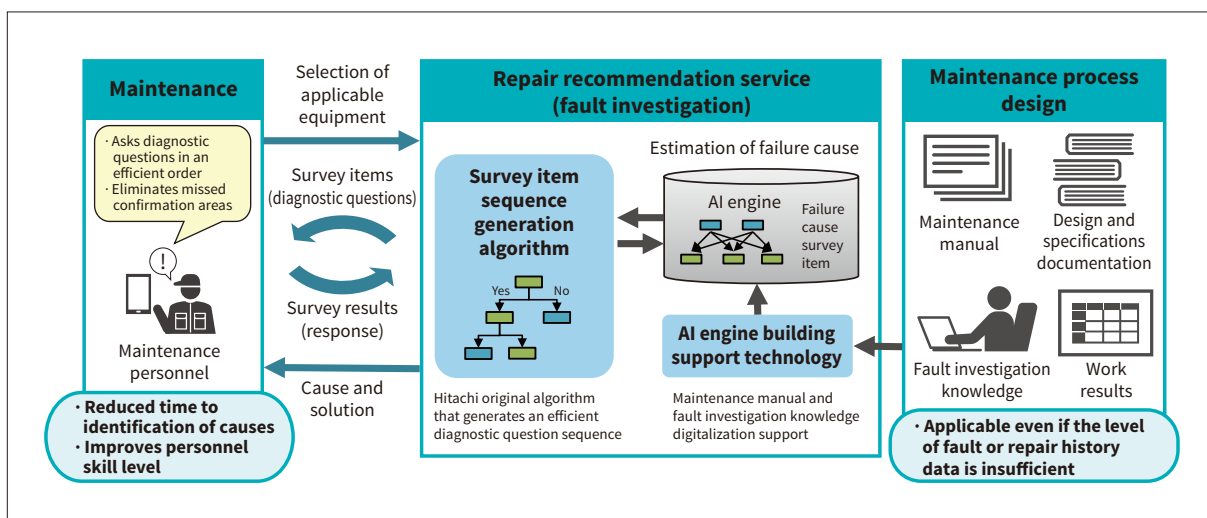
NX Dlink/RED is particularly effective for wireless communications, which tend to pose security issues such as frame loss and convergence, and risk of wiretapping. This service aims to provide highly secure communications between onsite equipment over local fifth-generation (5G) and wireless local-area network (LAN) at production sites,

and sites that have wireless communication needs such as public network applications on transportation (train cars, etc.). Hitachi will expand the utilization range of wireless technologies based on this product and contribute to achieving resilient social systems.

6 Digitalization of Fault Investigation Knowledge to Improve Social Infrastructure Maintenance Efficiency

Repair recommendation service (parts selection) use past fault and repair history data for machine learning so that an AI engine can appropriately recommend replacement parts according to the fault status.

This service is being applied to bank automated teller machine (ATM) maintenance tasks to verify the



6 Overview of repair recommendation services (fault investigation)

effectiveness of shortening the replacement parts selection time. However, in many cases the level of history data is insufficient, requiring a new approach to selection.

To deal with this situation, repair recommendation service (fault investigation) digitalize maintenance-related knowledge to cope with even projects that lack a sufficient level of fault and repair history data. The main features are shown below.

- (1) Fault investigation knowledge gleaned from maintenance manuals, design and specifications documentation, and interviews with veteran maintenance staff is modeled using AI engine building support technology.
- (2) When a fault occurs, responding to the order of diagnostic questions generated by the original Hitachi algorithm enables efficient estimation of the fault causes.
- (3) The service delivers fault investigation according to on-site operation circumstances, enabling establishment of diagnostic questions that lock or prioritize a sequence of questions.

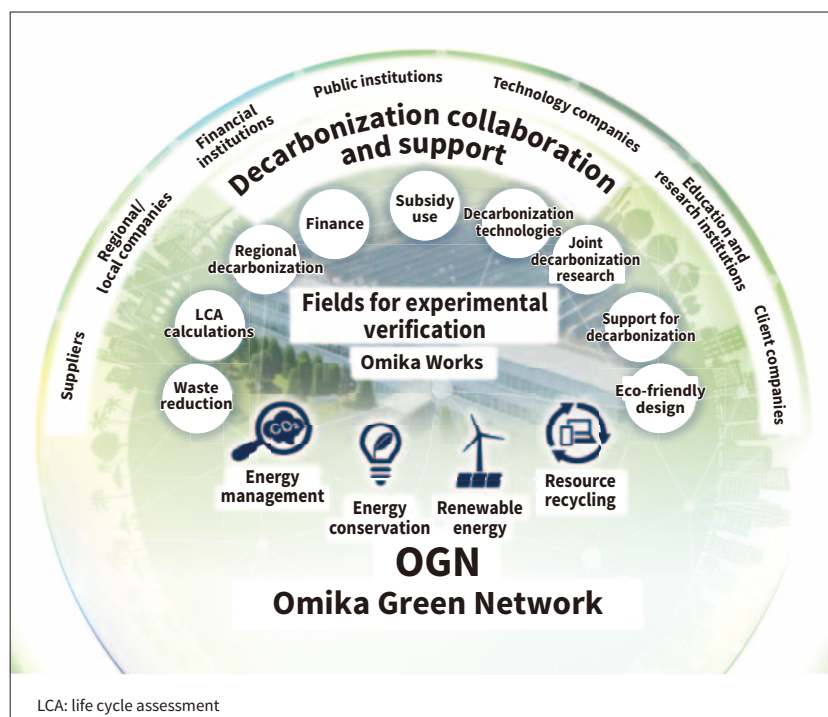
This process shortens the time to estimate the cause and is expected to improve the skill level of maintenance staff.

Currently, fault investigation repair recommendation service is being applied as a proof of concept (PoC) for particle therapy systems. Together with parts selection as a support service for maintenance tasks of complex, important equipment that serves as part of the social infrastructure, Hitachi plans to expand the scope of application.

7 Co-creating Decarbonization Growth with GX—Omika Green Network

Hitachi has set a goal of attaining carbon neutrality at its factories and offices by 2030 and across its entire value chain by 2050. This environmental goal is not Hitachi's alone, but a social issue that the community and the entire supply chain must work together to achieve. To tackle this issue head on, Hitachi, Ltd.'s Omika Works began working on the Omika Green Network in 2022.

Driven by years of onsite knowledge, digital technologies, and control technologies accumulated through production reform and factory digital transformation, Omika Works serves as the hub of a demonstration project for environmental management green transformation (GX) efforts, including the calculation, visualization, and reduction of CO₂ emissions in the production process, and efficient use of renewable energy sources. The Omika GX Model, regional energy management infrastructure, and environmental trusted digital infrastructure honed during this process will be rolled out to a variety of stakeholders outside the company, including supplier companies and financial institutions. To achieve carbon neutrality, Hitachi will engage in forming and developing a social infrastructure ecosystem in the region to help co-create a decarbonized society capable of sustainable growth.



7 Omika Green Network