

# Latest Applications and Future Plans for Integrated Building Management Solutions

Hitachi Building Systems Co., Ltd. operates a maintenance management service for building facilities that draws on the know-how and infrastructure it has built up through its work on the maintenance of elevators and escalators. Factors such as the increasing diversity of the people who use buildings and advances in digital technology have brought rapid changes over recent years to the environment that buildings have to deal with. This calls for services that focus on the people who use building rather than on the management of things (primarily equipment maintenance) as they have in the past. This article describes Hitachi's past activities and future plans with regard to smart buildings and other products that integrate and utilize accumulated data to provide digital solutions that match the needs of building users, focusing in particular on the cloud-based building management service and solution for building management companies supplied by Hitachi Building Systems.

**Atsushi Miyaji**

**Atsushi Hasegawa**

**Takeshi Saga**

## 1. Introduction

Recognizing changing social trends, particularly in developed nations, that include a shortfall in the working population, globalization, and a shift in consumer needs away from tangible goods and toward intangibles, there is a need in the field of building management to supply solutions aimed at improving operation rather than simply providing services.

Hitachi Building Systems Co., Ltd. has supplied solutions in tune with social trends in the past.

In response to increasing security requirements associated with continued leaks of personal

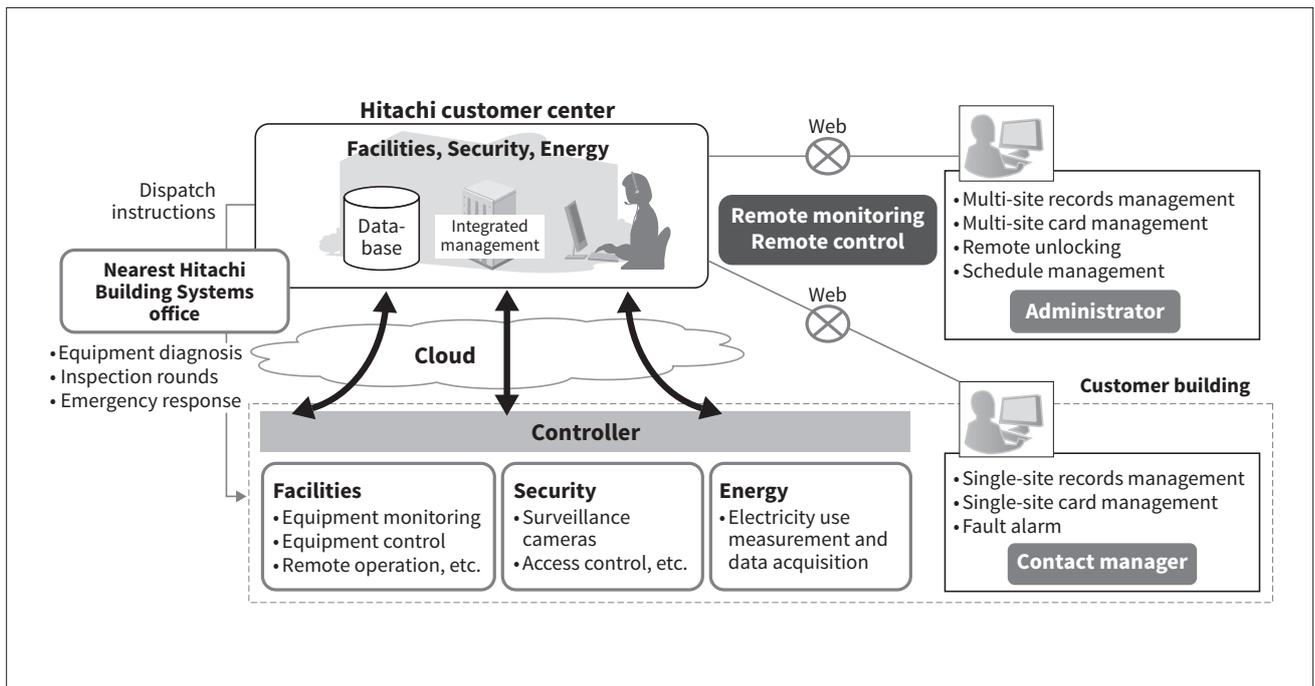
information and rising awareness of the environment and energy efficiency, especially concern about global warming, Hitachi has developed a cloud-based building management service.

Furthermore, with consumer (user) expectations of service quality having heightened considerably, as exemplified by media interest in things like the falsification of data, Hitachi has launched a solution for building management companies that ensures the high quality of building management work.

In the future, the use of accumulated data on building operations will be important for providing solutions that enhance convenience and comfort as perceived by users.

**Figure 1 – Block Diagram of Cloud-based Building Management Service**

The service installs controllers at customer buildings to collect information. Customers can browse and perform actions via the cloud.



## 2. Overview of Cloud-based Building Management Service

This section gives an overview of the cloud-based building management service introduced by Hitachi Building Systems in 2011.

Figure 1 shows a block diagram of the cloud-based building management service. It is characterized by combining the following three services under the same system and offering them to customers via the cloud.

- (1) Facilities: Remote monitoring and control of equipment faults and operating conditions
- (2) Security: Remote monitoring of access control systems and security cameras
- (3) Energy: Electricity use measurement and data acquisition

Whereas past services have required separate systems, integration into a single system brings cost advantages. The service had been adopted at approximately 6,000 sites nationwide as of December 2017.

The ability to centralize management of equipment condition and data for multiple sites is particularly appreciated by customers who have a number of sites around Japan (mainly building management

companies) as it helps them improve work efficiency and cut costs in their management divisions, utilizing the advantages of a cloud service.

## 3. Overview of Solution for Building Management Companies

While the system used to provide the cloud-based building management service described above includes the remote collection of information on equipment operation, information on the manual building management tasks of routine inspection and responding to problems is also important.

This section gives an overview of the solution for building management companies launched in September 2017, which obtains data on these manual activities.

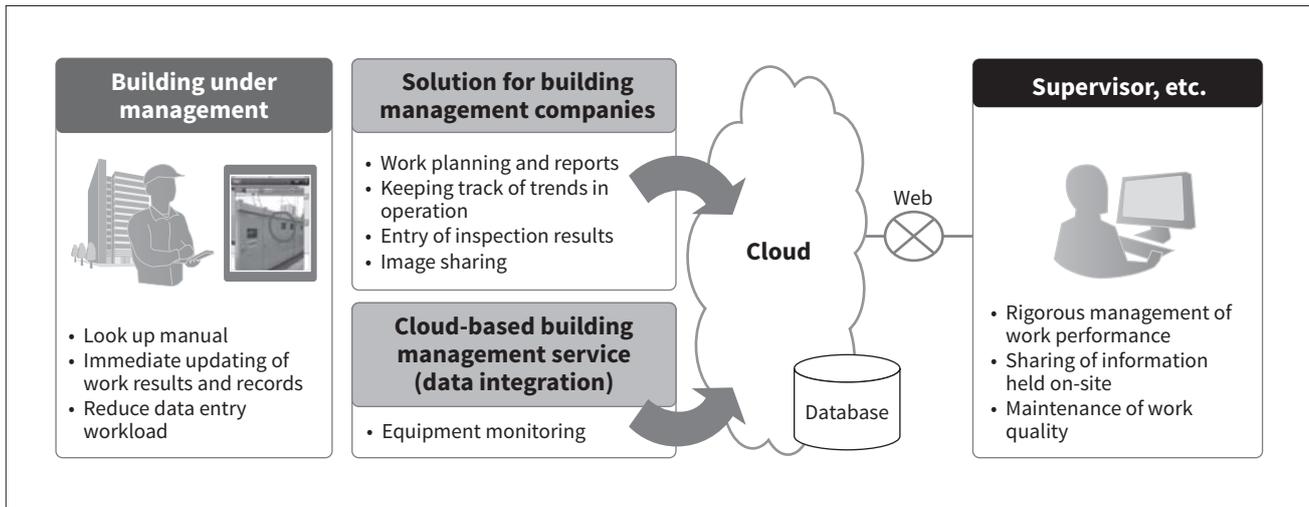
The system used to provide the solution is cloud-based and performs centralized management of maintenance activities from planning through to work data entry, report preparation, and administration of uncompleted work. Figure 2 shows a block diagram.

One of the features of the solution is its use of tablet computers for on-site work.

Inspection practices can be standardized by storing work procedure documents (that also serve as

**Figure 2 — Block Diagram of Solution for Building Management Companies**

Tablet computers are used on-site for things like entering inspection results. It is easy for management staff to see what is going on via the cloud.



inspection result check sheets) on these tablets in electronic form so that on-site staff can follow them when they perform their work. As the tablets can also be used for inspection results reporting, this reduces the amount of work staff need to put into report preparation compared to the paper-based practices of the past. It also means that supervisors have up-to-date information on inspection progress.

In addition to automatically inserting inspection results into the work report forms, the data is also accumulated and used for trend analysis. For example,

if prompt action is taken in response to being frequently called on to deal with problems on a particular item of equipment, such as installing a replacement, it can prevent sudden or extended unavailability due to a fault.

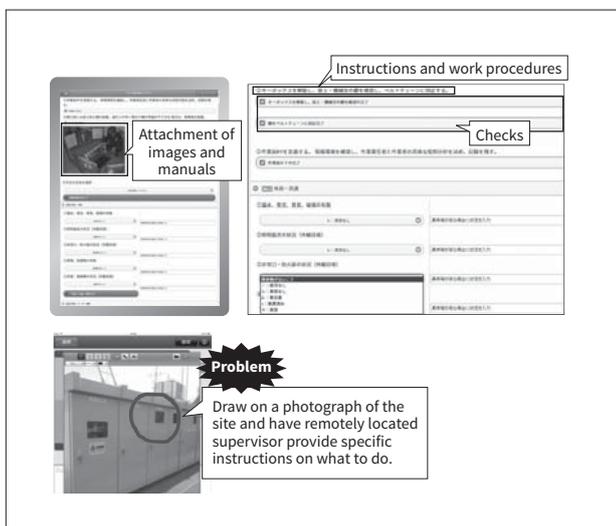
Video sharing is another feature of the solution. The camera on the tablet or other device can be used to provide a remotely located supervisor with a real-time view of the work at the site. In cases such as inexperienced maintenance staff, work can be performed at a level similar to that of an experienced person by providing support and instructions remotely. Moreover, having the maintenance person wear a camera frees them to work with both hands while viewing the instructions. **Figure 3** shows how the tablets are used.

In this way, by making good use of collected data as well as by providing support for on-site work, the benefits include making management more efficient and maintaining quality.

Another significant advantage for building management companies that cover multiple buildings is that, as well as managing on-site work more efficiently, use of the cloud means that they do not need to invest in any hardware at their own management center.

**Figure 3 — Use of Tablets by Solution for Building Management Companies**

On-site work can be carried out in accordance with procedure documents stored on tablet computers. The tablets can also be used to record work results. Another capability is the sharing of images annotated with information such as instructions on how to deal with problems.



## 4. Changing Social Trends

The above sections described building management systems developed in the past by Hitachi Building

Systems. These collect information on systems and manual work for building management and are beneficial for reducing costs and ensuring quality-of-work at building management companies in particular. However, the changing face of society means that building management, too, needs to undergo a transformation. This section describes these social trends.

One of the greatest concerns is the diminishing working-age population. Its direct consequence is the difficulty of recruiting staff, something that has already started to have an impact in areas like maintenance and cleaning staff. An indirect consequence, meanwhile, is that falling numbers of building users is creating an oversupply across buildings in general, including office and residential buildings. It is anticipated that, in order to attract tenants, building owners and developers will need to differentiate themselves from competitors by providing more added value. Relying on the basics such as location, floor area, and facilities to attract tenants, as in the past, will likely result in space remaining empty.

Together, these factors mean that the industry is facing the difficult challenge of how to combine higher added value with a smaller workforce in building management services.

Meanwhile, a 2016 white paper on “Information and Communications in Japan” published by the Ministry of Internal Affairs and Communications makes the point that information and communication technologies (ICT) such as the Internet of Things (IoT), big data, and artificial intelligence (AI) can facilitate solutions to issues such as the aging population and falling birthrate.

While the industry in the past has largely been based on the provision of services, ICT has started to become much more prevalent in building management, including telecommunication and other companies showing signs of entering the industry.

## 5. Future Directions for Services

Given the social trends described above, the desired future direction for services could be summarized as being the use of ICT to shrink the workforce and increase added value.

To begin with, the labor savings to date described in earlier sections involve an approach that could be described as “getting two people to perform the work of three.” Unfortunately, as the working age population continues to fall, it is likely that recruiting even those two people will prove difficult.

What is needed in response are solutions that can substitute for the human workforce as well as studying ways of reducing labor requirements based on sophisticated analysis and the acquisition of more detailed data than at present.

With regard to increasing added value, moreover, it is the provision of services from a user’s perspective that is the essential requirement for differentiation, enabling workers in offices and residents in apartments to use these facilities in greater comfort and safety.

Taking offices as an example, there is a need to boost efficiency through the detailed analysis of working conditions for office workers in order to pursue the workplace reforms being promoted by the government. Looked at in terms of building management, there is a need for detailed control of equipment to ensure that environment factors such as heat or cold are not detrimental to productivity, and with progress also being made on flexible working practices and the sharing of work spaces (liberalization), this cannot be achieved using the one-size-fits-all practices of the past.

To provide individual users with a safe and comfortable environment under these circumstances, along with information on things like the operation of building facilities, it is also important to obtain specific information on users such as attendance and records of entry and exit.

In summary, the acquisition of specific information and ways of substituting for the human workforce will be key to implementing the services of the future.

Hitachi Building Systems intends to offer optimal solutions by using technologies such as sensors and image analysis to acquire specific information that is not currently available, such as location data, and by utilizing it together with information that is already held, such as entry and exit records or equipment operation data.

One such solution will involve the use of service robots. Using robots in place of human staff is an

effective way to reduce the workforce, and they offer significant advantages for providing multilingual support in a more globalized future.

Hitachi Building Systems is trialing the use of EMIEW3 humanoid robots. With capabilities that include autonomous movement and interaction, the intention is to deploy them in place of people in services that handle tasks such as reception.

## 6. Future Plans

The section above described the addition of specific information on users to existing information on building facilities, and the directions being adopted for solutions in the form of services that use robots.

It is anticipated that solutions based on a user perspective will spread more widely in the future.

The 2016 white paper on “Information and Communications in Japan” published by the Ministry of Internal Affairs and Communications notes that the number of devices connected to the Internet will roughly double from 15.4 billion in 2015 to 30.4 billion by 2020, making available information on a variety of different things.

In the case of building management, in addition to facilities control, which represents an extension of current practices, there will also be a need to utilize all the different sorts of data in a building to supply solutions.

Hitachi Building Systems envisages buildings that use the Lumada IoT platform and evolve based on the accumulation of big data, which is to say “smart buildings.”

In the case of an office, for example, information about workers and their schedule for the day will be used to assign a particular elevator to staff as they arrive at work. At lunchtime, they will be provided with information on eating places that their past history indicates they have a high likelihood of visiting. Hitachi also plans to investigate solutions that go beyond the conventional boundaries of building management, such as offering people information on medical facilities based on an assessment of their physical condition from the tone of their conversation and facial color.

## 7. Conclusions

This article has described examples of past activities by Hitachi Building Systems and its future plans for building management.

The company’s corporate mission mentions “contributing to society by providing all building users with a safe and comfortable environment,” as one of its goals.

Hitachi intends to help build a better environment by utilizing its existing infrastructural resources, which take the form of experience, control centers, and technical staff built up over time, and also things like newly developed digital technologies and robots.

### Reference

- 1) Ministry of Internal Affairs and Communications, 2016 White Paper on “Information and Communications in Japan,” <http://www.soumu.go.jp/johotsusintokei/whitepaper/eng/WP2016/2016-index.html>

### Authors



**Atsushi Miyaji**

Business Planning Department, Global Solution Division, Hitachi Building Systems Co., Ltd. *Current work and research:* Business planning work.



**Atsushi Hasegawa**

Facility Solution Department, Global Solution Division, Hitachi Building Systems Co., Ltd. *Current work and research:* Building maintenance business.



**Takeshi Saga**

Systems Solution Department, Global Solution Division, Hitachi Building Systems Co., Ltd. *Current work and research:* System solutions business.