Capturing Benefits of M2M in Manufacturing

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OVERVIEW: M2M has attracted the interest of the manufacturing industry in recent years as a means toward cutting maintenance costs and improving the added-value of after-sales services. As numerous challenges need to be overcome to take advantage of M2M, expanding its use without first dealing with these may result in diminished efficiency. Accordingly, Hitachi recommends a three-stage implementation of M2M. The Global e-Service on TWX-21 is a SaaS-based support service for equipment lifecycle management. In addition to its current services, Hitachi also plans to add an assessment service that assists with the staged implementation of M2M and a globally available M2M service.

INTRODUCTION

IN addition to the conventional business model of enhancing and selling equipment, the manufacturing industry has seen growing interest in recent years in after-sales services that have the potential to be highly profitable. With the globalization of manufacturing, there has also been more significance given to the use of machine-to-machine (M2M) technologies to cut maintenance costs and improve the added-value of after-sales services by using "machinery big data" for the remote monitoring and management of this equipment. This "machinery big data" is collected automatically from equipment operating in different parts of the world and includes operating information and location information.

This article presents Hitachi's proposition for the introduction of M2M technology in the manufacturing industry, gives an overview of the Global e-Service on TWX-21* that uses the experience and know-how built up by Hitachi as a basis for supporting all aspects of equipment lifecycle management, and describes the planned assessment service and M2M service.

PROPOSITION FOR INTRODUCTION OF M2M IN MANUFACTURING

Typical benefits of M2M for the manufacturing industry include maintenance cost savings achieved through the availability of realtime information and the development of new businesses that utilize the collected information.

However, a number of challenges need to be overcome before these benefits can be achieved in practice. Going ahead with M2M without first dealing with these challenges may risk causing confusion in the workplace and actually diminish efficiency. Furthermore, because of the risk of failing to achieve a return on the long-term investment required, it is important to identify appropriate targets for investment based on an understanding of such factors as the product characteristics and the business environment in which the company concerned is operating. To provide greater certainty that manufacturing industry will be able to reap the benefits of M2M, Hitachi recommends a staged implementation.

The following explanation divides this process into three stages, comprising an initial stage in which the mechanisms for M2M are established, a second entrenchment stage in which the benefits of M2M are secured, and a third development stage for building on these benefits. It also explains the measures required to deploy M2M globally. Note that the explanations given here relate to the case in which the manufacturing industry supplies machinery with a long life and can be expected to create added value from the provision of after-sales services.

Initial Stage (Establishment)

In this initial stage, only a small number of machines will be fitted with M2M systems and therefore most equipment on the market will not have an M2M capability. Accordingly, the benefits of M2M will still be small in quantitative terms and it will be difficult to generate income from M2M on its own. This may tend to diminish the incentive to adopt new business processes that take advantage of equipment with an M2M capability.

This makes it important to accompany the initial introduction of M2M with the establishment of new

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business processes that allow for its greater use in the future, and to reduce support costs by adopting practices that also apply to equipment without an M2M capability. Specifically, in addition to establishing an equipment management regime that can be relied on to manage machines individually, this involves using this equipment management as a basis for providing access to business information and undertaking organizational reforms to standardize and support the activities of service engineers based in different parts of the world.

Second Stage (Entrenchment)

During the second stage, greater adoption of M2M means that equipment with an M2M capability makes up a larger proportion of the market. It is at this point that the benefits of M2M start to grow. Along with the changes to existing business processes implemented during the initial stage, the entrenchment stage is also characterized by growing integration of M2M into existing business processes.

Furthermore, an important factor in entrenching the benefits of M2M is to establish maintenance services that utilize M2M and take steps to increase service income. This means improving services by applying the plan, do, check and act (PDCA) cycle to dealings with customers, utilizing "machinery big data" (the location and other operating data on individual machines collected via M2M), and machine-specific maintenance records and other business information. This requires that service improvements be made by establishing and measuring quantitative and qualitative key performance indicators (KPIs), and then monitoring how they trend over time. KPI examples include the service income generated per machine, order ratios, and work times for service engineers.

Third Stage (Development)

In the third stage, equipment with an M2M capability has a high market share and the benefits from M2M exceed the investment. Also, with business process standardization now well established, a large amount of location and other machine-specific operating information is being collected along with associated business information.

To build further on the benefits of M2M, it can also be used as a catalyst for business innovation by performing analyses that combine business information with large amounts of machinery big data. Possible examples include analyzing machinery big data to perform "failure diagnosis" and make quality improvements for equipment, using machinery big data and information on service engineers to determine the best times to make service calls at customer sites, using machinery big data and production management to determine optimal inventory levels, and using machinery big data and sales information to improve marketing.

Global Deployment

In addition to the staged implementation described above, the global deployment of M2M also requires the resolution of issues specific to particular countries or regions, including regulatory requirements, different languages, communication unit certification, choice of communication protocol, and telecommunication costs. Because expanding coverage to more countries and regions makes the standardized collection of machinery big data more difficult, there is a need to establish international standards for machinery big data as well as for its collection and delivery processes, and to have these widely adopted. As M2M is extended to cover more equipment across more countries and regions, management tasks such as handling inquiries and the administration of equipment and users also become more complex. While it is necessary to perform equipment management in ways that are independent of country or region, a highly centralized approach becomes impractical when the number of machines being supported reaches the tens of thousands. Rather, a distributed and hierarchical management regime needs to be established.

The resolution of issues specific to particular countries or regions and the establishment of standards for information collection are both important considerations in the initial establishment stage. Similarly, establishing a distributed and hierarchical management regime is important during the second entrenchment stage. These challenges are associated with global deployment, and ways of dealing with their complexities include consulting and the adoption of existing best practice.

FUTURE PROSPECTS FOR GLOBAL E-SERVICE ON TWX-21

Hitachi supplies Global e-Service on TWX-21 to utilize the experience and know-how it has built up to support equipment over its entire lifecycle. To support the adoption of measures described above that provide greater certainty regarding the benefits of M2M to the manufacturing industry, Hitachi intends to include an assessment service and M2M service in Global e-Service on TWX-21.

This section gives an overview of Global e-Service on TWX-21 and describes the planned assessment service and M2M service.

Global e-Service on TWX-21

Global e-Service on TWX-21 is based on the Global e-Service, an international service provided by Hitachi Construction Machinery Group that collates business know-how and has been in operation collecting various types of information for 12 years. Through the centralized management and visualization of equipment lifecycle information, it helps improve the efficiency of maintenance work, the proportion of customers who enter into service contracts, and customer satisfaction (see Fig. 1). TWX-21, meanwhile, is the largest business-to-business media service in Japan. Using the TWX-21 platform to deliver the service ensures high reliability while reducing operating costs.

Assessment Service

Because of the increased risk of failing to earn a return on the long-term investment required to reap the benefits of M2M, it is necessary to consider which business areas warrant preferential reform based on an understanding of the company's characteristics and circumstances. Accordingly, as part of Global e-Service on TWX-21, Hitachi plans to provide an assessment service for equipment lifecycle management that will take account of the staged implementation of M2M and include consideration of business reforms. By developing an understanding of the business's current and future circumstances in the manufacturing industry, taking account of equipment lifecycles, the service will identify the areas that need to be worked on at each stage in order to use M2M to achieve the best possible equipment lifecycle management. If necessary, the service can also assist with measuring the effectiveness of business process

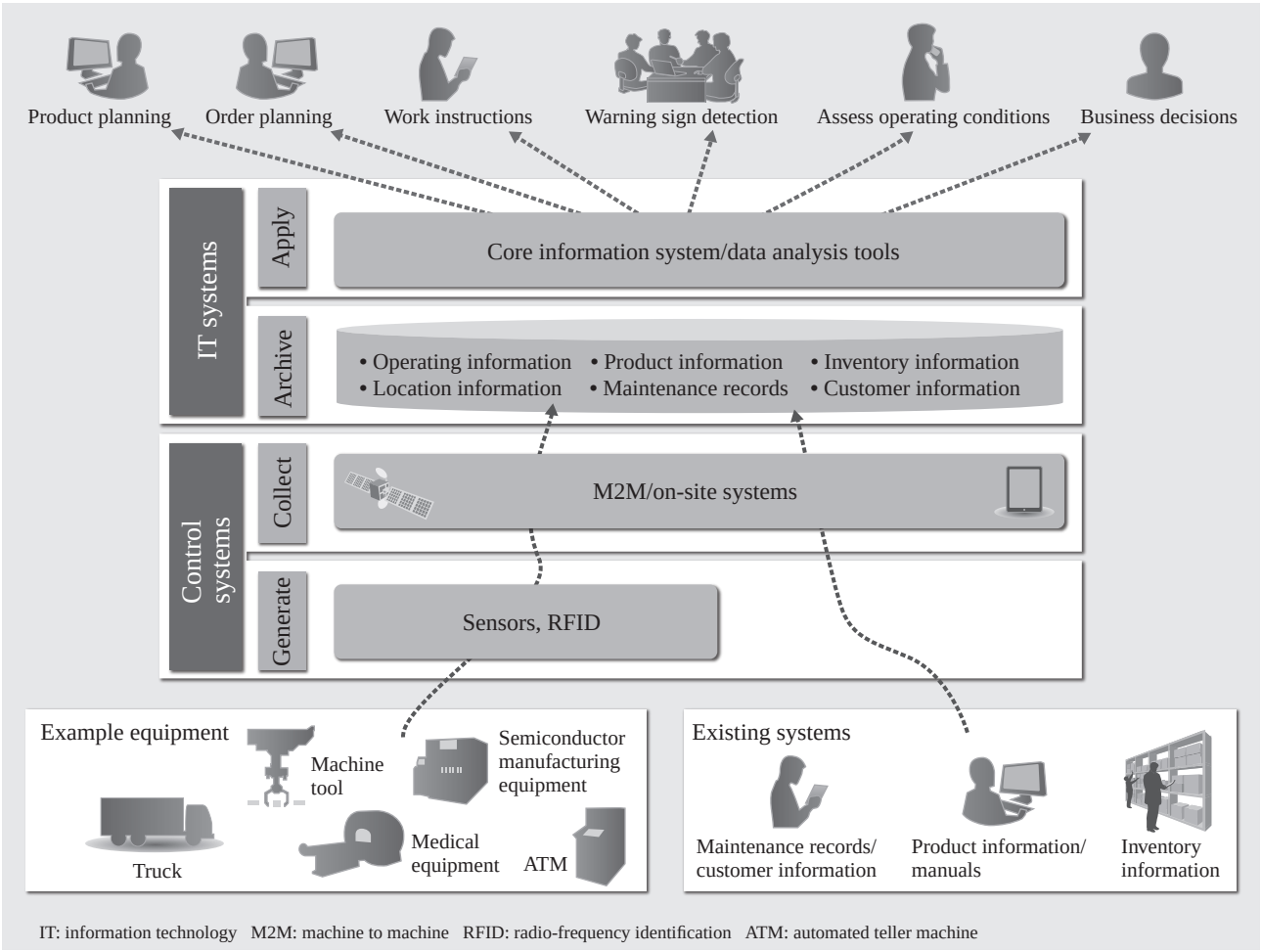

Fig. 1—Overview of Global e-Service on TWX-21.
Global e-Service on TWX-21 helps improve the efficiency of maintenance work, the proportion of customers who enter into service contracts, and customer satisfaction through the centralized management and visualization of equipment lifecycle information.

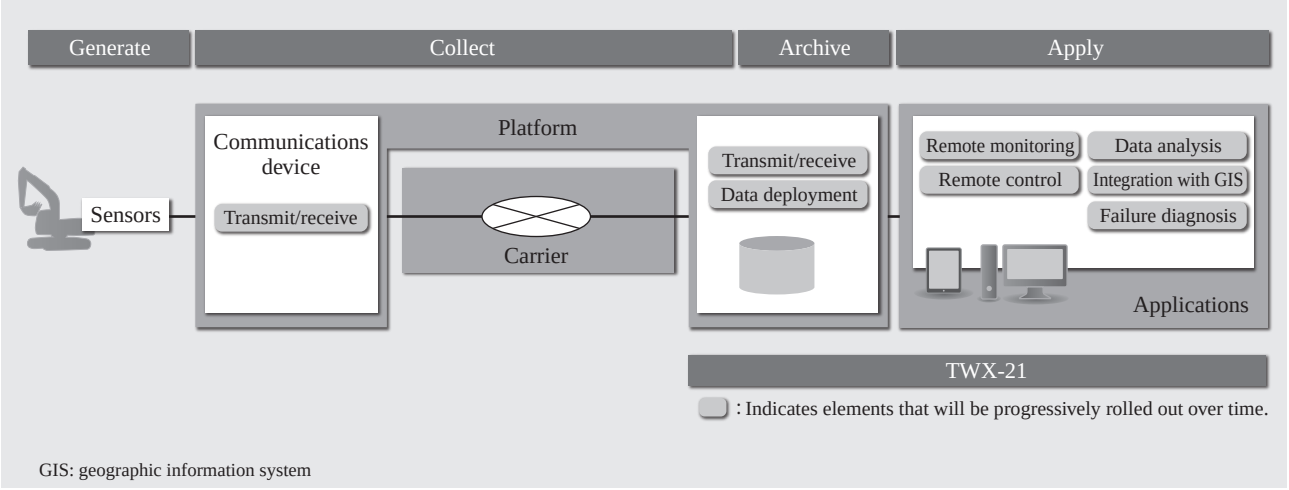

Fig. 2—Overview of M2M Service.
The M2M service will provide automatic collection of machinery big data, including location information obtained using the global positioning system (GPS) and other operating information, and also remote monitoring and control. This will allow the use of machinery big data incorporating machinery management functions to support sales and maintenance activities, and the analysis of machinery big data to improve quality or aid product development.

reengineering (BPR) or other business reforms in ways that are compatible with the adoption of M2M.

M2M Service

To assist the international operations of the manufacturing industry, Hitachi plans to include an M2M service in Global e-Service on TWX-21 that will be supported globally. The M2M service will be able to be used for the automatic collection of machinery big data (location and other equipment operating information), and for remote monitoring and control. This will allow the use of machinery big data incorporating machinery management functions to support sales and maintenance activities, and the analysis of machinery big data to improve quality or aid product development.

As part of the M2M service, Hitachi plans to progressively introduce the following elements (see Fig. 2).

(1) Applications

Remote monitoring, remote control, and functions such as geographic information systems (GIS), failure diagnosis, scheduling of service engineer visits, and inventory management that utilize machinery big data.

(2) Platform

Automatic collection of machinery big data required by applications, command transmission

(3) Devices

The issuing of operation commands or information collection requests to equipment

(4) Carrier

Communication links provided by overseas telecommunications carriers to support the international operations of the manufacturing industry

CONCLUSIONS

This article has presented Hitachi's proposition for the introduction of M2M technology in the manufacturing industry, given an overview of the Global e-Service on TWX-21 that uses the experience and know-how built up by Hitachi as a basis for supporting all aspects of equipment lifecycle management, and described the planned assessment service and M2M service.

The Global e-Service on TWX-21 draws on the experience and know-how within Hitachi to help customers improve their equipment lifecycle practices. The operation and maintenance (O&M) business can progress by continuing to provide the functions that customers need for business reform.

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