

An IoT Platform to Support Business Transformation - "NEC the WISE IoT Platform"

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Abstract

"NEC the WISE IoT Platform" is the systematization of the functions that implement the IoT systems for the smooth advancement of customers' digital technology businesses. It has an architecture that facilitates the easy-to-use implementation of "NEC the WISE", which is a portfolio of NEC's cutting-edge AI technologies. Based on the "5-Layer IoT Architecture Model", this platform changes the required common functions into "building blocks" and combines them enabling implementation and linkage. Benefiting from various advantages including scalability/portability, connectivity of non-IT devices and compatibility with open sources, the platform may be customized according to the growth requirements of each customer's business and serves for a speedy start-up and the verification of new services.

Keywords



5-Layer IoT Architecture Model, building block, AI, scalability, portability, multi-connectivity, open sources

1. Introduction

Rapid dissemination of the IoT (Internet of Things) has enabled the possibility of linking all "information, humans, things and events" and of simultaneously expanding opportunities for applying data science to support businesses.

When identification of the status of things is enabled via IoT, three changes are brought about in the business. The first of these is the improved efficiency of existing operations. "Visualization," which is the basis of business improvement clarifies problems in existing operations and thereby enables more efficient, effective business operations. The second change is the performance of current operations, particularly product sales, as services. Identification of the usage situations and consumption rates of things enables the detection of inadequate maintenance and the prediction of failures so that services for preventing issues before they occur can be provided. The third change is the invigoration of new business concepts. The linkage of collected data items from different viewpoints creates the possibility of data utilizations in support of new functions as well as oppor-

tunities to create new businesses.

At NEC, we believe that "NEC the WISE IoT Platform" has the potential of becoming a powerful foundation for accelerating such business reforms for our customers and for supporting their digital technology businesses.

2. Configuration of the "NEC the WISE IoT Platform"

"NEC the WISE IoT Platform" is the systematization of the functions that implement the IoT systems for the smooth development of customers' digital businesses. It has an architecture that facilitates the easy-to-use implementation of "NEC the WISE", a portfolio of NEC's cutting-edge AI (Artificial Intelligence) technologies (**Fig. 1**).

It is a platform that provides solutions and services that can match the level of each customer in addition to offering consulting services and co-creation programs.

"NEC the WISE IoT Platform" incorporates significant benefits drawn from the experience that NEC has acquired from several customer based projects and, as a result, exerts qualitative effects on a wide range of businesses. The platform is supported by the knowledge

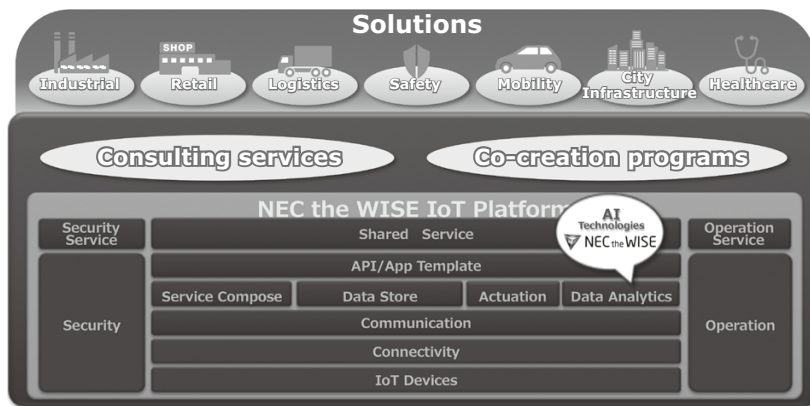


Fig. 1 Overall image of the "NEC the WISE IoT Platform."

acquired via the five steps that are critical in leading a digital technology business to success.

Namely, the five steps are; 1) to clarify the outcome (achievements) of each business and incorporate it in the requirements (hypothesis planning); 2) to verify the plan by visualizing things and events as visible data (hypothesis verification); 3) to start up the testing system quickly and transfer it as it is to the actual environment (small start-up); 4) to expand the system flexibly according to the business growth and environmental changes and; 5) to develop the system into a robust one that features continuing stability.

3. Features of "NEC the WISE IoT Platform"

This section describes the features of "NEC the WISE IoT Platform" that can be utilized via the five steps above.

3.1 5-Layer IoT Architecture Model

NEC announced the 5-Layer IoT Architecture Model in July 2015¹⁾. This model has five layers including L1 for device computing, L2 for short-distance networking, L3 for edge computing, L4 for wide-area networking and L5 for cloud computing, all of which are supported by a security platform.

From the experiences and achievements acquired via a number of projects based on the above ideas, NEC concluded that what is important is to define the functions required for IoT systems in advance, convert them into blocks and combine them to enable implementation in a 5-layer model (Fig. 2).

3.2 Building Blocks

We call the task of predefining the required functions

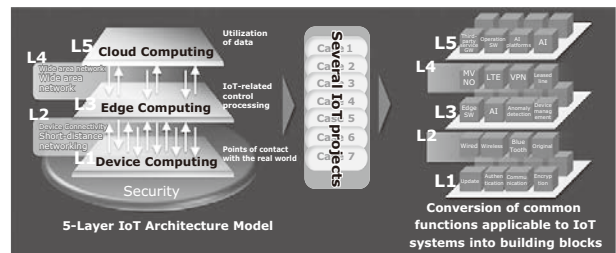


Fig. 2 5-Layer IoT Architecture Model.

and converting them into blocks the "building block" method. This approach facilitates system customization according to the verification results and business growth progress. It also enables small start-ups and flexible system building.

This building block type of system configuration is expected to reduce the time and costs compared to the traditional waterfall model of system development.

3.3 Use of Advanced Technologies Such as AI

The "NEC the WISE IoT Platform" naturally makes use of NEC's cutting-edge AI technologies from NEC the WISE but also accepts the free combination of non-NEC AI engines in order to meet the diversified needs of customers. This strategy maximizes the effects of operations at each phase including those of data collection, visualization and Analytics and Prescription (Fig. 3).

3.4 Use of Various Cloud Systems

In the process of business growth and of beachhead strategy deployment, it sometimes becomes necessary

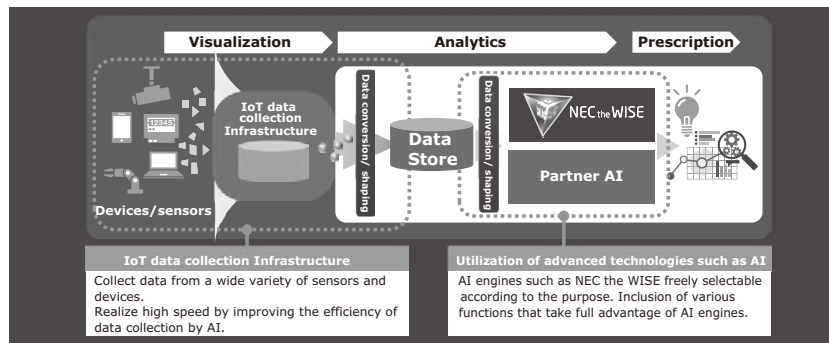


Fig. 3 Use of advanced technologies such as AI.

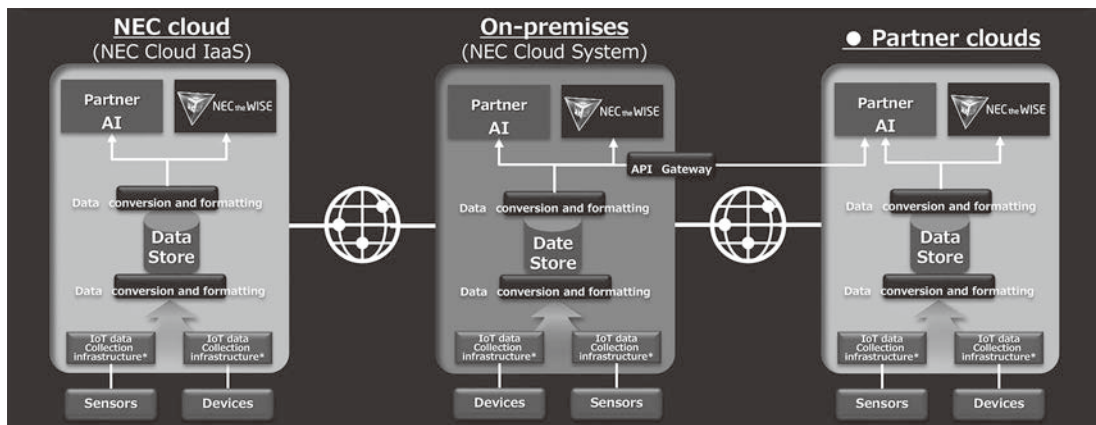


Fig. 4 Use of various cloud systems.

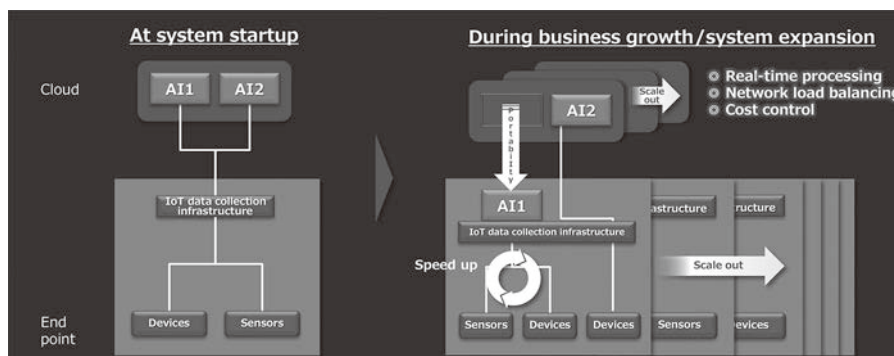


Fig. 5 Portability/scalability.

to select partner cloud technology systems from non-NEC manufacturers in addition to a customer's existing system of on premises software and NEC's cloud systems. The functions implemented on the "NEC the WISE IoT Platform" by means of the building blocks method can also be utilized on the partner cloud systems. On the contrary, it is also possible to utilize the functions and data on other cloud systems securely and seamlessly via the API gateway (Fig. 4).

3.5 Portability/Scalability

A system built using "NEC the WISE IoT Platform" can be flexibly modified according to changes in the business environment and stages in business growth. Even in cases for which the data quantity or the requirement for real-time processing increases from the time of the system startup, the blocks can be relocated flexibly for distributed processing (Fig. 5).

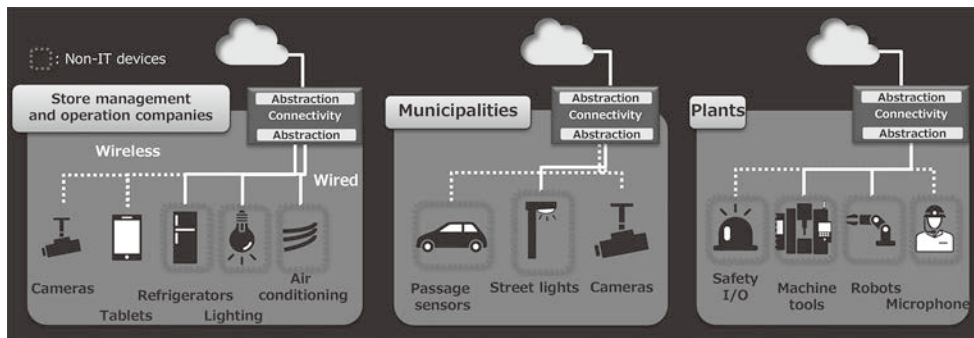


Fig. 6 Multi-connectivity.

Considerations are also made to increase the speed by porting specific functions to devices. For example, assuming that analysis data exists that has been done using only vibration and sound sensors. If video devices such as cameras are added to improve the analysis accuracy, the amount of data processing in the device computing layer will be increased considerably. However, the smooth scalability of the system makes it easy to transfer or to newly add AI functions to the device computing layer.

3.6 Multi-connectivity

IT Applications are still unavailable in many of the devices used in the actual fields of customers and there are consequently many requirements to utilize such tools actively by applying the IoT. To enable current use of non-IT devices, "NEC the WISE IoT Platform" prepares a set of adapters capable of reading them and verifies them in advance to enable data collection. We anticipate that absorption of the differences between different communications systems and data formats will facilitate connection of non-IT devices and save the labor required in equipment expansion/updating and device additions (Fig. 6).

3.7 Open Sources

"NEC the WISE IoT Platform" adopts a large number of pre-verified open sources in its building block system. With open sources, functions are developed very quickly and systems are updated very regularly. Adoption of these with a positive attitude makes it possible to utilize high-quality software over a wide range. Open sources with functions and security matters verified in open environments can be used safely, which also makes it possible to avoid "lock-in" by a specific vendor.

At NEC, we have challenged the active use of open sources from a very early stage and our achievements in various fields are widely appreciated.

4. Conclusion

"NEC the WISE IoT Platform" forms a service system called "NEC Flexible Business Infrastructure" together with consulting services, co-creation programs and various IoT solutions. At NEC, we prepare solutions and services that can match the different developmental phases of customers. For customers who have clearly defined business issues or functions, we can provide IoT solutions that can be extended to cover various business types. For customers who cannot decide how to apply the IoT and AI in their businesses, we are ready to propose consulting services and co-creation programs for them and to support the introduction of digital technology businesses.

* LTE is a registered trademark of ETSI (European Telecommunications Standards Institute).

* All other proper nouns such as product names, company names, logos, etc. that appear in this paper are trademarks or registered trademarks of their respective companies.

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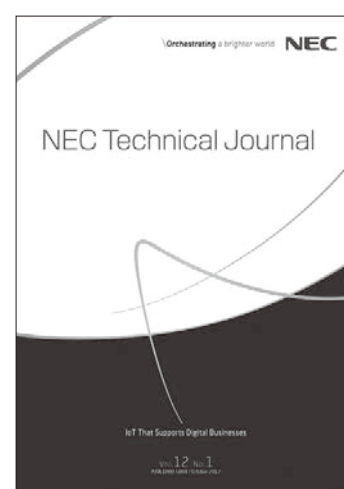
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