AI Assistant Service for Corporate Productivity Improvement

With the boosting of white-collar productivity posing a challenge for many companies, potential is seen in the use of chatbots in which an AI uses chat-based interaction and natural language interpretation to collect information from within the company or from the cloud and to perform tasks. Hitachi's AI assistant service is based on Office 365 (Skype for Business) and is suitable for a wide variety of in-house activities. This article describes the service and how it optimizes itself for specific users by using interactive chat to collect a greater volume of data and improve its accuracy through experience.

Naoki Sakaguchi
Hirotake Kitabayashi

1. Introduction

Labor productivity in Japan remains low, being below the average for Organisation for Economic Co-operation and Development (OECD) members with a rank of 20th out of the 35 countries[(1)]. Productivity improvement, meanwhile, forms a major part of the "work style reforms" being led by the government, and improving white-collar productivity in particular is a pressing issue for Japanese companies.

White-collar work can be broadly divided into routine and non-routine tasks. The former are tasks that follow a fixed pattern, such as data entry or the issuing of receipts or invoices, and can be automated using tools such as robotic process automation (RPA). Non-routine tasks, in contrast, can potentially benefit from the use of artificial intelligence (AI). AI comes in a variety of different forms with a diverse range of applications, with chatbots being one such form.

2. Overview of AI Assistant Service

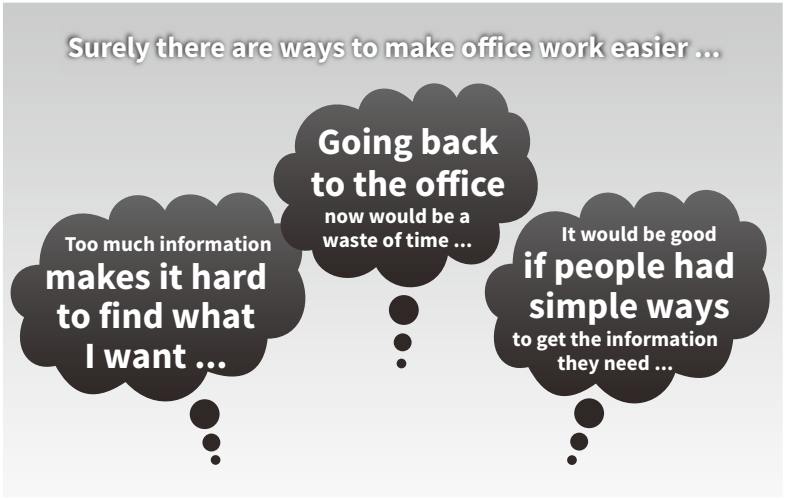
The AI assistant service operates as a chatbot to boost the efficiency of non-routine tasks that impose on the time of white-collar staff.

Non-routine tasks are those such as planning, negotiation, or coordination that rely on experience and judgment, and that frequently require preparatory work such as information collection and brainstorming.

Among the challenges when seeking to improve the efficiency of non-routine tasks are the time taken to seek out and collect information, the many incidental tasks such as trying to coordinate the schedules of the people involved, and the time wasted returning to the office after making visits (see **Figure 1**).

The AI assistant service is provided with the aim of overcoming these challenges by enabling these tasks to be performed using a smartphone or tablet, from outside the office, and through a simple interface.

Figure 1 — Issues Associated with Improving Efficiency of Non-routine Tasks
The figure presents some of the obstacles to making white-collar work more efficient.



2. 1
Overview of Chatbot

The term chatbot is a combination of "chat" and "robot," and a chatbot is a communication service for automating certain tasks and processes that uses chat to obtain information. Chatbots operate over LINE[*1], Facebook[*2], Messenger[*2], Slack[*3], and web interfaces, providing information and other responses in reply to queries passed to the bot by using chat as a means of interaction with people. As an AI is used to interpret the user queries, chatbots are capable of sophisticated interaction. Many of the examples of chatbot use in Japan are intended to improve call center efficiency, including handling online bank inquiries and customer inquiries at electronic commerce sites.

2. 2
Features of AI Assistant Service

The AI assistant service of Hitachi Solutions, Ltd. is a chatbot that uses an AI engine from a Japanese vendor and is designed to use Skype[*4] for Business (part of Microsoft[*4] Office 365[*4]) as its interface. Three features of the AI assistant service are its ability to interpret natural language and to use this to search for and retrieve information, its extensive integration with existing systems, and its application of machine learning to user characteristics (see **Figure 2**).

(1) Ability to interpret natural language when searching for and retrieving information

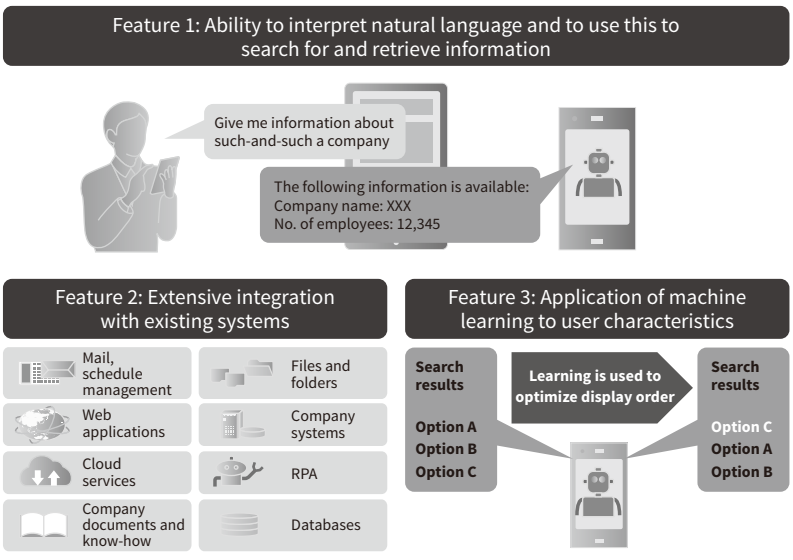
When searching for information or accessing company systems via the AI assistant service, the user can ask using the same words they would use in normal human conversation (entering them as text or speech), without requiring knowledge of where the information is held and which company systems need to be accessed. Examples include asking the AI assistant service to get a particular proposal document or to find out who is responsible for a particular product. The AI engine controls the interaction, using the entered words and context to determine what the user wants. Once this has been identified, the system seeks the requested information by, for example, invoking external services such as those in the cloud or searching company frequently asked questions (FAQs) or other knowledge held in the AI engine. The system then generates a conversational response based on the results of these actions and presents it to the user (see **Figure 3**).

The AI engine not only handles simple requests, it can also obtain the information it needs to perform the task from the user interactively by asking questions or presenting options for them to choose. If a user wants to log a daily report, for example, the system interactively prompts them to provide the names

*1 LINE is a registered trademark or trademark of Line Corporation.
*2 Facebook and Facebook Messenger are registered trademarks or trademarks of Facebook, Inc. and its affiliate companies.
*3 Slack is a registered trademark or trademark of Slack Technologies, Inc. and its affiliates.
*4 Microsoft, Office 365, Skype, and Outlook are trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries.

Figure 2 — Features of AI Assistant Service

The AI assistant service, which works by staff using a smartphone or tablet to chat with the AI assistant over Skype for Business, is able to access company systems on the user's behalf to find information or perform tasks.



AI: artificial intelligence RPA: robotic process automation

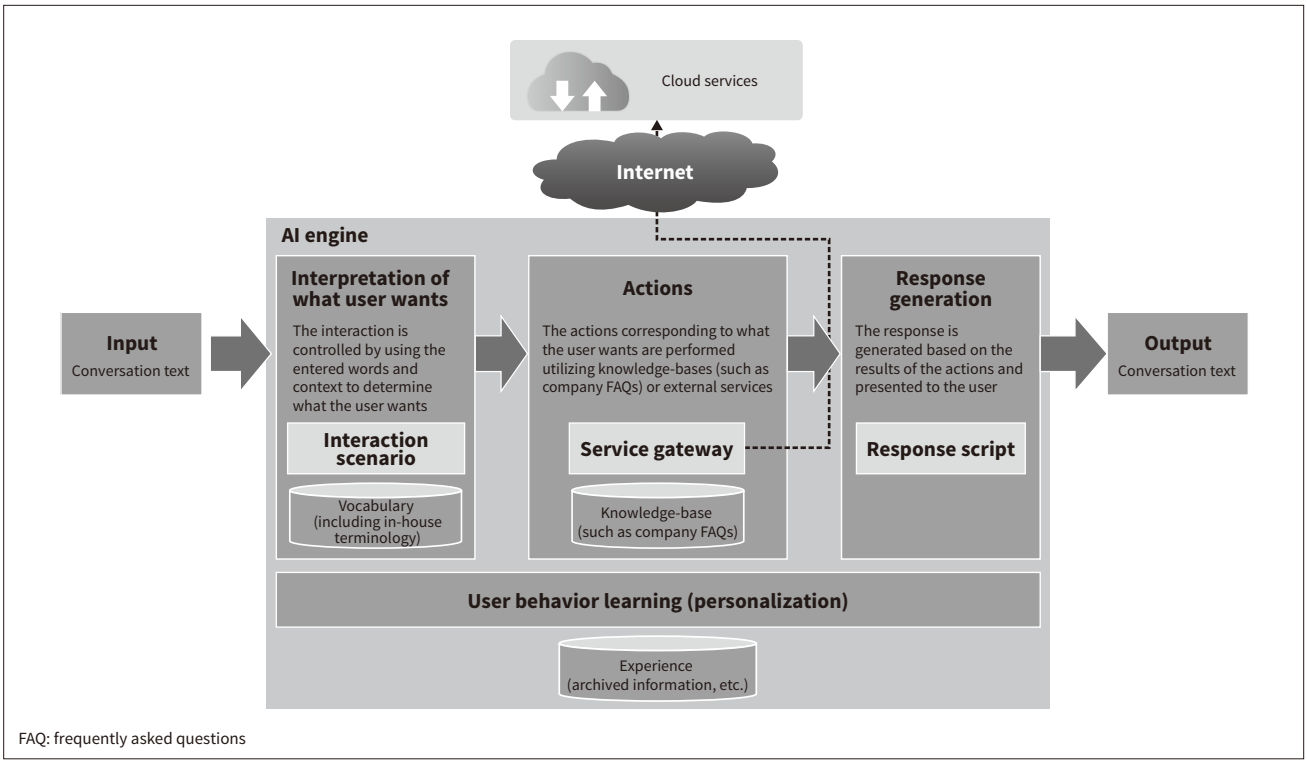
and addresses of companies visited, the purpose of the visits, details of discussions, follow-up actions, and so on. The user simply needs to answer these questions to complete the report. A task that previously involved going back to the office can now be handled from a smartphone while on the road.

(2) Extensive integration with existing systems

The ability of the AI assistant service to work extensively with existing systems expands the range of tasks that can be accomplished through chat. Integration with facilities reservation and schedule management in Outlook[*4], for example, means the AI assistant

Figure 3 — How the AI Assistant Service Works

The AI engine determines what the user wants and controls the interaction to perform the required actions. The response is generated based on the results of the actions and presented to the user.



FAQ: frequently asked questions

service can check the schedules of meeting attendees and book a meeting room. Files can be retrieved by searching the document management system, and preparing documents or identifying who is responsible for particular products can be done at the same time.

(3) Application of machine learning to user characteristics

As the results displayed in response to queries are stored, the system performs ongoing learning as the service is used to optimize the priority order based on which results the user chooses. This makes the system easier for people to use the more they use it.

3. Example Uses at Hitachi

3. 1
In-house Trial

Starting in April 2017, Hitachi Solutions undertook a proof of concept (PoC) trial of the AI assistant service involving approximately 100 sales department staff. The trial covered company information, staff contacts, product information, and work guidance (such as human resource management rules). The most frequent purpose to which the service was put was to find staff contact information (889 uses), followed by retrieval of company information (234 uses), work guidance (126 uses), identifying the person responsible for a particular product (103 uses), and obtaining product documentation (81 uses). The service was frequently used by people to obtain information when outside the office (while in transit or visiting customers), and the trial results indicated that use of the service provided users with the desired information in about a minute compared to the between five and 30 minutes it would have taken by conventional methods (see **Figure 4**).

On the other hand, the trial also encountered problems that included the system responding with "I don't understand" when unable to interpret what was being said, or replying with company information when asked for a person's contact details because of its inability to recognize their name. When using an AI, getting to the correct answer is invariably difficult in the early stages.

After the PoC trial, the developers conducted further testing to improve performance in terms of correctly interpreting conversations and obtaining the right answer, working on the data and updating the dictionary. Because people use different words to ask for the same thing, this involved identifying the actual words that people used to ask questions and performing learning on these variations.

The service has been in use by approximately 1,700 staff since February 2018.

3. 2
Making Services Easier to Use

A frequent request relating to the AI assistant service involves customers wanting to automate in-house inquiries. While FAQs and other company data needs to be collated before this can be done, this in turn raises concerns about people not knowing how best to collate such information, about data being scattered across a range of different locations, and about the amount of work needed to keep the dictionary database up-to-date after the service is adopted.

In response, Hitachi is developing a function for defining FAQ templates and consolidating the information into specified formats, a dictionary builder, and a function that provides a simple way to link tasks to uniform resource locators (URLs) using a web crawler that operates on the company web site (see **Figure 5**).

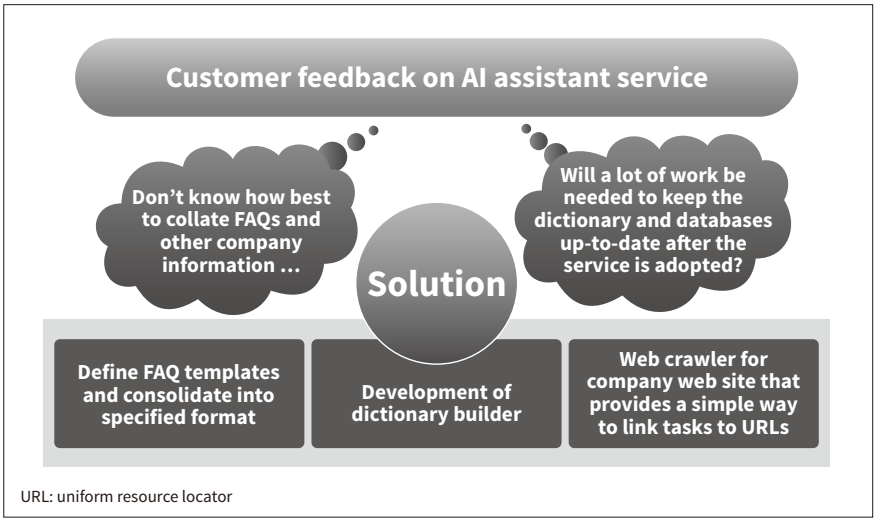
Figure 4 — Results of PoC Trial of AI Assistant Service

A proof of concept (PoC) trial involving approximately 100 sales department staff found that the service provided users with the desired information in about one minute.

	Benefits of use	
How service is used	Time taken (previously)	Time taken (using AI assistant)
To obtain information when traveling or dealing with customers	Five to 30 minutes	About one minute

Figure 5 — Making the AI Assistant Service Easier to Use

The service is being further developed to collate the data on which it is based and to make it easier to link information together.



Hitachi intends to continue using the service in-house to extend the system and provide feedback to the business by consolidating knowledge about how it is used.

4. Key Considerations Regarding Use of Service

Apart from anything else, use of an AI requires that learning be performed to improve its accuracy. Building up data through ongoing use improves accuracy through progressive learning. Although the service tended to produce mistakes during the PoC trial and when first introduced, it is anticipated that teaching the AI and allowing it to grow will increase its practical value.

The AI assistant service is also equipped with personalization functions that learn about user tendencies through ongoing use. For example, the service offers a choice of available meeting rooms when booking a meeting venue. If the user repeatedly chooses a particular meeting room, then this room will appear as the "frequently chosen room" at the top of the list when available rooms are presented. As a result, the service will present nearby and convenient meeting rooms in a way that makes it easy for the user to choose them. In other words, the attentive assistant will come to offer better options based on the user's patterns of behavior.

In this way, it is hoped that the AI assistant service will grow to become an attentive assistant that is familiar with users the more it is used.

5. Conclusions

Companies these days are being called on to achieve corporate growth in tandem with the well-being of individuals by providing environments in which staff are able to work while still placing a high value on lifestyle.

In the future, Hitachi Solutions, Ltd. intends to contribute to productivity improvement, one of the key challenges of work style reform, by providing effective solutions that utilize AI and other new technologies.

Reference

1) Japan Productivity Center, "Labor Productivity Trends in Japan, 2017 Edition," (Nov. 2017) in Japanese.

Authors

Naoki Sakaguchi
MS Service Department, Lifestyle Innovation Division, Smart Life Solution Division, Hitachi Solutions, Ltd.
Current work and research: Development and sales of work-style innovation solutions.

Hirotake Kitabayashi
MS Service Department, Lifestyle Innovation Division, Smart Life Solution Division, Hitachi Solutions, Ltd.
Current work and research: Development and sales of work-style innovation solutions.