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Kyushu University  
Itoshima City, Fukuoka Prefecture  
Fujitsu Laboratories Ltd.  
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## **Kyushu University, Itoshima City, and Fujitsu Begin Field Trial Using Automatically Evolving AI to Facilitate Relocation**

*Takes social acceptance of AI into account when matching people wanting to move to Itoshima with candidate locations*

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**Fukuoka, Itoshima, and Kawasaki, Japan, August 24, 2016** – The Fujitsu Social Mathematics Joint Research Unit within the Institute of Mathematics for Industry at Kyushu University (\*1), Itoshima City in Fukuoka Prefecture, and Fujitsu Laboratories Ltd. today announced the start of a joint field trial that, using a form of artificial intelligence that automatically evolves to gradually learn human preferences, seeks to match people wanting to relocate to Itoshima to appropriate candidate locations within the city.

Interest in relocating to the countryside is rising, and Itoshima officials are receiving an increasing number of inquiries about relocating to the area. When people wanting to move there consider where within the municipality they should reside, however, they have found it difficult to obtain information on different locations, which at times has led to a low level of satisfaction among those who relocated.

In this field trial designed to help match potential new residents to candidate locations within Itoshima, automatically evolving AI is trained on the preferences of users seeking to relocate. It presents, based on those preferences, day-to-day information (\*2) on such locations that are deemed appropriate for the user, and then seeks to provide appropriate matches through an iterative process in which the user rates the locations presented. Through this trial, the parties seek to develop AI that takes social acceptance into consideration and to build a system for matching people wanting to relocate with locations where they will feel a high level of satisfaction.

### **Background**

In recent years, there has been increasing interest in Japan in relocating from urban areas to the countryside. Itoshima, which is blessed with natural beauty and enjoyable scenery, enjoys easy access to Fukuoka City and is the site of Kyushu University's Ito Campus, has in recent years received increasing interest as a potential place to live, leading to a greater number of relocation inquiries. As Itoshima City is quite large, including areas with a wide variety of local characteristics, such as seaside, mountains, fields, town areas, and isolated islands, there are concerns that opportunities will be lost due to a mismatch in the day-to-day information presented to people seeking to relocate, who have a variety of different needs, or that people seeking to relocate will feel greater uncertainty because of a lack of information. In this situation, there is a need to build a system that will reliably provide people looking to move with the day-to-day information they desire.

### **Issues**

In order to encourage people to move to the countryside, AI technology that learns based on data obtained from those looking to move is considered effective for a system to reliably provide the day-to-day information potential residents hope for, but the following three primary issues presented limitations:

1. Data volume:  
The amount of data related to relocation decisions from which an AI system can learn is quite small.
2. Accuracy of data that can be obtained from those seeking to relocate:  
People seeking to relocate but who have never lived in a rural area cannot accurately convey the specific conditions they have for the place where they wish to move.
3. Social acceptance:



There is psychological resistance to using an AI system to determine things important to individuals.

In order to resolve these issues, Kyushu University, Itoshima City, and Fujitsu Laboratories launched this field trial aimed at improving the satisfaction of people moving to the countryside.

Summary of the Field Trial

1. Purpose

In order to learn the preferences of people seeking to relocate, the three partners aim to build an AI system that can start with a limited amount of data, by using automatically evolving AI that learns gradually, even with limited data. Rather than the AI system simply presenting optimal locations to those seeking to relocate, it will also convey to city officials the preferences gathered, and will thereby play a mediating role in the ultimate discussions between potential residents and city officials, with the aim of using AI in a way that is broadly accepted.

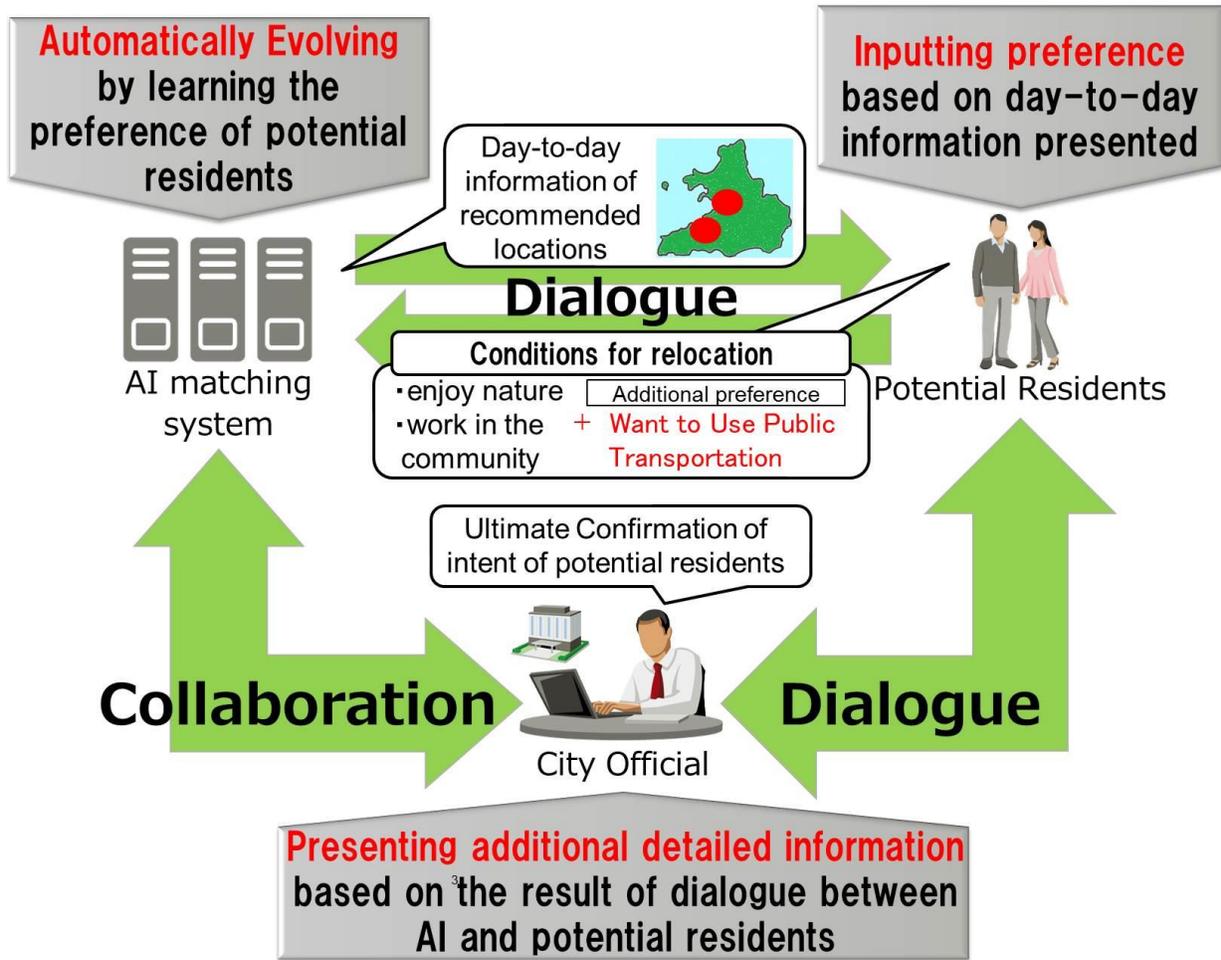


Figure1: Field Trial Overview

2. Period and Location

Period: September to October 2016 (planned) – Pre-evaluation of AI technology with a small number of test subjects

November 2016 to March 2017 (planned) – Effectiveness validation of AI technology in actual relocation discussions



Location: Itoshima City Hall, as well as Itoshima booths at events supporting relocation throughout Japan, especially those sponsored by the national government or local governments.

### 3. Trial Overview

In implementing this joint field trial, Itoshima City will provide a venue for interviews with local residents and people seeking to relocate, as well as experience in recommending candidate locations. The Fujitsu Social Mathematics Joint Research Unit within the Institute of Mathematics for Industry at Kyushu University and Fujitsu Laboratories will handle the development and evaluation of the AI technology using experience in the social sciences to carry out the following research:

- Validating the effectiveness of automatically evolving AI technology  
This test will model the relationship between the characteristics of people seeking to relocate and their preferences using mathematical techniques. The automatically evolving AI will present locations appropriate to the characteristics of the people seeking to relocate according to this model. The users seeking to relocate will evaluate the locations presented, and the AI system will further learn the preferences of those users based on their evaluations, automatically improving the mathematical model.

This field trial will not only evaluate the performance of automatically evolving AI in the real world, it will also evaluate effectiveness from the perspective of government service quality, based on the AI's ability to increase the degree of satisfaction of potential residents, as determined by comparisons with people, with the same characteristics, who seek to relocate using conventional recommendations by staff. In addition, in order to improve the relocation support system, the AI technology will be upgraded on the basis of feedback gained during the field trial from people seeking to relocate.

- Evaluating social acceptance of AI  
In this field trial, the focus is not on the AI system mechanically matching potential residents with candidate locations, but on it helping potential residents understand their own requirements for the place where they want to move, and promoting effective dialogue by sharing the recommendations provided by the AI system with city officials. The parties expect that, by using AI to promote dialogue between people in this way, it will eliminate psychological barriers to the use of AI and improve the satisfaction of people seeking to relocate. Moreover, based on the results of this field trial, the parties will review the system from the perspective of ease of use for potential residents, with the goal of building an AI system that operates collaboratively with people and is accepted by society.

### Future Plans

By providing detailed and day-to-day information, which enables potential residents to know their target area sufficiently enough to decide to move, Itoshima hopes to eliminate uncertainty on the part of relocating people, prevent problems with neighboring residents, improve people's satisfaction with their new lives, make the local community more dynamic, and encourage people to remain in the community.

By bringing together AI technology with mathematical models relating to aspects of human psychology, such as preferences and specific needs, Kyushu University and Fujitsu Laboratories aim to bring solutions to a variety of social issues beyond just helping people with relocation matching. In addition, Fujitsu Laboratories seeks to use the results of this field trial to further improve its automatically evolving AI and bring it into practical implementation in fiscal 2017 as a new technology in Human Centric AI Zinrai, Fujitsu Limited's AI technology.

### Glossary and Notes

#### 1. The Fujitsu Social Mathematics Joint Research Unit within the Institute of Mathematics for Industry at Kyushu University

- Fujitsu Social Mathematics Joint Research Unit



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A mathematical technology research and development unit aimed at resolving social issues, established in September 2014, as part of the Institute of Mathematics for Industry by Kyushu University, Fujitsu Limited and Fujitsu Laboratories Ltd.

- Institute of Mathematics for Industry  
Asia's first mathematics research center focused on industrial technology. In addition to carrying out mathematical theory research for industry, it also contains the Laboratory of Advanced Software in Mathematics, which implements and publishes theories as software.

## 2. Day-to-day information

Rather than just statistical information on such things as population and land areas, this is information rooted in local life that conveys a sense of the local atmosphere and activities.

### Related Links

- [Kyushu University, Institute of Mathematics for Industry, division of Fujitsu Social Mathematics](#)

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### About Kyushu University

Since its foundation in 1911, Kyushu University has become one of the leading universities in Japan. The University is comprised of 11 undergraduate schools, 18 graduate schools, 17 faculties, 5 research institutes, a University hospital, and a University library, as well as over 50 affiliated research centers. Empowered by our 100-years of tradition and experience, we are keen and ready to tackle whatever challenges we must face. For more information, please see: <http://www.kyushu-u.ac.jp/english/index.php>.

### About Itoshima City, Fukuoka

Please see: <http://www.city.itoshima.lg.jp/site/prof-en/>

### About Fujitsu Laboratories Ltd.

Founded in 1968 as a wholly owned subsidiary of Fujitsu Limited, Fujitsu Laboratories Ltd. is one of the premier research centers in the world. With a global network of laboratories in Japan, China, the United States and Europe, the organization conducts a wide range of basic and applied research in the areas of Next-generation Services, Computer Servers, Networks, Electronic Devices and Advanced Materials. For more information, please see: <http://jp.fujitsu.com/labs/en>.

### About Fujitsu

Fujitsu is the leading Japanese information and communication technology (ICT) company, offering a full range of technology products, solutions, and services. Approximately 156,000 Fujitsu people support



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