

HumanBridge—Cloud Computing Solution for Regional Health Information Exchange: from Preventive Medicine to Regional Comprehensive Care

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HumanBridge EHR Solution was launched in Japan in 2011 as a cloud-based service in order to share healthcare information between medical facilities. As of July 2014, HumanBridge has been introduced in nearly 400 hospitals. Regional medical network is now considered to have moved into the distribution stage and application of the system is now expanding beyond conventional collaboration between hospitals and clinics. In response to this expansion, Fujitsu continues to develop various features and provide new solutions. This paper describes the features and services of HumanBridge as applied to various areas, such as emergency medical treatment, remote medical care, home-care networks, pharmacy and hospital networks, health information-sharing over a wide area, and regional disease management. It also introduces actual use cases.

1. Introduction

In 2011, Fujitsu released HumanBridge EHR Solution (hereinafter referred to as “HumanBridge”) as a cloud type solution in Japan, in order to introduce the “sharing of medical care information.” By July 2014, HumanBridge has been introduced to nearly 400 medical institutions, providing electronic medical record information to various medical institutions. In addition to this system, other regional health information exchanges (HIEs) have become popular as well.

The major difference between an HIE and other medical systems such as electronic medical records is that the network is established and managed as an organization comprising of members from various corporations. Therefore, success is not only dependent on functional aspects but also management aspects, such as how to acquire funds, how to increase the number of participating medical institutions, and how to obtain consent from patients. To resolve these issues, a workshop¹⁾ for HIEs has been established to discuss and share information with even more medical institutions and information and communications technology (ICT) vendors. At this workshop, active discussion and case studies in HIEs have been introduced throughout Japan are carried out. Through such activities, HumanBridge also keeps evolving, responding not

only to the sharing of general medical information but also to ever-changing situations. This paper introduces application examples, such as emergency medical treatment, support for remote medical care, home-care networks, hospital and pharmacy networks, health information-sharing over a wide area, and regional disease management.

2. Emergency medical treatment

Generally, an HIE system shares information within the region, by coordinating an electronic medical record system from a core hospital. One advantage of this type of system is that high-volume data, such as images and test results, can be more conveniently provided to the coordinating hospital, clinic, etc., through the network system in real time than by sending an introduction letter and paper documents. In addition, the value of investment can be more readily seen. Medical treatment is usually provided through the following series of procedures—an initial visit, admission or surgery at a core hospital and then follow-up care provided at another coordinating hospital near the patient. This follow-up care is provided by sharing the medical treatment plan and the medical information through a network. Under such an arrangement, a regional medical network works well for the follow-up

care. However, under a conventional regional medical network system, collaboration during an emergency arising from a sudden onset of disease may face many difficulties, such as patient information not existing on the system in the first place, or even if such information is available, difficulty in obtaining consent or disclosure of medical treatment information by the information provider. In response, Fujitsu has developed some new approaches in HumanBridge to overcome these difficulties, and has also made progress in its use in emergency medical treatment. Services provided by HumanBridge are introduced below.

1) Face sheet

The primary care physician registers information, including the living conditions and intentions of terminally ill patients, on the face sheet screen as a minimum data set (basic information of the patient) in advance. In the case of an emergency, the information is referred to and used by emergency medical teams and the receiving medical facility. For residents in the region, this framework provides reassurance that they can receive treatment at the hospital of their choice in case of an emergency.

2) Network consent

Up to now, it was common to receive “individual consent” for information to be disclosed in cases requiring cross-referencing of medical care information of a patient. This consent was obtained on a one-to-one patient basis, between the information provider and the facility requesting information.

The health information exchange can obtain consent for information as whole network in advance. The patient is issued an ID card which is linked to the regional patient ID. When the patient visits a medical facility, any medical care information linked to the patient ID from another medical facility can be referenced.

This is especially effective in areas where emergency care is provided by multiple medical facilities as patient information regarding previous treatment can be confirmed even when the patient is sent to a hospital which he/she does not usually visit.

Regardless of the application, a feature of this system is registering the patient into the HIE and issuing an ID card in advance. Further consideration regarding operations such as establishing a bureau to issue the ID card is still needed, but this system is considered to be spreading as a new approach in the medical care field.

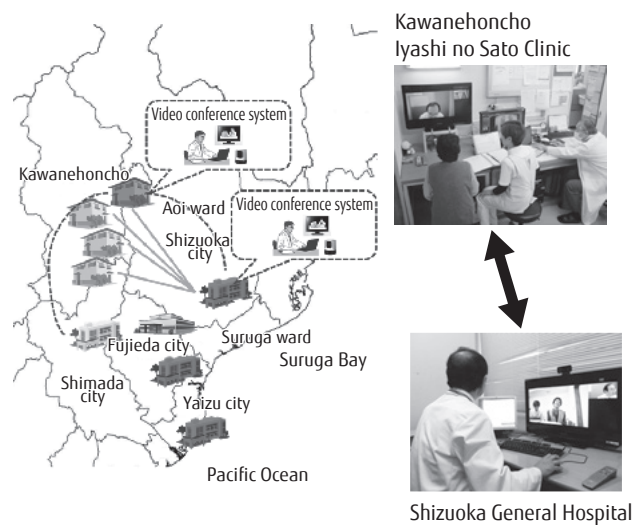


Figure 1
Remote medical care support system-Kawanehoncho Iyashi no Sato Clinic.

3. Support for remote medical care

As the population in Japan continues to age and fewer babies are born, regions which cannot maintain a medical care system have increased, especially in mountainous areas. In addition, it is common for the local governments, etc., to close or consolidate local clinics which bear regional medical care due to financial difficulty. Under these conditions, Fujitsu proposes a remote medical care support system using ICT, and test cases to resolve various issues are underway. (Figure 1 features Kawanehoncho^{note)} “Iyashi no Sato Clinic” [transliteration: “Village of healing”]).²⁾ The system configuration links HumanBridge and local clinical electronic medical records (FUJITSU Healthcare Solution HOPE EGMAIN-RX is used in this case), and operates in combination with a video conference system.

A few days a week, a specialist physician at the core hospital located in the city area uses the video system in HumanBridge to confirm the condition of patients who visit the local clinic in the mountain area and shares information on the electronic medical record with the local staff, thus providing medical care. Up to now, patients had to travel almost two hours to visit the core hospital in the city area. However, by adding this

note) Kawanehoncho town is located in the mountains in Shizuoka prefecture of Honshu, Japan. More than 90% of the town is within forested areas.

remote medical care, the frequency of visits to the core hospital has greatly decreased, leading to a reduction in the burden of the patients, especially the elderly. By widening the application of this system, support for HIEs, as well as medical care which has been said to be breaking down, can be provided using ICT, contributing to the development of towns where the local residents can live with peace of mind.

4. Link between home medical care and nursing care

By around 2025, most of the baby boomer generation in Japan will be over 75 years old. There are growing concerns over rapidly increasing social security costs and the lack of manpower in nursing care.³⁾ In addition, calls for the linking of medical care to nursing care to form a regional medical network can be heard.

HumanBridge provides a "Home medical care option" and functions as a link between home medical and nursing care.

1) Home medical care option

Related personnel use a tablet terminal as a communication device during a home medical care visits (Figure 2).

Input information is reflected on the HumanBridge screen. In actual use, the condition of the patient can be viewed using a camera during a visit, (bedsores and dermatosis conditions, etc.) and information, which would normally take time to enter by text, can be easily shared using photos. For home medical care, the attending physician, home-visit nurse, and various nursing care service providers can visit at different times, so the burden of information transmission can be reduced by ICT. In addition, regular meetings can be more easily arranged, especially for busy physician. By sharing information through the system, a reduction of this burden can also be expected.

2) Nursing care support collaboration

Provision of nursing care information between medical personnel, by coordinating the regional medical network with the nursing care support system, has been attempted in nursing care facilities and home-visit

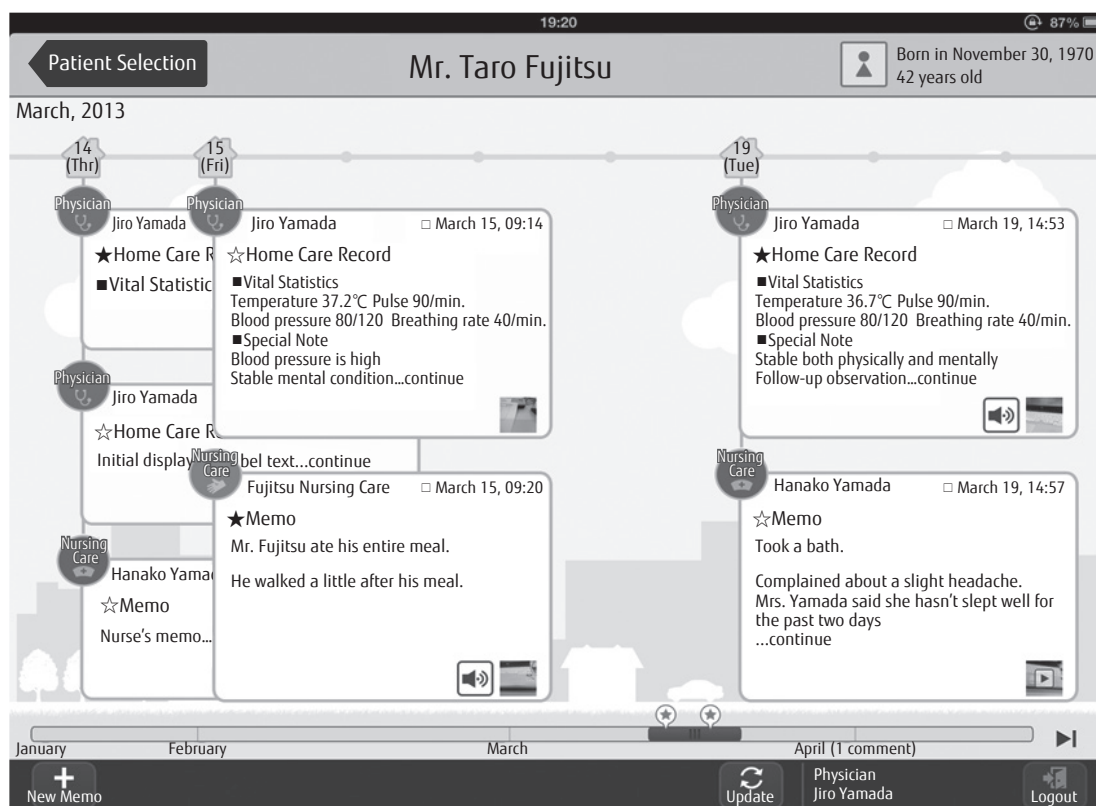


Figure 2
Screen shot of home care communication.

nursing stations.

For such collaboration, consideration and verification of standardized method are currently being conducted by the Ministry of Internal Affairs and Communications, Ministry of Health, Labor and Welfare. Further enhancement of the collaboration is expected in the future.

5. Pharmacy and hospital networks

In Japan, the physician carries at the examination and diagnosis at the hospital or clinic. After entering information regarding the examination, diagnosis, and prescription into the medical system, the information is sent to a dispensing pharmacy, where the pharmacists then receives the information on the pharmacy computer system and prescribes the prescription. Under these conditions, a questionnaire on the HIE operating in each prefecture was carried out. From the results of a questionnaire on the HIE operating in each prefecture, it was indicated that, in addition to physician, pharmacists at the dispensing pharmacies greatly benefited from the regional medical network. The effect on pharmacists is shown below.

- By referring the description of the chart, a pharmacist detected a mistake in the prescription and contacted the physician, resolving the problem.
- The HIE was useful for managing pharmacotherapy as the results can be confirmed in chronological order during implementation of outpatient chemotherapy.
- Since information such as diagnostic details and test results can be obtained through the network, the medical personal does not need to repeatedly ask the patient various questions and predict the diagnostic and clinical conditions. As a result, care can be provided without causing undue discomfort to the patient.

Not only is HumanBridge helpful for pharmacists to refer to the medical record information, but it also is helpful for the prescribing physician to refer to and get prescription information from the pharmacist. As a result, prescribing physician are starting to more fully understand the use conditions of a generic drug. This collaboration uses NSIPS⁴⁾ (New Standard Interface of Pharmacy-system Specification, copyright held by Japan Pharmaceutical Association). Since the specifications of the prescription information exchange system

interface are used for this collaboration, most pharmacy computers can be linked to the system.

Major progress in the collaboration between pharmacies and hospitals can be expected in the future due to the high possibility of developments in full-scale operations such as electronic prescriptions (a verification project is currently underway).

6. Health information-sharing over a wide area

HIEs are generally constructed focusing on medical districts based on administrative units such as a prefecture, but there are often cases where a medical facility located on the border of a prefecture wishes to coordinate with another medical district. To resolve this issue, HumanBridge promotes collaboration between different areas, as well as collaboration with HIEs developed by other vendors through standardization, based on an integrated IHE (Integrating the Healthcare Enterprise) profile (such as PIX/PDQ, XCA).⁵⁾

Health information-sharing over a wide area has obstacles from the system aspect as well as the operations aspect.

The first challenge is how to determine the rules which should be applied when two organizations with different operating procedures are linked, for example, how should consent be handled when one area operates on an individual consent basis while the other operates on a comprehensive consent basis. Another challenge is where to draw the line of responsibility regarding security when connecting two different networks. These challenges in operation will be addressed by consideration and verification at regional medical network workshops in fiscal 2014 and early 2015. Moreover, Fujitsu is scheduled to construct an environment which can connect the HIEs to a HumanBridge relay center in a Fujitsu data center. The relay center can also connect with HIE systems developed by other vendors. By providing this environment, medical information can be shared throughout all of Japan (Figure 3).

7. Regional disease management

One effect required by a regional medical network is the reduction of medical costs. In recent years, an effective method to reduce medical costs is said to prevent the progression of severe chronic diseases such as diabetes. For example, if a person requires dialysis due

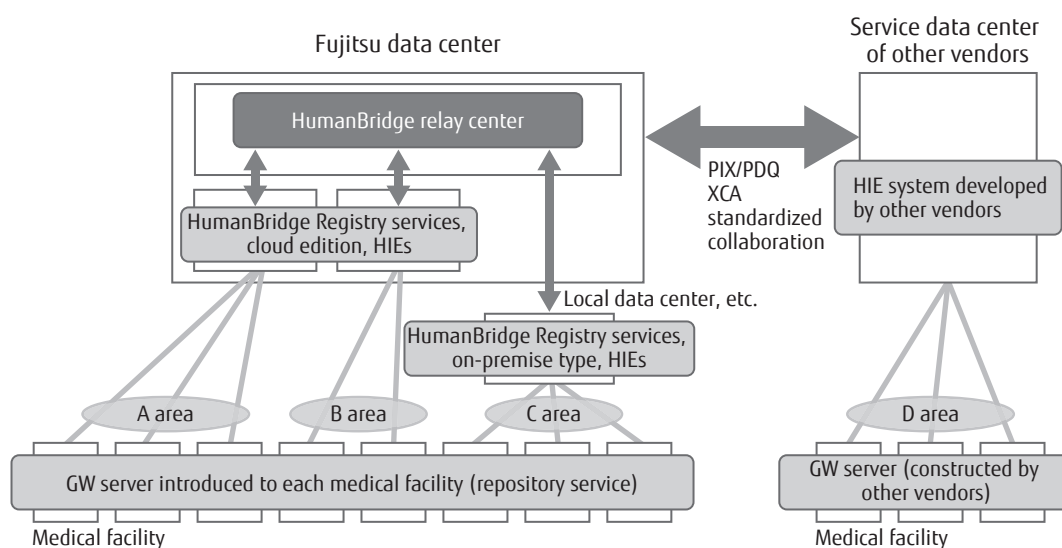


Figure 3
Collaboration over a wide-area using the HumanBridge relay center and standardized technologies.

to kidney dysfunction accompanied by a severe case of diabetes, medical costs are said to increase approx. 5 million yen per year. Hence by reducing the number of patients which require dialysis through prevention is said to greatly contribute to a reduction in medical costs. The solution to support the prevention of severe cases is a regional disease management system (Figure 4).

In a regional disease management system, laboratory test results are collected from the hospital and laboratories. Laboratory test items and their standard values which suggest a severe disease are set as minimum data. Using the list of the minimum data sets for all patients, patients who need intervention, or those who do not, can be classified. Patients with chronic disease commonly need to visit a local clinic, and the test results from the local clinic are sometimes needed for diagnosis by a visiting specialist. Through collaboration with the laboratory, comprehensively understanding the test results at the local clinic is possible.

One effect of this approach, for example, is that dietitians can voluntarily pick out patients who need nutritional guidance. The provision of medical care for patients with chronic diabetes by region and by multiple departments through role-sharing is possible. While current cases focusing on diabetes are being carried out, application to other chronic diseases such as chronic kidney disease is expected in the future.

8. Future developments

As previously introduced, HumanBridge has continued to evolve as an information collaboration foundation to respond to various use situations, and has widened its collaboration to include preventative medicine and home-care networks. Not only can electronic medical records be shared between hospitals, but also between various systems, such as electronic medical record information between a hospital and a local clinic, the hospital computer, home-care networks, health checkup systems, pharmacy computer, test systems (laboratories), etc. These connections can be realized under a multi-vendor environment by standardization of specifications such as SS-MIX, IHEPIX/PDQ, and XCA.

In 2014, Fujitsu released a cloud type home-care network, HOPE Cloud WINCARE, and an electronic medical record system for mid-size hospitals, the HOPE Cloud Chart. In the future, Fujitsu will provide each health-care product in a cloud type solution. Information can be accessed at any time under the conditions of the HumanBridge sharing system (Figure 5).

Even now, the need for small-midsize hospitals, local clinics, and home-care companies to connect an HIE is high, but the cost to construct a network environment at each facility and to revise the system, as well as determining the settings, is high. As a result, it has not spread as fast as

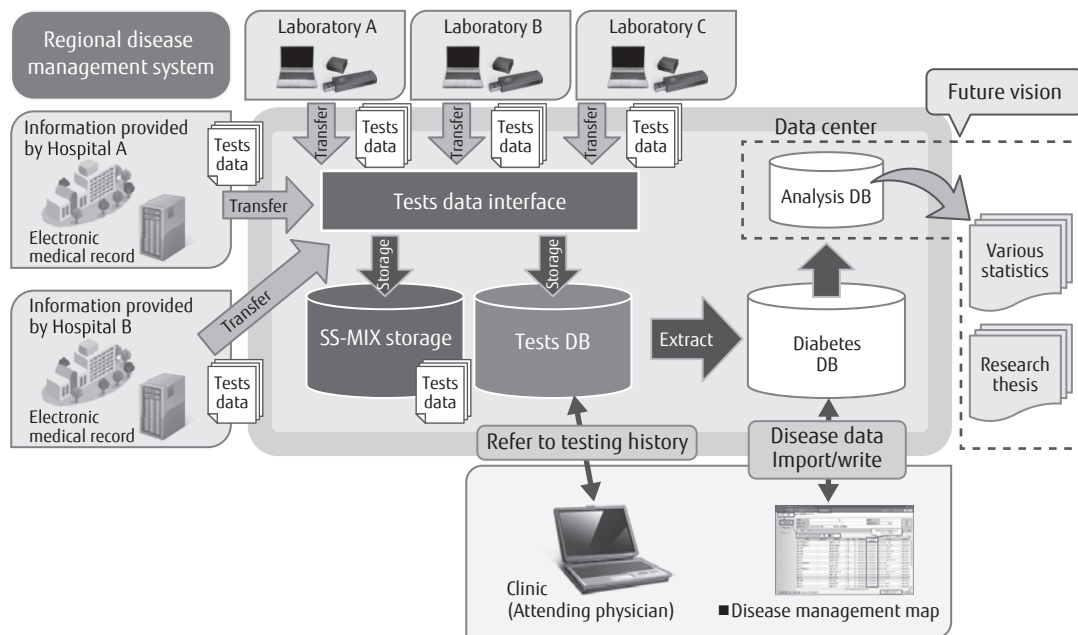


Figure 4
Outline of disease management system.

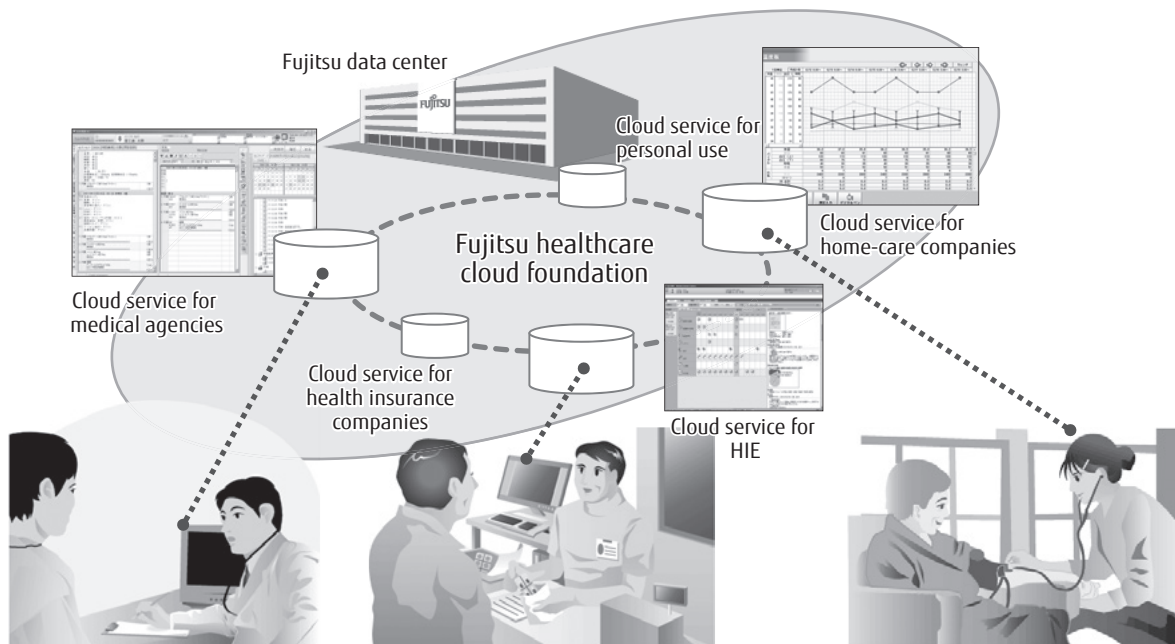


Figure 5
Fujitsu healthcare cloud service (illustration).

expected. Still, Fujitsu feels that information-sharing between regions will make progress in the future through the use of these cloud solutions.

Furthermore, this is expected to lead not only to collaboration between the hospital staff and the

home-care staff, but also connect the home-care staff to the local residents, through communication using personal smart phones and portable devices. Fujitsu is continuing in its research and development in this area.

9. Conclusion

As described in the beginning, this HIE is organizationally different from the start-up and management of the other systems because the exchange comprises of different corporate members. Therefore, it usually takes one or two years to be on the right track. For the HIE, starting operations is not the goal, but only the beginning.

Hence, Fujitsu will continue to contribute to the development of the system while considering the opinions of the users, through activities such as HIE workshops etc. Moreover, Fujitsu will continue to contribute, not only to the system, but also to research and know-how accumulation from the aspect of operations, and support the activities of those involved with the HIE. By doing this, Fujitsu will contribute to the HIE of Japan, as it faces a super-aging society, from the standpoint of an ICT vendor.



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