

## Current Status and Future of Dolphin Project

Professor of Kyoto University  
Japan Medical Network Association (Nonprofit Organization) Administrative Director

Hiroyuki Yoshihara, M.D., Ph.D.

### 1. History of Dolphin Project

The examination of a Japanese version of the medical information exchange convention MML (Medical Markup Language) began in 1995, and MML was released in 2000 as a standard that utilized XML [1]. Development continued after that time, and MML 2.3 [2] was released in 2003; then MML 3.0, which conformed to HL7 CDA rel.1, was released in 2004 [3]. In 1998 the original draft of the Dolphin Project was proposed by Yoshihara as a cooperative regional medical application that utilized this standard [4].

It had the following type of concept (Figure 1):

- 1) Establish Data Centers for storing medical information in regional units.
- 2) In this center, create accounts for each patient.
- 3) Using means such as the Internet, send data generated in the hospital to this account. On such occasions, send standardized data in MML, HL7, etc.
- 4) Make it possible for the patients themselves to browse through this data (B2C: business to customer) and, with the patient's approval, for the data to be shared between hospitals (B2B: business to business).

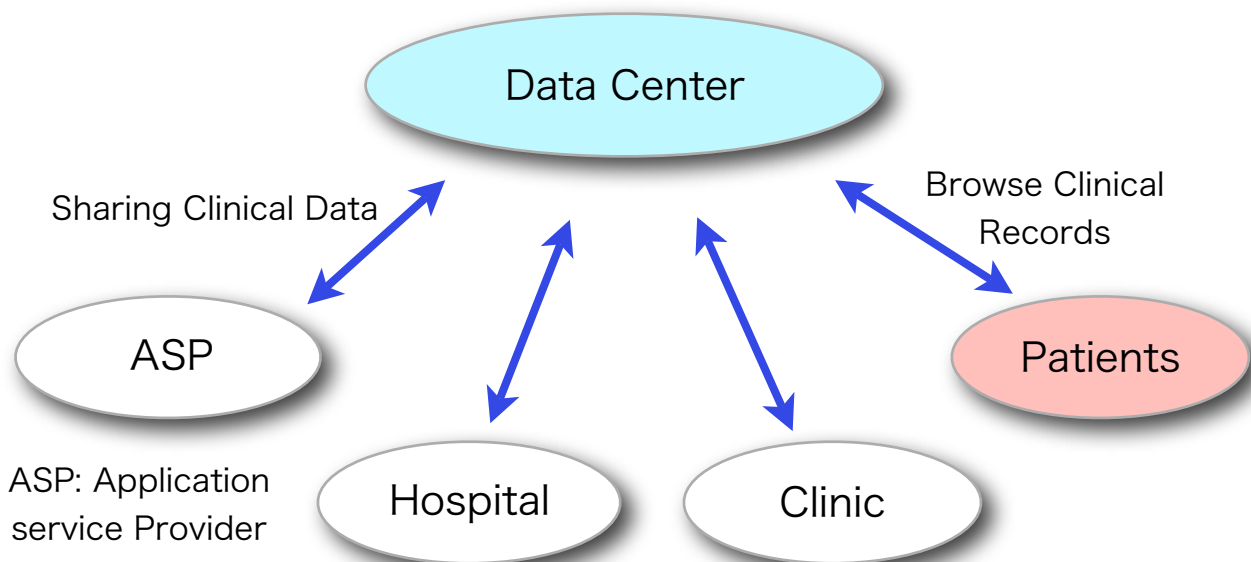


Figure 1 Model of Dolphin Project

Data Centers for accumulating information are established in each region. Corresponds to model centered on the RHIO (Regional Health Information Organization) in the U.S.

## 2. Background of Dolphin System development and utilization

In 2001 the system was developed with the cooperation of the prefectures of Miyazaki and Kumamoto as a research and development project of the Ministry of Economy, Trade and Industry [5]. Data Centers were established respectively in the city of Miyazaki (Haniwa Net) and city of Kumamoto (Higo Medo). Under the leadership of Miyazaki University Hospital and Kumamoto University Hospital, utilization of the system continues with the aim of providing cooperative medical care through which data is shared between medical institutions and data is disclosed to patients.

In 2003 the Tokyo Medical Association established a Data Center in the Tokyo metropolitan area (HOT Project). In 2006 a Data Center was established in Kyoto (Kyoto Association for Cooperative Medicine). In 2007 the Kyoto University Hospital became connected to the Kyoto Association for Cooperative Medicine, and data disclosure and data link services started in October 2007. As of September 2008, the Kyoto Association for Cooperative Medicine has approximately 3,000 user accounts. Utilizing the Internet, users (patients, doctors, nurses, etc.) can browse through data by accessing their account from a personal computer or cell phone (Figure 2).



Figure 2 Browsing through medical charts by cell phone and personal computer

## 3. Dolphin System function composition and future plans

Figure 3 shows the (planned) functions that compose the Dolphin Project as of 2008.

As shown in the figure, it is taken into consideration from three separate levels: an international level (global), national level, and regional level. Users exist at the regional level; and through mutual provision of data from medical institutions, patients can browse through more than just their personal data from one institution but data integrated from various institutions.

- The regional-level "iDol: iDolphin" accumulates the essence of medical data.
- "uDol: Ubiquitous Dolphin" can be accessed by cell phone, but has no data and only provides a directory service.
- The national-level "sDol: Super Dolphin" was already implemented in 2006. Spanning over multiple Data Centers, it ethically integrates user accounts that have multiple accounts, and enables single sign-on. For instance, if a person has separate accounts in both Tokyo and Kyoto, the data from both centers will automatically be integrated and made available for searching when that person accesses either of the centers. This

corresponds to the National Health Information Network (NHIN) that is currently being conceived in the United States.

■“gDol: Global Dolphin”(unimplemented) will be in charge of an international directory service. Already in China (Zhejiang Province, Zhejiang University) in 2007, an iDolphin whose localization in China was completed is being test-operated. In the future, sDol will be installed and international connections will be possible with gDol.

■“Trans”(unimplemented) is a function that provides language translation when gDol is operating.

■”xMappin’: Cross Mapping” (currently contained in sDol) is a function that utilizes data mapping to interconvert differences in XML standards sent from subordinate Regional Data Centers (iDol). Even in the Dolphin Project, the standard that is adopted (MML 2.3/3.0) may differ, depending on the time of Data Center establishment. In order to absorb these differences, this function is installed. In the future, utilization will be possible from multiple iDols independently from sDol, and efficiency and maintainability will thus be improved.

## Dolphin 4.0

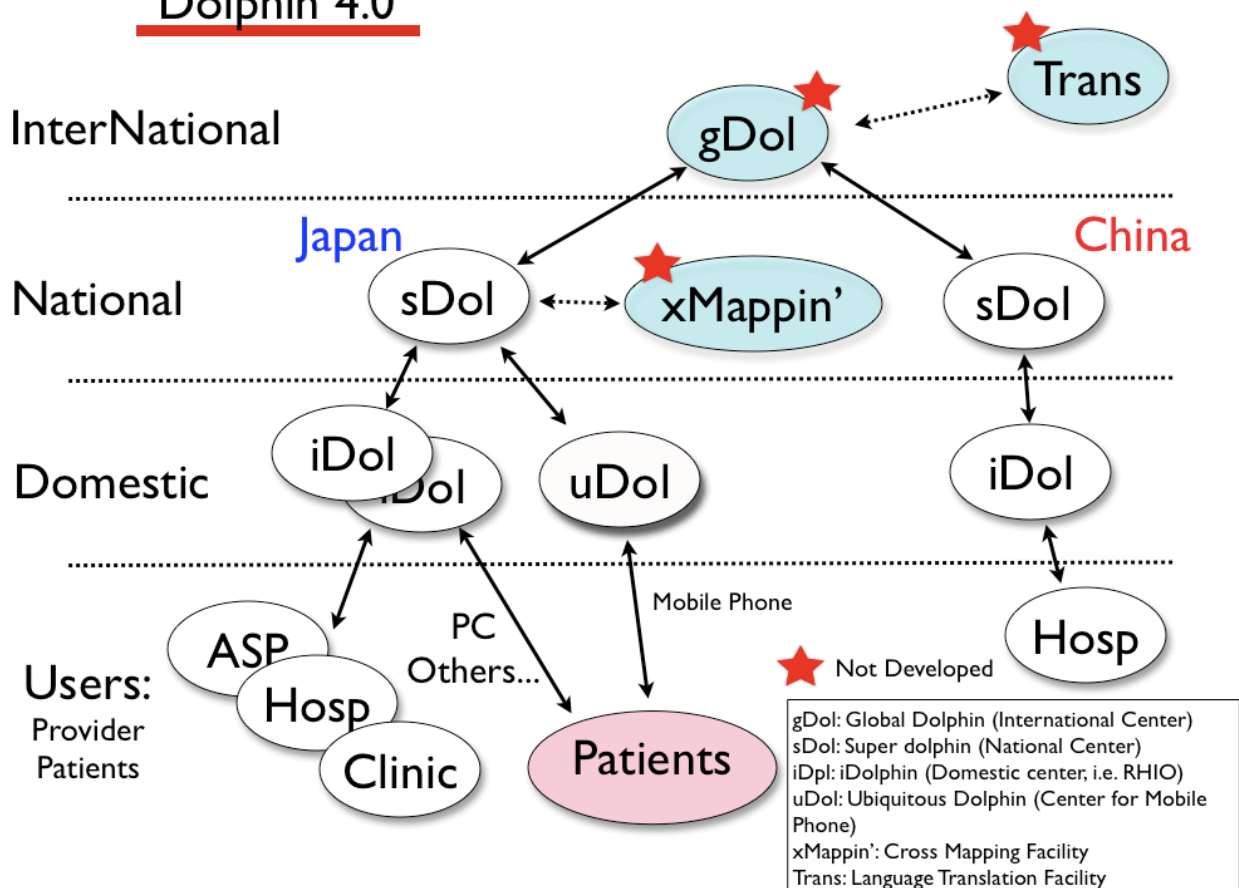


Figure 3 Dolphin System functions and their relationships (Dolphin 4.0)

As previously mentioned, the purpose for developing the electronic health record (EHR) with the Dolphin Project is to secure medical care transparency, safety, and accountability; further improve the quality of medical care; and utilize limited medical resources effectively. As the use of electronic medical charts grows in the future, we plan to continue making efforts so that this project becomes a part of the social infrastructure and functions effectively.

**【Reference information】**

- 1) Araki K, Ohashi K, Yamazaki S, Hirose Y, Yamashita Y, Yamamoto R, Minagawa K, Sakamoto N and Yoshihara H: Medical markup language (MML) for XML-based hospital information interchange., Journal of Medical Systems; 24(3): 195-211, 2000, <http://lob.kuhp.kyoto-u.ac.jp/paper/MML10.pdf>
- 2) Jinqiu Guo, Kenji Araki, Koji Tanaka, Junzo Sato, Muneou Suzuki, Akira Takada, Toshiaki Suzuki, Yusei Nakashima and Hiroyuki Yoshihara: The Latest MML (Medical Markup Language) Version 2.3—XML-Based Standard for Medical Data Exchange/Storage, Journal of Medical Systems; 27(4): 357-366, 2003, <http://lob.kuhp.kyoto-u.ac.jp/paper/200308mml23JMS/mml23JMS.pdf>
- 3) Jinqiu Guo, Akira Takada, Koji Tanaka, Junzo Sato, Muneou Suzuki, Toshiaki Suzuki, Yusei Nakashima, Kenji Araki, Hiroyuki Yoshihara: The development of MML (Medical Markup Language) version 3.0 as a medical document exchange format for HL7 messages, Journal of Medical Systems; 28(6): 523-533, 2004, <http://lob.kuhp.kyoto-u.ac.jp/document/2004papers/mml30-fulltext.pdf>
- 4) Hiroyuki Yoshihara, Kazushi Minagawa and Hisaatsu Tanaka: The concept of Global Medical History Database (GMHD) and Its prototype, TEPER Europe'97 - Toward An Electronic Health Record Europe '97 Conference on the Creation of a Electronic Health Record; 290-293, 1997London, UK, [http://lob.kuhp.kyoto-u.ac.jp/miyazaki/medinfo/SGmeeting/document/GMHD\\_Sympo97/GMHD.html](http://lob.kuhp.kyoto-u.ac.jp/miyazaki/medinfo/SGmeeting/document/GMHD_Sympo97/GMHD.html)
- 5) Akira Takada, Jinqiu Guo, Koji Tanaka, Junzo Sato, Muneou Suzuki, Takatoshi Suenaga, Ken Kikuchi, Kenji Araki and Hiroyuki Yoshihara: Dolphin Project - Cooperative Regional Clinical System Centered on Clinical Information Center, Journal of Medical Systems; 29(4): 391-400, 2005, <http://lob.kuhp.kyoto-u.ac.jp/document/2005papers/dolphin-JMS.pdf>