MEDINFO 2007
HISA Ltd Australia
© 2007 The authors. All rights reserved.

Development of a Web-Service PrototType for Blood Bank Product Management According to the ISBT 128 Standard

B. Spyropoulos, D. Dimitriadis, M. Botsivaly

Technological Education Institute of Athens, Medical Instrumentation Technology Department Athens, Greece

Abstract and objective

The aim of this project was the development of an ISBT 128 compliant prototype of interface descriptions, in Web Service Definition Language (WSDL), for Blood products management. ISBT 128 sets a global standard for the identification, labeling, and information processing of human Blood, Tissue and Organ products across international borders and disparate health care systems, and WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document or procedure oriented information. The web-services for Blood-Bank management of the developed system are grouped in Donation Centre, Laboratory, Transportation and Storage, and Hospital Services, according to the pending organizational reform in the Blood-Bank network in Greece, and the system is presently running successfully in a web environment in our laboratory.

Keywords:

ISBT 128, Blood Bank, web services

Introduction

ISBT 128 sets a global standard for the identification, labeling and information processing of human Blood, tissue and organ products across international borders and disparate health care systems. The standard has been designed to ensure the highest levels of accuracy, safety, and efficiency for the benefit of donors, patients and official ISBT 128 licensed facilities worldwide. The aim of this project was the development of an ISBT 128 compliant prototype of interface descriptions, in Web Service Definition Language (WSDL), for Blood products management. In the following, the approach of these tasks will be described in details.

The ISBT 128 compliant prototype of interface descriptions in WSDL

The developed Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface that is described in a machine process able format such as WSDL. Other systems may interact with the Web service in a manner prescribed by its interface, by employing appropriate messages. These messages are typically conveyed using HTTP, and normally comprise of XML in conjunction with other Web-related standards.

Table 1 - The ISBT 128 specified entities of the developed web service system

Item	Description
1	A donation numbering system that ensures globally unique identification.
2	The information to be transferred, using internationally agreed reference tables.
3	An international product reference database.
4	The data structures in which this information is placed.
5	A bar coding system for transfer of the information on the product label.
6	A standard layout for the product label.
7	A standard reference for use in electronic messaging.

Software applications written, first, in various programming languages, and second, running on various platforms can use the web services, in order to exchange data over computer networks and over the Internet. The web services for Blood Bank management comprise of first, the Donation Centers Services, second, the Laboratory Services, third, the Transportation and Storage Services, and finally, the Hospital Services.

The ***Donation Centre Services*** group includes the Personal Data, Donation Data, Label and Transportation Services. The Personal Data Service registers the personal data of the donor, his medical history, and the examination results before the donation, and assigns a new Donor ID, according to the ISBT128 rules. The Donation Data Service assigns a new Donation ID and stores the Blood product type, the determined Blood group, the donor ID, the collection date and time, the container manufacturer catalogue number and LOT, and the Staff ID. The Label Service returns the ISBT128 codes for the labels on the container. The Transportation Service stores the data of the Blood product carrier, its destination, and forwards the Donation Data to the Transportation and Storage Services Group Server.

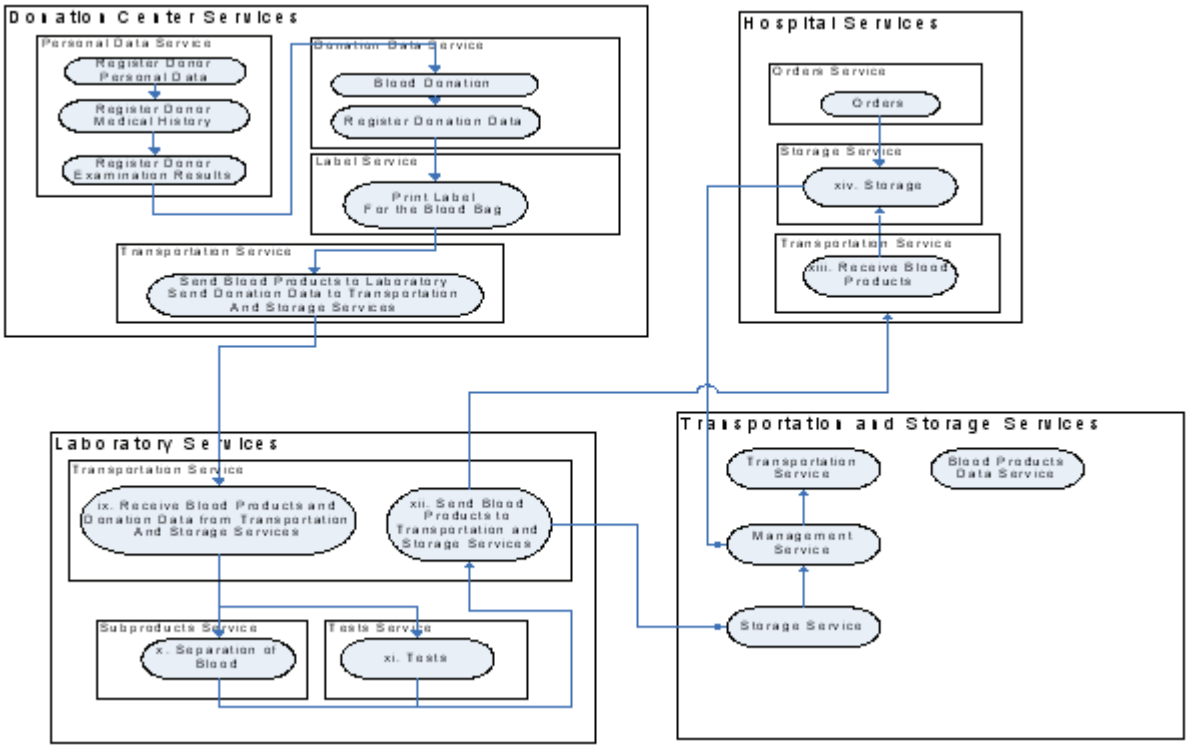

Figure 1: Schematic representation of the proposed work flow of a typical Blood Donation Centre.

The ***Laboratory Services*** group comprises of the Transportation, the Sub products, and the Tests Services. The Transportation Service records the incoming and outgoing Blood products, receives the donation data, and updates the Storage Services Group Server for the availability of Blood products. The Sub-products Service records, which products have been extracted from each donation. The Tests Service records the results of the Antigens tests, and of the HIV, HBV, HCV, HTLV, RPR etc. tests. The ***Transportation and Storage Services*** group runs the Transportation, Blood Products Data, Storage, and Management Services. The Storage Service provides information about the transportation availability of Blood products, from the Laboratory or from one hospital to another. The Blood Products Data Service stores the all the information about Blood products based on the Donation ID. The Management Service checks the availability of Blood products, administrates the orders, and manages the final destinations of the products. The Transportation Service stores the information of the number of Blood products are on their way, and the estimated transportation time. The ***Hospital Services*** group includes the Order, Storage and the Transportation Services. The Order Service takes orders for direct donation from the client program of the physicians in charge. The *Storage Service* manages the Blood products available in the Hospital and forwards the Orders to the Management Service of the Transportation Group. Finally, the Transportation Service stores the information of the overall Blood product movements.

Concluding remarks

The Hospital Blood-Banks in Greece are presently working almost quite independently from each other, they employ their own work-flow and the corresponding software from different vendors and it is rather difficult to find out the availability of Blood products. The developed system covers an existing managerial gap, by proposing a standard way of information and products exchange, between Blood processing and transfusion points, fully complying with ISBT128, 2002/98/EC and HL7. We have implemented one possible scenario of the pending organizational reform in the Blood-Bank network in Greece, however, the Donation Centre, Laboratory, Transportation and Storage, and Hospital Services grouping approach, allows for, the fast redesign of the system, in order to be easily adapted, to the final decisions of the Ministry of Health, to be made in the future. The system is presently running successfully in a web environment in our laboratory, and the next stage under development, will attempt to extend international consistency to support the transfer,

transfusion or transplantation, beyond the Blood, of cell and tissue products, according always to the ISBT 128 standard.

Address for correspondence

Prof. Basile Spyropoulos, PhD, Medical Instrumentation Technology Department, Technological Education Institute of Athens, GR 12210 Athens, Greece, E-mail: basile@teiath.gr.