# ULTRASOUND DECISION SUPPORT SYSTEM INFORMATION MODEL

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**Abstract**. *This publication present the Database architecture of our Ultrasound Decision Support System, describe the main problem that we meet in creation of Informational Database and our solution in solving of this problem. Our Ultrasound Decision Support System is designed not to offer final conclusion but to offer additional information for technicians in creation of there conclusions.*

**Keywords:** *DICOM, Knowledge Database, Multilayer Architecture*

## 1. INTRODUCTION

Current medicine healthcare have a lot of diagnostic technologies to offer complete examination in case of different disease. MRI, computer tomography, 3D reconstruction of internals human organs are the newest directions in contemporaneous medicine. However, it is well known that current new investigations technologies are not so cheap and not every clinics can organize there activity using this technologies. Another aspect is the risk of diagnostic process in some specific disease and in case of prenatal diagnostic. Ultrasound diagnostic is less exactly but in the same time less dangerously method to obtain preliminary conclusions about human organs status. In many cases correct descriptions of the possible abnormality in human body force the technicians to know perfectly all organs in the human body. Our work is concentrated in creation of the software tool that consists of the following components:

- Informational Database
- Knowledge Database
- Image Processing Algorithms
- Web Based Presentation Interface

This article is concentrated on our work related to creation of Informational Database.

In creation of Ultrasound Decision Support System (UDSS) prototype a lot of information was identified, considered as independent information that our system must process, analyze, store, present, etc. This information appears in all implementation steps of our system:

- creation of the basic information model;

- implementation of the multilayer architecture in the system;
- managing of the users roles and maintaining users identification and authorization;
- database population with ultrasound images;
- population of the database with expert information (conclusions, pre-diagnostic information, human bodies organs descriptions, etc.), based on existing images;
- additional knowledge acquisitions based on image processing and interface adaptation;

## 2. CREATION OF THE BASIC INFORMATION MODEL

In description process we identify that it is impossible to describe finally the normal characteristics of one organ [1] . It depends of physiological and anatomical factors. Our database solutions propose Attributes – Values in organ definition architecture [2]. The following types of attributes that was identified: Date/Time, Image Set, Set, Boolean, Numeric, String, Interval.

Also we create Romanian and English versions of interface simultaneous.

## 3. IMPLEMENTATION OF THE MULTILAYER ARCHITECTURE IN THE SYSTEM

Important in creation of our Decision Support System is software components [3]. Our system and database decision try to satisfy the following principles:

- Platform Independent Solution [4]
- Database Independent Solution

## 4. MANAGING OF THE USERS ROLES [5] AND MAINTAINING USER'S IDENTIFICATION AND AUTHORIZATION [6]

System architecture is important in definition of the user access concept. There are four defined roles in the system:

- Expert
- Guest
- Administrator
- Technician

**User identification component –** assure correct identification of the user in our internal database.

**User Authorization component** – assure to user accessing of functionality that is defined in the definition of his role. Other functionalities are not allowed.

## 5. DATABASE POPULATION WITH ULTRASOUND IMAGES [7]

Our Ultrasound Decision Support System will store images in TIFF format[1] converted from original DICOM format.

Our database will store information about image clusterization, original images, definition of the clusters, processed images, common properties etc. In present, we try to identify common characteristics of the images to create definition of image clusterization for specific disease.

## 6. POPULATION OF THE DATABASE WITH EXPERT INFORMATION [8]

Our team, in collaboration with ultrasound experts identifies four types of conclusions:

- Normal Organ
- Organ Pathology
- Organ Abnormality[2]
- Organ Information

## 7. ADDITIONAL KNOWLEDGE ACQUISITIONS BASED ON IMAGE PROCESSING AND INTERFACE ADAPTATION

We decide to adjust on Application Layer our architecture to collect additional information about steps made using computer assisted ultrasound diagnostic. Processing of this information will offer additional knowledge like:

- Time needed for one diagnostic information entry;
- Steps made by technicians;
- Possible multiple accessing of the same information;
- More often used conclusions;

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