

# “An Application of an Electronic Health Record System in order to integrate clinical and molecular data and guide therapeutic strategy in Paraguay”

Sipan Arevshatyan <sup>1</sup>, Josefina Ayala <sup>2</sup>, Diego Boscá <sup>3</sup>, Verónica Burriel <sup>1</sup>, Cinthia Gauna <sup>2</sup>, Rita Denis <sup>4</sup>, Ita Yoffe <sup>4</sup>, Maider Ibarrola-Villaba <sup>5</sup>, Gloria Ribas <sup>5</sup>, Andrés Cervantes <sup>5</sup>, Jose Alberto Maldonado <sup>3</sup>, María Teresa Martínez <sup>6</sup>, Oscar Pastor <sup>1</sup>, Tania Fleitas Kanonnikoff <sup>5</sup>

<sup>1</sup> GemBiosoft- Universitat Politècnica de València; <sup>2</sup> Instituto Nacional del Cáncer, Capiatá-Paraguay; <sup>3</sup> Veratech-Valencia, España; <sup>4</sup> Hospital de Clínicas- Universidad Nacional de Asunción; <sup>5</sup> CIBERONC-INCLIVA- Valencia; <sup>6</sup> Laboratorios Curie SA, Asunción-Paraguay

## INTRODUCTION

Improve data management in two public hospitals in Paraguay - Hospital de Clínicas and Instituto Nacional del Cáncer (INCAN). Currently, data management in oncology department is complex and requires advanced Information System to process data where "omic" information should be integrated together with patient's clinical data to improve data analysis and decision-making process. Conceptual Modelling is an important and essential activity that helps us not only to design an abstract model of an advanced Information System but also facilitates the development process.

## OBJECTIVES

The main objective of the project was to design and develop a platform adapted to the needs of two hospitals in Paraguay, where in addition to clinical information, genomic data could be integrated for the data management and statistical data reporting.

### SPECIFIC OBJECTIVES

1. Data integration
2. Data management
3. Data analysis

## RESEARCH PHASES AND METHODOLOGY

### PHASES

The platform was developed in 3 phases:

- ✓ The initial design was performed in Valencia as a cooperative work between clinicians from Medical Oncology Department Hospital Clínico Universitario de Valencia and Bio-informaticians from GemBiosoft and Veratech for Health. The Clinical report system was developed based on the archetypes of the ISO-13606 standard.
- ✓ Collaborative work with researchers and clinicians from Paraguay to adapt the platform to the needs of two public hospitals of Paraguay.
- ✓ Testing and pilot implementation to correct mistakes and improve the Information System.

### METHODOLOGY

Design Science methodology has been used to accomplish the research. The methodology is proposed by Roel Wieringa.

For the engineering problems, Design Science iterates over these five steps: 1. Problem investigation; 2. Solution design; 3. Solution validation; 4. Solution implementation; 5. Implementation evaluation

### Engineering cycle



### 1. Problem investigation

- 1.1 Motivation
- 1.2 Problem statement

### 2. Solution design

- 2.1 State of the Art
- 2.2 Relevant information analysis
- 2.3 Conceptual modelling and Information system design

### 3. Solution validation

- 3.1 Adapting the solution to the needs of the public hospitals of Paraguay

### 4. Solution implementation

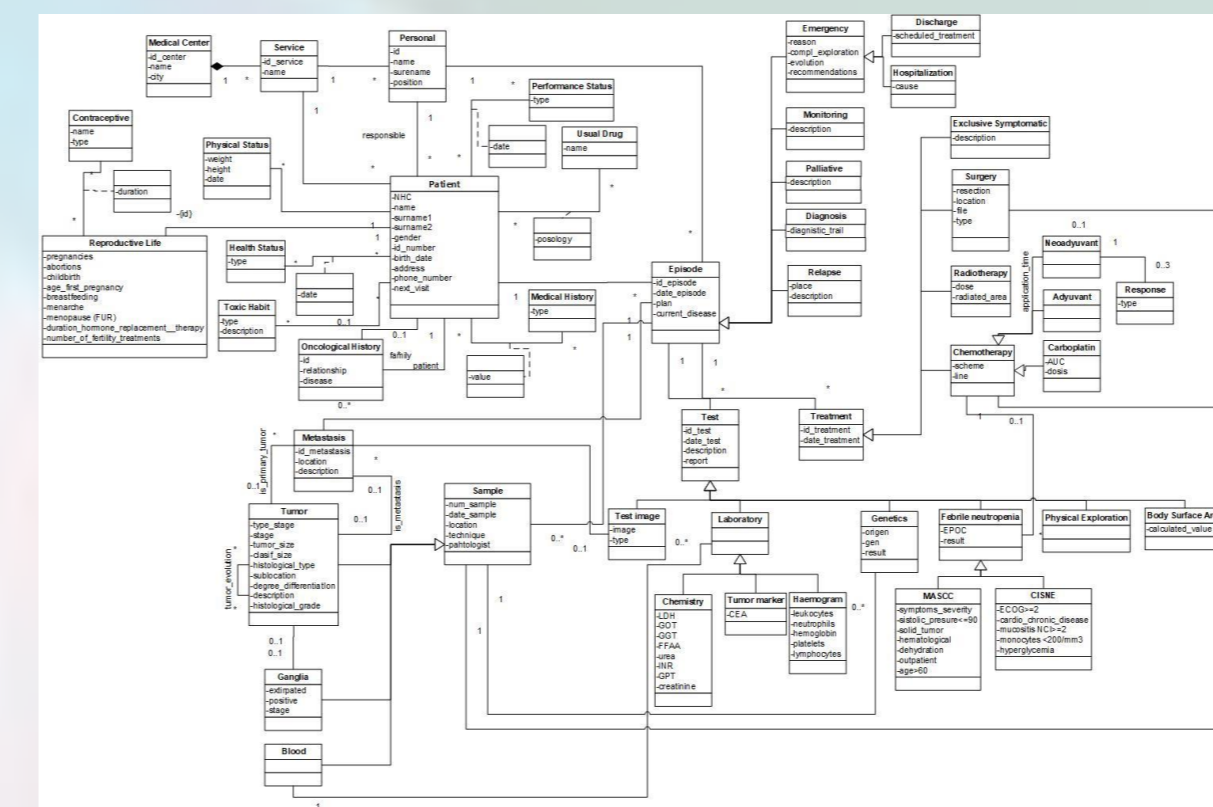
- 4.1 Implementation of the solution within the pilot project.
- 4.2 Teaching doctors how to use the platform

### 5. Implementation evaluation

- 5.1 Monitoring
- 5.2 Error correction
- 5.3 Conclusions

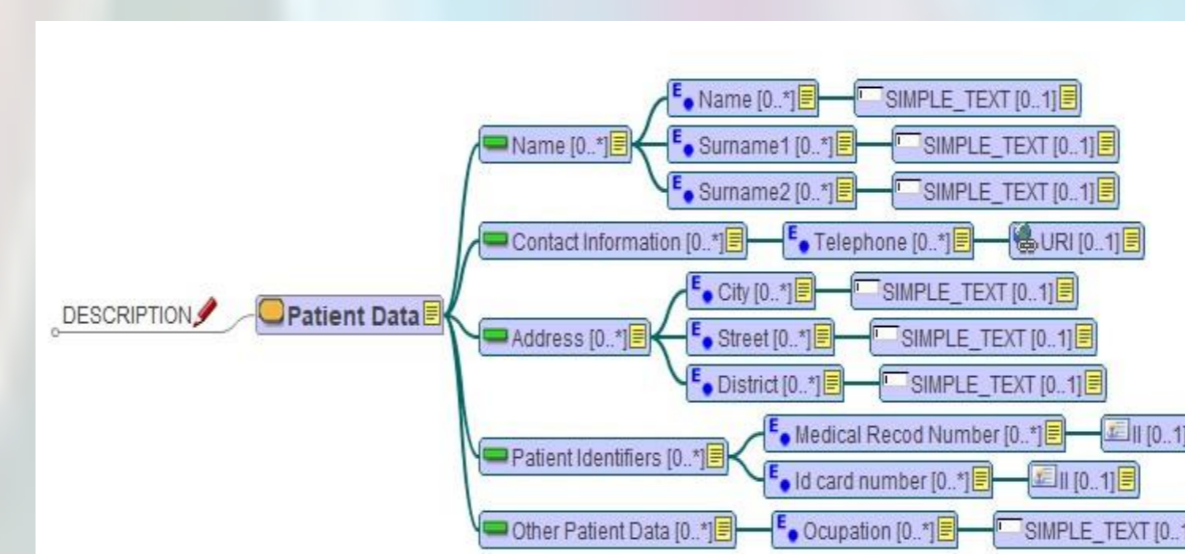
## RESULTS

### THE CONCEPTUAL MODEL



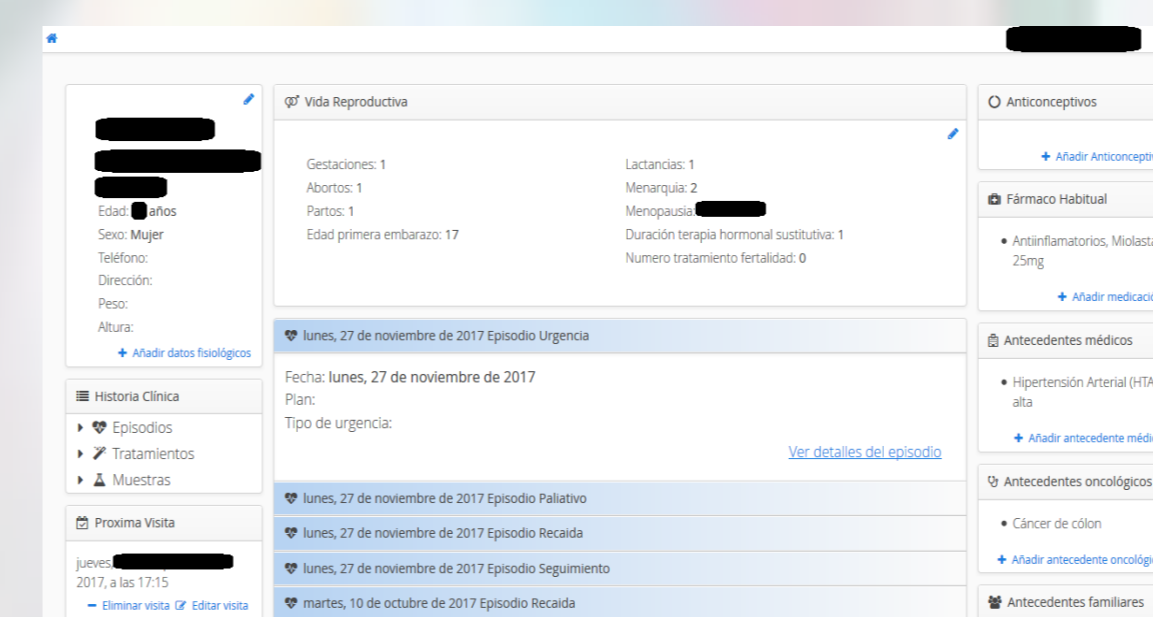
The model is an abstract representation of the system. It contains detailed descriptions about types of entities, relationships, and constraints. The model includes the patient's demographic information, episode description, complementary information, treatments, pathological and genomic information.

### THE ARCHETYPES

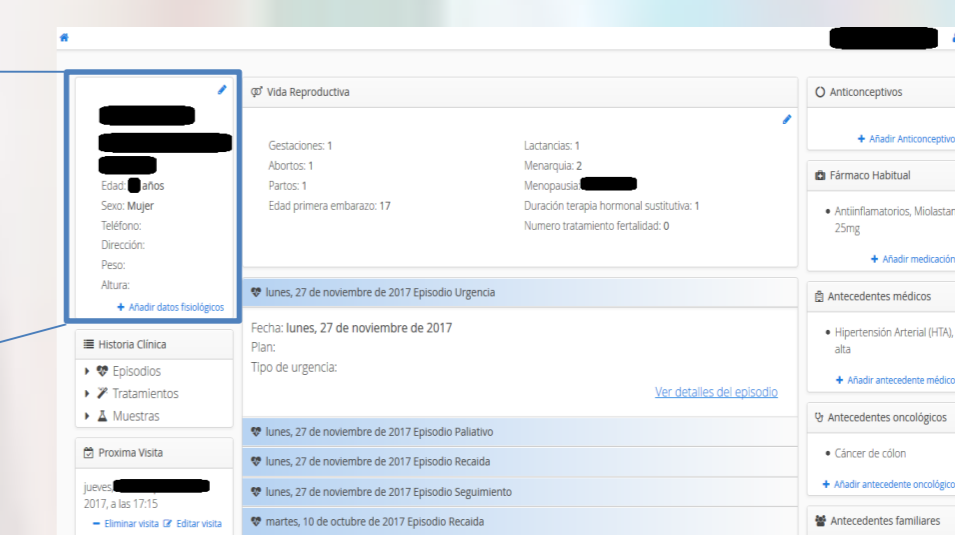
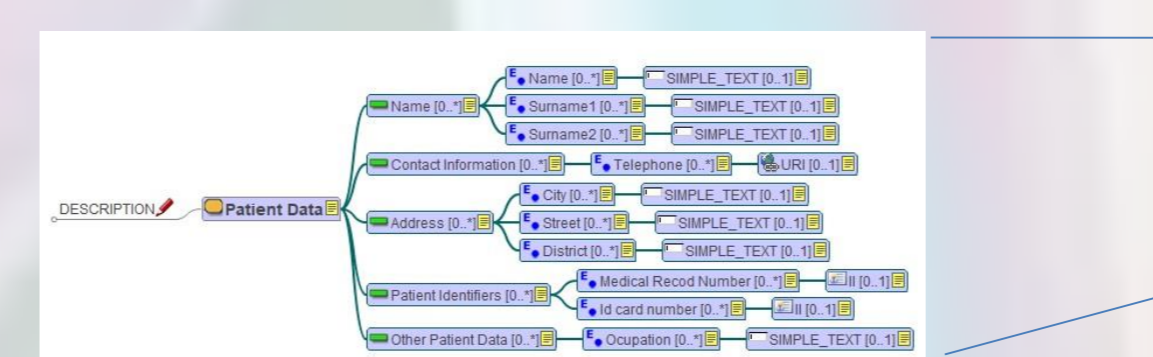


Archetypes have been created based on ISO 13606 standards. This makes the Information System semantically interoperable. Archetypes provide well-defined User Interfaces.

### THE USER INTERFACE

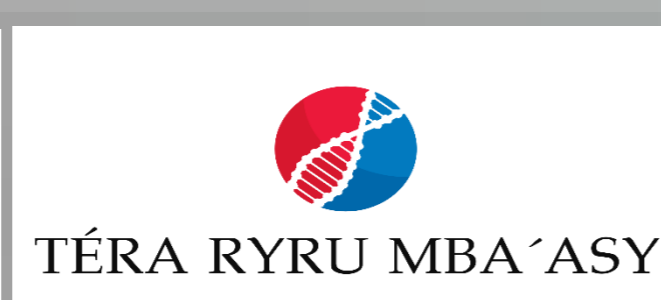


The simultaneous use of the Conceptual Model and the Archetypes facilitates a proper design implementation and a structured visualization of the information, making the Information System more efficient and easy to use.



**THE SYSTEM WAS INSTALLED IN NOVEMBER, 2017**

**CONCLUSIONS:** The system is the first platform that integrates medical records and the genomic data in Paraguay. The platform is a robust and agile system that automates the access to information, makes it possible to obtain statistical data and facilitates the research adapted to the needs of the oncology department of two public hospitals in Paraguay.



**CONTACT**  
siar5@upv.doctor.es

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