

# A Model-driven Data Management System for Clinical and Genomic Data Integration



Centro de Investigación en Métodos de Producción de Software

Sipan Arevshatyan [siar5@doctor.upv.es]  
Doctoral Program in Computer Science  
Dr. Óscar Pastor López  
Research Center on Software Production Methods (PROS)  
Universitat Politècnica de València, Spain



UNIVERSITAT POLITÈCNICA DE VALÈNCIA

## INTRODUCTION

Currently, data management in oncology department is complex and requires advanced *Information Systems* to process data where "omic" information should be integrated together with patient's clinical data to improve data analysis and decision-making process.

The implementation of Conceptual Modelling techniques to this domain 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 investigation is to design and develop an Information System, where in addition to clinical information, genomic data could be integrated for the data management and statistical data reporting.

### SPECIFIC OBJECTIVES

1. To integrate clinical and genomic data
2. To improve data management in the oncology department of the hospitals
3. To analyse data and improve decision-making process

## RESEARCH 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 hospitals

#### 4. Solution implementation

- 4.1 Implementation of the solution in hospitals.

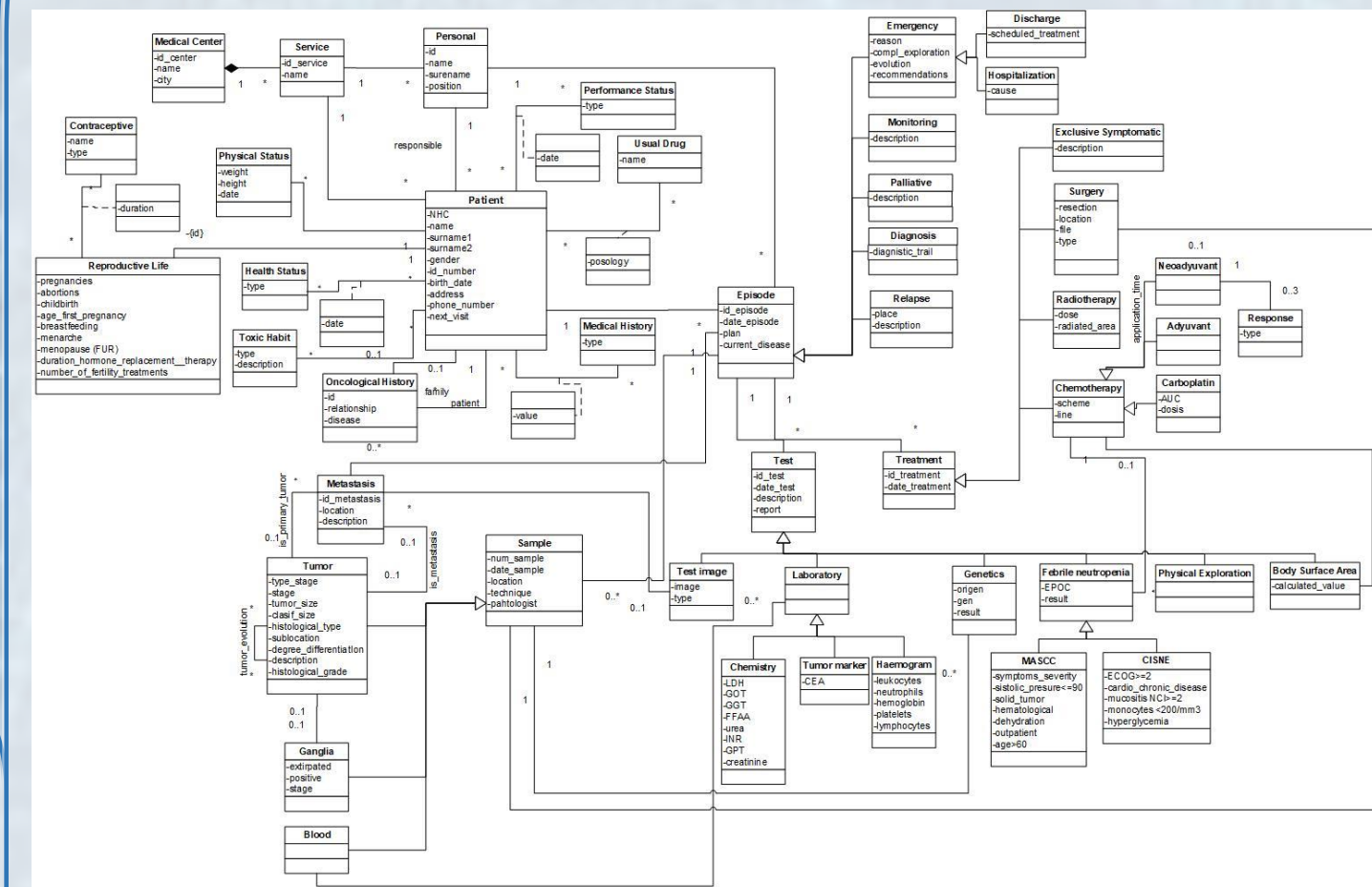
#### 5. Implementation evaluation

- 5.1 Monitoring
- 5.2 Error correction
- 5.3 Conclusions

## RESULTS

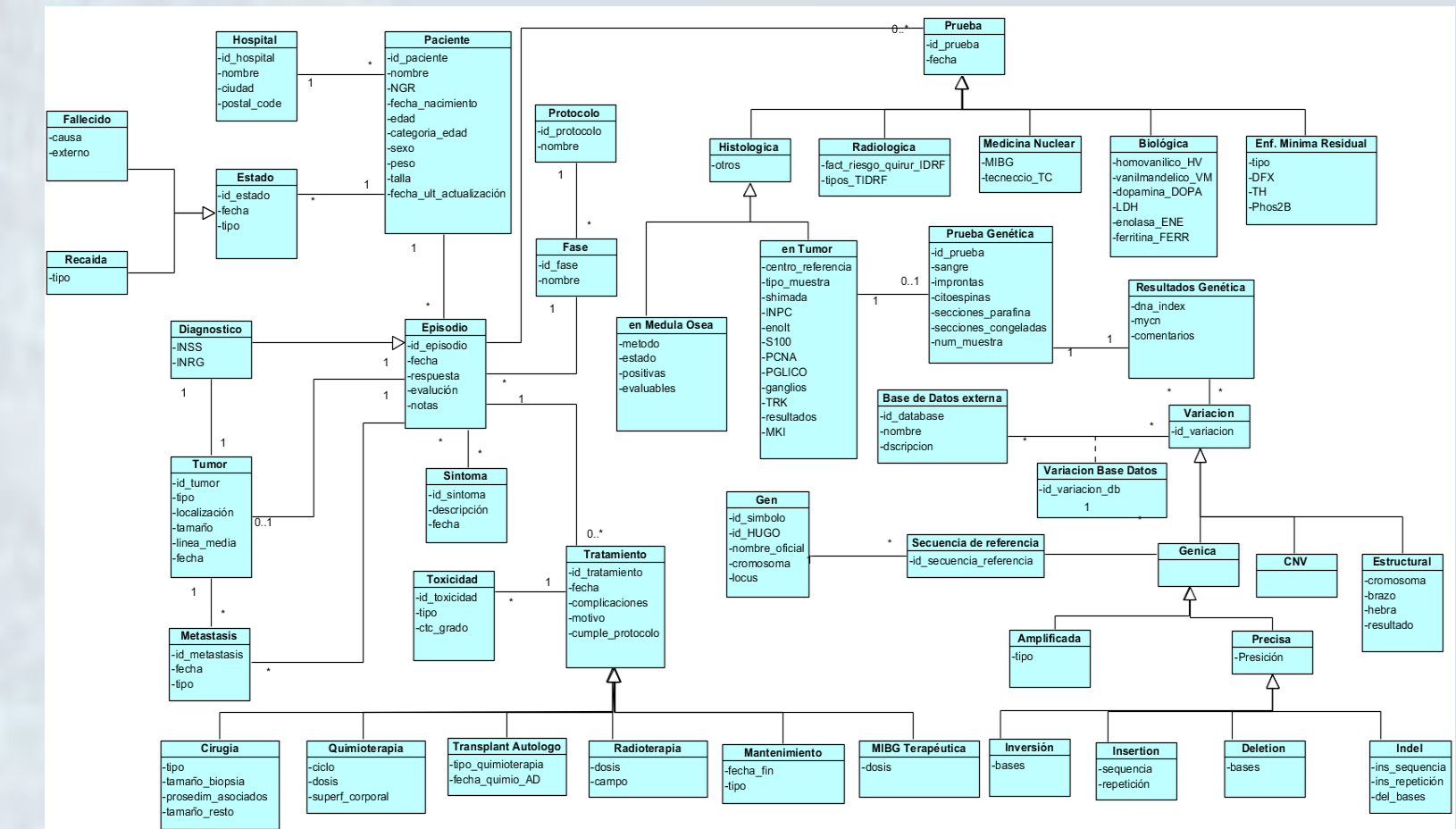
### THE CONCEPTUAL MODEL

#### Use case 1



Hospital de Clinicas,  
Instituto Nacional del Cancer  
Asunción, Paraguay

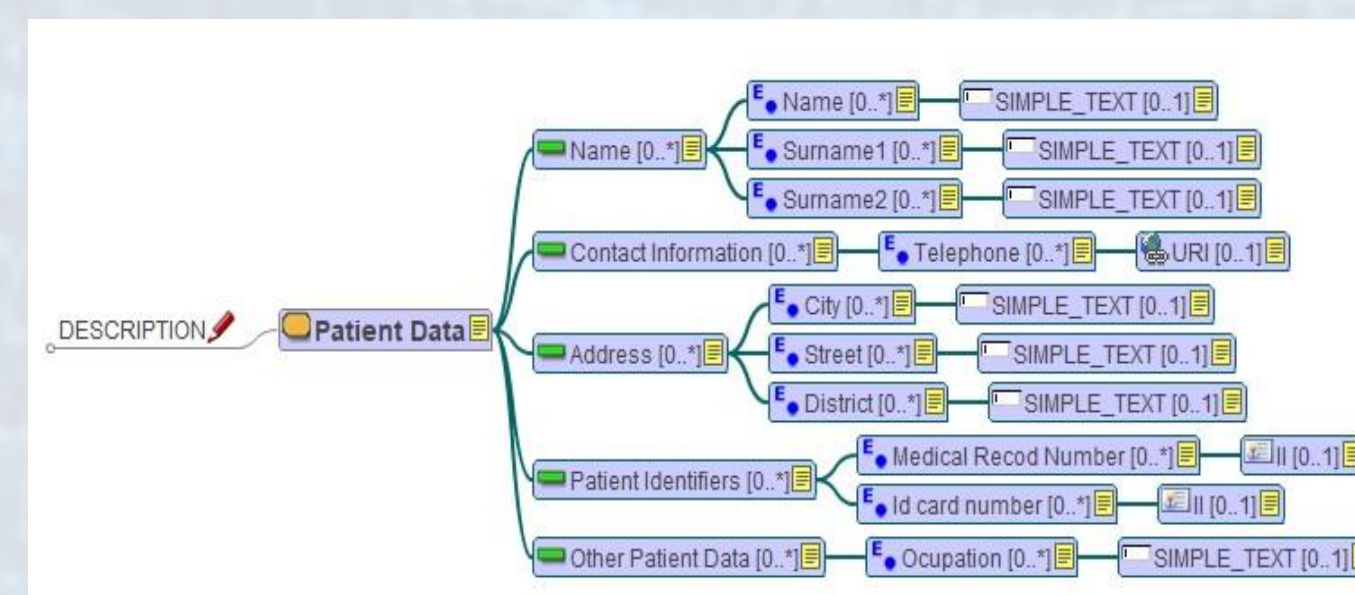
#### Use case 2



Hospital La Fe  
Valencia, Spain

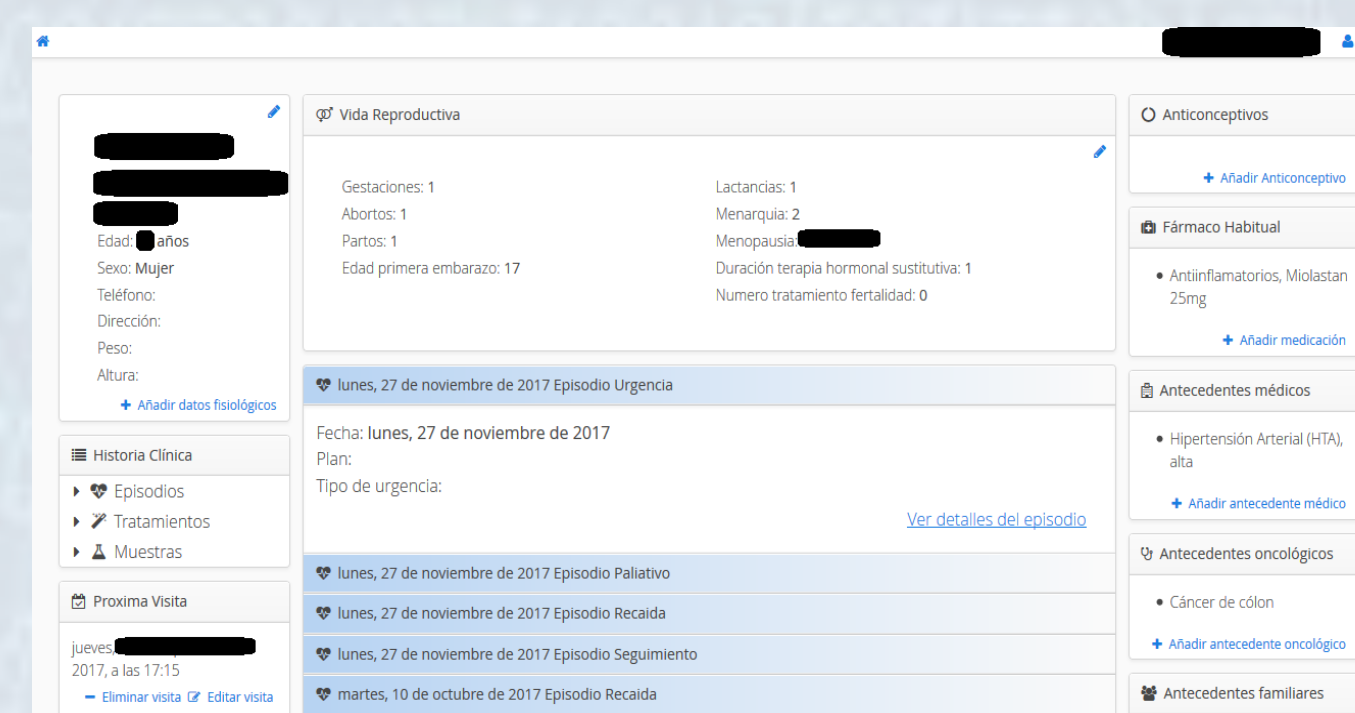
The model is an abstract representation of the system. It contains detailed descriptions about types of entities, relationships, and constraints. The model includes the patient's demographic information, episode description, complementary information, treatments, pathological and genomic information.

### THE ARCHETYPES

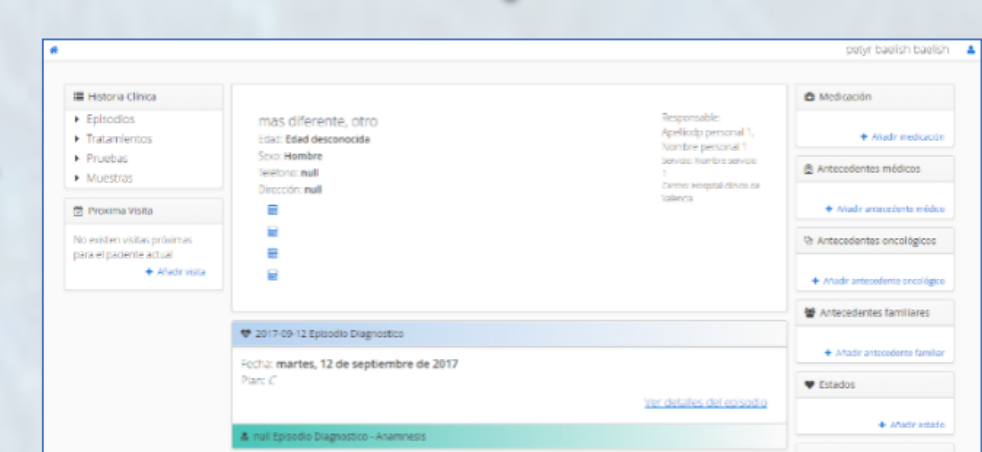
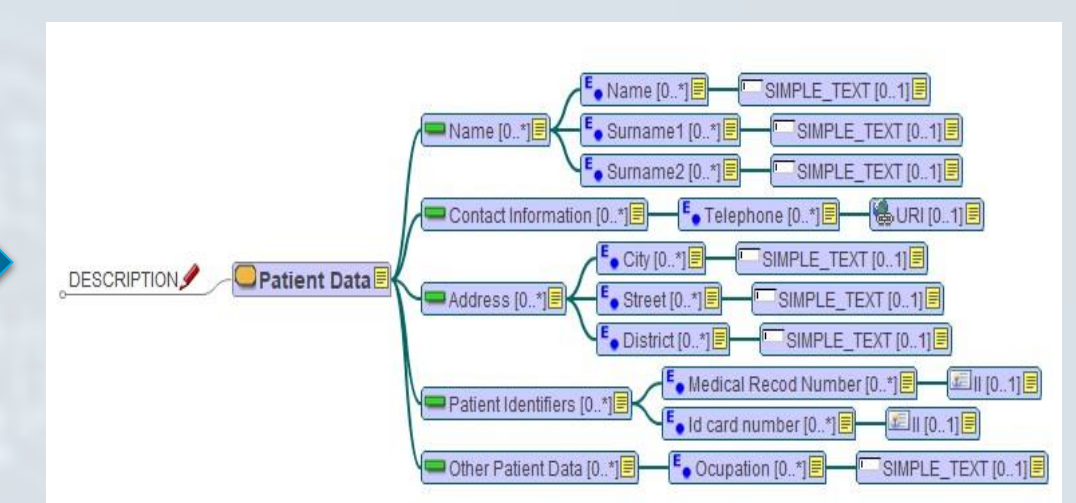
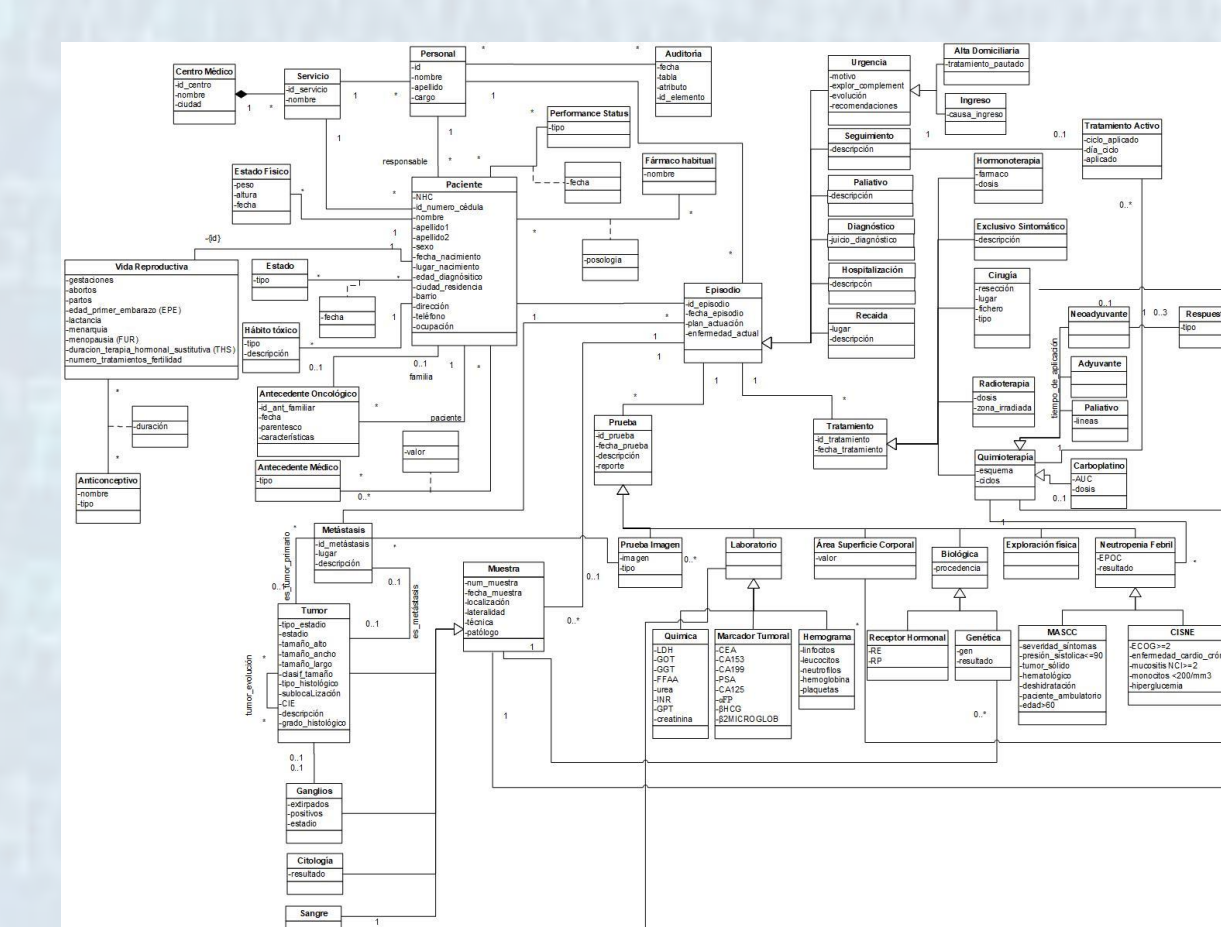


Archetypes have been created based on ISO 13606 standards. This makes the Information System semantically interoperable. Archetypes provide well-defined User Interfaces.

### 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.



**CONCLUSIONS:** The Information System is a robust and agile platform that automates the access to the information. The system makes it possible to obtain statistical data and facilitates the research adapted to the needs of the oncology department of the hospitals.

## REFERENCES

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## CONTACT



siar5@doctor.upv.es