WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Urbanization of Health Information Systems: Decision Support with Chek Code

BASA KUTUPU Faustin[1], TSHIBAKA MUSENDEKA[2]

[1]Works Manager at UNIKAN
[2]Emmanuel (Professor at UPN)

ABSTRACT

The world of health and care needs a nervous system. We must indeed be able to communicate, understand, decide, steer and develop our health information systems in a world where information represents, a little more every day, a real strategic challenge. This is true in hospitals and medical practices, but also in pharmacies, laboratories and all the rest of the health system, including its community and public health dimensions. As the English say, "information is care".

Medical informatics is the discipline that builds and operates these nervous systems of health and care, with the aim of improving their quality, safety and efficiency. The aim of this work is to offer a generalist interdisciplinary vision that addresses the various issues of the implementation and appropriate use of computer tools to support medical and nursing practice, and more broadly the functioning of health systems.

Introduction

Although it is a new science, computing has already entered almost all areas of our daily lives. Its impact on society is manifested in the proliferation of computers, information systems, text editors, spreadsheets and all those amazing applications that have been developed to make computers more productive and easier to use.

Medical informatics is the discipline that builds and operates these nervous systems of health and care, with the aim of improving their quality, safety and efficiency. The purpose of this work is to offer a generalist interdisciplinary vision that addresses the various issues of the implementation and appropriate use of computer tools to support medical practice, care and analysis of epidemiological data, and more broadly the functioning of health systems.

Our investigation has set itself the objective, "The Urbanization of Health Information Systems: Decision Support with the Chek Code. It is a question of evaluating the performance of the computerized information system for the management of existing health data on the one hand and on the other hand to verify the reliability of the legal information resulting from the said existing one, to propose possible solutions for ensure quality assurance - of the health management system.

With regard to the foregoing, an evaluative study of the challenge of processing health data at the DPS / Kasaï Central and identifying the ways and means to provide them with a database distributed in a Client-Server environment, which can enable data to be managed securely and efficiently sometimes through mobile web software.

Indeed, this set of anomalies observed during our study does not allow decision-makers to obtain the information necessary for decision-making at the appropriate time; This leads to a considerable financial loss and an inefficient strategy.

This allows us to ask questions about the problem:

- How to produce the expected results in the establishment of a system of a Database distributed in the "Client-Server" environment at the DPS Kasaï Central for the Scalable analysis of health data?
- In relation to the slowness in the flow of data, will it be important to interface the distributed database created with a mobile web application under Java NetBeans with the Java Spring developer?

With regard to our problem to be solved, it is good to suggest provisional answers before their confirmations or infirmations in the continuation of this work. The epidemiological data at the DPS/Kasaï Central must have an information system that meets the principles of formal specifications and implemented on the basis of formal languages or abstract machines, in order to improve their management in the processing of

[1] BASA KUTUPU Faustin., Works Manager at UNIKAN or (Chef de Travaux à l' UNIKAN)
[2] TSHIBAKA MUNSEDEKA Emmanuel., Professeur à l'UPN/ Kinshasa or (Professor at UPN)

epidemiological data, to highlight the skills meeting the requirements of the user's needs and the requirements of the rule of quality assurance in the Study on the Evolutionary Analysis in the urbanization of Health Information Systems in order to fix the decision-makers with precision on the numbers and movements of cases of the different epidemics they manage.

SECTION I: GENERAL INFORMATION ON THE URBANIZATION OF SYSTEMS

Companies and organizations have long known the decisive place of IT and have reached higher thresholds of efficiency and production of operations and its critical role in their function( ).

Urbanization refers to the world of architecture, which consists of designing an IS in the manner of a city's urban plan. It is based on the principle of an arrangement of IT functions in relation to each other, like the zones and districts of a city. In the same way, the construction plan of an agglomeration is drawn up according to the needs of the inhabitants, in the same way the plan of an IS will be drawn with regard to the business requirements and/or the strategic priorities of the organization

1.1. Definition of Systems Urbanization

Information systems (IS) have become an essential condition for the implementation of reforms and a lever for the performance of establishments and services in the field of health.( )

It is important to identify the guiding principles of urbanization to be applied in order to "equip", at the regional level, in an appropriate manner a network organization providing, within the framework of the health pathways, to the attending physician, to the team hospital or medico-social, an efficient and quality coordination offer.

Most Health Information Systems (SIS) have been built gradually over the last twenty years in the form of independent applications where information is duplicated( ).

This translates operationally into the following five breaks:

- Application breakage: data updates are not passed between applications;
- Rupture of identifiers: the same information is accessible via multiple identifiers;
- Break in the computer chain: exchanges between applications are not industrialized, which leads to processing defects and errors in the repercussions of updates;
- Temporal break: delays in passing on information updates between applications are long (several days or even several weeks);
- Geographical break: the data is dispersed in the applications established in the different geographical entities.

This results in inconsistencies, multiple entries and unsatisfactory service for users and organizations.

1.2. What is a Shared Health Information System (SIPS)?

A SIPS is an information system that allows multi-professional collaboration for the benefit of patients regardless of their place of care, based on information and communication technologies (ICT), rules of shared uses and resources( ).

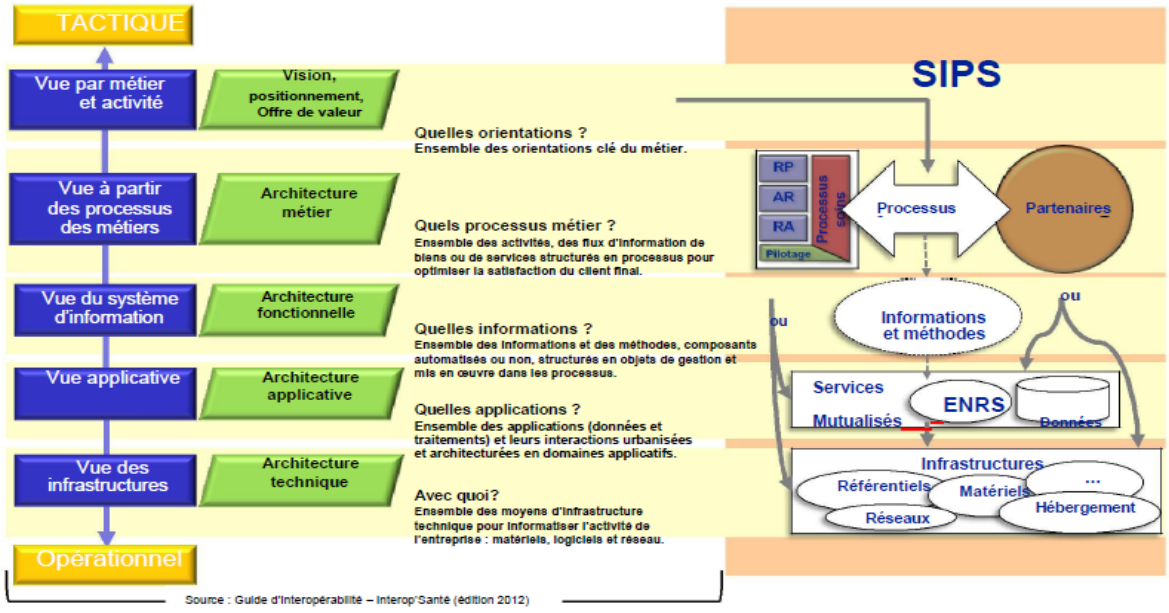
It allows sharing and exchange between health actors (partners) with the aim of seeking efficiency (quality of care and economic relevance). Telemedicine information systems are SIPS for example( ).

1.3. Regional urbanization scheme

The new SIPS must comply with the regional urbanization scheme, which itself complies with the national SIPS urbanization scheme.

The regional urbanization plan respects the following urbanization principles:

- SIPS must support a business process between actors in the health system;
- SIPS must implement the "mandatory" rules of this document;
- In the event that SIPS require specific information processing services, these services are supported by one or more shared application(s) at regional or national level, possibly relying on data warehouses (ENRS);
- Data sharing and exchanges are ensured by a regional infrastructure (broadband network, application proxy servers, gateways, etc.) or national infrastructure (actor repositories, classifications, etc.).



SECTION 2: DECISION SYSTEM

″Whenever you see a successful business, you think it's because someone once made a brave decision.″

Peter Drucker

″ A decision-making system is a system that must be able to combine data at all times. ″

Benjamin EPE

Currently in all companies or institutions that want to reach the top or reach a high level of performance must make good decisions or rational decisions based on data analysis. Companies need an IT tool that should allow them to make decisions and to improve the proper functioning of their existing system. The decline or disappearance of many companies in this world comes from the fact that they lack qualified personnel to make adequate decisions.

2.1. Definition of decision

According to [Inmon, 2005] "these systems also include a set of information and tools made available to decision-makers to effectively support the decision-making process, they are dedicated to the management of the company in order to to help manage its activities.

2.2. Decision-Making System Definition

Indeed, the decision-making information system (SID) refers to "all the means, tools and methods that allow the company to collect, reinforce, store, aggregate and restore important data in order to provide real assistance to the decision ".

2.3.. Architecture of a decision-making system

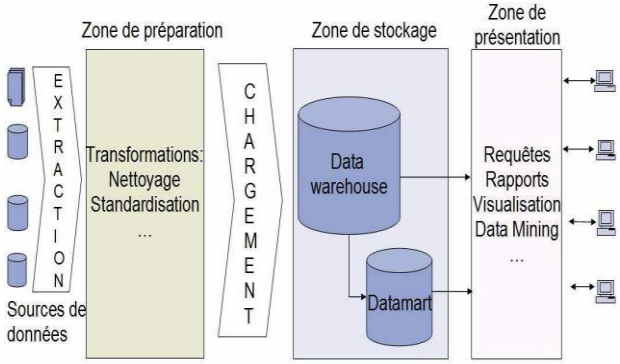


Figure 4: Architecture of a decision-making system

2.3.1.Data warehouse

According to [Kimball, 2002]: "The Data Warehouse is a system that extracts, cleans, processes and conforms source data to a multidimensional storage space. It thus allows the implementation of interrogation and analysis for decision-making support purposes".

2.3. 2. Basic components of a data warehouse:

A DataWarehouse is a basic structure in a decision-making system. It is the place used to collect and store information from other data sources, then transformed into information that is manipulated by analysis tools for decision-making purposes.

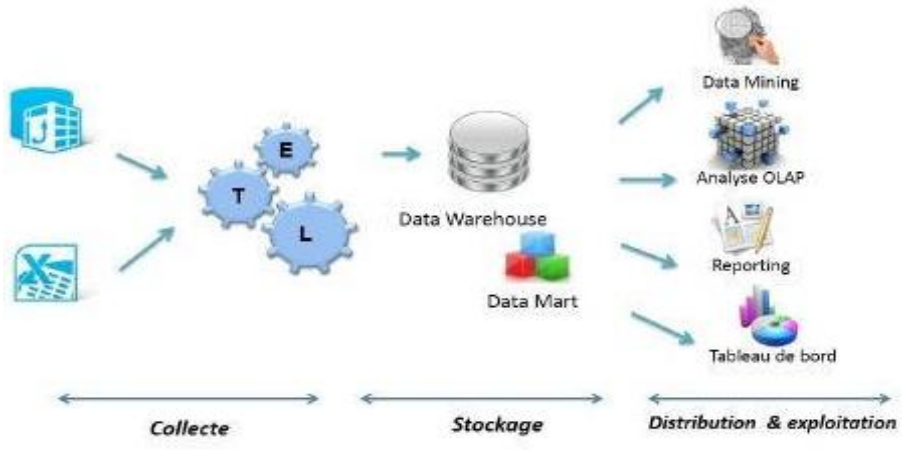


Figure: Data warehouse architecture

2.4. Data Mart

Is a logical subset of data warehouse. Beyond this relatively simple definition, a data mart is often thought of as the reduction of the data warehouse to a single process targeting a specific business group. It is usually sponsored by a particular department or unit ". [Kimball, 2002]

2.5. DATA MINING

Or data mining is a set of techniques and methods in the field of statistics, mathematics and computer science allowing the extraction, from a large volume of raw data, of original knowledge previously unknown by automatic methods. or semi-automatic.

3.6. OLAP concept

To manage its information assets, companies rely on systems, namely:

- OLTP (On Line Transaction Processing) for DBMS.
- OLAP (On Line Analytical Processing) for a data warehouse.

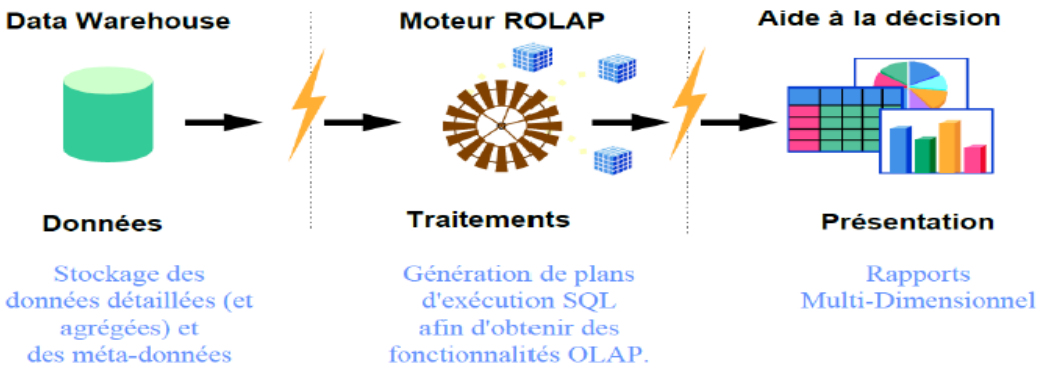
3.7. Architecture of OLAP systems

When creating an OLAP cube, you have to decide how to store the automatic data as well as the aggregates (groupings). There are several versions of OLAP, but the three most common are:

- ROLAP architecture: (Relational OLAP).
- MOLAP architecture: (Multidimensional OLAP).
- HOLAP architecture: (Hybrid OLAP).

3.6.1. ROLAP (Relational OLAP)

"Is a set of user interfaces and applications that give a dimensional view to relational databases" [Kimball, 2002].



3.7.1. MOLAP (Multidimensional OLAP)

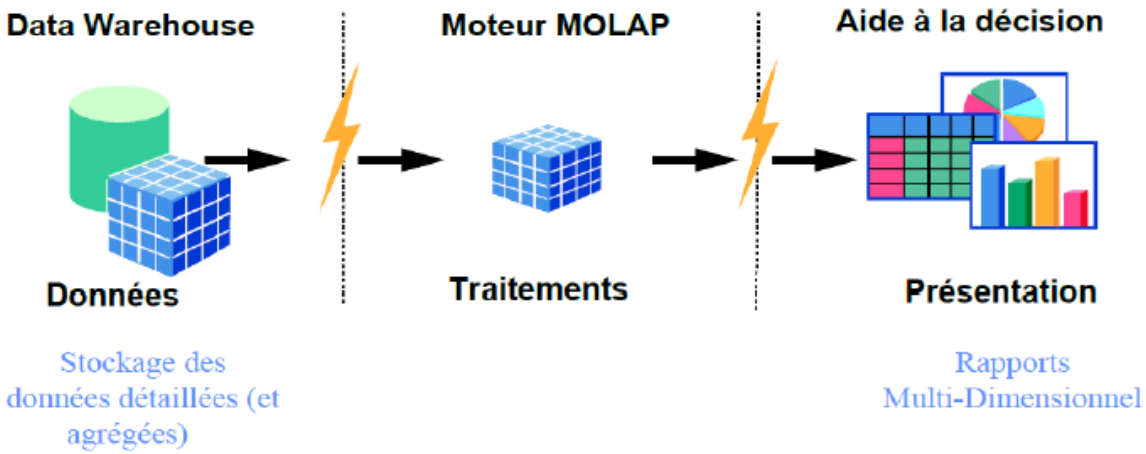
"Is a set of application interfaces and proprietary database technologies whose dimensional aspect is predominant" [Kimball, 2007].

This architecture is based on a multidimensional database (cube) which makes it possible to store frequently used data requiring a minimum response time. Its disadvantage that it is more expensive to set up, and it does not support a large mass of data.

3.7.3. HOLAP (Hybrid OLAP)

This architecture is a hybrid solution between MOLAP and ROLAP. This approach combines both relational and dimensional approaches. Indeed, the basic detailed data of a data warehouse is stored in a relational database and the aggregated data is stored in a multidimensional database.

Its advantage that it is good in terms of cost and performance.



SECTION 3: CHECK CODE: SPAD 5.0

To believe it, to have precision known the overall opinion of the results obtained, we used the statistical data analysis and processing software which is "SPAD 5.0" which allowed us to calculate the covariance matrix or linear regression for each Health zones, and also whether individuals are correlated with their Health zones.

Indeed, to get there; we used the Grouping "Factorial Analysis" with the method "Principal Component Analysis, PCA", which aims to represent a table of quantity data in a reduced table to have the information contained in the data or table and also to array dimension reduction in order to get the result.

While, the Corresponding Factor Analysis: allows to gather in a reduced number of dimension to most of the initial information, by focusing not on absolute values but on correspondences between variables, it is – to – say to relative values.

Survey Questionnaire

N° Questions YES NO ABSTENTION

N°	Questions	YES	NO	ABSTENTION
1	Are you a recognized Health Agent in a health zone or DPS/Kga?	40	40	0
2	Did you have a computerized epidemiological management system?	90	45	25
3	Do you master the use of IT tools in the management of epidemiological data?	95	40	25
4	Do you have continuous training for the computerized management of your data?	447	105	12
5	Does your software have a User License?	18	131	11
6	Is there a maintenance service to help you out in the event of a problem?	37	107	16
7	What is your level of education	86	56	18
8	Are there security features in your system?	36	105	19
9	Do you think your system has weaknesses that can be corrected? or improve?	69	47	34

10	Are you satisfied with the treatment or the conditions in which you work?	14	130	10
11	Were you satisfied with your work as a caregiver, especially during the Covid 19 period	23	105	17
12	Do the data collected ensure completeness?	80	68	12
13	Do you receive feedback from the reports you submit?	71	15	14
14	Have you received training on data encoding?	52	91	17
15	Do you encounter any breaks in the collection supports?	115	33	7

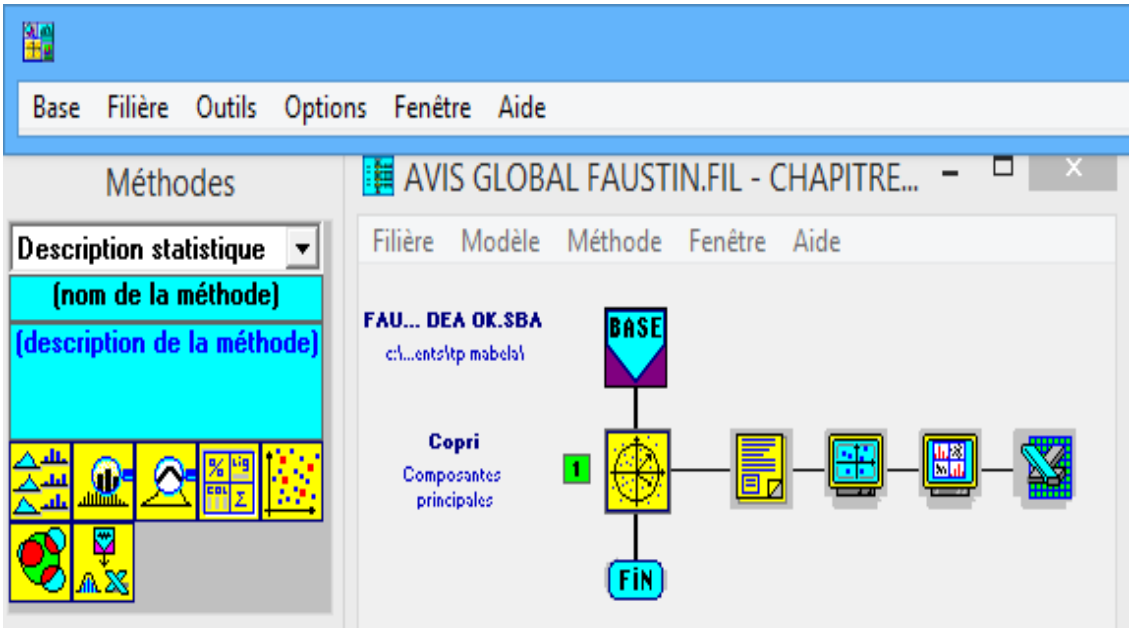


Tableau Statistiques sommaires des variables continues

Libellé de la variable	Effectif	Poids	Moyenne	Ecart-type	Minimum	Maximum
OUI	15	15,00	58,200	29,851	14,000	115,000
NON	15	15,00	78,533	32,926	33,000	131,000
ABSTENT	15	15,00	15,800	7,893	0,000	34,000

Comment: this table stipulates that out of 15 effectives all responded and we find that the highest maximum value is 131, the minimum is 31 and also their weight varies from 15 to 78, without forgetting the standard deviation which is 32 as highest value

.

Matrice des corrélations

	C2	C3	C4
C2	1,00		
C3	-0,85	1,00	
C4	0,27	-0,19	1,00

Comment: The correlation matrix table shows that the value the data correlates to 1 and the value is 1

Matrice des valeurs-tests

	C2	C3	C4
C2	99,99		
C3	-4,83	99,99	
C4	1,05	-0,75	99,99

Comment: The matrix of values – tests table shows that the test value is 99.99

Tableau des valeurs propres

Trace de la matrice: 3.00000

Numéro	**Valeur propre**	**Pourcentage**	**Pourcentage cumulé**
1	1,9563	65,21	65,21
2	0,8945	29,82	95,03
3	0,1492	4,97	100,00

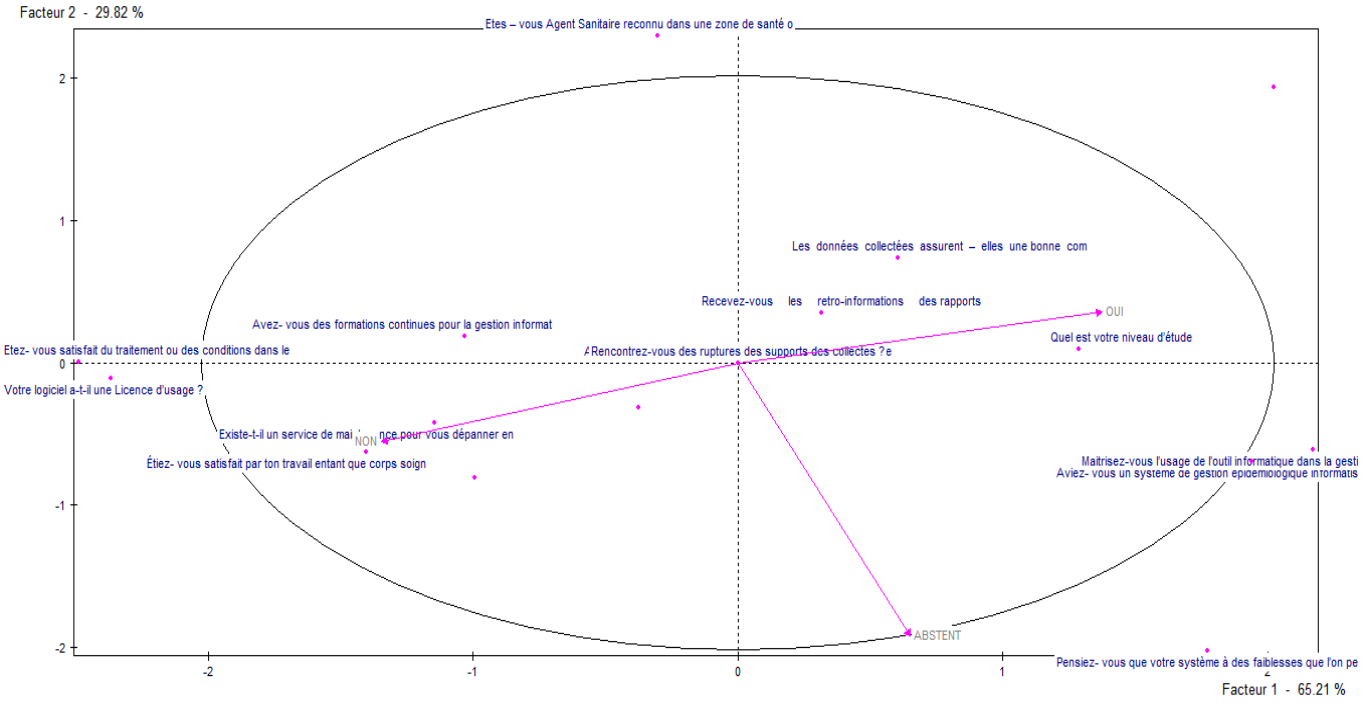
Comment: The table indicates the eigenvalue of the matrix is 1.95 and the trace is 3 because from the correlated data we add their trace and we find 3.000 as Trace of the matrix.

Matrice des corrélations permutée suivant le premier facteur

	C3	**C4**	**C2**
C3	1,00		
C4	-0,19	1,00	
C2	-0,85	0,27	1,00

Comment: Permuted correlation is 1 on all variables

Graphique



Comment: we see in this graph that each question is positioned on the basis of values in relation to their individuals

Section 4: Application

A critical step in any software or design development cycle is to conduct a pre-study. The purpose of this phase is to understand the context of the system. It is a question of clarifying as well as possible the functional and non-functional needs, defining the actors and identifying the cases of use. In this chapter, we will try to express the needs in the form of use case diagrams

Section 1: Modeling

Identification of actors: The three actors involved in this system:

- The simple user (investigator),
- Member user (Health Zone),
- The administrator user (DPS)

1.1. Use case diagrams

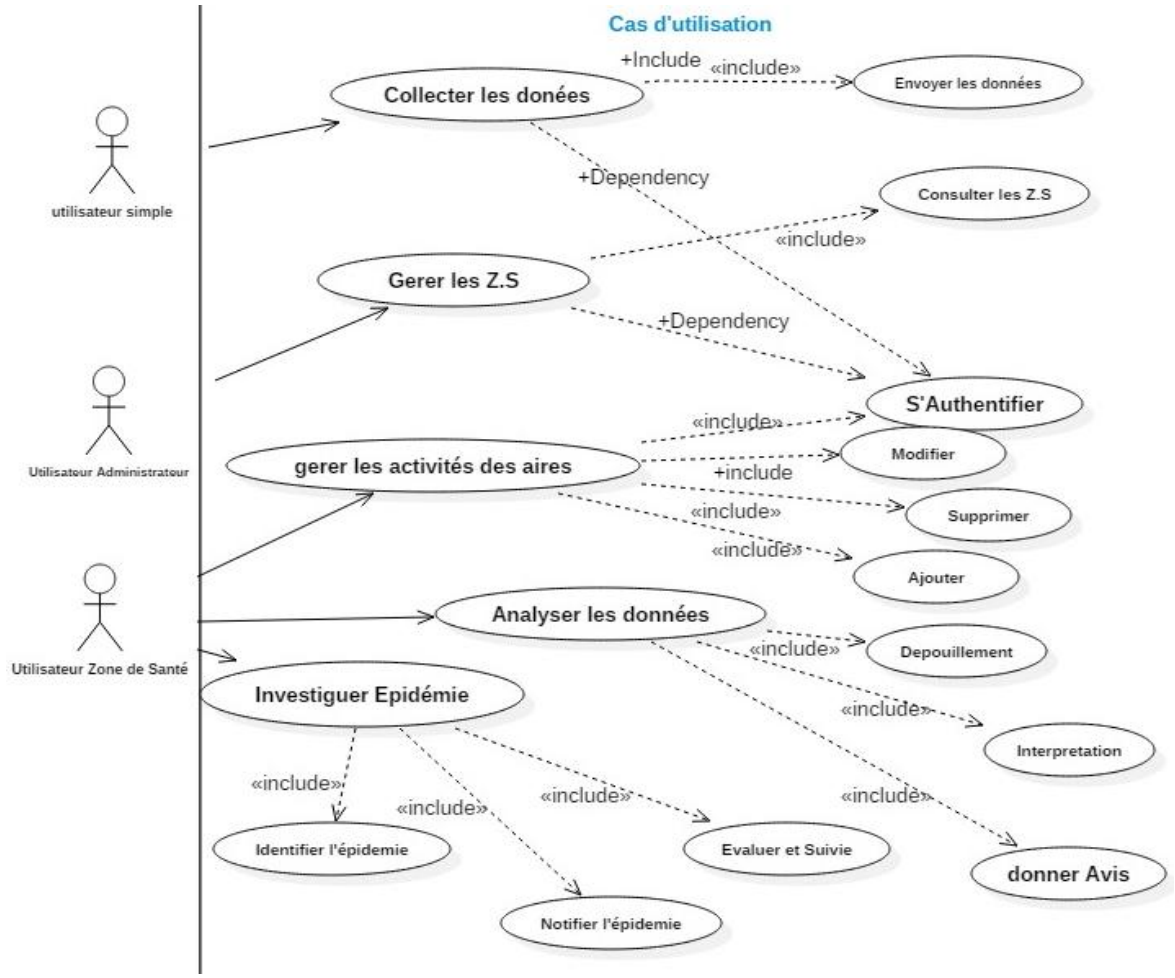
The purpose of the use case diagram is to give an overall view of the future application interfaces. It is the first UML diagram made up of a set of actors who act on use cases and who describe, in the form of actions and reactions, the behavior of a system from the user's point of view.17.

Actor: An actor is a user who communicates and interacts with the use cases of the system. It is an entity having a behavior like a person, a system or a hospital.

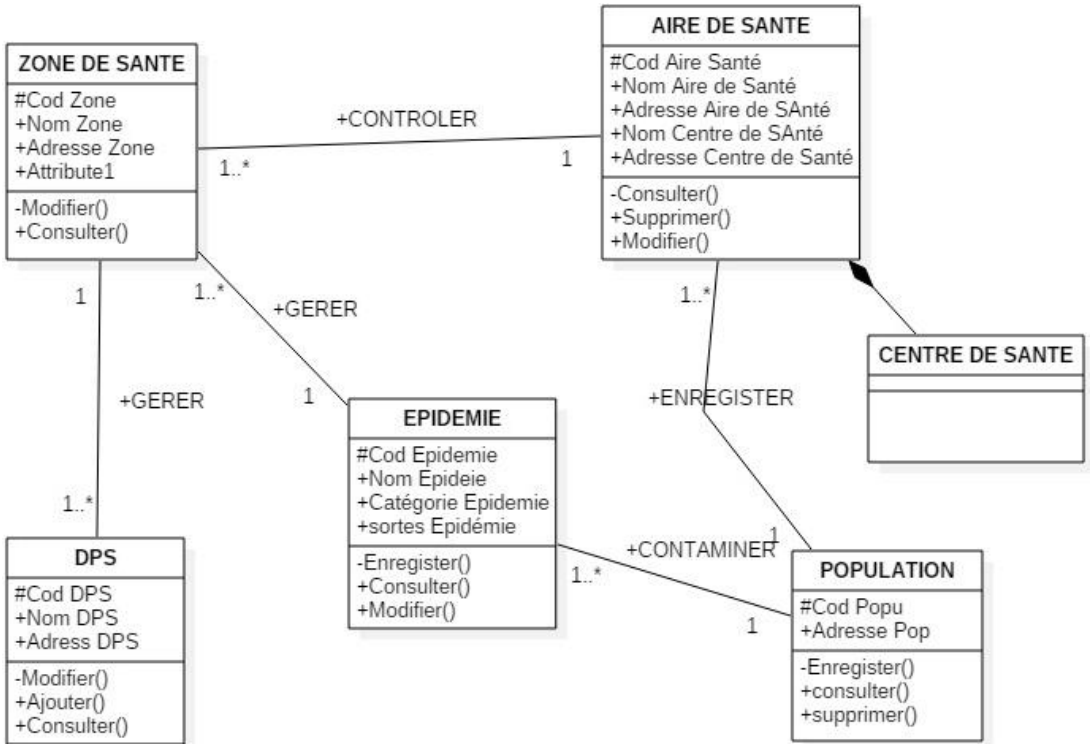
System: this element sets the limits of the system in relation to the actors who use it (outside the system) and the functions it must provide (inside the system).

Use case: a use case represents a set of sequences of actions to be carried out by the system and producing an observable result of interest for a particular actor represented by ellipses and limited by a rectangle to represent the system.

Complete use case diagram



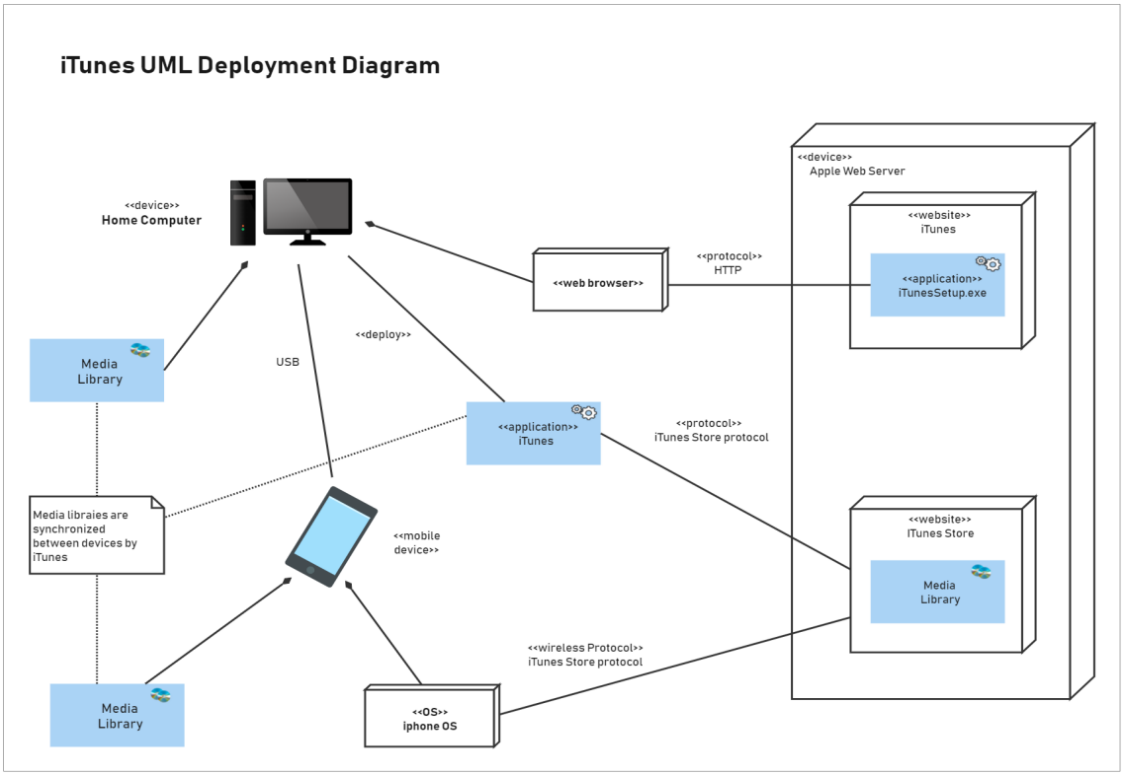
CLASS DIAGRAM



DEPLOYMENT DIAGRAM

The environment that reacts to commands from the controller is a set of physical devices associated with each gate. We have chosen to represent the information of each door by a status record which includes four fields:

- The green LED takes the values: (off, on)
- The red light, which takes the values (off, on)
- Blocked or unblocked information (boolean value)
- Open or closed information (boolean value)( )



CONCLUSION

Data degradation during a telematic transmission can be the cause of interpretation errors. A security flaw can facilitate the illicit use of confidential data.

On the other hand, another aspect of liability relates to the use of software or databases in the field of health. So, if a program provides bad information to health experts, is the responsibility of the latter engaged or should we turn to the manufacturer of the machine or the developer of the software?

Nowadays, information is considered the primary key of the economy and constitutes an instrument of competition, which is why companies are aware of the mastery of information in order to make it available in the right form, at the appropriate time to the right person who will operate it. This is why it is necessary to support business decision-makers with sophisticated analytical tools to allow them to make relevant decisions.

In order to properly carry out our project, we have adopted an iterative project planning and monitoring methodology inspired by the UML life cycle approach, which consists of different stages for the implementation of a Client-Server system by approach. Mobile environment. This method mainly uses the approach guided by the needs analysis.

At the end, we can cite some perspectives that seem important in order to bring improvements and developments to the system, and which are the following:

- Follow the current solution to make the necessary changes to improve system performance.
- Integrate new powerful tools
- Create other data stores for other services
- Proposed a new data coding or a standardized coding for epidemics based on simplicity.
- Integrate new collection, analysis and interpretation tools such as the dashboard to monitor and anticipate the functioning of the activities of the health information service, in order to measure the performance of the latter.

Finally, we can conclude that despite the obstacles encountered, this end-of-studies project is an amply enriching experience which has allowed us to increase our knowledge, while putting into practice our knowledge acquired during our course, it has also allowed us to explore new technologies and tools for analysis and development, and also this allowed us to say that it was a pleasant professional experience, which made us discover the job market in order to prepare us to continue our path.

BIBLIOGRAPHIES

A. Works

1. Alain COLLONGUES, Bernard Laroche., *Merise and the Specifications*, Ed. DUNOD, Paris, 1993,
2. ALAIN APRIL; CLAUDE Y. LAPORTE., "*Software Quality Assurance* I" Ed LAVOISIER, Paris 2011
3. ALEXIS RIVIER., "*Aide-mémoire of documentary computing*", Ed. Du Cercle de la Librairie, Paris 2007
4. AFREDO MORABIA., *Clinical epidemiology*", 1st Ed. University Press, Paris 1996
5. Aleen Frisch., *The Basics of System Administration*, 3rd Ed. O'REILLY, Paris, 2003
6. ABDERRAZAK MKADMI IMAD SALEH., "*Digital library and information retrieval*" Ed. Lavoisier, Paris 2008
7. A. Fernandez, "*The essentials of the dashboard: Complete method and practice with Microsoft Excel*", 2011.
8. Alizon S, Is it serious Dr. Darwin? *Evolution, microbes and us*, ed. Threshold, Paris 2016
9. Bezzaoucha A: *Summary of epidemiology*. ed. University Publications Office (OPU), Algiers 2016.
10. Bezzaoucha A.: *Complements in basic epidemiological techniques*, ed. University Publications Office (OPU), Algiers 2003.
11. Bezzaoucha A.: *Epidemiology and biostatistics for the use of students in medical sciences*. Ed. Office of University Publications (OPU), Algiers 1996, reprint 2005.