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**Design and implementation of a decision support  
system Civil protection**

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## DEDICATION

*" Starting with the name of Almighty Allah, I thank Him for guiding me to success and giving me the strength to work on this special project. All sincerity and effort are for Him. I dedicate this thesis to my parents for the love they have always shown me, the courage and support I have received from them to complete my studies. Not forgetting my siblings whom always been there for me to help me through everything, supporting me through everything. And a special dedication to anyone who has helped me in my life."*

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*Hoping that this modest work is up to the task and reflects what I was able to acquire during this internship period.*

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# **Introduction**

## **1. Study content :**

The profound changes affecting the global economic system have an increasing impact at the regional, national and local levels.

This development is now presented as irreversible and unavoidable, and it is therefore necessary to consider globalization as essential data to be taken into account in the business strategy.

In this context, the Foundation's managers have an obligation to manage the present and the future by making optimum use of the material and human resources available to them. Therefore, they have to make decisions, faster and faster, based on a clear understanding of their internal and external environment. Thus, information and all relevant dimensions, reliability, speed and usefulness, become a critical weapon. The same role as the Controller is to guide the operators' work in order to ensure a lasting correlation with strategy and the proper use of resources. He is required to give "the right information at the right time and to the right person."

The 1980s saw the birth and development of information systems for the effective management of information flows throughout the organization. However, these information systems are not intended as an enterprise's decision-making tool.

As a result, in an increasingly competitive environment, the company is forced to adopt a decision-making system.

The Foundation adopts a decision-making system to improve its performance. It must determine the information available, expect it and draw on its expertise. For several decades, a large amount of information was stored in computer form in institutions. The purpose of information systems is to track events reliably and in an integrated manner. They're increasingly automating processes.

But right now, data is abundant, unregulated and scattered in multiple heterogeneous systems, and from a decision-making perspective, it's very difficult for civil protection to access information..., so I thought about setting up a decision-making system to support decision-making.

Thus, it is easy to understand the importance of the data repository, for administrative control, and to improve the enterprise's performance in order to achieve its objectives.

## **2. Problematic**

In the era of information and communications technologies and strategies, critical decisions are made on the basis of relevant information provided by the Operational Intelligence Section. It provides the operational knowledge needed to achieve managers' objectives.

**Civil Protection** operating systems generate many interventions daily in different forms stored in many scattered databases. Analytical and decision-making processes are becoming difficult.

As a result, the current system faces some of the difficulties we have observed at different levels in our study, and we present them as follows:

- Required information:
- A large volume of data is scattered in many databases, and exploiting this data is a difficult task. Thus, the simplest analysis process becomes a daunting task.
- Difficulty in maintaining the record of interventions, so city protection cannot track full interventions immediately.
- Preparation of reports.
- High cost of resources, high risk of unreliability.
- Delays in the preparation of periodic reports, sometimes exceeding 15 days, mean that information is not available in a timely manner.

### **3. Project Objectives**

- To overcome the above problems, we plan to improve through the establishment of a data repository. The objectives can be summarized as follows:
- Data centralization to facilitate access to information, without neglecting the security aspect
- Make the necessary information available for decision-making at any time for appropriate analysis.
- Reduce the time and total cost of reporting from 15 days to a minute.
- Reducing the number of intermediaries to a single database when reporting, as well as improving the quality of reports.
- Enrichment of daily intervention indicators to reduce material **human losses**

# Chapter I

## Business Intelligent

## **1. Introduction**

In companies with IT infrastructure, business intelligence implementation is becoming more explicit and requires a Decision Information System. A decision-making information system, of course, is not a decision-making system. In English, we say Decision Support System , it is a system of «support» to the decision. The decision itself is human; the vocation of the decision-making information system is not to automate the decision, it is to automate the process of, seeking information and formatting the data necessary for decision-making. The decision itself is a socio-technical process, in which human actors are in increasingly close inter-action with automated systems.

## **2. Definition of BI**

Business Intelligence (BI) is a DSS (Decision Support System) that combines data collection, data storage, knowledge management and analysis to make a contribution to the decision-making process. The term appeared in 1989 before many of its features were part of management information systems. Business Intelligence focuses on analyzing large volumes of data about the company and its operations. It includes competitive intelligence (tracking competitors) as a subset. In IT environments, BI uses a large database, usually stored in a data warehouse or data mart, as a source of information and a basis for complex analysis..... [1].

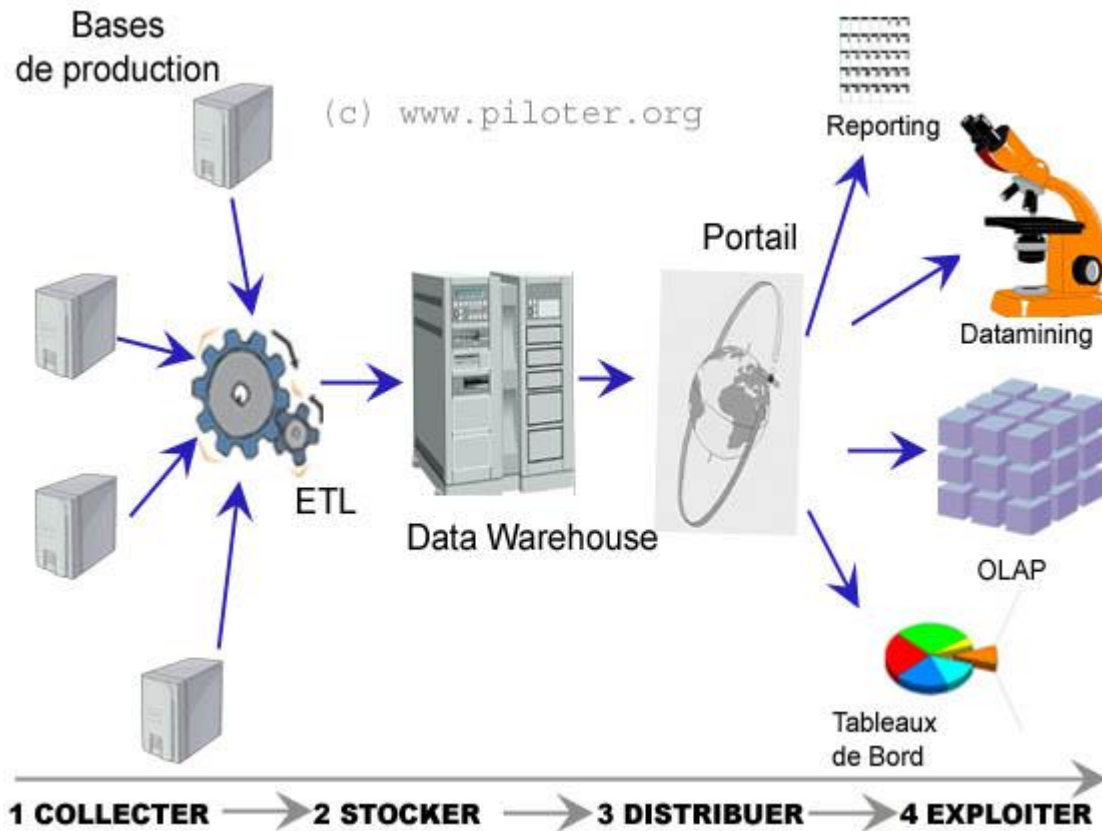
## **3. How does BI support strategic decision-making?**

BI facilitates strategic decision-making through two elements: dashboards and visualization. With the first, key performance indicators (KPIs) are presented to decision makers, which allows them to estimate the evolution of their business in view of the strategic objectives predefined by the company.

Data visualization provides a graphical representation of the indicators and other information present on the dashboard. This allows decision makers such as Information Systems Managers or analysts to better understand the current situation of their company and anticipate potential changes in progress. Data visualizations can be done by changing parameters of observations such as time, geographical location, age...

## **4. Architecture of BI**

It is customary to present the elements composing the decision-making chain in four categories, each corresponding to a specific function, a phase of the process.



**Figure 1.** The 4 phases of the Business Intelligence process, from data to information.

#### 4.1. Collect: Extract Transform and Load (ETL) tools

Collect, Clean and Consolidate extended enterprise data. Data collection is a function performed by a family of tools called ETL for Extract Transform load. Before being usable, the data will be formatted, cleaned and consolidated. Extract Transform load (ETL) tools are used to automate these processes and manage the data flows feeding the storage bases: Data warehouse or Datamart.

#### 4.2. Store: Data warehouse and datamart

Production databases are not usable for decision-making. The raw data is not ready for this use and decision-making queries are particularly demanding in terms of machine resources.

The data, previously cleaned and consolidated, will be stored in a specialized database: the data warehouse or the datamart.

The datamart is a smaller version of the data warehouse. The data mart is subject or theme oriented and can be used for example for CRM (Custom Relationship Management) or Data Mining applications.

The data warehouse or datamart is powered by the ETL tool (Extract Transform load). Note that the Data Warehouse project is quite special. It is better to consider it as a process. The Data Warehouse is constantly evolving.

#### 4.3. Distribute information EIP Enterprise Information Portal

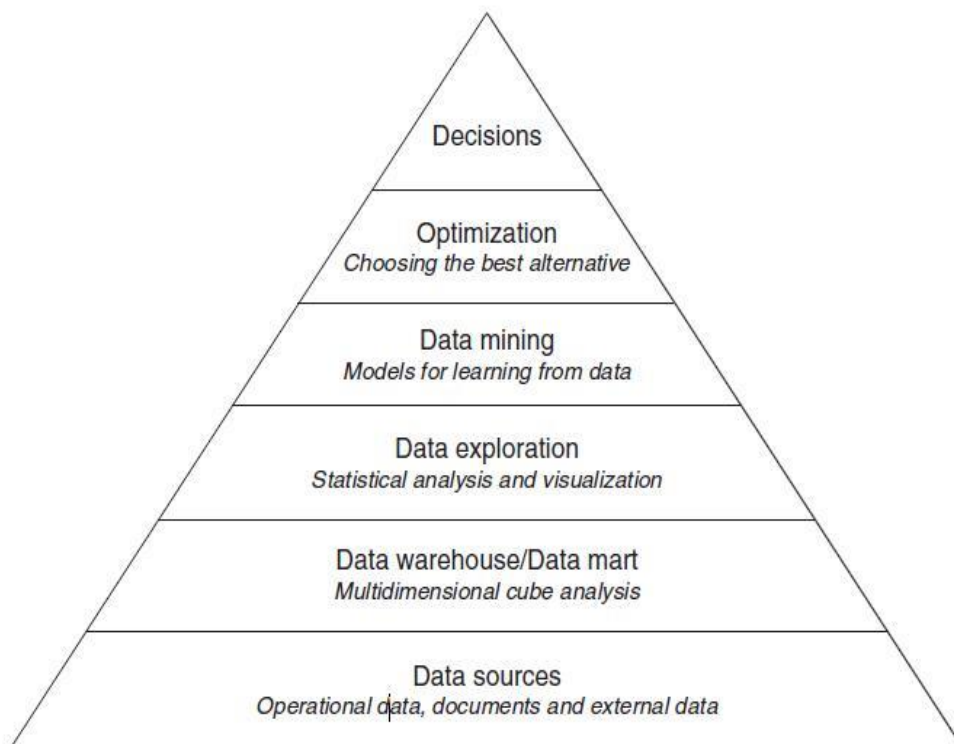
The crushing of the pyramid and the multiplication of decision-making points fundamentally change information management. The information will be perceived in terms of flow and not storage unit. In order to boost global responsiveness, the information will be widely distributed to all partners. The EIP Enterprise Information Portal fulfils this essential function.

#### 4.4. Operate: dashboard, OLAP analysis, datamining,...

Once the data is stored, cleaned, consolidated and accessible, it is usable. Depending on the needs, different types of extraction and exploitation tools will be considered [2].

#### 4.5. The main components of a business intelligence system:

The pyramid in Figure 2 shows the building blocks of a business intelligence system:.



**Figure 2.** The main components of a Business Intelligence system

##### 4.5.1. Data sources:

In a first step, it is necessary to collect and integrate the stored data into the various primary and secondary sources, which are heterogeneous in origin and type. Sources consist for most of

the data belonging to operational systems, but can also include unstructured documents, such as emails and data received from external suppliers. In general, a major effort is needed to unify and integrate the different data sources.

#### **4.5.2. Data warehouses and data marts:**

Using extraction and transformation tools called extract, transform, load (ETL), data from different sources is stored in databases to support business intelligence analysis. These databases are generally referred to as data warehouses and datamarts.

#### **4.5.3. Data exploration:**

At the third level of the pyramid are the tools to perform a passive analysis of business intelligence, which consists of query and reporting systems, as well as statistical methods. This is called passive methods because decision-makers are asked to make assumptions before or define data extraction criteria, then use analytical tools to find answers and confirm their original vision. For example, consider the sales manager of a company that finds that revenues in a given geographic area have fallen for a specific group of customers. Therefore, she may want to confirm her hypothesis using extraction and visualization tools, and then apply a statistical test to verify that her conclusions are well supported by data.

#### **4.5.4. Data mining:**

The fourth level includes the active methods of the BI, whose purpose is the extraction of information and knowledge from the data. These include mathematical models for pattern recognition, machine learning and data mining techniques. Unlike the tools described at the previous level of the pyramid, models of an active genus do not require decision makers to formulate any hypothesis before being later verified. Their goal is to broaden the knowledge of decision-makers.

#### **4.5.5. Optimisation:**

Optimization models allow us to determine the best solution for a set of alternative measures, which is generally quite large, and sometimes even infinite.

#### **4.5.6. Decision:**

Finally, the top of the pyramid corresponds to the selection and effective adoption of a specific decision, and somehow represents the natural conclusion of the decision-making process. Even when business intelligence methods are available and successfully adopted, the choice of a decision is made by decision-makers, that will also benefit from the informal and unstructured

information available to adapt and modify recommendations and conclusions obtained through the use of mathematical models.... [3].

## **5. Business Intelligence Analysis Tools:**

### **5.1. Dashboard:**

A dashboard is a decision-making and forecasting tool, consisting of a small set of indicators (five to ten) designed to allow managers to become aware of the state and evolution of the systems they manage and to identify trends that will influence them over a horizon consistent with the nature of their functions ... [4].

### **5.2. Reporting:**

It is intended primarily for the production of reports and dashboards and is the periodic presentation of reports on the activities and results of an organization, a work unit or the head of a function, intended to inform those responsible for supervising them internally or externally, or simply concerned by these activities or results. [5].

### **5.3. Data Mining :**

According to the Gartner Group, 'Data mining is the process of discovering new significant correlations, characteristics and trends by sifting through large amounts of data stored in repositories, using pattern recognition technologies as well as statistical and mathematical techniques.' [ 6].

### **5.4. Text Mining :**

Text Mining is a set of methods, techniques and tools to exploit the unstructured documents that are written texts, such as word files, emails, powerpoint folders. To extract meaning from unstructured documents, text mining relies on linguistic analysis techniques. Text mining is used to classify documents, produce summaries of automatic synthesis or to assist business or technological intelligence according to predefined research tracks [7].

### **5.5. Olap :**

The term OLAP (On-Line Analytical Processing) refers to a class of technologies designed for data access and instant analysis, in order to meet the needs of reporting and analysis.

R. Kimball defines the concept of "OLAP" as "Global activity of querying and presenting textual and numerical data contained in the data warehouse, Specifically dimensional interrogation style"...[8].

### **5.6. Statistical analysis :**

Statistical analysis refers to a collection of methods used to process large amounts of data and general trend reporting. Statistical analysis is particularly useful when dealing with noisy data. Statistical analysis provides means of objectivity of information on how an unusual event is based on historical data [9].

### **5.7. Predictive :**

It is a methodological framework associated with analytical techniques to argue and justify the decision-making process of certain professions. From known elements, we determine models that allow us to anticipate future behaviors. Integrated into a business process, predictive analysis promotes informed decision-making. Predictive analysis is not a tool in itself, it is rather a practice that relies on statistical tools of course, but also data mining and correlation research and game theory [10].

### **5.8. Map-reduce :**

Map-reduce is a massively parallel programming model suitable for processing very large amounts of data. MapReduce is a Google Corp product. Programs adopting this model are automatically parallelized and run on clusters (clusters) of computers [11].

### **5.9. Hadoop :**

Hadoop is an open source project managed by Apache Software Foundation based on the principle Map Reduce and Google File System, two Google Corp products. The product is written in Java language. Hadoop can be considered a scalable data processing system for storing and batch processing very large amounts of data. It is perfectly suited for large storage and "ad hoc" type analyses on very large amounts of data [12].

## **6. Conclusion**

Business Intelligence systems have a crucial role in the success of a company. Their main objective is to provide employees with the knowledge of the tools and methods that enable them to make effective and timely decisions, with the aim of improving their performance and increasing competition.

# Chapter II

## Data Warehouse

## **Chapter II. Data Warehouse**

### **1. Introduction**

In this chapter we are going to learn about Data Warehouse how it comes, The structure of it, The elements of Data warehouse The global architecture of it.

### **2. Data Warehouse definition:**

Any company currently has large volumes of data, most often stored in different media (databases, paper documents,...) and needs a tool that enables efficient and efficient use of this data to help it make decisions. Data warehouses provide solutions to this problem.

A warehouse is defined by Bill Immon reference, considers as the father of the concept, in his book "Using the Data Warehouse", he gives the following definition, which refers to: "The Data Warehouse is a collection of integrated, subject-oriented, non-volatile, historized, summarized and available data for query and analysis" [FRA00], [EVO00].

It stores data necessary for decision-making; it is fed through data extractions relating to production databases (data sources) and daily data entry [EVO99].

### **3. Data in a Data Warehouse therefore meets the following characteristics**

#### **3.1. Integrated**

Warehouse data comes from different sources, possibly heterogeneous. Integration consists in solving the problems of heterogeneity of models, schemas, semantics.

#### **3.2. Subject oriented**

Warehouse data is organized around themes that have a major interest for the company, the purpose of this organization is to have all the useful information on a theme most often transversal to the functional and organizational structures of the company such as: The customer, The Product, Sales... This thematic orientation will allow the company to develop its decision-making system gradually, it is an iterative approach.

#### **3.3. Non-volatile**

The warehouse data are mainly used in consultation mode; they are very rarely modified, the non-volatility of the data is in a way a consequence of historization.

### 3.4. Sumarize

Information from data sources must be aggregated (or summarized) and reorganized to facilitate the decision-making process.

Available for query and analysis:

Users should be able to view re-organized warehouse data based on their access rights.

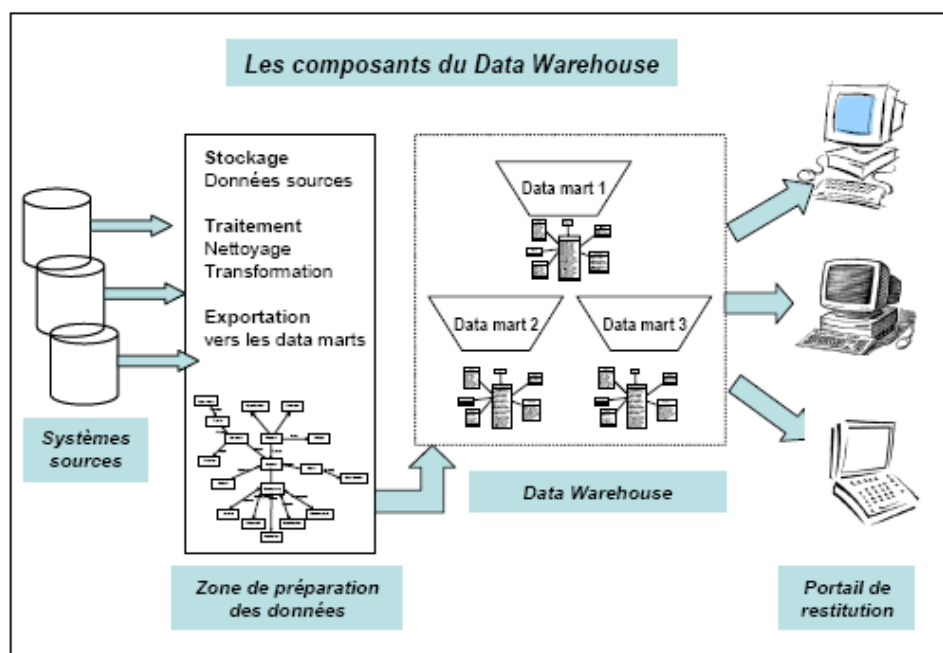
In addition, the data warehouse offers the company the following advantages [EVO00]:

- It is a collection of centralized data available for decision support (OLAP, datamining,...).
- The changes in the warehouse data are preserved (data historization). – It contains a consolidated data set (consistent and reliable data).
- It contains aggregated data for analysis at different levels of detail.
- It allows to develop different themes of analysis (reorganization according to the topics to be analyzed).

## 4. Architectural Components of a Data Warehouse:

The architecture of decision-making systems involves four essential elements:

data sources, data warehouse, data stores and analysis and query tools



**Figure 3.** Components of the Data Warehouse

- **The data sources:** are numerous, varied, distributed and autonomous. They can be internal (company production bases) or external (Data provided by partners such as: Suppliers, Customers, Public Administration, Legal Documentation) to the company.
- **The data warehouse:** is the place of centralized storage of useful information for decision makers. It pools data from different sources and keeps their evolutions.
- **Data stores:** are subject oriented warehouse extracts. The data are appropriately organized to enable rapid analysis for decision-making purposes, and mainly dedicated to a class of decision-makers.
- **Analysis tools:** allow to manipulate the data according to axes of analysis. The information is visualized through interactive and functional interfaces dedicated to decision-makers who are often not computer scientists (directors, department heads, etc.).

## 5. Data Warehouses and Data Stores:

It is important to distinguish between warehouses and stores [TEST00]:

The data warehouse is the place of centralized storage of a production database extract. This excerpt concerns the data relevant to the decision support. They are integrated and historized. The organization of data is done according to a model that facilitates the effective management of data and their historization.

The data store: Is an extract from the warehouse. The extracted data are adapted to a class of decision-makers or a particular use (correlation research, statistics software,...). The organization of data follows a specific model that facilitates decision-making.

## 6. OLAP (On-Line Analytical Processing):

### 6.1. Definition

R. Kimball defined the OLAP concept as “a global activity of querying and presenting textual and numerical data contained in the data warehouse; specifically dimensional interrogation and presentation style” [13].

OLAP is a technology created in 1993 by E. Codd, to meet the analysis and reporting needs of management applications. These relational databases were born from the On Line Transactionnal Processing (OLTP) model. Codd continued in the same direction by defining the OLAP model "On Line Analytical Processing" ... [14].

## 6.2. OLTP :

is the system used by DBMS. It has a transactional work mode. OLTP aims to be able to insert, modify, integrate quickly and by several users simultaneously, the data of the database. The versions of data processed are always the most recent.

### 6.2.1. The 12 OLAP Rules

OLAP is the term to describe the dimensional approach of decision support. Like OLTP, OLAP was proposed by E. F. Codd. This philosophy includes twelve criteria that represent the measurement standard for comparing decision support systems. To these 12 criteria, 6 were added in 1995. It should be noted that these six additional criteria are rarely cited and used.

- **Multidimensional view:** Allows to have a multidimensional view of the data.
- **Transparency of the OLAP server to different types of software:** The user should not be aware of the source of the data if it comes from heterogeneous sources; these sources can be an Excel file, a production database or even a text file.
- **Accessibility to many data sources:** OLAP is described as a middleware that sits between heterogeneous data sources and a front-end (in the form of a data warehouse). It must provide access to the data necessary for the analyses requested in order to present the user with a simple and consistent view. They also need to know what kind of systems the data comes from.
- **Reporting System Performance:** Performance should not be decreased when increasing the number of dimensions or database size, but should be proportional to the size of the responses returned.
- **Client/Server architecture:** It is essential that the product is in Client-Server but also that the server components of an OLAP product easily integrate its different clients.
- **Generic Dimensions:** Each dimension must be equivalent in relation to its structure and operational capabilities.
- **Dynamic management of hollow matrices:** The OLAP system automatically adjusts its physical schema to adapt to the type of model and the volume of data (the more space you have the more you can aggregate).
- **Multi-User Support:** OLAP tools must provide competitive access, integrity and security.

- **Calculations across dimensions:** Calculations must be possible across all dimensions (aggregates must be made in all dimensions).
- **Intuitive data manipulation:** Data manipulation is done directly through the cells of a spreadsheet, without resorting to menus or multiple actions. It must allow intuitive analysis in several dimensions in the end.
- **Flexibility and ease of reporting:** When creating reports, dimensions can be presented in any way.
- **Unlimited levels of aggregation and dimensions:** Unlimited dimensions and levels of aggregations... [15].

### 6.3. OLAP Architectures :

When creating an OLAP cube, it is necessary to decide how to store the automatic data as well as the aggregates (grouping).

Three versions of OLAP are currently competing. The MOLAP “multidimensional OLAP” architecture is based on a multidimensional database. ROLAP «Relational OLAP» represents their equivalent on a relational database and finally HOLAP «Hybrid OLAP».

### 6.4. OLAP Vs OLTP :

Before we can compare OLAP-previously defined-with OLTP, we need to talk even briefly about the latter.

OLTP is the system used by DBMS. It has a transactional workflow. OLTP aims to be able to insert, modify, integrate quickly and by several users simultaneously, the data of the database. The versions of data processed are always the most recent.

characteristics	OLTP	OLAP
Utilization	DBMS (Production)	Data storage
Typical operation	Update	Analyze
Access type	Reading/Writing	Teaching the lesson
Level of analysis	Elementary	Global
Amount of information exchanged	Weak	Important
Orientation	Line	Multidimensional
DB size	Low (max some GB)	Important (>TB)
Age of data	Recent	Historical

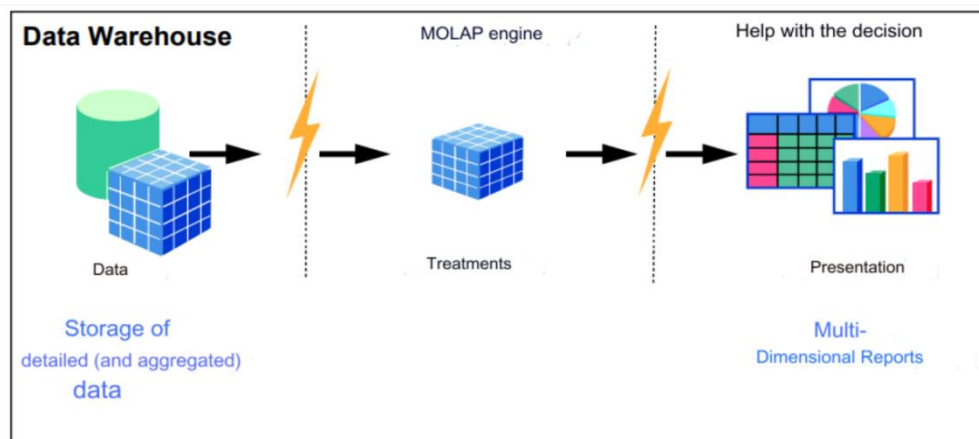
**Table 1.** OLTP Vs OLAP Comparison

### 6.5. MOLAP architecture «Multidimensional OLAP»:

Cube data and aggregations are stored in a multidimensional structure. Multidimensional OLAP storage (MOLAP) provides potential for the fastest response times, depending only on the percentage of aggregations and the cube aggregation model. In general, MOLAP storage is more suitable for cubes that are used frequently and require a quick response.

Advantages: fast, proprietary formats.

Disadvantage: does not support very large volumes of data.



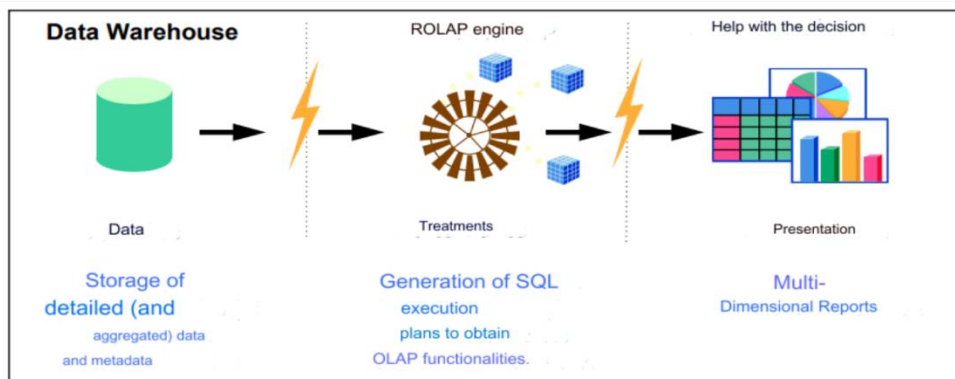
**Figure 4.** MOLAP Architecture

### 6.6. ROLAP architecture «Relational OLAP»:

Cube data and aggregations are stored in the existing warehouse. (Relational databases). The relational OLAP (ROLAP) response time to queries is generally longer than the other two options. The ROLAP storage mode is typically used for large datasets that are not frequently queried, including historical data for remote data.

Advantages: flexibility, easy evolution, allows to store large volumes.

Disadvantage: inefficient for complex calculations.



**Figure 5.** ROLAP diagram, [Nakache 1998]

### 6.7. HOLAP Architecture

The cube data is stored in the existing relational warehouse, and the aggregations in a multidimensional structure. For queries accessing summary data, OLAP Hybrid storage is similar to MOLAP storage. Queries that access master data, such as those that level down to a simple fact, must extract data from the relational database. The response time to these requests will not be as fast as if the master data had been stored in a MOLAP structure. The cubes stored in HOLAP mode are smaller than the MOLAP cubes and allow faster response than the ROLAP cubes to requests launched on synthesis data. The HOLAP storage mode is generally suitable for cubes that require quick responses to queries on summary data calculated from a large volume of basic data...[16].

## 7. Conclusion

In this chapter we have learnt that any decision-making information system relies on a Data Warehouse. The Data Warehouse is a database containing all the functional data of a company, its purpose and to provide the information necessary for decision-making.

However, data collection is only the first step in the process of setting up a decision-making system, how to transform and represent this data so that it is exploitable and visible to the decision-maker?

In the next chapter, we try to answer this question by introducing the concept of dimensional modeling.

# Chapter III

## Protection Civil

## **Chapter III. Protection Civil**

### **1. Introduction**

Civil protection is an organ responsible for the protection of persons and property. Accordingly, it is a State facility with regulations and laws that govern it. It controls the ways in which users operate, as well as rapid interventions, which remain one of the first priorities of critics and the protection of all those who are in real danger. The task is therefore limited to the third: Expectation, prevention, ambulance and this trend is driven by civil protection policy, by the composition of its users in various fields and by the achievement of modern technology to overcome the various difficulties that disasters can cause, whether natural or technological.

### **2. Formation and development of civil protection**

The history of the establishment of civil protection dates back to 1931, when the French physician George Saint-Paul established the Geneva Association of the Outskirts of Geneva and Paris was based. From this society, the International Organization for Civil Protection emerged. Dr. George Saint-Paul, referring to the civilian (Geneva) the birthplace of Henri Dunan, founder of Chapter II: Civil Protection Foundation (CPF) 50 Red Cross Movement aims to create neutral zones or open and safe cities, to which civilians can resort in the event of war and conflict. In 1935, the French Chamber of Deputies was promulgated by the Assembly. (Assembly of the Geneva Outskirts) resolution inviting the League of Nations to examine ways to support the establishment of sites in each State that are safe from military actions in time of conflict on the basis of conventions adopted by the League of Nations. The Assembly intervened with the belligerents during the Spanish Civil War that year, 1932 Also upon the outbreak of the Sino-Japanese conflict in 1937 and in one year, 1949 Diplomatic Conference held in Geneva issued a fourth convention after the first III on the protection of civilians in time of armed conflict. In 1958, the International Civil Protection Organization became a non-governmental organization, moving from an association to a non-governmental organization. In 1966, the organization's Constitution was adopted where the International Civil Protection Organization became an intergovernmental organization. This Constitution was ratified by 18 Member States. In March 1972, the Organization's Constitution entered into force and entered into force as one of the least Member States of the Organization.

### 3. Development of civil protection in Algeria

Algeria's Civil Protection has defined two basic stages:

**First:** Before Independence

**Second:** After the restoration of national sovereignty

#### 3.1. Civil protection in colonial time

During the occupation period, civil protection was a unit based in major cities where the highest proportion of centenarians were directed to defend their interests.

#### 3.2. Civil Protection Foundation Civil after Independence

After independence, civil protection has witnessed important developments at the organizational level, as well as in terms of means, equipment and users of intervention. In this period, we can distinguish 4 stages:

##### 3.2.1. The first Phase : (1962-1964)

On the day of independence Algeria had a civil protection interest consisting of:

- Central member at the level of the Ministry of the Interior and local communities.
- State-level fire-fighting ambulance centres

In practice, interventions were guaranteed by a variety of agents:

- Municipal officers.
- Permanent professional assistants.
- Professional Volunteer Assistants

It should also be noted here that the legal texts were derived mainly from French law in 1884 and because of the few possibilities available, the interventions of the ambulance and firefighting centres were concentrated only in the major cities, precipitating the need for reforms.

##### 3.2.2. The second phase

called the reform phase, was promulgated by Decree No. 129-64 of 1964/04/15, which is the main factor in several changes, the most important of which occurred:

The central interest is transformed into a national civil protection interest with good and important powers, particularly the right to review the status of municipal agents.

- In order to renew the transformation, the State has undertaken or commissioned training courses at the National School of Civil Protection for municipal officials.
- In addition to improving the theoretical information of the agents, this process allowed for a comprehensive overhaul of the aforementioned group of agents, which led to the emergence of two groups of agents professionals.
- Unstructured temporary

But this shift was only the beginning of a more profound series of shifts, as difficulties and ineffectiveness were mainly due to the problems in which it was floundering and hastened overall reform.

### **3.2.3. The third phase**

Is called the nationalization phase, which must ensure the security of persons and their revolutionary acquisitions. In accordance with the directives of the socialist system, the State decided to nationalize all civil protections in Avril, 1970. Since that date, the State has assumed the task of protecting persons and their property and has placed the interests of fighting the fire and the outbreak under one name: "Civil protection" has also strengthened the means of this interest and developed a comprehensive national organization in line with the country's economic and social establishments.

This new regulation has made interventions take place with significant effectiveness and organization with the possibility of movement of unit users as a supply to infected areas outside their area of intervention.

### **3.2.4. The fourth phase**

is called the reorganization phase in which the central administration of the Ministry of the Interior was reorganized in Feffrey 1976 giving civil protection new dimensions and tasks. In addition to classical tasks, civil protection has been assigned new and important tasks such as: The protection of airports, the protection of ports, the protection of socio-economic vehicles, as well as the absolute authority to monitor the application of measures to combat marine pollution.

For this new regulation, Decree No. 76 39 of /20 /02 1976 provides for the reorganization of the Central Administration of the Ministry of the Interior, thereby transforming the national interest of the General Directorate of Civil Protection.

### **3.3. Organization of the Directorate-General for Civil Protection:**

#### **3.3.1. Central level :** contains two directorates

- Directorate of Practical Activity: It consists of 03 sub-directorates:

- Sub-Directorate of Surveillance
- Users' Sub-Directorate
- Sub-Directorate of Studies and Programmes

In addition to having 04 cells of great importance:

- National School of Civil Protection.
- National Training and Recovery Unit.
- Central barn for gear.
- National Coordination Centre.

At the local (state) level has become the head of the Civil Protection and Ambulance Service of the state, the officer is considered as the Head of Interest and Technical Adviser of the Wali in the field of civil protection and the interest contains.

Operational installations, which are intervention units.

- Administrative establishments for the conduct of interest, namely:

#### **3.3.2. Materiel's office**

- Office of Mastery and Formation
- Technical Monitoring Office for Prevention and Anticipation

With the advent of the General Act on Public Office and the Special Act on Civil Protection Agents, Civil Protection Agents are performing their duties in a regulated framework characterized by paramilitary organization, uniform and rank, having their own training centres.

With regard to the whereabouts, framing and equipping of civil protection units, they are characterized by the dangers and demographic and economic importance of the area to be defended on the basis of Decree No. 167-70 of 1970/11/10, which provides for the application of the civil protection units' processing and framing:

- **Main Unit:** at the state level.
- **Secondary Unit:** at the circle level.
- **Sectore Unit:** at the municipal level.

### **3.3.3. Advanced centres:**

To combat a particular hazard, especially in areas with special hazards (industrial zones, beaches). For users and organized intervention agents to units, they are classified in such a way as to distribute their importance to the division, platoon, battalion, corps and corps

The fifth Phase: 1991/12/21 To date, the independence phase is called the organization of civil protection structures. This led to a qualitative change during the living phase in the light of Decree 39/79 of, 1976/02/20 To create a balance along the lines of public structures and interests that have known deep and successive reviews and this has led to structural functional inconsistencies and organizational where the important role of civil protection and its effects on economic and social life do not arise, leading to the reflection of a reorganization of civil protection that is in line with its overall objective.

## **4. The central administration of the Directorate General of Civil protection:**

The Central Administration of the Directorate General of Civil Protection was organized in accordance with Executive 3 Decree No. 91 503 of 21-12 1991.

- **At the practical level:**

The relations that prevailed between the Central Civil Protection Administration and local interests were difficult, with regard to the use of local means exclusively for the territory of the Wali, which led to a rethinking of its structure and establishment, in accordance with Executive Decree No. 43-92 of the /04 /02 1992, which included the establishment, organization and activity of the General Inspectorate of Civil Protection Interests.

- **At the administrative and technical management units for civil protection and aid interests of the states:**

He was walking by the regulatory texts specified in Decree No. -64 129 of -15-04 1964 concerning the administrative management of civil protection This reorganization at previous stages has not been concerned with the civil protection interests of those who have been overshadowed by the stalemate without carefully defining the functions and unified organization at the national level. In addition, the absence of a specific regulation of the functions and

organization of civil protection and ambulance interests of the communities has resulted in the organization of their structures under the sole local initiative, innovative in pluralism and heterogeneity of structures. Thus, civil protection and ambulance interests have found themselves marginalized, especially without any specific authority in the field of management of the means of interest.

This has led to reflection on this aspect by issuing Executive Decree No. 54-92 of the 2-12-02 1992 regulating the activity of the external interests of civil protection.

### **3. The definition of the Civil Protection Institution by Colonel Saad bin Oda Al-Radadi:**

As a set of actions and actions necessary to protect the population and public property from various hazards, disasters, fires and accidents, to provide relief to the affected, to ensure the safety of transport and communications, the functioning of public facilities and to ensure the sources of national wealth in peacetime and war situations

Brigadier-General Bhaig Bahlis defined it as humanitarian action imposed by an emergency, disaster or war crisis. It was also known as civil defence: one of the six civil defence systems known as civil defence, namely, political, military, social, economic and psychological defence, which is a set of actions, procedures, laws and instructions that bring peace and protect citizens from many dangers<sup>3</sup> such as the dangers of war and natural and industrial hazards.

The Algerian Directorate of Civil Protection is one of the directorates spread across the national territory, which provides many services and interventions to Algerian citizens and individuals, including the extinguishment of fires and the evacuation of injured and affected persons in various circumstances. A number of matters are being carried out by civil protection agents and individuals. (Civil Protection) and results of recruitment competitions for this sector.

In case of requesting urgent interventions such as traffic accidents, fires and other urgent matters, you can call the green number (14-1021) of the secondary unit located in the nearest area to which you relate what is known as the helpline number and assistance in case of necessity and emergency.

### **5. Importance of the Civil Protection Corporation**

Highlights the importance of civil protection in the provision of various assistance and first aid at the least possible time and the importance of civil protection has increased after wars 1 and 2, where humanity has been able to take the greatest priority measure in times of war and peace,

For these reasons, States have worked to create an effective organ and have worked to develop and expand it. The great men of history have felt the importance of civil protection and have confined themselves to it peacefully, including General Eisenhower, who stated in 1956: In every difficult circumstance we are surprised, our nation's survival depends on the path adopted by the Civil Defense to carry out its mission.

## **6. Civil protection functions :**

- **First aid:** First aid is considered immediate and temporary until specialized medical care is provided. In other words, possible assistance is provided as quickly as necessary to preserve the life of the person in an accident until his or her delivery to the nearest hospital. s rights ", medical aid or the criticism of spirits, by virtue of the fact that it has been established as part of the tasks entrusted to civil protection since the 1990s under the Executive Decree 96/97 contained 2 the Organic Law on Civil Protection Agents.
- **Awareness-raising campaigns:** whatever the effectiveness of any operational organ remains dependent on a work based on awareness-raising, information and mentoring that is directed throughout the year to the public as well as to the various interventions involved in emergency situations, among the prominent roles involved in the functions of the civil protection interests of the media The General Directorate of Civil Protection has initiated a number of large-scale actions aimed at addressing these concerns by promoting a culture of danger in society, By using all methods to enable them to achieve their objective to inform them of the dangers to them and the actions to which they must be valued in order to protect themselves and their friendship, and therefore the total Civil Protection Units are conducting campaigns " Wishes fires, beach guards, recreation, floods (especially the Sub-Directorate of Statistics and Information by organizing media operations or open doors and other symposiums, distributing leaflets, folders, posters and preparing crumbs with an inspirational slogan from the theme as well as a cultural and sporting event, particularly during the celebration of World Civil Protection Day.
- **Preservation of the environment:** Civil protection interests deal with all the consequences of wrongdoing and mention them (fires and natural disasters). Civil protection has therefore been evident from providing protection and self-protection

requirements in order to reduce the occurrence of accidents and mitigate their effects.  
Areas of civil protection action lie in the achievement of a safe environment:

Contribute to the transfer of environmentally friendly technology as well as the use of environmentally friendly materials.

Disagreement with the transfer of old technology harmful to the environment through the provision of modern multi-use equipment and mechanisms to reduce the cost and gases emitted by the mechanisms' movement. - Rehabilitation of tyres by informing them of all new environmental protection techniques

. - Participation in all environmental activities: seminars, workshops, conferences.

- **Guarantees of sporting events:** Civil protection interests are an effective tool in ensuring sports events of all sizes.
- **Evacuations from citizens by health or other means:** Civil protection teams intervene to transport the wounded and sick with various injuries: Victims of an explosion, victim of prolonged heat, victim of cold, victim of bite, sting, victim of an electrical accident, victim of poisoning, victim of asphyxiation, victim of suicide attempt, to other interventions under the jurisdiction of civil protection.

Civil protection functions are diverse and can be limited to two points: natural and man-made accidents.

- **Confronting natural hazards:** such as searches for missing persons, rescue and criticism of persons of religion threatened by death or difficulties at sea, in dams and valleys, as well as operations to carry out urgent maritime works (recovery of debris from ships, ships and other objects) and during summer monitoring of beaches and swimming.
- **Combating forest fires:** One of the first interests in which the legislature is concerned is the promulgation of Decree No. 129-64 of 15 March 1964 on the administrative organization of civil protection.
- **The role of civil protection in the prevention of earthquakes:** public awareness campaigns have been launched throughout the country, including in a state at risk of earthquake. The programme consists of open exhibitions on rescue equipment, guides on how to act in the event of a disaster during and after, and the distribution of leaflets and seminars on the subject.

- **The civil protection cycle in flood prevention:** natural and irreversible risks associated with daily life in many parts of the world.
- **Snow Rescue:** Civil Protection Spares Effort in Such Calamities
- **Well rescue:** Civil protection agents need to intervene to save every victim at risk.
- **Rescue in disturbed water pools.**
- **Man-made incidents:** civil protection interests also interfere with all human-induced and self-inflicted threats and property.
- **The role of civil protection during war:** All necessary means are used to identify threats to civilians and gather the following actions:

Public and local security measures - protection measures - ambulance measures. In order to ensure the success of its mission, Civil Protection works on the development of schemes that 3 define the objective to be achieved as well as the identification and prioritization of

- **Prevention of accidents:** this phenomenon, which worsens and increases by the day and affects all segments of society, creates victims each day, including (dead, wounded and disabled). The scale of accidents necessarily reflects the scale of civil protection interventions.

#### 6.1. Fire suppression of various types.

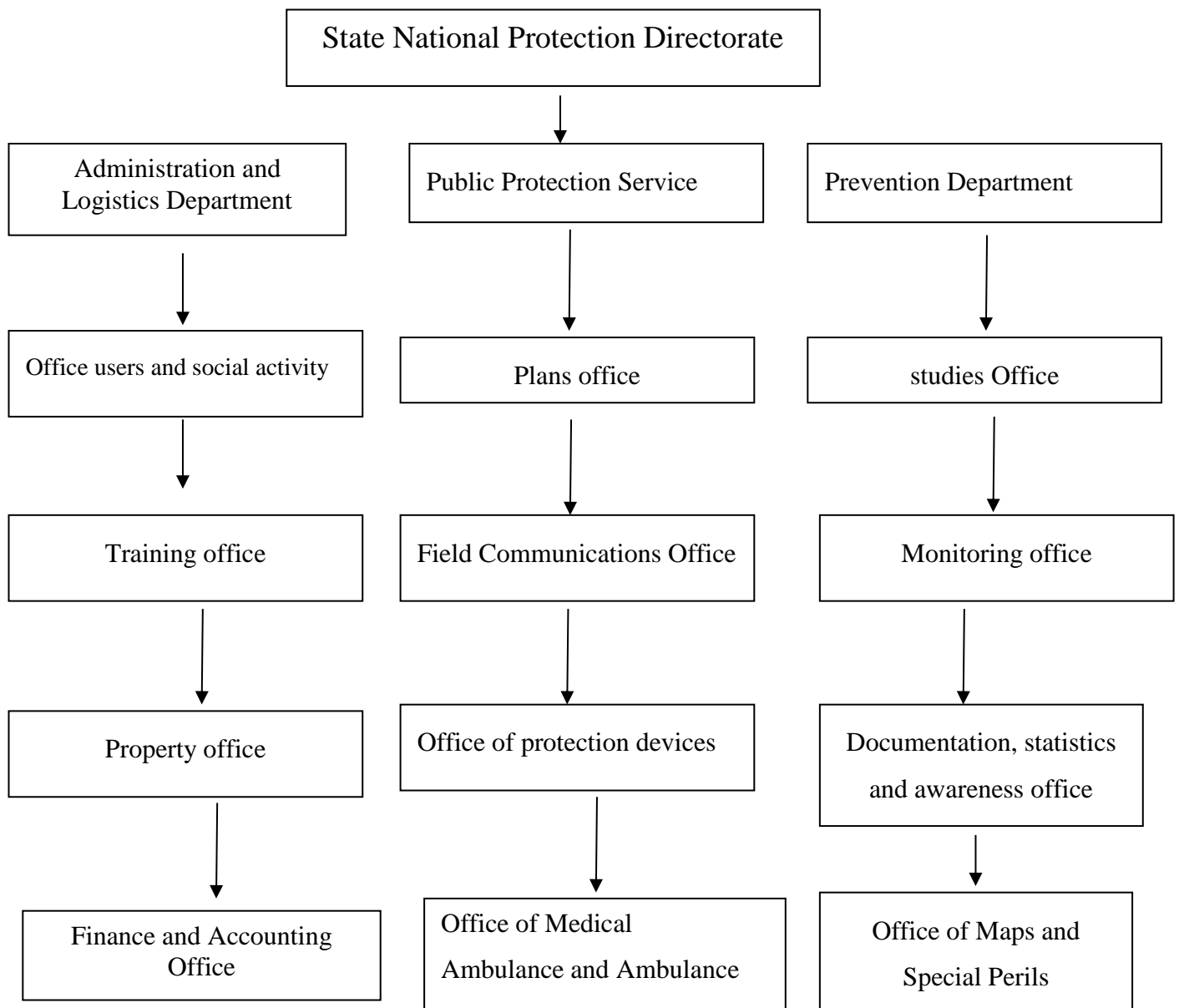
- **Rescue in elevators :** Elevators and their mechanical preferences are numerous and generally varied. Accidents occur because of people's erroneous operation and because of mechanical failure, resulting in the derailment of the elevator and engine failure.
- Consequently, agents are required to intervene in the event of hazards of this kind.
- **Rescue in aircraft and rail accidents:** Civil protection agents intervene according to the aid scheme, which is equipped, thoughtful and at the disposal of the guardian
- **Rescue under demolition:** Rescuing victims from under backfire is not an easy task, as the risk remains complete for the rescuer and the victim together with the potential for new collapses and the risk of electricity, gas and fire.

### 7. The local administration of civil

protection is defined by Executive Decree No. 54-92 of 12 February 1992, which divides and regulates the local administration into three interests:

- Management and Supply Service MSS
- Public Protection Interest PPI
- Prevention Service PS

**8. Organizational structure of the Civil Protection Directorate :**



**Table 2.** State National Protection Directorate

## **9. Conclusion**

Civil protection has been linked to the challenge facing societies and countries, the challenge of various disasters and events, which reached its peak at the beginning of the third millennium and in a way that has become a threat to the existence and economies of various countries. Therefore, it was necessary for civil protection, as an institution affiliated with the Ministry of the Interior, to have a greater role and to harness the necessary capabilities and means available to it in order to advance The dangers and disasters that threaten and afflict citizens, their property, states and their institutions.

# Chapter IV

## Data Warehouse Data Modeling

## Chapter IV. Data Warehouse Data Modeling

### 1. Introduction

In this chapter we are going to talk about Multidimensional modeling which was introduced by Ralph Kimball to meet decision-making needs and the requirements of relational DBMS (Database Management Systems). The dimensional model is the most widely used and most appropriate data structure for user queries and analyses.

### 2. Dimensional modeling and its concepts :

It should not be forgotten that the Data Warehouse is only one step in the implementation of a decision support system. Hence the need for a simple structure that allows for the visual representation of data for end users. This structure is the dimensional model. It involves representing data as points in a multidimensional space (cube). The data are viewed as subjects of analysis (facts) studied according to several axes (dimensions).

Dimensional modeling not only allows data to be presented in an intuitive standardized form but also enables highly efficient access. [17].

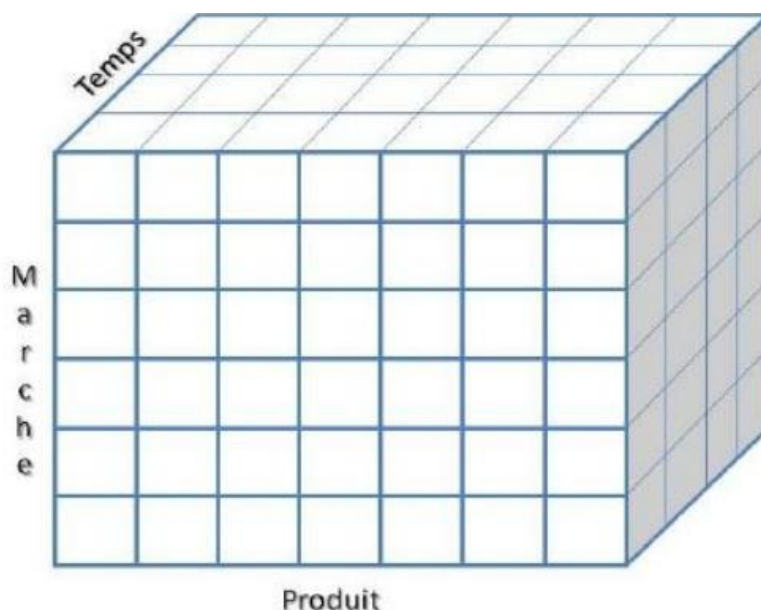


Figure 6. Consideration of an analysis subject as a cube with several.

### 3. Fact Tables and size tables

The multidimensional model consists of facts containing the measures to be analyzed and dimensions containing the analysis parameters.

### 3.1. Fact Table

The term “fact” represents an economic measure on the subject under discussion.

The fact table is used to store activity measurements. Each of these measurements is taken at the intersection of all dimensions. A line in a made table corresponds to a measurement.

These measurements are usually numerical, additive values.

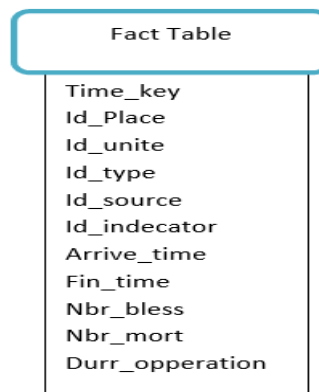


Figure 7. Example of a fact table. [Franco, 1997]

A table of facts provides several to several links between the dimensions. They include foreign keys, which are other than the primary keys of dimension tables.

### 3.2. Dimension Table

The dimension tables accompany a fact table and are used to record the textual descriptions of the dimensions of the activity.

It is made up of several column

which describe a row. It is the fact table that makes the data warehouse comprehensible and usable.

‘A dimension table establishes the human/warehouse interface, and includes a primary key [Kimball, 2002]

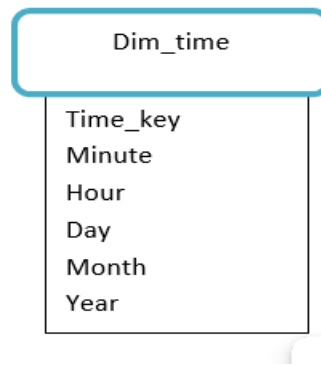


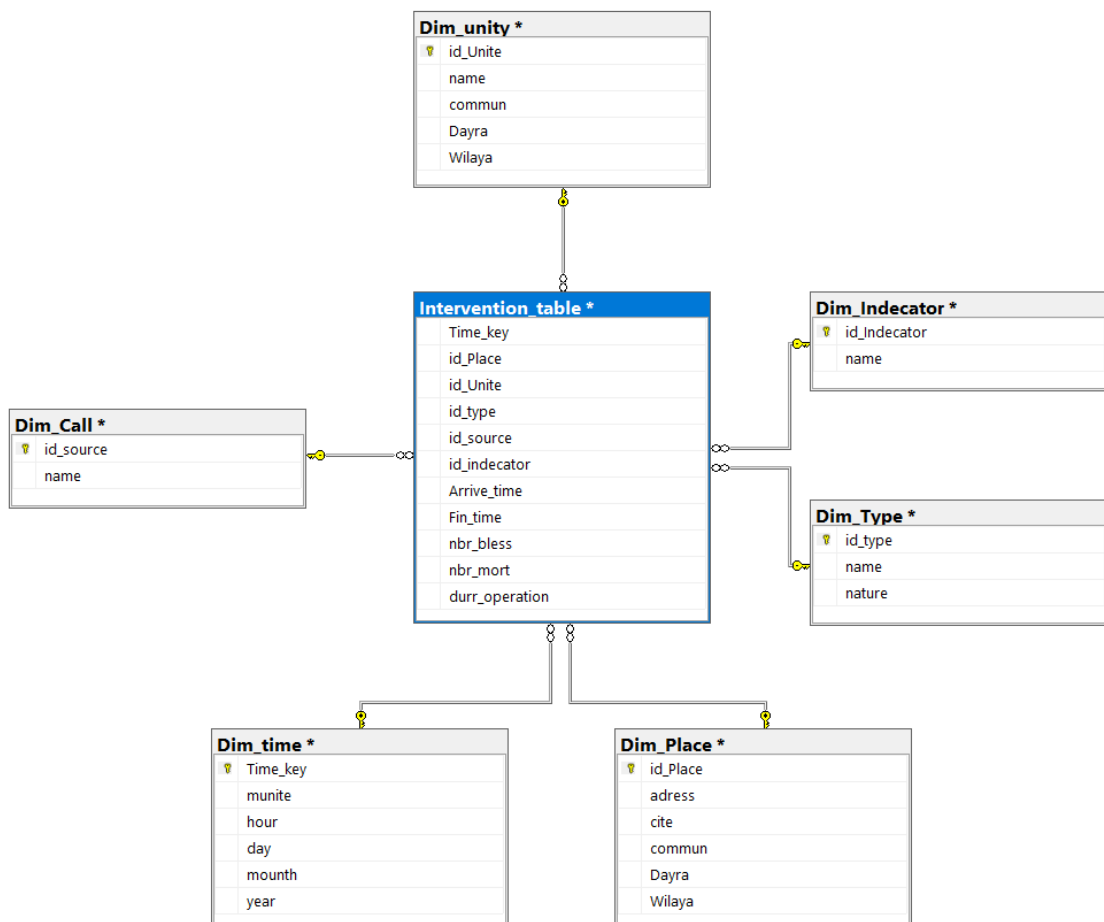
Figure 8. Example of a dimension table. [Franco, 1997]

#### 4. Different models of dimensional modelling :

##### 4.1. Star model :

Called the star model because the diagram that represents it looks like a star. It there is a large table (table made), dominating the others, in the centre of the diagram. This is the only table in the diagram with multiple joins linking it to the other tables (dimension tables).

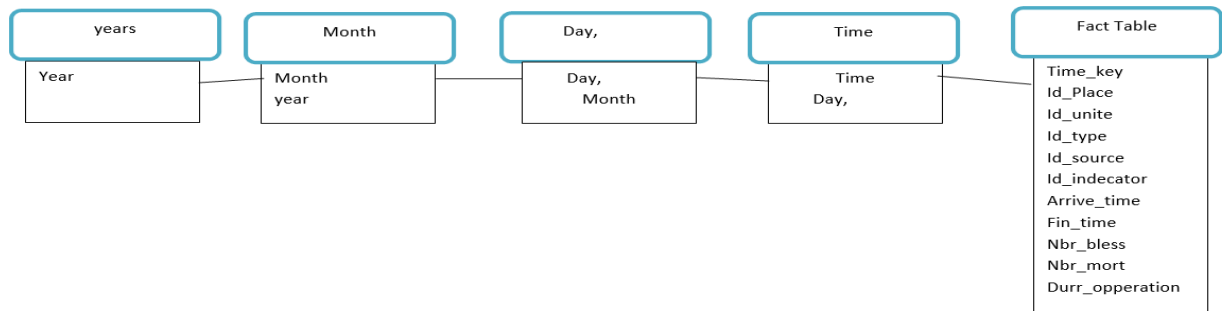
The other tables have a single join linking them to the fact table. This is the model for its readability and performance.



**Figure 9.** Example of a star schema. [Web4]

**4.2. Snowflake model :**

This scheme is just a variant of the star model. The difference is that each attribute is placed in a separate dimension table. Let's take the time dimension as an example:



**Figure 10.** Example of a flake diagram. [Franco, 1997]

**4.3. Constellation model :**

The constellation model is a set of star models linked together by common dimensions.

**4.4. The data cube :**

The multidimensional database is based on a hyper cube (n dimensions). The administrator defines the dimensions, which represent a way of sorting the information.

This modelling allows users to obtain the information they need without the help of a computer specialist.

they need. The user chooses two or three criteria to be displayed in the form of a table or cube. They can also rotate the axes of analysis to project the information from a different angle. For example, after examining sales by region, the user can swap the axes for a monthly view. This criterion is certainly the key criterion in the OLAP concept, as it reflects the dimensionality of the company as perceived by its members, who are none other than the users of the system. who are none other than the users of the system.

Example: The diagram below distinguishes between the dimensions: product, time and region.

The facts are the sale. For each combination of dimensions, we can access the numerical value associated with the sales fact.

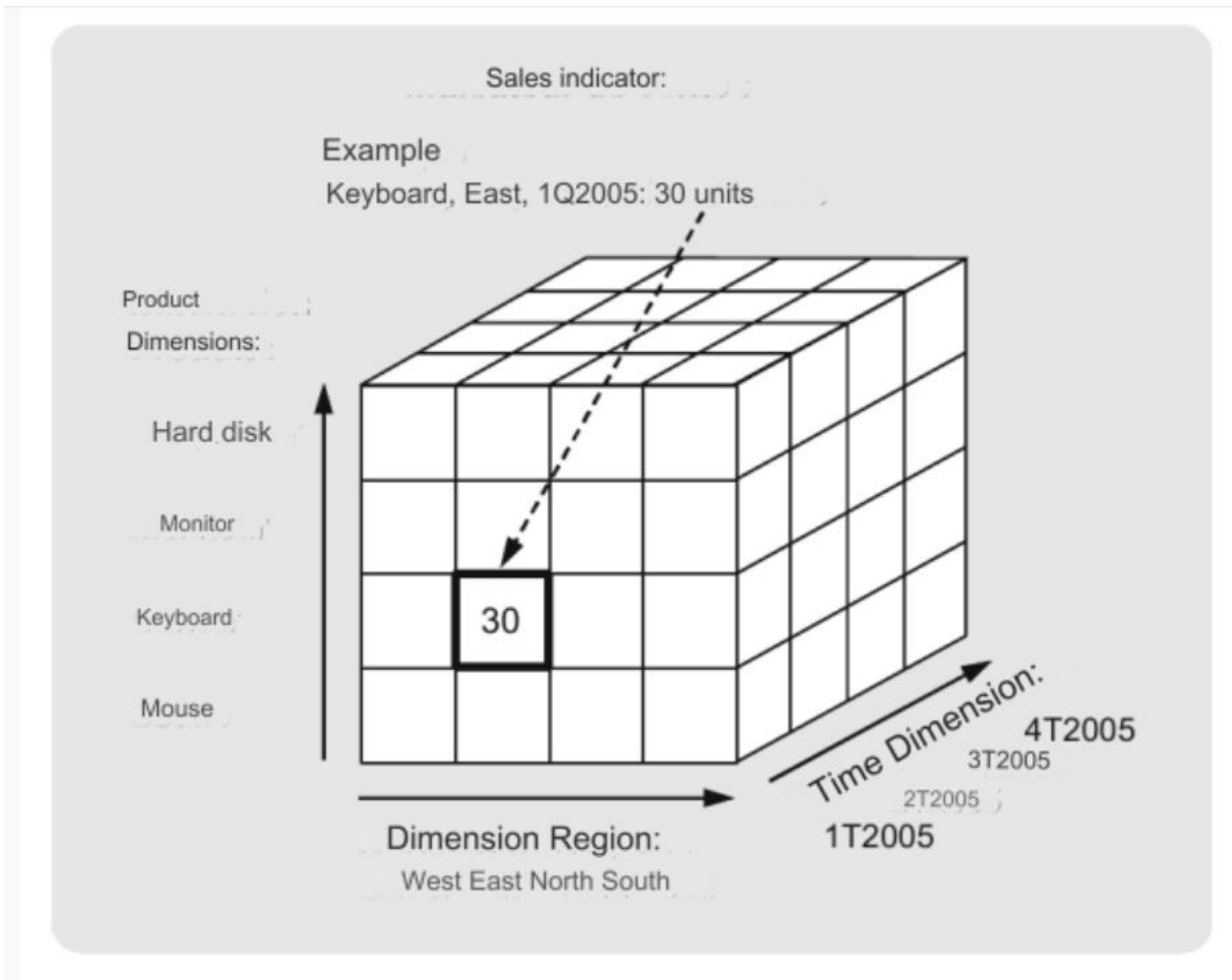


Figure 11. Example of a hyper-cube. [Web5]

## 5. Data navigation

Once the OLAP server has built or simulated the multidimensional cube, several operations are possible on the latter, thus offering the possibility of navigating Data Surfing. These operations address all data and allow the user to freely and intuitively navigate the model dimensional.

The operations are:

Set operations: Slicing & Dicing (extraction).

Granularity operations: Roll-up, Drill-down.

### 5.1. Slice & Dice Set Operations

- **Slicing** consists of making a selection of slices of the cube according to predicates and by a dimension “filter a dimension by a value”. [Chouder, 2007]

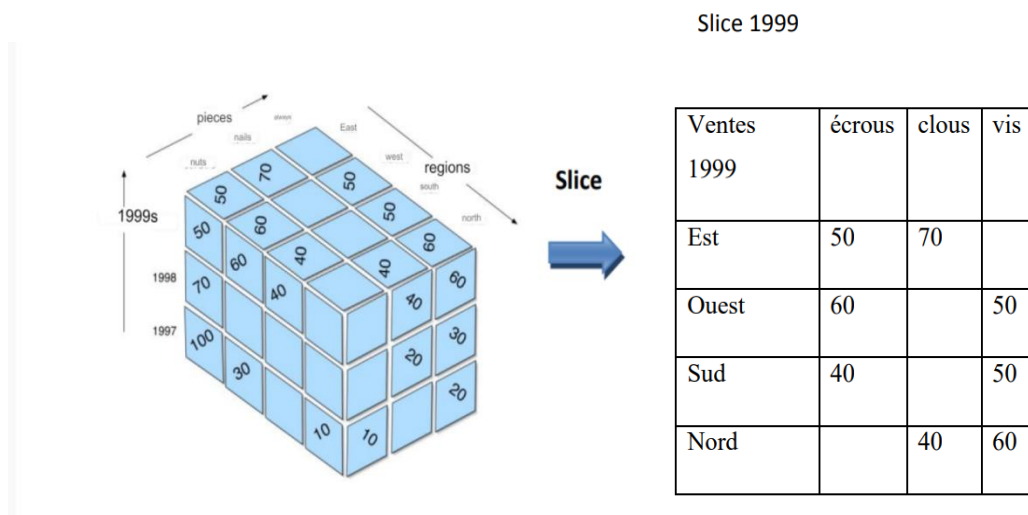


Figure 12. Slicing example. [Web7]

- **Dicing** can be seen as the extraction or selection of a sub-cube.

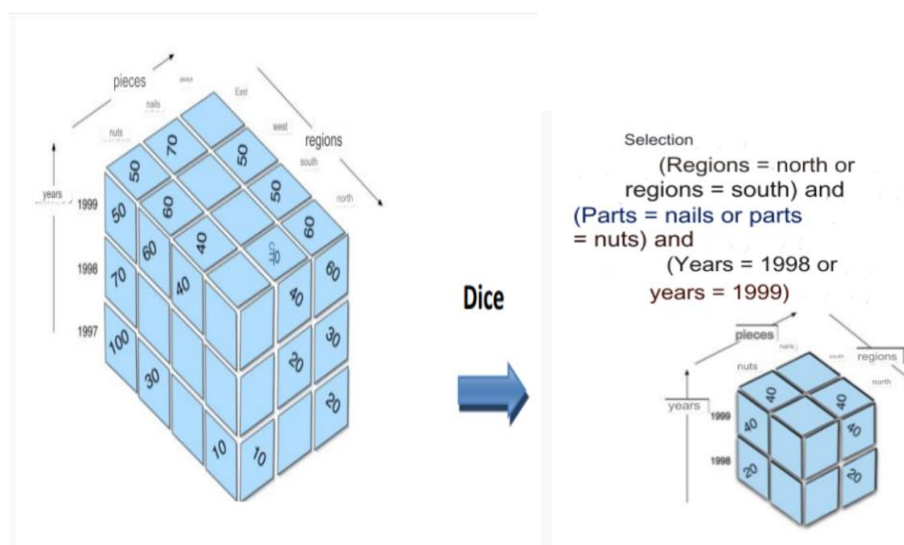


Figure 13. Dicing example. [Web7]

**5.2. Roll-up & Drill-down granularity operations :**

- **Roll-up** consists of representing the data in the cube at a higher level of granularity in accordance with the hierarchy defined for the dimension.

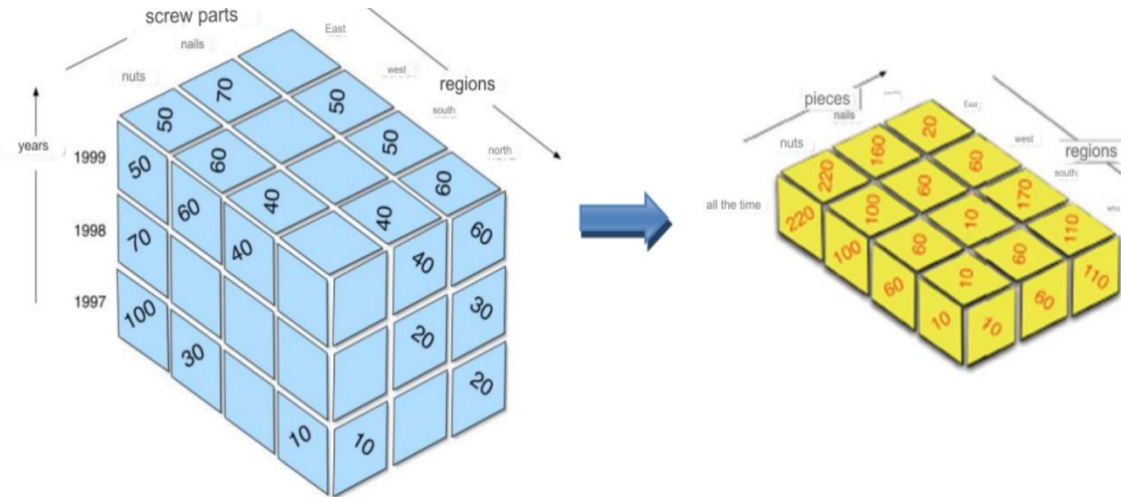


Figure 14. Example Roll-up. [Web7]

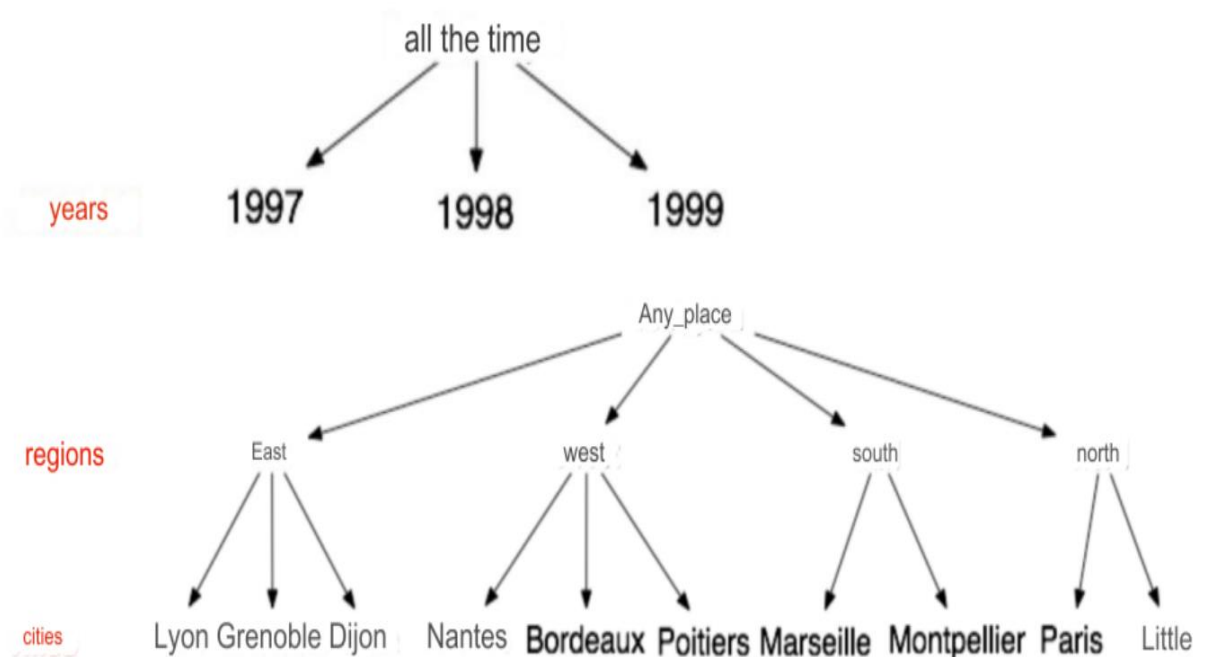


Figure 15. Example hierarchies defined on the dimensions of years and regions. [Web7]

**5.3. The Drill-down** involves representing the data in the cube at a lower level of granularity, thus in a more detailed form (according to the defined hierarchy of the dimension)

- **Top-Down** : It is the most burdensome, the most restrictive, and the most comprehensive method at the same time. It involves designing the entire warehouse (i.e., all the stars), and then implementing it. Imagine the work that such a method entails: knowing in advance all the dimensions and all the facts of the enterprise, and then realizing all of that... The only advantage of this method is that it offers a very clear and very conceptual view of the company's data as well as the work to be done.
- **Bottom-Up** : This is the opposite approach, it involves creating the stars one by one and then grouping them through intermediate levels until achieving a true pyramidal warehouse with an enterprise-wide view. The advantage of this method is that it is simple to implement (one star at a time); the disadvantage is the amount of integration work needed to obtain a data warehouse, as well as the possibility of redundancies between the stars (since they are created independently of each other).
- **Middle-Out** : This is the hybrid approach, recommended by BI professionals. It involves the complete design of the data warehouse (i.e., designing all dimensions, all facts, all relationships), then creating smaller, more manageable divisions and implementing them. This is equivalent to breaking down our design by common elements and realizing the segments one by one. This method takes the best from the previous two without the constraints. It should be noted that this method sometimes involves compromise in segmentation (duplicating identical dimensions for practical needs). [web8]

## 6. Technology used in this project

### 1.1 Talend open studio

Talend is a comprehensive collection of services and software solutions for managing data from multiple sources. Talend's data integration tools make it easy for businesses to quickly combine data from various sources, such as databases, flat files, online services and web API Management [7].



**Figure 16.** Talend Studio

### 1.2 Microsoft SQL Server Management

SSMS provides tools to configure, manage and administer instances of Microsoft SQL Server, and it brings together a range of graphical and visual design tools and rich script editors to simplify working with SQL Server. SSMS combined features come from Enterprise Manager, Query Analyzer and Analysis Manager, along with features included in previous releases of SQL Server. It supports most of SQL Server's administrative tasks and maintains a single, integrated environment for SQL Server Database Engine management and authoring [[19].



**Figure 17.** SQL server management

### 1.3 Sql server studio 2022

The Visual Studio IDE is a creative launching pad that you can use to edit, debug, and build code, and then publish an app. Over and above the standard editor and debugger that most IDEs provide, Visual Studio includes compilers, code completion tools, graphical designers, and many more features to enhance the software development process.



**Figure 18.** visual studio

#### 1.4 SQL Server Data Tools (SSDT) : (SQL sever )

SQL Server Data Tools (SSDT) is a set of development tooling for building SQL Server databases, Azure SQL databases, Analysis Services (AS) data models, Integration Services (IS) packages, and Reporting Services (RS) reports. With SSDT, you can design and deploy SQL objects with the same project concept as other application development tools. The SQL projects capability extends to CI/CD pipelines, enabling you to automate the build and deployment of your database projects with the SqlPackage CLI.

#### 1.5 Power pi

At its highest level, Power BI enables organizations to pull raw data from numerous cloud-based (SaaS) systems and transform it into actionable data using a powerful, interactive, and easy-to-use user interface (UI). In addition, the platform isolates what's essential to provide invaluable insights into the metrics individual users need.



Figure 19. Power BI

### 7. Feeding the Data Warehouse :

The data contained in a Data Warehouse comes from the various databases of the company.

These production databases, the company's operational systems, correspond to all the applications used daily in the company for its activities (production management, banking management, commercial management, etc.).

The information stored there, specific to each application, can sometimes be used by other programs through data transfers, commonly called interfaces. [20].

#### **Processus Extract-Transform-Load:**

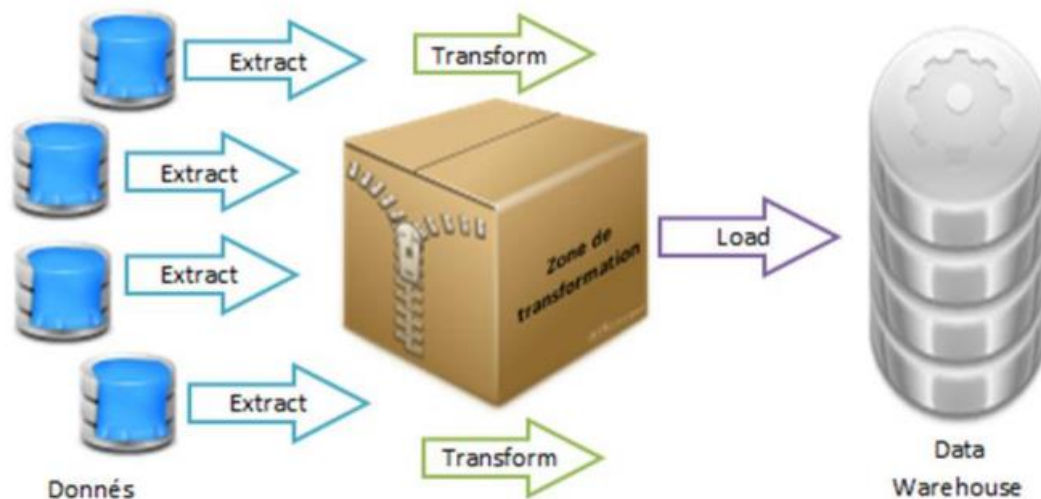
The data feed tool allows you to set management rules specific to the company and its sector of activity. These rules are also designed to ensure consistency between data and to store in the data warehouse only information that has been previously linked to each other.

#### **Definition:**

« Extract-Transform-Load » is known by the acronym ETL (or sometimes Datapumping).

It is a middleware technology used to synchronise massive amounts of information information from one database to another.

Depending on the context, the terms ‘feeding’, ‘extraction’, ‘transformation’, ‘constitution’ or ‘conversion’ are often used in combination. constitution’ or “conversion”, often combined.



**Figure 20.** The ETL feed system. [web9]

**The constructive phases of an ETL :**

**Extract :**

Data extraction is the first stage in ETL systems. The aim of this as its name suggests, is to read and extract data from the source system. It's easy to imagine that this stage is critical. If the source system has to operate continuously (24 hours a day, 7 days a week), the extraction process, a resource-intensive operation, must be carried out as quickly as possible and often during time (often referred to as the ‘extract window’), decided in collaboration with the teams responsible for managing and/or operating the source system.

The complexity of extraction lies not in the reading process, but above all in respecting the ‘extract window’. This constraint is the main reason for separating extraction and transformation.

On the other hand, we try as far as possible to extract only useful data (update or add after the

last extraction) and to do this we could agree with the source system manager to add either a flag or dates in each of the extracted tables, at least two dates: The creation date of the record in the table and the update date (in general, most source systems have these two dates). In addition, to avoid losing data as a result of extraction problems, it is important to ensure that the source system does not purge the data before the warehouse has extracted.

**Transform :**

Transformation is the most complex task and requires a great deal of thought to guarantee the reliability and quality of the data

Here are the main transformation functions:

- ✓ Data cleansing.
- ✓ Data standardisation.
- ✓ Data conformity.
- ✓ Fact table management.
- ✓ Dimension management.
- ✓ Assignment of surrogate keys.
- ✓ Management of slow evolution (Slow changing dimension).
- ✓ Late arriving fact management.
- ✓ Lookup management

**Load :**

Uploading transfers the data to its final destination. There are 3 possible depending on the architecture used.

Loading data into the data warehouse :

If the chosen policy has been to build a data warehouse with a database, then the data will be loaded into the warehouse. then the data will be loaded into the warehouse. This approach is similar to that Bill Inmon's approach. It will then be possible to use analytical functions, as Oracle allows.

Loading data into data cubes :

The data will be loaded directly into the data cubes without being stored

in a data warehouse.

This approach is certainly the closest to that of Ralph Kimball.

## 8. The hybrid mode:

This case is the one that offers the most benefits but requires more effort.

The data is loaded on both the Data Warehouse and the Datamarts:

- ✓ A first load of data into a data warehouse.
- ✓ A second load in data cubes

## 9. The deployment and implementation:

- **Ad hoc request:**

- Now widely used in active data warehouses, ad hoc queries accelerate the recovery of vital information to respond to interactive queries in a mission-critical application.
- Access to this kind of service can be done through different methods and tools. However, specialists recommend that users be given the opportunity to choose the tools **that they think are most appropriate.**

- **Reporting:**

- Le terme de « Reporting » désigne une famille d'outils de Business intelligence
- destinés à assurer la réalisation, la publication et la diffusion de rapports selon un format
- prédéterminé. Ils sont essentiellement destinés à faciliter la communication de résultats
- chiffrés ou d'un suivi d'avancement. [web10]

- **Dimensional analysis of data:**

- Dimensional analysis is undoubtedly the one that best exploits and highlights the capabilities of the data warehouse. The purpose of dimensional analysis is to offer users the possibility to analyze data according to different criteria in order to confirm a trend or monitor the company's performance.
- This analysis is done according to the OLAP principle, thus offering users the possibility of using different operations to facilitate navigation in the data. The implementation of these tools is a very interesting option since the data will be accessible in instant

analyses. Several OLAP solution providers exist on the market and offer solutions built on different methods and technologies.

- This is also why the choice of the solution must be made beforehand, according to the
- use requirements, warehouse size and technical means available.
- **Dashboard:**
- The dashboard is a small set of indicators, designed to allow managers to be aware of the state
- and evolution of the systems they manage and to identify trends that will influence them over a
- horizon consistent with the nature of their functions. [Book, 2003]
- It is a steering tool that highlights the state of progress in which the process is located in order to
- allow the manager to implement corrective actions.

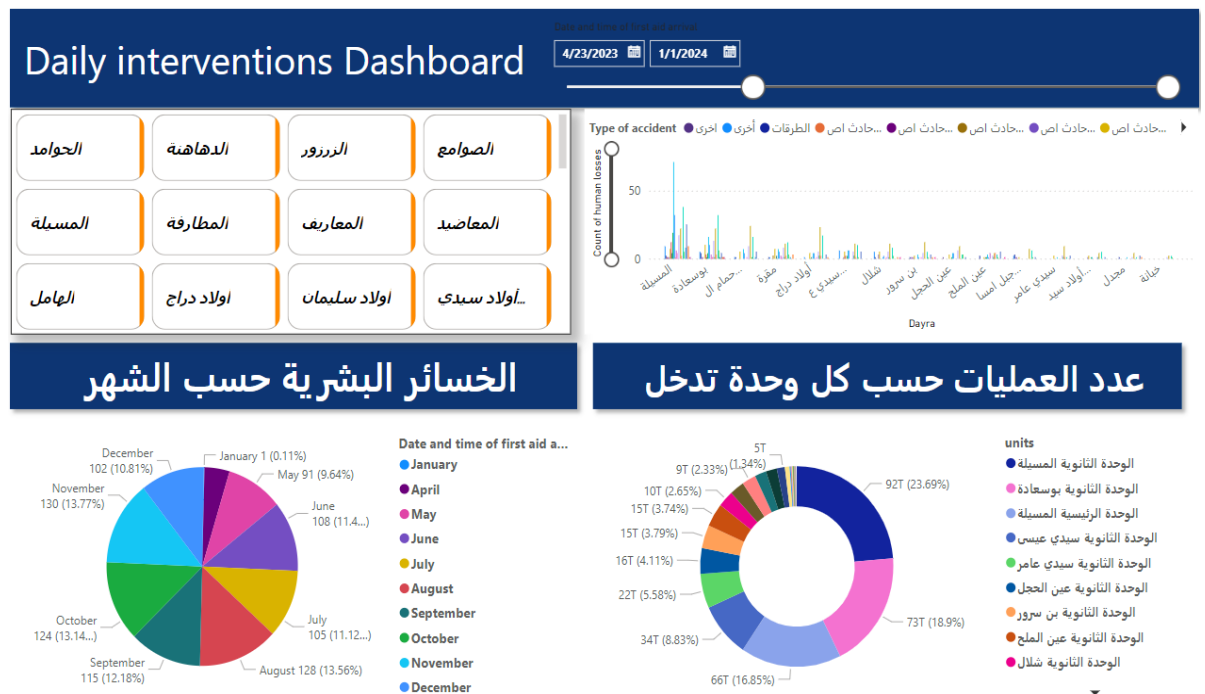


Figure 21: Example for dashboard (power Bi)

- **Maintenance and growth :**

- The evolution of the Data Warehouse schema requires constant monitoring, given the need to
- optimise performance or expand. It is therefore necessary to invest in the following areas.
- **User support :**
- It provides first-level assistance to users in the use of Data Warehouse for the resolution and correction of problems encountered.
- **Training :**
- It is essential to offer a training program to Data Warehouse users.
- **Technical support :**The technical support monitors with the greatest vigilance the performances and the trends in system load.
- **Evolution management:** Always ensure that the implementation meets the needs of the company. Systematic reviews at certain checkpoints are a key tool for identifying and defining opportunities for improvement. In addition to monitoring and maintaining the Data Warehouse, the requests for expansion are possible for new needs, data or improvements  
The participating dimensions: We will mention the different dimensions describing the fact, which will allow us to fully understand the process

## 10. Conclusion

The dimensional model is the most used and most appropriate data structure for queries and analyses by data warehouse users. They are easy to create, stable, and intuitively understandable by end users. The dimensional model is the very foundation for constructing OLAP cubes. After discussing the logical design of the Data Warehouse in this chapter, we now need to talk about its physical design and construction steps.



# General Conclusion

## **Conclusion**

Good information, for good people, at the right time, and in order to obtain real decision support from the available data, we created the Algerian Civil Protection Data Warehouse for the M'Sila Province.

The decision on this project has become a necessity, given the increasing number of recurring accidents and deaths in the state of M'sila

The approach we have adopted to implement this project is one that combines two approaches, Kimball's "data sources" approach and Inmon's "analysis needs" approach.

Combining these two approaches in our approach allowed us to meet the needs of the users, while exploiting the data from the source system in the best possible way, in order to identify unspoken needs. To meet users' needs, it is clearly necessary to know and reveal their needs. In this endeavour, interviews were the main collection tool, supplemented by questionnaires, observations and case studies, in order to compensate for the lack of information after the interview, or to replace the interviews, which, due to the interviewee's professional limitations, could not happen. This group concluded by highlighting daily interventions. After that, we started our design by modeling the storage area or staging area, where we followed the principles of dimensional modeling,

To provide clarity of vision, as well as easy and intuitive understanding, a three-star chart has been designed for the topic.

Once the dimensional models were designed, we moved to feeding the staging area, which is the most time-consuming phase of the project, as we had to create many maps to extract, transform and load the data, through certified professional tools.

Just like the staging area feed, our Datamars cubes and dimensions are loaded using professional tools. With the cubes loaded and ready to be queried, we can deploy our solution, and users can exploit data from the data warehouse, stored in the BI Server, via any thin client, using a simple web browser. With BI platform integration, users have the ability to distribute and manage documents and reports generated using reporting and data navigation tools. This platform also manages the roles and privileges of each user. Thanks to the network already in place, all Algerian Civil Protection branches will have access to the BI server.

With the implementation of this solution, we were able to centralize the data necessary for decision-making for faster and simpler access. The time for creating intervention reports was previously calculated in days, and sometimes exceeds 15 days. It is now calculated in minutes.

Daily Nutrition Policy The data warehouse that we created ensures the presence of information for potential decision-making.

Since an IT project is never complete, we can mention the following perspectives and developments:

- Monitor the current deployment and collect user comments in order to make the necessary corrections.
- Coordination with security and health services to obtain more data so that the decision becomes more accurate
- Using data mining methods and algorithms to improve the use of data.

Before concluding, we would like to say that this training was really useful for us, as we were able to apply some of our theoretical knowledge acquired during our university studies. All of this allowed us to gain a lot of experience, which will probably be very useful to us later, whether in the field of business intelligence or in Any other field.

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# ABSTRACT

## Abstract

we created a data warehouse for the M'Sila Civil Protection. Which helps decision makers make the best decisions in the present and future through the daily, monthly and annual reports provided by the control panel, by exploiting the available data and using our prior knowledge to create this project.

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## الملخص:

قمنا بإنشاء مستودع بيانات للحماية المدنية لولاية المسيلة . و الذي يساعد متخذي القرار بإتخاذ أفضل القرارات في الحاضر و المستقبل بواسطة التقارير اليومية و الشهرية و السنوية التي توفرها لوحة التحكم ، و ذلك من خلال إستغلال البيانات المتوفرة و استخدام معرفتنا المسبقة لإنشاء هذا المشروع .

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## Résumé:

nous avons créé un entrepôt de données pour la Protection Civile de M'Sila. Ce qui aide les décideurs à prendre les meilleures décisions dans le présent et le futur grâce aux rapports quotidiens, mensuels et annuels fournis par le panneau de contrôle, en exploitant les données disponibles et en utilisant nos connaissances préalables pour créer ce projet.