Djilali Boonaama University Khemis-Miliana

Faculty of Matter Sciences and Computer Science-DBKM

Computer Science Department

Matter: Information Systems (IS)

Chapter 4: *IS development methodology (MERISE)*

Level Students:2nd year bachlor's degree in Computer Science

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IS development process

The IS development process is a structured set of activities that aim to achieve the objectives of an IS project set by the organization. These activities vary depending on the type of organization, the type of project and the type of system to be developed. This process must be clearly described in order to be managed correctly.

2. Software life cycle

The life cycle of an IS describes the phases through which an information system passes from the initial need to the retirement of the system.

3. IS development activities

The development of an IS involves several activities which vary depending on the type of project and the organization, the essentials of which are:

- **Specification** system requirements and constraints, establishment of specifications. • تحديد متطلبات النظام وقيوده، ووضع المواصفات.
- **Design** of the solution, production of a model of the system to be developed تصميم الحل، إنتاج نموذج للنظام المراد تطويره
- **Implementation** of the system: programming this activity، تنفيذ النظام.
- **Test** of the system, verification of the adequacy between the implemented properties of the system and the specification of requirements.

اختبار النظام، والتحقق من مدى ملاءمة الخصائص المطبقة في النظام مع مواصفات المتطلبات.

- **Facility** of the system at the customer and verification of its operation. تثبيت النظام لدى الزبون والتحقق من سلامة تشغيله .
- **Maintenance** of the system, repair of faults

4. IS development models

There are different models used in the creation of software. These models aim to apply the development activities cited above with a certain organization between these activities.

Among the best-known models, we cite: the Waterfall model, the V model, the spiral model and the incremental model. The application of these models can involve the use of an analysis and design method. Each method has its advantages and disadvantages and each method is adapted to a type of project (industrial, management, scientific, etc.). Among the existing methods we cite:

MERISE, SADT, SART, OMT and UML (although UML is not a method but a unified modeling language)

4. IS development models (Method families)

A. *Old analytical or Cartesian methods* (**Corig , RSA ,** etc.): they allow us to describe an existing system rather than criticize it or design a new system. Some of these methods specify a development process, but neglect the meaning of the information. In the field of management, most analytical methods are no longer used;

الأساليب التحليلية أو الديكارتية القديمة (مثل Corig وRSA وما إلى ذلك): تسمح لنا هذه الأساليب **بوصف نظام قائم بدلاً من انتقاده أو تصميم نظام جديد**. تحدد بعض هذه الأساليب عملية التطوير، لكنها تهمل معنى المعلومات. في مجال الإدارة، لم تعد معظم الأساليب التحليلية مستخدمة.

4. IS development models (Method families)

B. ***Systemic methods'*** (**MERISE, Rémora** , . . .): they consider the company as a system in its own right. As in any system, three subsystems are distinguished: the *Decision system*, the *Information System* and the *Operating System*. In addition, these methods are characterized by the description of the relationships between information, a modelling of the relevant domain of the company, a circulation of information corresponding to the decision pyramid and an abstraction cycle going from the most general to the most precise.

تنظر هذه المنهجيات إلى الشركة كنظام قائم بذاته. وكما هو الحال في أي نظام، يتم تمييز ثلاثة أنظمة فرعية: نظام الإدارة ،ونظام المعلومات، ونظام التشغيل. بالإضافة إلى ذلك، تتميز هذه المنهجيات بوصف العلاقات بين المعلومات

4. IS development models (Method families)

C. ***Object-oriented methods*** (**OMT, GradyBooch , UML** , . . .): the object approach is less intuitive than the functional approach. Unlike classical techniques that focus on decomposing a computer science problem into a hierarchy of atomic functions and data, the object approach focuses mainly on *identifying the objects of the application domain and their interactions*. The term "object oriented" means that the system is organized as a collection of associated objects *with both* a data structure and a behavior.

يركز منهج الكائنات بشكل أساسي على تحديد كائنات نطاق التطبيق وتفاعلاتها. يشير مصطلح "موجه للكائنات" إلى أن النظام مُنظم كمجموعة من الكائنات المترابطة التي تمتلك بنية بيانات وسلوكًا محددًا.

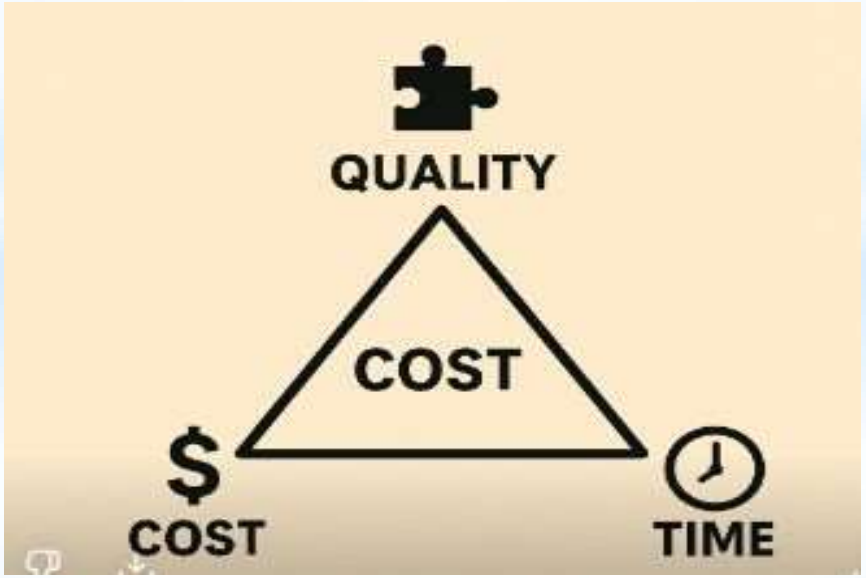
MERISE


M Méthode
E d'Étude
R et de Réalisation
I Informatique
S des Systèmes
E d'Entreprise

5. The MERISE method

Méthode d'Étude et de Réalisation Informatique pour les Systèmes d'Entreprise

Merise is a *systemic method* which appeared in 1979 as a result of a project launched in 1977 by the French Ministry of Industry whose aim was to provide companies with a design method which would enable them to succeed in their IT projects in expected costs and deadlines.



5.1. Characteristics of Merise

The major advantages of Merise are:

1. A global IS approach carried out in parallel on **data** and **processing (treatments)**.

2. A description of the IS using a simple and rigorous formalism standardized by ISO for the presentation of data (*Entity Association Model*).

3. Separation of Data and Treatements.

Abstraction levels of MERISE

5.2.1. Conceptual level

The conceptual level aims to answer the question **WHAT?ماذا** That is, **what to do? with what data? ماذا أفعل؟ وبأي بيانات؟** without taking into account the organization of work and the equipment used. The two model results of this level are:

- **The Conceptual Data Model (CDM)**
- **The Conceptual Treatment Model (CTM).**

Abstraction levels of MERISE

5.2.2. Organizational level

The organizational level aims to answer the questions **WHO? من** **WHERE?أين** and **WHEN? متى**At this level, we integrate the organizational criteria of the work. We take into account (or propose) the distribution of processing between *man* and *machine (Who?)*, the mode of operation (when?) (real time, deferred time). The resulting models from this level are:

- **The Logical Data Model (LDM)**
  - **The Organizational Treatment Model (OTM)**

Abstraction levels of MERISE

5.2.3. Operational (physical or Technical) level

It aims to fix the results of technical decisions taken according to technical objectives and constraints. It consists of answering the question **HOW? كيف**

We study technical solutions (storage mode for data, division of programs for treatement. The resulting models at this level are:

- **The Physical Data Model (PDM).**
- **The Physical Treatments Model (PTM).**

Abstraction levels of MERISE

The abstraction levels with their resulting models are summarized in the following table:

LEVEL	DATA	TREATMENTS
Conceptual *Management choice: What?*	Conceptual Data Model (CDM)	Conceptual Model of Treatments (CTM)
Organizational *Organizational choice: Who? Where? When?*	Logical Data Model (LDM)	Organizational Model of Treatments (OMT)
Physical *Technical choices: How?*	Physical Data Model (PDM)	Physical Model of Treatments (PMT)

5.3. Breakdown into stages

MERISE recommends dividing the project into four stages. This division is not specific to the Merise method, but it is generally recommended for carrying out any IT project. Each of the steps corresponds to a level of abstraction

There are five of these steps:

1) Preliminary study / master plan

2) Detailed study

3) Realization

4) Implementation

5) Maintenance

Conceptual level

The Conceptual Data Model (CDM)

Data Dictionary (DD)

The DD represents all the *properties* appearing on the documents used by the different workstations in our *field (domain) of study*. The model used in establishing a DD can be as follows:

Coded	Meaning	Type	Length	Syntactic rules	Semantic rules
Name	Student Name	A	20		
Pre	Student first name	A	20		
Date_N	Date of birth	D	10	DD/MM/YYYY	
Avg_	Student Average	N	5	XX,XX	$0 \leq Avg \leq 20$
.....					

Data Dictionary purification

1. After establishing the dictionary, it must be purified by eliminating synonyms and polysemes.

Synonyms: Different names designate the same reality.

Ex: - Order_Num and Order_Ref.
Agent and employee.

Polysemes: The same name designates 2 or more distinct realities.

Ex: - Num : to designate the customer number and the order number

Data Dictionary purification

Calculated Value: it must be purified by eliminating theses values

EX: Avg_Std=(((TD+TP)/2)*0.4)+EXAM*0.6

In this exemple the calculated value is Avg_Std deleted from DD

Concatenated value: it must be purified by eliminating theses values

EX: Adress is composed

 Adress deleted and replaced with its components.

Detailed study

7.1. Conceptual Level

7.1.1. Data: CDM (Conceptual Data Model)

The objective of the MCD ("Conceptual Data Model") is to provide a static representation in schematic form of the data related to the management domain concerned. This model is based around the following concepts:

A. Property (Attribute)

This is a basic piece of information that characterizes an entity or an association.

It is a representation in an information system of a material or immaterial object with its own independent existence. The entity is diagrammed as follows: