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USING SYSTEM MODELING AND SPECIFICATION METHODS

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Abstract: After presentation of MERISE method as a general-purpose modeling methodology for developing information systems, we propose a specification approach based on the OOPP method (Oriented Objective Project Planning) and Merise enabling a description of a system. In fact, a cooperative approach of two methods has been proposed and a case study of a cereal storage system has been presented. This cooperative approach has been presented in this work according to a methodology integrating the two methods OOPP and Merise that can complete them and that lead to the global resolution of a problem of management of activities of grain silos.
Keywords: Information System, MERISE, OOPP specification methods, grain silos

INTRODUCTION

Performances of a production structure as complex either it especially depends on the performance of its system of information. This is how the development of an information system of an enterprise and the efficiency of its exploitability is an important operation. It enables to adapt constraints of measure and collection of information to those of treatment and exploitation. The modeling of such information system enables us to dispose of a tool of analysis and help to the decision making.

Various methods and techniques have been exploited in a context of upgrading particularly the systemic OOPP method (Oriented Objective Project Planning), that has been spread and applied in various case (Project of upgrading of a grain silo, analysis of financial activities, analysis of the cereal grading system…) [1, 3]. This method has been used in order to contribute to the deployment and development of a system of information of various industrial enterprises. This activity requires using modern tools enabling to fear problems concerned by the enterprise.

We exploited the OOPP and SADT methods (Structured Analysis Design Technique) [4, 5] to express needs (not necessarily computer), to land the functional aspect of a load notebook, to communicate between a team's different members, and no as methods of functional analysis of software, because the gotten results depend more the analyst's expertise than of the rigor of the method.

The object of this paper is to present a specification approach based on the application of the method MERISE for the modeling of the information system in a context of cooperation with OOPP method.

DEVELOPMENT OF A MERISE MODEL

In order to manage a complex process as the cereal storage process, it is useful to model it taking in account of its behavior as well as rules of its conduct.

The achieved model will enables us to put in evidence dysfunctions of the system notably the aspects of the distribution of cereals in the one hand, and to make simulations of new scripts of optimization and organization, in the other hand.

If we consider the complexity of the system and the different aspects according to which we want to model, it is necessary to make a simplification of this last while defining for each of its constituent the degree of detail to not to pass.

MERISE [6, 7] has been applied in order to elaborate a model of representation of the process of cereal storage. This computer method is more complex than SADT [8, 9]. MERISE integrates the different levels of abstraction (Figure 1).

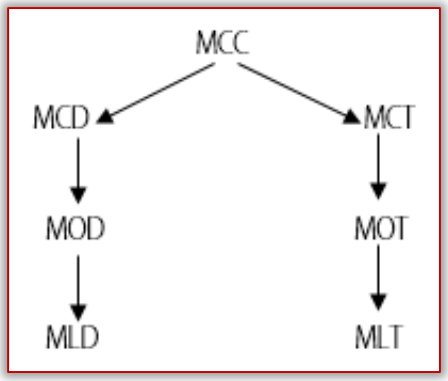

Figure 1. The abstraction cycle of MERISE

Conceptual Model of Communication (MCC) is the investigation of the current environment, which ultimately allows the realization of Conceptual Data Model (MCD) and the Conceptual Model of Treatments (MCT).

MCD is a model that represents the structure of the information, from the point of view of the data. This looks closely at the relationships between various key points like the relationship between clients, products, orders...

MCT is a model that represents the different treatments and responses to specific actions.

The Logical Model of Data (MLD) contains the contents of the MCD but specifies the structure and organization more clearly so it can be implemented.

Logical Model of Treatments (MLT) which specifies the parts and means to be implemented. It is in this part where each role is put into place.

The vocation of MERISE is double: on the one hand MERISE represents a method of conception of the information system of enterprises and on the other hand MERISE proposes a methodological gait of development of information system [10].

MOTIVATION OF COOPERATION APPROACH

Of the fact of its character structured and participative, we consider the OOPP method extensively evolutionary and adaptive (Figure 2). This is why our research team invested itself in view to develop some convivial and functional tools for the extended OOPP method, definite under the denomination MISDIP (Method Integrated of Specification, Development and Implantation of Project) [11, 12]. This new method, under development and normalization, present today a limit as for its environment of utilization.

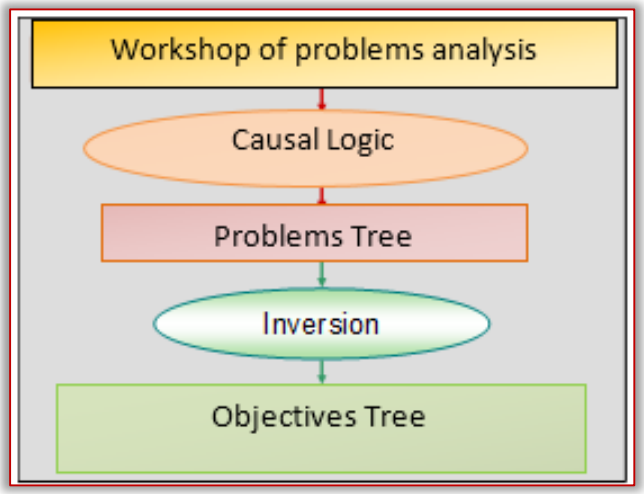

Figure 2. OOPP method

Hence, of our motivation to offer an environment of help to the development, we tempted to make cooperation between the OOPP [13, 14] and Merise that profit today of a more functional environment (tools, formalism, culture…).

The objective of this cooperation is to exploit the structuring and participative and specification aspect of the OOPP method on the one hand and the convivial tools of the environment MERISE, on the other hand [15].

MERISE is considered as being a standard, and an important tool for the survey and the development of a computer application. Its representation arranges numerous qualities as: a very good legibility thanks to the clarity of its diagrams; a hierarchical structure and no formalized; recognition of synchronizations as basis concept…

The methodology of this cooperation resides first to exploit OOPP in the phase of the structuring and the specification of the system to develop, to exploit an interfacing of cooperation between the two methods then and to exploit MERISE for the representation and the development (Figure 3).

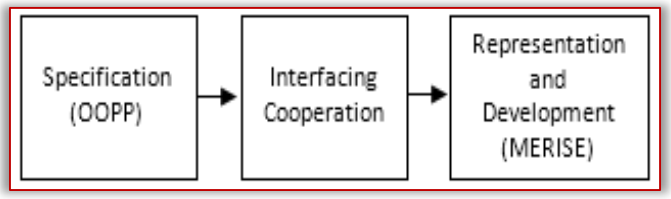

Figure 3. Methodology of cooperation

This is why the methodology of this cooperation is based on 3 phases: the first concerns the system with its various processes, the second relates to the process of cooperation and the third to the state of exit.

— 1st phase:

a. to delimit the process, object of the development, and to represent it by a simplified diagram block limited to the first levels of the analysis
b. to analyze by OOPP the system by a hierarchical manner
c. to identify the informational environment of every entity "Activity"
d. to establish the matrix of information that enables to determine ties between the entities "Activity". These information are regrouped them also by entity" Information"

— 2nd phase:

e. To consider these information as a data structured constituent so the dictionary of Merise
f. to define objects of MERISE according to a logical appreciation of entities as "Activity" that "Information"
g. to establish relations between objects while exploiting the entities "Activity" on the one hand and on the other hand the free ties of the "information" Matrix

— 3rd phase:

h. the whole of these elements (dictionary of data, objects, relations, events, operations, results) constitutes the specification of the system
i. to exploit the environment of representation, modeling and development of Merise to develop the project

CASE STUDY OF A GRAIN SILO

The analysis of the system of receipt, storage and expedition of cereals clears a part relating to data manipulated representing the information system and a part relating to the relative treatment process on the one hand to the system and to its management and its conduct on the other hand [16, 17].

Considering the fixed objectives and of results of simulation waited us we interest to rules of management of the system and its conduct. For it, one supposes that the system of handling is dimensioned in order to not to complicate the modeling, in the same way one won't retail the system of provision that is governed by the complex procedures [18, 19].

— Management process of activities of grain silos

In order to present a model simplified of the management process of the activities of grain storage system (Figure 4), we used a representation of block diagram and while retailing the two coins in particular process purchase and sale of cereals.

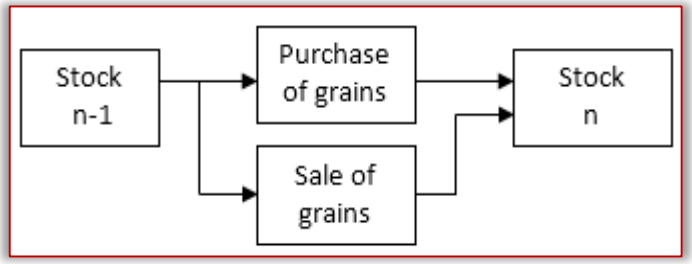

Figure 4 - Block diagram of the management process of activities of cereal storage system

— Specification of elements of the Merise formalism

In order to specify the various elements of the graphic formalism used on the one hand by MERISE, and the information associated to the management process and rules of conduct, we exploited the OOPP method (Table 1); besides we represent on this same matrix, in its last column, the correspondence of the entities "object" of the method MERISE.

Table 1- Results of the OOPP analysis

N°	Code	Designation
1	GO	Process of grain movement analysed
2	SO1	Extern information needed for the process of grain movement identified
3	R1.1	Extern information needed for the product identified
4	R1.2	Extern information needed for the purchase order identified
5	R1.3	Extern information needed for the provider identified
6	R1.4	Extern information needed for the client identified
7	R1.5	Extern information needed for the exit ticket identified
8	R1.6	Extern information needed for the stock identified
9	SO2	Process of purchase of grains analysed
10	R2.1	Product identified
11	A2.1.1	Estimate the number of grain purchase transactions
12	A2.1.2	Identify the code of grains
	A2.1.3	Identify the nature of grains
	A2.1.4	Identify the origin of grains
13	A2.1.5	Identify the quantity of grains
14	R2.2	Purchase order established
15	A2.2.1	Identify the order number of the purchase order
16	A2.2.2	Identify the date of establishment of the purchase order
17	A2.2.3	Identify the quantity of the ordered grains
18	A2.2.4	Identify the code of the ordered grains
19	A2.2.5	Identify the author of the purchase order
20	R2.3	Provider requested
21	A2.3.1	Identify the name of the grain provider
22	A2.3.2	Identify the code of the grain provider
23	A2.3.3	Identify the name of the grain applicant
24	A2.3.4	Identify the date of the solicitation

EXPLOITATION OF TOOLS OF MERISE

For the example of cereal storage presented, we considered the system of cereal storage as an information system, for which MERISE is well adapted. This is why we present the Conceptual model of Data (MCD) and the Conceptual Model of Treatments (MCT).

— Development of MCD

Considering the presented elements, we elaborated the MCD model. In order to facilitate the reading of the model, we specified by verbs the nature of relations.

From the list of properties and rules managing the system, we determined in a first time objects (correspondent often according to OOPP to Result) while specifying for each of them identifying him (correspondent for OOPP to information the more representative and most applicable). In the same way, we determined relations (correspondent for OOPP to the entity "Activity") and cardinality from the observation of the system and its working and the OOPP analysis done.

— Development of MCT

In the MISDIP model, the matrix of information, of by its constitution, can be considered like a support illustrating relations between information imported by an entity "Activity" and information produced by this last; these last information are considered then as the transformation of information imported by the entity "Activity". The relation between the produced information and the information imported by an entity "Activity" constitutes a treatment can give the MCT of Merise.

A treatment can be very elementary as the one of a registration of information considered like an event that triggers an operation to generate a result constituting another event triggering the following operation. Thus, the event whole - Operation - Result can constitute a basis entity of the representation of the MCT.

CONCLUSION

Techniques of specification, formal or semi-formal enable the description of a system; in view to model a grain silo while exploiting a cooperative approach of system analysis. This is why we presented a model of representation of based on two methods OOPP and MERISE. In this specification approach, we especially surrounded parameters of every method and we established correspondences between them in an objective to make complete them mutually.

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