

**A HELP TOOL OF INFORMATION SYSTEM DESIGN  
A CONTRIBUTION TO THE DYNAMICITY**

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**ABSTRACT**

Different semantic models that take into account the dynamic aspect of information systems, have been suggested until now. Such models make it possible to improve the conceptual schemas by representing, in addition to the structure, the behavior of the system. Among the methods that suggest a dynamic model, we can mention ACM/PCM, REMORA, DADES, IDA, .... Unfortunately, there exist only few tools able to completely support the task of design while taking into account the dynamic aspect. This paper presents a software tool which is a conceptual help to the design process, that combines the NIAM and JSD methods in order to cover not only the static aspect (data) but also the dynamic aspect (processing+behavior) of the system. The validation of the specification in a rigorous way (automatically) is done in the formalism of Rewrite Logic.

**KEYWORDS:** Information system design, Conceptual schema, static aspect, dynamic aspect, NIAM (Nijssen Information Analysis Methodology), JSD (Jackson System Development).

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## 1. Introduction

The design is the essential phase in the life cycle of information system (IS). Its aim is to produce a detailed specification of information system. The design is a complicated task which could be achieved by using methodologies which are generally supported by tools. However, we can notice that the latter are themselves complicated systems. Either because they are too theoretical to be accessible to the designer, or because they are "black boxes" which produce documents and whose logic is difficult to grasp for their users (it's the case for most help design tools). The difficulty of the design process lead us to develop a tool which gives a help in the design process, taking into account the static aspects (data) and the dynamic aspects (state change of data).

## 2. Justification of the choice of methods:

The choice is justified by a certain duality which exists between the two specifications NIAM and JSD each in the treatment aspect . There exists a coherence between the two methods. One validates the other , so that there is a complementary between specifications of data and those of treatments. The NIAM method is based upon the relational binary model and possesses an important number of constraints (exclusion, totality, equality,...) which enable to express explicitly the semantics of the real world [HAB 92]. The second advantage offered NIAM is the grouping algorithm which enables to express a conceptual schema into a set of relations in 5<sup>th</sup> Normal form. The JSD method enables the description of the behaviour of the model. All entities that belong to the real world are described in terms of actions which are executed or are undergone.

## 3. Architecture and functionalities of the tool:

### 3.1. Objectives of the tool:

The objective of the tool is to be an aid in the specification and the conception processes of information systems. It is adapted at the combination of the NIAM and JSD methods which enable to represent both the static and the dynamic aspects of information system.

3.2. Global Architecture of the Tool: The Tool is composed of five modules (Fig a):

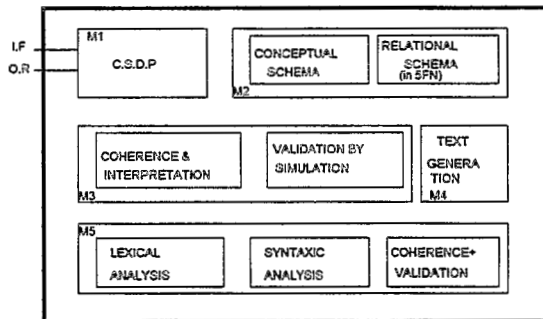


Figure a: Architecture of the Tool

-**The M1 Module** : It has for objective to automatize the C.S.D.P (the Conceptual Schema Design Procedure) [Nij 89] which has been developed originally by G. Nijssen and E.D. Falkenberg. The role is to modelize all the elaboration phase of C.S (Conceptual Schema) on the basis of NIAM, and this by starting from the Input Form (I.F) and/or Output Report (O.R) which will be analysed then transformed to obtain the global C.S corresponding to the universe of discourse.

- **The M2 Module** : The static aspect is realised by this Graphic Interface NIAM module having for objective to seize a NIAM schema with possibility of updating, to analyse its coherence with respect to NIAM rules and provide the relational schema corresponding at 5<sup>th</sup> Normal form (application of the grouping algorithm).

- **The M3 Module** : The dynamic aspect (treatment + behaviour) is realised by this module Graphic Interface JSD, having for objectives to seize a C.S (based upon JSD) in an interactive or graphic manner with the possibility to update it , to analyse its coherence with respect to the rules of JSD and provide the interpretations of specified schema [JEA 89].

- **The M4 Module** : This module enables the user to valid easily his schema with the inputs of module M1 (input form and output report). This consists in paraphrasing the C.S, that is to expressing by a set of sentences the conceptual definition of information system such as it has been constructed by this module.

- **The M5 Module**: This module allows to check in a strict way (automatically ) the specification done by the M3 module. To manage it , this specification has to be, according to us, transformed in the formalism of the rewriting logic [MES 86] in order to be grasped, lexically and syntactically corrected and later validated (checking the properties of the specification: completeness, consistence...) by this M5 module.

#### 4. CONCLUSION:

We have introduced the characteristics of a helping tool on the specification of information systems having as objectives, on one side, to take into account the static and dynamic aspects (in the Information System), and presenting to the user a product which is readable and easy to be understood ( C.S), and, on the other side to help the designer during the conception process and especially to be able to validate his specification in order to be sure of the latter before going to the implementation. To manage it, a combination of the NIAM, JSD methods and the rewriting logic formalism seem necessary to our work, in order to satisfy the objectives of our tool. Finally, we think that the satisfaction of both the user and the designer is an ideal objective but it is not (always) obvious.

#### REFERENCES

- [HAB 92]: H. HABRIAS \_ "Introduction à la spécification, editon Masson 1992"  
[JEA 89]: JEAN MARIE Filloque "La méthode JACKSON (JSD) - Laboratoire d'informatique de brest - Actes des 3èmes journées "pratique des méthodes et outils" IUT-Nantes 1989.  
[NIJ 89] : G.M NIJSSSEN, T.A HALPIN "Conceptual Schema and Relational Database Design" Prentice Hall, 1989.  
[MES 86] : J. MESEGUER "A Logical theory of concurent objects" Proc ECOOP/OOPSLA'90, Ottawa, Cannada, Octobre 1990, ACM.