Some Comments on Constituents of Contemporary Information Systems Development Methodologies

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ABSTRACT

Development of complex information processing systems in business organizations by interdisciplinary designing team requires specific guidelines - the methodologies, enabling the system developers to transform user's needs into operating system accomplishing the assumed criteria. In the last two decades numerous information systems development methodologies (ISDMs) has been proposed. Their heterogeneity inclines one to comparisons suggesting the proper selection of tools for practitioners.

The limited scope of this paper allows only to signal certain chosen questions on this subject. After characterization of the methodological diversity prerequisites, the general classification of methodologies and specification of their constituents are presented. According to this pattern the introductory specification of solutions relevant to each component is brought forward. The particular emphasis is laid on choice of methods, techniques and computerized tools for pragmatic methodology.

1. INTRODUCTION

Information processing systems extension in an obvious way has prompted the investigation of methodological approaches and their applications. It has resulted from the generalization of increasing experience in the fields of analysis, design and implementation of information processing systems particular in business and administration organizations. On the other hand the systems developers and users have become conscious of the essential methodological requirements in the light of failures in process of system development. The use of methodology allows gaining a number of advantages like the possibility of precise description and understanding of the investigated universe of discourse (UD) by non-professionals, control of the system design and operation process, coordination of the individual tasks within the interdisciplinary designing team and last but not least the acceleration and shortening of the whole system life cycle with the simultaneous improvement of the system quality. The proposed solutions have been the result, first and foremost, of the research center's efforts aiming at creation of the theoretical basis of so-called information systems science by integration of selected elements of computer science, management theory, semantics, ontology, artificial intelligence, psychology and others. The experimental methodological works of industrial organizations have significantly contributed to the empirical side of this field.

As a matter of fact several hundred partial or overall methodological approaches have been proposed up to now. But they have still remained the set of versatile, individual proposals descending from the distinct scientific assumptions and experiences. The succeeding CRIS-1[17], CRIS-2[18] and CRIS-3[19] Conferences (IFIP WG 8.1 Working Conference on Comparative Review of Information Systems Design Methodologies) haven't also had a direct effect on consistent, sound, generally accepted methodological foundations of Information Systems Development (ISD).

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This diversity has risen from different objective and subjective reasons. Their critical analysis is outlined especially in \[4\]. In this paper only the difficulty in accurate structuring and definition of data processing tasks in business is stressed. The contradiction of this situation is the possibility of precise problem definition in sciences. The new types and directions in systems development \[15\] like fourth generation languages, prototyping, knowledge bases and expert systems have been conductive to problems definition's precision and hence the accuracy of the result received.

2. THE CONSTITUENTS OF INFORMATION SYSTEMS DEVELOPMENT METHODOLOGY

The taxonomies of ISDMS have been usually based on the set of well-matched criteria. Their spectrum is either broad, universal \([3], [9]\) or refers to the specific methodological aspects for example time perspective \([11]\), requirements analysis \([5]\), conceptual modelling \([11], [23]\), graphical techniques \([7]\) and computer-aided tools \([1], [12]\).

In light of the research performed, the following dichotomic classification can be carried out according to the succeeding criteria:
- description of UD behaviour: data - and process-oriented,
- direction of ISO: top-down and bottom - up process,
- degree of formalization \([5]\): technical and social methodologies.

The viewpoints adopted in the specific methodology are suited the intermediate states of the extreme concepts.

In spite of the diversity among actual methodological approaches there are not many definitions of ISDM. It can be determined as a coherent, logically arranged set of methods and procedures of technical and organizational nature, which enables one to accomplish the system life cycle by system developers. It seems that with the present knowledge such methodology includes the following constituents:
- formalism's, the models of UD description, its statics and dynamics,
- the structure of ISO process in form of sequence of phases, subphases and succeeding tasks,
- the detailed methods and techniques of ISO, their documentation means and graphical notation adequately to the formalism proposed,
- computer - aided tools of ISO,
- quality estimation criteria of project and system and mechanisms of their check-up,
- specification of the essential requirements towards the members of interdisciplinary designing team and training materials,
- the rules of planning and control of system evolution.

3. A COMPARISON OF THE SELECTED METHODOLOGIES

The mentioned above set of potential ISDM constituents has been used for the general presentation of the current state of the art within ISDMs and the estimation of the selected approaches, commercially available. The limited scope of this contribution does not allow accomplishing detailed study in comparison to some previous quoted references.

The models of UD, called often conceptual models, should make it possible to describe UD statics and dynamics. The former is being described by such models as \([17]\) entity-