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#### ABSTRACT

In many application fields a need for more effective data processing has been identified. There are various means to achieve this goal: 1) new technological developments; 2) new information management and organizational techniques; 3) new methods and tools for systems development; 4) greater awareness of economic, legal, and social aspects of data processing. An attempt is being made to integrate these means into the "optimal solution" of effectiveness problem. The approach taken is to develop flexible software models in order to test for applicability in the real-world environment. Major characteristics of such software models are: 1) portability; 2) modifiability; 3) functionality; 4) operationality.

#### EFFECTIVE DATA PROCESSING

In various application fields the need for more effective data processing has been identified. Effectiveness is defined in terms of costs of system development and maintenance, in terms of quality of systems constructed, as well as in terms of their usefulness for the people. There are various means to improve effectiveness of data processing in specific application areas:

1. Technological development. Permanent development of integrated circuit techniques and advances in the allied technologies lead to constant changes in systems architectures. Advances in the development of basic technologies (e.g. VLSI, transmission techniques, memory techniques) and peripherals (e.g. digital optical discs) are overwhelming. Dramatic progress is being made in the field of dedicated architectures (e.g. data base computers, language computers, information and documentation computers). These (and others) technological developments have substantial impact on systems of higher order.

2. Information management and organizational techniques. The field of application of data processing techniques is rapidly expanding. This

leads to new developments in information management and organization methods. Four main lines of impact are due to:

- new orientations in the structuring of information
- developments in the area of data management in a distributed environment
- innovations in teleprocessing
- attempts to integrate structured, textual, and graphic information

These developments raise planning and organizational issues which have to be settled in order to achieve coherent development of the information processing facilities within the organization.

3. Technical methods and tools for systems development. New hardware and software architectures can help us obtain our objectives of controlling the costs and improving the quality of computer-based systems. New algorithms and data structures can sometimes have tremendous impact on the quality of those systems. There is also a need for new technical methods and tools that will permit us to use effectively whatever architectures are available; in particular methods and tools for analysis, design, construction, and testing of computer-based systems. The main reasons, why we must look up for new techniques are:

- insufficient system quality (e.g. reliability, maintainability, portability)
- difficulties in finding out, what the users and purchasers of a system really need
- low productivity of development personnel

4. Economic, legal, and social implications. A greater awareness of economic, legal, and social aspects of data processing is needed. Economic impact of an introduction of new systems on an organization have to be carefully investigated. There is a need for the protection of applications and data (present procedures seem to be insufficient to handle sensitive and confidential data). Social implications of data processing have to be reconsidered (e.g. rationalization effects on employment).

There is a necessity to integrate above mentioned means into the "optimal solution" of effectiveness problem. The major integration difficulties arise from:

- scope and complexity of these aspects
- underestimation, misunderstanding, and underweighing of some aspects
- heterogeneity of disciplines involved

## SOFTWARE MODELS FOR REAL-WORLD APPLICABILITY TESTS

As one possible solution to the problem of effectiveness of data processing, the development of flexible software models is proposed. The rationale for such an approach is the possibility to test these models for applicability in the real-world environment, e.g. not only technical characteristics of the particular model are being tested but also functionality thereof. Rather straight-forward method is being proposed:

- identify needs
- specify requirements
- develop a model as a laboratory system
- test for technical and functional qualities

Iterate above steps as many times as it is feasible. Then develop a product.

The crucial step in the method is to develop a model (with limited design resources); this model has to serve as a laboratory system for the development of a specific and operational system. Hence the minimal characteristics of such a model should be:

- portability
- utilization of commercially available software-components
- serving as a laboratory system for
  - further development of system functions
  - testing of system characteristics (e.g. response-time, user-friendliness)

## REFERENCES

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