Langefors Börje

THEORETICAL ANALYSIS OF INFORMATION SYSTEMS

Studentliteratur, Lund, 1969, 2 vol., 400 pages

Börje Langefors, professor of economic cybernetics at the Stockholm Technologic Institute, is known on a world scale, especially from the 1960—1967 period, when he was the President of the Swedish Society for Information Processing. The two volumes published in the collection of the National Computation Centre in Sweden represent a remarkable attempt of presenting a unitary theory of information systems, intensely used in modern management.

In the very first paragraph, the author makes obvious his intention: he wishes to present mathematical methods to be a guide in designing information systems. Still the book confines itself to a formal description, and does not deal with the establishment of solving algorithms for certain problems.

The systems engineer — as the author points out — deals with the problem of designing an assembly of mechanical, electrical or other components, in such a way as to ensure their operating together while satisfying a minimum of reliability and compatibility conditions, or conditions of optimal behaviour. The interaction between man and mechanical system is particularly important, as the man actually represents a component of the system.

All systems problems have a theoretical and a practical aspect. The theoretical problem in the systems technique consists in the mathematical analysis of the dynamic properties of the proposed mechanical system.

The work evinces, with good reason, that the information system is the system of information sets, necessary for decision making and signalling in a bigger system (within which the information system is a subsystem). The information system contains, in its turn, subsystems for collecting, storage, processing and distribution of information sets.

There still exists a certain confusion as regards the relation between the two concepts, information and data. Data are often considered as the equivalent of information, although there are cases when data are considered as process input, and information as output. Professor Langefors thinks that the last type of distinction is impractical, because most of the information produced by a process becomes an input for another one. In his opinion, any systems analysis which handles data must make a distinction between information and the necessary data for recording and processing this information. That is why the information is considered, in the book, as being knowledge or message, used to improve or to make possible a decision making, and data are representations of an amount of information.

He shows, in supporting his idea, that an analogous computer is not a data processor and that the information representation by analogous signals is not a representation by data, and the computer is still an information-processing machine.

The author draws attention to the fact that information systems must concentrate themselves especially upon capital problems of the systems, i.e. upon the defining of components, as well as upon the problems arising from the interconnections between different subsystems and components. The author, while emphasizing the particular importance attached to the systems problems proper, perceives that, when speaking of information-processing systems analysis, one must understand discussing on the components problem, and especially on the problem of their rationalization.

It goes without saying that components problems must be dealt with within the framework of a systems theory. Thus there must be dealt with methods of storing and finding again information in rapid storage devices, in random access memories, languages or methods of describing systems and processes, special processings which adapt themselves to different storage principles, problems of cancelling out errors, man-machine processes, the selection of the direct (in-one) processing or of the periodic (in-group) processing).

When discussing the basic problems of the systems theory, the author deals, among other, with different types of studying systems and with some problems connected with the systems structure, as well as with the types of current errors in designing and analyzing systems. Further on, he analyses the systems algebra, insisting on the necessity, when analyzing a system, of disposing on an adequate method, able to make possible the system description and to point out the way it is built. The author deals with algebra methods and introduces an operative of precedence and a matrix of precedence.

Particular attention is paid to the corresponding definition of the information systems. Afterwards, the author emphasizes the part played by designing and formalization, and indicates which are the problems arising from the system's components. The author succeeds, in a natural way, in defining the operative information, in establishing the value of directive information, and the effect of time in decision making. The value of information is considered the main parameter when designing information systems.

After analysing the data structure in an information system, the author defines the elemetary files and studies the interference problems, by illustrating this with an example concerning the salary calculation in an enterprise.

On considering data as a digital representation of information, namely as a representation by a finite set of various symbols, usually — but not necessarily — digits, alphabetic letters or electric binary signs, there arises the problem of determining the symbol amount, when it is necessary to represent piece of information.

Taking into account that, in data processing systems, the memory limitations or the considerations connected with the peripherals, require,

in many cases, that a run be segmented, a fact which leads to the increasing of the processing times and, sometimes, to the impossibility of solving problems for which the system was planned, or to an expensive reprogramming, the author analyses at lenght both the different possible situations, and the possible solutions, so that the analyst should be able to clearly understand these situations and to solve them rationally.

The author starts from the set of all types of information necessary in an enterprise, and describes the information system structure as a "matrix of incidence", disposing of a line for each "elementary process" and of a column for each set of elementary information, or "elementary file". For different reasons, as for instance the favourable space utilisation in the electronic computer memory, the author emphasizes that, by grouping some elementary processes into a compound process, the necessary number of multiple inputs and outputs of a file can be reduced. He also suggests the necessity of consolidating elementary files into compound files. Such a consolidation can lead to the increasing of file's inputs and outputs.

As a consequence, the basic problem of designing information systems is the optimizing of the grouping of processes, and the consolidation of files, so as to satisfy the needs of limited storage space and of input — output units, and to minimize the data transportation.

Another problem, which is adequately explained in the book, is that of the relations between process and its files.

Professor Langefors' work actually represents a monograph with an outstanding character of originality.

C. V. Negoiţă