

AN ORGANIZATIONAL PLANNING AND FEEDBACK CONTROL MODEL
INCORPORATING TIME-SPAN OF DISCRETION

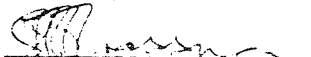
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Abstract

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A multilevel hierarchical planning and closed-loop control model is developed for the structure and general behavior of component organizational systems and the total organization. Elliott Jaques' time-span of discretion ideas and level of work estimators are conceptualized and formulated mathematically within the model framework. Based on such a systematic formulation as well as theoretical and empirical evaluations, it is concluded that the time-span of discretion concepts are highly significant system characteristics and the level of work estimators based on these concepts may be a valuable management tool in spite of certain theoretical limitations and practical problems. Although no mathematical modelling of the systems' dynamics is presently ventured, it is believed that certain quasi-linearity assumptions that would allow for the derivation and identification of impulse response and transfer function matrices are justified.

Initially, the model is formulated for the structure and general behavior of an arbitrary organizational level- l subsystem whose composite operation is the direct responsibility of a level- l role incumbent. The generally distinct effector operations of this system are in turn the direct responsibility of the level- l role incumbent's subordinate down the chain of command to and including level-0 physical process opera-

tions. The output of the level- l controller is, by means of lower-level "planners" and controllers, factored into goals and performance requirements for lower-level control systems. The typical data processing operation of data aggregation or compression found in any organization is modelled by "aggregators" through which the true performance of lower-level systems is passed prior to becoming feedback signals to higher-level controllers. It is because of the planner and aggregator elements that the nesting of individual control subsystems makes feasible the formulation of a hierarchical planning and feedback control model of the structure and general behavior of a total organization or some subsystem thereof.

With reference to such a level- l component control system, the general nature of the feedback monitoring process is analyzed. A controller logic flow chart is proposed which incorporates effector adaptation, the iterative nature of planning and control as well as fast-time internal effector model response predictions based on the principle underlying the so-called Ziebolz automatic controllers.

A level- l planning and control subsystem also serves as the basis for a systematic formulation of the basic concepts underlying the time-span of discretion theory. These concepts are shown to be directly related to such important system characteristics as the anticipation spans, the system's feedback sampling behavior and the way in which the system input is specified. Detailed time-span of discretion data are provided on the basis of interviews and field observations in two local firms.