Mechanism of control

Figure 4.7
Block diagram of the control structure.

output given to the user was the union of outputs obtained during different states of the system, then the user's initial reaction to the output provided by the system initiates the mechanism of optimization. Only after this mechanism transforms the system into the best state does the mechanism of adaptation begin to operate. When the output is formulated by only one state of the system, the reaction of the user to this output does not include a mechanism of optimization; it is immediately transferred to the mechanism of adaptation. Thus, reaction to the output originates in the mechanism of adaptation through the mechanism of optimization. An enlarged block diagram of the control structure is given in Figure 4.7.

It is clear that information about which states formulated the output originates in the control structure, not from the user; but it is communicated within the system from the object of control (see the dotted line in Figure 4.6). However, what is the object of control; that is, what is it necessary to control?

First, we note that control in any system influences the output of the system. In our case, the result is the output of a documentary IR system. Thus, the object of control must contain all those elements that affect the formulation of the output, because controlling actions on any of its elements can cause it to change. Earlier we showed that for formulation of the output, it is necessary to carry out information retrieval, and that the system represented in Figure 4.2 is able to fulfill this retrieval completely. Thus, what Figure 4.2 represents as a retrieval system is only a subsystem of a documentary IR system and is its object of control. This is why inputs 1 and 2 belong to the object of control, and input 3 belongs to the mechanism of control. Because the structure of a subsystem, the object of control, is represented in Figure 4.3, the structure of a documentary IR system is shown in more detail in Figure 4.8.

It is possible to control (i.e., to change in an oriented way) the output of a system, by acting either on each of the elements of the object of control or on any combination of these elements. Because this depends on the construction of the system chosen by its creators, the controlling actions in Figure 4.8 are shown by dotted lines.

Thus, we have defined the structure of a documentary IR system, taking
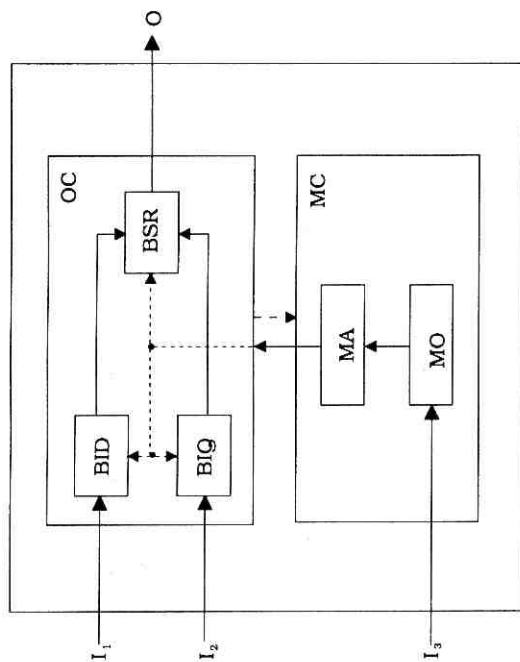
Figure 4.8
Structure of a documentary IR system.

into account the requirements of its predefined function, that is, accounting for the properties of POIN and optimal service to the user. In all of the discussions that follow, we will deal exclusively with documentary IR systems, and for simplicity we will drop the word "documentary" from its name.

4.6
Conclusion

In this chapter we discussed the notion of an IR system, which is necessary for all steps in its development. Detailed analysis of the goal of an IR system allows us to formulate its function, which assumes optimal service for each individual user in the framework of a given system. In formulating the function of an IR system, we took into account, as much as possible, the properties of IN. This is important because the quality of any IR system depends on how fully these properties are taken into account. Moreover, discovering new properties of IN (in our case, properties of POIN) and then finding ways to use them in developing IR systems are only some of the more promising directions toward the improvement of IR systems.

On the basis of formulated function, which plays a role of certain "specification," and also using general properties of any search process, we considered the structure of an IR system. The structure described in this chapter is aimed