must be realized in the system. But this is not enough. The system must contain a mechanism permitting a choice of the best of possible alternatives. And what does more than one alternative or more than one possibility of realizing a search mean? We mentioned earlier that the developers of a system aim to use the best (from their point of view) available methods for realization of each process in the IR system. In other words, in functioning systems the developers use one method for indexing documents, one method for constructing query formulations, and one method of feedback. However, there does not exist (and in view of attribute 2 of POIN it is unlikely that it could be created) a method that on all collections (thematic, quantitative, linguistic, for any length of time), for all users (at any moment of their activity, for any request), for all IR systems would give in all respects better results than others. In other words, if in some system one algorithm gives better search results than another algorithm, for example, in 75% of the cases, then it means that we should use a different algorithm in the remaining 25% of the cases. Therefore the following conclusion suggests itself: each of the available methods (algorithms) under specific conditions can lead to lower results than any other. Thus an IR system with more than one possibility of realizing a search is a system that uses not one (best from some point of view) method that realizes some process, but some set of methods.

It should be pointed out that when we talk about multiplicity of methods we could also include a case of one algorithm containing a parameter(s) that when assign different values would result in different output. For example, in the algorithm for the automatic construction of query formulations described in Chapter 7, it is possible to assign different values of zones, which would result in different query formulations and, hence, different outputs. Clearly, for each search request it is possible to obtain many outputs for each iteration and, as mentioned earlier, this is one of the necessary conditions for performing an optimal search.

We recall that to perform information retrieval it is necessary to translate into the IRL the documents (first process) and information about the POIN, that is, the search requests (second process); next it is necessary to compare the document profiles and the query formulation according to some chosen criterion, that is, to perform a search (third process). However, as indicated previously, for optimal satisfaction of the POIN this is not sufficient because in the IR system realizing optimal search, at least one of the processes must contain more than one method. Therefore it is necessary to realize the choice of the best method (or combination of methods) for this process (or processes) or the best state of the system, which is essentially a fourth process. To make this choice it is necessary to have some values of search parameters for each of the alternatives and then to choose the best available among them, which assumes an evaluation of the output for each alternative; consequently, before beginning the work of the system, the choice of its optimal state is not possible. Only after obtaining this evaluation (preferably from the user) is it possible to use it for the choice, and this means the presence of feedback in the IR system.

Notice that in this case the character of feedback is quite different. Indeed, for the choice of the system's best state, that is, the state that will provide the best service for the individual user, there is no need to have additional information about POIN. The feedback process for optimization of the search is fundamentally different from the feedback process used for adaptation to the boundaries of POIN. For this reason, all the approaches and algorithms used in the adaptive feedback cannot be used in solving the problem of optimization. In this case it is necessary to create a principally different mechanism that will use different information from feedback, specifically information about the algorithm (or a set of algorithms) that resulted in the most successful search. The source of this information should be the user's evaluation of the output (for the same reasons as those given for adaptive feedback). In other words, the user's evaluation of the pertinence of the documents in the output is sufficient for choosing the best state of the system for a given user's search request.

Methods for a feedback of this type were not studied by the researchers, although the problem of an optimal search (and the questions it raises) was considered in great detail in our papers published from 1972 through 1974 (see, e.g., Voiskunskii & Frants, 1974). This is because for a long time researchers did not know how to automate the choice of the system's best state. The first algorithm realizing feedback for optimal search for IR systems with a static collection of documents was published in 1993 (Frants et al., 1993). (It will be described later.)

In discussing adaptation we pointed out that it seems most expedient (in creating adaptive IR systems) to control such an element as BIQ. But what should be controlled during the optimization of the search? We consider this question next.

As mentioned earlier, to choose the system's best state there has to be a set of different methods realizing, at a minimum, one process involved in forming an output in an IR system. Now we consider for which process (processes) it is the most expedient to consider several methods. Note that the following considerations are similar to those that provided the basis for control by correcting query formulations when adapting to the user's POIN.

Clearly, a set of different methods can be used in realizing any process in the system. A system that uses a set of different algorithms for at least one process affecting the output in the system is called *multiversion* (terminology originated in Frants et al., 1993). Because we restrict our discussion to the systems using the Boolean search criterion, we will only consider the expediency of multiple alternatives for the first and second processes, that is, for indexing documents and indexing search requests.

The indexing of documents by many methods, in spite of possible theoretical expediency, is not practically feasible. The problem is that indexing documents (particularly large collections of documents) is a time-consuming operation, and multiversion indexing would therefore require a substantial amount of time. In addition, space requirements for several versions of indexed documents