

tions may be concentrated in a different area. At this point we would like to speculate about the next information crisis.

A manifestation of a future information crisis could appear in any known forms existing in the framework of information activity, although with different probabilities. It is clear that a crisis situation will arise again as the result of, on the one hand, increasing need for information and, on the other hand, growth in the volume of information that we will not be able to process with the existing forms used to satisfy IN.

Let us ask the following question: "What will happen when we successfully overcome the present information crisis, that is, when we succeed in creating highly effective IR systems?" Then IR systems will find all the required information. Clearly, this is good. However, the increasing flood of information may lead to a situation in which an IR system, for a specific search request, will return an amount of relevant information that the user will not be able to absorb. In such a case, it is possible to talk about a crisis situation based on the physical ability of a human being to absorb a very limited amount of information. Because, clearly, the users cannot be replaced or altered, one of the possible solutions might be to create advanced expert systems capable of analytically and logically processing information, performing automatic reasoning, and so on. In other words, it is necessary to develop systems capable of helping (simplifying) the absorption of information; for example, they might, at least partially, free the user from his or her work with information or condense existing relevant information to a size acceptable to the user. Even today there are attempts to create and use expert systems in information retrieval. There is some literature on the use of automatic reasoning in IR systems and other methods developed within the framework of artificial intelligence.

The previous discussion does not necessarily mean that the next information crisis will be connected with the absorption of information. This is only an assumption, and moreover it is possible to argue against it by pointing to the natural process of the differentiation of science and of specialization: with the growth of information the users' expertise is becoming more and more narrow and hence removing from their IN bigger and bigger parts of the existing flow of information. Maybe this tendency will prevent the described scenario.

In any case let us return to the existing information crisis and mention once again that today substantial efforts in information science are devoted to solving problems connected with the search for information. However, information science has to deal with any problems related to information activity. Thus, *information science is the science of satisfaction of an IN with available information, and the subject of investigation of this science is itself an IN, as also are the means, methods, and forms of its satisfaction*. Such understanding follows from the previous discussions of IN, its nature and characteristics (see Chapter 2), because in the final analysis any information activity and any information processes are directed (and intended) precisely for satisfaction of an IN. That was the origin of infor-

mation activity thousands and thousands of years ago, though the activity is constantly changing, and information retrieval is one (and currently an extremely important one) of the constituent parts of this activity.

It should be especially stressed that people have no need for search; we have a need for information. However, when we consider that we have "a lot" of information, then the problem of search usually arises. Obviously, the search, or retrieval, is one of the ancient methods used humankind to find an object by which or with the help of which it is possible to satisfy some of our existing needs. In the next section we will consider information retrieval in more detail.

3.4

Search for Information

Searching is one of the most common of human activities. In general, the phenomenon of searching is intuitively clear. Still, in spite of this it is useful to consider some of the most essential properties of this phenomenon. We are used to idioms with different meanings, such as "the search for mineral resources," "the search for defects," or "the search for improved design." Obviously in these examples, some actually existing objects or phenomena are sought. Of course, an actually existing object or phenomenon under specific conditions can be recognized and thus can be found. On the other hand, the "search for happiness," or the "search for a place in life" are well known. In these cases the objects of the search are not clearly defined, it is complicating to recognize them, and, consequently, not only is the search conducted with difficulty, but it is also difficult to determine from the result whether the search is successful.

Of course, those general properties are intuitively clear, and they permit us to combine in our consciousness various everyday, scientific, and technical situations in the concept of "search." First, it is clear that in all the situations mentioned, something or someone is found. Consequently, a search presupposes the existence of a "goal." The name of some goal is the defining addition to the word "search" in the examples described here.

Further, it is necessary to note that we do not speak about a search if within the framework of an arising need we have complete information about the required goal, and a previously known path leads to it. A search assumes motion toward a goal in the presence of a set of paths; it is a *process* unfolding in time; it is, as a rule, a repeating sequence of actions. Any reasonable search is carried out in correspondence with some plan that is a rule for choice of subsequent actions, a search *algorithm*.

Obviously the required elements of any retrieval process are recognition and choice. This means that any retrieval algorithm must include some criteria in correspondence with which recognition of the desired objects or phenomena is carried out. In fact, the choice of criteria for a search is based on the choice