

It is clear that if characteristic  $I_{14}$  allows for a pragmatically justified evaluation of the functional effectiveness in both cases of searches under discussion, we can conclude that the highest functional efficiency (according to this section) was achieved with the aid of the second search method.

Now let us turn our attention to the understanding of functional efficiency implied before this section. Recall that in this understanding of functional efficiency the nonpertinence degree of nonpertinent documents (both found and not found during search) was not taken into considerations. This means that if the user follows this approach in analyzing the pertinence of a document, then it is natural to assume that in the discussed example, vector  $K$  would be formed instead of vector  $W$ ; that is,

$$K = (1; 1; 1; 1; 0; 0; 0; \dots; 0).$$

In this case, for the evaluation of functional effectiveness in both searches in our example (and resulting in forming vectors  $V^1$  and  $V^2$ ), it is expedient to use one of the CSCs described earlier, such as complex search characteristic  $I_2$ . We determine the values that would be achieved in the cases of searches mentioned earlier:

$$I_2^1 = \frac{\sum_{i=1}^{N_0} k_i v_i^1}{\sqrt{\sum_{i=1}^{N_0} (k_i)^2 \cdot \sum_{i=1}^{N_0} (v_i^1)^2}} = \frac{3}{\sqrt{4 \cdot \sqrt{3}}} \approx 0.866;$$

$$I_2^2 = \frac{4}{\sqrt{4 \cdot \sqrt{6}}} \approx 0.816.$$

Because characteristic  $I_2$  allows for a pragmatically justified evaluation of the functional effectiveness of a search in both cases described earlier (indeed,  $P^1 = 1$  and  $P^2 = 4/6 \approx 0.667$ ), we can conclude that the first method of search leads to higher functional efficiency (based on the understanding implied before this section).

Thus, if the preceding example is correct, then it demonstrates that the choice of search method giving the highest functional efficiency may be different for the situation of the understanding of functional efficiency implied in this section and for the situation of the understanding of functional efficiency implied earlier. This means that there is a difference in the understanding of the functional efficiency of a document search in the described situations.

## 10.10

### Another Formulation of the Goal of Document Search

In the final section of this chapter, we will illustrate the role of formulation of the goal for a document search in the context of the problem of evalu-

ating the functional efficiency of such a search. Recall that in the first section of this chapter we pointed out that the functional efficiency of a search is determined by the extent to which the goal for which the search is carried out was fulfilled. We also pointed out that the goal of the document search (see also Chapter 4) is to find information satisfying POIN. The more complete and accurate the output given to the user, the higher the POIN satisfaction quality. In other words, we believe that functional efficiency is determined by output quality. It should be emphasized that all discussion in this chapter was based on the formulation of the goal of document search just given.

Next, it is important to recall that output quality is evaluated based on the task that is determined by the user's POIN. It is this task that forms concept-based views that jointly determine a position from which the functional efficiency of the document search is evaluated. These points of view were called content criteria of functional efficiency evaluation. It was pointed out in this respect that the formation of concrete content criteria was influenced to a certain degree by the scale of pertinence used by the user in analyzing a document. That is why not all the approaches and results proposed or obtained in this chapter were applicable when discussing problems associated with functional efficiency evaluation in the previous section. Even more influence on handling these problems may be expected from changing a task for which a document search is done and, naturally, from changing the formulation of the goal of the document search. In this section we will discuss only the influence determined by the change of the formulation of the goal of the document search.

In order to see that this influence exists, and also to have some idea of its limits, we propose to use a formulation of the document search goal that differs somewhat from the one used earlier (although it is sufficiently close to it). The goal of the document search is to obtain an exact identification of the documents in the search collection by retrieving as many pertinent documents as are available in the search collection and by not retrieving as many as possible nonpertinent documents available in the search collection (see, for example, Popov, 1981). In other words, in this case functional efficiency will be determined by how exact the identification (during the search) of the search collection documents is. At first glance one might think that this formulation of the document search goal is essentially identical to the one formulated previously. However, this is not so, and we will illustrate this by following examples.

1. Let us assume that a search in a collection containing 10,000 documents, 5 of which are pertinent, resulted in outputs consisting of
  - 5 pertinent and 3 nonpertinent documents;
  - 5 pertinent and 20 nonpertinent documents.

Naturally, these outputs differ significantly in their quality, although the correctness of the identification of documents in the search collection in these two cases appears (at least intuitively) to be very similar.