

considered approach, the structure of the multi-agent system is based on the architecture of the *OSTIS Ecosystem* discussed above and is constantly refined taking into account the addition of new *agents* to the *OSTIS Ecosystem*. In terms of classification of agents of *OSTIS Ecosystem* at the current stage it is proposed to single out only *corporate ostis-systems* into a separate class due to the fact that they play a special role in the process of organizing collective problem solving. The principles of agents' communication via *corporate ostis-systems* are discussed in more detail at Step 4.

• **Step 3: Designing the internal structure of the agent and the principles of its operation.** Since all *OSTIS Ecosystem* agents are *ostis-systems* (even users of the *OSTIS Ecosystem* interact with it through personal *ostis-assistants*, which are *ostisystems* [4], [8]), additional specification of the principles of their structure is not required, as it is discussed in detail in the works devoted to the *OSTIS Technology* [4], [16]. To ensure the possibility of interaction between *ostis-systems* over the network, it is proposed to add an interface subsystem to each system, which is discussed in more detail in Step 5.

• **Step 4: Develop the principles of agent interaction.** As mentioned earlier, it is proposed to base the principles of agents' communication within *OSTIS Ecosystem* during collective problem solving on the principles of agents' communication in the memory of *ostis-systems* (sc-agents). In the work [7] an approach is proposed assuming that one of the *ostis-systems* included in the collective of *ostis-systems* will be used as a tool of communication for the participants of the collective of *ostis-systems*. If such collective is formed on a permanent basis (is a *ostis-community* or a part of it), it is proposed to use the corporate *ostis-system* of the specified *ostis-community* as such communicator system. If a collective of *ostis-systems* is formed temporarily for solving one or several complex problems, i.e. it is necessary to temporarily involve *ostis-systems* belonging to several *ostis-communities*, two variants of organizing communication of *ostis-systems* are possible:

–One of the systems belonging to such a temporary collective of *ostis-systems* is selected as a communicator system. In this case, such an *ostis-system* becomes temporarily the corporate *ostis-system* of the temporary *ostis-community*.

Accordingly, in this case it is required to install in the *ostis-system* an interface subsystem for *ostis-systems* and to load into its knowledge base the specifications of other *ostis-systems* participating in the problem solving process. Thus, the cost of preliminary preparation of a collective of *ostis-systems* for problem solving can be quite serious, and this approach may be ineffective for relatively simple problems solving. – The corporate *ostis-system* of the closest hierarchical *ostis-community* is chosen as the communicator system, such that all *ostis-systems* required for the solution belong either to this *ostiscommunity* or to more private *ostis-communities* (possibly on several hierarchical levels). In the example of the *ostis-communities* hierarchy fragment shown in Figure 2, assuming that the problem solving requires the participation of *ostis-systems* OS1, OS2, and OS3, then the corporate *ostis-system* of *ostis-community* OC1 will be selected as the communicator system.

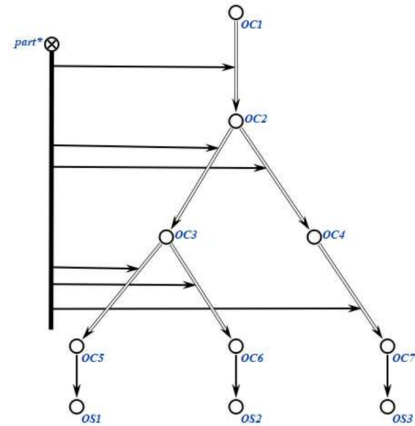


Figure 2. Example of communicator system selection

According to the above architecture of the *OSTIS Ecosystem* such an *ostis-community* will always exist, in the extreme case the role of such a corporate system will be played by the *OSTIS Metasystem*. The disadvantage of this communication option is that sending messages between the participants of the problem solving process may generally take more time due to the increased path between the corporate *ostis-system* and the *ostis-systems* which are performers.

It is important to note that in the presence of such a communicator system, agents at the logical level do not exchange messages directly, but communicate by specifying their actions in the shared memory of the communicator system; nevertheless,