Formal explorations of knowledge intensive tasks

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Appendix A

Problem statement for Sisyphus: models of problem solving

We devised the Sisyphus problem to compare different approaches to the modelling of problem-solving processes in knowledge-based systems and the influence of the models on the knowledge acquisition activities. To this purpose we give a short description of a sample problem concerned with office assignment in a research environment.

After a brief description of the settings in which the problem occurs, we describe the organizational structure of the research group and that group's facilities. We will then render a sample annotated protocol of the local expert Siggi D. solving the office assignment problem.

(...)

I Statement of the sample problem

The members of the research group YQT of the HNE laboratory are moved to a new floor of their chateau (...). Due to the severe cuts in funding they only get a very limited number of offices (...). It will be quite a problem to cram them all in. To complicate matters even further some will have to share an office. After several vain attempts - each ending as nightmares that would have impressed Freddy - the management of HNE is desperate. Sisyphus is their last hope. HNF implores the Sisyphus teams to provide knowledgeable systems that are up to the task.

It is important that the systems' way to solve the problem follow the shining example of the wizard Siggi D., the only one who ever managed to solve the problem. The system developers should be aware of the fact that YQT's members are used to being pampered. They all have their personal preferences and professional peculiarities that had better be observed, as the dungeons of the BABYLON tower are deep and lonely.

II Data on people and offices

Description of the members of YQT

Not all members of YQT can profit from this new office space in the chateau: about half of the group stay in their old offices. Those that are concerned by the new assignment are:
Figure 1
The floor-plan of the chateau.

Werner L.
Role=Researcher
Project=RESPECT
Smoker=No
Hacker=Yes
Works-with=Angi W., Marc M.

Jurgen L.
Role=Researcher
Project=EULISP
Smoker=No
Hacker=Yes
Works-with=Harry C., Thomas D.

Marc M.
Role=Researcher
Project=KRITON
Smoker=No
Hacker=Yes
Works-with=Angi W., Werner L.

Angi W.
Role=Researcher
Project=RESPECT
Smoker=No
Hacker=No
Works-with=Marc M., Werner L.

Andy L.
Role=Researcher
Project=TUTOR2000
Smoker=Yes
Hacker=No
Works-with=

Michael T.
Role=Researcher
Project=BABYLON product
Smoker=No
Hacker=Yes
Works-with=Marc M., Werner L.

Harry C.
Role=Researcher

Uwe T.
Role=Researcher
Hierarchical structures within YQT

Within the subset of members of YQT we have the following organizational structure: Thomas D. is the head of the group YQT; Monika X. and Ulrike U. are the secretaries; Werener L. and Angi W. work together in the RESPECT project; Harry C, Jurgen L. and Thomas D. work in the EULISP project; Michael M. and Hans W. work in the Babylon project; Hans W. is the head of this large project; Marc m, Uwe T. and Andy L. pursue individual projects; Katharina N. and Joachim I. are the heads of larger projects that are not considered in this problem.

The offices on YQT's floor of the chateau

C5-123, C5-122, C5-121, C5-120, C5-119 and C5-117 are large rooms that can host two researchers. Large rooms can be assigned to heads of groups too. C5-113, C5-114, C5-115 and
C5-116 are single rooms. [The shaded rooms in figure 1 are not available as office space - MGJ.]

<table>
<thead>
<tr>
<th>Action by the expert</th>
<th>Self-report transcript (stylized)</th>
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| 1 Put Thomas D. into office C5-117 | 1a The head of group needs a central office so that s/he is as close as possible to all the members of the group. This should be a large office.  
1b This assignment is defined first, as the location of the office of the head of group restricts the possibilities of the subsequent assignments. |
| 2 Monika X. and Ulrike U. into office C5-119. | 2a The secretaries' office should be located close to the head of group. Both secretaries should work together in one large office. This assignment is executed as soon as possible, as its possible choices are extremely constrained. |
| 3 Eva I. into C5-116 | 3a The manager must have maximum access to the head of group and to the secretariat. At the same time he/she should have a centrally located office. A small office will do.  
3b This is the earliest point at which this decision can be taken. |
| 4 Joachim I. into C5-115. | 4a The heads of large projects should be close to the head of group and the secretariat. There really is no reason for the sequence of assignments of Joachim, Hans, and Katharina. |
| 5 Hans W. into C5-114. | 5a The heads of large projects should be close to the head of group and the secretariat. |
| 6 Katharina N. into C5-113. | 6a The heads of large projects should be close to the head of group and the secretariat. |
| 7 Andy and Uwe T. into C5-120. | 7a Both smoke. To avoid conflicts with nonsmokers they share an office. Neither of them is eligible for a single office. This is the first twin-room assignment as the smoker/nonsmoker conflict is a severe one. |
### Action by the expert | Self-report transcript (stylized)
--- | ---
8  | Werner L. and Jürgen L. into office C5-123.  
  | 8a  | They are both implementing systems, both nonsmokers. They do not work on the same project, but they work on related subjects. Members of the same projects should not share offices. Sharing with members of other projects enhances synergy effects within the research group.  
  | 8b  | There are really no criteria for the sequence of twin-room assignments.
9  | Marc M. and Angi W. into office C5122.  
  | 9a  | Marc is implementing systems; Angi isn’t. This should not be a problem. Putting them together would ensure good cooperation between the RESPECT and the KRITON projects.
10 | Harry C. and Michael T. into office C5-121.  
  | 10a | They are both implementing systems. Harry develops object systems. Michael uses them. This should create synergy.

**Note 1**

Our wizard Siggi D. seems to pursue a general strategy of assigning the head of group and the staff personnel first, followed by the heads of large projects, who through their seniority are eligible to single offices (...). The offices of the head of group and the staff should be close to each other. Heads of projects should, if possible, be allocated offices close to the head of group’s office.

**Note 2**

Twin offices are assigned to the members of the research projects, under the consideration that synergy among projects is boosted. This means that researchers who work on the same project are, if possible not sharing an office. Co-workers who work on related subjects can share an office. It is important not to put smokers and non-smokers together into twin offices.

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