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A Helpdesk-System for the Processing of Students' Requests in a Distance Learning Environment

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ABSTRACT

This paper contains the basic principles, special concept and implementation of a helpdesk-system for the management of an Internet-based course Master of Business Informatics (MBI) of the Virtual Global University (VGU). A short presentation of the MBI/VGU scenario motivates the usage of the helpdesk-systems for a processing of the requests of worldwide distributed students by teachers that are located in Central Europe. The basic principles of the helpdesk and scenario related specific features form the basis for the special concept of the helpdesk-system SMILE (Support system for the Management of Internet-based Learning and Education), whose presentation is a core of this paper.

1 SCENARIO

The International Master of Business Informatics (MBI) is the first worldwide completely online available Master course of business informatics. The English-speaking long distance course uses Internet and multimedia technologies. It is a co-operation of the Virtual Global University (www.vg-u.org) and the Europe-University Viadrina Frankfurt (Oder). It was started in a winter semester 2001/2002 and is promoted by the Federal Ministry of Education and Research in Germany (BMBF) within the scope of the initiative "New Media in the Education" under the conveyance mark 08NM135C. The School of Business Informatics (SBI) supports the MBI program and provides an infrastructure for the courses and administration.

The lecturers of the courses as well as their assistants are distributed geographically over the Central Europe. In the winter semester 2002/2003 13 professors taught 14 courses, which were offered in the Internet. As a web-based learning platform WebCT is used. It serves, primarily, the administration of the single courses. In addition, here belongs an assignment of students and lecturers to the courses, authentication of the users, supply of teaching materials and their module structuring. It contains long distance communication features, based on Internet communication means like e-mail and discussion forums.

The VGU's students are distributed all over the world and are by the majority part-time students. As a rule they take courses as a sideline occupation and learn basically in the evening and during the week-end.

While studying at the VGU, the questions and problems appear like at the usual universities. These can be communicated and be answered exclusively electronically because of the spatial distribution and different working hours of students and lecturers. Up to now e-mail, phone, WebCT-mail and WebCT-discussion forums are available as communication medium. The processing of the requests with these means has the following weak points:

- For students the search for the right contact person is often time-consuming.
- The coordination of several agents for a request answering is only partly possible.
- There is a danger of the late or forgotten request's answer.
- The search for already solved cases is not possible because these are not saved at a central place. Often recurrent questions must be answered over and over again.

Hence, the idea was to develop a system, which helps to solve students' questions and problems in a more efficient and effective way than before. As a model for the development the helpdesk system was taken. It provides a support for the enterprise employees by the difficulties and problems, particularly, in the PC end user's area. The idea of helpdesks will now be moved to a new application area.

2 HELPDESK- AND TROUBLE-TICKET-SYSTEMS

A *helpdesk* is characterized by the following properties (cf. Wooten (2001), Goeker and Roth-Berghofer (1999), Knapp (1999), Thomas and Steele (1996), Lehner and Lueders (2000)):

- Helpdesk fulfils the support functions for its customers. The helpdesks' customers are all people that use the support of a helpdesk.
- Subject of support is products and services.
- Helpdesk serves as a central single point of contact for questions and problem reports.
- It forms an organizational entity within an enterprise.
- Helpdesks are solution oriented. The purpose is the efficient and effective answer of questions or solution of problems.
- Decentralized helpdesks can be distributed transparently over several locations from users' perspective.

The ***helpdesk-system*** is a software system, which supports the functions of helpdesks completely or partially (cf. Lehner and Lueders (2000)).

Trouble-Ticket-Systems (TTS) build a subclass of helpdesk-systems. Up to now, concepts are not standardized in this area (cf. Santos, Costa, Simões (1998)). Indeed, the concepts of different contributions are very similar. The Trouble-Ticket-System represents a request processing with a roadmap by software. Thereby a Trouble-Ticket is an electronic analogue of the roadmap. Another very descriptive explanation delivers Johnson, while he compares the (Trouble-)Ticket with a hospital Chart (cf. Johnson (1992)). The problems appeared are noted

on a ticket and then stored in the system. Each agent records the activities, carried out for the problem solving, on the Trouble-Ticket and forwards or closes it. Thus, the process of the problem elimination is documented and the collaboration of several agents on a problem is coordinated. Trouble-Ticket-System often supports the employees of a helpdesk. Therefore, this concept often is a synonym to the helpdesk-system (cf. Jagodic, Ungerer (1998) and Schade (1999)).

3 A HELPDESK FOR VGU – Special Features, Advantages and Requirements

3.1 Special Features Compared to Normally Used Helpdesks

The VGU-helpdesk SMILE (Support system for Management of Internet-based Learning and Education) is constructed according to the model of usually used helpdesk. The concepts used for helpdesk or helpdesk systems were copied to a new application field. The resulting benefits are described in the next chapter.

The specific features of the new application area are emphasized in the following. As an object of comparison the usual helpdesk of the user's service application field is used due to its technical concept adjacency.

Request Types

Requests, e.g. questions and problems, as well as their answers or solutions are treatment objects of every helpdesk. The requests in the end user's domain are hardware and software problems, which arise during PC and (application-) software handling. Moreover, here also belong problems with the system periphery (printer, scanner and networks).

The objects of the VGU-helpdesk are the students requests. On the basis of experience, which was accumulated during the first teaching semesters at the VGU, the following belong among other things to the requests:

- Technical questions concerning simple lectures
- Questions about appointments
- Questions to exam requirements
- Technical problems with the on-line learning materials
- Questions about learning process
- Questions concerning studies or examination regulations

From this enumeration it can be seen that the request spectrum of the VGU-helpdesk is wider than the usual one, which deals only with engineering problems for a bounded range (e.g. PC's with installed Windows and corresponding office package). Often returning or similar requests appear at the PC helpdesk. These can be then solved faster due to the accumulated knowledge.

Helpdesk Employees

The employees of the First-Level of the PC helpdesk are mostly employees of the enterprise IT department. Moreover, they were specially trained for their tasks and fulfil them all the time. On the next support level experts come into operation.

The employees of the VGU-helpdesk are professors, scientists, secretaries and student assistants. They are not trained for such tasks and do them along the way.

Customers of the Helpdesk

The customers of a usual helpdesk are end users and for the VGU-helpdesk - students. Also the employees of the VGU, which are far away from each other, can use the helpdesk for the clarification of their problems. Therefore, the helpdesk employees can also be customers.

Geographic Distribution

The First-Level employees of the end user helpdesk are mostly situated geographically near their customers, i.e. at the firm location. Even if one has several locations, the support employees can be distributed on a decentralized helpdesk principle around the locations. Unlike, the VGU-helpdesk employees are distributed over Central Europe and the customers worldwide.

3.2 Advantages of a Helpdesk for the VGU

In the following chapter the advantages of a usual helpdesk (cf. Lehner, Lueders (2000), Wooten (2001) and Thomas, Steele (1996)) are checked whether they can be applied to the new application area.

Centralized Knowledgebase

SMILE is a central knowledgebase of the VGU. All accumulated knowledge for the management of the MBI courses are documented here, saved in archives and are available for students, professors and employees. The data sources are requests (and their answers) of the students, professors and employees as well as further sources of information like the studies and examination regulations. If a request appears several times, it must be worked out only once. By recurrent requests one can access already stored information. In addition, the knowledge is available to every user round-the-clock.

Central Contact Point

A helpdesk acts as a single point of contact. It helps students and employees to perform efficient search for the right contacts. This is particularly relevant if the interdisciplinary questions or questions to the learning process appear. The helpdesk system reduces the number of the communication channels (E-mail, WebCT, and phone) to one. The redundancy of answers is, thereby, avoided and rules are consistently applied to all requests.

Improvement of the Employees' Accessibility

The helpdesk system is available for the search round-the-clock. It can contribute to the fact that requests are assigned faster to the right addressee and, thereby, their overall processing time is shorter. In addition, it should guarantee that requests are not neglected. All these increase the helpdesk customers' satisfaction (in this case - students) and contributes, therefore, to the image improvement of the VGU.

Indeed, there is a disadvantage: through the helpdesk system application as a mediator between professors and students the interpersonal relations can be lost.

Control Instrument

The helpdesk-system allows to analyze, for example, the source and number of the requests, average processing and neglecting time, the recurrence rate of the single categories etc. Hence, the mistakes and lacks can be recognized and perhaps improved. Furthermore, the permanent transparency of these data shows an incentive for the quick request processing.

3.3 VGU-Helpdesk-System Requirements

In the following the VGU-helpdesk-system requirements are derived from the requirements to the Trouble-Ticket-System in the system- and network management (cf. Dreo (1995)).

Trouble Shooting Documentation

For the support of the collaboration it is important that the agent see which remarks or answers have been given by the previous agent. Also students should be able to understand through the documentation, how long a ticket was neglected, by whom and what was the answer to the request. Additionally, there is no expenditure caused by documentation, in any case questions are answered in writing.

Coordination of the Trouble Shooting Activities

In order to eliminate mistakes in the network- and system management the collaboration of several experts is often necessary. The support of this collaboration is a primary goal of the Trouble-Ticket-Systems, which are used in this field. Also the TTS for the VGU should help to coordinate the teamwork.

Nevertheless, primary goal is not the collaboration promotion but the efficient processing by the minimum workers. In the ideal case a

student finds an answer to his request by a search among already solved cases and a processing can be completely avoided.

Integration

Another objective of the development is an integration with a learning platform WebCT. Requests are assigned to the SMILE categories. Allocation of categories and offered courses must be so designed that the lecturer of the course are at the same time the responsible person for the matching category. Now it is possible to place links in WebCT at suitable places, which automatically refer to the right SMILE category. Furthermore, it is planned to build the integration with an electronic student's secretariat and examination office (ESSEO), these are developed in the same project. ESSEO should administrate all relevant information about the learning process, from registration and exam performances up to the Master Diploma award.

Security

The TTS should secure that only authorized people have a right to create, process and forward the tickets. The authentication process should be assigned for different user groups (students and agents). Secondary security, as for example coded connections, is not necessary because no confidential personal data are transferred. Besides, the search possibility among available requests is all persons' desire. The confidential tickets are an exception. Here must be ensured that these can be seen only by entitled persons (producer and direct involved agents).

Statistics and Reports

At the beginning the advantages were described which the helpdesk application brings, namely the control instruments. In addition, it is necessary to provide statistics and reports by means of specific ratios. The components for a creation of statistics can be part of the helpdesk-system or external tools.

Intelligent Searching Mechanisms

The system to be provided should offer a possibility to search among already processed requests. This shows an essential advantage over the current situation where a search for the same or similar request is not possible. To be exact, a recurrent answer is avoided and the students as well as employees can save work and time. The planned searching function should give the possibility to search flexible for single words, whole word groups or with the Boolean operators. Furthermore, it is also planned to implement a similarity search with the help of methods known from the Case-Based Reasoning.

4 SMILE – THE VGU-HELPDESK

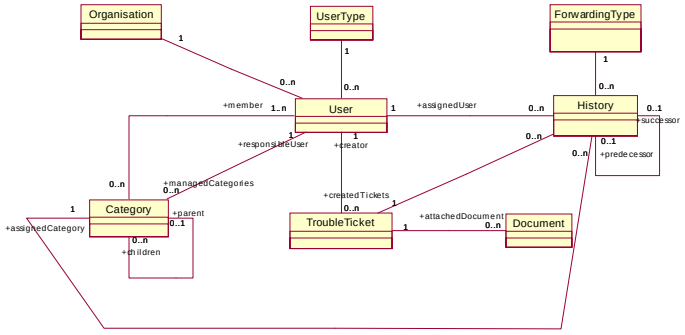
Based on requirements and specific features described above, different models were developed for SMILE. The most important ones are introduced in the following chapter. Subsequently, some important concepts are explained like the search among already available requests as well as the distribution and escalation of the Trouble-Tickets.

4.1 The Process Model

The macro-process model describes the rough sequence of the request processing. Owing to the clarity of the present article it is not further specified. Thus, for example function "Answer Trouble-Ticket" includes functions of the request forwarding and reclassification.

The customers of the helpdesk system can be not only students but also the lecturers and assistants. Already at the beginning of the macro-process the customer has a possibility to search for similar, already documented requests and their solutions. If the search is successful, the process can be cancelled, without somebody had to work on the request. This case is an ideal one. Otherwise, a new trouble ticket is generated and assigned to a category. For each category at least one responsible person and further experts are assigned. In order to be able to determine the right agent for a request, it is arranged in a category which is in its turn assigned to a responsible person. After the ticket is established and assigned via category to an agent, he answers. Moreover, the agent has a possibility to forward the Trouble-Ticket. This is necessary if, for example, the ticket's category was wrongly identified. Furthermore, the request's

Figure 1: VGU Helpdesk-System – Special Class Model



forwarding is necessary if the answer requires a co-operation of several agents. It can occur to the other categories or to a certain co-agent of own category. After forwarding the request to the right person it is answered. The answer is sent to the customer and stored in the database.

During the whole processing the information about sender, agent, problem, solution way and solution of the concern is stored. A request is counted as documented and searchable if it is in the state *finished*, i.e. it was answered and the customer was satisfied. Exception: if the concern was marked by the customer or agent as confidential, it does not appear in the searching results.

4.2 Special Class Model

Figure 1 shows the identified special classes. Customers, agents and administrators of the system are illustrated by the first class User. It contains general attributes of the user (surname, name, E-mail), information to authentication as well as to the absence of the user. Every user can establish a Trouble-Ticket.

Class History illustrates the processing of the Trouble-Ticket. It contains information about which agent, when and what ticket has worked and to which category it was arranged at the respective time. History objects are connected by a predecessor-successor-relationship. Thereby, for every Trouble-Ticket a linked list of existing processing steps.

In addition, the last History object of the list contains the actual information about ticket processing, i.e. by which user the trouble ticket is. Furthermore, the History class guaranties that a trouble ticket at a given time is assigned to exactly one user and exactly to one category. By every establishing, forwarding, answering and escalation of a Trouble-Ticket a new History object is created. The class ForwardingType determines which one of the mentioned above forwarding types is used.

The hierarchy of a category is represented by class Category and their recursive relationship. The cardinalities denote that every category is the upper category of none or many other categories, however, itself it can have maximum one upper category. For each category there is a responsible user, additionally, other users can be members of a category. To the Trouble-Ticket one or several documents can be attached.

4.3 The Search Among Available Requests

The search for already answered requests should be possible in several ways. The first one is the proper keyword search. Besides, search words can be connected with Boolean operators like AND, OR and NOT or a complete phrase can be looked for. The second method is the resemblance search. Here one receives not only proper but also similar results. The third possibility is the navigation through the categories tree-structure and the direct search for a request. The precondition is that the person knows, at least approximately, where a problem could be arranged. Indeed, this method can be not visual if there are a lot of available requests.

4.4 Distribution of the Requests

The system determines the request's agent with a help of the category to which it was assigned. For each category exists exactly one

responsible person. This anonymous distribution has the advantage towards the person's tied ones, the customer must not find out who is responsible for his request. If an agent feels himself incompetent, e.g. in case of field-general questions, he assigns the problem further to the top to a more general category. Another advantage consists in the fact that the customer is independent of the certain employee presence. In case of the agent absence other members of the category take on the processing of the request.

4.5 Escalation and Pooling

As already explained above, a new request is first of all assigned always to the responsible person of a category. If he is absent or the processing time exceeds its maximum, the request is pasted in a pool, i.e. all members of the same category can access the request. If somebody feels himself responsible for the request, he takes it over, removes from the pool and works it out. If the request remains in the pool longer than fixed time, it is automatically escalated, i.e. it is arranged to the upper category. There, again the category responsible person receives it. With every escalation of the request an E-mail notification is sent to the relevant agent. If the request is already in the uppermost category (root category), it stays in the pool and the category members receive remind mails in a certain time intervals.

The escalation mechanism, described above, is deactivated as soon as the agent has seen the Trouble-Ticket. Then it remains by agent. With timeout he receives remind mails in a certain time interval, until he takes care of the thing.

If a customer sends back a request because he is not satisfied with the answer, it is assigned again to the same agent. Nevertheless, if he is absent or does not work on the request, the escalation is exactly applied as it was described above.

But also with these sanctions one cannot guarantee a timely processing. The danger of the delay and non-processing exists generally and is of organizational nature. The system cannot eliminate this problem, but rather it supports the solution. As the downtimes are documented, they can be used for the analysis of the nuisances and as an argumentation help. For instance, it is conceivable to provide a top-ten-list of the professors and assistants with the longest answering time or the highest non-answer rate.

4.6 E-Mail Notification

As already mentioned, the system sends e-mail notifications to the users. This happens always when a request was created, forwarded, answered or escalated. In the case of the creation and forwarding the corresponding agent is informed, with the answer of a request the customer receives e-mail. If a request is escalated to the pool, all members of the relevant category receive a notification.

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