

Software System for Automated Support of End-users

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Abstract- The rapid development of the information technology worldwide contributes for a drastic change of the traditional procedures according to which the companies are functioning for completion of everyday activities. This change demands for establishing separate departments to support the end users. This paper presents a software system for automated support of end-users.

Keywords: *Help-desk; customer support; customer-relationship management.*

I. INTRODUCTION

The rapid development of the information technology worldwide contributes for a drastic change of the traditional procedures according to which the companies are functioning for completion of everyday activities. This change demands for establishing separate departments to support the end users. The same demands are valid not only for private companies but also for education institutions including universities.

The department for end users support at UGD Info Center, at Goce Delcev University – Stip, provides support to end users (students, teaching staff, assistants and student service officers) for problems that occur during their interaction with the developed information system. The communication between the end users and the Department of Customer Support currently is realized by e-mail, telephone and in person at the office of UGD Info Center. This approach, in problem resolving, causes huge burden on everyday activities of the operators at the Department of Customer Support, resulting in absence of systematic archiving of completed activities realized for the end users. Further on, most of the time is spent on distribution of the current requests among department's operators, and inefficient synchronization of the service incidents and responsible operators. In a long term, considering that the number of users who require daily assistance will be increased, this strategy is unsustainable.

The aim of this paper is to research the possibility for implementing a web designed software system for automated software support, through usage of suitable technology and upgraded Case Management process, aiming to increase the quality level of services provided by the Department of Customer Support. A survey conducted among each involved party proved that there is a need for such system, which will contribute to significantly increase productivity, effectiveness and efficiency of the employees of the Support Department. Additionally, the end users would be able to follow the status of the resolution of their service incidents at all times.

Upon the analysis the system was designed and developed. The implemented system was tested and evaluated by the potential end-users. The conducted evaluation study has shown that the proposed solution entirely fulfills the demands of end-users.

II. BACKGROUND OF END USERS SUPPORT SYSTEMS

Before the introduction of the concept of the IT department for end users support, the clients (users), in order to solve their technical problems, had to contact employees of the IT department, by phone or in person [1], [2]. However, this concept of problems solving have major drawbacks in terms of the structure of the IT department as well as in terms of users' satisfaction. The employees of the IT department are not always available for immediate assistance, because of their primary assignments within the department. The end users often require assistance from incompatible employee within the IT department, leading to users' frustration, because they have to make an extra call or waiting to be transferred to other expert responsible for solving their problem.

In order to overcome these problems, the idea of establishing the IT Department of Customer Support occurs. These department (also known as Computer Call Center, Contact Center or Support Center), is the central point of the IT department, that provides the end users with IT information about their needs in order to overcome some problems. The responsibilities of the Department includes first level of support in case of occurrence of incidents, daily communication between with the user support system and reports generation about the quality of provided service [3], [4]. In [5] Workman and Bommer also define the importance of IT Department of Customer Support in providing technical assistance to users in case of computer failures (software and hardware).

From the beginning of the establishment of the IT Department of Customer Support within the companies, several different models evolved.

The decentralized model was one of the most popular in the 80s of the 20th century. According to this model, companies have more than one IT department to support end users, separated by areas and IT groups. Decentralized model allows different problems' categories to be resolved within the respective IT group, that lead to timely resolution of problems and users satisfaction. This model initially gave the expected results, because ICT was very simple and the problems were well-known. Over time, IT infrastructure becomes increasingly complex and the problems were often transferred from one IT group to another in order to obtain the correct solution.

In order to overcome the problems faced by the decentralized model, companies started to use the centralized model within the IT department to support end users. This model enables merging most of the groups in a single (central) point for communication, which allows better allocation of resources, improved internal communication and incidents resolving [6].

Today, big corporations that have offices around the world, implement a virtual model of department to support end users. This model allows end users support within the departments located in different physical locations. The end users are able to contact the department for support through one contact phone, enabled by modern telephone routing technologies [7]. This method enables available of 24/7/365 days a year, regardless of department physical location.

Another approach which is very popular nowadays is e- support. This model is very widespread, because it allows better, faster and cheaper service. This model uses Internet and web as the primary communication channel [8]. End users use e- mail or website to contact the Department for support, or can access online resources such as knowledge base.

Which model the company will choose, depends on the needs and the technology that the company possessed. However, it is clear that a good customer support is essential for keeping the customers happy and most importantly, retaining them.

III. DEFINING THE REQUIREMENTS

In order to tailor a system that will satisfy the needs of its main stakeholders (students, teaching staff, administration, student service offices, employees at the UGD Info Center) and to make their work more efficient and more productive, structured survey technique was used for their requirements elicitation. Considering the current situation, where all the incidents are reported or forwarded to the UGD Info Center and there they are processed in a causal way, without any tracking and feedback, the results on the survey questions, revealed the necessity of an automated help desk system.

The survey was conducted among 85 participants, gender and percentage balanced from all stake holder groups. Majority of survey questions were offered with multiple choice answers. The results from the survey are presented in the following.

Table 1. *Your opinion about the current quality of services offered by UGD info center^a*

Answer	Number of Responses
Terrible	40
Bad	15
Neutral	20
Good	10
Very good	0

^aSingle answer allowed

Table 2. *What will be the benefit of implementing an electronic automized help-desk system^b*

Answer	Number of Responses
Saving time	67
Better coordination and visibility	70
Increasing the effectiveness and efficiency	65
Better productivity and flexibility	80
No advantages	4

^bMultiple answers allowed

Table 3. *What functions the help-desk system should provide^c*

Answer	Number of Responses
e-Cration of service incident	75
View of crated service incidents	72
Update an existing service incident	45
Attaching files to service incident	64
Creating notes to service incident	59

^cMultiple answers allowed

Table 4. *Which categories of service incidence should be provided^d*

Answer	Number of Responses
Question	79
Request	82
Problem	85

^dMultiple answers allowed**Table 5.** Which modalities for service incidence creation should be provided ^e

Answer	Number of Responses
Task	62
Fax	0
Phone call	79
Email	68
Letter	0
Meeting	9

^eMultiple answers allowed**Table 6.** Which templates should be provided by the system ^f

Answer	Number of Responses
Procedure for solving a specific problem	60
Question/answer for a given problem or situation	79
Solution to a given problem	69
General template	40

^fMultiple answers allowed

Considering the results of the survey the HelpDesk system was designed and integrated within the already developed information system.

IV. DEVELOPMENT OF THE SOFTWARE SYSTEM

Taking advantage of the existing Case Management process within MS Dynamics CRM platform (which is built within the overall student information system at the University), we developed automatic help-desk system which enables efficient and effective handling incoming service incidents by the end users through the automatic allocation of the responsible operator, escalation and resolving of these service incidents through implementation of uniform business rules using the plugin and workflow technology. The main advantage of the MS Dynamics CRM platform is the use of Internet as a tool for communication or more specifically web services. Web services enable simple integration and configuration of the applications, in order to meet business needs. Using a properly implemented web services, the interaction between the end user and the system is realized, through a dedicated web portal created for students, and a special web portal for teaching staff.

A service incident is simply an entry on the interaction between the client and the Department of Customer Support. When a customer is facing some problem, he contact the Department of Customer Support by phone, e-mail, or through a web form. This activity needs to be tracked, so the service incident is created. It can be created by all involved parties, regardless of their geographic location. When a new incident is created, a workflow is triggered

which determines if the client, reporting the problem, currently exists as a contact in CRM or not. If not the new record in the database is created. Using the contact information, an e-mail is send to the client, containing information about the reported service incident as a proof of successfully created incident. Activity records are added to the contact and service incident.

When a service incident is created, it triggers the procedure for granting a responsible operator (IT technician from the Department of Customer Support), that search which operator from the appropriate level is least loaded in terms of the number of open (unresolved) service incidents and assigns the service incident. In case there is more than one operator which is suitable to be assigned as responsible operator, the service incident is assigned by random. Then it's up to the operator to work on these new incidents and mark accordingly when completed. The mechanism for automatic assignment of responsible operator is realized by implementing the appropriate plugin trigger that triggers when a new service incident is created.

For resolving the service incident, operator first searches the database of knowledge, which includes all previously received incidents, in order to find the similar resolved service incident. Using the keywords, it is possible to search through the database of knowledge, on different category levels. If there is no previously resolved similar service incident, the responsible operator needs to resolve it first. If not, then he should assign the service incident to another operator from the superior level.

Different workflows are triggered when a service incident is closed (resolved), or reopened.

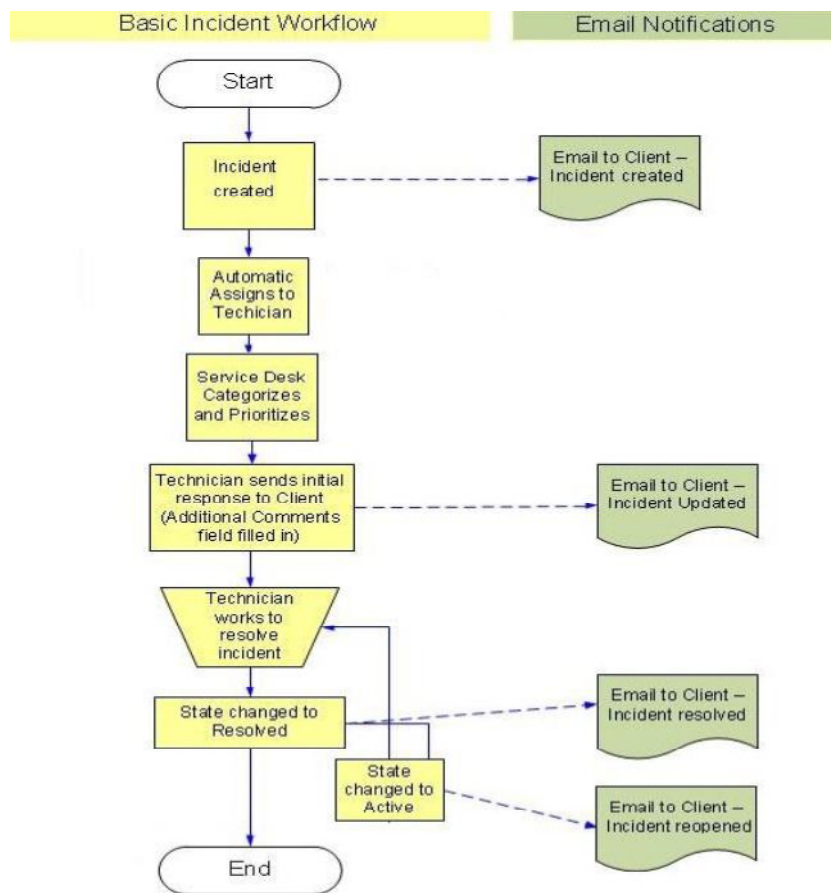


Figure 1. Activity diagram for service incident creation and solving

The system is designed so, it has built-in security, and only authorized users have access to appropriate parts of it. To enable data integrity and to support system reliability three new security roles for operators, regarding the levels of support, are defined.

V. EVALUATION AND DISCUSSION

After system implementation and in order to get a clear picture of the level of usability and satisfaction of the end users, the benefits of its use, a series of interviews with end users of all target groups were conducted.

Through interviews conducted between students, teaching staff and associates and officers of student services, 95% of interviewees were very satisfied with the implemented functionalities, great flexibility and simplicity in the process of interaction with the customer support department quickly and efficiently, filing service incidents, tracking their status, implemented automated way of informing and web reporting, as well as centralized and unified approach of incidence management. 85% of interviewees were satisfied with the way of implementing the functionality to search through the knowledge base and the ability to forward a specific item from the base of knowledge via email. Some of the interviewees (10%) gave suggestions for upgrading the system with the implementation of live chat operators.

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