A SOFTWARE APPROACH OF THE EQUIPMENTS QUALITY

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The quality requirements, in tight concordance with the quality management processes and relationship, result in a global, competitional and convergent frame, of the determinant factors and the market responses.

The paper deals with the designing the maintenance administration so that it could be integrated in the global software system of the organisation. There are developed three systems, MSQ Tech, PostTechnical and SATIS, which essentially improve the operational efficiency, reducing the waiting time and the general cost, and increasing the customer satisfaction.

1. Introduction

Optimisation of maintenance scheduling, replacement policies, evaluating the reliability of the systems subject to preventive maintenance are complex activities. And the system complexity increase exponentially if we consider also the human dimension of the reliability. A viable solution can be the system reliability approach from the angle of the close link among maintenance, integrated software systems and human aspect of the provider-customer relationship.

Generally, the equipment maintenance is, like any other function of a firm, an activity having its own objective rules, which can significantly improve the global functioning if there are consequently and coherently applied [1].

A suitable maintenance activity, based on a Computer-aided Maintenance Management System, takes over the problems concerning: task and responsibility distribution, real-time rendering topical and in the whole action sphere of the firm, monitoring the correct use of this information, offering some quick reports to the managers, and so on.

2. Methods

From the very beginning, the maintenance system was thought out as an integrated software system component, flexible and modular, adaptable to the specific requests and having the possibility to solve:

- Technical, financial and equipment usage administration.
- Administration of the human resources implied in the maintenance process.
- Spares administration.
- Activity administration.
- Maintenance process customisation depending on the firm essential features, combining the diverse maintenance types: corrective, preventive, predictive and conditional [2].
- Current works defining and monitoring.
- Administration of the service contracts, budgets and maintenance activity costs.
- Maintenance activity history.

An important element has been the product data management, with a view to make up a consistent and scalable database, considering all the evolution stages of the system. Thus, we have provided the information stocking and organising, the real-time accessibility and the control of the access and of the following functions:

- Data management
- Activity management
- Workflow management

Approaching in this manner the concurrent engineering implementation, as a process with its afferent sub-processes, it was allowed the achievement of a spectacular bettering in the efficiency, both of the organisational process and of the creative one, of services development. Thus, it was encouraged the frame setting up to the specific context of the Total Quality concept [3].

3. Research course and results

For the attainment of the research aims, we have used PC's and a various sort of software tools. For theoretical aspects implementing, we chose Delphi, a software product very appreciated by the programmers who want to develop Windows applications. The database administration is facilitated by its tools and the database engine on 32 bits permits the access at different database types, beginning with Paradox (chosen by us, for the optimum performance/cost ratio) and dBase, towards any ODBC server (including MS Access or FoxPro).

Being a multi-user software, for developing and testing we have used the Computer Network of the Integrated Software Systems Laboratory from the Electrical Drives and Automation Department of our university. Working in OS

Windows NT 4.0, it represents a good environment for the support of the desired quality of the integrated system we have created:

- Interdependence among processes.
- Security - the software is provided with username and password logging at definable levels.
- Flexibility - the database structure allows the attachment of new functions.
- Facility of use - through user-friendly interfaces.
- Quick results - in view of the approached implementing methods.

The new system has been applied since the second half-year of 1998. With a view to trace out the effects, we have been monitorised a series of equipments at which we had previous data too. The parameters of interest were:

- Non-operating time
- Waiting time for spares
- Total cost of the repairs
- Customer satisfaction

The data acquisition and processing operations have been achieved in a systemical view [4].

- Each equipment to be noticed as a complex system with a hierarchical structure.
- For each component to be gathered all the information.

The observation, data acquisition and processing must be organised for decision grounding towards reliability increasing. The results, reflected by two complex parameters, indicate the effectiveness of the method both in the case of operational time (Ratio Customer_Satisfaction / (Non_Operating_Time × Repair_Total_Cost)) and in that one of the waiting time for spares (Ratio Customer_Satisfaction / (Spares_Waiting_Time × Repair_Total_Cost)).

The necessary data for these parameters have been obtained after we realised and implemented, through original software, some complex systems:

- *PostTechnical* - for monitoring and analysing the Technical Service effect at the client. The code, written in Macro and VisualBasic languages, permits to view the result of the compared analyse (graphical transposed data) and of the obtained results synthesis (table captured data).
- *SATIS* - for monitoring the Customer Satisfaction degree administrating the requests/complaints of the clients. This implies a systematic feed-back, with both quantifiable and qualitative information, which could also determinate the expectation horizon of the customers.

These systems have been integrated to the system for global monitoring of the maintenance and quality, *MSQ Tech* (Maintenance, Service, Quality & Technical) that is provided with a user-friendly graphical interface with the view of facilitating the quick approach of all the components.

4. Future research

For the system development we intent to use Oracle's OLAP (Online Analytical Processing) features which provide functional, scalable tools for creating and maintaining big databases [5]. We want to integrate these enterprise applications in Java programs, a Web site and Intranet/Internet content, aided by the secure, scalable foundation of Oracle8i.

5. Conclusions

The concurrent engineering methods require the computer system approach from a new viewpoint, namely the ability to run, with great credibility, increasing complex applications, especially regarding to the information and data management. The efficiency will be not considered in respect of the individual task achievements, but of the co-operative work-frame degree.

We have studied the possibility of realising and we have designed a software, *MSQ Tech,* for the maintenance integration in the informatic system of the firms that distribute equipment and supply also the service. Two other original systems, *PostTechnical* and *SATIS*, support data processing in a common relational database. This fact has been permitted through the study of some elements in connection with the services reliability, considering some complex ratio parameters.

These have induced an essential improvement of the maintenance activity and the profitability.

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