

*Dejan Vidojevic*

*Tax Administration  
Headquarters Belgrade, Serbia*

*Branislav Jeremic*

*University of Kragujevac,  
Serbia*

## **Technical Support as a Basis of High Availability Level And IT System Service Quality**

**Abstract:** *This work presents the development and implementation methodology of technical support in IT<sup>1</sup> system operation. Methodology is developed and applied in realistic system (Information system of the Tax administration - DIS 2003), which is technically very complex and highly distributed. The results of IT system availability assessment and identification of the critical components are input parameters in the process of establishing of the technical support. The importance of technical support for achieving optimal IT system availability and IT service quality is assessed according to its operation during one year. The history of technical support system operation is a basis for further continuous improvement.*

**Keywords:** *technical support, availability, IT system, IT service, quality*

### **1. INTRODUCTION**

The design for high Availability needs to consider the elimination of single points of failure and/or the provision of alternative system components. It provides a minimal disruption to the business operation and a decrease of the downtime level to elements. The design also needs to eliminate or minimize the effects of planned downtime to the business operation normally required to accommodate maintenance activity, the implementation of Changes to the IT Infrastructure or business application.

*Serviceability* describes the contractual arrangements made with *Users IT Service providers*. This is to assure the Availability, reliability and maintainability of IT Services and components under their care. It is important to recognize that Serviceability in itself cannot be measured as a specific metric. It is the Availability, reliability and maintainability of IT Service and components under their care that must be measured.

The *technical support* system includes the

established processes, procedures and organization for support, the purpose of which is to ensure the serviceability and high availability level of IT system.

### **2. INPUTS INTO DEVELOPMENT PROCESS OF THE TECHNICAL SUPPORT**

This work presents the development and implementation methodology of technical support in IT<sup>1</sup> system operation. Methodology is developed and applied in realistic system (Information system of the Tax administration - DIS 2003), which is technically very complex and highly distributed.

The infrastructure of the Tax Administration's information system is based on the Information and Telecommunication network (ITC). Currently, the system provides services for **234** information "addresses" on **167** locations represented by the Tax

Administration's organizational units, where 7.457 workstations or system users are placed. ITC network is a highly distributed and complex technical system with respect to the high degree of organizational units' dislocations, and therefore the management, maintenance and improvement methodology is very complex.

Within the real system a previous analysis by the availability measurement methodology has been implemented. On that basis, the most critical elements of the system have been identified.

An important risk element of the system availability results from the lack of development of the IT organization. It reflects on the absence of clearly defined operation processes and procedures, which should be implemented in work operations. It is identified that there are neither clearly defined standards for development of the *technical support system*, nor for development of tools for management of activities of the functionality reinstatement, when an IT system failure occurs.

By an identification and analysis of the system critical elements, the conditions for implementation of the technical and technological improvements, which will provide the implementation of availability management process, have been met.

### 3. DEVELOPMENT OF THE TECHNICAL SUPPORT SYSTEM

The availability management should also ensure that within this design activity there is focus on the design elements required to ensure that when IT Services fail, the service can be reinstated to enable normal business operations to resume as quickly as is possible.

The way the IT organization manages failure situations can have the following positive outcomes:

- ü Normal business operations are resumed quickly to minimize impact on the business and users;
- ü The Availability requirements relating to reducing of the business costs result from the effective and timely recovery of the system failures;

ü The IT organization is seen as responsive and business oriented.

To provide an effective 'design for recovery' it is important to recognize that both the Business and the IT organization have needs that must be satisfied. The business requirements include business needs relating to impact of system failure on business processes, communication with users and business partners. The IT's needs are reflected in processes, procedures and tools, which ensure the technical recovery of the system failures and performance within an optimal timeframe.

In the process of designing the recovery of system failures, it is very important to define owners and management roles of the *IT Technical Support Department*. Within the management process of recovery of system failures and IT organization, there have to be defined and executed the following:

- ü Stringent implementation of procedures;
- ü Clearly defined roles and responsibilities for handling major Incidents;
- ü Clearly defined communication plan to support the process implementation.

It is important to recognize the differences between the activities within the system incident's life:

- ü Incident start;
- ü Incident detection;
- ü Incident diagnosis;
- ü Component repair;
- ü Component recovery;
- ü Service restoration (and verification).

The provision of a timely and accurate estimation of when service will be restored is the key issue for meeting the business requirements and positive impact on the business. Providing information relating to the business requirements and system maintenance planning makes the basis for forming the metric system reporting on the effects from the failure recovery process.

From another point of view, all IT components should be subject to a *planned maintenance* strategy. The frequency and levels of maintenance required varies from component to component and depends on the technologies involved, criticality and the potential business benefits that may be introduced.

Planned maintenance activities enable the IT support organization to provide:

- Preventative maintenance to avoid failures;
- Software or hardware upgrades to provide new functionality or additional capacity;
- Business requested changes to the business processes;
- Activation of new infrastructure features for exploitation.

The effective management of planned downtime is an important segment in meeting the required levels of availability.

#### 4. IT ORGANIZATION FOR THE TECHNICAL SUPPORT

The development process of the technical support system includes the development and establishment of the IT technical support department. In the real system as shown in the Section 2, for the purposes of the technical support system development, the separate department has been established.

The *IT Technical Support Department* consists of two units:

##### 1. Help Desk

The scope of activities of the Help Desk unit is as follows:

- Resolving of technical defects and problems in the IT system functioning;
- Technical assistance and support to the users when using the IT system services;
- Managing problems of the IT system functioning.

The Unit covers 5 geographic locations according to the organizational chart (Picture 1), where 17 experts from this area have been engaged. The organizational units' dislocations covered by the IT system are affected by the organizational structure of the Help Desk unit, which consists of 4 Regional Centers and the Head Office.

Within the Unit there are clearly defined procedures and work instructions. As a mean of support to implementation of the help desk business processes, the software application „*Help Desk*“ has been developed. The application is available on all workstations, or to all users of the IT system, through the ITC network within the continuous on-line regime.

All users may report the noted technical defects and problems within the IT functions through the application, by their personal identification therein and simple description of the problem incurred. As short as possible, the responsible persons from the regional center unit, according to their territorial competence, shall answer the particular question and the resulting solution shall record in the *knowledge base*. The coordination, management of the Unit's operations and updating of the knowledge base perform the professionals who belong to the expert group Head Office. The solution of the problem shall be available immediately after being recorded in the knowledge base, to all system users. The application allows for communication between the expert groups from the Regional Centers and the Head Office in order to resolve problems more efficiently and to consult each other.

Within the functions of the technical support system the alternative communication manner through the phone lines for particular cases has been developed

##### 2. Maintenance Desk

The scope of activities of the Maintenance Unit is the failure recovery and planned maintenance of the computer, communication and additional equipment integrated into the IT system.

The Unit covers 5 geographic locations according to the organizational chart (Figure 1), where 19 experts from this area have been engaged. The organizational units' dislocations covered by the IT system are affected by the organizational structure of the Maintenance Desk Unit, which consists of 4 Regional Centers and the Head Office.

Within the Unit there are clearly defined procedures and work instructions. As a mean of support to implementation of the component failure recovery business processes, the software application „*Failure report*“ has been developed. The application is available on all workstations, or to all users of the IT system, through the ITC network within the continuous on-line regime. The application may use, in each business organizational unit, only persons who are appointed as responsible for identification and failure reporting of the system components. The noted failures shall be reported through the application, by

identification of the failing system component and short description of failure.

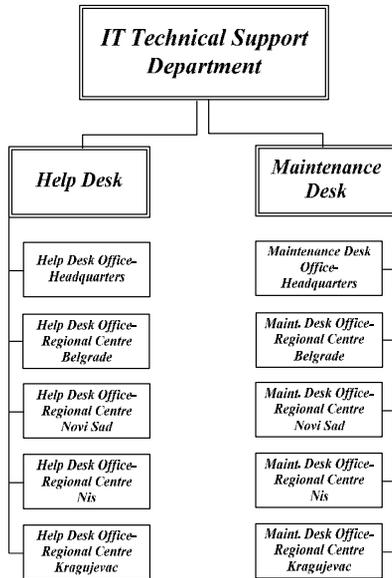


Figure 1. IT Technical Support Department organizational structure

As short as possible, the responsible persons from the regional center and/or Head Office Unit, according to their territorial competence, shall initiate the implementation of the failure recovery, defined in Section 3, which is the life cycle of system failure (Figure 2). The first steps are failure detection and diagnosis, being performed by the phone contact with the person who has reported the failure. If the nature of the failure is trivial, the person who reported it shall recover the failure, with the technical assistance by phone of the competent person from the Regional Center and/or Head Office. If the failures are too complicated, the failure recovery process and reinstatement of the system shall perform the expert from the Regional Center and/or Head Office. The repair of components shall be performed either on the location of equipment, or, if delivery of the equipment is possible, in the Regional Center and/or Head Office.

The application completely supports the maintenance process, including the

documentation management (work orders, warehouse packing specifications and so on).

The coordination, management of the Unit's operations and updating of the application perform the professionals who belong to the expert group Head Office.

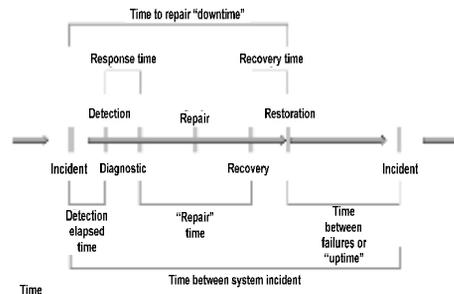


Figure 2. Incident "lifecycle" [4]

The IT Technical Support Department consists of the experts covering the following areas:

- Availability management;
- Computer and Business Operations;
- Network Management;
- Problem Management;
- Change Management;
- Help Desk;
- Maintenance Management;
- Service Level Management.

Within the availability plan for IT system, the resources to be engaged within the IT organization for technical support have been identified and defined in advance.

## 5. FURTHER DEVELOPMENT AND IMPROVEMENT DIRECTIONS

On the basis of one-year period, from the used applications, the reports representing the history of the technical support system functioning have been generated.

For one-year period of work (01.01.2006. – 31.12.2006.) of the **Help Desk** unit, on the basis of generated reports, the following statistical data could be listed:

- **12.794** noted technical defects and problems in IT functioning have been reported;
- **11.984 (93,7%)** of reported problems resolved;

ü Within the predefined period of (urgently-3 hours or normally-24 hours), **56 (0,4%)** of reported problems resolved;

ü **754 (5,9%)** of reported problems have not been resolved within the predefined period;

ü The knowledge base has been formed containing **1.550** particular problems resolved.

On the basis of data collected it is possible to form the statistical reports according to following criteria, important for further analyses and improvement of the technical support subsystems:

ü Identified technical defects and problems according to problem criteria;

ü Identified technical defects and problems according to relative IT system components;

ü Number of resolved problems within the predefined period .

For one-year period of work (01.03.2006. – 01.03.2007.) within the *Maintenance Desk* unit, on the basis of generated reports, the following statistical data could be listed:

ü **2.548** failures of the IT system components reported;

ü **1.322 (51,9%)** of work orders according to failures reported opened;

ü Without opening the work orders within the predefined period (urgently-3 hours or normally-24 hours) **1.226 (48,1%)** of reported failures recovered;

ü Within the predefined period **1.207 (91,3%)** of opened work orders closed;

ü **115 (8,7%)** of work orders not resolved within the predefined period.

On the basis of data collected it is possible to form the statistical reports according to following criteria, important for further analyses and improvement of the technical support subsystems:

ü Detected failures according to failure categories;

ü Detected failures according to relative IT system components;

ü Number of failures recovered within the predefined period.

The collection and recording of the abovementioned data pertain to IT component downtime (planned and unplanned) and make a basis for the forecasting and reporting of Availability. It would be usual to find this

information available from the IT organization, or its parts relating to IT Service delivery, system maintenance and availability management.

To improve the accuracy and quality of information it is recommended that component downtime detection and data recording be highly automated.

The results from collected data analyses initiate the availability improvement process of IT system. As a support to key activities of the real IT system availability management process and technical support improvement in its functioning, a number of methods are being implemented:

ü Component Failure Impact Analysis - CFIA;

ü Fault Tree Analysis - FTA;

ü Calculating Availability;

ü Calculating the Cost of Availability;

ü Systems Outage Analysis - SOA;

ü The Incident Lifecycle;

ü Continuous Improvement Methodology.

A guiding principle of Availability Management is to recognize that it is still possible to gain customer satisfaction even when things go wrong. One approach to help achieve this requires that the duration of any Incident be minimized to enable normal implementation of business processes and operations.

Availability management should work closely with incident management and problem management in the analysis of unavailability incidents.

## 6. CONCLUSIONS

The primary purpose of the availability management process is to ensure that the availability requirements agreed with the business for IT Service(s) are consistently met. The availability management might also have an important role in future optimization of existing IT structure and ensure the availability level improvement at the low costs.

To help achieve these aims availability management needs to be recognized as a leading influence over the IT support organization to ensure continued focus on availability and stability of the IT infrastructure. Continuous improvement is a key element of 'Quality Management' utilized to empower staff to implement improvements

that benefit the business and user (Figure 3).

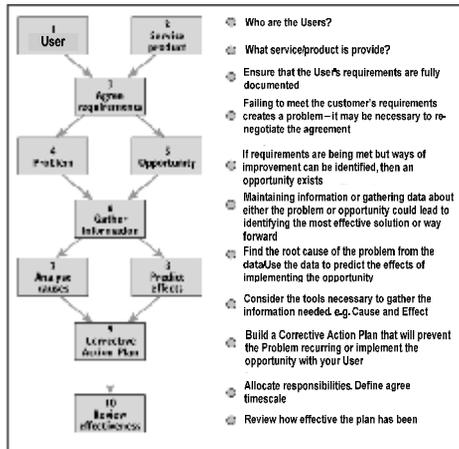


Figure 3. Continuous Improvement Methodology [4]

On the basis of technical support functioning analyses within one-year period, the benefits for concrete business organization

have been realized as follows:

- ü By forming the internal **IT Technical Support Department**, the services which the external organizations were delivering in the previous period, have been taken;
- ü The costs for maintenance of IT system by the internal IT organization are **40%** lower annually, compared with the service costs paid to the external organizations;
- ü The **knowledge base** on the technical defects, functioning problems and system failures have been formed;
- ü The staff within the IT organization for the availability, incidents, and operational IT system problems management has been trained.

The most important benefit from the technical support system, for achieving the optimal IT system availability and IT service quality, is reflected in identification of possibilities to increase the availability level according to detailed analysis of data on problems and failures.

**REFERENCES:**

[1] \*\*\*Project – Development of unique information and telecommunication network of the Tax Administration – project documentation, Tax Administration – Head Office, Belgrade, 2005

[2] \*\*\*Project study - Unique information and telecommunication network of the Tax Administration – project documentation, Tax Administration – Head Office, Belgrade, 2005.

[3] \*\*\*Information system DIS 2003 - technical documentation, Tax Administration – Head Office, Belgrade, 2002-2005.

[4] \*\*\*ITIL (Information Technology Infrastructure Library), Office for Government Commerce–OGC, British Government, London, GB, 1990.

[5] \*\*\*BS 15000 – I:2002 (IT service management), British Standard Institute-BSI, Office for Government Commerce–OGC, IT Service Management Forum-itSMF, London, GB, 2002.

Recived: 10.03.2007

Accepted: 25.04.2007

Open for discussion: 1 Year