Carrying out Performance Audits in the context of IT Audit:  
The Case of the Turkish Court of Accounts

I. Introduction

The Turkish Court of Accounts (TCA), thanks to the amendment made to the Law on TCA in 1996, was entitled with the authority to carry out performance audit and nearly 20 performance audit reports have been accomplished hitherto.

The TCA examines whether the public institutions, organizations and projects within its audit mandate are using their resources effectively, efficiently and economically.

In the context of information technology (IT) audit, the TCA either carried out performance audit of IT environment or covered the IT issues related to audit topics.

Firstly, the TCA prepared a performance audit report aimed to examine and evaluate the activities carried out within the framework of “e-Transformation Turkey (eDTr) Project”. In this performance audit study, TCA assessed the activities concerning the technical infrastructure of e-Government and some other IT processes such as the establishment of the e-Signature, e-Portal, Electronic Document Management System (EBYS) and ensuring the widespread service delivery.

Secondly, some of the performance audit studies handled by the TCA, also included some IT issues which were related to audit topics. These are the performance audits of “Combating Nosocomial Infections”, “Prevention Activities against Traffic Accidents” and “Coordination of Infrastructure Works by Metropolitan Municipalities”.

In this paper, we discuss the two different type performance experiences in the context of IT audit.

II. Example of a performance audit of IT environment: Performance Audit of e-Transformation Turkey (eDTr) Project

Developments in information technologies which affect all dimensions of life and eradicate time and place differences have led to the establishment of a vision in all countries and regional unions. Such a vision envisages the transformation of the society to an information society; keeping up with the rapid changes in the world; accessing to the
information with qualified manpower and producing and utilizing. In line with the developments in the world, the subject has also been put in the agenda of the European Union and an e-Europe Strategic Plan and Action Plans have been adopted with a view to realizing this vision.

As a reflection of these developments in the world, several studies have been conducted in our country as well since 1990s. The Transformation Turkey Project (eDTr) which was the subject of the study constitutes a comprehensive and significant progress in this field. Since the year 2002, the date at which the project was initiated; two action plans have been prepared and put into practice. A strategic plan which would ensure that the project and the actions were determined and implemented correctly could be finalized as of July 2006.

**Audit Issue**

The eDTr Project covers a vast area including;

- The establishment of the Information Society Strategy which shall be the road map during the transition from the traditional society to information society; from the production-consumption economy which is based on labor to information economy;

- Preparation of the technical infrastructure through which the services shall be delivered and ensuring the information security,

- Formulation of the regularity and legal framework,

- Planning and training of the human resources required by the information society

- Delivery of services in an electronic environment without the intervention of bureaucracy,

- Establishment of the standards which shall provide reference to the studies of the entities which are carried out so as to ensure that they deliver interoperable, integrated services,

- Development of the electronic services in the fields of health and trade.

In this performance audit study, TCA examined the activities in the eDTr Project within the framework of the following questions:

- Are the activities within the eDTr Project being carried out in coordination?

- Is an appropriate infrastructure being established for a sustainable e-Government?

- Is the cost effectiveness ensured in the activities carried out within the context of the eDTr Project?
**Audit Objective**

The objective of this audit activity is to take necessary measures on due time with a view to:

- Developing a strategic plan for the project through prioritizing the activities carried out within the eDTr Project and implementing it in coordination,

- Increasing the effectiveness in the public services through harmonizing the objectives of the activities aimed at re-engineering the public sector and the eDTr Project,

- Redefining and simplifying the business process in the public entities by taking the public sector management reforms into account and ensuring that the public services are appropriate to be delivered in the electronic environment,

- Establishing a technical infrastructure suitable for an e-Government which shall ensure network security and interoperability in the transformation of public services to electronic environment,

- Determining the costs to sustain the eDTr Project and sub-projects such as e-Portal, e-Signature, internet connections at schools; the benefits to be obtained from the project and the measurement criteria for these;

- Utilizing from the resources economically and efficiently by preventing repetitions and losses in the resources through ensuring that the eDTr Project and the IT investments are monitored on the basis of work/time/cost.

**Audit Methodology**

Performance audit team examined whether the eDTr Project and the IT investments within the Investment Program for the years 2003–2005 were monitored on the basis of work/time/cost and assessed the documents and the reports regarding the monitor and evaluation of the IT projects at State Planning Organization (DPT). The studies on the Project conducted so far by the governmental organizations and the NGOs which are within the scope of the eDTr Project were examined comparatively by taking the information and documents prepared by DPT as basis.

The team assessed sufficiency of the budget resources in eDTr Project and IT investments and also utilized the previous studies made by the other Supreme Audit Institutions (SAIs), international organizations and the literature. The current developments were followed through attending the conferences, symposiums, congresses organized at home.
On the other hand the performance auditors examined e-Signature and information security at DPT and Scientific and Technological Research Council of Turkey (TÜBİTAK) and e-Portal at DPT and Turk Telecommunication Company (TTAŞ) by taking the documents and data as basis and the auditors made interviews with academicians and experts in this field.

Audit team also conducted a survey in order to specify and evaluate the practices regarding the e-services and studies for e-signature, the dimensions of their dependency to technology, the adequacy of the human resources well informed and experienced in the field of IT and the studies which were made with a view to detecting the needs for IT investments of the public entities. By means of the mentioned survey, auditors assessed whether the public entities had re-engineered their business processes regarding their services that they would deliver in an electronic environment as a preparation to e-Government or not.

The studies concerning the Public Certification Center (KSM) were examined on site in Gebze the National Research Institute of Electronics and Cryptology (TÜBİTAK-UEKAE). The audit team made a logic model together with TÜBİTAK with a view to determining the costs, significant expenditure items and the ones that can be saved among them and detecting what may be the practices that can lead to sunk cost if measures are not taken on due time. A similar study was launched to be applied for e-Portal; however, it could not be finalized since an addressee could not be found due to the fact that the responsible entity for the establishment of portal was changed and the procedures for the transfer were not completed.

Audit Findings, Results and Recommendations

In the context that mentioned above; the performance auditors assessed the coordination, monitoring and evaluation of the activities carried out within the eDTr Project and the costs of this project and the Information Technology (IT) investments, the activities concerning the technical infrastructure of e-Government. In this paper we try to narrate the findings, results and recommendations of the audit team about the IT investments, the activities concerning the technical infrastructure of e-Government under the below headings;

a) Internet Infrastructure and Alternative Communication Technologies; The development of the information society and delivery of the e-government services in a better way depend on sufficient internet infrastructure and access possibilities. As stated in the eDTr action plans; investments of the e-Government with coordination in line with the priorities and needs of our country is of great importance for the success of the e-Transformation of Turkey. For this reason; TCA recommended that a strategy should be established in order to ensure
rapid, uninterrupted, economic and secure access and delivery of the service of “internet access” infrastructure to all the parts of the society and this strategy should be carried out on time and within coordination.

**b) Digital Divide and Universal Services:** Today, on another issue as important as the establishment of the information and communication Technologies (ICT) infrastructure in the e-government services is the fair access of the public to this technology. Shortly, if the digital divide which can be regarded as injustice in the access to ICT is not eradicated, the ICT investments which have high costs will remain idle. TCA recommended that in order to develop and implement accurate policies concerning the issue of decreasing the digital divide; first the situation analysis of our country should be carried out. The actions should be planned and finalized in due time so as to deliver rapid, uninterrupted, secure and inexpensive access, decrease the geographical and social inequalities, cover the all and present alternatives to the users.

**c) Qualified Personnel:** The planning, implementation and maintaining of the projects realized within the scope of the eDTr Project require qualified and experienced personnel in the field of IT. TCA recommended that the existing and needed human resource inventory required in the public and private sector should be prepared and the IT personnel should be trained so as to increase their knowledge in this field. In order to ensure the sustainability of the e-Government, in the areas such as software which require continuous support and resource; the precautionary measures should be taken which shall decrease the dependency and ensure that our human resource is trained.

**d) e-Inclusion:** Apart from the transfer of the public services to electronic environment, it is important to increase the demand to these services and the rate of usage within the framework of a specific plan. In our country the rate of IT ownership and internet access is low. Moreover this rate decreases more in the low income groups and displays critical differences according to the geographical regions. In order to make the services to be transferred to the electronic environment widespread, TCA recommended that the practice of the citizens in using the e-Government services should be encouraged by giving priority to the services which are easy to use and enable time and cost saving. On the other hand measures should be taken so as to create opportunity to deliver internet service to all socio-economic parts of the society with reasonable prices.
e) e-Portal; With a view to decreasing the red tape, time losses, mistakes and high costs that are created by the traditional delivery of the public services especially the ones that can only be completed by applying to more than one entity (combined services); the establishment of a developed public portal enabling access to central and categorized information from one single point, in other words, e-Portal is put on the agenda with the eDTr Project in our country, as in many other countries. In order to establish a flexible, secure, sustainable e-Portal whose architecture is well designed, TCA recommended that; an organizational structure should be constructed which is comprised of cadres competent and experienced in IT, system integration, e-Government architecture, public business processes. Its coordination with the eDTr Project and strategic plan should be ensured in the best way. The operations for the establishment of the portal should be carefully controlled. In order to ensure the security of the personal and public information, necessary legal and technical measures should be taken.

f) e-Signature; “Electronic Signature” (e-Signature) is one of the instruments which are important in terms of information security in an electronic environment. In the transactions made in electronic environment, it is possible to secure the indispensable elements of information security such as proof of identity, integrity, privacy and undeniability by means of e-signature technologies. In Turkey as of the end of the year 2005, there was not much progress in the transformation of the public entities to the e-signature. Besides, no study had been conducted on the topics such as the readiness of the entities, until which date the entities were required to pass to e-signature, with which priorities and by using which technologies; risky fields, disaster scenarios, proposed solutions, cost-benefit analysis and feasibility studies, the duty and responsibilities of the entities in the operations, methods and resources of finance. TCA recommended that in order to establish an e-signature system of which interoperability and security are ensured; to make its usage widespread and prevent the repetitions in this field of investment; the existing infrastructure and the business procedures should be reviewed and made ready for the usage of e-signature. A comprehensive and coordinated transition plan should be prepared so as to determine which entities start to use e-signature at what date.

g) Electronic Document Management System (EBYS) The e-Government services require the compatible operation of the electronic record systems with each other which shall be set up at the entities. With the e-signature legislation and the publication of the regulation enabling official exchange of electronic letters; there was no legal barrier for electronic correspondence. Thus TCA recommended that, in order to make the electronic correspondence widespread in the public sector; The Reference Model for the Criteria of Electronic Document Management
System should be regulated in accordance with the conditions of our country by considering its consistency with e-signature and be finalized as soon as possible; the software standards that must be applied should be established and put into practice. On the other hand necessary precautionary measures should be taken in order to obtain the implementation software on EBYS which ensures unity and consistency in the implementation and the entities need in order to prevent wasteful expenditure and repeated investments.

III. Performance Audit Studies covering certain IT Issues related to Audit Topics

1. Combating Nosocomial Infections

Nosocomial infection (Hospital acquired infection) is an infection acquired in hospital by a patient in whom the infection was not incubating at the time of admission and appearing within 48 to 72 hours after admission or within 10 days after discharge.

Nosocomial infections (NI) increase the duration of hospitalization, treatment costs and works lost, in advance cases it may even lead to deaths and threaten not only patients but also hospital staff.

As is seen in the whole world, NI constitute a significant problem in Turkey as well. Although there are difficulties in accessing sound data, the ratio of NI in Turkey is regarded between with the ratio of 5-15 per cent. On the other hand, especially the death of a former Minister and frequently seen infant deaths due to NI had been discussed extensively by mass media. So the TCA decided to carry out a performance audit over the activities combating NI which are handled by the relevant authorities.

Audit Objective

Main objective of this audit was to contribute in raising awareness and the level of knowledge concerning the importance of NI at all parts of society and to leverage the effectiveness and efficiency of such activities and maintaining their sustainability.

Audit Issue

The audit study dealt with the activities combating NI under the following main titles:

- Planning of activities combating nosocomial infections and the effectiveness of its organizational structure,

- Effectiveness of nosocomial infections surveillance and prevention activities.
Within this context, TCA examined and evaluated the NI surveillance system under the headline “Is there a modern information and record system at the hospitals which is monitoring rates of the risky areas in terms of nosocomial infections?”

**Audit Findings, Results and Recommendations**

It is necessary to collect data of the activities to combat with the NI systematically and it is also necessary to report, analyze and interpret these collected data and to inform the personnel in charge of NI or authorities timely with these data. Efficient and systematic surveillance of NI established in hospitals will be implement all these necessary elements.

At most of the hospitals in Turkey, an effective and systematic surveillance system that is to display the status of NI cannot be developed. According to the analysis of NI activity reports of the year 2005 prepared by Refik Saydam Hygiene Center Presidency; with the ratio of 57 per cent of the hospitals affiliated to the Ministry of Health did not conduct surveillance. With regard to existing NI surveillance at hospitals, on the spot audit the performance auditors observed that an effective and systematic structure had not been established and there were still deficiencies.

It is necessary to use a special software to implement an effective surveillance system. In most of the hospitals (approximately 68 per cent), there was no special software for NI surveillance. The audit team determined that NI control nurses were carrying out the procedures manual. On the other hand, although some of the hospitals were using computer programs for NI surveillance, some of these programs were not suitable for the structure of the hospital so they could not be used efficiently. These programs were not allowed to send the data to the Ministry of Health over the internet. Therefore, the Ministry gave start to the studies for a web-based program which all the hospitals can use as well as the Ministry can follow all the data. This program, named “National Nosocomial Infections Surveillance Information System” was at the testing phase during the audit. So the audit team couldn’t test the program effectively.

TCA recommended that “National Nosocomial Infections Surveillance Information System” should be structured effectively, supported by necessary technical equipment and personnel, and implemented as soon as possible. This software should be expanded to cover all hospitals. Data on nosocomial infections obtained within the surveillance system from the hospitals should be compared with the data collected from the other hospitals at home or abroad.
2. Prevention Activities Against Traffic Accidents

In Turkey, thousands of lives are lost while tens of thousands of people are injured in traffic accidents every year. Broken and vanished families as well as those disabled due to traffic accidents display the social dimension of this phenomenon whilst treatment costs of injured and material damages adversely affect economy.

There is a high risk of traffic accident in Turkey, because of the road transportation with the ratio of 95 per cent and road haulage with the ratio of 92 per cent. So, the statistical measure of “deaths per 100,000 vehicle”, which is considered as a significant data in terms of traffic accidents; is 16 in 2003 at certain OECD countries, while being 44 in Turkey.

In Turkey fifteen different boards, institutions and organizations are vested with authorities to ensure traffic safety. The activities for ensuring traffic safety such as traffic engineering, traffic training, traffic legislation and control, emergency rescue are handled by these authorities. In parallel with increase in traffic accidents, injury and death toll has increased since 2003. So the TCA decided to carry out a performance audit over these activities which are handled by the fifteen authorities.

**Audit Objective**

Objective of this audit was to contribute to the continuous improvement of prevention activities against traffic accidents dramatically leading to loss of life and property.

**Audit Issue**

The topic of the audit was “Effectiveness of Prevention Activities against Traffic Accidents”. The audit team examined the activities within the framework of:

- National strategies for ensuring traffic safety;
- Traffic training;
- Traffic control;
- Traffic signing and marking.

Within this context, TCA examined and evaluated the Traffic Information System (TIS) under the traffic control headline.

TIS was put into action in 2003 within the Highway Improvement and Traffic Safety Project (KITGİ). The main purpose of the system is to conduct the traffic control activities efficiently with the help of systematic data.
TIS consists of three subsystems. These are:

- Mobile Application Subsystem
- Internet Applications Subsystem
- Decision Support Subsystem.

**Mobile Application Subsystem:** Criminal questionnaire of the driver and vehicle records and the penalty scores of the drivers are carried out over the network by the help of tablet computers. Also with this subsystem the traffic patrols can be monitorized on the digital map, the communication between the patrol and the head office can be provided in a very short time and the reports about the activities of the traffic patrols can be produced.

**Internet Applications Subsystem:** The aim of this subsystem is to serve the statistical data and the regulations about the traffic activities to the citizens over the internet. This system can also be used in house by the officers.

**Decision Support Subsystem:** The aim of this subsystem is to produce the statistical data for the administrators who make the decisions about the traffic regulations.

**Audit Findings, Results and Recommendations**

On the spot audit, the auditors determined that TIS, aiming at modernizing traffic controls with technological opportunities, could not be used effectively. Geographical Information System (GIS) as well as digital maps at provincial level necessary to get expected benefit from TIS, had not been drawn. If these points were implemented, it would be determined particularly where the traffic accidents were happened intensely and the patrols would be directly observed where they work. But the audit team found out that only a digital map covering the whole country was prepared, the GIS and the digital maps at provincial level was not prepared.

The connection with the traffic control patrols is provided with the tablet computers over the GSM. The patrols can make criminal questionnaire of the driver and vehicle records and the penalty scores of the drivers in a shorter time than the radio connection. When the computers are online, it can be easily traced where the patrols are working. Besides all the questionnaires that made by the patrols can be seen on the monitor in the center of TIS at the same time, so the statistical data can be consolidated in a short time. Within the Mobile Application Subsystem 234 tablet computers were purchased and they delivered to the patrols.
which are working on the 4500 km route with the ratio of 80 per cent of the traffic accidents occurred all over the country.

To get optimum efficiency from TIS, key element is effective use of tablet computers. However, the performance auditors detected that as of 07.24.2007, out of 234, 98 laptops were sent to General Directorate of Security Affairs during 2005, 2006 and 2007 and kept there for repair, and 13 tablet computers were unserviceable. Moreover, the audit team observed during audits that most of the time, tablet computers were not used actively due to the facts that batteries did not last long, GSM network could not be established at every point or was interrupted, there were difficulties in integration of tablet computers to patrol cars, and traffic police preferred using radio connection instead of using tablet computers.

Only increasing the number of the tablet computers instead of finding solutions for the problems that mentioned above will contribute very little to increase the efficiency of the TIS on the traffic controls. Hereby, to get optimum efficiency from TIS that aiming at modernizing traffic controls with technological opportunities, TCA recommended effective use of TIS should be ensured. Digital maps at provincial level and GIS should be prepared to get expected benefit from TIS. Problems about the connection network, deficiencies in terms of infrastructure and usage should be eradicated.

3. Coordination of Infrastructure Works by Metropolitan Municipalities

Rapid population growth at metropoles as well as dense and structuring without appropriate plans have led to an increase in demand for utilities services and consequently, in the resources used for the construction and maintenance of utilities. Coordinated planning and operation of infrastructure (water, sanitary sewer, gas, electricity, telephone etc.) and superstructure (asphalt-paved road, sidewalk, etc.) is of great importance in terms of prevention of repetitions, wastage of time and resources, interruptions in vehicle and pedestrian traffic as well as ensuring a smooth and uninterrupted daily life during infrastructure works. In other words, provision of utilities services in a way that does not interrupt daily life of citizens through efficient and economic use of resources requires an effective planning and coordination.

In today's world and accordingly in Turkey, as a reflection of policies towards expanding the authorities of local administrations, duty to coordinate infrastructure works was assigned to metropolitan municipalities (MMs) and for this purpose Infrastructure Coordination Centers
(ICC) were established in all MMs with the Law No:3030. Although scope of duties entrusted to MMs was expanded with legal arrangements made later on, sufficient progress could not be achieved in coordination of municipal infrastructure works in Turkey.

Due to above-mentioned reasons, TCA decided to carry out a performance audit about this topic and audit topic is determined as “Coordination of Infrastructure Works by Metropolitan Municipalities”.

**Audit Objective**

The purpose of this audit is to ensure that MMs eradicate defects in implementation, and Ministry of Interior, as administrative trusteeship, improves policies and legal arrangements relating to coordination of infrastructure works to bring in necessary measures with a view to leveraging effectiveness in coordination of infrastructure services at MMs and preventing resource waste.

**Audit Issue**

Within this framework that mentioned above, the performance audit team examined the works between the years 2004-2006 of MMs, other municipalities located within the metropolitan municipal borders, organizations and institutions operating intensively with expanded facilities within municipal boundaries and providing water, gas, electricity and telecommunication services.

Audit topic was studied within the following questions:

- Has a proper structure that ensures the coordination of infrastructure works within MMs been established?
- Are infrastructure works in MMs coordinated in such a manner that is to ensure cost-effectiveness?

Within this context, TCA examined and evaluated the “Infrastructure Information Systems” (IISs) as a part of Geographic Information Systems (GISs).

**Audit Findings, Results and Recommendations**

For effective and good planning, coordination and monitoring of urban infrastructure; “Infrastructure Information Systems” (IISs) including up-to-date, complete and integrated information concerning infrastructure facilities and roads have great importance. At most MMs, regular and up-to-date infrastructure and superstructure data facilitating coordination has
not been documented. With legal arrangement made after 2004, municipalities were held responsible for establishing their geographic and city information systems.

In the audit work, the auditors examined and evaluated that whether there is IISs are established at MMs and utilities, what extent IISs, GISs were utilized and facilitated coordination of infrastructure works. It was found that at most utilities, IIS was established as of July 2007. However, establishment of IIS alone is not adequate. In order to obtain expected benefit, IISs must be based on accurate, up-to-date and adequate information.

GIS is grounded on building development plans prepared in digital environment, which are named also as "footing" in literature. However, since existing building development plans do not constitute an accurate and reliable ground for GIS; MMs and utilities are obliged to obtain satellite image and air photo individually for their information systems. Establishment of GIS via using different footings leads to problems at coordination of infrastructure works.

Another important issue for IIS is the data related to infrastructure lines including their coordinates. Existing IISs are far from including up-to-date, valid, reliable, complete and integrated data covering the whole infrastructure within the borders of MMs and are not open to access of relevant institutions. Besides, works on information system were conducted without coordination; interoperability of systems of MMs, other municipalities as well as infrastructure undertakings and data sharing were not taken into account.

TCA recommended that at MMs, a unified IIS covering also utilities and other municipalities, which is based on up-to-date, valid, reliable and complete database, should be developed in a coordinated manner. In this information system, apart from information on underground lines and municipal road and sidewalk constructions, data related to the type and features of materials used, infrastructure capacity, horizontal and vertical positions with coordinates, date of construction and its life cycle, which are of vital importance for planning of infrastructure coordination, should be placed.

IIS as a part of GIS is also an important cost item in the coordination of infrastructure works. In audit work the auditors determined that the activities about the IIS were carried out completely without planning coordination of infrastructure works and interoperability of GIS. IIS can be developed through use of map in digital environment as footing. With this aspect of it, digital maps named as footing are of vital importance in GIS. At many MMs, each utility prepare its own maps according to its needs and program. GISs are developed by using
incompatible footings and thus, these systems cannot be used in the coordination of infrastructure works, this in turn leads to double costs and work repetitions.

In order to benefit from GIS in the coordination of infrastructure works, TCA recommended use of same footing by MMs and utilities, its periodic update and interoperability should be ensured. Hence, efforts towards establishing GIS-IIS at MMs should be evaluated within the scope of infrastructure coordination and cost-reducing measures should be taken.

**IV. Conclusion**

The audits we pointed out above are not designed as IT audits. They are performance audits including studies on some selected information systems and using some IT audit methodologies. We know that a huge amount of money is spent for the IT Systems with the enormous budget allocations. On account of this, the effectiveness, efficiency and economy of these systems should be given more importance. To ensure it, separate IT performance audits should be carried out.

Although IT audit infrastructure studies have been completed and IT Audit Manual have been developed, separate IT audits are not carried out by the TCA. There are some acceptable reasons for this, like intensive works on new Financial Audit Methodology development, but partly or completely, the reasons are not adequate to explain the matter.

Nowadays, the importance of the IT audit becomes more apprehensible in Turkey and also in TCA. This importance comes especially from the auditors’ needs of reliability of data within the financial audits. There is an audit process on Information Technologies assessment in the financial audit works. But this process is carried out by the financial auditors. Therefore these assessments remain superficial according to the separate IT audits. This issue is also valid for IT evaluations within the performance audits.

Lastly, not only the big expenditures but also the different practices of the Turkish public institutions for the similar information systems, sound the alarm for the TCA to audit these systems. And these audits should be separate IT audits not focusing on specific issues, but going at corporate IT Governance.