

## An Intelligent Database System implemented for E-government

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**Abstract** - The aim of this paper is to develop an Executive Information Systems (EIS) for Taiwanese military internal auditing. Through military internal auditing, the military operations' strengths and weaknesses are determined from an objective standpoint and with a fair basis. However, in recent years, the frauds of military internal auditing have increased, and the redresses of military organizations from the Control Yuan (the highest governmental auditing institution) to reduce the internal frauds and enhance internal auditing mechanism. The research results show that several control phases within the internal auditing plan have to be improved, and the military organizations have to be effectively adapted to improve performance. This paper attempts to employ the theory of Executive Information Systems to the procedure of military internal auditing. This research built a web-based Executive Information System with the relational database framework, and provided a friendly user interface and on-line access prototype system. It will be used to support executives' leadership and decision-making references and enhance the military organizations' internal management function. The results are satisfactory and meet the needs of military internal auditing.

**Keywords** - E-government, Intelligent Database Systems, Executive Information Systems, Internal Management

### I. INTRODUCTION

In the face of growing global democracies, it is inevitable that there are growing pressures on the auditing procedures for more transparency and adoptive to changes. It is hence imperative to consider the revamp of current strategies in the most efficient and economic means possible to meet these changes. The Internal Audit Department serves to provide an objective and unprejudiced assessment of accounting procedures of various departments within the Organization, to provide necessary guidance and advice to the strategic utilization of funds, and hence the overall improvement of the defense capabilities gained from monetary savings and efficiency. In order to reduce internal frauds that plagued in recent years, there is an acute need to strengthen the Internal Audit mechanisms. Through the analysis, the research results show that several control phases within the internal auditing plan have to be improved, and the solutions of the improvement must be effectively adapted into the military organizations. This paper also attempts to employ the theory of Executive Information Systems to the procedure of military internal auditing. The Executive Information System is a web-based architecture designed by the relational database framework, which will build up a friendly user interface and on-line access prototype system. It will be used to

support executives' leadership and decision-making references and enhance the military organizations' internal management function.

The remainder of this paper is organized as follows. Section 2 reviews relevant literature correlate with the intelligent database system. Section 3 the implement of intelligent database system. Section 4 system processes and structure. Closing remarks and future work are presented in Sect. 5.

### II. AN OVERVIEW OF INTELLIGENT DATABASE SYSTEM

Rockart et al developed Executive Information Systems (EIS) in the 1980s that aimed to provide for executive level administrative needs [10]. Watson et al (1991) believed that the EIS provided the executives users a simple and interactive interface, coupled with the functions to extract, sift, compress and search in relevant databases. EIS also have the abilities to categories data, analyze trends, monitoring irregularities and back tracing functions[8]. In recent years the EIS had been successfully integrated into other applications and fields such as strategic planning, commercial activities, competitive reports and medical research and treatment [9,14,21]. This paper attempts to integrate the working concepts of the EIS into the national defense internal auditing mechanism, providing assistance various levels of the management in their current workings, and smoothening the working procedures of the audit department itself.

Internal audit refers to the audit on control of accounts, monetary and assets management, administrative recording and proper procedures. It served to as a standardization of operations among various departments, in our case here, the various government agencies' or statutory boards' internal department. The implementation of Internal Auditing strengthens the management of the defense, the efficient use of defense funds which leads to higher operational capabilities. He felt that the roles of the internal audit are: I . Audit Roles. Internal Audits demands high standards of working efficiency, a rigorous planning and budgeting in order to meet stipulated deadlines. II .Roles of ensuring clean practices. The audit on monies and assets determines correct practices and proper accounting in order to prevent frauds and waste. III . Supervisory Roles. Internal Audits could assist in finding flaws in managerial practices that could be corrected. VI. Improvisation Roles. Internal Audits employs a systematic and programmatic analysis of work procedures, providing the necessary solutions and

improvisations to the various departments.

In 2002, Liao proposed that in order to solve repetitive problems, the analysis of past experiences and trends to predict and extrapolate inclinations could be useful [17,18]. The research of Lindup revealed that auditors are required to understand thoroughly the workings and principles of internal audit for them to be able to even start resolving the current problems [13]. Oliphant, in 1995, wrote that he believed that auditors learning and using the Internet skills could enhance their proficiencies on the job [1]. Naor et al suggested the tracing and auditing of information systems and internet workings could prevent fraud and corrupt practices [6,20]. This paper approaches the integration of the EIS into the National Defense Ministry from a perspective of solving the current systematic loopholes. The integration model would analyse reports on accumulative data and irregular transactions, and providing accurate accounts and transparency in workings[2,3,4,5,7,11,12,15,16,19,22].

The Ministry of Defense in strengthening the management of the national defense, ensuring the efficient utilization of defense funds and improving working procedures, complied to the “Ministry of Defense and various Departments Internal Audit” Act and other constitutions. Such measures made it compulsory for departments in the Ministry to be subjected to internal audits, scheduled checks on various departments’ accounts, and improvements forwarded for implementation to the Department Heads for consideration. The Internal Audit Department is the chief subordinate of National Defense Statistics Department, and its jurisdiction covers the 6 constituent departments of the Ministry of Defense namely the Headquarters of Army, the Headquarters of Navy, the Headquarters of the Air Force, the Headquarters of Joint Chiefs, the Headquarters of Defense Reserves and the Chongshan Science College. Within the Headquarters there are audit offices peculiar to that of the Headquarters themselves which handles the internal budgeting, accounting and audit of its own subordinate branches. (see Figure 1).

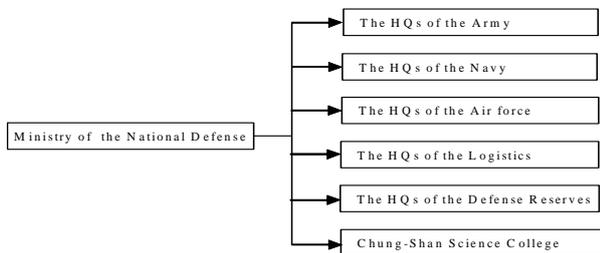


Fig. 1. Hierarchy of the military internal auditing organizations

### 3. The implement of Intelligent Database System

#### 3.1 The implement of EIS on military internal Audit

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funds and improving working procedures, complied to the “Ministry of Defense and various Departments Internal Audit” Act and other constitutions. Such measures made it compulsory for departments in the Ministry to be subjected to internal audits, scheduled checks on various departments’ accounts, and improvements forwarded for implementation to the Department Heads for consideration. The Internal Audit Department is the chief subordinate of National Defense Statistics Department, and its jurisdiction covers the 6 constituent departments of the Ministry of Defense namely the Headquarters of Army, the Headquarters of Navy, the Headquarters of the Air Force, the Headquarters of Joint Chiefs, the Headquarters of Defense Reserves and the Chongshan Science College. Within the Headquarters there are audit offices peculiar to that of the Headquarters themselves, which handles the internal budgeting, accounting and audit of its own subordinate branches. The National Defense Statistics Department is responsible for the implementing Internal Audit policies and directives, conducting the internal audits and controls on the Ministry’s subordinate branches and various management levels, and assisting the Internal Audit Department police and counsels its operations. And every Headquarters of the Ministry are responsible for implementation and promulgation of the Internal Audit policies and directives to its own auditing offices and various subordinates.

#### 3.2 Procedures of Internal Audit

The Internal Audit is divided into 4 main stages namely: Planning, Execution, Completion and Reviewing in chronological order.

**Planning Stage:** The planning stage is defined the scope and perimeters of the audit itself. The consolidation and analysis of related documents in preparation, the studies of relevant regulations and directives and finally, the convening of the Audit team for the Preparatory Meeting for the exchange of opinions and preliminary findings.

**Execution Stage:** The Execution Stage refers to the actual audit carried out as per stated in the Planning Stages. This stage covers the audit the defined scopes, the recording of practices, reviewing past mistakes. These mistakes include deficits in accounting which the auditors will readily attempt to advise and suggest improvements. The failure of clarity and ambiguous supporting documents should be enquired and discussed upon amiably and professionally to avoid unnecessary conflicts.

**Completion Stage:** The Auditors will conscientiously record the problems and suggestions, and from these records and findings compile an audit report that covers the work scope, the items noted for improvements and suggestions discussed with the audited parties.

**Reviewing Stage:** After completion stage, all matters pertains to policies, directives and regulations as well as items of standardization within the National Defense, or major issues that belong to a higher command decision that cannot be resolved, will be referred to the respective specialist departments for their decisions and authorities

over such matters. Major faults of the involved departments should be reviewed.

For us to be able to identify the flaws in the audit processes, this paper attempts to review the Internal Audit processes by listing out the flow chart (see Figure 2) and various stages of the Internal Audit processes.

Step 1: The Internal Audit panel had been convened, and compilation, understanding the audited departments' annual fiscal policies and budgeting, the workings and peculiarities, the current financial situation and the review of previous errors and improvements in place from previous audits. Finally, the Preparatory Meeting shall convene for the examination of preliminary findings.

Step 2: Coordinating with the audited departments and personnel responsible. The audited department will prepare the documents, receipts that are in subject to audit for the auditing team.

Step 3: The auditing team commences the audit based on the Scope listed in the planning stages, and conscientiously recording the good points and the mistakes of the practices.

Step 4: The auditing team will review the previous infringements and note the corrections put in place.

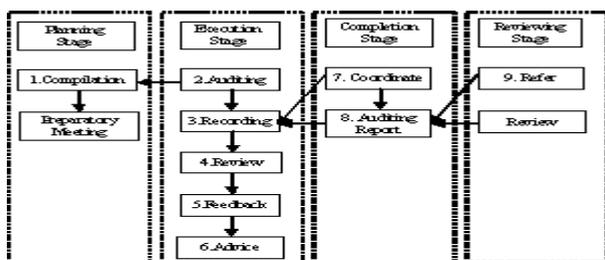
Step 5: Completing the audit, the auditing team provides the necessary feedback on the findings to the audited departments and offers suggestions and solutions; in the event of a disagreement the onus lies on the audited department to raise its arguments or organize meetings to smoothen the differences.

Step 6: The auditing team will continue to advice and monitor improvements on the practices In place to remedy the faults in accounts and other administrative flaws.

Step 7: The conclusion of the audit after both parties agree on salient points raised by the auditing team.

Step 8: The auditing team commences on the Audit Report that includes a summary on the working practices, issues to be remedied upon and suggested solutions that were discussed.

Step 9: After completion of the report, all matters pertaining to policies, directives and regulations as well as items of standardization within the National Defense, or major issues that belong to a higher command decision that cannot be resolved, will be referred to the respective specialist departments for their decisions and authorities over such matters. Major faults of the



involved departments should be reviewed.  
Figure 2 The procedure of the military internal auditing

## 4. System processes and structure

### 4.1 Processes of Executive Information System Processes

This paper aims to improve on the current flowchart of the internal audit process (see Figure 3) by using means of computerization into the proposed electronic system in Figure 4. In Figure 4, the Rectangles represent processes the auditors will need to physically participate; the Thicker-outlined Rectangles represent processes that are proposed to be computerized; the Ovals represent processes that after computerization which still required the auditors to complete; the Arrowheads represent the flow of the processes forward. The working explanations of the Electronic Internal Audit processes are as follows:

Step 1: The auditing team utilizes an Executive Information System (EIS) to search, understand and research on the audited departments annual fiscal policies, financial budgeting and actual financial status, as well as review previous errors and improvements from the database. With the available ready information the Preparatory Meeting is convened.

Step 2: The auditing team transfers the electronic documents pertaining to the scope and preparations to the audited department for its concurrence and coordination with the audited departments and personnel responsible. The audited department will prepare the documents, receipts that are in subject to audit for the auditing team.

Step 3: The auditing team commences the audit based on the Scope listed in the planning stages, and conscientiously recording the good points and the mistakes of practices into the Executive Information System (EIS).

Step 4: The auditing team will review the previous infringements and note the corrections put in place and conclude all observations into the Executive Information System (EIS).

Step 5: Completing the audit, the auditing team provides the necessary feedback on the findings to the audited departments and offers suggestions and solutions; in the event of a disagreement the onus lies on the audited department to raise its arguments or organize meetings to smoothen the differences.

Step 6: The auditing team will continue to advice and monitor improvements on the practices In place to remedy the faults in accounts and other administrative flaws.

Step 7: The conclusion of the audit after both parties agree on salient points raised by the auditing team.

Step 8: The auditing team commences on the Audit Report that includes a summary on the working practices, issues to be remedied upon and suggested solutions that were discussed. The Executive Information System (EIS) is used to compile the Audit Report based on compilation of various observations in the audit.

Step 9: After completion of the report, all matters pertaining to policies, directives and regulations as well as items of standardization within the National Defense, or major issues that belong to a higher command decision that cannot be resolved, will be referred to the respective specialist departments for their decisions and authorities over such matters. Major faults of the involved departments should be reviewed.

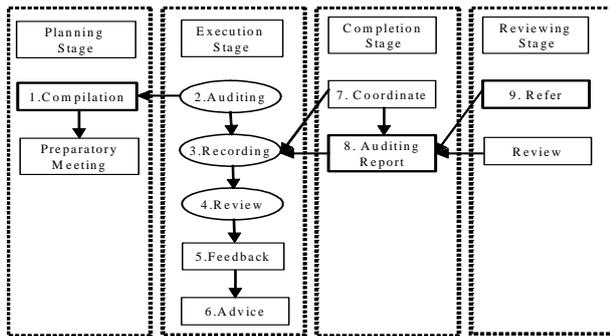


Figure 3 The procedure of electronic auditing

## 6. Conclusion

Due to globalization and the fast grow of World Wide Web, the organizations now had to deal with more and more information and information system. Internal Auditing is primarily about the accurate searching and counterchecking of accounts and adhering to standardized procedures. This paper approaches the integration of the EIS into the National Defense Ministry from a perspective of solving the current systematic loopholes. The integration prototype would analyze reports on accumulative data and irregular transactions, and providing accurate accounts and transparency in workings. The prototype had not fully integrated the internal audit procedures because in future developments, a possibility of a fully electronic system of internal auditing could be integrated.

### 4.2 Structure of Executive Information System

In accordance to the requirements of the System processes, we came up with the required structures in place shown in Figure 4. The Database will comprise of these 4 elements:

User database: The information required for both auditors and audited departments to maintain the finance records, as well as databases for contacts, addresses, roles and key appointment holders. Different user rights are maintained through exclusive passwords.

Legal database: Contains the necessary directives and regulations for ready references.

HTML database: This database contains the Internal Audit Department's templates for annual plans and records of audits, audit reports, enquiries and relevant documents for the Internal Audit Department.

Internal Audit database: An exclusive database for the interior workings for the department itself.

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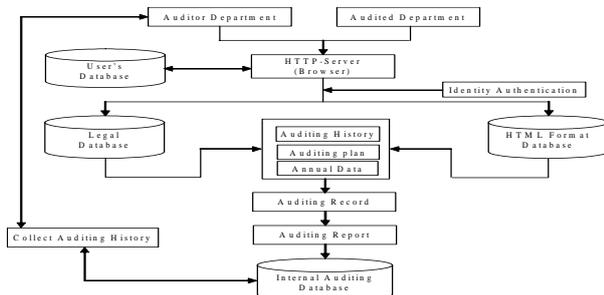
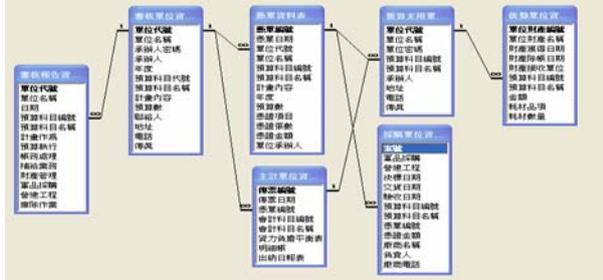


Figure 4 The architecture of electronic auditing system

## 5. System implementation

### 5.1 Design of system database

The System works on a Relational Database in accordance to the relations established in Figure 4. There are 7 main tables required namely the Audit Table, Receipts Table, Accounting Departments' Table, Budgeting Departments' Table, Reserves Departments' Table, Procurement Departments' Table and Audit Reports Table. They can be further classified by virtue of user groups: User Databases comprise of Audit and Budgeting Department Tables, Legal databases comprise of Receipts and Accounting Tables, Internal Audit Databases comprise of Reserves and Procurement Departments' Tables and the HTML Database contains templates for Audit Planning, Internal Audit Reports, Enquiry Reports, Audit Records. These templates are



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