

The Need for Automated Support,  
Expert Audit Support Software,  
The Microcomputer as an Audit  
Tool, Introducing Microcomputer  
Technology, The Impact of  
Microcomputers

# Microcomputers in Auditing

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*PAYOFF IDEA. Microcomputers have provided EDP auditors with access to productive methods and techniques to help them accomplish their work. The use and application of microcomputers has led to greater productivity and improved audit quality, given that an appropriate level of planning and training has taken place. This article discusses how microcomputers can be used effectively in the EDP auditing environment and what steps should be taken to successfully adopt and apply this technology.*

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## PROBLEMS ADDRESSED

The application of microcomputers to the EDP auditing process should be used to solve the following audit problems:

- The inability to effectively capture, sort, and analyze information.
- The inability to minimize the auditor's time in performing the repetitive tasks associated with financial scheduling.
- The low productivity and quality associated with manual tasks.

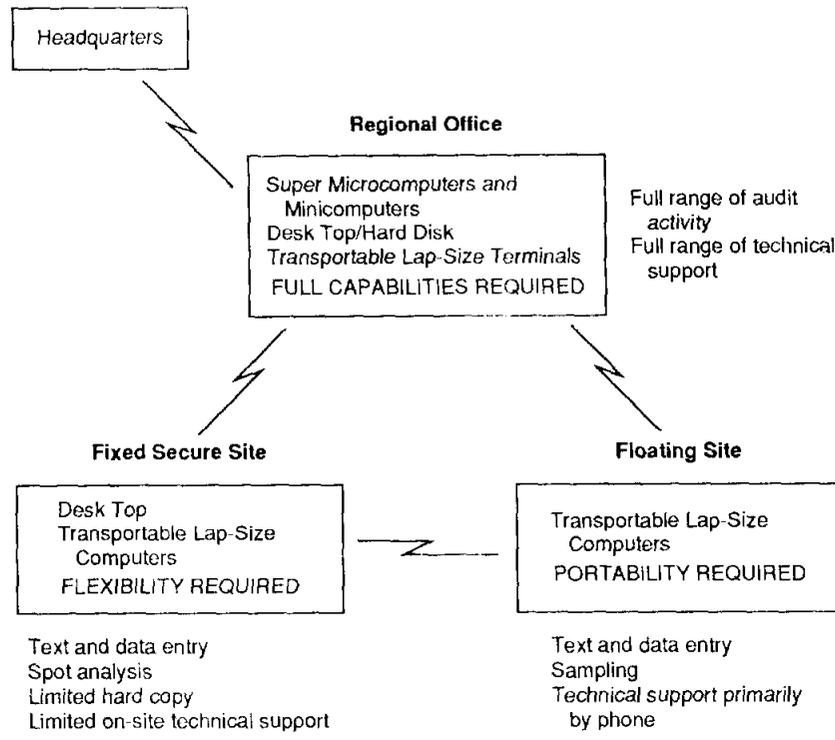
Senior management should adopt an orderly approach to integrate this technology into the daily operations of the auditing function.

## THE NEED FOR AUTOMATED SUPPORT

EDP auditing involves a complex and iterative investigatory process that includes the collection of data from a variety of sources. Tests and reviews are performed to establish patterns or conditions for subsequent information gathering. This methodological process is exploratory in nature, and each step of the way could trigger an unanticipated new direction. The objective of EDP auditing is to determine the relevance of the data and make recommendations for improvement.

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**Exhibit 1. Equipment Mix for Audit Support**



The EDP auditor is part of an investigative team whose place of work is transitory. Mobility is a key aspect of EDP auditors' jobs, and approximately 40% to 60% of their work time is spent on the road at various audit sites. Therefore, auditors need some type of portable computer resource to meet the challenges of their environment. The following scenarios illustrate EDP auditors' need for microcomputers while at the audit site (see Exhibit 1).

**The Need for Appropriate Software at the Site.** When EDP auditors are scheduled to be at a particular distant site, what software should they take along in anticipation of the expected work? Even if the audit had been specified beforehand, surprises can still occur once the auditor is on the scene. Because it is virtually impossible to predict all contingencies, some form of ad hoc access to a centralized software file or electronic audit support bulletin board is necessary along with the appropriate audit support tools.

**The Need to Access a Foreign Computer System.** When accessing a foreign computer system, should EDP auditors depend on the availability of someone else's terminal and unfriendly host software, or should they produce their own software for host operation? In addition, how should the auditor achieve the cooperation of the local MIS department in order

to set up a desired operating environment that may interfere with ongoing processing? EDP auditors would benefit from having their own computer systems to solve the problem.

**The Need for System Portability.** Working papers that are needed by the auditor may be physically dispersed at the site of the audit, which can include many offices in several different buildings. In addition, there may be files, people, and equipment that need face-to-face confrontation. This type of data collection requires a portable system that can easily be packed up and moved from site to site.

**The Need to Process Data Onsite.** Once EDP auditors are onsite and faced with an abundance of data, they must solve the matter quickly and efficiently. Instead of building a vast data base for subsequent analysis in the privacy of their home offices, EDP auditors can more cost-effectively zero in on the pertinent data and derive insight from the situation while at the scene of the investigation. Therefore, the computer support that is required is not simply for data entry, data selection, or sampling but for sorting, comparing, formatting, and producing tabular as well as graphical output. In order to further enhance productivity, it is also necessary to have the power of a word processor to produce a final report.

**The Need for a Versatile Communications Facility.** Because the auditor operates as part of a team, the need to share data as well as communicate with other members of the group is important. In addition, auditors may occasionally need to operate from a host computer terminal yet still have all the capability of a dedicated desktop processor. Therefore, it is necessary to have the computer hardware, protocol handlers, desired terminal software emulators, and high-speed modems at the audit site.

**The Need for a Friendly User Interface.** Although EDP auditors are trained analysts, they are not computer professionals. Therefore, a user-friendly interface will allow the auditor to perform a more efficient audit.

### **Expert Audit Support Software**

During the past 10 years, expert audit support software has been tested and implemented in such areas as tax and financial auditing. These challenging and complex systems require the storage of knowledge and the reasoning of a domain expert. As information is entered into the system, it analyzes the information and provides the user with possible solutions to a problem or alternatives to a situation. This evolutionary system offers tremendous potential in the accounting and auditing professions. Their capabilities are outlined in Exhibit 2.

### **The Microcomputer as an Audit Tool**

Several major studies performed by accounting firms and professional societies have identified many potential benefits of microtechnology. Because

**Exhibit 2. Expert Systems Support Facility**

<b>Function</b>	<b>Tasks</b>
Audit management	Work paper development and maintenance Project and audit scheduling Budgeting Narratives, summaries and graphics
Telecommunications	Transaction and file capture Auditor-to-client-to-office communications Electronic mail
Expert support	Compliance with audit policy Alternatives analysis Assertion planning Risk assessment
Systems security	Work paper manipulation Cross-reference and validation Trial balance and statement consolidation
Systems validation and verification	Simulation Modeling Statistical testing Data verification and validation

auditors have their own microcomputers, they do not have to disrupt the client's MIS operations. The audit staff can do the work itself rather than rely on the personnel of the audited firm to provide computer support. The auditors now have state-of-the-art technology to match that used by the client; they no longer need 14- or 21-column paper spreadsheets. In addition, audit independence has increased, and auditors can better assess whether the data supplied by the client was accurate and well supported.

For example, in a recent study on the impact of microcomputers by the EDP Auditors Association, the respondents acknowledged the following trends in business and auditing as a result of the impact of microcomputers:

- The predominant use of microcomputers for audit administrative support is in word processing, scheduling audits, and budgeting.
- The predominant use of microcomputers for general audit use is the spreadsheet—However, microcomputers are also used for forms generation, sampling, graphics, and automated work papers.
- More than 84% of the respondents indicated that their companies use microcomputers for either administrative functions or management analyst tools.
- Sixty-five percent of the respondents stated that physical security audits are the most widely performed EDP audits— Reviews of management controls, application controls, and operational controls are also common.
- Seventy-eight percent of the respondents felt that microcomputers are new tools that can help make EDP auditing more productive.

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- In-house or informal microcomputer training is the most widely used training method—The most popular medium for providing training is computer-aided instruction or personal instruction with not more than 10 students in a class.
- Seventy-three percent of the respondents felt that the best way to educate EDP auditors is for the organization to design and offer microcomputer courses.

Many of the Big 8 accounting firms have stated that microcomputer technology has enhanced their audit effectiveness and efficiency by approximately 20% to 45%. Several of the specific benefits cited were:

- Spreadsheet software avoids extended delays when modifications to spreadsheets are necessary—The ability to quickly edit or modify a given product is greatly enhanced.
- Manual handling, sorting, calculation, and recalculation of data can be eliminated or greatly reduced.
- Data is more accurate, timely, and readily retrievable than when prepared manually.
- The cumulative recording of data decreases work in later cycles.
- Calendars and tickler files reduce the number of missed due dates.
- Word processing reduces the turnaround time for drafts, rewrites, and final documents.
- The graphic display of information contained in data bases or spreadsheets enhances the presentation of data
- The ability to use information for projections and what-if analyses enhances the quality of audit work.
- The evolution of microcomputer-based expert systems to provide suggested solutions or answers to specific problems has also increased audit quality.
- State-of-the-art technology has improved employee morale—Employees now feel that management appreciates and recognizes their needs.

The Inspector General's Office has recently taken steps to more precisely understand how microcomputers can be used within the audit environment. In 1983, the Computer Audit Committee, under the President's Council on Integrity and Efficiency, launched an aggressive program to train several thousand auditors to use portable microcomputers. The committee met its goal of increasing the efficiency and effectiveness of the Inspector General's work. By 1987, the Inspector General's Office reported the following benefits:

- Auditors from the Department of the Interior used microtechnology to analyze royalty payment data and uncovered a \$1.5 million underpayment by oil and gas companies.
- An official from the Computer Audit Committee reported that savings for performing certain types of audits using microcomputers ranged from 24% to 75%.
- A former Department of Transportation official cited startling results achieved by the department's auditors, including 318 indictments, 272 convictions, and \$40 million in fines, all of which was accomplished with the assistance of portable microtechnology—These tools helped

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auditors uncover widespread bid rigging in federal construction projects. The Department of Transportation's auditors experienced a 25% improvement in their productivity.

The US General Accounting Office, the watchdog of congressional spending, has conducted similar studies that concur with the benefits cited by other agencies and firms. In addition, it cited that microcomputers can provide the ability to:

- Access agency data directly from its centralized systems for use in audit analyses.
- Share analyses and findings with sister agencies (e.g., the Congressional Budget Office) for comparative purposes.
- Share applications and develop templates for ease of data transcription and analysis.
- Generate graphics for congressional reports and briefings.

In its recent internal studies and publications on the use of microtechnology, the GAO has cited productivity gains of 30% to 50%. However, some of the productivity gains could be measured in either staff hours or dollars. In some instances, offices were able to take on more work and work that was previously impossible to perform with existing resources. Microcomputers not only helped the agency's EDP auditors perform their tasks more efficiently and effectively but also allowed them to better execute other collateral responsibilities, such as budgeting, management reporting, accounting, auditing, and financial reporting.

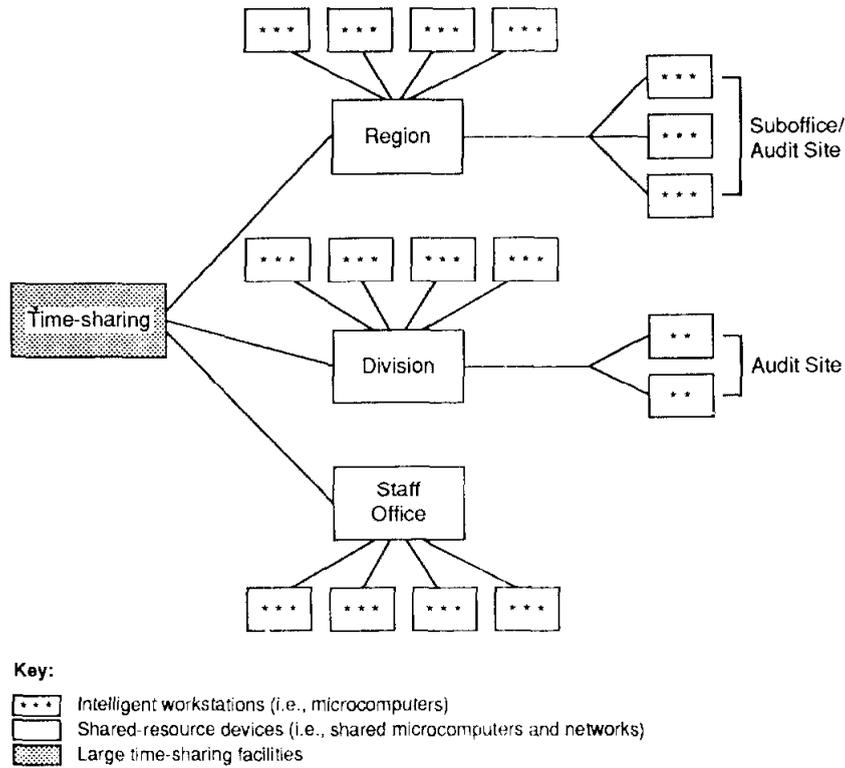
Other federal, state, city, and county audit organizations have integrated microcomputers into their audit operations. The federal agencies that have been able to do so include NASA, the Department of Agriculture, the Department of Education, the Department of Transportation, the Department of Defense, the Air Force Audit Agency, the Defense Contract Audit Agency, and the Naval Audit Service. In addition, similar uses of these tools have been reported in the audit departments of various city, county, and state audit organizations (e.g., the California State Auditor General's Office, the County of San Bernardino Auditor-Controller Office, and the City of New York Auditor's Office).

### **PREPARING AN AUDIT ORGANIZATION FOR MICROTECHNOLOGY**

There are two ways to introduce change into an organization. The first is sudden and the second is planned or staged. Because microcomputers can represent significant organizational resources and significant potential for either productivity or waste and lost opportunity, they must be managed properly and integrated into the organization carefully. The major concerns for EDP audit management to address are:

- How to plan for the integration of microcomputer technology into the company.
- The pace of introducing this new technology.
- The impact of this technology on the organization.

**Exhibit 3. Mission-Support Architecture for an Audit Organization**



EDP audit management's goal is to successfully integrate this technology into the work place along with other sources of automation (see Exhibit 3).

**Planning**

Determining the role that microcomputers will play is a key step in planning for most organizations. Several questions have to be asked within the organization to properly assess the potential application of this technology. These questions are:

- What role will microcomputers have in the organization, and how will they fit into the overall plan?
- What level of skill does the organization have in place to accept this technology?
- How will this technology be used now and during the next five years?

Exhibits 4 and 5 illustrate an organization's potential role and uses for microtechnology. The key point of both of the exhibits is that the organization must examine its needs and assess the potential impact that microcomputers will have on the way an audit is performed.

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Management should also assess the skill level of the audit staff to determine how much training and preparation will be needed before microcomputers can be successfully introduced into an organization. Assessing skills can be done through staff interviews or questionnaires. The proper skills required for microcomputer proficiency are:

- Prior knowledge or exposure to data processing and microcomputers.
- Analytical skills (e.g., math, logic, and qualitative methods).

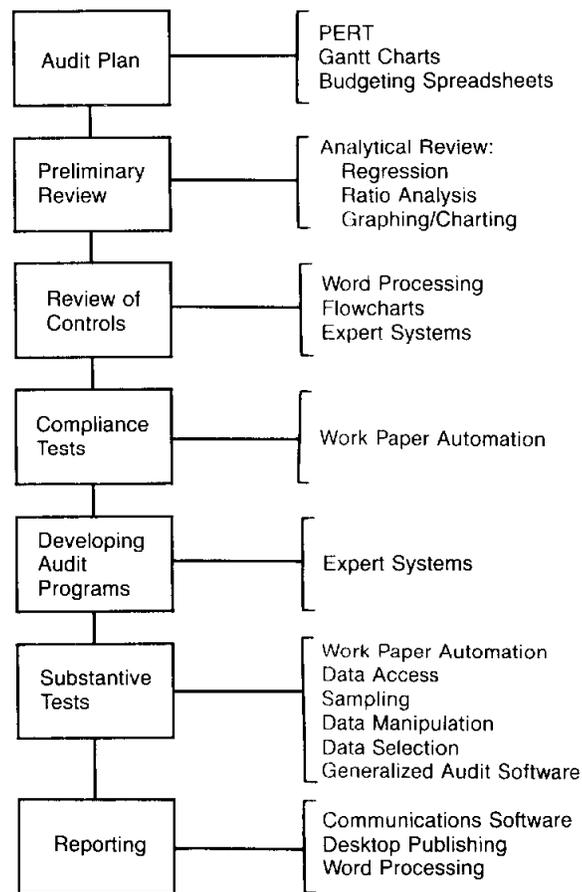
In addition, it is important for the staff to be open minded to the introduction of new technologies.

### Introducing Microcomputer Technology

Microcomputers should be introduced into the audit function so as to:

- Facilitate their use.
- Minimize disruption.
- Facilitate an orderly transition to the new environment.

**Exhibit 4. Audit Steps and Microcomputer Applications**



SOURCE: Casper Wiggins and Christopher Wolfe

**Exhibit 5. Uses of Microtechnology**

<p>Support Field Auditor's Needs</p>	<p>Data capturing and downloading          Word processing          Data management          Statistical manipulation and analysis</p>
<p>Support Requirements for Comprehensive Analysis</p>	<p>Modeling and graphics          Uploading to larger resources          Requires use of SPSS-PC, SAS-PC,          or other analytical package</p>
<p>Support the Capability to Transfer Applications to Other Locations and Clients</p>	<p>Data files (ASCII)          Applications          --Higher-level languages          --Family software          --Expert support systems</p>

One way to accomplish these goals is through pilot projects, which can be extremely useful in preparing the organization for new technology. A pilot project can help determine the appropriate support activities and effective ways to provide support to the users. It can also help an organization determine what applicable policies and guidelines should be established to facilitate and control the application of microcomputers.

In several recent surveys, respondents cited the use of pilot projects as a way of achieving success in introducing microcomputers. The respondents identified specific areas in which microcomputers could be used, including:

- Planning and budgeting.
- Analytical procedures.
- Work-paper filing systems.
- Narratives, reports, and graphics.
- Financial statements.
- Data transfer.

Pilot projects provide the organization with specific examples of how microcomputers can be used productively in the EDP audit function and allows the users to experiment with the technology in their daily work environment. In addition, pilot projects identify application goals so that management can better plan for the integration of the technology (see Exhibit 6).

**The Impact of Microcomputers on the Organization**

The impact of any new technology can be a traumatic experience for an organization. Technology often brings change, and unless the organization is prepared to accept that change, there can be a rough transition process. An organization typically goes through three phases of transition:

- The education phase.
- The familiarization phase.
- The application phase.

**Exhibit 6. Goals for the Use of the Microcomputer as an Audit Tool**

<b>APPLICATIONS</b>	<b>GOALS AND OBJECTIVES</b>
<p><b>Education Phase</b>                      Client accounting data                      Time and budget data                      Trial balances and working papers                      Memo and report generation                      Adjusting and updating financial data                      Complete documentation                      Drafting final documents</p>	<p><b>Automating the Audit Process</b>                      Overall audit efficiency                      Automation of time-consuming activities                      Improved time and budget control                      Improved documentation                      Reporting efficiency</p>
<p><b>Familiarization Phase</b>                      Spreadsheet analysis                      Designing audit programs                      Simple analytical review procedures                      Sampling and results analysis                      Controls analysis worksheet</p>	<p><b>Basic Auditing Functions</b>                      Improved basic auditing effectiveness                      Improved audit programs                      Evidence-collection efficiency                      Improved evidence analysis</p>
<p><b>Application Phase</b>                      Sophisticated analytical review procedures                      Access client files and remote data bases                      Generalized audit software functions                      Modeling and decision support functions                      Audit-file collection                      Continuous monitoring</p>	<p><b>Advanced Auditing Functions</b>                      Sophisticated computerized functions                      Improved auditor decision making                      Audit scope enhancement                      Improved compliance with corporate audit procedures                      Improved EDP audit skills                      Decision support systems                      Standalone collection                      Independent audit files                      Expert support system for auditing</p>

**The Education Phase.** This phase involves training and orientation on the use of the equipment. Usually, basic computer concepts, such as the physical components of the microcomputer (e.g., keyboard, disk drives, and cathode ray tube) and how they relate to input, processing, and output, are taught at this stage. Auditors may also be given some preliminary hands-on training and may use the microcomputer to solve a small case problem under the watchful eye of an instructor. In other cases, auditors may learn through tutorials or texts and progress at their own pace, depending on their skill, aptitude, and initiative.

**The Familiarization Phase.** The objective of this phase is to help auditors become comfortable with the microcomputer. They will start to explore its uses through experimentation and creativity. Auditors will learn how and when the technology can be useful in their daily operations, and they will begin to incorporate microcomputers into their audit methodology. Management should be extremely patient and understanding during this phase

because it entails a lot of trial and error before auditors become comfortable and fully accept the technology.

**The Application Phase.** During this phase, auditors reach a level of proficiency at which they can apply technology in an efficient and effective manner. EDP auditors begin to develop innovative approaches to problem solving and thereby enhance their methodology.

These three phases are continuous and concurrent. As long as new staff members continue to enter the organization, they will receive microcomputer orientation and training. The phases are concurrent in that each one blends into the next, depending on the individual auditor's level of skill and development.

### RECOMMENDED COURSE OF ACTION

To be successful in using microcomputer technology in the auditing profession, the organization must recognize, understand, and support the role of the microcomputer in the work place. Many organizations have benefited from this technology by recognizing that it must be planned for and introduced at an acceptable pace.

Auditors have realized the need to automate many of their tasks and functions. By properly educating auditors in the use and application of microcomputers, management can ensure a more productive and efficient audit.

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#### Recommended Reading

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