Payoff
A well-documented corporate information technology architecture is a guide for current operations and a blueprint for future direction. The architecture is used to ensure that the IS organization supports the strategic business needs of the corporation. In addition, by providing a formal IT architecture document, IS ensures that all departments and employees are informed about the corporation's existing and planned technology, thus preventing waste of resources.

Introduction
An IT architecture is the infrastructure of technology that provides the foundation for automated business procedures and practices. Just as a city's infrastructure of roads, sewers, bridges, buildings, and public utilities provides the foundation on which the city lives and operates, the corporate technology infrastructure provides the automation foundation on which the corporation operates.

An IT architecture can be as simple as a list of approved and supported automation products or as complex as an interwoven structure of products, procedures, methodologies, and standards. Regardless of the structure, the IT architecture should be a vital part of the corporate business plan because it defines how the corporation will deploy technology on a strategic, long-term level to meet corporate business objectives.

Strategy and Technology
The IT architecture is strategic in nature. Although it documents the current technology infrastructure, it also serves as a blueprint of the future technology direction of the corporation by:

- Examining technology directions beyond a two-year period.
- Providing technology migration planning.
- Joining technology products and directions with strategic corporate business objectives.

Relationship Between Corporate Objectives and Automation Plans
The corporate IT architecture is made up of corporate business objectives, the individual department automation plans that support those objectives, and the technology architecture necessary to support the automation plans. The IT architecture does not exist as a single document. One company may, for example, have a set of corporate business objectives, but each department may have its own automation plan, with the IS group providing the information architecture document.

The technology document the IS department provides is intended to ensure that there is a standard source of information about the various technology options that already exist in the organization and are available to solve the individual group's automation needs. When a
specific department or function is developing an automation plan with the IS department, such a document imposes controls or checks on the automation planning process by preventing or avoiding such ineffective and inefficient practices as individual groups duplicating research or even purchasing an automation tool that already exists elsewhere in the organization. Exhibit 1 shows the relationships between the corporate objectives and automation plans.

**Relationship Between Corporate Objectives and Automation Plans**

Many corporations use an automation plan that is tied to the yearly budget. The automation plan tells each segment of the organization what automation projects will be supported during that year and how many automation products they are authorized to purchase. The automation plan is tactical in nature, usually covering no more than two annual budget cycles. The automation plan may have a future trends section but usually does not extend into long-range planning. The annual automation plan is part of the overall IT architecture in that the products and projects included in the automation plan must adhere to the standards, guidelines, and practices outlined in the architecture document.

The overall IT architecture must include long-term corporate business objectives that have been clearly defined by senior management and carefully detailed as part of the architecture. These strategic business objectives enable the architecture planners to identify specific automation technology projects and products that support the company's business objectives.

For example, if a corporate business objective is to capture market share by increasing customer satisfaction, the planners might investigate technology to support a voice-activated inquiry and ordering system, bar-coding to improve inventory control, or videoconferencing to support customer meetings. Or, if a corporate business objective is to reduce administrative overhead by 10% and improve the accounts receivable function, the architecture planners might include technology to support an Electronic Document Interchange system for the purchasing and accounting departments. Again, technology decisions cannot be made in a vacuum; IT architecture planners must have corporate direction for their efforts. Only then can the work of building and documenting the technology infrastructure begin.

**Documenting the Technology Infrastructure**

The IT architecture document describes the recommended principles, guidelines, and standards for information technology used within the company. The information in the document should provide an up-to-date and ever-expanding list of appropriate technology solutions to meet business problems. The document should be referenced whenever an employee:

- Hears about a technology but does not know what it is.
- Needs help in determining criteria for application platform placement.
- Needs to find a recommended software tool or utility to help in applications development.
· Has a transferred or new employee who needs a source of basic information about the information technology found in the department.

· Works with the IS professionals or vendors and wants to review the detailed technologies discussed in the meetings.

· Needs to know the standard hardware and software used in the company.

· Finds that the current technology is aging and needs to identify and plan for a replacement.

· Needs a desktop tool to perform a standard business function.

· Is preparing the department's automation plan and needs information about available technology and trends.

It is important to stress that the IT architecture document provides detailed but general information. As the complexity and specificity of a department's technology search or investigation increase, users should work closely with the IS department to ensure proper integration and interpretation of the information contained in the document.

**IS Support of Business Objectives**

The IT document's main use is to support the business functions. Therefore, several uses of the IT document should be considered inappropriate in most companies. The document should not be used as a handbook on how to acquire information technology. Purchasing procedures and departmental practices usually provide direction on and maintain control over budgeting and requisitioning requirements. Likewise, it should not be used as a justification for the acquisition of hardware or software. The IT document does not provide instruction on how to implement or integrate a particular technology in a business unit, and it is not a manual on how to use the technology following implementation. Product requirements, business unit procedures, and application function can require that similar information technology be used differently from department to department.

**Policies on Standards.**

Deployment of client/server applications and distributed systems is much less stressful when there are product and environment standards in place. The IT architecture can specify the standards, but unless senior management backs the standards and both client departments and the IS department use them, the exercise is futile.

Some companies mandate that only specific products be purchased and used. This approach can succeed when all information technology purchases are done from a central budget. However, if a company has a decentralized budget structure, where each business unit controls its own budget, mandates are not effective.

Deploying standards does not have to be an adversarial contest. When a client department holds the purse strings and the IS department needs to implement a standardized IT environment, the better approach is to convince the user department that implementing the standard product set is in its best interest. IS can, for example, persuade
user departments to use standard products by outlining a policy. Such a policy might state that:

- The IS department technical support groups provide free support or training for standard products. Nonstandard products are supported, but at a premium cost.

- The IT architecture staff is available to help client departments evaluate new products necessary to meet business requirements. IS staff support is available for evaluated products only after they are certified as standard.

- The IT architecture staff provides free technical consulting services on obtaining and deploying standard products.

- The asset management staff within the IS department, working with the IT architecture staff, procures and supports only those products that appear on a list of approved standard products. Nonstandard products do not receive the benefits of electronic software distribution, inventory management, maintenance management, and upgrade management provided by the asset management team.

Under these policies, business functions are not prohibited from purchasing and using nonstandard products, but they do not receive the same level of support the IS department offers to users of standard products. Most business areas, which have been downsized and are operating with reduced resources, would rather use the standard products and receive all the IS support they can garner.

This approach to standards represents a win-win situation, because the client departments can use information technology more productively with the full support of the IS department, and because IS resources are well allocated supporting a standard environment, rather than overextended trying to support a wildly diverse environment. Senior management wins because the work gets done in an efficient manner with few wasted resources.

**Details of the Document**

Blocks of technology are used to build the infrastructure document. Although the blocks can stand alone, in reality they are very much integrated because each complements and supports the other. These technology blocks should include current and planned technology implementation.

The main categories of technology blocks are:

- **Computer platforms.** Includes all the mainframe, midrange, and microcomputer platforms used in the enterprise.

- **Networks.** Includes the local, metropolitan, and Wide Area Network used in the enterprise.

- **Applications development.** Includes the tools, methodologies, and practices used to design, implement, and operate computer applications.

- **Data administration.** Includes the policies and practices for security, data integrity, disaster recovery, backup, and operational support.
· **Data management.** Includes the data base tools and structures used to build and maintain data base applications.

· **Desktop tools.** Includes the various word processors, spreadsheets, electronic communications, data entry, and other desktop tools that assist employees in doing their jobs.

· **Specialized technology.** Includes such tools as bar-coding, videoconferencing, and image processing.

· Exhibit 2 shows a sample structure for an IT architecture document.

**Structure of the IT Architecture Document**

<table>
<thead>
<tr>
<th>Part I: Information Technology Architecture (1 document)</th>
<th>Part VI: Data Management (5 documents)</th>
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</thead>
<tbody>
<tr>
<td>Part II: Computer Platforms (5 documents)</td>
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<tr>
<td>- Introduction - .....for the mainframe</td>
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<tr>
<td>- Mainframe</td>
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<tr>
<td>- Personal computer</td>
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<td>- Network Server</td>
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<td>Part III: Networks (4 documents)</td>
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<tr>
<td>- Introduction - .....for the mainframe</td>
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<tr>
<td>- Local area - .....for the midrange</td>
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<tr>
<td>- Metropolitan area - .....for the personal computer</td>
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<tr>
<td>- Wide area - .....for the network server</td>
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<tr>
<td>Part IV: Applications Development Environments (5 documents)</td>
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<tr>
<td>- Introduction - .....for the mainframe</td>
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<td>- .....for the network server</td>
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<tr>
<td>Part V: Data Administration (1 document)</td>
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<tr>
<td>APPENDIXES: (2 documents)</td>
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<td>- Glossary</td>
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<td>- Product lists</td>
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Each of these building blocks must be defined in detail because the information is used as a guide for the purchase and implementation of the technology. For example, if the local area network (LAN) has been identified as the proper technology to achieve two strategic corporate objectives—improving customer service through local office automation and empowering local office employees through automation—the following types of information should be included in the LAN building block:

· Definition of a LAN (specific to the enterprise):
  · Geographical boundaries (where it is installed).
  · Administrative boundaries (who administers it).
  · Capacity boundaries (how many workstations).
· Definition of LAN applications approved for implementation, including information about:
  · Document processing.
  · Electronic Mail.
  · Local customer data base.
  · Local office spreadsheets.

· Corporate architectural considerations, such as information about:
  · Functional specifications for LAN hardware components, including server configuration (processor size, speed, and memory), workstation configurations, Network Interface Card specifications, wiring specifications, and UPS specifications.
  · Functional specifications for LAN software components, including Network Operating System specifications, approved network operating system (NOS) parameters and configurations, and approved workstation configurations.
  · Approved products that meet the functional specifications, including server hardware and software, workstation hardware and software, network interface card, LAN wiring components, and application software.
  · Future corporate business trends or technical trends that may impact LAN implementation or require product migration, including processor migration, Network Operating System migration, wide area networks connection requirements, and centralized LAN management.

· Full life cycle costs for implementing a LAN, including:
  · Initial purchase costs.
  · Implementation costs.
  · Training costs.
  · Maintenance and upgrade costs.

· LAN implementation considerations, including:
  · Hours of operation and support.
  · Application mix.
  · Node naming conventions (for wide area networks compatibility).
  · Capacity planning.
· Network tuning.
· Network security.
· Disaster recovery.

· Human resources considerations, including:
  · Network administrator selection.
  · Network administrator training.
  · Application training.

Exhibit 3 shows in much greater detail a sample IT architecture document chapter on LANs. Blocks similar to this could be constructed for mainframe, midrange, and microcomputer platforms, programming languages, data bases, wide area networks, word processing programs, Electronic Document Interchange, bar-coding, videoconferencing, and any current or planned technology that is part of the organization's IT architecture.

Document's Detailed Table of Contents
This list of topics is as extensive as the number of technology areas available to support strategic business objectives. However, each topic should contain similar types of information; for example, considerations for costs, training, implementation, integration, enhancements, and maintenance should be addressed in addition to the basic technology information provided.

Because the list of topics is so extensive and the potential for a very large document is high, the IT architecture document must have a detailed table of contents, index, and glossary. It is also helpful to include decision tables in the beginning of each technology section. For example, in the network technology section, a decision table would say: “If you need corporatewide distribution of data, see the wide area networks chapter” or, “If you need local or departmental distribution of data, see the Local Area Network chapter.” It must be easy to navigate within the architecture document if it is going to be used by many people. A common format must be used by the individuals writing the document to make it consistent and easy to read. Having a common format also reduces the amount of time spent correcting style differences when the document reaches the review stage.

**Assembling an Architectural Review Board**

After the IT architecture document has been drafted—including technology specifications, migration plans, and implementation considerations—the document must be marketed to the corporation. This involves developing an overall marketing plan that includes the client community in the approval process. Too many well-written and technically correct IS documents have failed miserably because the client community was not involved, did not buy in to the process, and resented having to accept another IS mandate. The architecture must be marketed to the clients as their tool to help them satisfy their goals and objectives.

As each section of the architecture document is completed in draft form, it should be routed to an architectural review board for technical and business review. Each architectural review board should consist of no more than a dozen IS and client department personnel and should concentrate on a specific technology area. Members of the review boards should be selected because of their potential involvement with or expertise in the particular technology area. Client personnel are included on the review boards because this is a corporate-level process that requires the active involvement of all concerned corporate citizens if it is to succeed. The architectural review board should review the document for technical accuracy and content, not writing style. The common format used for the document should reduce style contention. The review process should involve a formal routing procedure and established due dates.

After the reviewers have completed their evaluation, the document should be approved for distribution by the IS department management team. The management team and the entire IS department must support and follow the IT architecture document if it is to be accepted by the client community.

Senior corporate managers must also support the document. Without their support, the technology directions and standards listed in the document will be ignored.

**Conclusion**

The IT architecture cannot be set in concrete, therefore the document will undergo constant revision as business and technology needs change. The IS department must ensure that the architectural review boards and the client community have a mechanism by which they can submit changes and suggestions to the IT architecture group. Two-way communications
are vital, with the clients talking to the architecture group and the IS group talking to its clients. A revision cycle should review each technology section at least once a year.

The IT architecture document must be a resource and common reference for the entire corporation. There should be little confusion as to what technology directions have been set to meet corporate business objectives. When clients have a technology question, they should be able to refer to the document to find the best solution for their technology needs.

Although architecture will change, different sections will change at different rates. Business objectives and the technology areas tied to those objectives should change very slowly. Technology specifications will change at a somewhat faster rate as technology changes, and the product sets will change the fastest of all. For that reason, migration planning must be included in the product set sections of the architecture.

Tactical automation plans and strategic Information Technology Architecture must be joint ventures between senior management, client departments, and the IS department. No one group has all the answers to a corporation's business problems. But when all parties work together to establish a blueprint, automation solutions to business problems become carefully charted journeys to excellence.

**Author Biographies**

Howard A. Curle, Jr.

Howard A. Curle, Jr., has been in the IS business for 18 years. He joined Virginia Power in 1976 and is currently an information systems analyst. Previously he held positions as procedures analyst, systems analyst, data center communications supervisor, office systems analyst, and information resource specialist. He is a graduate of Virginia Military Institute and holds a BA and MA in English.